F. H. CARSSOW.

RELIEF VALVE.

APPLICATION FILED JUNE 21, 1909.

966,999.

Patented Aug. 9, 1910.

2 SHEETS—SHEET 1.

Fig. 2.

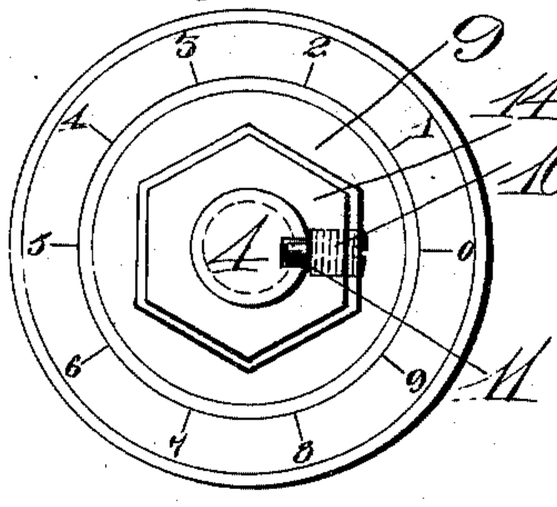


Fig. 1.

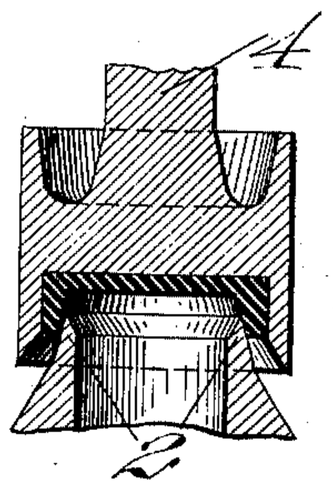


Fig. 3.

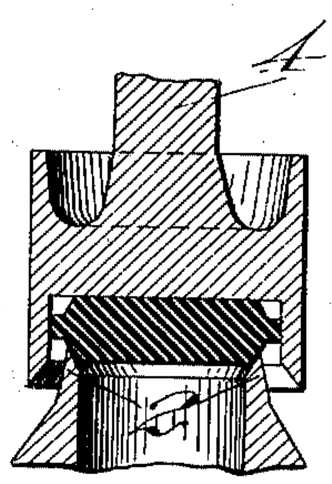


Fig. 4.

