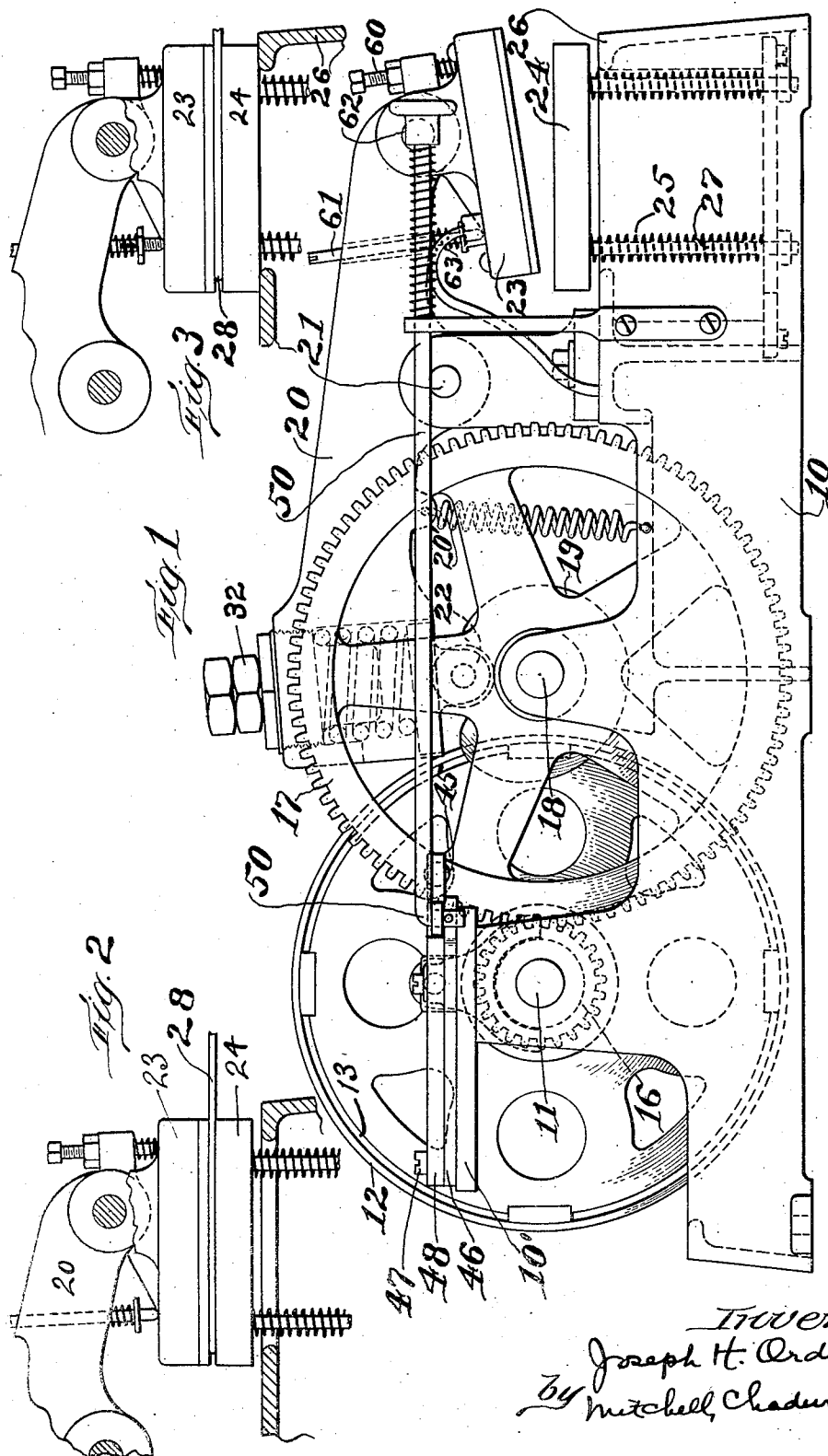


Jan. 30, 1923.

