

G. W. BISHOP.

Mechanisms for Reversing Engines.

No. 144,731.

Patented Nov. 18, 1873.

Fig. 1.

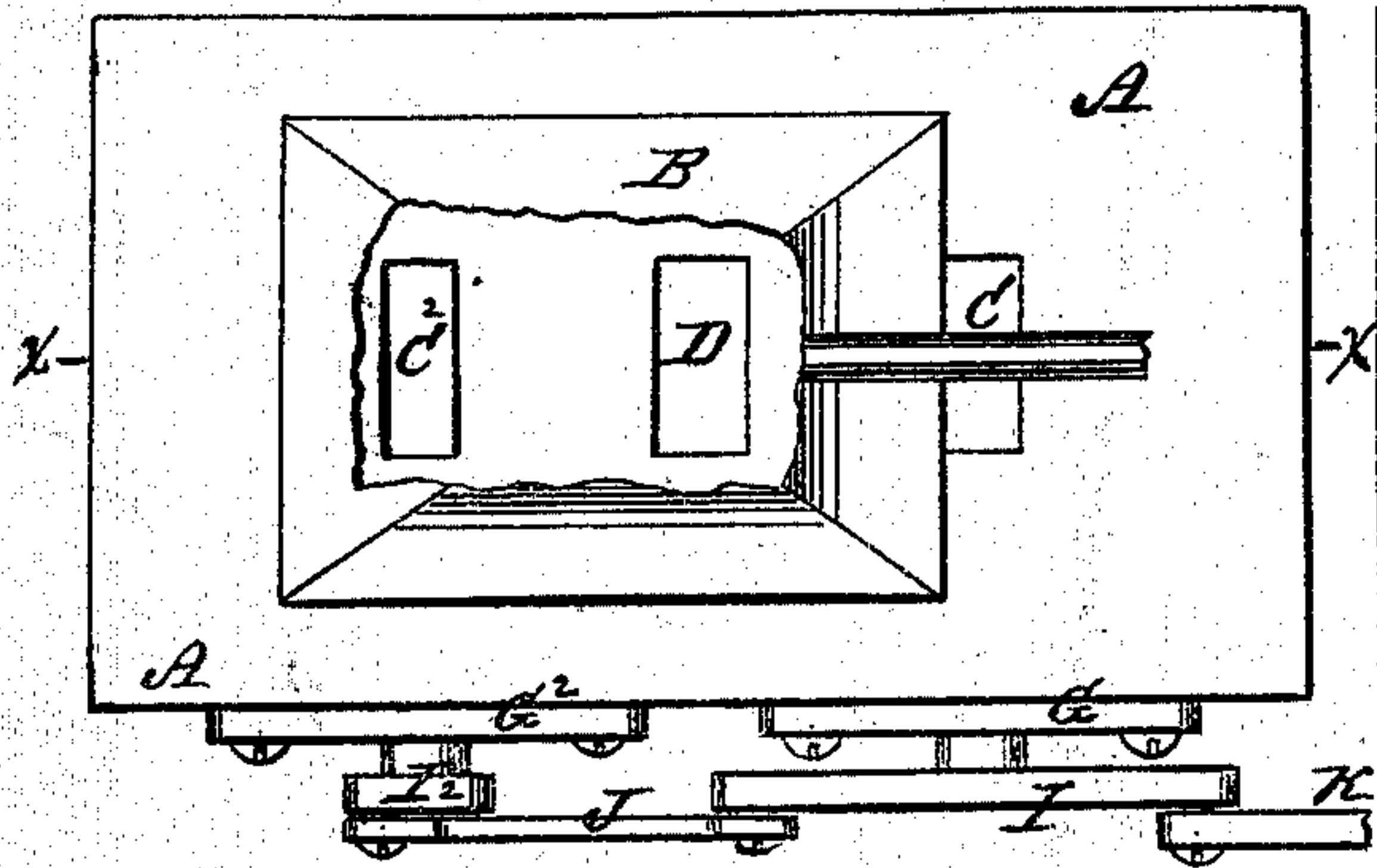


Fig. 2.