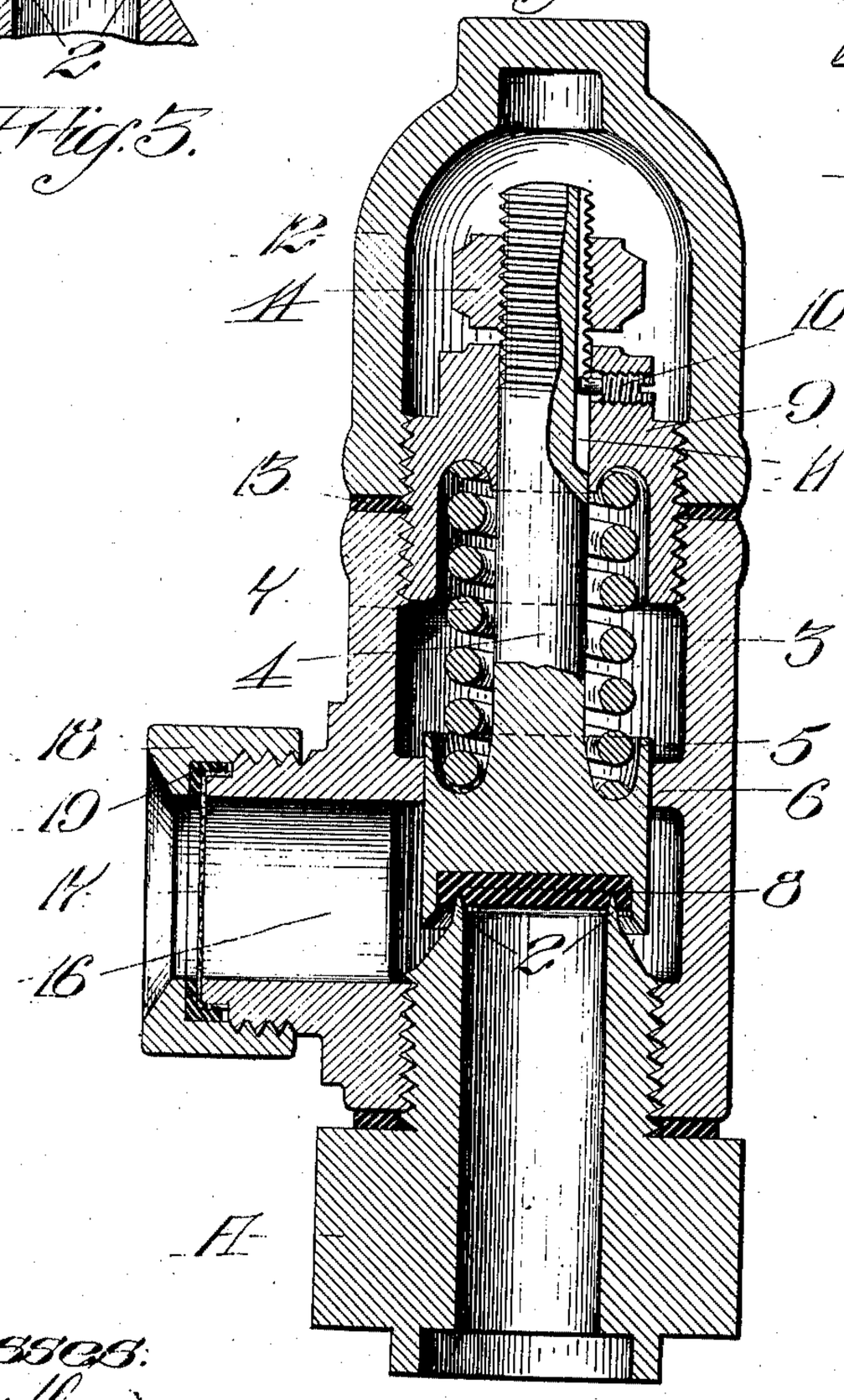


Fig. 5.

Witnesses:
D. Cashberg.
F. E. Maynard.

Inventor.
FELIX H. CARSSOW
by Geo. H. Strong.
Att'y.

F. H. CARSSOW.

RELIEF VALVE.

APPLICATION FILED JUNE 21, 1909.

966,999.

Patented Aug. 9, 1910.

2 SHEETS—SHEET 2.

Fig. 5.