1,443,378

J. H. ORDWAY.
MOLDING PRESS.
FILED APR. 12, 1920.

4 SHEETS-SHEET 1



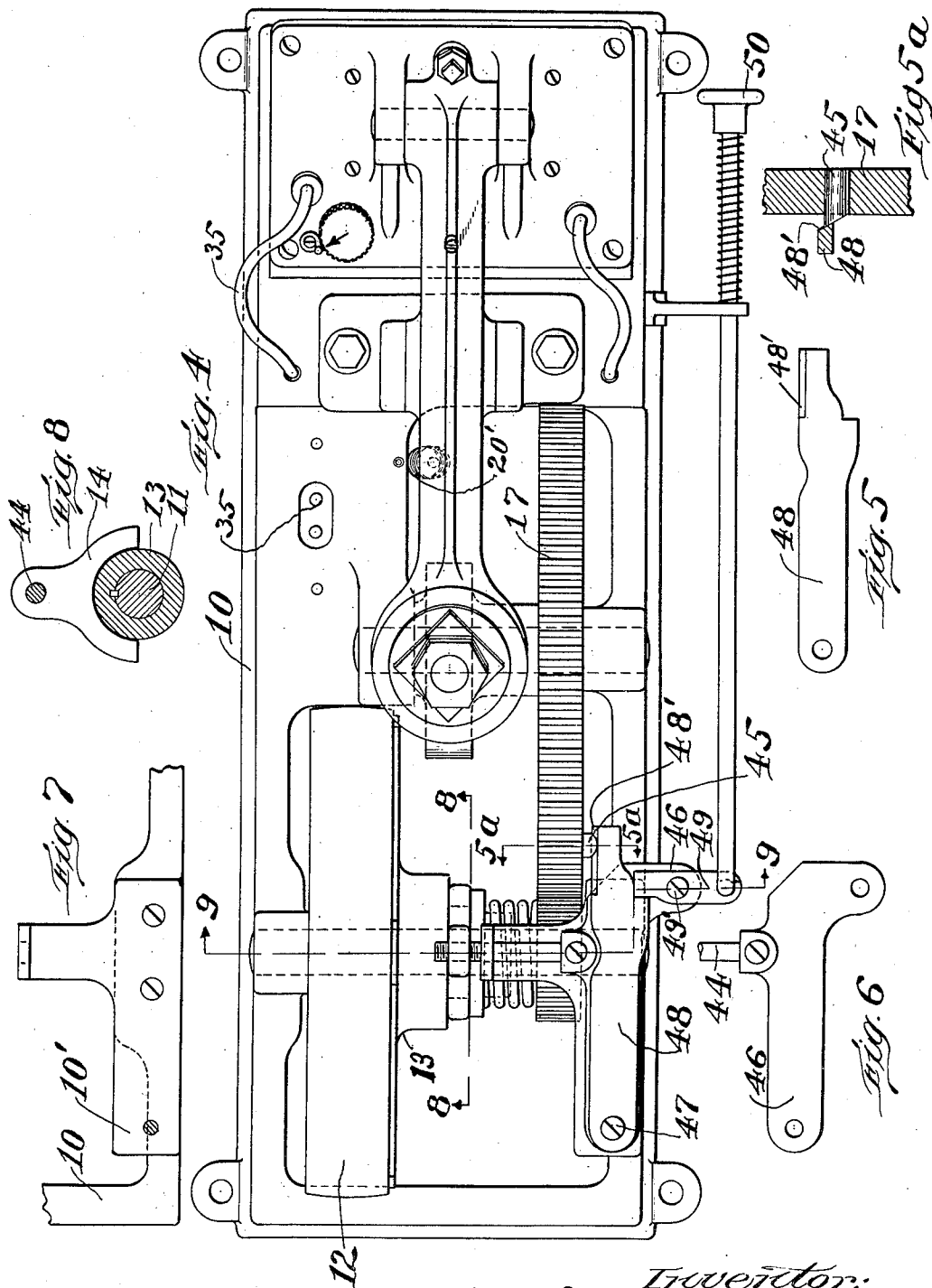
Inventor:
Joseph H. Ordway
by Mitchell, Chadwick & Kent
Attys

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4 SHEETS-SHEET 2



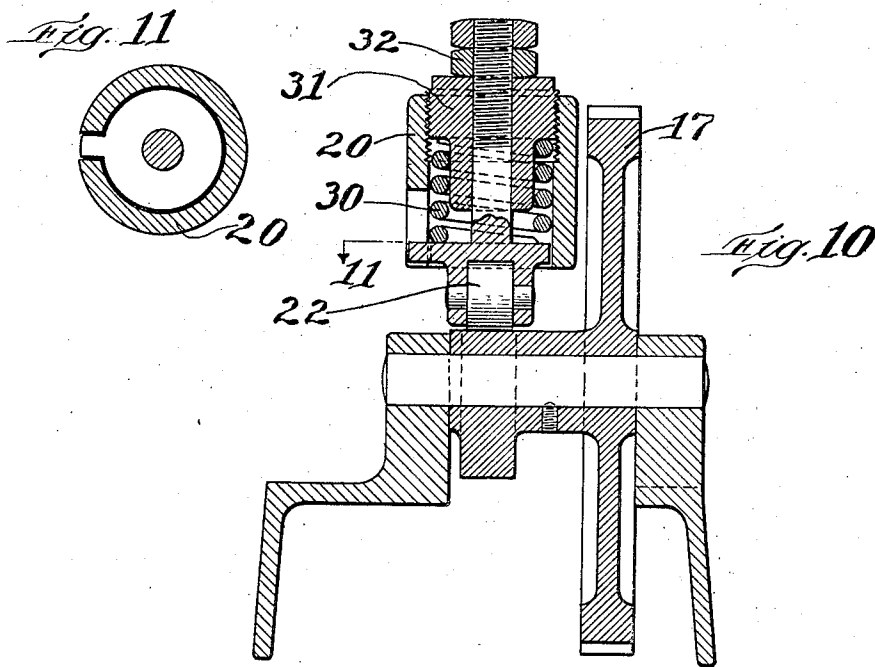
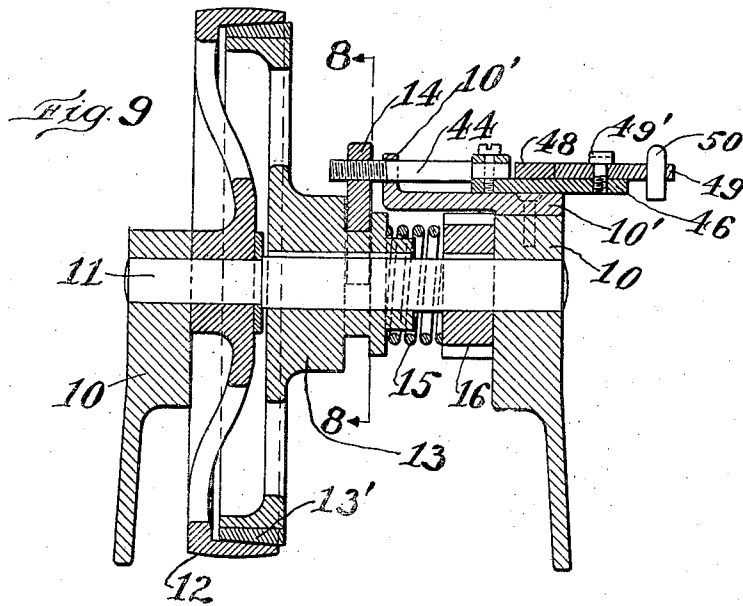
Inventor:
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4 SHEETS-SHEET 3



