J. B. RUSSELL.

SHELL CRIMPER.

APPLICATION FILED JULY 3, 1915.

1,166,636.

Patented Jan. 4, 1916.

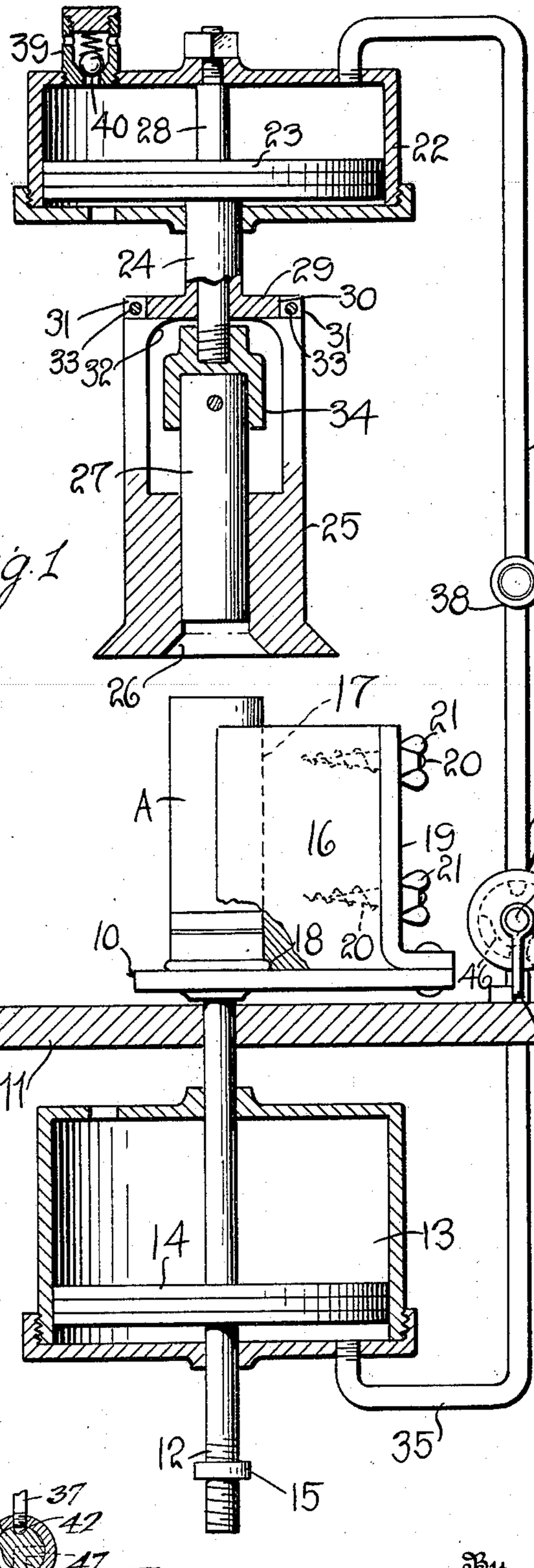

Fig. 1

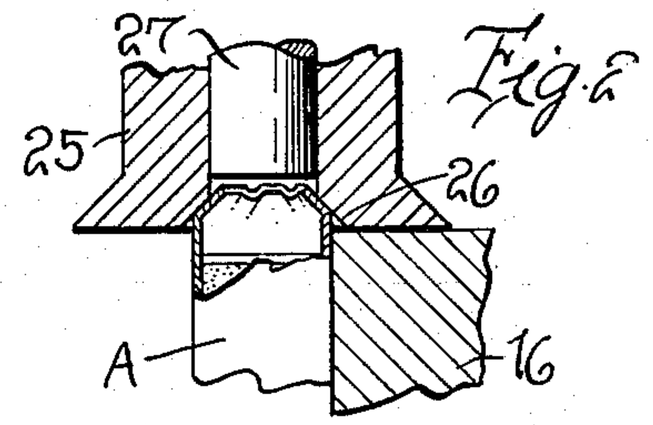

Fig. 2

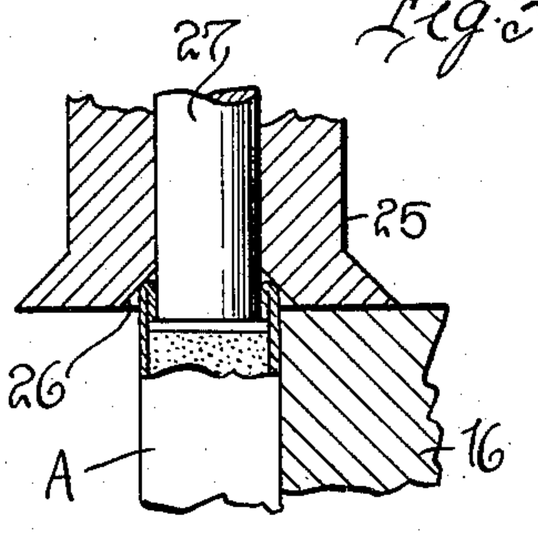

Fig. 3

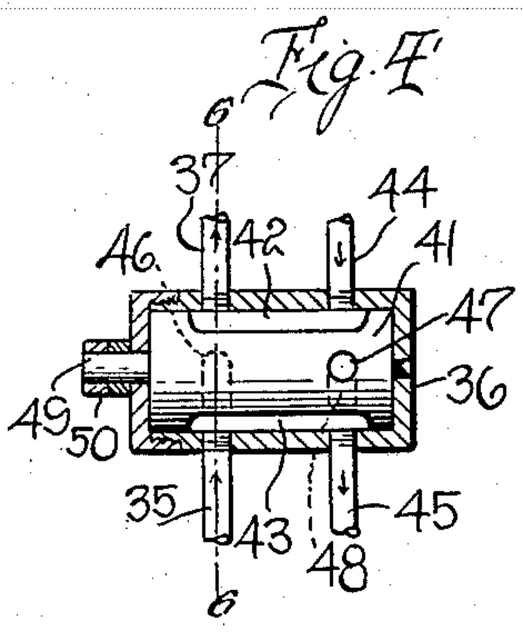

Fig. 4

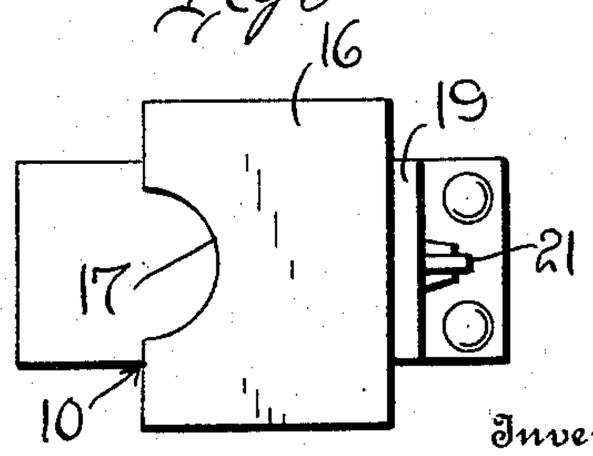

Fig. 5

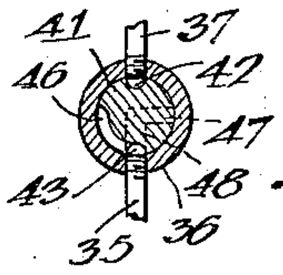

Fig. 6.

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SHELL-CRIMPER.

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To all whom it may concern:

Be it known that I, JAMES B. RUSSELL, a citizen of the United States, residing at Sinnamahoning, in the county of Cameron and State of Pennsylvania, have invented certain new and useful Improvements in Shell-Crimpers, of which the following is a specification, reference being had to the accompanying drawings.

My present invention relates broadly to new and useful improvements in machines for closing or crimping the ends of explosive shells after the shells have been filled with dynamite or other explosives.

The primary object of this invention is the provision of novel means whereby a shell such as a dynamite shell may be closed at one end by folding the material of the shell over upon itself and forcing the folded over ends downward so as to form a countersink, the wall of the shell acting to hold the cardboard wad firmly in place.

A further object of the invention is to provide improved means for supporting a shell beneath the crimping and folding member, this means permitting the ready insertion and removal of the shell.

Still another object of the invention is to provide means engaging the crimper after the shell has been crimped, said means positively preventing a further relative movement of the crimper down upon the shell.

