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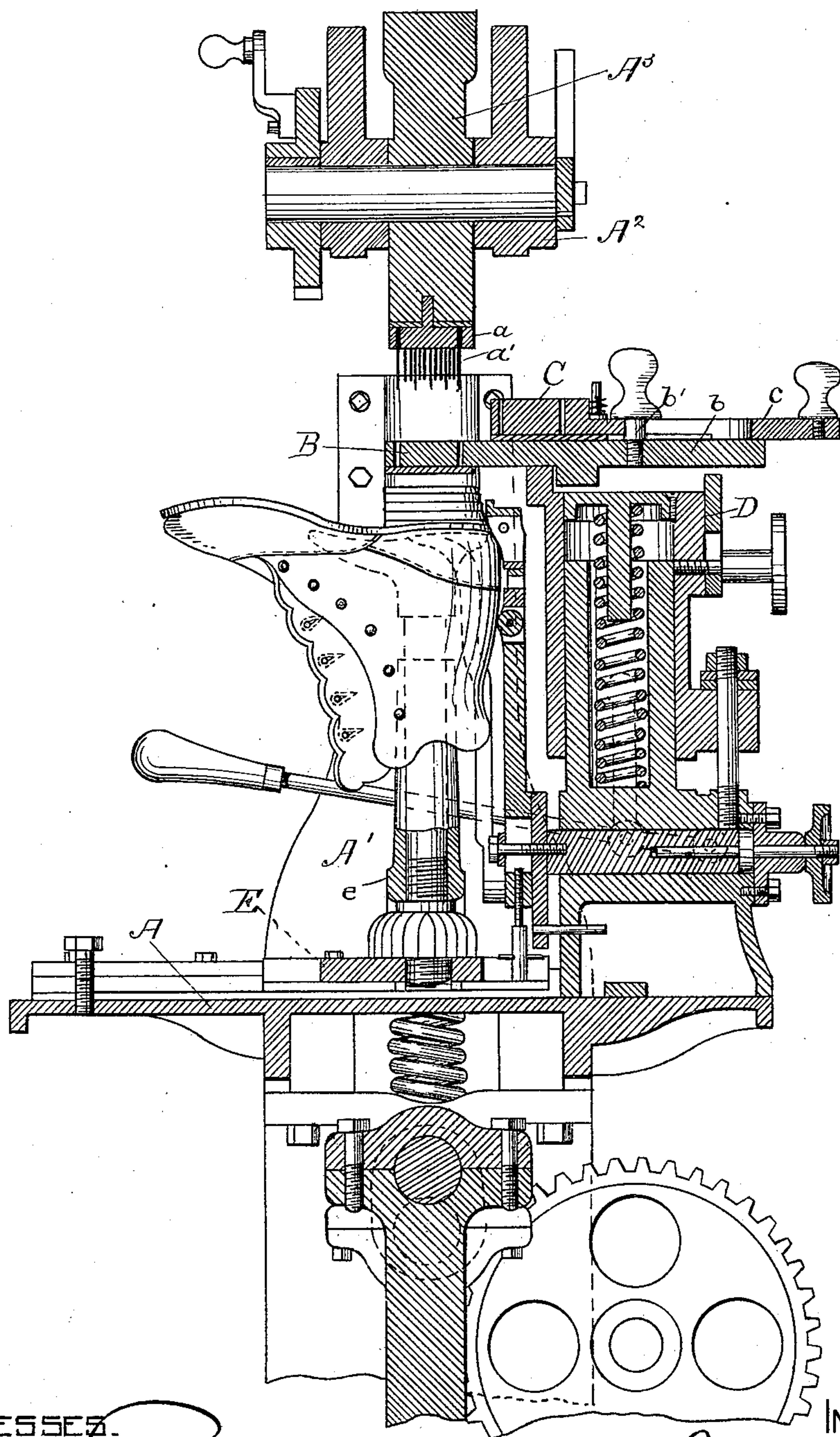
6 Sheets—Sheet 1.

J. B. GARDNER.

HEEL NAILING MACHINE AND METHOD OF ATTACHING HEELS.

No. 354,125.

Patented Dec. 14, 1886.



WITNESSES.

W. V. Raymond
Fred. B. Holan

FIG. 1.

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(No Model.)

6 Sheets—Sheet 2.

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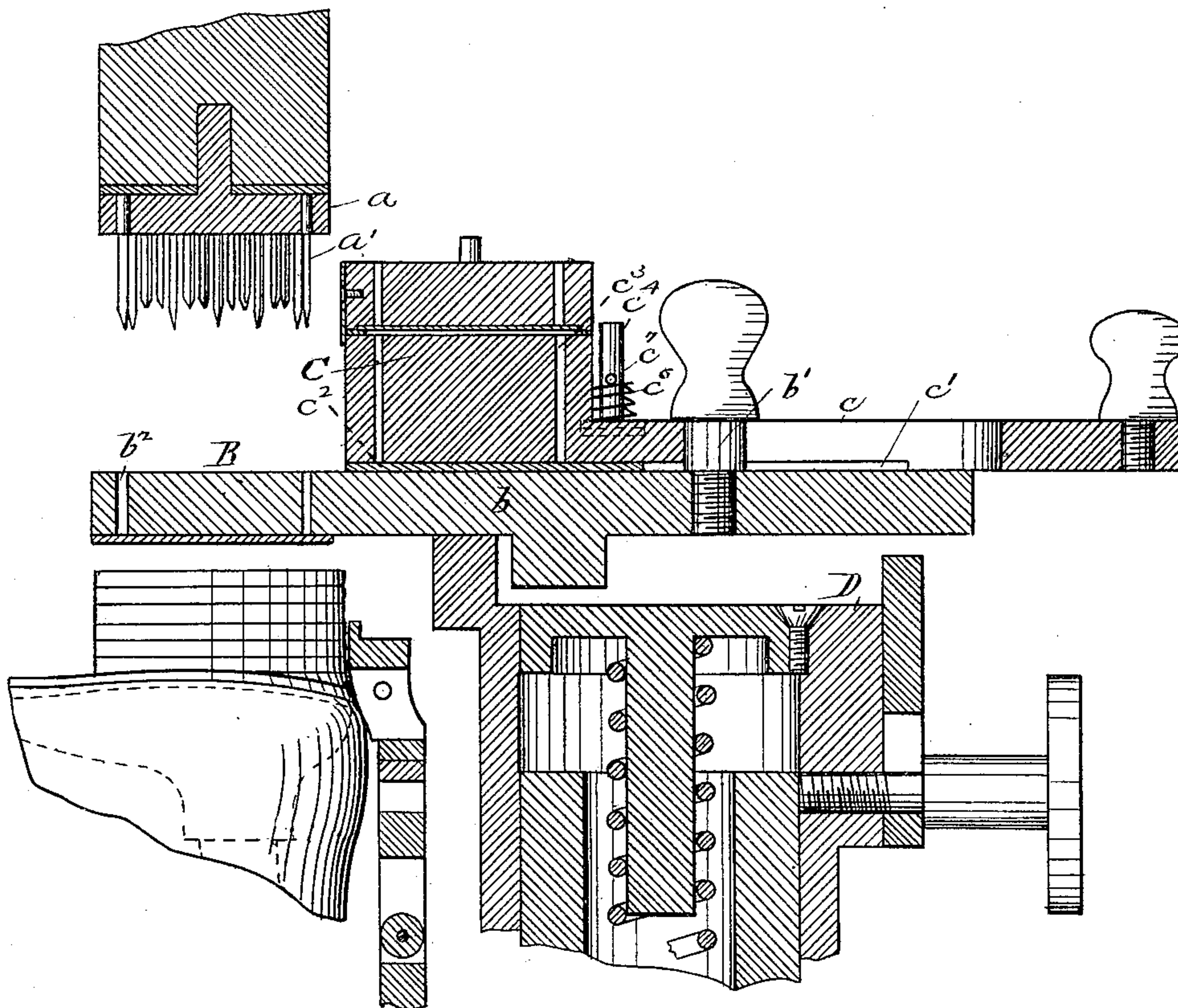


Fig. 2.

