

No. 644,811.

Patented Mar. 6, 1900.

P. L. SYLVESTER.
MACHINE FOR MAKING BUTTONS.

(Application filed Oct. 18, 1899.)

(No Model.)

5 Sheets—Sheet 1.

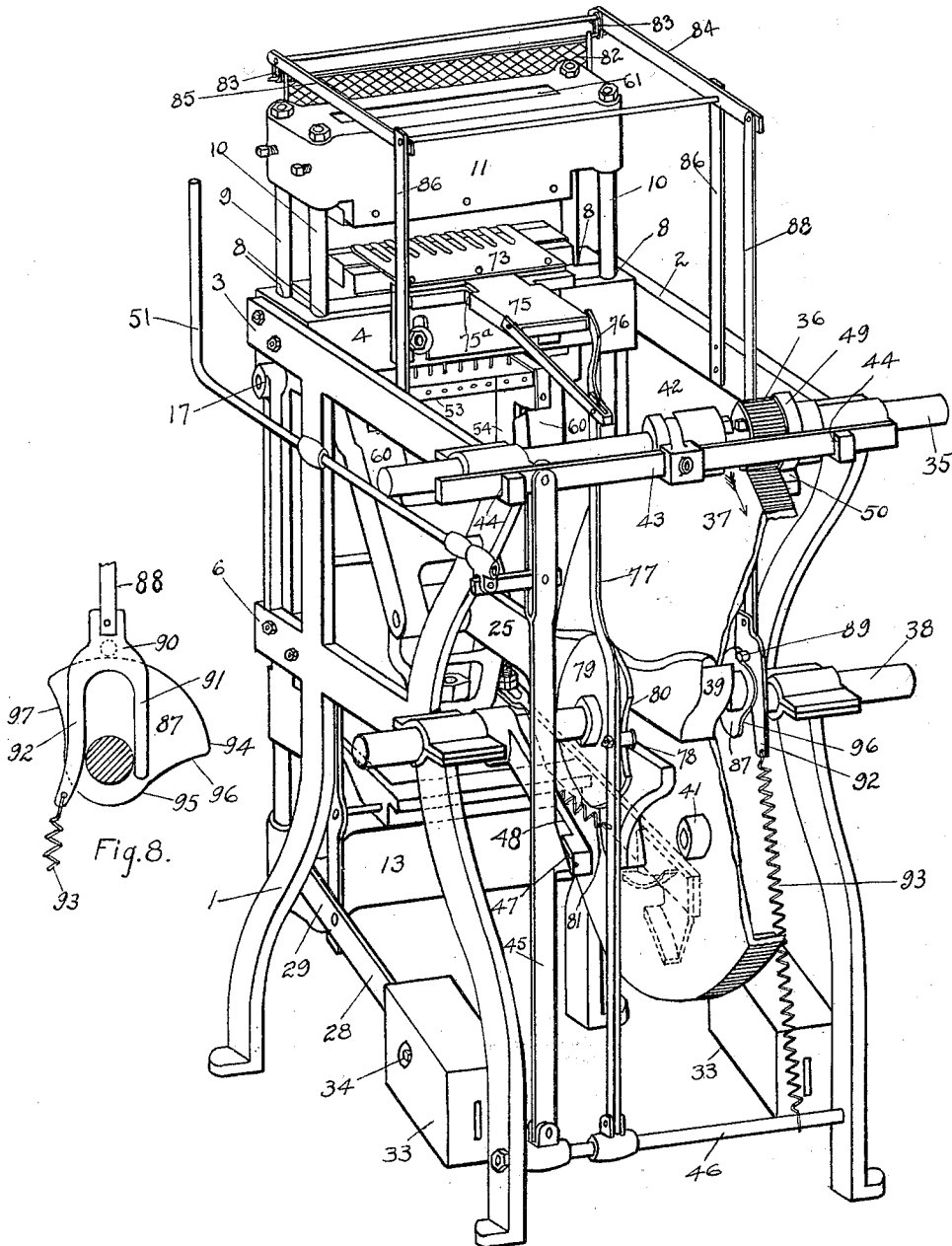


Fig. 1.

Witnesses
F. L. Levi.
Geo. T. Thomas.

Inventor
Philip L. Sylvester
By Watson & Watson
Attorneys

No. 644,811.

Patented Mar. 6, 1900.

P. L. SYLVESTER.
MACHINE FOR MAKING BUTTONS.

(Application filed Oct. 18, 1899.)

(No Model.)

5 Sheets—Sheet 2.

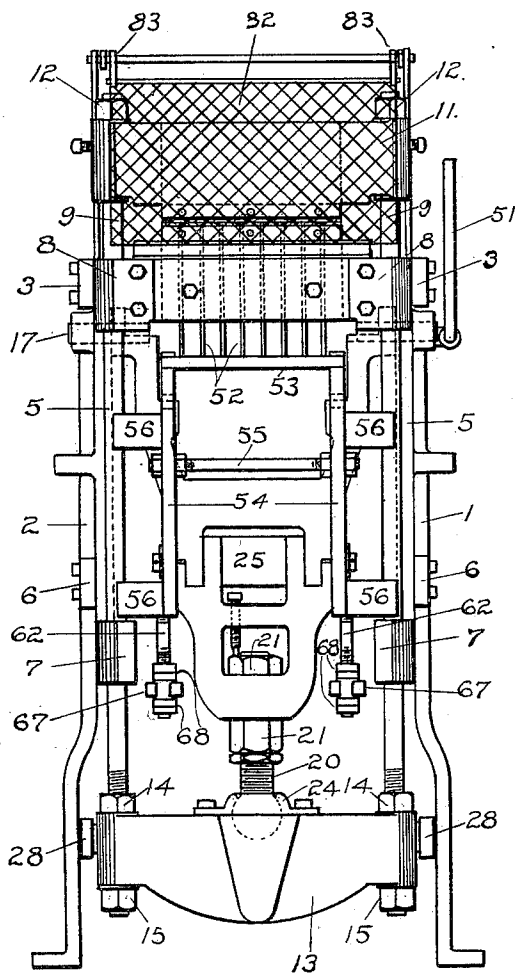


Fig. 2.

