

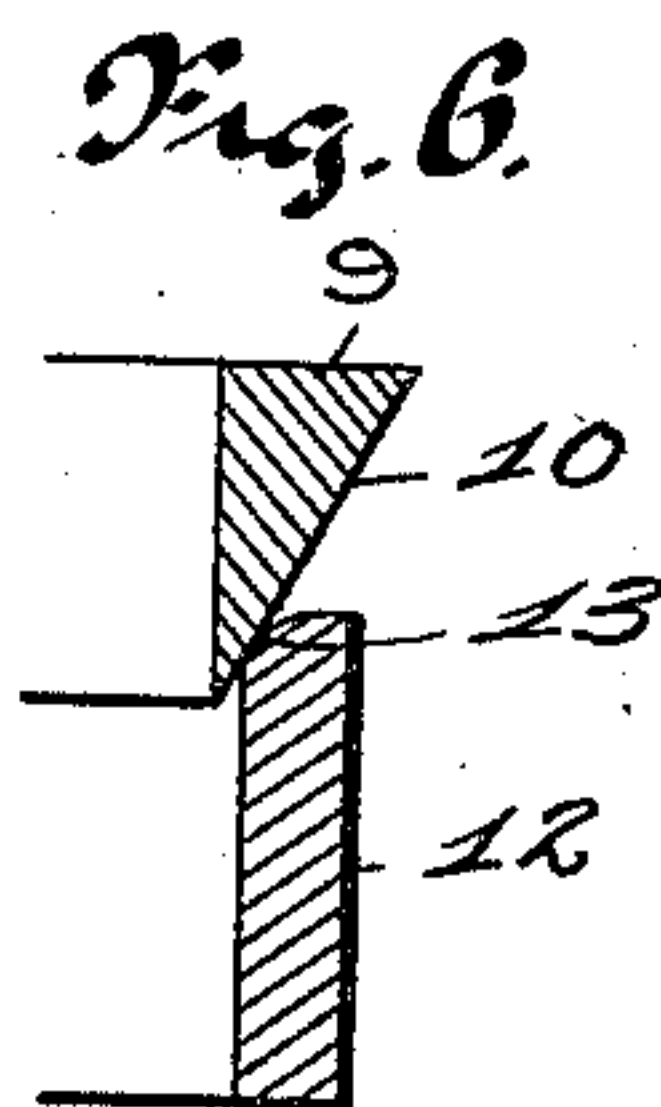
