(No Model.) 2 Sheets—Sheet 1.

E. P. COWLES.

BALANCED VALVE.

No. 465,242. Patented Dec. 15, 1891.

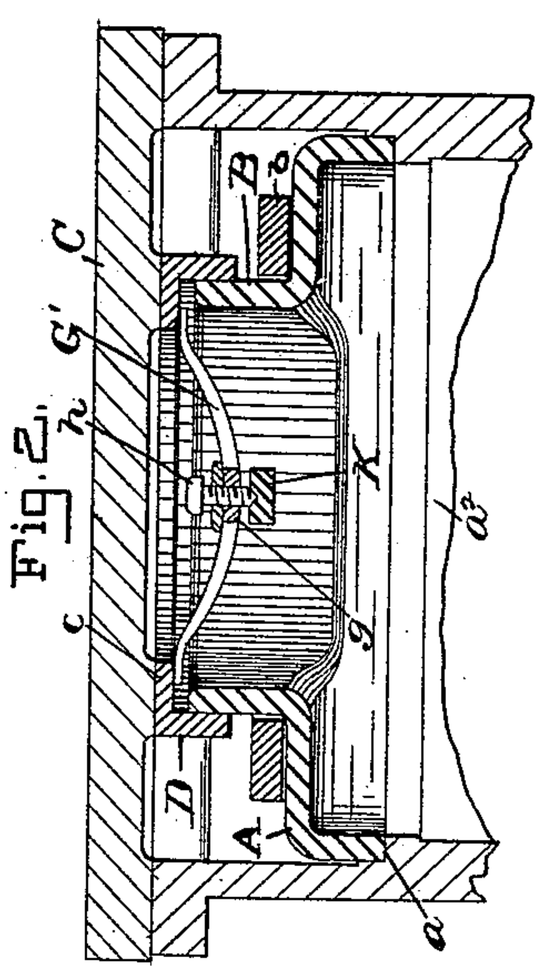

Fig. 2.

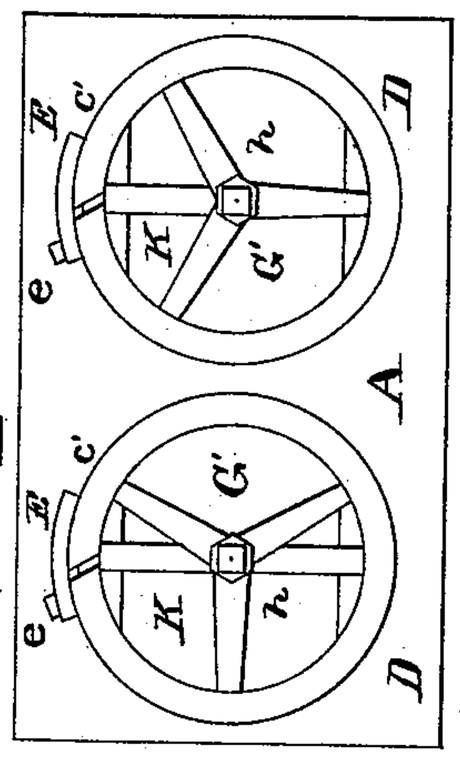

Fig. 8.

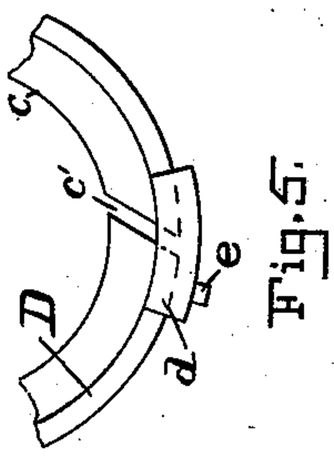

Fig. 5.

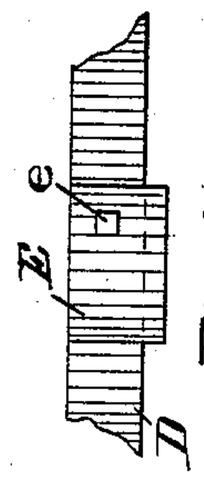

Fig. 4.