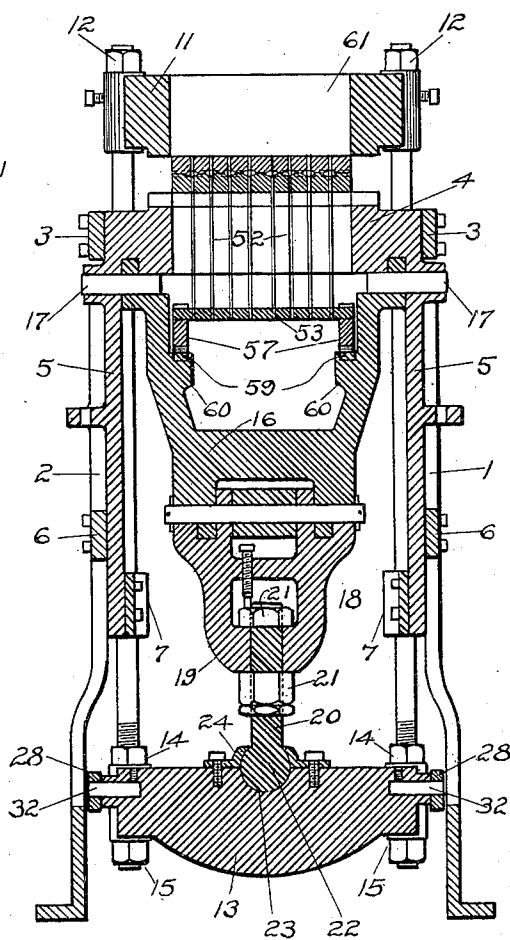


Fig. 3.

Witnesses
Alfred Revi.
Geo. J. Thomas.

Inventor
Philip L. Sylvester
By Watson & Watson
Attorneys

No. 644,811.

Patented Mar. 6, 1900.

P. L. SYLVESTER.
MACHINE FOR MAKING BUTTONS.

(Application filed Oct. 18, 1899.)

(No Model.)

5 Sheets—Sheet 3

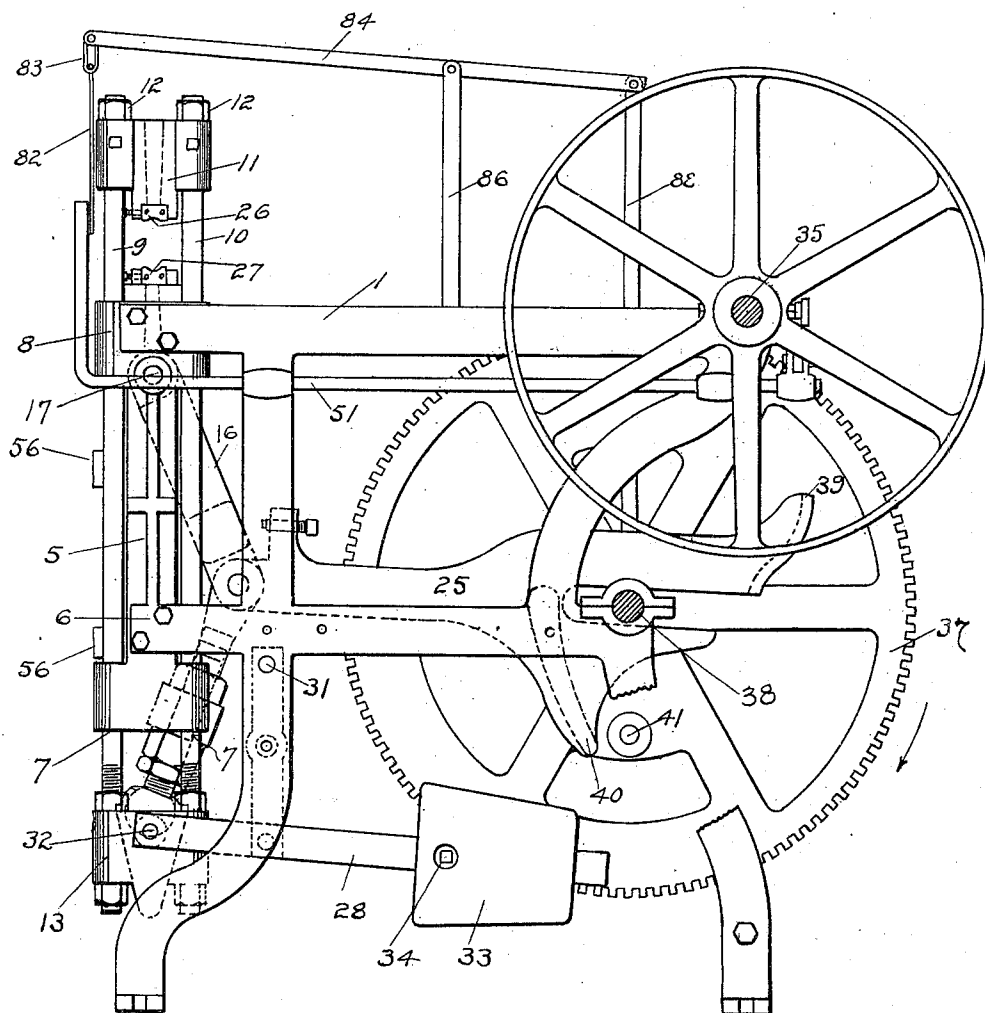


Fig. 4.

