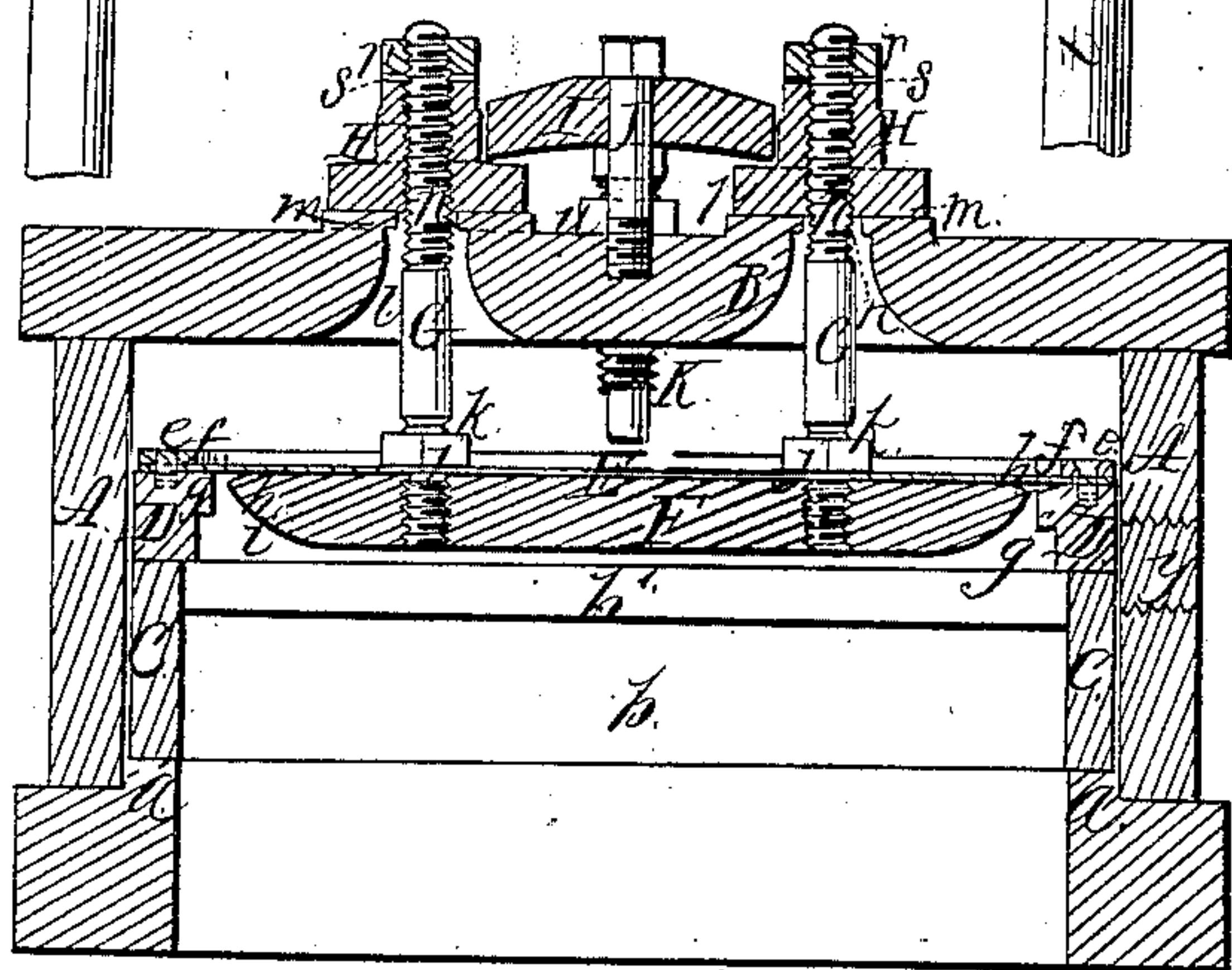
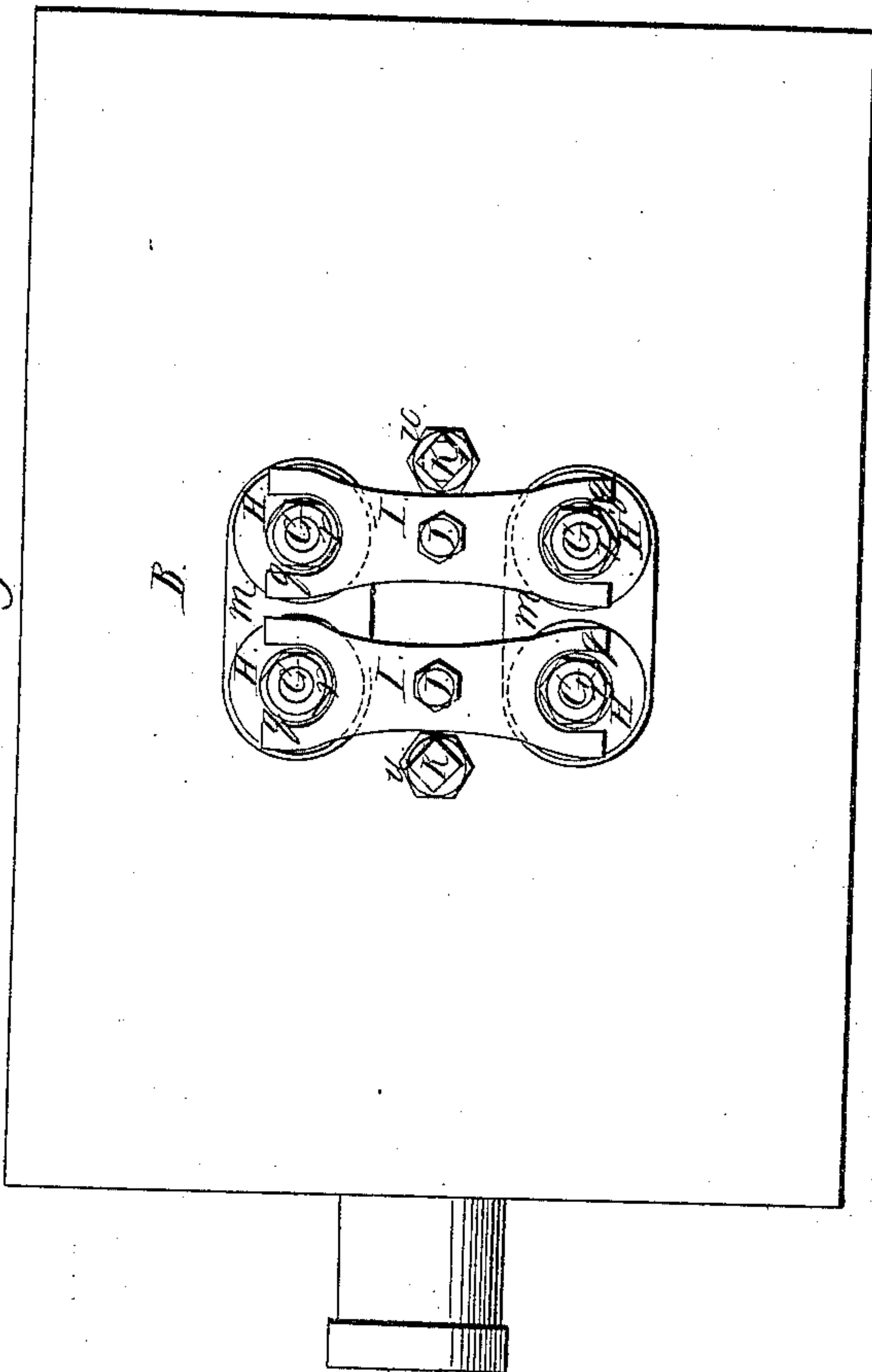