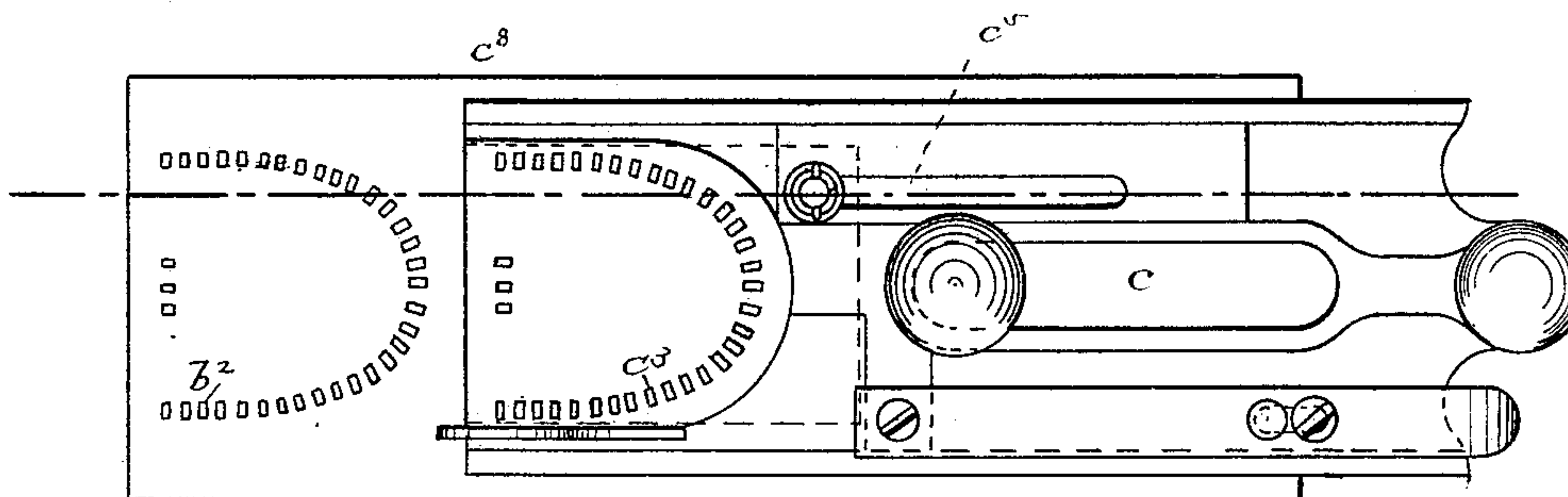


Fig. 5.

WITNESSES

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(No Model.)

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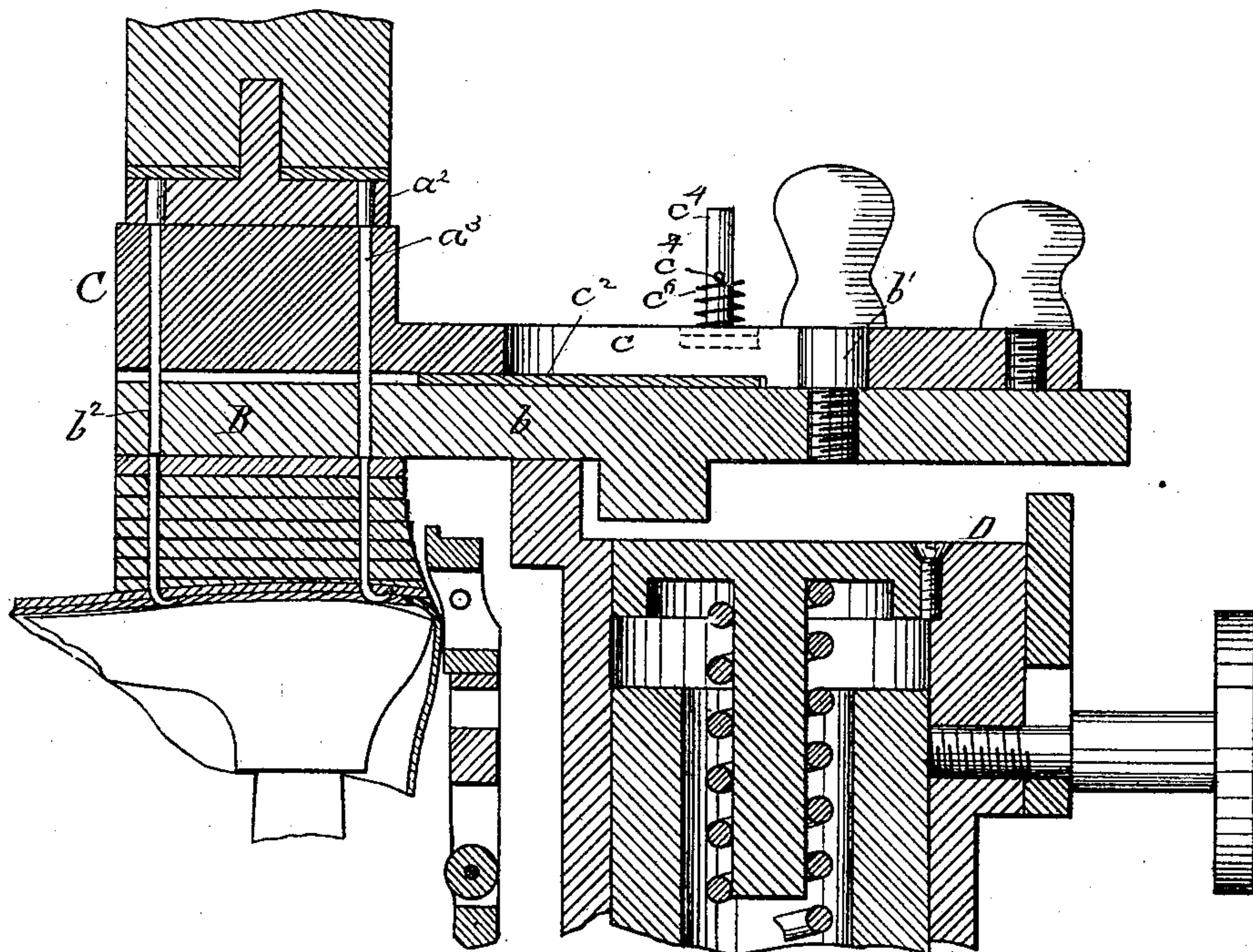
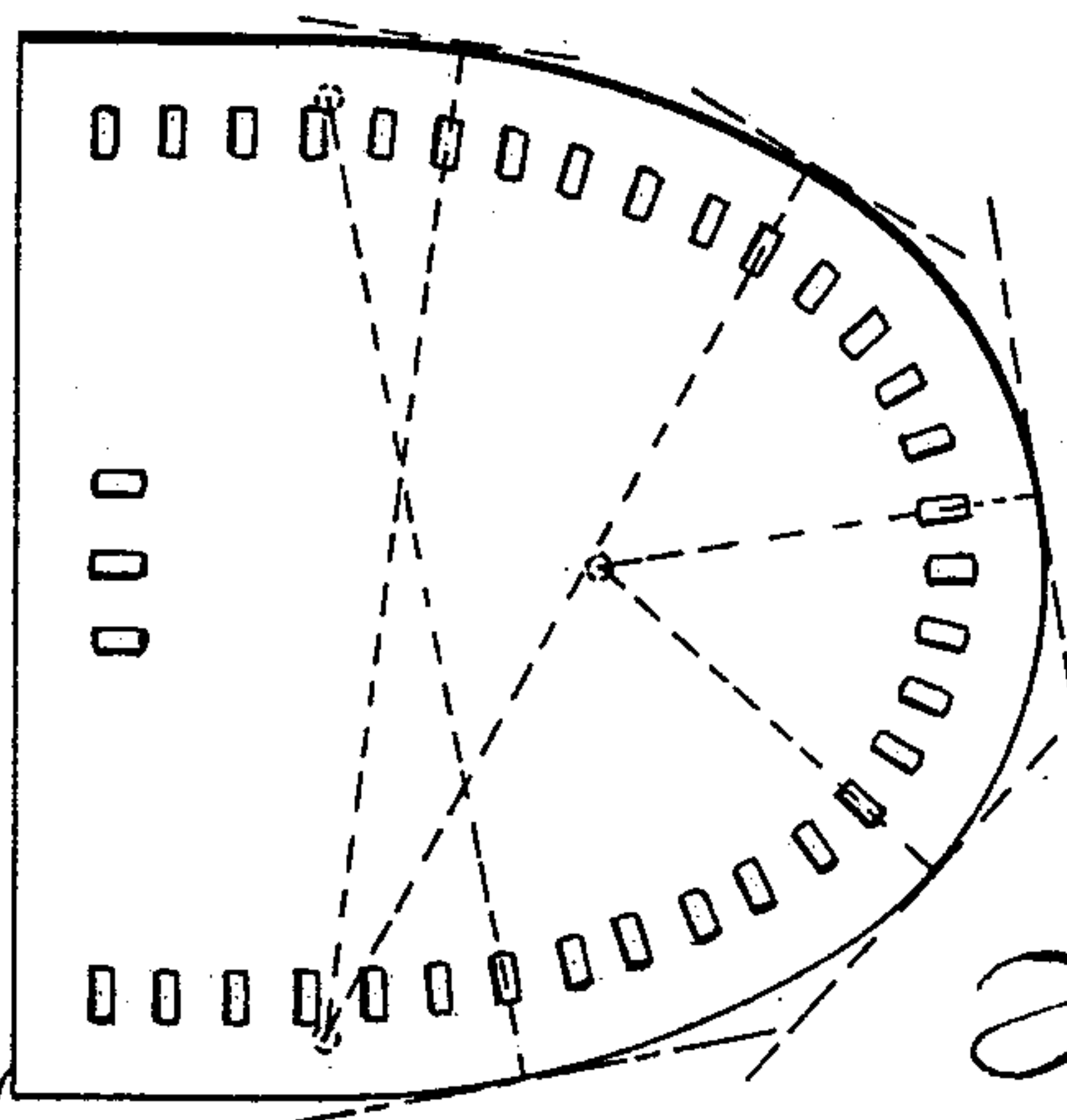


