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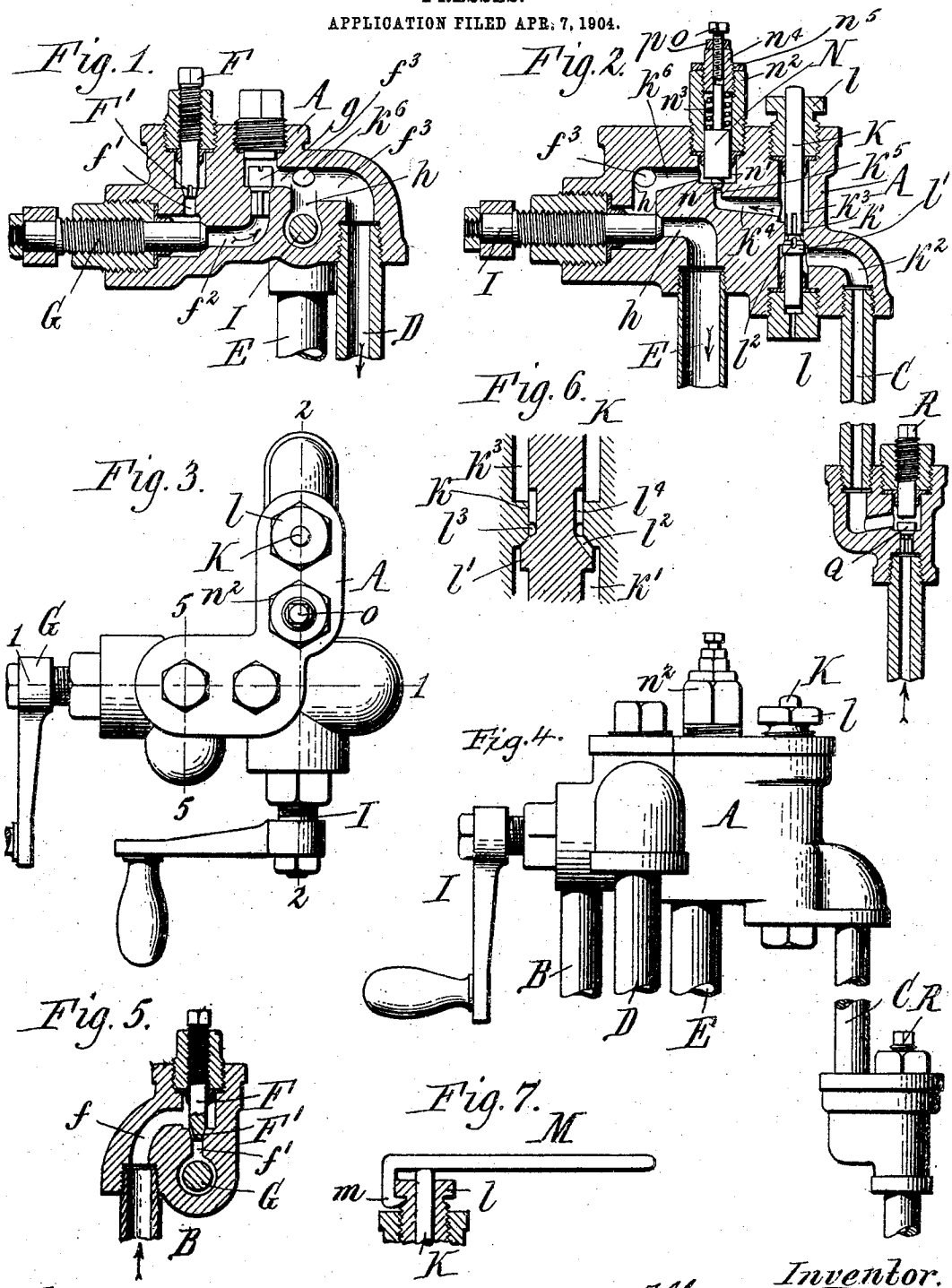

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UNITED STATES PATENT OFFICE.

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AUTOMATIC CHANGE-VALVE AND CHOKER FOR OPERATING HYDRAULIC PRESSES.

