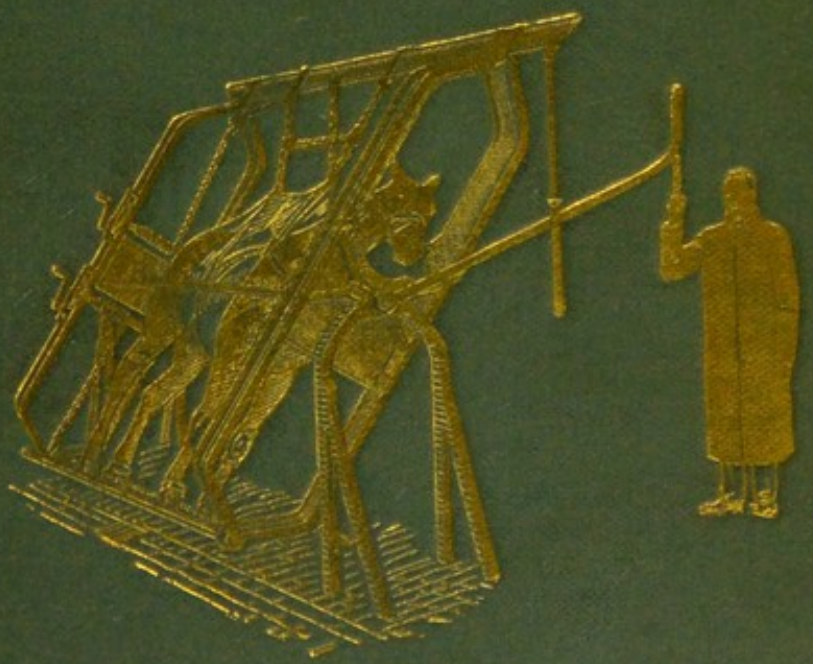
A surgical operating table for the horse / by Jno. A.W. Dollar.

A Surgical Operating Table for the Horse.



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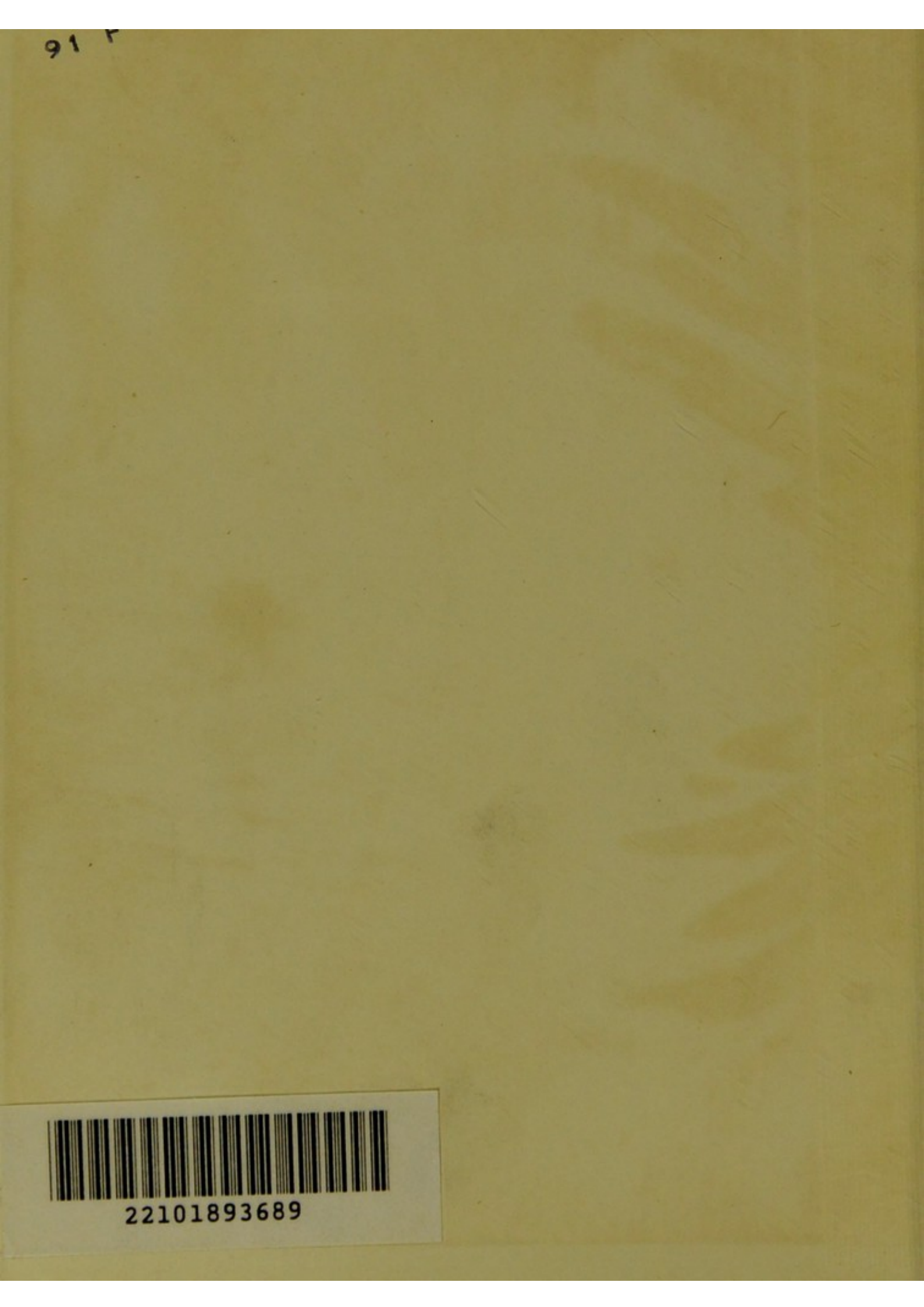

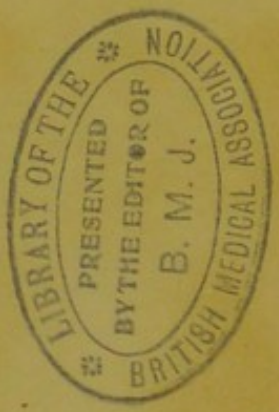
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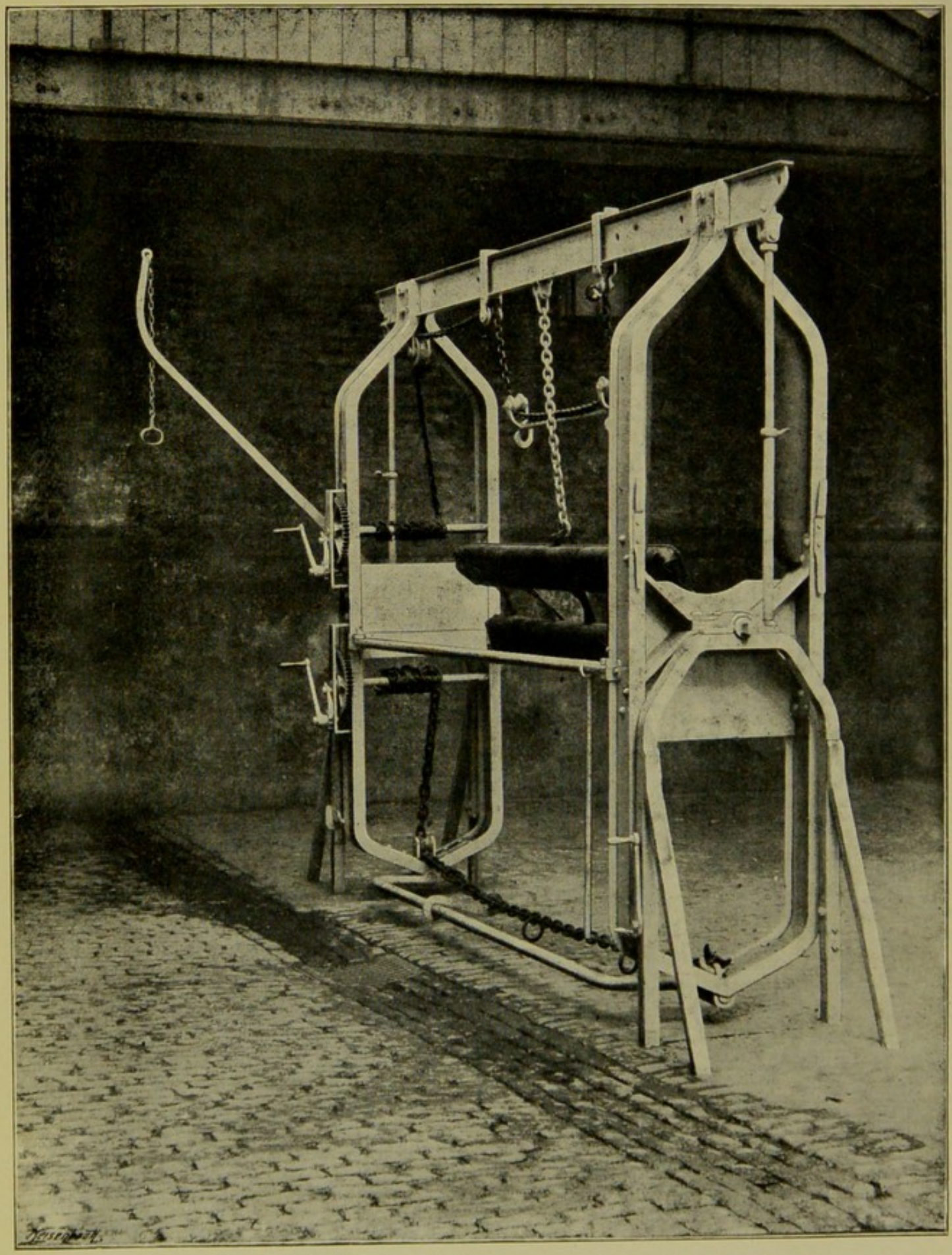

The Operating Table.

A SURGICAL OPERATING TABLE FOR THE HORSE.

BY

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Translator and Editor of 'Möller's Veterinary Surgery,' etc.

EDINBURGH
DAVID DOUGLAS, 10, CASTLE STREET.

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OPERATIVE VETERINARY SURGERY,

BY

H. MÖLLER.

Translated and Edited from the 2nd Improved and Enlarged Edition by

JNO. A. W. DOLLAR, M.R.C.V.S.

PREFACE.

WHILE introducing to the notice of the reader this brochure on a somewhat neglected subject, I take the opportunity of acknowledging my indebtedness to Messrs. Peuch and Toussaint for liberty to reproduce from their well-known 'Précis de Chirurgie Vétérinaire' the figures on p. 7, and to Herr Ch. Trapp for the illustrations numbered respectively 3 and 4 from his pamphlet entitled 'Neuer Apparat zum Niederlegen der Thiere.' In justice to Herr Trapp's apparatus which I notice under the title of "The German Operating Table," I should state that it has had a limited application in one of the larger slaughterhouses in Strassburg, of which Herr Trapp is the veterinary inspector. The fact, however, of its proving suitable for casting oxen in no way removes my objections to it so far as the horse is concerned.

The apparatus with which I am principally concerned was first suggested by M. Vinsot of Chartres. During 1892–3 I had frequent opportunities of studying it, and of coming in contact with its inventor.

Before, however, finally adopting this model and erecting an operating table of my own, I communicated with, and in many cases visited, those persons in Europe who were using such apparatus. The visits were made during 1892–3–4–8 and '9, usually while inspecting or studying at foreign veterinary schools, and extended to France, Germany, Italy, Austro-Hungary, Spain, Belgium, Switzerland, and Holland. My own operating machine was installed early in 1899, since which time it has been frequently used and has proved very satisfactory.

The full-page process-work illustrations of it are from my own photographs made during actual progress of operations in hospital here.

JNO. A. W. DOLLAR.

56, New Bond Street,
London, W:
February, 1900.

A SURGICAL OPERATING TABLE FOR THE HORSE.

Present Methods of Controlling Horses for Operation.