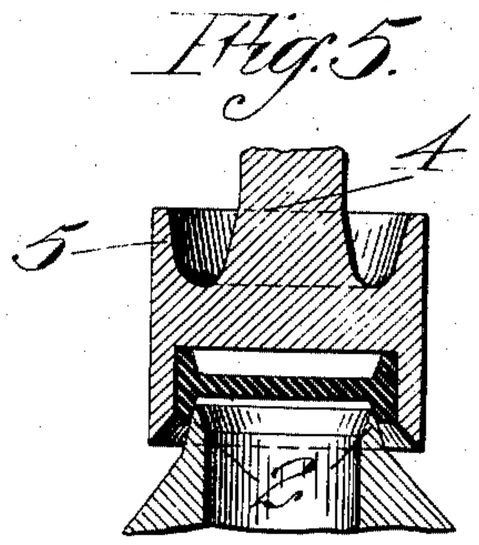
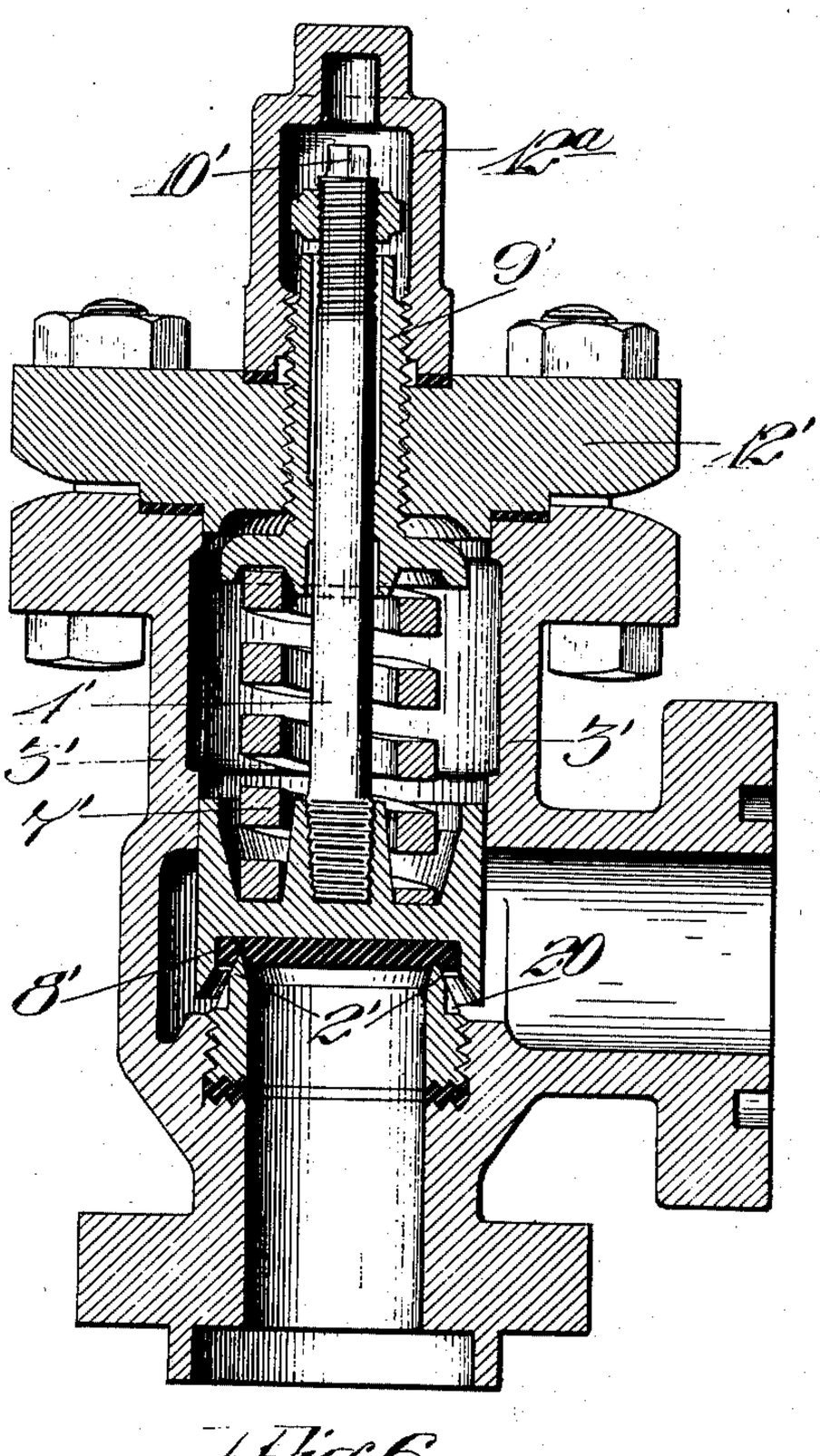


Fig. 6.



Witnesses.

Geo. H. Strong.

F. E. Maynard

Inventor.

FELIX H. CARSSOW

By Geo. H. Strong.

His Atty.

UNITED STATES PATENT OFFICE.

FELIX H. CARSSOW, OF SAN FRANCISCO, CALIFORNIA.

RELIEF-VALVE.

