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J. H. CRAWFORD & C. F. SCHAEFFER.

AUTOMATIC PRESSURE CONTROL.

APPLICATION FILED DEC. 8, 1904.

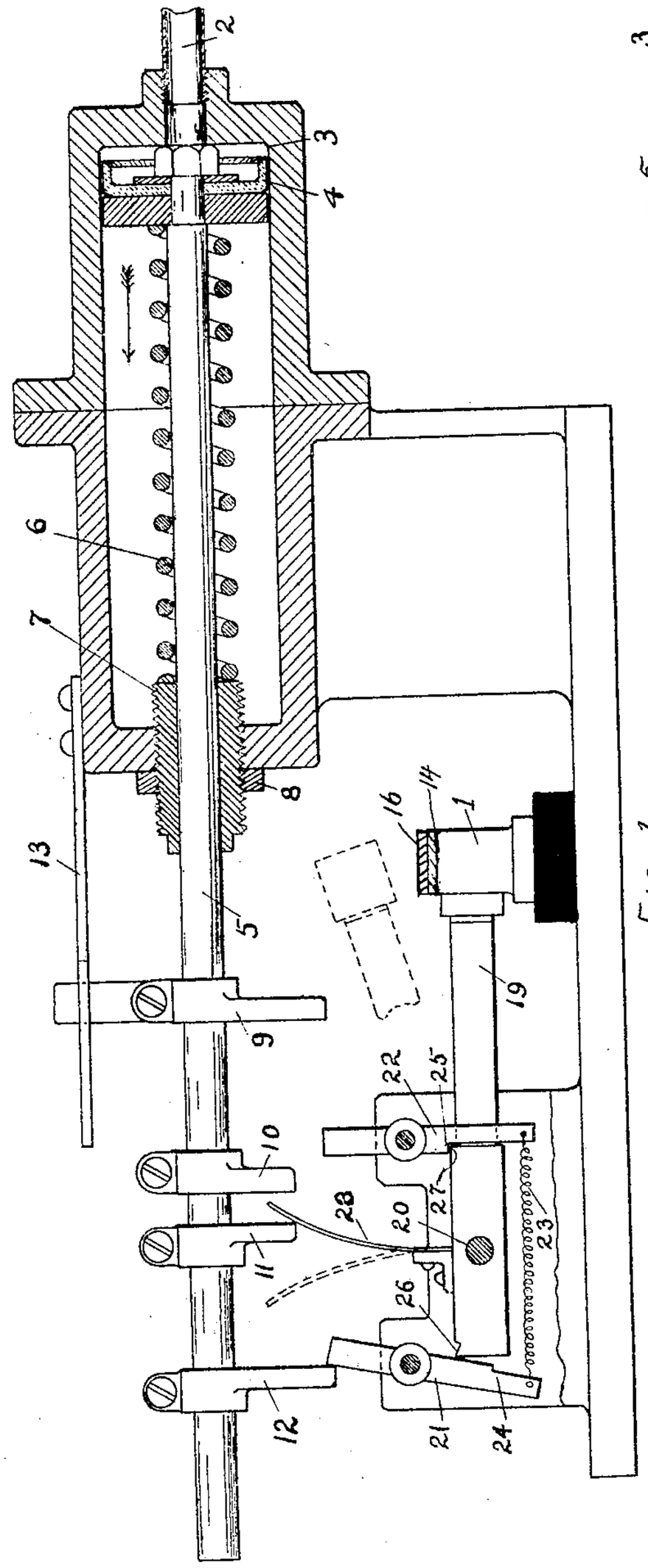

FIG 1.