Inventor:
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1,443,378

4 SHEETS-SHEET 4

Fig. 12

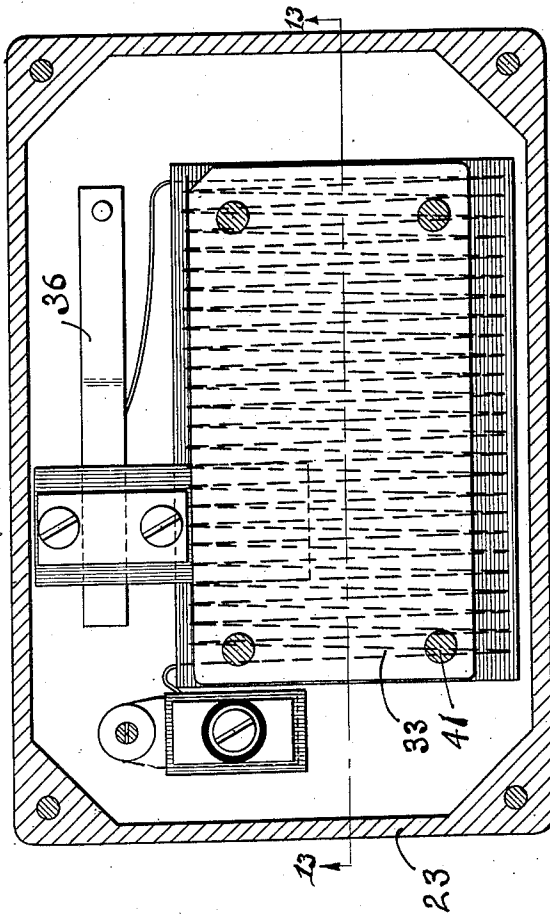


Fig. 13

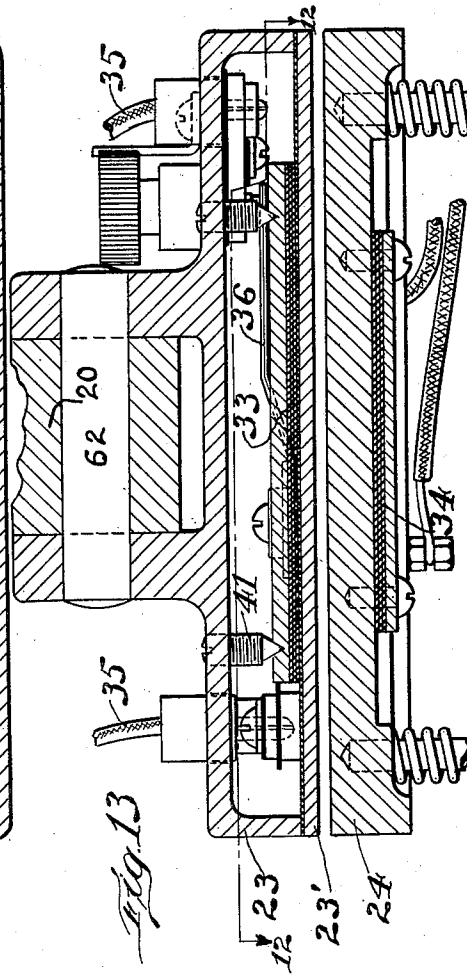
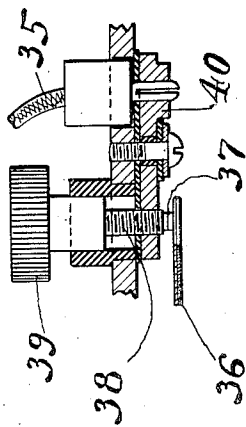


Fig. 14



Inventor:
Joseph H. Ordway
by Mitchell, Chadwick & Kent
Attys

UNITED STATES PATENT OFFICE.

JOSEPH H. ORDWAY, OF BROOKLINE, MASSACHUSETTS.

