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PUBLIC HEALTH BULLETIN

No. 220

PUBLIC HEALTH SERVICE
MILK ORDINANCE AND
CODE: 1935



U. S. TREASURY DEPARTMENT

PUBLIC HEALTH SERVICE

WASHINGTON, D. C.

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UNITED STATES TREASURY DEPARTMENT
PUBLIC HEALTH SERVICE

Public Health Bulletin No. 220

JULY 1935

PUBLIC HEALTH SERVICE
MILK ORDINANCE AND
CODE

PREPARED BY DIRECTION OF THE SURGEON GENERAL



UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON: 1935

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FOREWORD

The following milk ordinance and code, approved by the Public Health Service, United States Treasury Department, and the Bureau of Dairy Industry, United States Department of Agriculture, is recommended for adoption by States and communities in order to encourage a greater uniformity of milk-control practice in the United States.

This ordinance and code embodies the best information at present available on milk-control legislation, but it should be considered as subject to change as improvements are developed.

In order that it may have at its command the technical advice of a comprehensive group of experts in the various phases of the public health control of milk supplies, and in allied problems relating to the production, processing, and distribution of milk, the United States Public Health Service has appointed a board of consultants, termed the "Public Health Service Milk Sanitation Advisory Board", composed of the following members:

Mr. H. A. Whittaker, director division of sanitation, State health department, Minneapolis, Minn., chairman.

Mr. C. A. Abele, director bureau of inspection, State health department, Montgomery, Ala., member.

Dr. Paul B. Brooks, deputy commissioner of health, State health department, Albany, N. Y., member.

Mr. V. M. Ehlers, director bureau of sanitary engineering, State board of health, Austin, Tex., member.

Mr. H. A. Kroeze, director bureau of sanitary engineering, State board of health, Jackson, Miss., member.

Mr. E. S. Tisdale, chief engineer division of sanitary engineering, State health department, Charleston, W. Va., member.

Mr. Ernest Kelly, Chief Division of Market-Milk Investigations, United States Department of Agriculture, Washington, D. C., member.

Dr. D. B. Peck, Bowman Dairy Co., 140 West Ontario Street, Chicago, Ill. (nominated by the International Association of Milk Dealers),¹ member.

Mr. Loomis Burrell, Cherry-Burrell Corporation, Little Falls, N. Y. (nominated by the Dairy & Ice Cream Machinery & Supplies Association),¹ member.

Mr. Seth W. Shoemaker, 825 Sunset Street, Scranton, Pa. (nominated by the Certified Milk Producers Association of America, Inc.),¹ member.

Mr. Leslie C. Frank, sanitary engineer in charge, Office of Milk Investigations, United States Public Health Service, Washington, D. C., secretary.

Advantage has been taken of the recommendations of the advisory board in preparing this edition of the ordinance and code.

The milk code should be used as the legal interpretation of the ordinance.

¹ Participation of these members in the deliberations of the Public Health Service Milk Sanitation Advisory Board does not necessarily imply approval of the recommendations of the board by the represented organizations.

**SHORT ENABLING FORM OF UNITED STATES PUBLIC
HEALTH SERVICE MILK ORDINANCE**

(Suggested for adoption by municipalities, counties, or health districts, subject to the approval of the local legal authority, to reduce cost of publishing and printing, and to promote keeping the milk ordinance up to date)

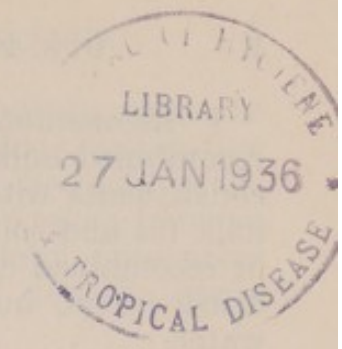
An ordinance to regulate the production, transportation, processing, handling, sampling, examination, grading, labeling, regrading, and sale of milk and milk products; the inspection of dairy herds, dairies, and milk plants; the issuing and revocation of permits to milk producers and distributors; the placarding of restaurants and other establishments serving milk or milk products; and the fixing of penalties.

The city of _____ ordains:

SECTION 1. The production, transportation, processing, handling, sampling, examination, grading, labeling, regrading, and sale of all milk and milk products sold for ultimate consumption within the city of _____, or its police jurisdiction, the inspection of dairy herds, dairies, and milk plants, the issuing and revocation of permits to milk producers and distributors, the placarding of restaurants and other establishments serving milk or milk products, and the fixing of penalties, shall be regulated in accordance with the terms of the 1935 edition of the United States Public Health Service milk ordinance, a certified copy of which shall be on file in the office of the city clerk: *Provided*, That the blank spaces following the words "city of" in said Public Health Service milk ordinance shall be understood to refer to the city of _____: *Provided further*, That in section 8 of said Public Health Service milk ordinance the _____ alternative wording shall apply: *Provided further*, That sections 15 and 16 of said Public Health Service milk ordinance shall be replaced, respectively, by sections 2 and 3 below.

SEC. 2. Any person, firm, or corporation violating any provision of this ordinance shall upon conviction be punished by _____

SEC. 3. All ordinances and parts of ordinances in conflict with this ordinance are hereby repealed; and this ordinance shall take effect _____ its adoption and publication.



PART I

THE UNITED STATES PUBLIC HEALTH SERVICE
MILK ORDINANCE

An ordinance defining "milk" and certain "milk products", "milk producer", "pasteurization", etc., prohibiting the sale of adulterated and misbranded milk and milk products, requiring permits for the sale of milk and milk products, regulating the inspection of dairy farms and milk plants, the examination, grading, labeling, placarding, pasteurization, regrading, distribution, and sale of milk and milk products, providing for the publishing of milk grades, the construction of future dairies and milk plants, the enforcement of this ordinance, and the fixing of penalties.

Be it ordained by the _____ of the city of _____ as follows:

SECTION 1. *Definitions.*—The following definitions shall apply in the interpretation and the enforcement of this ordinance:

A. *Milk.*—Milk is hereby defined to be the lacteal secretion obtained by the complete milking of one or more healthy cows, excluding that obtained within 15 days before and 5 days after calving, or such longer period as may be necessary to render the milk practically colostrum free; which contains not less than 8 percent of milk solids not fat, and not less than $3\frac{1}{4}$ percent of milk fat.

B. *Milk fat or butter fat.*—Milk fat or butter fat is the fat of milk.

C. *Cream and sour cream.*—Cream is a portion of milk which contains not less than 18 percent milk fat. Sour cream is cream, the acidity of which is not more than 0.20 percent, expressed as lactic acid.

D. *Skimmed milk.*—Skimmed milk is milk from which a sufficient portion of milk fat has been removed to reduce its milk fat percentage to less than $3\frac{1}{4}$ percent.

E. *Milk or skimmed milk beverage.*—A milk beverage or a skimmed milk beverage is a food compound or confection consisting of milk or skimmed milk, as the case may be, to which has been added a sirup or flavor consisting of wholesome ingredients.

F. *Buttermilk.*—Buttermilk is the product which remains when fat is removed from milk or cream in the process of churning. It contains not less than 8 percent of milk solids not fat.

G. *Cultured buttermilk, cultured milk, cultured skim milk.*—Cultured buttermilk, cultured milk, and cultured skim milk are products resulting from the souring or treatment, by a lactic acid or other culture, of milk or milk products. They contain not less than 8 percent of milk solids not fat.

H. *Vitamin D Milk.*—Vitamin D milk is milk the vitamin D content of which has been increased by a method and in an amount approved by the health officer.

I. *Reconstituted or recombined milk and cream.*—Reconstituted or recombined milk is a product resulting from the recombining of milk constituents with water, and which complies with the standards for milk fat and solids not fat of milk as defined herein. Reconstituted or recombined cream is a product resulting from the combination of dried cream, butter, or butter fat with cream, milk, skim milk, or water.

J. *Milk products.*—Milk products shall be taken to mean and include cream, sour cream, goat milk, vitamin D milk, buttermilk, cultured buttermilk, skimmed milk, reconstituted or recombined milk and cream, milk beverages, and skimmed milk beverages.

K. *Pasteurization.*—The terms “pasteurization”, “pasteurized”, and similar terms shall be taken to refer to the process of heating every particle of milk or milk products to a temperature of not less than 142° F. and holding at such temperature for not less than 30 minutes in approved pasteurization apparatus, provided that approval shall be limited to apparatus which requires a combined holder and indicating thermometer temperature tolerance of not more than 1½° F., as shown by official tests with suitable testing equipment, and provided that such apparatus shall be properly operated and that the indicating thermometers and the recording thermometer charts both indicate a temperature of not less than 143½° F., continuously throughout the holding period. The terms “pasteurization”, “pasteurized”, and similar terms shall also include the process of heating every particle of milk or milk products to 160° F. and holding at that temperature or above for not less than 15 seconds in apparatus of approved design and properly operated. Provided that nothing contained in this definition shall be construed as disbaring any other process which has been demonstrated as of at least equal efficiency and is approved by the State health authority.

L. *Adulterated milk and milk products.*—Any substance claimed to be any milk or milk product defined in this ordinance, but not conforming with its definition as given in this ordinance, or which carries a grade label unless such grade label has been awarded by the health officer and not revoked, shall be deemed adulterated and misbranded.

M. *Milk producer.* A milk producer is any person who owns or controls one or more cows, a part or all of the milk or milk products from which is sold or offered for sale.

N. *Milk distributor.*—A milk distributor is any person who offers for sale or sells to another any milk or milk products for human consumption as such.

O. *Dairy or dairy farm.*—A dairy or dairy farm is any place or premises where one or more cows are kept, a part or all of the milk or milk products from which is sold or offered for sale.

P. *Milk plant.*—A milk plant is any place, or premises, or establishment where milk or milk products are collected, handled, processed, stored, bottled, pasteurized, or prepared for distribution.

Q. *Health officer.*—The term “health officer” shall mean the health authority of the city of _____, or his authorized representative.

R. *Average bacterial plate count, reduction time, and cooling temperature.*—Average bacterial plate count shall be taken to mean the logarithmic average of the bacterial plate counts of the last four consecutive samples, taken upon separate days, irrespective of periodic grade

announcements. Average reduction time shall be taken to mean the arithmetic average of the reduction times of the last four consecutive samples, taken upon separate days, irrespective of periodic grade announcements. Average cooling temperature shall be taken to mean the arithmetic average of the temperatures of the last four consecutive samples, taken upon separate days, irrespective of periodic grade announcements.

S. *Grading period.*—The grading period shall be such period of time as the health officer may designate within which grades shall be determined for all milk and/or milk products, provided that the grading period shall in no case exceed 6 months.

T. *Bactericidal process.*—A bactericidal process is the application of any method or substance for the destruction of bacteria which, in the opinion of the health officer, does not adversely affect the equipment or the milk or milk products or the health of the consumer, and which is effective.

U. *Person.*—The word "person" as used in this ordinance shall mean, person, firm, corporation, or association.

V. *Goat milk.*—Goat milk is the fresh, clean, lacteal secretion, free from colostrum, obtained by the complete milking of healthy goats, and shall comply with all the requirements of this ordinance. The word "cows" shall be interpreted to include goats.

SEC. 2. *The sale of adulterated, misbranded, or ungraded milk or milk products prohibited.*—No person shall within the city of _____ or its police jurisdiction, produce, sell, offer, or expose for sale, or have in possession with intent to sell, any milk or milk product which is adulterated, misbranded, or ungraded. It shall be unlawful for any person, elsewhere than in a private home, to have in possession any adulterated, misbranded, or ungraded milk or milk product.

SEC. 3. *Permits.*—It shall be unlawful for any person to bring into or receive into the city of _____, or its police jurisdiction, for sale, or to sell, or offer for sale therein, or to have in storage where milk or milk products are sold or served, any milk or milk product defined in this ordinance, who does not possess a permit from the health officer of the city of _____ and on whose vehicle there does not appear in a conspicuous place the permit number in figures at least 3 inches high and 1½ inches wide.

Only a person who complies with the requirements of this ordinance shall be entitled to receive and retain such a permit.

Such a permit may be revoked by the health officer upon the violation by the holder of any of the terms of this ordinance or in any emergency when in the judgment of the health officer the milk or milk product in question has become a public health menace: Provided, That the holder of said permit shall, after complying with such revocation, have the right of appeal to the board of health.

SEC. 4. *Labeling and placarding.*—All bottles, cans, packages, and other containers enclosing milk or any milk product defined in this ordinance shall be plainly labeled or marked with (1) the name of the contents as given in the definitions in this ordinance; (2) the grade of the contents if said contents are graded under the provisions of this ordinance; (3) the word "pasteurized" only if the contents have been pasteurized; (4) the word "raw" only if the contents are raw; (5) the name of the producer if the contents are raw, and the name of the

plant at which the contents were pasteurized, if the contents are pasteurized; and (6) in the case of vitamin D milk, the designation "Vitamin D Milk" and the source of the vitamin D. The label or mark shall be in letters of a size, kind, and color approved by the health officer and shall contain no marks or words not approved by the health officer.

Every restaurant, cafe, soda fountain, or other establishment serving milk or milk products shall display at all times, in a place designated by the health officer, a notice approved by the health officer, stating the lowest grade of milk and/or milk products served.

SEC. 5. *Inspection of dairy farms and milk plants for the purpose of grading or regrading.*—At least once during each grading period the health officer shall inspect all dairy farms and all milk plants whose milk or milk products are intended for consumption within the city of -----, or its police jurisdiction. In case the health officer discovers the violation of any item of sanitation, he shall make a second inspection after a lapse of such time as he deems necessary for the defect to be remedied, but not before the lapse of 3 days, and the second inspection shall be used in determining the grade of milk and/or milk products. Any violation of any item of this ordinance on two consecutive inspections within any one grading period shall call for immediate degrading.

One copy of the inspection report shall be posted by the health officer in a conspicuous place upon an inside wall of one of the dairy farm or milk plant buildings, and said inspection report shall not be defaced or removed by any person except the health officer. Another copy of the inspection report shall be filed with the records of the health department.

SEC. 6. *The examination of milk and milk products.*—During each grading period at least four samples of milk and/or cream from each dairy farm and each milk plant shall be taken on separate days and examined by the health officer. Samples of other milk products may be taken and examined by the health officer as often as he deems necessary. Samples of milk and/or milk products from stores, cafes, soda fountains, restaurants, and other places where milk or milk products are sold shall be examined as often as the health officer may require. Bacterial plate counts shall be made in conformity with the latest standard methods recommended by the American Public Health Association. Examinations may include such other chemical and physical determinations as the health officer may deem necessary for the detection of adulteration, these examinations to be made in accordance with the latest standard methods of the American Public Health Association and the Association of Official Agricultural Chemists. Bacterial plate count, reductase test, and cooling temperature results shall be given to the producer or distributor concerned as soon as determined if said results fall without the limits prescribed for the grade then held. Samples may be taken by the health officer at any time prior to the final delivery of the milk or milk products. All proprietors of stores, cafes, restaurants, soda fountains, and other similar places shall furnish the health officer, upon his request, with the name of the distributor from whom their milk and/or milk products are obtained. Bio-assays of the vitamin D content of vitamin D milk shall be made whee

required by the health officer in a laboratory approved by him for such examinations.

SEC. 7. *The grading of milk and milk products.*—At least once every 6 months the health officer shall announce the grades of all milk and milk products delivered by all producers or distributors and ultimately consumed within the city of _____, or its police jurisdiction. Said grades shall be based upon the following standards, the grading of milk products being identical with the grading of milk except that the bacterial standards shall be doubled in the case of cream, and omitted in the case of sour cream, buttermilk, and cultured buttermilk. Vitamin D milk shall be only of grade A or grade B pasteurized, certified, or grade A raw quality.

Certified milk.—Certified milk is milk which conforms with the requirements of the American Association of Medical Milk Commissions in force at the time of production and is produced under the supervision of the Medical Milk Commission of the Medical Society of _____ County, and of the State board of health or of the city or county health officer of _____.

Grade A raw milk.—Grade A raw milk is milk the average bacterial plate count of which, as determined under sections 1 (R) and 6 of this ordinance, does not exceed 50,000 per cubic centimeter, or the average reduction time of which is not less than 8 hours, and which is produced upon dairy farms conforming with all of the following items of sanitation.

ITEM 1r. *Cows; tuberculosis, and other diseases.*—A physical examination and, except as provided hereinafter, a tuberculin test of all herds and additions thereto shall be made before any milk therefrom is sold, and at least once every 12 months thereafter, by a licensed veterinarian approved by the State livestock sanitary authority. Said tests shall be made and any reactors disposed of in accordance with the requirements approved by the United States Department of Agriculture, Bureau of Animal Industry, for accredited herds.

A certificate signed by the veterinarian or attested to by the health officer, and filed with the health officer, shall be evidence of the above test.

Provided that in modified accredited counties the modified accredited area system approved by the United States Bureau of Animal Industry shall be accepted in lieu of annual testing.

For diseases other than tuberculosis such tests and examinations as the health officer may require shall be made at intervals and by methods prescribed by him, and any diseased animals or reactors shall be disposed of as he may require.

ITEM 2r. *Dairy barn, lighting.*—A dairy or milking barn shall be required, and in such sections thereof where cows are milked windows shall be provided and kept clean and so arranged as to insure adequate light properly distributed, and when necessary shall be provided with adequate supplementary artificial light.

ITEM 3r. *Dairy barn, air space and ventilation.*—Such sections of all dairy barns where cows are kept or milked shall be well ventilated and shall be so arranged as to avoid overcrowding.

ITEM 4r. *Dairy barn, floors.*—The floors and gutters of such parts of all dairy barns in which cows are milked shall be constructed of concrete or other approved impervious and easily cleaned material, shall be graded to drain properly, and shall be kept clean and in good

repair. No horses, pigs, fowl, calves, etc., shall be permitted in parts of the barn used for milking.

ITEM 5r. *Dairy barn, walls and ceilings.*—The walls and ceilings of all dairy barns shall be whitewashed once each year or painted once every 2 years, or oftener if necessary, or finished in an approved manner, and shall be kept clean and in good repair. In case there is a second story above that part of the barn in which cows are milked, the ceiling shall be tight. If the feed room adjoins the milking space, it shall be separated therefrom by a dust-tight partition and door. No feed shall be stored in the milking portion of the barn.

ITEM 6r. *Dairy barn, cow yard.*—All cow yards shall be graded and drained as well as practicable and kept clean.

ITEM 7r. *Manure disposal.*—All manure shall be removed and stored or disposed of in such manner as best to prevent the breeding of flies therein or the access of cows to piles thereof.

ITEM 8r. *Milk house or room, construction.*—There shall be provided a milk house or milk room for the cooling, handling, and storage of milk and/or milk products and the washing, bactericidal treatment, and storage of milk apparatus and utensils. The milk house or room (a) shall be provided with a tight floor constructed of concrete or other impervious material, in good repair, and graded to provide proper drainage; (b) shall have walls and ceilings of such construction as to permit easy cleaning, and shall be well painted or finished in an approved manner; (c) shall be well lighted and ventilated; (d) shall have all openings effectively screened including outward-opening, self-closing doors, unless other effective means are provided to prevent the entrance of flies; and (e) shall be used for no other purposes than those specified above except as may be approved by the health officer, shall not open directly into a stable or into any room used for domestic purposes, shall have water piped into it, shall be provided with adequate facilities for the heating of water for the cleaning of utensils, shall be equipped with stationary wash and rinse vats, which, in the case of retail raw milk, if chlorine is employed as the principal bactericidal treatment, shall be of the 3-compartment type, and shall be partitioned to separate the handling of milk and the storage of cleansed utensils from the cleaning and other operations which shall be so located and conducted as to prevent any contamination of the milk or of cleaned equipment.

ITEM 9r. *Milk house or room, cleanliness and flies.*—The floors, walls, ceilings, and equipment of the milk house or room shall be kept clean at all times. All means necessary for the elimination of flies shall be used.

ITEM 10r. *Toilet.*—Every dairy farm shall be provided with one or more sanitary toilets conveniently located, and properly constructed, operated, and maintained so that the waste is inaccessible to flies and does not pollute the surface soil or contaminate any water supply.

ITEM 11r. *Water supply.*—The water supply for the milk room and dairy barn shall be properly located, constructed, and operated, and shall be easily accessible, adequate, and of a safe, sanitary quality.

ITEM 12r. *Utensils, construction.*—All containers or other utensils used in the handling, storage, or transportation of milk or milk products must be made of nonabsorbent material and of such construction as to be easily cleaned, and must be in good repair. Joints and

seams shall be soldered flush. All milk pails shall be of a small-mouth design approved by the health officer.

ITEM 13r. *Utensils, cleaning.*—All containers, equipment, and other utensils used in the handling, storage, or transportation of milk and milk products must be thoroughly cleaned after each usage.

ITEM 14r. *Utensils, bactericidal treatment.*—All containers, equipment, and other utensils used in the handling, storage, or transportation of milk or milk products shall between each usage be subjected to an approved bactericidal process with steam, hot water, or chlorine.

ITEM 15r. *Utensils, storage.*—All containers and other utensils used in the handling, storage, or transportation of milk or milk products shall be stored so as not to become contaminated before again being used.

ITEM 16r. *Utensils, handling.*—After bactericidal treatment no container or other milk or milk product utensil shall be handled in such manner as to permit any part of any person or his clothing to come in contact with any surface with which milk or milk products come in contact.

ITEM 17r. *Milking, udders and teats, abnormal milk.*—The udders and teats of all milking cows shall be clean at the time of milking. Abnormal milk shall be kept out of the milk supply and so handled and disposed of as to preclude the infection of the cows and the contamination of the milk utensils.

ITEM 18r. *Milking, flanks.*—The flanks, bellies, and tails of all milking cows shall be free from visible dirt at the time of milking.

ITEM 19r. *Milkers' hands.*—Milkers' hands shall be clean, rinsed with a bactericidal solution, and dried with a clean towel, immediately before milking and following any interruption in the milking operation. Wet-hand milking is prohibited. Convenient facilities shall be provided for the washing of milkers' hands.

ITEM 20r. *Clean clothing.*—Milkers and milk handlers shall wear clean outer garments while milking or handling milk, milk products, containers, utensils, or equipment.

ITEM 21r. *Milk stools.*—Milk stools shall be kept clean.

ITEM 22r. *Removal of milk.*—Each pail of milk shall be removed immediately to the milk house or straining room. No milk shall be strained or poured in the dairy barn.

ITEM 23r. *Cooling.*—Milk must be cooled within 1 hour after completion of milking to 50° F. or less, and maintained at that average temperature, as defined in section 1 (R), until delivery. If milk is delivered to a milk plant or receiving station for pasteurization or separation, it must be delivered within 2 hours after completion of milking or cooled to 50° F. or less and maintained at that average temperature until delivered.

ITEM 24r. *Bottling and capping.*—Milk and milk products shall be bottled from a container with a readily cleanable valve, or by means of an approved bottling machine. Bottles shall be capped by machine. The bottler and capper shall be cleaned and subjected to bactericidal treatment before each usage. Caps shall be purchased in sanitary containers and kept therein in a clean dry place until used.

ITEM 25r. *Personnel, health.*—Every person connected with a retail raw dairy whose work brings him in contact with the production, handling, storage, or transportation of milk, milk products, containers, or equipment shall furnish such information, permit such physical

examinations, and submit such laboratory specimens as the health officer may require for the purpose of determining freedom from infection.

The health officer, or a physician authorized by him, shall in each such instance take a careful history and if such history suggests that such person may be a carrier of or infected with the organisms of typhoid or paratyphoid fever or of any other communicable disease likely to be transmitted through milk, he shall secure appropriate specimens of bodily discharges and cause them to be examined in a laboratory approved by him or by the State health authorities for such examinations.

ITEM 26r. *Miscellaneous.*—All vehicles used for the transportation of milk or milk products shall be so constructed and operated as to protect the milk or milk products from the sun and from contamination. Such vehicles shall be kept clean, and no substance capable of contaminating milk or milk products shall be transported with milk or milk products in such manner as to permit contamination. All vehicles used for the distribution of milk or milk products shall have the name of the distributor prominently displayed.

The immediate surroundings of the dairy shall be kept in a neat, clean condition.

Grade B raw milk.—Grade B raw milk is milk the average bacterial plate count of which at no time prior to delivery exceeds 200,000 per cubic centimeter, or the average reduction time of which is not less than 6 hours, as determined under sections 1 (R) and 6, and which is produced upon dairy farms conforming with all items of sanitation required for grade A raw milk except as follows: Under item 4r tight wooden floors and gutters shall be permitted in place of concrete; under item 5r painting or whitewashing shall not be required; under item 8r the piping of water into the milk house, the partitioning of processes, and the provision of stationary and three-compartment wash and rinse vats shall not be required; under item 23r the temperature requirement of retail raw milk shall be 60° F. and of milk for pasteurization or separation 70° F.; item 25r shall not be required; under item 26r covered vehicles shall not be required; provided that all items or parts of items relating to cleanliness shall be required.

Grade C raw milk.—Grade C raw milk is milk the average bacterial plate count of which at no time prior to delivery exceeds 1,000,000 per cubic centimeter, or the average reduction time of which is not less than 3½ hours, as determined under sections 1 (R) and 6, and which is produced upon dairy farms conforming with all items of sanitation required for grade B raw milk except 7r, 12r, 20r, 21r, 22r, 23r, 24r, and 26r; provided that under item 4r properly constructed clay-mixture floors shall be permitted, and that under item 5r tight ceilings and feed rooms shall not be required.

Grade D raw milk.—Grade D raw milk is milk which does not meet the requirements of grade C raw milk, and which shall be plainly labeled "cooking only."

Grade A pasteurized milk.—Grade A pasteurized milk is grade A or grade B raw milk which has been pasteurized, cooled, and bottled in a milk plant conforming with all of the following items of sanitation and the average bacterial plate count of which at no time after pasteurization and until delivery exceeds 30,000 per cubic centimeter, as determined under sections 1 (R) and 6.

ITEM 1p. *Floors.*—The floors of all rooms in which milk or milk products are handled or stored shall be constructed of concrete or other equally impervious and easily cleaned material and shall be smooth, properly drained, provided with trapped drains, and kept clean.

ITEM 2p. *Walls and ceilings.*—Walls and ceilings of rooms in which milk or milk products are handled or stored shall have a smooth, washable, light-colored surface and shall be kept clean.

ITEM 3p. *Doors and windows.*—Unless other effective means are provided to prevent the access of flies, all openings into the outer air shall be effectively screened and doors shall be self-closing.

ITEM 4p. *Lighting and ventilation.*—All rooms shall be well lighted and ventilated.

ITEM 5p. *Miscellaneous protection from contamination.*—The various milk-plant operations shall be so located and conducted as to prevent any contamination of the milk or of the cleaned equipment. All means necessary for the elimination of flies shall be used. This requirement shall be interpreted to include separate rooms for (a) the pasteurizing, cooling, and bottling operations; (b) the washing and bactericidal treatment of containers and equipment. Cans of raw milk shall not be unloaded directly into the pasteurizing room. Pasteurized milk or milk products shall not be permitted to come in contact with equipment with which unpasteurized milk or milk products have been in contact, unless such equipment has first been thoroughly cleaned and subjected to bactericidal treatment. Rooms in which milk, milk products, cleaned utensils or containers are handled or stored shall not open directly into any stable or living quarters.

ITEM 6p. *Toilet facilities.*—Every milk plant shall be provided with toilet facilities conforming with the ordinances of the city of ----- Toilet rooms shall not open directly into any room in which milk, milk products, equipment, or containers are handled or stored. The doors of all toilet rooms shall be self-closing. Toilet rooms shall be kept in a clean condition, in good repair, and well ventilated. In case privies or earth closets are permitted and used, they shall be separate from the building and shall be of a sanitary type constructed and operated in conformity with the requirements of item 10r, grade A raw milk.

ITEM 7p. *Water supply.*—The water supply shall be easily accessible, adequate, and of a safe, sanitary quality.

ITEM 8p. *Hand-washing facilities.*—Convenient hand-washing facilities shall be provided, including warm running water, soap, and approved sanitary towels. The use of a common towel is prohibited.

ITEM 9p. *Milk piping.*—Only "sanitary milk piping" of a type which can be easily cleaned with a brush shall be used.

ITEM 10p. *Construction and repair of equipment.*—All containers and equipment with which milk or milk products come in contact shall be constructed in such manner as to be easily cleaned, and shall be kept in good repair.

ITEM 11p. *Disposal of wastes.*—All wastes shall be properly disposed of.

ITEM 12p. *Cleaning and bactericidal treatment of containers and apparatus.*—All milk and milk products containers and apparatus shall be thoroughly cleaned after each usage and subjected imme-

diately before each usage to an approved bactericidal process. When empty and before being returned to a producer by a milk plant each container shall be effectively cleaned and subjected to bactericidal treatment.

ITEM 13p. *Storage of containers.*—After bactericidal treatment all bottles, cans, and other milk or milk products containers shall be stored in such manner as to be protected from contamination.

ITEM 14p. *Handling of containers and apparatus.*—Between bactericidal treatment and usage and during usage containers and apparatus shall not be handled or operated in such manner as to permit contamination of the milk.

ITEM 15p. *Storage of caps and parchment paper.*—Milk bottle caps and parchment paper for milk cans shall be purchased and stored only in sanitary tubes and cartons, respectively, and shall be kept therein in a clean dry place until used.

ITEM 16p. *Pasteurization.*—Pasteurization shall be performed as described in section 1 (K) of this ordinance. The time and temperature record charts shall be dated and preserved for a period of 3 months for the information of the health officer.

ITEM 17p. *Cooling.*—All milk and cream received for pasteurization but not pasteurized within 2 hours after it is received at the plant shall within 2 hours of receipt be cooled to a temperature of 50° F. or less and maintained thereat until pasteurized, except during separation; and all pasteurized milk and milk products shall be immediately cooled to an average temperature of 50° F. or less, as defined in section 1 (R), and maintained thereat until delivery.

ITEM 18p. *Bottling.*—Bottling of milk and milk products shall be done at the place of pasteurization in approved mechanical equipment.

ITEM 19p. *Overflow milk.*—Overflow milk or milk products shall not be sold for human consumption.

ITEM 20p. *Capping.*—Capping of milk and milk products shall be done by approved mechanical equipment. Hand capping is prohibited.

ITEM 21p. *Personnel, health.*—Every person connected with a pasteurization plant whose work brings him in contact with the production, handling, storage, or transportation of milk, milk products, containers, or equipment shall furnish such information, permit such physical examinations, and submit such laboratory specimens as the health officer may require for the purpose of determining freedom from infection.

The health officer, or a physician authorized by him, shall in each such instance take a careful history and if such history suggests that such person may be a carrier of or infected with the organisms of typhoid or paratyphoid fever or of any other communicable disease likely to be transmitted through milk or milk products he shall secure appropriate specimens of bodily discharges and cause them to be examined in a laboratory approved by him or by the State health authorities for such examinations.

ITEM 22p. *Personnel, cleanliness.*—All persons coming in contact with milk, milk products, containers, or equipment shall wear clean outer garments and shall keep their hands clean at all times while thus engaged.

ITEM 23p. *Miscellaneous.*—All vehicles used for the transportation of milk or milk products shall be so constructed and operated as to protect the milk or milk products from the sun and from contamina-

tion. Such vehicles shall be kept clean, and no substance capable of contaminating milk or milk products shall be transported with milk or milk products in such manner as to permit contamination. All vehicles used for the distribution of milk or milk products shall have the name of the distributor prominently displayed.

The immediate surroundings of the milk plant shall be kept in a neat, clean condition.

Grade B pasteurized milk.—Grade B pasteurized milk is grade C raw milk which has been pasteurized, cooled, and bottled in a milk plant conforming with all of the requirements for grade A pasteurized milk, and the average bacterial plate count of which at no time after pasteurization and before delivery exceeds 50,000 per cubic centimeter, as determined under sections 1 (R) and 6.

Grade C pasteurized milk.—Grade C pasteurized milk is pasteurized milk which does not meet the requirements of grade B pasteurized milk, and which shall be plainly labeled "cooking only."

SEC. 8. *Grades of milk and milk products which may be sold.*—Two alternative wordings of section 8 are offered because some communities prefer to use the grading and degrading system of improving milk quality, whereas others prefer to use exclusively the system of forbidding the sale of milk and milk products which do not comply with all items of sanitation, and instituting court procedure if the violator persists in selling.

For those communities which prefer the first method the following wording of section 8 should be used:

From and after 12 months from the date on which this ordinance takes effect no milk or milk products shall be sold to the final consumer, or to restaurants, soda fountains, grocery stores, or similar establishments, except grades A and B pasteurized, certified, and grade A raw. This section shall not be construed as forbidding the sale of lower grades of milk and milk products during temporary periods of degrading not exceeding 30 consecutive days, or, in emergencies, such longer period as the health officer may deem necessary.

In some cases it may be desired to reduce still further the number of grades permitted to be sold. In other cases, such as communities just beginning milk sanitation work, there may be a fear of milk shortage unless the lower grades of milk are permitted to be sold for a longer period than the 12-month period above designated. In these instances the proper adjustment may be made in section 8.

For those communities which prefer to use exclusively the system of forbidding the sale of milk which does not comply with all requirements of the grades defined in this section, and instituting court procedure if the violator persists in selling, the following wording should be used:

From and after 12 months from the date on which this ordinance takes effect no milk or milk products shall be sold to the final consumer, or to restaurants, soda fountains, grocery stores, or similar establishments, except grades A and B pasteurized, certified, and grade A raw.

In some cases it may be desired to reduce still further the number of grades permitted to be sold.

SEC. 9. *Supplementary grading prescribed and regrading authorized.*—If, at any time between the regular announcements of the grades of milk or milk products, as the result of the findings of two consecutive inspections of any dairy or milk plant, or because the average bacterial plate count, the average reduction time, or the

average cooling temperature exceeds the limit fixed for the grade currently held by the milk supply in question, a lower grade shall become justified, in accordance with section 7 of this ordinance, the health officer shall immediately lower the grade of such milk or milk product, and shall enforce proper labeling and placarding thereof.

Any producer or distributor of milk or milk products the grade of which has been lowered by the health officer, and who is properly labeling his milk and/or milk products, may at any time make application for the regrading of his product.

Upon receipt of a satisfactory application, in case the lowered grade is the result of an excessive average bacterial plate count, reduction time, or cooling temperature, the health officer shall take further samples of the applicant's output, at a rate of not more than two samples per week. The health officer shall immediately regrade the milk or milk products upward whenever the average of the last four sample results indicates the necessary quality.

In case the lowered grade of the applicant's product is due to a violation of an item of the specifications prescribed in section 7, other than average bacterial plate count, reduction time, or cooling temperature, the said application must be accompanied by a statement signed by the applicant to the effect that the violated item of the specifications has been conformed with. Within 1 week of the receipt of such an application and statement the health officer shall make a reinspection of the applicant's establishment, and thereafter as many additional reinspections as he may deem necessary to assure himself that the applicant is again complying with the higher grade requirements, and, in case the findings justify, shall regrade the milk or milk products upward.

SEC. 10. *Transferring or dipping milk; delivery containers; handling of more than one grade; delivery of milk at quarantined residences.*—No milk producer or distributor shall transfer milk or milk products from one container to another on the street, or in any vehicle or store, or in any place except a bottling or milk room especially used for that purpose. The sale of dip milk is hereby prohibited.

All pasteurized milk and milk products shall be placed in their final delivery containers in the plant in which they are pasteurized, and all raw milk and milk products sold for consumption in the raw state shall be placed in their final delivery containers at the farm at which they are produced. Milk and milk products sold in the distributor's containers in quantities less than one gallon shall be delivered in standard milk bottles. It shall be unlawful for hotels, soda fountains, restaurants, groceries, and similar establishments to sell or serve any milk or milk product except in the original container in which it was received from the distributor or from a bulk container equipped with an approved dispensing device; provided that this requirement shall not apply to cream consumed on the premises which may be served from the original bottle or from a dispenser approved for such service.

No milk or milk products shall be permitted to come in contact with equipment with which a lower grade of milk or milk products has been in contact unless such equipment has first been thoroughly cleaned and subjected to bactericidal treatment.

It shall be the duty of all persons to whom milk or milk products are delivered to clean thoroughly the containers in which such milk or

milk products are delivered before returning such containers. Apparatus, containers, equipment, and utensils used in the handling, storage, processing, or transporting of milk or milk products shall not be used for any other purpose without the permission of the health officer.

The delivery of milk or milk products to and the collection of milk or milk products containers from quarantined residences shall be subject to the special requirements of the health officer.

SEC. 11. *Milk and milk products from points beyond the limits of inspection of the city of*-----*—Milk and milk products from points beyond the limits of inspection of the city of*----- *may not be sold in the city of*----- *or its police jurisdiction, unless produced and/or pasteurized under grading provisions identical with those of this ordinance; provided that the health officer shall satisfy himself that the health officer having jurisdiction over the production and processing is properly enforcing such provisions.*

SEC. 12. *Notification of disease.*—Notice shall be sent to the health officer immediately by any producer or distributor of milk or milk products upon whose dairy farm or in whose milk plant any infectious, contagious, or communicable disease occurs.

SEC. 13. *Future dairies and milk plants.*—All dairies and milk plants from which milk or milk products are supplied to the city of----- which are hereafter constructed shall conform in their construction to the grade A requirements of this ordinance.

SEC. 14. *Procedure when infection suspected.*—When suspicion arises as to the possibility of transmission of infection from any person concerned with the handling of milk or milk products the health officer is authorized to require any or all of the following measures: (1) The immediate exclusion of that person from milk handling; (2) the immediate exclusion of the milk supply concerned from distribution and use; (3) adequate medical and bacteriological examination of the person, of his associates, and of his and their bodily discharges.

SEC. 15. *Enforcement interpretation.*—This ordinance shall be enforced by the health officer in accordance with the interpretations thereof contained in the 1935 edition of the United States Public Health Service milk code.

SEC. 16. *Penalty.*—Any person who shall violate any provision of this ordinance shall be fined not more than----- at the discretion of the court. Each and every violation of the provisions of this ordinance shall constitute a separate offense.

SEC. 17. *Repeal and date of effect.*—All ordinances and parts of ordinances in conflict with this ordinance are hereby repealed; and this ordinance shall be in full force and effect immediately upon its adoption and its publication, as provided by law.

SEC. 18. *Unconstitutionality clause.*—Should any section, paragraph, sentence, clause, or phrase of this ordinance be declared unconstitutional or invalid for any reason, the remainder of said ordinance shall not be affected thereby.

PART II

THE UNITED STATES PUBLIC HEALTH SERVICE MILK CODE

(To be used as the legal interpretation of the ordinance)

An ordinance defining "milk" and certain "milk products", "milk producer", "pasteurization", etc., prohibiting the sale of adulterated and misbranded milk and milk products, requiring permits for the sale of milk and milk products, regulating the inspection of dairy farms and milk plants, the examination, grading, labeling, placarding, pasteurization, regrading, distribution, and sale of milk and milk products, providing for the publishing of milk grades, the construction of future dairies and milk plants, the enforcement of this ordinance, and the fixing of penalties.

Be it ordained by the ----- of the city of ----- as follows:

SECTION 1. *Definitions.*—The following definitions shall apply in the interpretation and the enforcement of this ordinance:

A. *Milk.*—Milk is hereby defined to be the lacteal secretion obtained by the complete milking of one or more healthy cows, excluding that obtained within 15 days before and 5 days after calving, or such longer period as may be necessary to render the milk practically colostrum free; which contains not less than 8 percent of milk solids not fat, and not less than $3\frac{1}{4}$ percent of milk fat.

Public-health reason.—The food value of milk depends upon its milk fat and its solids not fat content (which in turn determine the content of proteins, carbohydrates, minerals, and certain vitamins). If either of these is reduced below the range for normal market milk the food value is unnecessarily reduced. Practical experience shows that $3\frac{1}{4}$ percent milk fat and 8 percent solids not fat are reasonable minima for mixed-herd milk. Colostrum tends to produce intestinal disturbances in children, and milk is apt to contain colostrum if obtained within 15 days before or 5 days after calving.

Satisfactory compliance.—This definition shall be deemed to have been satisfied:

(1) When the inspector notes no evidence that cows are milked within 15 days before or 5 days after calving, and when no colostrum can be detected in the milk.

(2) When the milk-fat content, as determined by the Babcock, Mojonnier, or other recognized test, is $3\frac{1}{4}$ percent or more.

(3) When the milk solids-not-fat content is 8 percent or more, as determined from the milk-fat percentage and the specific gravity, or by other approved methods, provided that failure to satisfy this requirement shall be regarded as merely presumptive evidence of watering and that this evidence shall be confirmed by cryoscope, refractometer, or other approved test for added water.

B. *Milk fat or butter fat.*—Milk fat or butter fat is the fat of milk.

C. *Cream and sour cream.*—Cream is a portion of milk which contains not less than 18 percent milk fat. Sour cream is cream the acidity of which is not more than 0.20 percent, expressed as lactic acid.

D. *Skimmed milk.*—Skimmed milk is milk from which a sufficient portion of milk fat has been removed to reduce its milk-fat percentage to less than $3\frac{1}{4}$ percent.

E. *Milk or skimmed-milk beverage.*—A milk beverage or a skimmed-milk beverage is a food compound or confection consisting of milk or skimmed milk, as the case may be, to which has been added a sirup or flavor consisting of wholesome ingredients.

F. *Buttermilk.*—Buttermilk is the product which remains when fat is removed from milk or cream, in the process of churning. It contains not less than 8 percent of milk solids not fat.

G. *Cultured buttermilk, cultured milk, cultured skim milk.*—Cultured buttermilk, cultured milk, and cultured skim milk are products resulting from the souring or treatment, by a lactic acid or other culture, of milk or milk products. They contain not less than 8 percent of milk solids not fat.

H. *Vitamin D milk.*—Vitamin D milk is milk the vitamin D content of which has been increased by a method and in an amount approved by the health officer.

I. *Reconstituted or recombined milk and cream.*—Reconstituted or recombined milk is a product resulting from the recombining of milk constituents with water, and which complies with the standards for milk fat and solids not fat of milk as defined herein. Reconstituted or recombined cream is a product resulting from the combination of dried cream, butter, or butter fat with cream, milk, skim milk, or water.

J. *Milk products.*—Milk products shall be taken to mean and include cream, sour cream, goat milk, vitamin D milk, buttermilk, cultured buttermilk, skimmed milk, reconstituted or recombined milk and cream, milk beverages, and skimmed-milk beverages.

The above definitions require no explanation.

K. *Pasteurization.*—The terms "pasteurization", "pasteurized", and similar terms shall be taken to refer to the process of heating every particle of milk or milk products to a temperature of not less than 142° F., and holding at such temperature for not less than 30 minutes in approved pasteurization apparatus, provided that approval shall be limited to apparatus which requires a combined holder and indicating thermometer temperature tolerance of not more than $1\frac{1}{2}^{\circ}$ F., as shown by official tests with suitable testing equipment, and provided that such apparatus shall be properly operated and that the indicating thermometers and the recording thermometer charts both indicate a temperature of not less than $143\frac{1}{2}^{\circ}$ F., continuously throughout the holding period. The terms "pasteurization", "pasteurized", and similar terms shall also include the process of heating every particle of milk or milk products to 160° F., and holding at that temperature or above for not less than 15 seconds in apparatus of approved design and properly operated. Provided that nothing contained in this definition shall be construed as disbaring any other process which has been demonstrated as of at least equal efficiency and is approved by the State health authority.

For the discussion of the enforcement of this definition see item 16p, grade A pasteurized milk, of this code.

L. *Adulterated milk and milk products.*—Any substance claimed to be any milk or milk product defined in this ordinance, but not conforming with its definition as given in this ordinance, or which carries a grade label unless such grade label has been awarded by the health officer and not revoked, shall be deemed adulterated and misbranded.

The intent of this section with reference to adulteration is obvious. Any milk or milk product shall be deemed to have been misbranded if it is not labeled in accordance with the requirements of section 4 of this ordinance.

M. *Milk producer.*—A milk producer is any person who owns or controls one or more cows a part or all of the milk or milk products from which is sold or offered for sale.

N. *Milk distributor.*—A milk distributor is any person who offers for sale or sells to another any milk or milk products for human consumption as such.

