Dec. 7, 1954 J. A. CHYBA 2,696,183

PRESS

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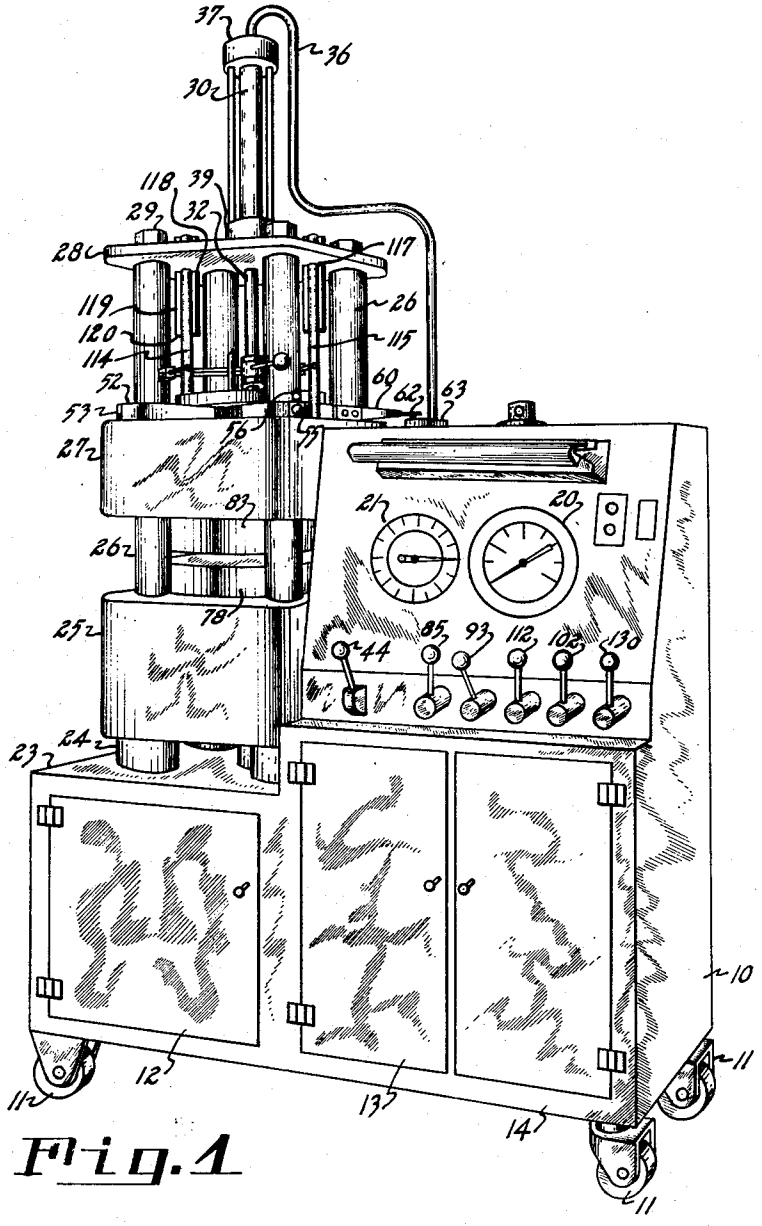


Fig. 1

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PRESS

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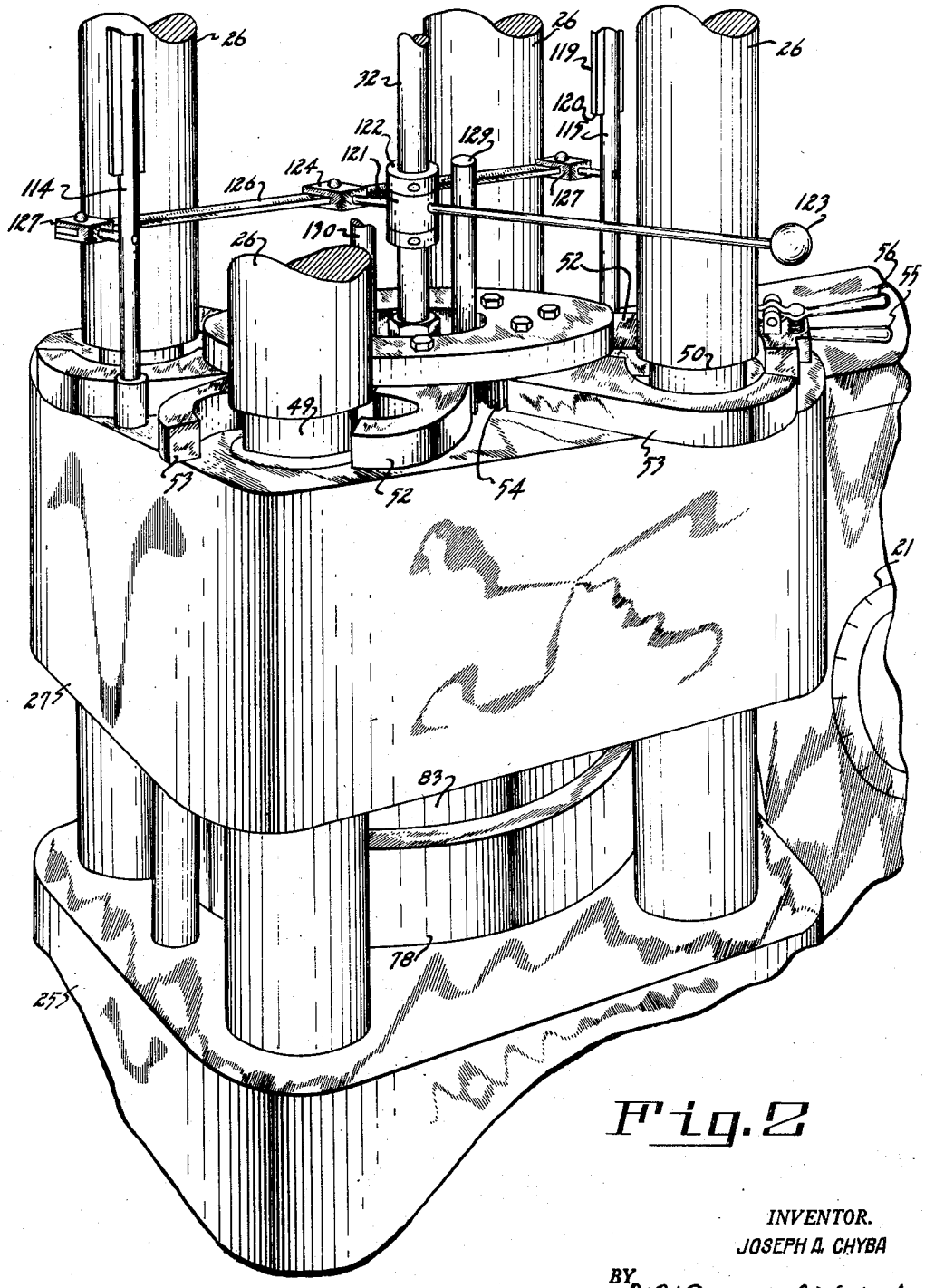


