

J. BAIRD.
BALANCED SLIDE VALVE.

No. 442,699.

Patented Dec. 16, 1890.

Fig. 2.

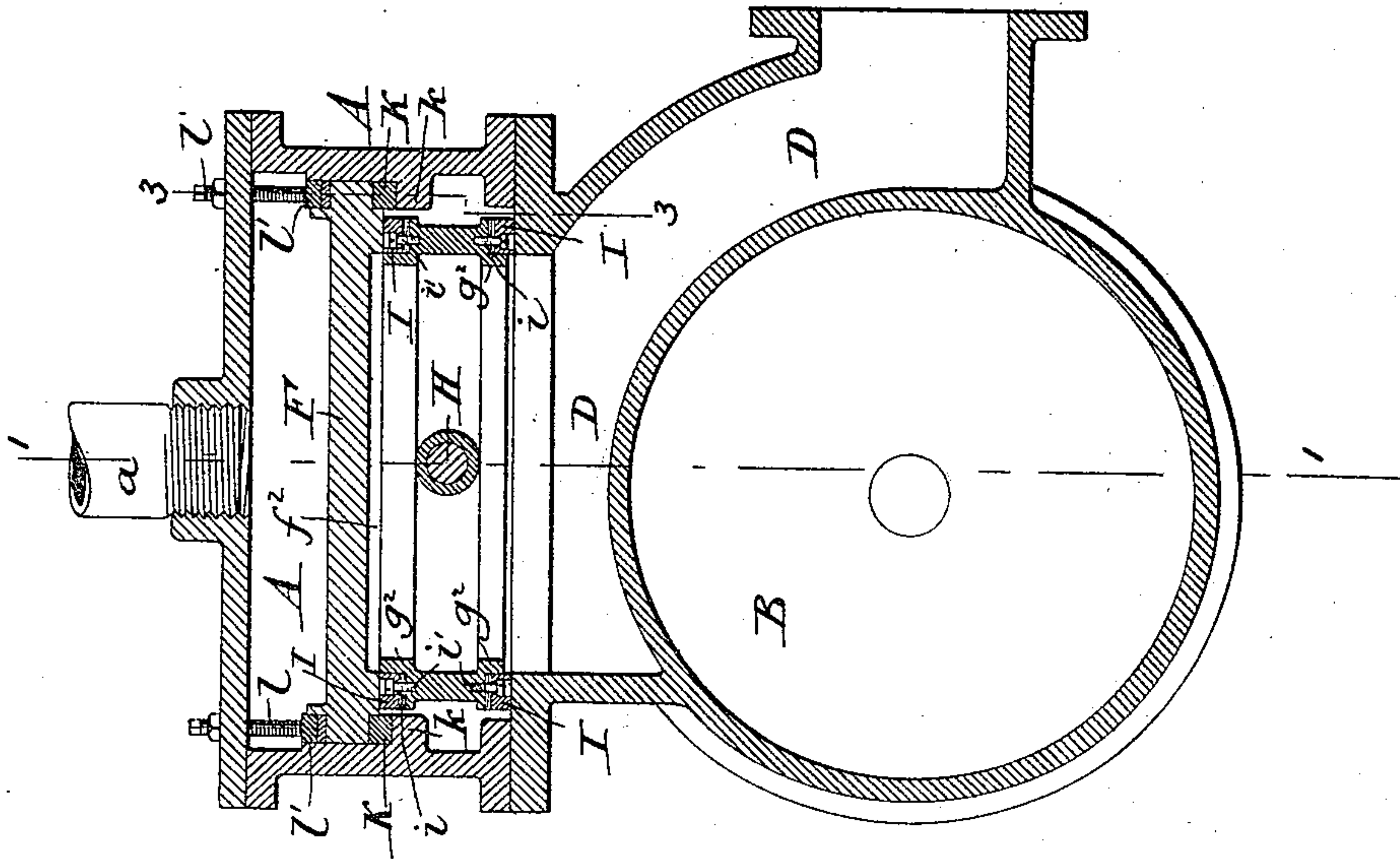
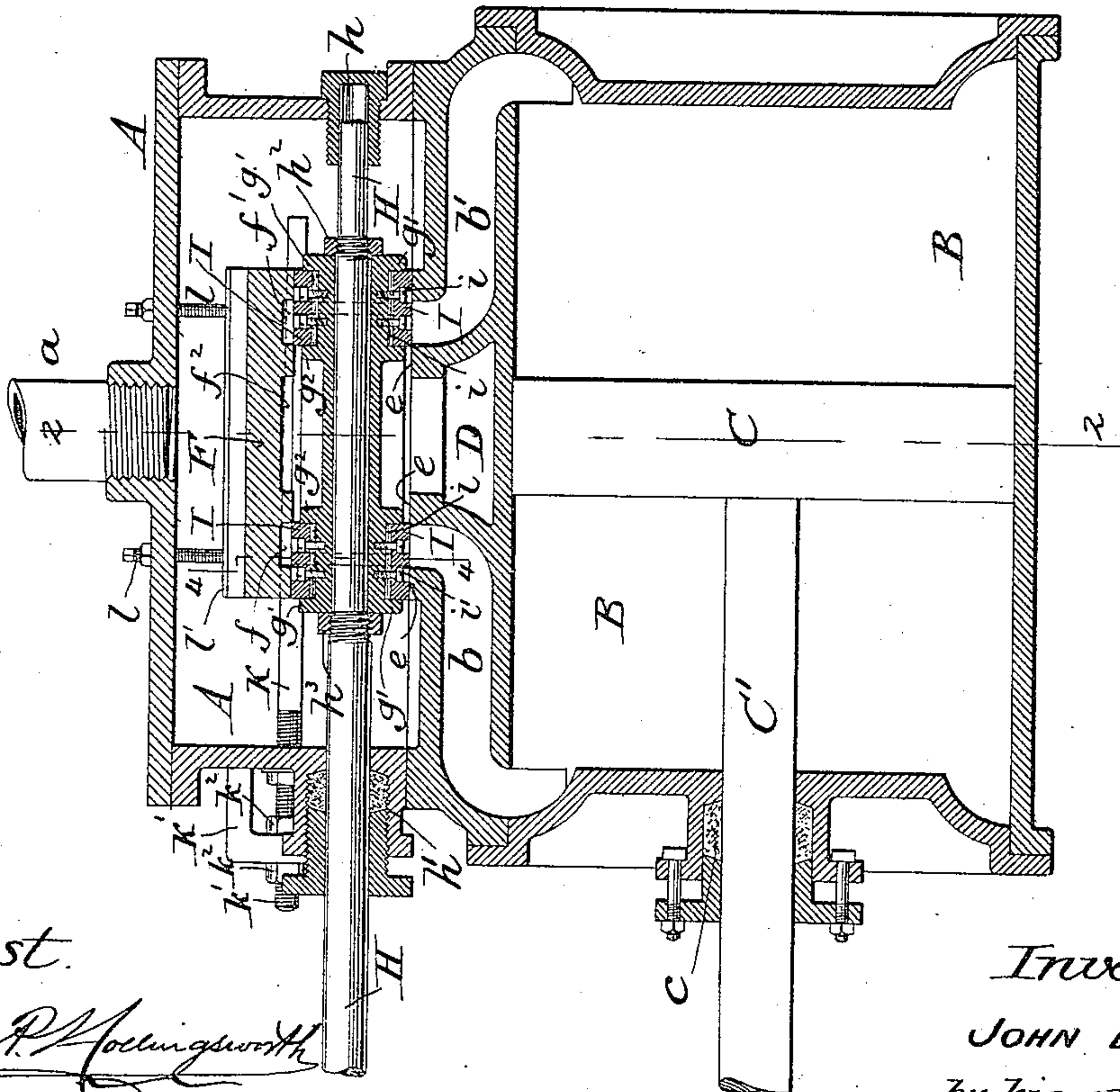