O. *Dairy or dairy farm.*—A dairy or dairy farm is any place or premises where one or more cows are kept a part or all of the milk or milk products from which is sold or offered for sale.

P. *Milk plant.*—A milk plant is any place or premises or establishment where milk or milk products are collected, handled, processed, stored, bottled, pasteurized, or prepared for distribution.

Q. *Health officer.*—The term "health officer" shall mean the health authority of the city of _____, or his authorized representative.

These definitions require no explanation.

R. *Average bacterial plate count, reduction time, and cooling temperature.*—Average bacterial plate count shall be taken to mean the logarithmic average of the bacterial plate counts of the last four consecutive samples, taken upon separate days, irrespective of periodic grade announcements. Average reduction time shall be taken to mean the arithmetic average of the reduction times of the last four consecutive samples, taken upon separate days, irrespective of periodic grade announcements. Average cooling temperature shall be taken to mean the arithmetic average of the temperatures of the last four consecutive samples, taken upon separate days, irrespective of periodic grade announcements.

For a discussion of bacterial plate count and reduction time see section 6 of this code. For a discussion of cooling temperature see section 7, items 23r and 17p.

S. *Grading period.*—The grading period shall be such period of time as the health officer may designate within which grades shall be determined for all milk and/or milk products, provided that the grading period shall in no case exceed 6 months.

Wide experience in the operation of this ordinance has indicated that it is undesirable to make the grading period shorter than 3 months. This is because most towns find it difficult to make inspections and analyses often enough to permit a shorter grading period.

On the other hand, the ordinance does not permit grading periods longer than 6 months. Experience has indicated that grading periods longer than 6 months result in inadequate supervision of the supply.

A grading period of 6 months does not imply an excessive enforcement cost. As a matter of fact, many of the cities enforcing this ordinance are grading every 3 months without prohibitive expense.

Finally, it is imperative that the grading periods be of equal length. If grades are not announced with rigid regularity procrastination is apt to set in and milk supervision become lax. A poor impression is made

upon both dairyman and consumer when the milk grades are not regularly announced.

T. Bactericidal process.—A bactericidal process is the application of any method or substance for the destruction of bacteria which, in the opinion of the health officer, does not adversely affect the equipment or the milk or milk products or the health of the consumer, and which is effective.

There are several bactericides which may be used by the industry in complying with this ordinance. These consist generally of calcium hypochlorite, sodium hypochlorite, or certain chloramine solutions.

Calcium hypochlorite.—Calcium hypochlorite (chlorinated lime) is a chemical compound used as a disinfectant for public-water supplies, and is also used in laundries as a bleaching agent. It can be obtained from drug supply houses in 12-ounce cans at about 15 cents per can, or less if purchased in larger quantities. A can should supply the needs of the average dairy about 1 week.

The most satisfactory method of preparation is to make a smooth watery paste of 12 ounces of calcium hypochlorite, adding the water in very small quantities at first, and bringing the final volume of this stock solution to 1 gallon. This solution should be kept tightly stoppered in a cool dark place. An earthenware or brown glass jug is a satisfactory container. One tablespoonful of this stock solution to each gallon of rinse water will make a solution of an effective strength, which will not be so strong as to injure hands or udders. A fresh stock solution should be made every 10 days and any old solution thrown away, or used to deodorize privies, etc.

A highly concentrated calcium hypochlorite is now available which is more stable and more soluble than ordinary chlorinated lime.

Sodium hypochlorite.—Solutions of sodium hypochlorite are on the market under various trade names. These have usually been found to be as strong as the stock chlorinated lime solutions when prepared as above directed. Unless otherwise instructed by the inspector, these commercial preparations of sodium hypochlorite should be made up in the proportion of one tablespoonful per gallon of rinse water.

Testing of chlorine solutions.—The above instructions assume that the strength secured will be roughly 100 parts per million or more. It is believed that as a matter of precaution no chlorine solution should be used after its strength has been reduced to less than the bactericidal strength of 50 parts per million of available chlorine in the form of hypochlorite. Therefore, the inspector must satisfy himself by test that solutions he finds in use by the industry have at least the bactericidal strength of 50 parts per million of available chlorine in the form of hypochlorite after use. Where the chlorine solution is used as a spray the inspector shall satisfy himself by test that the excess solution which runs off or collects in the equipment contains at least 50 parts per million.

A test which may be used by dairy inspectors for this purpose has been devised by the office of milk investigations of the United States Public Health Service.

The test makes use of the fact that when the proper amount of o'tolidin is added to a chlorine solution containing 20 parts per million or more a precipitate is formed, except that in the case of certain chloramines the solution becomes cloudy at chlorine concentrations having a 2-minute bactericidal strength equivalent to at least the

bactericidal strength of 20 parts per million of available chlorine in the form of hypochlorite.

The testing outfit consists of two test tubes $\frac{7}{16}$ by 4 inches, one of which contains o'tolidin. The other is fitted with a medicine dropper and is used for testing the chlorine solution. It is etched at the 2 cc and 5 cc levels so as to make possible the dilution of the solution to be tested to two-fifths of its original strength, thus diluting an original solution of 50 parts per million or more to one of 20 parts per million or more, which, as above stated, is the critical point for the formation of the precipitate when hypochlorites are tested.

Before any tests are made with the apparatus the medicine dropper should be tested to determine whether it delivers drops of the proper size. To do this, simply count the number of drops required to fill to the first mark of the testing tube. If the number required lies between 30 and 50 the dropper is satisfactory. If not, discard it and secure one of the proper size.

Directions for the chlorine test.—(1) Rinse the testing tube and its dropper thoroughly with clean water.

(2) Fill the testing tube to the lower mark with the chlorine solution to be tested, using the dropper for this purpose. (Avoid including floating particles.)

(3) Fill to the second mark with clean water, using the dropper for this purpose.

(4) Add 1 drop of o'tolidin.

(5) Hold the upper part of the testing tube firmly with one hand and tap the lower end of it sharply 50 times with one or two fingers of the other hand.

(6) If, in the case of hypochlorites, reddish or brownish particles separate out within 5 minutes, the solution tested contains at least 50 parts per million of available chlorine. If, in the case of certain chloramines the solution becomes cloudy within 5 minutes, the solution tested has a bactericidal strength for a 2-minute exposure equivalent to at least the bactericidal strength of 50 parts per million of available chlorine in the form of hypochlorite.

Dairymen will frequently ask the inspector whether a certain commercial preparation is strong enough for dairy use when mixed as directed on the label. In order to determine this the inspector should mix a portion as directed on the label, then dilute half and half, and test for 50 parts per million by means of the above-described test. If a precipitate appears, the directions upon the label may be approved. Otherwise, such larger quantity of the stock solution should be used by the dairyman as will give a satisfactory test.

Other bactericides.—The inspector should not permit the dairy industry to use any other form of bactericide until he has satisfied himself by his own or other official tests that they are satisfactory for use in connection with milk handling, and that they are of adequate strength. The local inspector should consult his State board of health regarding all bactericides in use in his territory, so that he may be certain he is using the proper test. Under no circumstances shall formaldehyde or other preservatives be used.

Any proprietary bactericide regarding the dairy sanitation efficiency of which the local or State health authority is in doubt should be referred to the Food and Drug Administration of the United States Department of Agriculture for opinion.

U. *Person.*—The word “person” as used in this ordinance shall mean “person, firm, corporation, or association.”

V. *Goat milk.*—Goat milk is the fresh, clean, lacteal secretion, free from colostrum, obtained by the complete milking of healthy goats, and shall comply with all the requirements of this ordinance. The word “cows” shall be interpreted to include goats.

SEC. 2. *The sale of adulterated, misbranded, or ungraded milk or milk products prohibited.*—No person shall within the city of -----, or its police jurisdiction, produce, sell, offer, or expose for sale, or have in possession with intent to sell, any milk or milk product which is adulterated, misbranded, or ungraded. It shall be unlawful for any person, elsewhere than in a private home, to have in possession any adulterated, misbranded, or ungraded milk or milk product.

This section of the ordinance may be used in preferring charges against persons who adulterate their milk or label their milk or milk products with any grade designation not awarded by the health officer under the terms of this ordinance, or who sell or deliver ungraded milk or milk products except as may be permitted under section 11 of this ordinance.

SEC. 3. *Permits.*—It shall be unlawful for any person to bring into or receive into the city of -----, or its police jurisdiction, for sale, or to sell, or offer for sale therein, or to have in storage where milk or milk products are sold or served, any milk or milk product defined in this ordinance, who does not possess a permit from the health officer of the city of -----, and on whose vehicle there does not appear in a conspicuous place the permit number in figures at least 3 inches high and 1½ inches wide.

Only a person who complies with the requirements of this ordinance shall be entitled to receive and retain such a permit.

Such a permit may be revoked by the health officer upon the violation by the holder of any of the terms of this ordinance, or in any emergency when in the judgment of the health officer the milk or milk product in question has become a public-health menace, provided that the holder of said permit shall, after complying with such revocation, have the right of appeal to the board of health.

It is not the intent of this section to require annual permits. The section is of value primarily as a registration device. It permits the health officer to prosecute any persons who begin distributing milk without notifying him, and thus without being graded. The periodic grading principle of the ordinance makes it unnecessary that the permit be renewed annually, inasmuch as the periodic announcement of grades is equivalent to the periodic granting of permits.

SEC. 4. *Labeling and placarding.*—All bottles, cans, packages, and other containers enclosing milk or any milk product defined in this ordinance shall be plainly labeled or marked with (1) the name of the contents as given in the definitions in this ordinance; (2) the grade of the contents if said contents are graded under the provisions of this ordinance; (3) the word “pasteurized” only if the contents have been pasteurized; (4) the word “raw” only if the contents are raw; (5) the name of the producer if the contents are raw, and the name of the plant at which the contents were pasteurized, if the contents are pasteurized; and (6) in the case of vitamin D milk, the designation “Vitamin D Milk” and the source of the vitamin D. The label or mark shall be in letters of a size,

kind, and color approved by the health officer and shall contain no marks or words not approved by the health officer.

Every restaurant, cafe, soda fountain, or other establishment serving milk or milk products shall display at all times, in a place designated by the health officer, a notice approved by the health officer, stating the lowest grade of milk and/or milk products served.

The outstanding principle of this ordinance is that, while particularly advanced cities may require all milk to be of the highest grade, other cities, in which milk control has not reached such an advanced status or which prefer the grading and degrading method of elevating and sustaining milk quality, may under the same ordinance permit lower grades to be sold, provided every bottle is labeled according to the grade, and provided all restaurants, soda fountains, etc., are placarded according to the grades of milk served. This is in order that consumers in such towns as do not require all milk to be of the highest grade may be at all times aware of the grade of milk purchased, and thus be encouraged to buy on grade, thereby promoting the production of the higher grades and gradually eliminating the lower grades from the market. When supplies are reduced in grade the health officer shall require a different and contrasting color of bottle cap lettering from that previously used.

For such cities, and they are the vast majority, the labeling and placarding sections of this ordinance assume particular importance, and should be rigidly enforced.

Enforcement of labeling.—In order to obviate the claim on the part of the distributors, when degraded, that lower grade caps are not available, arrangement should be made, if possible, with a local dairy supply or hardware firm to carry lower grade caps constantly in stock. If this arrangement cannot be made the local health department should stock the lower grade caps in sufficient quantities to meet emergencies. A sufficient number of caps for this purpose, 10,000 or 20,000 of each grade, can usually be purchased for not more than \$50. The distributors must pay for the caps, which during a temporary period of degrading need not carry the name of the distributor.

If the health department keeps caps on hand for this purpose they should be stored under the same sanitary conditions as would be expected of the dairy or dairy supply house.

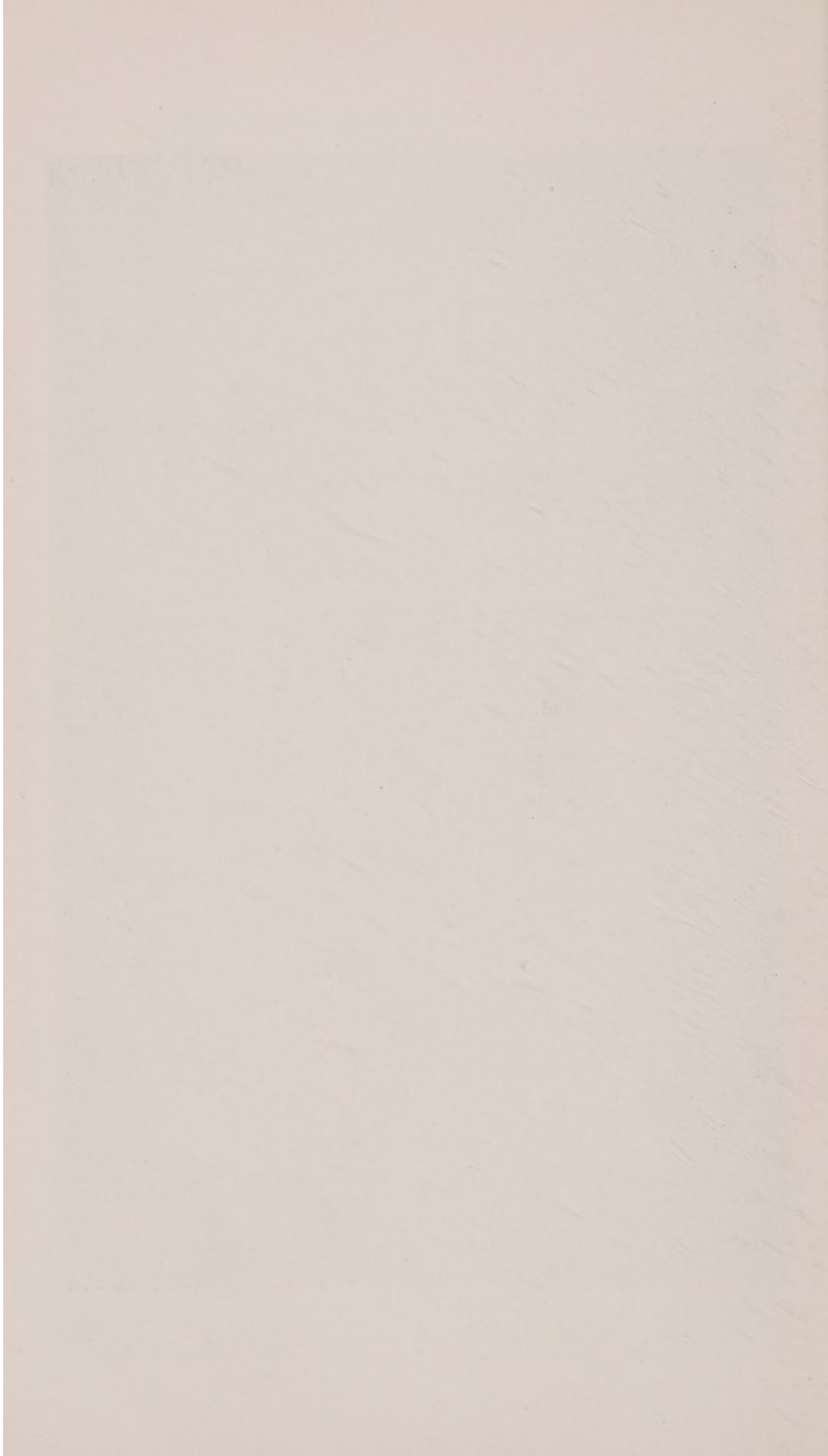
It is imperative that the health officer rigidly enforce the proper capping of bottles immediately after the award of grades, excepting immediately after the first grading announcement, when a short period of time may advisably be allowed for the purchase of the proper caps. The health officer should prefer a case against any dairyman or milk plant failing to carry the properly labeled bottle cap within 48 hours after receipt of notification from the health officer as to lowering of grade.

The health officer shall not permit the use upon the label of any words such as the term "natural milk" and similar terms, which may cause the milk consumer to believe that raw milk is more natural than pasteurized milk.

This requirement is made because, as stated by the Committee on Milk of the 1932 Conference of State and Provincial Health Authorities, "The only true natural milk for human babies is human milk. Nature intended cows' milk for calves, and cows' milk is used for



FIGURE 1.—GRADE A PASTEURIZED MILK PLACARD DISPLAYED IN DRUG STORE.



babies only as the next best thing to human milk. Raw milk which has been cooled is not more natural than raw milk which has been heated or pasteurized. Both cooling and heating retard the growth of certain kinds of bacteria. Heating, however, also devitalizes all disease bacteria which can be conveyed through milk supplies. This is not true of cooling. Therefore, while cooling is an important public health measure, heating is an even more important one. For these reasons, the committee considers dangerous to the public health any movement or policy the result of which would be to mislead the milk consumer into thinking that grade A raw milk is more natural and therefore better for babies than grade A pasteurized milk. Public health authorities should, therefore, not permit the use of the word 'natural' on the labeling of either raw or pasteurized milk or cream."

Enforcement of placarding.—It is not necessary that the local health officer carry in stock any other than grade A raw and grade A pasteurized placards. When lower grade placards are required the simplest course is to paste the lower grade letters over the letter A on the stock placard.

Immediately following the announcement of grades the inspector should see to it that the grade letters are changed in every restaurant, soda fountain, etc., in which a change is required.

Placards should preferably be enclosed in a glazed frame. This can be easily brought about by the health officer if he will purchase a stock of inexpensive frames and carry them with him in distributing placards. Practically all establishments will willingly pay 25 to 50 cents in order to secure the more favorable impression upon customers which will be afforded by an attractive placard properly framed. Distributors may be interested in providing these frames for their customers. The inspector should himself select a conspicuous location for the placard. Establishments using menu cards may in lieu of a grade placard display on their menu card a statement approved by the health officer, giving the lowest grade of milk served, and stating whether the milk is raw or pasteurized.

SEC. 5. *Inspection of dairy farms and milk plants for the purpose of grading or regrading.*—At least once during each grading period the health officer shall inspect all dairy farms and all milk plants whose milk or milk products are intended for consumption within the city of -----, or its police jurisdiction. In case the health officer discovers the violation of any item of sanitation, he shall make a second inspection after a lapse of such time as he deems necessary for the defect to be remedied, but not before the lapse of 3 days, and the second inspection shall be used in determining the grade of milk and/or milk products. Any violation of any item of this ordinance on two consecutive inspections within any one grading period shall call for immediate degrading.

One copy of the inspection report shall be posted by the health officer in a conspicuous place upon an inside wall of one of the dairy farm or milk plant buildings, and said inspection report shall not be defaced or removed by any person except the health officer. Another copy of the inspection report shall be filed with the records of the health department.

The first sentence of this section should not be taken to imply that one inspection per grading period is a desirable frequency. It should instead be regarded as the legal minimum. In actual practice it is desirable to inspect every dairy farm at least two or three times during

each grading period and every milk plant at least every 2 weeks. As often as possible inspection of farms should be made during milking time, and of plants while pasteurization or processing is in progress.

Special attention is directed to the last sentence of the first paragraph, which requires that a dairy or milk plant shall be immediately degraded without waiting for the end of the grading period if two successive inspections disclose one or more violations of the requirements of the grade in question. Even if the two violations do not refer to the same item of sanitation degrading should nevertheless be enforced immediately.

Experience has demonstrated conclusively that a strict enforcement of the ordinance with regard to routine grading and degrading leads to a far better and more friendly relationship between the health officer and the dairy industry than does a policy of enforcement which seeks to excuse violations and defer punishment therefor.

The inspector should not fail to post one copy of the inspection report at the dairy or milk plant. The milk-house wall of the dairy farm and a wall of the plant office are suggested as effective locations. If inspections are made in the absence of the owner or manager the inspection report should be posted nevertheless, but in addition a written notification should be mailed to the owner or manager.

SEC. 6. *The examination of milk and milk products.*—During each grading period at least four samples of milk and/or cream from each dairy farm and each milk plant shall be taken on separate days and examined by the health officer. Samples of other milk products may be taken and examined by the health officer as often as he deems necessary. Samples of milk and/or milk products from stores, cafes, soda fountains, restaurants, and other places where milk or milk products are sold shall be examined as often as the health officer may require. Bacterial plate counts shall be made in conformity with the latest standard methods recommended by the American Public Health Association. Examinations may include such other chemical and physical determinations as the health officer may deem necessary for the detection of adulteration, these examinations to be made in accordance with the latest standard methods of the American Public Health Association and the Association of Official Agricultural Chemists. Bacterial plate count, reductase test, and cooling temperature results shall be given to the producer or distributor concerned as soon as determined if said results fall without the limits prescribed for the grade then held. Samples may be taken by the health officer at any time prior to the final delivery of the milk or milk products. All proprietors of stores, cafes, restaurants, soda fountains, and other similar places shall furnish the health officer, upon his request, with the name of the distributor from whom their milk and/or milk products are obtained. Bio-assays of the vitamin D content of vitamin D milk shall be made when required by the health officer in a laboratory approved by him for such examinations.

Experience has indicated that four or more samples of a given milk supply should be examined before attempting to grade the supply. Therefore it is required that at least four samples be taken from each supply during each grading period.

The third sentence of this section refers to store and restaurant samples. Ordinarily the enforcement of this sentence is limited to the taking of temperatures so as to determine whether the establishment is keeping the milk at or below the temperature required for the

grade sold. Such temperatures should, however, be charged only to the establishment, and not to the dairyman supplying the milk, as the latter practice would be obviously unjust to the dairyman.

The health officer should by all means carry out that part of this section referring to the mailing of notices of bacterial counts or reductase test results to the dairymen. It is suggested that no further official samples be taken from any supply of which the bacterial plate count, reduction time, or cooling temperature was beyond the limit set for the grade currently held, until a reasonable period, not to exceed one week, has been allowed for notification of the result and for correction of the conditions responsible for said result.

Samples upon which grades are to be based should be taken from supplies while they are still in the possession of the dairyman. Any other practice would be unfair to the dairyman, as once the milk is out of his possession it is beyond his control. For this reason section 6 contains the sentence requiring that milk samples must be taken while in the possession of the dairyman.

Bacterial plate counts and reductase tests.—This ordinance requires that the various grades of milk fall within the following limits of average bacterial plate counts, or average reduction time as determined by the reductase test:

Grade	Logarithmic average bacterial plate count per cubic centimeter	Arithmetic average reduction time in hours
A raw.....	0 to 50,000.....	At least 8.
B raw.....	51,000 to 200,000.....	6 to 8.
C raw.....	210,000 to 1,000,000.....	3½ to 6.
D raw.....	Over 1,000,000.....	Less than 3½.
A pasteurized.....	0 to 30,000.....	
B pasteurized.....	0 to 50,000.....	
C pasteurized.....	Over 50,000.....	

Public-health reason.—It is widely accepted that the bacterial plate count of milk is an index of the sanitary quality of milk. A high count does not necessarily mean that disease organisms are present, and a low count does not necessarily mean that disease organisms are absent; but a high bacterial plate count does mean that the milk has either come from diseased udders, has been milked or handled under undesirable conditions, or has been kept warm enough to permit bacterial growth. This means, in the first two cases, that the chances of infection have been increased, and, in the last case, that any infection which has reached the milk has been permitted to grow to more dangerous proportions. In general, therefore, a high count means a greater likelihood of disease transmission.

On the other hand a wrong interpretation of the significance of low bacterial plate counts should be avoided, since low-count milk may be secured from tuberculous cows, may have been handled by typhoid carriers, and may even have been handled under moderately unclean conditions.

The above constitutes the public-health reason for grading milk partly on the basis of the bacterial plate count or the reductase test.

The collection of milk samples.—In order to yield significant results milk samples must be collected so as to represent the condition of

the milk when reaching the consumer or milk plant receiving station. Therefore they may not be taken at the dairy, but must be collected either from the delivery wagons or at the milk plant or its country receiving stations.

Furthermore, in order that the laboratory findings may represent the true condition of the samples when taken, these must without fail be kept below 50° F. until plated. This will require, except in freezing weather, that the samples be packed in ice until examined. The inspector should be provided with a case in which samples may be delivered to the laboratory. A metal-lined wooden box, of such size as to fit on the running board or inside the inspector's car, has been found satisfactory. The box should be drained to prevent the accumulation of ice water.

In case of bottled milk, a pint or quart bottle shall be taken at random from the truck by the inspector, and the top covered with paraffined or parchment paper so as to assure the dairyman that the milk will not be contaminated en route to the laboratory by the hands of the inspector or by the ice in the sample case. The sample tag (Treasury Department Form 8978-B) must be filled out by the inspector at the time the sample is taken, and the wire twisted tightly about the neck of the bottle, thus binding tight the paper cover.

When samples are to be shipped to a laboratory located in another city (a central or branch State laboratory) the same procedure must be followed, the milk being transferred to the shipping-case containers at the health office or some other suitable place. In transferring the milk from the original bottles to the shipping-case containers, the bottles shall first be thoroughly shaken and the cap and lip carefully swabbed with alcohol or a chlorine solution. The milk shall then be carefully poured into the shipping bottle, the tag being immediately transferred, so as to avoid mixing of tags.

Shipping cases must be constructed and iced so as to keep the temperature of the samples below 50° F. until they reach the laboratory.

For the collection of samples at pasteurizing plants or at their country cooling stations, the following procedure is recommended. Five ounces of stock chlorine solution are added to a 5-gallon can of water. A long-handled dipper is kept in this solution for a few moments and then used to stir the milk and collect the sample. It may be used without further bactericidal treatment for taking samples from any number of cans from the same producer, but must be re-treated before proceeding to sample milk from the next producer. The small amount of chlorine carried into the milk on the dipper will not affect its bacterial count. The cans of milk should be well stirred before the samples are taken, in order that the samples may be representative. Sample bottles should be of not less than 4-ounce capacity.

Reporting bacterial plate counts.—The number of routine samples which must be examined in many cities makes the use of more than two dilutions per sample impracticable. For this reason, it has become general practice for laboratories in cities enforcing this ordinance to make only two dilutions. In all except known high-count milk the dilutions used are 1-100 and 1-1,000; on the latter 1-1,000 and 1-10,000. The following special rules for reporting counts are now being used:

(1) When the higher plate count is more than twice the lower, record the lower count.

(2) When the higher plate count is not more than twice the lower, apply the Standard Methods rules for counting.

(3) In case one plate cannot be counted because of a spreader covering more than half the plate, the result is to be reported as unsatisfactory unless the count of the other plate is within the grade then held by the supply in question.

(4) Report bacterial plate counts to the nearest 1,000, unless the count exceeds 100,000, in which case report to the nearest 10,000, or unless the count exceeds 1,000,000, in which case report to the nearest 100,000.

(5) Plates showing no growth shall be reported as unsatisfactory.

A good method by which milk control officials may judge laboratory technique and the correctness of reporting is to have the laboratory enter its results upon the following form of milk analysis journal.

Milk-sample record

Sample no.	Fat	Sp. g.	S. N. F.	Adulterants	1-100 count	1-1,000 count	Count ratio ¹	Recorded count	Remarks
	<i>Percent</i>		<i>Percent</i>	<i>Percent</i>					
2834.....	4.1	1.031	8.57	-----	14,800	15,000	1.01	15,000	-----
2835.....	3.6	1.032	8.72	-----	210,000	234,000	1.11	220,000	* 230,000
2836.....	3.7	1.031	8.49	-----	8,600	32,000	3.72	9,000	-----
2837.....	4.2	1.030	8.34	-----	Spreader	190,000	-----	Unsatisfactory	Unsatisfactory
2838.....	2.3	1.025	6.71	9	-----	-----	-----	-----	Water

¹ Count ratio is the ratio of the greater to the lesser plate count.

² Corrected.

The State representatives should determine the following data each grading period as a part of the State records:

(1) Average ratio of such samples for which both colony counts are between 30 and 300. This should not be over 2.0.

(2) Percent unsatisfactory counts (spreaders). This should not be over 2 percent.

(3) Percent incorrectly recorded counts. This should be practically 0.

These three figures are measures with which to judge the work of the laboratory.

All counts should be recorded on the milk ledger (Treasury Department Forms 8976-B and 8976-C) as soon as reported by the laboratory.

Averaging bacterial plate counts in determining grades.—In grading milk supplies the average of the last four consecutive counts or red-uctase hours is used because less than this number has been found by experience not to give a dependable picture of the bacteriological condition of a milk supply. The averaging of bacterial plate counts in the determination of grades under this ordinance is done by the logarithmic instead of the arithmetic method. This is because the arithmetic method is sometimes unfair to the dairyman. Suppose, for example, the laboratory reports the last four consecutive plate counts to be 10,000, 10,000, 10,000, and 1,000,000. The one unusually high count may have been the result of accident, and is not fair cause for

degrading, yet if an arithmetic average is used the milk supply will be placed in grade C, whereas its most usual quality is grade A.

For this reason the logarithmic average is specified in connection with the enforcement of this ordinance. By its use infrequent high counts are "snubbed", so to speak. For example, the same counts previously listed would yield a logarithmic average of 32,000, thus keeping the milk supply in grade A, where it obviously belongs.

On the other hand, when the count is frequently high the snubbing effect largely disappears and the logarithmic average will be high, which is a fair punishment for frequently high counts.

How to find the average bacterial plate count by logarithms.—The logarithms of all bacterial plate counts from 1,000 to 100,000,000 are given directly in the following table. The logarithms should be entered opposite the counts in the milk control ledger. To find the average bacterial plate count find the average of the logarithms and then find the bacterial plate count in the table which is opposite the average logarithm.

Following is an example:

Counts	Logarithms
35,000	4.54
11,000	4.04
9,000	3.95
95,000	4.98
	17.51

¹ 17.51 ÷ 4 = 4.38 average logarithm.

4.38 in the table is opposite 24,000, which is therefore the average bacterial count.

If it is found that the average logarithm occurs opposite more than one bacterial plate count in the table, take the lowest bacterial plate count as the average:

Reductase test.—When the reductase test is used the procedure shall be as follows: Follow Standard Methods of Milk Analysis except that samples are to be examined at the end of each hour but not beyond 8 hours. The reduction time shall be expressed as the number of elapsed full hours when decolorization is first observed. Samples not reduced at the end of 8 hours are to be reported as reduced in 9 hours. For purposes of grading the simple arithmetic average (not the logarithmic average) of the last four consecutive samples is to be used.

Table to be used in computing logarithmic averages of bacterial plate counts

Counts	Loga- rithms	Counts	Loga- rithms	Counts	Loga- rithms	Counts	Loga- rithms	Counts	Loga- rithms
1,000	3.00	61,000	4.79	310,000	5.49	910,000	5.96	6,100,000	6.79
2,000	3.30	62,000	4.79	320,000	5.51	920,000	5.96	6,200,000	6.79
3,000	3.48	63,000	4.80	330,000	5.52	930,000	5.97	6,300,000	6.80
4,000	3.60	64,000	4.81	340,000	5.53	940,000	5.97	6,400,000	6.81
5,000	3.70	65,000	4.81	350,000	5.54	950,000	5.98	6,500,000	6.81
6,000	3.78	66,000	4.82	360,000	5.56	960,000	5.98	6,600,000	6.82
7,000	3.85	67,000	4.83	370,000	5.57	970,000	5.99	6,700,000	6.83
8,000	3.90	68,000	4.83	380,000	5.58	980,000	5.99	6,800,000	6.83
9,000	3.95	69,000	4.84	390,000	5.59	990,000	5.99	6,900,000	6.84
10,000	4.00	70,000	4.85	400,000	5.60	1,000,000	6.00	7,000,000	6.85
11,000	4.04	71,000	4.85	410,000	5.61	1,100,000	6.04	7,100,000	6.85
12,000	4.08	72,000	4.86	420,000	5.62	1,200,000	6.08	7,200,000	6.86
13,000	4.11	73,000	4.86	430,000	5.63	1,300,000	6.11	7,300,000	6.86
14,000	4.15	74,000	4.87	446,000	5.64	1,400,000	6.15	7,400,000	6.87
15,000	4.18	75,000	4.88	450,000	5.65	1,500,000	6.18	7,500,000	6.88
16,000	4.20	76,000	4.88	460,000	5.66	1,600,000	6.20	7,600,000	6.88
17,000	4.23	77,000	4.89	470,000	5.67	1,700,000	6.23	7,700,000	6.89
18,000	4.26	78,000	4.89	480,000	5.68	1,800,000	6.26	7,800,000	6.89
19,000	4.28	79,000	4.90	490,000	5.69	1,900,000	6.28	7,900,000	6.90
20,000	4.30	80,000	4.90	500,000	5.70	2,000,000	6.30	8,000,000	6.90
21,000	4.32	81,000	4.91	510,000	5.71	2,100,000	6.32	8,100,000	6.91
22,000	4.34	82,000	4.91	520,000	5.72	2,200,000	6.34	8,200,000	6.91
23,000	4.36	83,000	4.92	530,000	5.72	2,300,000	6.36	8,300,000	6.92
24,000	4.38	84,000	4.92	540,000	5.73	2,400,000	6.38	8,400,000	6.92
25,000	4.40	85,000	4.93	550,000	5.74	2,500,000	6.40	8,500,000	6.93
26,000	4.42	86,000	4.93	560,000	5.75	2,600,000	6.42	8,600,000	6.93
27,000	4.43	87,000	4.94	570,000	5.76	2,700,000	6.43	8,700,000	6.94
28,000	4.45	88,000	4.94	580,000	5.76	2,800,000	6.45	8,800,000	6.94
29,000	4.46	89,000	4.95	590,000	5.77	2,900,000	6.46	8,900,000	6.95
30,000	4.48	90,000	4.95	600,000	5.78	3,000,000	6.48	9,000,000	6.95
31,000	4.49	91,000	4.96	610,000	5.79	3,100,000	6.49	9,100,000	6.96
32,000	4.51	92,000	4.96	620,000	5.79	3,200,000	6.51	9,200,000	6.96
33,000	4.52	93,000	4.97	630,000	5.80	3,300,000	6.52	9,300,000	6.97
34,000	4.53	94,000	4.97	640,000	5.81	3,400,000	6.53	9,400,000	6.97
35,000	4.54	95,000	4.98	650,000	5.81	3,500,000	6.54	9,500,000	6.98
36,000	4.56	96,000	4.98	660,000	5.82	3,600,000	6.56	9,600,000	6.98
37,000	4.57	97,000	4.99	670,000	5.83	3,700,000	6.57	9,700,000	6.99
38,000	4.58	98,000	4.99	680,000	5.83	3,800,000	6.58	9,800,000	6.99
39,000	4.59	99,000	4.99	690,000	5.84	3,900,000	6.59	9,900,000	6.99
40,000	4.60	100,000	5.00	700,000	5.85	4,000,000	6.60	10,000,000	7.00
41,000	4.61	110,000	5.04	710,000	5.85	4,100,000	6.61	11,000,000	7.04
42,000	4.62	120,000	5.08	720,000	5.86	4,200,000	6.62	12,000,000	7.08
43,000	4.63	130,000	5.11	730,000	5.86	4,300,000	6.63	13,000,000	7.11
44,000	4.64	140,000	5.15	740,000	5.87	4,400,000	6.64	14,000,000	7.15
45,000	4.65	150,000	5.18	750,000	5.88	4,500,000	6.65	15,000,000	7.18
46,000	4.66	160,000	5.20	760,000	5.88	4,600,000	6.66	16,000,000	7.20
47,000	4.67	170,000	5.23	770,000	5.89	4,700,000	6.67	17,000,000	7.23
48,000	4.68	180,000	5.26	780,000	5.89	4,800,000	6.68	18,000,000	7.26
49,000	4.69	190,000	5.28	790,000	5.90	4,900,000	6.69	19,000,000	7.28
50,000	4.70	200,000	5.30	800,000	5.90	5,000,000	6.70	20,000,000	7.30
51,000	4.71	210,000	5.32	810,000	5.91	5,100,000	6.71	30,000,000	7.48
52,000	4.72	220,000	5.34	820,000	5.91	5,200,000	6.72	40,000,000	7.60
53,000	4.72	230,000	5.36	830,000	5.92	5,300,000	6.72	50,000,000	7.70
54,000	4.73	240,000	5.38	840,000	5.92	5,400,000	6.73	60,000,000	7.78
55,000	4.74	250,000	5.40	850,000	5.93	5,500,000	6.74	70,000,000	7.85
56,000	4.75	260,000	5.42	860,000	5.93	5,600,000	6.75	80,000,000	7.90
57,000	4.76	270,000	5.43	870,000	5.94	5,700,000	6.76	90,000,000	7.95
58,000	4.77	280,000	5.45	880,000	5.94	5,800,000	6.76	100,000,000	8.00
59,000	4.78	290,000	5.46	890,000	5.95	5,900,000	6.77	-----	-----
60,000	4.78	300,000	5.48	900,000	5.95	6,000,000	6.78	-----	-----

SEC. 7. *The grading of milk and milk products.*—At least once every 6 months the health officer shall announce the grades of all milk and milk products delivered by all producers or distributors and ultimately consumed within the city of -----, or its police jurisdiction. Said grades shall be based upon the following standards, the grading of milk products being identical with the grading of milk except that the bacterial standards shall be doubled in the case of cream, and omitted in the case of sour cream, buttermilk, and cultured buttermilk. Vitamin D milk shall be only of grade A or grade B pasteurized, certified, or grade A raw quality.

The following suggestions should be observed in the announcement of grades:

(1) The announcement should contain as a first section the statement that the grades of all milk supplies have been determined by the local health department in accordance with the grade specifications of this code.

(2) The second section should urge all consumers to purchase milk on the basis of grade; should state that the grades appear on each bottle cap and are posted in every restaurant, soda fountain, etc.; should state that grade A pasteurized milk is the safest pasteurized grade and that certified and grade A raw milk are the safest raw grades.

(3) The third and last section of the announcement should list the names of the distributors and their grades, in the order of the grades and in the alphabetical order of the distributors.

(4) The statement of grades should be limited to the names of the distributors and the grade of their supplies. No details, such as bacterial counts, etc., should be included in the announcement, as they confuse the buying public. For example, if one distributor's bacterial plate count is given as 20,000 and that of another at 25,000, some customers of the latter will tend to shift to the former, whereas no significant public health distinction exists between the two. The consuming public is not trained to know that bacteriological laboratory results do not permit of such fine distinctions. Furthermore, when grades are next announced, the positions of the two distributors may be reversed, and a second shift of customers occur, all unjustified by significant quality differences.

Such fictitious accuracy in announcing grades tends to give the public the idea that the quality of a given milk supply is not stable. Furthermore, the resulting frequent shifting of customers leads to friction among competitive dairymen, and resentment on the part of the dairy industry toward the health department.

For the above reasons it is believed that the announcement of grades should limit itself to the names of the distributors and the grades of their supplies.

(5) The announcement need not include the names of raw milk producers delivering to pasteurization plants, since their milk supplies do not reach the final consumer as individual supplies.

Certified milk.—*Certified milk is milk which conforms with the requirements of the American Association of Medical Milk Commissions in force at the time of production and is produced under the supervision of the Medical Milk Commission of the Medical Society of _____ County, and of the State board of health or of the city or county health officer of _____.*

The health officer should assure himself by frequent inspections and sample examinations that any certified milk produced for sale in his community fully meets the requirements of the American Association of Medical Milk Commissions in force at the time of production, copies of which may be obtained by addressing the American Association of Medical Milk Commissions, 1265 Broadway, New York, N. Y.

Grade A raw milk.—*Grade A raw milk is milk the average bacterial plate count of which as determined under sections 1(R) and 6 of this ordinance does not exceed 50,000 per cubic centimeter, or the average reduc-*

tion time of which is not less than 8 hours, and which is produced upon dairy farms conforming with all of the following items of sanitation.

ITEM 1r. *Cows, tuberculosis and other diseases.*—A physical examination and, except as provided hereinafter, a tuberculin test of all herds and additions thereto shall be made before any milk therefrom is sold, and at least once every 12 months thereafter, by a licensed veterinarian approved by the State livestock sanitary authority. Said tests shall be made and any reactors disposed of in accordance with the requirements approved by the United States Department of Agriculture, Bureau of Animal Industry, for accredited herds.

A certificate signed by the veterinarian or attested to by the health officer and filed with the health officer shall be evidence of the above test.

Provided that in modified accredited counties the modified accredited area system approved by the United States Bureau of Animal Industry shall be accepted in lieu of annual testing.

For diseases other than tuberculosis such tests and examinations as the health officer may require shall be made at intervals and by methods prescribed by him, and any diseased animals or reactors shall be disposed of as he may require.

Public-health reason.—This item is important because tuberculosis is one of the most important diseases of cows transmitted through milk supplies. Park and Krumwiede's figures indicate that in some regions about one-fourth of all cases of tuberculosis in children under 16 years of age are of bovine origin (Park and Krumwiede, *The Relative Importance of the Bovine and Human Types of Tubercle Bacilli in the Different Forms of Tuberculosis*, collected studies from the research laboratory, Department of Health of New York City, vol. 7, pp. 88-92, 1912-13). Rosenau states that it is now estimated that perhaps 7 per cent of all tuberculosis in man is of bovine origin (Rosenau, *Preventive Medicine and Hygiene*).

The organisms of tuberculosis get into the milk either directly from the udder or indirectly through cow manure. Manure may become a source of infection directly in the case of active intestinal tuberculosis, or indirectly in the case of respiratory tuberculosis as a result of coughing up the organisms and swallowing them. The infected manure then reaches the milk by dropping into it from the udder, etc., during milking or otherwise.

In addition to the transmission of tuberculosis, it is generally considered that milk supplies may transmit infection to man from infected udders, contagious abortion, running sores, "lumpy jaw", etc.

Satisfactory compliance.—The herd must have been tested with tuberculin by a United States accredited veterinarian, or one approved by the State livestock sanitary authority, within 12 months if no reactors were found on the last test, or within 6 months if reactors were found on the last test, except as noted in the ordinance for modified accredited counties. Reactors must have been immediately excluded from the premises and must have been disposed of in accordance with accredited herd requirements. A certificate signed by the veterinarian and filed with the health officer is valid evidence of the T. B. test. The veterinarian must furnish the health officer with a copy of the test charts, describing every animal and giving ear-tag numbers. Additions to the herd, as well as bulls and heifers, must be tested and reported as required above. Certificates signed by the local inspector to the effect that he has seen an original certificate, and giving

the date of the original certificate and the name of the veterinarian who made the test, shall be valid.

The Bureau of Animal Industry of the United States Department of Agriculture and the State livestock board or the State veterinarian will cooperate with the city or county boards of health in testing dairy cattle, provided certain requirements are met. The nature of these requirements can be ascertained from the State veterinarian. The health officer should file his request for cooperative testing with the State veterinarian. He may strengthen his appeal for the testing by enlisting the support of the county agent, farm bureau, board of trade, and civic clubs.

Evidence of satisfactory compliance with respect to diseases other than tuberculosis shall be based upon annual physical examinations supported by such clinical or laboratory tests as may be deemed necessary by the control officials. Diseased animals found at any time shall be removed from the herd and no milk therefrom offered for sale. (Local inspectors should in the regular line of duty be on the lookout for diseased udder conditions.)

ITEM 2r. *Dairy barn, lighting.*—A dairy or milking barn shall be required and in such sections thereof where cows are milked windows shall be provided and kept clean and so arranged as to insure adequate light properly distributed, and when necessary shall be provided with adequate supplementary artificial light.

Public-health reason.—Adequate light makes it more likely that the barn will be clean, and that the cows will be milked in a cleanly manner.

Satisfactory compliance.—The milking portion of the barn must be provided with windows or other openings sufficient in area and so arranged as to insure adequate light properly distributed. If glazed windows are used they shall be kept clean. For new construction 4 square feet of window space per stanchion is recommended.

Adequate artificial lighting must be provided for night milking. The inspector shall consider the requirement of adequate artificial light to be satisfied if the milking portion of the barn is so lighted that cleaning and milking operations can be efficiently performed.

ITEM 3r. *Dairy barn, air space and ventilation.*—Such sections of all dairy barns where cows are kept or milked shall be well ventilated and shall be so arranged as to avoid overcrowding.

Public-health reason.—This item is required in order to avoid overcrowding and to insure proper ventilation.

Satisfactory compliance.—This item shall be deemed to have been satisfied when, in the judgment of the inspector, conditions are such as to result in sufficient fresh air at all times and no overcrowding.

ITEM 4r. *Dairy barn, floors.*—The floors and gutters of such parts of all dairy barns in which cows are milked shall be constructed of concrete or other approved impervious and easily cleaned material, shall be graded to drain properly, and shall be kept clean and in good repair. No horses, pigs, fowl, calves, etc., shall be permitted in parts of the barn used for milking.

