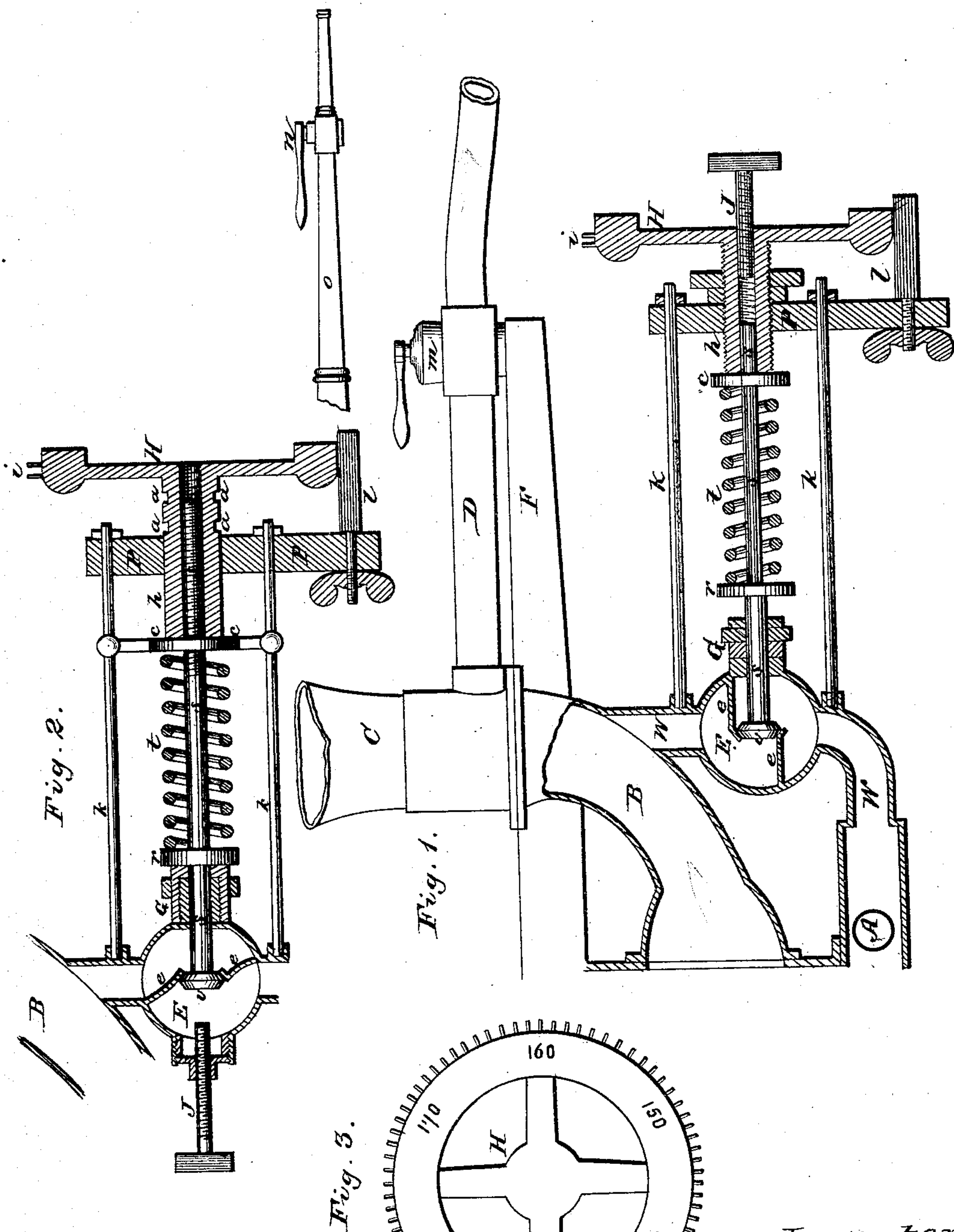


W. JEFFERS.

Relief-Valves for Steam Fire-Engines.

No. 144,765.

Patented Nov. 18, 1873.



Witnesses.
C. F. Brown.
Melville Church.

Inventor,
Wm. Jeffers
By H. A. Vellworth
His attys.

UNITED STATES PATENT OFFICE.

WILLIAM JEFFERS, OF PAWTUCKET, RHODE ISLAND.

IMPROVEMENT IN RELIEF-VALVES FOR STEAM FIRE-ENGINES.

Specification forming part of Letters Patent No. 144,765, dated November 18, 1873; application filed December 20, 1871.

To all whom it may concern:

Be it known that I, WILLIAM JEFFERS, of Pawtucket, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Relief-Valves for Steam Fire-Engines; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings forming part of this specification, in which—

Figure 1 is a longitudinal vertical section of the parts relating to the improvement, a portion of the hose, frame, and air-chamber being shown in elevation. Fig. 2 is a similar section, showing a modification of the construction represented in Fig. 1; and Fig. 3 is a front view of the graduated wheel attached to the screw that gages the valve.

Similar letters of reference with accompanying drawings denote the same parts.

In the practical operation of steam fire-engines, as heretofore constructed, the following difficulties have been encountered, viz: First, the hose is liable to be burst by the sudden starting of the engine, or by running up the steam too high when not playing; secondly, the engine has to be stopped whenever the hose is changed; and, thirdly, the only way to vary the discharge is to change nozzles, and this cannot be done; neither can the discharge be stopped altogether for any purpose without stopping the engine. To obviate some of these difficulties relief-valves have been applied to the side of the main outlet or discharge pipe, to which the hose is attached, and have been made to operate in various ways, automatically and otherwise, so that when the pressure within the hose becomes too great the valve opens and lets the water flow out, the engine meanwhile working on as usual. But here another inconvenience has supervened, namely, the waste of the water at the side outlet; the annoyance occasioned by its discharge to persons in the vicinity; and, in winter, the freezing and icing of the streets by the overflow.