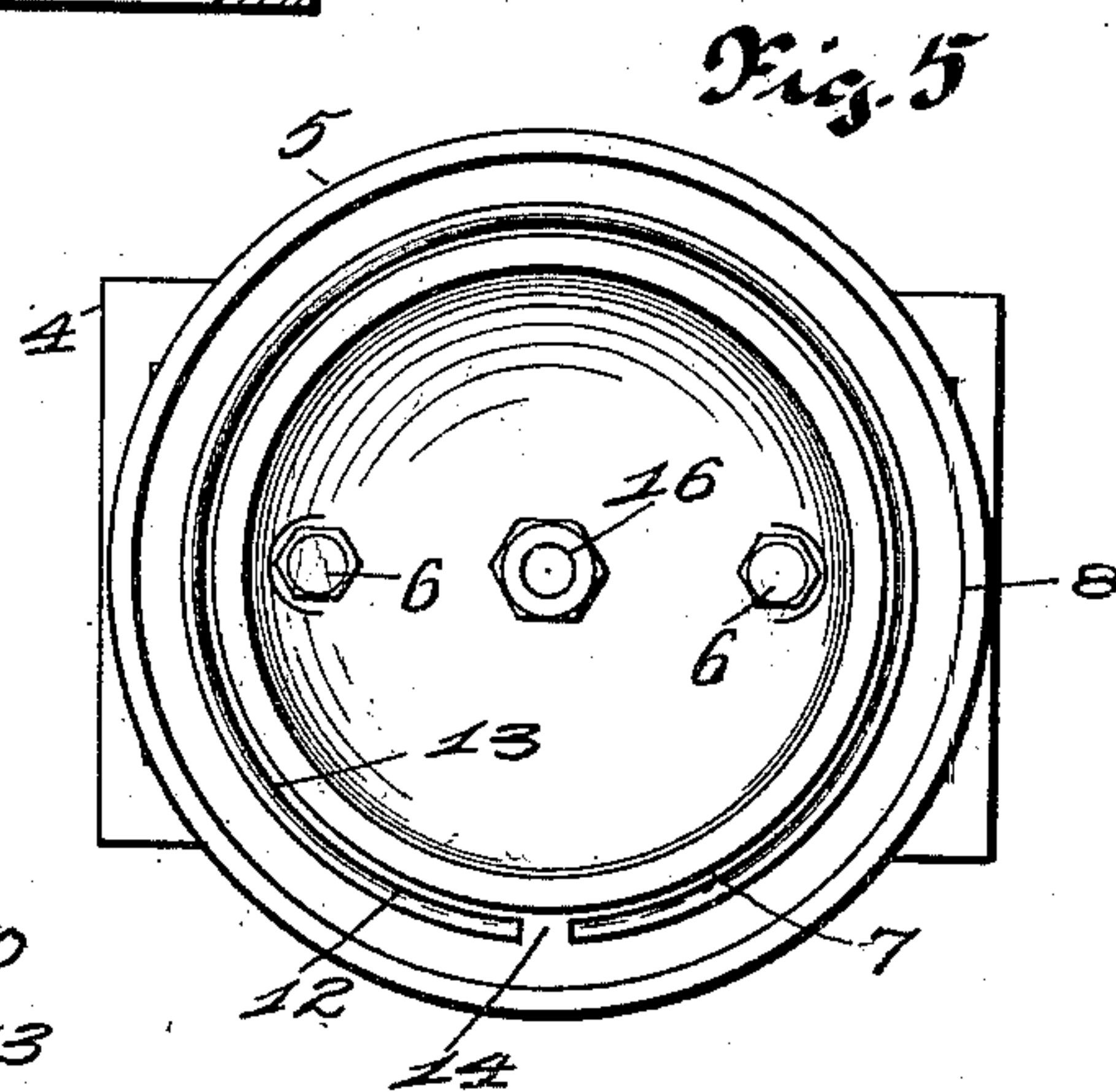
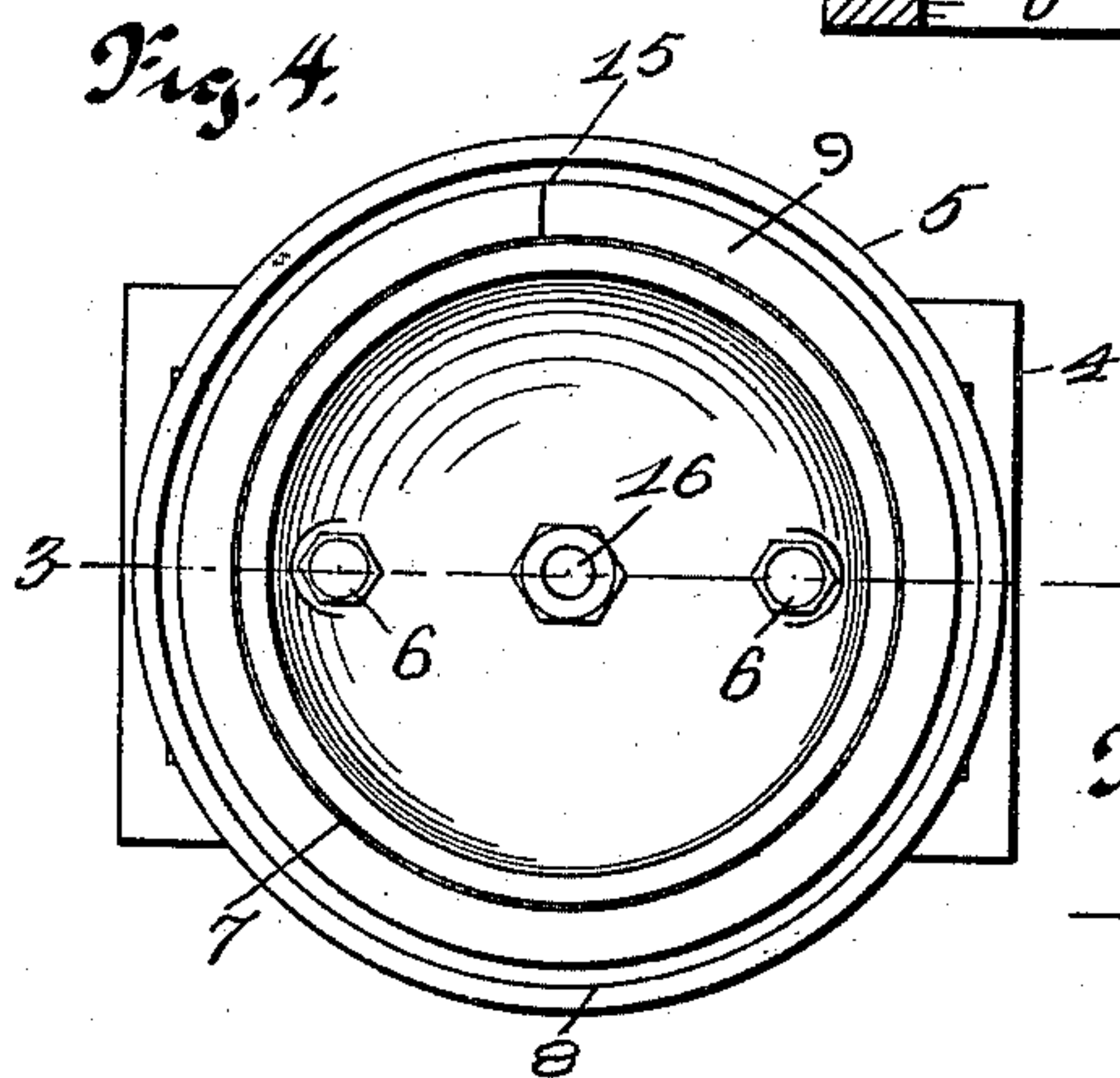