Fig. 1
ON LINE 1-1



Attest.
Sidney P. Hoeltingworth
B. Miller.

Inventor
JOHN BAIRD
by his attorneys
Baldwin Davidson & Wright

(No Model.)

2 Sheets—Sheet 2.

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Fig. 7.

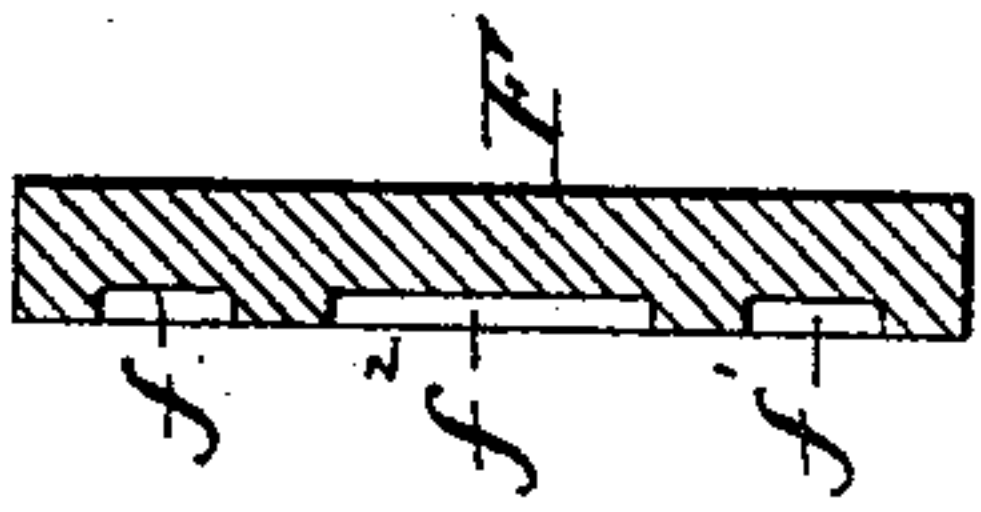


Fig. 6.