MOLDING PRESS.

Application filed April 12, 1920. Serial No. 373,036.

To all whom it may concern:

Be it known that I, JOSEPH H. ORDWAY, a citizen of the United States, residing at Brookline, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Molding Presses, of which the following is a specification.

This invention relates to improvements in presses for manipulating plastic sheets, such as stiffening compounds, for box toes, shoe counters, or other articles.

In U. S. Letters Patent, No. 1,252,298, granted to me on the first day of January, 1918, I have described a process of making box toes for shoes which may include as one of its steps the application of heat and pressure whereby a homogeneous sheet of composition is molded into the interfibrous spaces of a sheet or a plurality of sheets of cloth thereby, by the combination of composition and cloth, and upon the hardening of the composition, producing a sheet capable of making, when lasted, a strongly arched toe. Simultaneously the thickness of the sheet of compound may be reduced at its edge, or the thickness otherwise varied, as may be desired for the particular type of shoe in which it is to be used. The present invention is herein illustrated as applied to this process and provides apparatus capable of receiving a "disk" or suitably shaped sheet of the compound, assembled within the upper, and simultaneously heating, softening, and molding it into the interfibrous spaces of the cloth therein, preparatory to lasting. The invention is intended to make it possible for one machine with one set of dies to operate on disks for sundry sizes of shoes, for which heretofore sundry sizes of dies would have been needed; and to conserve human labor and time by providing automatic action, governing and termination of the process on each upper. This last mentioned object is accomplished by providing so that a multiplicity of the presses, four being a suitable number for ordinary work, can be mounted within convenient reach where an operator devoting 3 or 4 seconds to each in turn can keep them all at work. Other purposes and the means of attaining them appear hereinafter.

The invention can be used for various purposes and embodied in various forms.

It is intended that the patent shall cover, by suitable expression in the appended claims, whatever features of patentable novelty exist in the invention disclosed.

In the accompanying drawings:

Figure 1 is a side elevation of a complete machine embodying the invention with the pressing plates in position for insertion of the material;

Figures 2 and 3 are similar elevations of a fragment, showing successive stages of operation;

Figure 4 is a plan of the machine;

Figures 5, 6 and 7 are plans of details which underlie each other in Figure 4;

Figure 5^a is a front elevation in section on line 5^a of Figure 4;

Figure 8 is a side elevation of a detail, in section on the line 8—8 of Figure 4;

Figure 9 is a rear end elevation of parts, in section on the line 9—9 of Figure 4;

Figure 10 is a rear end elevation of parts, in section on the line 10—10 of Figure 4;

Figure 11 is a plan of a detail, in section on the line 11 of Figure 10;

Figure 12 is a plan of the forward portion of the machine on a larger scale, in section approximately on the line 12—12 of Figure 13; just above the thermostat;

Figure 13 is a front elevation of the same, in section on the line 13—13 of Figure 12; and

Figure 14 is a front elevation in medial section through certain details which are seen in full elevation in Figure 13.

Referring to the drawings, 10 indicates a base wherein is journaled a shaft 11 which, as most clearly seen in Figures 4 and 9, supports loosely a driving wheel 12 whose interior face constitutes one member of a clutch, the other member of the clutch being marked 13, splined on shaft 11 and slidable thereon by fork 14 working against spring 15. When the clutch is set closed, the shaft 11 is thereby driven, and with it the pinion 16 thereon which, as seen in Figures 1 and 4, drives a larger gear 17 set in the middle portion of the machine on a shaft 18 which also carries a cam 19 for operating the lever 20. Said lever, fulcrumed further forward in the machine at 21, has at its rear a roller 22 riding on top of the cam, so that the rises in the cam cause depression of the forward end of the lever 20, forcing the upper presser block or plate 23 which is there lo-

cated down upon the under presser block or plate 24. The latter is supported in a substantially horizontal position on four springs 25, one at each corner, and when these yield from the position seen in Figures 1 and 2, it rests firmly on the base 26 in the position seen in Figure 3. These springs are stiff enough to require exertion of a moderate pressure between the blocks before the under one yields. In yielding, the latter may be guided, as illustrated, on rods 27 on which the spiral springs 25 are wound. Cooperating with these springs is a single and powerful spring 30 at the other end of the lever 20, inserted between the cam roller 22 and the lever 20, as seen in Figure 10. The cam 19 is shaped with a quick rise followed by a rest at that elevation and then gradual further rise, followed by quick descent to initial point. When it begins to turn from the position illustrated in Figure 1, it quickly lifts the cam roller 22. As the spring 30 remains unyielding, the lever swings the upper presser block 23 downward toward the lower plate 24, engages anything that may be thereon, such as an upper 28 with a sheet of composition assembled in it, and depresses it a little, enough to make sure that pressure equal to the tension of the springs 25 is experienced. The rest, produced by the semi-circular right-hand half of the cam as represented in Figure 1 occurs here. Resumption of the rise of the cam slowly carries the under block down, through perhaps a fourth of a revolution, until it rests against the firm base support 26, after which the continuation of rise results in yielding of the material which is between the two blocks, or else in yielding of the powerful spring 30. The limit of pressure on the material may be adjusted and predetermined by the screw setting of the plug 31 which backs the spring and cam roller 22 and is held by lock nuts 32. It is at this stage that the composition is forced into the interfibrous spaces, having been preliminarily softened and rendered plastic by heat during the moderate pressure applied by springs 25. Upon the ensuing fall of the cam, at which the spring 20' draws down the cam roller, all is released and the blocks return to the position illustrated in Figure 1.