Fig. 4.



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Fig. 5.

(No Model.)

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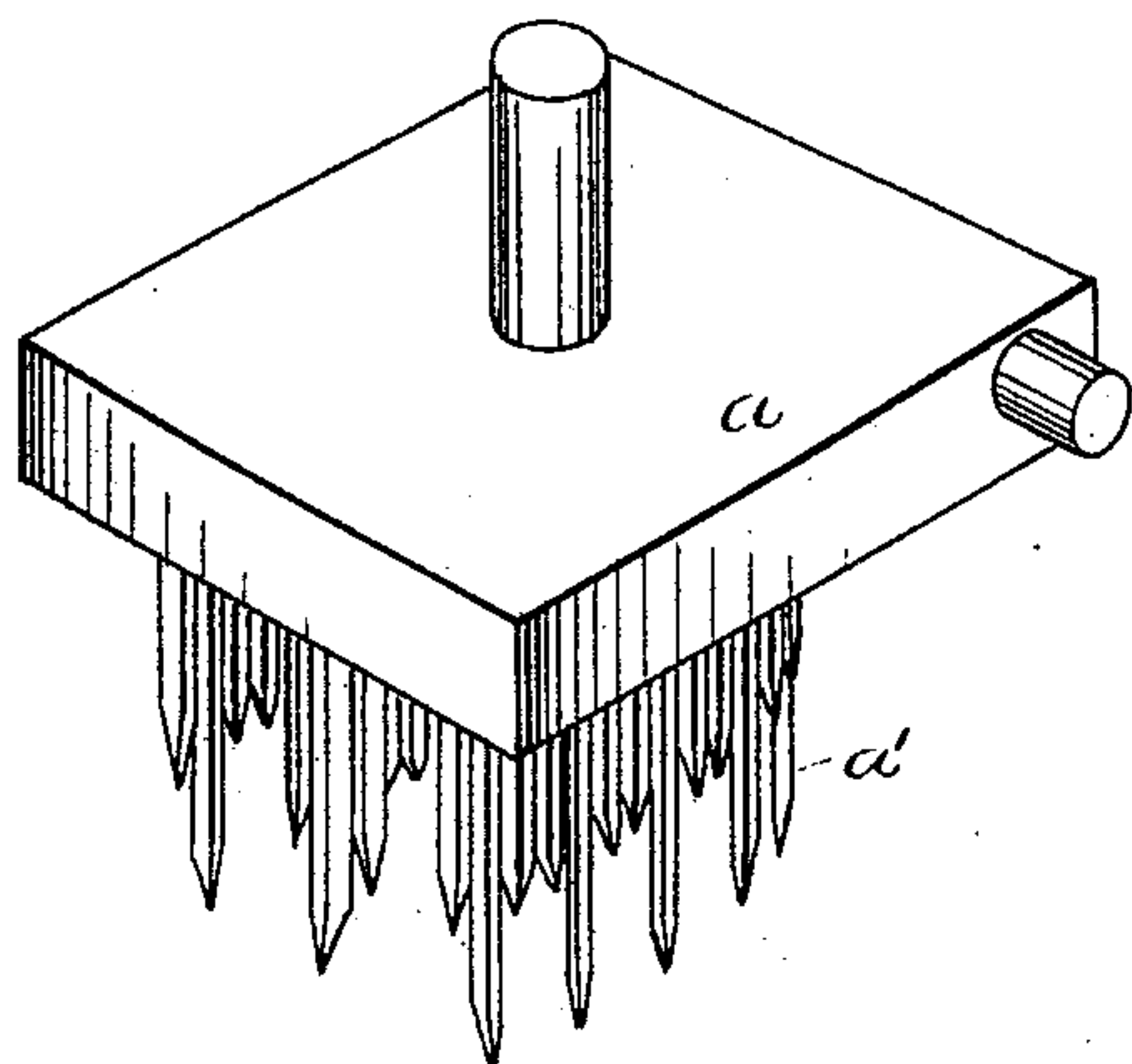


FIG. 6.