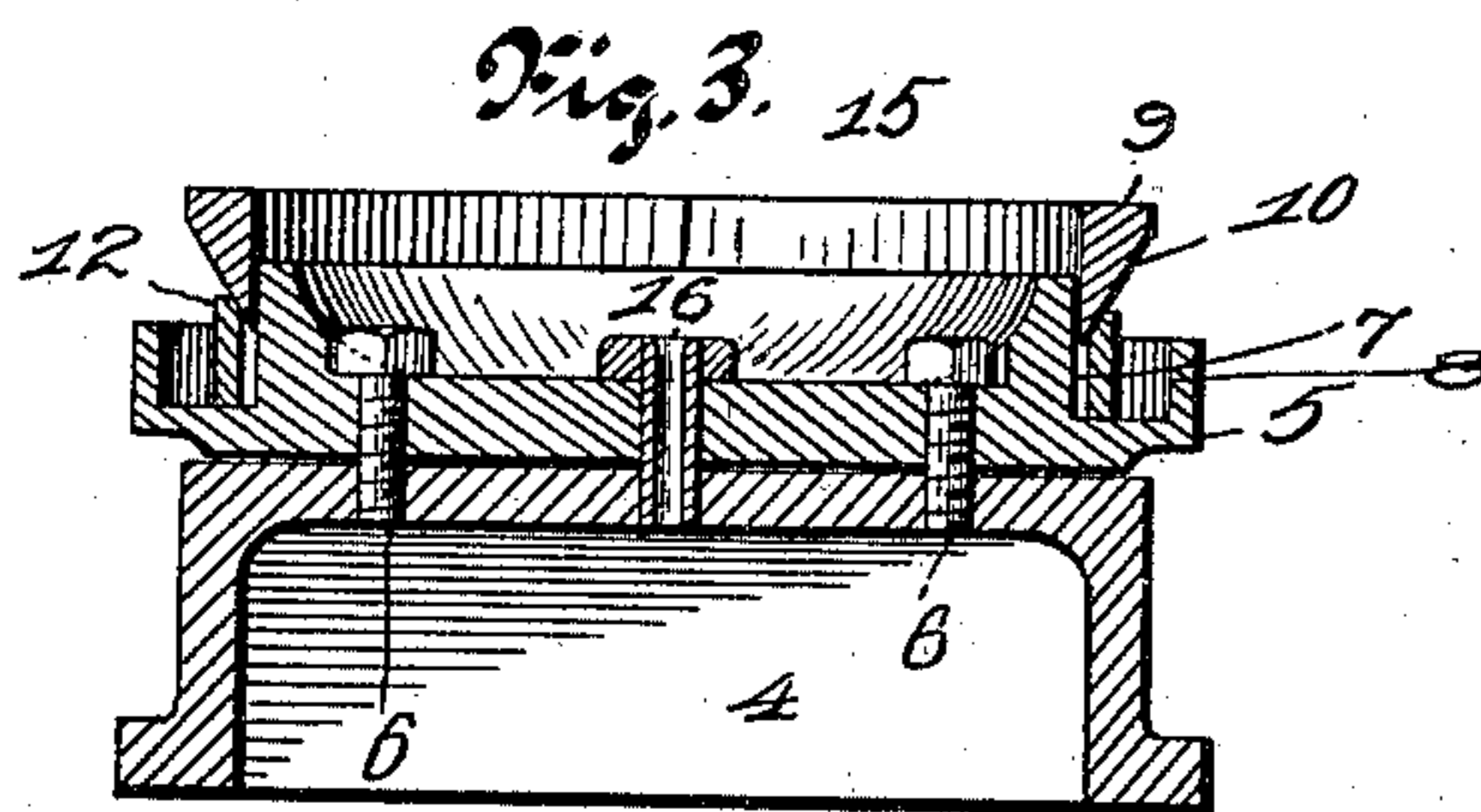
