D. C. PRESCOTT.

Balanced-Valves for Steam-Engines.

No. 215,293. Patented May 13, 1879.

Fig. 1.

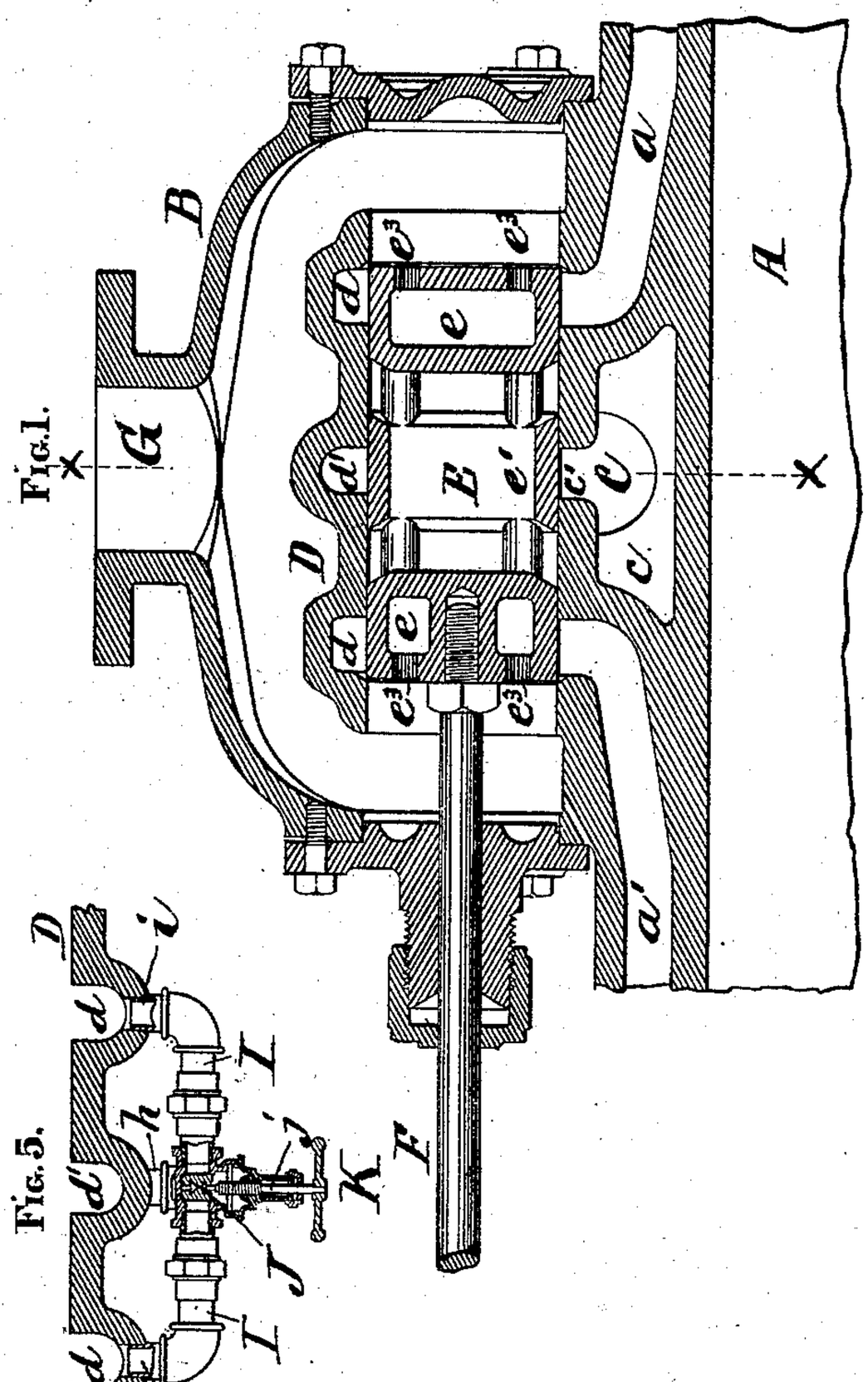


Fig. 3.

