

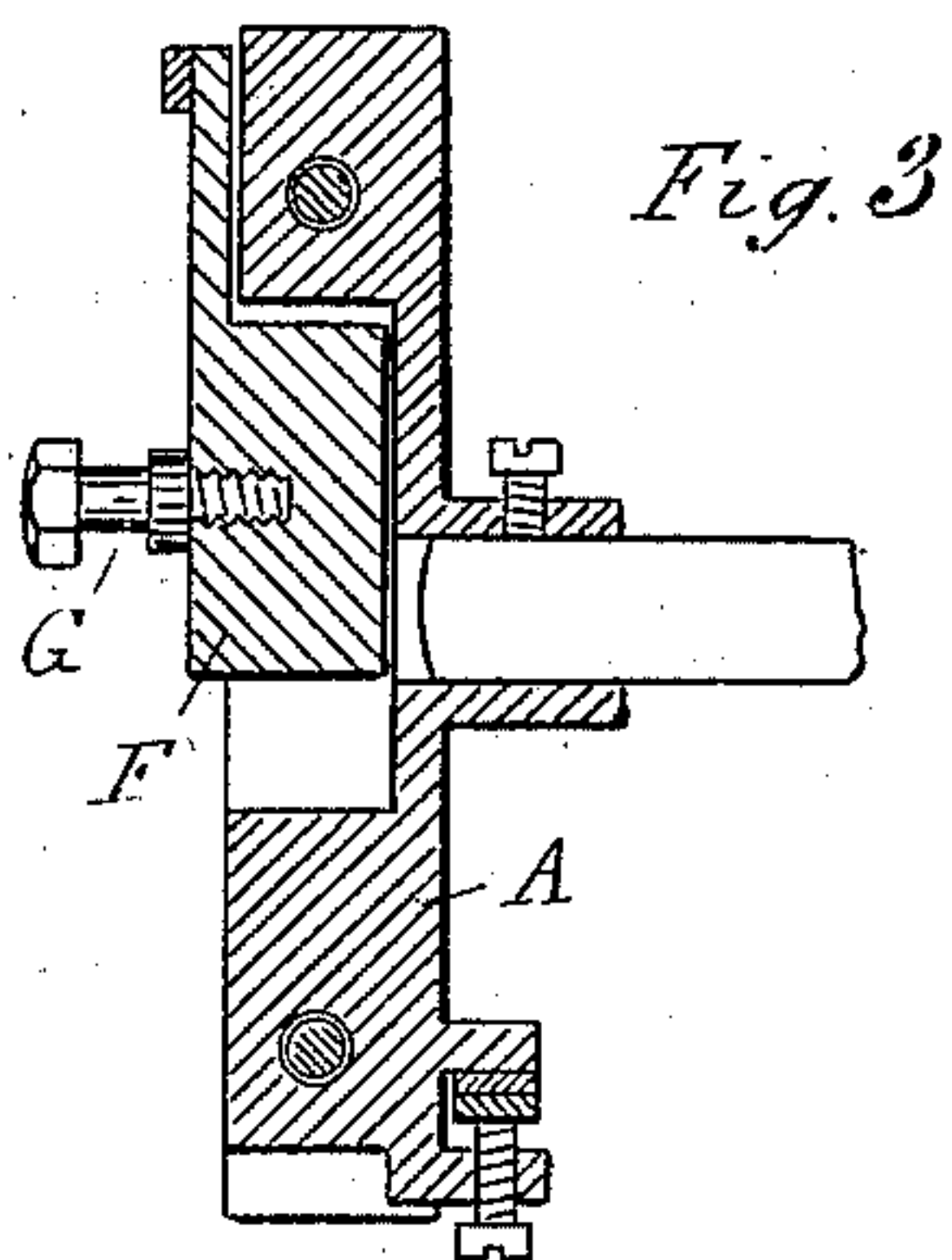
