

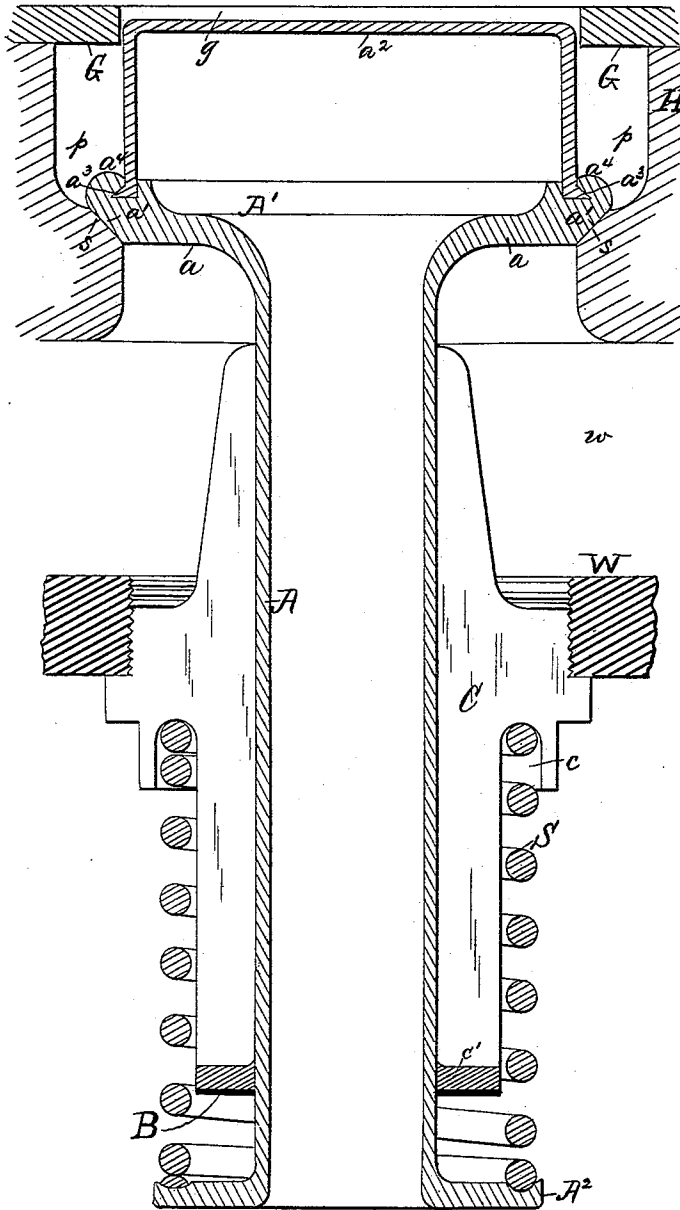
(No Model.)

2 Sheets—Sheet 1.

H. V. CONRAD.
INLET VALVE FOR AIR COMPRESSORS.

No. 569,323.

Patented Oct. 13, 1896.



WITNESSES:

C. M. Benjamin
A. J. Fales

Fig 1.

INVENTOR

Hugh V. Conrad

BY *Andrew S. Fitch*

ATTORNEY

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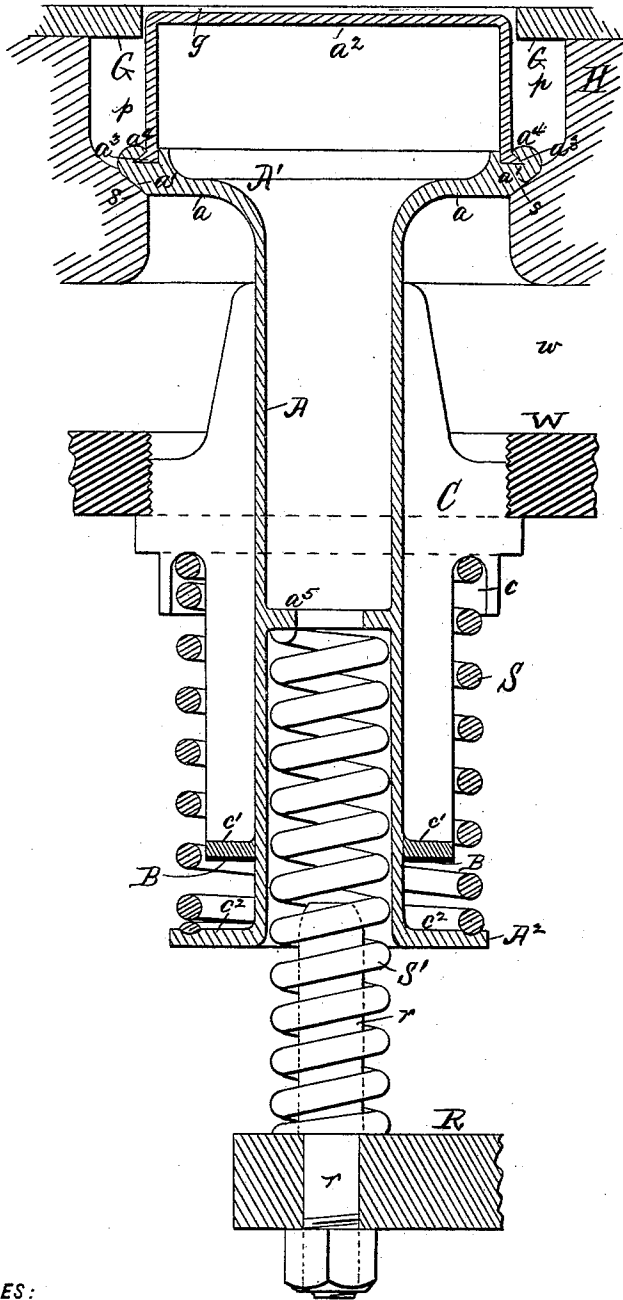