The heating is illustrated in Figures 4, 12, 13 and 14. Uniformity of heat is important, for obtaining uniform results. For the particular work that is being described, it is important to supply to the press block all heat that is abstracted by the work, or lost by radiation. This might readily be done by supplying an abundance of heat; but the leather would thereby be injured, as the rate of abstraction may vary considerably. It is, therefore, important to prevent oversupply of heat. To accomplish this, the face plate of the press block is made of thin material, for example $\frac{1}{8}$ " metal; and the heating unit is arranged close to its inner face, spread over it, and powerful enough to put heat back into that thin plate as rapidly as the shoe tip abstracts it. In practice, its capacity must exceed the normal rate of withdrawal. The invention, therefore, makes provision whereby it operates only intermittently, upon variations of temperature above and below a small fixed range, as controlled by a thermostat in the midst of the block. The heating unit 33 of the upper block may be of any suitable type, but it is represented as a flat unit set within the block against its removable and insulated under cover plate 23' (Figures 12 and 13). As automatic means governing uniformity of temperature of this plate the heating unit has in series a thermostatic element 36, at whose free end is a contact 37 with the tip of a screw 38, having a head 39 conveniently accessible for its hand adjustment on the top of the block. The circuit continues thence through the socket piece 40 to the plug end of the conductor 35. Turning the knurled head 39 varies the position of tip 38 where the contact is made. The thermostatic element is set in air enclosed within the hollow presser block 23 to the rear of the heating unit, where the latter does not intervene between it and the face of the plate, and is secured to the inner face of that plate, duly insulated electrically so that it is by conduction and by convection subject to temperature conditions thereof. It is a spring pressing upward. With increase of temperature, it tends to curve downward and so to break the contact 37, which occurs when the temperature reaches the point predetermined by the setting of the screw 39, 38; and with the ensuing decrease of temperature it curves upward and remakes the contact. The heating unit thus controlled is held against the inside of the bottom plate by pressing screws 41 whose conical points reach it from above. The heat generated close to the plate is readily transmitted through it to the material on which that plate operates; and the thermostat causing intermittent action of the heating coil has been found by experience capable of maintaining temperature at a fixed degree without more than 2° to 5° variation. The under plate 24 is thin, and is maintained moderately heated by a heating unit 34 of suitable sort, arranged beneath and in contact with the metal of the plate. This may be continuously connected, or may be in the circuit controlled by the thermostat; or it may at option be disconnected, leaving the lower plate cold, which is desirable for certain sorts of work. Its purpose when used is to prevent the leather from withdrawing heat from the plastic composition, filling the leather with heat from this source to a moderate degree, or

per contra, when not used, to cause the leather to withdraw heat from the composition by leaving the leather cool, thus hardening the lower surface of the composition without much penetrative flow thereof.

The drawings illustrate in Figures 1—4 a screw 60 and a pin 61, respectively forward and to the rear of the pivot 62 by which the block 23 is attached to the lever 20, the center of gravity of the block being to the rear of the pivot, so that the block tends to swing forward as illustrated, with its lower face at an angle with the lower block 24. A spring 63, strung on the rear pin, acting in conjunction with gravity, keeps the block 23 swung on its pivot 62 against the tip of screw 60 so long as the blocks are apart; and when the heavy compression comes the angle between the block faces may be determined by the setting of screw 60. If this is set down enough to make a small angle, opening to the rear, the upper being inserted with its toe pointing into the machine, the pressure will mold a thin edge of the plastic disk across the midst of the upper, at the beginning of the toe, as is suitable for plain toed shoes, with the thickness of disk gradually increasing toward the left in Figure 1. Although the machine is illustrated with dies having plane faces, it will be understood that concave or convex or composite faces might be used. Where it is desired to preheat a large tip, one which reaches to the back of the plates, a withdrawal of the adjusting screw 60 at the front edge lets the back edge of the upper plate sit lower, thus giving more pressure or a quicker contact at the back. In such case the spring 63 aids gravity in making a light and steady pressure during the preheating, so that the composition is uniformly softened over the whole area before the heavy pressure is applied.