966,999. Specification of Letters Patent. Patented Aug. 9, 1910.

Application filed June 21, 1909. Serial No. 503,537.

To all whom it may concern:

Be it known that I, FELIX H. CARSSOW, citizen of the United States, residing in the city and county of San Francisco and State of California, have invented new and useful Improvements in Relief-Valves, of which the following is a specification.

My invention relates to improvements in relief or safety valves for gas compressors or receivers.

The objects of my invention are: first, to provide a gas relief or safety valve which will open and instantly permit the reduction of the gas pressure within the cylinder or system to which it is attached, and will prevent leaking of gas between the face and seat; second, to afford easy facility for reversing or renewing the valve face disk; and third, to indicate by means of a diaphragm whether or not the valve has been very slightly raised, and did not settle back gastight, thereby permitting a slight leakage of gas into the valve; the diaphragm also sealing the interior of the valve from the air and trapping the leakage.

The invention by which these objects are attained consists of the parts and the construction and combination of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a vertical section through the center of the valve, taken along the line A—A, Fig. 2. Fig. 2 is a view of the top of the valve, with the locking cap, lifting nut, and gasket removed. Figs. 3, 4 and 5 are sections showing variations of the valve face disks. Fig. 6 is a section of a modified form of valve for use in large sizes.

Although the valve may be placed at any angle, in these drawings it is shown as vertical, and is so described in this specification.

A is the base or bottom flange of the valve, containing the hard metal circular edge or annular seat 2, which base is fastened directly to the compressor cylinder or system to be safeguarded; and to this is fastened the valve casing 3 in a gastight manner. In the casing 3 is the valve stem 4, the lower portion of which is enlarged into the valve head and turned up, as at 5, to pass through the guide at 6, and the top of the head 5 is designed to serve as a seat for the compression spring 7, by which the releasing pressure of the valve is regulated and by which the soft metal valve face or disk is held in contact with the circular knife edge 2. The bottom of the valve head is hollowed out, so that the soft metal disk 8 may be inserted therein, and from which it may be readily removed when it is desirable to reverse it, or replace it with another.

9 is án exteriorly threaded guide sleeve and spring seat through which the stem 4 passes and slides freely; the stem being prevented from turning by a pin 10 working in a longitudinal slot 11. Sleeve 9 screws into the top of casing 3 and a cap 12 screws on over the sleeve and houses in the parts and forms a tight air seal by means of the packing 13.

The upper extremity of the valve stem is threaded to receive the lifting nut 14 by which the valve is raised and lowered, and the spring 7 compressed and released. By compressing the spring with the lifting nut sufficiently to remove the pressure from between the valve face disk 8 and the valve seat 2, it makes easy the removal of the spring-adjusting sleeve 9 with the spring, valve head and stem, lifting nut, and valve face disk as a unit, so that the valve face disk 8 may be reversed or renewed.

The pin 10 is to prevent the valve stem from turning when tightening or loosening the lifting nut. Manifestly, this object may be accomplished by some other mechanical means. The threads of the sleeve 9 have numbers stamped on them, and the top of the casing has radial lines ruled on it, and these also numbered as represented in Fig. 3, so that the valve may be reset to the same spring compression.

The discharge outlet 16 is sealed with an elastic diaphragm or wafer 17 of rubber or the like, held in place by the ring 18 and gasket 19, making a gastight joint between the diaphragm and casing, and sealing the valve outlet 16 from the air. This sealing up or confining of the gas within the valve does not materially increase the pressure above the valve, as the diaphragm is designed to stretch and be ruptured at a low pressure. If a soft metallic diaphragm is used instead of the non-metallic, elastic diaphragm 17, the ring 18 may be dispensed with. The discharge outlet 16 may communicate by piping with the suction of the gas compressor or some other place, in which case the diaphragm or wafer 17 and its associated parts 18 and 19 may be omitted.