Fig. 2

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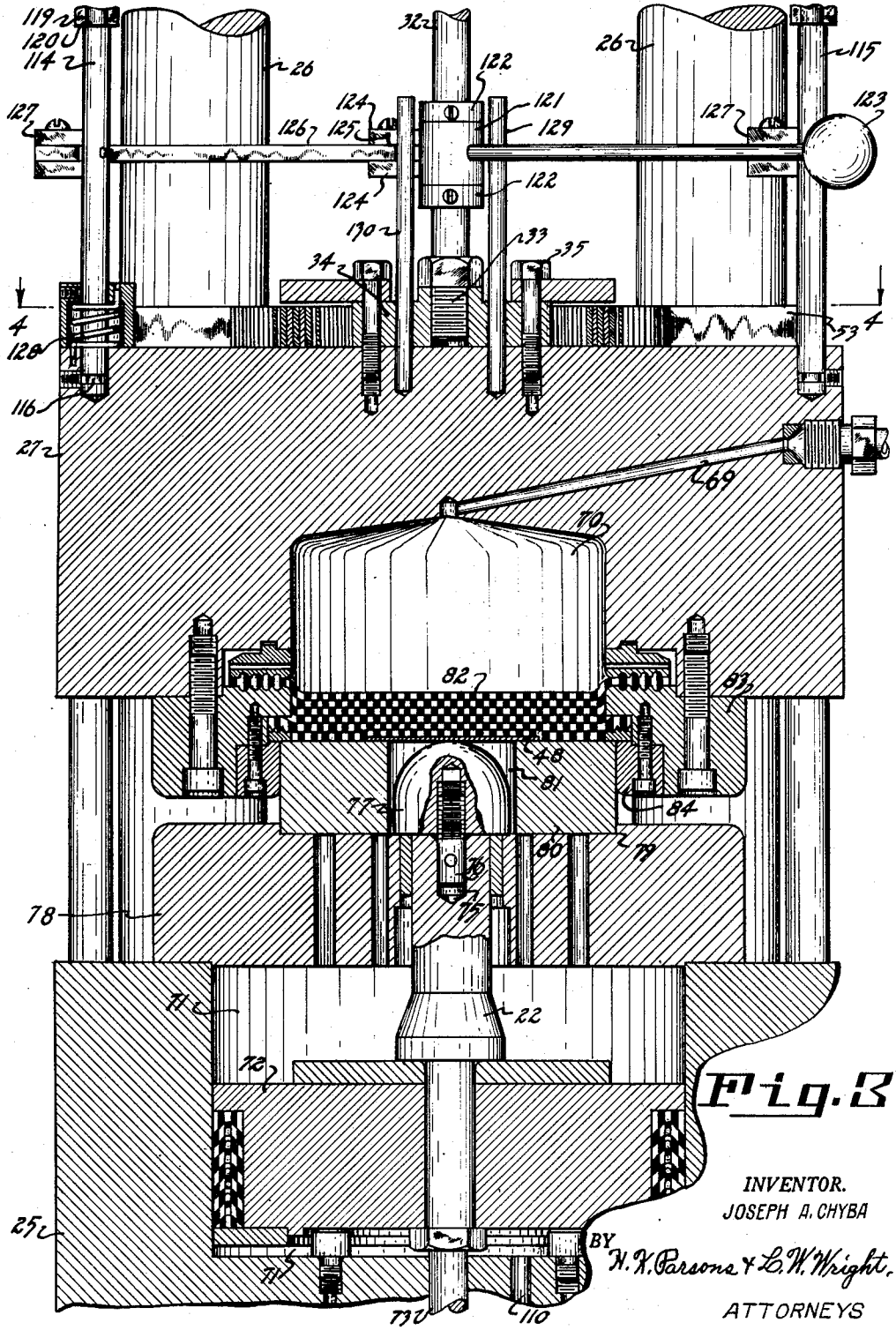


Fig. 8

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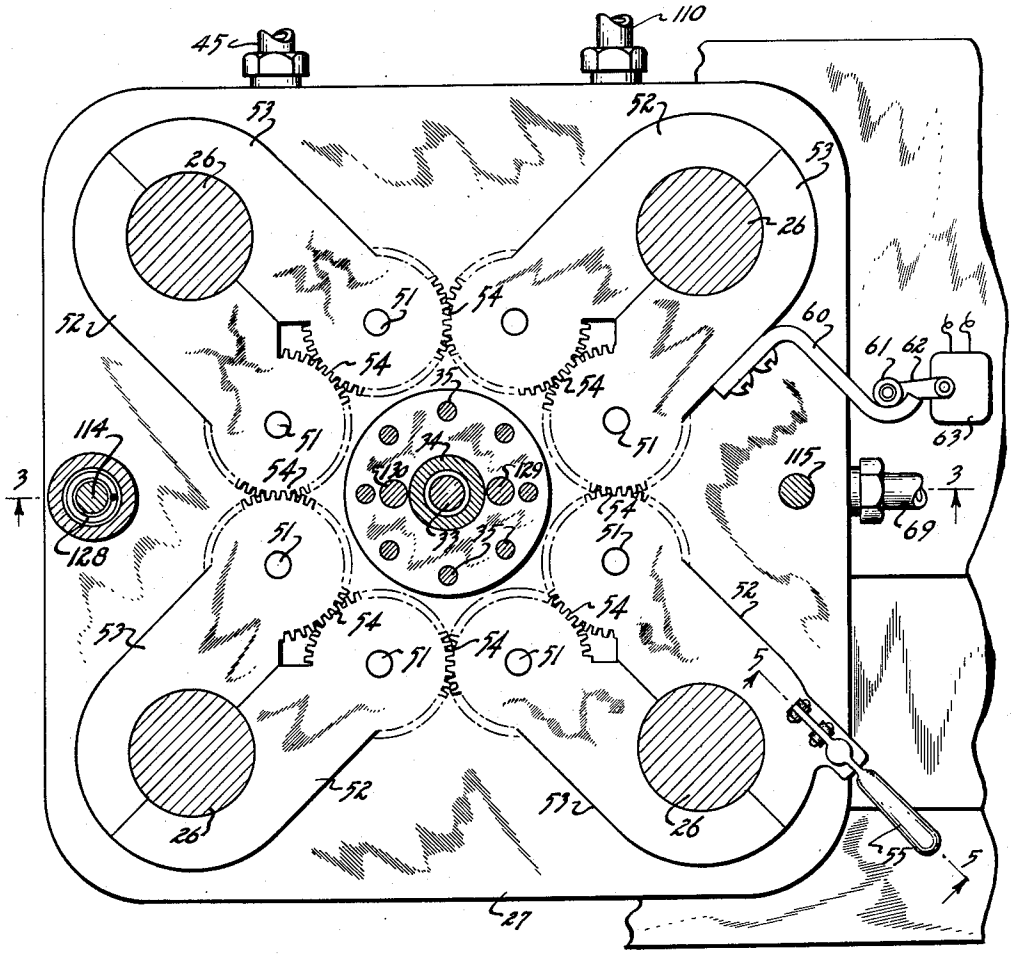