The lever operating mechanism requires to be started easily by the operator, and to be stopped automatically with the presser blocks separated, after application of the predetermined pressures at the predetermined angle and temperature for a predetermined number of seconds. Important parts which co-operate with others to produce this are the spring 15, which when released closes the clutch to start the machine and the cam pin 45 on the main gear 17 which opens the clutch. The clutch control device comprises the fork 14, the rod 44 extending therefrom and the horizontally swinging lever 46, pivoted at 47 at the rear on a plate 10' fixed on the base, which when set outward holds the rod 44, fork 14, and clutch member 13 open so that the power is disconnected. This opening is accomplished when the cam pin 45 in the large gear 17 strikes the cam surface 48' on an auxiliary lever 48 which overlies the lever 46, is ful-

crumed on the same pivot 47 with it, and acts as if integral with it, for the instant illustrated in Figure 5^a because of the latch 49 which connects these two. This latch, as illustrated, has the aspect of a detent pivoted on the lever 46 at 49', resting thereon in the same plane with the lever 48, and normally set so that, when the cam pin 45 in its travel reaches the cam surface 48' and drives the lever 48 outward, this pulls the rod 44 and clutch 13, cutting off the power; and the pin 45 is so set that this occurs when the roll 22 is at the bottom of the depression of the cam 19. With the power thus cut off, and with the springs 15 and 20' and the momentum of the heavy lever 20 opposing further motion, the latter having to reverse its motion after a quick swing, the parts come to rest before the pin 45 has passed the cam 48'. Thus they remain with the clutch 13 held open by the cam pin 45, which in turn is held still because the spring 20' maintains the cam 19 stationary by holding the cam roller 22 in the narrow trough whence it cannot move without rising against the spring 20'. Operation is resumed when the operator pushes the button 50, conveniently located on the end of a spring-held rod, ready when pushed to swing the detent 49 away from the lever 48, so that even though the lever 48 remains engaged by the cam pin 45, the lever 46 is free of it and can swing inward, which it immediately does under the pull of the clutch spring 15. The continuously running drive wheel 12 thereupon sets the cam 19 again in motion and the cycle is repeated, coming to a similar stop at the end of a single revolution of the cam 19.

The various parts thus described co-operate, for the special work for which the illustrated specimen of the press is designed, as follows: It being desired to cause a solid homogeneous sheet of stiffening compound to pass into impregnating relation to the cloth doubler and toe piece of a shoe upper, the purpose of the mechanism is to accomplish this automatically and correctly. The machine must pass heat through the leather and cloth, either or both, enough to soften the disk of composition, meanwhile guarding against injuring the leather by heat; must apply pressure which may be as much as 2,000 pounds for molding the disk, from its initial parallel-sided shape to a thin edged shape, if desired, and to force it into the body of cloth fabric, or, if preferred, merely to make it stick thereto; and must stop automatically when this is done. Furthermore, it is a purpose that the same machine shall be capable of treating large or small tips; thick and thin; and of producing a feather edge, or leaving a thick edge on each or all, with standard results, according to what is predetermined. The specifications to accomplish this in one machine, which may be

taken as an illustrative example, is to provide a heating unit, 34 in the under plate taking about 25 watts steadily, and a heating unit 33 in the upper plate taking 150 watts for a short period at the beginning of operations, but which, when running, takes only about 60 watts on the average. The under plate is thin so as not to contain a body of heat which may injure the tip, but just enough heat to warm the cold leather when it is put in; and radiation prevents it from rising above approximately 160° F. The upper plate face may be maintained by the thermostat within a range of 2° to 5° in the vicinity of 210° to 220°. The machine, making a complete revolution of the cam in 20 seconds, applies the heat for approximately 15 seconds at a moderate pressure of the springs 25 for the pre-heating, and then continues the application of heat at the high pressure for 5 seconds more, during which time the flux of composition into the cloth doubler and into the cloth toe piece occurs, and the flux into new shape as desired for production of the thin edge. The machine must then stop and leave the upper safe from the heat. All of this the machine does. The pressure is controlled by the cam 19 and relative action of springs 25 and 30. The intensity of heat is controlled by the thermostat; the length of heat is controlled by the cam 19, speed of the machine being taken into account; and the automatic cessation of heating comes with relaxation of pressure and heat by the cam pin 45, and the cam 19, and clutch control 44, leaving the upper resting on the merely warm lower plate to await removal.

Meanwhile, all that the operator does is to insert the upper and press the button 50.

Under these circumstances, an operator can work four machines, placing an upper in each of them in turn and pushing its button. For this, five seconds is ample time; and by the time the fourth is completed, the first has done its work and is ready again.

I claim as my invention:—

1. A machine having, in combination, two co-operating dies, one of which is yieldingly supported away from a fixed abutment, and the second of which is yieldingly supported away from the first die; and pressing means for piling the dies with material between them on the fixed abutment to compress the material; there being yieldable means in the line of pressure and yielding at a predetermined high pressure, whereby the compression of the material is limited to the said pressure.

2. A machine having, in combination, a fixed abutment and two co-operating dies, one of which is movable toward the other and said other of which is yieldingly supported away from the abutment; means for first pressing the movable die toward the

other enough to engage material between them and to move both dies and material simultaneously a limited distance against said yielding support, the same being moderate pressure; means adapted to maintain said moderate pressure for a period; means for imparting heat to the engaged material through one of said dies while said moderate pressure continues; means afterward operating to seat said dies and material on the abutment and to compress the material thereon; and means associated with said movable die whereby the force of compression by that die is limited.

3. A machine having, in combination, two dies, means for moving and pressing one of them toward the other with moderate pressure on an article between them; means for imparting heat to the article through one of them while said pressure is maintained; and means for actuating the dies further closer together thereafter with increased pressure, there being yielding means responsive to said increased pressure whereby the pressure between the dies may be limited.

