

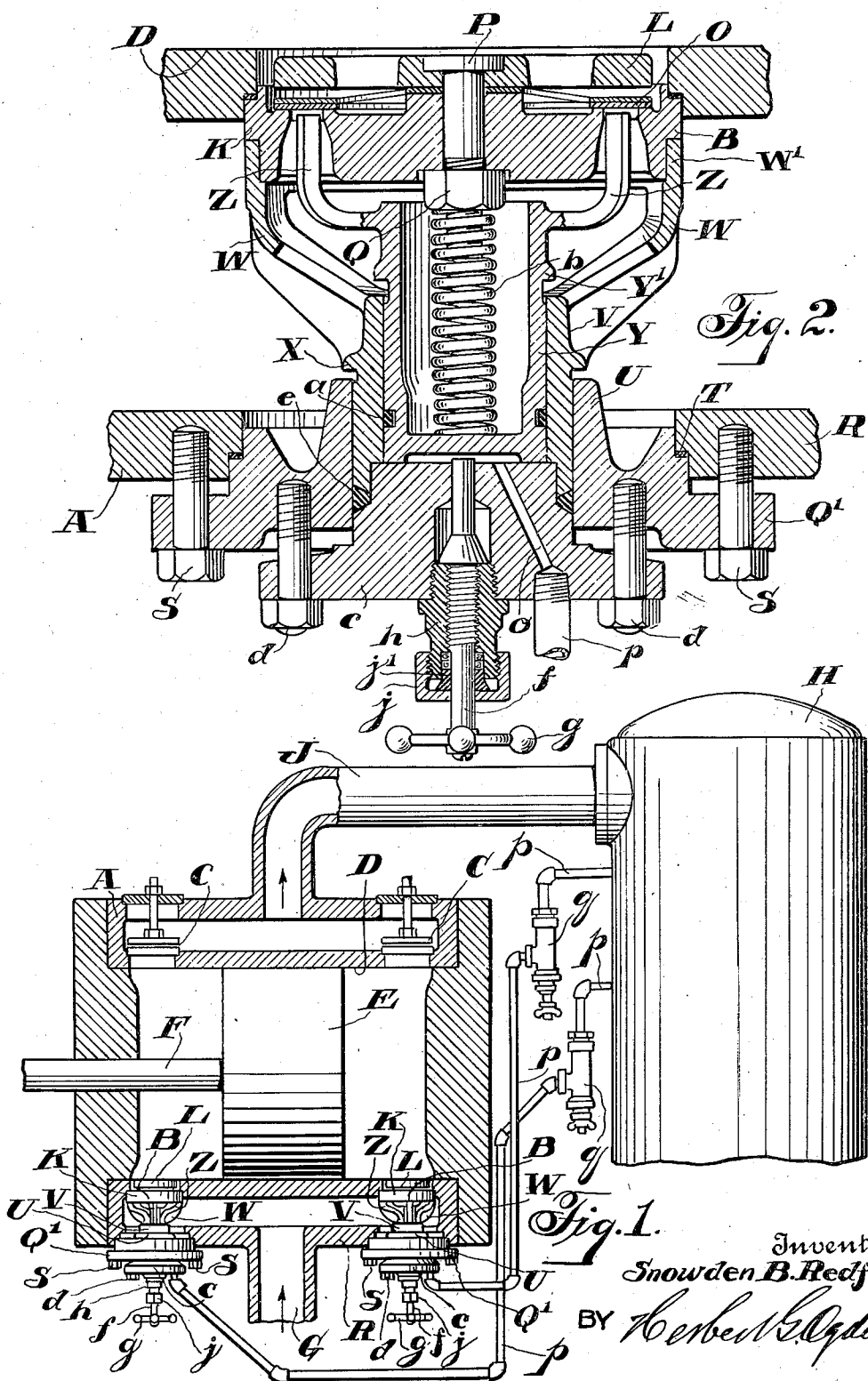
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S. B. REDFIELD

UNLOADER

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UNITED STATES PATENT OFFICE.

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UNLOADER.