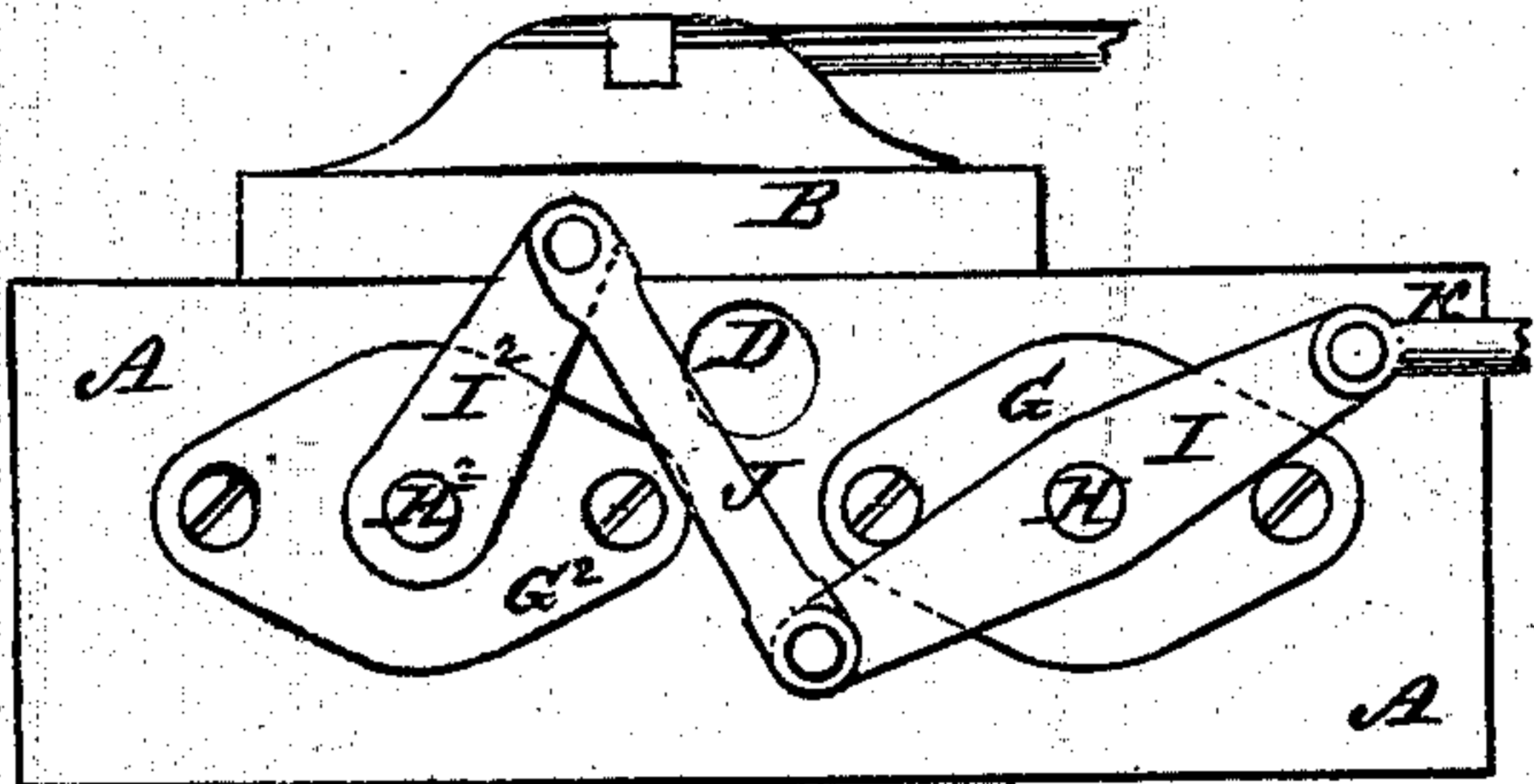


Fig. 3.