Fig. 4

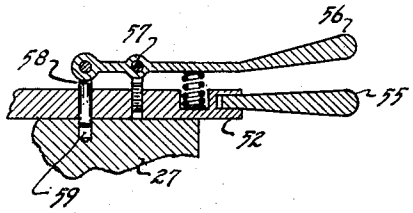


Fig. 5

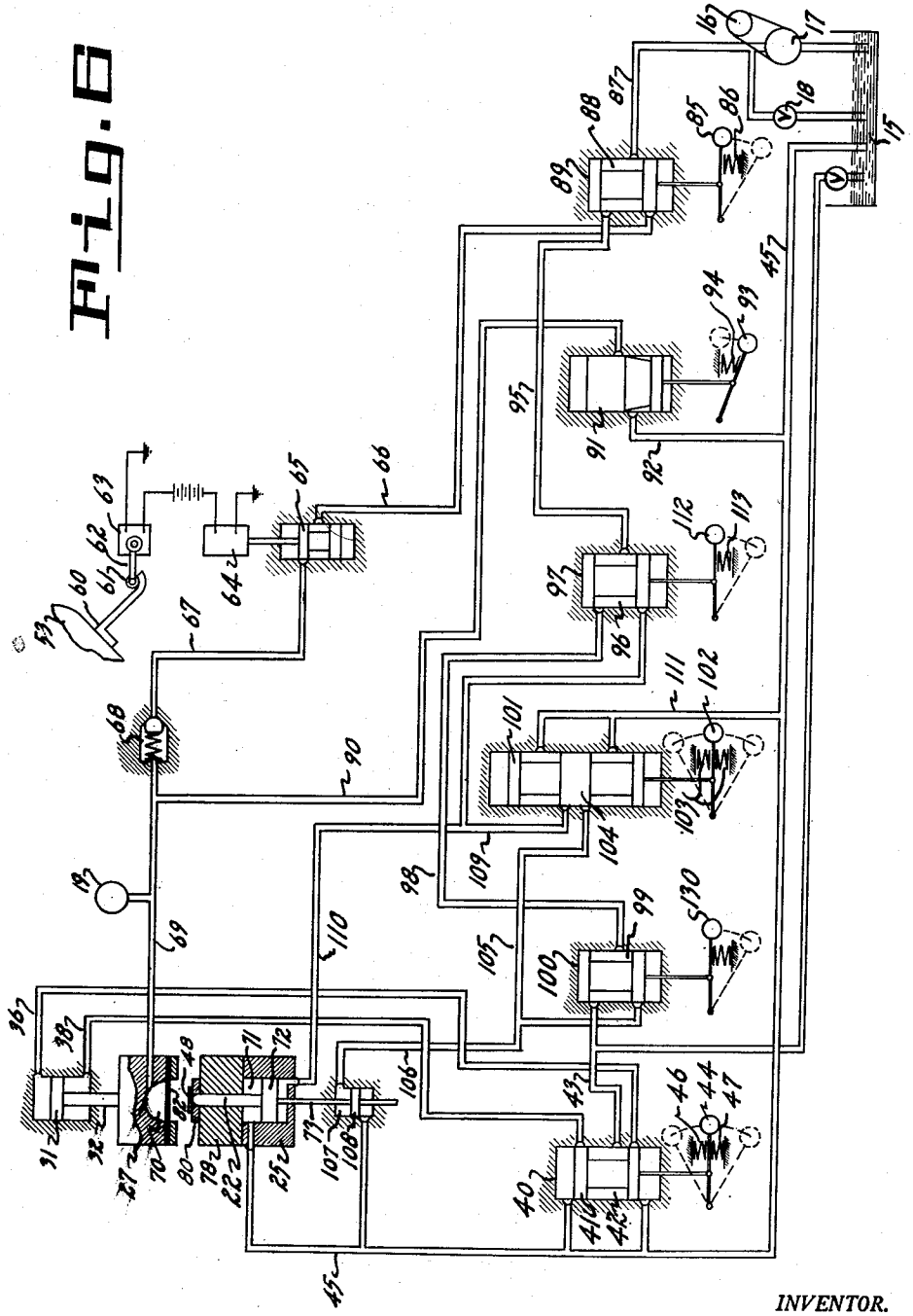
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Fig. 6



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United States Patent Office

2,696,183

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PRESS

Joseph A. Chyba, Baltimore, Md., assignor to Hydro-Form Corporation, Baltimore, Md., a corporation of Maryland

Application October 1, 1949, Serial No. 119,066

14 Claims. (Cl. 113—44)

This invention relates to improvements in presses and has particular reference to an improved construction of press particularly adapted for metal shaping or forming operations.

One of the objects of the present invention is the provision of a simple self-contained mobile press capable of development of high operating pressures.

A further object of the invention is the provision in a structure of this character of simplified control means for mechanically locking the respective movable elements of the machine in closed position during the forming operation.

A further object of the invention is the provision of an improved actuating circuit and controls therefor for a press mechanism, so related and arranged as to minimize the possibility of inadvertent operation of the power actuated press elements, and thus the possibility of injury to the press operator.