A further object of the invention is to do away with the use of springs for resisting the relative movement of the crimper to thereby obviate breakage of the springs and the possible explosion of the cartridge due thereto, and still another object is to provide means whereby the cartridge may be held in place by one hand of the operator while the other hand operates the valve which controls the movement of the cartridge support or holder and the crimping mechanism.

Still another object is to provide a mechanism of this character which shall have very few parts and be very simply operated, so as to do away as much as possible with complication and consequent liability of accident.

Other objects will appear in the course of the following description.

The above and other incidental objects of a similar nature, which will be hereinafter more specifically treated are accomplished by such means as are illustrated in the accompanying drawings, described in the following specification, and then more particularly pointed out in the claims which are appended hereto and form part of this application.

With reference to the drawings, wherein there has been illustrated the preferred embodiment of this invention, as it is reduced to practice, and throughout the several views of which similar reference numerals designate corresponding parts, Figure 1 is a vertical section of the various parts of the apparatus in assembled relation; Fig. 2 is a detail view in vertical section showing the manner in which the upper end of a shell may first be crimped by the crimping sleeve; Fig. 3 is a detail view in vertical section showing the manner in which the crimped portion of the shell may be folded inwardly after the crimping operation; Fig. 4 is a longitudnial sectional view of the air controlling valve; and Fig. 5 is a plan view of the shell holder.

By referring to the drawings it will be seen that my mechanism comprises a shell supporting and holding member which is designated 10. This member is preferably disposed above a table or bench 11 and is supported by a piston rod 12 which passes into a cylinder 13 and carries upon it a piston 14. The piston rod 12 preferably passes through the cylinder and at its lower end is provided with a stop 15. The shell is designated A and for the purpose of holding the shell upon the member 10 and supporting it in proper position for the clamping and holding operation, I mount upon the table 10 the block 16. This block, as illustrated in Fig. 5, extends across the member 10 and upon one face is formed with the semi-cylindrical recess 17 adapted to receive a shell. At its lower end this recess is cut away, as at 18, to accommodate the head of the shell.

The block 16 is held upon the member 10 in any suitable manner, and I have shown for this purpose the member 10 as being provided with the upwardly projecting brace 19 and the block 16 as being provided with screws 20 which pass through the brace and which are engaged by thumb nuts 21. I do not wish to be limited to this, however. It is necessary to provide means for detachably mounting the block 16 upon the support 10 in order to provide for interchanging various sizes of blocks, corre-

sponding to various diameters and heights of shells. Assuming that the shell when completed will be eight inches long and one inch in diameter, then it will be obvious that the block 16 should be eight inches high and that the recess 17 formed in this block should have a radius of one-half an inch. Before the shell is folded its wall projects above the block 16 as illustrated in Fig. 1.

Disposed above the shell supporting member 10 and in line with the piston 12 is a cylinder 22 within which is disposed a piston 23 from which extends a tubular plunger 24. This plunger at its lower end is operatively connected, as will be later described, to a crimper 25. This crimper is a cylindrical tubular member having its lower end formed with an upwardly tapering crimping recess 26. The center of the crimper 25 is bored out to accommodate a plunger or pin 27 which is in exact alinement with the center of the axis of the shell A and which is operatively supported upon the lower end of a supporting rod 28 which extends up through the tubular plunger 24, up through the piston 23, and is attached to the upper wall of the cylinder 22. I have shown the rod 28 as being reduced in diameter and having a screw threaded portion extending through the wall of the cylinder and engaged by a nut. I do not wish to be limited, however, to this means of supporting the rod 28. Normally the piston 23 is in a depressed position and the lower end of the plunger or pin 27 is disposed at or slightly above the upper end of the tapering recess 26. When the crimper 25 rises, however, it will be obvious that the pin will be moved relative to the crimper 25 so as to project below the crimper as shown in Fig. 3.

