(No Model.) 4 Sheets—Sheet 1.

C. F. LAMBERT.

HEEL COMPRESSING MACHINE.

No. 565,467. Patented Aug. 11, 1896.

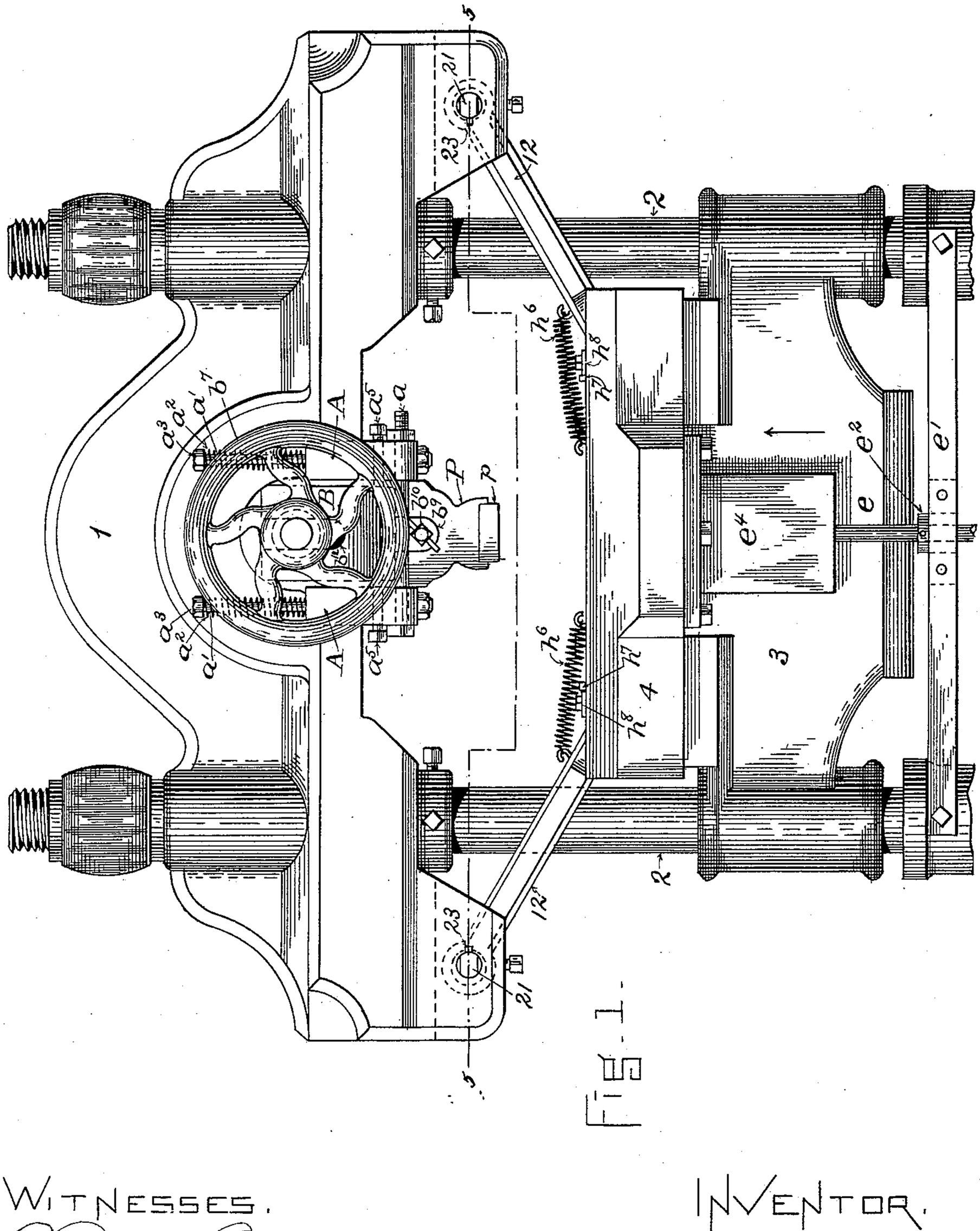

FIG. 1.

WITNESSES.

R. Henry Harsh.

A. E. Phillips.

INVENTOR.

Charles F. Lambert

By his Attorney

Benjamin Phillips

(No Model.) 4 Sheets—Sheet 2.

C. F. LAMBERT.

HEEL COMPRESSING MACHINE.

No. 565,467. Patented Aug. 11, 1896.

