

No. 637,994.

Patented Nov. 28, 1899.

A. KLAY.

RELIEF VALVE FOR ENGINE CYLINDERS.

(Application filed Jan. 30, 1899.)

(No Model.)

Fig. 1.

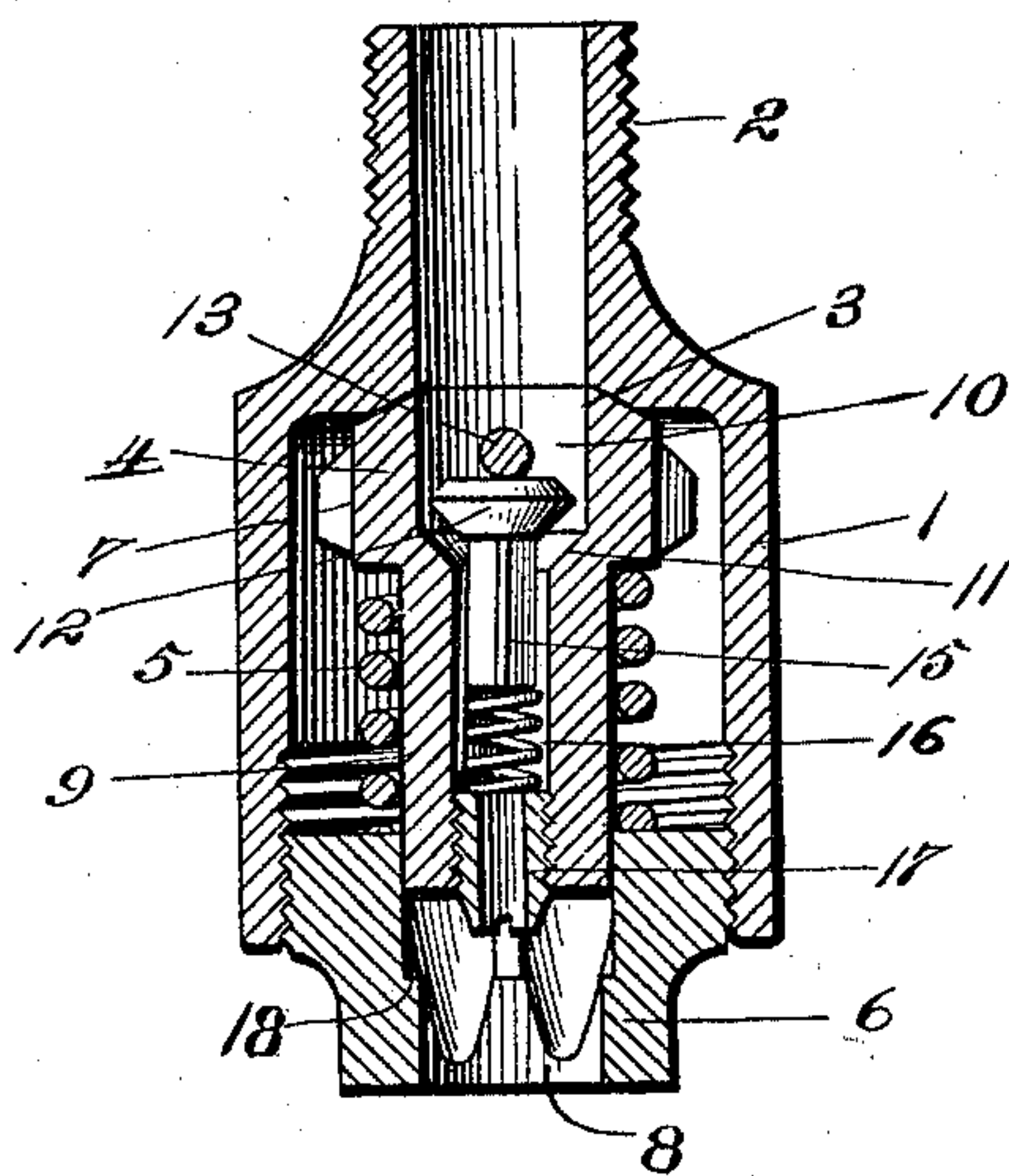


Fig. 2.