No. 796,635. Specification of Letters Patent. Patented Aug. 8, 1905.

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To all whom it may concern:

Be it known that I, ALFRED W. FRENCH, a citizen of the United States, residing at Piqua, in the county of Miami and State of Ohio, have invented new and useful Improvements in Automatic Change-Valves and Chokers for Operating Hydraulic Presses, of which the following is a specification.

This invention relates to automatic change cocks or valves and chokers of the kind used in connection with hydraulic presses, particularly those employed for expressing oil from oleaginous substances which are operated by oil under two different pressures from different sources of supply or accumulators, called the "low-pressure" and "high-pressure" accumulators, respectively. The low-pressure oil is admitted to the press first and operates the press-plunger until the resistance offered by the material in the press nearly equals the pressure exerted by the low-pressure oil, which is about five hundred pounds per square inch, more or less, and the change-cock is then automatically operated to admit the high-pressure oil to the press to complete the expressing operation. These change-cocks or devices include a choker, ordinarily consisting of a perforated diaphragm, or a screw-plug coöperating with a valve-seat and having a small notch through which the oil can pass when the plug is on its seat. The choker-passages are very small, sometimes only one sixty-fourth of an inch in diameter, and they therefore readily become clogged by fine solid particles in the oil. In the case of the perforated diaphragm it is a matter of considerable difficulty and requires some time to remove the obstruction, for the oil must be shut off, the change-cock opened up, and the choker removed, cleaned, and replaced. The other style of choker is not so troublesome to clean, for it can be moved off of its seat, so as to allow a considerable volume of oil to pass and flush and clean the choker-passage; but this construction is objectionable for the reason that careless workmen will leave the valve unseated to prevent it from clogging rather than bother to flush it each time it clogs, thereby permitting a rapid flow of the oil to the press and causing damage to the meal-bags and the waste of the meal by a too rapid operation of the press.

The object of the invention is to provide an efficient and desirable change-cock of exceedingly simple, compact, and inexpensive construction for automatically admitting the high-pressure oil to the press and having a choker which can be readily flushed to remove an obstruction clogging its passage and which after being so flushed or cleaned will be automatically returned to its normal choking position by the pressure of the oil to prevent a too rapid operation of the press.

In the accompanying drawings, Figure 1 is a vertical sectional elevation in line 1 1, Fig. 3, of a change cock or valve embodying the invention. Fig. 2 is a sectional elevation thereof in line 2 2, Fig. 3. Fig. 3 is a plan view thereof. Fig. 4 is an end elevation thereof seen from the right in Fig. 3. Fig. 5 is a sectional elevation thereof in line 5 5, Fig. 3. Fig. 6 is an enlarged detail section of a portion of the high-pressure choker. Fig. 7 is a detail sectional elevation showing the operating means for the high-pressure choker.

Like letters of reference refer to like parts in the several figures.

A represents the inclosing casing of the change-cock and choker; B and C, supply-pipes for the low and high pressure oil, respectively, and connecting the change-cock casing, respectively, with the low-pressure and high-pressure accumulators or other suitable sources of supply for the oil under the different pressures; D, a pipe connecting the change-cock casing with the press for conveying both the low and high pressure oil thereto, and E a discharge-pipe for draining the oil from the press and returning it to the pump to be again utilized. *f*, Fig. 5, is a passage in the change-cock casing leading from the low-pressure supply-pipe B to a choker F of any known or suitable construction provided with a small passage F′ for the oil, and *f′*, Fig. 1, is a continuation of the passage *f*, leading to an ordinary hand-stop or controlling-valve G, which is operated to open and close the passage to admit the oil to or shut it off from the press. *g*, Fig. 1, represents the usual check-valve arranged in the continuation f^2 of the low-pressure-oil passage, the continuation f^3 of which beyond said check-valve leads to the press-pipe D. The portion f^3 of the low-pressure-oil passage also connects, by a branch passage *h*, Fig. 2, controlled by the usual hand-operated controlling-valve I with the discharge or return pipe E, Fig. 2. These parts are all known and may be of any usual or suitable construction.

