Nov. 24, 1936. H. E. NEWCOMB 2,061,977

SHELL RELOADING DEVICE

Filed Nov. 26, 1934 4 Sheets-Sheet 1

Fig. 1.

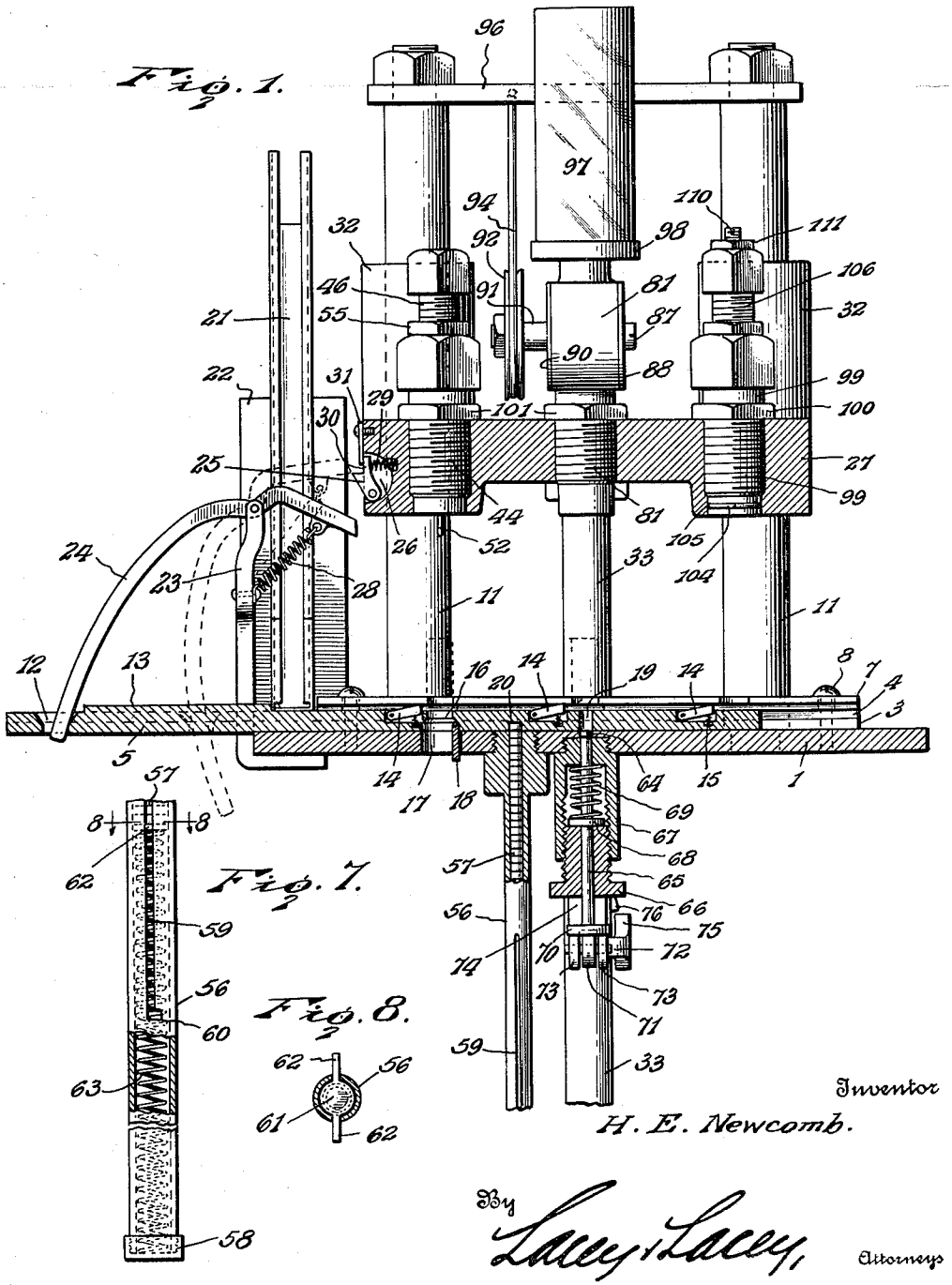


Fig. 7.

Fig. 8.