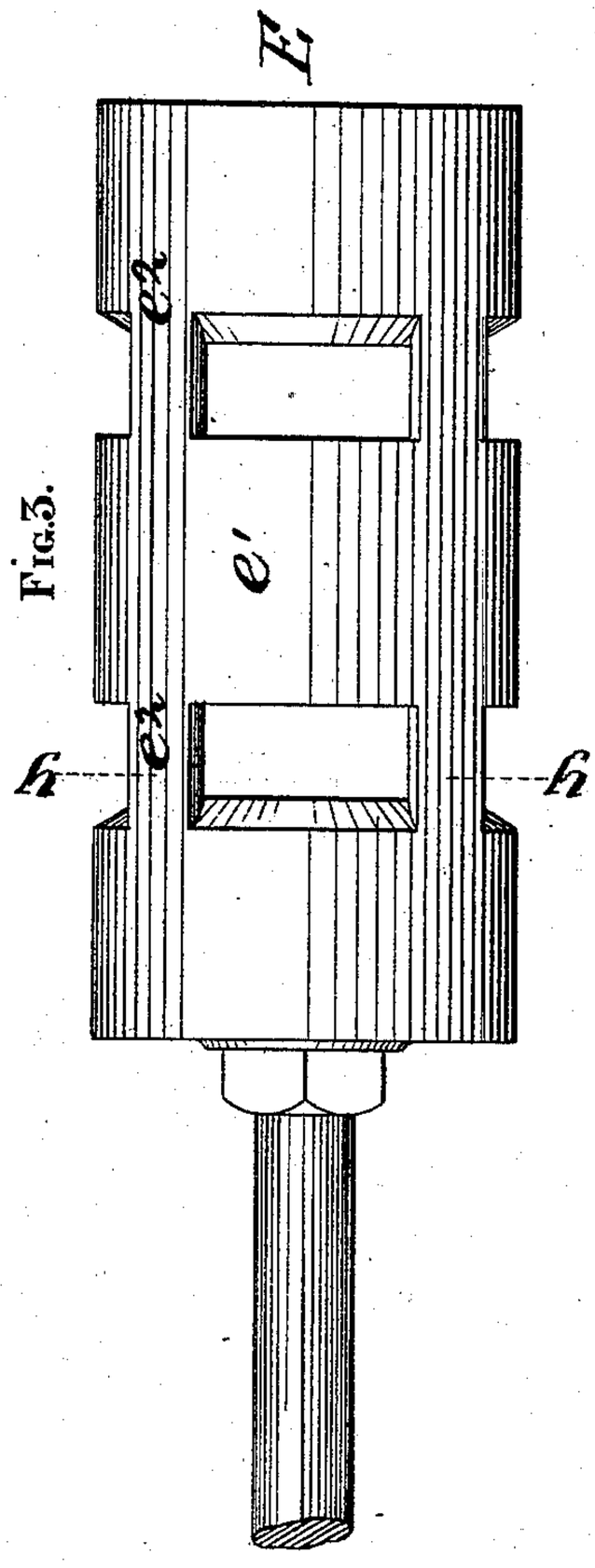


Fig. 2.