NOTWITHSTANDING the urgent need for a means of efficiently controlling horses during operation, and the inconvenience and real danger of throwing down valuable animals on which operations must be performed, no important advance on old systems has been reported in this country for the past fifty years. The "stocks" or "trevis," having undergone no improvement for a century, have practically disappeared, and at the present time "hobbles" may be said to constitute the only means of restraint for serious operations. That casting with hobbles exposes the patient to serious risks will scarcely be questioned by any person of experience. For my own part I may confess to having had cases of broken back produced in this way, while the references in professional journals to similar accidents, and the long discussions as to their exact cause, leave no doubt that broken back has been seen by most practitioners. No important veterinary surgical text-book is without a reference to it. From time to time, moreover, ingenious forms of harness have been devised to prevent

horses breaking their backs when cast ; but though in theory these appliances fulfil their object, few practical men regard them seriously. Of this nature is the back strap for keeping the head extended, which formed an accessory of Rarey's "hippo-lasso."

From the appearance of those cases I have seen I agree with Möller * that fracture usually results from (1) violent arching of the back after the horse has been thrown down and is struggling to free his feet, or (2) from lateral curvature of the spine when the animal attempts to rise. In the first instance the great muscle (*longissimus dorsi*) extending along the whole of the back contracts with extreme force, fracture sometimes being accompanied by the occurrence of a dull, crunching sound. The body of the vertebra is then usually found to be crushed. In the second case the muscles of one side of the body contract simultaneously, causing so marked a curvature of the spine that fracture results. This is most to be feared in aged animals, in which the separate vertebræ of the loins and back have become fixed together by new bony growth, and where in consequence the spine has become rigid.

One observer (Dieckerhoff) has alone reported fourteen cases, so that the number of fractures annually occurring must be considerable, especially as the total would be swollen by the rarer though nevertheless tolerably frequent cases of broken ribs and broken neck, and by the still less common fracture of the skull consequent on rearing up and falling over backwards.

A further danger consists in the horse moving just before being thrown, and thus falling on an unpadded spot. This is certainly very dangerous, and cannot always be provided against.

* See my translation of Möller's 'Veterinary Surgery,' p. 411.

In short, the risks are so real and so well recognised that no veterinary surgeon of experience will undertake operation involving casting without first warning his client of them.

The occurrence of such accidents is not, however, the only or even the chief reason for seeking a more satisfactory means of control. The peculiar nervous shock which sometimes follows the throwing down of high-couraged horses, and appears afterwards to deprive them of all pluck and energy, is well recognised both by owners and veterinary surgeons, and has gone far to favour the practice of operating without restraint. In such operations the veterinary surgeon often runs no less risk than his patient, and virtually pits his own agility against the strength and cunning of the animal. The smallest failure on the operator's part may result in a broken leg or worse ; the smallest oversight during a necessarily rapid examination may end in his being confronted with an opened hernial sac, the protrusion of a mass of bowel or omentum, or even the severance of an important vessel, causing dangerous if not fatal bleeding. In the face of complications the surgeon is helpless ; he has absolutely no control over the animal. That such accidents occur but seldom is a tribute to the ability of operators—it is no defence of the system. I do not go so far as to deny that this method of operation is sometimes of value, or that it will continue to be employed in certain eventualities ; but I do believe that in the great majority of all surgical operations efficient control should form the necessary precedent to any interference. I base this opinion not only on the unquestionable duty of the veterinary surgeon to observe all rules necessary for his own safety, but on the equally unquestionable duty to so conduct operations as to spare the animal all

unnecessary risk and pain. And this, I contend, cannot always be done when animals are cast with hobbles, still less when painful operations are performed standing. In the former case the anxiety and shock consequent on the fall and subsequent struggles cannot be avoided even though the operation which follows be conducted under an anæsthetic ; while, in the latter, anæsthesia (other than local) is utterly out of the question. Some years ago I made a number of experiments to settle the point of general anæsthesia without control, and shall not readily forget the spectacle of a heavy cart-horse, which I had attempted to chloroform for shoeing, breaking loose and scattering men and implements far and wide. Before being secured he had displaced heavy anvils, broken windows, thrown bars of iron in all directions, and pushed down a 4½-inch brick wall. Singularly enough, he damaged himself but little. This was the decisive termination of a number of experiments.

Without anæsthesia important operations are performed but ill, some cannot be performed at all. In no case can the operator observe that nicety in checking hæmorrhage, cleansing the wound, and applying dressings which so often determines between success and failure. But, as I have shown, general anæsthesia presupposes casting, and casting involves its own dangers. Many conditions, moreover, fall to be treated where frequently repeated attention is necessary. I need only recall operations on the sole for canker, on the lateral cartilage for quittor, on the feet for wounds due to picked-up nails, on the facial sinuses for the cure of nasal gleet, on fistulæ of the poll and withers, on necrosed ribs or scapulæ, on the teeth, on salivary fistulæ, etc. Every practitioner can supplement the list. Restraint is often required, simple methods fail,

and casting is the only resort. As casting is not only risky but troublesome, the cases are apt to receive less attention than they otherwise would. Furthermore the straw beds on which horses are cast give rise to clouds of microbe-charged dust, rendering it a matter of the greatest difficulty to entirely exclude organisms, and frustrating attempts to bring about primary union of wounds.

For the above reasons, and to facilitate new operations, impracticable by the old methods, a new means of restraint has become urgently needful. I believe it has been found. On account of the danger to the operator, his attendants, and the patient, both during and after casting, the inconvenience and surgical disadvantages of using straw beds, the humanitarian reasons for requiring anæsthesia, and lastly the impossibility of performing certain operations like that on the knee, later mentioned, without it, I consider the invention of the machine now to be described of the greatest importance. No apology is therefore necessary for introducing it to the notice of the reader.

The Evolution of the Operating Table.

Considering the facts of England's supremacy as a stock-breeding country, and the well-earned reputation of English veterinary surgeons for general knowledge of animals and practical skill in their profession, it is not a little surprising that surgical technique and the development of aids to practice have so far lagged behind, and that for many greatly demanded improvements we have to thank foreign colleagues. This is strikingly true in regard to improved operating tables, of which,

on the continent, several have been produced, and, moreover, have come into fairly common use. We in this country seem to have been too much of opinion that new ideas would "not pay," or still more were "not practical." We have therefore waited for the fullest demonstration of their value abroad before accepting them at home, forgetting that the rewards of enterprise are for the first in the field. In France, for instance, where the most strenuous efforts have been made to improve apparatus and technique, one veterinary surgeon is now making a generous income by one operation alone—that namely, for removing the scar from blemished ("broken") knees, and has as many patients as he can well accept. But without improved apparatus this operation would have been impossible.

Daviau's Operating Table.

Excluding the "stocks" or "trevis," the first apparatus of any practical value for controlling horses for operation was that shown in the accompanying illustrations. It consisted of a large oak table about 8 × 6 feet, the upper part of the front padded with horse-hair and covered with stout leather, the lower portion and the ends perforated with holes for the passage of ropes, the whole pivoted on a horizontal axis, to which was attached a rackwork quadrant. At the back was a stout framework about 2 feet 6 inches in height, with four legs, so arranged that the upright table could fold back upon it, when the whole had somewhat the appearance of an extremely massive and rather low kitchen table. In practice the horse, already provided with a powerful head-

collar, was led up to this arrangement, the strong ropes attached to the head-collar were passed through holes in the table and secured at the back to belaying-pins. At the same time the

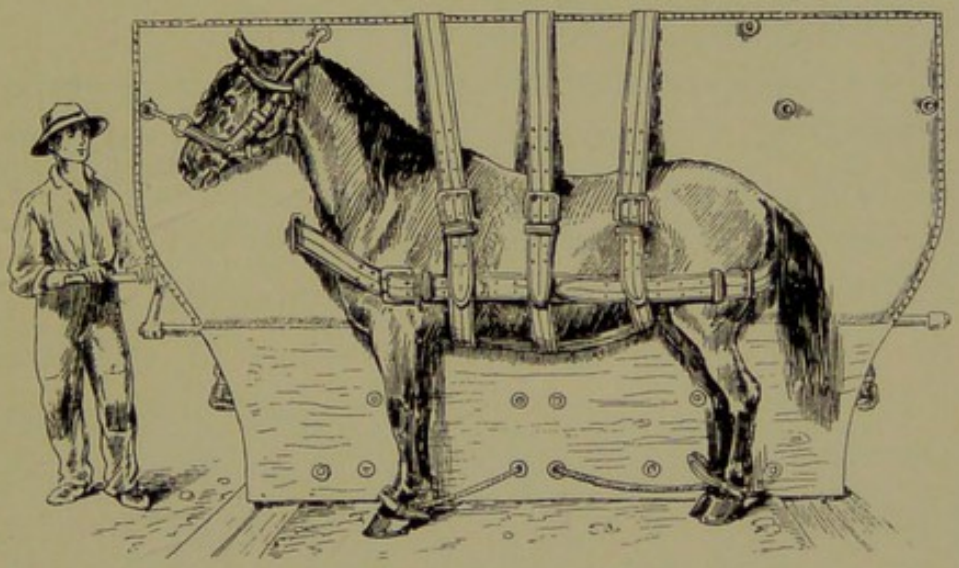

FIG. 1.—Daviau's operating table. Horse secured.

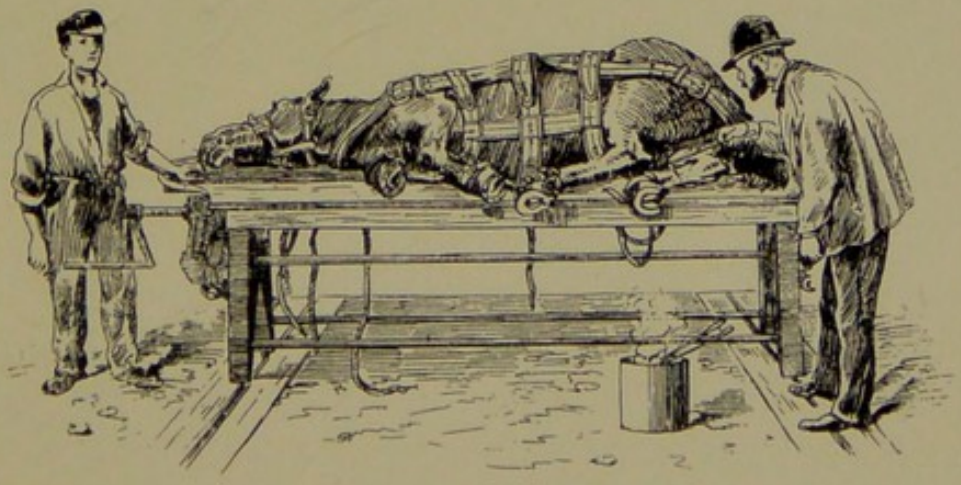

FIG. 2.—Daviau's table. Horse in position for operation.

broad horizontal strap (attached at each end to the table) was brought round the chest and flank, and fastened by drawing the

buckles tight. The vertical straps were secured, the hobbles adjusted on the feet, and the ropes controlling them tightened and fastened to belaying-pins behind the table. Thus secured, the horse and table were turned through the arc of a circle by working the crank handle seen at the left side.

For minor operations this table served a very useful purpose, but a patent defect was the inaccessibility of one side of the horse, and the need, when both sides had to be operated on, of releasing, turning round, and refastening the animal. To this must be added the difficulty of drawing tight the straps, a work depending entirely on the strength of the operator; the trouble in reaching the ropes, which were behind (and at times beneath) the table; the large amount of play allowed to the feet, and the closeness of the head to the fixed part of the table—a serious objection when operating on the middle line of the face. This table is still employed at the great French veterinary school of Alfort, where during the years 1892–3 I had many opportunities of testing its value.

Daviau's Improved Table.

To remedy the most apparent defects the inventor, M. Daviau, afterwards constructed a much larger and more complicated table, on which, by erecting standards in the centre, it was possible to turn the horse over without allowing him to regain his feet; but apart from the risk involved in this act, the cost, size, and weight of the table rendered its use almost impracticable. I have only seen two of these tables, and I fancy very few have ever been built. The first is owned by a French colleague at Chantilly, who some

years ago very obligingly showed it me in action ; the second I saw in Spain at the Royal Veterinary College, Madrid, during April, 1898. It was about to be installed in position.