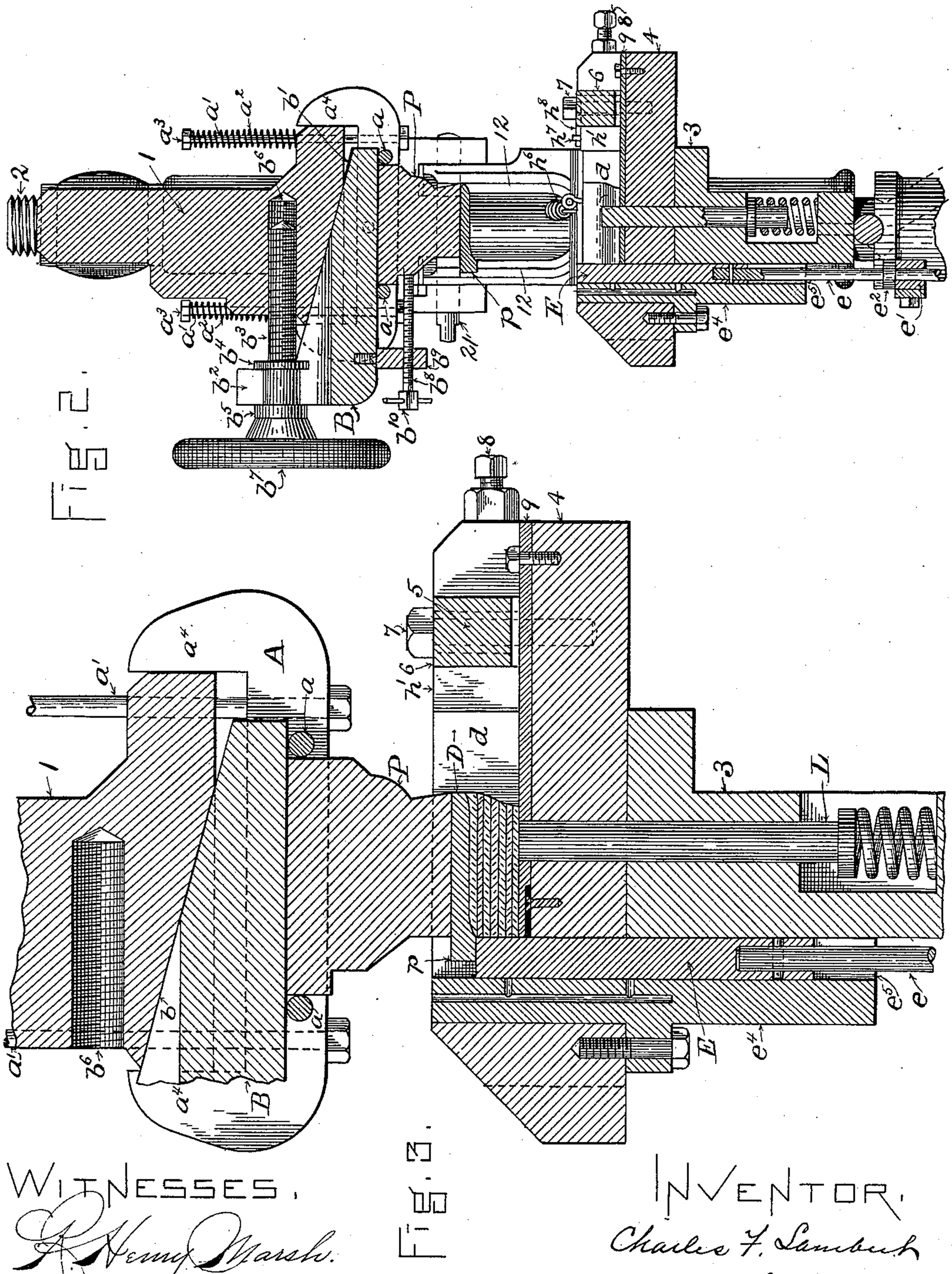

FIG. 2.

WITNESSES:

R. Henry Marsh.

A. Ellsworth.

INVENTOR:

Charles F. Lambert

By his Attorney

Benjamin Sheridan

(No Model.) 4 Sheets—Sheet 3.

C. F. LAMBERT.

HEEL COMPRESSING MACHINE.

No. 565,467. Patented Aug. 11, 1896.