Fig. 2.

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UNITED STATES PATENT OFFICE.

HUGH V. CONRAD, OF NORTH TARRYTOWN, NEW YORK.

INLET-VALVE FOR AIR-COMPRESSORS.

SPECIFICATION forming part of Letters Patent No. 569,323, dated October 13, 1896.

Application filed November 9, 1894. Renewed March 4, 1896. Serial No. 582,274. (No model.)

To all whom it may concern:

Be it known that I, HUGH V. CONRAD, a citizen of the United States, residing at North Tarrytown, county of Westchester, State of New York, have invented certain new and useful Improvements in Inlet-Valves for Air-Compressors, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to the inlet-valve of the compression-cylinder of an air-compressor or equivalent pump; and my invention consists, primarily, in such a valve composed of a hollow stem having bearing and capable of longitudinal play in an inclosing casing, and having a flared or flanged head adapted to fit to the valve-seat in the port-recess in the cylinder-head, which head, together with a hollow cap carried thereby, as hereinafter set forth, and adapted to approximately fill the said port-recess when the valve is on its seat, constitutes the body of the valve, together with a controlling-spring mounted on said casing and engaging said valve-stem and adapted to force and hold the valve to its port-seat.

Figure 1 is a central longitudinal sectional view of an inlet-valve containing my invention, and Fig. 2 is a similar view of a modified form of inlet-valve containing my invention.

In the drawings the cylinder-head, air-passage, and valve-gear are only partly illustrated, as these parts are well known and will be readily understood and are not essential to the particular features of my invention.

A is a hollow stem, preferably cylindrical, having bearing and capable of longitudinal play in a casing C, which is conveniently sectional, as shown, and which is seated in a wall W of an air-inlet passage, (indicated at *w*.) The hollow stem is formed or provided with the flange or flared head *a*, the rim of which is beveled or otherwise adapted, as at *a'*, to constitute a face thereon to fit to the seat *s* in the port *p*, as shown; and *a²* is a hollow cap carried by, extending beyond, and closing the flared or flange head of the stem, and, together with said head, constituting the valve-body A'. The cap *a²* is composed

of a separate cup-shaped piece having an externally beveled or flanged rim *a³*, which is fitted into an annular recess in the face of the flared head *a*, with an edge lip *a⁴* on said head turned down over said cap-rim, as shown. The cap *a²*, when the valve is on its port-seat, approximately fills or occupies the inward portion of the port-recess in the cylinder-head H, and the top of the cap desirably enters and partially fills the aperture *g* in the guard-plate G, which is indicated on the inner face of the cylinder-head. The valve-body A', constructed in the form described, obviously reduces the "clearance" in the port-recess in the cylinder-head to the least possible practicable minimum, and the described construction given to the valve and its stem and the cap *a²* permits the stem and cap to be made of very thin metal and hence light in weight.

The valve A' is forced and held to its port-seat by the stress of a controlling-spring S, which is arranged externally of the casing C and has bearing between a shoulder on said casing, as in a recess at *c*, and a flange A² on the outward end of the valve-stem A.

In the construction thus far described, and which alone is illustrated in Fig. 1, the valve is thrown to open the inlet-port by the external atmospheric-air pressure upon the outward face of the valve-body when the same overcomes the stress of the spring S and the air-pressure behind the receding piston in the cylinder, and it is obvious that the spring serves to throw the valve in the opposite direction and to force and hold it to its port-seat when and before the pressure in front of approaching piston in the cylinder is equal to the external air-pressure.