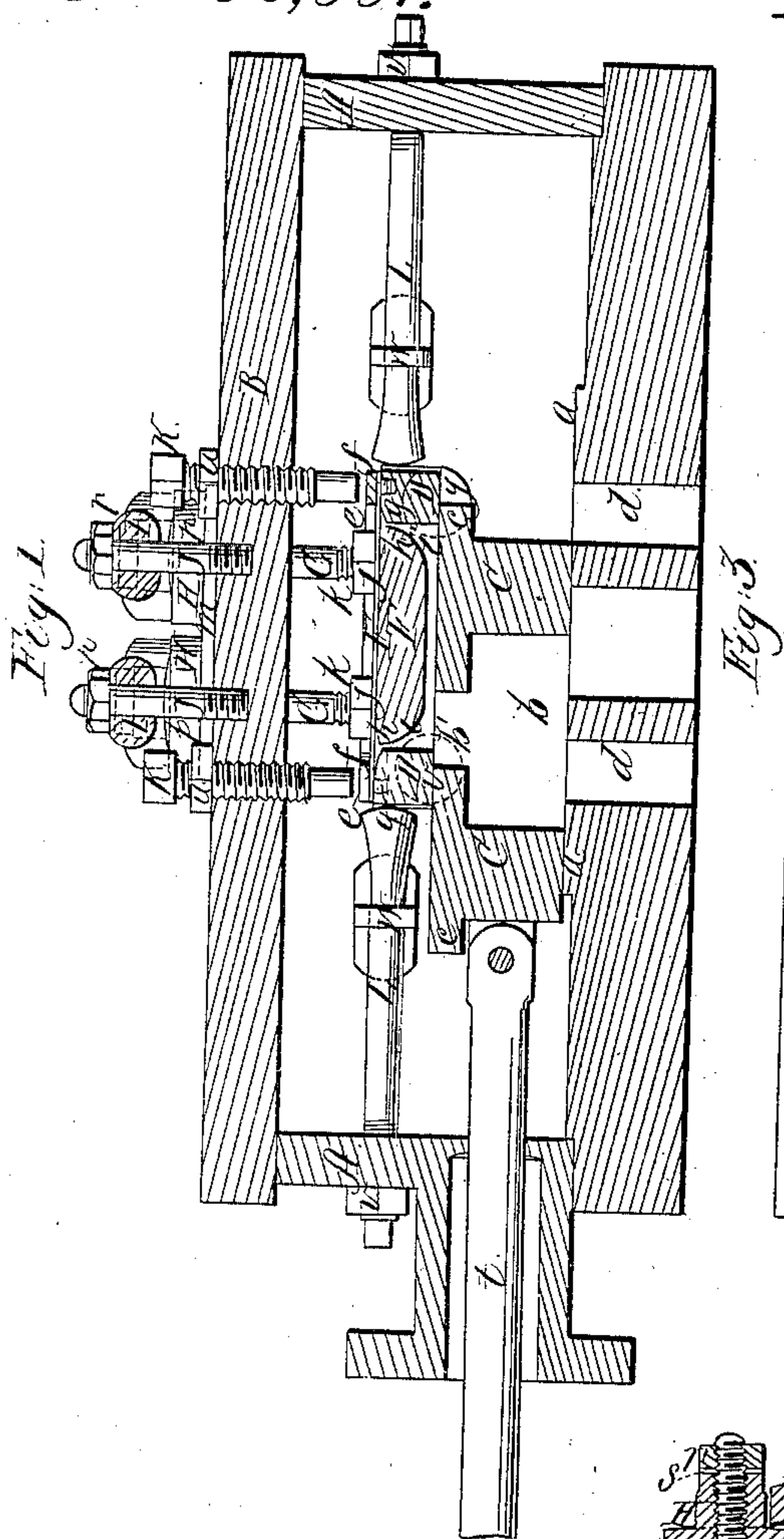