4. A machine having, in combination, a base; a die; means yieldingly supporting the die adjacent to the base at a little distance; a co-operating die; means for moving one die toward the other, a predetermined distance, enough to cause the support to yield part way toward the base; means temporarily maintaining the dies in this position, and means for moving the co-operating die further to press the first-named die against the base, there being an element co-acting with all of said means and yieldable under excessive pressure to limit the pressure between the dies.

5. A machine having, in combination, a base; a die; means yieldingly supporting the die adjacent to the base at a little distance; a co-operating die; means for moving one die toward the other, a predetermined distance, enough to cause the support to yield part way toward the base; means temporarily maintaining the dies in this position; means for moving the co-operating die further to press the first-named die against the base, and means for thereupon increasing the pressure between the dies, there being an element co-acting with all of said means and yieldable under excessive pressure to limit the pressure between the dies.

6. A machine having, in combination, a base; a die; means yieldingly supporting the die adjacent to the base at a little distance therefrom; a co-operating die; means for moving the co-operating die toward the other die with initial pressure between them, thereby causing the support to yield part way toward the base; means maintaining the dies in this position for a period;

means for moving the co-operating die further, thereby pressing the first named die against the base; and means for thereupon increasing the pressure between the dies; there being means associated with said co-operating die for yieldingly holding it at an acute angle with the first die when the apparatus is inactive, and yielding during the initial pressure to permit adjusting movement of the co-operating die face with respect to the other; and other means associated with said co-operating die for limiting said adjusting movement so as to fix the angle between the die faces during the time of increased pressure.

7. A machine having, in combination, a base; a die; means supporting the die adjacent to the base at a little distance; and yielding with moderate pressure; a lever fulcrumed upon the base; a die co-operating with the first die on one end of the lever; cam engaging means mounted at the other end of the lever, yielding with heavy pressure; and a cam therefor having successively a quick rise, a rest and a gradual further rise whereby the die face presses moderately on an article disposed between the dies, then temporarily maintains the pressure, and finally pressing the first die against the base subjects the article to increased pressure.

8. A machine having, in combination, a base; a die; means supporting the die adjacent to the base at a little distance; and yielding with moderate pressure; a lever fulcrumed upon the base; a die co-operating with the first die on one end of the lever; cam engaging means mounted at the other end of the lever, yielding with heavy pressure; and a cam therefor having successively a quick rise, a rest, a gradual further rise and a fall whereby the die face presses moderately on an article disposed between the dies, then temporarily maintains the pressure, then pressing the first die against the base subjects the article to increased pressure, and finally releases the pressure.

9. A machine having, in combination, a base; a die; means supporting the die adjacent to the base at a little distance; and yielding with moderate pressure; a lever fulcrumed upon the base; a die cooperating with the first die on one end of the lever; cam engaging means mounted at the other end of the lever; yielding with heavy pressure; and a cam therefor having successively a quick rise, a rest, a gradual further rise and a fall whereby the die face presses moderately on an article disposed between the dies, then temporarily maintains the pressure, then pressing the first die against the base subjects the article to increased pressure, and finally releases the pressure, there being means, overcome by the rise of the

cam, and released by the fall thereof, tending to swing the lever and its die away from the base, thereby releasing the article.

10. In a press for molding plastic sheets, the combination with pressing means including a die plate of means behind the face of the die plate supplying heat to the plate; and means controlling the supply of heat to said plate, said controlling means being intimately associated with the die plate and actuated by the temperature thereof, as distinguished from actuation by heat proceeding to it directly from the source of heat.

11. In a press for molding plastic sheets, the combination with pressing means including a die plate of means immediately behind the face of the die plate for supplying heat thereto and other means immediately behind the die plate responsive to the temperature residual in the die plate and adapted to control the supply of heat to said heating supply means; said responsive means being adapted to establish the supply when said residual temperature falls below a predetermined point and to interrupt the supply when said temperature rises above said point.

12. The combination with a hollow pressing block of electrical means within the hollow of the block for heating the pressing face thereof, and a thermostat arranged within said hollow in position to be governed by temperature of the said face and controlling the supply of current to said heating means.

13. The combination with a hollow pressing block of an electrical heating unit held against the inside face of the wall of the block whose outside face constitutes the pressing face; and a thermostat set mainly in air within the hollow in immediate proximity to another part of said inside face and controlling the supply of current to the heating unit.

14. The combination with pressing means including a die plate of electric means for heating the die plate, including a circuit supplying current thereto; a thermostat and means thereby to maintain the die approximately at predetermined temperature comprising the arrangement of a thermostatic element forming part of the electric circuit in sufficiently close proximity to and approximate parallelism with the said die plate so as to receive heat therefrom directly by conduction, convection and radiation; a terminus adjustable in position with which the thermostatic element is adapted to break contact upon its movement which ensues on increase of heat and micrometer manual means to set the position of said contact terminals in various predetermined positions.

15. A press having, in combination, a hollow pressing block; having a thin face plate; a heating unit held against the inside of the plate; a thermostatic spring mainly in air

within the block, secured to the inner face of the plate and receiving heat therefrom by conduction, and arranged at one side of the heating unit thereby receiving a minimum of heat therefrom directly; and adapted to control the supply of heat.