The object of my invention is to obviate all these disadvantages; and, to this end, it consists in the improved construction and combination of parts for the purpose of relieving the discharge-pipe in case of overpressure by returning the water to the suction, as I will now

proceed to describe; and, secondly, in the details of construction herein set forth.

In the drawings, A is the suction-pipe, from which the water passes toward the left hand to the pumps, which are not shown. B is the chamber, into which the water is forced from the pumps. C is the air-chamber. D is the main outlet or discharge pipe, to which the hose is attached, and F is the frame. All these parts may be constructed to operate as heretofore, my improvements consisting not in the construction of these parts, but in the devices to be employed in connection with them, which I will now proceed to describe; and, first, I establish a communication between the water-chamber below the pumps and that above them by means of a passage, W, which, when the main outlet is closed, allows the water in the engine to circulate round and round, passing continuously through the pumps, and preventing all danger of bursting the apparatus. Within this passage I arrange a valve-chamber, E, divided into two compartments by a diaphragm, *e*, said diaphragm having an aperture, which is opened or closed by the relief-valve *v*.

The drawings representing two methods of construction, I will first describe that shown in Fig. 1. Here the valve-rod *s* passes out through the wall of chamber E below the diaphragm, and is closely packed by a stuffing-box, G. K K are columns screwed into sockets cast on the wall of the pipe W, as shown, said columns being attached at their outer end to a stout cross-head, P. A hollow nut or shaft, *h*, screws through the cross-head in line with the axis of the valve, and the valve-rod extends into the shaft, as shown. *r* is a collar fixed to the valve-rod, and *c* is a similar collar, sliding on the rod, but prevented from turning by a spline. *t* is a coiled spring arranged between the two collars, and operating to hold the valve to its seat, the tension of the spring being regulated by screwing the nut or shaft *h* in or out. A hand-wheel or dial, H, is attached to the shaft *h*, and is graduated and marked with figures on its face, as shown in Fig. 3, so that when any number is brought to a given position it will indicate exactly the number of pounds pressure to the inch which the valve will resist before it will

open automatically. The wheel H is provided with cogs or spurs *i i*, which engage with a pawl or stop, *l*, and prevent it from turning accidentally. Any other form of stop or pawl that will answer the purpose may be employed instead. A screw, J, is inserted into the outer end of the shaft *h*, in such a position that it can be screwed up against the end of the valve-rod, and the valve be thereby fixed against its seat—a provision which is intended for use only in trials and other extraordinary occasions where it may be desirable to run the steam up to two hundred pounds or more. As thus constructed, the apparatus is liable to the objection that any slight leakage around the valve-stem would allow the air to enter below the pumps and interfere with their draft. To remedy this, I employ the construction shown in Fig. 2, which I will now proceed to describe.

In the drawing, the stuffing-box is on the upper side of the diaphragm, where, the pressure being outward, no air is liable to enter; and, if it did, could not pass the valve and get into the suction. The valve, being large than its seat, must be introduced through an opening in the opposite wall of the chamber E, which opening is afterward stopped with a closely-packed screw-cap, in which the screw J is arranged, as shown, and is closely packed to prevent leakage. In this form of the apparatus the shaft *h* does not screw through the cross-head, but slides freely back and forth therein; and the screw-rod, being made of uniform size, screws into the shaft. The collar *c* is made with arms, which embrace and slide upon the columns *k k* to prevent the collar from turning, and the collar *r*, instead of being fixed to the valve-rod, slides freely thereon. The spring *t* holds the collar *r* firmly against the stuffing-box G, and, by its tension, forces the collar *c* and the shaft or nut *h* outward, thereby holding the valve to its seat. The valve can be tightened and the tension adjusted by holding a forked plate against the

shaft, so as to enter one of the notches *a a* outside of the cross-head, and prevent the shaft from sliding inward, and then turning the wheel so as to screw up the rod *s*. With an apparatus thus constructed, I employ a stop-cock, *m*, to cut off the water from discharging at the main outlet whenever it is desirable to change or remove the hose; and I also provide a stop-cock, *n*, in the small outlet *o*, by which the pipeman can vary the jet when desirable, or shut off the water altogether when he wishes to change the nozzle, or for any other purpose. The stopping of the water at the cocks *m* or *n* will not endanger the engine or hose in the least, as the water at once backs into the passage W, returns to the pumps, and keeps circulating until the cocks are opened again.

The ordinary nozzle can be used, or, preferably, my improved patented nozzle.

Having thus described my invention, what I claim as new is—

1. In combination with the water-passage W, leading from the discharge to the suction side of the pump in a fire-engine, and a diaphragm or valve-seat, E, arranged across said passage, the spring relief-valve *v*, capable of being set at any given pressure, and the independent screw J, for the purpose of counter-acting the spring when necessary, substantially as described.

2. The combination of the valve *v*, rod *s*, collars *r c*, spring *t*, shaft *h*, and index-wheel H, constructed and operating substantially as shown in Fig. 2, for the purposes set forth.

3. The hollow shaft *h*, having the graduated hand-wheel H, and the grooves *a a*, in combination with the spring-valve, guides, and supporting-frame, substantially as and for the purposes set forth.

WM. JEFFERS.

Witnesses:

ROYAL LEE,
GEO. A. CARPENTER.