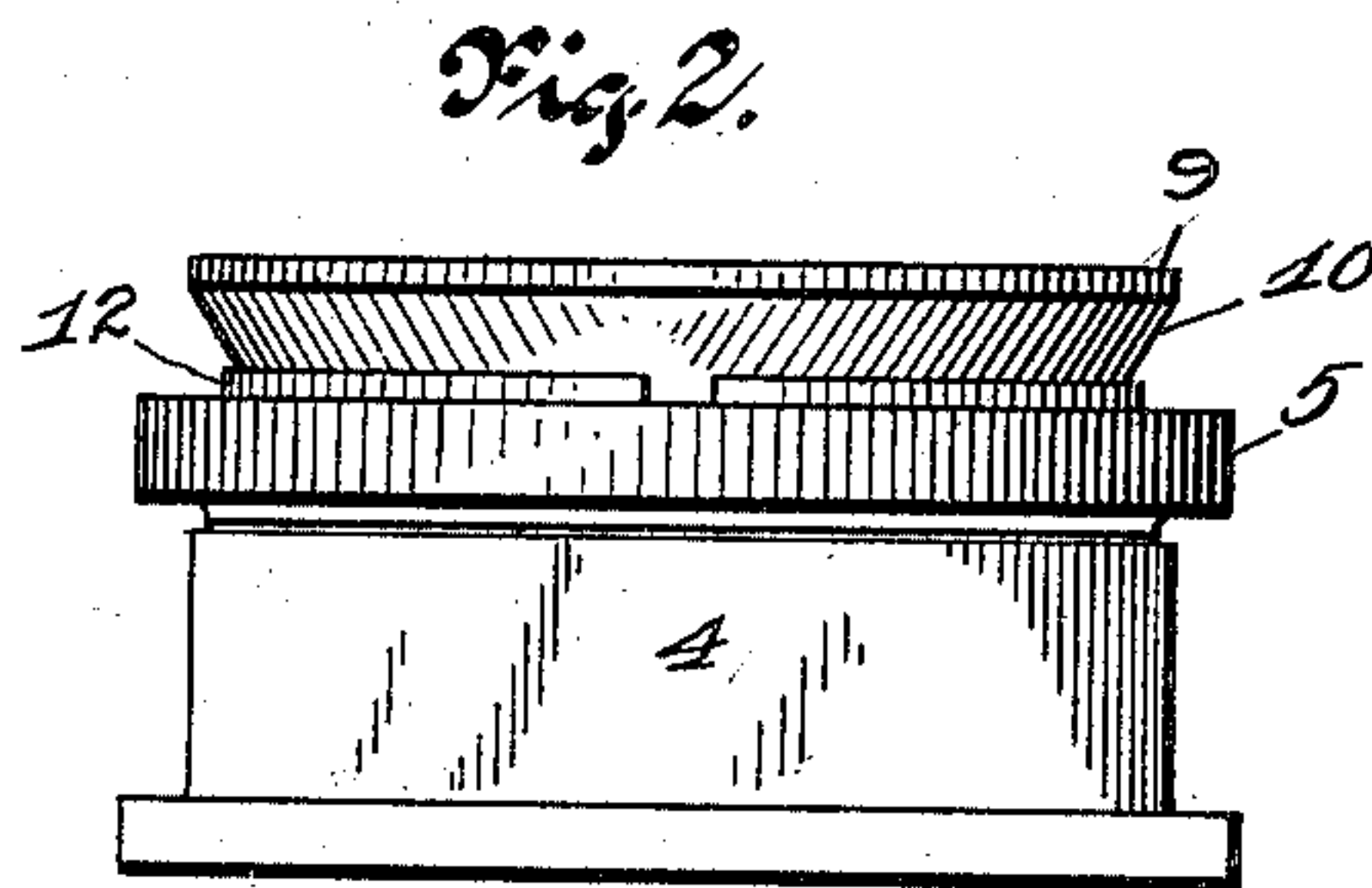