Witnesses
Flora Levi.
Geo. T. Thomas

Inventor
Philip L. Sylvester
By Watson & Watson
Attorneys

No. 644,811.

Patented Mar. 6, 1900.

P. L. SYLVESTER.
MACHINE FOR MAKING BUTTONS.

(Application filed Oct. 18, 1899.)

(No Model.)

5 Sheets—Sheet 4.

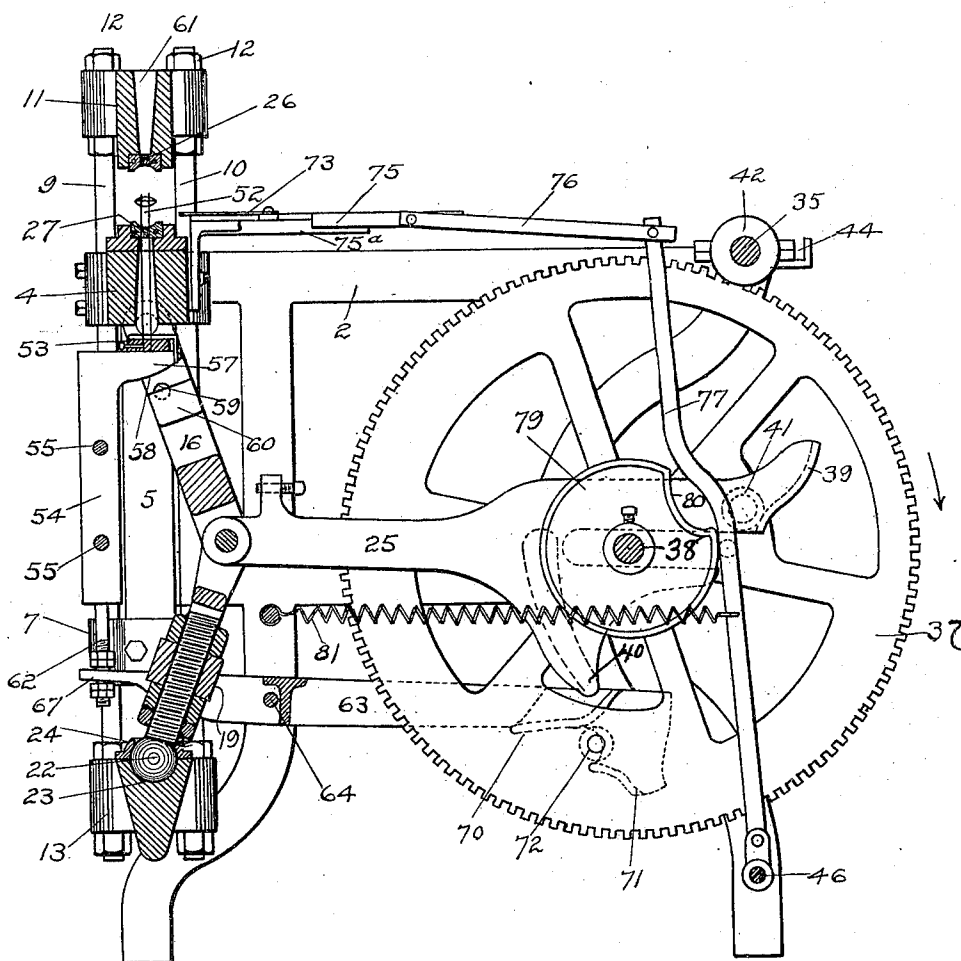


Fig. 5.

Witnesses
Flora Levi.
Geo. T. Thomas.

Inventor
Philip L. Sylvester
By *Matson & Matson*
Attorneys

No. 644,811.

Patented Mar. 6, 1900.

P. L. SYLVESTER.
MACHINE FOR MAKING BUTTONS.

(Application filed Oct. 18, 1899.)

(No Model.)