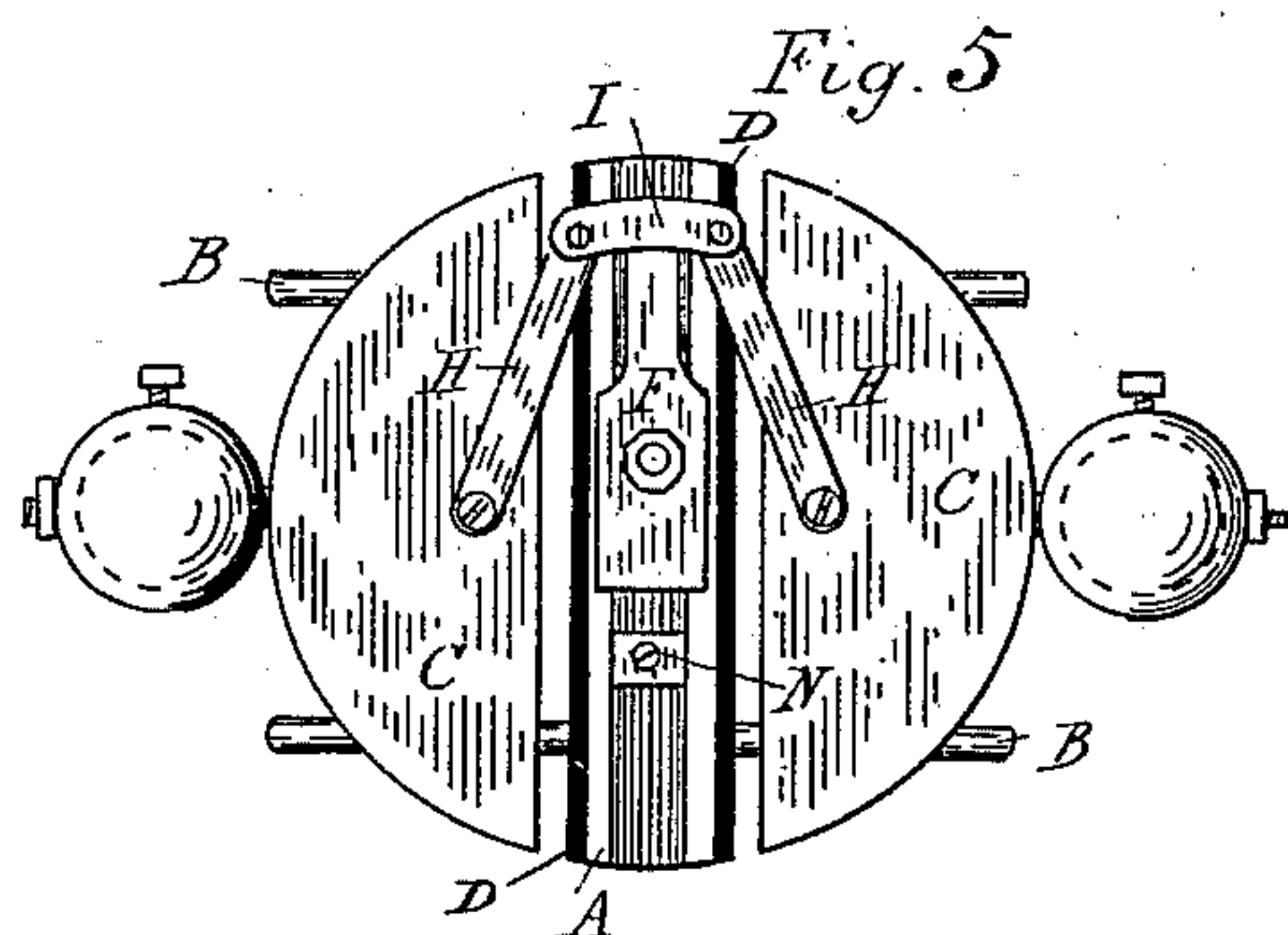
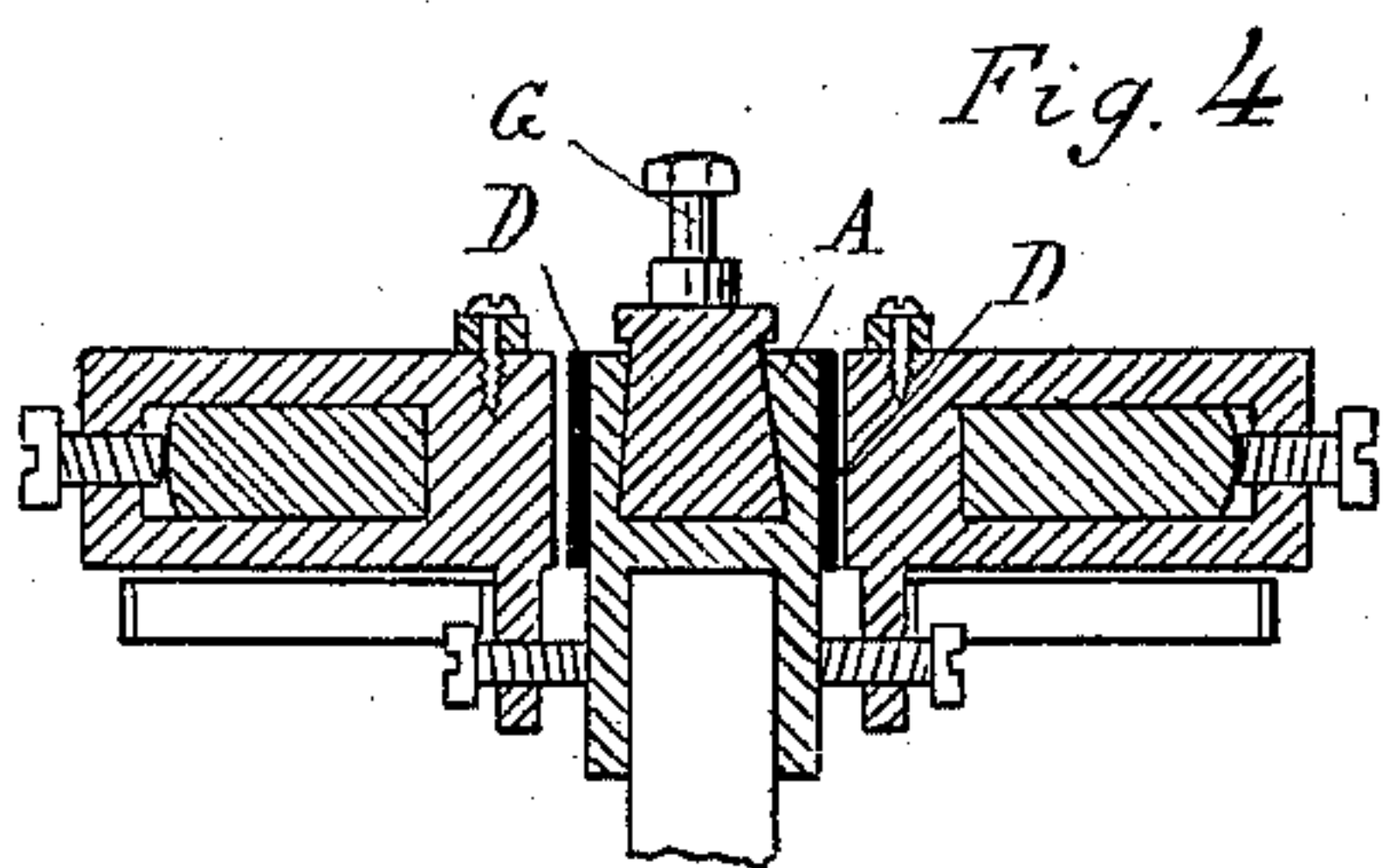