The German Operating Table.

The next table, of which I am able to give an illustration, is a German invention, and, although very alluring in appearance, would, I fear, prove much less satisfactory in practice than it looks on paper.

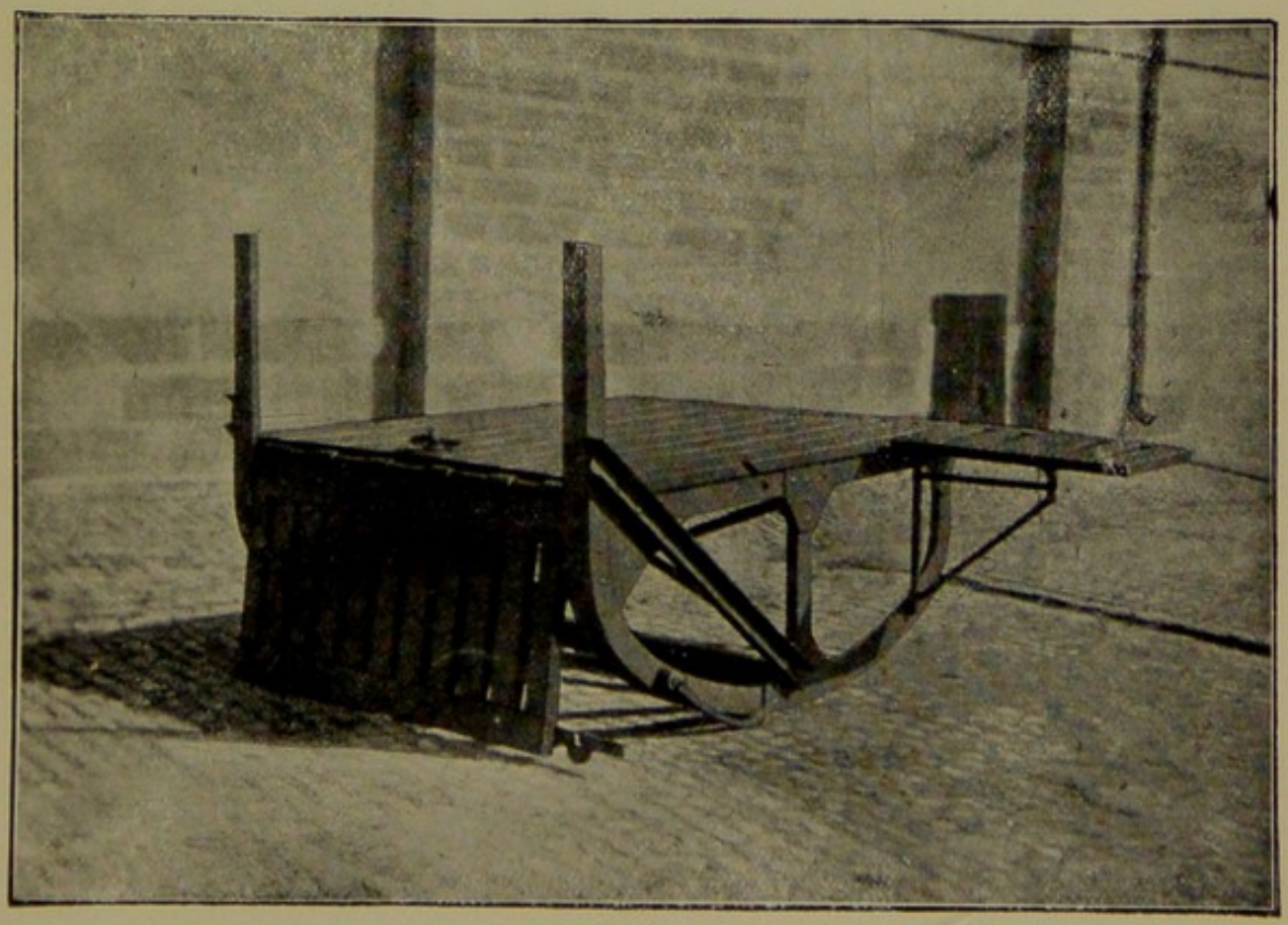

Fig. 3.—The German operating table.

At rest, the table proper, which consists of strong lattice-work, is upright ; the two standards (vertical in the illustration) form feet,

Fig. 4.—The German operating table. Patient in position.

and between them lies the lattice bottom piece, which is then horizontal. The horse is walked on to the bottom piece and

secured to the upright table. In this lies much of the difficulty, for, unless the animal is unable to move to any great extent, the struggling, which always ensues when he feels himself losing his balance, will have disastrous results. Once fixed to the table, the horse can readily be turned over, as the table and horse are, even at first, in a position closely approaching unstable equilibrium. Replacing the horse on his feet is a more difficult operation, and calls for the assistance of several men. Not only has this table all the defects of the Daviau, save, perhaps, a portion of its expense, but the working out of its details is much less perfect. Hitherto it has not come into common use even in Germany.

The New Apparatus (Early Form).

I now come to the early form of the apparatus of which this little book is intended to treat. At the commencement of my work at the French (Alfort) Veterinary College it had only just been installed, having recently been invented by M. Vinsot, an alumnus of Alfort. As will be seen from the illustrations, this early form presented a rather complicated appearance, the portion in which the horse was secured being controlled and supported by an independent upright.

Commencing with Fig. 5, the main portion of the apparatus, which now lies prone, is seen roughly to consist of two rectangular end pieces, connected at the top by a strong steel girder, and at the bottom by a strong iron rod of circular section. These rectangular frames are further connected at 2 feet 6 inches from the ground by two moveable rods, adapted to swing open.

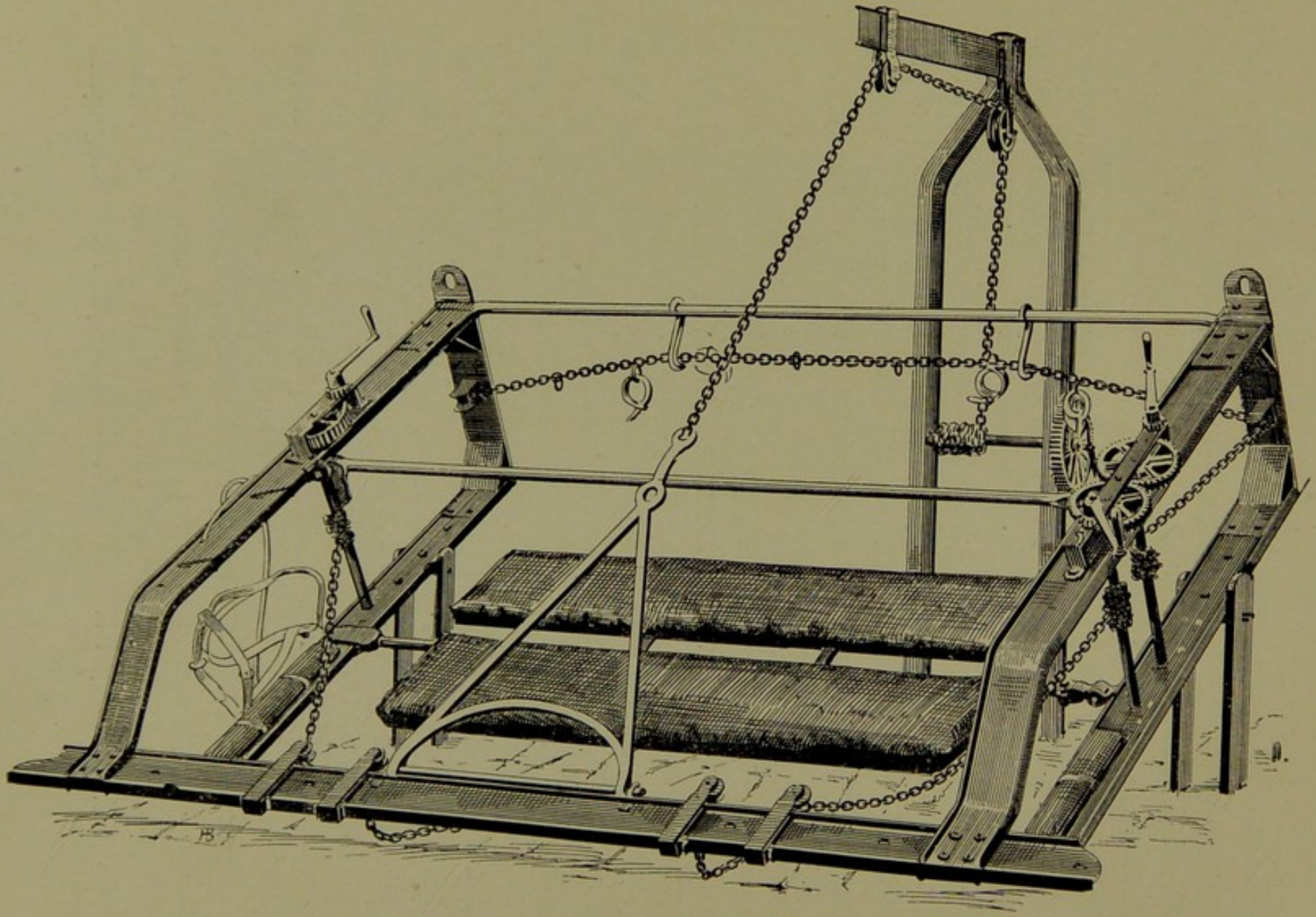

FIG. 5.—Early form of the table used by author. Depressed to show details of working parts.

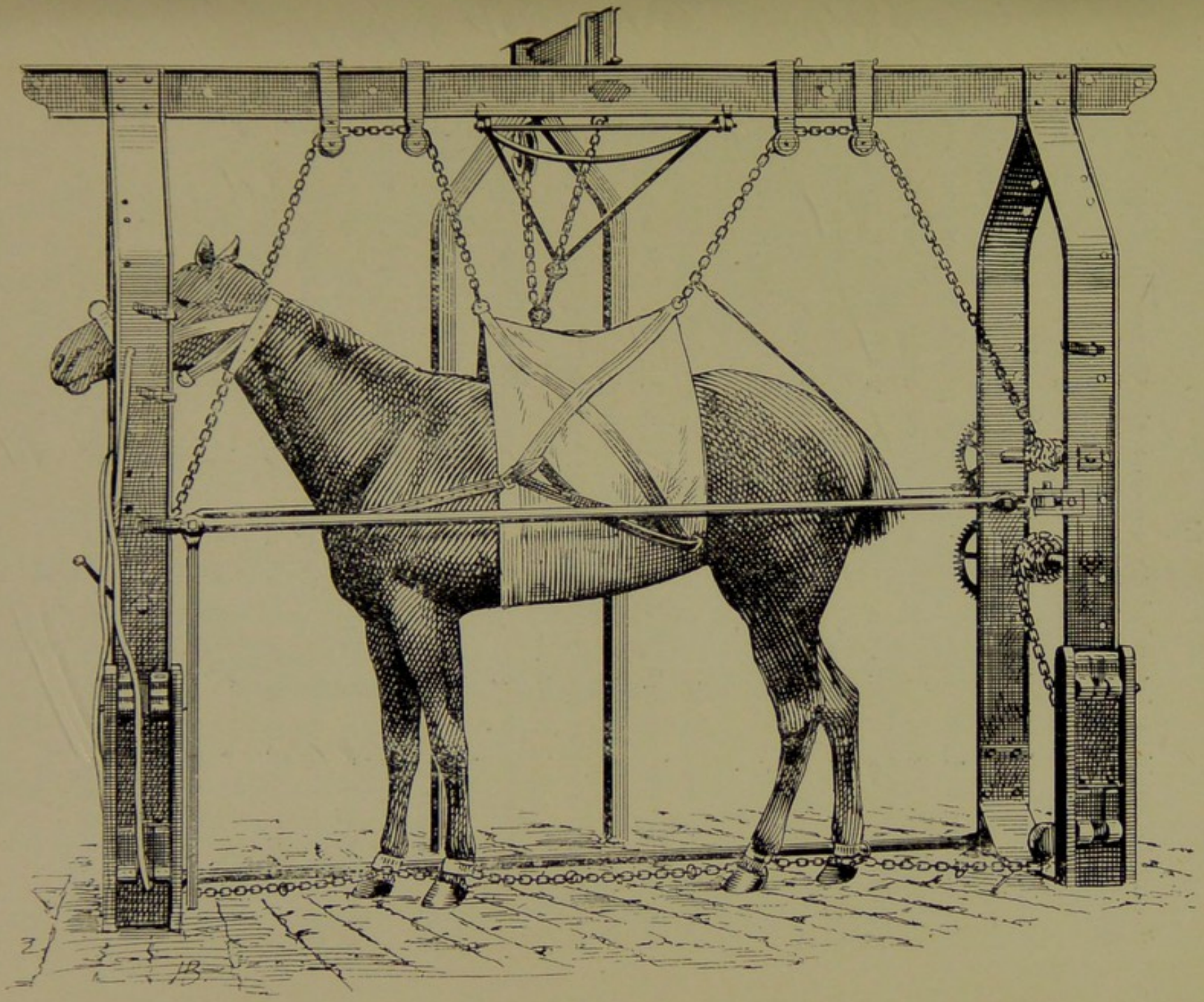

FIG. 6.—Horse in the early form of table. In addition to the table itself, the harness has since been greatly improved as shown in subsequent figures.

