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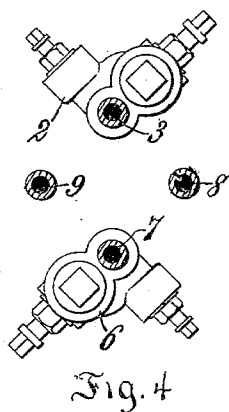
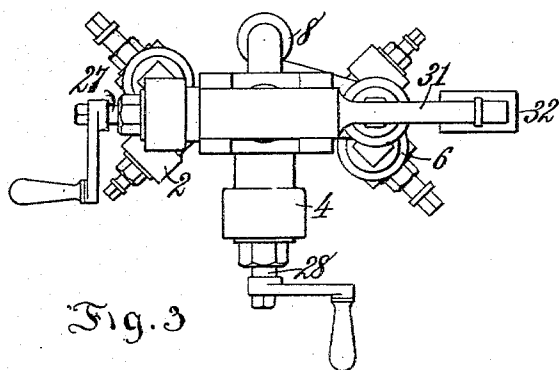
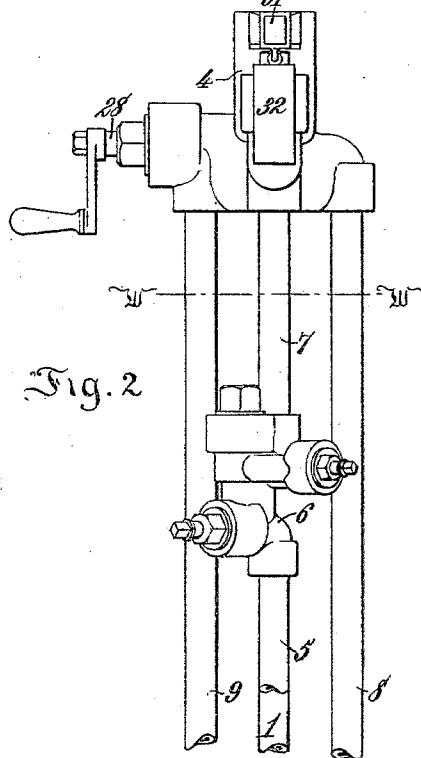
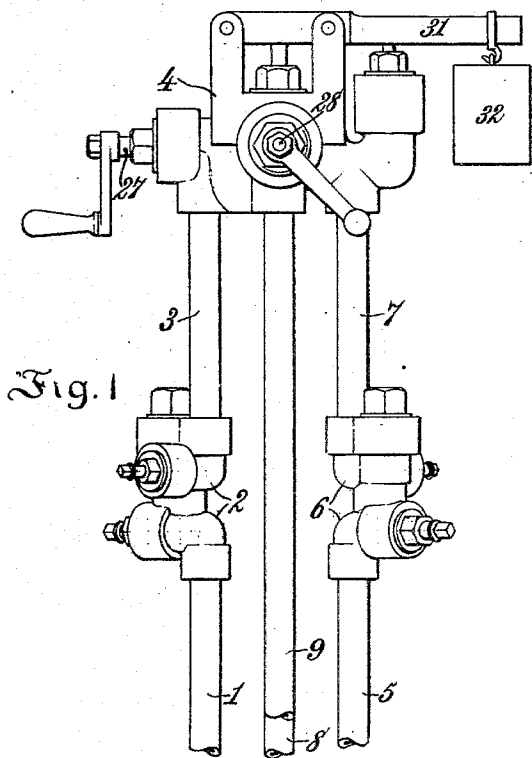
3 Sheets—Sheet 1.

J. H. HUBBELL.

AUTOMATIC PRESSURE CONTROLLING MECHANISM FOR HYDRAULIC SYSTEMS.

No. 548,549.

Patented Oct. 22, 1895.



Witnesses  
Thos. A. Green  
Robert Everett.

Inventor  
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By Attorney  
James L. Norris.

(No Model.)