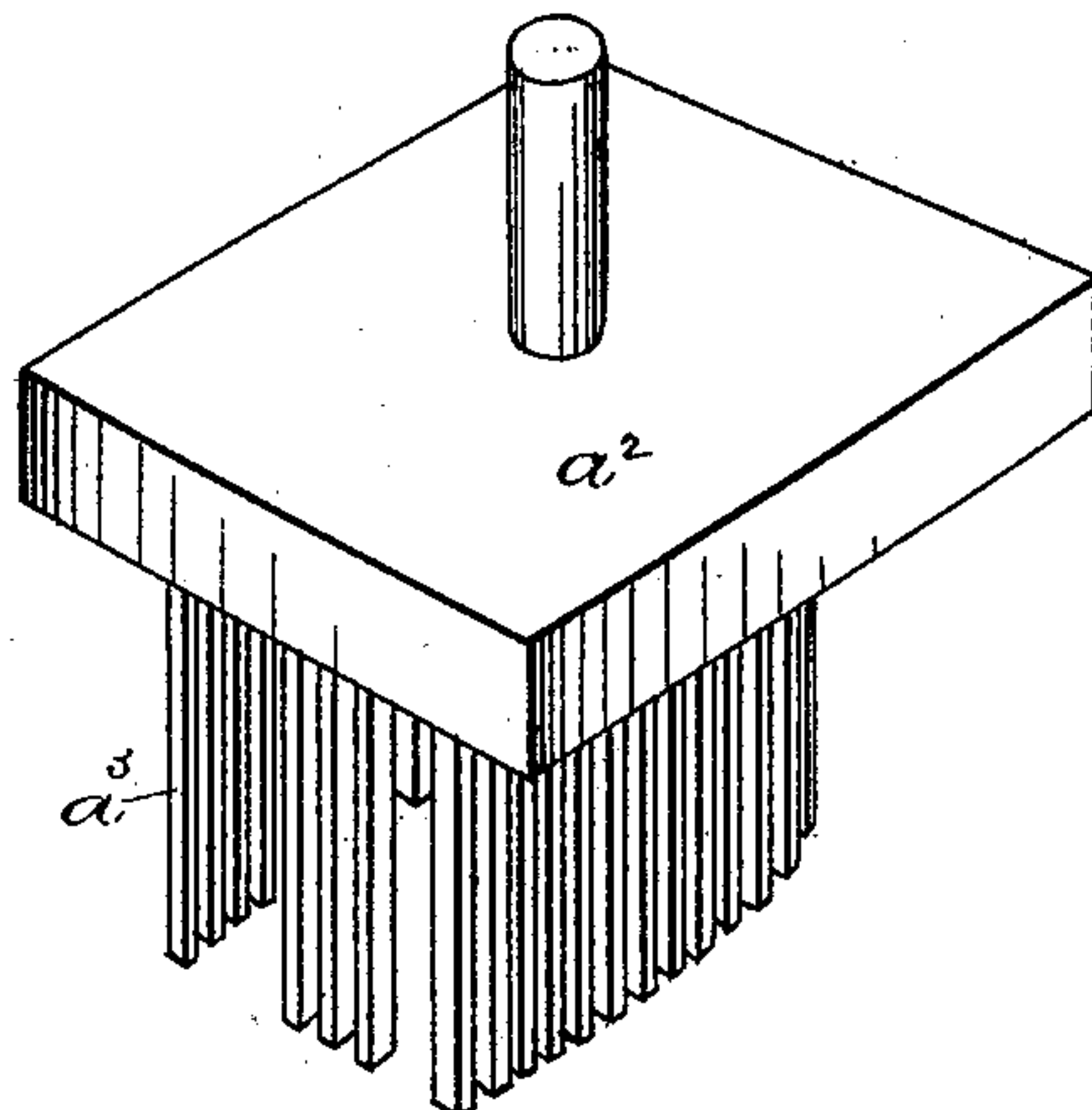


FIG. 7.

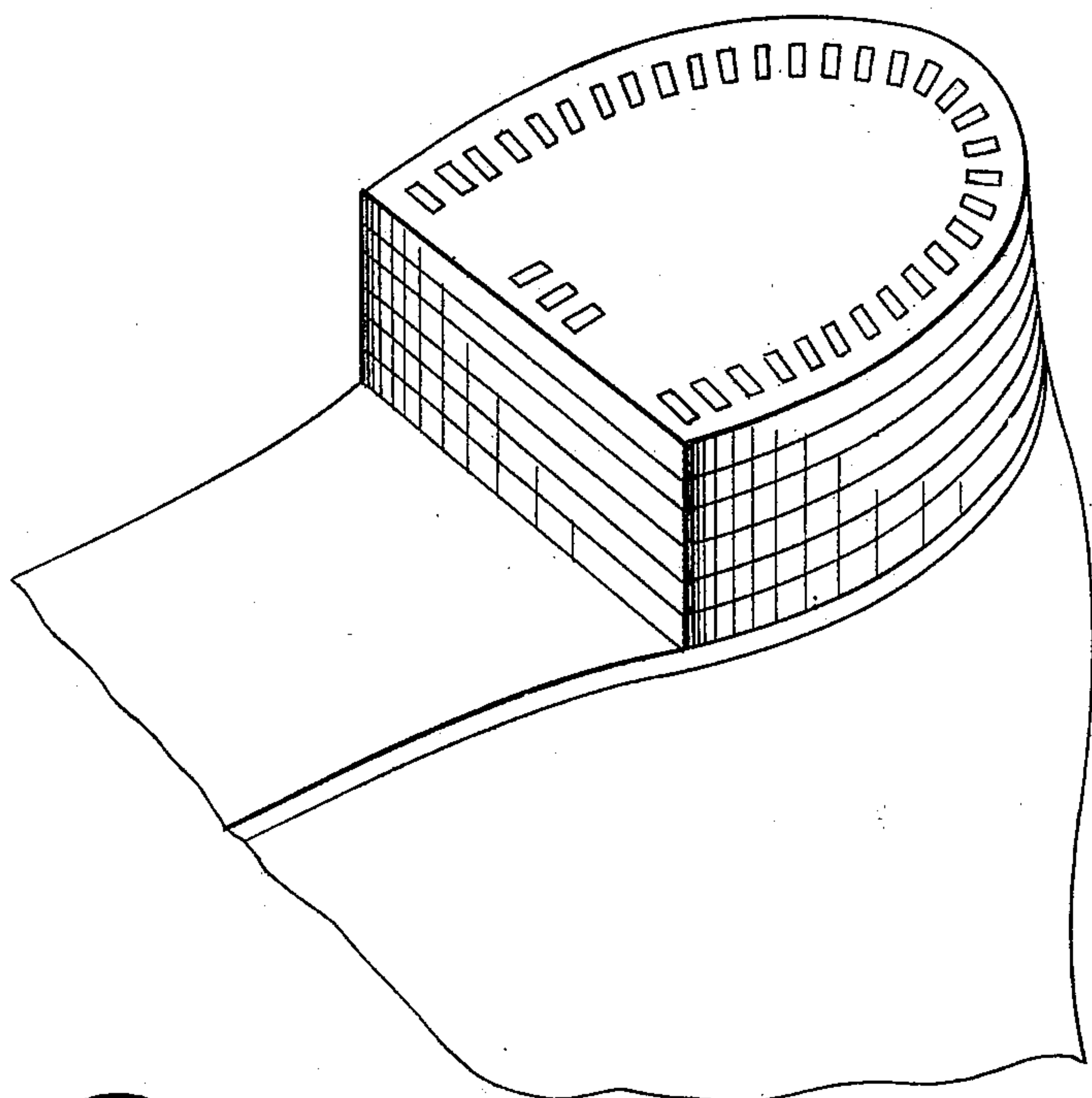


FIG. 8.

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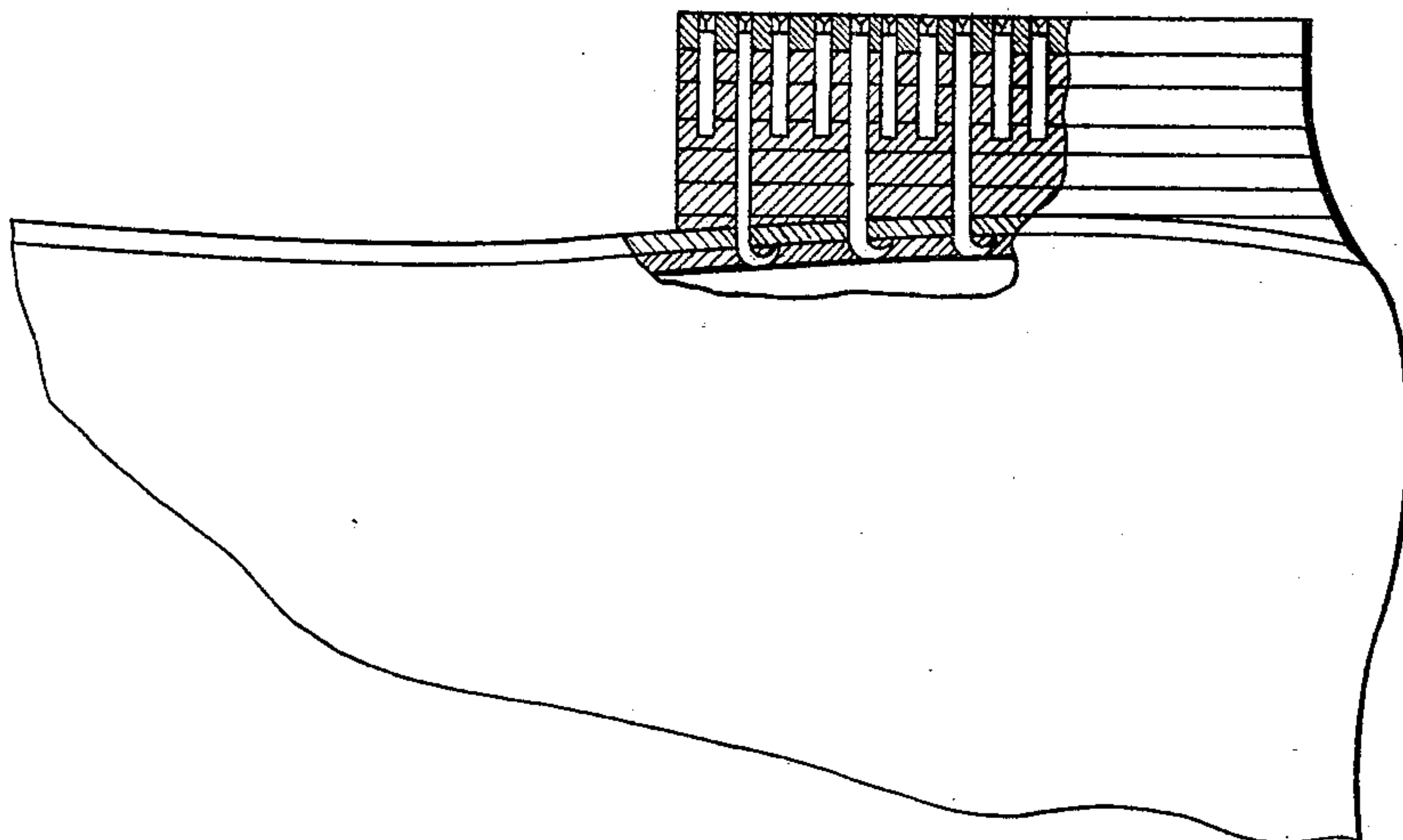