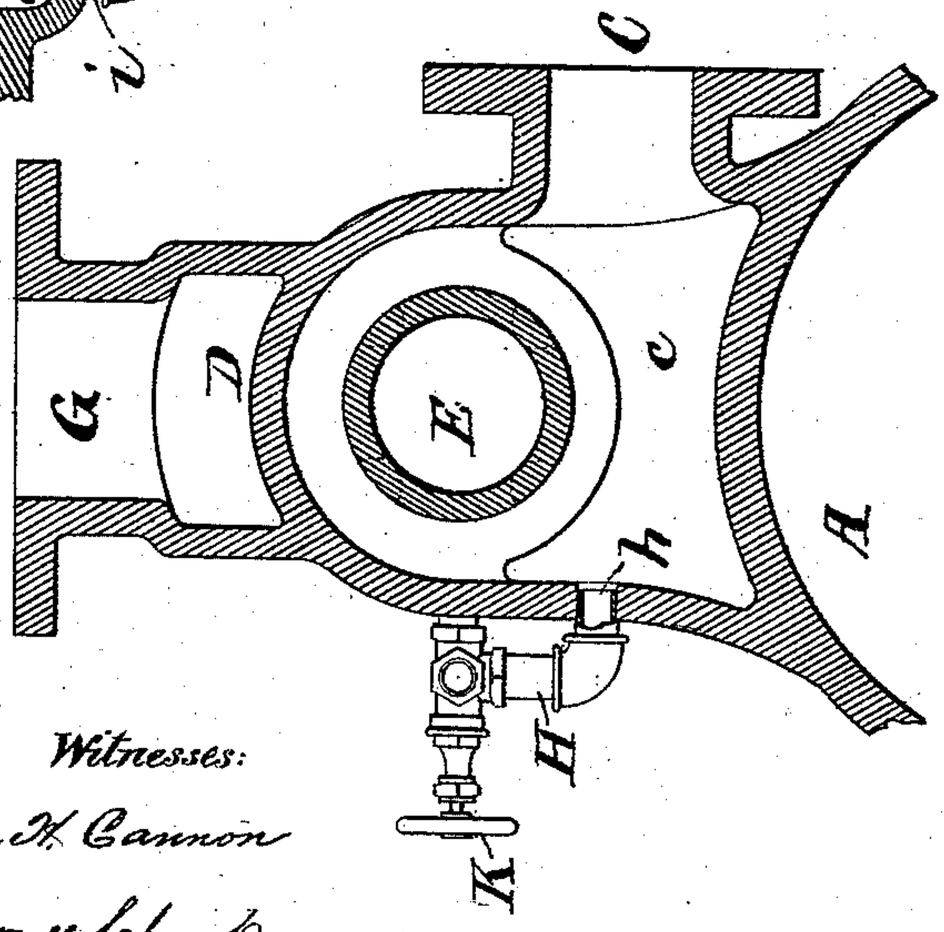
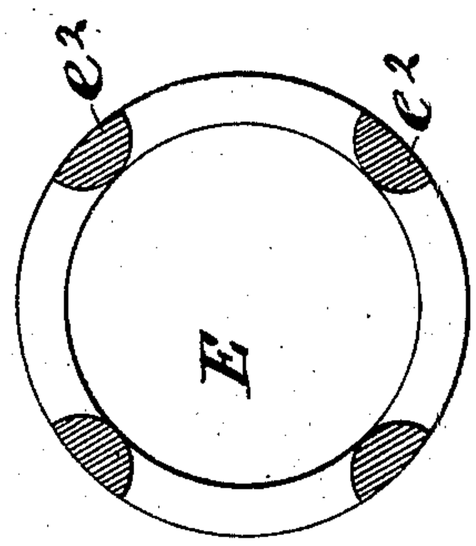


Fig. 4.



Witnesses:

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UNITED STATES PATENT OFFICE.

DE WITT C. PRESCOTT, OF MARINETTE, WISCONSIN.

IMPROVEMENT IN BALANCED VALVES FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **215,293,** dated May 13, 1879; application filed December 9, 1878.

To all whom it may concern:

Be it known that I, DE WITT CLINTON PRESCOTT, of Marinette, in the county of Oconto and State of Wisconsin, have invented a new and useful Improvement in Balanced Valves for Steam-Engines and other Purposes, which is fully described in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a longitudinal section of the exhaust-steam chest and valve, with so much of the cylinder of an engine as is necessary to illustrate my invention; Fig. 2, a transverse section of the same, taken on the line *x x*, Fig. 1; Fig. 3, a side elevation of the valve on an enlarged scale; Fig. 4, a transverse section of the same, taken on the line *y y*, Fig. 3; Fig. 5, a detail view, partly in section, showing the application of a "bleeder" to the steam-chamber, for the purpose of warming the valve before starting.

The object of my invention is to obtain a perfectly-balanced valve, in which all danger of binding will be obviated.

The invention consists in the peculiar construction of the hollow valve and valve-case, and the special combination therewith of the exhaust-steam chest and cylinder, all of which will be hereinafter more fully described, and specifically pointed out in the claims.

In the drawings, A represents the cylinder of a steam-engine, and B the exhaust-steam chest, the cylinder being provided with ports *a a'*, through which steam is admitted to and exhausted from the cylinder in the usual way.

The steam-pipe C communicates directly with a chamber, *c*, in the casing, over the cylinder, between the ports in the valve case or seat D, independent of the walls of the chest, so as to afford large free space around the outside of the valve-case, as shown in Fig. 1 of the drawings. The valve-case is open at each end, thereby communicating with the free space within the exhaust-chest, and is provided with three grooves or passages, *d d'*, running entirely around the interior of the case, and arranged one near each end and the third at the center thereof, the end passages, *d*, connecting directly with the ports *a a'*, and the central passage, *d'*, connecting with the chamber *c* through an opening, *c'*.