A double cushion, intended to support the horse when lying, is capable of attachment to either of these side rods.

The purpose of the various ratchet wheels and chains will be better understood by reference to Fig. 6. Here we see the horse in position for turning over. His head, secured by a strong head-collar and side-ropes, rests within the padded upper portions of the front frame. Under his body passes a strong "bed-piece" reinforced with leather straps, the extremities of which carry iron eyes for the reception of two chains, by tightening which he is lifted almost off his feet just before turning over. In front this "bed-piece" is secured in position by a strap passing round the chest, and behind by a crupper attached to the back chain. The two chains are wound on spindles, turned, through the medium of gearing, by the crank handles shown. The horse's feet are fixed by hobbles to a strong chain running along the whole length of the bottom of the apparatus, and tightened by turning the lower of the two crank handles seen to the right.

The method of introducing and securing the horse continues almost the same, and the latest pattern of this machine will therefore be given at a later stage.

A comparison of this and the succeeding illustration (where the horse is seen turned over) with the later photographs will sufficiently prove how greatly the apparatus is now simplified, and how nearly perfect it has become in every mechanical detail.

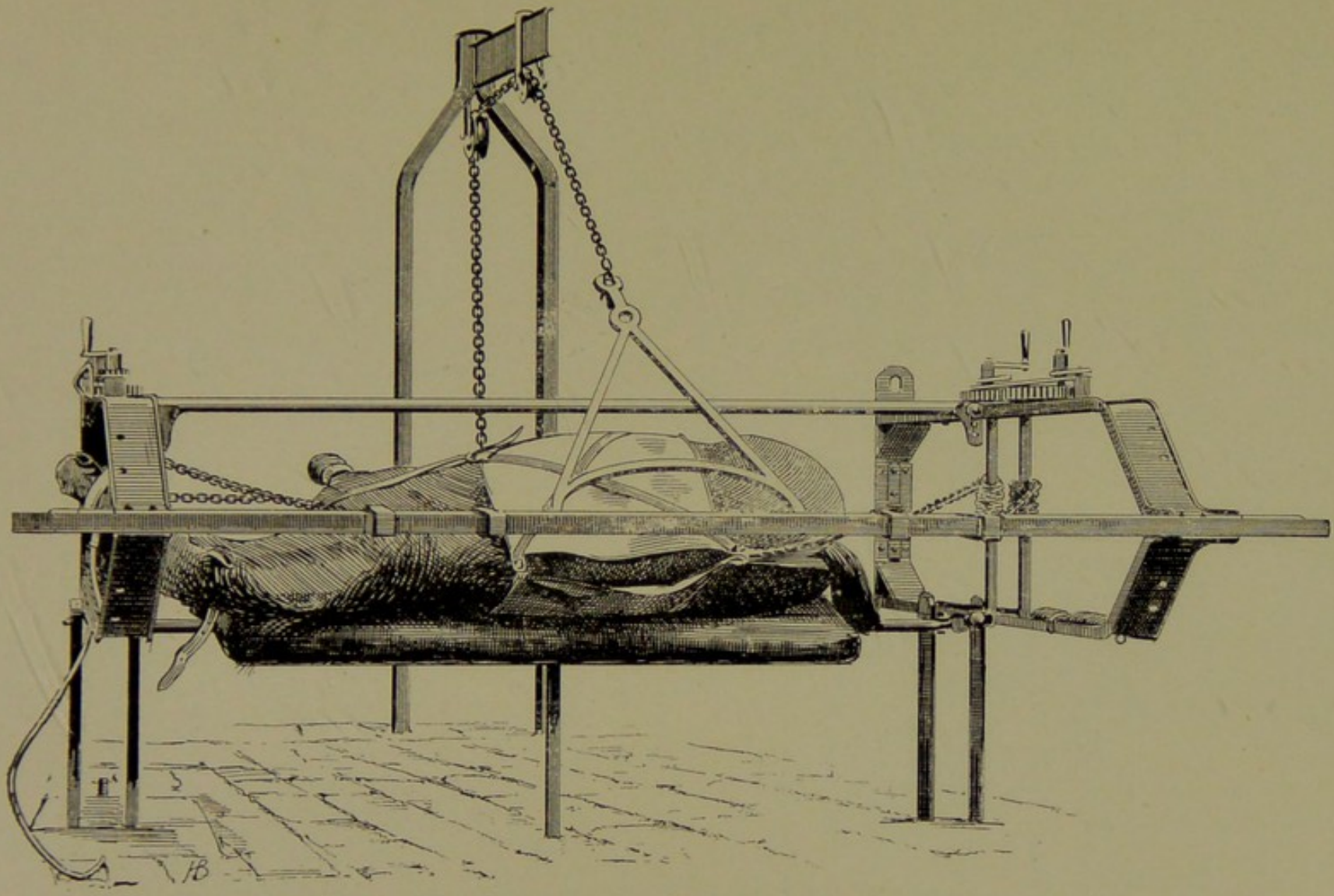

FIG. 7.—Early form of table. Horse in position for operation.

The New Operating Table.

Although in most respects a great advance on any of its predecessors, the original form of the operating machine presented at least one great disadvantage, viz. the difficulty in handling the apparatus when once the horse had been introduced. To turn the animal over demanded that the whole machine be once more set upright, and inclined *de novo*, of course, in the opposite direction. The difficulty of this procedure is manifest, the time occupied was considerable, and the need for an accessory standard rendered the apparatus little, if at all, preferable to Daviau's table.

After long thought and frequent alteration of models it was determined to make the whole machine revolve about a central horizontal axis, a change in design which has now been effected, more than doubling the efficiency of the apparatus.

A glance at the frontispiece and Figs. 13 and 14 will show how great an improvement this has been, and how simple the machine has become. To support the revolving part, which weighs 7 cwt. and is capable of accommodating horses of any size, two strong iron standards 4 feet 6 inches in height, provided with stays of 2-inch iron, are sunk in the earth, where they are surrounded by masses of concrete weighing five tons. This provides a practically immoveable base, on which any accidental shocks can have no effect. Each standard carries at its upper part a carefully turned bearing to receive the axes of the revolving part.

As in the old model, the main body of the machine consists of

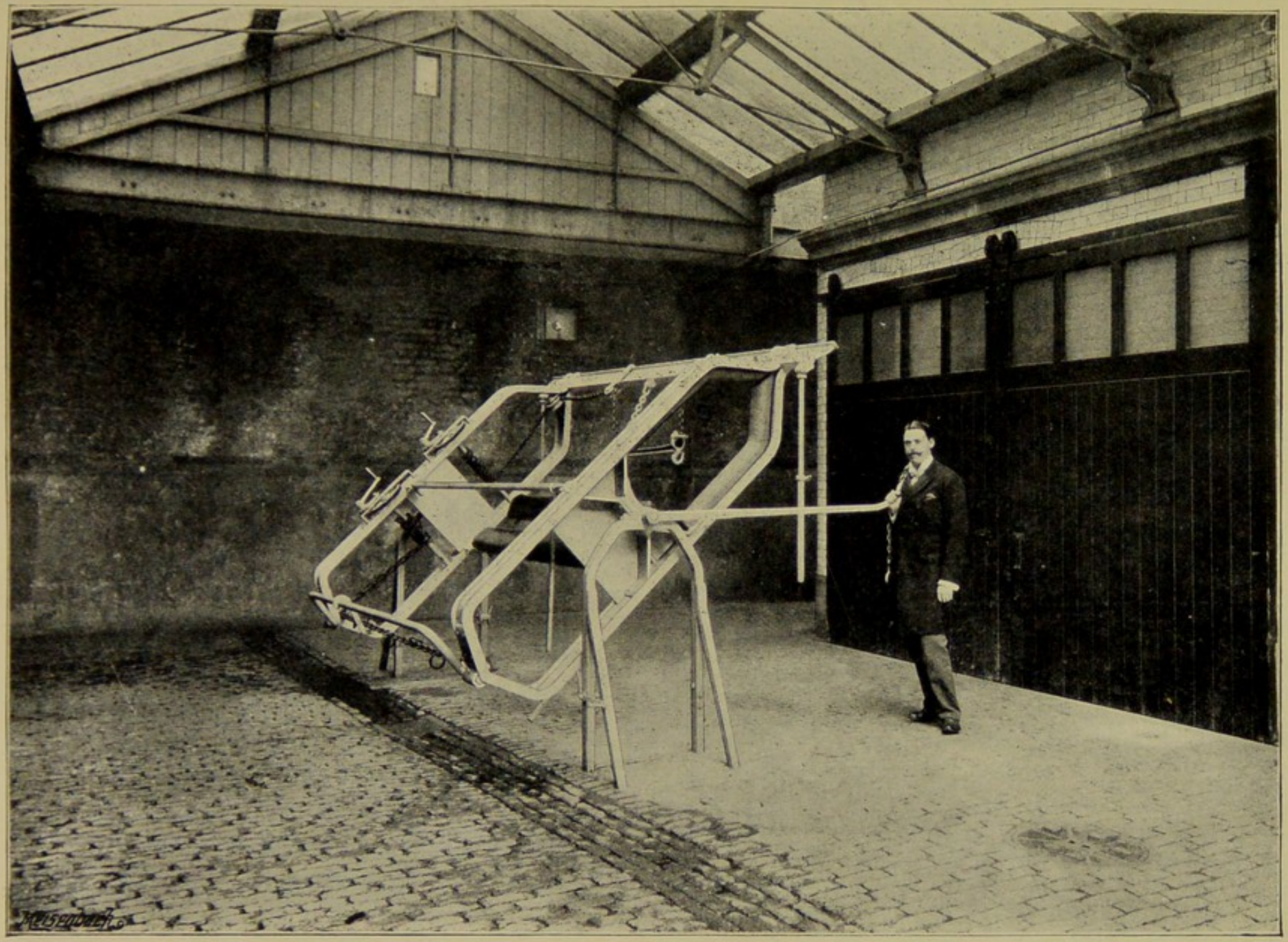

FIG. 8.—Showing method of inclining the table.