A. Buchanan,
Steam Balanced Valve.

N^o 50,331.

Patented Oct. 10, 1865.



Witnesses:
Henry T. Brown
J. W. Coombs

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UNITED STATES PATENT OFFICE.

ALEXANDER BUCHANAN, OF NEW YORK, N. Y.

IMPROVEMENT IN SLIDE-VALVES.

Specification forming part of Letters Patent No. **50,321**, dated October 10, 1865; antedated September 30, 1865.

To all whom it may concern:

Be it known that I, ALEXANDER BUCHANAN, of the city, county, and State of New York, have invented a new and useful Improvement in Means of Relieving the Slide-Valves of Engines from Excessive 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 drawings, forming part of this specification, in which—

Figure 1 is a central longitudinal vertical section of a valve-chest, slide-valve, and their appurtenances, illustrating my invention. Fig. 2 is a transverse vertical section of the same. Fig. 3 is a plan.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates to the use of a flexible valve-cover attached to the inflexible cover of the valve-chest, for the purpose of protecting the back of the slide-valve to as great an extent as desired from the pressure of the steam in the chest.

It consists in a novel construction of the said flexible cover, a novel mode of attaching the same to the inflexible cover of the valve-chest, and certain novel means of adjusting the same and keeping it in place, whereby great facility is afforded for the necessary adjustments, and all liability to corrosion of the parts is obviated.

