(No Model.) 2 Sheets—Sheet 1.

W. H. TAPPEY.

FLUID COMPRESSOR.

No. 360,542. Patented Apr. 5, 1887.

Fig. 1

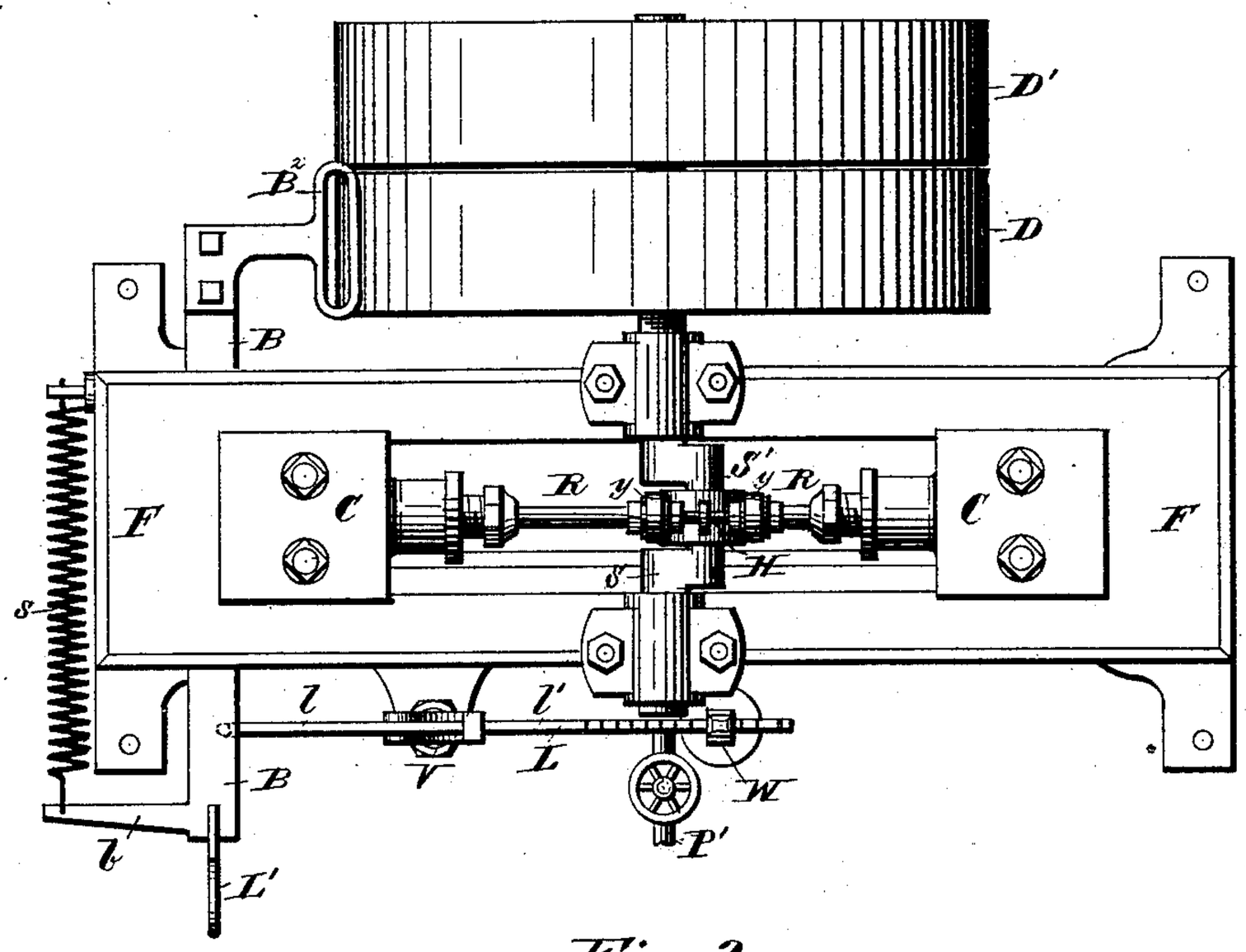
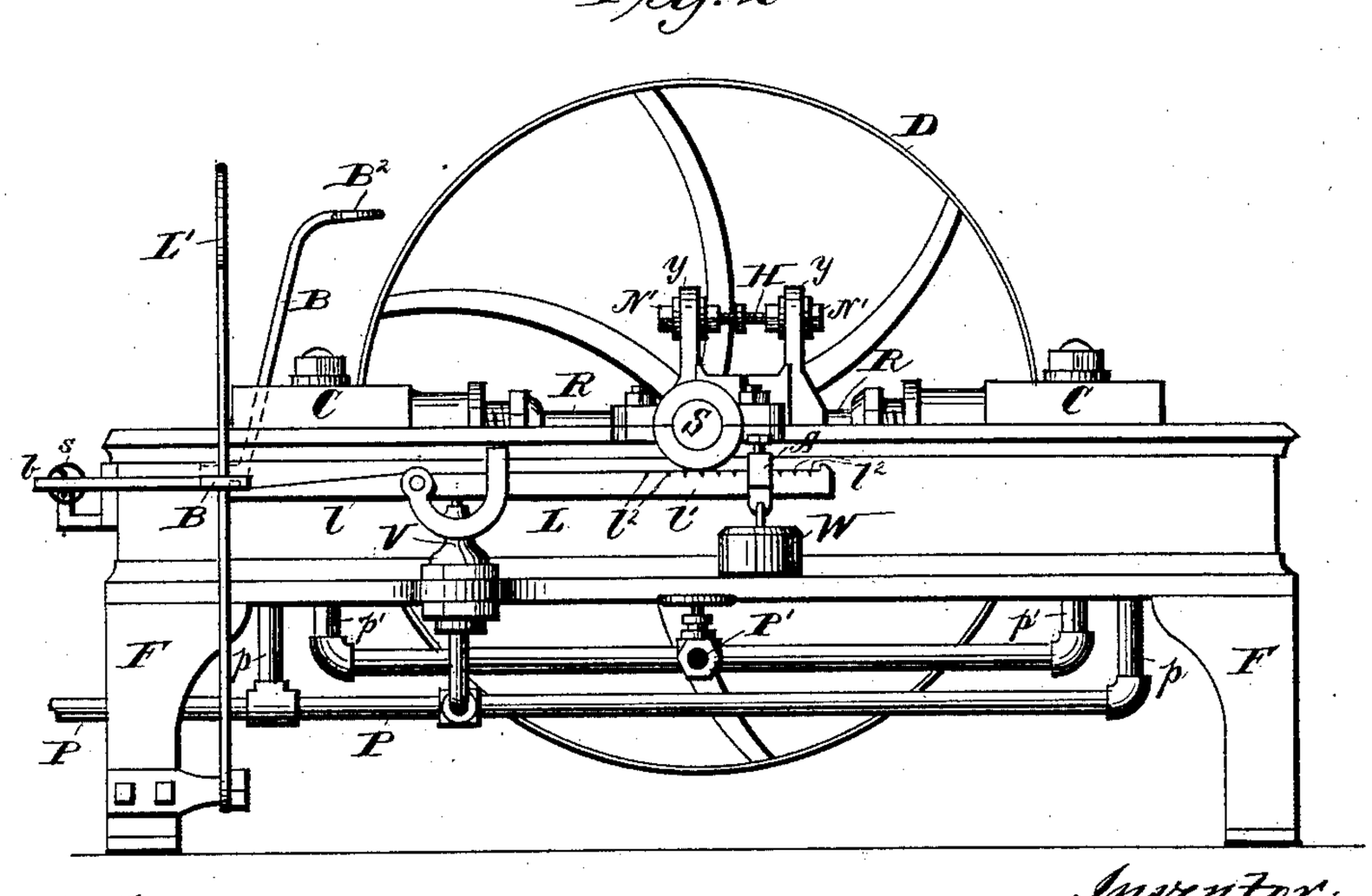