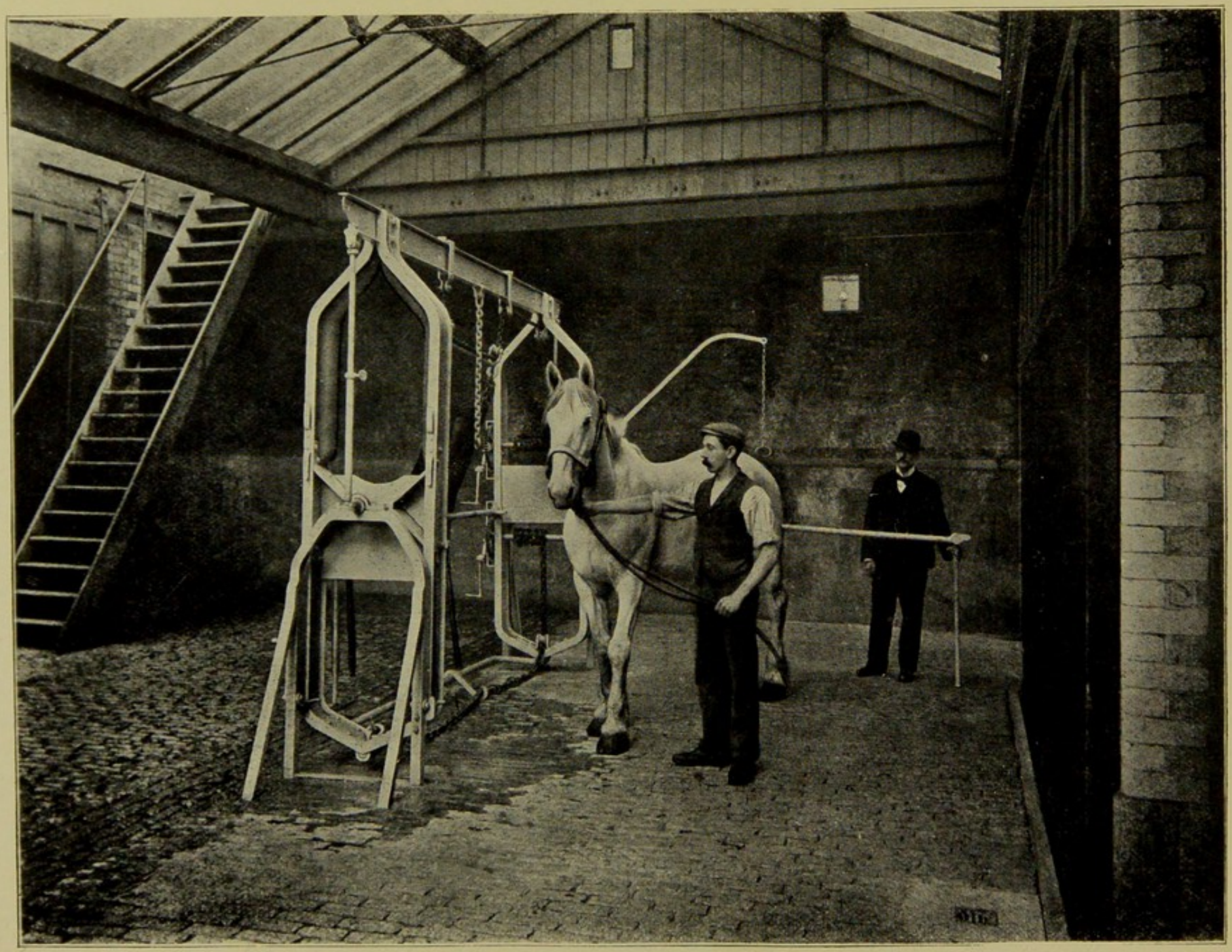

FIG. 9.—The horse entering the operating table.

two powerful end pieces connected at the top by a stout rolled girder. In place, however, of being rectangular these end pieces curve sharply inwards at top and bottom, and carry at their lower extremities a two-inch circular iron rod fastening them together and giving necessary rigidity to the whole machine. About 2 feet 3 inches from the ground the end pieces are again connected by stout iron rods of circular section, arranged to swing open and allow of the horse entering. The forward end piece (right hand of the picture) is padded inside to prevent the horse accidentally injuring his head, and is perforated throughout its upper part with one-inch holes to permit the head collar ropes being passed through and fastened to spring belaying pins seen projecting in front. The back end piece carries crank arms, gear wheels, and spindles by which the chains are drawn tight. It will be noticed that only two crank arms are necessary as compared with three in the older forms, an ingenious compensating chain piece having been introduced enabling one chain to give a perfectly vertical pull at both ends of the "bed," by which the horse is lifted. This compensating arrangement seen hanging from the chain in the middle line of the upper part of the machine indeed does more, for it enables the harness to adapt itself exactly to the animal's form, and in every position gives a vertical pull.

The rods suspended from either end of the upper girder are telescopic, and automatically stop the machine when tilted at whatever point desired by the operator.

The double cushion seen about the centre of the picture is intended to sustain the major part of the animal's weight, and can be fixed at either side. By an ingenious arrangement it locks on the bar, and once fixed it cannot be displaced without

the intervention of the person in charge. To avoid excessive strain on the side bars the cushion is partly slung from the upper girder, so that when the animal is lying flat a portion of the weight is sustained by the girder and only a part by the side bar.

The very strong chain which runs the length of the lower part of the machine is provided with four strong rings for securing the horse's feet. To these are attached independent hobbles, so arranged that any foot may at once be released for operation, and as readily be resecured. For operations like plantar neurectomy the leg may be drawn forward and secured by webbing to the front frame or to the bottom bar. For greater convenience the latter is arranged to rotate around the horizontal axis of the machine, thus permitting a foot or leg to be secured in any position or at any height desired.

Lastly, the revolving portion of the apparatus in which the animal is fixed is secured against premature movement by four "safety chocks" or catches secured to the standard, and locking with the end frames. These catches are seen in the lower part of the picture. The lever arm shown at the back and on the left side of the figure can be affixed to either end of the machine, and gives the operator the necessary purchase for moving the animal when in position.

In Figs. 13, 14, and 15 the machine is seen in profile. The bottom chain, the locking catches, spindles and gearing, spring belaying-pins and standards are there well shown.

The disposition of weight has been so carefully planned that when ready for rotation horse and machine form a mass whose common centre of gravity is within an inch or two of the

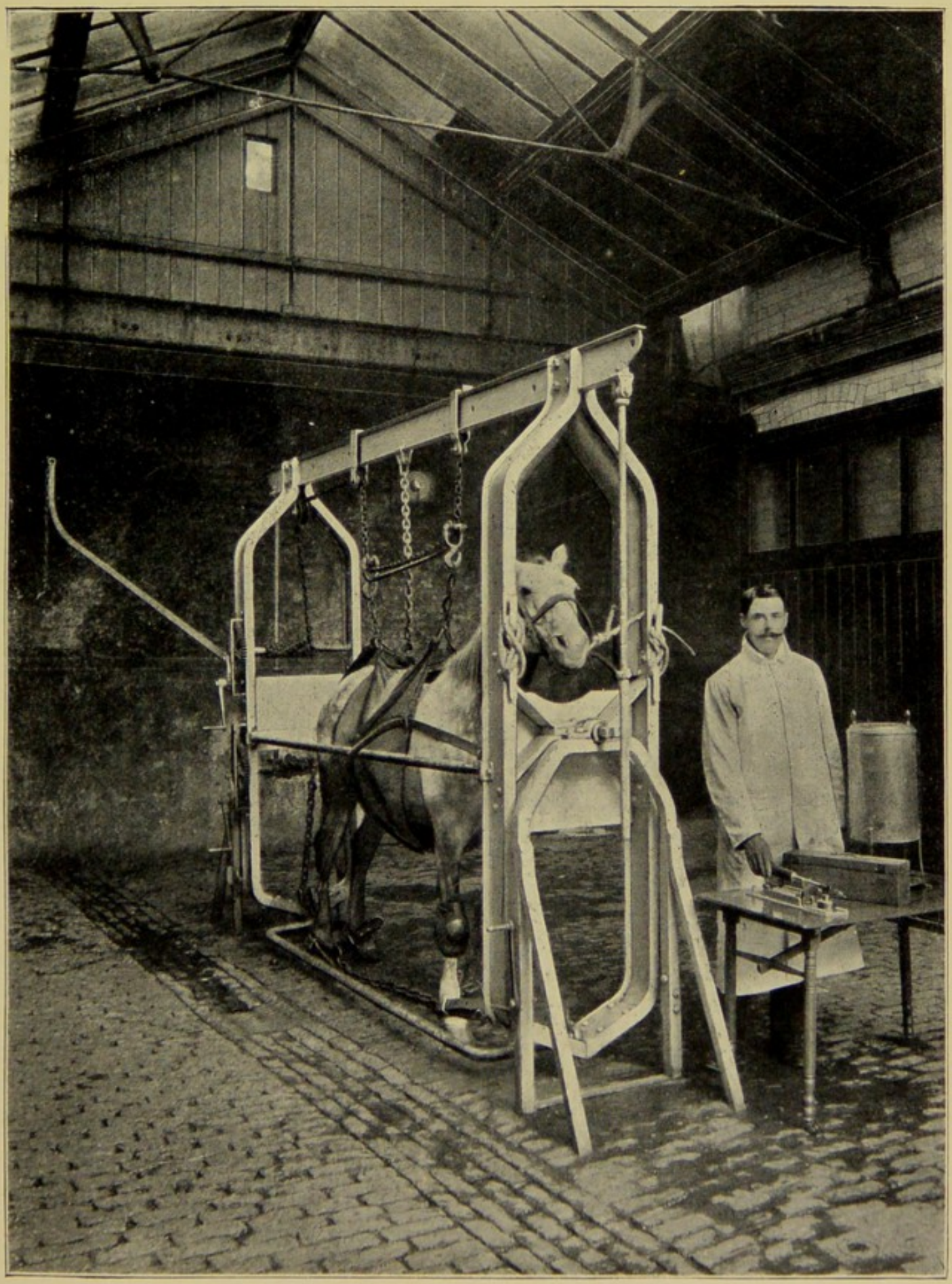

FIG. 10.—The horse secured for operation.

horizontal axis around which the whole moves. Very little exertion is therefore required in handling even a heavy horse, and no undue strain is thrown on the machine, whatever the point at which it may be brought to rest. As shown by Figs. 8 and 11, the machine swings equally freely to the right or left, and is readily controlled by one person.

In these figures the locking catches have been cast off, and the machine is commencing its phase of rotation. The cushions in the end pieces, designed to prevent injury to the horse's head, are very distinctly visible. The telescopic stop rods are seen to be swinging with the machine, and as arranged will check movement when the machine is horizontal. To prove, however, that if necessary a still greater degree of movement is possible, Fig. 14 is given. The machine is now very nearly inverted, the horse's feet are high in the air, his neck and head near the ground. Needless to say, such a position is seldom required, though for such operations as the reduction of herniæ, etc., it might be necessary. From the above description it may be thought the machine is complicated and troublesome to use. Such, however, is not the case, two persons usually being quite sufficient to control and rotate any ordinary horse. The advantage of this is obvious, for I can scarcely be accused of exaggeration in declaring that by any other method four persons at least would be needed.

The Machine in Use.

Coming now to the actual business of operation, the horse is first provided with a strong head collar carrying two stout lines, and the "bed-piece" strapped tightly round his body like a horse-

rug. One of the side rods is swung open, giving admission to the machine, and the horse is walked forward until his head comes within the front frame (Fig. 9). At the same moment the assistant follows up with the side bar, and, as the horse enters, drops the bar in place, where it locks of itself. The groom passes the head collar lines through holes in the front frame, and drawing them tight winds them in a figure of 8 round the spring belaying-pins, while the "bed-piece" is hooked on to the hanging "compensation bar" (Fig. 10). If a comparatively simple operation is to be performed nothing further is needed. A hind foot may be drawn up and fixed for examination or dressing, and the horse be set at liberty again in less than a couple of minutes.