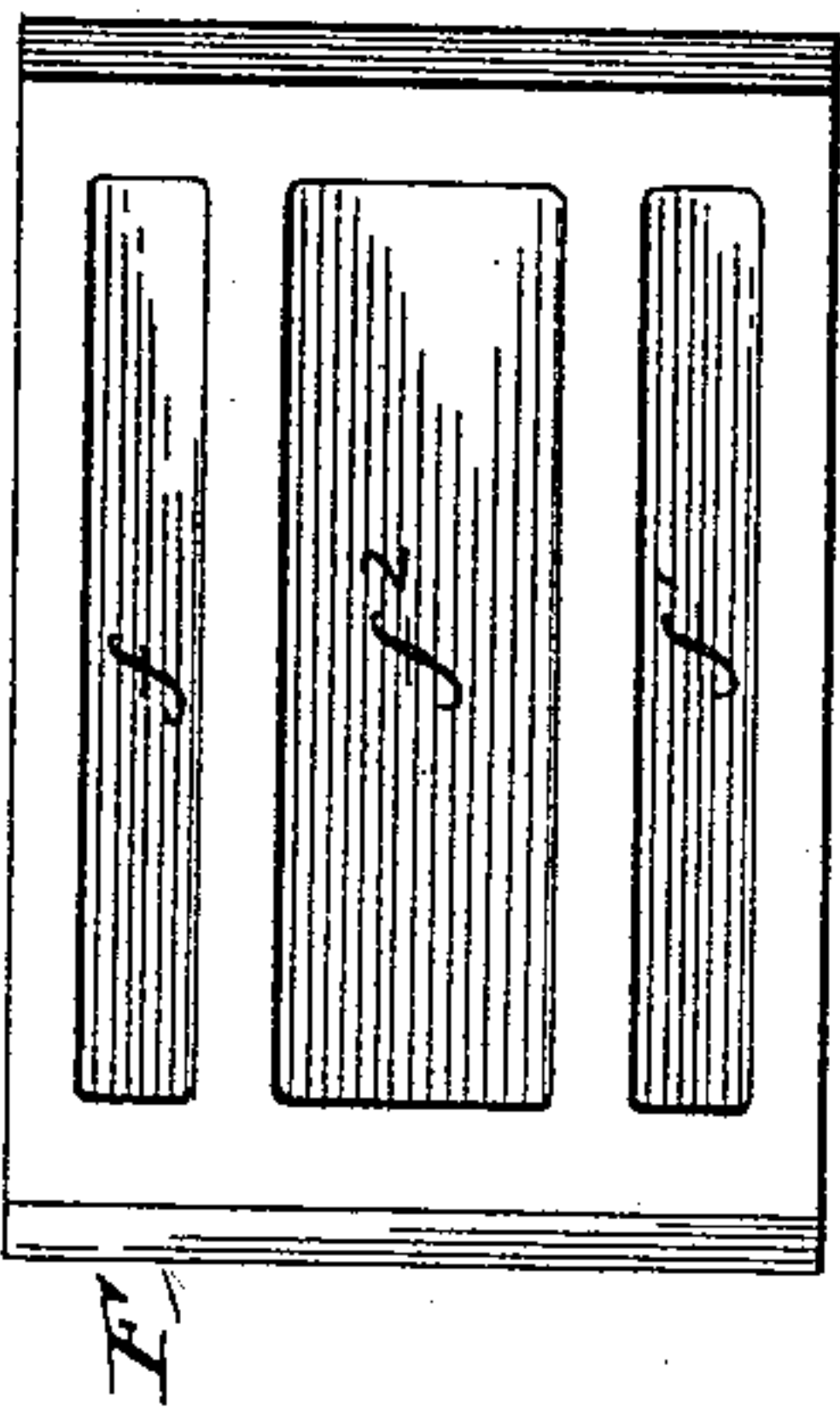


Fig. 8.

