

No. 757,901.

PATENTED APR. 19, 1904.

W. S. FAIRHURST.
UNLOADING DEVICE FOR AIR COMPRESSORS.

APPLICATION FILED APR. 29, 1902.

NO MODEL.

Fig. 1.

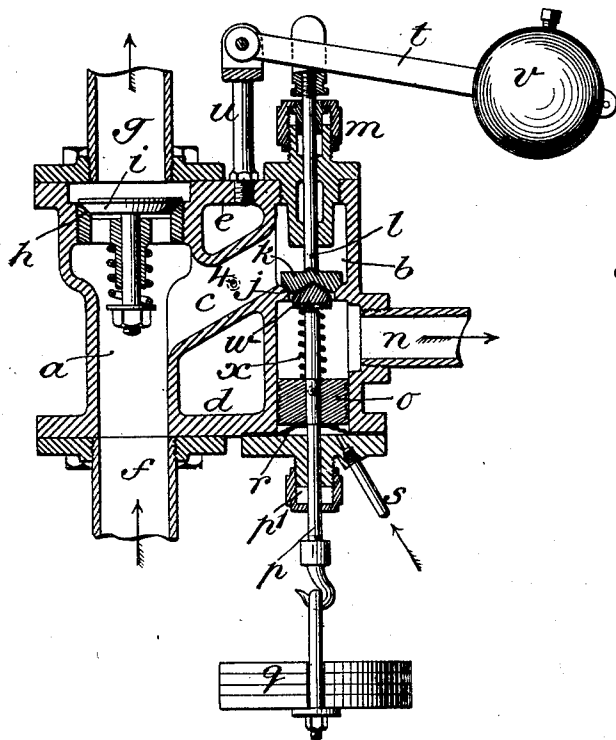


Fig. 2.

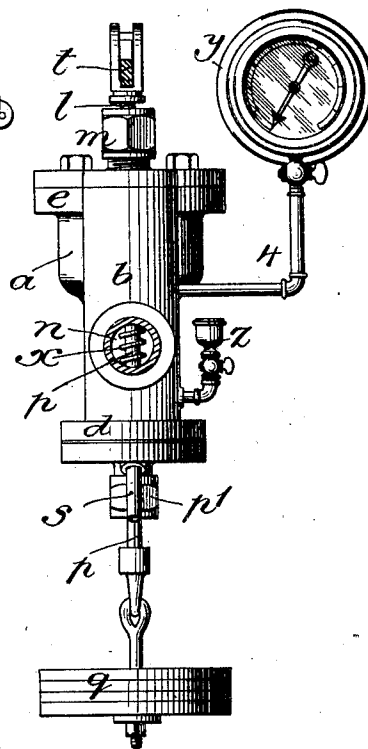
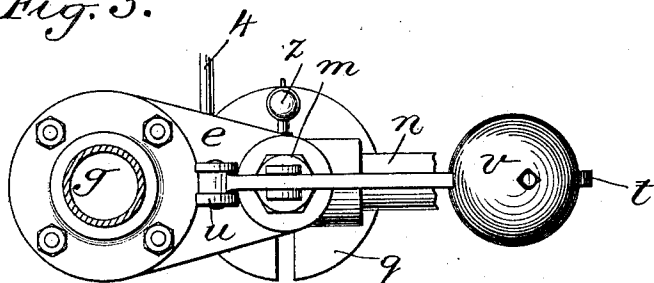


Fig. 3.



Witnesses:-

George Barry Jr.

Henry Shume

Inventor
William S. Fairhurst
By attorneys
Brown & Howard

UNITED STATES PATENT OFFICE.

WILLIAM S. FAIRHURST, OF BROOKLYN, NEW YORK, ASSIGNOR OF ONE-HALF TO JOHN J. RILEY, OF BROOKLYN, NEW YORK.

UNLOADING DEVICE FOR AIR-COMPRESSORS.

SPECIFICATION forming part of Letters Patent No. 757,901, dated April 19, 1904.

Application filed April 29, 1902. Serial No. 105,134. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM S. FAIRHURST, a citizen of the United States, and a resident of the borough of Brooklyn, in the city and State of New York, have invented a new and useful Improvement in Unloading Devices for Air and Gas Compressors, of which the following is a specification.

This invention relates to that class of unloading devices for compressors, sometimes designated as "pressure-relief governors," in which there is employed between the compressor and the receiver or system to which the compressed air or gas is thereby delivered a valve which is so loaded as to be kept closed while the pressure in the receiver or system remains at or below the maximum desired therein, but which is opened to the atmosphere by the pressure in the receiver or system when such pressure exceeds that maximum; and my invention consists in the combinations herein-after described and claimed, which constitute a very simple yet effective unloading device in which such a valve is an essential element.

In the accompanying drawings, Figure 1 represents a central vertical section of an unloading device embodying my invention; Fig. 2, an elevation of the same, taken at right angles to Fig. 1; Fig. 3, a plan of the same.

a b c d e designate a valve-box consisting of a single casting containing two upright chambers *a b*, connected by a lateral passage *c* and united by an externally-flanged bottom *d* and an externally-flanged head *e*. At the bottom of the chamber *a* there is communication with the delivery-pipe *f* of the compressor, and at the top of said chamber there is a pipe *g*, which leads to the receiver. Between these two pipes there is in said chamber the seat *h* for the check-valve *i*, such as is commonly used between a compressor and the receiver to which it delivers. In the chamber *b* below the lateral passage *c* there is the seat *j* for the relief or unloading valve *k*, represented as of the puppet kind and the stem *l* of which passes through a stuffing-box *m* in the head of the valve-box, and below this valve-seat is an escape-outlet *n* to the atmosphere. The valve-stem *l* has applied to it a lever *t*, which

has its fulcrum in a post *u* on the top of the valve-box, and said lever is loaded by an adjustable weight *v*, which operates to produce and maintain the closing of the valve *k*.