If, however, any serious operation is required four hobbles are affixed to the feet, the winch handles are turned (both together) until the horse's feet begin to leave the ground, when the safety chocks are cast off, permitting the apparatus to revolve, and depositing the horse without shock or pain in a horizontal position (Figs. 11 and 12). Here he rests, extended on cushions, and incapable of any dangerous struggle, his feet being in their normal position, and not "bunched up," as they must necessarily be in hobbles. It is this position, with the feet closely drawn together, which in ordinary "casting" seems specially to favour broken back. The back and loins are bent, and the dorsal muscles are acting to the greatest possible advantage. That broken back is often due to muscular effort is shown by the reported cases where certain vertebræ appear actually to have been *crushed*, a result only explicable on the theory of a longitudinal strain produced by muscular contraction. As stated, the feet are never drawn together in the machine, and so far as my knowledge goes no case

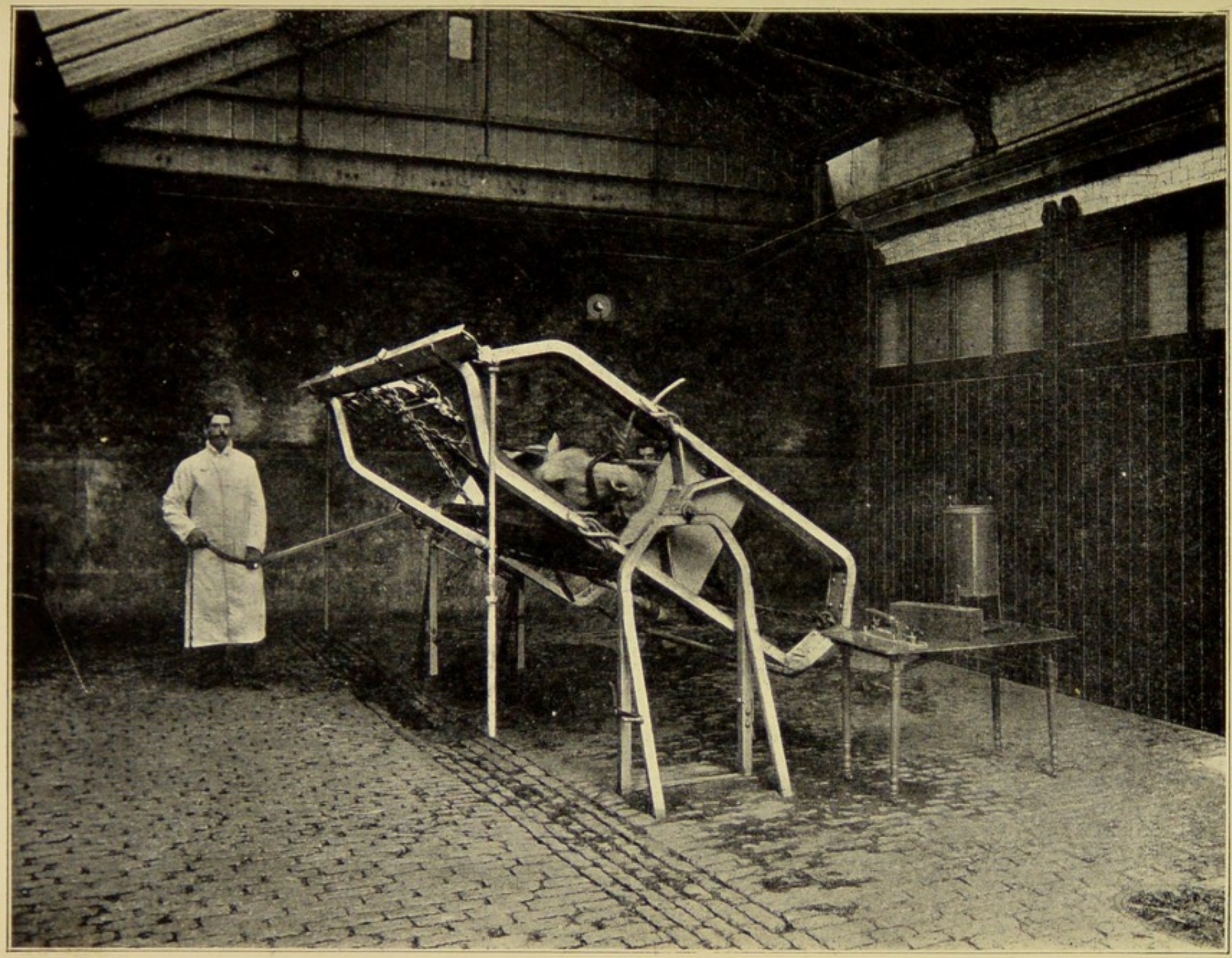

FIG. 11.—Inclining the table; patient turned to the left. Showing the perfect balance of parts; the whole apparatus controlled by operator.

of broken back has ever been recorded in consequence of its use.

In this position all ordinary operations may be performed, either with or without anæsthesia. The use of chloroform, however, becomes so easy, it prevents suffering so completely, and facilitates operation to such a degree, that I do not think professional men would neglect its administration in a case of any magnitude.

In operations involving both sides the animal is swung over with only a very short pause, and the operation completed.

To remove the horse from the machine the above-described process is reversed. Having returned the machine to its normal (upright) position, the operator secures it by throwing into gear the four "safety chocks," lifts the pawls on the winches, allowing the animal to come to his feet, and slackens the foot chain. The hobbles are then removed, the body-piece unhooked, the head collar ropes loosened, and, on the side bar being swung outwards, the horse is at liberty. The procedure is simple, and occupies little time, while risk of the animal injuring itself is reduced to a minimum.

A New Operation for removing Scars from Blemished Knees.

Although in a *brochure* of this kind there is neither space nor reason for dealing at length with the many operations facilitated, or those for the first time rendered possible by the machine described, I may be permitted to refer at some length to an

operation of the highest interest, which, though already attempted in this country, has hitherto always failed.

How often does it not happen that a valuable horse, irreproachable in other respects and a great favourite of its owner, has to be discarded and sold for a trifle on account of an accident resulting in "broken knees"? The character of the injury generally prevents the resulting scar being linear; as a rule the wound is broad, contused, and indefinite. It has no geometrical shape, its edges are prone to slough, and however careful the treatment the resulting cicatrix is irregularly circular or oval, devoid of hair, and painfully conspicuous to the most careless observer. The attempts subsequently made to induce a growth of hair on the scar must necessarily fail, inasmuch as the hair-follicles are destroyed, and after trying in succession all the resources of the veterinary pharmacopœia, and often in addition those of the too plausible quack, the owner is forced to acknowledge that the horse is permanently blemished, and for its original purpose worthless.

An experience of such cases induced Mr. Cherry, seventy years ago, to attempt surgical interference. He excised the scar, but owing to lack of surgical appliances and a knowledge of antiseptics, failed to obtain satisfactory union of the new wound. He discarded the operation. Ten years ago Mr. Hunting revived it. A disciple of Gamgee, he has often rendered veterinary surgery valuable service by his originality and readiness to attack new problems. Unfortunately, as he himself states, he "had not much success," and does not appear to have repeated the operation. In 1892 I described Mr. Hunting's procedure to Professor Cadiot, of the École Vétérinaire d'Alfort, and furnished him with

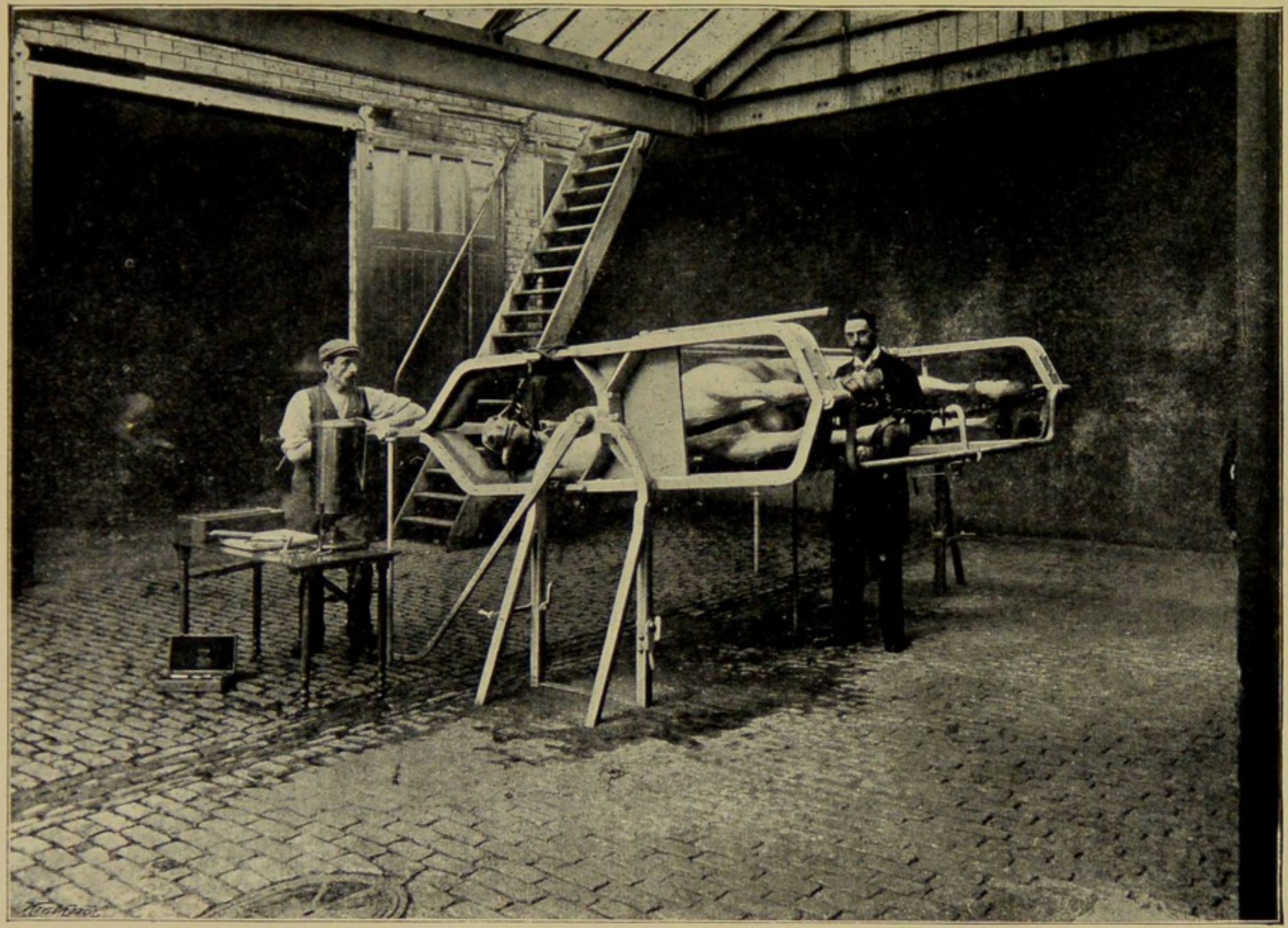

FIG. 12.—In position for operating; patient turned to the left. Showing the free accessibility of all parts.

a number of the magazine in which details are given. He, it appears, induced Monsieur Vinsot to study the matter, with the result that the latter has carefully worked out the details, and with the aid of the machine just described has rendered it a brilliant success. The matter was of such interest that two years ago I undertook a special visit to Chartres to study the operation, and to fully acquaint myself with the details of procedure.

The object of the operation is to permanently remove the scar left by accident, substituting at first a mere linear cicatrix, which, once covered by hair, is almost imperceptible, even to the trained senses of an expert.

To render operation successful the strictest asepsis or, failing this, antisepsis is necessary, and for a considerable time the personal attention of the operator is indispensable. To facilitate operation and ensure uninterrupted recovery a series of novel and ingenious appliances have been produced, due reference to which will later be made.

The new operating machine forms one of the most important of these ; without it, in fact, success is always doubtful and generally unattainable. Not only is it necessary during operation, but on account of the dressing and bandage afterwards applied fixing the knee in position, there would, in the ordinary way, be great difficulty in replacing the animal on its legs. Finally, the use of the new machine greatly facilitates the use of antiseptic precautions, and entirely avoids the need for a straw bed, a fruitful source of infection in surgical operations on the horse.