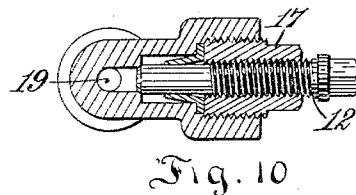
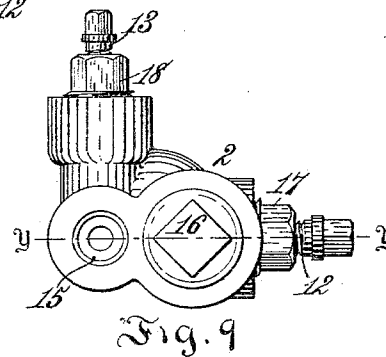
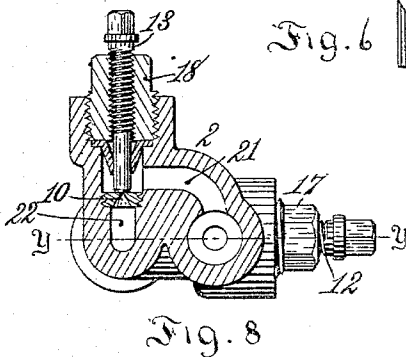
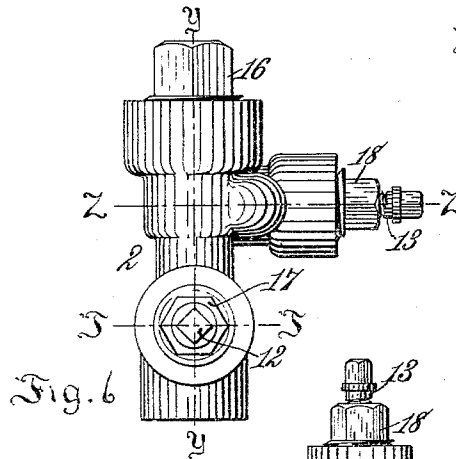
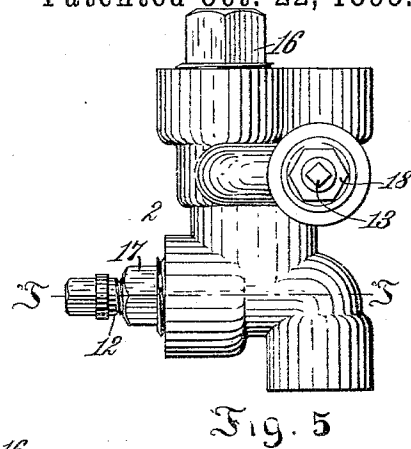
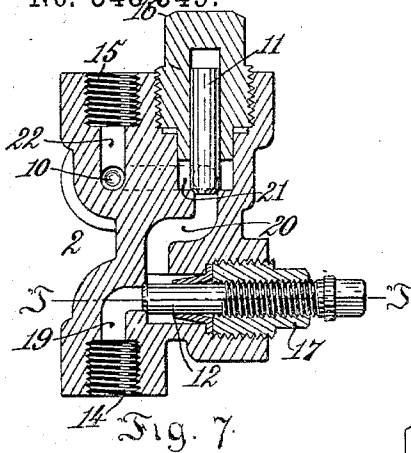
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Fig. 10

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(No Model.)