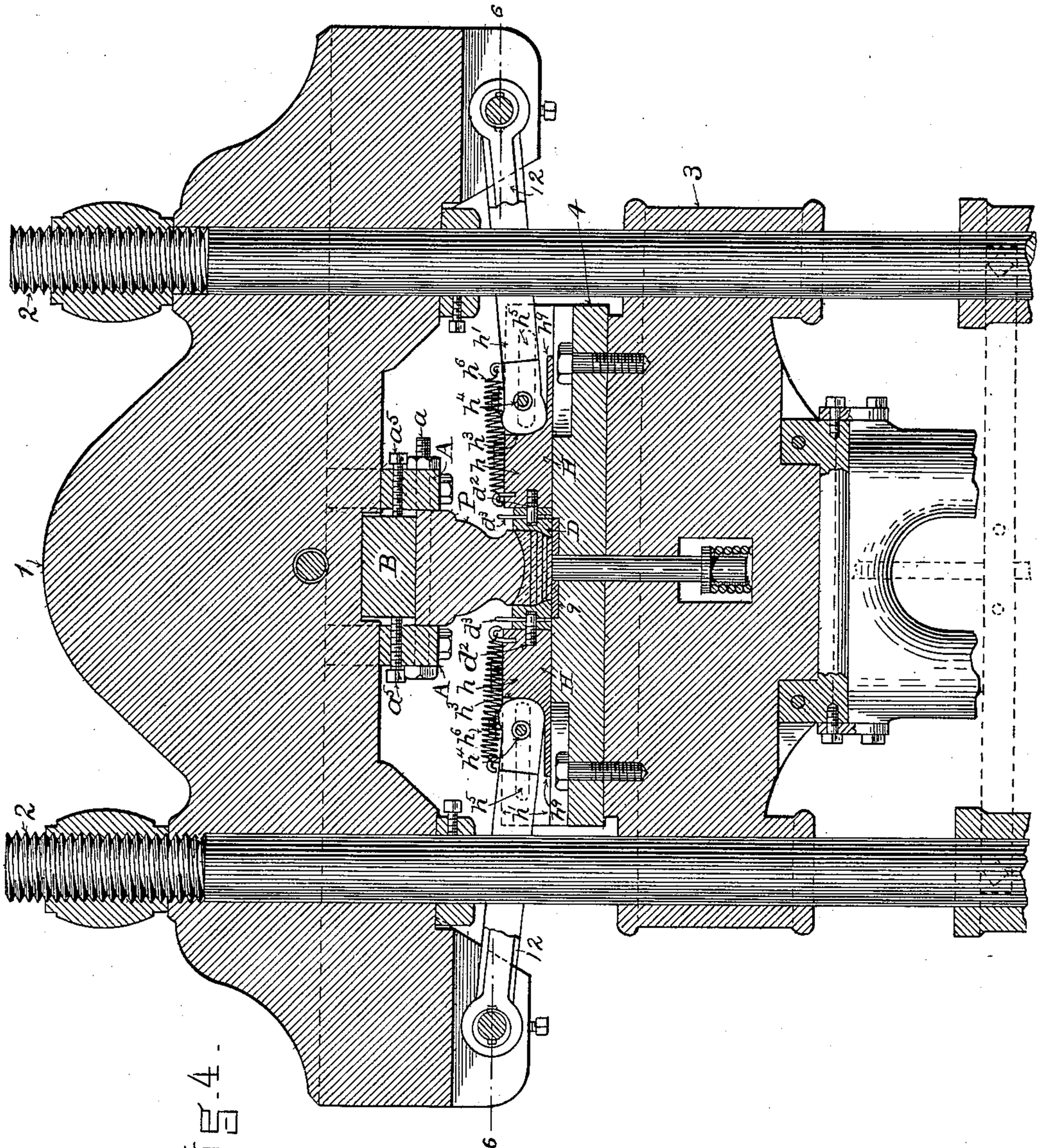

FIG. 4.

WITNESSES.

R. Henry Marsh

C. E. Hyde.

INVENTOR.

Charles F. Lambert

By his Attorney

Benjamin Phillips

(No Model.) 4 Sheets—Sheet 4.

C. F. LAMBERT.

HEEL COMPRESSING MACHINE.

No. 565,467. Patented Aug. 11, 1896.