Other objects and advantages of the present invention should be readily apparent by reference to the following specification, considered in conjunction with the accompanying drawings forming a part thereof, and it is to be understood that any modifications may be made in the exact structural details there shown and described, within the scope of the appended claims, without departing from or exceeding the spirit of the invention.

Referring to the drawings in which similar reference characters are employed to denote the same or similar parts:

Figure 1 is a perspective view of a press embodying the features of the present invention.

Figure 2 is an enlarged fragmentary perspective view particularly illustrating the locking members for the movable press head and associated parts.

Figure 3 is a vertical sectional view illustrating the various elements of the forming mechanism as on the line 3—3 of Figure 4.

Figure 4 is a horizontal sectional view on the line 4—4 of Figure 3.

Figure 5 is a fragmentary sectional view on the line 5—5 of Figure 4.

Figure 6 is a diagrammatic view illustrating the actuating circuit including the various controls therefor and parts actuated thereby.

In the drawings the numeral 10 designates the frame of the press unit supported by rollers 11 and provided with the door sections 12, 13 and 14 permitting access to the interior of the press wherein is contained the reservoir 15 in the event that hydraulic actuating medium for the press is employed. Likewise contained within the body portion 10 is the drive motor 16, pressure pump 17, with by-pass relief valve 18 and the various pipe or conduits and control valve elements particularly illustrated in Figure 6. This piping, it will be noted, includes the pressure gage 19 having the enlarged dial 20 on the face of the machine disposed in cooperative relationship with the dial 21 indicating the position of the forming or die carrying plunger 22. The particular cooperative action of these parts form no part of the invention here claimed inasmuch as they constitute the subject matter of my copending application, Serial No. 12,871, now Patent No. 2,550,672, issued May 1, 1951.

The frame unit 10 is provided with the low bed portion 23 having mounted thereon the supports 24 for the lower press unit or block 25. Extending downwardly through the block and supports 24, and secured to the bed portion 23 are the tie rods or columns 26 on which is slidably guided the press head 27. The upper ends of the columns 26 project through the cap plate 28 which is secured in position at the top of the columns by the nuts 29. The columns, shown as four in number, provide

guides for the vertical movement of head 27 in properly guided relation with respect to the member 25.

To effect the desired vertical movement of head 27 there is mounted on the plate 29 a cylinder 30 containing piston 31 from which depends the piston rod 32 attached as by threaded connection 33 to the circular nut and guide element 34 secured by the plurality of bolts 35 to the head 27. As this piston is ordinarily only to perform the work of raising and lowering the head 27, it can be made relatively small in size and only a light weight cylinder is required. Hydraulic actuating medium for effecting the downward movement is introduced by way of conduit 36 and piston head 37 while the hydraulic medium for raising the piston, and thus the head is introduced through conduit 38 by way of the cylinder head 39.

Movement of the piston is controlled by the reversing valve 40 mounted in the frame 10 having a valve plunger 41 which in its central or intermediate position, as shown in Figure 6, blocks off both conduits 36 and 38. The valve plunger 41 has an intermediate groove 42 receiving pressure from pump 17 by way of conduit 43 forming part of the main power circuit. A branch conduit 143 extending from the conduit 43 between valves 40 and 100 provides a discharge from the main power circuit to reservoir through relief valve 144. This valve 144 determines the maximum effective pressure available in 43. When valves 89, 97, or 100 are shifted from the power circuit completing position shown in Figure 6, they each interrupt the series connection of the power circuit through these valves to the reversing valve 40. When either of these valves is so shifted, the effective pressure in the power circuit is that established by the valve 18, which, as is conventional in hydraulic power or control circuits of the type here illustrated, has a higher value than the valve 144. Thus, a higher pressure is rendered available for charging the dome 70 and for actuation of the pistons 72 and 108 than is utilized or required for actuation of piston 31 which serves merely for positioning of one of the press elements. Forward movement of the control handle 44 shown at the left in Figures 1 and 6 serves to move the plunger portion of the valve so that the groove or cannelure 42 will connect pressure conduit 43 with conduit 36 to lower the head, while at the same time the conduit 38 extending to the underside of the piston is connected through the chamber of valve 40 with return conduit 45 extending to reservoir so that the hydraulic medium may be reutilized.

Opposite or inward movement of the control handle 44 will oppositely shift valve 41 coupling the pressure conduit 43 with conduit 38 to effect upward movement of piston 31 while at the same time conduit 36 now becomes a return line coupled through the lower or forward chamber of the valve with the reservoir conduit 45.

The control handle mounting for effecting these movements is of conventional three-position type having the centralizing springs 46 and 47 normally holding the handle in the intermediate position specifically shown in Figure 6, permitting its manual movement either forward or back as desired, but automatically returning the handle to neutral when released.

In Figures 1, 2, 3, and 4, the head 27 is shown in its lowered position so that the press is conditioned for suitable forming of the metal blank 48. To retain the head in its lowered position, positively to prevent movement thereof without dependence on hydraulic pressure on piston 31 or the like, one or more of the guide columns 26 have been grooved as at 49 to provide the locking shoulders 50. As most clearly shown in Figure 4, there are pivoted as at the points 51 on the upper face of the head the pairs of locking elements in the form of arcuate jaws 52 and 53 having the intermeshing toothed or gear portions 54. These jaw members are of width to just fit within the grooves 49 and beneath the shoulders 50 when in their closed position as particularly shown in Figures 1 and 4. They thus bear at the one side against the upper face of the head 27 and at their opposite side or face fit beneath and interlock with the shoulders 50, securely locking the head in position. As shown, one of the members 52 is provided with an actuating handle 55 having a locking pin releasing portion 56 pivoted to

a bracket 57 carried by the jaw 52 having on its outer end locking pin 58 which extends downwardly through the jaw 52 for engagement in the pin socket 59. When the parts are in closed or locking position as shown in Figure 4, the pin by engagement in the socket retains the clamping members in position. To release the head for retracting movement it is only necessary for the operator to grasp and press together the sections 55 and 56 withdrawing the locking pin and to then impart a counterclockwise swinging movement to the jaw 52. This motion will be transmitted through the several interlocking gear or circular rack portions 54 on the various jaws causing opposite actuation of the jaws of each pair, opening same to the position shown in Figure 2 when the head 27 may be readily raised.

