

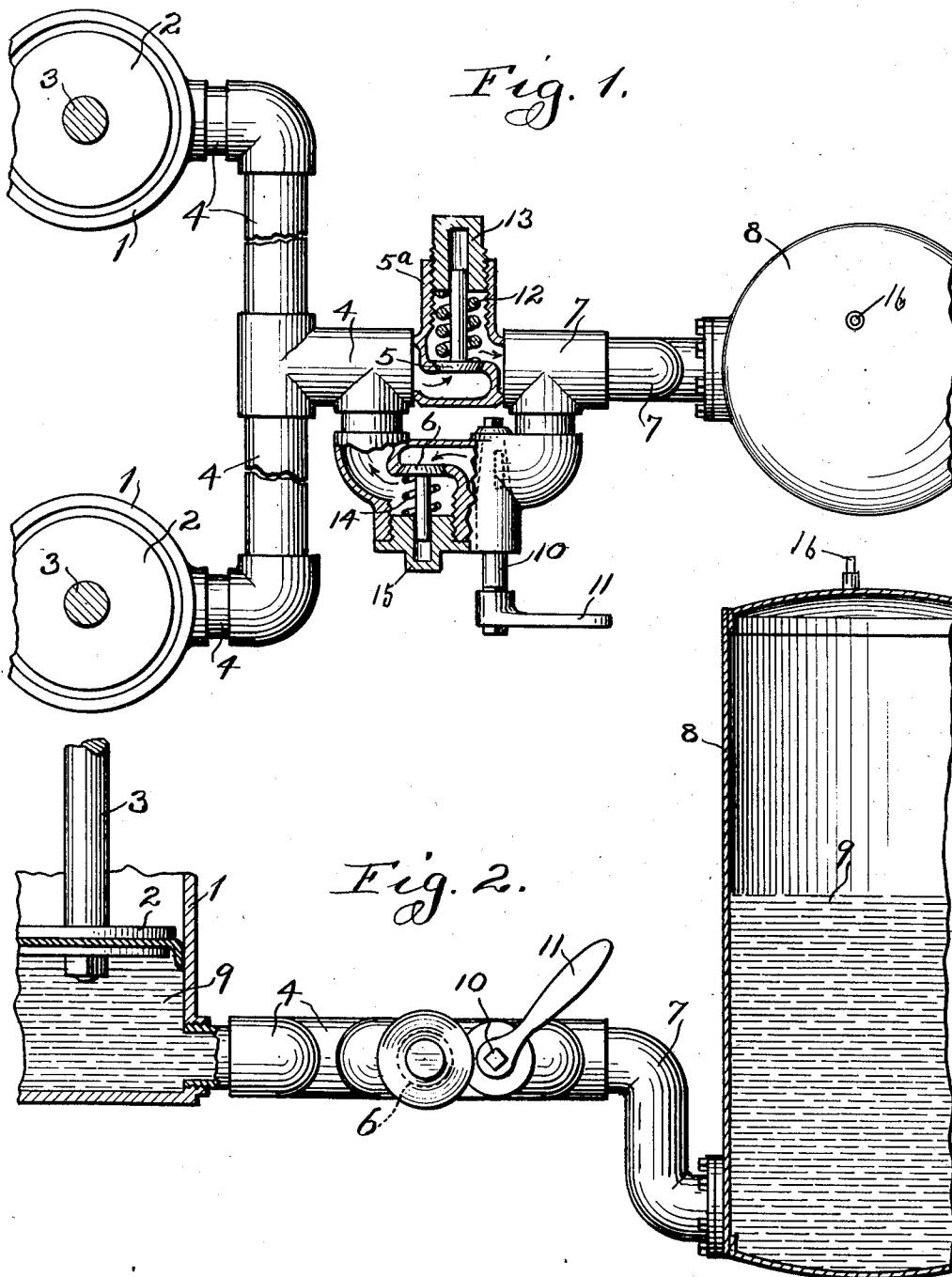
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CUSHION FOR DIE PRESS DRAW RINGS

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CUSHION FOR DIE-PRESS DRAW RINGS.

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To all whom it may concern:

Be it known that I, STEWART BROWN, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in a Cushion for Die-Press Draw Rings, of which the following, when taken in connection with the drawing accompanying and forming a part hereof, is a specification.

This invention relates to a cushion which is particularly adapted to be used in a die press when sheet metal is to be drawn into a determined shape by dies installed in said press.

Among the objects of the invention are to obtain a cushion by means of which a determined heavy pressure can be obtained on the metal which is being drawn into shape by the dies in the press, with a comparatively small area to said cushion; and to obtain a cushion wherein the pressure on said sheet metal will be substantially uniform when considerable movement is required in the draw ring of the press, and corresponding movement in the cushion controlling the pressure of said draw ring against said sheet metal. A further object is to obtain a cushion the pressure whereof is easily adjusted to obtain a desired pressure. A further object is to obtain a cushion which is economically constructed, is durable, and not liable to break or get out of order, and a device by means of which a plurality of cushions having uniform pressure may be positioned under and connected to the same draw ring. A further object is to obtain a cushion wherein great pressure will not present, in case of a break caused by said pressure, results similar to an explosion, such as results when a vessel or container containing air, is broken by said pressure.