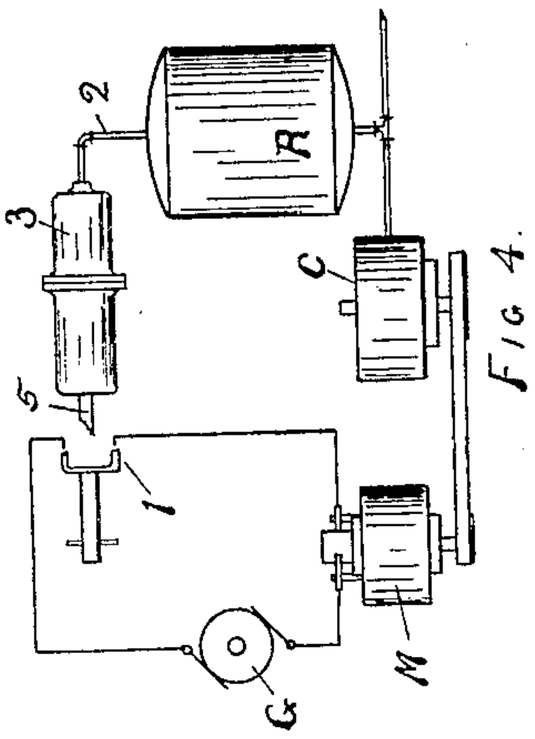

FIG 4.

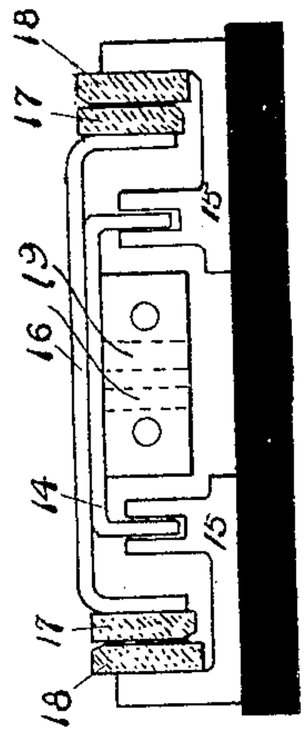

FIG 3.

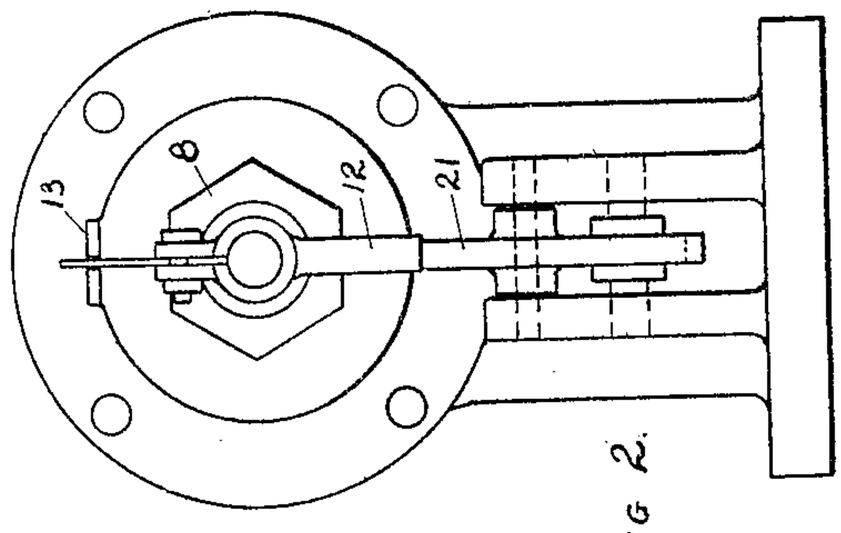

FIG 2.

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AUTOMATIC PRESSURE CONTROL.

No. 806,325. Specification of Letters Patent. Patented Dec. 5, 1905.

Application filed December 8, 1904. Serial No. 235,951.

To all whom it may concern:

Be it known that we, JOHN H. CRAWFORD, a resident of Camden, Camden county, State of New Jersey, and CHARLES F. SCHAEFFER, a resident of Philadelphia, Philadelphia county, State of Pennsylvania, citizens of the United States, have invented a new and useful Automatic Pressure Control, of which the following is a specification.