It will be noted that one of the jaws 53 is provided with the safety device actuating arm 60 for engagement with roller 61 on switch arm 62 of the solenoid controlling safety switch 63. This switch may be of conventional construction in which the arm 62 is spring actuated into a forward position. When the jaws are closed, the counterclockwise movement of jaw 53 will correspondingly shift arm 60, pushing roller 61 to the rear to close contact in the switch 63. This, in turn, will energize solenoid 64, moving the safety valve 65 from its blocking position as shown in Figure 6. Such movement couples the pressure conduit 66 with conduit 67 extending by way of check valve 68 and conduit 69 to the pressure dome 70 inside head 27. Coupled into the pressure conduit 69 is the gage member 19 previously referred to which registers the pressure at any time existing in chamber 70.

The particular elements for imparting desired deformation or shape to the work piece 48 are shown in detail in Figure 3.

It will there be noted that the base block 25 is formed with the large cylinder or chamber 71 in which is vertically movable piston 72 provided with a downward extending piston rod 73 which carries at its upper end the plunger 22 having a socket 75 to receive the tang 76 on which is mounted the plunger die element 77. This plunger is slidable through a central aperture in the bolster plate 78 which forms a top closure for the cylinder 71 and is recessed at 79 to receive the die nest 80 having a central aperture or bore 81 normally receiving and through which moves the die element 77. The upper face of the nest serves as a support for the work piece 48 prior to and during the forming or drawing operation. Forming a closure for the lower side of the pressure dome or chamber 70 is a flexible or elastic diaphragm 82 retained by suitable clamping mechanism 83 including the ring 84 interfitting with the periphery of the nest 80. The height of the member 78 and of the nest 80 are such that the diaphragm will be tightly compressed against the upper face of the nest and the work piece imbedded therein when the head is clamped in its lower position, as is clearly shown in Figure 3.

With the parts so located and secured, handle 85 may be forwardly actuated against action of spring 86 to couple pressure conduit 87 by way of groove 88 in valve 89 with the dome pressure conduit 66, creating sufficient pressure in the dome to cause the diaphragm firmly to hold the work piece against the nest and condition the parts for the forming operation. This having been effected, handle 85 is released and will be restored by spring 86 to the position shown in Figure 6 when the lower spool of valve 89 will blank off return flow through conduit 66. Such flow, of course, is additionally blocked by the automatic check valve 68 so that any escape or release of pressure within the dome chamber 70 will be by way of conduit 90 and the variably positionable throttle valve 91. This valve, as shown in Figure 6, is normally in forward position, blocking the flow from conduit 90 into conduit 92. It may, however, be rearwardly actuated as respects the position shown in Figure 6 to control the release of pressure as by operation of valve handle 93 normally held in forward position by the action of spring 94.

The desired initial pressure having been created in dome 70 the subsequent shaping operation is performed by supplying pressure in the lower portion of cylinder 71 forcing piston 72, plunger 22 upwardly to urge die 77 against the work piece 48. The dome pressure reacting on the resilient diaphragm clamps the edge of the material against the surface of the nest surrounding the die 77 so that desired tension may be maintained on the peripheral portion of the work as the material 48 and diaphragm are forced upwardly into the dome, it being understood that this movement will cause an automatic increase in pressure within the dome.

To control the introduction of pressure into the chamber 71 it will be noted that the pressure conduit 95 is normally connected by way of the groove 88 in valve 89, groove 96 of valve 97, conduit 98, groove 99 of valve 100 to the pressure input conduit 43 communicating with the groove 42 of valve 41. It will be evident that these several valves are serially arranged in such manner that movement of either valve 97 or 99 from its normally spring effected position, as shown in Figure 6, will interrupt any possible flow of pressure by way of valve 41 for movement of the press head. Likewise, as valve 89 is serially arranged intermediate the source of pressure medium, and the pressure conduit 95 movement of this valve for effecting introduction of pressure into the dome will prevent any possible utilization of pressure tending to disturb the position of the head or the die plunger. Consequently, there has been in this respect provided a safety feature in that valve 65 prevents introduction of pressure into the dome which might tend to distort or blow out the resilient diaphragm, the diaphragm pressure being introducible only when the head is in its lowered position and the clamps in position mechanically to lock the head against movement. Correspondingly, the valve 97 serves as a safety selector so that the actuating pressure may be employed either as respects the cylinder 71 for raising the plunger or as respects up and down movement of the head under control of valve 41, but both movements cannot be simultaneously effected. Additionally, the inward movement of valve 100 to couple pressure for retraction of the plunger and die likewise disconnects the power source from the head so that no movement of the head is possible under these conditions.

An additional four-way valve 101 has been provided under control of the bi-directionally movable valve handle 102. This handle is maintained in a centralized position as shown in Figure 6 by the springs 103 and has a central spool 104 normally blocking the branch 105 of the plunger retraction conduit 106 which extends to the small cylinder 107 containing piston 108 on the lower end of piston rod 73. This spool 104 at the same time blocks branch conduit 109 of the conduit 110 extending to the lower portion of cylinder 71. Forward movement of lever 102 serves to couple 109 with reservoir conduit 111 while rearward movement maintains 109 blocked but couples conduit 105 with 111 for movement of the opposed pistons 72 and 108. In this manner, a blocking or throttle control is provided in the reservoir connections from the oppositely acting cylinders 107 and 71 so that when either cylinder is connected to pressure the back pressure may be relieved in the other, permitting piston movement. Forward pressure for raising the piston 72 is supplied by forward movement of valve controlling lever 112 against positioning spring 113, thus suitably shifting valve 97 to couple pressure conduit 95 with conduit 110.

It is, of course, to be understood that in some instances the valve 101 may be eliminated as an independent member or its functions combined with or motion may be derived from movements of the valve members 97 and 100 in the event that the independent lever safety control and throttling of the exhaust conduits from the respective cylinders 71 and 107 are not deemed necessary. It is further to be understood that while reference has been made to employment of hydraulic actuating medium for the several pistons and pressure chambers, such medium normally being a relatively non-compressible oil, that air or other pressure media may be utilized depending upon the forces required which in the small press here illustrated due to its rigidity of construction may with safety rise to 15,000 to 20,000 pounds per square inch.

It will be evident that in utilization of the press, head 27 should be in raised position to permit ready introduction of the work piece 48, and it is desirable the same be securely held in such manner as to prevent accidental downward movement with attendant possibility of injury to the press operator.