K represents a choker for the high-pressure oil, preferably located in a chamber *k* in the change-cock casing. The choker-cham-

ber has a contracted waist portion, an inlet enlargement k', which connects, by a passage k^2, with the supply-pipe C for the high-pressure oil, and an outlet enlargement k^3, which is connected by a passage k^4 and port k^5 with a large passage k^6, which is in direct communication with the portion f^3 of the low-pressure-oil passage. The passages k^2 k^4, port k^5, and chamber k constitute, in effect, a single direct passage for the high-pressure oil and the passage k^6 a connecting-passage between the passages for the low and high pressure oil. The choker shown is provided with opposite cylindrical end portions or stems which pass through the enlarged portions of the choker-chamber and through packing-glands l of any usual or suitable construction and with an intermediate enlargement or valve portion l', located in the inlet enlargement of the choker-chamber and having a conical face which coöperates with a corresponding valve-seat surrounding the contracted portion of the choker-chamber at the inlet end thereof. The conical face of the valve has a longitudinal notch or channel l^2, through which the oil can pass when the valve is on its seat, and that portion of the stem of the choker-valve which passes through the contracted waist of the valve-chamber is provided with circumferential and longitudinal grooves l^3 l^4 or is otherwise shaped to permit the flow of the oil past the same into the outlet enlargement of the choker-chamber. Instead of notching the valve a similar result would be attained by providing the valve-seat with a notch or passage. The opposite stems of the choker are so proportioned that the pressure on the inlet side of the valve enlargement will predominate over the opposing pressure thereon to hold the choker normally on its seat, as indicated in Figs. 2 and 6 of the drawings, so that only a restricted flow of the oil is permitted through the choker notch or passage l^2. Should the latter become clogged by a solid particle or be stopped from any cause, it is only necessary to press the choker in to move the valve portion off of its seat, thereby flushing the choker-passage and dislodging the obstruction. When the choker is released, it will be again moved to seat its valve by the pressure of the oil thereon.

The choker can be moved by any convenient means—such, for instance, as a lever M, (shown in Fig. 7,) which is provided with a hooked end m, adapted to be engaged over the flange at the outer end of the packing-gland for the choker with the lever bearing on the exposed end of the choker-stem. By pressing on the lever the choker can be moved inwardly against the pressure of the oil. When the lever is disengaged and the choker released, it is reseated by the oil-pressure, as explained.

Only the high-pressure-oil passage is described as controlled by the automatically-seating choker above described; but it will be understood that a similar choker can be employed for the low-pressure oil in the change-cock or in other applications where conditions attain similar to those explained.

N, Fig. 2, represents an automatic change cock or valve which extends into the connecting-passage k^6 and preferably consists, as shown, of a cylindrical plug or piston having at its lower end a reduced conical portion n, which coöperates with a valve-seat at the upper end of the port k^5, and provided above said reduced part with an enlarged face or portion n', which is exposed to the pressure of the low-pressure oil in the connecting-passage k^6. The change-cock is surrounded by a packing-gland of the usual or well-known construction, consisting of a cup-shaped packing disk or washer and a bushing n^2, screwed into a threaded hole in the casing A.

n^3 is a coil-spring, which is confined in the bushing around a reduced upper portion or stem of the change-cock and bearing at its opposite ends, respectively, against a shoulder on the change-cock and an adjustable screw plug or cap n^4, which is screwed into a threaded hole in the outer end of the bushing and provided with a lock-nut n^5. The pressure of the spring on the change-cock is regulated by an adjustable screw-plug n^4 and is adjusted to hold the change-cock on its seat against the pressure exerted thereon by the high and low pressure oil until the latter reaches a predetermined value. To limit the upward movement of the change-cock, and thereby prevent it from unduly straining its spring, an adjustable stop-screw o is screwed into a screw-threaded hole in the spring-adjusting plug, with its inner end in position to engage the upper end of the stem of the change-cock to limit the movement of the latter away from its seat. The screw can be adjusted to permit the necessary movement of the change-cock and is held when adjusted by a lock-nut p.

