**Specification of Pierre Armand le Comte de Fontaine Moreau : manufacture of fuel.**

### Contributors

Fontainemoreau, Pierre Armand, comte de.

### Publication/Creation

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A.D. 1851 . . . . . N° 13,617.

# SPECIFICATION

OF

# PIERRE ARMAND LE COMTE DE FONTAINE MOREAU.

## MANUFACTURE OF FUEL.

LONDON:
PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,
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1857.


# A.D. 1851 . . . . . N° 13,617.

## Manufacture of Fuel.

### DE FONTAINEMOREAU'S SPECIFICATION.

**TO ALL TO WHOM THESE PRESENTS SHALL COME,** I, PIERRE ARMAND LE COMTE DE FONTAINE MOREAU, of 4, South Street, Finsbury, in the County of Middlesex, and 24, Boulevard Poissonnière, Paris, in the Republic of France, Patent Agent, send greeting.

**WHEREAS** Her present most Excellent Majesty Queen Victoria, by Her Royal Letters Patent under the Great Seal of the United Kingdom of Great Britain and Ireland, bearing date at Westminster, the Third day of May, One thousand eight hundred and fifty-one, in the fourteenth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said Pierre Armand le Comte de Fontaine Moreau, my ex̃ors, adm̃iors, and assigns, Her especial licence, full power, sole privilege and authority, that I, the said Pierre Armand le Comte de Fontaine Moreau, my ex̃ors, adm̃iors, and assigns, or such others as I, the said Pierre Armand le Comte de Fontaine Moreau, my ex̃ors, adm̃iors, or assigns, should at any time agree with, and no others, from time to time and at all times during the term of years therein expressed, should and lawfully might make, use, exercise, and vend, within England, Wales, and the Town of Berwick-upon-Tweed, and in the Islands of Jersey, Guernsey, Alderney, Sark, and Man, and also in all Her said Majesty's Colonies and Plantations abroad, my Invention of "IMPROVEMENTS IN THE MANUFACTURE OF FUET," communicated to me from abrod; in which said Letters Patent is contained a proviso, that I, the said Pierre Armand le Comte de Fontaine Moreau, shall cause a particular description of the nature of my said Invention, and in what manner the same is to be performed, by an instrument in writing under my hand and seal, to be

inrolled in Her said Majesty's High Court of Chancery within six calendar months next and immediately after the date of the said in part recited Letters Patent, as in and by the same, reference being thereunto had, will more fully and at large appear.

**NOW KNOW YE,** that in compliance with the said proviso, I, the said Pierre Armand le Comte de Fontaine Moreau, do hereby declare that the nature of the said Invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the Drawings hereunto annexed, and to the figures and letters marked thereon, that is to say:—

The Invention communicated to me consists in producing charcoal from the small branches of trees, animal plants, and from all kind of refuse of wood, such as tan shavings, sawdust, &c., and in combining the same with other inflamable substances. As the manufacture of the charcoal requires several operations, it is necessary to describe them successively, and the apparatus with which they are carried on. The first operation is to submit the vegetable substances to a preparatory carbonisation, in order to render them fit for being pulverized. To carry out the first operation or the carbonisation of vegetable substances, and which operation can be put into execution in all places where the herein-before enumerated substances are found in abundance, the furnace represented by Figures 1, 2, 3, Drawing 1, is employed. These three Figures represent a front view of a furnace, which, in Figure 1, is constructed with bricks, and in Figure 2 the furnace is of cast-iron, and in Figure 3 of cast-iron surrounded by wood. When it is of metallic construction the furnace has the advantage of being portable from one place to another, and being put in operation where the vegetable substance are abundant, which presents the economy of the carriage of such bulky materials. In order to prevent the escape of the caloric when the furnace is of cast iron, it is surrounded by an outer envelope in sheet iron, cast iron, or wooden board, which is erected at about three feet distant from the furnace. The space left between is filled with substances which are not conductive of heat, such as sand or earth; the Figure 3, Drawing 1, represents a furnace surrounded by a wooden case, in which A, A, A, are the poles, to which are attached the boards B, B, forming the casing.