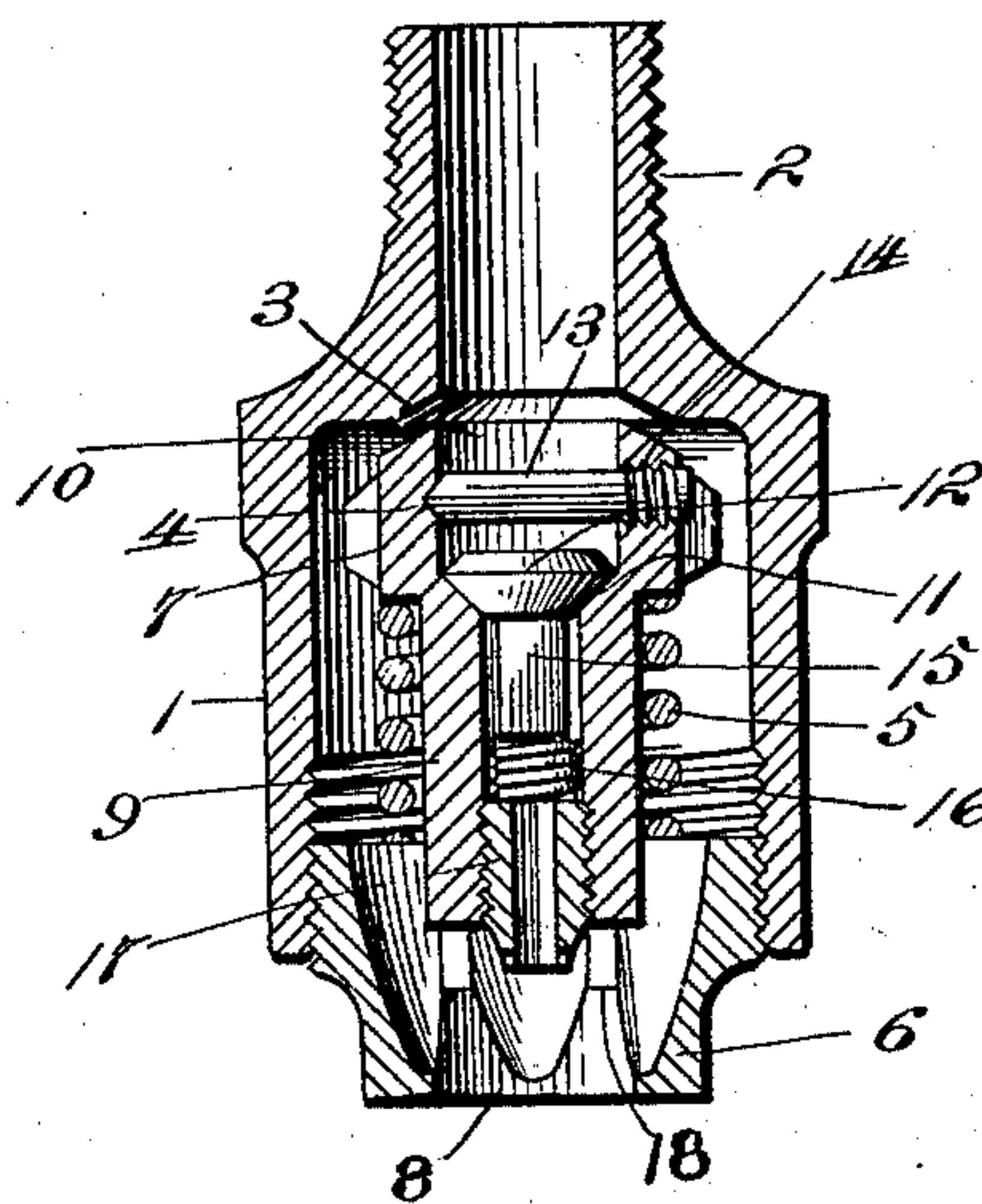


Fig. 3.