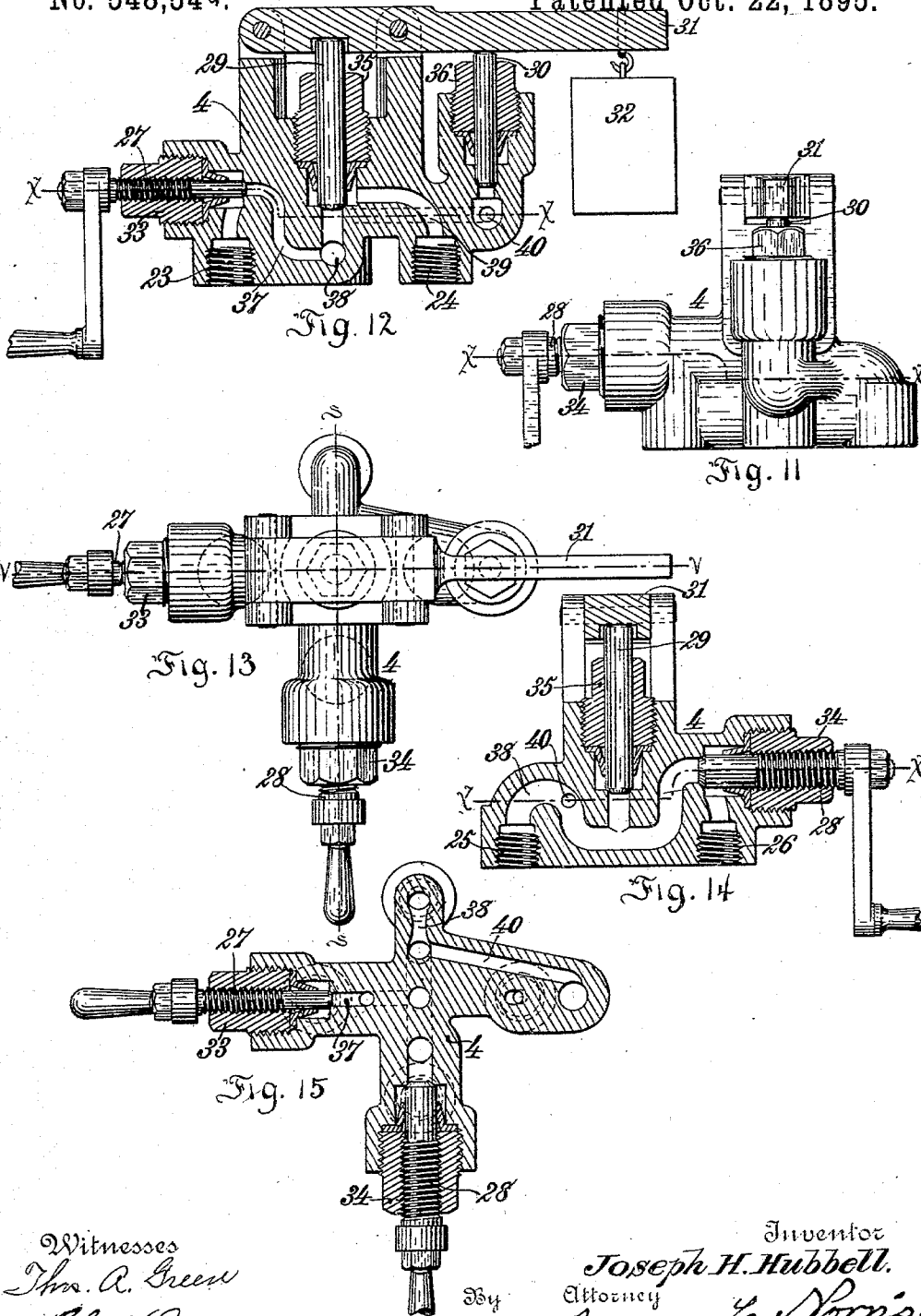
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AUTOMATIC PRESSURE CONTROLLING MECHANISM FOR HYDRAULIC SYSTEMS.

No. 548,549.

Patented Oct. 22, 1895.



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# UNITED STATES PATENT OFFICE.

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AND BRASS WORKS, OF SAME PLACE.

## AUTOMATIC PRESSURE-CONTROLLING MECHANISM FOR HYDRAULIC SYSTEMS.

SPECIFICATION forming part of Letters Patent No. 548,549, dated October 22, 1895.

Application filed December 26, 1894. Serial No. 532,993. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH H. HUBBELL, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented new and useful Improvements in Automatic Pressure-Controlling Mechanism for Hydraulic Systems, of which the following is a specification.