The furnace is of a cylindrical form, and is provided at its upper extremity with the round hole C serving to its alimentation, as herein-after described. The furnace has also a square opening D at its basis provided with a door. The height of the opening D is generally larger than the width. The furnace

can be sunk into the ground either in part or in whole, but in that case it is necessary to cut an inclined road reaching its basis, and the door D to enable the workman to have free access to it. The furnace can also be constructed by means of a sufficient hole dug in the ground, surrounding the side with a brick wall, taking care in that case also to have a proper road reaching the door D, as herein-before stated.

The furnace being constructed by any of the means herein-before described, the operations for carbonising is conducted as follows:—Twenty or twenty-five bundles of small branches of trees or any other kind of ligneous substances are thrown into the furnace through the opening at the top C, and the fire is applied to them by the aperture D, set at the lower part of the furnace, when the woody substances are well lighted; the door D is shut air tight, and well luted to prevent internally any introduction of the external air, and another quantity of alimenting substances is thrown again into the furnace by the said opening at the top, through which the smoke escapes; the same mode of feeding the furnace is carried on during the whole time the carbonising takes place, which allows the furnace to be filled with vegetable charcoal to nearly three-fourths of its height. The opening C is then shut with a sheet iron damper, or any other suitable contrivance, and the bottom door D opened, in order to withdraw with an iron raker the charcoal from the furnace. The charcoal is immediately extinguished either by sprinkling water over it with a watering pot, or by throwing it into convenient close vessels, in which it is immediately extinguished, or again by covering it with a thick layer of charcoal perfectly cold.

As soon as the charcoal contained in the furnace has been withdrawn, as herein-before described, the door D is shut and well luted again, and the furnace is fed with bundles or any other ligneous substances in order to repeat the former operations, without however, being obliged, then and for all the following ones if they are carried successively one after the other, to put on fire the woody substances contained in the furnace, as the caloric retained by it is quite sufficient for carbonising without producing the smallest incinerations.

### Pulverization of the Carbonised Substances.

The substances being carbonized, as herein-before described, are submitted to the pulverizing apparatus represented by Drawing 11, Figure 1, which is a plan of the machine. In that Figure A is a circular cast-iron through, having about nine feet in diameter and one foot in heighth; B is a vertical shaft giving the motion to the cylinders serving to pound the carbonized

charcoal; C is a roller provided with teeth for tearing; D is another roller for pounding; E is a wooden board to carry the gathering rakes F and the levellers G of the pounded charcoal; H, H, are rakes forcing the pulverized charcoal to fall through a lateral opening; I, I, wooden frames passing into the socket on which the rakes H, H, are set; J, J, cast-iron sockets supporting the axis of the rollers; K is a lever serving to raise or to lower the rakes F, F. When the charcoal is pounded by means of the herein-before described apparatus, it is impregnated with coal tar or any other similar bituminous or resinous substance, and well mixed into a paste by means of the following apparatus, represented by Figure 2, Drawing 11.

The Figure 2 represents a plan of the said apparatus, which is nearly similar to the pulverising apparatus, except, however, that the through is more elevated, and that also the roller C is provided with teeth larger, longer, and wider apart, in order to operate a better mixing of the component substances; this apparatus is put in motion by the same means than the apparatus herein-before described. The substances having undergone a thorough mixing, they are moulded into small cylinders or into prisms of a regular form by means of the apparatus herein-after described and shewn by Figure 4, Drawing 1; that Figure 4 represents a front elevation of the machine at work, in which A is the wooden cross-head of the machine, provided with four sockets B, B, serving to guide the cross-head A. C, C, C, C, are ramming pistons fixed to the head-piece A, by means of a cast-iron plate and screws; D, D, D, D, are iron rods serving to dislodge by the bottom the moulded charcoal; E, cast-iron frame carrying the bags to receive the substances, and in which is exercised the pression of the ramming pistons C, C, C, C; F, slide having a forward and backward motion, and carrying the tubes into which the substances are moulded. It is from the slide F that the charcoal having received the required shape, is forced out of the tubes by means of the rods D, D, D, D, herein-before described. G is an horizontal shaft to which the cog-wheel H is keyed, and on which is fastened the bolt I; J, J, connecting rods attached to the cross-head; A, K, is a shaft on which a pinion, two drums and a fly-wheel are set; L is the excentric, communicating the forward and backward motion to the slide F; M is a cog-wheel catching with the cog-wheel N; O, cast-iron stay serving to support the pression of the machine; P, cast-iron frame set in massonry work, or in strong wood work. The charcoal cylinders or prisms being prepared as herein-before described, are subjected to the last operation (that is to say), to the final carbonisation in close cast-iron or refractory clay pots, placed in a furnace represented in Drawing III. In that Drawing Figure 1 is a sectional