5 Sheets—Sheet 5.

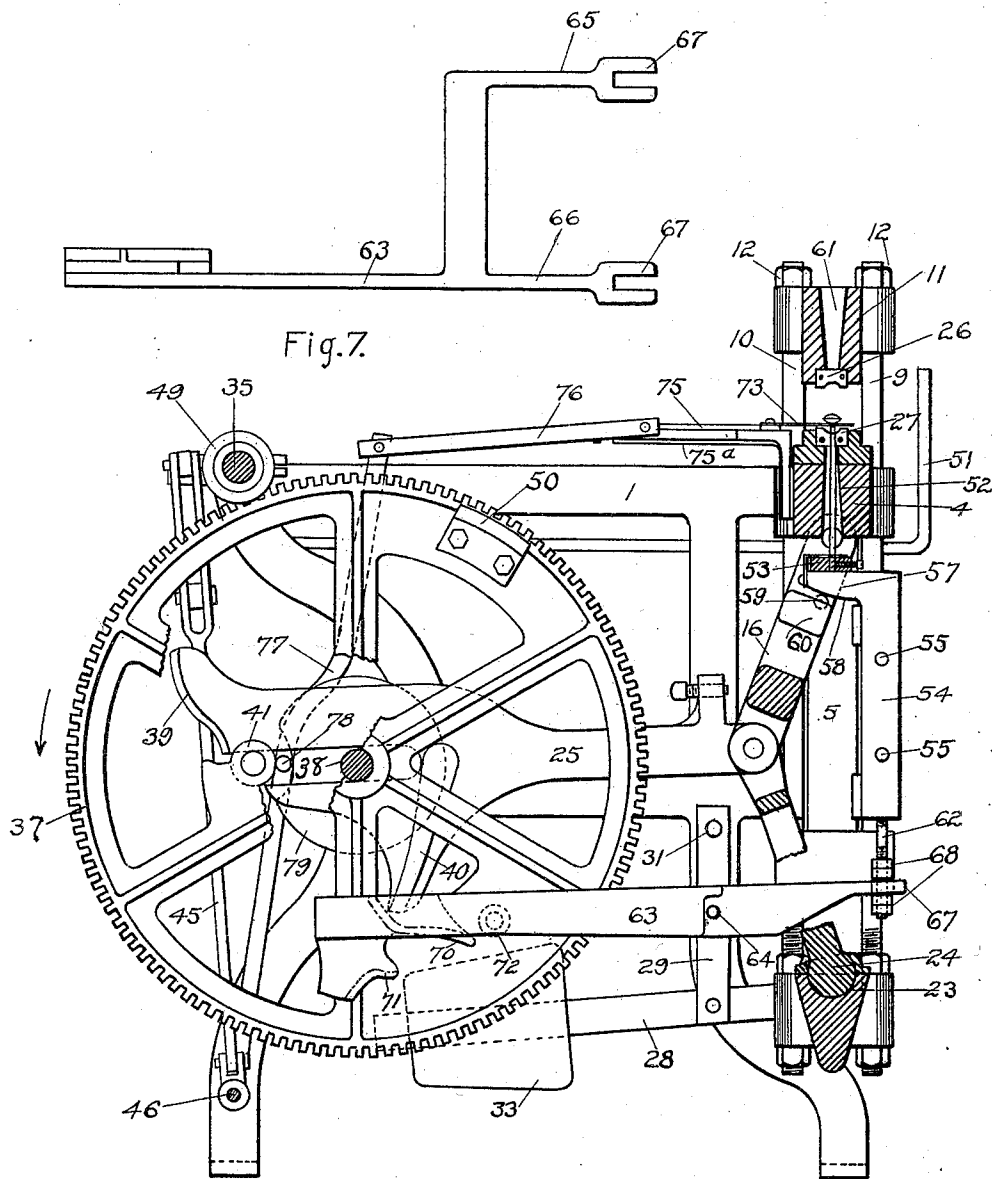


Fig. 6.

Witnesses
Flora Levi.
Geo. T. Thomas

Inventor
Philip L. Sylvester
By Watson & Watson
his Attorneys

UNITED STATES PATENT OFFICE.

PHILIP L. SYLVESTER, OF SCRANTON, PENNSYLVANIA.

MACHINE FOR MAKING BUTTONS.

SPECIFICATION forming part of Letters Patent No. 644,811, dated March 6, 1900.

Application filed October 18, 1899. Serial No. 734,019. (No model.)

To all whom it may concern:

Be it known that I, PHILIP L. SYLVESTER, a citizen of the United States, residing at Scranton, in the county of Lackawanna and State of Pennsylvania, have invented certain new and useful Improvements in Machines for Making Buttons, &c., of which the following is a specification.

My invention comprises certain improvements in machines for the manufacture of buttons and other articles from heated plastic material, whereby the efficiency and durability of such machines are increased and the person of the operator is protected from injury.

In the accompanying drawings, which illustrate my invention, Figure 1 is a perspective view of my improved machine, taken from the rear, the operating-gear being partly broken away. Fig. 2 is an elevation of the front of the machine with the die-blocks brought together. Fig. 3 is a transverse section through Fig. 2 on a line centrally of the dies. Fig. 4 is a side view showing the die-operating mechanism and the safety mechanism, the remainder of the machine being removed. Fig. 5 is a longitudinal section through the machine about on the central line and showing the perforating and stripping mechanism. Fig. 6 is a similar view, partly broken away, taken at the right of the center, as viewed from the rear, the toggle-lever and dies being shown in central section. Fig. 7 is a plan view of a lever for operating the pin-frame, and Fig. 8 is a side view of the cam for operating the safety-guard.

In the drawings, 1 and 2 indicate the side frames of my improved machine, which are suitably formed to support the working parts and are tied together at convenient points by brace-rods. Arranged between and bolted to the forwardly-projecting ends 3 of the frame is a stationary die-block 4, having at its opposite ends and formed integrally therewith a pair of depending supports 5, which are bolted to the projecting ends 6 of the frame. Said supports are each provided with a pair of guideways 7 at their lower ends, and guideways 8, registering therewith, are arranged on each side of the stationary die-block. At each side of the machine within the guideways is arranged a pair of guide-

rods 9 and 10, and a die-block 11 is suitably supported between the upper ends of the two pairs of guide-rods. As shown, the guide-rods project through the die-block, and the latter is securely held in place by means of nuts 12. The lower ends of the guide-rods are threaded and extend through openings in the opposite ends of a cross-head 13, which is adjustably secured to said guide-rods by means of suitable nuts 14 and 15. The movable die-block and the cross-head are thus tied together by means of the guide-rods, so that they will move vertically in unison.

The movable die-block is moved toward and from the stationary block by means of a pair of toggle-levers, consisting of a member 16, pivoted upon studs 17 in the upper portions of the supports 5 beneath the stationary die-block, and a member 18, adjustable in length, the lower end of said member being connected to the cross-head 13 by means of a ball-and-socket joint located midway between the ends of the cross-head. As shown, the member 18 consists of a stirrup 19 and a threaded stud 20, adjustably secured to said stirrup by means of lock-nuts 21, the lower end of said stud terminating in a ball 22, which fits within a socket 23, centrally located in the cross-head, said ball being retained within the socket by means of a cap 24, bolted to the cross-head. The toggle-lever is alternately straightened and flexed by means of an automatically-operated push-rod 25 in the manner hereinafter explained, thereby alternately raising and lowering the movable die-block.