Fig. 2



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 1

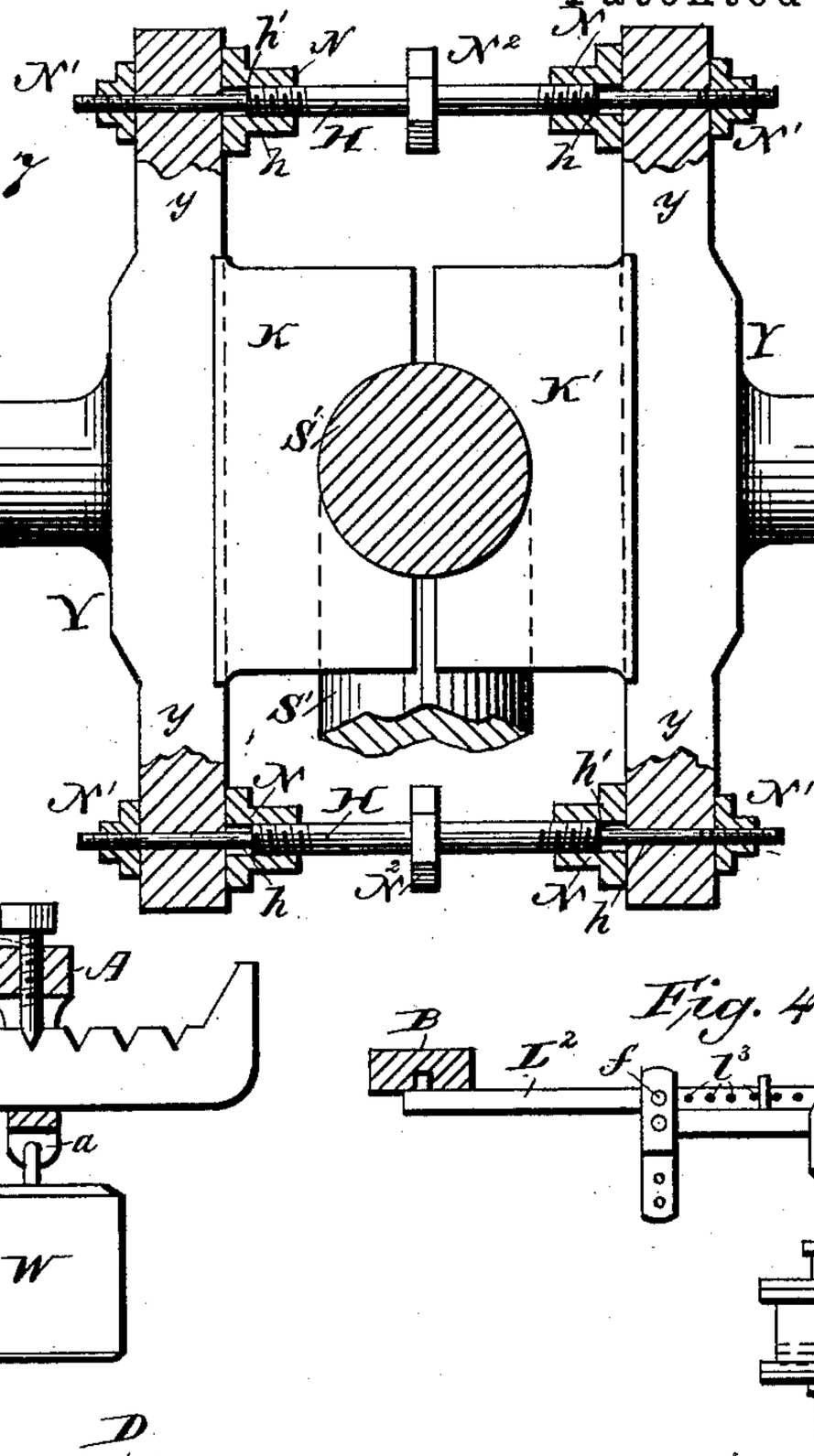


Fig. 6

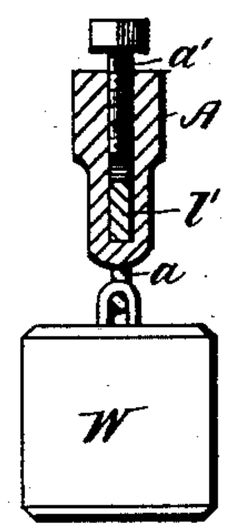


Fig. 5

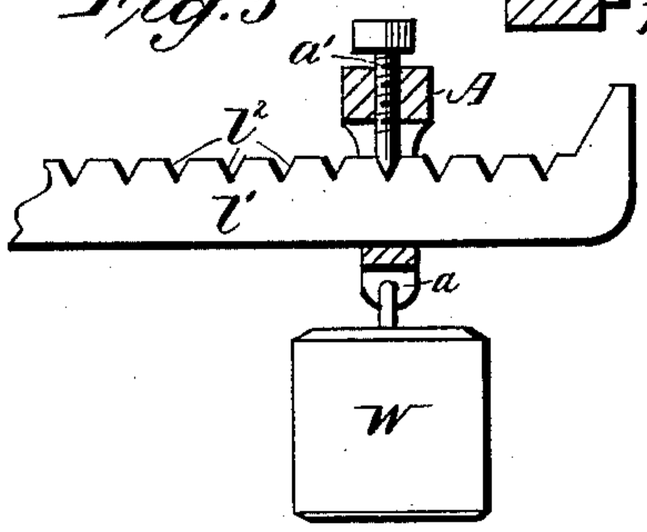