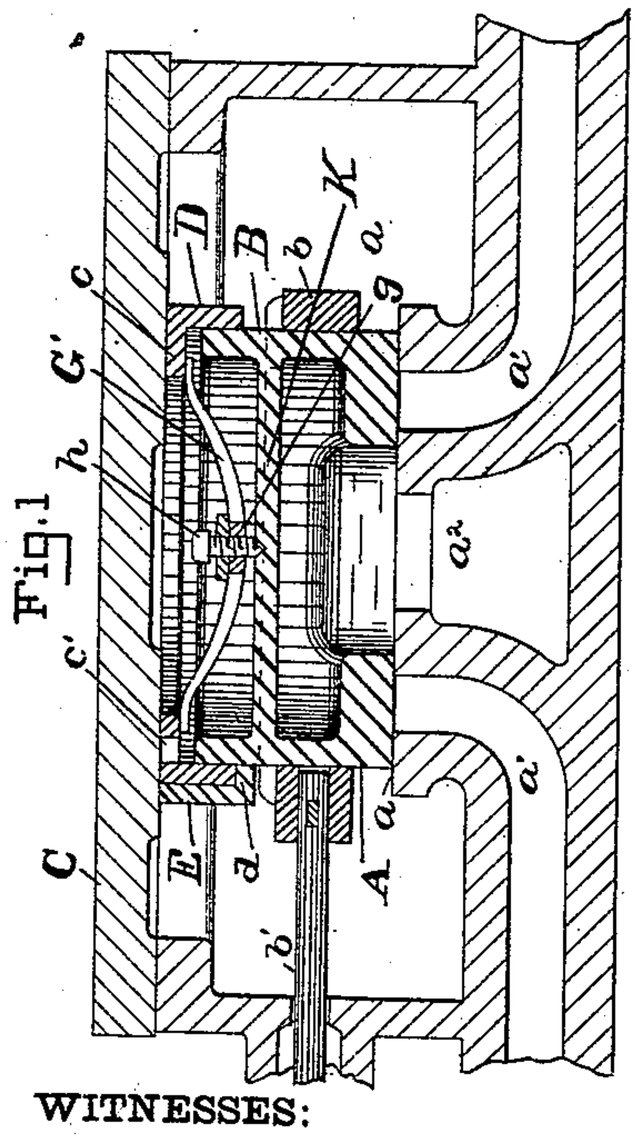

Fig. 1.