The particular mechanism illustrated for this purpose includes the pair of rotatable rods 114 and 115 which are swiveled as at 116 in the head 27 and extend upward-

ly through the apertures **117** in the cap plate **28**. These apertures are of generally circular form with the radially extending slots **118** to receive the ribs **119** on the rods **114** and **115**, these ribs providing the lower terminal shoulders **120**. A sleeve **121** mounted on piston rod **32** intermediate the collars **122** carries an operating handle **123** and the lugs **124** between which are pivoted as at **125** the links **126**. At their outer ends, these links are pivoted to the rod shifting arms **127** carried by the rods.

By this construction, oscillation of handle **123**, through the linkage described, will impart a rocking motion to the rods **114** and **115**. A spring **128** tends to rock the rods and thus the handle **123** in a clockwise direction to the extent permitted by the stop pin **129**, while movement of the lever in the opposite direction is limited as by the stop pin **130**. These pins, if desired, may be of length to engage the underface of the cap plate and thus limit upward movement of the head.

When the head is in its extreme raised position, the shoulders **120** will be disposed slightly above the upper face of the cap plate **28**. Under these circumstances, the spring **128** will oscillate the rods **114** and **115** to such position that the ribs **119** will be moved out of alignment with the slots **118** and will overlie a solid portion of the cap plate surrounding the apertures **117**. Slight reverse downward movement of the head **27** will then cause the shoulders to rest firmly upon the upper face of the cap plate, positively locking the head in raised position. On the other hand, when the head is upwardly actuated to its limit of movement the tension on the supporting rods **114** and **115** will be released when handle **123** can be shifted, bringing the ribs into alignment with the slots **118** permitting of reverse downward movement of the head. It will be noted that by making one or more of the ribs equal in length to the stroke of the head, that the rods will be maintained in their released position during the entire downward movement of the head so that there will be no interference with reverse retraction of the head. When fully raised, release of engagement of the controlling rib or ribs in the slots **118** permits the spring automatically to move the parts into positive locking position, when frictional engagement of the shoulders with the plates due to the suspended weight of the head will be adequate to prevent releasing movement of handle **123**.

In the operation of the press, with the head **27** locked in its raised position, a work piece or blank, such as **48**, is placed on the nest in overlying relationship to the plunger die **77**. Handle **44** is then moved inwardly coupling conduit **38** with pressure, raising head **27** sufficiently to disengage the locking shoulders **120** with respect to cap plate **28**. This operation is ordinarily performed with the right hand of the operator. With lever **44** held in this position, the operator can then grasp lever **123** with his left hand, assuring that the hands of the operator are therefore outside of the press area and lever **123** held in its left hand position, aligning the rib or ribs **119** with slots **118**. Reverse or forward rocking of handle **44** will then introduce pressure into conduit **36**, moving piston **31** and the head **27** downward into the position, particularly illustrated in Figure 3, the lever **44** being held forward to insure tight clamping together of the parts while the left hand of the operator is shifted to the handles **55—56** which are moved in a clockwise direction to close the clamps **52** and **53** until locking pin **58** can be suitably engaged in socket **59**, securing the clamps in proper head retaining relationship to the guide columns **26**.

At this point, the forming assembly will be securely bound together as a unit in position to be reacted upon by the desired high forming pressures here utilizable.

In the forming operation it is preferred to first move valve handle or lever **85** forwardly to admit desired initial pressure through conduit **69** to the dome chamber **70**, providing the proper reacting pressure firmly to hold the work blank **48** against nest **80**. In proceeding with the work forming operation, valve handle or lever **112** is moved forwardly, blocking off any potential flow of pressure through conduit **98** and at the same time coupling pressure from 95 to 110, effecting upward movement of piston **72** and the parts associated therewith as particularly illustrated in Figure 3.

It will be understood by those conversant with the art that the upward movement of die **77** tending to force the central portion of blank **48** against diaphragm **82** will cause a building up of existing pressure in chamber **70**. The extent and rate of movement of die member **77** and thus the formation of shape in the blank **48** can be generally controlled as respects input of pressure by the extent of movement of valve **97** in connection with the variable throttling of exhaust effectable by the positioning of spool **104** on valve **101** as determinable by setting or adjustment of lever **103**.

In performance of such operations it is frequently desirable to vary the rate of movement of the die plunger, or to stop the movement for a partial setting of the material to a particular configuration, while in other instances it is desirable that the movement of the die be substantially continuous.

In either event, it is, however, desirable to control the reaction pressure through the diaphragm on the work piece to permit greater or less freedom of movement of the clamped edge portions over the face of the nest and the extent of forming pressure of the diaphragm to effect conformity of the blank to the shape of the die. To attain this result the operator variably moves handle **93** which controls the position of throttle valve **91** effective as respects the reservoir or return conduit **90** from the dome chamber **70** so that this pressure may be impounded or varied in accordance with particular working conditions.

When the die has reached its desired limit of movement into chamber **70** as determinable by reference to dial **21**, release by the operator of valve handle **112** will automatically stop further movement of the die, when the pressure may be maintained for any desired period or immediately released, it being preferable in the operation of the machine that the dome pressure be released before retraction of the other parts of the press. This having been effected, valve lever **130** may be forwardly moved coupling pressure from conduit **98** to conduit **106** operating the stripping piston **108** rapidly to retract the die element, and valve lever **44** is then forwardly actuated introducing pressure against cylinder **31**, forcing head **27** downward and releasing the lateral pressure on clamp members **52** and **53**.

These clamps can then be opened, releasing the head. Reverse movement of lever **44** will cause pressure to react on the underside of piston **31** raising the head to its extreme upper position, where the spring **128** will effect sufficient rotation of rods **114** and **115** so that the shoulders **120** will overlie solid portions of the cap plate **28**, thus locking head **27** in raised position.

It will be noted that the present construction provides a machine which is small, compact, readily movable and due to its particular construction capable of utilizing highly concentrated working pressures with safety and without strain on parts of the frame to an unusual extent. It will further be noted that due to the particular structure and relationship of controls as shown this invention makes possible the utilization of a wide range of pressures, applied evenly to all surfaces of the work and without harm due to tool marks or the like as respects the final surface of the formed part. It will additionally be noted that, by the interlocking and serial relationship of the various control valve and other operating mechanisms, in the case of all important movements of the machine and particularly those which might involve danger to the hands of the operator, it is necessary that both hands be occupied in operation of the machine controls and therefore possibility of injury to the operator is minimized.