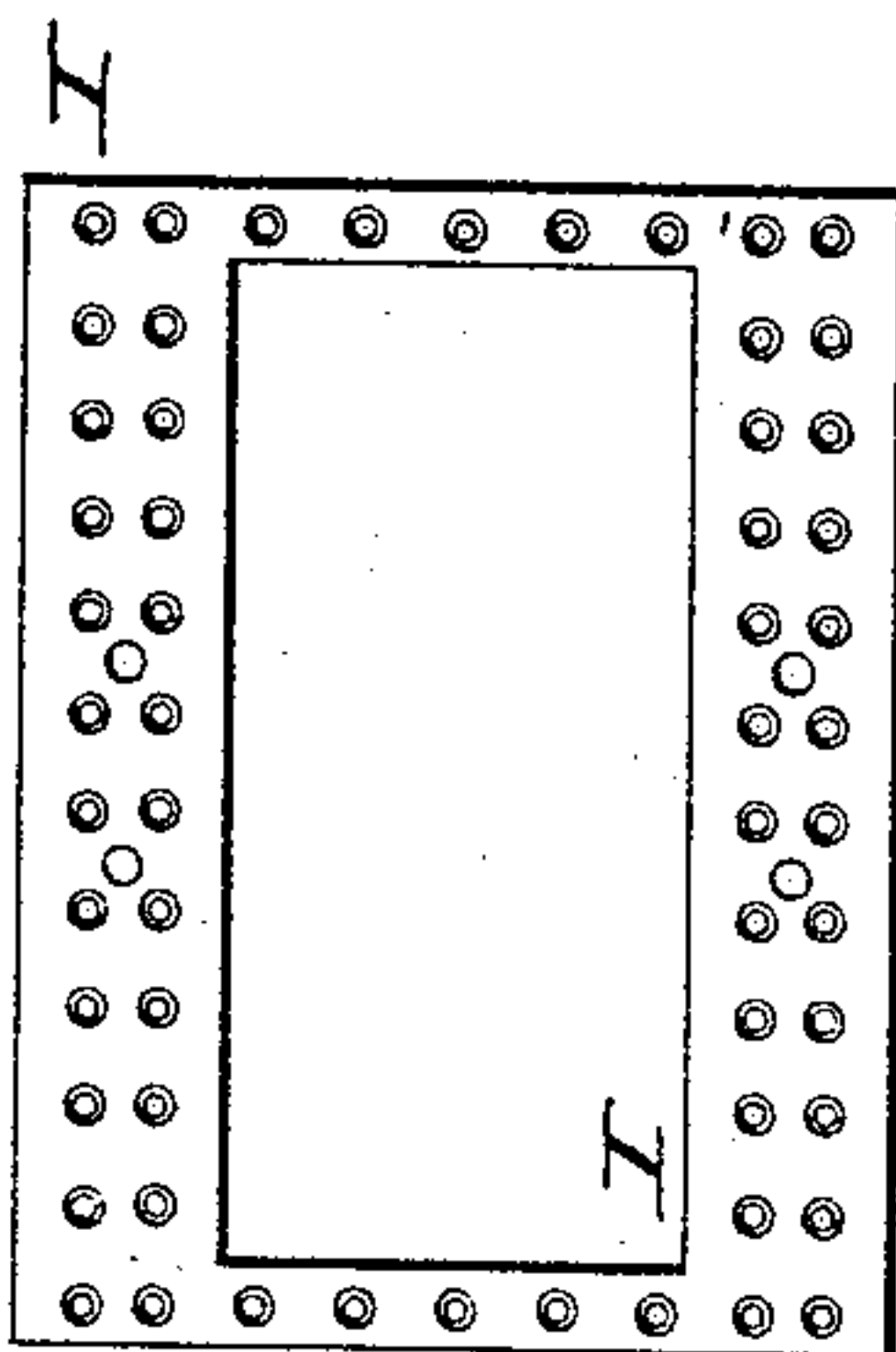


Fig. 9.