Fig-9-

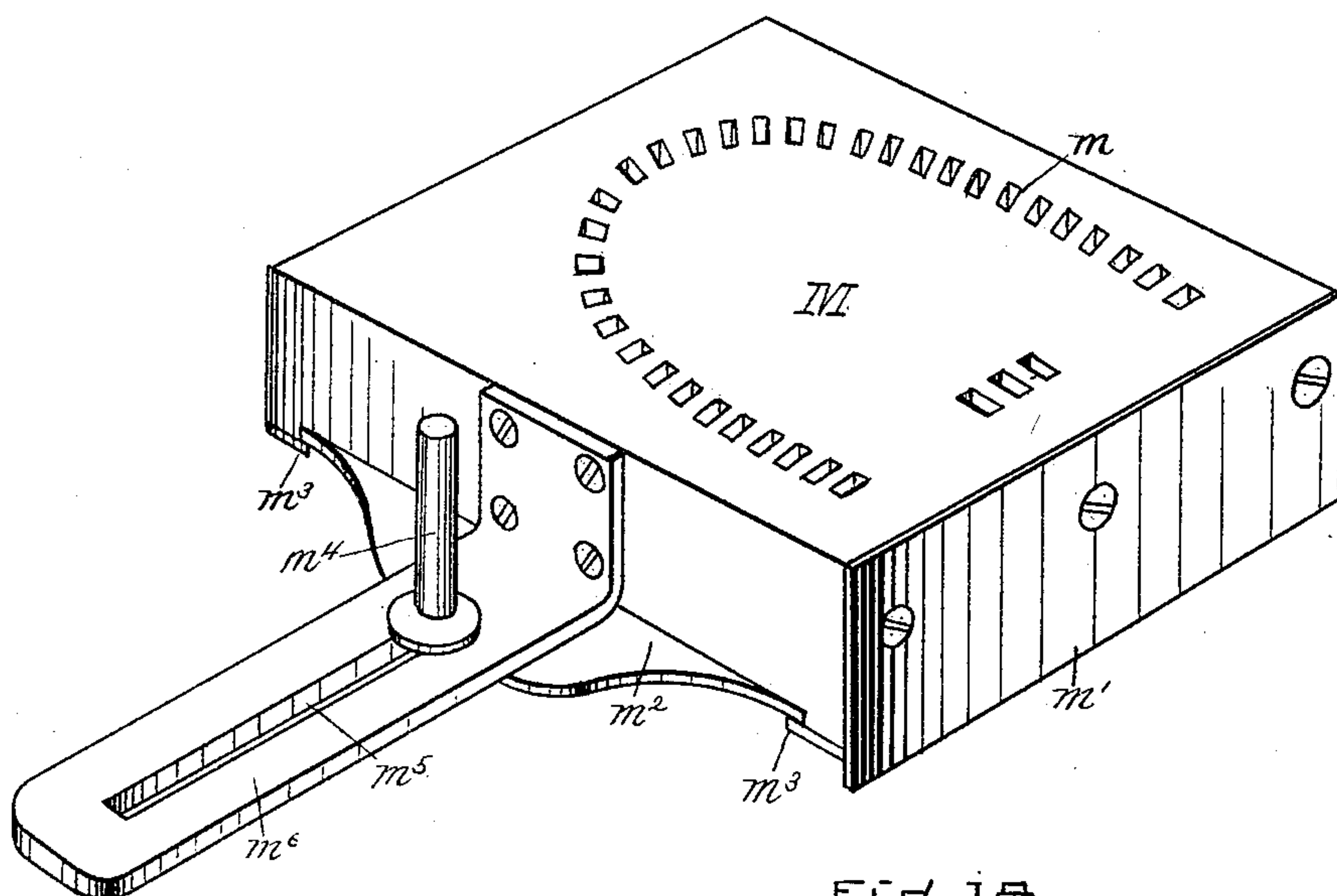


Fig. 1a.

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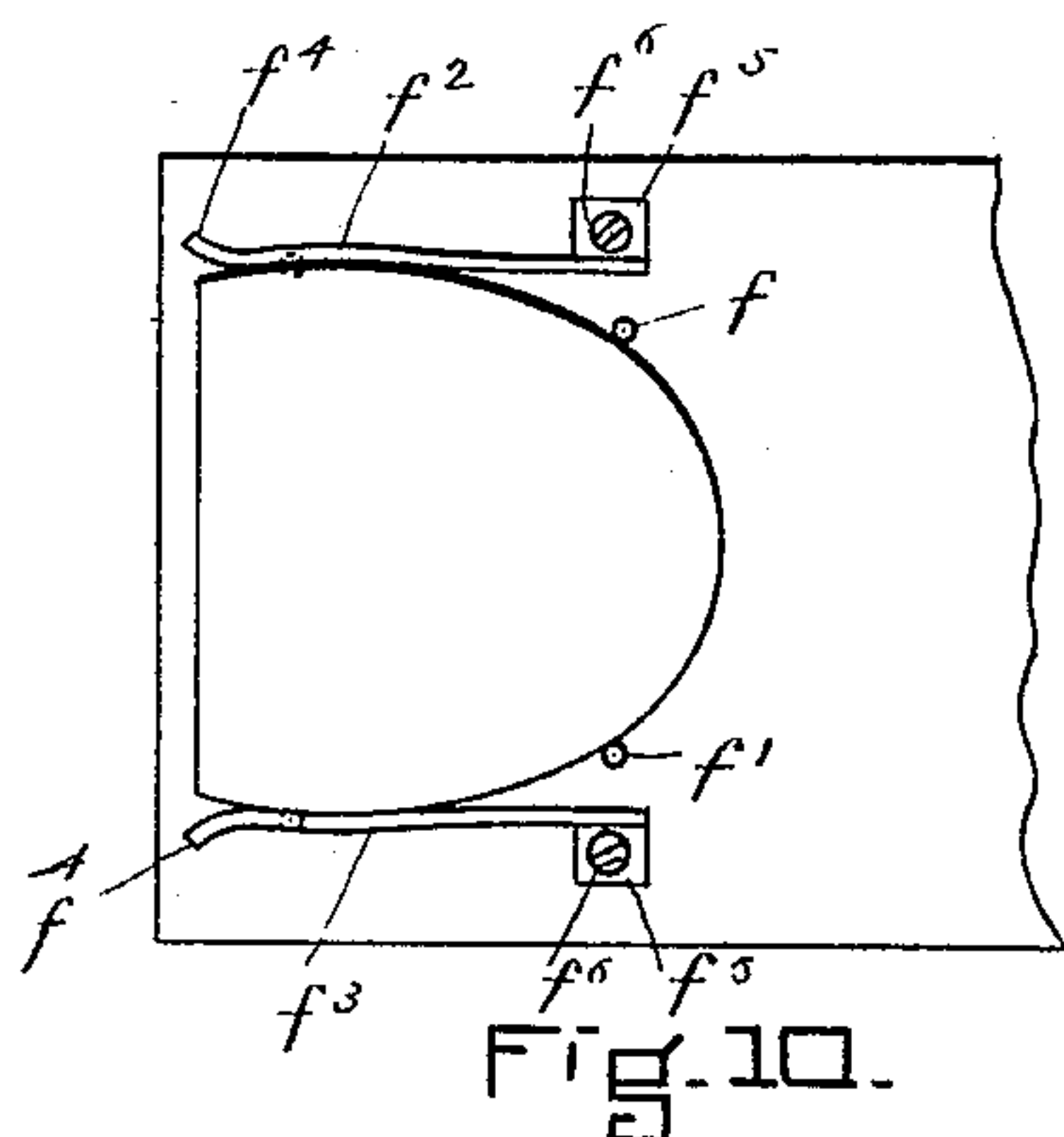


Fig. 10.