elevation of the basis of furnace, and A is the external part of the wall of the furnace; B, partition of the retort; C, interior of the retort in which two rails are fixed; D, hearth and grating of the furnace; E, ventilating holes for the egress of the gas; F, empty space surrounding the retort, and serving when the gases are burning for the warming of the said retort in all its extent; G, aperture for the discharge of the smoke, which escapes into the main chimney by means of a subterraneous discharge pipe. Figure 2 is a front view of the same furnace H; in that Figure is a cast-iron door luted with earth in the interior, to close hermetically the retort; K, retort opened, and representing the pots placed on a carriage introduced into the interior; L, iron fastenings for the consolidation of the furnace and retort, and serving to fix with hinges the doors H; M, aperture for the introduction of cold air; N, hearth of the furnace, serving only once to light the gas. P, Figure 4, is a plan of a cast-iron carriage. Figure 3 represents a side elevation of a carriage, with two sets of cast-iron or earth pots filled with charcoal, prepared as herein-before described, and placed on the carriage ready to be introduced into the retort.

The advantages and result obtained by this furnace are, firstly, to prevent the pots containing the moulded charcoal coming in contact with the flame during the operation of carbonising, to preserve them from a two rapid destruction, which is the natural consequence of all other systems. Secondly, to employ no other combustible than that given out by the gases submitted to carbonisation. Thirdly, to maintain the furnace at an equal and continual temperature during the whole of the operation. Fourthly, to burn infectious gases, and, in this respect, to solve one of the most important problems of public health. Fifthly, to prevent the workmen from entering into the furnace when it is heated to take out the pots, and to render their work more healthy and less difficult. Sixthly, to add to the fabrication a great rapidity of operation, with a very important economy.

The working of this improved furnace is carried on as follows:—The pots filled with the moulded charcoal are placed upon the carriages, two of which loaded with pots are introduced into each retort by means of rails. The doors H, H, of the retorts are hermetically closed by carefully luting them air-tight. The fire of the hearth N, by introducing itself into the space F, left vacant between the retorts, warms them, and causes the evaporation of the gases which escape from the pots, and the fire only lights after their exit from the retorts by the ventilating holes E. By these means the flame is entirely separated from the pots; when the retorts are hot enough, and the gases escape in sufficient quantity to maintain the furnace at the necessary heat, the

fire of the hearth is put out, and the hearth is closed up with bricks or earth. When there is no longer any flame to be seen in the space F the operation is completed. The doors H, H, of the retorts are opened, the carriages taken out and placed apart, so that the pots and the charcoal cylinders may cool. At the same instant, by means of a truck rolling on rails, two other carriages loaded with fresh sets of pots are introduced into the retorts, and the doors are hardly closed when the gases light again. The operation is continued thus without interruption, and without it being necessary to light the fire, the heat of the retorts and furnaces being, by the incessant combustion of the gases, more than sufficient to cause constantly the carbonisation. The refuse of the carbonised turf submitted to the treatment herein-before described (that is to say), being pulverised and mixed with the tar of pit coal, moulded like the vegetable charcoal already described, and being also submitted to the final carbonisation in closed pots, presents a charcoal very hard, burning without smell or smoke, and fit for all domestic and culinary uses. The same process applied to the refuse or dust of coke gives also an excellent combustible, burning in the same way as the charcoal before described, without smell or smoke, and present a very fit combustible for the heating of apartments. By adding the dust of the coke some dust of coal, in the proportions of one-fifth, a quarter, a third, or even one-half, the produce is remarkably hard, and possessed of a very great quantity of caloric.

It is easy to understand that the combustible matters I have just indicated can be employed together, separately, mixed in equal or unequal proportions, according to the quality of charcoal required, and also according to the matters which are cheaper and more conveniently procured.

