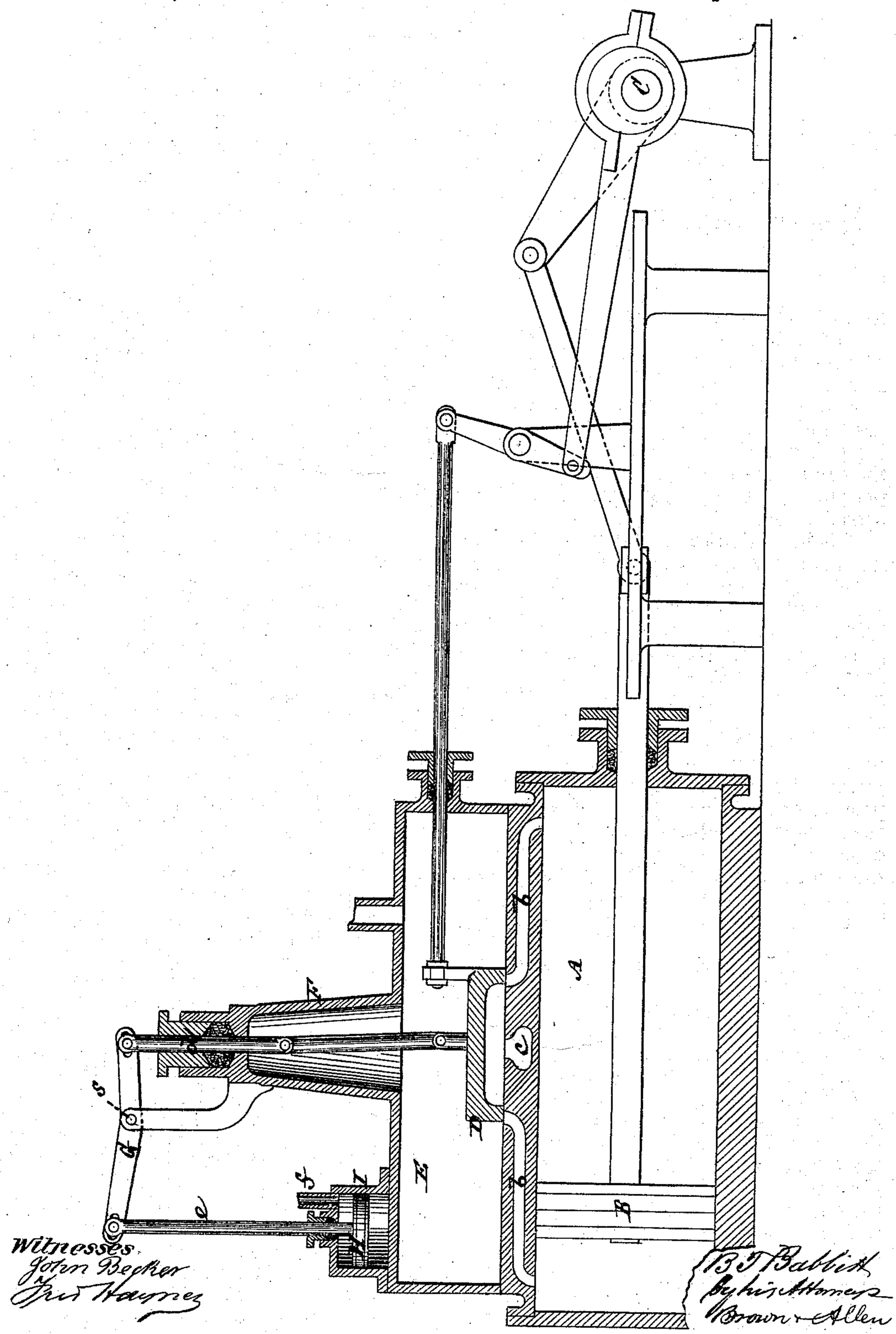
B. T. BABBITT.

BALANCED VALVE.

No. 182,628. Patented Sept. 26, 1876.



UNITED STATES PATENT OFFICE.

BENJAMIN T. BABBITT, OF NEW YORK, N. Y.

IMPROVEMENT IN BALANCED VALVES.

Specification forming part of Letters Patent No. **182,628**, dated September 26, 1876; application filed June 9, 1876.