4r (a). *Floor construction.*—*Public health reason.*—Floors constructed of concrete or other impervious materials can be kept clean more easily than floors constructed of wood, earth, or similar materials, and are therefore more apt to be kept clean.

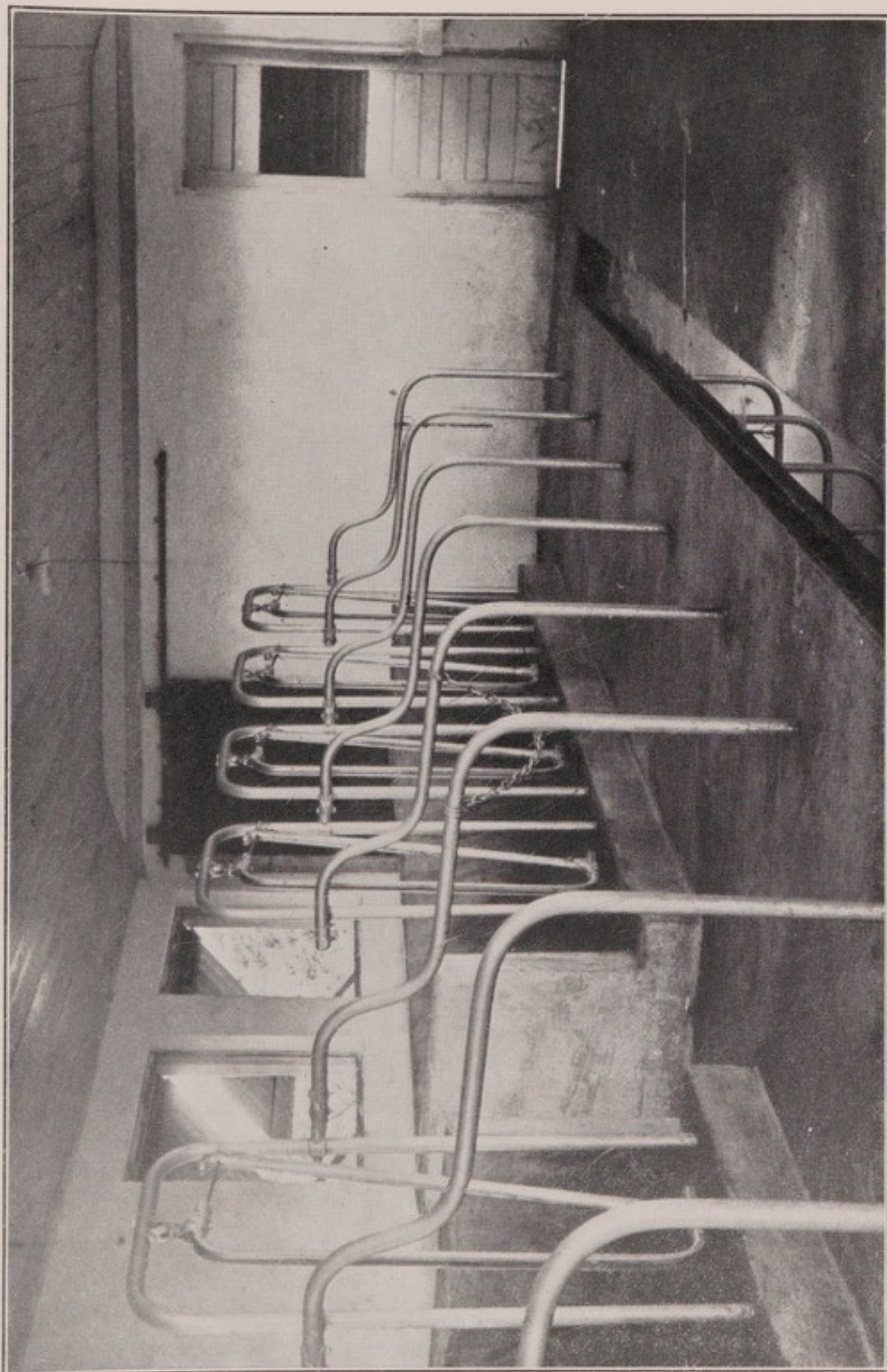
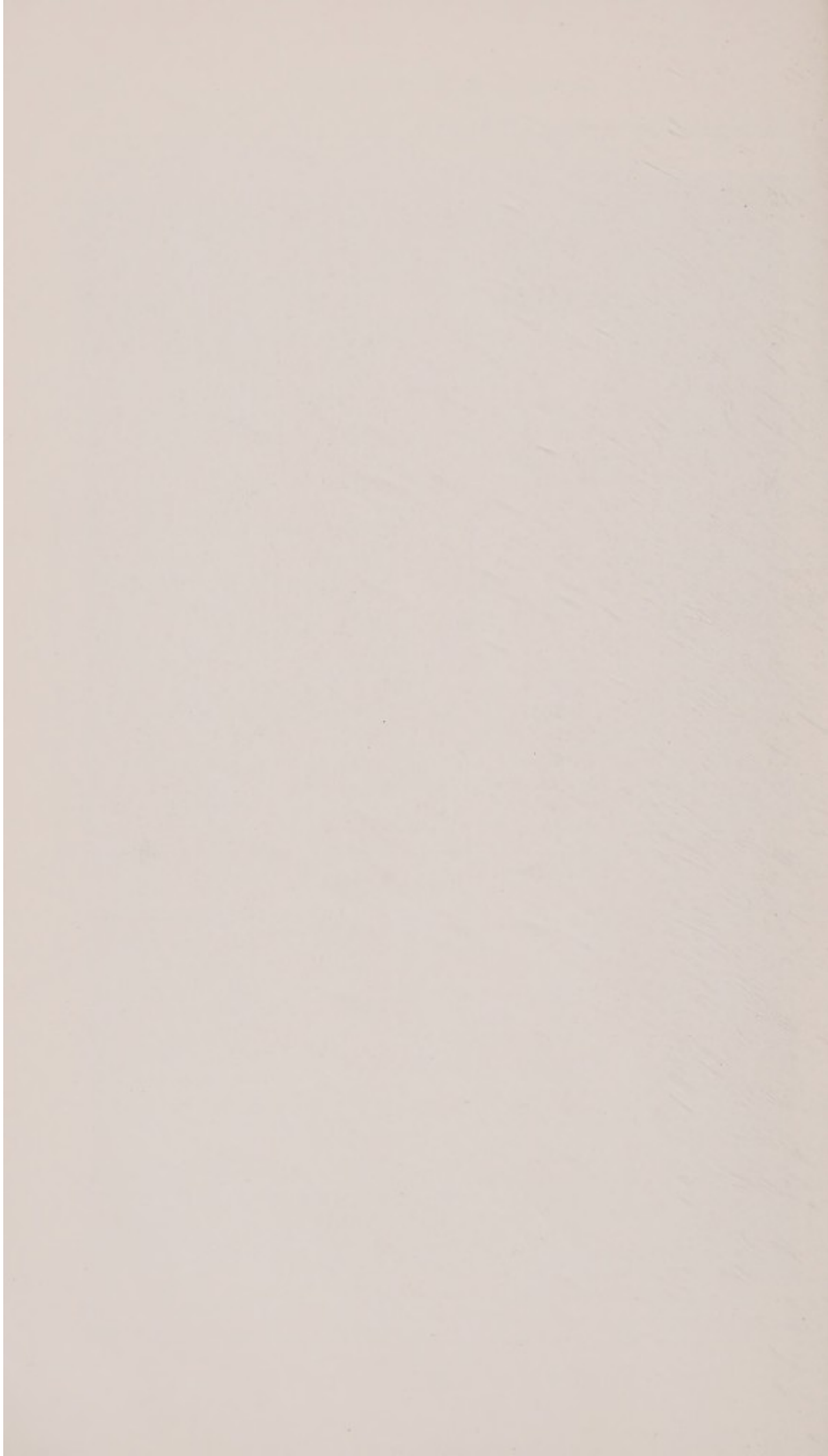


FIGURE 2.—SATISFACTORY TYPE OF MILKING BARN.



Satisfactory compliance.—Plans and directions for laying dairy-barn floors may be found in *Concrete on the Dairy Farm*, published by the Portland Cement Association, Chicago, Ill., or in United States Department of Agriculture Farmers' Bulletin No. 1342.

The floors should preferably be of concrete, but may be of other similarly impervious material. Cork bricks or creosoted wood blocks so long as these are impervious to water and permit no pooling of liquids or wash-water, are approved. Manure gutters shall be of concrete.

Earth floors are not approved because they are not deemed impervious.

Only such portions of milking-barn floors to which cows have access shall be required to be surfaced with impervious material. Feed alleys are included in this exemption, provided that they are floored with tight wood or its equivalent and protected from washings or drainage from other parts of the barn floor.

Other portions of the barn shall be separated from the milking portion by railings or partitions. If such other portions of the barn are not kept clean, and free of dust and objectionable odors, tight partitions are required; in fact, tight partitions are recommended for all cases.

It is recommended, but not required, that feed troughs be of smooth-surfaced concrete in order to facilitate bactericidal treatment when necessary.

Although it has become general practice among modern dairymen to build milking-barn floors of concrete, some dairymen still hesitate to take this step because of the fear of possible injury to their cattle. This objection is answered by the experience of the great number of dairymen who milk on concrete floors. The danger of injuries is not great enough to counterbalance the many advantages of a well-drained, impervious barn floor. The floor should have an untroweled surface in order to prevent slipping. When necessary to keep the cattle in the milking barn, the floors may be bedded in order to prevent discomfort.

Concrete floors in barns under construction or reconstruction should have curbs where the floor joins the walls. These are desirable in order to promote cleanliness in the angles of the floor and walls, and to avoid rotting of wall sills and studs.

Gutters are not technically required under the wording of this section, but they should be urged by the inspector as a means of promoting cleanliness and improving drainage.

4r (b) *Floor cleanliness—Public-health reason.*—A clean floor reduces the chances of contamination of the milk or milk pails during milking. The presence of other animals increases uncleanness.

Satisfactory compliance.—This item shall be deemed to have been satisfied if the milking-barn floor is free of accumulations of filth or litter except such as have accumulated since the beginning of the last milking period; provided that the floor must be clean at the beginning of each milking period; and if horses, pigs, fowl, calves, etc., are kept out of the milking barn.

When floors of milking barns are bedded, bedding containing more than one milking's collection of manure shall be considered as equivalent to unclean floors.

The method of cleaning is immaterial. Dairymen whose barns are provided with water under pressure should scrub the floors after each milking with a stiff-bristled brush. In barns in which water under pressure is not available, the floors may be brushed dry and limed. In the latter event care should be exercised to prevent caking of the lime. If clean floors are not maintained by this method the inspector should require cleansing with water.

ITEM 5r. *Dairy barn, walls and ceilings.*—The walls and ceilings of all dairy barns shall be whitewashed once each year or painted once every 2 years, or oftener if necessary, or finished in an approved manner, and shall be kept clean and in good repair. In case there is a second story above that part of the barn in which cows are milked, the ceiling shall be tight. If the feed room adjoins the milking space, it shall be separated therefrom by a dust-tight partition and door. No feed shall be stored in the milking portion of the barn.

Public-health reason.—Whitewashed, painted, or properly finished walls and ceilings encourage cleanliness. Tight ceilings and feed rooms reduce the likelihood of dust and trash getting into the milk and thus increasing its bacterial count.

Satisfactory compliance.—This item shall be deemed to have been satisfied if the walls and ceilings—

(1) Have been whitewashed or finished with cold-water paint once every year or oftener if necessary; or

(2) Have been painted once every 2 years or oftener if necessary; or

(3) Have interior surfaces of finished concrete, concrete block, brick, tile, galvanized iron, plaster, or similar material, which may be accepted without painting; joints and rafters of the roof structure shall not be required to be whitewashed or painted, but must be kept clean; the use of wall board attached to the rafters to make the ceiling tight shall be accepted; and

(4) Are in good condition, with ceiling tight if there is a second story above the milking portion of the barn, and with a dust-tight partition, provided with doors, separating the milking space from the feed room. No feed shall be stored in the milking portion of the barn except in covered, dust-tight bins or boxes.

It is not required that the barn have four walls extending from the floor to the roof. A shed-type barn shall be approved provided the requirements of item 4r as to animals entering the barn is satisfied. Barns newly constructed of wood shall be required to be painted or whitewashed when completed.

Whitewash formula.—The following formula for whitewash has given satisfaction:

Unslacked lime	pecks	2
Spanish whiting (barium sulphate)	pound	½
Salt	peck	1
Powdered glue	pound	1
Rice flour	do	3

Add water so that it can be applied easily and thoroughly (for full painting and whitewashing instructions see United States Department of Agriculture Farmers' Bulletin No. 1452).

ITEM 6r. *Dairy barn, cow yard.*—All cow yards shall be graded and drained as well as practicable and kept clean.

6r (a). *Grading and draining of the cow yard.*—*Public-health reason.*—The cow yard is interpreted to be that enclosed or unenclosed area

in which the cows are apt to congregate, approximately adjacent to the barn. This area is, therefore, particularly apt to become filthy with manure droppings, and being nearest the barn, may be a public health menace through the breeding of flies. The grading and drainage of the cow yard as far as practicable are required because wet conditions are conducive to fly breeding, make it difficult to keep manure removed, and make it difficult to keep the cows clean.

Satisfactory compliance.—This item shall be deemed to have been satisfied:

(1) When the cow yard has been graded and drained as well as local conditions will permit. Low places must in all cases be filled in. Approaches to the barn door and to stock tanks should preferably be of concrete.

(2) When the wastes from the barn and milk room are not allowed to pool in the cow yard.

The most satisfactory method of conducting milking-barn wastes and wash water beyond the cow yard limit is the construction of a drain. The drain should preferably be lined with concrete, tile, or brick, although a well-kept open earth ditch shall be accepted. Open drains should be recommended because of the danger of frequent clogging of closed drains, unless closed drains of adequate diameter and slope can be provided.

Cow yards which are muddy due to recent rains should not be considered as defective.

6r (b). *Cleanliness of the cow yard—Public health reason.*—If manure and barn sweepings are allowed to accumulate in the cow yard fly breeding will be promoted and the cows will, because of their habit of lying down, be more apt to have manure-soiled udders.

Satisfactory compliance.—This item shall be deemed to have been satisfied if the cow yard is kept clean. Swine shall not be permitted in the cow yard.

ITEM 7r. *Manure disposal.*—All manure shall be removed and stored or disposed of in such manner as best to prevent the breeding of flies therein or the access of cows to piles thereof.

Public health reason.—Improper manure disposal induces the breeding of flies, which are considered capable of transmitting infection to milk or milk utensils.

Satisfactory compliance.—This item shall be deemed to have been satisfied when the manure droppings are removed from the barn floor between each milking and the cow yard is kept clean, and manure is

(1) Spread upon the fields; or

(2) Stored for not more than 4 days in a pile on the ground surface and then spread upon the field; or

(3) Stored for not more than 7 days in an impervious floored bin or upon an impervious curbed platform, and then spread or stored in a tight, screened, and trapped manure shed; or

(4) Fly breeding is minimized by methods equivalent to the following recommendations of the United States Department of Agriculture, Bureau of Dairying, Milk Inspector Letter No. 104, May 1926:

Any program to eradicate flies from dairies should begin with the elimination of breeding places. The premises should be cleared of piles of manure and other refuse, such as spoiled silage and accumulations of wet and decaying hay and

straw. Even with the utmost care flies cannot be entirely prevented from breeding, and it is necessary to destroy those which do appear from undetected breeding places and the premises of neighbors. In carrying on this work, traps properly constructed and baited, and the judicious use of sprays will be found helpful and not exorbitantly expensive.

The baited traps are used for catching the flies which do not bite but get their nourishment from foods they can suck through their elongated mouth parts. Most of these are the common house flies. The spray is used to kill or repel the biting type of flies that live on blood, which they obtain by piercing the skins of animals. Stable and horn flies are examples of this type.

Last year the Bureau of Dairying, on its experimental farm at Beltsville, Md., with the cooperation of the Bureau of Entomology, made effective use of the fly-fighting measures outlined above. The premises were kept as free as possible from accumulations of manure. Box stalls were cleaned and scraped regularly. As a rule, manure was not allowed to accumulate near the buildings for more than 3 or 4 days, and an effort was made to have the immediate premises entirely freed from accumulations of manure at least once each week. Cylindrical traps like those described in Farmers' Bulletin 734 were set as soon as the first flies appeared. They were baited with black strap molasses from sugarcane diluted with 3 or 4 parts of water. The bait was removed once a week and the traps emptied when the accumulation of dead flies was so great as to reduce seriously the light under the trap. Before emptying the traps the living flies were killed by steaming the traps for about a minute in a steam sterilizer. During the season the 10 traps used caught 86 gallons, or approximately a half billion flies. The milk room was practically free from flies throughout the whole season.

In order to protect the cattle as much as possible from horn and stable flies a spray was used. It was thought best to apply a spray which would kill the flies rather than merely repel them.

A good killing spray may be made by suspending 5-10 pounds of unground, half-closed pyrethrum flowers (inclosed in a double-thickness cheesecloth bag) in a mixture of 9 gallons of kerosene and 4 quarts of fuel oil of 28-32 gravity. The mixture should stand 24 hours before being used. It may not kill all the flies immediately, but many flies that are hit will fly away and eventually die. Fuel oil is the ordinary low-grade oil that is burned in furnaces for heating, and usually can be bought from fuel dealers. The "28-32 gravity" does not mean "specific gravity", but is a commercial term used in the oil business. If 28-32 oil is not available, use any furnace oil. Lubricating oils, including waste oils from engines, should not be used. When only small quantities of spray are required, concentrated pyrethrum extracts may be bought. These need only the addition of kerosene and fuel oil to make them effective.

To apply this extract an air-pressure sprayer was used which held about one gallon and could easily be operated with one hand. In spraying for horn flies an attempt was made to catch them in a cloud of vapor as they swarmed up after the first spray struck them, and this was very effective. They were easily killed by the pyrethrum extract. In applying this spray, a nozzle which will produce a very fine vapor should be used. This is facilitated by using plenty of pressure.

In spraying for stable flies, which are in most cases found sucking blood from the cows' legs, the spray was shot directly on them, usually with telling effect. Since the major part of the spray is kerosene, care was taken not to cover the cattle with it unnecessarily, and they were not curried or brushed, or turned out in the hot sun immediately after being sprayed. By observing these precautions no trouble was experienced from blistering.

Although in both seasons the horn flies had appeared in considerable numbers before the spray was used, their numbers were appreciably reduced after a week of daily spraying, and they were easily kept under control the rest of the season.

Requirements (1) to (4) shall apply only during the fly-breeding season. Manure, if stored in a pile, shall be stored in such a way as to be inaccessible to the cows.

ITEM 8r. *Milk house or room, construction.*²—*There shall be provided a milk house or milk room for the cooling, handling, and storage of milk and/or milk products and the washing, bactericidal treatment, and storage of milk apparatus and utensils. The milk house or room (a) shall be provided with a tight floor constructed of concrete or other impervious*

² The place in which utensils are washed shall be considered part of the milk room and all requirements of this section shall apply thereto.

material, in good repair, and graded to provide proper drainage; (b) shall have walls and ceilings of such construction as to permit easy cleaning, and shall be well painted or finished in an approved manner; (c) shall be well lighted and ventilated; (d) shall have all openings effectively screened including outward-opening, self-closing doors, unless other effective means are provided to prevent the entrance of flies; and (e) shall be used for no other purposes than those specified above except as may be approved by the health officer, shall not open directly into a stable or into any room used for domestic purposes, shall have water piped into it, shall be provided with adequate facilities for the heating of water for the cleaning of utensils, shall be equipped with stationary wash and rinse vats, which, in the case of retail raw milk, if chlorine is employed as the principal bactericidal treatment, shall be of the 3-compartment type, and shall be partitioned to separate the handling of milk and the storage of cleansed utensils from the cleaning and other operations, which shall be so located and conducted as to prevent any contamination of the milk or of cleaned equipment.

8r (a). *Floors (concrete or other impervious material, graded to drain)*—*Public-health reason.*—A well-drained concrete or other impervious floor promotes cleanliness.

Satisfactory compliance.—This item shall be deemed to have been satisfied when the floor consists of concrete, brick, tile, asphalt-macadam, or other composition material laid so as to be impervious and to drain properly.

Drain pipes should be carefully set before the floor is laid. A grade of one-fourth to one-half inch per foot gives ample floor drainage. The finish of the floor should be as smooth as possible, and the junction of the floors and walls should be curbed and the joints rounded to avoid angles for collecting and holding dirt. If the milk house is of frame construction, all walls (including partitions) should be made of the floor material up to a height of 10 or 12 inches.

If the milk house, including the floor, was in existence when this ordinance was passed, a tight floor of tongue-and-groove flooring, rubber composition, or sheet metal which has been painted or otherwise treated to make it waterproof, may be taken by the inspector to comply with the specifications for the production of grade A raw milk until it needs repairs, at which time it must be covered or replaced with surfacing satisfying the previous specifications of this item.

Milk-house floors of brick or concrete in which depressions have been worn so that liquids stand in them, are unsatisfactory. Smooth floors, the drainage of which is not good, are unsatisfactory. Such conditions can usually be remedied by a new covering of rich cement or fine aggregate concrete, preferably at least 2 inches thick to avoid frequent repairs.

8r (b). *Walls and ceiling (painting or other approved finish, easily cleaned)*—*Public-health reason.*—Construction which permits easy cleaning promotes cleanliness.

Satisfactory compliance.—This item shall be deemed to have been satisfied when all parts of the walls and ceiling, except light openings, are composed of

(1) Smooth-dressed lumber, sheet metal, or plaster board, well painted with washable paint; or

(2) Tile, cement blocks, bricks, concrete or cement plaster, provided that the surfaces and joints are smooth.

The milk room should not be required to be ceiled overhead unless flies cannot otherwise be kept out, as in the case of corrugated-metal roofing, where openings under corrugations cannot easily be fly-

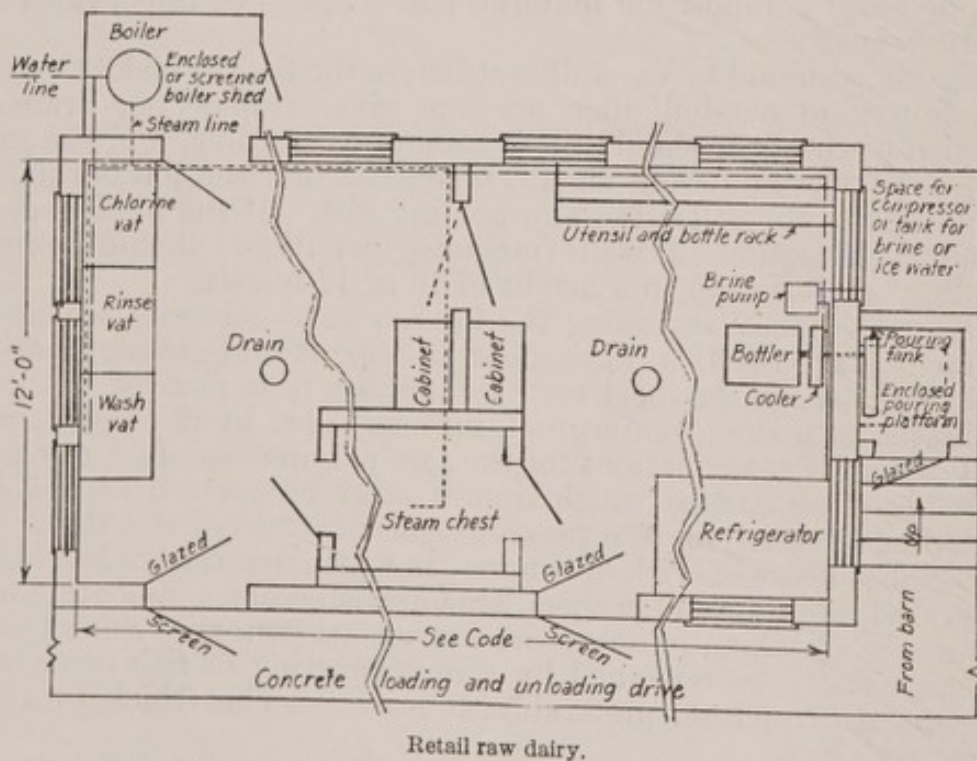
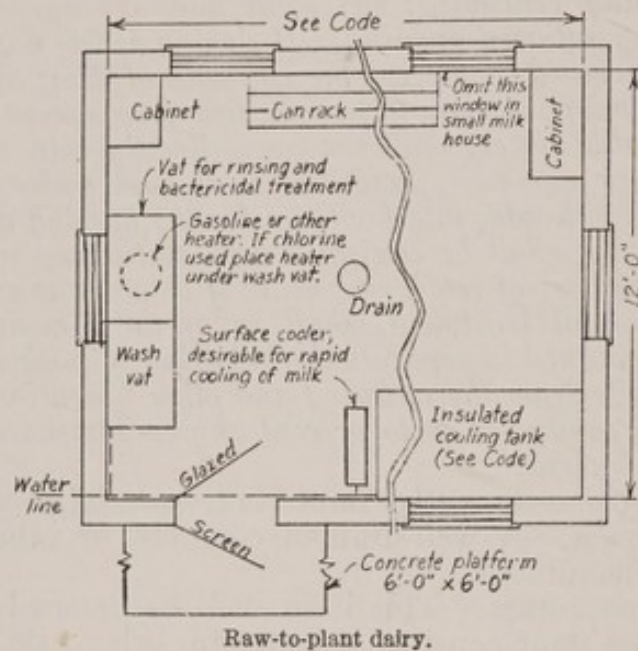


FIGURE 3.—Suggested milk-house plans for raw-to-plant dairy and for retail raw dairy.

NOTES.—Floors slope $\frac{1}{4}$ inch in 1 foot toward drains. Walls concreted to at least 12 inches above floor level, and joints rounded. Doors and windows screened with 16-mesh wire. Doors self-closing. Total window and glazed-door area to be at least 10 percent of floor area.
In retail raw dairy plan, if dry heat from a gasoline or electric heater is used in bactericidal chest, same chlorine and heat treatment of utensils. Ordinance does not require both

proofed, or unless the roof construction is such that the underside cannot easily be kept clean and free of cobwebs.

The inside walls of the milk room may be approved unshathed, provided the inside surfaces of the outer sheathing and all framing

surfaces are smooth-dressed and painted. This interpretation applies to partitions also.

8r (c). *Lighting and ventilation—Public-health reason.*—Ample light promotes cleanliness, and proper ventilation reduces likelihood of odors.

Satisfactory compliance.—This item shall be deemed to have been satisfied if the window space is not less than 10 percent of the floor area

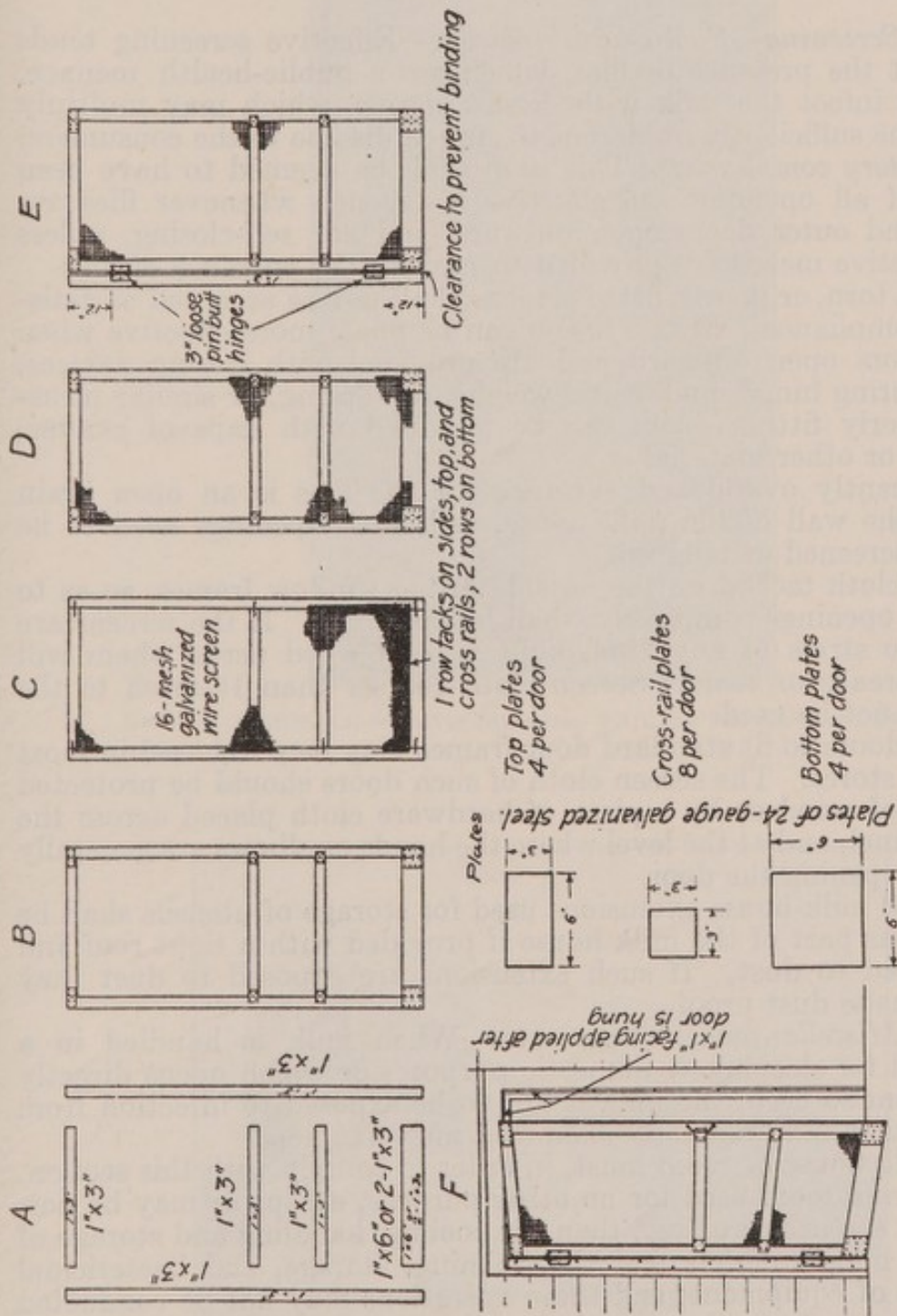


FIGURE 4.—Home-made screen door. (U. S. P. H. S. screen-door model 2.)

SCHEDULE OF OPERATIONS

1. Cut frame members as shown in sketch A.
2. Attach cover plates. All nails should clinch. Sketch B.
3. Turn door over. Insert $\frac{1}{4}$ by 5 inch corrugated fasteners across joints to stiffen. Tack on screen. Two rows of tacks at bottom. Sketch C.
4. Nail cover plates over screen. Clinch nails. Sketch D.
5. Turn door screen side down and attach hinges and hanging strip. Sketch E.
6. Attach door to house to overlap opening. Sketch F. Put 1 by 1 inch facing strips along top and open side.
7. Attach good coil spring to cross member to keep door closed. Examine door for good fit.

and light is reasonably evenly distributed, and if the milk house is adequately ventilated in the judgment of the inspector.

Milk houses in dusty locations shall be required to have glazed windows, which shall be kept closed during dusty weather.

Artificial lighting is also important. The milk house must be well lighted for periods when there is not sufficient natural light. The

inspector shall consider the milk house to be adequately provided with artificial light if it is equipped with at least one 25-watt electric light or its equivalent for each 100 square feet of floor area, reasonably evenly distributed. An ordinary 1-inch-wide flat-wick oil lamp in good condition shall be considered the approximate equivalent of one 25-watt electric light. A gasoline or gas mantel lamp in good condition shall be considered the equivalent of four 25-watt electric lights.

8r (d). *Screening—Public-health reason.*—Effective screening tends to prevent the presence of flies, which are a public-health menace. Flies may infect the milk with disease germs, which may multiply and become sufficiently numerous to spread disease to the consumers.

Satisfactory compliance.—This item shall be deemed to have been satisfied if all openings are effectively screened whenever flies are evident and outer doors open outward and are self-closing, unless other effective means are provided to prevent the entrance of flies.

Broken, torn, or poorly fitted screens shall not be accepted as satisfactory compliance. Fly exclusion can be made more effective when screen doors open outward and are provided with closing devices, such as spring hinge, pulley and weight, coil spring, or similar measures. Poorly fitting doors can be provided with flaps of canvas, linoleum, or other material.

A frequently overlooked entrance for the flies is an open drain through the wall of the milk house. All such openings need to be properly screened or plugged.

Screen cloth tacked on the outside of the window frames, so as to cover the openings completely, shall be approved. If the screens are exposed to stress of any kind, light bars of wood across them will prevent breaks or tears. Screen cloth coarser than 16-mesh to the inch shall not be used.

Screen doors to fit standard door frames may be purchased in most hardware stores. The screen cloth of such doors should be protected by strips of wood or by a piece of hardware cloth placed across the bottom panel, and at the level where the hands or elbows are generally placed in opening the door.

Screened milk-house extensions used for storage of utensils shall be approved as part of the milk house if provided with a tight roof and not exposed to dust. If such extensions are exposed to dust they shall be made dust proof.

8r (e). *Miscellaneous requirements.*—When milk is handled in a room used for sleeping or domestic purposes or which opens directly into a room so used, the milk is apt to be exposed to infection from persons other than regularly examined milk handlers.

The milk house or room must, in order to comply with this section, be a separate room used for no other purpose, except as may be permitted by the health officer, than the cooling, handling and storage of milk and milk products and the cleaning, storage, and bactericidal treatment of equipment; and these operations may not be conducted elsewhere except as subsequently noted.

The milk barn is usually infested with some flies. If the milk room opens directly into the barn, so that a door is the only barrier between it and the barn, flies are certain to enter the milk room in larger numbers. When the milk house is a part of or attached to the barn or dwelling, this part of item 8r shall be deemed to have been

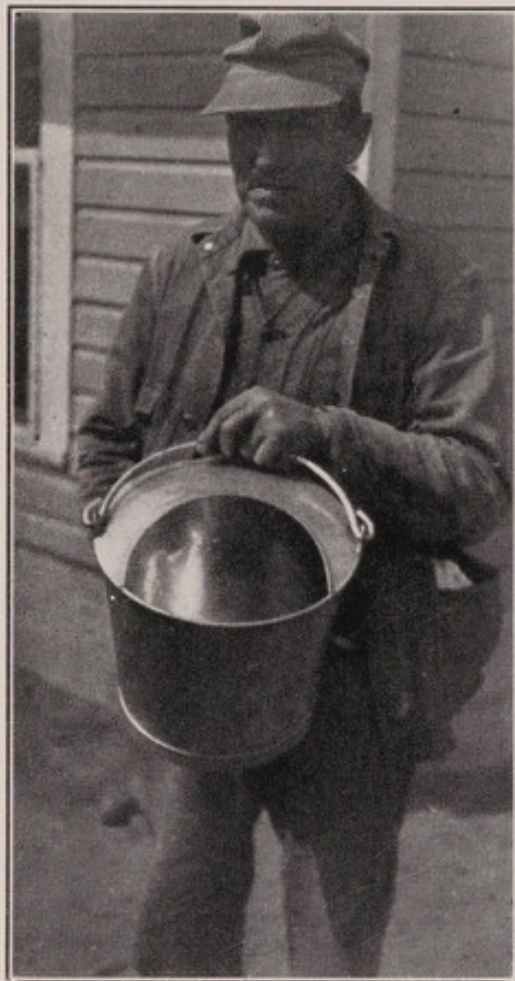


FIGURE 5.—SMALL-MOUTH MILKING PAIL OF APPROVED DESIGN.

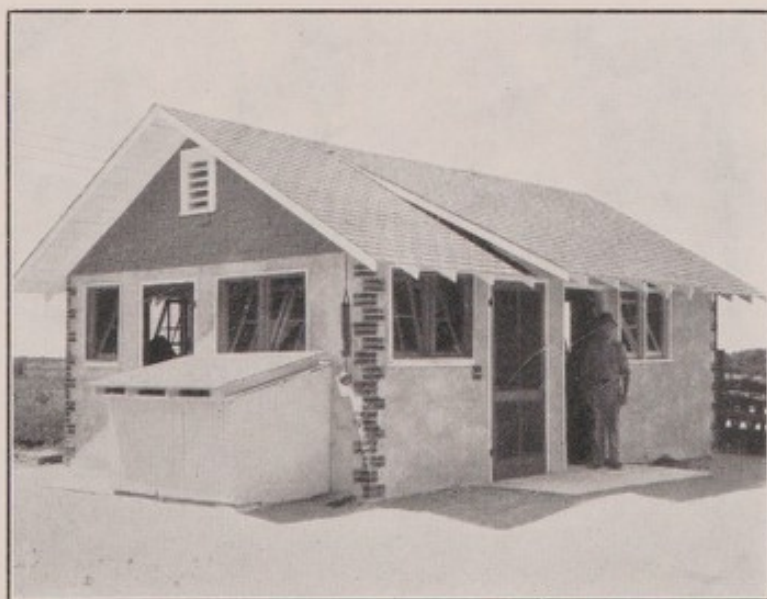
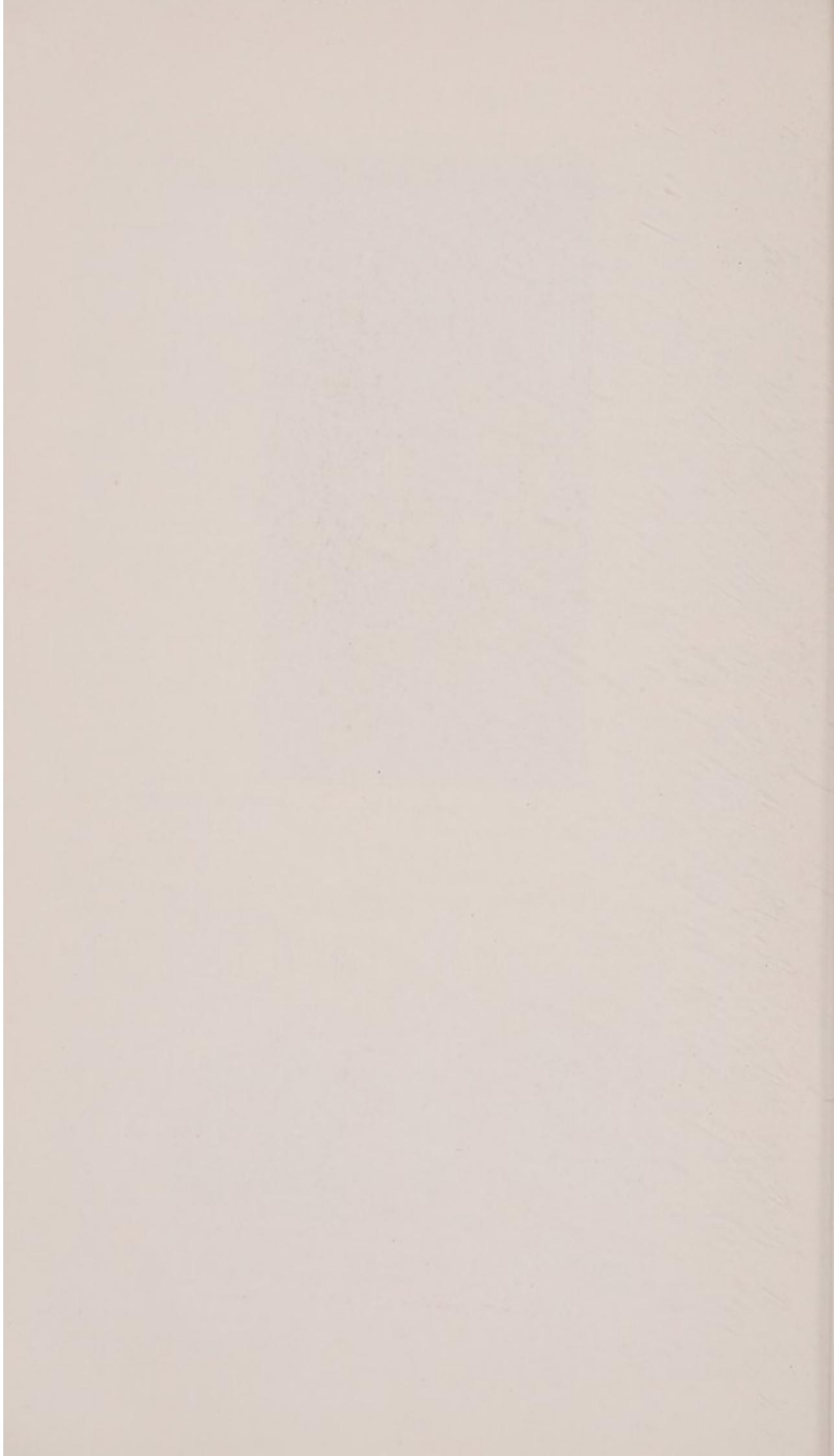


FIGURE 6.—EXTERIOR OF MILK HOUSE.



satisfied if there is an outside entrance but no entrance through the partition wall, or, if entered from the barn, the entrance is through self-closing doors having a vestibule between them and so arranged that both doors will not be open at the same time. Pouring milk into conductors which are protected, or passing the pails of milk through self-closing openings not exceeding 4 square feet into the milk house will be considered satisfactory compliance.

The factors and conditions which should determine the location of the milk house are:

- (1) Availability of water.
- (2) Transportation of every bucketful of milk from the barn.
- (3) Drainage.

Each milk house shall be provided with adequate facilities for the heating of water for the cleansing of utensils. The piping of water into the milk house shall be required.

The milk house shall be equipped with stationary wash and rinse vats, and in case chlorine is employed as the principal bactericidal treatment these shall be of the 3-compartment type. Stationary or 3-compartment wash and rinse vats are not required in the production of grade B raw milk. Three-compartment vats are not required for the production of milk for pasteurization.

The waste water from the washing of utensils and the scrubbing of the milk house must be led away, and the surroundings of the milk room should be clean and dry. For these reasons the milk house should preferably be located where the natural drainage is good. Wastes from the milk room shall be disposed of as indicated for barn wastes under item 6r (a).

The rooms in which milk or milk products are handled and cleansed utensils are stored shall be partitioned from rooms in which other processes are conducted, but this requirement shall not apply to the production of milk for pasteurization or of grade B retail raw milk or milk products. Such partitions shall be provided with self-closing doors. For existing milk rooms this partitioning requirement may be waived, provided the room is obviously large enough so as to preclude contamination of the milk or cleansed utensils from the washing operations.

The milk inspector may be guided by the following suggested approximate milk-house dimensions, exclusive of any space for pouring platform, boiler, compressor, or brine tank.

Suggested floor space of milk house

Milk output in gallons	Existing milk houses		Future milk houses	
	Retail raw	Raw-to-plant	Retail raw	Raw-to-plant
Under 20.....	12 by 14 feet.....	10 by 8 feet.....	12 by 18 feet.....	12 by 10 feet.
20 to 50.....	12 by 16 feet.....	10 by 10 feet.....	12 by 20 feet.....	12 by 12 feet.
50 to 100.....	12 by 18 feet.....	10 by 12 feet.....	12 by 22 feet.....	12 by 14 feet.
Over 100.....	12 by 20 feet.....	10 by 14 feet.....	12 by 24 feet.....	12 by 16 feet.

See accompanying suggested designs, and also Farmers' Bulletin No. 1214.

ITEM 9r. *Milk house or room, cleanliness and flies.*—The floors, walls, ceilings, and equipment of the milkhouse or room shall be kept clean at all times. All means necessary for the elimination of flies shall be used.

Public-health reason.—Cleanliness and freedom from flies in the milk room reduce the likelihood of contamination of the milk.

Satisfactory compliance.—This item shall be deemed to have been satisfied if:

(1) The floors, walls, windows, shelves, tables, and equipment are clean.

(2) The milk room is free of trash and articles not used in milk-room work, such as empty cap cartons, pasteboard boxes, old papers, feed sacks, broken crates, bottles, etc.

(3) Very few or no flies are present.