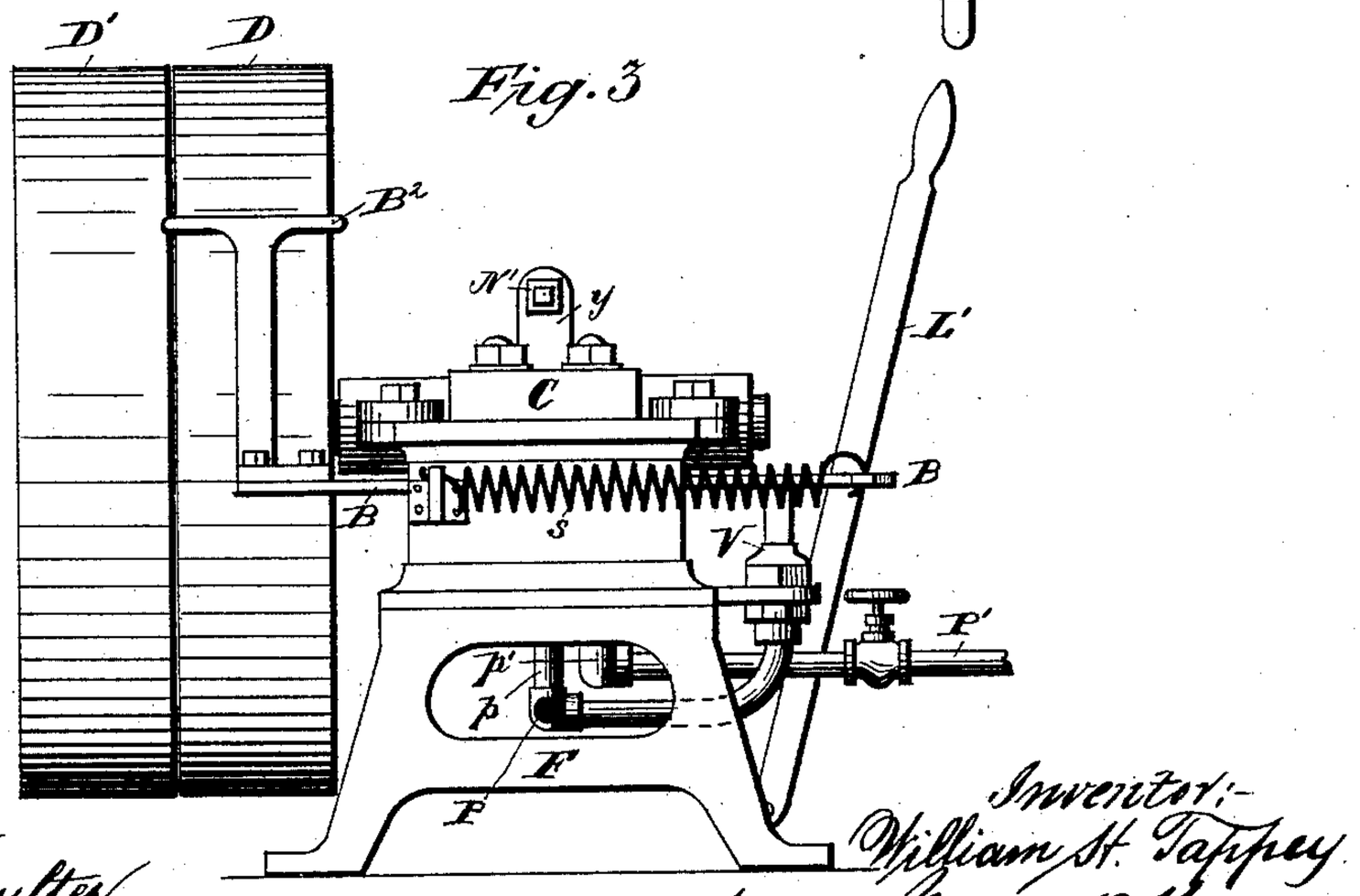


Fig. 4

Fig. 3



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Inventor:-
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per Henry Orth
his atty

UNITED STATES PATENT OFFICE.