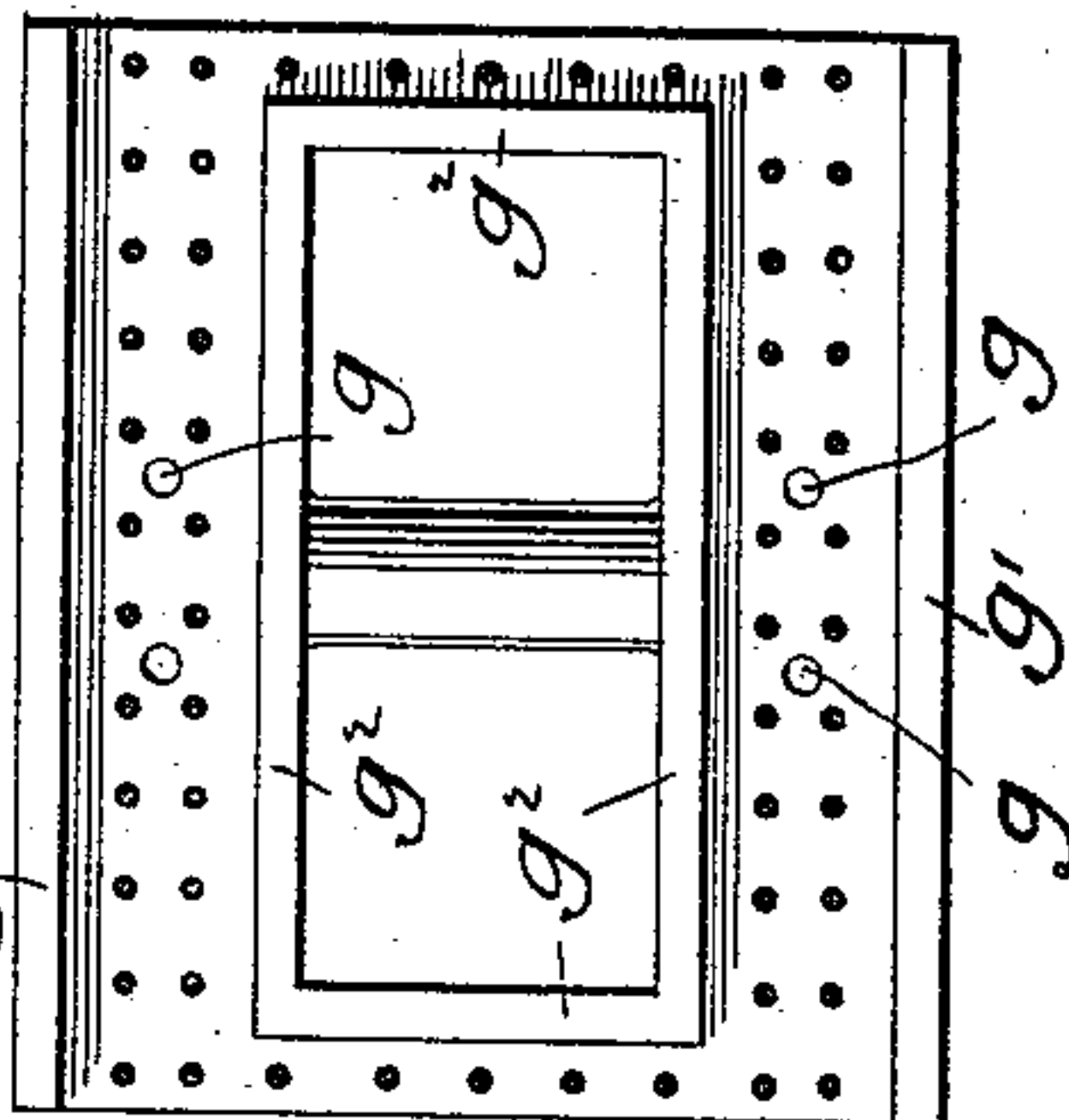


Fig. 3.

ON LINE 3-3

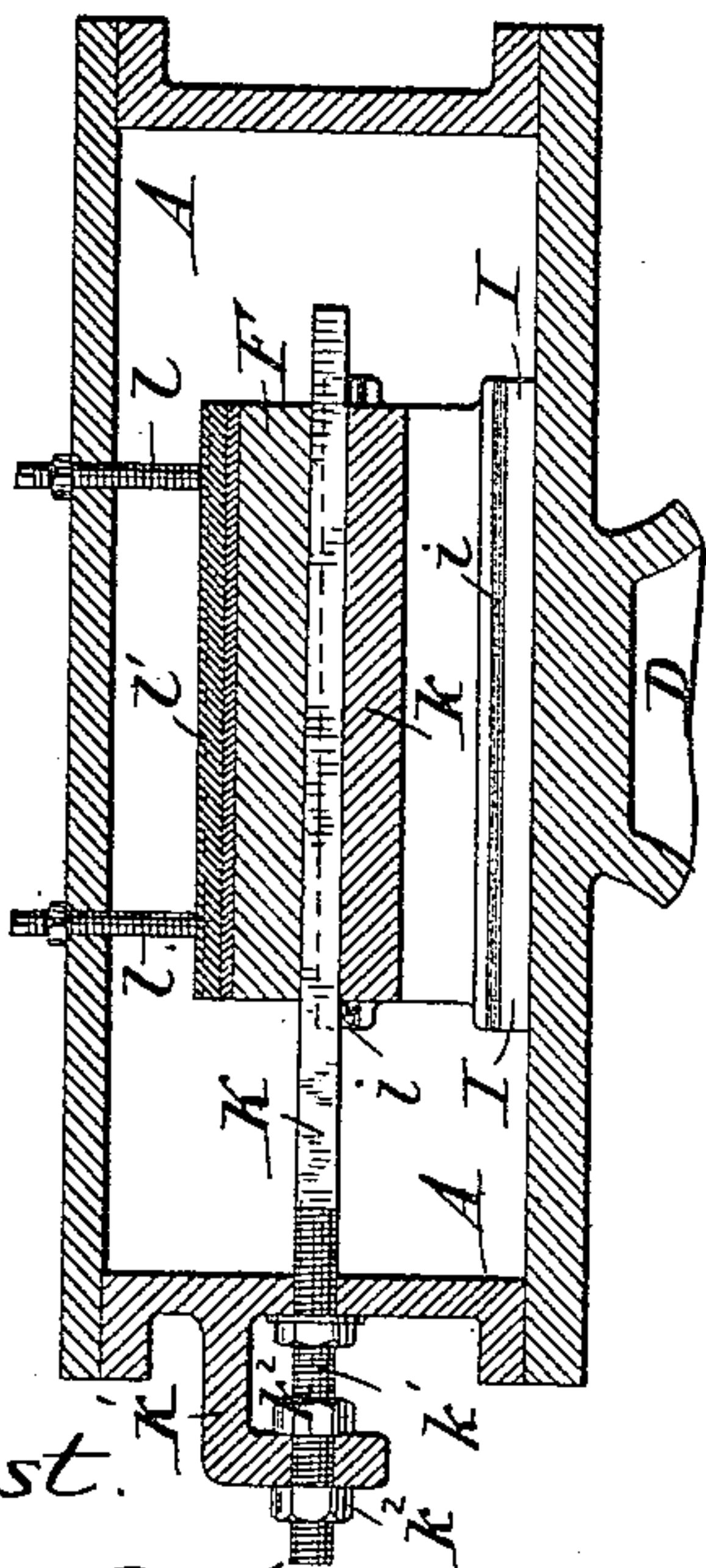


Fig. 4.

