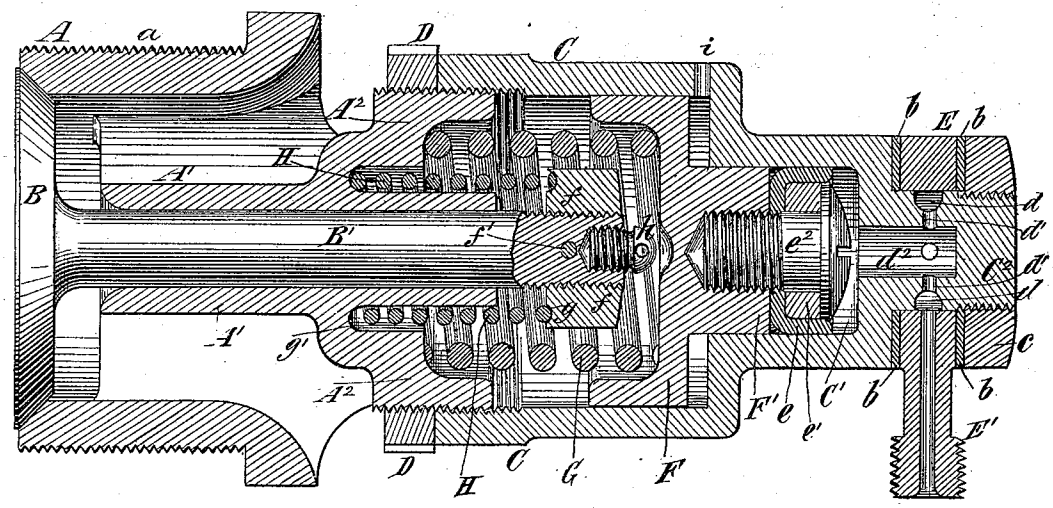
(No Model.)

G. R. CULLINGWORTH & C. W. POTTER.

PRESSURE REGULATOR FOR AIR COMPRESSORS.

No. 287,105. Patented Oct. 23, 1883.



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UNITED STATES PATENT OFFICE.

GEORGE R. CULLINGWORTH AND CHARLES W. POTTER, OF NEW YORK, N. Y., ASSIGNORS TO THE SERGEANT & CULLINGWORTH COMPANY, OF SAME PLACE.

PRESSURE-REGULATOR FOR AIR-COMPRESSORS.

SPECIFICATION forming part of Letters Patent No. 287,105, dated October 23, 1883.

Application filed March 8, 1883. (No model.)

To all whom it may concern:

Be it known that we, GEORGE R. CULLINGWORTH and CHARLES W. POTTER, both of the city of New York, in the county and State of New York, have invented a new and useful Improvement in Pressure-Regulators for Air-Compressors, of which the following is a specification.

Our invention relates more particularly to air-compressors which are employed in compressing air in a tank or receiver from which air is supplied to a number of machines—as, for example, to a number of rock-drills. In such cases the consumption of compressed air is variable, according to the number of machines in use at different times, and pressure-regulators are therefore employed, which are acted upon by the air when it reaches an undesirable or unnecessary pressure, to partly or wholly check the compression. Such regulators have been made to vary the compression in various ways—as, for example, by connecting the pressure-regulator with the steam throttle-valve or governor of the engine used for operating the air-compressor, so as to check its speed by opening a valve which controls communication between the discharge-valves of the compressor-cylinder and the atmosphere, to permit the compressor to discharge directly into the atmosphere, and by opening the suction valve or valves of the compressor, and holding it or them open to a greater or less extent during the discharge-stroke of the compressor, so that more or less of the air taken in through the suction valve or valves on the suction-stroke will be discharged or returned through the suction valve or valves on the return-stroke.

Our invention relates to compressors in which the suction-valve is held open, as above described, and is particularly applicable to compressors which are operated by belts; but it may be embodied in other compressors.

The invention consists in the combination, with the suction-valve for an air-compressor, of a cylinder, a plunger or piston fitting therein and adapted to be acted upon by compressed air, and serving by its movement to open and hold open said valve and a spring for resisting and controlling said plunger or piston in its movement to open said valve, as more fully hereinafter described; and the invention, furthermore, consists in details of construction and combinations of parts, which are pointed out in the claims.

The accompanying drawing is a central longitudinal section of a suction-valve embodying our invention. We have not thought it necessary to show any other parts of the compressor, as the valve proper is of ordinary form, and the manner of applying it is well known.

A designates the seat of the valve, which is or may be provided with the external screw-thread, *a*, for securing it in the head or other part of a compressor-cylinder, or in a compressor-piston.

B designates the valve, and B′ the valve-stem, which works in a guide, A′, formed in the seat.