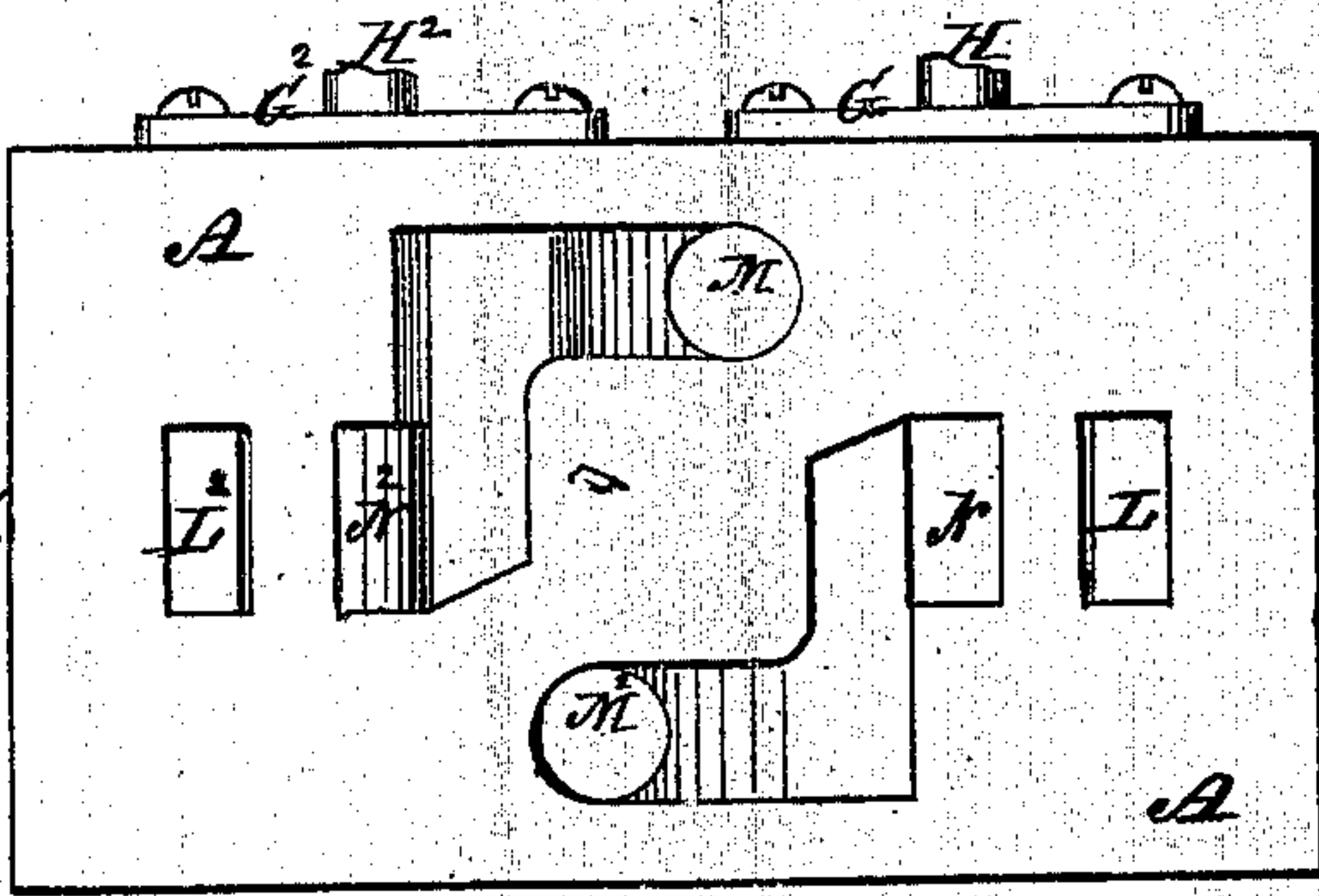


Fig. 4.