Below the escape-outlet *n* the chamber *b* is bored to form a cylinder for the reception of a piston *o*, which is of larger area than the valve *k*. The rod *p* of this piston works through a stuffing-box *p'* at the bottom of said chamber and has suspended from it below said chamber a weight or weights *q*. As it is desirable that this piston should work with as little friction as possible and as it requires to have very little movement, I may not apply packing to it, but, as represented, I may connect it with the bottom of the chamber *b* by a flexible air-tight diaphragm *r* of a corrugated metal or other suitable material. Below the piston and diaphragm a small pipe *s* from the receiver enters the chamber *b*. Above the piston its rod *p* has coiled upon it a spiral spring *x*, which rests upon the piston, and on the top of this spring there is supported a cap-piece *w*, the crown of which is conical and enters a recess in the bottom of the unloading-valve. The portion of the rod *p* which projects above the piston and upon which the spring *x* is coiled is not long enough to reach the cap-piece *w* while the piston is at rest in its lowest position, (shown in Fig. 1,) in which it is held by the weight or weights *q* until the pressure in the receiver, acting through the pipe *s*, becomes sufficient to overcome the load of said weight or weights and raise the piston, said weight or weights *q* being so proportioned or adjusted as to permit the piston to rise as soon as said pressure exceeds the maximum which it is desired to carry in the receiver.

Until the pressure in the receiver exceeds the desired maximum the valve *k* remains closed by the loaded lever *t*, the force normally stored up in the spring *x* being insufficient to open it; but as soon as the pressure in the receiver exceeds that maximum the piston begins to rise, yet as it rises it does not lift the valve *k* until it has compressed the spring *x* to a sufficient tension to overcome the load of the weighted lever *t*. Then the said spring at once starts the valve from its seat

and having so started it quickly expands and opens it to its full width, giving free outlet from the chamber *a* of the valve-box and the delivery-pipe *f* of the compressor through the passage *c* and chamber *b* to the escape-pipe *n*, and so unloading the compressor. As soon as the pressure in the receiver is diminished to or below the desired maximum the piston *o* is drawn back by the weight or weights *q*, and the unloading-valve *k* is closed by the loaded lever *t*.

If from any cause the valve *k* should stick or the force in the spring should not be sufficient to open it, the piston by its continued upward movement would cause the upper end of its rod *p* to strike the cap-piece *w* on the head of the spring, and so start the valve, the rapid full opening of which would then be produced by the expansion of the spring.

I may here mention that I have shown a pressure-gage *y*, connected with the passage *c* by a pipe *4*, and an oil-cup *z*, applied to the chamber *b* for lubricating the piston; but these do not constitute any part of my invention.

What I claim as my invention is—

1. In an unloading device for a compressor, a chamber in the lower part of which is a cylinder, an upwardly-opening relief-valve and a seat therefor in said chamber above said cylinder, a piston in said cylinder, the piston being of larger area than the said valve, a communication between the outlet of the compressor and said chamber above said valve, an escape-outlet to the atmosphere from said chamber between said valve and piston, a communication between the receiver of the compressor and the space below its piston, a loading device applied to said valve for closing it, a spring between the piston and valve for opening the latter, and a loading device applied to said piston and acting thereon in opposition to the pressure in the receiver, substantially as herein described.

2. In an unloading device for a compressor, a valve-box containing two upright chambers, one of which contains a check-valve between the compressor-outlet and a receiver and the other of which contains an upwardly-opening relief-valve, a communication between the two chambers below the check-valve and above the relief-valve, a cylinder and a piston contained therein below the relief-valve in the chamber which contains said valve, the said piston being of larger area than the relief-valve, an outlet to the atmosphere from the space between said piston and the relief-valve, a communica-

tion between said cylinder and the receiver of the compressor below said piston, a loading device applied to said piston and acting thereon in opposition to the pressure in the receiver, a spring between the piston and the relief-valve for opening the latter, and a loading device applied to the latter for closing it, substantially as herein described.

3. In an unloading device for a compressor, a chamber in the top and bottom of which are stuffing-boxes and in the lower part of which is a cylinder containing a piston, an upwardly-opening relief-valve in said chamber above said piston, the piston being of larger area than the relief-valve, an inlet from the compressor-outlet to the space in said chamber above said valve, an outlet to the atmosphere from the space in said chamber between said valve and piston, a communication between the receiver of the compressor and the space in said chamber below said piston, a stem to said valve passing through the upper stuffing-box, a rod to said piston passing through the lower stuffing-box and extending upward toward the valve for opening the latter, a weight applied to the valve-stem for closing the valve, and a weight applied to the piston-rod for acting on the piston in opposition to the pressure in the receiver, substantially as herein described.

4. In an unloading device for a compressor, a chamber in the lower part of which is a cylinder, an upwardly-opening relief-valve and a seat therefor in said chamber above the said cylinder, a piston in said cylinder, a communication between the outlet of the compressor and said chamber above the said valve, an escape-outlet to the atmosphere from said chamber between said valve and piston, a communication between the receiver of the compressor and the space below its piston, a flexible air-tight diaphragm interposed between the piston and the communication from the receiver, a loading device applied to the said valve for closing it, a spring between the piston and valve for opening the latter and a loading device applied to said piston and acting thereon in opposition to the pressure in the receiver, substantially as herein described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 21st day of April, 1902.

WILLIAM S. FAIRHURST.

Witnesses:

FREDK. HAYNES,

GEORGE BARRY, Jr.