It is desirable, in order to accommodate the machine to crimping shells of different diameters, that the crimper 25 shall be detachable from the tubular plunger 24 so as to permit a crimper having its bore increased or decreased in diameter to be applied to the plunger. To this end I have shown the plunger as formed with a cross head 29, cleft at its ends to provide slots 30 for the reception of the upper ends of the upwardly extending lugs 31 formed upon the member 25. These lugs preferably are provided with inwardly projecting shoulders 32 to engage upon the under side of the cross head and are held in place within the slots 30 by means of the transverse clamping screws 33. I do not wish to be limited, however, to this manner of connecting the several sizes of crimpers to the plunger rod 24. For the same reason it is of course necessary to provide a detachable connection between the plunger 27 or pin and the rod 28. To this end I screw thread upon the lower end of the rod 28 the head 34 which is formed with an interiorly screw threaded or pinned seat for engagement with the upper end of the plunger 27. Thus one plunger or pin 27 may be readily removed from the rod 28 and another engaged therewith. It will be understood that the exterior diameter of the member 25 does not necessarily vary but that the diameter of the bore will vary and that the diameter of the pin 27 used therewith will vary correspondingly.

In order to provide for shifting the member 10 upward so as to carry the shell into engagement with the crimper 25 and the pin 27, I connect to the lower end of the cylinder 13 the air pipe 35. This pipe extends upward to a valve casing 36. From the upper end of the cylinder 22 extends a pipe 37 which also connects to the valve casing 36 in the manner illustrated in Fig. 4. Disposed between the valve casing 36 and the cylinder 22 is a reducing valve 38 of any suitable character which will act to reduce the pressure in the pipe 37 above this valve from the pressure in the pipe 37 below the valve. Mounted in the upper end of the cylinder 22 is an escape valve comprising a casing 39 having a valve seat formed therein and a valve 40 which is yieldingly held in the seat as by means of a spring. This valve moves upwardly under the pressure of the air within the cylinder 22 and when it is raised from its seat it permits the escape of the air from the cylinder 22 to the exterior atmosphere. The valve is held to its seat with a predetermined pressure, but is raised when the pressure in the cylinder 22 is greater than that holding the valve to its seat. For the purposes of illustration it is assumed that the pressure exerted upon the valve to hold it to its seat is about six pounds; that the pressure within the pipe 37 above the valve 38 is reduced to five pounds, while the pressure in the pipe 37 below the valve is twenty-five pounds.

I do not wish to limit myself to any particular form of valve disposed within the casing 36 and controlling the passage of air to the cylinders 13 and 22, but I have shown a valve so constructed that in one position it will admit air under compression to the pipe 37 and thus to the cylinder 22, and simultaneously connect the cylinder 13 to the outlet or exhaust pipe while in another position of the valve the pipe 37 will be cut off from access to the compressed air and the cylinder 13 will be connected to the source of compressed air.

The valve 41 mounted within the casing 36 is a rotatable valve and has formed upon its circumference at diametrically opposite points the longitudinally extending channels 42 and 43. The channel 42 is long enough to connect the pipe 37 with a pipe

44 extending from the source of compressed air or other fluid. The channel 43 is long enough to connect the pipe 35 with an outlet or exhaust pipe 45. Intersecting the forward end of the channel 43 is a circumferential channel 46 which extends around a quarter of the circumference of the valve, and also extending from the channel 43 is a passage 48 which extends, as at 47, to the circumference of the valve to provide a port which is adapted to register with the inlet pipe 44 when the valve is turned a quarter circle from the position shown in Fig. 4. Extending outward from the valve 41 and to the valve casing is the spindle 49 upon which is mounted a handle 50. Upon one of these spindles is also mounted an arm which is engaged by a spring 51. This spring normally holds the valve 41 in such a position that the channel 42 will connect the source of fluid pressure with the pipe 37, while the pipe 35, and as a consequence the cylinder 13, will be connected with the outlet pipe 41. Upon rotating the valve, however, through a quarter circle by means of the handle 50 and against the force of the spring 51, the channel 42 will move out of register with the pipes 37 and 44, thus cutting off the supply of air to the cylinder 22 and at the same time the port 47 will be brought in engagement with the pipe 44 and compressed air will pass through the port 47, the passage 48, to the channel 46 and thence to the pipe 35, and so to the cylinder 14 urging the piston therein upward. As soon as the valve handle 50 is released, however, the spring 51 will return the valve to its original position.