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SHELL RELOADING DEVICE

Filed Nov. 26, 1934 4 Sheets-Sheet 2

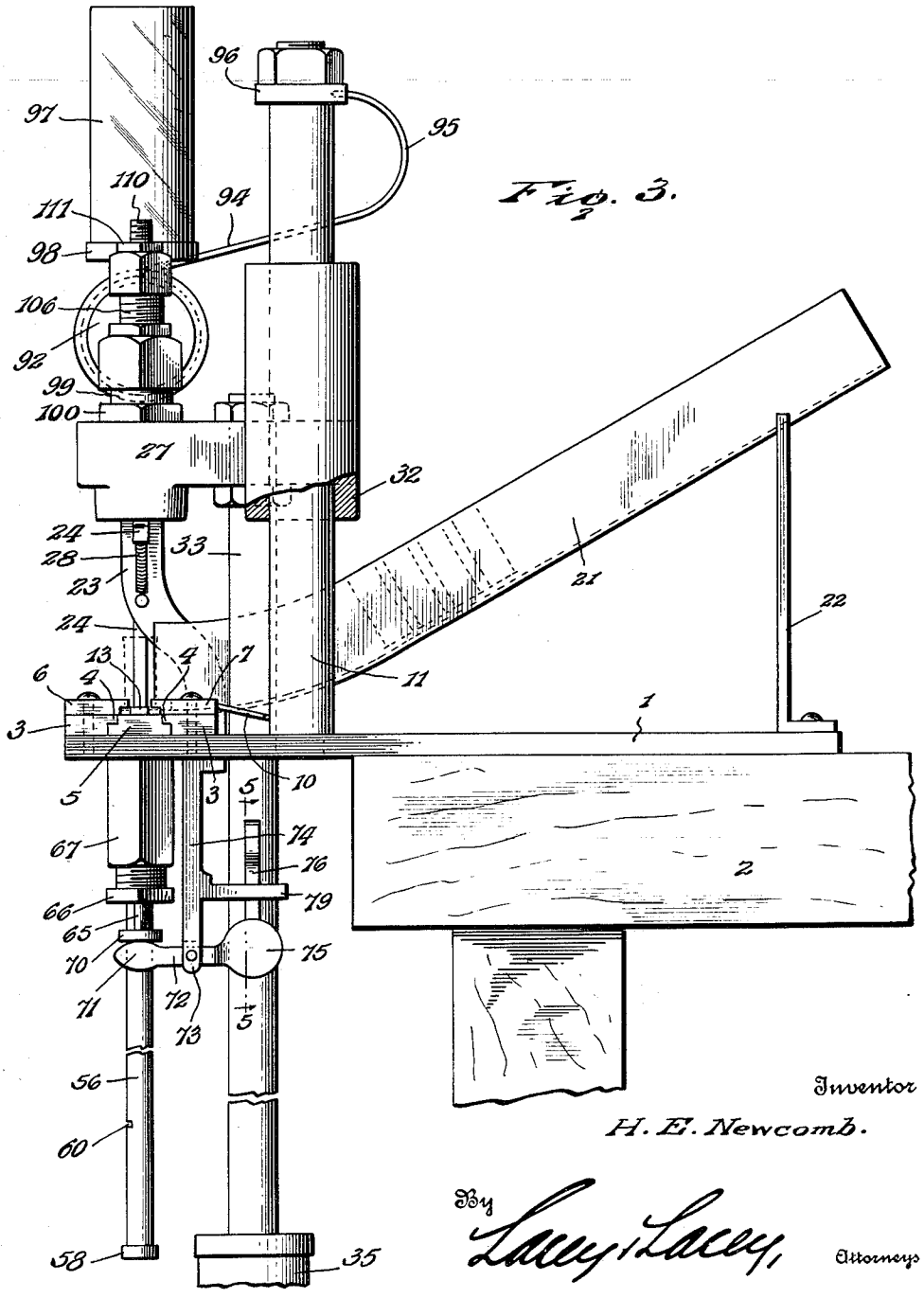


Fig. 3.

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SHELL RELOADING DEVICE

Filed Nov. 26, 1934 4 Sheets-Sheet 3

Fig. 2.