This invention relates to automatic pressure-controlling mechanism for hydraulic systems of the character employed in connection with hydraulic accumulators as applied to the operation of such machinery as presses for use in processes of extracting oil from oleaginous matter and for other purposes.

The invention consists in the features of construction and in the novel combinations of parts in a combined choker, check-valve, and stop-valve and in an automatic change-cock and in the connections of these parts with each other and with the hydraulic accumulators and the machinery to be operated therefrom, as hereinafter more fully set forth and claimed.

In the annexed drawings, illustrating the invention, Figure 1 is a side elevation of my improved automatic pressure controlling and changing mechanism for hydraulic systems. Fig. 2 is an end elevation of the same. Fig. 3 is a plan or top view. Fig. 4 is a horizontal section on the line W W of Fig. 2. Fig. 5 is a side elevation of one of the chokers or combined choker, check-valve, and stop-valve. Fig. 6 is an end elevation of the same. Fig. 7 is a central vertical section of the same on the line Y Y of Figs. 6, 8, and 9. Fig. 8 is a horizontal section on the line Z Z of Fig. 6. Fig. 9 is a top view of the combined choker, check-valve, and stop-valve. Fig. 10 is a cross-section on the line T T of Figs. 5, 6, and 7. Fig. 11 is a rear elevation of the automatic change-cock. Fig. 12 is a central vertical longitudinal section of the same on the line V V of Fig. 13. Fig. 13 is a plan or top view of the change-cock. Fig. 14 is a vertical transverse section on the line S S of Fig. 13. Fig. 15 is a horizontal section on the line X X of Fig. 12.

Referring more particularly to Figs. 1, 2, 3, and 4, in which is represented the general arrangement of the pressure-controlling mechanism embraced in this hydraulic pressure

system, the numeral 1 designates a pipe leading from a low-pressure accumulator (not shown) to the casing 2 of a combined choker, check-valve, and stop-valve, the construction of which is more clearly shown in Figs. 5 to 10. This combined choker, check-valve, and stop-valve casing 2 is made to connect with a pipe 3, leading to the change-cock 4, of which the details of construction will be seen in Figs. 11 to 15.

From the high-pressure accumulator (not shown) a pipe 5 leads to the casing 6 of a combined choker, check-valve, and stop-valve that is in all respects like the valve mechanism 2, already referred to as being connected with the low-pressure accumulator. A pipe 7 leads from the combined choker, check-valve, and stop-valve casing 6 to the change-cock 4, which has also connected therewith a pipe 8, through which the fluid passes between the change-cock 4 and the point at which the pressure is to be applied, and a pipe 9, that conveys the fluid back to the pump-tank.

Each of the parts here designated 2 and 6 may be termed a "choker," though in the construction that I have devised the casing contains not only a choker proper, as 10, Figs. 7 and 8, but in addition to that a check-valve 11, Fig. 7, and a stop-valve 12, Figs. 7 and 10, thus combining in one these three important contrivances for facilitating the proper handling of hydraulic pressure in connection with the hydraulic accumulators.

It is well known that the pressure obtained in connection with hydraulic accumulators is even and continuous. Therefore, it is obvious that if fluid, through the agency of which this pressure is being conveyed, should be applied in a considerable volume the shock and strain to all the mechanisms would be so great as to probably cause a large amount of damage. To obviate this danger is the purpose of the choker 10, the essential feature of which is a very small taper hole having its smaller end turned toward the direction from which the fluid is supposed to flow. By this means I am enabled to reduce the volume of the stream of fluid without producing a great amount of friction; but the hole is so small at one end that almost any solid particle which may happen to be in the fluid is apt to lodge