In the drawing referred to Fig. 1 illustrates in top plan view a plurality of cushions and associated mechanisms embodying the invention, with portions of the shell or housings of some of said associated mechanisms broken away to expose operating parts to view; and

Fig. 2 is a side elevation of the several elements illustrated in Fig. 1, with a portion of the shell or housing of a cushion in vertical section.

A reference character applied to designate a given part indicates said part throughout

the several figures of the drawing wherever the same appears.

1 represent cylinders; 2 represent pistons which are longitudinally movable in the several cylinders 1; and 3 represent the stems of pistons 2. The upper ends of stems 3 are connected to a draw ring in the ordinary way, and no invention is claimed by me in the making of said connections. In certain work a single cushion is all that is required, and in other work a plurality of cushions is preferred, and I have therefore illustrated a plurality of said cushions arranged to obtain uniform pressure in both thereof; but it will be understood that one of said cushions may be removed and additional cushions may be added to the two which are illustrated in Fig. 1. 4 represents a pipe or conduit which is in communication with cylinders 1, adjacent to the bottom of said cylinders. 5 and 6, respectively, represent check valves which are in communication with pipe or conduit 4, and with pipe or conduit 7. 8 represents a tank adapted to contain air under pressure, and liquid; and 9, Fig. 2, represents liquid in tank 8 and cylinder 1, respectively, which may be water, oil, or glycerine.

It will be observed that check valve 5 is arranged to permit the flow of liquid from pipe or conduit 4 therethrough to pipe or conduit 7 and tank 8: and the check valve 6 is arranged to permit the flow of liquid in the opposite direction, that is, from tank 8 and pipe or conduit 7 to pipe or conduit 4. 10 represents a cock by means of which the quantity or rapidity of flow of liquid through check valve 6 is controlled; and 11 represents the handle of cock 10. 12, Fig. 1, represents a spring which yieldingly holds said check valve 5 seated, and 13 represents a plug by means of which the pressure of spring 12 is adjustable, within certain limits, said plug 13 being provided with external screw threads which engage with corresponding internal screw threads in housing 5^a of check valve 5. 14, Fig. 1, represents a spring which is arranged to yieldingly hold check valve 6 seated, and 15 a plug against which said spring abuts.

The pressure of liquid 9 in cylinder 1 is controlled by spring 12, on check valve 5, plus the pressure in pipe or conduit 7 and tank 8. By making spring 12 of suitable size and material the pressure in cylinders 1

and pipe or conduit 4 may be many times the pressure in conduit 7 and tank 8, and by means of plug 13 the pressure of spring 12, is, within certain limits, adjustable. It is evident that the opening of check valve 5 is automatically controlled by spring 12, so that check valve 5 is opened, on the downward movement of piston 2 and stem 3, sufficiently to permit the flow of liquid there-through when a determined pressure of liquid in said cylinder 1 is obtained, and that said pressure in cylinder 1 and the flow of liquid through check valve 5 will be substantially uniform, with but slight opening of said check valve as compared with the longitudinal movement of said piston 2 and stem 3. By making the tank 8 of sufficient size so that the flow of liquid thereinto from pipe or conduit 7 will not appreciably increase the pressure of the air in said tank 8, the pressure in cylinder 1 will not be appreciably increased during the entire downward travel of piston 2.

The cock 10 and check valve 6 constitute a by-pass from pipe or conduit 7 to pipe or conduit 4, so that on the upward movement of piston 2 and stem 3, liquid 9 in tank 8 will be forced through said cock 10 and said check valve 6, from pipe or conduit 7 into pipe or conduit 4, and therethrough into cylinder 1.

The spring 14 need be only, and preferably is, of sufficient resilience to return check valve 6 to its seat, when a flow of liquid from pipe or conduit 7 to pipe or conduit 4, ceases.

The direction of the flow of liquid through check valves 5 and 6, respectively, is indicated by arrows in Fig. 1.

The quantity or rapidity of the flow of liquid through check valve 5 is determined by the rapidity of the downward movement of piston 2; and the quantity or rapidity of the flow of liquid through said check valve 6 is desirably controlled by cock 10, to permit said piston 2 to travel in its upward movement substantially as rapid, or slightly less rapid, as the upward travel of the upper die in the die press; thus enabling the draw ring with which the piston stem 3 is connected, to resume its initial and upward position, before the succeeding downward movement of said upper die.

In case cock 10 is omitted from the construction embodying this invention, the flow of liquid from pipe or conduit 7 through check valve 6 into pipe or conduit 4, and into cylinder 1 is controllable by the pressure in tank 8 and the size of check valve 6; but I prefer to control said flow by said cock 10, to obviate adjustment of pressure in tank 8 and the size of check valve 6.