To enable others skilled in the art to make and apply my invention, I will proceed to describe it with reference to the drawings.

A is the valve-chest; B, the inflexible cover of the same; C, the slide-valve, and *a* the valve-seat.

The valve has its back surface planed or otherwise finished up parallel with its face. There is an opening, *b'*, in the back communicating with its central exhaust-cavity, *b*, and it has flanges *c c* at its ends to increase the length of its back. In other respects it is substantially like slide-valves commonly used, and in the respects above mentioned it resembles some of what are termed "balanced valves." It is operated in the usual manner by an eccentric or any suitable valve-gear connected with its stem *t*.

D, E, and F are the principal parts of the flexible valve-cover. The part D is a quadran-

gular frame, of cast-iron, brass, or other metal, of a width equal to the width of the valve, and of a length equal to the distance between the outer edges of the ports *d d* in the valve-seat. Its lower face is planed or otherwise finished up to a flat surface to fit the back of the valve, and its upper face is planed or otherwise finished parallel with the lower one. The part E consists of a thin flexible elastic plate, of steel or other suitable metal, the margin of which is clamped to the frame D by means of screws *e e* or rivets and a clamping-piece, *f*. The part F consists of an inflexible plate secured to the under side of the flexible plate E. This plate F is of a form corresponding with the interior of the frame D, but of a size sufficiently smaller to allow it to work up and down freely within the said frame without touching, and its object is to confine the flexibility of the plate E near the interior of the frame D.

In order to obtain the necessary degree of flexibility of the plate E, the inner edge of the upper side of the frame D is beveled or rounded off, as shown at *g g* in Figs. 1 and 2, and the outer edge of the upper side of the plate F is beveled or rounded off in a similar manner, as shown at *h h* in the same figures, and to prevent corrosion between the plate F and the frame D the edge of the plate F is beveled or rounded off on the under side, as shown at *i i*, so as to make the edge quite thin or sharp.

The plate F is secured closely to the flexible plate E by means of screw-threads *k k* and nuts *j j* on the lower parts of the four perpendicular standing bolts G G, by which the flexible valve-cover is attached to the inflexible steam-chest cover. These bolts pass through holes in the plate E and screw into tapped holes in the plate F, and the nuts *j j*, which are fitted to the screw-threads *k k* above the plate F, are screwed so tightly down on the latter plate as to prevent any leakage of steam around the bolts through the holes in the said plate, and thus entirely exclude the steam in the chest from the under side of the valve-cover. The standing bolts G G pass through holes, *l l*, Fig. 2, in the inflexible valve-chest cover B, the said holes being large enough to give plenty of clearance around the bolts to allow the cover B to be easily taken off and put on the valve-chest without any danger of jamming or straining the said bolts, and

to allow the flexible cover to be set in its proper position over the valve without coming in contact with the sides of the said holes, the said proper position being such that the said cover occupies a central position over the parts *d d*.

Seats *m m*, Fig. 2, are formed upon the exterior of the chest-cover B, and faced parallel with the valve-seat, to form bearings for the under faces of the broad flanged bottoms of the adjusting-nuts H H, which are fitted to screw-threads *n n* on the upper parts of the said standing bolts, the said faces being scraped or ground with emery to fit the said seats *m m* so that the said nuts may form steam-tight valve-like joints with the said seats when held down by clamping-pieces I I and screw-bolts J J, and thus prevent leakage through the holes *l l* in the cover B.

The clamping-pieces I I, two in number, consist of arched bars, each of which bears upon the flanges *p p* of two of the nuts H H, both ends being forked to embrace the circular necks of the two nuts, as shown at *q q* in Fig. 3. One bolt J, inserted through a hole in the center of each clamping-piece and screwed into a tapped hole in the cover B, makes the clamping-piece hold down the two nuts firmly upon their seats *m m*.

Above the nuts H H nuts *r r* are applied to the screw-threads *n n*, with india-rubber washers *s s* below them, the said nuts *r r* serving to tighten the said washers in such a manner as to prevent any leakage of steam around the threads of the bolts G G.

The nuts H H support the bolts G G and the flexible valve-cover, and by turning the said nuts the bolts and valve-cover are adjusted in such a manner that when the pressure of steam comes on the back of the said cover it will just keep its frame D in steam-tight contact with the back of the valve, without allowing the pressure of steam on the back of the said cover to produce any considerable pressure or friction of the said frame on the back of the valve. By fitting the nuts H H to seats *m m*, and providing additional nuts *r r* and india-rubber washers *s s* on the bolts G G the adjustment is provided for without the use of either stuffing-boxes or caps to cover the adjusting-bolts, as are used with other methods of supporting and adjusting the valve-cover.