over the said hole and thus obstruct the free passage of the fluid. To prevent any difficulty of this kind I have arranged in line with and close to the tapered choke-hole a regulating-screw 13, Fig. 8, which will serve normally as a guard or regulator for the choker, and may be used, also, as a cleaning device. This screw 13 may be adjusted to have one end so close to the mouth of the hole in the choker 10 as to restrain the access thereto of such particles as would be likely to lodge over or against the hole, and yet the screw need not be so close to the hole as to obstruct the required passage of fluid. Should, however, a solid particle slip into and obstruct the small end of the hole in the choker 10, the screw 13 may be used as a cleaning device by screwing it down upon and thus causing it to crush and force the obstruction wholly into and through the hole, the taper shape of which being conducive to the crushed solid freeing itself entirely from the passage. The screw 13 may be used, also, as a regulator for the fluid in case the volume passing through the choker 10 is too great, as the form and arrangement of the screw admit of very fine adjustment as regards the space between the mouth of the opening in the choker and the adjacent screw end.

The choker-casings 2 and 6 are each screw-tapped at 14, Fig. 7, for connection with the pipe 1 or 5, leading from the accumulator, a similar screw-tap being provided at 15 for connection with the pipe 3 or 7, leading to the change-cock. Each casing 2 and 6 is also screw-tapped to receive bushings 16, 17, and 18, for the check-valve 11, stop-valve 12, and regulator 13, respectively. By screwing the stop-valve 12 in or out, as required, it may be made to control a port connecting the passages 19 and 20, Fig. 7, leading from the accumulator-pipe connection 14 to the check-valve 11, from which a passage 21, Fig. 8, leads to the regulator 13 and choker 10, the latter being in communication through a passage 22, Figs. 7 and 8, with the pipe connection 15 for the pipe 3 or 7, as the case may be, that leads to the change-cock.

In the casing of the automatic change-cock 4 there are screw-tapped connections 23 and 24, Fig. 12, for attachment of the pipes 3 and 7, respectively, that lead from the chokers. The change-cock is screw-tapped, also, at 25, Fig. 14, for connection with the pipe 8, Figs. 1 and 2, through which the fluid passes from the change-cock to the point where the pressure is to be applied. It is also screw-tapped at 26 to connect with the pipe 9 for exhaust. Besides these connections the automatic change-cock 4 comprises a low-pressure-inlet stop-valve 27, Figs. 12, 13, and 15; an exhaust-valve 28, Figs. 11, 13, 14, and 15; the automatic change-valve plunger 29, and the lifting-plunger 30 for the weighted lever 31, that normally holds the change-valve 29 to its seat. The lever 31 is suitably mounted upon the top of the change-cock 4, and carries a sliding

weight 32, that may be adjusted on the lever, as required. The screw-threaded and rotary stop-valves 27 and 28 are mounted in bushings 33 and 34, respectively, and bushings 35 and 36 are also provided for the plungers 29 and 30, as shown. In the casing of the change-cock 4 are suitable passages controlled by the above-named valves and plungers, as will presently appear.

The mechanism in connection with which this hydraulic-pressure-regulating system is designed to be used—as in the case of an oil-press, for instance—will require two pressures, a low pressure when the apparatus or machine begins its work and a higher pressure to enable it to finish its task.

The lower pressure, governed by the low-pressure accumulator, passes through the pipe 1 to and past the opened stop-valve 12 to the check-valve 11, which it lifts, and then passes to and through the choker 10 and pipe 3 and rests against the low-pressure inlet stop-valve 27 of the change-cock. The higher pressure, governed by the high-pressure accumulator, travels through the pipe 5 and connected choker to and through the pipe 7 until it rests behind the change-valve plunger 29, which is held to its seat by the weighted lever of the change-cock. Now, in order to apply these pressures, all that is necessary is to open the stop-valve 27, whereupon the low pressure will pass through the passage 37, Figs. 12 and 13, to the press-passage 38, Figs. 12, 14, and 15, and thence through the pipe 8 to the press or other machine or place where the pressure is to be applied. So long as this low pressure is performing the work for which it is designed the high pressure is held in its passage 39, Fig. 12, by the change-valve 29, and is confined above the seat of said valve; but as soon as the resistance offered to the low pressure in the performance of its work becomes great enough to produce back-pressure sufficient to force up the weight 32, which will occur when a greater pressure is required than that supplied through the low-pressure passages, then this back-pressure will pass through a passage 40, Figs. 12, 14, and 15, leading from the press-passage 38 to the lifting-plunger 30, which is thus acted on with such force as will raise the lever 31 and attached weight. The change-valve 29, being thus relieved of the pressure from the lever 31 and weight 32 and having, owing to its construction, no other resistance than that of friction and being forced up by the action of the back-pressure on its under surface, rises from its seat and allows the high pressure to find its way through the passage 38 and pipe 8 to the point of action in the press or other machine. After all work required of the pressures has been performed they may be removed and all former conditions restored by simply closing the stop-valve 27 and throwing the exhaust-valve 28 open. By this action virtually all pressure is removed from under the change-valve 29 and the lifting-plunger 30, and consequently the