ON LINE 4-4

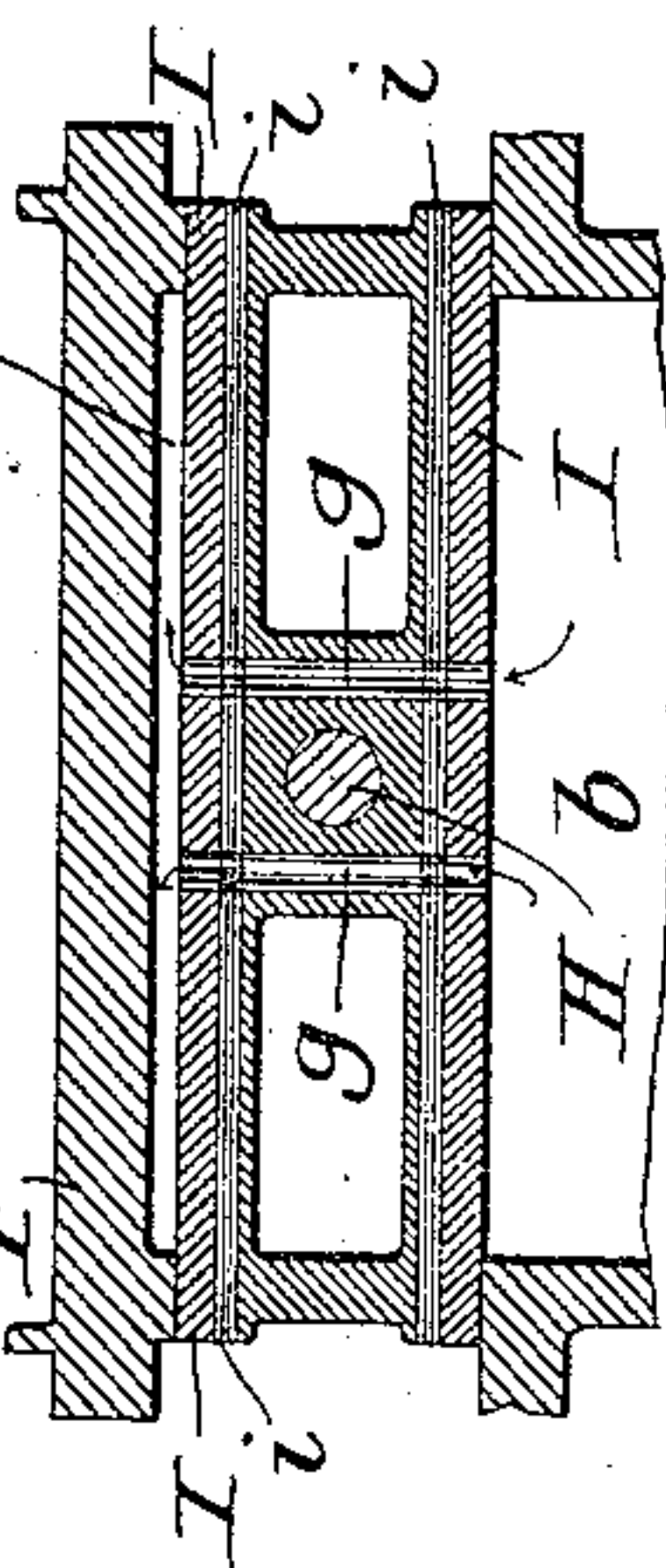
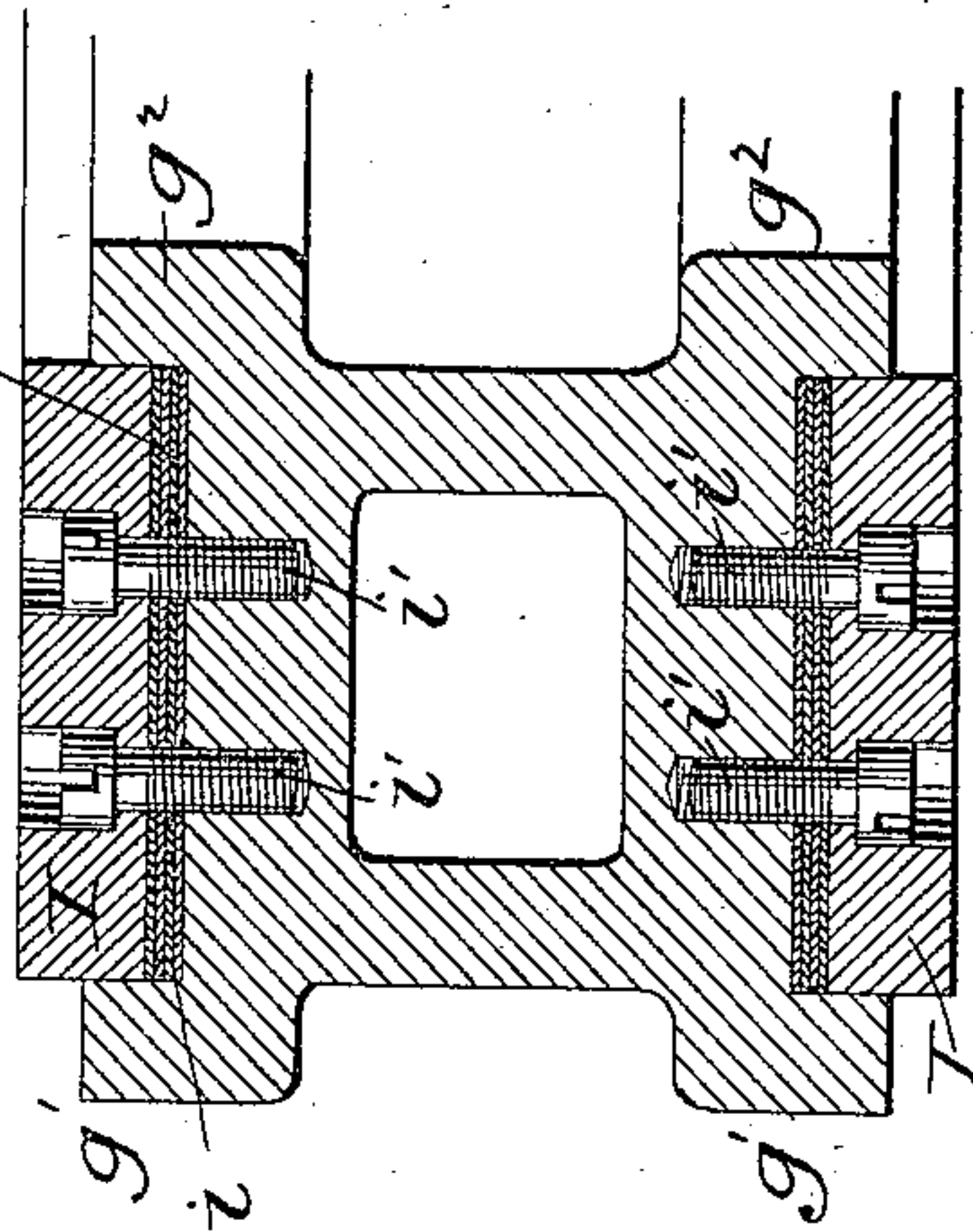