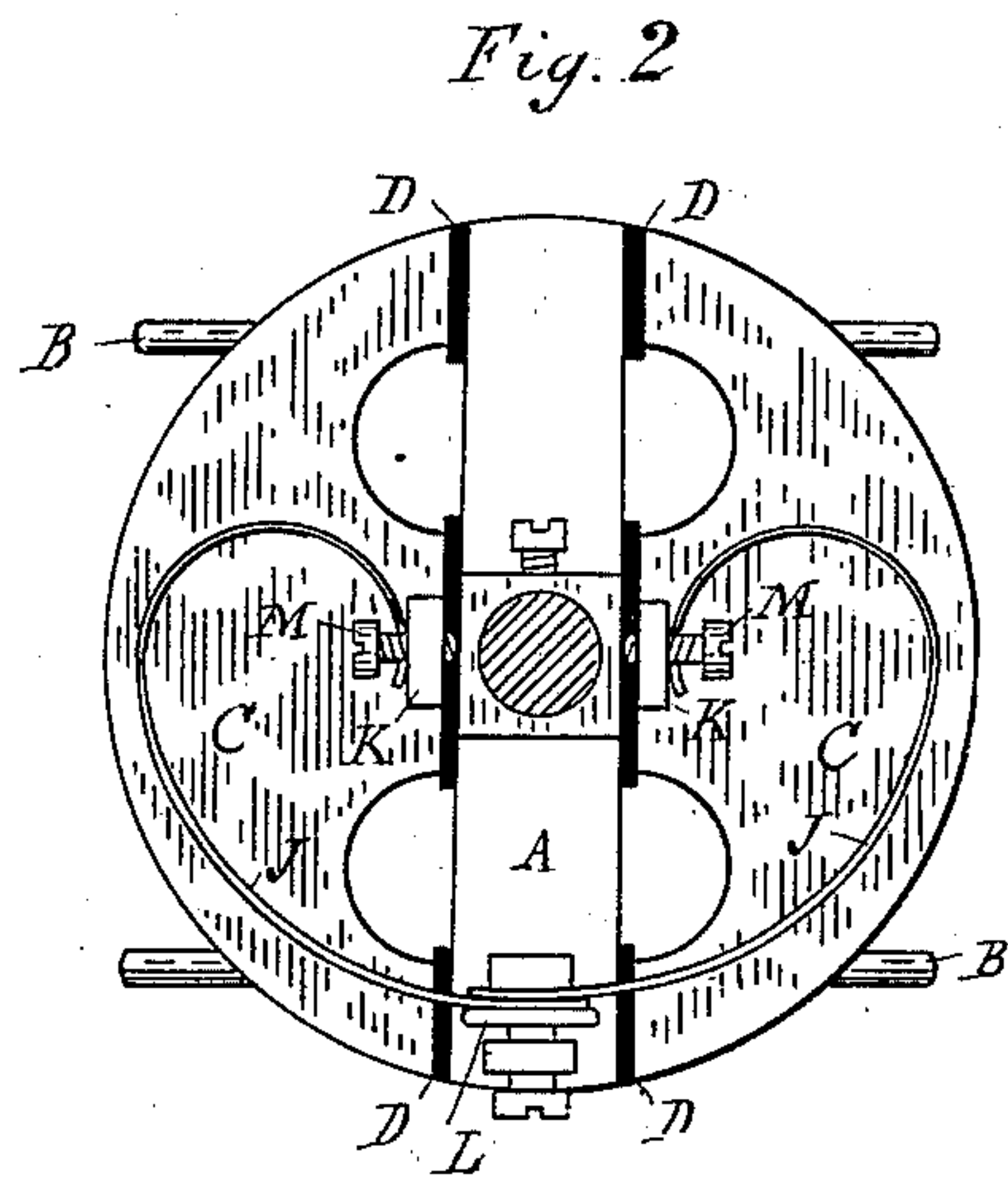