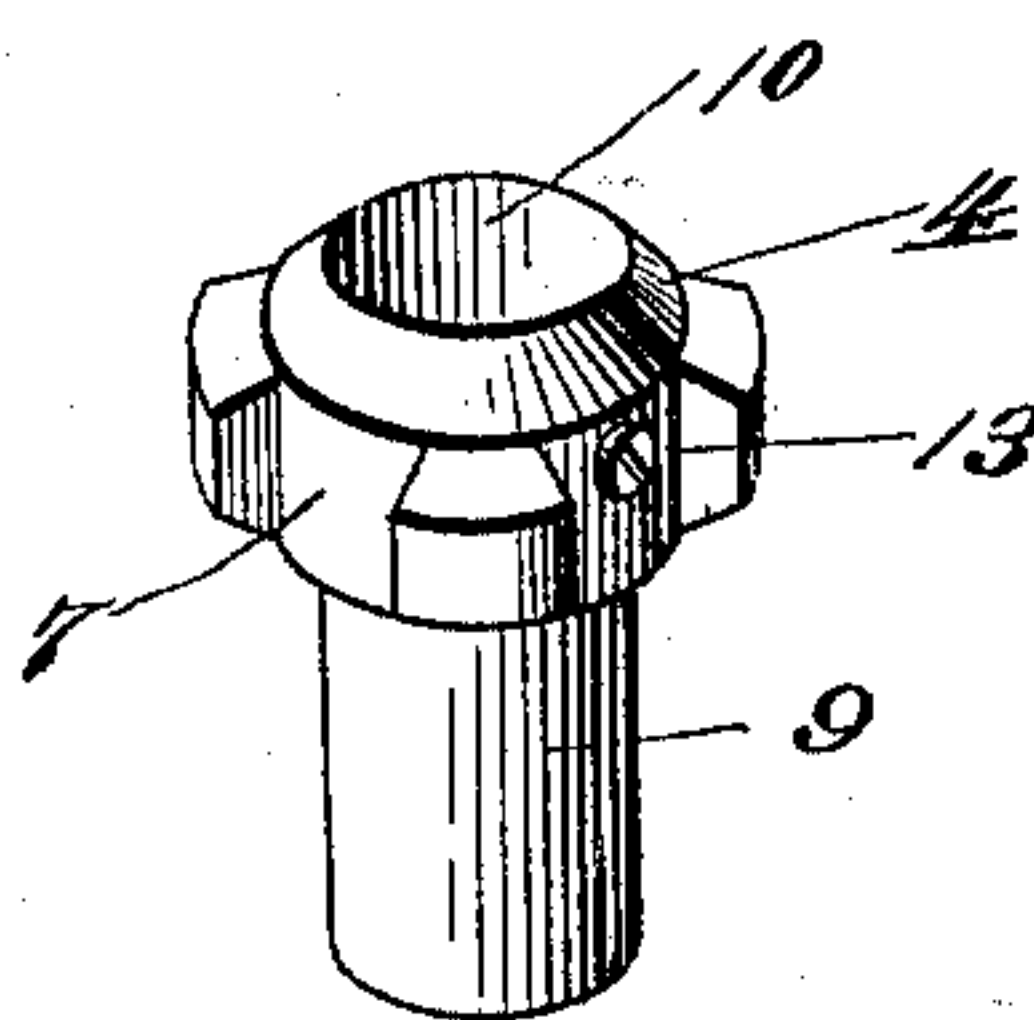
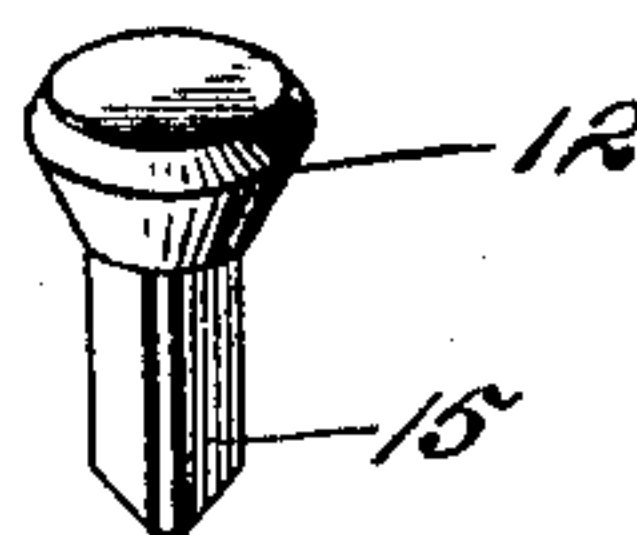


Fig. 4.