Fig. 5.



Attest.

Samuel P. Hockingworth
B. Miller

Inventor

JOHN BAIRD

by his attorneys

Baldwin, Davidson & Wright.

UNITED STATES PATENT OFFICE.

JOHN BAIRD, OF NEW YORK, N. Y.

BALANCED SLIDE-VALVE.

SPECIFICATION forming part of Letters Patent No. 442,699, dated December 16, 1890.

Application filed September 17, 1890. Serial No. 365,210. (No model.)

To all whom it may concern:

Be it known that I, JOHN BAIRD, mechanical engineer, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Steam-Engine Balanced Slide-Valves, of which the following is a specification.

My invention relates to that class of balanced valves which slide between the valve-face and the face-plate parallel therewith, and constitutes an improvement upon the valve shown in United States Patent No. 37,802, granted to me March 3, 1863.

The objects of my present improvements are to secure a valve which will work steam-tight with comparatively little friction and having the capacity of being maintained at all times in correct alignment or adjustment with the other parts of the apparatus.

To carry out the objects of my invention I interpose between the valve and valve-face a valve-plate maintained in proper relation to the valve-face by means of a series of thin sheets or plates of soft or yellow metal—such as brass—interposed between the valve and valve-plate. I also provide suitable clamping, guiding, and adjusting devices for maintaining these parts in proper relation.

The subject-matter claimed is hereinafter specified.

The accompanying drawings represent so much of my improved apparatus as is necessary to illustrate the subject-matter herein claimed.

Unless otherwise indicated, the parts are of usual well-known construction and organization.

Figure 1 is a vertical longitudinal section on the line 1 1 of Fig. 2, which latter is a transverse section on the line 2 2 of Fig. 1; Fig. 3, a vertical longitudinal section on the line 3 3 of Fig. 2; Fig. 4, a vertical transverse section on the line 4 4 of Fig. 1; Fig. 5, a vertical section through one end of the valve, showing its details of construction. Fig. 6 is a plan, and Fig. 7 a cross-section, of the face-plate; Fig. 8, a plan of the valve-plate, and Fig. 9 a similar view of the valve.

Steam from the boiler enters the valve-chest A through an inlet-pipe *a*, and escapes there-

from through ports or steam-passages *b b'* to a cylinder B, provided with a piston C, the rod C' of which passes through a gland *c* in the cylinder-head, as usual. The exhaust-port D is shown as arranged between the inlets *b b'*. The valve-face *e'* is parallel with the face of the cylinder and with the face-plate F. The surface of this face-plate in contact with the valve is of the same length and width as the valve-face. Recesses *f f'* *f²* are made in the face-plate directly opposite to and of the same size as the steam-ports *b b'* and exhaust-port D, in order that the pressure on each side of the valve shall always be equal. The recess *f²* in the face-plate opposite the exhaust-port D is always in direct communication with it; but the recesses *f f'* opposite the steam-ports in some positions of the valve will not have such communication. This difficulty is obviated by providing openings *g*, passing entirely through the valve, thus insuring equal pressure on both its sides.