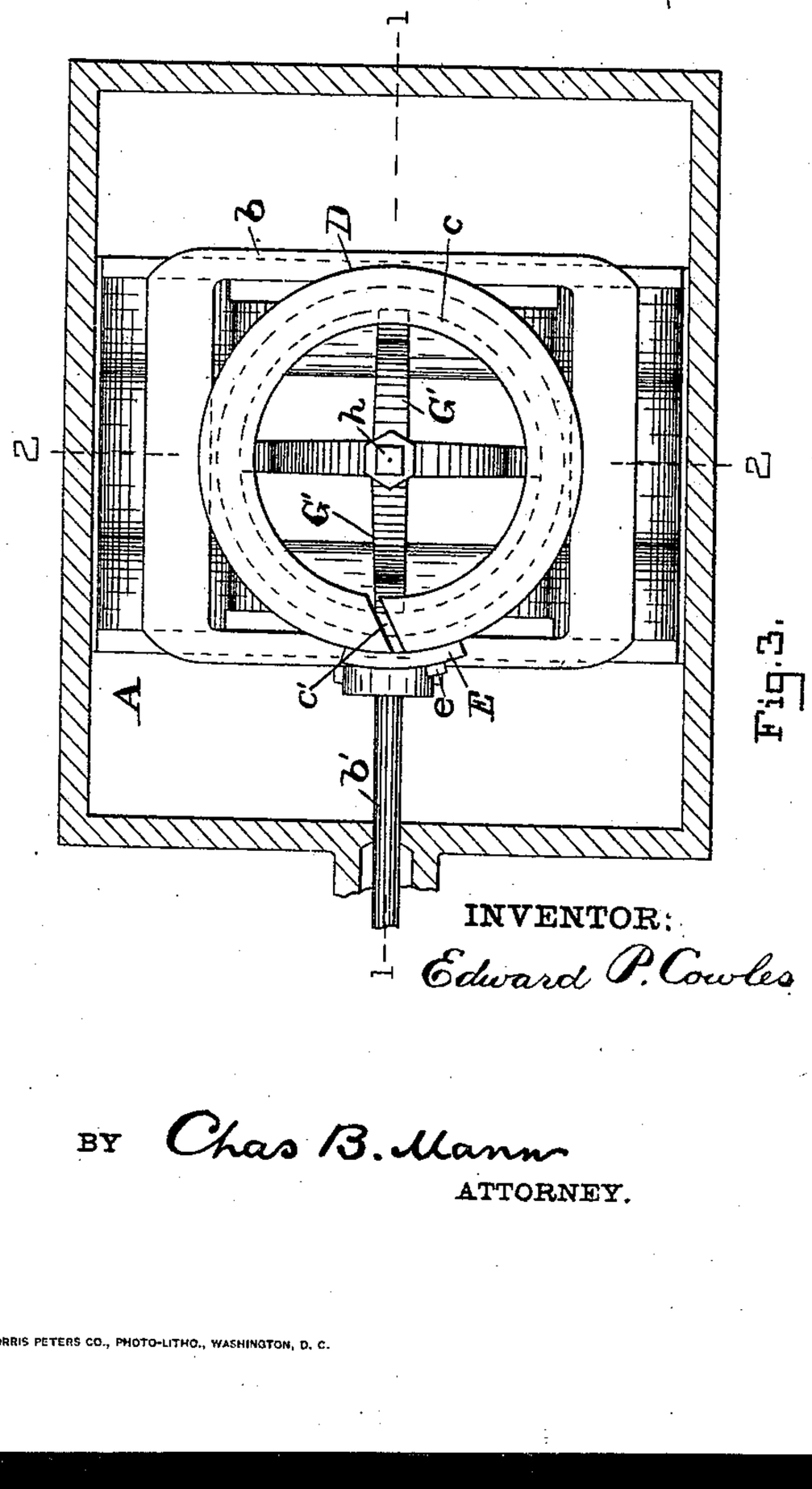

Fig. 3.

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(No Model.) 2 Sheets—Sheet 2.

E. P. COWLES.

BALANCED VALVE.

No. 465,242. Patented Dec. 15, 1891.

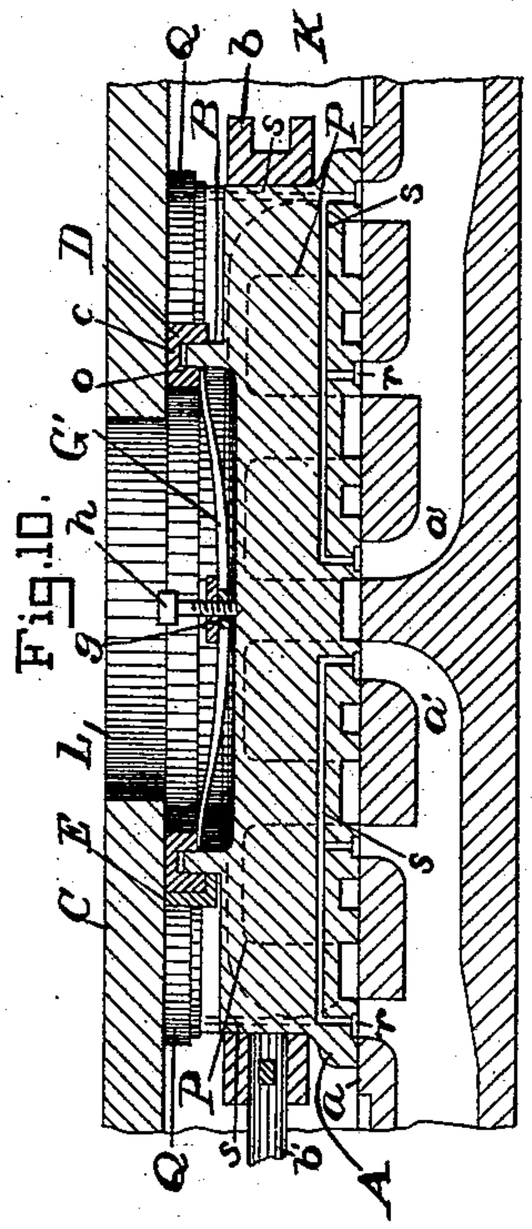

Fig. 10.