The milkhouse floors should be flushed and swept immediately after the operations incidental to each milking are completed. Tables should be scrubbed daily. Unless the boards of table tops are tight fitting they should be separated by spaces at least three-eighths inch wide. The walls and ceiling should be flushed down as often as necessary.

Accumulations of rubbish have no place in the milkhouse and should be removed.

The washing vat and its surroundings should receive careful inspection. Coagulated grease is often permitted to accumulate in corners and crevices, and especially between the vat and the wall. The bottle brush and shaft are sometimes badly in need of cleaning.

Some flies inevitably enter the milkhouse in spite of good screening. These should be killed daily by means of fly paper, fly traps, or fly-killing sprays or powders, or other means.

This section does not specifically forbid the location of gas engines in the milk room, but experience has indicated that it is extremely difficult to keep clean those milk rooms in which gas engines are located. There are also the disadvantages of heat and odor. The inspector should therefore advise against this practice, because if uncleanliness is later observed by him he will be obliged to report a violation of this requirement, and the dairyman may be forced to relocate his machinery in order to regain his grade.

ITEM 10r. *Toilet.*—Every dairy farm shall be provided with one or more sanitary toilets conveniently located, and properly constructed, operated, and maintained so that the waste is inaccessible to flies, and does not pollute the surface soil or contaminate any water supply.

Public-health reason.—The organisms of typhoid fever, dysentery, and colitis are present in the body wastes of persons sick with these diseases. In the case of typhoid fever well persons (carriers) may discharge the organisms in their body wastes. If a toilet is not fly tight and so constructed as to prevent overflow, infection may be carried from the excreta to the milk by flies, or through the pollution of water supplies or streams in which the cows wade.

Satisfactory compliance.—This item shall be deemed to have been satisfied if:

(1) There is one or more flush toilets connected to a sewer system or to a residential sewage-disposal plant and constructed and operated in accordance with plans and instructions of the State board of health; or

(2) A chemical toilet or pit privy is provided, constructed, and operated in accordance with plans and instructions of the State board of health in those States permitting the use of these types of toilets; and

(3) There is no evidence of human defecation or urination about the dairy premises except in the toilets provided for these purposes.

Provided further, that (1) and (2) shall include at least the following minimum standards:

A. *Flush toilets.*—At dairy farms provided with water under pressure, flush toilets are preferable, and their installation shall conform

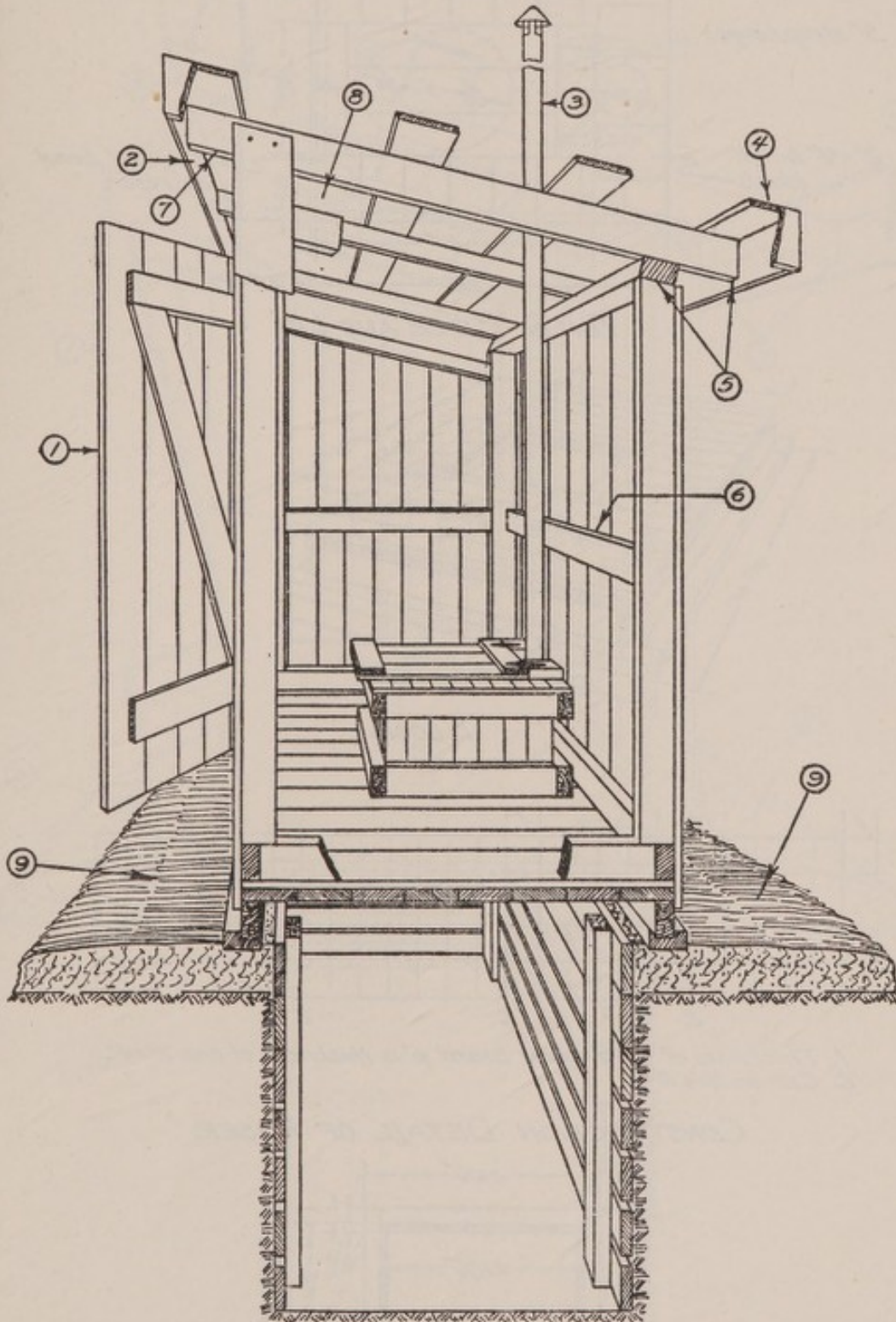
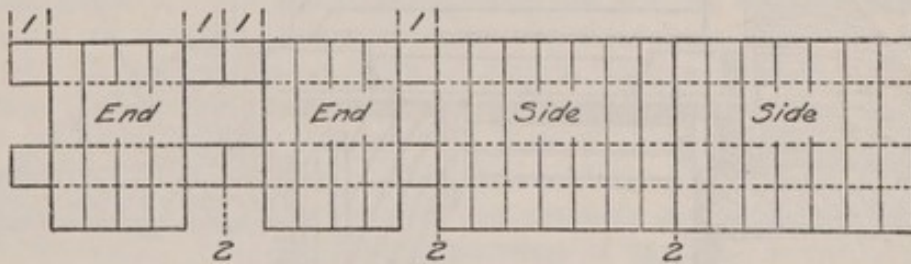
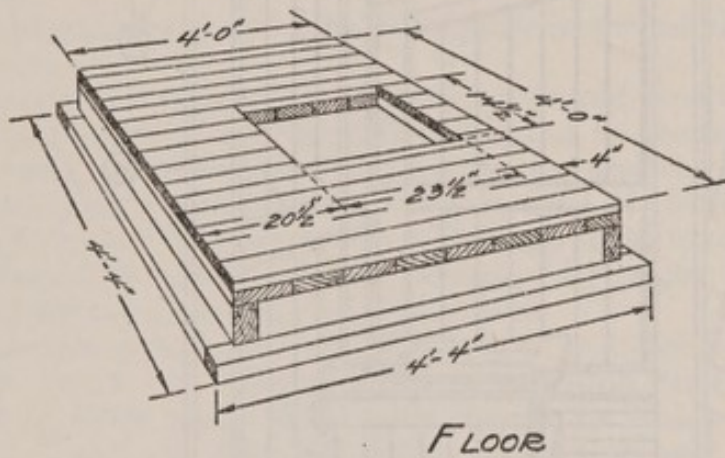
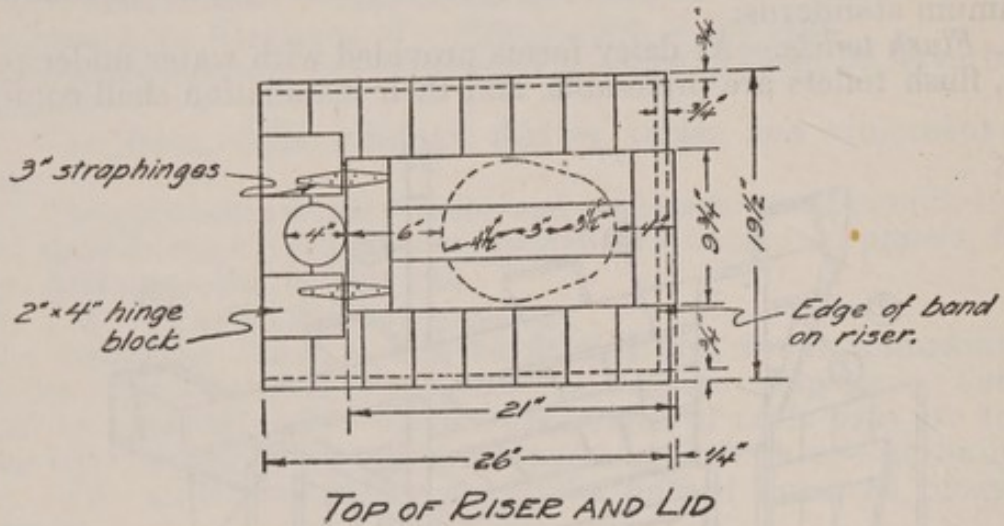


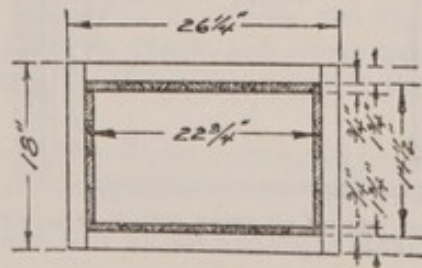
FIGURE 7.—Suggested wood-floor wood-riser pit privy with floor constructed on sills independent of curbing. (From Supplement No. 108, P. H. Reports.)

to the local or State plumbing regulations, or in the absence of these, to good plumbing practice which shall be interpreted to mean (a) water pressure at all times sufficient to fill the toilet reservoir; (b) toilet bowl of nonabsorbent material, rim-flush, properly vented and



1. Thickness of 3/4" flooring board plus thickness of one 2" x 4"
2. Cut on this line.

CONSTRUCTION DETAIL OF RISER



PLAN OF ASSEMBLED RISER

FIGURE 7.—Suggested wood-floor wood-riser pit privy with floor constructed on sills independent of curbing. (From Supplement No. 108, P. H. Reports.)—Continued.

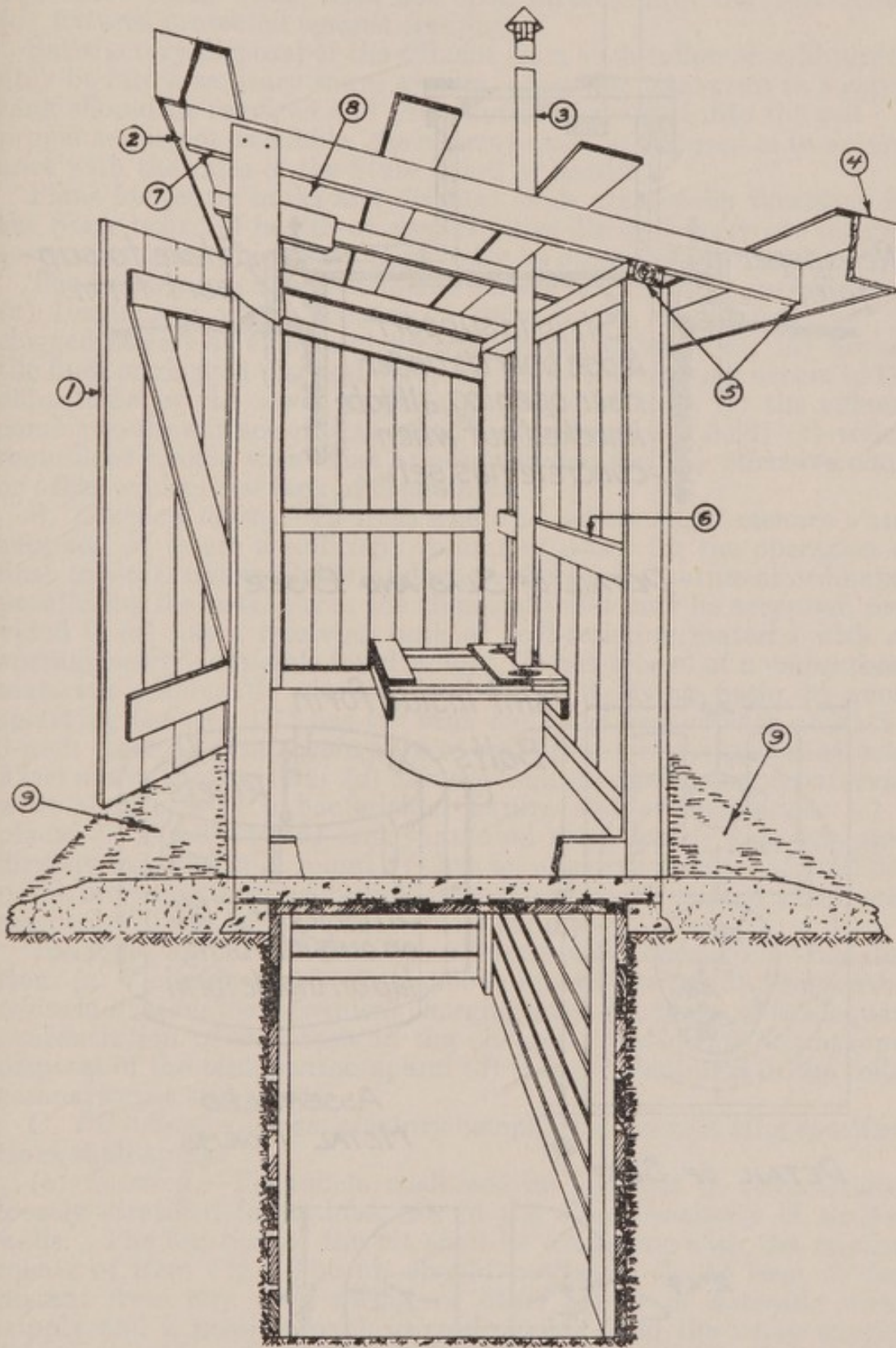
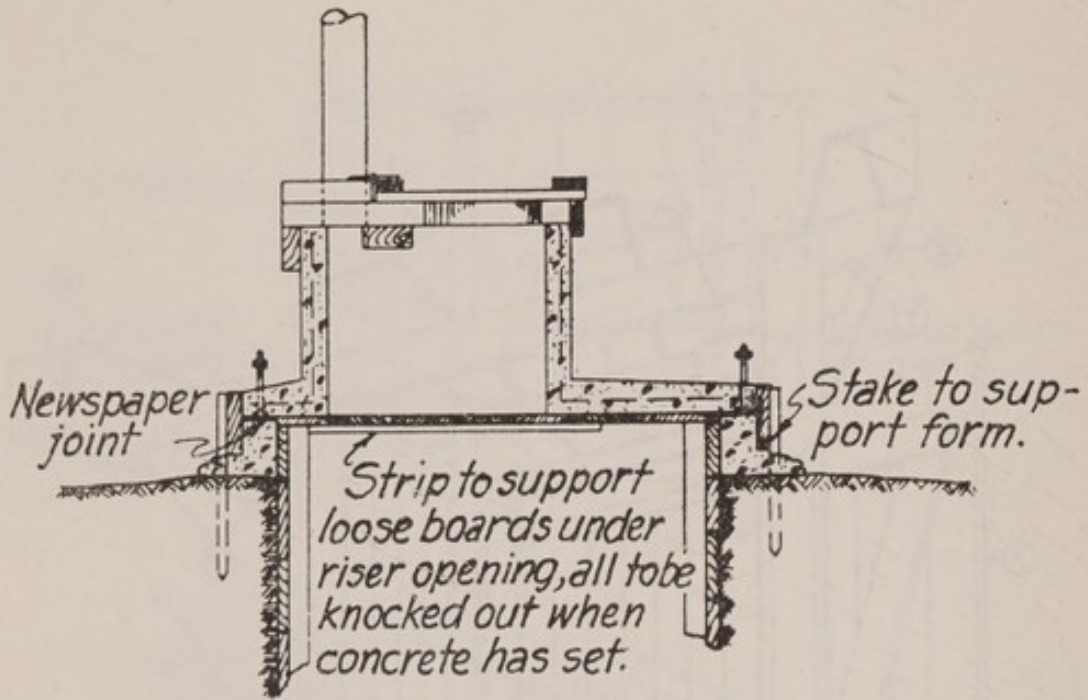


FIGURE 8.—Suggested concrete-floor concrete-riser pit privy. (From Supplement No. 108, P. H. Reports.)



DETAIL OF SLAB AND RISER

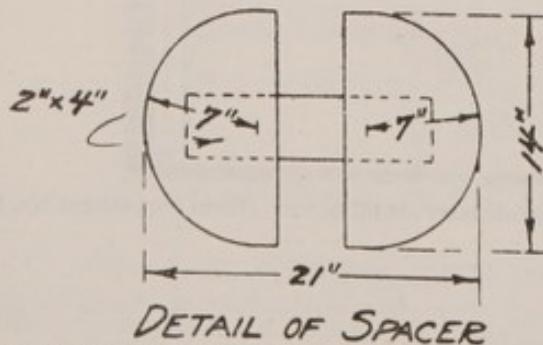
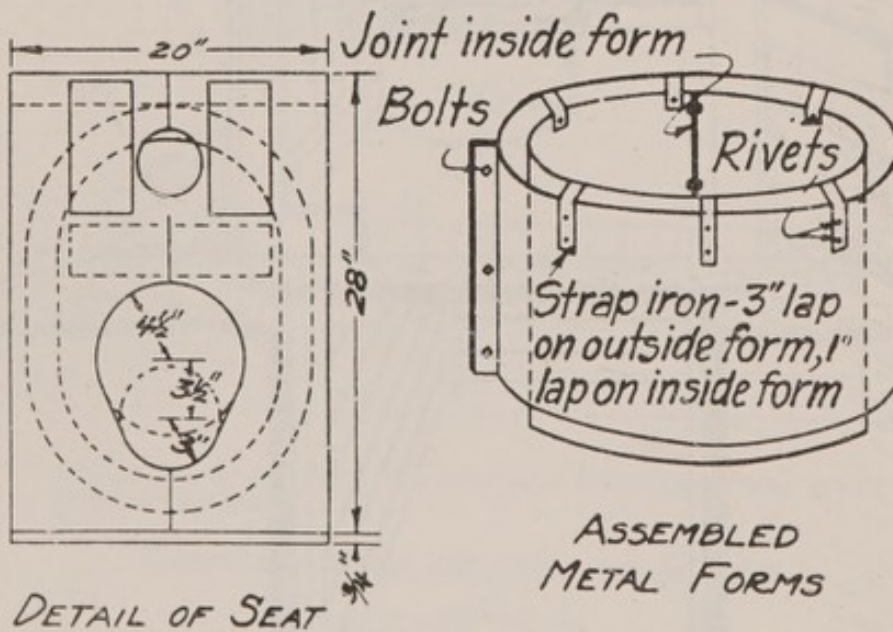


FIGURE 8.—Suggested concrete-floor concrete-riser pit privy. (From Supplement No. 108, P. H. Reports.)—Continued.

trapped, and with tight joints; (c) toilet placed in a well lighted and ventilated room which does not open directly into the milk room; (d) fixtures protected against freezing.

Satisfactory disposal of the effluent from such toilets should preferably be into a sanitary sewer system, otherwise treatment in a septic tank should be required and the effluent discharged into the soil. If proper soil is not available, the effluent shall be disposed of in accordance with the rules of the State board of health.

Plans for septic tanks and disposal fields are usually furnished by the State board of health or else inquiries directed there are referred to sources from which such plans may be obtained.

The following shall be considered defects in flush-toilet installations: (a) Insufficient water pressure or volume; (b) leaky plumbing; (c) clogged sewers as evidenced by overflowing toilet bowl; (d) broken tile lines or clogged disposal field; (e) dairy cows having access to the effluent below the sewer or disposal field discharge; (f) the effluent coming to the surface of the ground in the absorption field; (g) toilet-room floor soaked with urine or other discharges; (h) offensive odors or other evidence of lack of cleanliness.

B. *Chemical toilets.*—In areas where pit toilets might menace water supplies, or where a sufficient volume of water for the operation of flush toilets is not available, and where there is no statute or ordinance prohibiting its installation, the chemical toilet may be accepted, provided it (a) has a receiving tank of acid-resisting material with an opening easily accessible for cleaning; (b) has a bowl of nonabsorbent materials sufficiently elevated above the receiving basin to avoid splashing the user; (c) has the tank and bowl vented with at least a 3-inch screened pipe, preferably of cast iron, which extends at least 2 feet above the roof line; (d) has the tank charged at proper intervals with chemicals of a bactericidal nature and concentration; (e) is placed in a well lighted and ventilated room which does not open directly into the milk room; (f) has an effective method of final disposal, including burning, burial, or leaching vat or cesspool where such cesspool will not endanger any water supply.

The following shall be considered defects in a chemical toilet installation: (a) Violation of any of the above requirements; (b) disagreeable odors indicating too infrequent charging with chemicals, or inadequate concentration of chemicals in the charge; (c) evidence of improper disposal of the tank contents; and (d) lack of cleanliness in the toilet compartment and room.

C. *Pit toilets.*—For satisfactory compliance the following specifications shall apply:

(a) *Location.*—Pit toilets shall not be installed in cavernous or loosely stratified formations, nor in the close proximity of shallow wells. The location of the pit shall be consistent with the requirements of item 11r. The pit should preferably be at least 50 feet distant from any well, spring, or other source of domestic water supply and if possible upon ground sloping from the water supply. Distances of less than 50 feet should be permitted only upon the approval of the health authority having jurisdiction.

(b) *The pit.*—The pit shall have an original minimum capacity of not less than 60 cubic feet and shall be so excavated that the cribbing, when inserted, shall make a firm, uniform contact with the earth walls on all sides.

(c) *Pit cribbing.*—The pit cribbing shall extend not less than three inches above the original ground line, and to the full depth of the pit except in rock formation or in very tight soil in which cases the lower section of the cribbing may be omitted.

(d) *Pit curbing.*—In case of concrete or metal-slab privies, an additional collar of reinforced concrete shall be constructed around and

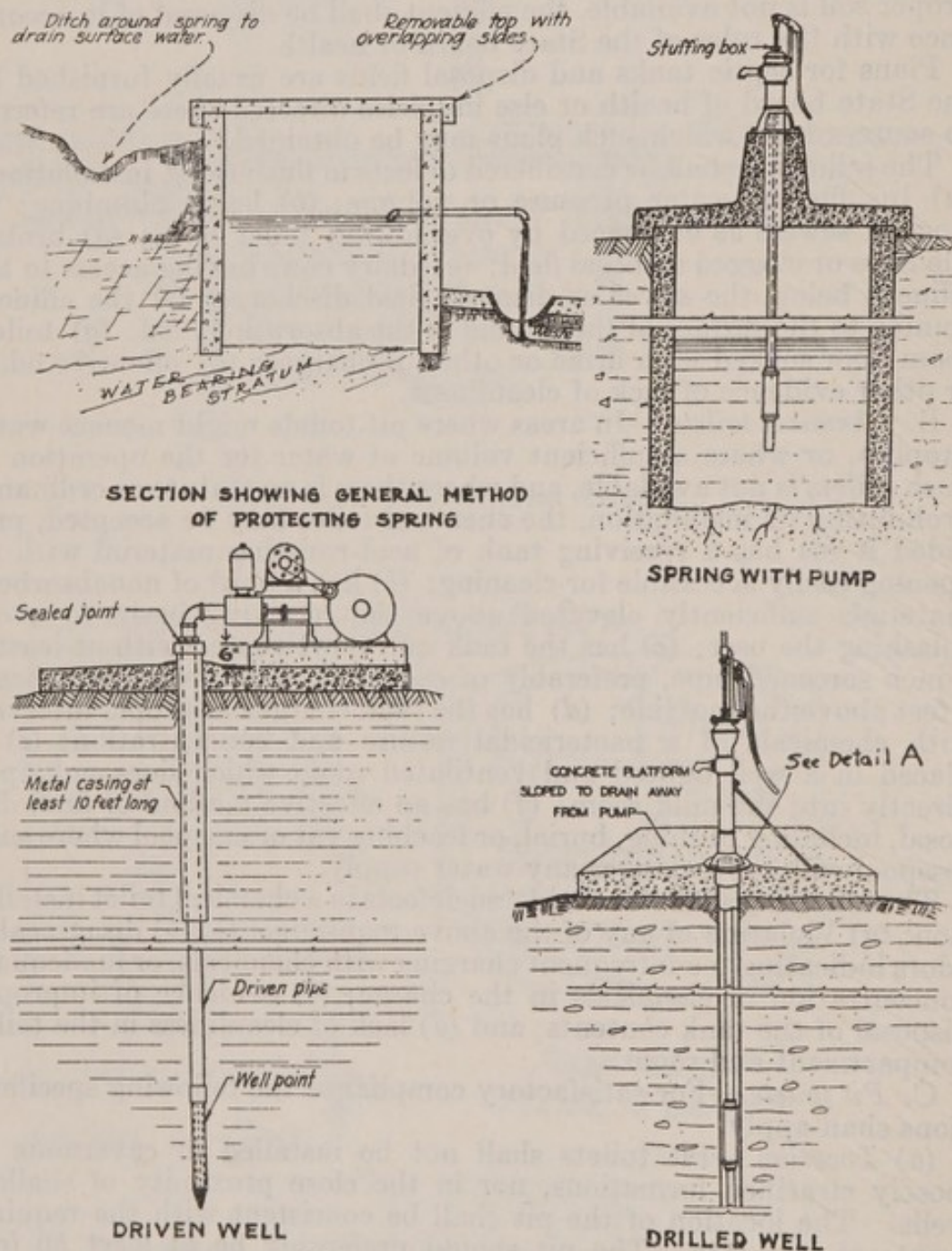


FIGURE 9.—Spring and well designs.

just outside the top of the pit cribbing on which to set the slab. This collar shall be at least 3 inches wide and extend down at least 4 inches into firm earth and up to the top of the pit cribbing. In the case of wood-slab privies, if such a concrete collar is not constructed, there shall be constructed in lieu thereof a mud sill of at least 2 by 4 inches material around and just outside the top of the pit cribbing. This

sill shall be at least as long and as wide as the privy floor or pit cover and shall be set on well-tamped earth.

(e) *Pit mound*.—An earth mound shall be banked by tamping the excavated earth in layers around the pit curbing and level with the top of the curbing for a distance of not less than 18 inches, thence outward to meet the surrounding ground surface with a slope not greater than 1 in 3.

(f) *Seat riser*.—The bench or seat riser shall have an inside clearance of not less than 18 inches to the front and rear walls and not less than 12 inches to the side walls. The top of the seat shall be not less than

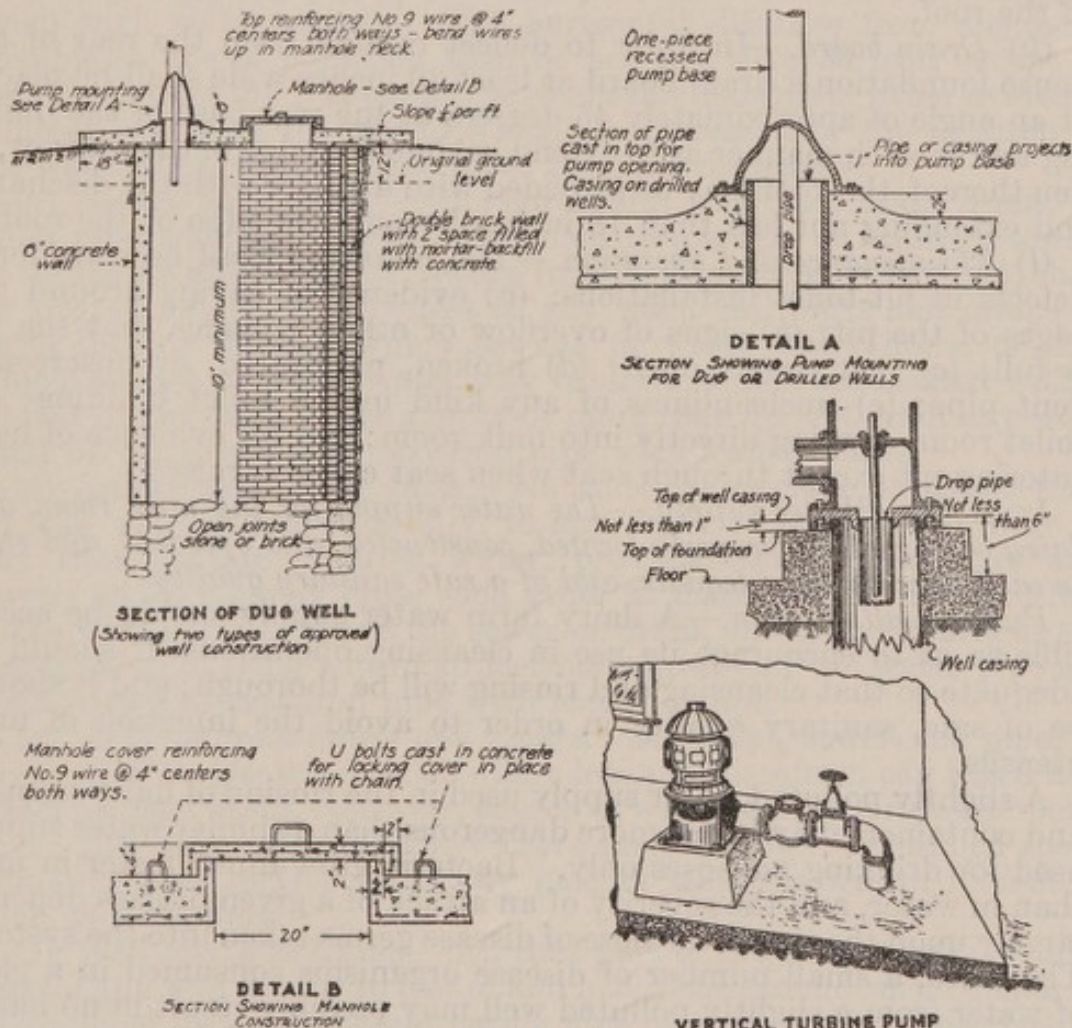


FIGURE 10.—Spring and well designs—Continued.

12 nor more than 16 inches from the floor. The seat riser shall be so constructed and bonded with the floor as to prevent seepage through the riser onto the floor.

(g) *Seat cover*.—The seat opening shall be covered with a lid, hinged so as to provide a clearance of not less than 3 inches horizontally between the back of the seat opening and the lid when raised. The lid shall be so constructed and installed that when closed it will exclude flies.

(h) *Vent pipe*.—The pit shall be vented from the riser to a point outside the building by a flue or vent pipe having a cross-sectional area of not less than seven square inches. The joints shall be tight and the opening screened with 16-mesh copper screen wire.

(i) *Floor and riser*.—The floor and riser shall be built of impervious material or tongue-and-grooved lumber, in a manner to exclude flies.

The floor and bench, or riser, for a single unit shall cover an area of at least 16 square feet.

(j) *Superstructure*.—The house shall be rigidly constructed and shall provide privacy and protection from the elements. Except where climatic conditions prohibit, the building shall be ventilated by leaving a 4-inch opening at the top of the walls just beneath the roof. The building should preferably be covered with a single-plane roof having a pitch of 1 in 4 and with an overhang of not less than 5 inches front, 13 inches back, and 9 inches on each side, with a facing board not less than 4 inches wide extending around the entire margin of the roof.

(k) *Drain board*.—In order to deflect rainfall from the rear of the house foundation a drain board at least 30 inches wide shall be placed at an angle of approximately 45 degrees at the rear base of the building and in such manner as to extend beyond the edge of the roof; or, in lieu thereof, the roof may be provided with a gutter with the discharge end extending not less than 18 inches beyond the edge of the roof.

(l) *Maintenance and operation*.—The following shall be considered defects in pit-toilet installations: (a) evidence of caving around the edges of the pit; (b) signs of overflow or other evidence that the pit is full; (c) seat covers open; (d) broken, perforated, or unscreened vent pipe; (e) uncleanness of any kind in the toilet building; (f) toilet room opening directly into milk room; and (g) evidence of light entering pit except through seat when seat cover is raised.

ITEM 11r. *Water supply*.—The water supply for the milk room and dairy barn shall be properly located, constructed, and operated, and shall be easily accessible, adequate, and of a safe sanitary quality.

Public-health reason.—A dairy farm water supply should be accessible so as to encourage its use in cleansing operations; it should be adequate so that cleansing and rinsing will be thorough; and it should be of safe, sanitary quality in order to avoid the infection of milk utensils.

A slightly polluted water supply used in the rinsing of dairy utensils and containers may be far more dangerous than a similar water supply used for drinking purposes only. Bacteria grow much faster in milk than in water, and the severity of an attack of a given disease depends largely upon the size of the dose of disease germs taken into the system. Therefore, a small number of disease organisms consumed in a glass of water from a slightly polluted well may possibly result in no harm, but if left in a milk vessel which has been rinsed with the water may, after several hours growth in the milk, result in a case of disease.

Satisfactory compliance.—This item shall be deemed to have been satisfied:

(1) When the water supply is easily accessible to the milk house and the dairy barn.

(2) When the water supply is, in the judgment of the inspector, adequate in quantity to promote cleanliness.

(3) When no surface or cistern water supply is used except under conditions approved by the State board of health.

(4) When the source of water supply is a public water supply approved by the State board of health, or a spring, dug well, driven well, bored well, or drilled well which complies with the following specifications; provided that items (c), (f), and (j) shall be required only for water-supply structures which are installed subsequent to the first inspection based upon these requirements.

(5) When there is no connection between the safe water supply and an unsafe water source through which it is possible to contaminate the safe water supply.

At least one inspection shall be made each grading period to determine whether the location, construction, and operation of the supply comply with the specifications which follow. Bacteriological results on samples of water shall comply with the United States Treasury standards for drinking water.

(a) *Privies, etc., near wells.*—Every well or spring shall be located in such manner that neither underground nor surface contamination from any cesspool, privy, or other possible source of pollution can reach such water supply. The horizontal distance from any such possible source of pollution shall be not less than 50 feet, except as provided under (b). If bacteriological examinations or other evidence indicate pollution the distance shall be increased or the location of the water supply changed to meet these specifications.

(b) *Sewers near wells.*—No floor drain, soil pipe, main drain, or other pipe which is directly connected to a storm or sanitary sewer, or through which water or sewage from any source may back up, shall be located nearer than 10 feet to any well. All pipes and drains or parts thereof through which sewage or waste water flows, or into which sewage or waste water may back up, which are located within 50 feet of any such water supply or more than 10 feet from any well, shall be constructed of cast-iron pipe with leaded joints.

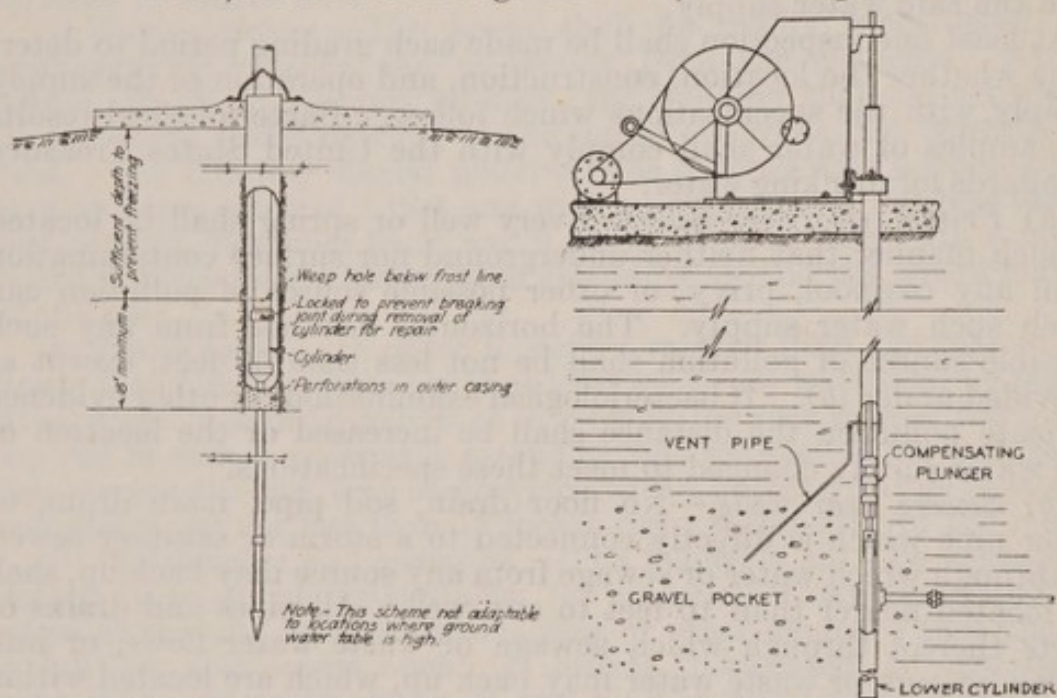
(c) *Sewers near water lines.*—No water pipe shall be closer than 10 feet, measured horizontally, to any sewer or drain which may at any time contain polluted water, provided that water pipes and sewers or drains may cross each other at distances less than 10 feet if the water pipe is above the sewer or drain, and if such parts of the sewer or drain lying within 10 feet horizontally of the water pipe are constructed of cast-iron pipe with leaded joints.

(d) *Leakage from toilets and sewers.*—No toilet, sewer, soil pipe, or drain shall be located over or where leakage therefrom can reach any water storage basin, reservoir, source of water supply, or pump room.

(e) *Pits near water supply.*—There shall be no pit or unfilled space below ground surface level, any part of which is within 10 feet of such water supply.

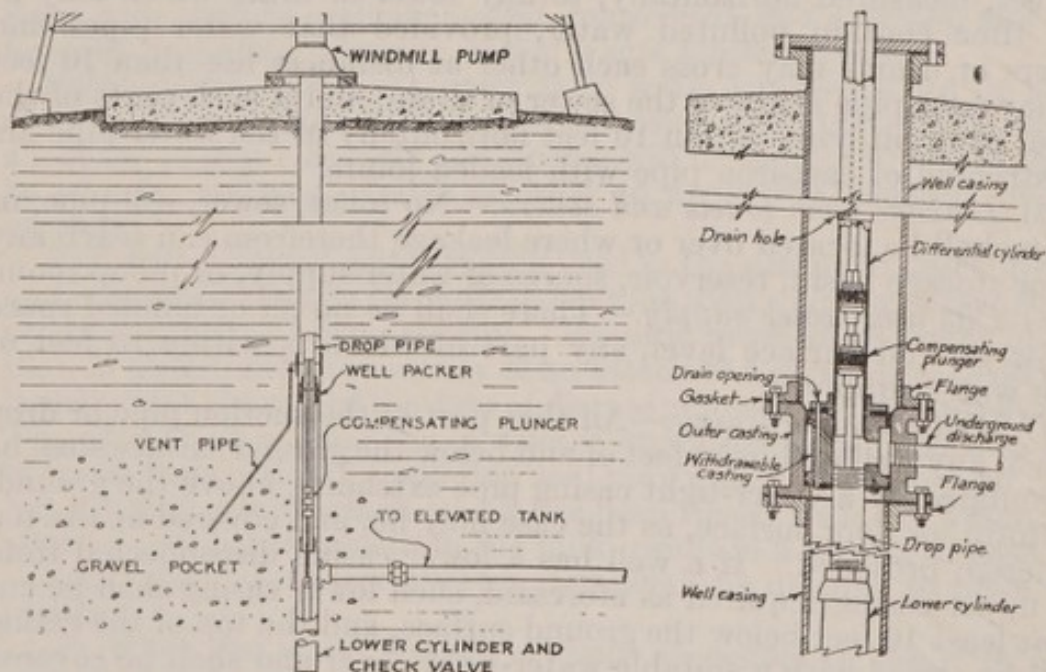
(f) *Well casing or lining.*—All that part of the suction pipe or drop pipe of any well within 10 feet of and below the ground surface shall be surrounded by a water-tight casing pipe extending above the ground, platform, or floor surface, as the case may be, and covered at the top as herein provided. If a well has a lower casing disconnected from the upper casing required as aforesaid, such lower casing shall be cut off at least 10 feet below the ground surface, and the top of the casing shall be closed with a suitable water-tight cover and shall be covered with a compact earth fill so that there shall be no depression at the ground surface above the casing top; provided that a dug well, in lieu of such casing pipe, may be provided with a substantial water-tight lining of concrete, vitrified tile with outer concrete lining, or other suitable material. Such lining shall extend down for a distance of at least 10 feet and shall extend up to the well platform or pump room floor with a water-tight connection. In such case the platform or floor shall have a suitable sleeve pipe surrounding the suction pipe or drop pipe and projecting above as herein provided for a casing pipe.

(g) *Cover or floor.*—Every well, spring, or other structure used as a source of water, or for the storage of water, shall be provided with a



(A) FOR SINGLE TUBULAR WELLS WITHOUT UNDERGROUND DISCHARGE LINES. CYLINDER MAY BE RAISED FOR REPAIRS.

(B) FOR SINGLE DROP WELL WITH COMPENSATING PLUNGER OF SAME DIAMETER AS DROP PIPE. CHECK AND PLUNGERS MAY BE RAISED FOR REPAIRS.



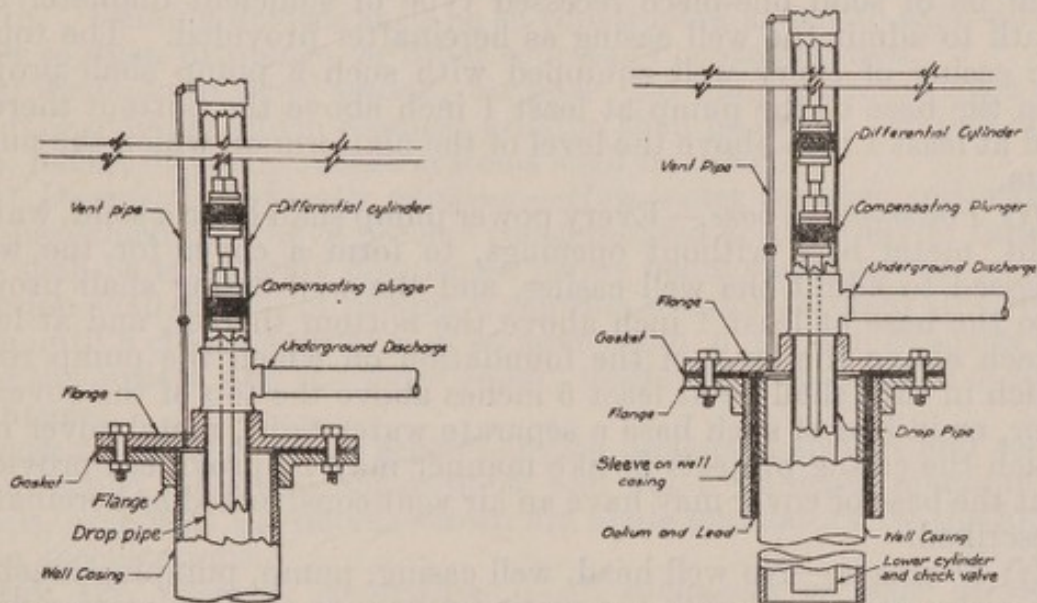
(C) FOR SINGLE DROP WELL WITH COMPENSATING PLUNGER REDUCED IN DIAMETER (THUS REDUCING UPWARD THRUST) TO AVOID BUCKLING WINDMILL ROD. CHECK AND PLUNGERS MAY BE RAISED FOR REPAIRS.

(D) FOR WELL WITH DROP PIPE AND CASING AND EXPANDED LOWER CYLINDER. SPECIAL WITHDRAWABLE CASTING USED IN CASING SO THAT DROP PIPE AND EXPANDED CYLINDER MAY BE RAISED FOR REPAIRS.