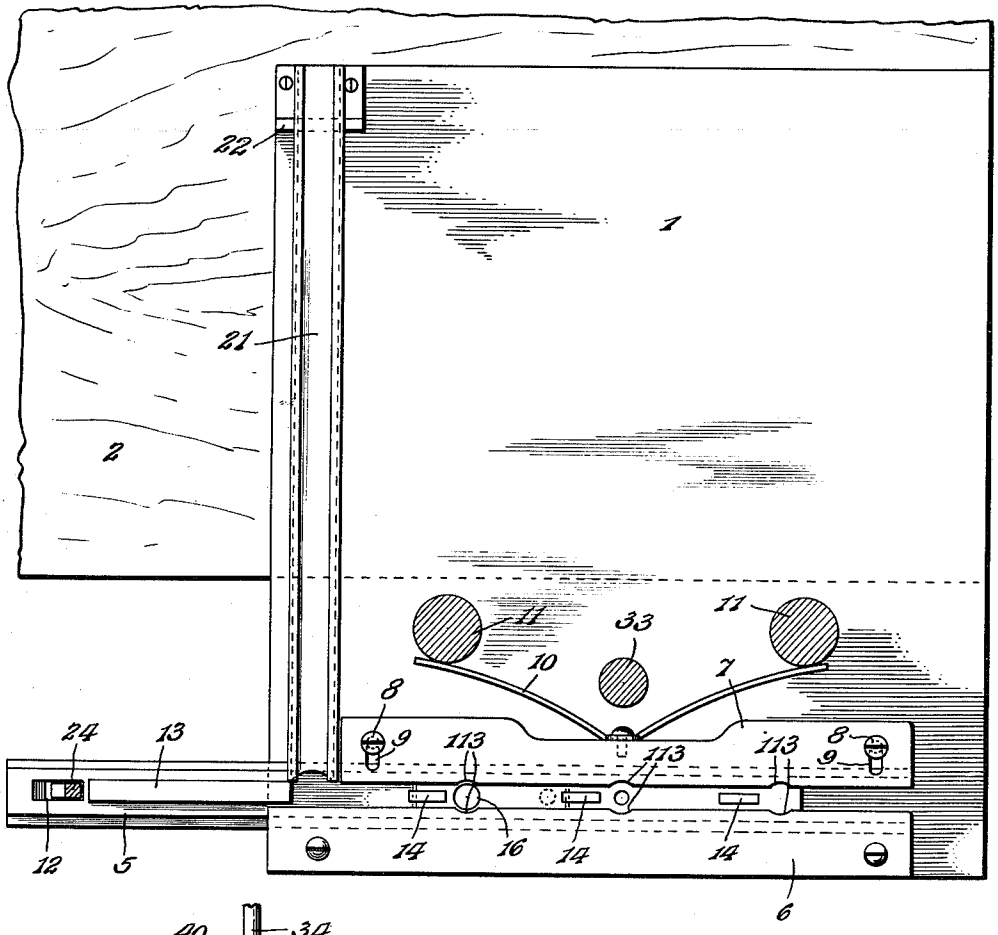


Fig. 10.

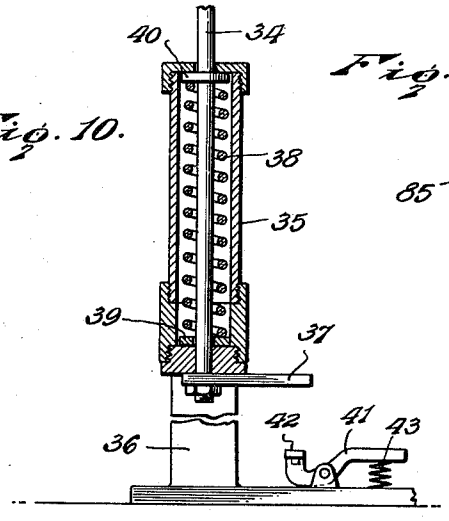
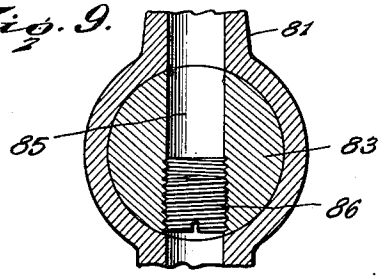


Fig. 9.



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SHELL RELOADING DEVICE

Filed Nov. 26, 1934 4 Sheets-Sheet 4

Fig. 4.