Our invention relates to improvements in automatic pressure control, our object being to provide improved means for the automatic control of the air or other fluid-compressing means, so as to maintain a constant required pressure or to maintain a certain required range of said pressure.

Our invention comprises a spring-controlled element actuated by the air or other fluid under pressure for operating a quick make-and-break electric switch to cut in and out the electric motor for driving the compressor.

Our invention comprises means for adjustment of the spring controlling the fluid-operated element, so as to vary the amount of pressure necessary to cause or permit its actuation.

Our invention also comprises a plurality of adjustable stops having operative relationship with said fluid-operated element for varying the amount of movement in either or both directions necessary to cause the actuation of said switch.

Our invention is especially adapted to be used in connection with any of the well-known forms of electric motor, a motor-driven compressor, and a reservoir for receiving said compressed air or other fluid. It is obvious that these devices need not be particularly described.

Referring to the drawings, Figure 1 is a side elevation of our device, showing the piston and cylinder in vertical section. Fig. 2 is an end elevation from the left of Fig. 1. Fig. 3 is an elevation of the switch-contacts from a view-point at right angles with that of Fig. 1. Fig. 4 is a diagrammatic view of the generator, motor, compressor, reservoir, and switch.

Similar characters refer to similar parts throughout the several views.

It will be understood that the switch 1 is located between the generator or source of electrical energy and the motor M and serves to open and close the circuit thereof, while pipe 2 serves to connect the cylinder 3 with the reservoir R for air or other fluid under pressure. The reservoir R is supplied with compressed air or other fluid by a compressor C, driven by an electric motor M, controlled by said switch 1. The cylinder 3 is provided with the piston 4, which is connected with the piston-rod 5. This piston-rod 5 is surrounded by the compression-spring 6, which operates between the piston 4 and the threaded adjustable bushing 7, which is secured in any desired adjustable position by the lock-nut 8. Upon the outer end of piston-rod 5 are adjustably secured the lugs 9, 10, 11, and 12. The lug 9 is provided with an upper extension adapted to have slidable engagement with the horizontal rod 13 to prevent the piston-rod 5 from turning. The switch 1 may be in any desired form—either of the knife-blade or laminated type. We have shown the usual knife-blade form constructed of a copper bridge 14, adapted to coöperate with the split blocks 15 of the stationary contacts and the copper bridge 16, carrying the shunt-carbons 17, adapted to coöperate with the fixed or stationary carbons 18 for the purpose of taking the final arc. The bridges 14 and 16 are mounted on the arm 19, pivotally secured at 20 to a stationary support. The latches 21 and 22 are also pivotally secured to a stationary support and are controlled by the spring 23, connecting their lower ends. These latch members are provided with shoulders 24 and 25, adapted to engage, respectively, with the shoulders 26 and 27, carried by the switch-arm 19. The arm or member 19 is also provided with a spring-blade 28, extending upwardly and adapted to be encountered by the lugs 10 and 11. The upper extensions of latch members 21 and 22 are adapted to be encountered, respectively, by the lugs 12 and 9.

The operation of our device is as follows: The interior of cylinder 3 is constantly connected and affected by the pressure in the reservoir R. By the proper proportioning of the spring 6 and the adjustment of the bushing 7 it is obvious that a certain predetermined pressure will be required to move