Fig. 6 is a sectional view of a valve similar to that shown in Fig. 1, and intended to serve a similar purpose, but modified in construction due to increase in size. In this valve the annular seat 2′ is made as a separate part of the valve casing or base, and screwed or fitted into a receptacle designed so that no gas can escape through their joint. The cap or bonnet 12′ is bolted to the valve casing 3′ in a gastight manner and into it is screwed the spring compression nut 9′, which also acts as the upper guide for the valve spindle 4′. This spring compression nut is designed to adjust the compression in the spring 7′, and through it the pressure between the valve face 8′ and seat 2′, as well as the releasing pressure of the valve. The upper end of the spring compression nut is threaded to receive the locking cap 12ª, and its upper extremity is squared off, as at 10′, to afford a grip for a wrench whereby it may be turned. The locking cap 12ª is screwed to the top of the spring compression nut when it is in its desired position, locking the same, and also sealing the interior of the valve. The valve seat 2′ may have slots 20 or equivalent to give a hold to a spanner wrench or other suitable tool so that the seat may be screwed on or off. In this valve the discharge outlet 16′ may be covered with a diaphragm 17′ similar to 17, or may be made to communicate with piping with the suction of the compressor or some other place.

In practice, one of these valves is set by suitably manipulating the adjusting screw 9 or 9′ so that the valve will normally remain closed on its seat 2 or 2′ up to a predetermined pressure, above which the valve will open. In case the pressure in the receiver or compressor exceeds this predetermined maximum, the valve is opened against the compression of the spring 7 or 7′ and the escape of the gas into the outlet 16 or 16′ will result in the distention and bursting of the diaphragm or wafer 17 and escape of the gas into the open air, or, in the case where the outlet communicates by piping with the suction or some other point, the escaping gas is conducted to the communicating point. When the pressure has been reduced to a safety point, the valve reseats itself under the action of the spring 7 or 7′. In case the valve has been very slightly raised and has not settled back gastight on to its seat, the same will be readily recognized by the condition or appearance of the diaphragm when the diaphragm is used. The diaphragm has also the effect of completely sealing up and confining the gas within the valve; and by reason of this sealed diaphragm and the sealing cap 18, and employing a soft metal disk face 8 or 8′ an absolutely gas and airtight valve is produced. This reversible soft metal seat 8 or 8′ is an important feature, because it coöperates with the sharp hard metal knife edge 2 or 2′ to form a tight joint. The metal face 8 or 8′ may be given an inclined conical surface, wedging either inside or outside of the correspondingly shaped surfaces of the knife edge 2 or 2′, as shown in the drawings. This combination of a hard circular edge or annular seat with the coacting soft metal disk gives a minimum surface of contact, and when acted upon by a spring a relatively great pressure is produced between these contacting surfaces, thereby preventing the escape of gas between them until the pressure beneath the valve face exceeds a predetermined amount; whereupon the valve is raised and opened, affording instant relief to the cylinder or system to which it is attached.

One of the important features of this valve construction is that the guide for the valve head is above the valve seat, so that when the valve opens the fluid passageway in the valve is uninterrupted.

My construction is notably different from the ordinary relief valves in that my valve stem and fixed guide for the valve head are positioned as shown so as to give a clear passageway to the escaping fluid when such an undesired pressure is exerted on the underside of the valve head as to render relief necessary.

Having thus described my invention, what I claim and desire to secure by Letters-Patent, is:

1. In a relief valve, the combination of a casing inclosing an annular knife-edge seat and a valve member contacting therewith having a projecting stem, the contact portion of said valve member comprising a reversible soft metal seat, a spring acting on the valve member to maintain the latter normally closed, and means engaging said stem adapted to raise and lower the stem to adjust the tension of the spring and to hold the valve member with its spring and stem so that these parts may be removed as a unit.