Fig. 14



Fig. 15.



Fig. 16.

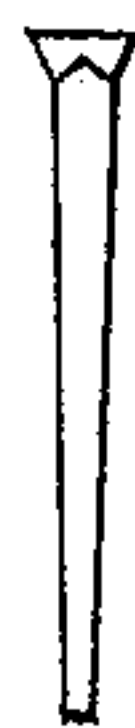


Fig-17.

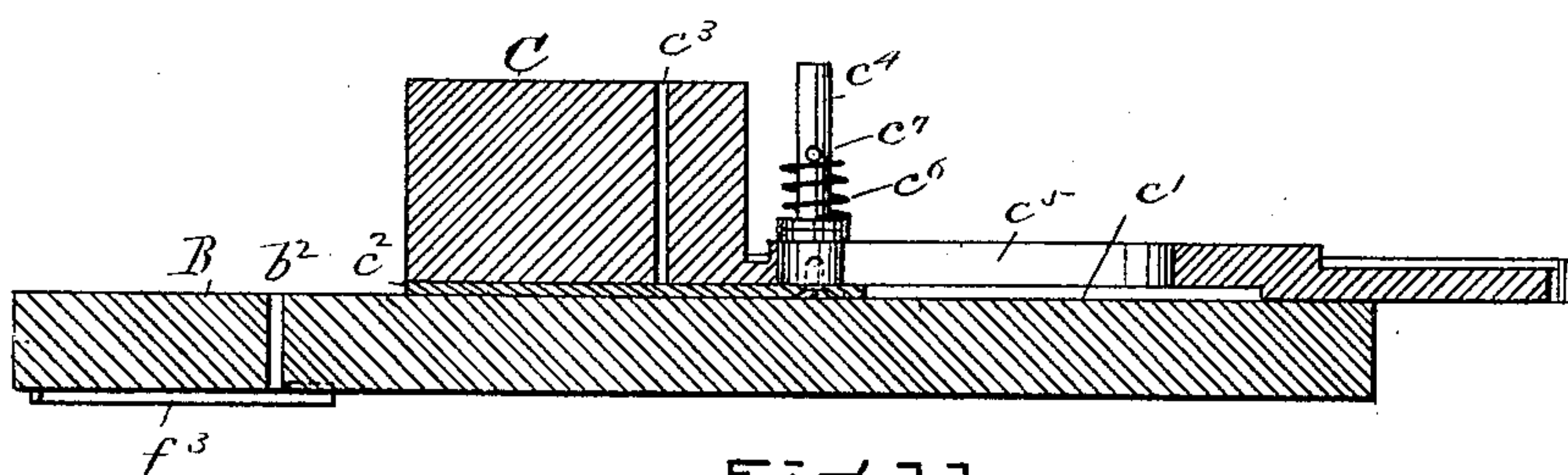


Fig. 11.

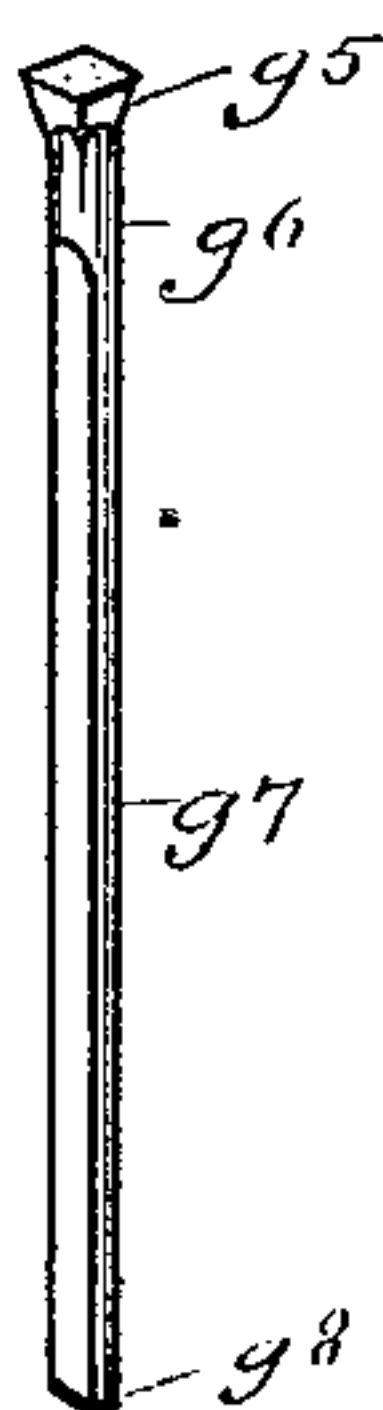


Fig. 12.

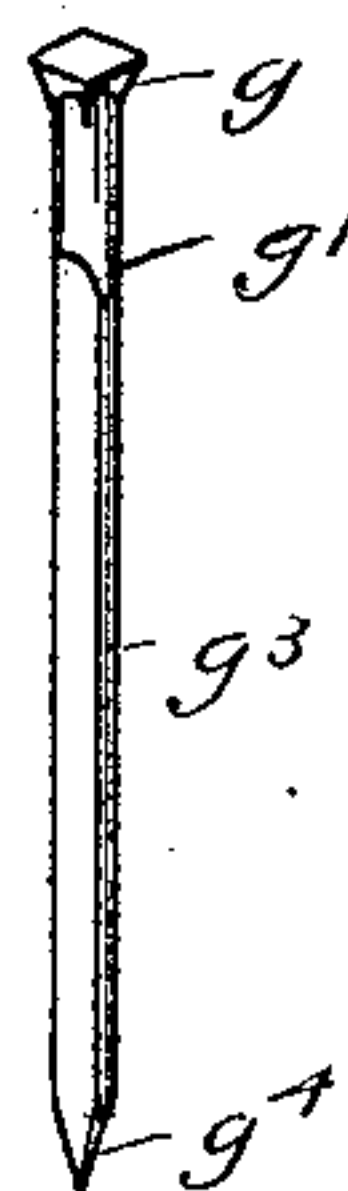


Fig. 13.

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UNITED STATES PATENT OFFICE.

JAMES B. GARDNER, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE NATIONAL HEELING MACHINE COMPANY, OF PORTLAND, MAINE.

HEEL-NAILING MACHINE AND METHOD OF ATTACHING HEELS.

SPECIFICATION forming part of Letters Patent No. 354,125, dated December 14, 1886.

Application filed July 27, 1886. Serial No. 209,202. (No model.)

To all whom it may concern:

Be it known that I, JAMES B. GARDNER, of Boston, in the county of Suffolk and State of Massachusetts, a citizen of the United States, have invented a new and useful Improvement in Heel-Nailing Machines and Methods of Attaching Heels, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

The object of the invention is to provide means for driving through the top lift and into and through the heel-blank nails, either rectangular in cross-section or plan, or having a diameter longer in one direction than another, so arranged in relation to each other that their greatest diameters shall be at a right angle to the tangent of a curve described by the edge of the finished heel, and so as to expose their heads and provide a uniform and finished appearance, and also so that they may be accurately and simultaneously driven automatically, or as a gang or group.

It also relates to the method of attaching heels to the soles of boots or shoes, consisting in placing the heel-blank on the outsole of the boot or shoe, cutting or forming a top lift to its finished or complete shape, locating it centrally in relation to the heel-seat of the boot or shoe, simultaneously compressing the separate complete top lift and detached heel-blank upon the outsole, and while thus held compressed forming in the top lift and heel-blank a gang or group of holes, and uniting the top lift and heel-blank to the boot or shoe by a gang or group of fastenings simultaneously driven into the top lift, heel-blank, and soles of the boot or shoe.

It further comprises the method of attaching heels to the soles of boots or shoes, consisting in forming in the heels a series of holes having their greatest diameters substantially at right angle to the line of the edge of the top lift of the heel; and, second, in simultaneously driving into said holes a gang or group of nails, arranged before driving so that their greatest diameters shall be at a right angle to the line of the top lift, and held in that position while they are being driven.