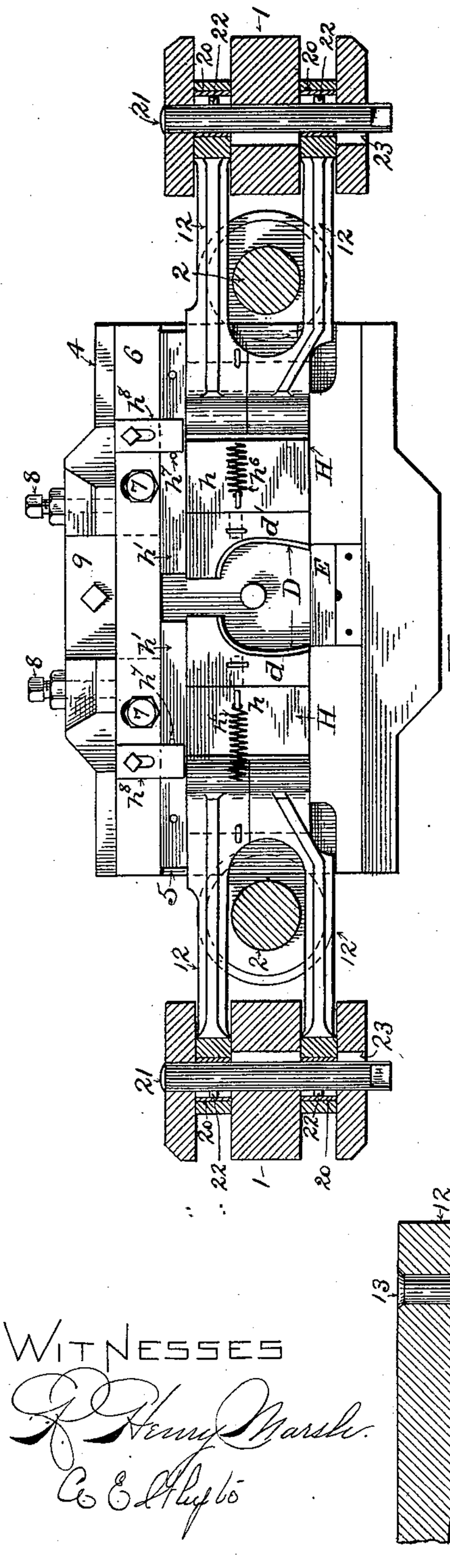

FIG. 5.

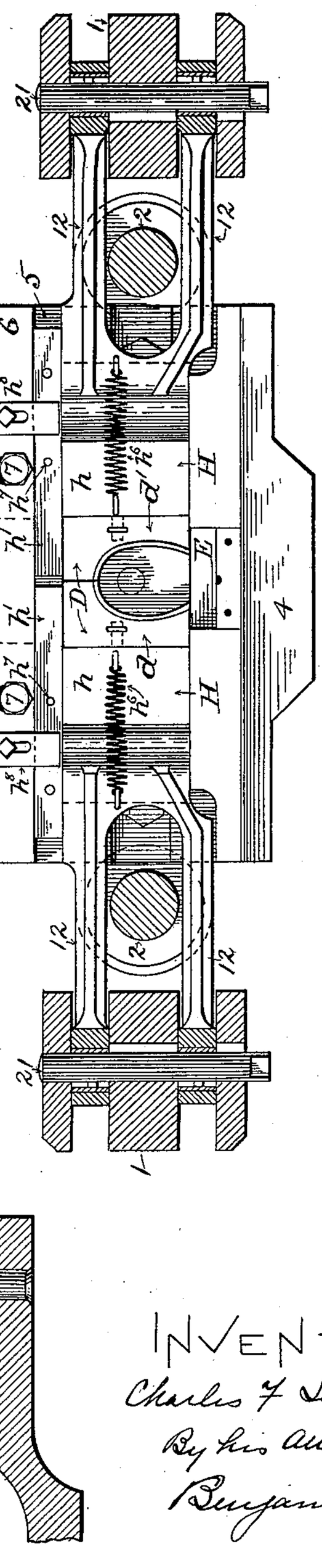

FIG. 6.

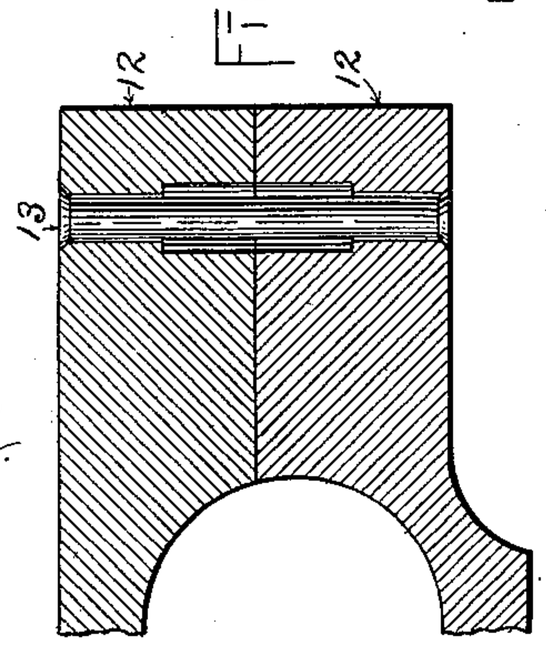

FIG. 7.

WITNESSES

F. Henry Marsh.

C. E. Hayes

INVENTOR.