The frame D of the flexible cover is free to rise with the valve in case of any compression of steam on the exhaust side of the piston, or in case of working water in the cylinder, or when from any cause it becomes necessary; but it is desirable to prevent the said frame from rising so high as to strain the flexible plate E; and in order to effect this two or more guard-bolts, K K, are screwed through the inflexible cover B of the chest in such positions that their lower or inner ends will serve as stops to the said frame. These bolts are adjustable by a wrench outside of the cover B, and their adjustment is secured by jam-nuts *u u*, screwed down upon the cover B.

The beveling or rounding of the edges of the frame D and plate F, as shown at *g* and *h*, renders the plate E less liable to fracture than if the said frame D and plate F presented square edges to the said flexible plate E. It also obviates the necessity for frequent adjustment of the flexible cover to compensate for wear of the valve by allowing the frame D to follow further the wear of the valve-faces, and enables the said frame to rise more easily when the valve lifts from its seat.

The flexible valve-cover is kept in proper position lengthwise of the valve-chest by means of four adjustable bars, L L, arranged parallel with the valve-seat, two screwed into tapped holes in one end of the valve-chest and two into similar holes in the other end, and secured by jam-nuts *v v* outside. The inner ends of these bars, which come in contact with the frame D of the valve-cover, are slightly rounded. These bars have their outer ends formed to receive a wrench, by which, when the jam-nuts are slackened, they can be screwed in or out to adjust the flexible cover to the desired position over the ports. The said bars pass through and fit easily into stationary guides *w w*, secured to the sides of the valve-chest for the purpose of steadying them.

In one side of the valve-chest, opposite to the flexible valve-cover and back of the valves, there are two peep-holes, *x x*, through which to examine the position of the said valve-cover. These holes are fitted with tight screw-plugs *y y*, which are only removed when it is desired to adjust the valve and when steam is shut off from the valve-chest.

The method of applying and adjusting the flexible valve-cover and its appurtenances is as follows: The valve being in its seat, the adjustable bars L L are inserted through the guides *w w*, and screwed through the ends of the chest from the inside. The flexible cover, having the standing bolts G G secured in it, is then placed on the back of the valve and brought to its proper position, which is over the center of the throw of the valve. The bars L L are next adjusted to bring their inner ends into contact with the frame D of the valve-cover without either binding or allowing play or longitudinal movement of the said cover, and the jam-nuts *v* are then screwed up to secure this adjustment. The chest-cover B is next put on and screwed down, the standing bolts G G passing freely through the roomy holes *l l* provided therein. The flanged nuts H H are then put on the standing bolts G G and run down as far as the seats *m m*. A light now being held to one of the peep-holes *x x* enables the engineer looking through the other one to see the valve and flexible cover, and he turns the nuts H H in a direction to raise the flexible cover from the back of the valve, adjusting the cover to make the frame D nearly touch the valve. When this adjustment has been made the guard-bolts K K are adjusted and secured, and the clamping-pieces I I are

put on and screwed down by the bolts J J to secure the nuts H H, and the nuts *r r* and the washers *s s* are put on and screwed down. The flexible cover may require a further adjustment by means of the nuts H H after the engine has been heated by the steam.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The attachment of the flexible valve-cover to the inflexible cover of the steam-chest by standing bolts G G and flanged nuts H H, which are fitted to form steam-tight bearings on seats *m m* outside of the latter cover, substantially as herein specified.

2. The clamping-pieces I I and bolts J J, in combination with the flanged nuts H H, standing bolts G G, valve-chest cover B, and flexible valve-cover, substantially as and for the purpose herein specified.

3. The guard-bolts K K and jam-nuts *u u*, in combination with the inflexible valve-chest cover and flexible valve-cover, substantially as and for the purpose herein specified.

4. The longitudinally-adjustable stop-bars L L, applied at the ends of the valve-chest and adjustable from the exterior thereof, in combination with the flexible valve-cover, substantially as and for the purpose herein specified.

5. The nuts *r r* and elastic washers *s s*, in combination with the standing bolts G G and adjusting-nuts H H, substantially as and for the purpose herein specified.

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Witnesses:

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