(No Model.)

J. GRZYBOWSKI.

BALANCED VALVE.

No. 265,314. Patented Oct. 3, 1882.

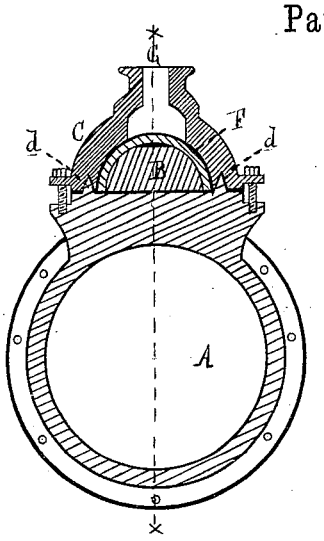

Fig. 1

Fig. 2.

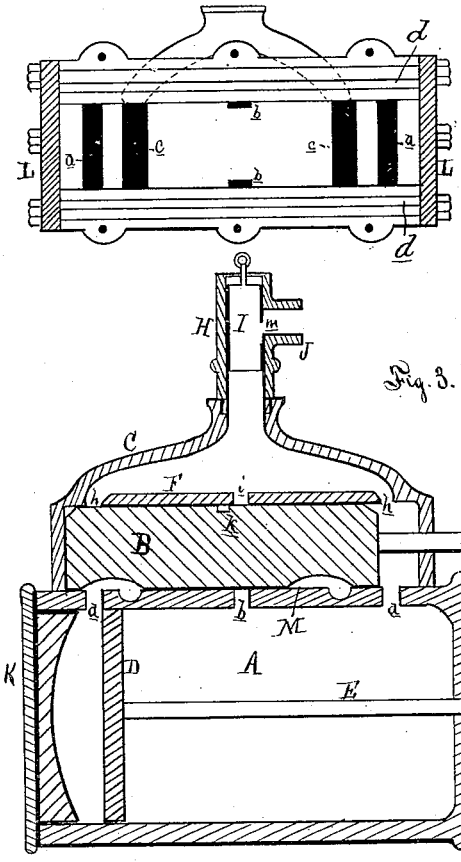

Fig. 3.

Attest:

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UNITED STATES PATENT OFFICE.

JULIAN GRZYBOWSKI, OF DETROIT, MICHIGAN.

BALANCED VALVE.

SPECIFICATION forming part of Letters Patent No. 265,314, dated October 3, 1882.

Application filed February 16, 1882. (No model.)

To all whom it may concern:

Be it known that I, JULIAN GRZYBOWSKI, of Detroit, in the county of Wayne and State of Michigan, have invented new and useful Improvements in Balanced Valves for Steam-Pumps; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification.

The nature of this invention relates to certain new and useful improvements in the construction of steam pumps and engines.

The invention consists in the peculiar construction of the valve, of the valve-case and steam-chest, and in the peculiar construction, arrangement, and combinations of the various parts, all as more fully hereinafter set forth.

Figure 1 is a vertical cross-section through my improved pump. Fig. 2 is a plan of the valve-seat, showing the arrangement of the ports. Fig. 3 is a longitudinal vertical section on the line *x x*, Fig. 1.

In the accompanying drawings, A represents the cylinder of a steam-pump, which is provided with the ordinary piston, D, and rod E. Upon the top of this cylinder is formed the valve-seat M, through which are cut the steam-ports *a* near each end, and the central side ports, *b*, of a much smaller area, which afford communication to the cylinder A. There are also formed in the upper face of the valve-seat the exhaust-ports *c*. Upon the sides of the valve-seat are cast or otherwise formed the ribs *d*, which fit into similarly-shaped channels or grooves in the under side of the steam-chest case C, which latter is secured to place by the proper bolts, *e*, as in the ordinary manner. This steam-chest is semicircular in cross-section, and is provided with a similarly-formed wall, F, beneath which is placed the half-round slide-valve B. Through this wall F are formed the steam-ports *h*, at each end, through which steam passes to the slide-valve, and it is also provided with the ports *i* upon each side of the valve-seat and immediately above the ports *b* in the cylinder, and should be of the same area, while the steam-chest receives steam from any suitable source of supply through the inlet G. At the center of the length of the slide-valve, and upon the semicircular face thereof, is formed the channel-port *k*, which communicates with the ports *b i* in the reciprocation of the valve. The semicircular face of the slide-valve is slightly beveled off or cut away at each end thereof, as shown in Fig. 3.