Charles F. Lambert

By his Attorney

Benjamin Phillips

UNITED STATES PATENT OFFICE.

CHARLES F. LAMBERT, OF HAVERHILL, MASSACHUSETTS.

HEEL-COMPRESSING MACHINE.

SPECIFICATION forming part of Letters Patent No. 565,467, dated August 11, 1896.

Application filed June 10, 1895. Serial No. 552,355. (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. LAMBERT, a citizen of the United States, residing at Haverhill, in the county of Essex and Commonwealth of Massachusetts, have invented a new and useful Improvement in Heel-Compressing Machines, of which the following, taken in connection with the accompanying drawings, is a specification.

As machines of this class have heretofore been constructed they have embodied in their structure a male die or plunger and a divided female mold, mechanism being provided for laterally actuating the parts of the female mold to laterally compress the blank and for vertically moving either the mold or the plunger to vertically compress the blank.

The breast-wall of the female die above referred to or the portion of the machine which forms the same has heretofore been fixed as to its vertical position with reference to other parts of the mold, and the plunger as it enters the mold passes along a portion of the inner face of said wall.

The arrangement above described has been found to be objectionable in that the extreme upper edge of the breast of the blank is turned up between the plunger and the breast-wall of the mold, forming an upturned projection or ridge along the breast of the blank which, when the heel is applied to the shoe and pressure applied, as during the nailing operation, cuts into and injures the sole.

In machines of this class it has heretofore been proposed to adjust the machine for blanks of different thickness by raising or lowering the plunger (manually) and interposing between the same and its supporting cross-head detachable plates of different thickness. It has also been proposed to vertically adjust the plunger with reference to its cross-head by means of a direct-acting screw having a thread-bearing in the cross-head.

Both of the arrangements above suggested are objectionable, the first on account of the time required to make the same and the liability of the detachable plates to become lost or broken while off the machine, and the second on account of the great strain on the threads of the screw and its bearings when pressure is applied, and, further, on account of the tendency of the plunger to twist and get out of line with the female mold.

The object of the present invention is to remove the objections above cited and improve the form and arrangement of other features of the machine, as hereinafter more specifically pointed out; and to this end it consists in providing the female mold with a breast-wall vertically movable with reference to other parts of the mold and in providing the plunger with a downwardly-extending projection or lip overlapping the breast-wall of the mold, and, further, of a reciprocating bar having an oblique face interposed between the plunger and its supporting cross-head, and of the devices and combinations of devices hereinafter set forth and claimed.

The present invention is illustrated by the accompanying drawings, in which—

Figure 1 is a front elevation of the upper portion of a heel-compressing machine embodying the present invention. Figs. 2 and 3 are transverse sections showing different positions of parts. Fig. 4 is a longitudinal section. Fig. 5 is a sectional view taken on line 5 5, Fig. 1. Fig. 6 is a sectional view on line 6 6, Fig. 4. Fig. 7 is a detail sectional view hereinafter more fully explained.

Similar letters and figures of reference refer to similar parts throughout the several views.

In the drawings, 1 represents a stationary or fixed cross-head which is supported by the vertical rods 2 2, and 3 represents a movable cross-head having suitable bearings on the rods 2 2, along which it is free to reciprocate.

The above arrangement of the cross-heads 1 and 3 and rods 2 2 is common in this class of machines, the cross-head 3 being commonly actuated by a toggle-lever operated by a crank-and-pitman connection which I have not considered necessary to illustrate in the drawings, as the same can be supplied by the ordinary mechanic having any knowledge of the art.

Upon the stationary cross-head 1 is mounted the male die or plunger P, which I have rendered vertically adjustable with reference to the cross-head 1 by the following mechanism:

A A represent a pair of clamps, between which the upper portion of the plunger F is pinched and held by means of the bolts *a a*,

which connect the clamps A A and which may be set up to approximate the clamps in the usual manner.

The clamps A A are supported from the cross-head 1 by means of the vertical rods a' a' and a' a', which are projected through suitable bearings in the cross-head 1, in which they are free to reciprocate vertically. Suitably-placed springs, preferably consisting of a coil-spring a^2, surrounding each of the rods a' and bearing against a shoulder or head a^3 thereon and against the cross-head 1, act to force the rods a' a' a' a' upward and to raise the clamps A A and the plunger P held thereby toward the cross-head.

To prevent any longitudinal movement of the clamps A A whereby a lateral strain might be brought upon the rods a' a', &c., I have provided each of the clamps A A with the upwardly-extending projections or jaws a^4 a^4 and a^4 a^4, which embrace a fixed portion of the cross-head 1, along which they are free to slide vertically. The bearings of the rods a' a' a' a' in the cross-head 1 are preferably slightly elongated transversely to clamps A to allow a limited lateral play to rods a' a' a' a' for the purpose hereinafter explained.