The operation of this invention is as follows: In the normal position of the parts the piston 14 is lowered within the cylinder 13 so that the support 10 is also in its lowered position. The piston 23 is also in a lowered position in the cylinder 22. Behind the piston 23 is air pressure at five pounds. The normal position of the valve 41 is such that communication is established between the source of compressed air and the pipe 37. This air pressure may be assumed to be at twenty-five pounds, but the reducing valve causes the pressure within the cylinder 22 to lie at five pounds. The crimper and folding pin or plunger are disposed as shown in Fig. 1. In order to operate the device the valve handle 50 is turned to rotate the valve to such a position as to cut off communication between the pipe 44 and the pipe 37 and to establish communication between the pipe 44 and the pipe 35. Under these circumstances the pressure beneath the piston 14 will cause the piston 14 to rise, carrying with it the member 10 and the shell A which has been disposed against the block 16. As the shell rises, its upper end will strike the inclined face of the recess 26 and inasmuch as the pressure holding the crimper 25 down will be greater than the strength of the shell wall the shell wall will be crimped or turned inward as illustrated in Fig. 2. When this shell wall has been crimped so far that the block 16 strikes the lower end of the crimper 25, the crimper will be lifted inasmuch as the pressure in the cylinder 13 is twenty-five pounds while the pressure in the cylinder 22 is only five pounds, and the raising of the piston 23 will still further compress the air in the cylinder 22 until the air will force open the valve 40 and the air within the cylinder 22 escapes. As the crimper rises the folded-in end of the shell will be carried up against the plunger or pin 27 which will act to fold the crimped end of the shell in still farther as shown in Fig. 3. As soon as the end of the shell has been folded inward the valve 41 is released whereupon the spring 51 will cause the return of the valve to its original position. This will open connection between the pipe 35 and the outlet pipe 45, causing the release of the air behind the piston 14 and the piston will fall. At the same time communication will be established between the source of compressed air and the pipe 37 and the piston 23 will once more descend carrying the crimper to its original position.

In reduction to practice, it has been found that the form of this invention illustrated in the drawings and referred to in the above description as the preferred embodiment is the most efficient and practical; yet realizing that the conditions concurrent with the adoption of this device will necessarily vary, it is desirable to emphasize the fact that various minor changes in the details of construction, proportion and arrangement of parts may be resorted to, when required, without sacrificing any of the advantages of this invention, as defined by the appended claims.

What is claimed is:—

1. A shell closer including a vertically movable shell holder, fluid operated means controlling the shell holder, a vertically movable crimper engageable with the shell for crimping the upper terminal thereof, fluid operated means controlling the crimper, said holder and crimper being adapted to relatively move in opposite directions, and a fixed folding pin disposed within the crimper.

2. A shell closer including a vertically movable shell holder, fluid operated means controlling the shell holder, a vertically movable crimping sleeve, fluid operated means controlling the sleeve, and a fixed folding pin disposed within the crimping sleeve, said sleeve being adapted to crimp the upper terminal of a shell mounted in the holder, said folding pin being adapted to

fold the crimped portion of the shell inwardly, subsequent to the crimping operation.

3. A shell closer including a fixed folding pin, a vertically movable crimping sleeve slidable upon the pin, means controlling the movement of the crimping sleeve, a shell holder, and means controlling the movement of the shell holder, said shell holder and crimping sleeve being relatively movable in opposite directions for crimping the upper terminal of a shell mounted within the holder, and means for lifting said shell holder subsequent to the crimping of the upper terminal of the shell by the sleeve member to engage the crimped portion of the shell with the folding pin, whereby the crimped portion is folded inwardly.

4. A shell closer including a vertically movable shell holder, a member extending upward from the holder and normally disposed below the upper end of a shell supported upon the holder, a shell crimping sleeve disposed above the holder having a portion thereof disposed in the path of travel of said upwardly extending member and also having a crimping face disposed in the path of travel of the shell, means exerting a predetermined force upon the sleeve to hold it in a depressed position but yielding upon the upward movement of the sleeve under the action of a greater force, a shell folding member disposed within the sleeve and fixed from longitudinal movement therewith, and means for moving the shell holder and shell supporting member upward relative to the sleeve and folding member.