WILLIAM H. TAPPEY, OF PETERSBURG, VIRGINIA.

FLUID-COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 360,542, dated April 5, 1887.

Application filed March 17, 1886. Serial No. 195,573. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. TAPPEY, a citizen of the United States, residing at Petersburg, in the county of Dinwiddie and State of Virginia, have invented certain new and useful Improvements in Fluid-Compressors; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters or figures of reference marked thereon, which form a part of this specification.

Referring to the accompanying drawings, in which like letters of reference indicate like parts, Figure 1 is a top plan view of a compressing-pump embodying my invention. Fig. 2 is a side elevation thereof; Fig. 3, an end elevation thereof. Fig. 4 shows a modification in the arrangement of levers and their combination with an actuating-piston instead of a valve; and Fig. 5 shows, on an enlarged scale and in side elevation, a portion of the detent-lever that controls the shifting devices and the means for adjusting the weight thereon, the latter parts being shown in section. Fig. 6 is a cross-sectional view of the lever shown in Fig. 5, also on an enlarged scale. Fig. 7 is a sectional detail view, on an enlarged scale, of the crank-shaft, showing the means for adjusting the coupling brasses or bearings for the piston-rods, the latter being broken away.

The object of my invention is to provide means for automatically stopping the operation of fluid-compressors by throwing the same out of gear or connection with the driving mechanism.

The invention has for its further object to provide simple means for compensating or taking up the wear of the connections between the piston-rods and crank-shaft of a twin-cylinder or double-acting compressing-pump.

To these ends the invention consists in the combination, with the force-pipe of a fluid-compressor, of means for automatically throwing the compressor out of gear with the driving mechanism, substantially as hereinafter described, and as set forth in the claims.

The invention further consists in providing the piston-rods with heads, in which are formed seats for the pillow or bearing blocks for the crank of the crank-shaft that operates the pistons, and in combination therewith of means for taking up the wear of the parts, substantially as hereinafter fully described, and as set forth in the claims.

Before describing my invention in detail I would remark that I do not limit myself in its application to a compressor of specific construction, my improvements being applicable to any form of fluid-compressor or compressing-pump.

In the above-described drawings I have shown a compressing-pump, which, in its general features, is of usual construction, and those versed in the art to which my invention pertains will readily understand the same without describing the construction of the pump in detail, except in so far as the application of my invention may require such description.

The pump shown in the above-described drawings is a twin-cylinder or double-acting hydraulic compressing-pump, F being the frame from which it is supported; C C, the cylinders; R R, the piston-rods connected with the driving or crank shaft S, which driving-shaft S carries a loose and a fast pulley, D′ and D, respectively.

It is well known that the connections between the piston rod or rods and the crank of the crank-shaft wear very rapidly. To compensate for or take up such wear, I have devised the following means: The piston-rods R R are each provided with a bearing-plate, *y*, in which is formed a recess or seat for one of the bearing blocks or brasses K and K′ for the crank S′ of crank-shaft S. The two bearing-plates *y y* are connected by means of adjusting and retaining screws H H, thus forming a yoke, Y, in which the brasses are seated. The screws H H are attenuated at their opposite ends, *h*, and said ends are screw-threaded to receive check-nuts N′ N′. From the shoulders *h′*, formed by the attenuated portion of the screws H, toward the center thereof, said screws have at one end a right-hand and at the other a left-hand thread, upon which work the nuts N N, and centrally of said screws is a rigid hexagonal or other angular flange, collar, or nut, N^2, to which a suitable key or wrench is applied for the purpose of

rotating the screws H, as more plainly shown in Fig. 7.

It is obvious that by rotating the screws H in one direction the seat-plates *y y* of the yoke Y will be brought closer together, and by rotating said screws in a reverse direction the said plates will be moved apart, as will be readily understood. By means of this simple construction the brasses K K′ may be readily adjusted when the contacting surfaces are worn, and the amount of wear compensated or taken up by such adjustment.