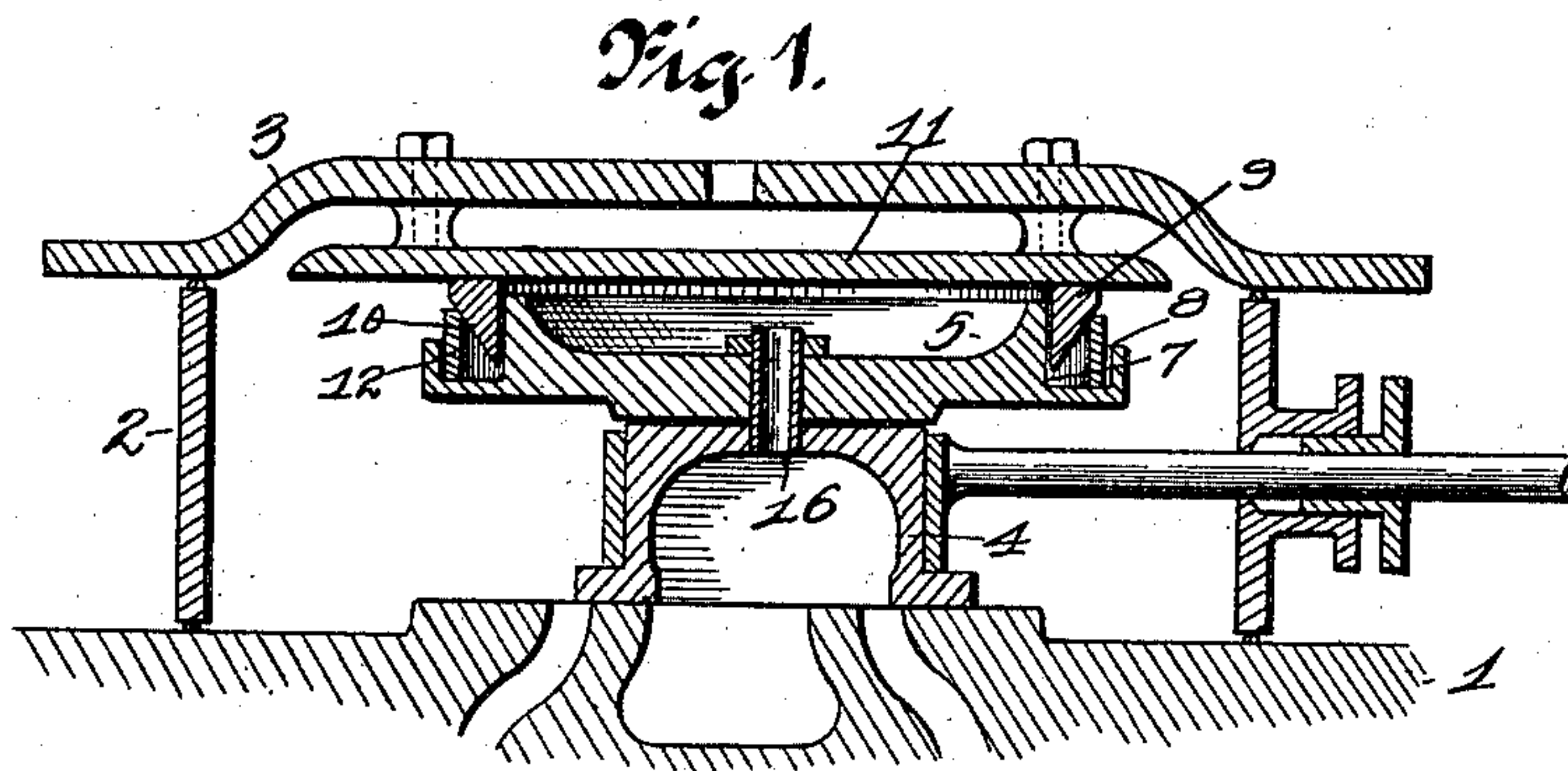
No. 696,718.