5. A shell closer comprising a vertically movable shell holder, a piston connected thereto, a cylinder within which the piston operates, a folding pin mounted above the shell holder and fixed from longitudinal movement, a crimping sleeve surrounding the folding pin, a piston connected to said crimping sleeve, a cylinder within which the piston operates, a relief valve on the cylinder opening when the pressure within the cylinder increases beyond a predetermined amount, a member mounted upon the shell holder and extending upward to a point below the upper end of the shell supported upon the member and adapted to engage the crimping sleeve upon the upward movement of the holder, means for admitting fluid under pressure to the cylinder controlling the crimping sleeve or for cutting off the pressure to said cylinder and admitting pressure to the first named cylinder below the piston thereof to cause the elevation of the shell holder.

6. A shell closer comprising a vertically movable shell holder, a shell crimping sleeve disposed above the holder, a piston operatively connected to the shell holder, a cylinder within which the piston operates, a piston operatively connected to the crimping sleeve, a cylinder within which the piston operates, a folding pin disposed within the sleeve and held from longitudinal movement, a relief valve mounted upon the second named cylinder and relieving pressure therein when the pressure rises beyond a predetermined point, and means for connecting the cylinder of the crimping piston with a source of fluid pressure and connecting the cylinder of the shell holder piston with the atmosphere, said means being movable to a position to disconnect the crimping cylinder from the source of fluid pressure and simultaneously connect the shell holder cylinder with a source of fluid pressure to cause the upward movement of the shell holder.

7. A shell closer comprising a vertically movable shell holder, a shell crimping sleeve disposed above the holder and also vertically movable, a shell folder disposed within the crimping sleeve and held from longitudinal movement, a member mounted upon the shell holder and movable therewith and normally having its upper end disposed below the upper end of the shell supported on the holder, said member being engageable with the crimping sleeve upon an upward movement of the holder, a cylinder, a piston mounted therein and connected to the shell holder, a cylinder and a piston mounted therein and connected to the shell crimper, a relief valve in the second-named cylinder, a controlling valve having a pipe leading to the first named cylinder, and a pipe leading to the second named cylinder, a pressure reducing valve mounted within the first-named pipe, an inlet pipe connected to the controlling valve casing, an outlet pipe extending therefrom and a valve mounted within the controlling valve casing movable in one direction to establish communication between a source of fluid pressure in the first named cylinder and the bottom of the second named cylinder and the outlet opening and in another direction to establish communication between the second named cylinder and the source of fluid under pressure and cut off communication between the first named cylinder and said source.

8. In a shell closer a vertically movable shell holder, a fixed folding pin disposed above the holder, a shell crimper surrounding the pin and normally extending below it, and means for yieldably resisting the upward movement of the crimper due to its engagement with the shell on the holder.

9. In a shell closer a vertically movable shell holder, a fixed folding pin disposed above the holder, a shell crimper surrounding the pin and normally extending below it, means for yieldably resisting the up-

ward movement of the crimper due to its engagement with the shell on the holder, and means for variably controlling said yielding means.

10. A shell closer including a vertically movable shell holder, a shell crimping sleeve disposed above the holder, means for yieldably holding the sleeve in a depressed position, means mounted upon the shell holder and normally disposed below the upper end of the shell for engaging the sleeve after the upper end of the shell has been moved inward and downward, and a shell folding member disposed within the sleeve and fixed from longitudinal movement and having a diameter slightly less than the interior diameter of the shell.

11. A shell closer including a vertically movable shell holder, pressure operated means for raising the shell holder, a fixed folding pin disposed above the holder, a shell crimper surrounding the folding pin and normally extending below it, pressure operated means for yieldably resisting the upward movement of the crimper, and unitary means for controlling said fluid pressure operated means.

12. In a shell closer, a supporting plate adapted to support a shell, a member mounted upon said plate and extending upward therefrom and having a vertically extending recess to receive the body of the shell, said member being less in height than the shell, a shell crimper mounted above the shell holder, a folding pin disposed within the crimper, and means for relatively moving the crimper, the folding pin, and the shell holder to thereby cause the engagement of the shell with the crimper and then the engagement of the folding pin with the shell.

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

JAMES B. RUSSELL.

Witnesses:
THOMAS E. MOORE,
J. F. WOLFE.