P′ indicates the supply-pipe for the pump; *p p′*, the pipes leading to and from the cylinders, and P the pipe leading to a receiver in which the water is compressed, or to a press or other device operated by the pressure of the water, which press or other device I have deemed unnecessary to show, as it forms no part of my invention.

B indicates the usual belt-shifting bar, that carries at one end a belt-shifting fork or a loop, B^2, and slides in suitable guides formed in the framing F. With the opposite end of the bar B is connected an ordinary hand-lever, L′, pivoted to the framing, for operating the bar B by hand to shift the belt from the loose pulley D′ to the driving-pulley D, or from the latter to the former, when this is required.

V indicates the safety-valve, which is also of well-known construction, the valve-lever L being, however, a two-armed lever whose arm *l* extends under the belt-shifting bar B; and said arm *l* is provided on its end with a stud or lug that engages a suitable hole or recess or a shoulder formed in or on the under side of the bar B, near the end where the hand-lever is connected thereto, to hold the bar in proper position with the belt on driving-pulley D, the lever performing the function of a detent with respect to the bar B. The other arm, *l′*, of the valve-lever L carries, as usual, a weight adjustable on said lever.

The belt-shifting bar B has at its rear end an arm, *b*, to which is attached one end of a sufficiently-strong coiled spring, *s*, to throw the bar toward the loose pulley D′ and shift the belt from the fast pulley onto said loose pulley when said bar is released from the arm *l* of valve-lever L, the opposite end of the spring *s* being attached to an arm projecting from the frame F.

It is obvious that if the weight W on arm *l′* of lever L is adjusted to hold the valve down until a predetermined pressure in pipe P has been reached and lift the valve when said pressure increases, the lever L, when the valve is lifted, will be moved on its fulcrum, the arm *l′* ascending while the arm *l* descends and releases the bar B, which, under the stress of spring *s*, is thrown forward and shifts the belt from fast pulley D to loose pulley D′.

In Figs. 1, 2, and 3 I have shown the belt-shifting bar D controlled from the safety-valve V. It will, however, be understood that said bar may be controlled from any other suitable form of valve independently of the safety-valve; or it may be controlled from a piston, as shown in Fig. 4; or it may be controlled from a diaphragm, or from any other suitable mechanical appliance adapted to be actuated by the pressure of the water or to transmit the power exerted by the water under pressure to a detent for releasing the belt-shifting bar B.

In order to facilitate the adjustment of the weight on the valve-lever L to any desired pressure, I form in the upper face of said lever a series of notches, l^2, forming a graduated scale, indicating pounds of pressure to the square inch, and to prevent the accidental displacement of the weight when adjusted I have devised the means shown in detail in Figs. 5 and 6. In these figures, L is the lever, and *l′* its weighted arm provided with a series of V-shaped notches, l^2. The weight W is suspended from the loop or strap *a* of a sliding support, A, the head of which has a screw-threaded opening, in which works a set or binding screw, *a′*, whose lower end is wedge-shaped to fit the correspondingly-shaped notches in the lever L. The loop or strap *a* of the slide A embraces the lever-arm, and when said slide is brought into proper position to bring the set-screw *a′* over any one of the notches the said set-screw is screwed down into said notch, thus binding or tightening the support to the lever-arm.

Instead of a set-screw a spring-actuated pin may be employed, said pin sliding freely in an opening in the head of the support, a spring secured to said head being arranged so that its free end will bear on a collar or shoulder of or on the head of the pin, a construction that will readily be understood.

Under some circumstances it may be desirable to have a detent-lever that is adjustable as to the length of its detent-arm, in which case I employ two levers, L^2 L^3, pivoted to the valve-head or other suitable support, the lever L^2 being adjustable on its fulcrum *f*, and is to this end provided with a series of fulcrum or pivot holes, l^3, as shown in Fig. 4. One end of said lever L^2 bears upon the lever L^3, to enable the latter when lifted to depress the outer end of lever L^2 and release it from engagement with the bar B. In either construction the lever or levers act as a detent in conjunction with the bar B, to hold the latter against movement, or to release it.