The valve E is hollow, and sectional in construction, and provided with stem F, in the usual manner. The valve is preferably cylindrical in form, and the form of the valve-seat is, of course, made to correspond with that of the valve. The valve is composed of end sections, *e*, and a central section, e^1, connected together by narrow bridges e^2, extending between the center and end sections. The end sections, *e*, are entirely closed, with the exception of small openings e^3 in their outer heads, which may be employed or not, as desired.

The central section, e^1, is open at each end, and hence the large openings between the bridges e^2 communicate freely with the interior of this portion of the valve. In the upper part of the chest B is an exhaust-port, G, for the escape of steam into the exhaust-pipe.

The sections of the valve and the internal passages in the valve-seat are relatively arranged as shown in Fig. 1 of the drawings, so that the end sections move back and forth across the end passage, *d*, while the central section moves in the same way across the central passage, *d'*.

Steam being admitted to the chamber *c*, it is evident that as the valve is reciprocated by the valve-gear, it will alternately enter the ports or openings in the valve on each side of the central section, passing thence through the central portion of the valve and the openings on the opposite side of the central section, e^1, into one of the ports *a a'*, and thence to the cylinder.

When the position of the valve is such that steam is supplied in this way to the cylinder through the port *a*, the opposite port, *a'*, is open into the exhaust-steam chest, and vice versa, so that the exhaust is always directly into the exhaust-steam chest through the ends of the valve-case, but not through the valve, as is usual in ordinary hollow valves, and thence escapes through the exhaust-pipe at G. The valve is so constructed and arranged that the port from which steam is exhausted is opened just a little before steam is admitted again to the interior of the valve, and thence to the cylinder through the opposite port. Now, it is evident that by reason of the passages *d d'* on the interior of the valve-seat, the pressure upon the exterior of the valve will be the same

in all directions, as steam will surround the valve through said passages; also, the pressure in the interior of the valve will be the same in all directions, by reason of the free admission of steam into the central hollow portion of the valve, and also into the end section through the openings c^3 in the heads.

The valve-seat and valve will, therefore, be heated equally in all parts, and the pressure upon the valve being the same in all directions, it will move with the least possible friction, and be entirely free from danger of sticking or wedging. In valves for large engines, packing-rings may be employed, if found necessary.

The construction and arrangement of the valve and ports so as to exhaust directly into the exhaust-steam chest instead of through the valve is a desirable improvement, as it simplifies the construction of the valve, and provides for the freer escape of steam.

In starting up the engine after standing some time, so that the parts have become cold, there is danger of a slight inequality in the expansion of metal at first, from the fact that steam will surround the central portion of the valve, while the end sections, as well as the end portions of the valve seat, will not be sensibly affected thereby. This will sometimes be sufficient to cause the valve to stick and obviate this difficulty. I have provided a device which I call a "bleeder," by means of which the valve and seat may be warmed throughout before starting. This bleeder is composed of three branching pipes—a main pipe, H, and two branches, I, connecting therewith and projecting therefrom at each side. Each of these pipes is bent as shown in Fig. 5 of the drawings, and at the junction is a valve, J, provided with a stem, *j*, on the outer end of which is an ordinary hand wheel or crank, K.

Suitable openings *h i* are made in one side of the steam-chest, to enter, respectively, the chamber C and the end passages, *d*, in the valve-seat. The pipes H I are so arranged that when the former is inserted in the opening *h* the latter will enter, respectively, the opening *i*, thereby providing a communication between the chamber *c* and the annular spaces around the end sections of the valve.

When the valve J is opened, steam (a certain quantity of which is admitted to the chamber *c*) will pass directly through the pipes H and I to the annular spaces around the ends of the valve, so that all parts of the valve and valve-seat will be expanded equally, and the engine may be started without danger of sticking.

I am aware of the patent of W. D. Andrews, granted April 11, 1876, and in view of that patent I limit my claims to the details specified.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The exhaust-steam chest B, in combination with the cylinder A, provided with the ports *a a'*, the valve-seat D, and the tubular valve E, whereby the exhaust is directly into the exhaust-steam chest through the end of the valve-seat, substantially as described.

2. The cylinder A, provided with the ports *a a'*, in combination with the exhaust-steam chest B, valve-seat D, having the passages *d d'*, tubular valve E, constructed substantially as specified, and the supply-steam chamber *c*, located below the valve, whereby the supply is through the tubular portion of the valve, and the exhaust directly into the exhaust-steam chest, substantially as described.

DE WITT CLINTON PRESCOTT.

Witnesses:
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