The purpose of providing a centrally-located ball-and-socket joint between the toggle-levers and the cross-head is to equally distribute the strains between the guide-rods when the levers are straightened and the dies brought together, this arrangement permitting the cross-head to adjust itself so as to bear evenly upon all the rods and to compensate for any slight variation from the true position of the cross-head or die-block upon the rods which may be caused by improper adjustment or otherwise.

The die-blocks are fitted with suitable dies 26 and 27, having a series of matrices conforming in shape and size to the form of the button to be made. As these dies are not always of the same thickness, the movement of

the die-block 11 must be varied to suit the thickness of the die which it is intended to use, so that said dies may be brought together with great precision and without too great pressure. This adjustment is effected by shortening or lengthening the member 18 of the toggle-levers by turning the nuts 21 upon the studs 20. When thick dies are to be used, the nuts are turned to shorten the toggle-lever, thereby raising the die-block 11 to a correspondingly-greater height above the stationary die-block, and when thinner dies are to be used the member 18 is lengthened and the die-block 11 will be correspondingly lowered. The range of movement of the die-block will of course be the same under all circumstances.

In order to counterbalance the combined weight of the cross-head, guide-rods, and movable die-block, I provide on each side of the machine levers 28, which are fulcrumed upon the lower ends of links 29, the latter being pivotally suspended from a rod 31, passing through the side frames of the machine. The forward ends of the levers are pivoted upon studs 32, projecting from the ends of the cross-head 13, and weights 33 are adjustably secured upon the rear ends of the levers by means of set-screws 34. By properly locating the weights the cross-head, guide-rods, and die-block may be exactly counterbalanced, so that the parts will move with an easy motion and sudden dropping of the die-block is prevented.

The machine is operated from a constantly-running shaft 35, having mounted thereon a clutch-pinion 36, Fig. 1, which meshes with a large operating-gear 37, the latter being mounted upon an operating-shaft 38. The rear end of the push-rod is forked, as shown, and straddles the shaft 38, by which it is supported. Cams 39 and 40 project laterally from the push-rod toward the operating-gear 37, and these cams are located so as to come within range of a stud 41, projecting from the side of the operating-gear. The gear rotates slowly in the direction indicated by the arrow, and as the stud 41 comes in contact with the cam 40 the push-rod is forced forward, thereby straightening the toggle-levers and lowering the movable die upon the plastic material which has previously been laid upon the stationary die. The dies remain together until the continued movement of the gear brings the stud into contact with the cam 39, when the push-rod is forced backward, thereby flexing the toggle-levers and separating the dies.

The dies, as shown, are formed with channels through which cold water is passed for the purpose of cooling them while they are pressed together upon the plastic material in order to cool and harden the buttons and through which steam is passed when the dies are separated in order to heat them, so that they will not chill the plastic material before the compression is complete. This heating

and cooling of the dies is effected automatically in the manner specified in my prior patent, No. 265,181, of September 26, 1882, and as it forms no part of my present invention the means for alternately heating and cooling the dies will not be herein described.

The operating-gear 37 is automatically stopped after each revolution, while the movable die is in its highest position, in order to permit the operator to arrange the plastic material upon the stationary die without danger of having his fingers caught between the dies, and said gear will not start until the operator causes it to move by turning a hand-lever. In order to arrange for automatically stopping the machine, the clutch-pinion 36 is fitted loosely upon the shaft 35, and said pinion is adapted to be engaged by a clutch 42, splined to the shaft. (See Fig. 1.) This clutch is movable into and out of engagement with the pinion by means of a clutch-bar 43, which is horizontally arranged in guideways 44 at the rear of the machine. The clutch-bar is connected to the upper end of a lever 45, the lower end of which is hinged to a rod 46, passing through the frame of the machine. The lever 45 is formed with an inclined face 47 about midway of its length, and an arm 48, fixed to the shaft 38 and revolving therewith, is arranged to bear against the inclined face 47 at the completion of each revolution, thereby forcing the lever and clutch-bar to the left, as shown in Fig. 1, and drawing the clutch out of engagement with the clutch-pinion. This separation of the clutch and the pinion would stop the machine instantly, leaving the arm 48 resting upon the inclined face 47, as shown in said figure, so that the clutch could not again be thrown over to engage the pinion to start the machine if some means were not provided for moving the arm beyond the incline. In order to move the arm beyond the inclined face, I secure to the shaft 35 a friction-wheel 49, and I arrange upon the side of the gear 37 a short shoe 50, which is so situated that when the arm 48 bears against the inclined face of the lever 45 said shoe will come into contact with the friction-wheel 49 and the operating-gear 37 will be thereby given a further movement of a few inches, thus carrying the arm 48 beyond the inclined face 47. As soon as the shoe 50 passes out of engagement with the friction-wheel the machine stops. When the operator is ready to start the machine, the clutch is thrown into engagement with the pinion by means of a hand-lever 51, extending to the front of the machine and connected at its rear end to the lever 45. The movement of the hand-lever to start the machine therefore moves the inclined face of the lever 45 into the path of the arm 48, so that said parts will engage at the completion of the next revolution of the arm and the machine will be stopped, as before.