weighted lever 31 will force the change-valve 29 back to its seat and thereby cut off the high pressure. In operating this system, when the higher pressure is automatically called to action by the back-pressure the stop-valve 27 in the change-cock 4 is still open, thus allowing the high pressure to run into pipe 3 as well as into pipe 8. Now, if this high pressure were allowed to make itself felt back at the fountain-head of the low pressure it would effect serious damage. Therefore, it is found necessary to insert a check-valve, as 11, somewhere between the automatic change-cock and the hydraulic accumulators. The check-valve must be arranged to lift in the direction in which the on-pressure is flowing and to close against any back-pressure. This check-valve, as 11, I have combined or inclosed in the same casing 2 or 6 that contains the choker 10, and which casing is wholly separate and distinct from the automatic change-cock, and will also support or contain a stop-valve 12, with which to stop off fluid from either direction, such a valve being very valuable in case of needed repairs, &c. By incasing these three contrivances—the choker 10, the check-valve 11, and the stop-valve 12—in one body considerable time, trouble, and expense will be avoided, in that the combined choker, check-valve, and stop-valve is cheaper and easier to fit up and connect in one body than in two or three, besides the greater convenience, neatness, and compactness of the combined devices.

The advantages derived from the improved construction and arrangement of parts embraced in this pressure controlling and changing apparatus are numerous. A more prompt and efficient action is obtained from the combined choker, check-valve, and stop-valve when constructed and arranged as described and located outside the change-cock, besides the greater accessibility of its parts for needed adjustments and repairs, and it also provides an effective guard against the access of back-pressure to the low-pressure accumulator. The automatic action of the change-cock renders it a comparatively cheap and most efficient and simply-operated piece of mechanism for exchanging one pressure for another without requiring any great amount of care or attention on the part of the operator. Thus the automatic change-cock requires the pressman to make but four operations, namely: Opening the low-pressure valve 27 runs the press up. Closing this low-pressure valve and opening the outlet or exhaust valve 28 allows the press to descend. Closing the exhaust-valve after press is down makes all ready for press to be again applied. After the low-pressure valve is opened the pressures require no more attention until the press is ready to be let down, the higher pressure being attended to automatically at just the moment it is required.

It will be observed that the press-passage 38, Figs. 12 and 14, is located and arranged