The instruments and materials required are—clipping machine, razor, scalpels, artery forceps, lion forceps, suture needles, "silk-worm-gut" ligature, carbolic gauze sponges, iodoform gauze, pieces

of freshly boiled linen, absorbent wadding, tarlatan bandages, cotton bandages, plaster bandages, nail brush, soap, boiled water and several vessels for holding it, 2½ per cent. carbolic solution, 1 per cent. permanganate solution, 12½ per cent. bisulphite of soda solution, sulphuric ether. All dressing materials must previously have been sterilised. A convenient form of steriliser is the tall copper cylinder shown in Figs. 10 *et seq* It consists of an outer and an inner vessel, in the latter of which the dressings are placed. After sterilisation the bandages, absorbent wool, etc., may be kept for some days without danger.

All the instruments should be of metal and have metal handles. They should be boiled for at least twenty minutes, and be placed in sterilised, shallow, enamelled iron trays containing a little boiled carbolic solution.

The operation is divided into four stages :

1. Control of the animal and aseptic precautions.
2. Excision of the scar.
3. Suturing the operative wound.
4. Adjustment of the antiseptic dressing and splint.

1. A dressing saturated with 5 per cent. carbolic solution is applied to the seat of operation overnight. Next morning the animal is placed in the operating machine as before described, and brought under the influence of an anæsthetic ; chloroform is usually employed. Having been rotated until horizontal, the limb intended for operation is freed, drawn forwards as far as possible, and fixed to the lower bar of the machine by means of broad strips of webbing. To ensure the limb being fully extended another strip of webbing is passed round the forearm and drawn forcibly backwards ; the knee is thus fully extended. It will be

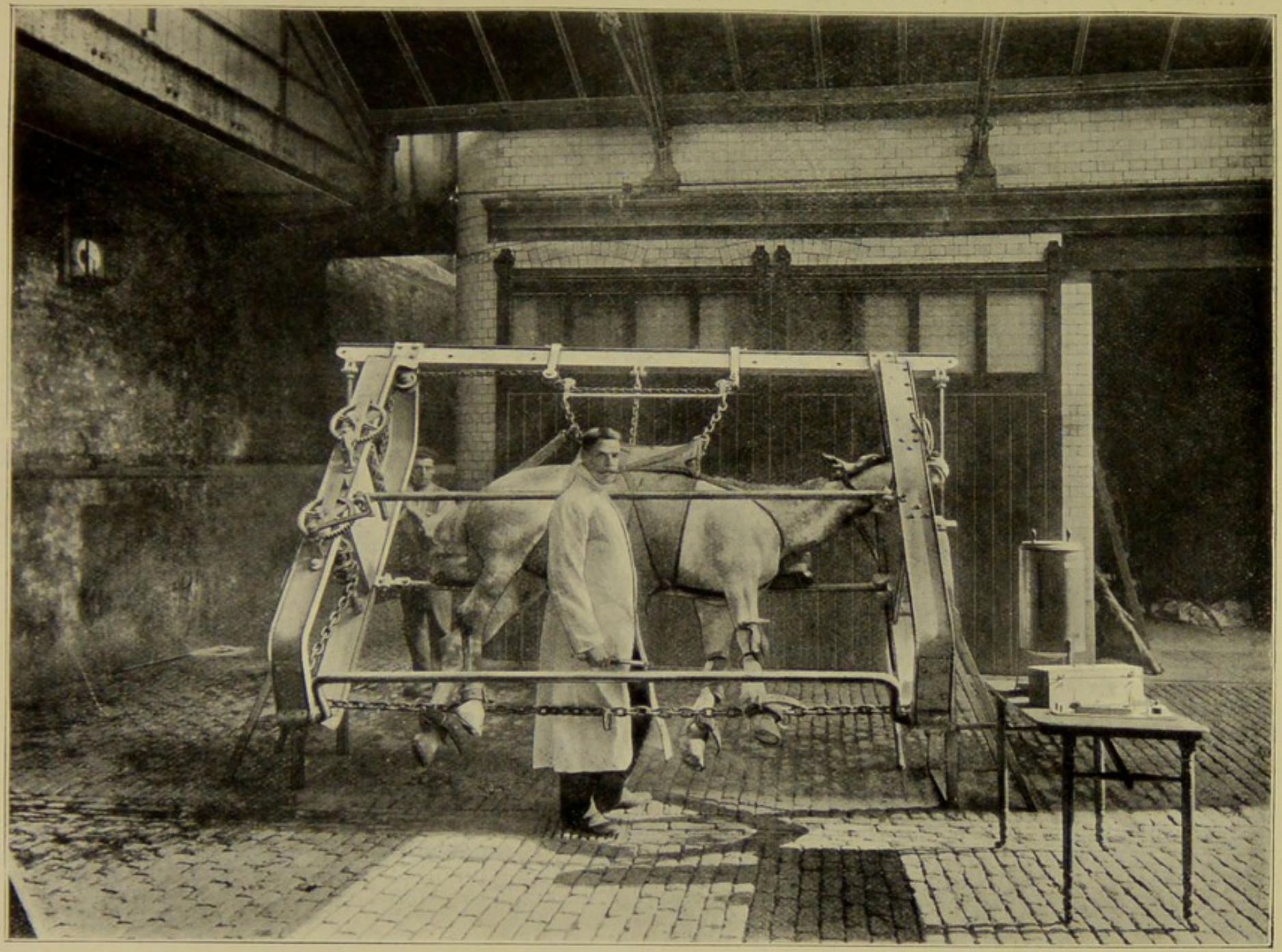

FIG. 13.—The table inclined to the right. A convenient position for operations about the lower parts of neck and shoulder.

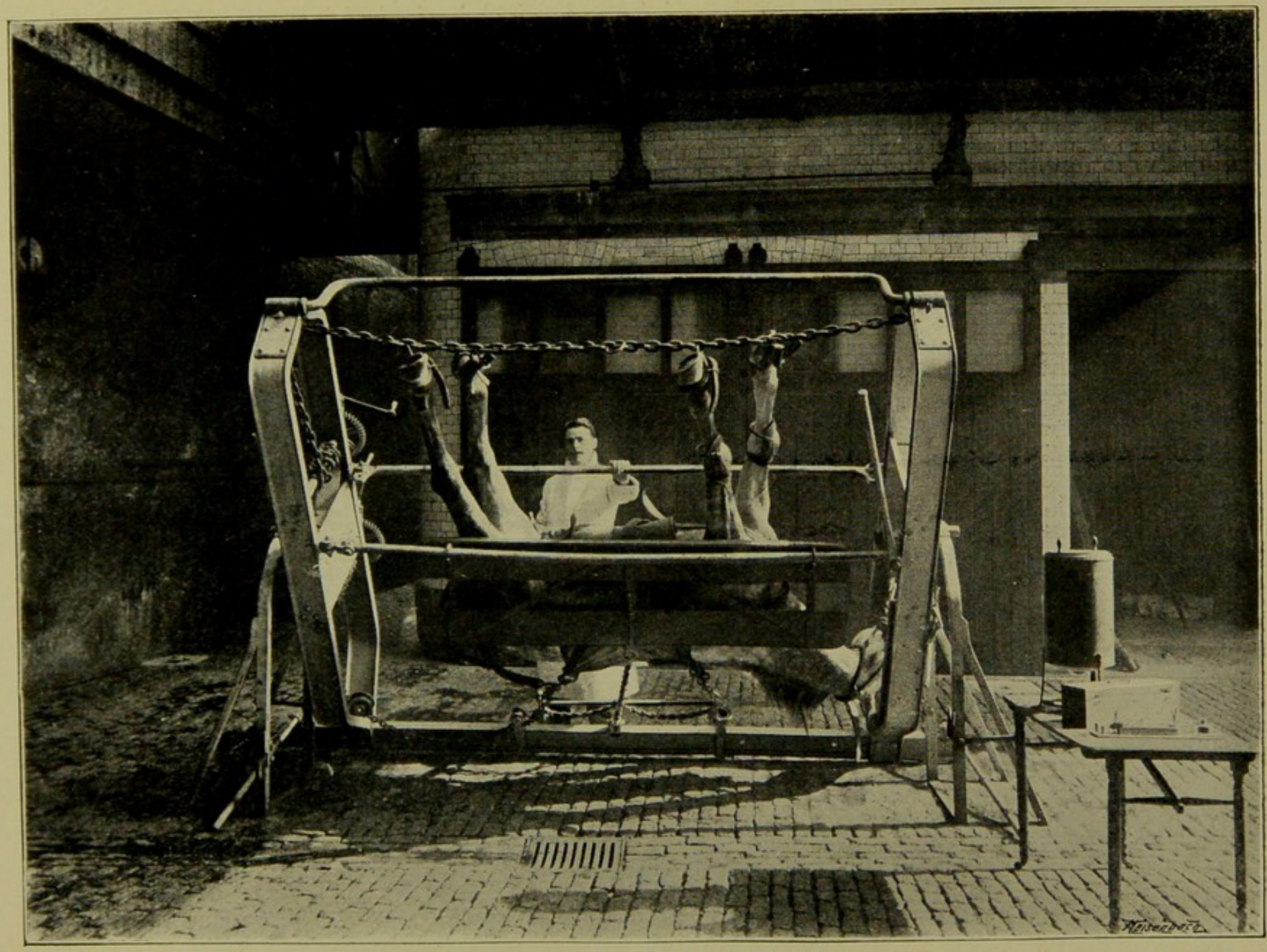

FIG. 14.—Horse on its back. This position is seldom necessary, but is shown to demonstrate the range of movement available.

found of service to apply an Esmarch bandage above the knee, with the object of controlling bleeding at a later stage.

The limb, if not previously clipped, is divested of all long hair, using the clipping machine. The seat of operation and a liberal space on either side (about twelve inches above and below the scar) are then wetted with warm water, rubbed with soap, and briskly cleansed with the brush. Following on this the parts are shaved, a lozenge-shaped area corresponding to the part to be excised being left, however, so as to guide the operator at a later stage. To ensure this area being of the correct shape a special spring calliper is used. The lather is washed away and the parts rinsed carefully with permanganate of potash solution, followed by bisulphite of soda solution, which removes the discoloration caused by the permanganate. (A variation of this method may be made by substituting for the permanganate and bisulphite solutions, boiled water, tinged a deep sherry colour by the addition of iodine tincture.) Finally the parts are washed with ether to remove fatty substances from the skin, and immediately covered with pieces of linen removed from boiling water, so as to ensure their being aseptic.

In the meantime the operator and his assistant have thoroughly cleansed their hands, arms, and finger-nails in a similar way, and with similar solutions. The operation, properly so called, then begins.

2. The importance of the unshaven area now becomes apparent. Having been traced around the edges of a special spring calliper, the shape of which always remains symmetrical, though its sides can be made to recede from one another, the unshaven area is necessarily itself symmetrical, so that when brought

together in the subsequent operation of suturing the edges of the wound exactly coincide, forming a straight line. It has further been found advantageous to trace this area, not in a line with the long axis of the limb, nor at right angles, but inclined obliquely to it. The final linear cicatrix is then extremely difficult to discover. In this way it is possible to remove scars as large as a five-shilling piece, leaving a very trifling cicatrix. Scars of a larger size may be greatly diminished, though not entirely removed.

The operator, armed with a sharp scalpel, held after the manner of a pen, next proceeds to make the first incision. If possible this should be effected without stoppage, as it is extremely important to produce clean-cut edges ; the scalpel should penetrate the entire thickness of the scar, stopping just short of the synovial sacs. The second incision, completely delimiting the tissue to be removed, is made in a similar manner. Grasping the upper edge of the partially detached fragment of skin, etc., by means of forceps, the operator carefully dissects it away from the underlying tissues, removing at the same time as much of the thickened (cicatricial) material as possible, but taking great care not to open the synovial sacs. This operation finished, the remaining fibrous tissue must be removed, so as to leave the base of the wound perfectly level, and any trifling hæmorrhage checked by picking up and ligaturing bleeding vessels. If the piece of tissue thus removed is so broad as to render it difficult to bring together the edges of the wound, the skin may be dissected from subjacent tissues over the entire front of the knee. It will then glide easily, and offer much less resistance to the coaptation of the wound edges.