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To all whom it may concern:

Be it known that I, SNOWDEN B. REDFIELD, a citizen of the United States, and a resident of Easton, county of Northampton, and State of Pennsylvania, have invented a certain Unloader, of which the following is a specification accompanied by drawings.

This invention relates to unloading mechanism for compressors, but more particularly to that type of unloading mechanism which may be automatically or manually operated.

It has been found highly desirable to provide a compressor with a combined manually and pneumatically operated unloader. In starting a compressor, especially when the compressor is operated by an electric motor, it is essential that the compressor piston be able to start up under little or no load. If there is sufficient receiver pressure, one satisfactory manner of unloading is to enable the inlet valves to be held open by means of the receiver or discharge line pressure, and thus obtain automatic unloading. There are times, however, when it is necessary to unload the compressor by hand, as for example when the receiver pressure is low, or when but partial unloading is desired, and this may be accomplished by holding open one inlet valve and allowing the remaining valves to function. In this manner partial unloading may be accomplished, and a less amount of fluid will be forced into the discharge line.

One of the objects of this invention, is to improve on compressor unloaders by producing an unloader which may be cheaply manufactured, is ruggedly constructed, readily applicable in an assembled condition to a compressor, and adapted to be either manually or pneumatically operated.

Further objects of the invention will hereinafter appear, and the invention is shown in one of its preferred embodiments in the accompanying drawings, in which—

Figure 1 is a diagrammatic elevation, partly in vertical section of a compressor unit embodying the invention, and

Figure 2 is an enlarged detail vertical sectional view of the compressor unloader shown in Figure 1.

Referring to the drawings, the compressor A is provided with an inlet valve mechanism B, and discharge valve mechanism C, and is formed with a cylinder D, in which a piston E having a piston rod F, is adapted to reciprocate, being operated from any suitable source of power. Fluid such as air, is supplied to the compressor cylinder D through the intake conduit G, and discharged into the receiver H through the discharge line J. In this instance, the inlet valve mechanism B comprises a valve seat K, and guard L between which a plate valve O is clamped by the bolt P and nut Q, although it is to be understood that any suitable valve mechanism may be employed without departing from the scope of the present invention.

In accordance with the present invention, a cover Q' is secured to the compressor cylinder casing R by the bolts S, and a packing T is preferably interposed between the cover and the casing R, in order to form a fluid tight joint therebetween. The cover Q' is preferably formed with an extension or hollow boss U in which is located a cylinder V, having legs or extensions W, terminating in a ring W' which is adapted to bear against the valve seat K, in order to hold the valve mechanism in place in the wall of the cylinder D. An annular flange X is formed on the cylinder V and limits the inward movement of the cylinder in the cover Q' in the assembly of the parts, when the unloader is applied to the compressor.

A piston Y is in this instance slidably mounted in the cylinder V, and is preferably formed with a plurality of integral fingers Z, which are adapted to bear against and unseat the plate valve O. In order to form a seal between the cylinder V and the piston Y, a piston ring a may be provided in the piston Y. An external annular flange Y' is in this instance formed on the piston Y so that the piston and ring will not slide out of the cylinder V when the unloader is being assembled in the compressor. In order to hold the fingers Z normally away from the plate valve O, a coil spring b is in this instance guided over the bolt P at one end, and bears at its other end against the inside of

the piston Y, thereby holding the piston normally in its inward position in the cylinder V. A plate *c* is in this instance secured to the cover Q' by the bolts *d* and closes one end of the cylinder V. A packing *e* is preferably located between the plate *c*, cover extension U and cylinder V, and is adapted to be wedged tightly in place to prevent fluid, such as air or gas, from escaping from the compressor cylinder passage and unloader cylinder to atmosphere.

In order to move the piston Y, manually, outwardly from the cylinder V and thereby move the fingers Z to hold the plate valve O in its open position, a plunger *f* provided with a hand wheel *g*, is threaded into a nut *h* carried by the plate *c*. The end of the plunger *f* extends through the plate *c*, a short distance so that by screwing the plunger *f* inwardly, the piston Y and fingers Z will be moved outwardly from the cylinder and the fingers will bear against and hold open the valve O. A cap *j* is in this instance threaded on the nut *h* to hold the packing *j'* firmly in place about the plunger *f*, so that fluid is prevented from escaping to atmosphere from the cylinder V.