FIGURE 11.—Well designs for elimination of frost pits.

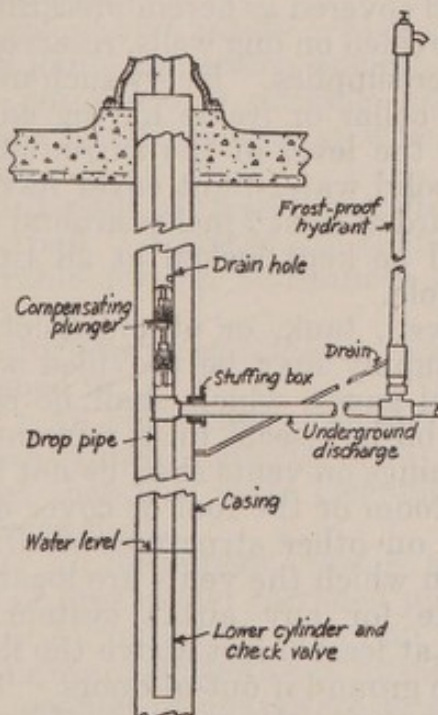
water-tight cover or pump room floor constructed of concrete or similarly impervious material so as to provide proper drainage from

the cover or floor and so as to prevent contamination of the water supply. Such cover or floor shall be constructed so that there shall be no copings, parapets, or other features which may prevent proper



(E) FOR WELL WITH DROP PIPE AND CASING AND LOWER CYLINDER NOT LARGER THAN DROP PIPE. DROP PIPE SUPPORTED FROM FLANGES SCREWED TO CASING. CHECK AND PLUNGERS MAY BE RAISED FOR REPAIRS.

(F) SAME AS (E), EXCEPT SHOWS METHOD OF APPLYING FLANGES TO WELL CASING WHERE CASING IS BATTERED.



(G) ALTERNATE TO METHOD (E) USING STUFFING BOX. CHECK AND PLUNGERS MAY BE RAISED FOR REPAIRS.

NOTES ON FIGS. 11 AND 12

Type (A) is without underground discharge, (B) to (G) with underground discharge.

Types (A), (B), (C) not adaptable to locations where ground water table is above frost line.

Drain hole in (A) and (D) and junction of vent pipe with well in (B), (C), (E), and (F) should be located below frost line.

Highest point at which ground water may enter well should be at least 10 feet below surface of ground, as at perforations in casing in (A), lower end of vent pipe in (B) and (C).

FIGURE 12.—Well designs for elimination of frost pits—Continued.

drainage, or by which water can be held on the cover. Well casings shall project at least 6 inches above the top of this cover or floor, except as noted in (h), and the cover or floor shall slope away from a well casing or suction pipe in all directions, and shall be at least 6 inches above the ground surface at the outside edges.

(h) *Pump head and base.*—Every hand-operated pump shall have the pump head closed by a stuffing box or other suitable device to exclude contamination from the water chamber. The pump base shall be of solid one-piece recessed type of sufficient diameter and depth to admit the well casing as hereinafter provided. The top of the casing of every well equipped with such a pump shall project into the base of the pump at least 1 inch above the bottom thereof, and at least 1 inch above the level of the platform on which the pump rests.

(i) *Power-pump base.*—Every power pump shall have a solid, water-tight, metal base without openings, to form a cover for the well, recessed to admit the well casing, and the well casing shall project into the base at least 1 inch above the bottom thereof, and at least 1 inch above the level of the foundation on which the pump rests, which in turn shall be at least 5 inches above the top of the cover or floor, or in lieu of such base a separate water-tight, metal cover into which the casing projects in like manner may be provided; provided that the base or cover may have an air vent constructed as hereinafter prescribed.

(j) *Drainage.*—No well head, well casing, pump, pumping machinery, valve connected with the suction pump, or exposed suction pipe, shall be located in any pit, room, or space extending below ground level, or in any room or space above the ground which is walled in or otherwise enclosed so that it does not have free drainage by gravity to the surface of the ground; provided that this shall not apply to a dug well properly constructed, lined, and covered as herein prescribed.

(k) *Manholes.*—Manholes may be provided on dug wells, reservoirs, tanks, and other similar features of water supplies. Every such manhole shall be fitted with a water-tight collar or frame having edges which project at least 2 inches above the level of the surrounding surface, and shall be provided with a solid water-tight cover having edges which overlap and project downward at least 2 inches around the outside of the frame. The cover shall be kept locked at all times except when necessary to open the manhole.

(l) *Vent openings.*—Any reservoir, well, tank, or other structure containing water for any such water supply may be provided with vents, overflows, or water-level control gages, which shall be constructed so as to prevent the entrance of birds, insects, dust, rain, snow, or other contaminating material. Openings on vents shall be not less than 2 feet above the floor of a pump room or the roof or cover of a reservoir. Openings on vents located on other structures shall be not less than 2 feet above the surface on which the vents are located.

(m) *Airlift systems.*—The air intake for any airlift system or mechanical aerating apparatus shall be at least 6 feet above the floor surface if indoors, and 10 feet above the ground if out-of-doors. The air intake shall be so constructed as to prevent the entrance of birds, insects, dust, rain, snow, or other contaminating material. Every airlift system shall be equipped with effective oil traps, tanks, or filters to prevent oil from entering the water.

(n) *Lubrication of pump bearings.*—Pump bearings situated in any well below the pump-room floor shall be lubricated with water taken from within the well, or from the reservoir or distribution system supplied with water from the original source of the water supply, or from another supply approved by the State board of health.

(o) *Priming of power pumps.*—Water for priming pumps on any water system shall be taken directly from the reservoir or distribution system which is supplied with water from the original source of the water supply or from another supply approved by the State board of health. Priming devices shall be so constructed as not to expose the water to dust, drippings, or other sources of contamination.

(p) *Priming of hand pumps; buckets.*—No hand-operated type of pump or cylinder which requires priming shall be used. No pail and rope, bailer, or chain-bucket systems shall be used.

(q) *Disinfection of water supplies.*—New water supplies and water supplies which may have become contaminated accidentally or otherwise shall be thoroughly disinfected before being placed in use. Disinfection shall consist of passing a chlorine solution through all of the units until a chlorine residual of at least one p. p. m. is in evidence at all of the outlets, and the water supply meets the requirements of this ordinance.

Suggested designs.—The accompanying designs of springs and wells are intended merely as suggestions, and not to indicate mandatory details, except as the details shown are made mandatory by the foregoing specifications.

ITEM 12r. *Utensils, construction.*—All containers or other utensils used in the handling, storage, or transportation of milk or milk products must be made of nonabsorbent material and of such construction as to be easily cleaned, and must be in good repair. Joints and seams shall be soldered flush. All milk pails shall be of a small-mouth design approved by the health officer.

Public-health reason.—Milk containers and other utensils not having flush joints and seams, smooth, easily cleaned, and accessible surfaces, and not made of durable, not readily corrodible metal are apt to harbor accumulations in which undesirable bacterial growth is produced.

Milk pails of small-mouth design, sometimes known as the "hooded milk pail", decrease the chance of hairs, dust, chaff, and other undesirable foreign substances getting into the milk at the time of milking.

Satisfactory compliance.—This item shall be deemed to have been satisfied if:

(1) All containers, utensils, and other equipment are constructed of heavy-gage material with a not readily corrodible surface, of a shape that will make cleaning easy, and with all joints and seams soldered flush.

(2) All containers, utensils, and other equipment are in good repair, free of breaks and corroded places.

(3) All milk pails are of an approved small-mouth design.

The use of agateware or unsubstantial milking pails is not acceptable. The enamel of agateware is subject to chipping, and many unsubstantial pails rarely have the seams filled with solder, and in addition rust easily.

Some so-called "small-mouth milking pails" are merely open-top pails with a wide lip covering about one-fourth of the top. These are not satisfactory, since the opening should be not more than one-third of the area of the top of an open-top pail of the same size. Some patented small-mouth pails are designed to hold a strainer cloth. These shall be approved provided the construction does not include

wire screen cloth, and the pails meet the other specifications of this item.

Milking into small cups and pouring into pails shall not be approved. If milking machines are used and stripping is done by hand, small-mouth pails shall be used.

All milk cans should preferably have umbrella-type covers.

ITEM 13r. *Utensils, cleaning.*—All containers, equipment, and other utensils used in the handling, storage, or transportation of milk and milk products must be thoroughly cleaned after each usage.

Public-health reason.—Milk cannot be kept clean in contact with unclean milk vessels and utensils.

Satisfactory compliance.—This item shall be deemed to have been satisfied when all containers, utensils, milking-machine pails and tubing, separator parts, bottle caps, and other equipment used in the cooling, handling, storage, or transportation of milk and milk products are thoroughly cleaned after each milking. Unless bottles, equipment, and utensils are clean to the sight and touch, this item shall be deemed to have been violated.

ITEM 14r. *Utensils, bactericidal treatment.*—All containers, equipment and other utensils used in the handling, storage, or transportation of milk or milk products shall between each usage be subjected to an approved bactericidal process with steam, hot water, or chlorine.

Public-health reason.—Mere cleansing of containers, equipment, and utensils does not insure that all disease organisms will have been removed or destroyed. Even very small numbers thus remaining may grow to dangerous proportions in the milk, since many kinds of disease bacteria grow rapidly in milk.

For this reason all milk containers, equipment, and utensils must be treated with a bactericidal agent between each usage.

Satisfactory compliance.—This item shall be deemed to have been satisfied if all milk containers, utensils, strainer cloths, and other equipment have been:

(1) Exposed for at least 15 minutes to at least 170° F. or for at least 5 minutes to at least 200° F. in a steam cabinet; or

(2) Exposed to a jet of steam for at least 1 minute; or

(3) Exposed to a chlorine solution of approved strength for at least 2 minutes. (For approved strength refer to definition of bactericidal process in section 1 (T) of the code); or

(4) Immersed in hot water at 170° F. or more for at least 2 minutes.

The inspector should satisfy himself that the efficiency of the process is such as to produce bottles and cans having a residual bacterial plate count of not more than one per cc of capacity.

Any equipment touched by the inspector shall be again subjected to bactericidal treatment before being used.

Cabinets with auxiliary steam boilers.—For medium-sized and large dairies this is the most satisfactory type of steam cabinet. Everything considered, the most satisfactory construction material is wood or metal. A wood cabinet is less durable than one of concrete, brick, or hollow tile, but is, on the other hand, both cheaper to build and cheaper to operate. A metal cabinet is somewhat more expensive to build, but is about as cheap to operate as a wood cabinet.

In the case of concrete, brick, or hollow-tile cabinets, care must be taken to see that the boiler is large enough to provide the extra amount of steam required to offset the greater amount of heat absorbed by the walls of these materials.

The *size* of cabinet must be determined by each individual dairyman to suit his conditions. He must first decide whether he wishes to use it once a day, or for each milking. If the former, his cabinet must be large enough to accommodate all utensils and containers used in a day's operation. The best method of determining the size is to stack together all articles to be treated at one time and thus determine the required cabinet dimensions. Care should be taken to allow for any immediately expected expansion of business, but an excessively large design which would be wasteful of steam should be avoided.

The cabinet may be very simply constructed of 2- by 4-inch framing, sheathed inside and out with tongue-and-groove lumber. Local builders or carpenters should be consulted as to the kind of locally available wood which will best withstand moisture, and as to the advisability of using narrow flooring for inside sheathing, to prevent warping. The inside surface may be painted or lined with metal, wall board, or asbestos board, as may be preferred.

The *floor* may be of any wear-resisting material and should be sloped for proper drainage. A drainpipe should be provided for the escape of water of condensation.

The *door* should be substantially constructed so as to withstand warping, and should fit snugly, but allowance must be made for swelling.

The principal advantage to be sought in connection with the *location* of the cabinet is that it shall open conveniently into the milk room. The milk room and the cabinet should not be separated by an un-screened or uncovered space, as this causes milk-room equipment to be unnecessarily exposed to flies and dust. However, since a considerable number of cabinets have already been so located with the approval of the local inspector, such location for cabinets already constructed shall be approved.

The size of *boiler* needed depends upon the size of cabinet to be heated and upon the material of which it is made. In general, the following scale of horsepower will hold for brick, concrete, or hollow-tile cabinets:

Size of cabinet	Boiler horsepower
2½ by 2½ by 4½ feet.....	2
4 by 4 by 4 feet.....	4
5 by 5 by 5 feet.....	5
6 by 6 by 6 feet.....	6

For cabinets constructed of wood or sheet iron approximately half the above boiler horsepower will be required. The admission of steam into the cabinet is simple. The steam line should enter the cabinet near the bottom, and the steam preferably be permitted to discharge through a number of outlets. The pipe line between boiler and cabinet should preferably be insulated.

Steaming should proceed about as follows. Store all containers (bottles, pails, and cans in an inverted position) and other equipment in the cabinet, taking care that no article is closer than 6 inches to the floor. Raise steam to full pressure in the boiler and then admit steam to the cabinet slowly. Do not open the steam valve wide, as this may carry over boiler water and reduce boiler efficiency. Maintain steam

flow sufficiently long to keep the thermometer reading above 170° F. for 15 minutes, or above 200° F. for 5 minutes.

Cabinets with steam generated in bottom.—For small-sized dairies a satisfactory device consists of a metal cabinet located over a direct flame (grate fire, kerosene or gasoline burner, etc.). The cabinet consists of a galvanized or other not readily corrodible sheet-metal tank large enough to hold all articles which it is desired to treat. (Size to be determined as previously described.) A drain cock should be located at such distance above the bottom so as to leave three-fourths inch of water. The tank should be provided with a false bottom or rack. The cover should be tight fitting.

The cover or one of the sides of the cabinet may be provided with a small flanged opening into which should be plugged a stem thermometer reading to 212° F. or higher (see suggested specifications below). The heating unit may consist of a simple grate and flue, or of gas or liquid-fuel burners. Some dairymen are using a 3-burner oil or gasoline stove.

The operation of the cabinet is simple. The cabinet is generally filled with sufficient water for washing purposes. This is heated to the desired temperature for washing, and then drained off to the level of the cock. After being washed all articles to be treated are placed in the cabinet, the lid replaced, and the remaining water kept at a boil for such period as will keep the thermometer reading above 170° F. for at least 15 minutes, or 200° F. for 5 minutes.

Suggested specifications for indicating thermometers for steam cabinets—Type.—Metal scale case, mercury actuated, regular angle or straight style.

Magnification of mercury column.—To apparent width of not less than one-sixteenth inch.

Scale range.—130° F. to 220° F. with extension on either side permissive.

Temperature represented by smallest scale division.—Not more than 2° F.

Number of degrees per inch of scale.—Not more than 32.

Accuracy.—Within 2° F., plus or minus, between 150° F. and 212° F.

Stem.—Two inches long beyond face of flange for single-thickness metal sterilizers; 8 inches long for walls not over 6 inches thick.

Stem fitting.—Iron or other metal floor flange.

Steam jets.—Steam jets are sometimes used by producers delivering to pasteurization plants, particularly where milk is delivered without cooling, thus limiting articles to be treated to pails, cans, and strainers. Jets, properly constructed and operated, will bring the equipment to a considerably higher temperature than is generally true of steam cabinets, and for this reason the shorter exposure period of 1 minute is approved.

Sometimes the following arrangement is used in place of a standard boiler. A 50-gallon barrel is connected to a coil or jacket water heater. A check valve is placed in the pipe between the barrel and the heater in order to prevent the steam blowing back through the barrel. A water trap, consisting of a 12-inch length of 4-inch pipe, is located in the line between the heater and the jet, a return drain connecting the trap with the water pipe leading to the heater. The water trap should be located above the top of the barrel. A simple

pop valve is located in the top of the water trap, the exhaust from the pop valve leading back into the water barrel near the bottom. A throttle valve is located just behind the steam jet. The jet nozzle is simply a one-fourth-inch nipple connected by means of a reducer to the main steam line. The whole equipment can be set up for about \$20 to \$25.

In operation the barrel is filled and the throttle closed. Then a hot fire is built in the heater. When the pop valve blows (it should be set for about 20 pounds pressure) the outfit is ready for use.

In using the steam jet care must be taken that each article is kept over the jet for at least 1 minute. Before removing any article it must be so hot that it is impossible to handle it with the bare hands.

If crates of bottles are treated by a steam jet the steam must emerge from a perforated plate the size of the crate, so that it will be uniformly distributed, and the crate must be covered with a tight hood to confine the steam. (See Farmers' Bulletin No. 1675.)

Treatment with chlorine solution.—It is possible to treat bottles and pails with chlorine solution without special apparatus, simply by filling the last compartment of the washing vat with water containing chlorine solution of standard strength, and by fully submerging each article to be treated for at least 2 minutes.

The principal objection to this method is that it is difficult to make sure that air will not be trapped in some of the bottles, and that there is a temptation to place so many bottles in the tank as to have some of them protrude above the surface of the solution. To meet this objection the Minnesota State Board of Health has suggested the following method:

As the bottles are washed by hand, revolving brushes, or by machine, they are placed in the crates in an inverted position. A wooden or metal perforated cover or grate is placed over the top of the crate of washed bottles. The crate is then inverted and submerged in the solution, the cover being held in place by gripping it to the top of the crate at both ends with the hands. While the crate is in the solution it is in an inverted position, but the bottles are upright.

When another crate of bottles has been washed, the crate in the solution is taken out, turned right side up, and drained. The cover is then placed on the freshly washed crate of bottles, and it is inverted and submerged.

If the cover is not constructed so as to allow the fingers to be easily inserted under it when in the solution, metal rods should be placed on the bottom of the tank so as to keep the cover off the bottom. Where the tank is large enough, 2 crates of bottles should be kept submerged thus allowing each crate to be subjected to the solution for twice as long as it takes to wash 1 crate of bottles. Two covers will then be necessary.

Crates should be washed before immersion in the solution.

Treatment of equipment other than bottles and pails.—The treatment of milk cans, coolers, bottling machines, milking machines (all their parts), etc., requires special consideration. Articles which cannot be placed in the steam cabinet can probably best be treated by swabbing thoroughly with a cloth saturated with standard chlorine solution, allowing the solution film to remain at least 2 minutes. Rubber milking-machine parts can be satisfactorily treated by immersing them for 2 minutes in water brought to 170° F. and leaving them in standard chlorine solution until the next milking. (Also see Farmers' Bulletin No. 1315.) Milking machine rubbers may also be treated by submerging them in a 0.3–0.5 percent lye solution and, just before again using, draining off the lye solution and rinsing out the rubbers with a standard chlorine solution. When the dairy is

provided with a steam jet instead of a cabinet, pails and cans may be treated over the jet, but chlorine swabbing must be used for larger equipment unsuited to that method.

Strainer cloths shall be treated (only after thorough washing) by boiling, or by exposure in steam cabinets, or by immersion in standard chlorine solution. If treated in the steam cabinet they must be physically separated from each other to insure free access of steam.

Boiling-water treatment.—Boiling-water treatment shall not be accepted as satisfactory compliance unless the articles are completely immersed for at least 2 minutes in water maintained at 170° F. or higher throughout the period of immersion. Pouring hot, or so-called "boiling water", from vessel to vessel is not adequate and shall not be accepted.

ITEM 15r. *Utensils, storage.*—All containers and other utensils used in the handling, storage, or transportation of milk or milk products shall be stored so as not to become contaminated before again being used.

Public-health reason.—Careless storage of milk utensils which have previously been properly treated is apt to result in recontamination by flies and dust and thus to render them unsafe.

Satisfactory compliance.—This item shall be deemed to have been satisfied when all utensils and vessels, including strainer cloths, are—

- (1) Left in the treating chamber until used; or
- (2) Stored in the milk house in a place protected from contamination, inverting such articles as can be inverted. Storage racks shall preferably be constructed of metal protected against rusting.

If cotton discs are used they shall be kept in the original package, protected from contamination, until used.

ITEM 16r. *Utensils, handling.*—After bactericidal treatment no container or other milk or milk product utensil shall be handled in such manner as to permit any part of any person or his clothing to come in contact with any surface with which milk or milk products come in contact.

Public-health reason.—Handling bottles by inserting the fingers into their mouths, carrying milk pails by inserting the fingers under the hood, carrying an armful of milk-can covers against a soiled shirt or jacket, carrying a strainer cloth over the shoulder or in a pocket, and similar handling of vessels and utensils, undo the effect of bactericidal treatment.

Satisfactory compliance.—This item shall be deemed to have been satisfied when none of the above or similar practices is in evidence.

ITEM 17r. *Milking, udders and teats, abnormal milk.*—The udders and teats of all milking cows shall be clean at the time of milking. Abnormal milk shall be kept out of the milk supply and so handled and disposed of as to preclude the infection of the cows and the contamination of milk utensils.

Public-health reason.—Cows frequently contaminate their udders by standing in polluted water or lying down in the pasture or barn yard. Unless the udders and teats are carefully cleaned just before milking, particles of filth are apt to drop into the milk. Such contamination of the milk is particularly dangerous because cow manure may contain the organisms of tuberculosis and polluted water may contain the organisms of typhoid fever and other intestinal diseases.

Abnormal milk may indicate mastitis or other diseased condition, and should therefore be kept out of the milk supply and away from the cows and the milk utensils.

Satisfactory compliance.—This item shall be deemed to have been satisfied when the cows' udders look and feel clean at the time of milking, and if any abnormal milk is detected the cow is excluded from the milking herd and not readmitted until the milk resumes a normal appearance.

It is recommended that for grade A raw milk the strip cup be used once each week and the fore milk examined and discarded.

A number of States and cities require that the udders and teats must, in addition to being clean, be treated with the previously described chlorine solution. The only objection to this additional requirement is that some authorities in cold climates fear that the use of water in extremely cold weather will, whether or not it contains chlorine, cause chapping. Long experience has proven that this objection does not hold for warm climates.

The latter precautionary measure has the advantage of giving an additional factor of safety with reference to such disease organisms as are not removed by ordinary cleansing. The measure is best carried out by following the preliminary cleansing by scrubbing the udders and teats with a large cloth saturated with the chlorine solution. The cloth is then wrung as dry as possible and the bag mopped free of excess solution. After thus treating 6 or 8 cows a fresh pail of solution should be prepared. Tests made by the Public Health Service gave quicker and more complete bacterial removal of udder contamination by means of a chlorine solution than with plain water or with soap and water.

An additional precaution not required by the ordinance, but which inspectors should encourage, is the discarding of the first several streams of milk from each teat. They can be discarded into a calf bucket, and wasting the milk or soiling the floor thereby avoided. This precaution will help keep the bacterial count of the milk low, as it is the first few streams of milk which contain most of the bacteria in fresh milk.

ITEM 18r. *Milking, flanks.*—*The flanks, bellies, and tails of all milking cows shall be free from visible dirt at the time of milking.*

Public-health reason.—Cleanliness of the cows is one of the most important factors affecting the bacterial count of the milk. Under usual farm conditions cows accumulate on their bodies quantities of manure, caked mud, dust, chaff, loose hairs, etc. Practically all of these materials carry bacteria and are apt to fall into the milking pail during the process of milking. This may result in contaminating the milk with bacteria.

Satisfactory compliance.—This item shall be deemed to have been satisfied when the flanks, bellies, and tails are free of dirt at the time of milking, as evidenced by sight and touch.

A satisfactory method of cleaning the cows is to go over each one with a stiff brush, preferably using water freely at the same time to assist in the cleansing and to prevent dust. Grooming is facilitated by clipping the flanks, belly, and bag, and by cutting the brush of the tail so that it does not drag. The brushing of part of the herd while other cows are being milked is undesirable, because of the dust which may be raised. Therefore all brushing should be completed before milking is begun.

ITEM 19r. *Milkers' hands.*—*Milkers' hands shall be clean, rinsed with a bactericidal solution, and dried with a clean towel immediately before milking and following any interruption in the milking operation. Wet-hand milking is prohibited. Convenient facilities shall be provided for the washing of milkers' hands.*

Public-health reason.—The reasons for bactericidal treatment of the hands of milkers are similar to those for bactericidal treatment of the udders. In the course of the preparation for milking, the hands of the milkers have come into contact with almost identically the same kind of materials as may have contaminated the udders. During the course of his duties and natural habits outside of the milking barn, the dairyman's hands must be assumed to have been exposed to body discharges.

Wet-hand milking increases the likelihood of contaminating the milk. Washing facilities are required in order to increase the assurance that milkers' hands will be washed.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

- (1) The milker's hands have been washed with water to which an approved bactericide has been added.
- (2) Hands are dry at the time of milking.
- (3) Hand-washing facilities, including clean towels, are provided in or easily accessible to the milking barn.

The hands of all milkers must be dipped and washed in a standard bactericidal solution and wiped dry before milking is begun. This applies to the man who handles the milking machines and applies and removes them from the cows, and to the stripper.

A bucketful of bactericidal solution should be handy in the barn during milking. Every time a milker has finished milking a cow, has carried out and strained the milk, and has removed his stool to the next cow, he should rinse his hands in the solution. The first washing in the solution does not afford subsequent protection against recontamination from the cow's flanks, or even from the clothes and person of the milker.

Washing facilities convenient to the barn are required, including either running water or a suitable vessel and an adequate supply of clean water, soap, and a clean cloth or towel for each milker.

ITEM 20r. *Clean clothing.*—*Milkers and milk handlers shall wear clean outer garments while milking or handling milk, milk products, containers, utensils, or equipment.*

Public-health reason.—Because of the fact that the hands of all workers frequently come into contact with their clothing, it is important that the clothes worn during the milking and handling of the milk be clean.

Satisfactory compliance.—This item shall be deemed to have been satisfied when milkers are found wearing outer garments that are not excessively soiled.

Washable overgarments are not required, but milkers should be urged to have one suit of overalls for milking and another for general work. The suits are changed just before milking. If women milkers wear clean aprons this shall be considered as satisfactory.

ITEM 21r. *Milk stools.*—*Milk stools shall be kept clean.*

Public-health reason.—Clean milk stools reduce the likelihood of contamination of milkers' hands between the milking of individual cows.

Satisfactory compliance.—This item shall be deemed to have been satisfied when the milk stools are so constructed as to be easily kept clean, look and feel clean, and are stored above the floor when not in use.

The usual practice is to scrub the stools several times a week, and keep them on hooks or pegs when not in use. Otherwise they are inevitably kicked around on the floor or in the gutters, or thrown into a corner, and quickly become soiled. Many dairies are equipped with metal milk stools, which are easy to wash and keep clean.

Milk stools are frequently padded with old carpet or sacking for the comfort of the milkers. Such stools cannot be washed and cannot be kept clean. Their use does not comply with the requirements of the ordinance.

ITEM 22r. *Removal of milk.*—Each pail of milk shall be removed immediately to the milk house or straining room. No milk shall be strained or poured in the dairy barn.

Public-health reason.—Keeping the milk in the barn until all or a large part of the herd has been milked is apt to expose it to flies and dust, and to delay cooling. Straining milk in the barn likewise exposes it to dust and flies.

Satisfactory compliance.—If the milk house and barn are too widely separated to make practicable the straining of milk in the milk house, the construction of a small screened straining room in or near the barn, but not opening directly into it, is satisfactory. This method still has the disadvantage of delaying cooling, though this can be reduced by taking every canful of milk to the milk house as soon as filled.

Dairymen sometimes use the feed room or a similar enclosure for a straining room. This is not approved unless all feedstuffs or other materials are removed, and the room is so located that it does not open directly into the milking barn.

ITEM 23r. *Cooling.*—Milk must be cooled within 1 hour after completion of milking to 50° F. or less, and maintained at that average temperature, as defined in section 1 (R), until delivery. If milk is delivered to a milk plant or receiving station for pasteurization or separation, it must be delivered within 2 hours after completion of milking or cooled to 50° F. or less and maintained at that average temperature until delivered.

Public-health reason.—Milk produced under cleanly conditions usually contains from 1,000 to 10,000 bacteria per cc immediately after milking. These multiply to enormous numbers in a few hours if the milk is not cooled. When the milk is quickly cooled to 50° F. or less, however, there is but a very slow increase in numbers of bacteria. In order to understand this it is merely necessary to recall that bacteria are very small plants, and that most plants do not grow in cold weather.

Usually the bacteria in milk are harmless, and if this were always true there would be no reason to cool milk except to delay souring. There is, however, no way for the dairyman or health officer to make absolutely sure that no disease bacteria have entered the milk (even though observance of the other items of this ordinance will much reduce this likelihood), and frequent epidemics among milk consumers prove without question that this happens. The likelihood of contracting disease is much increased when the milk contains large numbers of disease bacteria, and for this reason it is extremely important

that milk be quickly cooled so that any small numbers of disease bacteria which may have entered shall not be permitted to multiply.

Satisfactory compliance.—This item shall be deemed to have been satisfied when—

(1) Milk delivered raw to the consumer is cooled within 1 hour after completion of milking to 50° F. (60° F. for grade B raw) or less, and maintained at or below that average temperature, as defined in section 1 (R), until delivery to the final consumer.

(2) Milk delivered to a milk plant or one of its receiving stations for pasteurization or separation is either delivered within 2 hours after completion of milking, or, if delivered after the expiration of 2 hours, has been cooled before the expiration of 2 hours to 50° F. (70° F. for grade B raw) or less, and maintained at or below that average temperature until delivery.

The inspector shall determine in the following manner the milk temperature every time a sample for bacterial examination or reductase test is taken. In the case of bottled milk the temperature of a bottle other than the one used for determining the bacterial count shall be taken. The bottle shall be selected at random by the inspector and well shaken before inserting the thermometer. The thermometer must be kept in the milk long enough to insure a correct reading. The dairyman should be instructed not to sell the bottle of milk which has been opened for the temperature test. In the case of bulk milk the contents of the can or vat shall be thoroughly stirred before the thermometer is inserted. The stirring dipper may be treated between samples in a 5-gallon can of water to which has been added 5 ounces of standard stock chlorine solution. The small amount of chlorine which is carried into a can of milk on the stirrer will not affect the bacterial count of the milk.

In no case shall the temperature of the milk be estimated by the inspector, as such a practice is certain to result either in unfairness to the dairyman or in lax grading.

Inspectors' thermometers to be used in determining milk sample temperatures—Type.—Pocket type, mercury actuated.

Magnification of mercury column.—To apparent width of not less than one-sixteenth inch.

Scale range.—30° to 120° F. with extension either side permissive.

Temperature represented by smallest scale division.—1° F.

Number of degrees per inch of scale.—Not more than 32.

Accuracy.—Within 1° F., plus or minus.

Case.—Metal, provided with suspension ring and fountain-pen clip.

Bulb.—Corning normal, or equally suitable thermometric glass.

Cooling methods—Cooling in the vat.—A simple and frequently used method of cooling is to pour the milk as it comes from the barn directly into cans set in a vat of ice water, and then to stir the cooling water thoroughly each time another pailfull is added to the can. A can of milk can be cooled to below 50° F. in this manner in about half an hour.

The advantage of this method is its simplicity. The disadvantages include excessive use of ice, the necessity for stirring, which is apt to be neglected, and slowness of cooling.

It is recommended that where ice is used the size of cooling vats be determined from the following tables:

Inside dimensions, in inches, of cooling vats for 5-gallon cans

Number of cans.....	2	4	6	8
Width.....	26	26	26	30
Length.....	36	46	70	80

Inside dimensions, in inches, of cooling vats for 10-gallon cans

Number of cans.....	2	4	6	8
Width.....	30	30	36	42
Length.....	36	60	75	84

The bottom of the vat should be provided with a removable wooden rack to protect it from undue wear. The vat should be provided with a lid in order to reduce ice consumption. If it be assumed that the thickness of the wooden rack is 2 inches, the total inside height of the vat from the vat floor to the under surface of the lid should be 26 inches for vats for 5-gallon cans, and 30 inches for vats for 10-gallon cans. The vat must be provided with an overflow outlet which, assuming again that the wooden rack is 2 inches thick, must be 18 inches above the vat floor in the case of vats for 5-gallon cans, and 23 inches for vats for 10-gallon cans.

If the dairyman wishes to cool both 10- and 5-gallon cans at the same time it will be necessary to divide the vat into two compartments by means of a water-tight partition, and to provide each compartment with an overflow outlet located as above instructed.

All cooling vats should be provided with bottom drains to permit emptying and cleaning.

Kelly & Clement in *Market Milk* recommend that, in order to provide for fluctuations in quantity of milk to be cooled, vats may be divided into two compartments, one double the size of the other, which may be used either separately or together. This, in effect, provides the dairyman with three sizes of vat, and insures a very flexible cooling equipment.

The vat may be constructed of metal, wood, or concrete. In any case a saving in ice is secured by insulating the vat. United States Department of Agriculture Farmers' Bulletin No. 976 contains the following statement regarding insulated cooling vats:

While from the point of view of cooling, wooden tanks give good results, an insulated concrete is much more desirable, as it is easily built and can be set partly in the ground. A wooden or galvanized iron tank does not last long under similar conditions. When the tank is set low, cans of milk can be lifted in or out with much less effort than when it is entirely above the ground. The total thickness of the walls of an insulated concrete tank should be 8 inches, divided into two walls, the outside being 2 inches, then 2 inches of good insulation, and the inside wall 4 inches thick. The concrete mix should consist of 1 part Portland cement, two parts clean, sharp sand, and four parts broken stone or gravel. For the purpose of waterproofing, hydrated lime equal to 10 percent by weight of the cement should be added to the mixture. The insulation used should be coated with and set in hot asphalt which should be allowed to become thoroughly dry before the inner walls of the tank are put up. The inside walls should be very carefully troweled so as to insure a smooth surface without projecting particles.

One good type of insulating material is 2-inch sheet cork. If cork is considered too costly, 2-inch plank, carefully dried and then

thoroughly coated on all surfaces with hot asphalt, has probably a fairly high insulating value when imbedded in concrete.

The quantity of ice necessary to cool the milk to a certain temperature is dependent upon the size of the vat, the atmospheric temperature, the amount of milk to be cooled, and the extent to which it has been precooled.

In areas where electric power is available electric refrigeration may be advantageous.

Cooling over surface coolers.—One of the disadvantages of simple vat cooling was given as slowness of cooling. It is obvious that milk could be cooled more quickly by causing it to flow in a thin film over a metal surface constantly cooled by a cold liquid behind it. This principle has been applied in the so-called "surface cooler."

One device for applying this principle is the plain *conical cooler*, with which every dairyman is familiar. This device is usually operated by filling it with a mixture of ice and water and stirring the mixture as the milk flows over the cooler. The advantages of this method of cooling are its low first cost and the fact that milk is cooled more quickly than by the previously described vat method. The disadvantages include the necessity for stirring, the excessive use of ice, and the fact that one cooling cannot be depended upon to bring the milk below 50° F.

The first two disadvantages may be overcome by cooling the milk in two stages: First cooling it as far as possible over a conical cooler equipped so as to permit the constant flow through it of the farm water supply unchilled by ice, and then doing the remainder of the cooling in cans in a vat; or the dairyman may use two conical coolers in series, one using the farm water supply, and the other containing ice water. These methods save ice because considerable of the cooling is done before the use of ice or ice water comes into play.

Another type of surface cooler, somewhat more expensive in first cost, but better designed, is the corrugated or *tubular cooler* designed to permit the constant flow of water through it while the milk flows over its outer surface. Because of its efficient design this type of cooler can be made to cool milk to within 2 or 3 degrees of the temperature of the water (impossible with the conical cooler). This utilizes the maximum cooling effect of the water supply. If the temperature of the natural water supply is somewhat below 50° F., no ice is necessary, except for icing the crates during delivery. Usually, however, the water supply is not cold enough to permit this, and the two-stage method of cooling previously described will be necessary.

Another type of tubular cooler is composed of two sections, uniced water flowing through the upper section, and cold brine or ice water through the lower section. This type also utilizes the full cooling effect of the natural water supply. The principal advantage of this layout lies in the fact that the desired milk temperature is achieved more rapidly than by another means.

Keeping milk cold.—The keeping of milk at a temperature of 50° F. or less during delivery necessitates the icing of the bottles in the crates. The ice should be broken into fist-size pieces and packed closely around the necks of the bottles. All crates should be iced, except when the weather is cold, when part or all of the icing may be eliminated, depending upon the atmospheric temperature.

Many dairymen are using metal crates, by means of which it is somewhat easier to keep the milk cold because of the tight bottom, which prevents the ice water from escaping and prevents the circulation of warm air around the bottles.

Covering the crates with a close-woven cloth or tarpaulin during delivery will retard the melting of ice on the crates by reducing the circulation of warm air.

Dairymen who can deliver milk twice a day to a milk pasteurizing plant or cooling station are not required to cool the milk if it can be delivered within 2 hours after milking. However, prompt cooling immediately after milking is to be recommended in all cases.

The inspector is frequently questioned as to the cost of cooling milk. This depends almost entirely upon the amount of ice required, which in turn is dependent upon the method of cooling used.

The most expensive method is that in which the milk is precooled over a plain conical cooler in which ice is used, and the cooling then completed in a vat. This is because the entire cooling effect is obtained from ice, and because of the relatively large exposure of ice-cooled surface to the air temperature.

Somewhat less ice is used when the milk is cooled entirely by immersing the cans in a vat of ice water, since in this case the exposure of ice-cooled surface to the air is avoided.

The greatest saving in ice is effected by precooling the milk over a surface cooler connected with the uniced water supply, and then securing the final cooling by means of one of the ice-water or brine methods previously described.

The United States Department of Agriculture estimates the amount of ice required with the last method at 2 to 2½ pounds per gallon of milk cooled and held below 50° F., provided it has been precooled to 60° F. If either of the first two methods is used, the amount of ice required will be 4 pounds or more per gallon. In the case of bottled milk the above figures do not include the ice required in icing crates, which will vary from nothing to 2 pounds per gallon, depending upon the weather.

ITEM 24r. Bottling and capping.—Milk and milk products shall be bottled from a container with a readily cleanable valve, or by means of an approved bottling machine. Bottles shall be capped by machine. The bottler and capper shall be cleaned and subjected to bactericidal treatment before each usage. Caps shall be purchased in sanitary containers and kept therein in a clean dry place until used.

Public-health reason.—If milk is bottled in an unclean manner, or milk bottles are capped with unclean or infected bottle caps, most of the value of the items of sanitation hitherto discussed will have been lost.

Satisfactory compliance.—This item shall be deemed to have been satisfied when bottling and capping are done as described, and caps are purchased in sanitary tubes and kept therein in a clean dry place until used.

Parts of the capping machine which are soiled must be thoroughly cleaned and treated before each usage. The first cap from each tube should be discarded as it is exposed and may be contaminated.

ITEM 25r. Personnel, health.—Every person connected with a retail raw dairy whose work brings him in contact with the production, handling, storage, or transportation of milk, milk products, containers, or

equipment shall furnish such information, permit such physical examinations, and submit such laboratory specimens as the health officer may require for the purpose of determining freedom from infection.

The health officer, or a physician authorized by him, shall in each such instance take a careful history, and if such history suggests that such person may be a carrier of or infected with the organisms of typhoid or paratyphoid fever or of any other communicable disease likely to be transmitted through milk, he shall secure appropriate specimens of bodily discharges and cause them to be examined in a laboratory approved by him or by the State health authorities for such examinations.

Public-health reason.—Investigations of milk-borne diseases have shown that the most frequent source of infection is the presence of the disease organisms in the discharges of milk handlers. The diseases so transmitted through milk include typhoid fever, dysentery, diphtheria, septic sore throat, scarlet fever, and tuberculosis. However, most health officers feel that the practical application of the health-examination principle is limited to examinations for active tuberculosis, diphtheria, and typhoid and paratyphoid fevers, and that even these examinations should not be required for milk which is to be pasteurized.

Satisfactory compliance.—In carrying out this item the following procedure shall be required for every employee of retail raw milk dairies and pasteurization plants who comes in contact with milk, milk products, containers, or equipment. The examination shall include a history and, where necessary, examinations for typhoid fever, paratyphoid fever, diphtheria, and tuberculosis, blood specimens for typhoid and paratyphoid agglutination tests, nose and throat cultures on Loeffler's blood serum, and, in cases showing clinical symptoms of tuberculosis, specimens of sputum. The examination of laboratory specimens shall be considered necessary when the history suggests the occurrence at any time of typhoid or paratyphoid fever, or recent infection with or exposure to any other disease transmissible through milk supplies.

The following shall be barred from employment in connection with a retail raw dairy or a pasteurization plant:

(a) A person who has not been immunized against typhoid fever within 2 years, and who shows a positive or atypical Widal, or a person who gives a history of typhoid fever, unless such person is willing to have 3 sets, or more if required, of specimens of feces and urine collected by the health officer, in a manner prescribed by the health officer, or if any of said specimens prove positive, or

(b) A person who is found to harbor virulent diphtheria organisms, or

(c) A person showing significant clinical or laboratory evidence of active tuberculosis.

Any of the above determinations which the local laboratory is not equipped to make may be made by the State health department laboratory.

ITEM 26r. Miscellaneous.—All vehicles used for the transportation of milk or milk products shall be so constructed and operated as to protect the milk or milk products from the sun and from contamination. Such vehicles shall be kept clean, and no substance capable of contaminating milk or milk products shall be transported with milk or milk products in such manner as to permit contamination. All vehicles used for the

distribution of milk or milk products shall have the name of the distributor prominently displayed.

The immediate surroundings of the dairy shall be kept in a neat, clean condition.

The condition and appearance of the delivery vehicles and of the immediate surroundings of the dairy do much to credit or discredit milk control in the mind of the consumer. It is important, therefore, in order to encourage the consumption of milk, as well as in order to protect it from contamination during delivery, that the health officer rigidly enforce this item, both as to the cleanly appearance of the vehicle, as to its being a covered type, and as to the carrying of such material capable of contaminating milk supplies. The distributor's name should be prominently displayed on each vehicle for convenience in inspection and sampling.

Grade B raw milk.—Grade B raw milk is milk the average bacterial-plate count of which at no time prior to delivery exceeds 200,000 per cubic centimeter, or the average reduction time of which is not less than 6 hours, as determined under sections 1 (R) and 6, and which is produced upon dairy farms conforming with all items of sanitation required for grade A raw milk except as follows: under item 4r tight wooden floors and gutters shall be permitted in place of concrete; under item 5r painting or whitewashing shall not be required; under item 8r the piping of water into the milk house, the partitioning of processes, and the provision of stationary and three-compartment wash and rinse vats shall not be required; under item 23r the temperature requirement of retail raw milk shall be 60° F. and of milk for pasteurization or separation 70° F.; item 25r shall not be required; under item 26r covered vehicles shall not be required; provided that all items or parts of items relating to cleanliness shall be required.

Grade C raw milk.—Grade C raw milk is milk the average bacterial plate count of which at no time prior to delivery exceeds 1,000,000 per cubic centimeter, or the average reduction time of which is not less than 3½ hours, as determined under sections 1 (R) and 6, and which is produced upon dairy farms conforming with all items of sanitation required for grade B raw milk except 7r, 12r, 20r, 21r, 22r, 23r, 24r, and 26r; provided that under item 4r properly constructed clay-mixture floors shall be permitted, and that under item 5r tight ceilings and feed rooms shall not be required.

Grade D raw milk.—Grade D raw milk is milk which does not meet the requirements of grade C raw milk, and which shall be plainly labeled "cooking only."

Grade A pasteurized milk.—Grade A pasteurized milk is grade A or grade B raw milk which has been pasteurized, cooled, and bottled in a milk plant conforming with all of the following items of sanitation and the average bacterial-plate count of which at no time after pasteurization and until delivery exceeds 30,000 per cubic centimeter, as determined under sections 1 (R) and 6.

ITEM 1p. *Floors.*—The floors of all rooms in which milk or milk products are handled or stored shall be constructed of concrete or other equally impervious and easily cleaned material and shall be smooth, properly drained, provided with trapped drains, and kept clean.

Public-health reason.—Floors constructed of concrete or other similarly impervious material can be kept clean more easily than floors constructed of wood or other pervious or easily disintegrating

material, will not absorb organic matter, and are, therefore, more apt to be kept clean and free of odors. Properly sloped floors facilitate flushing, and avoid sloppiness. Trapping of drains prevents sewer gas entering the plant. Clean floors are conducive to clean milk-handling methods.