The operation of the automatic change cock or valve is as follows: The operator closes the hand-valve I, controlling the discharge-passage, and opens the valve G, controlling the inlet of the low-pressure oil. The latter then enters through the low-pressure-oil-supply pipe and passage, lifts and passes the check-valve g, and passes through the continuation f^3 of the low-pressure-oil passage and pipe D to the press to operate the latter. When the back pressure in the press-pipe and low-pressure-oil passage, due to the resistance of the material in the press, reaches a predetermined degree—for instance, five hundred pounds per square inch, more or less—it is communicated to the connecting-passage k^6 and acting upon the enlarged portion of the automatic change cock or valve in the connecting-passage, aided by the pres-

sure of the high-pressure oil upon the reduced lower end of the valve, raises the latter against the pressure of its spring and permits the high-pressure oil to flow into the connecting-passage k^6 and low-pressure-oil passage. The predominant pressure of the high-pressure oil seats the check-valve *g*, controlling the low-pressure-oil passage, to prevent the high-pressure oil from backing into the low-pressure supply-pipe, and the high-pressure oil passes through the low-pressure-oil passage and press-pipe to the press to exert its pressure thereon. When the expressing operation is completed, the controlling-valve E for the low-pressure oil is closed and the discharge-valve I opened, thereby permitting the oil to flow back through the press-pipe and low-pressure-oil passage into the discharge-pipe, which returns it to the pump to be again utilized.

It will be observed that the automatic change cock or valve consists of but a single piece and requires only one ordinary packing-gland and also that only the one connecting-passage k^6 is required between the high and low pressure passages both for carrying the high-pressure oil to the press and for communicating the pressure of the low-pressure oil to the change cock or valve to operate it.

The high-pressure oil pipe or passage is provided at some suitable point with the usual check-valve Q for holding the high-pressure oil to its work in one press when another press is opened to the high-pressure oil-supply, and a screw-plug R is preferably provided for holding the check-valve on its seat to shut off the high-pressure oil to enable access to the change-cock for inspection and repairs.

I claim as my invention—

1. The combination with a passage for liquid under pressure, of a choker which is arranged and constructed to provide a restricted passage and to be normally held by the liquid-pressure in a position to permit only a restricted flow of the liquid through the said passage, said choker being movable to allow the passage of a greater volume of liquid, and being automatically returned to its normal position when released by the pressure of the liquid thereon, substantially as set forth.

2. The combination with passages for liquid under different pressures, and a change-valve for the purpose described, of a choker which is arranged and constructed to provide a restricted passage and to be normally held by the liquid-pressure in position to permit only a restricted flow of the liquid through one of said passages, said choker being movable to allow the passage of a greater volume of liquid, and being automatically returned to its normal position when released by the pressure of the liquid thereon, substantially as set forth.

3. The combination with passages for liquid under different pressures, and a change-cock for the purpose described, of a choker which controls one of said passages and is provided with a portion which is normally held by the liquid-pressure against a seat in said passage, a restricted passage through which the liquid passes when said choker is seated, said choker being movable to enlarge the passage for the liquid, and being automatically reseated when released by the pressure of the liquid thereon, substantially as set forth.

4. The combination of a passage for liquid under pressure, having a valve-seat, and a movable choker in said passage and provided with a valve portion which bears on said seat, said valve portion having a restricted passage through which the liquid passes when said valve portion is on said seat, said choker having differential areas whereby the liquid-pressure holds said valve portion against said seat and reseats it after it is moved from the seat, substantially as set forth.

5. The combination of a passage for liquid under pressure, having a valve-seat and enlargements of said passage on opposite sides of said seat, a movable choker having differential reduced portions in said enlargements of the passage, and a valve portion coöperating with said seat, a restricted passage in said valve portion through which the liquid passes, when said valve portion is on said seat, and means whereby said choker can be moved to unseat said valve portion, said valve portion being held by the liquid-pressure against said seat, substantially as set forth.

Witness my hand this 18th day of February, 1904.

ALFRED W. FRENCH.

Witnesses:
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