The operation of this mechanism or device is as follows: On the downward movement of stem 3 and piston 2 the pressure

of liquid 9 in cylinder 1, and in pipe or conduit 4, is increased until said pressure is sufficient to open check valve 5, against the adjusted resilience of spring 12, plus the pressure existing in tank 8 and pipe or conduit 7. Said pressure in pipe or conduit 4 is added to the resilience of spring 14, to seat check valve 6. The spring 12 is forced back or retracted by the opening of check valve 5, and said check valve remains open and permits a flow of sufficient liquid through the shell or housing thereof to prevent increase above said pressure in cylinder 1 and pipe or conduit 4; and by the foregoing operation a substantially uniform pressure in cylinder 1 is obtained when there is considerable movement of piston 2 in said cylinder, while at the same time a very slight movement of check valve 5, from its seat, is sufficient to maintain said pressure. The slight movement of check valve 5 from its seat, will not appreciably increase the resilience of spring 12, and by the use of a suitable sized spring and the adjustment of plug 13 I can readily obtain the desired pressure in cylinder 1, throughout the entire downward travel of piston 2.

The check valve 6 and cock 10 is preferably used to form a by-pass around check valve 5, and liquid flows therethrough from tank 8 to cylinder 1, through pipes or conduits 7 and 4.

The pressure in tank 8 is sufficient to force liquid 9 through check valve 6 into cylinder 1, and move piston 2 upward when pressure is released from stem 3, and such pressure may be obtained by an ordinary air pump attached to check valve 16.

I claim:

1. A cylinder, a longitudinally movable piston in said cylinder and a stem to said piston, in combination with a tank adapted to contain liquid and air under pressure, means to establish communication between said cylinder and said tank, and a check valve in said means, said check valve comprising yielding means arranged to control the pressure required to open said check valve to permit the flow of liquid from said check valve to said tank.

2. A cylinder, a longitudinally movable piston in said cylinder and a stem to said piston, in combination with a tank adapted to contain liquid and air under pressure, means to establish communication between said cylinder and tank, and yielding means to obstruct said communication, and means to establish communication between said tank and said cylinder.

3. A cylinder and a longitudinally movable piston in said cylinder, in combination with a tank adapted to contain liquid and air under pressure, means to establish communication from said cylinder to said tank, and yielding means to obstruct said commu-

nication, means to adjust said means to obstruct, and means to establish communication from said tank to said cylinder.

4. A cylinder, a longitudinally movable piston in said cylinder and a passage way communicating with said cylinder, in combination with a tank adapted to contain liquid and air under pressure, a passage way communicating with said tank, a check valve in communication with said passage ways and arranged to permit the flow of liquid from said cylinder to said tank, adjustable yielding means to maintain said check valve seated, and means to establish communication between said tank and said cylinder and to obstruct communication in the opposite direction.

5. In a cushion, a cylinder, a longitudinally movable piston in said cylinder and a passage way from said cylinder, in combination with a tank adapted to contain air and liquid under pressure, a passage way to said tank and a check valve in communication with said passage ways arranged to permit the flow of liquid from said cylinder to said tank, yielding means to maintain said check valve seated, a by-pass arranged to permit the flow of liquid from said tank to said cylinder, and means to obstruct the flow of liquid from said cylinder through said by-pass to said tank.

6. In a cushion, a cylinder, a longitudinally movable piston in said cylinder and a passage way from said cylinder, in combination with a tank adapted to contain air and liquid under pressure, a passage way in communication with said tank, a check valve in communication with said passage ways and arranged to obstruct the flow of liquid from said tank to said cylinder, means to obtain a determined pressure to maintain said check valve seated and obstruct the flow of liquid in the opposite direction through said passage ways, additional means to obstruct the flow of liquid from said cylinder

to said tank, said additional means arranged to permit the flow of liquid from said tank to said cylinder.

7. A cylinder and a movable piston in said cylinder, in combination with means to obtain a determined pressure against the downward movement of said piston, said means comprising a spring and liquid arranged so that limited movement of said spring maintains continuous pressure on said piston during the entire travel thereof in said downward movement.

8. A cylinder, a movable piston in said cylinder, and a passage way communicating with said cylinder, in combination with a receptacle adapted to hold liquid and air under pressure, a passage way communicating with said receptacle, means to connect said passage ways, said connecting means comprising check valves arranged, respectively, to obstruct the flow of liquid therethrough, one of said check valves obstructing said flow in one direction and the other thereof obstructing the flow in the opposite direction, means to yieldingly seat said check valves, and means to control the flow of liquid through one of said check valves.

9. A cylinder and a movable piston in said cylinder, in combination with a receptacle adapted to hold liquid and air under pressure, means to establish communication between said cylinder and said receptacle, said means to establish communication provided with yielding means to obstruct said communication in one direction and to obstruct communication in the opposite direction, and additional means to establish communication between said cylinder and said receptacle, means to obstruct said additional communication to the flow of liquid in one direction and means to control the flow of liquid therethrough in the opposite direction.

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