Satisfactory compliance.—This item shall be deemed to have been satisfied:

(1) When the floors of all rooms in which milk is handled are constructed of good-quality concrete, equally impervious tile, or brick laid closely with impervious joint material, metal surfacing with impervious joints, or of other material which is the equivalent of good quality concrete.

(2) When the floor surface is smooth and sloped so that there will be no pools of standing water after flushing and the joints of the floor and walls are constructed so as to be impervious.

(3) When the floors are provided with trapped drains so constructed as to minimize clogging, and the plumbing is so installed that no sewage can back up into any drain line and flood the floor.

(4) When the floors are kept clean at all times. Floors shall be kept free not only of organic filth, but also of litter. Materials and equipment not routinely used in a given room shall not be stored therein, as this practice renders it difficult to keep the floors clean. Materials and equipment not in routine use shall be stored in a special storage room or rooms in which milk-handling operations are not conducted.

ITEM 2p. Walls and ceilings.—*Walls and ceilings of rooms in which milk or milk products are handled or stored shall have a smooth, washable, light-colored surface and shall be kept clean.*

Public-health reason.—Painted or otherwise properly finished walls and ceilings are more easily kept clean and are therefore more apt to be kept clean. A light-colored paint or finish aids in the even distribution of light and the detection of unclean conditions. Clean walls and ceilings are conducive to clean milk-handling operations.

Satisfactory compliance.—This item shall be deemed to have been satisfied if walls and ceilings are finished with light-painted wood, tile, smooth-surface concrete or cement plaster, brick, or other equivalent materials with a washable light-colored surface, and walls and ceilings are kept clean and refinished as often as the finish wears off or becomes discolored. A darker colored paint may be used for the lower part of the wall to a height not exceeding 36 inches.

ITEM 3p. Doors and windows.—*Unless other effective means are provided to prevent the access of flies, all openings into the outer air shall be effectively screened and doors shall be self-closing.*

Public-health reason.—Flies may infect the milk with disease germs after it has been pasteurized, thus nullifying the effectiveness of pasteurization.

Satisfactory compliance.—This item shall be deemed to have been satisfied:

- (1) If all openings to the outer air are effectively screened; and
- (2) If all doors are self-closing and all screen doors to the outer air open outward; or
- (3) If fans of sufficient power to prevent the entrance of flies are in use at all ineffectively protected openings; or
- (4) If flies are absent.

Openings through which cans or crates or other articles are loaded in rapid succession so as to make impracticable the proper use of self-closing screens may be protected by properly constructed flaps or by fans of sufficient power to prevent the entrance of flies. Such fans must be operated at all times when doors are open.

Window and door screens must be tight-fitting and free of holes. This includes the screens for skylights and transoms.

This item must be satisfied during the seasons of the year when flies are evident.

ITEM 4p. *Lighting and ventilation.*—All rooms shall be well lighted and ventilated.

Public-health reason.—Ample light promotes cleanliness. Proper ventilation reduces odors and prevents condensation upon interior surfaces.

Satisfactory compliance.—This item shall be deemed to have been satisfied:

(1) If artificial light is provided equivalent to one 50-watt electric light per 100 square feet of floor area, reasonably evenly distributed.

(2) If the unobstructed window or skylight space in each room of pasteurization plants hereafter constructed is not less than 10 percent of the floor area of said room, and the light is reasonably evenly distributed so that all operations and equipment are adequately lighted.

(3) If all rooms are adequately ventilated, in the opinion of the inspector. Ventilation equipment supplementary to windows and doors is to be provided if necessary.

ITEM 5p. *Miscellaneous protection from contamination.*—The various milk-plant operations shall be so located and conducted as to prevent any contamination of the milk or of the cleaned equipment. All means necessary for the elimination of flies shall be used. This requirement shall be interpreted to include separate rooms for (a) the pasteurizing, cooling, and bottling operations; (b) the washing and bactericidal treatment of containers and equipment. Cans of raw milk shall not be unloaded directly into the pasteurizing room. Pasteurized milk or milk products shall not be permitted to come in contact with equipment with which unpasteurized milk or milk products have been in contact, unless such equipment has first been thoroughly cleaned and subjected to bactericidal treatment. Rooms in which milk, milk products, cleaned utensils, or containers are handled or stored shall not open directly into any stable or living quarters.

Public-health reason.—If the washing and bactericidal treatment of containers are conducted in the same room in which the pasteurizing, cooling, or bottling is done, there is opportunity for the pasteurized product to become contaminated, particularly by flies. For this reason separate rooms are required as indicated. The unloading of cans of raw milk directly into the pasteurizing room is apt to increase the prevalence of flies therein and to render it too public.

Sometimes simple screening is not sufficient to keep out flies. For this reason other methods are required if screening proves insufficient.

Satisfactory compliance.—This item shall be deemed to have been satisfied under the following conditions:—

(1) The plant contains separate rooms for (a) the pasteurizing, cooling, and bottling operations, and (b) the washing and bactericidal treatment of containers. The pasteurizing, cooling, and bottling

operations may be conducted as a group in a single room, if desired, and the washing and treatment of containers may be conducted in a single room; but the two groups of operations must be kept in separate rooms. All rooms shall be of sufficient size for the purpose for which they are intended.

(2) Cans of raw milk are unloaded either into a receiving room separated by solid or screened partitions from the pasteurizing room, or upon an outside platform and then pushed through a flap or fan-protected opening into the receiving or pasteurizing room. The purpose of this provision is to prevent the unloading of cans directly from the trucks through open doors into the pasteurizing room, which would make the pasteurizing room too public.

(3) All equipment with which milk comes in contact is covered and otherwise protected to prevent the access of flies, dust, and other contamination during operation. (For protection during cooling see item 17p; for protection during bottling see item 18p.) Receiving or dump vats shall be completely covered except during washing and bactericidal treatment, and except when milk is being received, when an opening of sufficient size for this purpose may be uncovered. Where strainers are used the cover for the dump opening shall be so designed as to cover the opening with the strainer in place.

(4) All necessary means supplementary to the use of screens are used for the elimination of flies.

(5) Pasteurized milk shall not be strained or filtered except through a metal strainer constructed of not readily corrodible material other than woven wire.

(6) Pasteurized milk or milk products are not permitted to come into contact with equipment with which unpasteurized milk or milk products have been in contact, unless such equipment has first been thoroughly cleaned and subjected to bactericidal treatment. There shall be no raw milk by-pass around the pasteurization holder.

(7) Rooms in which milk or milk products or cleaned utensils or containers are handled or stored shall not open directly into any stable or living quarters.

Inspectors are urged to encourage the provision of a receiving room separate from rooms (a) and (b) defined above in item 5 p, containing a dump vat the milk from which is piped into the pasteurizing room. In all proposed plants the requirement should be made mandatory.

If the design of the plant provides for pasteurizing or other equipment upon an elevated platform or mezzanine floor, the construction must be such as to prevent contamination of equipment on the lower floor from cleaning or other operations on the upper floor.

ITEM 6p. *Toilet facilities.*—Every milk plant shall be provided with toilet facilities conforming with the ordinances of the city of -----
----- Toilet rooms shall not open directly into any room in which milk, milk products, equipment, or containers are handled or stored. The doors of all toilet rooms shall be self-closing. Toilet rooms shall be kept in a clean condition, in good repair, and well ventilated. In case privies or earth closets are permitted and used, they shall be separate from the building, and shall be of a sanitary type constructed and operated in conformity with the requirements of item 10r, grade A raw milk.

Public-health reason.—The need for toilet facilities and the necessity for protecting the plant processes from toilet-contaminated flies are obvious.

Satisfactory compliance.—This item shall be deemed to have been satisfied if:

(1) Toilet facilities complying with the city plumbing code are provided.

(2) The toilet room does not open directly into any room in which milk, milk products, containers, or equipment used in connection therewith are handled or stored.

(3) The toilet-room doors are provided with springs or checks to make them self-closing.

(4) The toilet room, stool, etc., are kept clean, sanitary, and in good repair.

(5) The toilet room is well ventilated, and free from flies.

(6) Durable, legible signs are posted conspicuously in each toilet room directing employees to wash their hands before returning to work.

A booth open at the top shall not qualify as a toilet room, as understood in this item.

Privies shall be constructed and operated in accordance with the requirements of item 10r, grade A raw milk.

ITEM 7p. *Water supply.*—*The water supply shall be easily accessible, adequate, and of a safe, sanitary quality.*

Public-health reason.—The water supply should be accessible so as to encourage its use in cleaning operations, it should be adequate so that cleaning and rinsing will be thorough, and it should be of safe, sanitary quality in order to avoid the infection of milk equipment and containers.

Satisfactory compliance.—This item shall be deemed to have been satisfied if:

(1) All milk-handling rooms of the pasteurizing plant are provided with an adequate number of water outlets.

(2) The water supply is ample in quantity to insure proper cleaning of the plant and its equipment.

(3) The water supply is approved as safe by the State board of health.

(4) The source of water supply complies with the specifications contained under item 11r, water supply, grade A raw milk, satisfactory compliance, paragraph (4).

ITEM 8p. *Hand-washing facilities.*—*Convenient hand-washing facilities shall be provided, including warm running water, soap, and approved sanitary towels. The use of a common towel is prohibited.*

Public-health reason.—Washing facilities and sanitary towels are essential to the personal cleanliness of the milk handlers.

Satisfactory compliance.—This item shall be deemed to have been satisfied if hand-washing facilities, including warm running water, soap, and individual cloth or paper towels, are provided. Washing facilities must be convenient. Bottle- or can-washing vats shall not be accepted as washing facilities for personnel. Warm water must be on hand at all times or within a reasonable time after opening the faucets. Soap and towels should be provided by the plant management. No employee shall return from a toilet to a room where milk or milk utensils are handled without first having washed his hands.

ITEM 9p. *Milk piping.*—*Only "sanitary milk piping" of a type which can be easily cleaned with a brush shall be used.*

Public-health reason.—Milk piping and fittings are sometimes so designed as to be difficult to clean or they may be constructed of metal which corrodes easily. If piping and fittings are used which are difficult to clean or which corrode easily, or if exceptionally long lines or individual lengths of piping are used, it is unlikely that they will be kept clean. So-called "sanitary milk piping" is a term which applies to properly designed standard equipment.

Satisfactory compliance.—This item shall be deemed to have been satisfied:

(1) When the milk piping, fittings, and connections are of such a diameter and so designed as to permit easy cleaning with a brush.

(2) When the milk piping and connections have a heavy, not readily corrodible, smooth finish, and all sweated connections are soldered smooth and flush.

(3) When the connections are of such design as to avoid sharp corners or crevices which are difficult to clean.

(4) When all parts of interior surfaces of pipe or fittings (including valves, fittings, and connections) are of such size and shape as to be accessible either to the sight or the touch, thus making it possible to determine whether they are clean. Bent or dented milk piping shall be considered as violating this item, also couplings or other types of fittings the joints of which are not visible for inspection. Except in small installations at least 1½-inch piping shall be urged.

(5) When the length of milk pipe lines is reduced to the minimum practicable.

ITEM 10p. *Construction and repair of containers and equipment.*—All containers and equipment with which milk or milk products come in contact shall be constructed in such manner as to be easily cleaned and shall be kept in good repair.

Public-health reason.—If the equipment is not so constructed that it can easily be cleaned, and is not kept in good repair, it is unlikely that it will be properly cleaned.

Satisfactory compliance.—This item shall be deemed to have been satisfied if:

(1) All surfaces with which milk comes in contact consist of smooth, not readily corrodible, metal or unbroken vitreous material.

(2) All joints are soldered flush with the surface or otherwise fitted to avoid open seams, or the surface if vitreous is continuous.

(3) All surfaces with which milk or milk products come in contact are easily accessible for cleaning, and are self-draining.

(4) All containers and other equipment are in good repair, free of breaks and corroded places.

The above requirements preclude the use of milk pumps which are not constructed of smooth, not readily corrodible metal, and all parts of which cannot be readily taken apart for cleaning.

The above requirement also precludes the use of any type of equipment so designed as to permit milk or milk products routinely to come in contact with threaded surfaces.

In all cases where a rotating shaft is inserted through a surface with which milk or milk products come in contact, the inspector shall assure himself that the joint between the moving and stationary surfaces is close fitting.

In cases where the thermometer bulbs are inserted through the surfaces with which milk or milk products come in contact, the thermometer bulb shall be provided with a pressure-tight seat ahead of all threads or crevices.

All milk cans should preferably have umbrella-type covers.

ITEM 11p. *Disposal of wastes.*—All wastes shall be properly disposed of.

Public-health reason.—The wastes resulting from the cleaning and rinsing of containers, equipment, and floors, from flush toilets, and from washing facilities, should be properly disposed of so as not to create a nuisance or a public-health menace.

Satisfactory compliance.—This item shall be deemed to have been satisfied if:

- (1) All wastes are disposed of in a public sewer.
- (2) In the absence of a public sewer, all wastes are disposed of by a method approved by the State board of health.
- (3) No trash or garbage is present upon the plant premises except in properly covered containers. Trash containers in the pasteurizing rooms should preferably be of the automatic-cover type.

ITEM 12p. *Cleaning and bactericidal treatment of containers and apparatus.*—All milk and milk products containers and apparatus shall be thoroughly cleaned after each usage and subjected immediately before each usage to an approved bactericidal process. When empty and before being returned to a producer by a milk plant each container shall be effectively cleaned and subjected to bactericidal treatment.

Public-health reason.—Milk and milk products cannot be kept clean and safe if permitted to come into contact with containers and apparatus which have not been properly cleaned and treated. By bactericidal treatment is meant the destruction of such pathogens as are transmissible through milk supplies and all other organisms so far as practicable.

Satisfactory compliance.—This item shall be deemed to have been satisfied if:

(1) All containers are thoroughly cleaned after each usage, and all apparatus is thoroughly cleaned once each day on a clean support such as a tank or rack (not the floor). Greasy or rough surfaces shall not be considered sufficiently clean. All demountable apparatus shall be taken down once each day for cleaning, including thermometer fittings where pressure-tight seats are not employed. The storage on racks of all demountable apparatus until just before bactericidal treatment and usage is urged.

(2) All containers are given bactericidal treatment after each usage, and all apparatus is given bactericidal treatment at least once each day immediately before the beginning of the day's operations, in the following manner:

Bactericidal treatment of entire assembled equipment immediately prior to day's run.—The bactericidal treatment of the entire assembled equipment immediately prior to the day's run is required. This may be done by means of steam, hot water, or chlorine solution, as follows, except that in the case of high-temperature short-time pasteurizers the apparatus shall, immediately before the day's run, be heated by recirculating hot water until the heater outlet recording thermometer has recorded a temperature of not less than 170° F. for not less than 5 minutes. The circulation of water shall then be continued until the

temperature control has been brought into proper adjustment for milk pasteurization after which milk may be admitted.

If *steam* is used, each group of assembled piping shall be treated separately by inserting the steam hose into the inlet and maintaining steam flow from the outlet for 5 minutes after the temperature of the steam at the outlet has reached 200° F. (The period of exposure required here is longer than that required for individual cans, etc., because of the heat lost through the large surface exposed to the air.) Any completely enclosed equipment continuous with the pipe system, and under pressure from the pipe system, such as preheaters, pumps, filters, valves, tubular holders, regenerative heater-coolers, etc., may be considered as having been adequately treated by means of the above procedure. Covers and other closures and unions should be cracked loose to insure joints being thoroughly steamed, and to lessen expansion and contraction cracks or strains.

Equipment not under pressure from the pipe line, however, such as weigh cans, storage vats, forewarmers, clarifiers, separators, pasteurization vats and pockets, coolers, and bottlers, must be treated separately.

Coolers should either be drained of refrigerant and the refrigerant valves closed before treatment, or the refrigerant intake valve closed and the return valve left open to provide for the expansion of the refrigerant. Covers must be in place during treatment.

If *hot water* is used, this may be done by pumping hot water through the entire equipment, the temperature of the water and the period of pumping being such that the temperature of the water at both the inlet and the outlet end of the assembly will have been at least 170° F. for at least 5 minutes.

If the assembly is so long that it is difficult to secure this temperature and time at the outlet end, the equipment should be treated in sections.

Supplementary treatment should be applied to any holder or to any other equipment the entire surface of which is not reached by the hot water.

Coolers should either be drained of refrigerant and the refrigerant valves closed before treatment, or the refrigerant intake valve closed and the return valve left open to provide for the expansion of the refrigerant. Covers, which must have been separately treated previously, must be in place during treatment of the cooler proper. Care should be taken to see that the hot water covers the entire surface of all coolers.

If *chlorine* solution is used, the solution appearing at the outlet end shall show the required strength (see section 1 (T) of the code). The chlorine solution should be pumped through the entire equipment for at least 5 minutes.

Here again, such surfaces as are not reached by the chlorine solution shall be treated with steam as previously described, or the spray method of applying chlorine solution may be used for such surfaces as are not reached by the flowing chlorine solution.

Bottler treatment.—The bottler must be completely assembled before using any of the above methods. In the case of hot water or chlorine treatment, the bottler must be operated during the process so as to insure bactericidal treatment of all valves and fittings. This is not necessary in the case of steam treatment, but in this case the valves must be individually treated in place. This operation can be made

most effective by attaching a device to the end of the steam hose which will enclose the valve and confine the steam.

Thermophiles.—If the pasteurization plant becomes infected with thermophilic organisms, it may prove that more intensive bactericidal treatment or a change in methods may be necessary. If the steam or hot-water method has been in use, an attempt should be made to use higher temperatures and for longer periods (above 200° F. for more than 10 minutes).

Bottle and can treatment.—Small plants, for which automatic washers may be deemed too large, frequently wash their bottles manually. For these the use of the steam cabinet, of an individual steam-jet plate provided with a hood, or of chlorine immersion-type apparatus is accepted as compliance.

Larger plants should be encouraged to use automatic washers which include steam, hot water, or chlorine treatment. In these types of equipment the use of a strong alkali solution (not less than 2.5 percent should be approved) makes it possible to use a shorter exposure period for the final treatment. The inspector should satisfy himself by bacteriological examination that the effect of the combination of the various agents is such as to produce bottles and cans having a residual bacterial plate count of not more than one per cc of capacity. After bactericidal treatment cans shall be so treated as to dry rapidly.

ITEM 13p. *Storage of containers.*—*After bactericidal treatment all bottles, cans, and other milk or milk-products containers shall be stored in such manner as to be protected from contamination.*

Public-health reason.—If milk containers are not protected from contamination the value of bactericidal treatment will be partly or entirely nullified.

Satisfactory compliance.—This item shall be deemed to have been satisfied if all bottles, cans, and other containers are stored in crates or on racks in a clean place protected from flies and dust. Such containers as can conveniently be inverted shall be stored in an inverted position. Storage racks shall preferably be constructed of metal protected against rusting.

Floors of any room shall not be flushed when crates of cleaned bottles are stacked thereon.

ITEM 14p. *Handling of containers and apparatus.*—*Between bactericidal treatment and usage, and during usage, containers and apparatus shall not be handled or operated in such manner as to permit contamination of the milk.*

Public-health reason.—Carrying bottles by inverting fingers into the mouths, running the hands over the surfaces of milk coolers, bottling machines, or pasteurization equipment, or allowing the clothing to brush against cleaned surfaces with which milk or milk products come in contact, will obviously nullify the effect of bactericidal treatment.

Satisfactory compliance.—This item shall be deemed to have been satisfied if the inspector is assured that the employees of the pasteurization plant are using every reasonable precaution to prevent the milk-contact surfaces of containers and apparatus from coming into contact with their persons or clothing between the time they are given bactericidal treatment and the time they are again used, or while in use.

ITEM 15p. Storage of caps and parchment paper.—Milk bottle caps and parchment paper for milk cans shall be purchased and stored only in sanitary tubes and cartons, respectively, and shall be kept therein in a clean dry place until used.

Public-health reason.—Soiled or contaminated caps nullify the benefits of the safeguards prescribed throughout the ordinance, and packing the caps in tubes which are unbroken until they are placed in the bottling machine is the best manner of assuring cap cleanliness. This is similarly true of parchment papers for milk cans.

Satisfactory compliance.—This item shall be deemed to have been satisfied if:

(1) All bottle caps are purchased in tubes, and all parchment paper for milk cans is purchased in cartons.

(2) The tubes and cartons are stored so as to be kept clean and dry.

The storage of cap tubes or parchment-paper cartons in wet or dusty places or the refilling of tubes or cartons with spilled caps or papers violates this item. At the beginning of each run the first cap or the first paper should be discarded, as it is exposed and may be contaminated.

ITEM 16p. Pasteurization.—Pasteurization shall be performed as described in section 1 (K) of this ordinance. The time and temperature record charts shall be dated and preserved for a period of 3 months for the information of the health officer.

The definition of pasteurization reads as follows:

The terms "pasteurization", "pasteurized", and similar terms shall be taken to refer to the process of heating every particle of milk or milk products to a temperature of not less than 142° F., and holding at such temperature for not less than 30 minutes in approved pasteurization apparatus, provided that approval shall be limited to apparatus which requires a combined holder and indicating thermometer temperature tolerance of not more than 1½° F., as shown by official tests with suitable testing equipment, and provided that such apparatus shall be properly operated and that the indicating thermometers and the recording thermometer charts both indicate a temperature of not less than 143½° F., continuously throughout the holding period. The terms "pasteurization", "pasteurized", and similar terms shall also include the process of heating every particle of milk or milk products to 160° F., and holding at that temperature or above for not less than 15 seconds in apparatus of approved design and properly operated. Provided that nothing contained in this definition shall be construed as disbaring any other process which has been demonstrated as of at least equal efficiency and is approved by the State health authority.

Satisfactory compliance.—This item shall be deemed to have been satisfied if the design and operation of the apparatus meets the following specifications:

ITEM 16p (a). Indicating and recording thermometers.—Both indicating and recording thermometers shall be installed and used on each holder in which the holding time is not automatically controlled; provided that thermometer equipment may be transferred from one holder to another if the required thermometer equipment is in place on each holder during the entire filling, heating, holding, and emptying periods.

Both indicating and recording thermometers shall be installed and used in both inlet and outlet manifolds of 30-minute holders in which

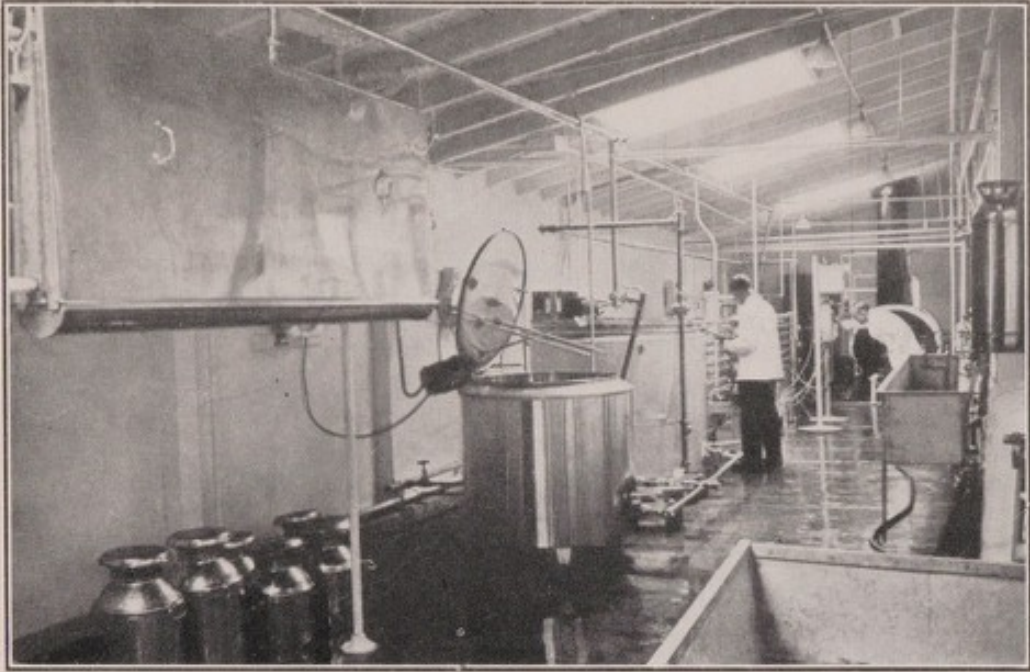


FIGURE 13.—U. S. P. H. S. EXPERIMENTAL PASTEURIZATION PLANT.

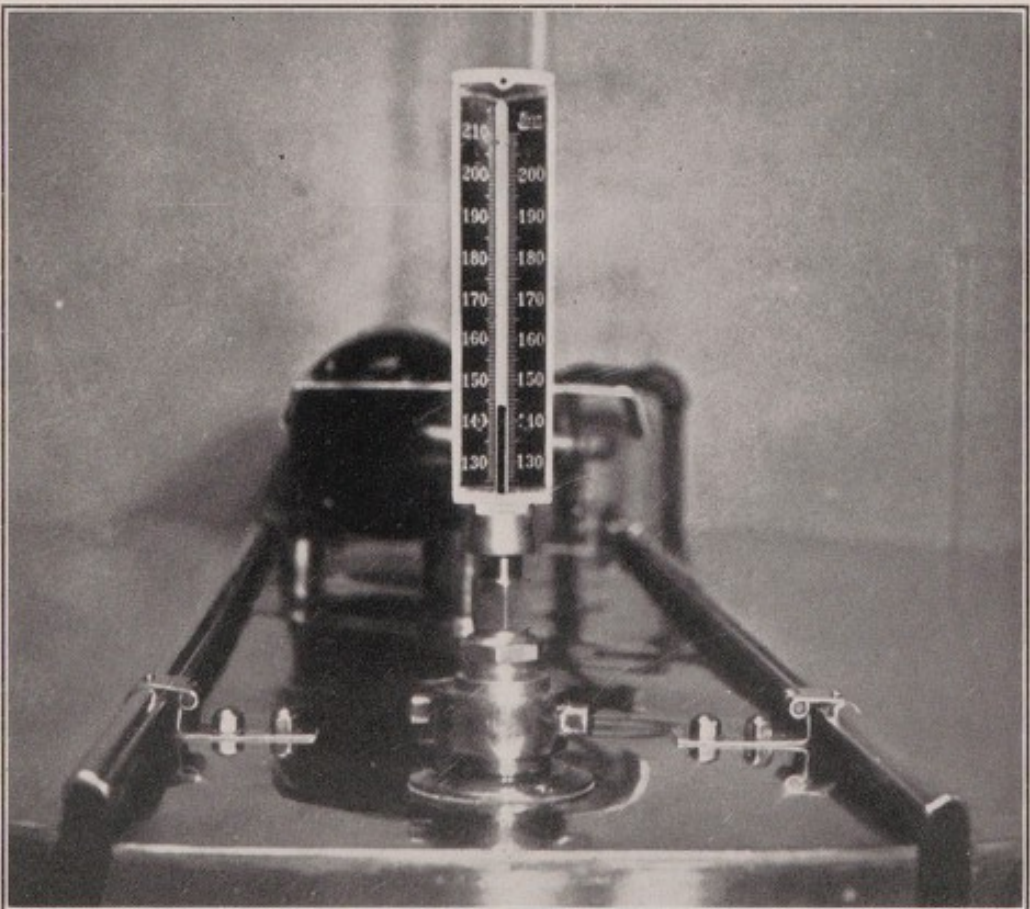
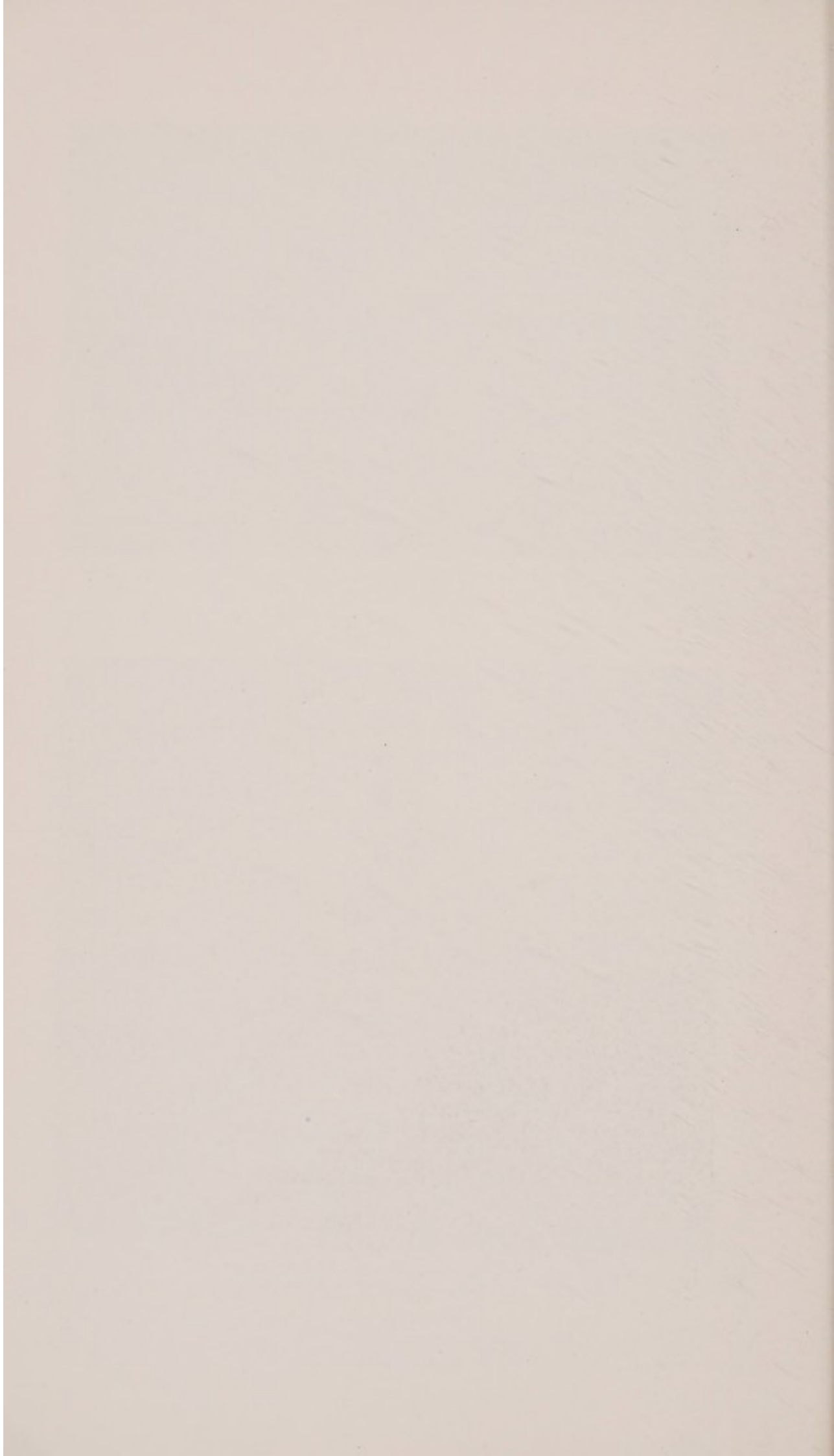


FIGURE 14.—PASTEURIZATION INDICATING THERMOMETER; ALSO VAT-COVER HINGES OF APPROVED DESIGN.



the milk is brought to the final pasteurization temperature before entering the holder, and in which the holding time is automatically controlled.

For high-temperature short-time pasteurizers both indicating and recording thermometers shall be installed and used in the outlet of the final heating chamber; provided that in installations in which the holder is not heated the recording thermometer may be located at the holder outlet, but in that case indicating thermometers shall be installed and used at both the heater and the holder outlets, the former for checking the milk-pump stop and the latter for checking the recording thermometer.

The bulbs of the indicating thermometers shall be located as near as practicable to the corresponding recording thermometer bulbs and/or to the corresponding milk-flow stop bulb.

The following specifications shall be complied with in the case of all new equipment and in the case of all replacements of indicating and recording thermometers. They shall also apply to all repairs of recording thermometers requiring a renewal of the tube system. The accuracy specifications shall apply to old as well as new equipment.

Indicating thermometers located on pasteurization vats or pockets—Type.—V-shaped brass or equally noncorrodible scale case, with removable glass front, mercury actuated, line etched in glass tube at $143\frac{1}{2}^{\circ}$ F., filling above mercury, nitrogen, or equally suitable gas.

Magnification of mercury column.—To apparent width of not less than $\frac{1}{16}$ inch.

Scale range.— 130° to 210° F., extension either side permissive, protected against damage at 220° F.

Temperature represented by smallest scale division.—Not more than 1° F. between 130° and 150° F.

Number of degrees per inch of scale.—Not more than 16.

Accuracy.—Within one-half degree F., plus or minus, between 142° F. and 145° F.

Submerged stem fittings.—Pressure-tight seat against inside wall of holder. No threads exposed to milk. Location of seat to conform to that of standard I. A. M. D. wall-type fitting.

Bulb.—Corning normal, or equally suitable thermometric glass.

Indicating thermometers located on pasteurization pipe lines—Type.—V-shaped brass or equally noncorrodible scale case, with removable glass front, mercury actuated, lines etched on stem at $143\frac{1}{2}^{\circ}$ F. and at 160° F., filling above mercury, nitrogen, or equally suitable gas.

Magnification of mercury column.—To apparent width of not less than one-sixteenth inch.

Scale range.— 138° to 165° F., with extension on either side permissive, protected against damage at 220° F.

Temperature represented by smallest scale division.— 0.5° F. between 138° and 165° F.

Number of degrees per inch of scale.—Not more than 8.

Accuracy.—Within 0.5° F., plus or minus, throughout specified scale range.

Stem fittings.—Pressure-tight seat against inside wall of fittings; no threads exposed to milk; distance from under side of ferrule to top of bulb not less than 2 inches.

Thermometric lag.—When thermometer is at room temperature and then immersed in a well-stirred water bath maintained at a temperature at which the thermometer to be tested reads 160° F., the time required for the reading to increase from 141° F. to 153° F. shall not be more than 4 seconds.

Bulb.—Corning normal, or equally suitable thermometric glass.

The local or State inspector shall once each month check the accuracy of all indicating thermometers at the legally required temperature of pasteurization by means of a standardized thermometer reading within 0.2° F. In the case of indicating thermometers located on vats or pockets, this may be done by lowering a standardized maximum self-registering test thermometer to the position of the bulb of the indicating thermometer in the holder during the holding period with the milk in agitation. In the case of indicating thermometers located on pipe lines this may be done by fitting the indicating thermometer to a sanitary cross and inserting a standardized test thermometer through a thermometer holder (I. A. M. D. fitting no. 55-A) equipped with a rubber washer for holding the thermometer in place against pressure in the milk line, and attached to one of the arms of the cross by means of a union nut (I. A. M. D. fitting no. 13). The inspector should carry with him thermometer holders of the sizes necessary for the plants in his territory. Ordinarily the 1½-inch and 2-inch sizes will be sufficient.

The inspector shall identify by number, seal, or otherwise the indicating thermometer when tested.

Inspectors' maximum self-registering thermometers to be used in the testing of indicating thermometers on pasteurization vats or pockets—Type.—Maximum self-registering, mercury actuated, pocket type, readily cleanable.

Magnification of mercury column.—To apparent width of not less than one-sixteenth inch.

Protection against high-temperature damage.—At 155° F.

Scale range.—138° F. to 148° F., with extension of scale on either side permissive, 138° point to be not less than three-fourths inch above contraction.

Temperature represented by smallest scale division.—0.2° F.

Number of degrees per inch of scale.—Not more than 6.

Accuracy.—Within 0.2° F., plus or minus, between 142° F. and 145° F.

Case.—Metal, provided with suspension ring and fountain-pen clip.

Armor.—Thermometers, if armored, to be easily removable for cleaning, armor to be fenestrated opposite thermometer bulb; scale to be visible without removing armor.

Bulb.—Corning normal, or equally suitable thermometric glass.

The inspector should check maximum self-registering test thermometers against themselves occasionally for failure to hold reading when taken from the liquid in which they have been immersed. This may be done by holding them in clear water at approximately 142° F., reading the temperature while immersed, and then reading the temperature again after the thermometer has been removed from the water.

Inspectors' thermometers to be used in the testing of indicating thermometers located on pasteurization pipe lines—Type.—Mercury actuated, readily cleanable, plain front, enameled back, top finished with

glass ring, length 12 inches, standardized for 4-inch immersion, immersion point to be etched on stem; contraction chamber to be of narrow type immediately above bulb, not over 1 inch long, mercury to stand in contraction chamber at 32° F.

Protection against high-temperature damage.—At 220° F.

Scale range.—138 to 165° F., with extension of scale on either side permissive, 138° point to be not less than 1 inch above immersion line.

Temperature represented by smallest scale division.—0.2° F.

Number of degrees per inch of scale.—Not more than 6.

Accuracy.—Within 0.2° F., plus or minus, throughout specified scale range.

Carrying case.—Felt-lined metal.

Bulb.—Corning normal, or equally suitable thermometric glass.

Recording thermometers for pasteurization apparatus—Case.—Moisture proof (under operating conditions obtaining in pasteurization plants).

Scale range.—100° to 150° F., or, in the case of 15-second pasteurization, 150° to 200° F., with extension of scale on either side permissive.

Temperature represented by smallest temperature-scale division.—1° F. between 142° and 145° F., or, in the case of 15-second pasteurization, between 159° and 162° F.

Length of 1° F. scale division.—Not less than one-sixteenth inch between 142° and 145° F., or, in the case of 15-second pasteurization, between 159° and 162° F.

Time represented by smallest time-scale division.—Not more than 10 minutes.

Chord or straight-line length of 10-minute scale division.—Not less than one-fourth inch between 142° and 145° F., or, in the case of 15-second pasteurization, between 159° and 162° F.

Accuracy.—Within 1° F., plus or minus, between 142° and 145° F., or, in the case of 15-second pasteurization, between 159° and 162° F. The accuracy may be determined by the following mode of procedure:

(1) The instrument shall be adjusted to read correctly (if necessary) at some point between 142° and 145° F., or, in the case of 15-second pasteurization, between 159° and 162° F., while it is connected with the pasteurization apparatus, and as shown by the tested indicating thermometer after a stabilization period of 5 minutes at constant temperature with the agitation device in operation.

(2) The bulb shall be removed from the pasteurizer and immersed for not less than 5 minutes in boiling water.

(3) The bulb shall then be immersed for not less than 5 minutes in melting ice.

(4) The bulb shall be again connected with pasteurizer and temperature brought to a point between 142° and 145° F., or, in the case of 15-second pasteurization, between 159° and 162° F., as shown by the tested indicating thermometer under the same test conditions outlined under No. (1). At this time the deviation of the recording thermometer reading from that of the indicating thermometer shall not be more than 1° F., plus or minus.

Pen-arm setting device.—Easily accessible, simple to adjust.

Pen and chart paper.—Designed to give line not over one-fortieth inch thick when in proper adjustment, which shall be easy to maintain.

Pressure system (bulb, tube, spring, etc.).—Protected against damage at bulb temperature of 220° F.

Stem fitting.—Pressure-tight seat against inside wall of holder or pipe. No threads exposed to milk. Location of seat in batch-type pasteurizers to conform to that of a standard I. A. M. D. wall-type fitting.

Chart speed.—The chart shall make one revolution in 12 hours, and shall be graduated for a 12-hour record. The rotating chart support shall be provided with a pin to puncture the chart in a manner to prevent its fraudulent rotation.

Record of milk flow.—On installations equipped with a milk-flow stop the recording thermometer located nearest the milk-flow stop shall be provided with an additional pen arm for recording upon the chart the full record of the time during which the milk-flow stop is preventing the flow of milk into the holder.

ITEM 16p (b) *Maintenance of pasteurization time and temperature—Maintaining minimum legal pasteurization temperature.*—The pasteurization equipment shall be operated so that the indicating thermometers and the recording thermometer charts both read at least the temperature which the definition of pasteurization requires the thermometers to show, continuously throughout the holding period. The indicating and not the recording thermometer shall be used as an index of temperature by the plant operator. The temperature shown by the recording thermometer shall be checked against the temperature shown by the indicating thermometer daily by the plant operator, and at least biweekly by the health officer, and the recording thermometer shall be kept adjusted so as at no time to read higher than the indicating thermometer.

The health officer shall accept only designs of equipment which have shown on official test a deviation between the hottest and coldest particles of milk or milk products of not more than 1° F. For all existing installations provided with agitation devices, and for all new vat, tank, and pocket-type holders, *agitation* throughout the holding period shall be required; provided that in the case of vat, tank, or pocket holders in which the milk is brought to the final pasteurization temperature before entering the holders, agitation may be omitted if the lowest portion of each holder is provided with or is in contact with a jacket through which is circulated a heating medium thermostatically controlled, and provided that bulbs of both an indicating and a recording thermometer shall be located in the heating medium downstream from the point of its discharge from the jacket, and provided further that both the indicating and the recording thermometers shall indicate throughout the filling, holding, and emptying periods at least the temperature found necessary, by tests made on that particular model of holder and acceptable to the State health department, to prevent the temperature of the coldest particle of milk in any holder during the holding period from falling below 143½° F. when the atmospheric temperature of the pasteurization room is 55° F. or less.

All apparatus in which the milk or milk products are brought to the final pasteurization temperature before entering the holder, and in which the holding time is automatically controlled, or is manually controlled but with no means provided for heating the milk in the holder, shall be equipped with a dependable thermostatic control

of the milk temperature and with an automatic *milk-flow stop*. Automatic milk-flow stops are devices for preventing the entrance of milk of sublegal temperature into holders, and include automatic milk-pump stops (which automatically start and stop the milk-pump motor at predetermined milk temperatures) and automatic flow-diversion valves (which automatically divert the flow of milk into or away from the holder at predetermined milk temperatures). Either of these may be used, except that an automatic flow-diversion valve is mandatory for the following installations, unless a milk-pump stop is installed and operated as herein provided and the pipe connecting the heater and the holder is drained immediately following each stopping of the milk pump: (1) 30-minute holders which are not equipped with agitation devices to mix the incoming milk with all the milk in the holder; and (2) 30-minute holders which, though equipped with agitation devices to mix the incoming milk with all of the milk in the holders, are so arranged that the milk between the outlet of the heater and the inlet of the most distant holder will be sufficient in quantity, when cooled to 70° F. (room temperature), to lower the final temperature of the milk in the holder to below 143½° F.

If an automatic milk-pump stop is used it shall be located at the outlet of the heater. This device should be so connected as simultaneously to stop all milk pumps in the system which would be likely to cause overflow if operating when flow to the holder has stopped. This is better than to stop automatically only the milk pumps for the holder proper and depend upon manual operation of a switch for any other milk pumps in the system.

If an automatic flow-diversion valve is used it shall be located at the holder inlet with the control bulb for the valve located in the pipe line as close to the valve as is practicable. In installations open at any point upstream from the heater, such as those using a surface-type regenerator, the milk flow can be diverted back to the unpasteurized milk at the open point. In such cases some provision will be required for taking care of the additional milk coming to that point. This may be accomplished by a float-operated valve controlling the raw milk supply. If a float-valve arrangement is not used some warning signal, such as a bell or a horn, will be necessary to warn the operator that the milk flow is being diverted away from the holder, and thus enable him to shut off the pumps in case there is a likelihood of overflow. In closed-system installations the milk flow may be diverted back to the suction side of the pump forcing the milk through the heater. This diversion line may contain some milk at all times. When there is a positive head on the suction side of the pump a low-point drain valve may be placed in this line, also a check valve where the line connects into the pump suction. With this arrangement of valves the operator, if he so desires, may drain the diversion line.

The milk-flow stop shall be so designed as to insure automatic starting. The electrical system comprising the milk-flow stop, the milk-pump motor or the diversion-valve mechanism, as the case may be, and their connections shall be designed so as to make it impossible to start the flow of milk into the holder unless the bulb of the milk-flow stop is at or above the legal pasteurization temperature. The milk-flow stop bulb shall not be removed from its proper position during the pasteurization process.

The milk-flow stop shall be so designed as to make it impossible for the plant operator to lower the temperature at which it operates without the knowledge of the health officer. This may be done by means of a seal, which shall not be broken by the plant operator without promptly notifying the health officer.

The milk-flow stop is intended as a safety feature and not as a part of the routine temperature-control equipment. The routine operating milk temperature shall be sufficiently above the setting of the milk-flow stop so that the latter will not be brought into frequent operation.

