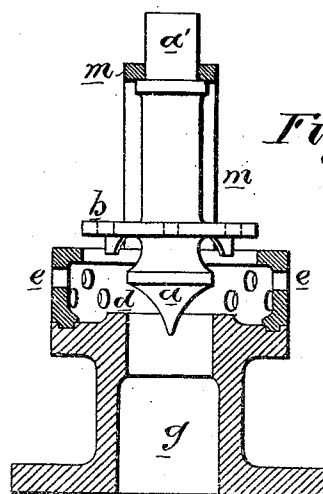
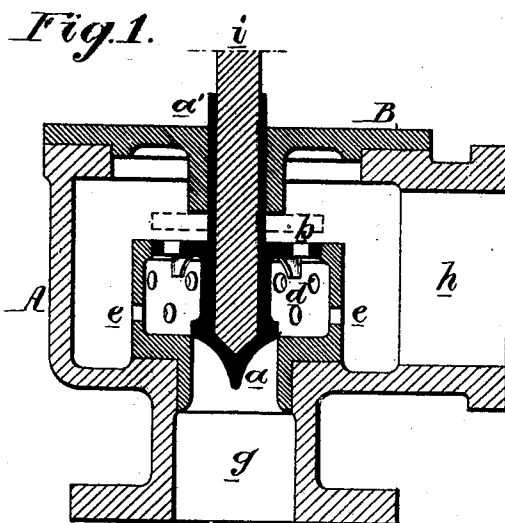


J. JORDAN & A. PAUL.

Safety-Valves.

No. 145,876.

Patented Dec. 23, 1873.



Witnesses, *Wm. A. Steel*
Harry Smith

John Jordan and
Alfred Paul
by their Attyys.
Horsman and Sus

UNITED STATES PATENT OFFICE.

JOHN JORDAN AND ALFRED PAUL, OF LIVERPOOL, ENGLAND.

IMPROVEMENT IN SAFETY-VALVES.

Specification forming part of Letters Patent No. **145,876**, dated December 23, 1873; application filed November 12, 1873.

To all whom it may concern:

Be it known that we, JOHN JORDAN and ALFRED PAUL, of Liverpool, in the county of Lancaster, Kingdom of Great Britain and Ireland, have invented certain Improvements in Safety-Valves, of which the following is a specification:

The object of our invention is to more effectually and rapidly relieve a steam-boiler of its surplus steam than by ordinary safety-valves, the lift of which is very limited, and this object we attain by combining a loaded valve, *a*, and piston *b*, attached to or forming part of the valve, with a casing inclosing a chamber, *d*, all substantially as shown in the vertical section, Figure 1, of the accompanying drawing, so that when the pressure of steam overcomes the load of the valve its pressure on the latter and on both valve and piston will raise them, so as to present an extended area for the escape of the steam.

In Fig. 1 the casing inclosing the chamber *d* is a continuation of the valve-seat, and has lateral openings *e e* for the escape of steam, and in the top of the casing is an opening for receiving the disk or piston forming part of the valve *a*, or rather projecting from the tubular stem *a'* of the valve, which passes through and is guided by the cover B of the valve-chest A, into which stem the pin *i* for receiving the load of the valve fits. The moment the steam is in excess of the desired pressure, it raises the valve, gains access to the chamber *d*, and its partial escape takes place through the openings *e*. This partial escape causes pressure to be exerted on the piston, which is elevated until arrested by the cover B, as shown by dotted lines, thereby exposing the opening at the top of the chamber *d*, whence the steam can escape in a large volume into

the interior of the chest A, and thence through the outlet *h*. After the main volume of surplus steam has been disposed of, the load will depress the valve, and the piston will enter the opening in the top of the chamber *d*, thus preventing the free escape of steam through the said opening, while the lateral openings *e* will permit the escape of the diminishing volume of steam as the valve seeks its seat.

Fig. 2 illustrates an exposed safety-valve made in accordance with our invention, the tubular stem *a'* passing through and being guided by a yoke, *m*, which also serves to limit the upward movement of the valve and its piston *b*.

We may remark, in conclusion, that it is usual in proportioning ordinary safety-valves to allow one square inch of valve area for two square feet of grate surface, but that one-third of this valve area will be sufficient in constructing safety-valves according to our invention.

We do not claim, broadly, the combination, with a safety-valve, of a perforated chamber for receiving the escaping steam; but

We claim as our invention—

The loaded valve *a* and its piston *b*, in combination with the fixed perforated chamber *d*, adapted to the said piston and containing the seat of the valve, all as set forth.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

JOHN JORDAN.
ALFRED PAUL.

Witnesses:

CHRISTOPHER MORRIS,
Notary Public, Liverpool.
GEO. HAYES, *his Clerk.*