For the purpose of forming thread passages or eyes in the buttons the dies are perforated to receive a series of pins 52, corre-

sponding to the number of holes required in the button. These pins are secured to a pin-plate 53 and project upwardly into the stationary die. The pin-plate is mounted upon the top of a frame, which I shall call the "pin-frame," consisting of bars 54, connected together by rods 55 and having outwardly-projecting guides 56, which embrace and slide upon the forward guide-rods 9. The bars 54 have rearwardly-projecting lugs or shoulders 57, upon which the pin-plates are secured, and the lower edges 58 of said shoulders are curved or inclined, as shown, and rest upon rollers 59, which are arranged within sockets 15 upon inward projections 60 of the toggle-lever. The arrangement is such that when the toggle-levers are flexed, with the pin-frame resting upon the rollers 59, as shown in Fig. 6, the upper ends of the pins will be flush with the top of the stationary die. When the toggle-lever is straightened, it will be seen that the rollers 59, bearing upon the inclined ways 58 of the pin-frame, will wedge the latter upward just as the dies are coming together, so that the pins will be forced through the plastic material and into the perforations in the upper die, as indicated in Figs. 2 and 3, thus forming the thread-holes in the buttons and preventing the escape of material through the perforations in the upper die. The upper die-block is channeled vertically, as shown at 61, so that the material forced upward by the ends of the pins will pass into said channel, from whence it may be removed.

After the buttons have been formed and perforated in the manner described and have become hardened by the cooling of the dies the latter separate, and it is then necessary to eject the buttons from the mold and to strip them from the pins. In order to eject the buttons, I arrange to give the pin-frame a further upward movement, as shown in Fig. 5. For this purpose threaded rods 62 are secured to each of the side bars of the pin-frame, and a rocking lever 63, (see Fig. 7,) pivoted upon a bar 64, is provided with arms 65 and 66, having forked ends 67, through which the rods 62 extend. Adjusting-nuts 68 are arranged upon the rods 62, above and below the ends of the lever, at a sufficient distance apart to allow of the slight play necessitated by the rocking motion of the lever. The rear part of the lever is provided with cam-faces 70 and 71, which project toward the operating-gear 37, within the range of a stud 72, upon the side of said gear. The cams are so formed and arranged that the passage of the stud 72 will first bear upon the cam 71, thus depressing the rear end of the lever and raising the pin-frame, as shown in Fig. 5, thereby lifting the buttons out of the die. Immediately thereafter the stud will engage the cam 70, raising the rear end of the lever and returning the pin-frame to its normal position. This action of the pin-frame

occurs immediately after the separation of the dies.

While the buttons are raised upon the pins, as shown in Fig. 5, and before the pin-frame is lowered, a stripper-plate 73 is automatically moved forward, so that the tines of said stripper-plate will pass between the pins and beneath the buttons. The subsequent lowering of the pin-frame deposits the buttons upon the tines of the stripper-plate, as shown in Fig. 6, and withdraws the pins from the thread-holes. The stripper-plate is secured to a cross-head 75, which moves upon a guide 75^a, secured to the stationary die-block, and is automatically moved forward and rearward at the proper times by means of a connecting-rod 76 and a lever 77, which is hinged at its lower end to the rod 46. The lever 77 is provided with a stud 78, which bears against a cam-wheel 79, mounted upon the operating-shaft 38. This cam-wheel is circular throughout the greater part of its circumference, but is formed with a depression 80 for a short distance. The pin 78 is held against the cam-wheel by means of a spring 81. The cam-wheel is so arranged upon the shaft that the pin 78 will enter the depression while the buttons are in their elevated position, and the depression 80 is of sufficient length to permit the stripper-plate to remain forward long enough for the operator to remove the buttons. As the cam-wheel 79 continues to turn the pin 78 is forced out of the depression 80, and the stripper is thereby drawn backward out of the way of the dies, just prior to the stoppage of the machine.

In my former patent referred to the stripper was caused to glide under the buttons by means of a cam and was withdrawn by means of a spring, thus making a positive forward and a yielding rearward motion. This method has proved unsatisfactory for the reasons that the positive forward motion sometimes forced the stripper against the pins and broke them and the tines of the stripper were sometimes forcibly wedged between the pins, thus holding the stripper in its forward position until the die came down upon it, resulting in injury to the die or stripper. In my present invention it will be noticed that the forward motion of the stripper is made yielding by means of the spring 81, so that if any obstruction is met with the stripper will stop, and the rearward motion of the stripper is made positive by means of the cam-wheel, so that if the stripper should become wedged between the pins it will be positively withdrawn and no injury to the stripper or dies can result.

The operation of the parts thus far described is as follows: When the clutch-pinion 36 is disengaged from the clutch 42 and the machine is stopped, with the dies separated, the operator places a strip of plastic material upon the lower die, both dies being in the meantime heated by the automatic inlet of steam. He then throws the clutch into engagement with

the clutch-pinion by means of the lever 51, thus starting the operating-gear 37 and shaft 38 in the direction indicated by the arrow. The revolution of the gear brings the stud 41 into contact with the cam 40 of the push-bar, forcing the latter forward, and thereby bringing the movable die down upon the plastic material in the stationary die. As the dies come together the pin-frame is lifted a short distance, as shown in Fig. 3, by the rollers 59, which bear against the cam-surfaces 58, so that the pins penetrate the still plastic material and extend upward into the movable die, the material ahead of the pins being forced into the channel 61 in the movable die-block. The dies remain together while the pin 41 slowly travels around to the cam 39, said die-blocks in the meantime being automatically cooled, so as to harden the buttons. When the stud 41 engages the cam 39, the push-bar is forced backward, thus flexing the toggles and raising the upper die. Just as the dies separate the stud 72 engages the cam 71 of the rocking lever 63, thus elevating the pin-frame and lifting the buttons out of the die, as shown in Fig. 5. While the pin-frame is elevated the stud 78 on the lever 77 enters the depression 80 in the cam-wheel 79, as shown in Fig. 6, and the stripper-plate moves forward under the buttons. The stud 72 immediately thereafter engages the cam 70, raising the rear end of the lever 63 and lowering the pin-frame and pins, so that the buttons are deposited upon the stripper, as illustrated in said figure. The buttons are then removed from the stripper by the operator, and the continued movement of the cam-wheel, acting upon the pin 78, forces the stripper backward out of the way of the dies. As shown in Fig. 1, by the time the cam 80 commences to force the pin 78 backward to withdraw the stripper the shaft 38 has almost completed a revolution and the arm 48 engages the inclined face 47 upon the lever 45, thus disengaging the clutch from the clutch-pinion. The friction-wheel 49 then engages the shoe 50, rotating the operating gear and shaft a sufficient distance to move the arm 48 down beyond the inclined face 47, and the machine comes to a stop with the stripper clear of the dies. New material may then be placed upon the stationary die and the operation will be automatically repeated when the operator moves the clutch into engagement with the clutch-pinion by means of the hand-lever 51.