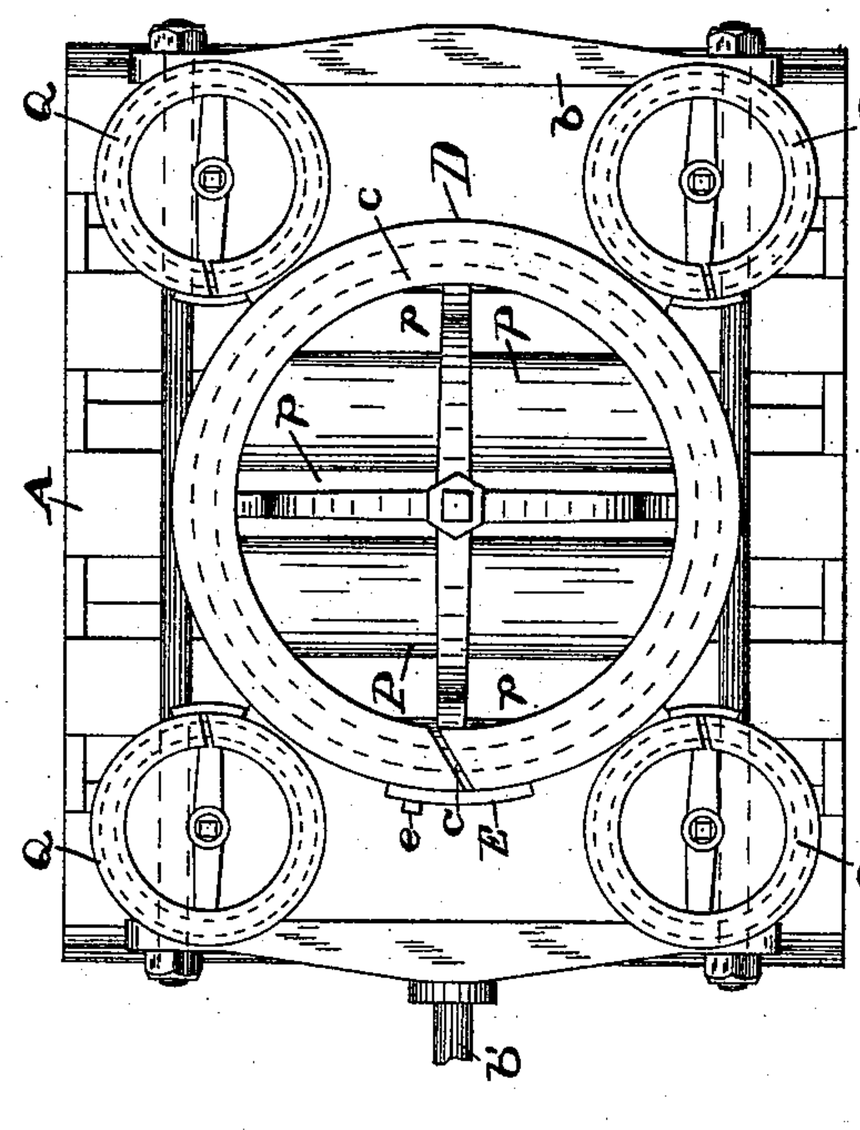

Fig. 11.

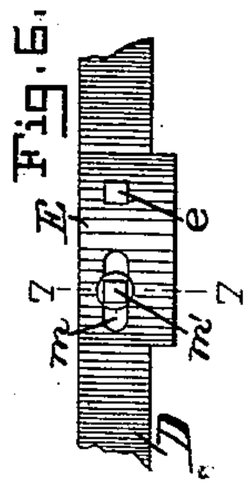

Fig. 6.

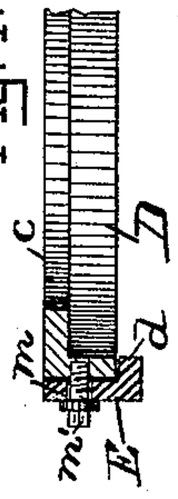

Fig. 7.