In the cross-head 1, between the clamps A A, is formed the inclined lateral slot or groove b, in which works a bar B, having an inclined upper face b'. The bar B rests upon the bolts a a, which connect the clamps A A, and the upper end of the plunger P, when held between the clamps, abuts against the bottom of bar B, which furnishes a firm support therefor.

The bar B is longitudinally reciprocated along the slot b, preferably by the following mechanism: To the bar B is secured a lug b^2, through a vertically-elongated bearing, in which is projected a rod b^3, free to rotate but held from longitudinal motion by suitably-placed collars b^4 and b^5. The inner portion of rod b^3 is threaded and engages with a correspondingly-threaded bearing b^6 in the cross-head 1. The rod b^3 conveniently carries an operating lever or wheel b^7, by means of which it may be rotated. The above-described arrangement is such that a rotation of the wheel b^7 in one direction advances the bar B along the slot b under the cross-head 1, depressing the clamps A A and the plunger P, carried thereby, against the tension of the springs a^2 a^2, &c., while an opposite rotation of the wheel b^7 withdraws the bar B and allows the clamps A A and the plunger P to be raised by the action of the springs a^2 a^2, &c.

In connection with the mechanism above described it is to be noted that the plunger P can readily and quickly be adjusted to any required elevation thereby, and that at any elevation the bar B furnishes a firm backing for the plunger, capable of sustaining any required pressure with comparatively little wear upon itself or the working parts connected therewith. It is to be further noted that when arranged as above suggested the plunger P has no tendency to twist out of line with the female mold.

In practice I find it convenient to provide a check-bolt b^8, which is threaded and projected through threaded bearings in a lug b^9, dependent from the bar B. The check-bolt b^8 is conveniently provided with an operating-handle b^{10} and serves to prevent any liability of the plunger P working forward between the clamps A A and out of alinement with the female mold.

By means of the check-bolts a^5 a^5, which are also threaded and projected through threaded bearings in the clamps A A, and which bear upon opposite sides of the bar B, the plunger P may be laterally adjusted to bring it laterally into line with the mold, the elongated bearings of the rods a' a', &c., hereinbefore referred to, admitting of a limited lateral motion of clamps A A for this purpose.

Upon the movable cross-head 3 is mounted a suitable bed-plate 4, preferably bolted to cross-head 3, which supports the female mold D.

As shown in the drawings, the mold D is the usual form of two-part divided mold common in this class of machines, comprising the two parts d and d'. In the prior art the parts d and d' are arranged to form the back and sides of the mold and to coöperate with a fixed portion of the machine which forms the breast-wall. In the present invention I have provided the mold D with a breast-wall which is movable vertically with reference to other parts of the mold and the plunger with a downwardly-extending projection or lip which overlaps the movable breast-wall and changes its elevation with reference to other parts of the mold as the plunger enters the mold.

In the drawings, E represents the vertically-movable breast-wall, which extends along the front of the mold D and is mounted in suitable bearings, supported by the cross-head 3 or the bed-plate 4 thereon, in which it is free to reciprocate.

In practice I find the following to be a simple and convenient arrangement: The plate which forms the breast-wall E works between the outer face of cross-head 3 and a plate e^4, conveniently secured to the bed-plate 4. The plate E is fitted to a slot in the bed-plate 4, and below said slot is held laterally in position by the flanges e^5 e^5 on the plate e^4. (See Fig. 3.)

In the above arrangement the plate E is in contact with its bearings along both its faces and sides, and I find in practice sufficient friction will be developed to support the weight of the plate E and the rod e, as hereinafter described. To the lower part of the plate E is secured a rod e, which extends downward and is projected through suitable bearings in a cross-bar e', in which it is free to reciprocate vertically. The rod e carries above the cross-bar e' a collar or shoulder e^2,

By p is represented a downwardly-extending projection or lip upon the plunger P, which extends forward, overlapping a portion of the wall E. (See Fig. 3.)

The hereinbefore-described arrangement is such that when the cross-head 3 starts to rise the wall E is held by friction flush with the top of mold D, or nearly so, and as the plunger P starts to enter the mold D the overlapping lip p, coming in contact with the wall E, holds it from rising with the other parts of the mold, thereby depressing it with reference to the same. It may be noted in this connection that in arrangement just described while the compression (or the latter portion thereof) of the blank is occurring the blank is being moved upward along the breast-wall E, which is held stationary by the lip p, which effectually prevents any liability of turning up any portion of the breast edge of the blank, as hereinbefore described. As the cross-head 3 moves down to separate the plunger and mold the rod e slides through its bearings in bar e', and the position of the collar e^2 is such that before the cross-head 3 reaches the limit of its downward movement the collar e^2 comes in contact with the bar e' and lifts the plate E to its original position. In regard to this feature of the present invention I wish to say that I consider the same broadly new and therefore not limited to details of form and arrangement of parts, as hereinbefore specified.