The machine might be operated continuously instead of being automatically stopped each time the dies are separated; but the automatic stoppage of the machine gives the operator as much time as he requires for arranging the strip of plastic material upon the dies without danger of having his fingers crushed when the dies are brought together. As the machine cannot be started except at the will of the operator, this provision for stopping the machine will ordinarily afford him ample protection; but as a further pro-

tection to careless or reckless operators who may start the machine while arranging the plastic material upon the die or who may be tempted to place their hands between the dies for the purpose of arranging the material while the dies are coming together I provide a guard 82, which is suspended immediately in front of the dies, and automatic means for lowering said guard before the dies come together, so that if the hands of the operator should be between the dies when the machine is started the guard 82 will come down upon his hands or wrists, thereby warning him to withdraw his hands. Before the upper die starts to move the guard is almost or quite in its lowest position, so that the operator is prevented from placing his hands between the dies after the machine is set in motion.

As shown in the drawings, the guard 82 consists of a wire screen suspended by links 83 from the ends of levers 84 and 85, which are pivoted upon standards 86, secured to the opposite sides of the frame of the machine. The links 83 are provided in order to afford a yielding connection between the guard and the levers, so that the guard will not be pressed forcibly down upon the operator's hands, but will merely rest upon them and in that way give him the desired warning. The guard is automatically operated by means of a cam 87, secured upon the shaft 38, and a rod 88, connected to the lever 84 and having a pin 89 at its lower end in engagement with the cam. As shown, the rod is provided with a forked lower end 90, the arms 91 and 92 of the fork extending on either side of the shaft and forming a guide for the rod. The arm 92 is connected by a spring 93 to the cross-bar 46. The cam 87 has an outer arcuate face 94 and a similar face 95 having a shorter radius, said faces being connected by inclined faces 96 and 97. The cam is arranged upon the shaft so that when the machine is stopped or about to be stopped, as indicated in Fig. 1, the pin 89 will rest at the bottom of the inclined face 97, the guard being in the raised position, as shown in said figure. When the lever 51 is thrown over, thereby starting the machine, the inclined face 97 will force the pin 89 and the rod 88 upward, thereby lowering the guard before the stud 41 comes in contact with the cam upon the push-rod to operate the movable die. In Fig. 4 the guard is shown part way down, with the stud 41 approaching the cam 40 of the push-rod. The stud travels quickly upward over the inclined face 97 and onto the face 94, as shown in Fig. 8, thereby permitting the guard to descend to its lowest position in advance of the die-block. The die-block then descends and the guard remains down until the revolution of the shaft brings the inclined face 96 beneath the pin 89. By this time the dies are ready to separate and the movement of the inclined face past the pin permits the guard to be lifted through the medium of the spring 93. The pin will rest upon the arcuate face 95 during

the remainder of the revolution, and the guard will therefore remain in the elevated position until the machine is started for the next operation.

5 Having described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. The combination with the stationary die-block of a movable die-block mounted upon
10 guide-rods, a cross-head in which said guide-rods are secured, a toggle-lever connected to the center of the cross-head by a ball-and-socket joint, and means for operating said lever.

15 2. The combination with the stationary die-block of a movable die-block mounted upon guide-rods, a cross-head in which said guide-rods are secured, a toggle-lever connected to the center of the cross-head by a ball-and-socket joint, said lever being adjustable in
20 length, and means for operating said lever.

3. The combination with the stationary die-block of a movable die-block and a cross-head connected thereto by guide-rods, a toggle-lever connected to said cross-head, and a weighted lever arranged to counterbalance said parts.

4. The combination with the stationary die-block of the movable die-block and a cross-head mounted upon guide-rods, a toggle-lever connected to said cross-head, a push-rod connected to said toggle-lever and having two
30 cams or tracks thereon, an operating-shaft and a stud or pin rotatable therewith, adapted to engage said cams alternately, thereby flexing and straightening said toggle-lever.

5. In a button-making machine, the combination with a pair of dies having perforations therethrough, one of said dies being
40 movable toward and from the other die, of a series of pins projecting into the perforations in one of said dies and means for moving said pins and causing them to project into the perforations in the other die when said
45 dies are closing.

6. In a button-making machine, the combination with the stationary and movable dies having perforations therethrough and a toggle-lever arranged to operate said movable die, of a pin-frame having a series of
50 pins projecting through the perforations in the stationary die, and means for moving said pins upward, into the perforations in the movable die when the dies are closing.

7. In a button-making machine, the combination with the stationary and movable dies having perforations therethrough of a pin-frame having a series of pins projecting
60 into the perforations in the stationary die, a toggle-lever arranged to operate the movable die and also to raise said pin-frame when the dies are closing.

8. The combination with the movable and stationary dies having perforations there-
65 through and a toggle-lever arranged to operate the movable die toward and from the stationary die, of a vertically-movable pin-frame

having a series of pins projecting into the perforations in the stationary die said frame having inclined shoulders or lugs resting upon
70 the toggle-lever, whereby when said lever is straightened the pin-frame will be lifted.