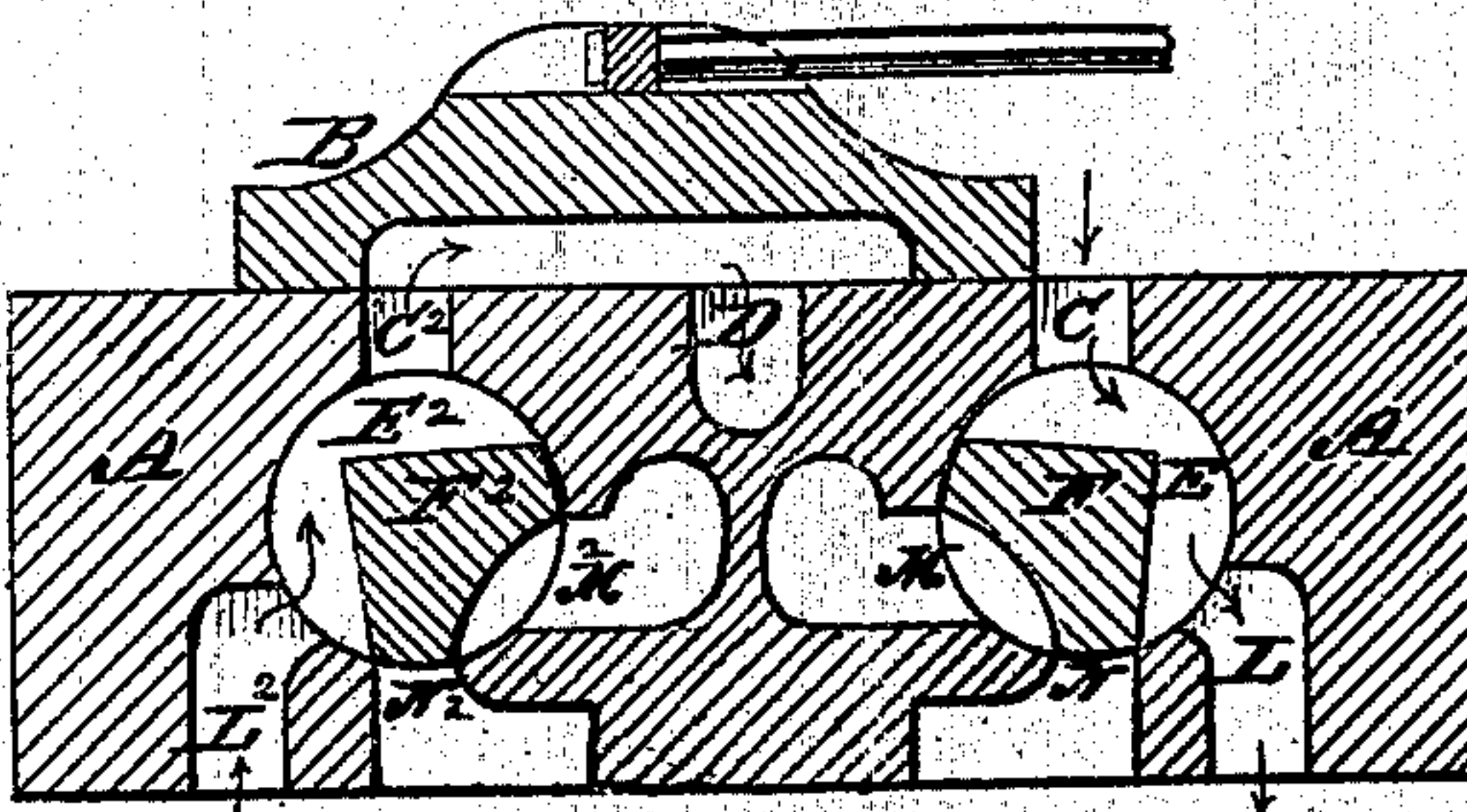


Fig. 5.