To manufacture the last produce herein-after described, that is to say, a charcoal having a kind of metallic sound, coke of good quality, possessing as few cinders as possible, is employed; it is pulverized very fine, indeed passed through a sieve, mixed with a large proportion of tar of pit coal, so that a well-formed paste may be made; this paste is moulded in an iron or cast iron tube, in which it is very strongly compressed, by pressing screws, or by any other means which will lead to the same result. The cylinders of paste thus formed, are submitted to carbonisation in closed pots at a very high temperature; after this operation, they are dipped in boiling pitch, where they are left a sufficient time for the pitch to penetrate into their pores, and they are then again submitted to carbonisation. This second operation is repeated three or four times until the weight of the produce ceases to increase; this process produces a charcoal extraordinarily close, compact, and of a metallic sound.

INFLAMMABILITY GIVEN TO THE CHARCOALS BY THE INTRODUCTION OF AN ARTIFICIAL POROSITY.

When by their nature or their density the charcoals are less easy to light, the difficulty is got over by giving them an artificial porosity. To obtain that species of separation of molecula which facilitates the inflammability and combustion of the charcoals in all their parts, a salt capable of crackling, melting, or decomposing itself during the calcinating or carbonisation is introduced. This result is obtained by sprinkling marine salt or chlorate of soda dissolved in water over the pulverized charcoal to be employed. Alcaline chlorates, azotic acid, the azotates of soda, of potassium, of lime, and all soluble salts in general, susceptible of undergoing chemical changes at certain temperatures, are also calculated to produce the same effects. These salts may also be employed without being dissolved in water, by pulverizing them very fine indeed, and mixing them with the charcoals before their being manufactured. The quantity of salt to be employed differs according to the nature of the salt and according to the amount of inflammability to be given to the charcoals.

And having now described the Invention communicated to me, and the manner of carrying the same into effect, I wish it to be understood that I do not confine myself to the precise details herein-before described, so long as the general features of the arrangements be retained for the carrying out of the said improvements; but what I do claim as the Invention communicated to me and intended to be protected by the said Letters Patent is,—

Firstly, the carbonising the small branches of trees and other animal plants, the refuse of all ligneous substances, by means of apparatus as herein-before described, reference being had to Figures 1, 2, 3, of Drawing 1.

Secondly, the pulverising of carbonised small branches of trees and other animal plants, refuse of all ligneous substances herein-before described, reference being had Figure 1, Drawing II.

Thirdly, the mixing of carbonised and pulverised small branches of trees and animal plants, refuse of all ligneous substances, by means of apparatus, as herein-before described, reference being had to Figure 2, Drawing II.

Fourthly, the moulding of carbonised, pulverised, and mixed small branches of trees, animal plants, and refuse of all ligneous substances, by means of apparatus as herein-before described, reference being had to Figure 4, Drawing 1.

Fifthly, the mode of carbonising in close vessels the carbonised, putrefised, mixed, and moulded small branches of trees, animal plants, and refuse of

ligneous substances, by means of apparatus, as herein-before described, reference being had to Figures 1, 2, 3, 4, Drawing III.

Sixthly, the mode of rendering charcoal more easily inflammable, by means of an artificial porosity, as herein-before described.

In witness whereof, I, the said Pierre Armand le Comte de Fontaine Moreau, have hereunto set my hand and seal, this Third day of November, in the year of our Lord One thousand eight hundred and fifty-one.

L. DE FONTA (L.S.) INEMOREAU.

MOWBRAY.

**AND BE IT REMEMBERED**, that on the Third day of November, in the year of our Lord 1851, the aforesaid Pierre Armand le Comte de Fontaine Moreau came before our said Lady the Queen in Her Chancery, and acknowledged the Specification aforesaid, and all and every thing therein contained and specified, in form above written. And also the Specification aforesaid was stamped according to the tenor of the Statute made for that purpose.

Enrolled the Third day of November, in the year of our Lord One thousand eight hundred and fifty-one.

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Printers to the Queen's most Excellent Majesty. 1857.

A.D. 1851. May 3. N°13,617.
DE FONTAINEMOREAU'S SPECIFICATION.