What is claimed is:

1. A forming press including a pair of press elements, a first hydraulic piston and cylinder mechanism connected to one of said elements for moving said element from an open work receiving position to a closed forming position, one of said elements having a pressure chamber and a diaphragm sealing the pressure chamber, a reciprocable die element carried by the other of said elements, a second piston and cylinder mechanism including a pair of opposed piston reacting pressure areas for effecting opposite reciprocations of said reciprocable die element, and a control circuit for determining the activation of said chamber and said piston and cylinder mechanisms including a source of actuating medium, and conduits providing a power circuit connected to the source and extending to the first piston and cylinder mechanism, said power circuit having a plurality of valves in the power circuit connected in series by the conduits, said valves including a first selector valve, a branch conduit from said valve to said pressure chamber, said valve being positionable to interrupt the power circuit and couple the actuating medium with

the pressure chamber, a second selector valve in series in the power circuit with said first valve, a branch conduit from said second valve to one of the piston areas of the second piston and cylinder mechanism, said second valve having a position effective to interrupt the power circuit and to couple the medium to one piston area of said second piston and cylinder mechanism, a third selector valve serially interposed in the power circuit, a branch conduit from said third valve to the other of the pair of opposed piston areas, said third valve having a position effective to interrupt the power circuit and to couple the medium to the other piston area of said second piston and cylinder mechanism, whereby the positioning of the respective selector valves determines the flow of pressure medium through the power circuit or its diversion into a selected branch conduit.

2. A forming press including a pair of press elements, a first hydraulic piston and cylinder mechanism connected to one of said elements for moving said element from an open work receiving position to a closed forming position, a reversing valve, conduits connecting the reversing valve to said piston and cylinder mechanism to control said movement, one of said elements having a pressure chamber and a diaphragm sealing the pressure chamber, a reciprocable die element carried by the other of said elements, a second piston and cylinder mechanism including a pair of opposed piston reacting pressure areas for effecting opposite reciprocations of said reciprocable die element, and a control circuit for determining the activation of said chamber and said piston and cylinder mechanisms including a source of actuating medium, and conduits providing a power circuit connected to the source and extending to the reversing valve, and a plurality of valves in the power circuit connected in series by the conduits, said valves including a first selector valve serially interposed in said power circuit, a branch conduit from said valve to said pressure chamber, said valve being positionable to interrupt the power circuit and couple the actuating medium with the pressure chamber, a second selector valve in series in the power circuit with said first valve, a branch conduit from said second valve to one of the piston areas of the second piston and cylinder mechanism, said second valve having a position effective to interrupt the power circuit and to couple the medium to one piston area of said second piston and cylinder mechanism, a third selector valve serially interposed in the power circuit, a branch conduit from said third valve to the other of the pair of opposed piston areas, said third valve having a position effective to interrupt the power circuit and to couple the medium to the other piston area of said second piston and cylinder mechanism, whereby the positioning of the respective selector valves and the reversing valve determines the flow of pressure medium through the power circuit or its diversion into a selected branch conduit.

3. A forming press including a pair of press elements, a first hydraulic piston and cylinder mechanism connected to one of said elements for moving said element from an open work receiving position to a closed forming position, one of said elements having a pressure chamber and a diaphragm sealing the pressure chamber, a reciprocable die element carried by the other of said elements, a second piston and cylinder mechanism including a pair of opposed piston reacting pressure areas for effecting opposite reciprocations of said reciprocable die element, and a control circuit for determining the activation of said chamber and said piston and cylinder mechanisms including a source of actuating medium, and conduits providing a power circuit connected to the source and extending to the first piston and cylinder mechanism, said power circuit having a plurality of valves in the power circuit connected in series by the conduits, said valves including a first selector valve, a branch conduit from said valve to said pressure chamber, said valve being positionable to interrupt the power circuit and couple the actuating medium with the pressure chamber, a second selector valve in series in the power circuit with said first valve, a branch conduit from said second valve to one of the piston areas of the second piston and cylinder mechanism, said second valve having a position effective to interrupt the power circuit and to couple the medium to one piston area of said second piston and cylinder mechanism, a third selector valve serially interposed in the power circuit, a branch conduit from said third valve to the other of the pair of opposed piston areas, said third valve having a position effective to interrupt the power circuit and to couple the medium to the other piston area of said second piston and cylinder mechanism, whereby the positioning of the respective selector valves determines the flow of pressure medium through the power circuit or its diversion into a selected branch conduit, return flow conduits individual to the respective piston reacting pressure areas for controlling the movements of the second piston and cylinder mechanism, a return flow control selector valve coupled to said return flow conduits, said valve having a first position blocking the return flow as respects both of said conduits, and other positions to couple one or the other of said conduits to reservoir, whereby the direction and extent of operation of the second piston and cylinder mechanism is jointly controlled by said return flow control selector valve and the positioning of one of the selector valves in the power circuit.

4. A forming press including a pair of press elements, a first hydraulic piston and cylinder mechanism connected to one of said elements for moving said element from an open work receiving position to a closed forming position, a reversing valve, conduits connecting the reversing valve to said piston and cylinder mechanism to control said movement, one of said elements having a pressure chamber and a diaphragm sealing the pressure chamber, a reciprocable die element carried by the other of said elements, a second piston and cylinder mechanism including a pair of opposed piston reacting pressure areas for effecting opposite reciprocations of said reciprocable die element, and a control circuit for determining the activation of said chamber and said piston and cylinder mechanisms including a source of actuating medium, and conduits providing a power circuit connected to the source and extending to the reversing valve, and a plurality of valves in the power circuit connected in series by the conduits, said valves including a first selector valve serially interposed in said power circuit, a branch conduit from said valve to said pressure chamber, said valve being positionable to interrupt the power circuit and couple the actuating medium with the pressure chamber, a second selector valve in series in the power circuit with said first valve, a branch conduit from said second valve to one of the piston areas of the second piston and cylinder mechanism, said second valve having a position effective to interrupt the power circuit and to couple the medium to one piston area of said second piston and cylinder mechanism, a third selector valve serially interposed in the power circuit, a branch conduit from said third valve to the other of the pair of opposed piston areas, said third valve having a position effective to interrupt the power circuit and to couple the medium to the other piston area of said second piston and cylinder mechanism, whereby the positioning of the respective selector valves determines the flow of pressure medium through the power circuit or its diversion into a selected branch conduit, return flow conduits individual to the respective piston reacting pressure areas for controlling the movements of the second piston and cylinder mechanism, a return flow control selector valve coupled to said return flow conduits, said valve having a first position blocking the return flow as respects both of said conduits, and other positions to couple one or the other of said conduits to reservoir, whereby the direction and extent of operation of the second piston and cylinder mechanism is jointly controlled by said return flow control selector valve and the positioning of one of the selector valves in the power circuit.