The parts d and d' of the mold D are free to slide horizontally along the bed-plate 4 and are actuated and held in position by the following mechanism:

H H represent the mold-carriers and, as shown, consist of a suitable block or plate h and what I have denominated a "wearing-strip" h', bolted or otherwise suitably secured thereto. The blocks h h are free to slide along the bed-plate 4, working in a suitable guideway 5 therein.

In practice I find it convenient to provide between the side of the guideway 5 and the wearing-strip h' a laterally-adjustable bearing-piece 6, which is secured to the bed 4 by the bolts 7 7, which extend through transversely-elongated bolt-holes in the bearing-piece 6. Projected through the table 4 at the side of the way 5 are the bolts 8 8, which bear against the bearing-piece 6, and by which the same may be laterally adjusted to take up the wear upon the wearing-strip h'.

The tendency of the mold D is to move backward under pressure, which causes it to bear more heavily upon its bearing or guide at the back, producing rapid wear. For this reason I have extended the wearing-piece inward beyond the block h h and along the back of the parts d and d' of the mold D. (See Figs. 5 and 6.) To prevent wear upon the bed-plate 4, I have provided under the mold D a hardened steel plate 9, sunk in a groove in the bed-plate 4. The inner end of the plate 9 is provided upon its under side with a dovetailed open-ended groove, which engages a correspondingly-shaped projection on the bed-plate 4 and holds the inner end of the plate 9 in position without interfering with the evenness of its surface within the mold. The outer end of the plate 9 may be bolted to the table 4 in the usual manner. The parts d and d' of the mold D may be conveniently connected with the carriers H H by means of a lug d^2, projected from the block h into a socket in the part d or d' and locked therein by a pin d^3, substantially as shown in Fig. 4.

The mold-carriers H H are reciprocated laterally by means of the oblique arms 12 12, pivotally secured at their upper ends to the cross-head 1, and the lower ends of which abut upon the shoulders h^3 h^3 on the blocks h h.

In the prior art the parts of a divided mold have been actuated by means of oblique arms pivoted to the stationary cross-head and pivotally connected with the respective parts of the divided mold, but such arms have heretofore been rigidly connected at their lower ends, rendering them liable to be broken by the slight twisting motion of the machine apt to occur when pressure is applied.

To remedy the difficulty above suggested, I have so connected the arms 12 12 at their lower ends that they are capable of a slight independent movement.

As shown in Fig. 7, I secure the above result by connecting the arms 12 12 by a bolt 13, which is projected through a bolt-hole drilled in each arm and drilled to a greater diameter than the bolt 13 at the abutting sides of the arms 12 12. The above arrangement gives a short bearing for the bolt 13 in each of the arms 12 12 and, with the ordinary machine fit, play enough for the purpose above suggested.

Heretofore when it has been proposed to actuate parts of a divided mold by means of pivoted oblique arms connected therewith and with a fixed part of the machine, the parts of the mold were separated by the full throw of the arms, a feature which has been found to be objectionable in that the molds were separated farther than required, rendering the blank liable to get out of position before being inclosed by the mold and occasioning unnecessary wear on parts. I remedy this objection by the following arrangement: As already stated, the inner ends of the arms 12 12 abut upon the shoulders h^3 h^3 of the blocks h h. From each of the arms 12 12 is laterally projected a stud h^4, which engages with a slot h^5 in the wearing-strip h', forming what I term a "draw connection" between the carriers H H and the arms 12 12. A suitably-placed spring h^6, suitably secured to the block h and the arms 12 12, normally acts to hold the shoulder h^3 in contact with the inner ends of said arms. Upon each of the wearing-strips h' h' is an upwardly-projecting bolt or stud h^7, which is arranged to come in contact with a laterally-projecting stop h^8,

conveniently secured to the bearing-piece 6, and limit the outward motion of the carrier H. At the bottom of the block h is formed a flange or projection h^9, which projects outwardly under the inner ends of arms 12 12. (See Fig. 4.)

The above-described arrangement is such that as the cross-head 3 is lowered the parts d and d' of the mold D are carried outward by the arms 12 12 until the studs h^7 h^7 come in contact with the stops h^8 h^8, when the outward motion of the parts d and d' is stopped and the arms complete their outward throw against the tension of the springs h^6 h^6, which allow them to move away from the shoulders h^3 h^3.