16. A press having, in combination, two co-operating dies, a heating unit for each die, means continuously supplying a low degree of heat to one, and means automatically controlling the supply of heat to the other of the dies, according to the temperature thereof, to maintain a predetermined high temperature therein.

17. A press adapted to force sheets of fabric and composition together, comprising in combination, two dies adapted, respectively, to engage on the side of the fabric sheet and the composition sheet, a heating unit for each of the dies, and means whereby the supply of heat to the composition side unit may be connected and interrupted automatically according to the rate of escape of heat from its die, to a predetermined high temperature to render the composition plastic, but not fluid; the said heating unit for the fabric side die being adapted to impart a temperature to the fabric to prevent it from cooling below plasticity the composition forced into it by the high temperature die.

18. A press for sheets of composition in solid form adapted for molding the same with fabric for box toes comprising two co-operating die plates adapted to receive between them a sheet of fabric and a sheet of composition, the said die plates having their faces diverging from parallelism by a small angle; an element for forcing them together at this angle, arranged for the apex of the angle to be at the back edge of the box toe, whereby the composition is molded thin at its edge which crosses the upper.

19. A press having, in combination, a relatively stationary die, a relatively movable die, operating means pivotally holding the movable die and automatically lifting it at a predetermined interval, and means respectively forward and to the rear of the pivotal point for maintaining the relatively movable die in position while lifted, one of said last means being yielding.

20. A press having, in combination, two dies adapted to co-operate with their faces at a variable small angle; means yieldingly maintaining one of the dies at an angle to the other approximating said variable angle, and a pressure element, pivotally holding the die which is thus maintained, whereby the die, under the pressure thereof, is shifted to an angle depending upon the resistance of different parts of the material compressed between the dies, and automatically returns to said angle when relieved of said pressure.

21. A press having, in combination, two

dies adapted to co-operate with their faces at a variable small angle; means yieldingly maintaining one of the dies at an angle to the other approximating said variable angle, with its apex pointing in the direction in which the material to be pressed is inserted, and a pressure element, pivotally holding the die which is thus maintained, whereby the die, under the pressure thereof, is shifted to an angle depending upon the resistance of different parts of the material compressed between the dies, and automatically returns to said angle when relieved of said pressure.

22. A press having, in combination, two plane faced dies, the edge of one of which is movable against the face of the other, and supports for them both, rigid up to the maximum predetermined pressure, whereby one is set so that their faces are at a small angle to each other, and adapted to cooperate in molding a vamp for a box toe.

23. A press having, in combination, two co-operating die plates; means to move one of them toward the other, comprising means whereby the terminal portion of said movement includes a lateral motion approximating parallelism with the face of said other.

24. A press having, in combination, two co-operating die plates; means to move one of them toward the other, the plates being molded so that the initial contact is with the plates at a small angle; and one of them being pivotally mounted, whereby the continuance of the motion introduces a lateral component into the motion of one die plate with respect to the other.

25. A press having, in combination, two co-operating die plates; and means to move one of them toward the other; one being horizontal and the other descending upon it being pivotally supported at a point whereat the pressure is communicated to it, said point moving in a predetermined path and being located beside its center of gravity whereby the plate by gravity hangs with one edge in advance of the other, thereby introducing a lateral component into the final portion of its motion toward the under die plate.

26. A press having two co-operating die plates and an element moving in a fixed path forcing and having a pivotal support for one of them, moving it toward the other of them, combined with supplemental means yieldingly holding one part of the plate in advance of the other, whereby pressure is exerted by the advance part of the plate in addition to the pressure thereof transmitted through said pivotal attachment.

27. A press having two co-operating die plates and an element moving in a fixed path forcing and having a pivotal support for one of them, moving it toward the other

of them, combined with supplemental means yieldingly holding one part of the plate in advance of the other, whereby auxiliary pressure is exerted by the advanced part 5 of the plate in addition to the pressure thereof transmitted through said pivotal attachment; and means to vary the said auxiliary pressure.

28. A press having two co-operating die 10 plates and an element moving in a fixed path forcing and having a pivotal support for one of them, moving it toward the other of them, combined with supplemental means yieldingly holding one part of the plate in 15 advance of the other, whereby auxiliary pressure is exerted by the advanced part of the plate in addition to the pressure thereof transmitted through said pivotal attachment; there being for said auxiliary pressure a rod passing loosely through said 20 pressing element from said advance portion backward through said moving element; a screw thread and nut thereon; and a spring between the nut and said moving element, whereby according to the adjustment of the 25 nut the tension of the spring is set without varying the length of the rod.

29. A press having, in combination, a relatively stationary die; a relatively movable die; pivotal-contact means for pressing 30 the movable die toward the other with its face at a predetermined angle and yielding supports between said pressing means and movable die at each side of the axis of the pivotal contact whereby the die, approach- 35 ing at the predetermined angle, yields therefrom to a different angular position according to the relative resistance encountered on opposite sides of said pivotal axis through which the ultimate pressure is ap- 40 plied to it.

Signed at Boston, Mass., this 31st day of March, 1920.

JOSEPH H. ORDWAY.