The milk-flow stop shall be so adjusted that the flow of milk into the holder will stop before or when the legal temperature of pasteurization is reached during descending temperatures, and will not start before the legal temperature of pasteurization is reached during ascending temperatures. The accuracy of the cut-out and cut-in responses shall be tested daily by the plant operator at the beginning of the day's run and at least monthly by the health officer, and entered upon the recording thermometer chart. This test may be made by starting the run with water which is then heated to above pasteurization temperature by opening the steam bypass valve, then cooling the water to below the pasteurization temperature by turning off the steam supply, and noting the reading of the heater outlet indicating thermometer at the instant the cut-out response occurs, then gradually reheating the water to above the pasteurization temperature by reopening the steam bypass valve, and noting the temperature at which the cut-in response occurs.

Maintaining minimum holding period (nonautomatic).—Holders in which the holding time is not automatically controlled shall be so operated that the record charts will indicate the above required temperature continuously for a period of not less than 30 minutes; provided that where milk is brought to the pasteurization temperature before entering the holder, the chart shall indicate the required temperature for an additional period of time equal to the filling time from the level of the recording thermometer bulb; and provided that where cooling either is begun in the vat after the outlet valve is opened or is done entirely outside the vat, the chart shall indicate the required temperature for an additional period of time equal to the emptying time to the level of the recording thermometer bulb. These times shall be determined by the inspector for each holder. If cooling is begun in the holder simultaneously with or before the opening of the outlet valve, the recording thermometer chart shall show a holding time of not less than 33 minutes. No milk shall be added to the vat after the pasteurization temperature has been reached.

Maintaining minimum holding period (automatic).—For designs in which the holding period is automatically controlled the recording thermometer charts are not required to show evidence of the holding period, but the following specifications shall be fulfilled:

Tubular holders shall be constructed and equipped in a manner to insure that every particle of milk or milk products will be held for the required period. In order to meet this requirement all holder inlet and/or outlet pumps shall be geared directly to motors of approximately constant speed. These motors shall therefore be induction-type A. C. motors (neither D. C. nor universal types are satisfactory, but practically all A. C. motors are of the induction type and

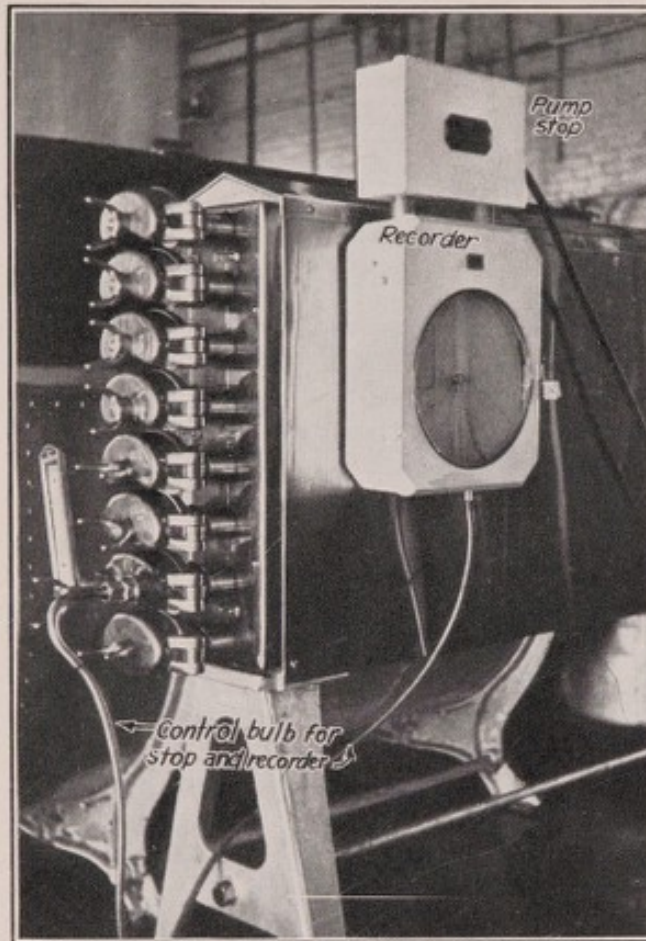


FIGURE 15.—MILK-PUMP STOP FOR CONTINUOUS-FLOW PASTEURIZERS.

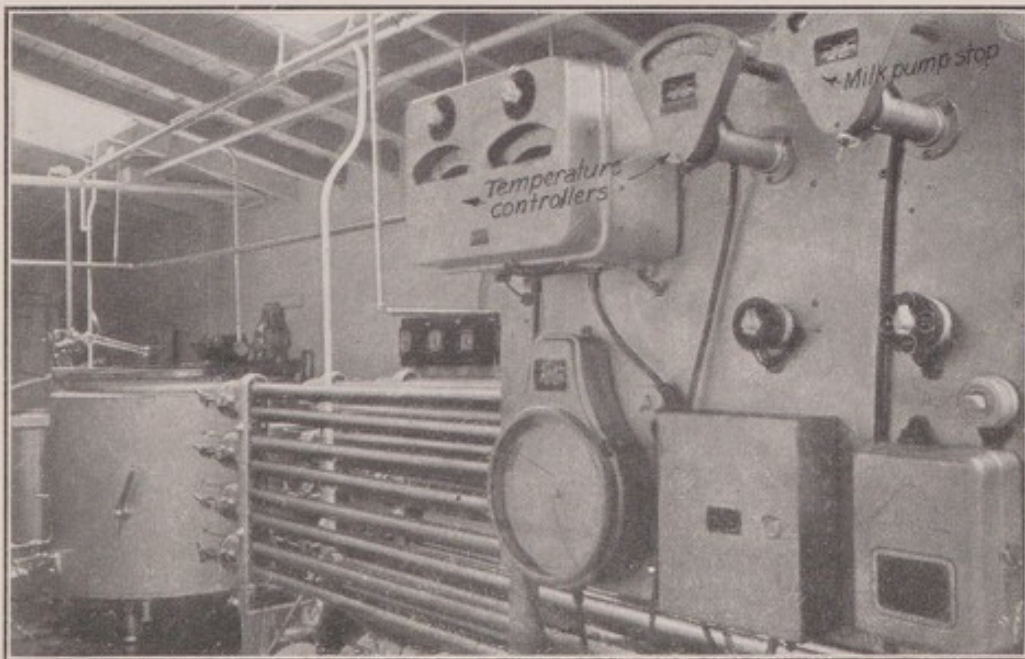
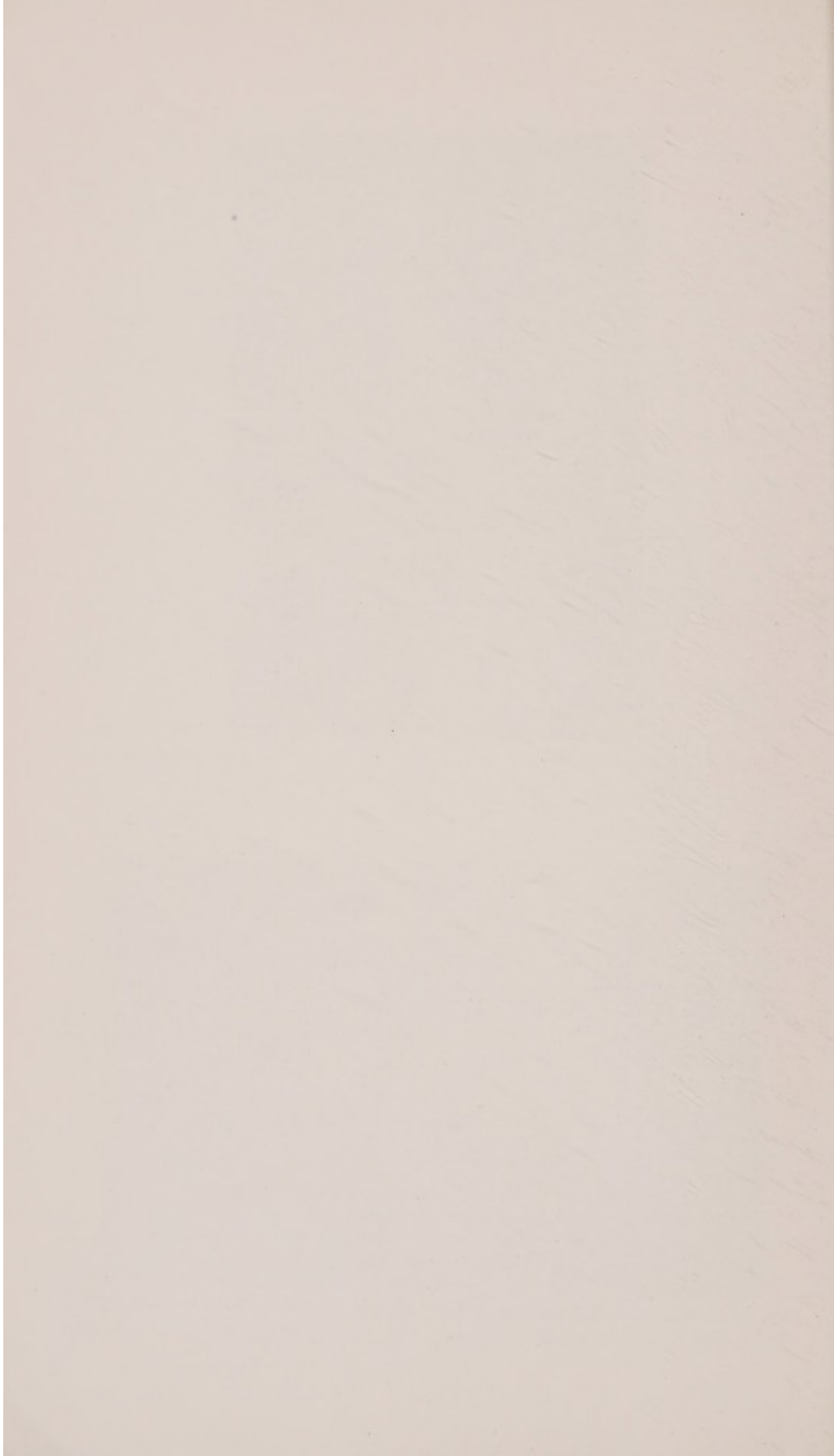


FIGURE 16.—CONTROL PANEL OF HIGH-TEMPERATURE SHORT-TIME PASTEURIZER.



are satisfactory). The holding section shall be so designed as to prevent the accumulation of air or gases therein, as this may decrease the holding time to below that found by test. This may be done by equipping both the outlet and the inlet end of the holding section with sanitary-pipe vents of a size which can be easily cleaned, or by sloping the holder section continuously upward to the cooler or regenerator inlet. The milk may be sucked through the regenerator and the heater, but shall not be sucked through the holder. If the milk is sucked through the heater or the regenerator an automatic air vent shall be installed on the discharge side of the pump, the vent being so designed as to eliminate all of the air or gases. In the case of 30-minute installations in which the holder empties by gravity the valve on the outlet piping shall be of such a size and so constructed that every particle of milk issuing from the holder during the emptying period will have been held in the holder for the legally required holding period.

Pocket-type holders shall be equipped with a timing device operated by a constant-speed motor so that every particle of milk or milk products will be held for the legally required holding period. The interval between the closing of the inlet valve and the opening of the outlet valve must be not less than 30 minutes.

Immediately after installation or any replacement or alteration in design or arrangement each pasteurizer shall be tested by the health officer for compliance with the required detention requirement. The test shall be made with all valves and any other flow-impeding devices open to their fullest extent, and in case filters are used, with a new filter in place. The holding time determined shall be for that part of the system lying between the heater outlet and the cooler inlet.

In the case of pocket-type installations this may be done by checking the timing device with a watch.

In the case of tubular holders this may be done by means of either chloramine, uranine, starch-iodide, or prodigiousus. When the chloramine, uranine, or starch-iodide methods are used the solution may be pumped through the holder at the pasteurization temperature. When the prodigiousus method is used lower temperatures must be used in order to avoid killing the organisms.

The following is a suggested method of *testing by means of chloramine, uranine, or starch solutions*.

The inlet to the holder is drilled to receive a one-eighth-inch straight-way petcock. A large veterinary-type syringe, with a flat rubber washer slipped over its glass nipple in place of the needle, is filled with a saturated solution of chloramine, uranine (fluorescin), or starch, and the syringe pressed into the petcock opening. In making the injection the petcock is opened, the syringe discharged, and the petcock closed again. The solution is injected after the installation is in smooth operation with water at the pasteurization temperature. The time of beginning injection must be observed accurately.

Twenty-five minutes after the solution has been injected the taking of samples at the outlet end of the holder is begun and continued at 30-second intervals. (For high-temperature short-time pasteurizers the holding time is determined in the same manner, except that sampling is begun 10 seconds after the solution has been injected and continued at intervals of 1 second.) These samples

are tested for the presence of chloramine, uranine, or starch. The difference in time between injection and appearance at the effluent end is the observed holding time.

The holding time during filling or emptying of the holder may not be identical with the holding time observed for normal flow conditions.

The holding time during filling may be determined by (1) injecting the solution 10 minutes after filling has begun; (2) opening the effluent valve and beginning routine flow through the holder as soon as the holder is full, but not before the lapse of 30 minutes from the beginning of filling; and (3) taking samples at the effluent end at 30-second intervals from and after 25 minutes from the time the solution was injected. The holding time is then computed as before.

The holding time during emptying may be determined by injecting the solution at the moment the emptying operation begins and observing the time taken to reach the effluent end by taking samples as before.

For *testing by means of prodigiosus* the following method evolved by the United States Department of Agriculture is used:

The supply tanks, heaters, and holders are cleaned. The system is then filled with tap water at ordinary temperature. A supply of water sufficient to run the apparatus for 30 minutes at its rated capacity is essential. The apparatus is then run at its rated capacity, using water in the same way as when milk is being pasteurized, except that no heat is used. Repeated checks upon the rate of flow are necessary. Samples of water for bacteriological analysis are taken at the inlet and outlet of the holder. These are check samples. A water emulsion of a 24-hour-old agar culture of the test organism (*Bacillus prodigiosus*) is then introduced at the inlet of the holder, the time being noted. Samples are then taken every 3 minutes at the outlet of the holder up to 18 minutes, and every minute thereafter up to 30 minutes. One cubic centimeter of each sample is then plated, plain agar being the medium used. Plates are incubated for 48 hours at 20° C. (room temperature). At the end of this period the holding time is determined by the first plate in the series that shows the presence of the test organism. The organism produces a very characteristic and distinctive deep-red colony. Check samples should show no red colonies if the test is to be accepted.

Recording thermometer charts.—All recording thermometer charts shall be preserved for a period of 3 months for the information of the health officer. No chart shall be used more than 1 day except with the permission of the health officer. All charts shall contain the following information:

- (1) Date.
- (2) Number or location of the recorder, if more than one is used.
- (3) Reading of indicating thermometer at some indicated time during the holding period. Biweekly, initials of health officer opposite reading.
- (4) Amount and grade of pasteurized milk or cream represented by chart.
- (5) If milk-flow stop is used, the temperatures at which the stop cut in and cut out on test made before beginning of pasteurization. Monthly, initials of health officer opposite readings.
- (6) Signature of operator.

ITEM 16p (c). *Inlet and outlet valves and connections.*—Inlet and outlet valves and pipe-line connections to pasteurization holders shall conform with the following design and operation requirements.

Definitions.—The following definitions shall apply in connection with these specifications:

(1) A *90° stop* shall mean a stop so designed as to prevent turning the plug more than 90°. A *single-quadrant stop* shall mean a 90° stop which limits the motion of any point on the plug to a single quadrant, in other words, one which prevents reversing the position of the plug.

(2) *Closed position* shall mean any position of the valve plug between the fully-closed and the just-closed positions. The *fully-closed position* shall mean that in which the plug channel is at right angles to the line of flow. The *just-closed position* shall mean that in which the flow of milk is just stopped, or any closed position within one thirty-second inch thereof as measured along the circumference of the valve seat.

(3) *Leakage* shall be taken to mean the entrance of unpasteurized milk into a pasteurization holder during the holding or emptying period or the entrance of unpasteurized milk into any pasteurized-milk line at any time.

(4) A *leak-protector valve* shall mean a valve which is provided with a leak-diverting device which, when the valve is in any closed position³, will prevent leakage of milk past the valve or, in the case of holders filled or emptied by suction or compressed air, will prevent leakage of milk due to the leakage of air past the suction valve or the compressed-air valve, as the case may be.

(5) *Wetted area*, in the case of plug-type valves, shall mean that part of the surface of the plug seat which actually passes the vat outlet as the valve is closed, and which, in the fully-closed position, lies between the vat outlet and the nearest leak groove.

(6) A *closed-coupled valve* shall mean a valve the seat of which is either flush with the inner wall of the holder or so closely coupled that all milk in the valve pocket is not more than 1° F. colder than the hottest milk in the holder at any time during the holding period; provided that in the absence of tests to the contrary, a close-coupled valve which is not truly flush shall be considered as satisfying this requirement (a) if the holder outlet is so flared that the smallest diameter of the large end of the flare is not less than the diameter of the outlet line plus the depth of the flare, and (b) if the greatest distance from the valve seat to the small end of the flare is not more than one and one-half times the diameter of the outlet line, and (c) if, in the case of vat and pocket holders, the outlet and the agitator are so placed as to insure that milk currents will be swept into the outlet.

Design.—All valves and connections shall comply with the following requirements:

(1) Valves and pipe-line connections shall meet the requirements of item 10p, construction and repair of equipment.

(2) All pipe lines and fittings shall be so constructed and located that "leakage" will not occur.

(3) Dependence shall not be placed on soldered joints to prevent "leakage."

(4) All inlet and outlet valves on vats or pockets shall be of the leak-protector type, except in the case of existing single-vat installations. Multiple-vat installations equipped with leak-protector inlet valves but with single-seat close-coupled outlet valves not of the leak-protector type and for which no satisfactory leak-protector

³ For existing valves the term "any closed position" may be limited in meaning to the fully closed or approximately fully closed position.

device can be reasonably provided, shall be considered satisfactory if (a) each vat is disconnected from the outlet piping during the filling, heating, and holding periods, and (b) the outlet piping is so arranged that only one vat can be connected to the discharge line at a time.

(5) Leak-protector valves shall be provided at the outlets of all 30-minute tubular holders, or the outlet piping shall be left disconnected until at least 30 minutes after the filling of the holder is begun.

(6) In the case of holders filled or emptied by suction or by compressed air, inlet and outlet connections other than through "close-coupled valves" shall not enter or leave the holder below the level of the milk therein. This is in order to insure adequate pasteurization of all milk in inlet and outlet connections.

(7) To prevent clogging and to promote drainage, grooves for diverting "leakage", when used, shall be not less than 0.0138 square inch in cross-section throughout their effective length (equivalent to the area of a semicircle three-sixteenths inch in diameter).

(8) Mating grooves shall provide this full cross-sectional area throughout their combined length whenever the valve is in or approximately in the "fully-closed position."

(9) All single grooves and all mating grooves when mated shall extend throughout the entire depth of the seat, so as to divert "leakage" occurring at all points throughout the depth of the seat, and so as to prevent air binding.

(10) All valves shall be so located as to be readily accessible for cleaning.

(11) Washers or other parts shall not obstruct leak-protector grooves.

Inlet valves and connections shall, in addition, comply with the following requirements:

(1) Pipe lines between the inlet valve and the holder shall be as short as practicable, and shall be sloped to drain.

(2) In cases where the milk in the vat is apt to submerge the inlet pipe and thus prevent its complete emptying when the inlet valve is closed, the inlet line shall be provided with automatic air relief located either at the valve or otherwise and so designed as to function in every "closed position" of the valve.

Outlet valves shall, in addition to the requirements listed above under "All valves and connections", comply with the following requirements:

(1) Outlet valves on pasteurization holders shall be "close-coupled whenever the outlet penetrates the holder below the milk level."

(2) Outlet valves shall be designed (a) ⁴ so that the surface area "wetted" by "leakage" is less than the inside cross-sectional area of the outlet pipe, and (b) so as to prevent the accumulation of unpasteurized milk in the milk passages of the valve when the valve is in any "closed position"; or, in lieu thereof, shall be provided with steam or hot water connections for bactericidal treatment; provided that these alternatives shall not be required in the case of valves on existing single-vat installations.

Such connections for bactericidal treatment shall (a) open automatically when the milk valve is closed and close automatically when

⁴ Required for new installations and replacements.

the milk valve is opened, except in the case of existing manually operated valves, and (b) be of sufficient size and so operated as not to clog readily.

(3) To insure correct operation of leak grooves all plug-type outlet valves shall be provided with "90° stops," If such stops are not of the "single-quadrant" type, duplicate, diametrically opposite leak-

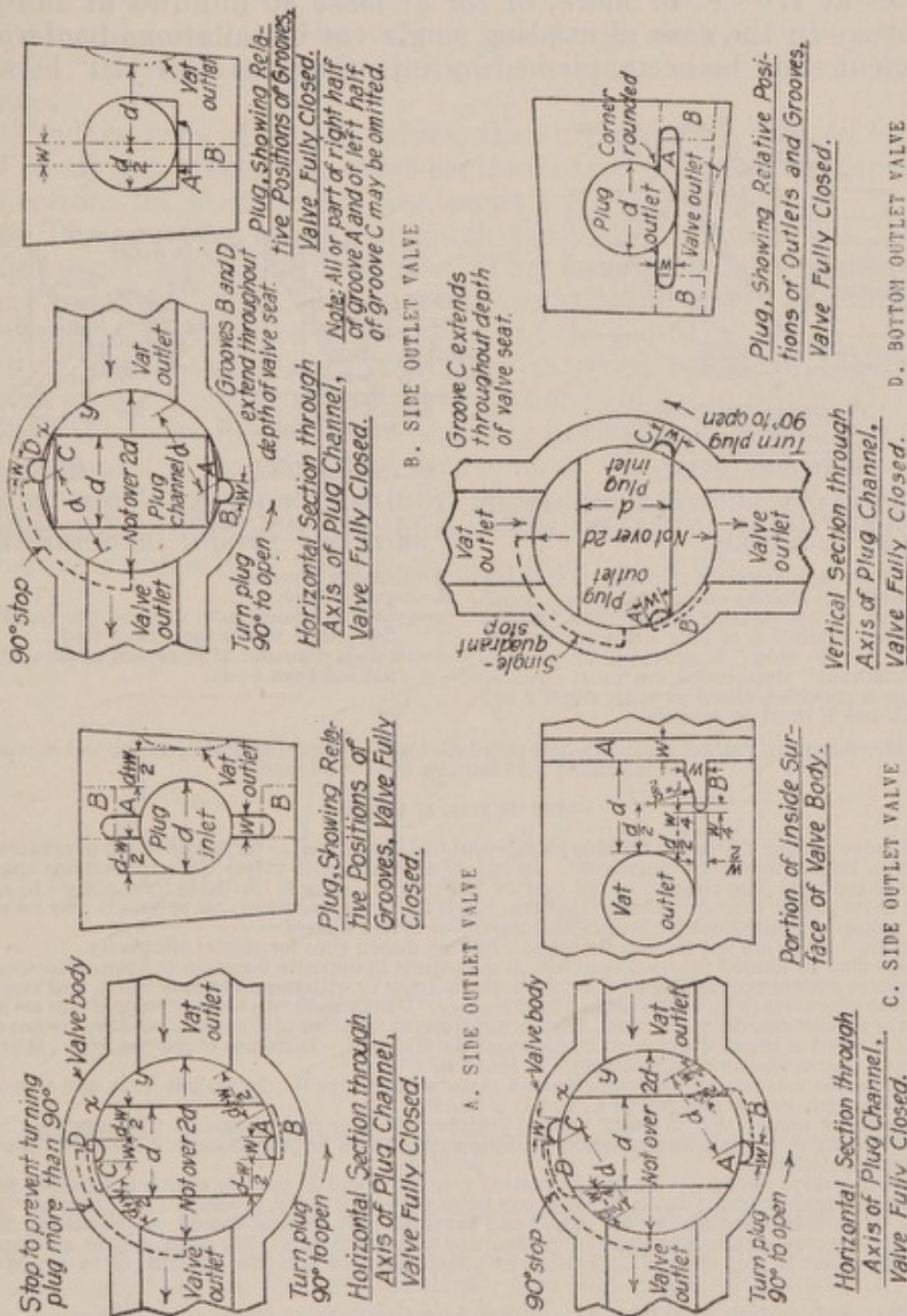


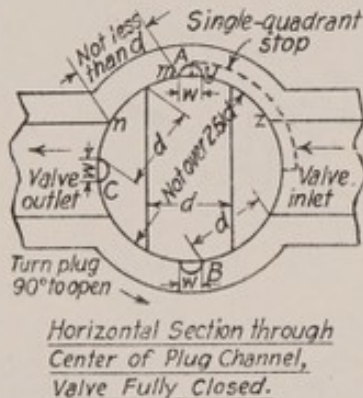
FIGURE 17.—Suggested designs of gravity-flow plug-type leak-protector pasteurizer valves and connections conforming with item 16p (c).

groove systems, as illustrated in the accompanying drawings, shall be provided.

Operation.—Existing single-vat installations, if not provided with "leak-protector" inlet valves, shall be disconnected from the raw milk supply during the holding and emptying periods, and, if not provided with "leak-protector" outlet valves, shall be disconnected from the outlet piping during the filling, heating, and holding periods.

All outlet valves shall be kept "fully closed" during the filling, heating, and holding periods, and all inlet valves shall be kept "fully closed" during the holding and emptying periods.

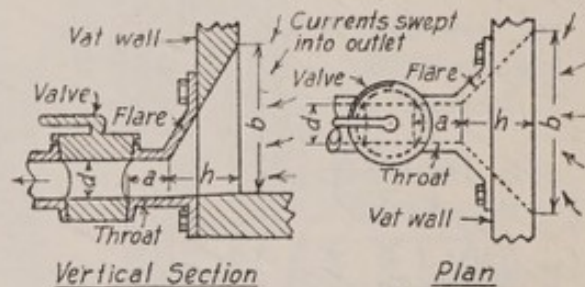
All outlet valves required above to be provided with connections for bactericidal treatment shall immediately before the discharge of pasteurized milk be given bactericidal treatment for at least 2 minutes at 170° F. or more, or for at least 30 minutes at 143½° F. or more. In the case of existing single-vat installations bactericidal treatment shall be accomplished by injecting steam or 170° F. water



Horizontal Section through
Center of Plug Channel,
Valve Fully Closed.

E. INLET VALVE, SHOWING ONE METHOD OF PROVIDING AIR RELIEF WHEN LATTER REQUIRED.

A and B are leak-protector grooves. C is an air-relief groove. All grooves extend throughout depth of valve seat. When air relief is not required groove C, stop, and limitation of plug diameter may be omitted. If "90° stop" is provided in place of "single-quadrant" stop, chord mn must equal d . If no stop is provided, chord yz must equal d and grooves A and B must be centered.



Vertical Section

Plan

F. CLOSE-COUPLED SIDE OUTLET VALVE CONNECTED TO HOLDER, SHOWING DESIGN REQUIREMENTS.

d = diameter of outlet.

h = depth of flare.

a = greatest distance from valve seat to small end of flare (shall be not more than $1\frac{1}{2}d$).

b = smallest diameter at large end of flare (shall be not less than $h+d$).

FIGURE 18.—Suggested designs of gravity-flow plug-type leak-protector pasteurizer valves and connections, conforming with item 6p (c)—Continued.

NOTES ON FIGS. 17 AND 18.

(1) All valve designs shown are suitable for new installations as well as for modification of existing plug-type valves, both grooved and ungrooved. In case of existing outlet valves the requirements that plug diameter at center of plug channel be not over $2d$ and that in design C distances from outlets to grooves A and C be no greater than d (so that wetted area is less than cross-sectional area of outlet) may be waived without requiring connections for bactericidal treatment in lieu thereof.

(2) Sectional views are not technically correct, but are drawn thus for greater simplicity.

(3) Stops may be located in any quadrant. If plug turns in opposite direction to open, grooves shown located near or with respect to plug inlet should be located near or with respect to plug outlet, and vice versa.

(4) Width of grooves (w) must be not less than $\frac{3}{16}$ inch. Distances shown between ends of arcs are lengths of chords or parts of chords, not of arcs. Distances involving fractions of d , such as $\frac{1}{2}d$ — $\frac{1}{4}w$, are not chords but parts of chord of length d and must be measured parallel to it. Distances of grooves from vat or valve outlets may be increased within a tolerance of $\frac{1}{32}$ inch.

(5) In all outlet valve designs shown, groove A mates with groove B. In designs A, B, and C groove C mates with D; groove C is like groove A, and D is like B.

(6) Grooves as located will in every "closed position" of plug protect against "leakage" and, in all outlet valve designs, prevent accumulation of unpasteurized milk in plug channel. They will also avoid spurt except in design D.

(7) In outlet valve designs A, B, and C, mating grooves C and D may be omitted, provided a single groove, extending throughout depth of seat at any point between x and y , is substituted, provided "single-quadrant" stop is substituted for "90° stop," and provided plug channel drains toward mating grooves A and B so as to prevent accumulation of unpasteurized milk in channel. The latter may be accomplished by grooving invert of plug channel on a slope, by attaching valve to holder at a tilt, or by tilting entire holder.

into the valve for not less than 2 minutes from a hose, or by any other method approved by the health officer.

Discussion of valve design drawings.—The accompanying drawings suggest four designs of outlet valves, one design of inlet valve, and one design of holder outlet connection, which may be considered as complying with the above design specifications.

The reasons for and the methods of arriving at some of the design elements shown on the accompanying valve drawings follow:

The four requirements which determine the location of leak-protector grooves on plug-type valves are:

(1) The design shall protect against "leakage" in every position of the plug which prevents the flow of milk, i. e., every "closed position."

(2) In the case of outlet valves, the design shall, in every "closed position", prevent the accumulation of unpasteurized milk in the plug channel.

(3) In the case of outlet valves, the surface "area wetted by leakage" shall not exceed the cross-sectional area of the outlet pipe when connections for bactericidal treatment are not provided.

(4) The spurting of milk through the leak grooves as the valve is being opened should be avoided. (This is not of public-health significance and therefore not made mandatory in the above specifications, but is desirable from the point of view of the plant.)

All of the above requirements are satisfied by all of the designs shown, except that spurt is not altogether avoided in design D.

All of the valve designs show the plug in the "fully closed position." The reasons for the indicated locations of leak grooves will be more apparent if the plug is mentally pictured as closed just enough to prevent the flow of milk, i. e., in the "just-closed position." In figure 19 below is given the "just-closed position" of design A:

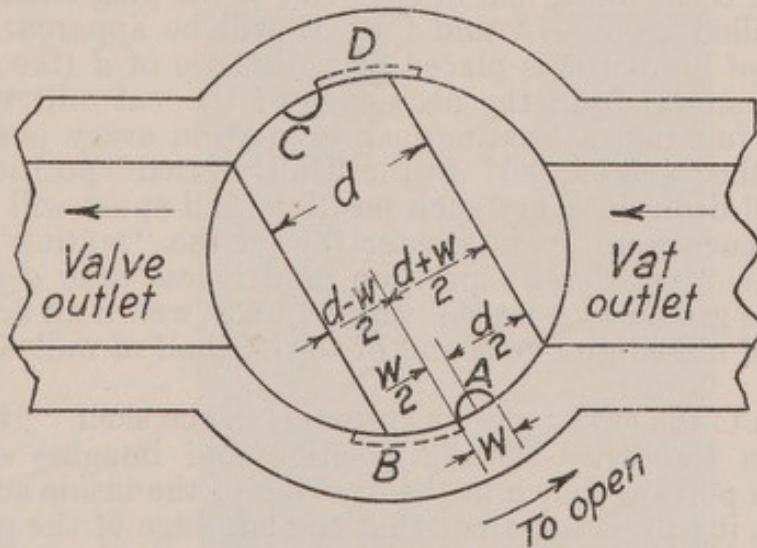


FIGURE 19.—Valve design A, horizontal section through axis of plug channel, valve in "just-closed" position.

In design A requirement (1) above would not be satisfied if in the "just-closed position" the right edge of groove B were further from the near edge of the vat outlet than the left edge of groove A, for in that case these grooves would not begin to mate and to function the instant the plug is turned from the "partly open" to the "just-closed" position. On the other hand, spurt would not be avoided if, in the "just-closed" position, the right edge of groove B were nearer to the edge of the vat outlet than the left edge of groove A, for in that case these grooves would be mated when the plug is in the "just-open" position, and milk entering the plug channel would spurt out through

the mated grooves. The size and location of groove B is thus determined by requirements (1) and (4) and by the location of groove A.

The location of groove A is determined, in design A, by requirement (2) above. Thus, groove A is centrally located with respect to the plug inlet, so that in every "closed position" of the valve it drains the lowest point of the plug inlet. It is obvious, however, that groove A will not be able to drain the plug channel completely if the latter slopes downward away from the plug inlet toward the plug outlet. To provide for such a condition, grooves C and D are necessary, and are located diametrically opposite grooves A and B, respectively. Grooves C and D may, however, be omitted if the plug channel is properly sloped and other necessary conditions are complied with, as described in the last paragraph of the "Notes" on the sheet of valve drawings.

The above discussion will now make clear that in design A the right edge of groove B must be $\frac{d+w}{2}$ from the near edge of the vat outlet,

and the left edge of groove D must be $\frac{d+w}{2}$ from the near edge of the valve outlet, as shown, and that the sides of grooves A and C must be $\frac{d-w}{2}$ from the near sides of the plug channel, thus centering grooves A and C. These distances are not lengths of arcs or chords, but are measured parallel to a chord of length d .

In design B the lower half of each end of the plug channel is milled (termed milled grooves A and C). It will be apparent that if the right edge of groove B is placed at a distance of d (the diameter of the plug channel) from the near edge of the vat outlet, grooves A and B will function as mating leak grooves in every position of the plug from the "just-closed" to the "fully-closed" position, the plug channel will drain in every such position, and spurt will be avoided. If this distance were made greater than d the "mating" would not begin in the "just-closed" position, and if less than d spurt would occur. The groove system will work equally well if all or part of the right half of milled groove A and of the left half of milled groove C is omitted.

In design C the entire groove system is in the shell. If we imagine the plug in the "just-closed" position and imagine ourselves as viewing the portion shown in the drawing of the inside surface of the valve body, it will be apparent that the left edge of the plug channel will be tangent to the right edge of the vat outlet, and that the bottom edge of the plug channel will just coincide with the upper arc edge of groove B. In other words, the groove system will just have begun to function in the "just-closed" position. It is obvious also that the groove system will still be functioning in the "fully-closed" position. To satisfy this requirement, therefore, the center of the circle of which the arc edge of groove B is a part must be on a level with the center of the vat outlet and must be $\frac{d}{2}$ from the right edge of the vat outlet. The radius of the arc must also be $\frac{d}{2}$. The lower edge of groove B has been shown as $\frac{w}{2}$ below the lower edge of the vat

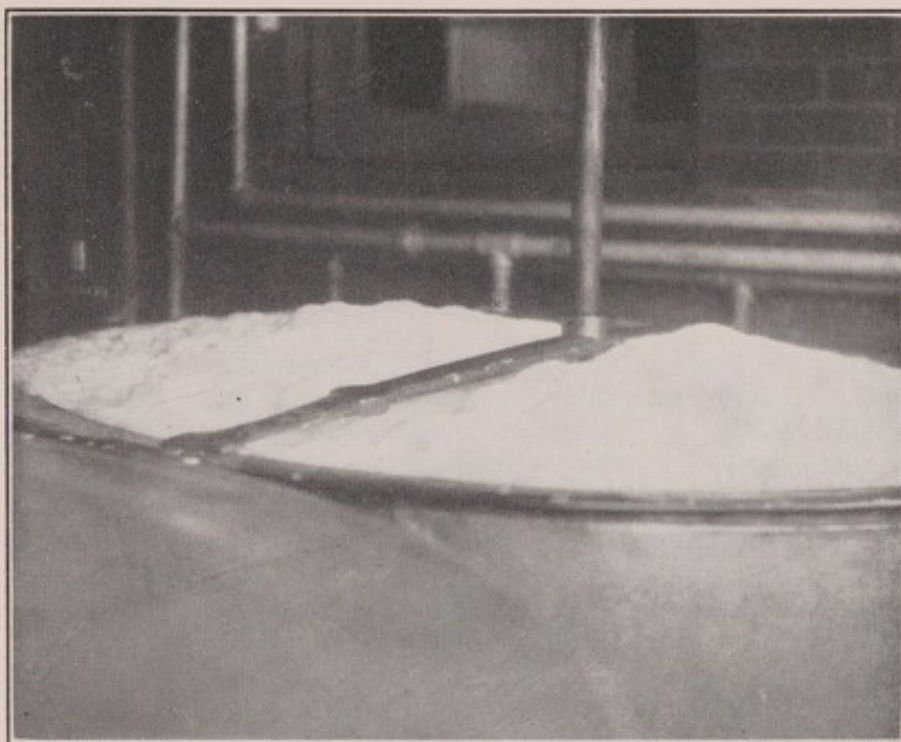


FIGURE 20.—FOAM OVER MILK IN PASTEURIZER.
(Cover of vat removed.)

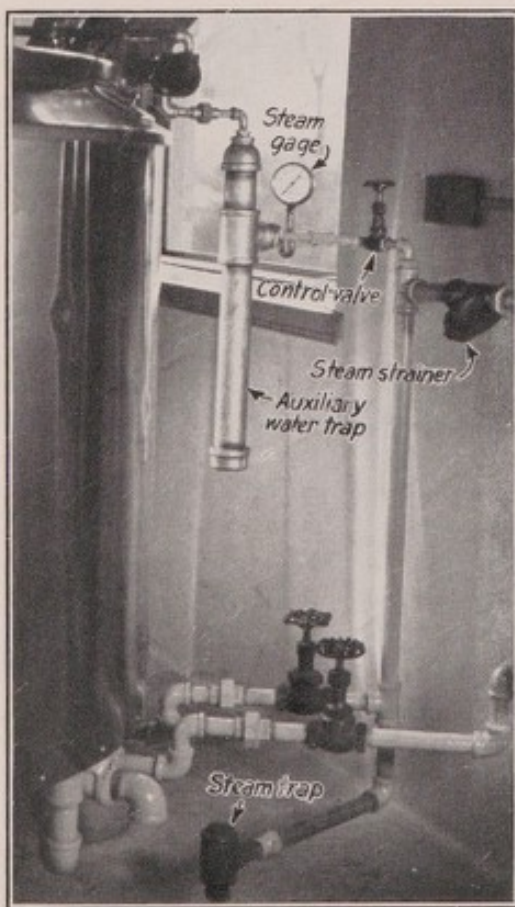


FIGURE 21.—STEAM-CONTROL ASSEMBLY OF AIR AND FOAM HEATING EQUIPMENT.



outlet in order to insure proper drainage immediately beyond the "just-closed" position. It may also be desirable to slope the lower edge of groove B down toward groove A. The dimension $\frac{d}{2} - \frac{w}{4}$ is intended to permit the rounding of the left end of groove B to a radius of $\frac{w}{4}$. The left edge of groove A should be not less than d from the right edge of the vat outlet in order to prevent spurt, and not more than d to minimize the "wetted area."

Design D is a bottom outlet valve designed for vertical discharge of milk from the holder. In this case, in order to insure complete drainage of the plug channel in all positions from the "just-closed" to the "fully-closed", it was necessary to place groove A in the plug with its lower edge tangent to the invert of the plug outlet. Groove B must extend from the upper edge of groove A in the "fully-closed" position of the valve to the near edge of the valve outlet, in order that the grooves may mate and the plug channel may drain in all "closed positions." On the opposite side of the valve the only groove necessary is groove C in the shell, which must be located so that its lower edge is tangent to the invert of the plug inlet when in the "fully-closed" position. These grooves insure complete channel drainage and protection against "leakage" in every "closed position" of the valve. They will, however, permit spurt in the "just-open" position, but no better design has thus far been developed, hence this will be acceptable, since the avoidance of spurt is not required by item 16p (c). The axis of the plug and the axis of the plug channel must be approximately horizontal in the "fully-closed" position.

Compliance with requirement (3) above is accomplished in all the outlet valve designs by the location of the grooves and by the limitation shown for the diameter of the plug. In the case of a plug-type valve the "area wetted by leakage" is taken to mean that part of the surface of the plug seat which actually passes the vat outlet as the valve is closed, and which, in the "fully closed" position, lies between the vat outlet and the nearest leak groove. It can be demonstrated geometrically that in order that this area may not exceed the cross-sectional area of the outlet the diameter of the plug at the center of the plug channel must not exceed $2d$ when the chord distance from the vat outlet to the nearest leak groove equals d . In design D groove C is more than the chord distance d from the vat outlet, hence to satisfy requirement (3) the maximum plug diameter should be slightly less than $2d$; but as it may be computed that the maximum error (in the case of a 1-inch valve) is only 1 percent the $2d$ limitation may be considered sufficiently accurate for practical purposes. Similarly, in design A, since the chord distance from the vat outlet to the near edge of groove A may be slightly less than d , the plug diameter could strictly be slightly over $2d$, but the difference (a fraction of 1 percent) is so slight as to justify, for the sake of simplicity, the "not over $2d$ " requirement.

In the inlet valve design, E, mating grooves are not necessary because requirement (2) above does not need to be satisfied. The location of leak-protector grooves A and B is governed by requirements (1) and (4) only. The chord distance from the right edge of groove B to the near edge of the valve inlet should be not less than

d to prevent spurt, and must be not more than *d* to protect against "leakage" in all "closed positions" of the plug; and the chord distance from the left edge of groove A to the near edge of the valve outlet should, similarly, be not less than *d* to prevent spurt, but it may be more than *d* and still permit the groove to function in all "closed positions." As is indicated in the drawing, the stop may be omitted if the air-relief groove is not provided, but in that case a change in the location of groove A becomes necessary. If the "single-quadrant

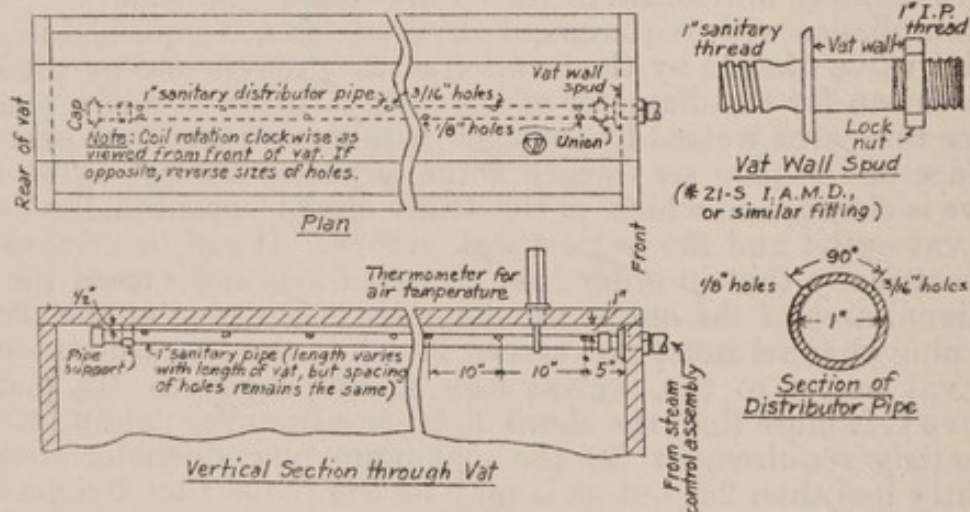
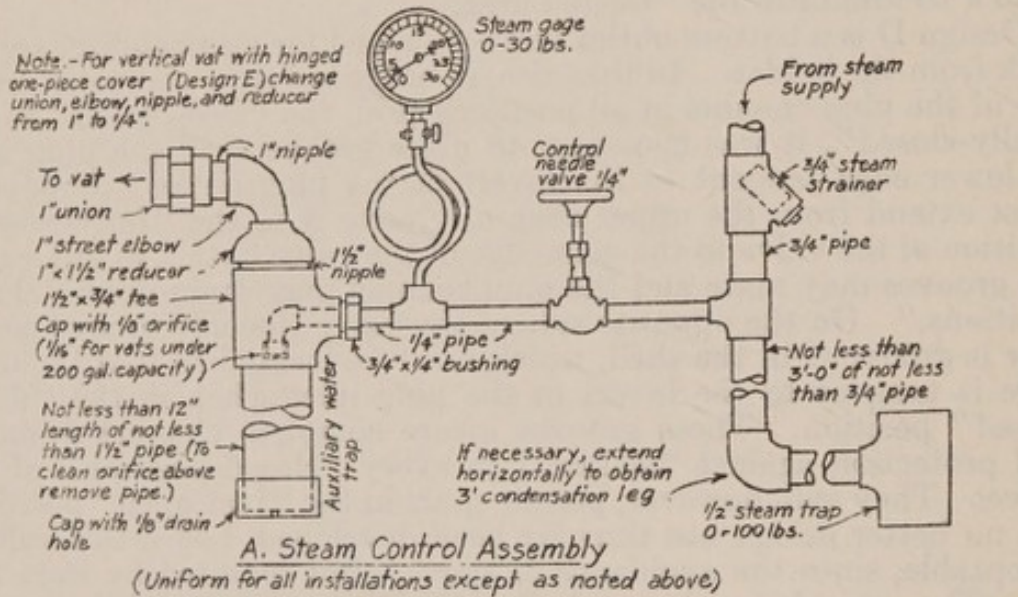


FIGURE 22.—Air and foam heating equipment.

stop" is replaced by a "90° stop," the length of the chord between *m* and *n* must equal *d* so that the grooves may function in all "closed positions" even if the position of the plug is reversed. If, however, neither a "single-quadrant stop" nor a "90° stop" is provided, the length of the chord between *y* and *z* must equal *d* and grooves A and B must be centrally located between the vat outlet and the valve outlet, so that the grooves may function in all "closed positions" for counter-clockwise as well as for clockwise closing in both the indicated and the reversed positions of the plug. In the latter case, these

requirements definitely fix the length of the plug diameter at the center of the plug channel in terms of d and w .