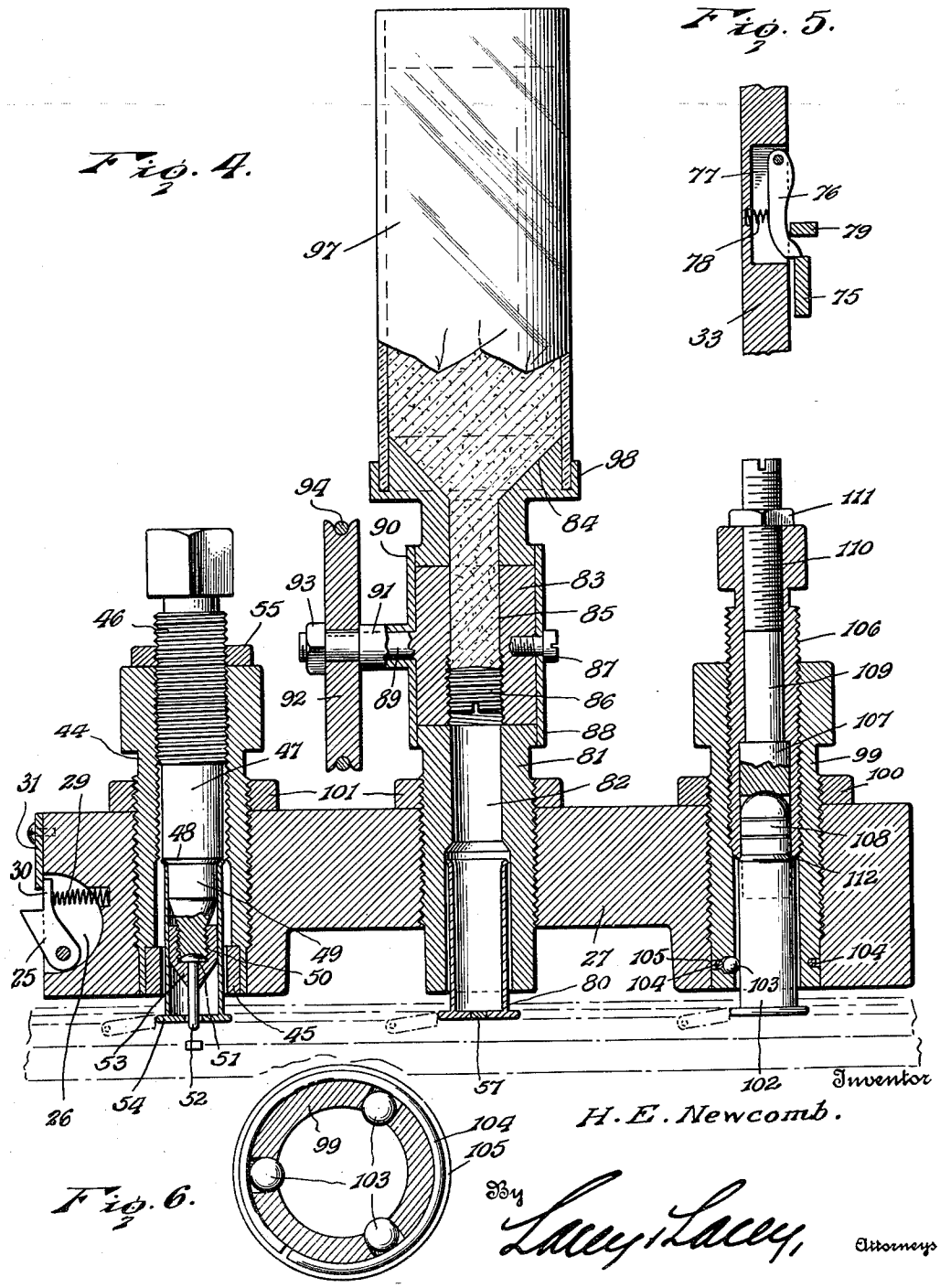


Fig. 5.

Fig. 6.

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Patented Nov. 24, 1936 2,061,977

UNITED STATES PATENT OFFICE

2,061,977

SHELL-RELOADING DEVICE

Harry E. Newcomb, San Diego, Calif.

Application November 26, 1934, Serial No. 754,870

7 Claims. (Cl. 86—23)

This invention is a machine for reloading shells which have been fired and its primary object is to provide a machine which will be nearly automatic in ejecting the old primer, injecting a new primer, charging the shell with powder, and setting a bullet. The invention provides means whereby shells may be removed singly from a magazine or rack and fed successively to operating stations, and facilitates the operations of resizing and removing the fired primer, injecting a new primer and supplying a charge of powder and finally securing a bullet upon the charge of powder and then ejecting the refilled shell. It is an object of the invention to provide a machine for the stated purpose which will be compact, easily operated and efficient in operation, and with these stated objects in view, the invention resides in a certain novel construction, arrangement and combination of parts which are illustrated in the accompanying drawings and will be hereinafter fully described and then more particularly defined in the appended claims.

In the drawings:

Fig. 1 is a front elevation, with parts in section, of a machine embodying the present invention;

Fig. 2 is a plan view with parts in section;

Fig. 3 is an end elevation, partly in section;

Fig. 4 is a vertical section on a larger scale taken in a plane longitudinally of the gang of dies;

Fig. 5 is an enlarged detail section on the line 5—5 of Fig. 3;

Fig. 6 is an enlarged horizontal section through one of the dies;

Fig. 7 is an enlarged side elevation, partly in section, of the primer magazine;

Fig. 8 is a detail section on the line 8—8 of Fig. 7;

Fig. 9 is a section through the powder-charging member;

Fig. 10 is a vertical section through the operating treadle and its connections.

In carrying out the invention, there is provided a bed plate 1 which may be supported upon any convenient bench or frame 2 having the requisite strength and rigidity. At and adjacent the front edge of the bed plate, tracks 3 are secured thereon and, as shown in Fig. 3, these tracks are provided with overhanging flanges 4 along the upper portions of their opposed edges so that they will guide a slide 5 which rests upon the bed plate and is slidable thereon parallel with the front edge of the same. Upon the top of the outer or front track 3, I secure a keeper plate 6, the edge of which projects over the edge of the slide and thereby serves to prevent shells resting on the slide from slipping laterally therefrom. Cooperating with the keeper plate 6 is an inner or rear keeper plate 7 which is slidably mounted upon the top of the inner track 3 and is held thereon, for limited transverse movement, by screws 8 inserted through slots 9, as clearly shown in Fig. 2. A bowed spring 10 is secured at its center to the back of the keeper plate 7 and its ends bear against columns 11 erected upon the bed plate, as will be understood upon reference to Figs. 2 and 3. The slide 5 is provided at one end with a longitudinal slot or opening 12 and near said slot a rib 13 is provided upon the top of the slide to engage at one end against shells fed onto the slide so that as the slide moves along the bed plate, the shells will be fed to the first operating station. Dogs 14 are also provided upon the slide at stated intervals corresponding to the intervals between the several operating stations so as to successively engage the shells and feed them from station to station as the slide is operated. These dogs each consists of a short lever pivoted at one end within a recess provided therefor in the slide and resting at its free end upon an expansion spring 15 seated in the slide under the lever. Immediately adjacent one of the dogs 14, an opening 16 is formed in the slide, and in the bed plate is an opening 17 with which the opening 16 will aline when the slide is in its retracted position of rest. A flap valve 18 is hinged to the slide at its lower side and normally depends through the opening 17, as shown in Fig. 1, but when the slide is moved to feed the shells, the valve will be swung upwardly by its engagement with the far side of said opening 17 and will close the opening 16 so that as the slide moves over the upper end of the primer magazine, the primers cannot be ejected into said opening and clog the action of the apparatus. The slide also has an opening 19 therein which normally is alined with the powder-charging mechanism and with the primer injector, as will presently more fully appear, and between the said openings 16 and 19 a recess 20 is formed in the under side of the slide to receive a fresh primer as the slide moves toward the primer injector.