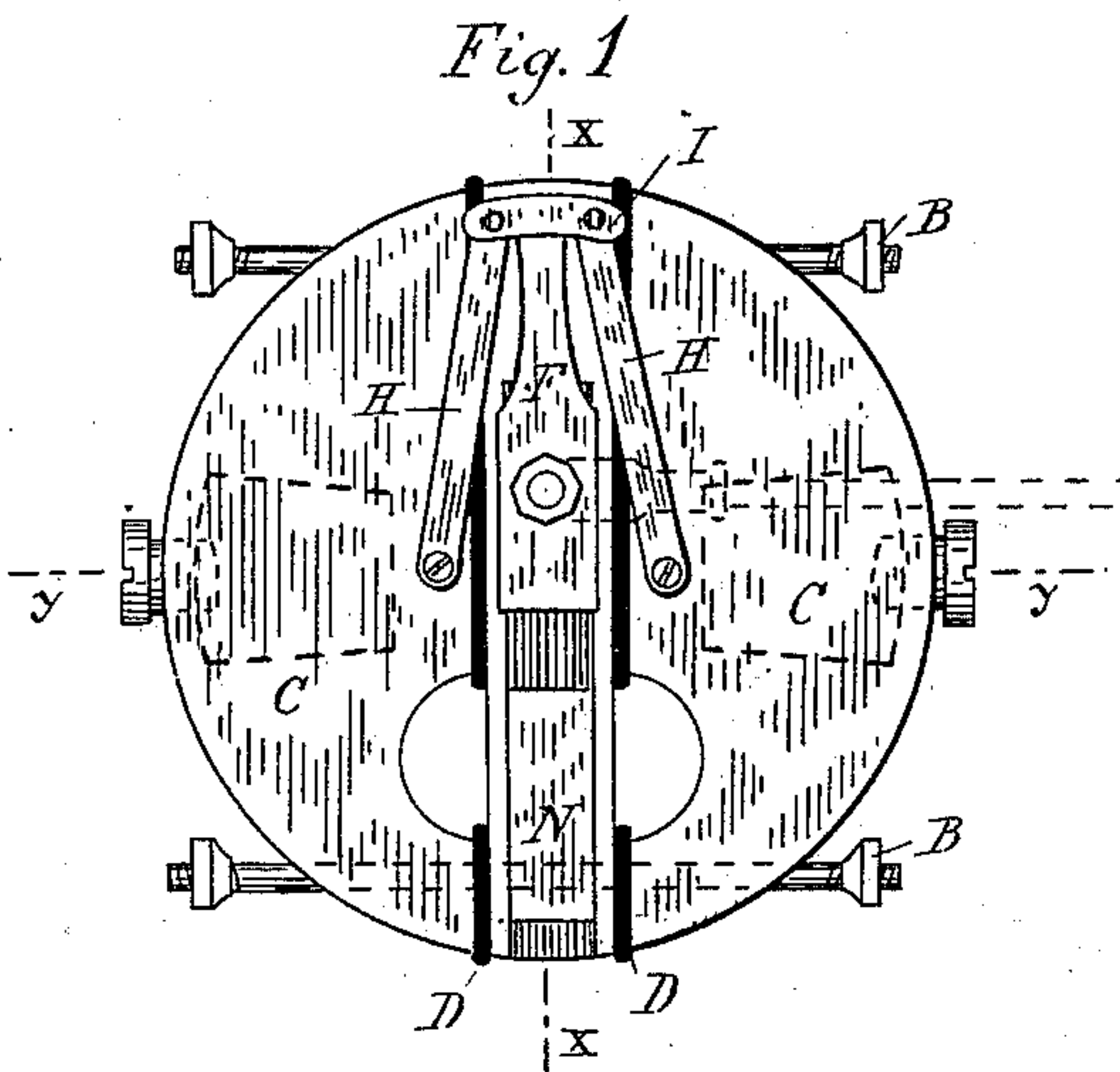
(No Model.)