In the pipe H, which conducts steam to the steam-chest, I place a hollow slide-valve or piston, I, open at the bottom, and with a port, *m*, in its side, which receives steam from a steam-pipe, J. This valve I is designed to be operated through a system of levers by a float in the boiler, which will close and open the valve as the water in the boiler rises or falls, and thus admit steam to the pump.

The cylinder is provided with the usual heads, K, while the steam-chest is provided with semicircular heads L, which are secured to place by bolts which pass through into the steam-chest case and valve-seat.

In practice, steam entering the steam-chest C finds exit therefrom through one of the ports *h* to one of the ports *a* of the cylinder, in its passage actuating the slide-valve. We will suppose the slide-valve to be in the position shown in Fig. 3, with all the ports (inlet) at the left of the pump closed, and the piston D as approaching the end of its stroke toward the same point. Just before the piston completes its stroke a suitable tappet upon the piston-rod comes in contact with a collar upon the valve-stem, slightly starting the valve upon its return-stroke, causing the cut-away portion of the valve to partially disclose the steam-port at that end. Steam thus is allowed to enter the valve-case behind the valve and suddenly shoot the valve to the opposite end of its case, while in its passage the central ports, *i*, *k*, and *b*, are rapidly opened and closed, allowing a jet of steam to pass to the cylinder before the piston has reached the end of its stroke and impart a further impetus to the piston. It is evident that the valve is not actuated by the steam until it has first been moved by the tappet on the piston-rod a sufficient distance to close one of the ports *a*. The movement of the valve described opens the ports *a* in front of the piston, allowing steam to enter the cylinder and drive the piston in the opposite direction. The operation above described

is produced at each stroke of the piston, while the steam exhausts through the ports *c*.

It will be seen that there is no steam-pressure upon the valve, excepting at such times as the valve stands under the ports, and that the steam entering through the ports *i* strikes upon the top of the valve and divides in the channel-port *k*, passing over and through the same to the ports *b*.

By the employment of the slide-valve or piston I in the steam-inlet pipe, which is operated by a float in the boiler, it will readily be seen that steam may be admitted to the steam-chest to operate the pump with greater or less rapidity, determined by the height of water in the boiler.

The heads of the steam-chest are provided with vertically oval holes near the semicircular edge, which allow the head to be secured to place upon the steam-chest at various vertical positions, which could not be done were these bolt-holes round. For instance, supposing the valve to have been worn off to such a degree that steam would pass by it, I then remove the case and scrape off from the faces of the ribs *d* a sufficient amount of their surfaces to allow the case to drop closely over the valve.

It will be observed that in this construction the valve admits steam at the end and center ports at each stroke, and exhausts separately at each end.

What I claim as my invention is—

1. The cylinder A, having a flat valve-seat, M, with the ports *a a*, in combination with the semicircular valve B, having its upper edges partially cut away under the port *h*, substantially as and for the purpose specified.

2. The valve-seat M, provided with parallel V-shaped ribs *d*, in combination with the steam-chest C, having corresponding grooves, but of less depth than the height of the ribs, whereby the chest can be lowered as the valve wears loose, substantially as described.

3. A slide-valve for steam engines and pumps, provided with a central channel-port, which affords communication through central side ports in the valve-seat to the cylinder, substantially as set forth.

4. The cylinder A, provided with ports *a b c*, in combination with the piston B, having cut-away portions or passages at K and at its lower surface and upper edges, substantially as and for the purpose specified.

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Witnesses:
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