9. In a button-making machine, the combination with stationary and movable dies having perforations therethrough of the pin-frame having pins projecting into the perforations in the stationary die, a toggle-lever
75 arranged to operate the movable die and to raise said pin-frame when the dies are closing, and means for further raising said pin-frame when the dies separate, so as to eject the formed buttons from the stationary die.

10. The combination with the movable and stationary dies having perforations therethrough, the toggle-lever arranged to operate
85 the movable die toward and from the stationary die, and the pin-frame having pins projecting into the perforations in the stationary die and adapted to be raised by the toggle-lever when the dies are closing, of the rocking lever connected to said pin-frame and having cams or tracks thereon, and an operating-gear having a stud adapted to engage
90 said cams so as to raise and then lower the pin-frame after the dies separate.

11. In a button-making machine, the combination with the movable and stationary dies having perforations therethrough of the pin-plate having pins projecting into the perforations in the stationary die, means for closing
100 said dies and for raising the pin-plate when the dies are nearly together to perforate the buttons, means for further raising the pin-plate when the dies are separated to eject the buttons from the stationary die, a stripper arranged to pass beneath the buttons while in their elevated position and means for lowering
105 said pin-plate while the stripper is beneath the buttons.

12. In a button-making machine, the combination with the movable and stationary dies having perforations therethrough, of a pin-plate having pins extending into the perforations in the stationary die, means for closing
110 said dies and for raising the pin-plate when the dies are nearly together to perforate the buttons, means for further raising the pin-plate when the dies are separated to eject the buttons from the stationary die and a stripper arranged to pass beneath the buttons while
115 in their elevated position, said stripper having a yielding forward motion and a positive backward motion.

13. In a button-making machine, the combination with the movable and stationary
125 dies having perforations therethrough, of the pin-plate having pins projecting into the perforations in the stationary die, means for closing said dies and for raising the pin-plate when the dies are nearly together, to perforate the buttons, means for further raising
130 and then lowering the pin-plate when the dies are separated, an automatically-operated stripper adapted to extend between the pins

while in their elevated position and to be withdrawn after the pins are lowered, and means for automatically stopping the machine when the stripper is withdrawn.

14. The combination with an operating-shaft having an operating-gear thereon of a driving-shaft having a loosely-mounted clutch-pinion meshing with said operating-gear, a clutch member upon the driving-shaft adapted to engage said pinion, an arm secured to the operating-shaft and a rod operatively connected with said clutch member and having an inclined face or cam projecting into the path of said arm, whereby when said arm engages the inclined face on the rod the clutch member will be disengaged from the pinion.

15. The combination with an operating-shaft having an operating-gear thereon of a driving-shaft having a loosely-mounted clutch-pinion meshing with said operating-gear, a clutch member upon the driving-shaft adapted to engage said pinion, an arm secured to the operating-shaft and a rod operatively connected with said clutch member and having an inclined face or cam projecting into the path of said arm, whereby when said arm engages the inclined face on the rod the clutch member will be disengaged from the pinion, a friction-wheel upon the driving-shaft and a shoe upon the operating-gear said shoe being arranged to engage the friction-wheel when the arm bears against the inclined face on the rod.

16. The combination with an operating-shaft having an operating-gear thereon of a driving-shaft having a loosely-mounted clutch-pinion meshing with said operating-gear, a clutch member upon the driving-shaft adapted to engage said pinion, an arm secured to the operating-shaft and a rod operatively connected with said clutch member and having an inclined face or cam projecting into the path of said arm, whereby when said arm engages the inclined face on the rod the clutch member will be disengaged from the pinion, a friction-wheel upon the driving-shaft, a shoe upon the operating-gear adapted to engage the friction-wheel when the arm bears against the inclined face on the rod, and a hand-lever arranged to move the clutch member into engagement with the pinion.

17. The combination with a stationary die and a movable die and means for automatically raising and lowering the latter of a guard suspended in front of said dies and means for

automatically lowering said guard in advance of the movable die.

18. The combination with a stationary die and a die movable toward and from said stationary die, of a guard yieldingly suspended in front of said dies and arranged to be automatically lowered in advance of the movable die.

19. The combination with the stationary die and the movable die, a toggle-lever for raising and lowering the movable die and an operating-shaft and intermediate connections for operating the toggle-lever, of a lever suitably supported above the machine, a guard suspended from the forward end of said lever in front of the dies, a rod connected to the rear end of said lever, and a cam upon the operating-shaft engaging a pin upon said rod, whereby the guard is lowered in advance of the movable die.

20. In a machine for forming articles from plastic material, the combination with the stationary die-block and the movable die-block mounted upon guide-rods, the cross-head to which said guide-rods are secured, the toggle-lever connected to said cross-head, the operating-gear and intermediate connections arranged to straighten and flex the toggle-levers alternately, of means for automatically stopping said gear when the toggle-levers are flexed.

21. In a machine for forming perforated articles from plastic material, a lower die-block having a perforated die and an upper die-block having a channel extending vertically therethrough, and a perforated die extending across the lower end of said channel, means for bringing said dies together, and pins arranged within the perforations in the lower die and adapted to be extended into the perforations in the upper die when said dies are nearly together.

22. The combination with a pair of dies and means for automatically moving one of said dies toward and from the other die, of a guard, and means for automatically moving said guard in front of the dies to prevent access to the same before said dies come together.

In testimony whereof I affix my signature in presence of two witnesses.

PHILIP L. SYLVESTER.

Witnesses:

CYRUS B. WELLS,
ROBERT WATSON.