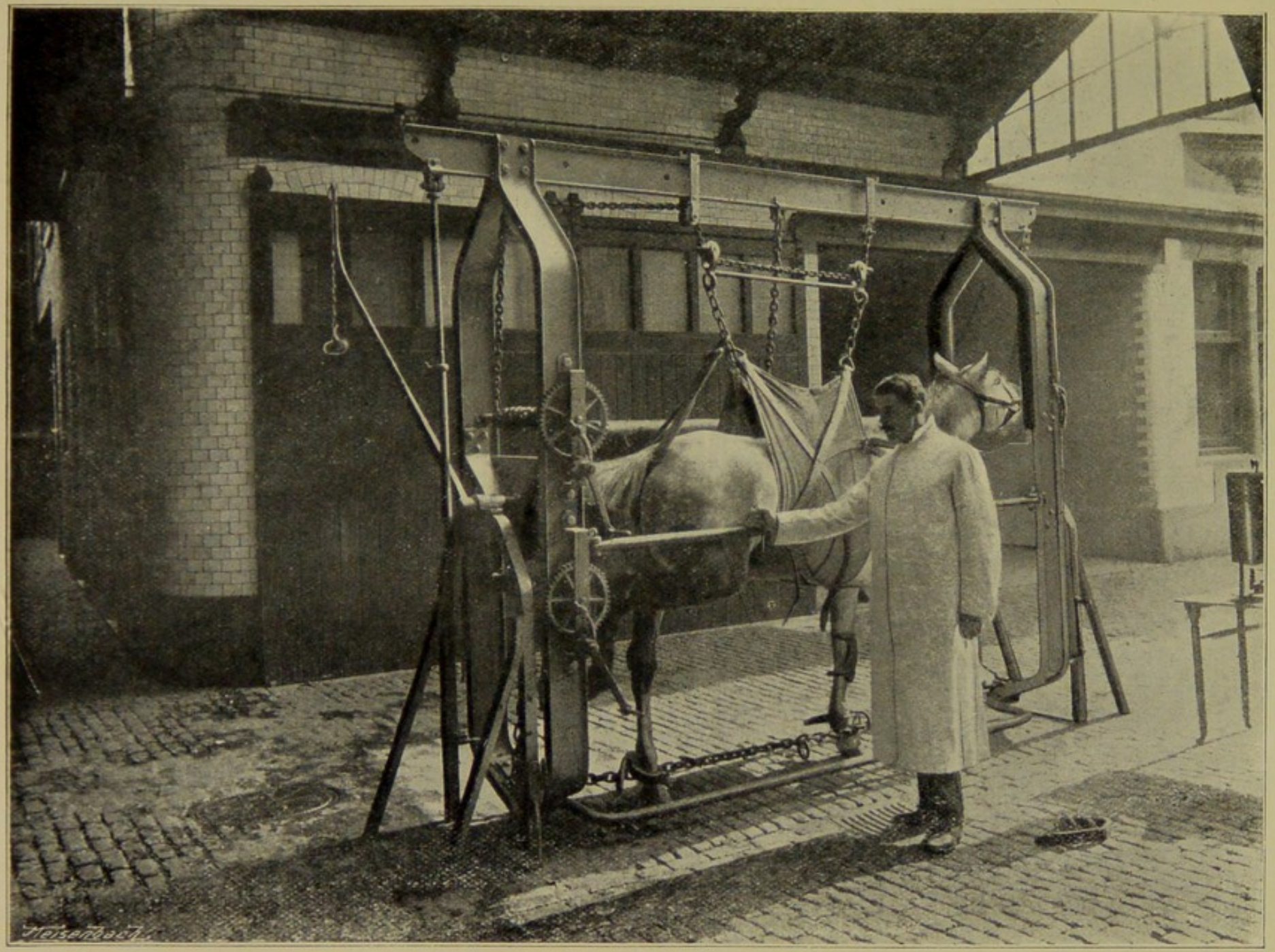

FIG. 15.—Horse fixed; a hind leg lifted and drawn backwards for operation. A convenient position for dressing the sole, shoeing, etc.

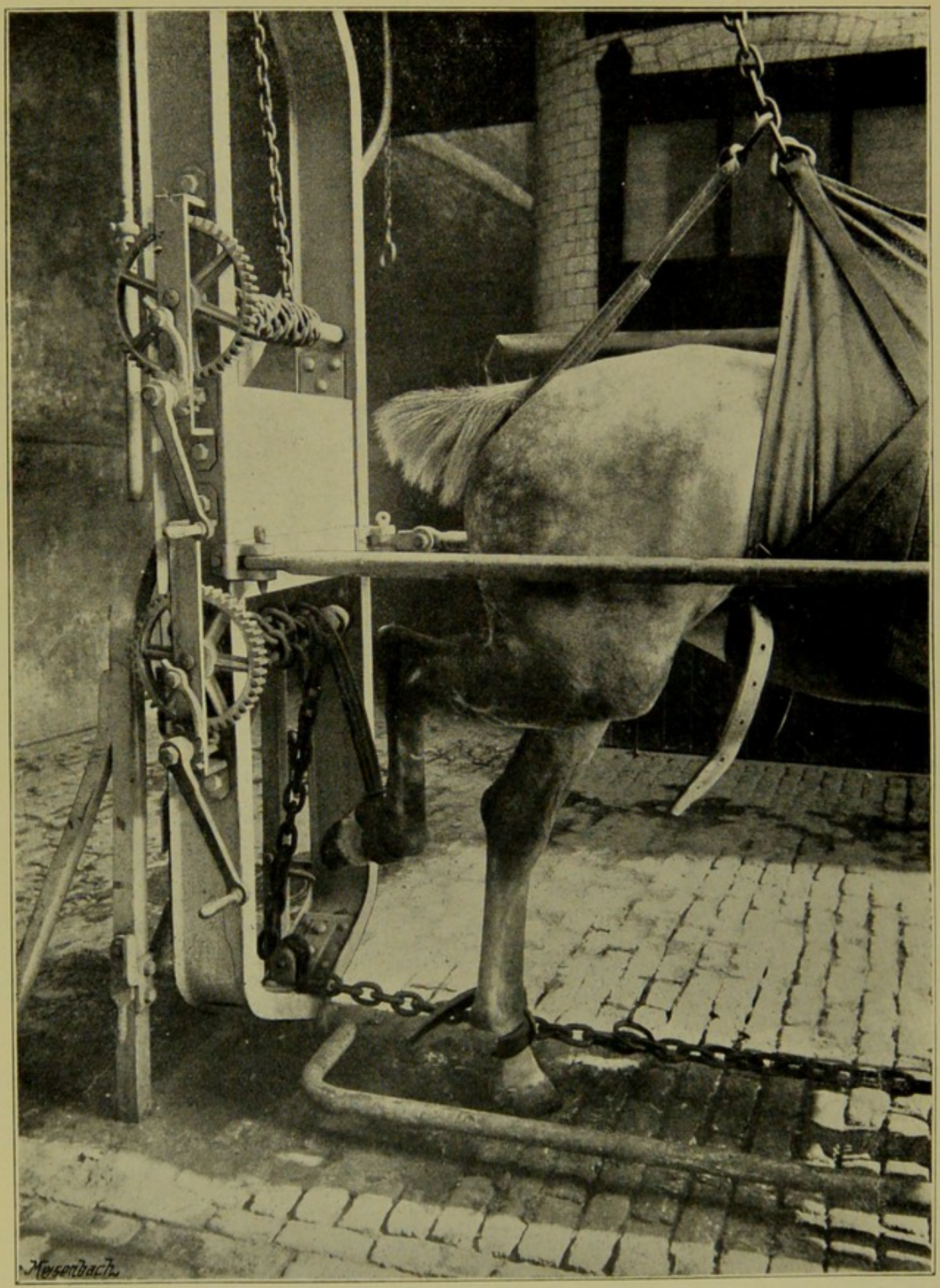

FIG. 16.—Showing details of apparatus for lifting hind feet. If required the foot may be drawn much further backwards.

3. When bleeding has ceased the surface of the wound is carefully dried with pledgets of aseptic or carbolised gauze, care being taken to avoid the formation of blood-clots, which check healing. In a few minutes the wound is dry, and the edges can be brought together with interrupted sutures of silkworm gut, each inserted about $\frac{1}{4}$ inch from the line of incision, and about $\frac{3}{8}$ inch from its neighbour. It is better to commence at, say, the upper extremity of the wound, and proceed downwards, rather than to commence at the centre or at an intermediate point. The surgical knot should be employed, *i. e.* the free end of the silk should be twisted twice round the attached portion instead of once as in making an ordinary knot, in order to avoid loosening. Silkworm gut is by far the best material to employ ; it is solid, aseptic, non-porous, does not irritate the tissues, and is readily removed at a later stage.

4. The wound being perfectly closed is powdered with iodoform, carefully covered with iodoform gauze, and afterwards with a large pad of surgical cotton wool. This dressing is retained in position by tarlatan bandages, previously boiled. The slightly moist tarlatan readily adapts itself to the form of the limb, and is preferable to any other material. Bandaging should commence low down on the cannon-bone, and be gradually continued upwards over the knee.

It being absolutely essential to prevent all movement in the limb after operation, some form of splint is necessary. Plaster bandages have been tried with good effect, but a much simpler and more effective apparatus consists of a " legging " of very stout leather, reinforced by ribs of spring steel, and capable of being tightened by straps. This serves all the purposes of a plaster

bandage, is slightly flexible, will not crack, and is less likely to injure the skin. Moreover it permits of the occasional inspection of the dressing, should this become necessary—a procedure which, in the case of the plaster bandage, calls for the total destruction of the bandage itself. The legging extends from just above the fetlock to 8 inches, more or less, above the knee.

All going well, the "legging" and dressings are removed about the twelfth day after operation, when, if all details of the operation have been thoroughly carried out, the operative wound is found cicatrised without the most trifling formation of pus. The threads may then be cut with scissors and removed with aseptic forceps. A light bandage of iodoform gauze, retained in place by tarlatan bandages, is applied for another week to permit healing of the orifices left by the sutures, after which time the animal may be exercised in hand or put to light work. Slight swelling over the seat of operation occasionally persists for a week or two, but soon disappears, the hair grows again, and, instead of a large conspicuous blemish, an almost imperceptible linear cicatrix remains. This is soon covered by the growth of hair, and nothing can be distinguished except by the closest examination.

In the performance of this operation observance of the following precautions is essential :

Complete asepsis of the operator's hands, of the region of operation, of all instruments, and of all dressings.

Sufficiently extensive dissection of the skin adjacent to the wound to permit of perfect apposition of the lips of the wound.

Care in inserting sutures at equal distances apart, and in

drawing the sutures sufficiently tight to secure perfect coaptation of the lips of the wound.

Thorough drying of the seat of operation and removal of all blood-clots, so as to avoid moistening the dressings.

The free use of padding over bony prominences of the knee, without which rubbing is certain to occur.

Non-removal or disturbance of dressings before the twelfth day, or of sutures before the sixteenth or seventeenth.

Painful swelling of the limb, or discharge or smell from the dressing during the progress of treatment, points to suppuration. In such case the dressing must be removed, the parts irrigated thoroughly with some antiseptic solution, and the dressing renewed. Where local suppuration occurs around one or two sutures, it is sometimes sufficient to touch these lightly with nitrate of silver.

Though originally proposed more than half a century ago, the above operation has only become practicable within the past five years. The advances of antiseptic surgery and the invention of the new operating machine have placed in the hands of veterinary surgeons a means of overcoming obstacles hitherto regarded as insuperable. Between these two factors, however, an important difference exists, inasmuch as while we all recognise with a fair degree of precision the requirements and capabilities of antiseptic surgery, it is at present impossible to accurately forecast the benefits to be obtained from a new means of controlling animals during operation. In important operations the disadvantages inherent to the old method not infrequently form a fatal bar to success, or even to experiment. While fully recognising, there-

fore, the immense importance and possibilities of antiseptic surgery, I venture to predict for it an extended scope and greatly increased success in veterinary operations, since its application has been so greatly facilitated by the invention of this operating table.

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