Patented Apr. 1, 1902.

F. C. CHARLES.  
BALANCED SLIDE VALVE.

(Application filed Mar. 12, 1901.)

(No Model.)



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# UNITED STATES PATENT OFFICE.

FRANK C. CHARLES, OF CEDAR RAPIDS, IOWA.

## BALANCED SLIDE-VALVE.

SPECIFICATION forming part of Letters Patent No. 696,718, dated April 1, 1902.

Application filed March 12, 1901. Serial No. 50,881. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK C. CHARLES, of the city of Cedar Rapids, Linn county, State of Iowa, have invented certain new and useful Improvements in Balanced Slide-Valves, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

This invention relates to balanced slide-valves; and it consists of the novel construction, combination, and arrangement of parts hereinafter shown, described, and claimed.

My invention relates specifically to that class of balanced slide-valves wherein the steam-pressure tending to keep the valve on its seat is partially relieved by a balance-plate which prevents access of steam to the larger portion of the upper area of the valve.

The object of my invention is to provide an improved balanced slide-valve which shall possess advantages in point of simplicity and durability.

In the drawings, Figure 1 is a sectional side elevation through a portion of the steam-engine cylinder and steam-chest having my invention applied thereto. Fig. 2 is an elevation of the slide-valve and the balancing devices carried thereby. Fig. 3 is a section on the line 3 3 of Fig. 4. Fig. 4 is a plan view of the devices shown in Fig. 2. Fig. 5 is a plan view with the packing-ring removed. Fig. 6 is a detail section showing the construction of the packing-ring and its spring-ring.