2. In a relief valve, the combination of a casing inclosing an annular knife-edged seat, a valve member coacting therewith, said valve member having a stem, a head with a recess and a reversible and replaceable disk in said recess, said disk forming a face to rest on said annular seat, means for pressing said face yieldingly against its seat, and means for adjusting the relief valve to any desired blowing-off pressure, said means comprising an adjusting sleeve through which the stem passes, and a nut engaging the stem and serving to unite the valve member with its stem and head and the sleeve so that these parts may be removed as a unit.

3. In a relief valve, the combination of a casing inclosing an annular knife-edged seat, a valve member coacting therewith,

said valve member having a stem, a head with a recess and a reversible and replaceable disk in said recess, said disk forming a face to rest on said annular seat, means for pressing said face yieldingly against its seat, means for adjusting the relief valve to any desired blowing-off pressure, said means comprising an adjusting sleeve through which the stem passes, and a nut engaging the stem and serving to unite the valve member with its stem and head and the sleeve so that these parts may be removed as a unit and means whereby the valve face may be reversed or replaced, and the valve reset to its original blowing off pressure.

4. In a relief valve, the combination of a casing having an inlet and an outlet, a valve closing the inlet and said valve having a stem, an adjustable guide member for the stem, a fixed guide member for the valve head above the valve seat, a spring interposed between the adjustable member and head to maintain the valve normally closed over the inlet, the upper end of the stem threaded, a nut fitting said threaded portion and coacting with said guide member to raise the valve, and means whereby the nut may be turned relative to the valve stem.

5. In a relief valve, the combination of a casing inclosing a separable annular knife-edge seat, a valve member coacting therewith, said valve member having a head with a recess and a soft metal disk in said recess, and said disk forming a face to rest on said annular seat, and means for pressing said face yieldingly against its seat, said knife edge and said disk having coacting contacting surfaces.

6. In a relief valve, the combination of a casing having an inlet and an outlet, a valve closing the inlet and said valve having a stem, an adjustable guide member for the stem, and a fixed guide member for the valve head above the valve seat, a spring interposed between the adjustable guide member and head to maintain the valve normally closed over the inlet, the upper end of the stem threaded, a nut fitting said threaded portion and coacting with said guide member to raise the valve, and means for preventing the stem from turning.

7. In a relief valve, the combination of a casing having an inlet and an outlet, a valve closing the inlet and said valve having a stem, an adjustable guide member for the stem, and a fixed guide member for the valve head above the valve seat, a spring interposed between the adjustable guide member and head to maintain the valve normally closed over the inlet, the upper end of the stem threaded, a nut fitting said threaded portion and coacting with said guide member to raise the valve, said stem being provided with means so that the stem may be prevented from turning when said nut is operated.

8. In a relief valve, the combination of a casing having an inlet and an outlet, a valve in the inlet, and said valve having a stem, an adjustable guide member for the stem, a spring interposed between the guide member and head to maintain the valve normally closed over the inlet, the upper end of the stem threaded, a nut fitting said threaded portion and coacting with said guide member to raise the valve, said stem having a longitudinal slot, and a pin carried by the guide member and fitting said slot to prevent the stem from turning when said nut is operated.

9. In a relief valve, the combination of a casing having an inlet and an outlet, a valve in the inlet, and said valve having a stem, an adjustable guide member for the stem, a spring interposed between the guide member and head to maintain the valve normally closed over the inlet, the adjustable guide member compressing the spring so the valve may be set to any desired blowing off pressure, the upper end of the stem threaded, a nut fitting said threaded portion and coacting with said guide member to raise the valve, said stem being provided with means so that the stem may be prevented from turning when said nut is operated.

10. In a gas relief or safety valve, the combination of a valve head and stem, reversible and replaceable face, lodged in the valve head, said valve stem being threaded at the top, a nut engaging said stem and adjusting sleeve, and means whereby the stem is, or may be held while the nut is being turned relatively to the same, so that the valve face may be raised from or lowered onto its seat, to make reversal or renewal of the valve face easy, and the resetting of the valve to its original blowing off pressure easy and certain.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

FELIX H. CARSSOW.

Witnesses:
CHARLES EDELMAN,
W. DAR.