The shells to be loaded are mounted in an inclined rack or chute 21 which is mounted upon the bed plate adjacent one end of the same, and as shown in Figure 1, is constructed with side walls spaced apart a distance to readily admit the shells and having grooves in their lower ends in their opposed sides to engage the flanges of the shells so as to guide them and retain them in

proper position. This rack or magazine may be of any desired capacity and its upper end is supported by a prop 22 secured upon and rising from the bed plate, as clearly shown. As seen in Fig. 2, the lower discharging end of the magazine is disposed over the inner or rear edge of the slide so that a shell issuing from the magazine will be received on the slide in upright position. To insure the proper movement of the shells, a weight of any approved design is inserted in the upper end of the magazine or rack after the rack has been filled so that the shells will be caused positively to slide down the rack as each successive shell is removed from the front end thereof. The rib 13 on the slide, when the slide is operated, will extend across the lower end of the rack in abutting relation to the shell which has been delivered therefrom so that until the slide has completed its movement, the shells will be held in the rack. When the slide is retracted so that the rib is moved from across the discharge end of the rack, as shown in Fig. 2, the shell issuing from the rack will be prevented from moving off the slide by the keeper plate 6 which will arrest the movement of the shell as it assumes a position against the end of the rib 13. Pivoted upon the upper end of a bracket 23, which is secured to and rises from the bed plate, is an arcuate lever 24 which has its lower end engaged in the opening 12 in the end of the slide and its upper end disposed in the path of a latch 25 which is pivotally mounted within a recess 26 in the adjacent end of a die block or cross head 27 slidably mounted upon the columns 11. A retractile spring 28 is attached to the bracket 23 and to the upper end of the lever 24, as shown in Fig. 1, and tends constantly to hold the lever in the position shown by full lines in Fig. 1 with the slide retracted in position to receive a shell from the magazine or rack 21. The latch 25 is held in its operative position by a spring 29 housed in the recess 26 and bearing upon a tongue 30 on the upper end of the latch which is adapted to impinge against a keeper 31 secured on the end of the die block so as to limit the outward movement of the latch. Upon a downward movement of the cross head or die block 27, the latch 25 will yield to its impact upon the end of the lever 24, but on the return upward movement of the die block, the end of the latch will engage under the upper end of the lever and will rock the lever, as indicated by dotted lines in Fig. 1, so that the slide 5 will be moved over the bed plate to feed a shell one step. As the die block or cross head reaches the upper limit of its movement, the latch will clear the end of the lever and the spring 28 will then return the lever to its initial position, shown in full lines in Fig. 1, and retract the slide to receive another shell.

The die block may be of any desired configuration and it is provided at its ends with sleeves 32 which fit slidably upon the columns 11 and thereby hold the die block to a rectilinear path in its movements. Securely fastened to the die block between the ends thereof is an operating post or rod 33 which extends through the bed plate and has its lower extremity reduced, as shown at 34 in Fig. 10, and slidably fitted through a cylinder 35 which is secured upon a pedestal 36 firmly secured upon the floor of the workroom. A treadle 37 is secured to the lower end of the rod below the cylinder 35 and an expansion spring 38 is housed in the cylinder around the rod and bears at one end against a washer 39 in the lower end of the cylinder and at the opposite end upon a collar or other abutment 40 fixed upon the rod, the spring serving, as will be readily understood, to yieldably hold the rod and the die block in the uppermost position. The upward movement of the rod is limited by the treadle 37 impinging against the lower end of the cylinder 35, and to hold the rod and the parts connected therewith in the lowered position, as may be desired, I provide a trip lever 41 which is mounted upon the floor of the workroom and has one end 42 adapted to engage over the treadle 37 and its opposite end yieldably held raised by a spring 43, as will be understood upon reference to Fig. 10. When the rod has been lowered by pressure of the operator's foot upon the treadle 37, the treadle automatically rides into engagement with the trip lever 41 and when the parts are to be returned to their upper positions, the operator presses upon the end of the trip lever so as to release its holding end from the treadle whereupon the spring 38 at once expands and raises the rod and the die block.