It further relates to the method of attaching

heels to the soles of boots and shoes, consisting in forming in the heel a line of holes of varying lengths close to the edge of the top lift, and having their greatest diameters at right angle to the line thereof, the deeper of which are adapted to receive attaching-nails, and the others slugs or shorter nails, and in simultaneously driving into said holes a gang or group of nails and slugs of different lengths, and arranged before driving so that their greatest diameters shall be at right angles to the line of the edge of the top lift, and held in this position while they are thus driven.

The invention is represented as applied to a National heel-nailing machine; but I would say that I do not limit it to such machines, as it may be used with other machines which do not employ loaded heel-blanks.

Referring to the drawings, Figure 1 shows, principally in vertical central section, the central and upper parts of a National machine, a portion of the jack and the shoe being represented in elevation. Fig. 2 is a view in vertical section, enlarged, to show certain of the parts necessary for carrying my invention into effect. Fig. 3 is a plan view of the nail-carrier plate and a portion of the templet and templet-plate. Fig. 4 is a view in vertical section, enlarged, further illustrating the features of my invention. Fig. 5 is a view in plan to show the arrangement and form of the nails and the relation which they bear to each other and to the edge of the heel. Fig. 6 is a view in perspective of an awl-holding block and the awls arranged therein, showing the shape and arrangement of awls which I deem preferable. Fig. 7 represents in perspective a driver-holder block and drivers, also showing the shape of the drivers and their relation to each other. Fig. 8 is a view in perspective, showing a portion of a boot or shoe with a finished heel, to further illustrate the object of the invention. Fig. 9 is a sectional view of the shoe and heel. Fig. 10 is a view in plan of a portion of the templet-plate inverted, to show the manner of holding a top-lift thereto. Fig. 11 is a view in section of the nail-carrier and templet-plates, to illustrate the form of sliding templet for holding the nails in the nail-carrier. Fig. 12 is a perspective view of the form of driver required. Fig. 13 illustrates the form of awl

which I prefer to use. Figs. 14, 15, 16, and 17 show in front and side elevation the short and long nails which I prefer to use. Fig. 18 is a view in perspective of a removable nail-loader.

It is very essential in flush-nailing the better grades of work to use nails which have a diameter greater in one direction than another, and preferably having heads of rectangular or diamond shape or oval in cross-section or plan. By "flush-nailing" is meant the attaching of the heels by nails driven through the top lift and heel-blank, so as to bring their heads or ends flush with the upper surface of the top lift, and thereby expose them, and for the best results it is desirable that these nails be closely arranged or located in relation to each other, and that they be closely placed to the edge of the finished heel, and also that they should have a regular or uniform position in relation to each other and in relation to the edge of the finished heel, so far as their greatest diameters are concerned, and so that their greatest diameters shall be at right angle to the straight portions of the finished heel and radial to the curved portions thereof. It is also desirable that the top lift and heel-blank be attached simultaneously to the sole or soles of the boot or shoe by the same group or gang of nails and at the same time. It is also desirable that certain of the nails should be long enough to be driven through the top lift, heel-blank, and soles, so that their ends or points can be upset upon the last or work-support, and that others of the nails be only long enough to extend through the top lift into the heel-blank any desired distance but not through it, as by so doing a saving in the cost of the nails is obtained and a greater certainty of a perfect result is secured, because as the nails must be necessarily driven, as a general rule, very closely to the edge of the top lift and heel-blank, and as there is always some danger of their not driving entirely straight, it is desirable not to drive any more nails entirely through the heel-blank into the soles than is necessary for properly holding the heel in place thereon. I am now speaking, of course, of heels having the nails placed very closely to the edge, and where any material variation from the predetermined lines upon which the nails must be driven, especially if in an outward direction, would cause an imperfection. For ordinary work of this character, I drive every third or fourth nail through into the sole. The other nails are driven from one-half to two-thirds through the top lift and heel-blank. I also, in order to obtain this perfect driving which is so necessary, use long awls or prick deep, so that deep holes having the proper direction are provided for the nails. Moreover, a short nail is comparatively much stiffer than a long nail, and consequently drives straighter. It is also necessary that the holes formed in the top lift and heel-blank should be so located in relation to the edge of the finished

heel and shaped as to properly guide the nails as they are being driven, and this necessitates the use of an awl that shall in cross section approximate the form of the nail used—that is, it must have substantially the shape of the nail in section, but should be somewhat smaller. If a nail that is rectangular in cross-section in shape is used, then awls of similar shape should be used; if oval, an oval awl should be employed; if diamond-shaped, an awl diamond-shaped in cross section should be used. It is not only necessary that the holes should be thus prepared, but it is also essential that the nails should be presented to these holes so that their greatest diameters shall be in line with the greatest diameters of the holes, and they must while they are being presented be held or be prevented from turning from this position while they are being driven. This of course necessitates that the templet-holes shall be of the same shape, or substantially of the same shape, so far as their horizontal conformation is concerned, as the shape of the head of the nail—that is, the holes must be rectangular or substantially rectangular in shape, they must have a diameter which is longer in one direction than another, they must be placed closely to each other and their longest diameters must be at right angle or radial to the edge of the finished heel, in order that the nails when dropped therein from the nail-carrier shall be held and prevented from turning so long as any part thereof remains in the holes, so that in driving from the templet the nails are not only guided or directed by the especial form and arrangement of holes of the top lift and heel-blank, but they are also supported in the templet in a manner to prevent their turning while they are being driven. It is also requisite, of course, that the nails be arranged for driving, so that their longest diameters shall have this regular and uniform relation to each other and to the edge of the finished heel-blank which I have indicated. In order to do this, it is necessary that the nail-carrier have holes which serve to give the proper order and arrangement to the nails, and which serve to hold them in place in this form and arrangement, so that they may be delivered to the holes of the templet without turning or losing their original relation to each other; consequently the holes in the nail-carrier must be of substantially the same shape as the holes in the templet—that is, they must have their longest diameters arranged in relation to the edge of the heel—and they must be so shaped that upon the insertion of the nails therein they are caused to be brought into the arrangement in relation to each other and in relation to the edge of the finished heel which they must have after they have been driven into the heel and their heads become exposed. In other words, in order to obtain this accurate result the holes must be formed so that the nails cannot be turned therein after they have been once placed, and also so that a nail can-

not be placed crosswise, or so that its greatest length shall be parallel with the edge of the sole, instead of at right angle thereto, when it is desired that all the nails shall have their greatest diameter at right angle to such edge. The drivers must also be of the general shape and arrangement of the head of the nail and of the holes in the nail-carrier and templet—that is, having a diameter longer one way, and arranged in their holder so that their long diameter shall be at right angle to the straight and curved sides of the finished heel.

Referring to the drawings, A represents the bed of the machine; A', one of the side frames; A², the cross-head, which is reciprocated as described in the Henderson Patent No. 316,894, or in any other desired way, and which carries the revolving head A³, upon one arm of which is mounted a block, a, carrying a gang or group of awls, a', and upon another arm of which is mounted a block, a², carrying the gang or group a³ of drivers. Another arm supports a spanker-block.

B is the templet, and it is represented as formed at the front end of the templet-plate b.

C is the nail-carrier, and it is represented as formed at the end of the plate c, which is arranged to be moved horizontally in the yielding table D.

The work is mounted upon a last or work-support, (shown in dotted lines in Fig. 1,) which is carried or supported by a standard, e, extending upward from a plate, E. The templet-plate has upon its under surface a device for holding the top lift of the heel central in relation to the holes therein and to the heel-seat of the boot or shoe, (see Fig. 10,) which comprises the two pins f f', against which the back of the lift is brought in contact, and two side holding spring or yielding arms, f² f³, each of which has an outwardly-flaring front end, f⁴. Each spring-arm is fastened to a block, f⁵, which is secured to the templet-plate by a screw, f⁶. (See Fig. 10.) This device furnishes a cheap and efficient means for holding the top lift suspended upon the under surface of the templet and for centering it. I would not be understood, however, as confining myself to this especial form of device for holding and centering the top lift, as I may use any of those already described in various patents.