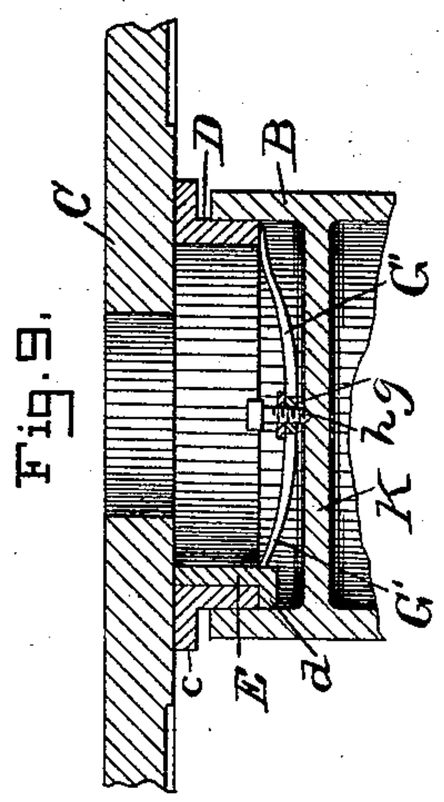

Fig. 9.

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UNITED STATES PATENT OFFICE.

EDWARD P. COWLES, OF NEW DECATUR, ALABAMA.

BALANCED VALVE.

SPECIFICATION forming part of Letters Patent No. 465,242, dated December 15, 1891.

Application filed March 25, 1891. Serial No. 386,287. (No model.)

To all whom it may concern:

Be it known that I, EDWARD P. COWLES, a citizen of the United States, residing at New Decatur, in the county of Morgan and State of Alabama, have invented certain new and useful Improvements in Balanced Valves, of which the following is a specification.

This invention relates to a balanced slide-valve, and has for its object to provide a simple, efficient, and cheap balance-valve suited for engines of any size.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal section through the valve; Fig. 2, a cross-section; Fig. 3, a top or plan view with the lid removed; Figs. 4 and 5, detail views of the lap-clip closing the cut in the balance-ring; Figs. 6 and 7, detail views of a modified form of clip, Fig. 7 being a section on line 7 7 of Fig. 6; Fig. 8, a plan view of a valve where two balance devices are employed; Fig. 9, a sectional view showing the arrangement of parts where the valve takes steam inside and exhausts into the steam-chest; Fig. 10, a longitudinal section through a six-ported gridiron-valve to which my invention is applied, and Fig. 11 a top view of this gridiron-valve with the lid of the steam-chest removed.

The letter *a* designates the valve-seat; *a'*, the steam-ports leading to the cylinder, and a^2 the exhaust-port. The valve A slides in the ordinary manner on the seat and carries a yoke *b*, having attached a rod *b'* in the usual way. At its back the valve has a cylindric neck B, which extends toward the lid C of the steam-chest and carries a balance-ring D. In Figs. 1, 2, and 3 the steam-pressure is outside of the valve, and therefore the cylindric neck B in this instance is finished on its outside and the balance-ring D is fitted to surround it. This ring has a flange *c*, which is in contact with the lid C and is cut at *c'*. A lap-clip E exteriorly covers the cut in the ring. This lap-clip is a section of a ring and has a flange *d*, which takes under the edge of the ring D and fits the exterior of the cylindric neck, while its upper edge is in contact with the lid C. A rivet or screw *e* rigidly connects the clip to one end of the cut ring D, while the other end of the latter is free to slide behind the clip, whereby the ring adjusts itself to the cylindric neck B. It will thus be seen that the ring tightly embraces the said neck and that the lap-clip effectually closes the cut in said ring. The ring is held close up to the lid C by a spring, which comprises a number of radial arms G', which fit beneath the flange *c* at their outer ends and come together at the center to form a hub or boss *g*, through which extends a set-screw *h*, the pointed end of which seats upon a bar K, extending across the interior of the valve and preferably formed therewith. It will be obvious that by turning this screw the tension of the spring will be decreased or increased.

The usual exhaust-port has been shown, but it will be obvious that it might be dispensed with and the exhaust allowed to take place directly through the lid C, which would then be provided with an opening above the balance-chamber, as shown in Fig. 10.