To all whom it may concern:

Be it known that I, BENJAMIN T. BABBITT, of the city, county, and State of New York, have invented a new and useful Improvement in Means for Relieving Slide-Valves of Pressure; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, which forms part of this specification.

This invention relates to means for balancing slide-valves of steam and other engines, in which a piston exposed to the pressure of the steam or impelling-fluid is connected with the valve for the purpose of counteracting, to a greater or less extent, the pressure of said fluid on the back of the valve, and so reducing friction and wear of the latter and of its seat.

The invention consists in an indirect connection of the pressure relieving or balancing piston with the valve by or through the interposition of one or more levers, whereby, among the advantages which are obtainable, a smaller balancing-piston may be used than when the same is directly connected with the valve, and said piston may be repaired or removed without stopping the engine or arresting the working of the valve.

The accompanying drawing represents a longitudinal vertical section of a horizontal steam-engine with my improvement applied, said description of engine answering as well as any other to illustrate my invention.

A is the engine-cylinder; B, its reciprocating piston, and C the engine-shaft, deriving motion by crank and rod connections from the piston B. D is the slide-valve, which controls the motion of the piston B by or through passages *b*, *b*, and *c*, in the ordinary or any suitable manner. This valve, which works within the steam or valve chest E, may be of any desired construction, and may be operated by any suitable means. Erected on the steam-chest E, over the valve D, is a trunk, F, fitted with a stuffing-box at its top, and serving as a long guide for a rod, *d*, by which and an interposed link or jointed extension of said rod the valve D is connected at its back with the one arm of an outside lever, G, of the first order, having its fulcrum at *s*. The other arm of said lever is connected by a rod, *e*, (which also may be jointed, if desired,) with a piston, H, in a steam-cylinder, I, which latter has steam admitted to its upper end by an inlet, *f*, either direct from the boiler, or from the steam-chest E, but preferably the latter. There need be no other connection, however, between said cylinder I and chest E, and any water of condensation collecting in the cylinder I may be drawn or passed off by an escape-opening provided in the latter for the purpose. The piston H is thus exposed to steam-pressure on its top only, and exerts a balancing effect on the valve D against the pressure of steam on the back of the latter by reason of the lever-connection of said piston with the valve. It is not designed, however, that the piston H should wholly balance the valve, but only relieve it of excessive or objectionable friction, as induced by the superincumbent pressure. This is regulated by proportioning the size of the piston H and length of the lever G, or arms of the latter, relatively to one another, with the area of the valve on its back, and it is one peculiarity of a lever-connection between the balancing or pressure-relieving piston and the valve, over or as compared with a direct connection of said piston, that, by suitably proportioning the leverage, a much smaller balancing-piston suffices to produce the same effect, thus reducing liability to leakage, and being in many respects preferable to a larger piston in direct connection with the valve. Moreover, by the indirect or lever connection of the balancing-piston with the valve the same can readily be repaired or removed without removing the valve-chest cover or stopping the engine, by simply disconnecting the lever from the piston or from the valve, which latter will then work without being balanced. The detached arrangement, too, of the cylinder in which the balancing-piston moves is an advantage as regards accessibility, and, in other respects, over or as compared with other arrangements of said cylinder relatively to the valve-chest.

It will be obvious that it is immaterial, as regards effect, whether the balancing-piston move up or down during the reciprocating action of the slide-valve. This motion need be but very little, and the jointed connections of

the parts may readily be made to provide for the different curvatures described by the same, including the jointed connection of the rod from the lever at the back of the valve, the versed sine of the arc described by which controls the movement of the lever.

It will be apparent, too, that the lever-connection between the balancing-piston and the valve admits of many different arrangements without departing from the invention; thus, instead of admitting steam above the balancing-piston, it might be admitted below it by employing a lever of the second order to connect the balancing-piston with the valve, or two or more levers may be interposed between said piston and valve.

I claim—

In combination with the slide-valve D of an engine, jointed rod *d*, passing through a stuffing-box in the upper part of the trunk F, forming part of the valve-chest, the lever G, rod *e*, piston I, and cylinder *f*, connected with the steam-chest or boiler above the piston I, the whole arranged to operate substantially as set forth.

B. T. BABBITT.

Witnesses.
E. J. GIBBONS,
CHAS. G. HEISER.