To provide for wear at the pivoted connection of arms 12 12 with cross-head 1, I have adopted the following device: Each of the arms 12 12 is provided with an eccentric bushing 20, and the pin 21, which connects the arms 12 12 with the cross-head 1, is provided with laterally-projecting studs 22 22, which bear against the bushings 20 20. The bearing of the pin 21 in the cross-head 1 is provided with a slot 23, which enables the pin 21 with its projecting studs to be inserted therein.

The above-described arrangement is such that a rotation of the pin 21 by means of the studs 22 22, acting upon the bushing 20 20, will move the arms 12 12 slightly inward to take up any wear on the arms or their bearing and secure an accurate closing of the mold D.

L represents a vertically-reciprocating heel-rest, a device common in this class of machines, which may be either elastically supported, as shown, or positively actuated, as in other forms of heel-compressing machines.

The function of the several features of my invention and their mode of operation has already been sufficiently described in connection with the description of their form and arrangement.

I therefore claim as novel and desire to secure by Letters Patent—

1. In a heel-compressing machine the combination with a divided mold, plunger, and suitable actuating mechanism, of a breast-wall for the divided mold vertically movable with reference thereto, and a projection or lip on the plunger arranged to overlap the breast-wall, substantially as described.

2. In a heel-compressing machine the combination with a female mold, of a plunger, a cross-head, a spring or series of springs upon the cross-head arranged to support the plunger, a longitudinally-reciprocating oblique-faced bar interposed between the plunger and the cross-head, and mechanism for reciprocating the bar, substantially as described.

3. In a heel-compressing machine the combination with a female mold, of a plunger, a cross-head, a spring or series of springs on the cross-head, arranged to support the plunger, an inclined groove in the cross-head above the plunger, a reciprocating bar having a correspondingly-inclined face, arranged to work in said groove and to bear upon the plunger, substantially as described.

4. The combination with associated parts of a heel-compressing machine, of a plunger, a cross-head for supporting the same, and a pair of spring-supported vertically-movable clamps for connecting the plunger to the cross-head, substantially as described.

5. The combination with associated parts of a heel-compressing machine, of a plunger, a cross-head for supporting the same, and a pair of vertically and laterally adjustable spring-supported clamps for connecting the plunger to the cross-head, substantially as described.

6. The combination with associated parts of a heel-compressing machine, of a two-part divided mold, suitable carriers for the parts of the mold, oblique arms for actuating the carriers, stops for limiting the outward movement of the carriers, draw connections between the carriers and their actuating-arms, and springs connecting the carriers with their actuating-arms, substantially as described.

7. The combination with associated parts of a heel-compressing machine, of a two-part divided mold, carriers for the parts of the mold, a wearing-strip on the carriers projecting back of the parts of the mold, and an adjustable bearing-piece arranged to take up the wear upon the wearing-strips, substantially as described.

8. The combination, with associated parts of a heel-compressing machine, of a two-part divided mold, the parts of which are movable toward and from each other, mechanism for actuating the parts of the mold, stops for limiting the motion of the parts of the mold, and a draw connection between each part of the mold and its actuating mechanism, substantially as described.

9. The combination, with associated parts of a heel-compressing machine, of a plunger, a cross-head for supporting the same, spring-supported vertically-movable clamps for connecting the plunger to the cross-head, and a reciprocating oblique-faced bar interposed between the plunger and the cross-head, substantially as described.

10. The combination with associated parts of a heel-compressing machine of a suitable cross-head, a plunger carried thereby, a clamp for securing the plunger to the cross-head, and an adjustable stop arranged to prevent any forward motion of the plunger, substantially as described.

11. In a heel-compressing machine the combination of a plunger, a female mold, a breast-wall for the female mold vertically movable with reference to other parts thereof, a projection on the plunger for depressing the breast-wall with reference to other parts of the mold, and means for returning the breast-wall after such depression to its original position, substantially as described.

12. In a heel-compressing machine the combination, with a heel-seat die, of a female mold comprising a breast-wall vertically movable independently of the mold and die, substantially as described.

13. In a heel-compressing machine the combination, with a stationary heel-seat die, of a vertically-movable cross-head, a female mold mounted on the cross-head, and a breast-wall for said mold carried by the cross-head and vertically movable independently thereof, substantially as described.

In testimony whereof I have hereunto set my hand, this 5th day of June, in the presence of two attesting witnesses.

CHARLES F. LAMBERT.

Witnesses:
BENJAMIN PHILLIPS,
A. E. WHYTE.