(3 SHEETS.)
DRAWING N°1.

FIG. 1.

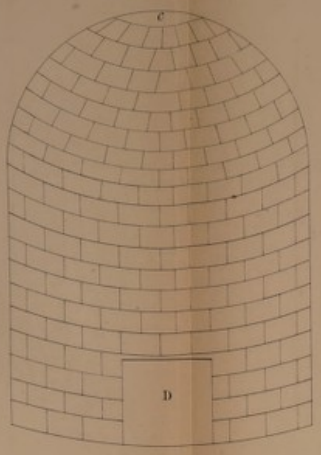



FIG. 2.

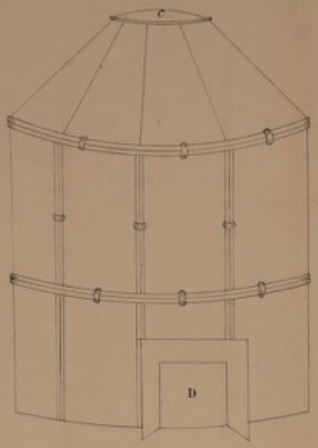



FIG. 3.

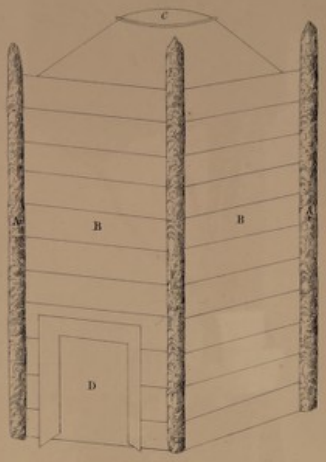
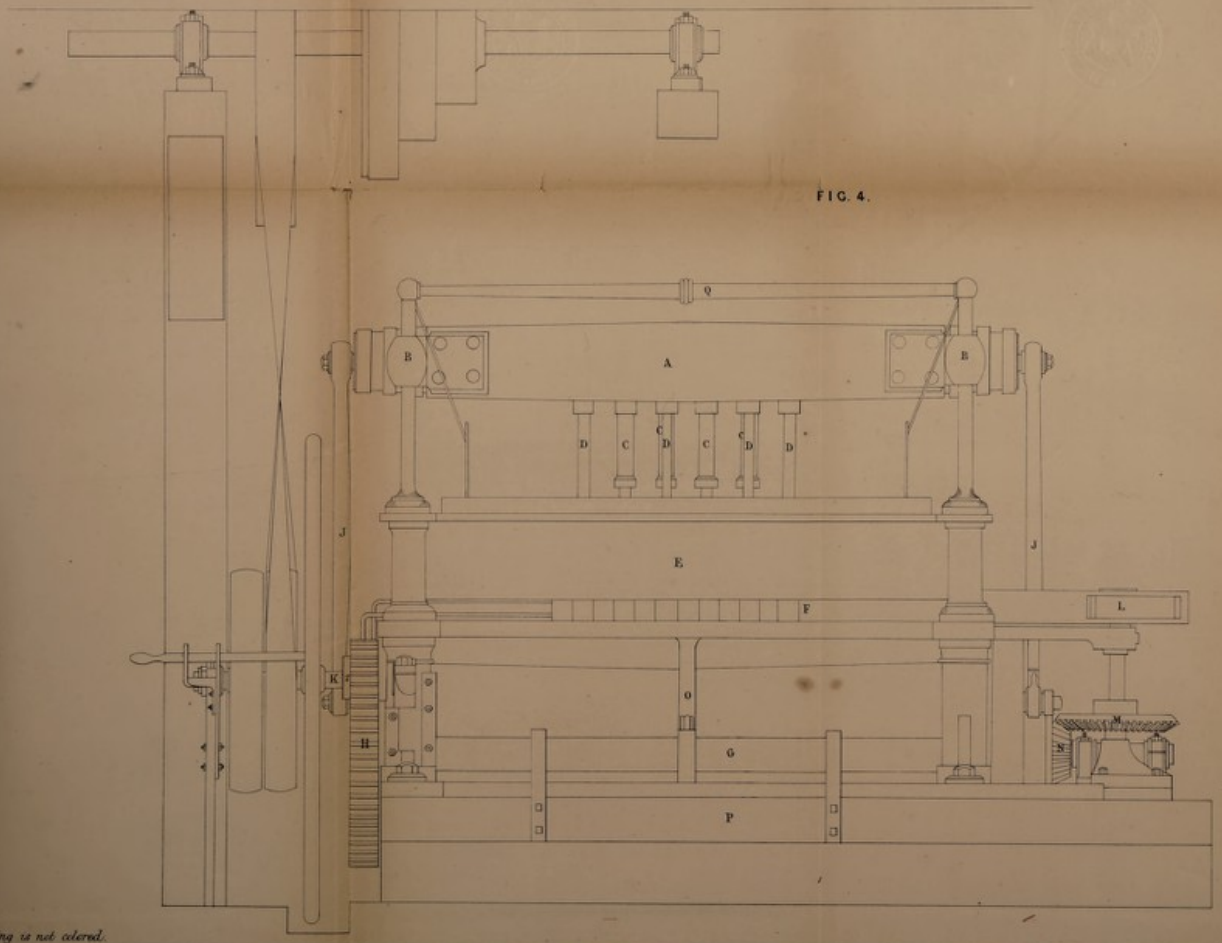