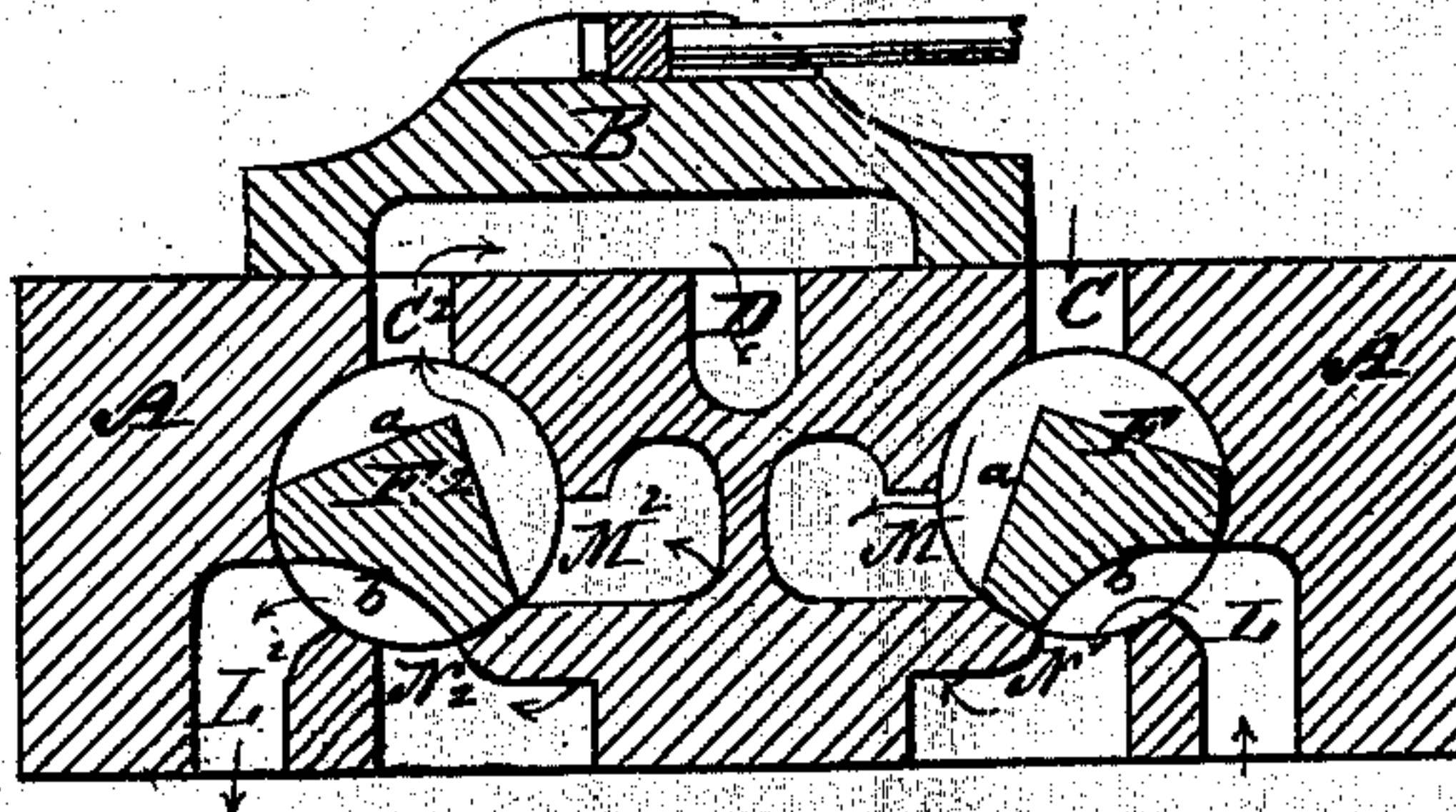


Fig. 8.