1 indicates the engine-cylinder, having the usual steam and exhaust ports, and to which cylinder is secured in the usual manner the steam-chest 2 and its cover 3. I have not deemed it necessary to show the bolts which hold the cover in place.

4 indicates the slide-valve, carrying upon its upper side a circular disk 5, which is secured in position by means of suitable bolts or screws 6. Formed in the outer face of said disk is an annular groove or recess, the parallel surfaces 7 and 8 of which extend at a right angle to the top of said disk. The bottom surface 17 of the groove surrounds the face 7 and is at a right angle thereto, so that the spring-ring, hereinafter referred to, will

always be supported at the same height, whether it be expanded or contracted.

Closely fitted to slide upon the wall 7 is a packing-ring 9, the outer face of which is beveled at 10 and the upper face of which is securely urged into contact with a balance-plate 11 by means of a spring-ring 12, which latter is made rounding or beveled on the top inner edge at 13, (see Fig. 6,) so that the said beveled face 10 of said packing-ring may readily slide upon the spring-ring during operation. Said spring-ring is cut at 14, so that it may expand and contract during operation, and the said packing-ring 9 may be cut at 15 for taking up the wear, whereby it may be snugly fitted at all times to the vertical wall 7. Said spring-ring is carried or supported upon the surface 17 of the disk, and when the cover to the steam-chest, with balance-plate attached thereto, is put in place it forces the packing-ring 9 into the spring-ring, expanding the same on the said surface 17, which is of sufficient width to permit the said ring 12 to expand when the packing-ring is forced down into working position or until the top of the packing-ring is nearly even with the top of the disk. When the packing-ring 9 and the spring-ring 12 are in this position, the elasticity of the said spring-ring comes into action, tending to return it to its original size, and this force acting against the packing-ring urges the latter into contact with the balance-plate 11, which is held in position in a well-known manner.

The space between the balance-plate 11 and the disk 5 is vented in the usual manner at 16. The area of said space is of course proportioned according to the area of the face of the valve, thus preventing excessive wear upon the said face.

The operation of my improvement will be readily apparent to those skilled in the art; but I may state by way of supplement that when the cover 3 is placed in position as shown the balance-plate 11 will force the packing-ring 9 downwardly, and thereby expand the spring-ring 12, and the elasticity of said spring-ring acting through the beveled face 10 of said packing-ring will hold the said packing-ring firmly in position against



the said balance-plate, and thereby form a tight joint. In case of breakage of said spring-ring 12 its pieces will be caught in the said groove, and the outer wall 8 will prevent  
5 said pieces from falling onto the valve-seat.

It is obvious that slight changes in the contour of the rings 9 and 12 may be made without departing from the scope of my invention—as, for instance, the said packing-  
10 ring may be rectangular in cross-section instead of V-shaped, as now shown, and the upper edge of the said spring-ring 12 may be beveled to a greater degree, it only being essential that the packing-ring be the inner  
15 ring and the spring-ring exterior thereof.

I claim—

1. In a balanced slide-valve, the combination of a valve having a disk attached thereto provided with two surfaces located at right  
20 angles to each other, a packing-ring fitting upon one of said surfaces and a spring-ring located upon the other of said surfaces and

encircling the packing-ring to uphold the latter, and a balance-plate above the said packing-ring. 25

2. The improved balanced slide-valve, comprising a valve, a disk secured thereto and having a vertical face 7 and a horizontal surface 17, a packing-ring engaging the said face 7, a spring-ring carried upon the horizontal surface 17 and encircling the said packing-ring, the contacting surfaces of said two rings being relatively beveled or inclined so that the elasticity of the said spring-ring will act through its beveled or inclined surface to  
30 hold the packing-ring firmly against the balance-plate. 35

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

FRANK C. CHARLES.

Witnesses:

W. A. BRADLEY,  
W. J. MONROE.