Mounted in the die block are dies or operating instrumentalities which act upon the shell to eject the fired primer, inject a new primer and load the shell with a charge of powder, and then secure a bullet in the charged shell, these operations being performed by the respective dies simultaneously after the machine is in full operating condition. The first die comprises an adapter sleeve 44 which is threaded into an opening provided therefor in one end of the die block and has a hard steel bushing 45 secured in its lower end. The bore of this adapter sleeve 44 is internally threaded and receives a plunger having a threaded upper end portion 46 and an intermediate smooth portion 47 with a beveled shoulder 48 at the lower end of said intermediate smooth portion. There is also a second smooth portion 49 below the beveled shoulder, the lower end of which is reduced and externally threaded, as shown at 50. The extremity of the plunger provides a concave seat for the head 51 of an ejector pin 52 which is supported by a cup or thimble 53 threaded onto the extremity 50 of the plunger. A shell, indicated at 54, is brought into position under the plunger and when the die block is lowered, as has been described, the bushing 45 will be forced down over the shell so as to resize the same while the ejector pin 52 will force the fired primer from the shell, and said primer will drop through the openings 16 in the slide and 17 in the bed plate into any receptacle. Simultaneously with the ejectment of the fired primer, the beveled shoulder 48 on the plunger will enter the open upper end of the shell and spread the same, as clearly shown in Fig. 4. The plunger can obviously be adjusted axially to obtain the desired results with certainty, and a lock nut 55 is fitted upon the plunger and turned home against the head of the adapter sleeve 44 so as to hold the adjustment.

A primer magazine 56 is secured to and depends from the bed plate at a point beyond the opening 17 and the primers 57 are stacked within this magazine which consists of a tube of proper diameter having its lower end closed by a cap 58 of suitable design. The magazine is provided with diametrically opposite slots 59, at the lower ends of which are lateral notches 60, as clearly shown in Fig. 7, and a follower 61 is disposed within the tube and has guiding fingers 62 projecting therefrom to pass through the respective slots 59 and thereby guide the follower in its movements. The primers rest upon the follower,

and an expansion spring 63 housed in the magazine below the follower and bearing against the same tends constantly to move the follower and the primers upwardly. The slide 5, of course, extends across the upper end of the magazine and prevents the primers being ejected except when the recess 20 in the underside of the slide registers with the bore of the magazine whereupon the uppermost primer will be ejected into said recess and will be carried over the bed plate with the slide in the further movement of the latter, it being understood, of course, that the recess 20 is of such dimensions that it will admit just one primer.

As the slide continues its movement, the primer in the recess 20 will eventually be brought over an opening 64 in the bed plate and will drop into said opening, and upon the reverse movement of the slide the opening 19 therein will be brought into position over this primer, as shown in Fig. 1. When the primer drops into the opening 64, it will rest upon the injector pin 65 which is slidably fitted through a plug 66 closing the lower end of a casing 67 secured to and depending from the bed plate. The injector pin is provided with an annular flange or shoulder 68 within the casing 67 and a spring 69, housed in the casing and bearing upon said flange or shoulder, yieldably holds the pin in its lowered position. At its lower end, a head 70 is formed on the pin and this head rests upon the rocker head or terminal 71 of a lever 72 which is fulcrumed between its ends in the forked lower end 73 of a bracket 74 which is secured to and depends from the bed plate, as clearly shown in Fig. 3. The rear end of the lever 72 is formed into an enlarged head 75 upon which rests the lower end of a dog 76, pivoted at its upper end in a recess 77 in the side of the operating rod 33 and having its lower end projected from the recess by a spring 78 seated in the inner wall of the recess and bearing upon the dog, as shown clearly in Fig. 5. As shown in said Fig. 5, the upper edge of the dog is given a projecting convex surface adapted to ride against an arm 79 of the bracket 74 so that upon the initial downward movement of the rod 33 and the die block, the head 75 will be pressed downwardly and the lever 72 rocked so that the injector pin 65 will be forced upward against the tension of the spring 69 and the primer resting on the injector pin will be inserted in the shell resting on the slide over the opening 19. As the downward movement of the rod 33 continues, the projecting surface of the dog will be brought against the arm 79 and the dog will be thereby swung inward against the tension of the spring 78 so that it will be released from the head 75 and the lever 72 and injector pin may return to their normal positions. It may be noted at this point also that the arm 79 prevents the latch 76 from being swung out of the recess 77 to such an extent as to be inoperative.

As the injector pin retires from the shell 80 in which it has just inserted a primer, a second adapter sleeve 81 will be brought down over the shell and the bore of this adapter sleeve will fit closely around the flared upper end of the shell so that the powder charge which is delivered thereinto will not escape over the sides of the shell. It will be noted that the adapter sleeve 81 has a bore 82 in its upper portion which is of the same, or slightly less, diameter than the diameter of the shell and a charge-forming and feeding disc 83 is rotatably mounted in the upper portion of the adapter sleeve, the upper extremity of the bore of the sleeve being flared, as shown at 84, so that the powder will be directed into the central bore of the adapter and thence into a diametrical passage 85 formed in the disc 83. As shown most clearly in Fig. 9, the adapter sleeve is formed with a circular enlargement within which the disc 83 is rotatably mounted and in one end of the passage or opening 85 is threaded a plug 86 so that the charge of powder may be accurately measured and a uniform charge will be fed to the successive shells. By properly adjusting the plug 86 in or out in the passage 85, the extent or length of said passage which may receive the powder will, of course, be varied. The disc 83 is secured in position by a screw 87 secured axially in one end or side of the disc and rotatably engaged in a side plate 88 secured to the adapter sleeve. At the opposite side, the disc is formed with a stud or shaft 89 and a second side plate 90 having a hub member 91 is fitted over said stud or shaft to close the side of the adapter sleeve opposite the plate 88. At the end of the hub member 91 a roller or disc 92 is keyed to the shaft or stud 89 and a lock nut 93 is mounted on the shaft at the outer side of the disc or roller to prevent undesired movement of the disc along the shaft. This disc is formed with a peripherial groove in which is seated the coil of a spring 94 which extends upwardly and rearwardly from the disc and has its upper terminal bowed, as shown at 95, and secured to the brace or cross bar 96 which is secured upon the upper ends of the columns 11 to impart rigidity to the structure. When the die block 27 is moved downwardly, the sleeve 81 and the parts carried thereby will, of course, move downwardly with it and the spring 94 will be unwound and in unwinding will rotate the disc 92 so that the powder receiving rotor 83 will be rotated through 180° and the charge of powder will be delivered through the bore 82 into the shell 80, and upon the return movement, the spring will rewind and return the powder holder to normal position. The supply of powder is contained in a transparent magazine 97 which is seated in an annular groove provided therefor in a flange 98 on the upper end of the adapter sleeve 81.