FIG. 4.




*The enrolled drawing is not colored.*

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FIG. 2.

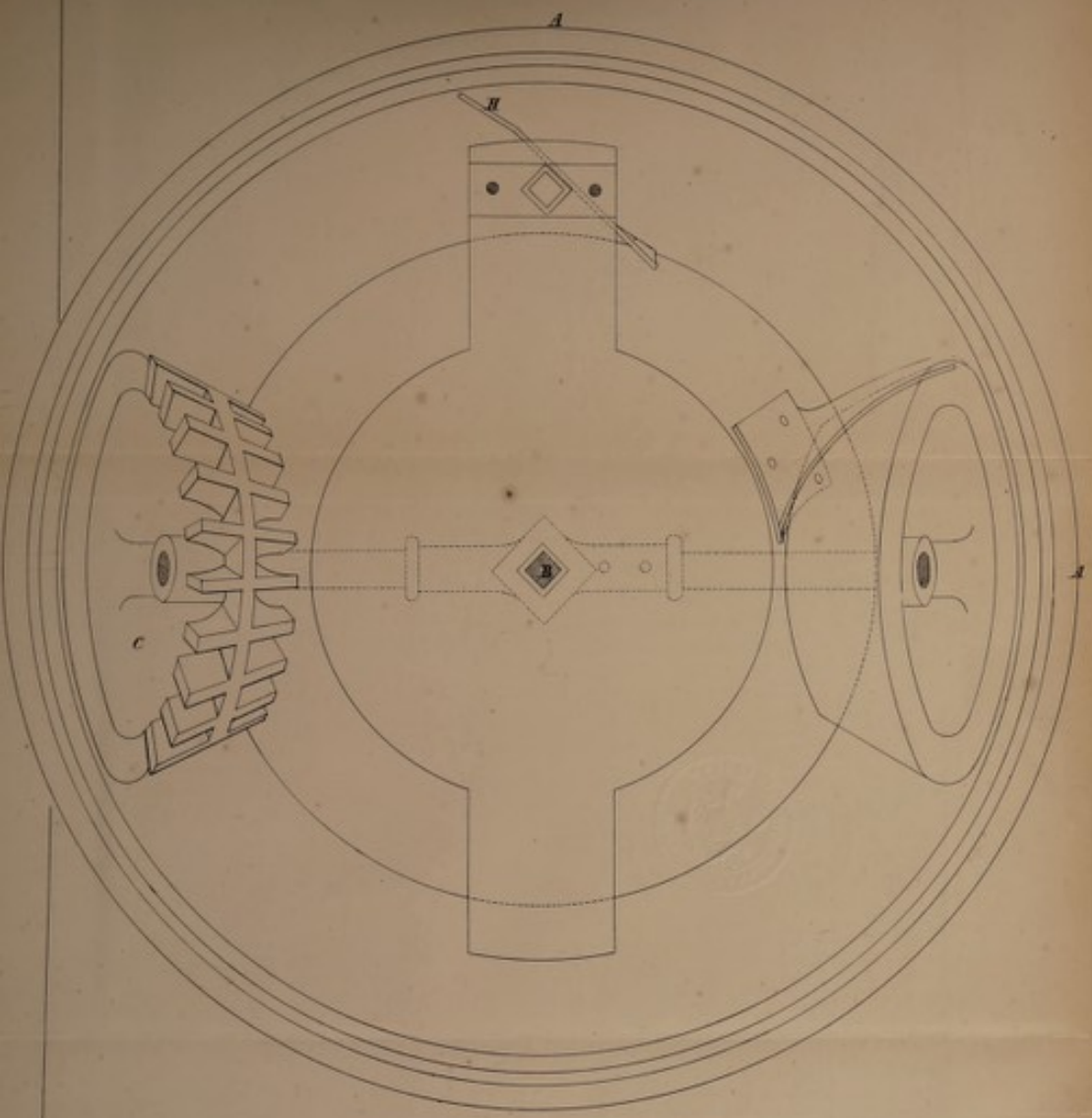
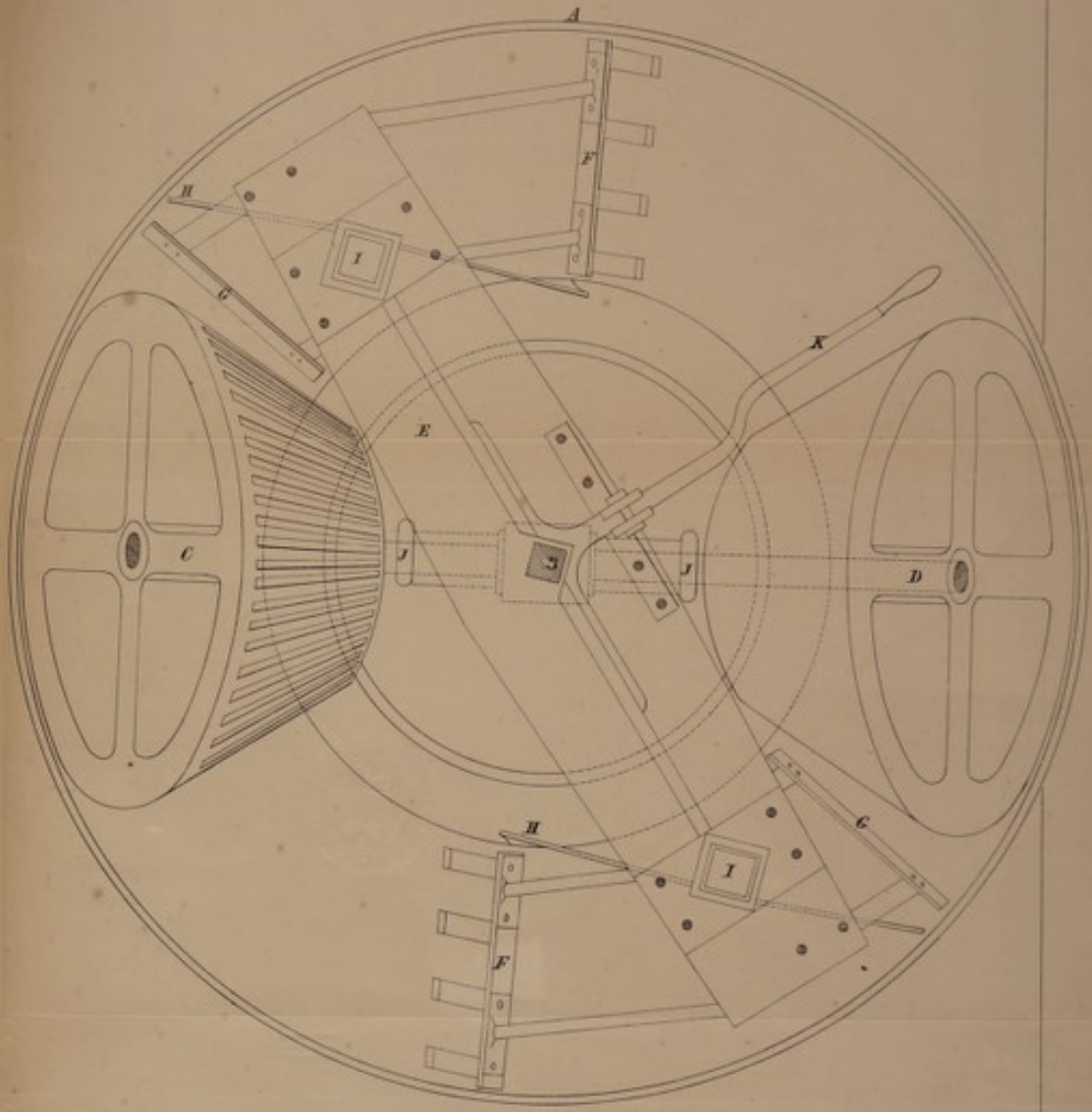