Witnesses

Clarence N. Walker By his Attorneys,

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UNITED STATES PATENT OFFICE.

ANDREW KLAY, OF BLUFFTON, OHIO.

RELIEF-VALVE FOR ENGINE-CYLINDERS.

SPECIFICATION forming part of Letters Patent No. 637,994, dated November 28, 1899.

Application filed January 30, 1899. Serial No. 703,859. (No model.)

To all whom it may concern:

Be it known that I, ANDREW KLAY, a citizen of the United States, residing at Bluffton, in the county of Allen and State of Ohio, have
5 invented a new and useful Relief-Valve for Engine-Cylinders, of which the following is a specification.

My invention relates to an automatic relief-valve particularly designed for use in
10 connection with the cylinders of locomotives and similar engines wherein the cylinder-piston has a reciprocatory movement and wherein high and low pressures exist alternately at each end of the cylinder or upon each side of
15 the plane of the piston; and the object in view is to provide a simple and efficient valve mechanism designed upon each stroke of the piston to allow water of condensation to be blown off and in connection therewith to provide a safety-valve adapted to be unseated
20 by an excess of pressure in the cylinder to prevent injury to the operating parts.

Further objects and advantages of this invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended
25 claims.

In the drawings, Figure 1 is a central sectional view of a relief-valve mechanism constructed in accordance with my invention,
30 the parts being shown in their normal relations. Fig. 2 is a similar view showing the parts in the positions which they occupy when subjected to an excess of pressure in the cylinder. Fig. 3 is a detail view of the safety-valve detached. Fig. 4 is a similar view of
35 the relief-valve detached.

Similar reference characters indicate corresponding parts in all the figures of the drawings.
40

1 designates a valve-casing provided with a terminal threaded nipple 2, adapted to be seated in the blow-off opening of a locomotive or other engine cylinder, said casing
45 having an interior safety-valve seat 3, to which is fitted a safety-valve 4, normally held seated by an operating-spring 5, of which the tension may be varied by means of an adjustable plug 6, threaded in the lower end
50 of the casing, said plug being annular or tubular in construction to provide a passage

longitudinally through the casing for the relief of pressure in the cylinder when the safety-valve is unseated. The head of the safety-valve is cut away or channeled, as
55 shown at 7, whereby while the diameter of the head is such as to fit approximately in the bore of the casing, and thus guide the safety-valve in its movements toward and from its seat, fluid passing through the valve-seat is adapted to pass the valve to reach the
60 outlet 8 in the terminal plug. The safety-valve is also provided with a reduced stem 9, and the rear or lower side of the valve-head forms a shoulder against which the seating-
65 spring bears.

The safety-valve, with its stem, is of tubular construction, and the front or upper portion of the channel 10 therein is enlarged or counterbored and is constructed to form a relief-valve seat 11 to receive the relief-valve
70 12, whereby said relief-valve is housed within the safety-valve. Transversely spanning the enlarged or counterbored portion of the channel in the safety-valve is a stop-pin 13 to
75 limit the upward or unseating movement of the relief-valve, and said stop-pin is removably fitted in place by means of a threaded shoulder 14 thereof, whereby the removal of the relief-valve for purposes of repair or
80 cleansing is facilitated. The relief-valve is provided with a webbed guide-stem 15 to fit in the bore of the safety-valve stem, and thus allow a passage between its sides and said walls of the channel, and bearing against the
85 lower end of the relief-valve stem is an unseating-spring 16, of which the tension may be varied by means of an adjusting-plug 17, threaded in the lower end of the bore of the safety-valve stem, said plug being tubular or
90 of annular construction to communicate with the bore of the safety-valve stem, and thus provide for the escape from the bore of the safety-valve of water of condensation when the relief-valve is unseated.
95