In the modified form of inlet-valve shown in Fig. 2 an auxiliary spring S' is arranged to have bearing between the outward end or portion of the stem A and an independent vibratory arm R. To this end a bridge or circumferential shoulder *a⁵* is formed in the base of the stem, and the spring S' is preferably seated within the hollow open end of the stem, as shown; and bears against the bridge *a⁵*, with a portion of the spring extending beyond the open end of the stem and around a finger *r*, carried by said arm R, as shown. The

arm R is geared to and actuated by the piston-rod of the compression-cylinder, so that the arm is vibrated in the direction to compress the spring S' at the moment at which the compressor-piston approximates the completion of its stroke toward the cylinder-head II, whereby the stress of the controlling-spring S on the valve in the direction to hold the valve to its seat is counterbalanced and overcome by the stress of said auxiliary spring S' on the valve in the opposite direction, thus leaving the valve and its stem free to be thrown to open the port, when the piston begins its return stroke, by the combined force of the external air-pressure and the continuing stress of the spring S' on the stem, and the connection of said arm R to and its actuation by the compressor piston-rod is furthermore such that said arm is reversely vibrated to permit the recoil of the auxiliary spring S' at the moment at which the compressor-piston approximates the completion of its said return stroke, whereby the valve is left free to be forced and held to its seat by the stress of its controlling-spring S when said piston begins its ensuing forward stroke.

A further description and illustration of the operation and function of the said vibratory arm and auxiliary spring S' in combination with an inlet-valve are not necessary herein to a full comprehension of my present invention, but reference is hereby made to Letters Patent to Edward M. Strange, No. 373,419, dated November 15, 1887, wherein this particular form of valve is fully shown and described.

In both the forms of inlet-valve herein shown and described the movement of the valve in the direction to open the port is limited by a stop which is constituted by a shoulder or flange c' on the outward end of the casing C, against which the flange A^2 on the outward end of the valve-stem A impinges at the limit of the movement of the valve and its stem in the direction stated.

A feature of the valve structure shown comprises the combination, with the stem of an inlet-valve, of the flange A^2 on the outward end thereof of such diameter that it will afford at the rim of its inward face a bearing for the outward end of the valve-controlling spring S, the inward end of said spring being seated to a flange or shoulder c on the stem-casing, while the remainder c^2 of said face of said flange A^2 is unobstructedly opposed to the outward face of the shoulder c' on the outward end of the stem-casing, together with an elastic or yielding cushion, which may be in the form of a washer of hard leather or analogous material, as at B, which is interposed between the described opposed faces of said flange A^2 and shoulder c' , and pref-

erably by mounting the said washer upon the outward face of said shoulder c' , as shown. 65

It is apparent that at the limit of its movement in the direction to open its port, when the valve is stopped by the impingement of the flange A^2 upon the elastic or yielding cushion B on the shoulder c' , the said flange will act as a buffer to the active valve body and stem, and the force of the impact or blow due to such impingement will be taken up and to a great degree dissipated by said buffer-flange A^2 and the cushion B, so that the valve-body and its stem may be made hollow, as shown, with thin walls, and hence of comparatively extremely light weight, whereby the desirable abruptness and rapidity of movement of the valve in its motions to open and close its port are promoted, while at the same time the liability of the valve or its stem to fracture or other injury during operation, in consequence of shock to their structure by the repeated impacts of the stem upon the motion-limiting stop, is reduced to the least possible minimum. Furthermore, it is evident that the construction of the valve-stem in the hollow form shown and described secures an increased diameter to the stem and consequently an increased bearing-surface on the same in its inclosing casing without a corresponding increase in the weight of the stem, and that owing to the increased bearing-surface secured for the stem, together with the described elongation of the valve-body A' by the hollow cap a^2 , the possibility of a longer throw or movement of the valve and its stem in the direction to open the port, and consequently a wider opening of the port, is attained than can be accomplished with safety in inlet-valves of the character shown as usually constructed. 70 75 80 85 90 95 100

What I claim as my invention, and desire to secure by Letters Patent, is— 105

In an inlet-valve for the compression-cylinder of an air-compressor or equivalent pump, the combination of a hollow valve-stem, a casing in which said stem has bearing and longitudinal play, a valve-body composed of a flared or flanged head on said stem, externally adapted to fit to the valve-seat in the port-recess in the cylinder-head, and a separate hollow cap provided with a bevel-flange at its rim adapted to seat in a corresponding groove in the face of the stem-head and to be held thereto by a lip provided on said face of said stem-head, together with a controlling-spring mounted on said casing and engaging said valve-stem, substantially as and for the purpose set forth. 110 115 120

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Witnesses:

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A. T. FALES.