In order to unload the compressor cylinder automatically by holding the inlet valves O in their open position, a passage *o* is preferably formed in the plate *c* and piping *p* connects the passage *o* with the receiver H. In order to regulate the admission of air from the receiver H to the unloading device so that unloading will occur at the proper time, a suitable auxiliary valve *q* is connected to the pipe *p*. The auxiliary valve *q* may be set for any pressure desired in the receiver H and when the pressure in the receiver reaches such predetermined point, air will be admitted through the piping *p* rearwardly of the piston Y in order to move the fingers Z to hold the plate valve O in its open position. As soon as the pressure in the receiver H has dropped below the point at which the auxiliary valve *q* has been set, the passage of air to the piston Y will be automatically shut off and the coil spring *b* will return the piston Y to its normal position. It is to be understood that any suitable auxiliary valve *q* may be employed, because any automatic auxiliary valve, which can be set for certain pressures in the receiver is included in the scope of the present invention.

In order to obtain partial unloading, one of the auxiliary valves *q* may be set to operate at one pressure in the receiver and the other auxiliary valve may be set to operate at a higher pressure. In this manner, when the receiver pressure reaches a certain point, one of the auxiliary valves will operate to admit pressure fluid to one of the unloaders, but the other unloader will not be brought

into operation, and as a result the compressor will work at only half load. Further increase in pressure in the receiver will bring the other auxiliary valve into operation, and complete unloading will occur.

Manual means are provided, whereby the compressor cylinder may be unloaded and it is not essential that there be complete unloading, because but one inlet valve may be held open if desired. Whenever the unloaders are brought into operation, the fluid drawn in on the suction stroke of the compressor piston will be forced out to atmosphere on the compression stroke, and consequently no fluid will be forced into the receiver. By constructing the unloading mechanism as described considerable flexibility is obtained so that the cover, plate and casing can be secured together to effect an efficient construction fluid tight as to the unloader cylinder V and also the inlet passage of the compressor cylinder. This construction makes this device applicable not alone to air compressors but to any other analogous type of machine, as an ammonia or other gas compressor.

I claim:

1. Unloading mechanism for compressors, comprising in combination, valve mechanism controlling the inlet to the compressor, a cover adapted to be secured to the compressor cylinder casing, a cylinder in the cover adapted to hold the valve mechanism in place in the compressor cylinder wall, a piston in said cylinder having fingers adapted to unseat the compressor valve, a plate secured to said cover and closing one end of said cylinder, a passage leading from the outside of the said plate to the space between said plate and said piston for admitting pressure fluid to the piston for unseating said valve, a spring for holding the piston normally in its inward position in said cylinder, sealing means between said cover plate, unloader cylinder and cover to prevent the escape of pressure fluid therebetween, and a manually operable plunger extending through said plate for actuating the piston to unseat the compressor valve.

2. Unloading mechanism for compressors comprising in combination, valve mechanism controlling the inlet to the compressor, a cover adapted to be secured to the compressor cylinder casing, a hollow boss formed on said cover, a cylinder slidable in said boss, extensions carried by said cylinder for holding the valve mechanism in place in the compressor cylinder wall, a stop on said cylinder for limiting the inward movement of the cylinder in said boss, a piston slidable in said cylinder having fingers adapted to bear against the compressor valve, a stop on said piston for limiting the inward movement of the piston in said cylinder, a spring in said

piston for holding the piston normally in its inward position in the cylinder, a plate secured to said cover for holding the cylinder in position, a packing interposed between
5 said plate, unloader cylinder, and cover for preventing the escape of pressure fluid therebetween, a passage in said plate for admitting pressure fluid to actuate said piston, and a manually operable plunger in said plate for actuating said piston to unseat the
10 compressor valve.

In testimony whereof I have signed this specification.

SNOWDEN B. REDFIELD.