At or near the outer end of the guide A′ is formed a head, A^2, upon which is secured a cylinder or casing, C, which may be adjusted by turning it, and a lock-nut, D, for holding the cylinder or casing in place after such adjustment. The cylinder or casing constitutes a spring-case, and has formed integral with it a small cylinder, C′.

Upon the outer end of the casing forming the cylinders C C′ is a neck or extension, C^2, upon which is fitted a collar, E, which may be secured between washers *b* by a nut, *c*, so that it may be turned, or, rather, so that the neck or extension may be turned within the collar. The collar E has a nipple, E′, to which may be attached an air-pipe leading to the compressed-air receiver, and the air entering through the nipple fills an annular channel, *d*, between the collar and neck or extension C^2, and passes through openings d' and a bore or hole, d^2, into the cylinder C′. F designates a head which fits, not necessarily tightly, in the cylinder or casing C, and connected or formed integral therewith is a plunger, F′, provided with a cup-leather, *e*, held in place by a ring, *e′*, and screw e^2, or by any other suitable means; or in lieu of the cup-packing any other suitable form of packing may be

used. The pressure of air which enters through the nipple E′ into the cylinder C′ acts upon the piston or plunger F′, and thereby tends to move the latter toward the left; but between the heads A^2 and F is arranged a spiral spring, G, which resists such movement until the pressure exceeds a predetermined limit, when it will overcome the pressure of the spring G and move the head F and plunger F′ toward the left and compress the spring. The tension of the spring G can be varied by screwing the casing C in or out on the head A^2 and locking it in place with the lock-nut D. The heads A^2 F are concave or cup-shaped, for the purpose of properly holding the ends of the spring G.

Upon the outer end of the valve-stem is secured a nut, *f*, and between said nut and the head A^2 is arranged the usual spiral closing-spring, H, which is held in place by a groove, *g*, in the face of the nut, and an annular groove or socket, *g′*, in the head A^2. The nut *f* may be additionally secured by a cross-pin, *f′*. In the end of the valve-stem B′ there is or may be inserted a screw, *h*, which forms a head to the stem.

The operation of our invention is as follows: During the ordinary operation of the compressor, or so long as the pressure in the air-receiver does not increase beyond the desired limit, the suction-valve operates in the usual way, opening against the force of the spring H, and being closed by said spring. The air-pressure upon the plunger F′ will cause some movement thereof, and the spring G will be somewhat compressed, as shown in the drawing, but not sufficiently to cause the head F to bear upon the end of the valve-stem B′ or the screw *h*, which forms an adjustable part thereof. As shown in the drawing, the pressure of air is supposed to be acting on the plunger F′, and the spring G is somewhat compressed. When, by reason of any of the rock-drills or other machines supplied from the air-receiver being stopped, the pressure in the receiver rises above the desired limit for which the spring G is set, the plunger F′ and head F are moved inward, and on the latter coming in contact with the screw *h* the suction-valve B will be opened and free communication will be established between the compressor-cylinder and the atmosphere. By this means the compressing of air is wholly suspended or is lessened until the pressure in the air-receiver falls to or below the desired pressure, when the spring G will overcome the pressure on the plunger F′ and will force back the head F out of contact with the stem B′ and allow the valve to close and resume its normal operation. The adjustment of the cylinder or casing C on the head A^2 provides for varying the tension of the spring G, and by adjusting the screw *h* more or less movement of the head F will be allowed before it can act upon the stem. The plunger F′ acts upon the suction-valve B through the head F and stem B′. In the cylinder C is an opening, *i*, which prevents compressed air from accumulating behind the head F.

We do not limit ourselves to the particular construction and arrangement here shown, although such construction and arrangement are very desirable.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination, with a suction-valve for an air-compressor, of a cylinder, a plunger or piston fitting therein and adapted to be acted upon by compressed air, and serving by its movement to open and hold open said valve, and a spring for resisting and controlling said plunger or piston in its movement to open the valve, substantially as and for the purpose described.

2. The combination of the suction-valve and its stem B B′, the cylinder C′ and plunger F′, the spring G, and the screw *h* in the end of the stem, substantially as described.

3. The combination of the suction-valve and its stem B B′, the guide A′ and head A^2, the cylinder C′, the plunger F′ and its head F, and the spring G, arranged between the heads A^2 and F, substantially as described.

4. The combination of the valve B, stem B′, guide A′ and its head A^2, the casing forming the cylinders C C′, screwed upon the head A^2, and provided with the extension C^2, the collar E, provided with the nipple E′, the plunger F′ and its head F, and the spring G, all substantially as described.

5. The combination, with the suction-valve B, its stem B′, and the guide A′, provided with the head A^2, of the casing screwed upon the head A^2, and comprising the cylinder C′, the plunger F′ and its head F, and the spring G, all substantially as described.

G. R. CULLINGWORTH.
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