When the belt has been shifted from the fast to the loose pulley, and is to be shifted back onto the former pulley, the hand-lever L′ is used, as will be readily understood.

From the above description the operation of the belt-shifting devices may be readily understood, and no further description thereof is deemed necessary.

It will be observed that the belt-shifter-controlling devices may be applied to any existing form of fluid-compressor without altering any part thereof to any great extent; that they

may be applied at any suitable point where the pressure of the fluid can be made available, and need not necessarily be applied to the line-pipe—that is to say, to the pipe P, leading from the compressor to the receiver, in which the fluid is to be compressed or stored under pressure, or to a hydraulic press or other mechanism operated by the fluid, as said devices, valve, piston, diaphragm, or other pressure-transmitting devices may be connected with a branch pipe leading from said line-pipe. It will further be observed that the mechanism is simple in its construction, therefore not liable to get out of order, efficient and reliable in operation; that it is not absolutely necessary to operate the belt-shifting bar by a spring, as it may be operated in any other suitable manner—as, for instance, through the medium of a cord attached at one end to the bar B and running over a pulley, and carrying at its other end a weight to throw the bar in the proper direction when released from the detent-lever L; or a weighted lever may be pivoted at any suitable point to the frame F, in proximity to and connected with the bar B, to throw the latter the required distance to shift the belt from the fast to the loose pulley when released from the detent-lever; and, lastly, that the invention is not necessarily limited to belt-shifting devices, as it will be obvious to any skilled mechanic that it may be applied with equal facility and without very material changes to a clutch-shifting lever connected with the bar B, or equivalent device.

Having thus described my said invention and how the same is to be performed, what I claim, and desire to secure by Letters Patent, is—

1. The combination, with the crank-shaft S and the piston-rods R R, provided each with a seat-plate, *y*, of the brasses K and K′ for the crank of the shaft, the screw-bolts N, and check-nuts N′, said parts being constructed and operating substantially as and for the purpose specified.

2. The combination, substantially as herein described, with the force-pipe, the piston-driving shaft, and a connection between said shaft and a prime motor, of a valve interposed in the force-pipe and controlled by the pressure of the fluid therein, and a detent connected with the crank-shaft connection and valve, and operated by the latter to disconnect said shaft from the prime motor, for the purpose specified.

3. The combination, substantially as herein described, with the piston-driving shaft carrying a fast and loose pulley, a belt-shifting bar, and the force-pipe, of a valve interposed in said force-pipe and operated by the pressure of the fluid therein, and a weighted valve-lever operating to lock the belt-shifting bar in position with the belt on the fast pulley and release said bar when the valve is moved by the pressure of the fluid, for the purpose specified.

4. The combination, substantially as herein described, with the piston-driving shaft carrying a fast and loose pulley, a spring-actuated belt-shifting bar, and the force-pipe, of a valve interposed in said force-pipe and operated by the pressure of the fluid therein, and a weighted valve-lever operating to lock the belt-shifting bar against the stress of its spring, for the purpose specified.

5. In a fluid-compressor, the combination, with the force-pipe, the piston-driving shaft, and a connection between said shaft and a prime motor, of a valve interposed in said force-pipe, and an extensible detent operated by the valve and controlling the connections of the crank-shaft with the prime motor to disconnect the same when the valve is moved by the pressure of the fluid, substantially as and for the purpose specified.

6. The combination, substantially as herein described, with the crank-shaft S, carrying fast and loose pulleys D and D′, the spring-actuated belt-shifting bar B, and the force-pipe P, of the valve V, and a weighted valve-lever provided with a lug at the end of one of its arms engaging a notch in or shoulder on the under side of the bar B, for the purpose specified.

7. The combination, substantially as herein described, with the crank-shaft S, carrying the fast and loose pulleys D D′, the spring-actuated belt-shifting bar B, and the force-pipe P, of the valve V, and a weighted lever composed of two levers, L^2 L^3, said lever L^2 being adjustable longitudinally on the lever L^3, for the purpose specified.

8. The combination, substantially as described, with the valve V, and a valve-lever provided with a series of V-shaped notches, of the weight W, its sliding support A, and a locking pin or screw operating in said support and engaging the notches in the lever to lock the weight in position, for the purpose specified.

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

WILLIAM H. TAPPEY.

Witnesses:
F. WHITTLE,
EUGENE JONES.