FIG. 1.

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A.D. 1851. MAY 3. N°13,617.
DE FONTAINEMOREAU'S SPECIFICATION.

(3 SHEETS)
DRAWING 3

FIG. 1.

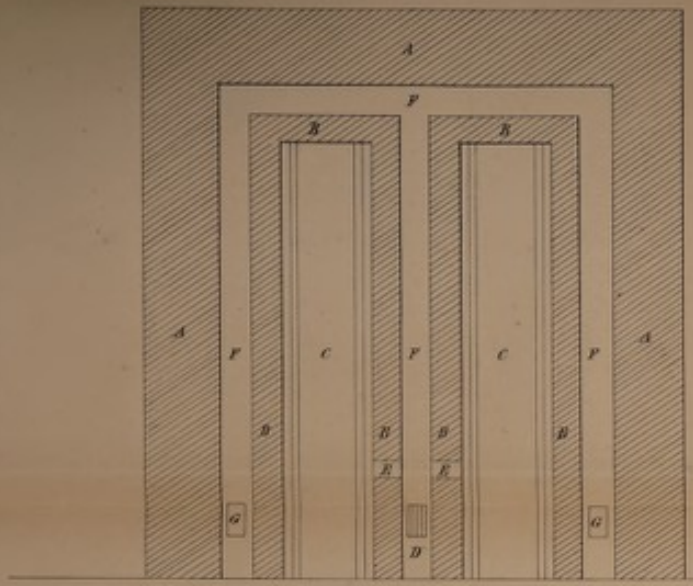



FIG. 2

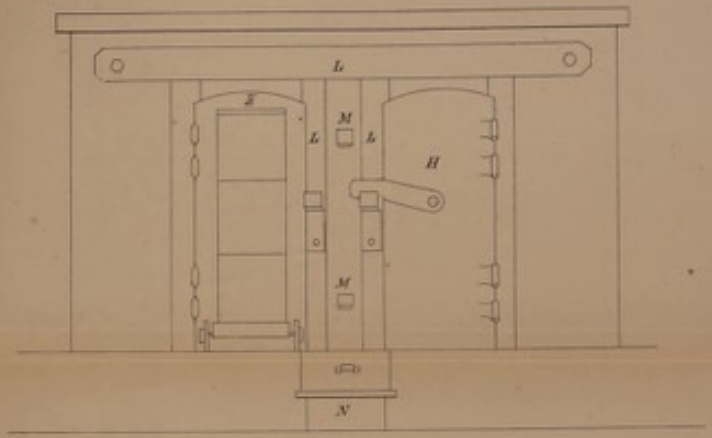



FIG. 3.

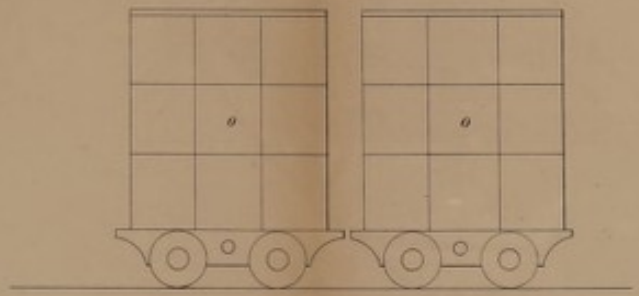
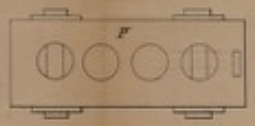



FIG. 4

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