In operation the relief-valve, which may be termed a "low-pressure" valve, is normally held unseated by the light unseating-spring employed in connection therewith, and hence during the return stroke of the piston
100 in the cylinder to which the valve mechanism is applied or during the time that said piston

is approaching the valve in question water of condensation in advance of the piston may escape through the relief-valve seat and thence through the channel of the safety-valve stem and the opening in the main adjusting-plug 6. The tension of the relief-valvespring, however, is so small that a slight increase of pressure in the cylinder, as by the admission of steam thereto, will close the relief-valve in opposition to its unseating-spring to allow the full force of the motive agent to be applied to the piston. Thus upon each stroke of the piston as the latter recedes from the valve mechanism the relief-valve will be closed, while as the piston approaches the valve mechanism the relief-valve will be opened to allow the escape of water of condensation. On the other hand, should there be an excess of pressure in the cylinder or a pressure liable to result in injury to the operating parts of the machine the safety-valve will be unseated to allow the escape of such excess, and also it will be understood that said safety-valve will be unseated by an excess of water in the cylinder should the relief-valve have failed to allow a complete exhaust thereof. Obviously the tension of the unseating-spring may be varied to offer any desired resistance to the pressure of steam within the cylinder in the seating of the relief-valve, and in the same way the main or seating spring may be adjusted to have any desired tension to resist pressure in the cylinder, and thus require any desired cylinder-pressure to unseat the same in opposition to its spring.

An advantage of the above-described construction resides in the fact that the relief-valve is housed within the safety-valve, the same remaining therein in all of its positions, whereby the entire mechanism occupies the minimum space and accomplishes the desired objects without necessitating any considerable projection beyond the surface of the cylinder to which it may be applied, and in addition to this compactness of construction it will be seen that by the removal of the main plug at the lower or outer end of the casing the safety-valve and the contained relief-valve may be removed from the casing when necessary for repair or cleaning. It will be understood that a valve mechanism constructed as above described should be arranged at each end of the cylinder in a double-acting engine.

I preferably extend the lower or outer end of the safety-valve stem into the opening of the main adjusting-plug and provide the walls of the latter with stops 18, which limit the unseating movement of the safety-valve to avoid straining the seating-spring, and also it will be seen that by the arrangement specified the adjusting-plug of the unseating-spring may be adjusted to vary the tension of the unseating-spring without dismounting the parts of the valve mechanism, for the reason that said adjusting-plug of the unseating-

spring is accessible through the central opening in the adjusting-plug of the seating-spring.

It will be understood that in practice various changes in the form, proportion, size, and minor details of construction within the scope of the appended claims may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having described my invention, what I claim is—

1. The combination of a safety-valve having a through longitudinal bore, means for yieldingly holding the said valve seated, a relief-valve housed within and carried by said safety-valve, an unseating-spring therefor, and means carried by the safety-valve for adjusting the tension of said spring, substantially as specified.

2. The combination of a safety-valve having a through longitudinal bore, means for yieldingly holding the said valve seated, a relief-valve housed entirely within the bore of the safety-valve, an unseating device for the relief-valve and a hollow adjusting-plug for said unseating device, substantially as specified.

3. The combination of a valve-casing, a hollow safety-valve seated within said casing, a valve-seating spring in operative relation with said valve, an annular spring-adjusting plug threaded in the outer end of the casing and adapted for adjustment to vary the tension of the spring, said safety-valve having an axial channel provided at an intermediate point with a relief-valve seat, a relief-valve housed entirely within the channel of the safety-valve, a removable stop-pin transversely spanning said channel in the path of the unseating movement of the relief-valve, an unseating-spring in operative relation with the relief-valve, and a hollow spring-adjusting plug fitted in the outer end of the safety-valve channel in contact with said unseating-spring, and accessible through the opening of the first-mentioned plug, substantially as specified.

4. The combination of a valve-casing, a safety-valve seated therein and having a seating-spring, a centrally-open adjusting-plug fitted in the casing, said safety-valve having a through longitudinal bore, a relief-valve seated wholly within the plane of the safety-valve and adapted to close the bore therein, said relief-valve having an unseating-spring, and an adjusting-plug for said unseating-spring, mounted upon the safety-valve, and accessible, for adjustment, through the central opening of the first-named spring-adjusting plug, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

ANDREW KLAY.

Witnesses:

JOHN ALTHAUS,
SAMUEL AMSTUTZ.