below the change-valve 29, and that when the inlet stop-valve 27 is opened to start the press it is only a low-pressure fluid that can come in contact with the under side of the change-valve 29 and its seat. Meanwhile the high-pressure fluid is confined by the valve 29 in the passage 39, Fig. 12, above the seat of the change-valve. This passage 39 is of much larger diameter than the small passage afforded by the choker 10 comprised in the combined choker, check-valve, and stop-valve 6, that is located intermediate the automatic change-cock and the high-pressure accumulator. There cannot, therefore, be exerted on the seat of the valve 29 any destructive action or pressure that would cut or impair the efficiency of the valve-seat and permit leakage of the high-pressure fluid, as would be liable to occur with a different relative arrangement of the press-passage and change-valve involving a holding of the high pressure beneath or in front of a closed valve. The change-valve plunger 29 is held firmly and closely to its seat by means of the weighted lever 31 until the resistance offered to the low pressure at the press becomes so great as to develop sufficient back-pressure to raise the lifting-plunger 30 and weighted lever 31, whereupon the change-valve plunger 29 will be unseated by the low pressure or back-pressure acting on its underside or end, and the high pressure from the passage 39 behind or above the seat of the valve 29 will now find its way to and through the press-passage 38 to the point where its power is to be exerted in the required work. The relative arrangement of the change-valve plunger 29 and press-passage 38, whereby the low pressure and high pressure are respectively applied in the direction described, will protect the seat of the change-valve from cutting, so that the efficiency of the valve will not be impaired even after long use.

What I claim as my invention is—

1. In hydraulic pressure controlling mechanism, the combination with an automatic change-cock, and pipes leading to said change cock from a low pressure accumulator and a high pressure accumulator, respectively, of a separately inclosed combined choker, check and stop valve distinct from the change-cock and located intermediate said change-cock and a source of pressure and communicating with each, substantially as described.

2. In hydraulic pressure controlling mechanism, the combination with an automatic change-cock, and pipes connecting said cock with a source of pressure, of a combined choker, check and stop-valve communicating with said pipes intermediate the change-cock and source of pressure and provided with a regulating screw arranged in line with and close to the choker-opening and adapted to serve as a guard and as a regulating device and cleaner for the choker, substantially as described.

3. In hydraulic pressure controlling mechanism, the combination with an automatic

change-cock and pipes for connecting the same with a low pressure accumulator and a high pressure accumulator, respectively, of a separately inclosed combined choker, check and stop valve, as 2 and 6, one of which communicates with each of said pipes outside the change-cock, and each comprising a tapered choke passage 10 and a regulating screw 13 arranged in line with and close to said choke passage and adapted to serve as a guard and cleaning device for the choker, substantially as described.

4. In hydraulic pressure controlling mechanism, the automatic change cock comprising a press passage 38 communicating at one end with a pipe leading to a press and at the other end communicating with an exhaust pipe, passages 37 and 39 communicating with said press passage 38 and also communicating with pipes leading from a low pressure accumulator and a high pressure accumulator, respectively, a hand valve 27 to control the inlet of fluid from a low pressure accumulator to the passages 37 and 38, the automatic change valve 29 controlling a port through which the high pressure passage 39 and press passage 38 communicate, the weighted lever 31 for normally holding the change valve to its seat, the lift plunger 30 for said lever, the back pressure passage 40 leading from the press passage 38 to the lift plunger, and an exhaust valve 28 at the exhaust end of the press passage; in combination with a separately inclosed combined choker, check and stop-valve 6 intermediate said change-cock and the source

of high pressure, and distinct from the change-cock, substantially as described.

5. In hydraulic pressure controlling mechanism, a combined choker, check and stop-valve consisting of the choker 10 having a tapered choke hole therein, the screw 13 arranged in line with and close to the small end of the tapered choke passage and adapted to serve as a guard and as a regulator and cleaner for said passage, the inlet stop-valve 12 and the check valve 11 intermediate the said stop-valve and choker, all of said parts and their connecting passages being combined and inclosed in one body or casing, substantially as described.

6. In hydraulic pressure controlling mechanism, an automatic change-cock adapted to receive fluid from a low pressure source and a high pressure source, respectively, and comprising a change valve adapted to hold the high pressure at a point behind the seat of said valve until released by back pressure from the press, the front or under side of said change-valve and its seat being exposed only to low pressure, in combination with a combined choker, check and stop-valve intermediate said change-cock and the source of high pressure, substantially as described.

In testimony whereof I have hereunto set my hand and affixed my seal in presence of two subscribing witnesses.

JOSEPH H. HUBBELL. [L. S.]

Witnesses:

JOHN L. H. FRANK,

GEO. FORNUFF.