The nail-carrier C has a long recess, c', formed in its under surface of sufficient extent to permit the hole-covering plate c² to be moved away from the holes c³ sufficiently to uncover them all, the covering-plate being solid, or unprovided with perforations. This form of covering-plate is necessary, because the holes are placed so closely together that a revolving or a sliding plate having perforations as close as it is necessary to place the holes c³ in the nail-carrier would not be certain to work accurately. The plate c² is moved to uncover the holes after the nail-carrier has been moved into position over the templet by means of the handle or stud c⁴, which passes up through a slot,

c⁵, in the plate c; and in order that the covering-plate may be moved with the carrier as it is thrown forward I hold it or secure it to the plate c by sufficient friction to effect this end. This I have represented as being obtained by means of the coil spring c⁶, which bears against a pin, c⁷, of the stud and against the upper surface of the plate c, or a washer placed thereon, and this operates to draw the covering-plate c² with some pressure against the under surface of the plate c.

Upon the backward movement of the carrier the rear end of the plate comes in contact with the portion of the templet-plate stud b', and it is held thereby while the nail-carrier plate and nail-carrier are moved backward, so that the stud operates to automatically hold the covering-plate upon the backward movement of the nail-carrier, and thereby automatically cause it to cover the holes c³ when the nail-carrier has been moved back to its original position.

The holes c³ of the nail-carrier are shown as very closely arranged in relation to each other, and as being substantially rectangular in shape, and as having a long diameter, c⁸. The holes, it will be seen, are also arranged so that the long diameter of each hole is at right angle to the straight and rounded surface of a finished heel. The templet has the holes b², which are similarly shaped—that is, they are substantially rectangular in form—and they have their long diameters at right angle to the straight and curved sides or edges of the finished heel. The shape of these heels is well represented in Fig. 4.

The awls are well shown in Figs. 1, 2, 6, and 13, and they each have a square head, g, the short cylindrical or round section g' immediately adjacent thereto, and the long section g³, having parallel flat sides, and rectangular in cross-section, and the point g⁴. The head or round cylindrical section enters the holes in the block, and the head is made square and fits the square section of the hole therein, so that the awl is prevented from being turned in the hole. Each driver has the square head g⁵, the cylindrical or round section g⁶, the long section g⁷, having flat sides, substantially rectangular in cross-section, and the flat surface g⁸.

Two lengths of awls are used—namely, those necessary for forming deep holes for the heel-blank-attaching nails, or nails which are driven entirely through the heel-blank into the soles, and which should be of a length to form holes extending through the top lift and heel-blank very nearly or quite to the outsole, and the shorter awls, which are made of a length sufficient to form holes in the top lift and heel-blank.

I have shown in the drawings the awls at the breast and front corners, and every third awl therefrom as long.

In operation the jack, with the boot or shoe upon the last or work-support, is moved into operative position. The heel-blank is placed upon the outsole and against the heel back-

stop. The templet-plate is moved outward to a position over the heel-blank, and a top lift placed upon its under surface in the top-lift-grasping devices. The nail-carrier is loaded with the long and short nails, which once placed in the holes thereof cannot be turned, but are held in such position during the subsequent delivery and nailing, and bear such position and arrangement in the finished heel. The awls having been moved into operative position, the cross-head is reciprocated, the templet moved downward by contact of the surface of the awl-block therewith, and a top lift is thereby placed upon the heel-blank, and, with the heel-blank, is compressed upon the outsole, and the deep holes having the different angles in relation to the sides and curved edge of the finished heel made. The nail-carrier is then moved into position to discharge its nails into the templet-holes and the pricked holes of the heel. The gang of drivers is also moved into operative position. The machine is caused to make another reciprocation, and the nails are driven from the nail-holder and templet through the top lift and some through the heel-blank into the soles, and others part way through the heel-blank, the holes in the nail-carrier and templet and in the pricked heel preventing the nails from turning from the original angles or positions which they bore when first placed in the nail-carrier. The templet is locked down automatically upon the reciprocation of the awls, and is held locked until after the nails have been driven, when it is unlatched and assumes its highest position, and the nail-carrier and templet are then simultaneously withdrawn from over the attached heel. The spanker-block is then brought into position, the machine caused to make another reciprocation, and the tread or top lift of the heel and the nails leveled.

I am aware that the "National machine," so called, uses a templet and a nail-carrier having holes in which the drivers are reciprocated and through which nails are driven, but such holes are round in form, and cannot act to hold nails or prevent them from turning as they are being driven; and I therefore consider that it does not contain the spirit of my invention.

In order to load the nail-carrier with nails quickly, there may be used separate nail-loaders, substantially like the one represented in Fig. 18, comprising a block, M, preferably made of wood, having the nail-receiving holes m , gage-plate m' , the imperforate covering-plate m^2 , which is held to the under surface of the block by the cap-plates m^3 . The covering-plate m^2 has a stud, m^4 , which passes up through the slot m^5 , formed in the metal arm m^6 , which is screwed to the side of the block. A number of these nail-holders can be used, and in use it is placed upon the nail-carrier, as represented in Fig. 2, the gage-plate m' coming in contact with the front edge of the carrier, and when it is in this position the sliding plate m^2 is

withdrawn sufficiently to uncover the holes and allow the nails to fall into the holes of the nail-carrier. This device enables nails to be prepared for loading the carrier without interfering with the operation of the machine.

The top lift used in the process herein described is first cut to a finished or complete shape before it is located centrally in relation to the heel-blank and heel-seat of the boot or shoe to which they are both subsequently attached.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

1. The combination of the templet C, having the holes c^3 , the templet-plate c , having the recess c' in the templet and templet-plate, the imperforate sliding plate c^2 , and stud c^4 , substantially as described.

2. The combination of the templet C, having the holes c^3 , the templet-plate c , having the recess c' in the templet and templet-plate, the imperforate sliding plate c^2 , stud c^4 , and a friction-spring, c^6 , substantially as and for the purposes described.

3. The combination of the nail-carrier plate c , the nail-carrier C, the holes c^3 therein, the long recess c' , the imperforate sliding plate c^2 , arranged to slide in said recess c' , and the templet-plate stud b' , arranged so that the sliding plate c^2 is held by the said templet-plate stud while the nail-carrier plate is moved backward, substantially as described.

4. The combination of a jack, a last or work-support mounted thereon, a templet having top-lift-grasping devices, comprising the pins $f f'$ and the yielding or spring arms $f^2 f^3$, substantially as shaped, the nail-carrier, a reciprocating gang or group of awls, a reciprocating gang or group of drivers, and a reciprocating spanker or leveler, substantially as described.

5. The combination, in a heel-nailing machine, of an awl-holding block with a gang or group of awls each of which has the square head g , the round or cylindrical section g' , the shank g^3 , flattened on two surfaces, and the point g^4 , substantially as described.

6. In a heel-nailing machine, an awl having a square head, g , a round or cylindrical section, g' , adjacent thereto, a shank, g^3 , having two flat parallel surfaces, and a point, g^4 , substantially as described.

7. The combination, in a heel-nailing machine, of a driver-holder block, a^2 , and a gang or group of drivers, a^3 , each of which has the square head g^5 , the round or curved section g^6 , and the shank g^7 , made flat upon two sides, and having a diameter greater in one direction than in any other, substantially as described.

8. In a heel-nailing machine, a driver having a square head, g^5 , a round or cylindrical section, g^6 , and a shank, g^7 , made flat upon two surfaces, and having a diameter longer in one direction than in any other, substantially as described.

9. The combination, in a heel-nailing machine, of a nail-carrier, C, having the flat guiding-surface, with a removable nail-loader, M, having the gage-surface m' , the slotted bracket m^6 , the slide-plate m^2 , and stud m^4 , substantially as described.

10. The method of attaching heels to the soles of boots and shoes, consisting in forming in the heels at the edge a series of holes having their greatest diameters substantially at right angle to the line of the edge of the top lift of the heel, and, second, in simultaneously driving into said holes a gang or group of nails, arranged before driving so that their greatest diameters shall be at a right angle to the line of the top lift, and held in this position while they are being driven, substantially as and for the purposes described.

11. The method of attaching heels to the soles of boots and shoes, consisting in forming in the heel a line of holes of varying lengths, close to the edge of the top lift, and having their greatest diameters at right angle to the line thereof, the deeper of which are adapted to receive attaching-nails and the other slugs or shorter nails, and in simultaneously driving into said holes a gang or group of nails and slugs of different lengths, and arranged before driving so that their greatest diameters shall be at right angle to the line of the edge of the top lift and held in this position while they are thus driven, substantially as described.

JAMES B. GARDNER.

In presence of—

F. F. RAYMOND, 2d,
FRED. B. DOLAN.