the piston 4 against said spring 6. As shown in Fig. 1, the switch is closed and the compressor is operating. When the predetermined pressure is reached in the reservoir, to overcome the opposition of spring 6 the piston is pushed in the direction indicated by the arrow in Fig. 1, causing the corresponding movement of piston-rod 5. This causes the engagement of lug 10 with spring 28 to bend it in the opposite direction from that shown in Fig. 1. Until lug 10 reaches the position which will cause the flexing of spring 28, as indicated by the dotted line, the arm 19 is held securely in the closed position, as shown in Fig. 1, by latch member 22, normally controlled by spring 23. When, however, lug 10 has been moved by the piston-rod 5 sufficiently in the direction of the arrow to cause said flexion of spring 28, the lug 9 has also been moved sufficiently to encounter the upper extension of latch member 22 to cause a sufficient rotation thereof to disengage shoulder 25 from shoulder 27 of arm 19. Upon such disengagement of latch member 22 from arm 19 the said arm flies upwardly in response to the stored power in spring 28 to the position indicated by the dotted line, thus causing the separation of the movable and fixed contacts of switch 1. When member 19 has reached the full open position, it is securely locked in said open position by the engagement with shoulder 26 of shoulder 24 of latch 21, actuated by spring 23. This causes the cutting out of circuit of the electric motor M and maintains said motor cut out so long as the pressure communicated to cylinder 3 is sufficient to maintain the piston in the outward position just described. When, however, the pressure falls below the predetermined amount necessary to overcome the action of spring 6, the piston is returned by said spring 6 to the initial position, causing in similar manner as above described the flexing of the spring 28 back to the original position, as shown in Fig. 1, and the actuation of latch 21 by the engagement therewith of lug 12, thus permitting the member 9 to snap back to the closed position to again establish the motor in circuit. When said arm 19 is snapped back to the closed position, it is locked in said position by the latch member 22 snapping in position under the tension of spring 23. It is obvious that by a proper adjustment of the bushing 7 to secure the required normal tension of spring 6 and by the proper adjustment of the relative positions of lugs 9, 10, 11, and 12 upon piston rod 5 our device may be made to act within any required range of pressures. For instance, assuming that it is desirable to maintain a range of pressure between sixty and eighty pounds, we may so adjust our device as to cause the automatic closing of the switch to establish the motor in circuit when the pressure falls to sixty pounds and to automatically cause the opening of the switch to cut the motor out of circuit when the pressure rises to eighty pounds. By the double means of adjustment, comprising the threaded bushing 7 and the independently-adjustable lugs 9, 10, 11, and 12, we may readily increase, diminish, or vary this range to practically any extent in order to meet the various requirements for which the device is designed. By providing purely mechanical means for the operation of the switch instead of the electromagnetic means heretofore used we get a more positive action and an action capable of more precise adjustment.

What we claim is—

1. In combination with a compressor, an electric motor, an electric switch for controlling the motor, a pivoted switch member, latches acting directly upon the switch member, to lock the switch in the open or closed position, a spring connected directly with the switch member, a reciprocating member actuated in one direction by the fluid-pressure and spring-actuated in the other direction, provided with a plurality of lugs for operating the switch, spring and latches.

2. In combination with a compressor, an electric motor, an electric switch for controlling the motor, a pivoted switch member, latches acting directly upon the switch member, to lock the switch in the open or closed position, a spring connected directly with the switch member, a reciprocating member actuated in one direction by the fluid-pressure and spring-actuated in the other direction, provided with a plurality of adjustable lugs for operating the switch, spring and latches.

3. In combination with a compressor, an electric motor, an electric switch for controlling the motor, a pivoted switch member, latches acting directly upon the switch member, to lock the switch in the open or closed position, a blade-spring connected directly with the switch member, a reciprocating member actuated in one direction by the fluid-pressure and spring-actuated in the other direction, provided with a plurality of lugs for operating the switch, spring and latches.

4. In combination with a compressor, an electric motor, an electric switch for controlling the motor, a pivoted switch member, spring-controlled latches acting directly upon the switch member, to lock the switch in the open or closed position, a spring connected directly with the switch member, a reciprocating member actuated in one direction by the fluid-pressure and spring-actuated in the other direction, provided with a plurality of lugs for operating the switch, spring and latches.

5. In combination with a compressor, an electric motor, a pivotally-supported electric switch for controlling the motor, latches, one

on either side of the pivot-support of the switch, acting directly upon the switch member, to lock the switch in the open or closed position, a spring connected directly with the switch member, a reciprocating member actuated in one direction by the fluid-pressure and spring-actuated in the other direction, provided with a plurality of lugs for operating the switch, spring and latches.

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