5. In a forming press including a pair of press elements, a first piston and cylinder mechanism including a reversely actuable hydraulic piston connection to one of said elements for moving said element from an open work receiving position to a closed forming position, one of said pair of press elements having a pressure chamber and a diaphragm sealing the pressure chamber, a plunger supported by the other press element for reciprocation relative to its supporting element, and a second piston and cylinder mechanism coupled with said plunger having a first effective piston pressure area reacting to shift the piston and plunger in one direction and a second effective piston pressure area reacting to shift the piston and plunger in the opposite direction, a hydraulic circuit for determining the pressure conditions in said chamber and in said piston and cylinder mechanisms, said circuit including a pressure medium supply conduit,

a first selector valve coupled with the supply conduit, a first conduit extending from the valve to the pressure chamber, a second selector valve, a second conduit connecting said first and second selector valves, said first selector valve being alternatively positionable to couple the supply conduit with said first conduit or with said second or valve connecting conduit, a third selector valve, conduit means connecting said second and third selector valves, additional conduit means connecting said second selector valve with one of the piston pressure areas of the second piston and cylinder mechanism for transmitting pressure actuating medium to actuate said second piston and cylinder mechanism in one direction, a reversing valve, conduit means connecting the third selector valve with the reversing valve, additional conduit means connecting said third selector valve with the other of the piston pressure areas of the second piston and cylinder mechanism than that to which the conduit from the second selector valve is coupled for transmitting pressure actuating medium to effect actuation of said second piston and cylinder mechanism in an opposite direction to that effected by connection thereto of pressure medium through the second selector valve, said third selector valve being alternatively positionable to couple the pressure actuating medium either to said conduit connecting it to the reversing valve or to the conduit connecting said third selector valve to said second piston and cylinder mechanism, a pair of conduits extending from the reversing valve to opposite ends of the cylinder portion of the first piston and cylinder mechanism, and additional reservoir connection conduits extending from said reversing valve, said reversing valve being positionable alternatively to couple one or the other of the pair of conduits extending to the first piston and cylinder mechanism with the conduit from the third selector valve to the reversing valve and to couple to a reservoir conduit the conduit of said pair of conduits not coupled to the conduit from the third selector valve, said reversing valve having an intermediate neutral position blocking flow as respects said pair of conduits and being supported for movement in opposite directions from said intermediate position for determining the direction of actuation of said piston and cylinder mechanism.

6. A press construction as claimed in claim 1 having individual manually operable controls coupled with the several selector valves for effecting positioning movement of said valves.

7. A press construction as claimed in claim 1 having means individual to and reacting on said selector valves for effecting a first definite positioning of the said selector valves.

8. A press construction as claimed in claim 1 having means individual to and reacting on the selector valves for effecting a first definite positioning movement of the said selector valves, and having additional manually operable shifters connected to said valves for effecting individual movements of the same from their said first definite positions.

9. A press construction as claimed in claim 2 having a first means connected to the reversing valve for maintaining the reversing valve in an intermediate neutral position, and additional manually operable means connected to said reversing valve for movement of the valve in one direction or the other from said intermediate position to determine the direction of actuation of the piston and cylinder mechanism controlled thereby.

10. A press construction as claimed in claim 3 having a first means connected to the reversing valve for maintaining the reversing valve in an intermediate neutral position, and additional manually operable means connected to said reversing valve for movement of the valve in one direction or the other from said intermediate position to determine the direction of actuation of the piston and cylinder mechanism controlled thereby.

11. A press construction as claimed in claim 3 having means coupled with the return flow selector valve for maintaining said return flow control selector valve in an intermediate flow blocking position, and additional means connected to the valve for movement of the valve selectively to unblock one or the other of the return conduits from the piston and cylinder mechanism.

12. A press construction as claimed in claim 3 having a first means connected to the reversing valve for maintaining the reversing valve in an intermediate neutral position, additional manually operable means connected to said reversing valve for movement of the valve in one direction or the other from said intermediate position to determine the direction of actuation of the piston and cylinder mechanism controlled thereby, and having means coupled with the return flow selector valve for maintaining said return flow control selector valve in an intermediate flow blocking position, and additional means connected to the valve for movement of the valve selectively to unblock one or the other of the return conduits from the piston and cylinder mechanism.

13. A press of the character described including a pair of press members relatively movable from an open work receiving to a closed forming position, a piston and cylinder mechanism to effect this movement of one of the members with respect to the other, one of said members having a pressure chamber formed therein and a diaphragm sealing the pressure chamber, a source of actuating medium, a conduit connected to the chamber, a conduit connected by way of a conduit system and reversing valve to the piston and cylinder mechanism, a selector valve structure connected to said conduits and to the source to determine the operative connection of the source through the valve to one or the other of said conduits, said valve having a portion movable to connect the source to the chamber connected conduit or to the piston and cylinder conduit, a locking device movable to secure the relatively movable press members in closed forming position, a blocking valve in the conduit connected to the chamber and movable to unblock the conduit to permit flow of actuating medium therethrough, and means actuable by movement of the locking device for effecting the aforesaid movement of the valve into unblocking position.

14. A press of the character described including a pair of press members relatively movable from an open work receiving to a closed forming position, a piston and cylinder mechanism to effect this movement of one of the members with respect to the other, one of said members having a pressure chamber formed therein and a diaphragm sealing the pressure chamber, a source of actuating medium, a conduit connected to the chamber, a conduit connected by way of a conduit system and reversing valve to the piston and cylinder mechanism, a selector valve structure connected to said conduits and to the source to determine the operative connection of the source through the valve to one or the other of said conduits, said valve having a portion movable to connect the source to the chamber connected conduit or to the piston and cylinder conduit, a locking device movable to secure the relatively movable press members in closed forming position, a blocking valve in the conduit connected to the chamber and movable to unblock the conduit to permit flow of actuating medium therethrough, and means actuable by movement of the locking device for effecting the aforesaid movement of the valve into unblocking position, said means including a switch having a portion projecting into the path of movement of the locking device and actuable by movement of the locking device and a solenoid controlled by said switch for effecting the shifting of the blocking valve.

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