J. C. WELLS.
Balanced Valve for Steam-Engines.

No. 204,640. Patented June 4, 1878.

Fig. 1

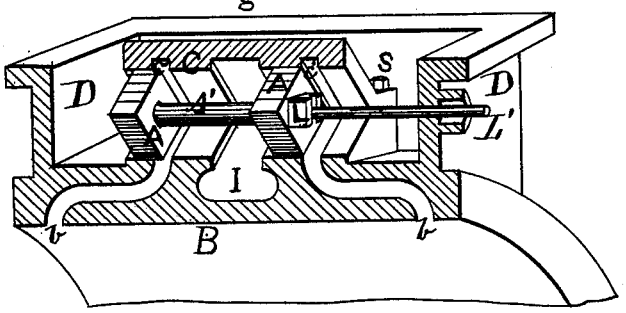


Fig. 2

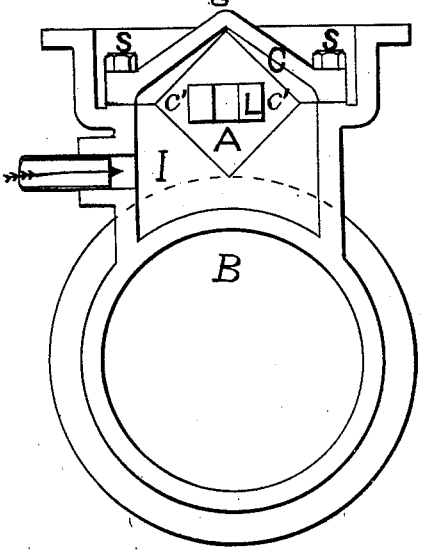


Fig. 3

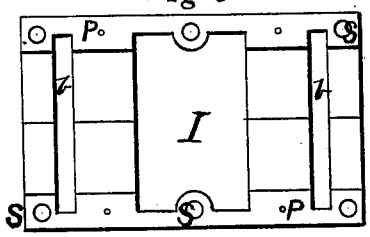
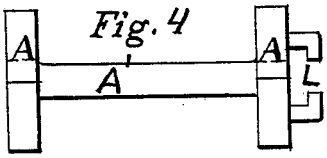


Fig. 4



Witnesses:

F. B. Rice

A. M. McKelvey

Inventor

James C. Wells

UNITED STATES PATENT OFFICE.

JAMES C. WELLS, OF WARREN, PENNSYLVANIA.

IMPROVEMENT IN BALANCED VALVES FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **204,640**, dated June 4, 1878; application filed August 23, 1876.

To all whom it may concern:

Be it known that I, JAMES C. WELLS, of Warren, in the county of Warren and State of Pennsylvania, have invented a new and Improved Valve for Steam-Engines; and I hereby declare that the following is a clear and complete description thereof, reference being had to the accompanying drawings, forming part of this specification.

The object of my invention is to produce a perfectly-balanced valve, the wear of which may be taken up by an ordinary machinist without moving the engine to a machine-shop, and one that will have a large bearing-surface in proportion to its weight and capacity.

Figure 1 is a perspective view of so much of the steam chest and cylinder of an engine and of the valve as is necessary to illustrate my invention. Fig. 2 is a transverse vertical section of the same, taken through the induction-pipe. Fig. 3 is a plan view of the lower part of the valve-seat. Fig. 4 is a detached view of the valve.

B is the cylinder. D is the steam-chest. *b c b c* are the ports through which the steam passes to and from the cylinder. The valve is composed of the two square blocks A A, connected by a shank, A′, and provided with a clamp or lock, L, with which the valve-stem L′ engages.

The lower part of the valve-seat (represented in Fig. 3) is preferably formed in one piece with the cylinder and steam-chest. The upper part C of the valve-seat is secured to the lower part by means of bolts or set-screws S, three, more or less, of these set-screws being used upon each side.

The dividing-line between the cap C and the lower part of the valve-seat is at the opposite horizontal corners of the valve; and the throats or passages *c* in said cap form, with the corresponding passage-ways *b* in the seat and cylinder, steam-ports, which are alternately opened and closed by the valves A, as will be readily understood without further explanation.

P P represent dowel-pins, projecting upwardly from the valve-seat, these pins entering corresponding holes in the cap C. *c′ c′* represent thin strips of copper or other similar soft metal, interposed between the upper and lower parts of the valve-seat.

Steam is introduced through the opening I into the space within the valve-seat and between the blocks A of the valve, passing thence into opposite ends of the cylinder through the ports, and from the cylinder into the space within the steam-chest, but outside of the valve-seat and valve. As the valve is shifted backward and forward by the valve-gear, it will, of course, be understood that the blocks A of the valve fit steam-tight within the valve-seat; and in case of wear of the seat and valve the upper part or cap C of the said seat may be screwed down, so as to compensate for such wear, as the strips *c′*, of comparatively soft metal, will yield sufficiently for that purpose.

There are some advantages incident to my construction of the valve-seat, as follows: From an examination of the drawings it will be seen that both the upper and lower parts of the seat consists of the V-shaped grooves, which fit accurately the angular sides of the blocks A of the valve; and, from the fact that each of the four sides of each block has the same sized and shaped bearing-surface, the wear produced by the friction will be uniform upon each of the sides, and will reduce the blocks in size, but not in shape, for which reason such wear may be readily compensated for by tightening the set-screws or bolts S and slightly compressing the packing-strips *c′ c′*. Thus it will be seen that a large extent of port is provided for, while at the same time the joint between the seat and the valve is easily kept tight.

Another advantage which grows out of making the blocks A square is the increased strength of the upper part C of the valve-seat, as it will be readily understood that the central part of this cap C is not so liable to be sprung out from the valve, as it would be if it (the cap) were flat, while at the same time the valve may be packed tightly by means of the set-screws S, which would not be the case if the valve and seat were cylindrical in form.

It will also be seen that the dowel-pins P prevent the lower edges of the cap C from being sprung outwardly between the set-screws S by the pressure of the steam within.

It is also apparent that some of the advantages

growing out of the use of the square valve may be enjoyed without the use of the strips *c' c'*, because the valve might be packed by simply grinding down slightly the valve-seat at the point where the upper and lower portions are screwed together.

It is apparent that, instead of the dowel-pins P, a rib might be formed upon the edge of the lower part of the valve-seat, with which the lower edge of the upper part C should engage, for the purpose of supporting the part C against this outward pressure of the steam.

From an examination of the drawings it will be seen my construction possesses some important advantages over those now in use. For instance, by forming the cap C separate and apart from the steam-chest D, I provide a free passage for the steam from the cylinder to the exhaust-pipe outside of the valve-seat and within the steam-chest, whereas if the cap constituted the cap of the chest, it would necessitate a steam-passage through the shank A', or else a branching pipe connecting with the chest at both ends of the valve.

Again, making the cap C separate and apart from the cap of the steam-chest greatly facilitates grinding down the joints between the cap C and the lower part of the seat, from the fact that these joints consist of two straight sides.

What I claim is—

1. The herein-described balanced valve, consisting of the blocks A A, united by the shank A', in combination with the valve-seat provided with the ports *b c b c*, the cap C being formed of a piece separate and apart from the steam-chest D, substantially as set forth.

2. In combination with the upper and lower parts of the valve-seat, the dowel-pins P and the yielding packing, all constructed and arranged substantially as set forth.

JAMES C. WELLS.

Witnesses:
F. B. RICE,
A. H. MCKELVY.