C. E. BILLINGS.

GOVERNOR.

No. 308,737.

Patented Dec. 2, 1884.



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GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 308,737, dated December 2, 1884.

Application filed February 23, 1884. (No model.)

To all whom it may concern:

Be it known that I, CLARK E. BILLINGS, of Detroit, in the county of Wayne and State of Michigan, have invented a new and useful Improvement in Governors; and I do 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.

This invention relates to an improvement in governors for steam-engines; and the invention consists in the construction and combination of the parts, all as more fully hereinafter described. The purpose of this governor is to regulate the admission of steam to the engine-cylinder by altering the stroke of the slide-valve which is operated by the crank, the eccentricity of which is controlled by the governor.

In the drawings which accompany this specification, Figure 1 is a front elevation. Fig. 2 is a rear elevation. Fig. 3 is a cross-section on the line X X. Fig. 4 is a cross-section on the line y y in Fig. 1. Fig. 5 shows a modified construction of Fig. 1.

A is a cross-head secured to the crank-shaft of the engine, or to a counter-shaft geared to the crank-shaft of the engine by means of a set-screw or key in the usual manner.

B B' are two parallel rods transversely secured to the cross-head.

C C are two circular segments sleeved upon the parallel rods B B'.

D D are rubber strips interposed between the sides of the cross-head and the adjoining sides of the circular segments C C.

F is a slide secured in a dovetailed recess in the cross-head A.

G is a wrist secured to the slide F.

H H are links pivoted at one end to the circular segments, and at the other end to a yoke, I, which is secured near one end of the slide F.

J J are two springs secured to the rear side of the governor in the following manner: one end of each spring rests against a lug, K, one of which projects from each circular segment. The other ends of the springs are lapped and secured by a clamp, L, on the rear side of the cross-head A.

M M are two set-screws passing through the lugs K K, and impinging, when the governor

is at rest, against the adjacent sides of the cross-head.