The valve G is of the skeleton variety and reciprocates between the valve-face and face-plate. To insure the maintenance of the valve in a correct position, it is mounted on a spindle H, passing entirely through the valve, the inner end of the spindle working in a guide *h* in the valve-chest. The opposite end of the spindle passes through a stuffing-box *h'*, as usual. Nuts *h² h³* at opposite ends of the valve act on the screw-threads on the spindle to adjust the valve properly relatively to its ports. Lips or projections *g' g²* on the valve inclose plates I on both sides and ends thereof, fitting snugly between the lips. The plates are preferably made of bronze or gun metal, but may be made of other metal, and usually from three-quarters of an inch to an inch in thickness, their faces accurately fitting the valve-face. Although not essential to safe operation, I prefer to fasten the plates to the valve by screw-bolts *i'*. Between the valve and these valve-plates I interpose a series of thin sheets *i* of soft metal—such as brass or yellow metal—superimposed upon one another, and secured in position by the screw-bolts above mentioned. These plates may vary from three to seven in number when compressed, being about three-sixteenths of an inch thick in the aggregate. In some cases

I provide the valve-plate and packing on one side only of the valve, its other side working against the valve-face or face-plate.

The distance between the valve-face and
 5 the face-plate is maintained and adjusted by means of tapering keys K, resting on projections *k* on the side of the steam-chest, and bearing against the sides of the face-plate. These keys taper very slightly, not exceeding
 10 one-eighth of an inch to fifteen inches in length. By moving the keys forward or backward the distance between the valve-face and the face-plate may be adjusted to less than the two-hundredth part of an inch. This
 15 longitudinal adjustment of the keys is effected by means of a screwed spindle *k'* passing through a bracket K' on the valve-chest and regulated by nuts *k²* *k²*. The face-plate is likewise secured in place and rendered ad-
 20 justable by screw-bolts *l* *l*, passing through the valve-chest. These screw-bolts act against bearing-plates *l'*, resting on the face-plate, thus coacting with the keys K to hold the face-plate firmly in its adjusted position.
 25 The valve itself does not support this face-plate, but the sheets *i*, interposed between the valve and the valve-plate, constitute an elastic packing between the valve-plate and valve-face, acting somewhat in the manner
 30 of the ordinary spring piston-packing. As before remarked, these plates are fastened to the valve by screw-bolts *i'*, which, although preferred for safety, are not essential. The thin sheet-metal packing *i*, being com-
 35 posed of separate sheets, acts within a limited range similarly to a spiral or elliptic spring, their thickness being reduced under compression and increased by the springing apart of the sheets when released from pressure.
 40 A moderate pressure serves to maintain the valve-plate in contact with the valve-face and face-plate, and thus prevent the leakage of steam. The valve, being perfectly balanced, works with little friction, and consequently
 45 requires little power for its operation. The steam supply and exhaust passages may consequently be made larger than usual, and thus give increased power and freedom of movement to engines revolving rapidly. As
 50 the valve-spindle passes entirely through the valve and is guided at both ends, its accurate alignment is preserved and wear on its sides prevented, and the central portion of the spindle itself, being inclosed within the central

rib or portion of the skeleton valve, is prevented from springing out of line. 55

My patent No. 37,802, above mentioned, shows a solid skeleton valve working between a valve-face and face-plate, and perforated for the passage of steam, the face-plate 60 being adjustable by tapering keys. I do not, therefore, broadly claim any of these features herein.

Having thus fully described the construction and organization of my improved balanced slide-valve, what I claim therein as new and as of my own invention is— 65

1. The combination, substantially as hereinbefore set forth, of a valve-face, a face-plate, a valve sliding between them, a valve-plate 70 carried by the valve, and a packing consisting of thin sheets of yellow metal, such as brass, interposed between the valve and valve-plate.

2. The combination, substantially as hereinbefore set forth, of a steam-cylinder, its inlet and exhaust ports, a valve-face, a face-plate, a skeleton valve sliding between the valve-face and face-plate, valve-plates corresponding with the steam-ports, and a series 80 of thin yellow-metal plates interposed between each valve-plate and the valve.

3. The combination, substantially as hereinbefore set forth, of a valve-face, a face-plate, a valve sliding between them, valve-plates, a 85 series of thin sheets of yellow metal interposed between the valve and valve-plates, tapering keys movable endwise in bearings in the valve-chest and acting on the face-plate, and bearing-screws also acting on the face- 90 plate in opposition to the keys to adjust and hold the face-plate firmly in position.

4. The combination, substantially as hereinbefore set forth, of a valve-face, a face-plate, a skeleton valve sliding between them, valve- 95 plates, thin sheets of yellow metal interposed between the valve and face-plate, a valve-spindle passing through the valve and traversing-guides at each end thereof, and mechanism for adjusting the valve longitudinally 100 on the spindle to secure its correct adjustment and operation.

In testimony whereof I have hereunto subscribed my name.

JOHN BAIRD.

Witnesses:

HUBERT KOOPER,
 ADDISON W. BAIRD.