Fig. 9 shows the arrangement of the parts when the valve takes steam inside, and in this form of valve the balance-ring D is fitted inside of the cylindric neck B, and is turned slightly larger, so that it has to be compressed in fitting it in said ring, and hence will expand against the latter and fit colsely therein. In this arrangement the clip E is secured inside the ring and takes up beneath the latter, as in the former case, so as to effectually close the cut. The flange *c* extends outwardly instead of inwardly, and the spring bears against the lower edge of the ring.

With the construction described it will be seen that the balance-ring is so supported as to allow of a slight oscillation, to accommodate any deviation from parallelism of the lid C and the valve-seat. It will be observed that the lap-clip is of such form as to perfectly close the cut in the ring and at the same time allow said ring to expand or contract to accommodate itself to the cylindric extension B.

In the modified form shown in Figs. 6 and 7 the clip is slotted at *m*, and a screw *m'* engages this slot, and is threaded into the ring D. After the ring is closed up tightly on the neck B this screw may be turned, and secures the said ring in its tightened adjustment, making it practically a solid ring. When the ring becomes worn so that it leaks, the screw *m'* may be loosened and the ring taken up again.

In long and narrow valves two balance-rings may be used, as shown in Fig. 8.

In Figs. 10 and 11 my invention is shown applied to a six-ported gridiron valve, which exhausts through an opening L in the lid C. In this form of valve a large central balance-ring D is provided, and is of the same form and construction as in the other forms of valves, except that the flange *c* has a rib *o* extending, down from its inside edge on the inside of the cylindric neck B. This rib serves to stiffen the balance-ring and also, in case of breakage, to hold the pieces in place. The exhaust takes place through the passages *p* between the bars P of the valve and thence through the balance-ring D and opening L in the lid. The spring G′ is supported, as in the other forms of valves, by a cross-bar or web K.

In addition to the central balance-ring D four smaller rings Q are provided and located at the corner of the valve. In construction they are exactly the same as the rings in the ordinary slide-valve hereinbefore described. These auxiliary rings Q are connected with the steam-ports *a′* by passages *s* in the cross-bar or web K, which passages lead out of chambers *r* in the face of the valve over the steam-ports. This is to prevent the lifting of the valve from its seat.

It will be evident that the clip E might extend all the way around the balance-ring and form a cut ring like the latter, breaking joint therewith in the same manner as piston-packing rings.

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

1. The combination of a slide-valve having a cylindric neck at the back, a yoke and rod for said valve, a balance-ring fitting said cylindric neck and bearing against the lid of the steam-chest, said ring having a cut, and a lap-clip closing said cut and secured to one end of the balance-ring and overlapping the other end, said clip fitting against the lid of the steam-chest and having a flange which takes under the edge of the balance-ring and against the cylindric neck.

2. The combination of a slide-valve having a cylindric neck at the back, a yoke and rod for said valve, a cut balance-ring fitting said cylindric neck and having a flange which projects over the top edge of the same and bears against the lid of the steam-chest, a lap-clip closing the cut in said ring and having a flange which takes beneath the ring and against the cylindric neck, and a spring in the cylindric neck bearing under the projecting flange of the balance-ring to hold the same in contact with the lid of the steam-chest.

3. The combination of a slide-valve having a cylindric neck at the back, a yoke and rod for said valve, a cut balance-ring fitting said cylindric neck and having a flange which projects over the top edge of the same and bears against the lid of the steam-chest, a lap-clip closing the cut in said ring, and a spring having diverging arms and a boss at the center through which extends an adjusting-screw bearing on a bar extending across the cylindric neck, the end of said diverging arms bearing under the balance-ring flange to hold the latter in contact with the lid of the steam-chest.

4. The combination of a slide-valve having a cylindric neck at the back, a yoke and rod for said valve, a cut balance-ring fitting said cylindric neck and bearing against the lid of the steam-chest, said ring having a cut, and a lap-clip closing said cut and secured to one end of the balance-ring and overlapping, the overlapping part having a slot engaged by a set-screw in the balance-ring, said clip fitting against the lid of the steam-chest and having a flange which takes under the edge of the balance-ring and against the cylindric neck.

In testimony whereof I affix my signature in the presence of two witnesses.

EDWARD P. COWLES.

Witnesses:
F. P. DAVIS,
CHAS. B. MANN.