In practice the centrifugal force of the governor is furnished by the two circular segments C C, and the centripetal force is furnished by the springs J J. When the governor is at rest the centripetal force of the springs firmly holds the circular segments against the adjacent sides of the cross-head, and the three parts form a circular disk. In this position the wrist G has its greatest eccentricity. With the motion of the engine, the centrifugal force of the segments C C overcomes the centripetal force of the springs J, separates the segments from the cross-head more or less, and correspondingly changes the eccentricity of the wrist G, which grows lesser the farther the segments are carried away from the cross-head, until it finally moves into the center of motion, at which point the parts are prevented from separating any farther by the slide F, encountering a stop, N. The initial position of the segments C C is regulated by means of the set-screws M, and the centripetal force of the springs J is adjusted by means of the clamp L by shortening the effective length of each spring. The rubber strips D D simply form cushions between the cross-head and the segments C C to deaden the impact when the parts are brought together. The motions of the segments under the action of the centrifugal force are diametrically opposite to each other, and the centripetal force of the springs upon these segments is in the same line and acts inversely to the centrifugal force of the weights.

In order to concentrate the weight of the segments, I either cast them partially hollow at their center of gravity, as shown in Figs. 1 and 3, and run lead into the spaces and then close the opening with screw-plugs, or I attach hollow balls similarly filled with lead to the segments, as shown in Fig. 5. Either of these two ways furnishes a means for properly balancing the governor.

It will readily be seen that instead of attaching a wrist to the slide the latter may be made the means of shifting a valve-eccentric used as a substitute for operating the slide-valve.

Some of the advantages of my construction are: First, I dispense with the use of a heavy

frame or shell generally used in this style of governors; second, the governor is very sensitive to slight changes of speed, as there are few parts and little internal friction, the transverse parallel rods B being made of polished steel; third, the danger of the flying weights becoming detached at a high rate of speed is very small, as the circular segments are firmly held and guided by the parallel rods; fourth, the angle between the links H H and slide F is so small during the whole range of the governor that while the links easily move the slide in the cross-head the slide can exert no control over the weights—in other words, the links and slide form a locking device, which counteracts any tendency of displacement exerted by the valve through the medium of the wrist-pin; fifth, I use comparatively long leaf-springs for furnishing the centripetal force; these springs keep their tension well, and are not liable to buckle and produce injurious side strains, as coil-springs are liable to do; sixth, I can use large masses of weights in the most compact form of governors.

I am aware that it is not new to provide a shaft with a stationary frame having radially-extending arms on which are mounted weights, the centrifugal force of which shifts a plate carrying an eccentric, the centripetal force being furnished by flat bow-springs, and do not claim such construction, for the device referred to is not in a compact form like mine, because the parts are not all in the same plane, and the springs and weights extending outwardly form arms or beaters, which impinge against the air, thus materially increasing the force required to drive the device. By my arrangement the weights forming segments of a disk of which the fixed frame or cross-head is the main or intermediate portion, and the segments and cross-head are in the same plane, the device is thus in a very compact form occupying the minimum of space, and when in

motion there is no loss of power occasioned by the parts beating the air.

What I claim as my invention is—

1. In combination with the cross-head A, provided with means for securing it to a revolving shaft of an engine, and having the parallel guide-rods B secured to it, the weights C, forming corresponding circular segments, so that when the governor is at rest the weights and cross-head form a circular disk, substantially as described.

2. In combination with the stationary frame of a governor, a pair of flying weights which, under the centrifugal force, are forced to separate diametrically opposite to each other, and a spring or springs having one end adjustably attached to the cross-head and the other end attached to the weight for furnishing the centripetal force, and having a tension diametrically opposed to the centrifugal force of the weights, substantially as set forth.

3. In combination with the stationary frame and flying weights of a governor, substantially as described, the links H H, slide F, and stop N, the latter arranged on the said frame within the path of the slide, substantially as and for the purpose set forth.

4. The combination of the cross-head A, provided with a dovetail recess, of the slide F, wrist G, parallel guide-rods B, segment-weights C, links H H, and springs J J, combined and arranged substantially as described.

5. The combination, in a governor, of the leaf-springs J J, weights C C, lugs K K, and clamp L, substantially as set forth.

6. The combination, with the cross-head A, provided with lugs K, of the weights C C, of the leaf-springs J J, and of the set-screws M M, substantially as and for the purposes described.

Witnesses: CLARK E. BILLINGS.
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