Beyond the adapter sleeve 81 and adjacent the end of the die block 27, a third adapter sleeve 99 is secured in an opening provided therefor in the die block and a lock nut 100 is mounted upon this adapter sleeve and turned home against the die block to hold the sleeve in place after it has once been adjusted. Similar lock nuts 101 are mounted upon the adapter sleeves 44 and 81, as shown in the drawings. The adapter sleeve 99 will ride down over the shell 102 which has received a primer and a charge of powder as the die block is lowered, and in the lower end of this adapter sleeve are radial sockets receiving ball detents 103 which are held against outward movement by a split spring ring 104 fitted in an annular groove 105 in the outer circumference of the sleeve. Within the upper end portion of the bore of the adapter sleeve 99 is threaded a second sleeve 106, the bore of which is somewhat enlarged at its lower end, and received in the bore of this sleeve is an anvil 107 having a concave seat in its lower end to engage the nose of a bullet 108. The anvil 107 is formed on the lower smooth end of a shank 109 fitting in the bore of the sleeve 106 and having a threaded upper portion 110 engaging in the threaded extremity

of the bore of the sleeve 106 and equipped with a lock nut 111 to hold the adjustment. The lower extremity of the sleeve 106 is beveled, as shown at 112, so that it may ride into engagement with the upper end of the shell 102 and pinch the same into an annular groove in the bullet so that the bullet will be firmly secured in the end of the shell. As the die block moves upwardly, the filled shell with the bullet therein will be left upon the slide 5 at the end of the slide and the next movement of the slide will carry the shell to the end of the keeper plates 6 and 7 where it will be released and may be removed by hand or otherwise disposed of.

The keeper plates 6 and 7 are provided with notches or recesses 113 in their inner opposed edges at stated intervals in the length thereof and the purpose of these notches will now appear. As has been heretofore stated, when starting operations the treadle 37 is pressed downward so as to pull the rod 33 and the die block down. The first action requires merely that the latch 25 be brought below the end of the lever 24, it being understood that the first shell in the rack or magazine has been slid onto the slide and abuts the end of the rib 13. When the latch 25 has been brought to a position below the end of the lever 24, the cross head or die block is permitted to rise and the lever 24 will be rocked to the position shown by dotted lines in Fig. 1, thereby moving the slide with the shell thereon to a position below the first die whereupon the spring 10 will move the keeper bar 7 outwardly or forwardly so that the first recess 113 therein will engage the shell and the shell will be held by and between said recess and the corresponding recess in the front keeper plate 6. When the slide was moved to feed the shell, as stated, the several dogs 14 thereon, of course, moved with them. When the upward movement of the die block releases the latch 25 from the lever 24, the spring 28 at once returns the lever to the position shown in full lines in Fig. 1 and retracts the slide, the first dog 14 then riding under the shell so as to assume the position shown in Fig. 1 immediately at the side of the shell. Upon the next downward movement of the die block, the ejecting pin 52 will eject the primer of the shell and the primer will fall through the openings 16 and 17, as has been explained. Upon this second downward movement of the die block, the latch 25 will again ride into engagement with the lever 24 so that upon the return upward movement of the die block, the lever will be rocked and the shell from which the primer has just been ejected will be moved by the dog 14 with the slide into position between the second notches 113, and simultaneously with this movement a second shell will be brought by the rib 13 to the position just vacated by the first shell. Upon return movement of the slide, the dogs will ride under the respective shells and assume positions at the sides of the same and on the next downward movement the ejector pin 52 will eject the primer from the second shell and the first shell will receive a new primer and a charge of powder will be delivered thereinto by the action of the powder-measuring disc 83, as has been explained. Upon the third downward movement of the die block, the shells previously brought into position will be each moved forward one step and the first shell will be brought below the third adapter sleeve or die ready to receive the bullet, the second shell will be brought into position to receive a primer and a charge of powder, while a third shell will be brought below the ejector pin. The bullet is inserted by the operator in the end of the sleeve 106 and the extent to which it may be inserted is determined by properly adjusting the anvil 107, so that, after three shells have been fed to the working positions, at each operation one shell will be deprived of its old primer, another shell will receive a new primer and a charge of powder, and a third shell will receive a bullet, these operations being performed simultaneously and automatically except for the placing of a bullet in position to enter the end of a shell. The descent of the die block and the dies carried thereby will, of course, be due to pressure upon the treadle 37 and the engagement of the trip lever 41 over said treadle will hold the parts in the lowered position until the operator has had time to remove the completely reloaded shell and obtain a bullet to be inserted at the next operation. Upon release of the trip lever 41, the working parts will be automatically returned to initial positions.