- In the inlet valve design, the limitation shown for the plug diameter, namely, that it shall not exceed $2.61d$, is fixed by the conditions which must be met when the air-relief groove C is provided. The chord distance from the left edge of the plug outlet to the near edge of groove C must be not less than d to avoid spurt, and must be not

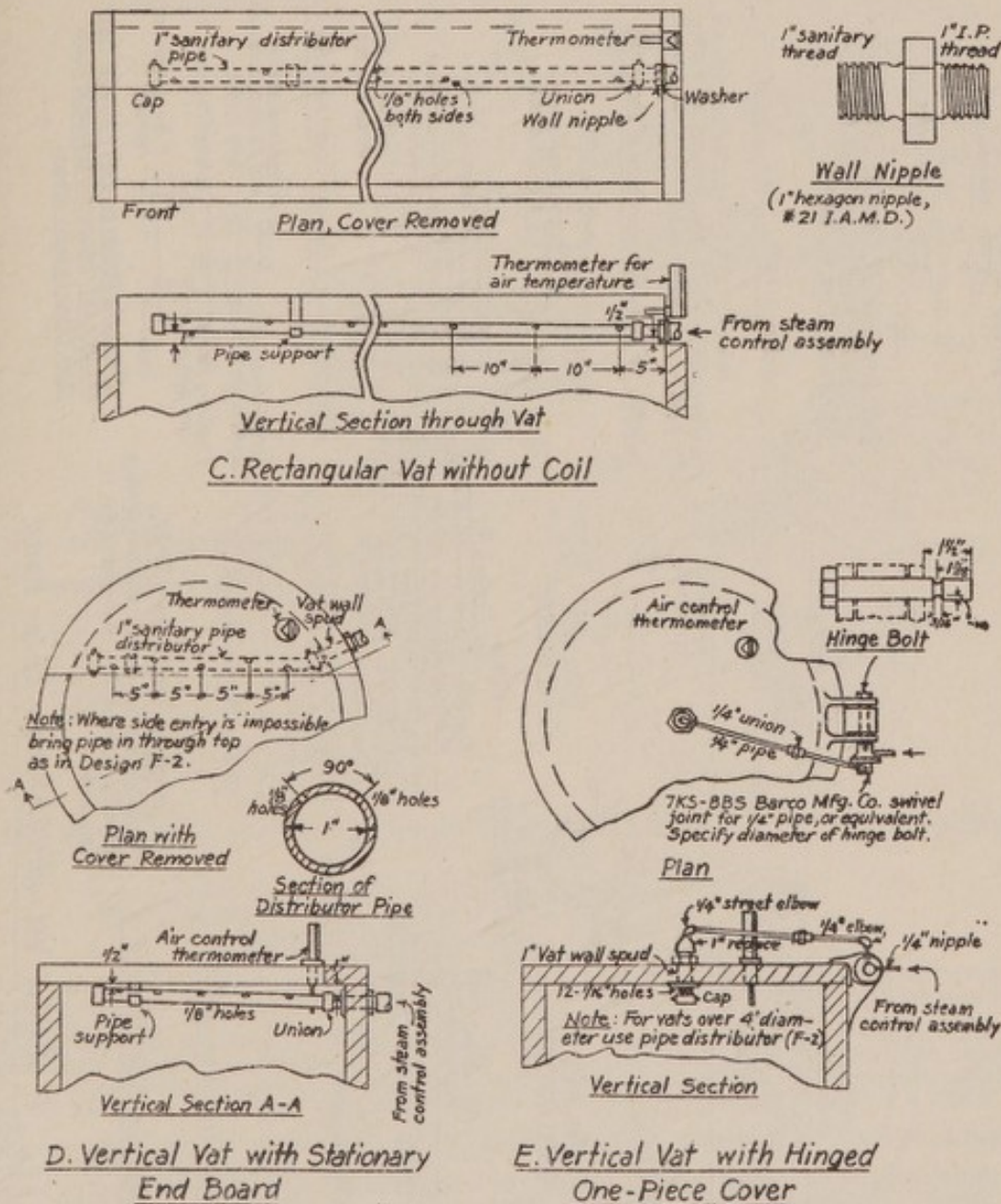


FIGURE 23.—Air and foam heating equipment—Continued.

more than d to permit the air-relief groove to function in every "closed position" of the plug. If the plug is imagined in the "fully-closed" position with the plug diameter 3 or more times the diameter of the plug channel, it will be seen that when groove C is at a distance of d from the plug outlet it will not be in contact with the valve outlet and will, therefore, be unable to function as an air-relief groove. Hence both of these conditions cannot be satisfied when the circumference of the plug is larger than necessary to circumscribe an octagon with sides of length d . In the case of such an octagon the diameter

of the circumscribed circle equals $2.61d$, hence this is the maximum diameter that will satisfy the conditions.

ITEM 16p (d). *Foam heating.*—For holders of vat or pocket types, means shall be provided and used which will keep the atmosphere above the milk at a temperature at least 5° F. higher than the existing milk temperature during the heating period and at least 5° F. higher

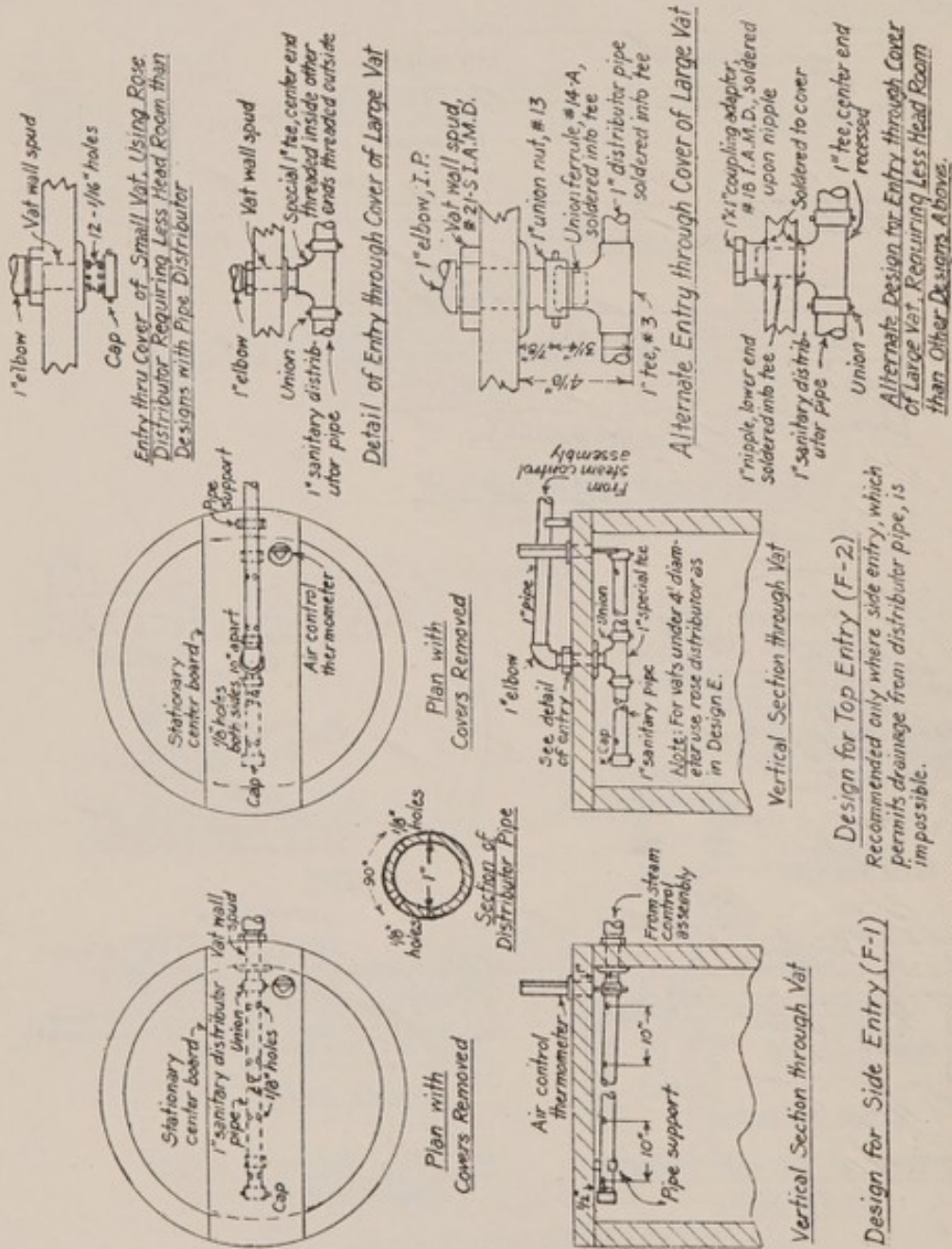


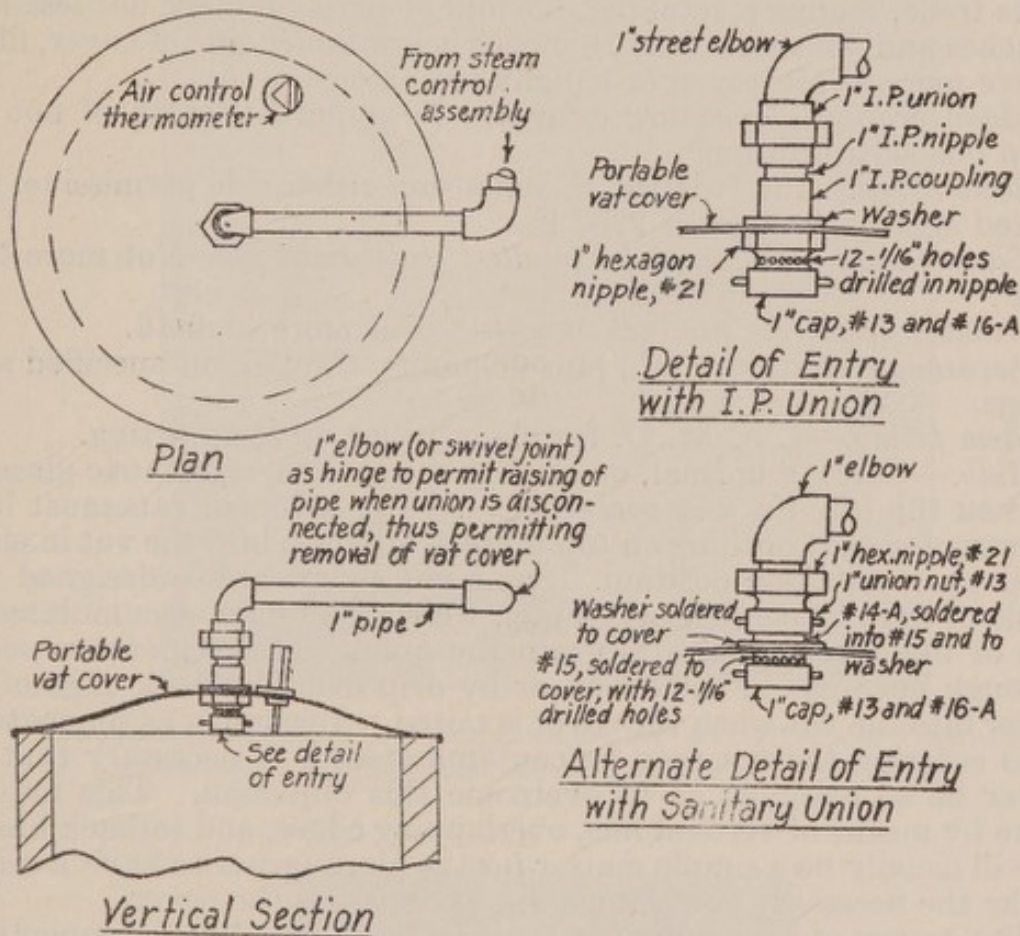
FIGURE 24.—Air and foam heating equipment—Continued.

than the required temperature of pasteurization during the holding period. If steam is admitted into the holder, the steam line shall be provided with a trap properly designed to avoid the discharge of water into the milk.

This specification is included because a large percentage of the designs of milk-handling equipment in use today result in the formation of a blanket or of islands of foam on the surface of the milk in vat or pocket-type holders, and because the temperature of the air above the milk is frequently far below the temperature of pasteuriza-

tion, and studies show that the temperature of the foam can be well below 130° F. when the main body of the milk is at 145° F.

Therefore, the mixture of such foam and milk which leaves the holder at the end of the pasteurization process is not safely pasteurized.



This design recommended only where side entry (as in Design F-1) is impossible.

G. Vertical Vat with Portable Cover

FIGURE 25.—Air and foam heating equipment—Continued.

Design notes.—The steam control assembly (design A) is uniform for all installations except as noted. The steam trap and the auxiliary water trap (or expansion chamber) insure maximum removal of water of condensation.

The air and foam temperature indicating thermometer should be located as far from distributor pipe as practicable and not directly opposite any steam opening. For specifications see text, item 16p(d).

The resistance orifice in combination with the needle valve provides an inexpensive method of obtaining more delicate steam control than is possible with the valve alone. The orifice is simply a hole drilled in cap.

The steam gage serves as a convenient guide to the proper setting of the needle valve, obviating frequent adjustments of the valve setting.

Operating instructions.—In order to heat air prior to filling vat, steam should be admitted to distributor about 5 minutes before milk enters vat. Air temperature in vat should be kept at least 5° F. higher than milk temperature throughout the heating and holding periods. More steam is usually required during heating period than during holding.

The surface of the milk should be not less than 1 inch below the bottom of the thermometer bulb to avoid erroneous air thermometer readings from milk splash during agitation.

The steam distributor and its openings should be thoroughly cleaned every day.

Disease organisms, if present in the foam before pasteurization, may be present in the foam after pasteurization.

The accompanying designs illustrate the types of air-heating equipment which should be required by the health officer with respect to this item. The precise details need not be made mandatory, but the provision of and the relative positions of the distributor perforations,

the steam trap, the strainer, the auxiliary water trap, the orifice, the thermometer, the gage, and the control valve should be mandatory.

Air and foam temperature indicating thermometers—Type.—V-shaped brass or equally noncorrodible scale case with removable glass front, mercury actuated, bottom of bulb chamber not less than 2 inches and not more than 3½ inches below under side of cover, filling above mercury, nitrogen or equally suitable gas.

Magnification of mercury column.—To apparent width of not less than one-sixteenth inch.

Scale range.—130° to 210° F., extension either side permissive, protected against damage at 220° F.

Temperature represented by smallest scale division.—Not more than 2° F.

Number of degrees per inch of scale.—Not more than 16.

Accuracy.—Within 1° F., plus or minus, throughout specified scale range.

Stem fitting.—I. A. M. D. ferrule or other sanitary fitting.

Bulb.—Corning normal, or equally suitable thermometric glass.

ITEM 16p (e). *Vat and pocket covers.*—The covers of vats must be so constructed that nothing on top thereof will drop into the vat in either their open or closed position. Some vat covers are so designed that pools of milk or condensation, etc., which may have accumulated on top of the covers, may drop into the milk. This sometimes occurs through openings in the cover, or by drip over the back edge of the cover into the vat when the cover is raised. Inasmuch as the material thus entering the vat may be contaminated, it is necessary that the cover be so designed as to overcome this objection. This may be done by means of vertical fins, overlapping edges, and setback hinges. It will usually be a simple matter for the plant owner to have a tinner make the necessary corrections in the design of the cover.

The covers of all equipment must be kept closed during operation, except in case of emergency.

ITEM 16p (f). *Preheating holders.*—All holders used for holding milk which has been heated to the pasteurizing temperature before entering the holders shall be preheated with steam or otherwise so that the metal shall be at least at the pasteurizing temperature before the holding period begins.

ITEM 17p. *Cooling.*—All milk and cream received for pasteurization but not pasteurized within 2 hours after it is received at the plant shall within 2 hours of receipt be cooled to a temperature of 50° F. or less and maintained thereat until pasteurized, except during separation; and all pasteurized milk and milk products shall be immediately cooled to an average temperature of 50° F. or less, as defined in section 1 (R), and maintained thereat until delivery.

Public-health reason.—If milk is not cooled within a reasonable time after it is received at the pasteurization plant its bacterial count will be materially increased.

The same public-health reason applies to the cooling of the milk and milk products after pasteurization.

Satisfactory compliance.—This item shall be deemed to have been satisfied if:

(1) All milk intended for pasteurization, but not pasteurized within 2 hours after it is received at the plant or cooling station, is then immediately cooled to 50° F. or below, and maintained thereat until pasteurized.

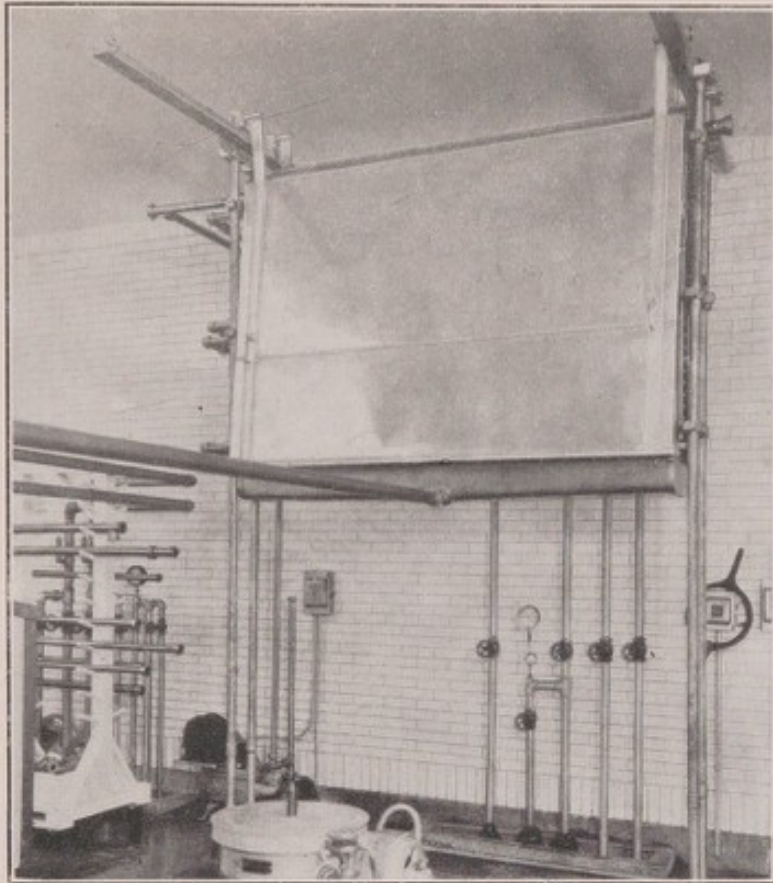


FIGURE 26.—TUBULAR SURFACE COOLER, WITH COVERS AND TROLLEYS.
(Note rack for milk piping at left, and box at bottom of rack for valves, etc.)

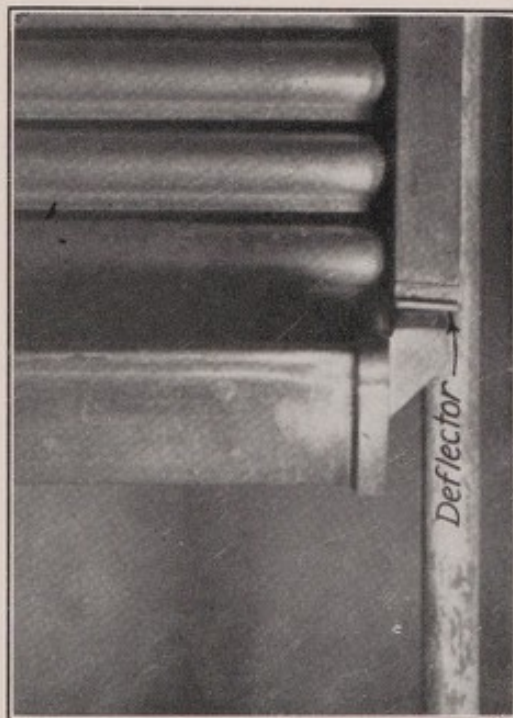


FIGURE 27.—SURFACE COOLER WITH DRIP DEFLECTOR AT BOTTOM OF HEADER AND SHORT BOTTOM TROUGH TO PREVENT CONDENSATION GETTING INTO MILK.

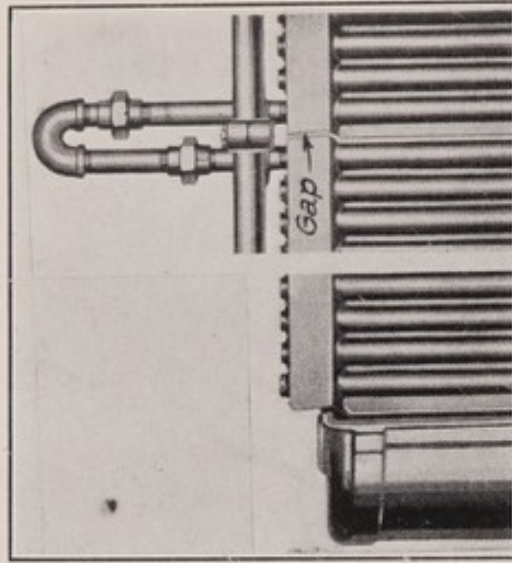


FIGURE 28.—SURFACE COOLER WITH GAP BETWEEN HEADER SECTIONS TO PERMIT EASY CLEANING.
(Slope of bottom of header directs condensation away from trough.)

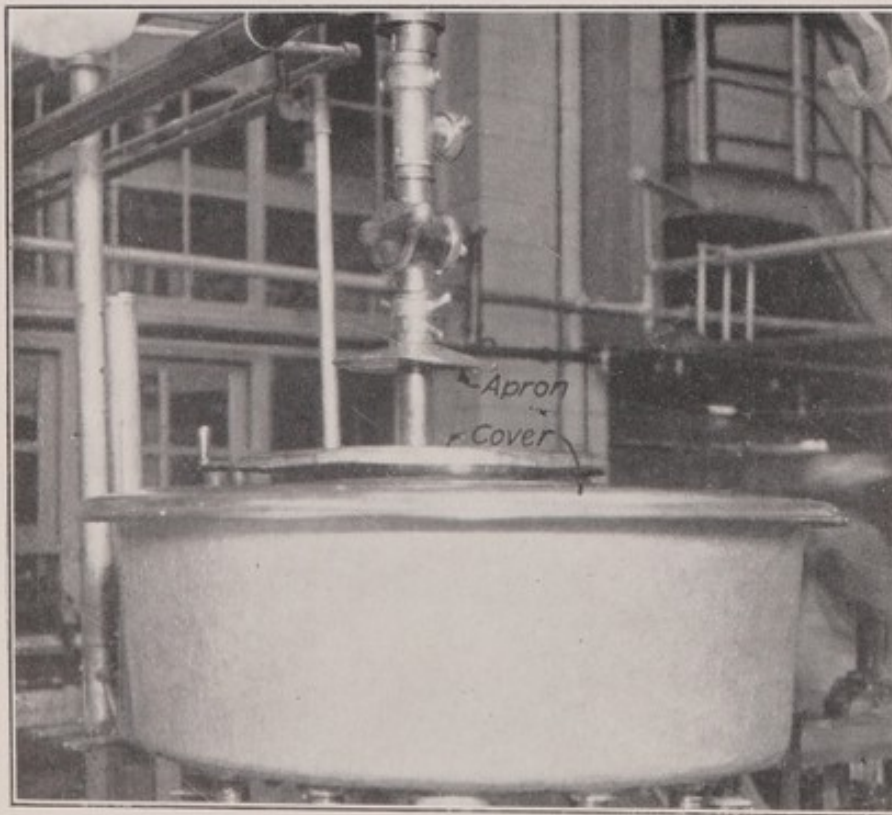


FIGURE 29.—BOTTLER-BOWL COVER, AND DRIP-DIVERTING APRON ON FILLER PIPE.

(2) All pasteurized milk and milk products are cooled immediately after pasteurization to 50° F. or below and maintained at that average temperature, as defined in section 1 (R), until delivery.

(3) All surface coolers meet the following specifications:

(a) The sections of open-surface coolers shall be installed so as to leave a gap of at least three-eighths inch between the header sections to permit easy cleaning. The header faces above and below such gap shall be so shaped as to direct condensation away from the tubes.

(b) Suitable means shall be provided to prevent leakage of brine or water from the headers dropping into the milk trough, by shortening the bottom trough, by the use of deflectors at the bottom of the headers, or by other approved method.

(c) The supports of the cooler sections shall be so located as to prevent drip therefrom reaching the milk.

(d) Regenerative heater-coolers shall be so constructed and maintained as to prevent access of the raw milk to the pasteurized milk. The pasteurized milk shall always be under greater pressure than the raw milk.

(e) All open-surface coolers and open-surface regenerative coolers shall be located in a separate well ventilated room or shall be provided with tight-fitting shields, preferably suspended on trolleys. Special exceptions may be made by the health officer when clearly warranted. The health officer is clearly warranted in making exceptions only when the room is so constructed and the cooler is so located as to eliminate all danger of contamination by flies, dust, drip, splash, manual contact, and droplet infection from coughing and sneezing. If the milk surface of the pasteurized-milk cooler is exposed at least part of the service rendered by pasteurization is nullified, since the milk cooler represents the largest single exposure of milk which takes place at any time in its course. The ideal requirement is, obviously, that pasteurized milk shall not be exposed again from the moment pasteurization begins until the pasteurized milk is in the bottle. A separate cooler room shall be taken to mean a room used exclusively for the cooler and through which there is no traffic except for work necessary for the operation of the cooler.

The shields shall conform to the following specifications:

(1) The material shall be of smooth metal which is not readily corrodible.

(2) All seams shall be flush.

(3) All parts shall be readily accessible for cleaning.

(4) The shields shall be tight fitting and shall effectively protect all milk surfaces from contamination by flies, dust, drip, splash, manual contact, and droplet infection.

Items (d) and (e) are to be required for all existing equipment. All items are to be required for newly installed equipment.

ITEM 18p. *Bottling.*—*Bottling of milk and milk products shall be done at the place of pasteurization in approved mechanical equipment.*

The term "mechanical equipment" is not interpreted to exclude machinery operated by man power, but is interpreted to exclude methods in which the bottling and capping devices are not integral in one machine.

Public-health reason.—Hand-bottling is very apt to result in the exposure of the milk and milk products to infection, which would nullify the effect of pasteurization.

Satisfactory compliance.—This item shall be deemed to have been satisfied if the bottling is done by mechanical equipment conforming with the following requirements:

(1) The bottler is of a design which does not require frequent adjustment during operation, thus exposing the milk to danger of contamination.

(2) Bottling machine supply tanks and bowls are provided with covers which are so constructed as to prevent any contamination reaching the inside of the bottler tank or bowl.

(3) All parts can be readily cleaned.

(4) Bottler floats are so designed as to be adjustable without removing the cover.

(5) The filler pipe of the bottler is provided, as close to the top of the bottler as possible, with an apron or other approved device to prevent water of condensation or drip from fingers reaching the inside of the bottler during float adjustments.

Bottler designs which do not include filler pipes or floats shall not be required to comply with items (4) or (5).

(6) Automatically operated bottler infeed conveyors are provided with overhead shields from the bottle washer to the bottler feed star to protect the bottles from contamination.

(7) All surfaces with which milk comes in contact are of smooth, not readily corrodible material, readily accessible for cleaning.

ITEM 19p. *Overflow milk.*—*Overflow milk or milk products shall not be sold for human consumption.*

Public-health reason.—Milk or milk products which have come in contact with equipment surfaces which have not been treated with a bactericide or safeguarded after treatment, have been exposed to infection, and are therefore dangerous.

Satisfactory compliance.—This item shall be deemed to have been satisfied so long as there is no evidence of the use of spilled or overflow milk or milk products for delivery to consumers.

ITEM 20p. *Capping.*—*Capping of milk and milk products shall be done by approved mechanical equipment. Hand capping is prohibited.*

For definition of "mechanical equipment" see item 18p.

Public-health reason.—Hand capping is apt to expose the milk to contamination.

Satisfactory compliance.—This item shall be deemed to have been satisfied if—

(1) All bottlers are equipped with a mechanical capping mechanism of a design which does not require frequent adjustment.

(2) Bottles imperfectly capped are dumped into cans or other containers and the dumped milk or milk products repasteurized.

Attempts to adjust caps by hand, or to remove them and recap either by hand or by machine, inevitably expose the milk in the bottle to manual contamination. The substitution of a pick for the fingers in removing caps does not prevent manual contamination inasmuch as the point of the pick, which often touches the milk is exposed to contamination from the fingers, etc.

The above requirement is specially important because a fundamental rule in the case of pasteurized milk and milk products is that they shall be protected against contamination, particularly manual contact, from the time they are pasteurized until delivery.

ITEM 21p. Personnel, health.—Every person connected with a pasteurization plant whose work brings him in contact with the production, handling, storage, or transportation of milk, milk products, containers, or equipment shall furnish such information, permit such physical examinations, and submit such laboratory specimens as the health officer may require for the purpose of determining freedom from infection.

The health officer, or a physician authorized by him, shall in each such instance take a careful history and if such history suggests that such person may be a carrier of or infected with the organisms of typhoid or paratyphoid fever or of any other communicable disease likely to be transmitted through milk or milk products, he shall secure appropriate specimens of bodily discharges and cause them to be examined in a laboratory approved by him or by the State health authorities for such examinations.

(See item 25r, grade A raw milk specifications.)

ITEM 22p. Personnel, cleanliness.—All persons coming in contact with milk, milk products, containers, or equipment shall wear clean outer garments and shall keep their hands clean at all times while thus engaged.

Public-health reason.—The public health reason for this requirement is obvious.

Satisfactory compliance.—This item shall be deemed to have been satisfied if:

(1) The outer garments of all milk handlers, including delivery personnel, are reasonably clean. Inside employees must wear washable outer garments especially provided and used for no other than milk-plant duty.

(2) The hands of all milk handlers are clean.

ITEM 23p. Miscellaneous.—All vehicles used for the transportation of milk or milk products shall be so constructed and operated as to protect the milk or milk products from the sun and from contamination. Such vehicles shall be kept clean, and no substance capable of contaminating milk or milk products shall be transported with milk or milk products in such manner as to permit contamination. All vehicles used for the distribution of milk or milk products shall have the name of the distributor prominently displayed.

The immediate surroundings of the milk plant shall be kept in a neat, clean condition.

(See item 26r, grade A raw milk specifications.)

Grade B pasteurized milk.—Grade B pasteurized milk is grade C raw milk which has been pasteurized, cooled, and bottled in a milk plant conforming with all of the requirements for grade A pasteurized milk, and the average bacterial plate count of which at no time after pasteurization and before delivery exceeds 50,000 per cubic centimeter, as determined under sections 1 (R) and 6.

Grade C pasteurized milk.—Grade C pasteurized milk is pasteurized milk which does not meet the requirements of grade B pasteurized milk, and which shall be plainly labeled "cooking only".

SEC. 8. Grades of milk and milk products which may be sold.—Two alternative wordings of section 8 are offered because some communities prefer to use the grading and degrading system of improving milk quality, whereas others prefer to use exclusively the system of forbidding the sale of milk and milk products which do not comply with all items of sanitation, and instituting court procedure if the violator persists in selling.

For those communities which prefer the first method the following wording of section 8 should be used:

From and after 12 months from the date on which this ordinance takes effect no milk or milk products shall be sold to the final consumer, or to restaurants, soda fountains, grocery stores, or similar establishments, except grades A and B pasteurized, certified, and grade A raw. This section shall not be construed as forbidding the sale of lower grades of milk and milk products during temporary periods of degrading not exceeding 30 consecutive days, or, in emergencies, such longer period as the health officer may deem necessary.

In some cases it may be desired to reduce still further the number of grades permitted to be sold. In other cases, such as communities just beginning milk sanitation work, there may be a fear of milk shortage unless the lower grades of milk and milk products are permitted to be sold for a longer period than the 12-month period above designated. In these instances the proper adjustment may be made in section 8.

For those communities which prefer to use exclusively the system of forbidding the sale of milk which does not comply with all the requirements of the grades defined in this section, and instituting court procedure if the violator persists in selling, the following wording should be used:

From and after 12 months from the date on which this ordinance takes effect no milk or milk products shall be sold to the final consumer, or to restaurants, soda fountains, grocery stores, or similar establishments, except grades A and B pasteurized, certified, and grade A raw.

In some cases it may be desired to reduce still further the number of grades permitted to be sold.

SEC. 9. Supplementary grading prescribed and regrading authorized.—*If, at any time between the regular announcements of the grades of milk or milk products, as the result of the findings of two consecutive inspections of any dairy or milk plant, or because the average bacterial plate count, the average reduction time, or the average cooling temperature exceeds the limit fixed for the grade currently held by the milk supply in question, a lower grade shall become justified, in accordance with section 7 of this ordinance, the health officer shall immediately lower the grade of such milk or milk product, and shall enforce proper labeling and placarding thereof.*

Any producer or distributor of milk or milk products the grade of which has been lowered by the health officer, and who is properly labeling his milk and/or milk products, may at any time make application for the regrading of his product.

Upon receipt of a satisfactory application, in case the lowered grade is the result of an excessive average bacterial plate count, reduction time, or cooling temperature, the health officer shall take further samples of the applicant's output, at a rate of not more than two samples per week. The health officer shall immediately regrade the milk or milk products upward whenever the average of the last four sample results indicates the necessary quality.

In case the lowered grade of the applicant's product is due to a violation of an item of the specifications prescribed in section 7, other than average bacterial plate count, reduction time, or cooling temperature, the said application must be accompanied by a statement signed by the applicant to the effect that the violated item of the specifications has been

conformed with. Within 1 week of the receipt of such an application and statement the health officer shall make a reinspection of the applicant's establishment, and thereafter as many additional reinspections as he may deem necessary to assure himself that the applicant is again complying with the higher grade requirements, and, in case the findings justify, shall regrade the milk or milk products upward.

Supplementary regrading downward.—The first paragraph of this section provides for regrading downward between regular announcements of grades. This provision is necessary in order to insure adequate protection to the consuming public in case a dairyman, once having obtained a high grade, evidences repeated carelessness which warrants his being degraded before the end of the next regular grading period.

As stated under section 5, the supply of a dairy or milk plant shall be immediately degraded (between regular grading announcements) if two successive inspections disclose one or more violations of the requirements of the grade in question, although the successive violations may be of different items of sanitation.

Supplementary regrading upward.—The last three paragraphs of this section deal with the problem of regrading upward at any time between routine announcements of grades. This provision is made in order to avoid unnecessarily long punishment of the dairyman who has corrected the defects responsible for his lower grade.

No application for regrading upward should be considered by the health officer unless the dairyman or milk plant in question has complied with the requirements and interpretation of section 4 of this ordinance relative to the use of proper bottle caps after having been degraded. In no case should a milk supply be regraded upward before the lapse of two weeks from the preceding grading announcement.

SEC. 10. *Transferring or dipping milk; delivery containers; handling of more than one grade; delivery of milk at quarantined residences.*—No milk producer or distributor shall transfer milk or milk products from one container to another on the street, or in any vehicle or store, or in any place except a bottling or milk room especially used for that purpose. The sale of dip milk is hereby prohibited.

All pasteurized milk and milk products shall be placed in their final delivery containers in the plant in which they are pasteurized, and all raw milk and milk products sold for consumption in the raw state shall be placed in their final delivery containers at the farm at which they are produced. Milk and milk products sold in the distributor's containers in quantities less than 1 gallon shall be delivered in standard milk bottles. It shall be unlawful for hotels, soda fountains, restaurants, groceries, and similar establishments to sell or serve any milk or milk product except in the original container in which it was received from the distributor or from a bulk container equipped with an approved dispensing device; provided that this requirement shall not apply to cream consumed on the premises, which may be served from the original bottle or from a dispenser approved for such service.

No milk or milk products shall be permitted to come in contact with equipment with which a lower grade of milk or milk product has been in contact unless such equipment has first been thoroughly cleaned and subjected to bactericidal treatment.

It shall be the duty of all persons to whom milk or milk products are delivered to clean thoroughly the containers in which such milk or milk

products are delivered before returning such containers. Apparatus, containers, equipment, and utensils used in the handling, storage, processing, or transporting of milk or milk products shall not be used for any other purpose without the permission of the health officer.

The delivery of milk or milk products to and the collection of milk or milk-products containers from quarantined residences shall be subject to the special requirements of the health officer.

The purpose of this item is to prevent, so far as practicable, exposing the milk to contamination from the time it is placed in its container at the dairy or milk plant until the time it is delivered to the final consumer. The practice, formerly quite prevalent, of transferring milk from a bulk container located in the delivery vehicle to the household container, either by dipping or by drawing from a faucet, is dangerous because of the opportunity for contamination by dust and flies or manually. This practice has now practically died out, but may occasionally be discovered by the inspector.

Another practice on the part of some distributors, still occasionally observed, is the filling of returned bottles, which have not been treated with a bactericide, with milk or milk products along the milk route, particularly at retail depots. This item expressly forbids this practice.

The use of standard milk bottles for delivering milk and milk products in quantities less than 1 gallon is required in order to prohibit delivery in such containers as buckets, fruit jars, etc., which may be difficult to wash and to subject to adequate bactericidal treatment, which cannot be filled and capped with the proper equipment used for these purposes, and which it is often difficult to label properly.

The portion of this section dealing with the method of selling or serving of milk or milk products in restaurants, groceries, etc., is designed to prevent contamination of the milk in handling or serving. Such contamination is frequently observed in the dipping of milk from a bulk container into the container or glass in which it is sold or served to the customer, the container or glass frequently overflowing and the milk coming in contact with the fingers and then dripping back into the bulk container from which it was dipped. Furthermore, even if milk is poured into glasses from bottles in the kitchen there is more opportunity for carelessness and consequent contamination than if it is served in the original container, because the transferring is done out of sight of the customer.

The selling or serving of milk in the original container has been found to be practical. In fact, many establishments report increased sales because of the reaction of the consumer to the improved service sanitation, and to the fact that he is assured of receiving all of the cream in the original container.

However, there are rapidly being developed sanitary bulk dispensers which may result in reducing the cost of milk distribution. For this reason this section is so worded as to permit the selling or serving of milk or milk products from approved sanitary bulk dispensers which insure correct mixing of the milk and cream. The health officer should not approve any bulk dispenser which does not satisfy the following design and operation requirements:

(1) It shall comply with the requirements of item 10p, construction and repair of equipment.

(2) No surfaces with which milk or milk products come in contact shall while in use be accessible to manual contact, droplet infection, dust, or flies.

(3) All parts of the dispensing device with which milk comes in contact, including any measuring device, shall be cleaned and subjected to bactericidal treatment at the milk plant, not at the retail vendor's establishment.

(4) The dispensing device shall be filled and sealed with two seals at the milk plant in such manner as to make it impossible to withdraw any part of its contents without breaking one seal and impossible to introduce any substance without breaking the other.

(5) It shall mix the milk and cream thoroughly and automatically with each dispensing operation. This requirement may be waived in the case of milk products which remain homogeneous without mixing.

In enforcing this section the health officer may make an exception in the case of cream served with coffee, cereals, etc., as in this case it is impracticable to serve in the original container because of the fact that it is impossible for the distributor to deliver cream to the establishment in the unit-size containers which would be required in each case. Furthermore, the use of expensive bulk dispensers as described above may not be a defensible requirement for all soda fountains, restaurants, and similar establishments in the case of cream used for coffee, cereals, etc. For such service the health officer may permit transferring from the original bottle, or from a pump, urn, or other dispenser which complies with requirements (1) and (2) above, and which is filled in a sanitary manner, kept clean, and frequently subjected to bactericidal treatment complying with the requirements of item 12p.

SEC. 11. *Milk and milk products from points beyond the limits of inspection of the city of -----.*—*Milk and milk products from points beyond the limits of inspection of the city of ----- may not be sold in the city of -----, or its police jurisdiction, unless produced and/or pasteurized under grading provisions identical with those of this ordinance; provided that the health officer shall satisfy himself that the health officer having jurisdiction over the production and processing is properly enforcing such provisions.*

This item is intended to permit the health officer to bar milk and milk products shipped in from great distances unless he can assure himself that they meet the provisions of the ordinance. This the health officer can do only in case he is able to finance the cost of inspection and analysis at the distant points of production or pasteurization, or at the points of shipment. Under no conditions should the health officer authorize the receipt of such shipments if arrangements cannot be made for supervision, unless an emergency exists, in which case permission should be given for its receipt, provided it is labeled "ungraded milk" when distributed.

SEC. 12. *Notification of disease.*—*Notice shall be sent to the health officer immediately by any producer or distributor of milk or milk products upon whose dairy farm or in whose milk plant any infectious, contagious, or communicable disease occurs.*

SEC. 13. *Future dairies and milk plants.*—*All dairies and milk plants from which milk or milk products are supplied to the city of*

----- which are hereafter constructed shall conform in their construction to the grade A requirements of this ordinance.

This item is designed to permit the local and State health and agricultural authorities to promote the construction of properly designed new dairies and milk plants.

SEC. 14. *Procedure when infection suspected.*—When suspicion arises as to the possibility of transmission of infection from any person concerned with the handling of milk or milk products, the health officer is authorized to require any or all of the following measures: (1) the immediate exclusion of that person from milk handling, (2) the immediate exclusion of the milk supply concerned from distribution and use, (3) adequate medical and bacteriological examination of the person, of his associates, and of his and their bodily discharges.

SEC. 15. *Enforcement interpretation.*—This ordinance shall be enforced by the health officer in accordance with the interpretations thereof contained in the 1935 edition of the United States Public Health Service Milk Code.

SEC. 16. *Penalty.*—Any person who shall violate any provision of this ordinance shall be fined not more than ----- at the discretion of the court. Each and every violation of the provisions of this ordinance shall constitute a separate offense.

This section must be worded in accordance with the city charter and the State constitution. Where legally possible the desirability is suggested of prescribing a minimum fine and an increase in fine for second and subsequent offenses.

SEC. 17. *Repeal and date of effect.*—All ordinances and parts of ordinances in conflict with this ordinance are hereby repealed; and this ordinance shall be in full force and effect immediately upon its adoption and its publication, as provided by law.

SEC. 18. *Unconstitutionality clause.*—Should any section, paragraph, sentence, clause, or phrase of this ordinance be declared unconstitutional or invalid for any reason, the remainder of said ordinance shall not be affected thereby.

These sections need no explanation.

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