When the primer magazine is to be loaded, the follower 61 is moved down to the lower ends of the slots 59 and then turned to engage the fingers 62 in the notches 60 whereby to hold the follower in the lowered position. After the loaded magazine is secured in position on the bed plate, the fingers are disengaged from the notches whereupon the device will operate in the described manner.

From the foregoing description, taken in connection with the accompanying drawings, it will be seen that I have provided a very compact mechanism whereby fired shells may be readily and efficiently reloaded and made fit for further use.

Having thus described the invention, what is claimed as new is:

1. In a shell-reloading machine, the combination of a magazine for holding shells, a series of dies, a cross head carrying said dies and shiftable vertically, a slide to reciprocate horizontally under the magazine and dies and having members arranged to engage and feed shells singly from the magazine and progressively move the shells to positions below the dies, means actuated from the cross head for reciprocating said slide, keeper plates arranged at sides of the slide and one being shiftable toward and away from the slide, said plates serving to guide sliding movement of the slide and being provided in their confronting edges with recesses adapted to receive portions of the successive shells and arrest their movement at points below the dies, and means cooperating with the dies to supply primers to the shells successively.

2. In a shell-reloading machine, the combination of a bed plate having a series of openings therein, a primer magazine secured to and depending from the bed plate between the openings, a primer injector mounted below the bed plate in alinement with one of the openings, a series of dies mounted above the bed plate and movable toward and from the bed plate, a slide movable over the bed plate across the openings therein, dogs mounted on the slide to feed shells step by step under the several dies as the slide is moved in one direction and to ride under the shells as the slide moves in the opposite direction, the slide being provided with openings adapted in a position of rest to register with the openings in the bed plate and provided between said openings with a recess adapted to register with the primer magazine when the slide is at rest, means for closing one opening in the slide as the slide carries

said opening across the primer magazine, means for operating the slide in timed relation to the dies, and means for operating the primer injector in timed relation to the operation of the dies.

3. In a shell-reloading machine, the combination of a die block, a powder-measuring and discharging element mounted on said die block, a primer injector arranged below and in alinement with the die measuring and discharging element, a vertically adjustable rod for raising and lowering the die block, a lever for operating the primer injector, means carried by said rod for actuating the lever during reciprocation of the rod and imparting movement to the primer ejector in timed relation to the die block, and means for feeding a shell into position between the measuring and discharging element and the primer injector.

4. In a shell-reloading machine, a base, a die block over the base, a rod for raising and lowering the block, a powder-measuring and discharging device mounted on the block, a primer injector mounted below and in alinement with the powder measuring and discharging device, a primer magazine arranged at one side of the injector, means for feeding a shell into position between the powder measuring and discharging device and the injector and transferring a primer from the primer magazine to a position over the injector, a bracket depending from the base, a lever carried by said bracket for actuating the ejector, and a dog carried by the rod and yieldably held in position for engaging and actuating the lever during movement of the rod.

5. In a shell-reloading machine, the combination of a bed plate, a slide mounted to move upon the bed plate, a magazine to deliver shells onto the slide, a rib on the slide to extend across the end of the magazine and retain the shells therein in one position of the slide and in another position of the slide to release the shells, means at the sides of the slide to retain shells thereon, a die block, means for moving the die block toward and from the slide, a latch mounted at one end of the die block, a lever mounted upon the bed plate with one end in engagement with the slide and its opposite end disposed in the path of the latch whereby upon downward movement of the die block the latch will engage under the lever and upon upward movement of the die block will rock the lever to move the slide, and a retractile spring acting upon the lever to return the same and the slide to initial position when the latch clears the lever.

6. In a shell-reloading machine, the combination of a bed plate, a plurality of dies mounted above the bed plate, means for raising and lowering the dies, a slide mounted upon the bed plate, means for moving the slide in timed relation to the dies, the slide having openings therethrough adapted when at rest to aline with the first and second dies, and a bed plate having an opening therethrough to register with the first die, a primer magazine depending from the bed plate at one side of the opening therein, a primer injector mounted on and depending from the bed plate at one side of the magazine, a flap valve pivoted to the slide and adapted to close the first opening therein as the slide moves over the bed plate whereby to prevent injection of a primer from the primer magazine, and means for moving the primer injector in timed relation to the dies.

7. In a shell-reloading machine, a series of dies, a rod for raising and lowering the dies, a primer injector arranged adjacent said rod, yieldable means holding the injector normally lowered, a lever mounted between the injector and said rod and bearing upwardly against the lower end of the injector, a dog on the rod engaging the lever whereby upon initial downward movement of the rod the lever will be rocked and the injector raised, and means for releasing the dog as the rod moves downwardly.

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