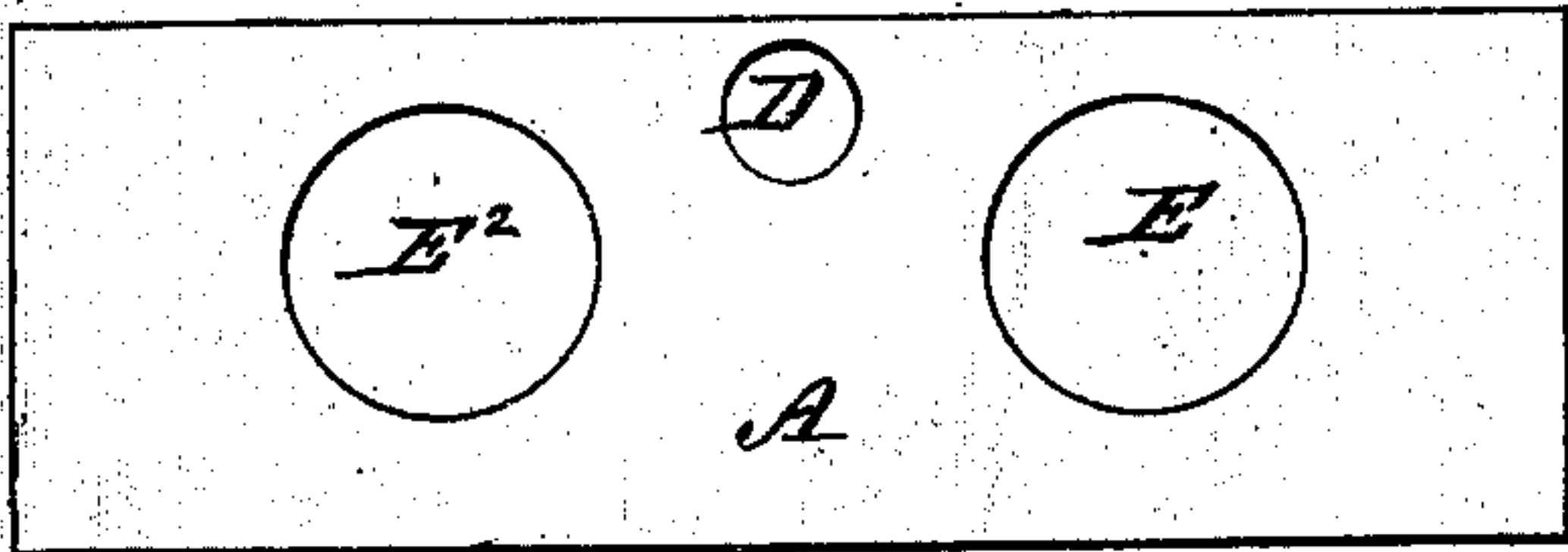


Fig. 6.

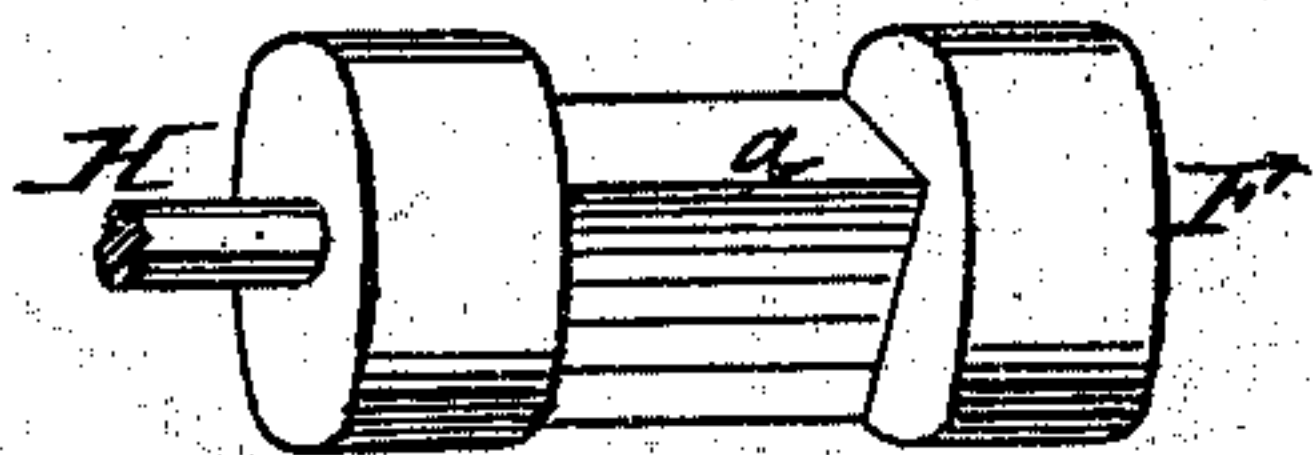
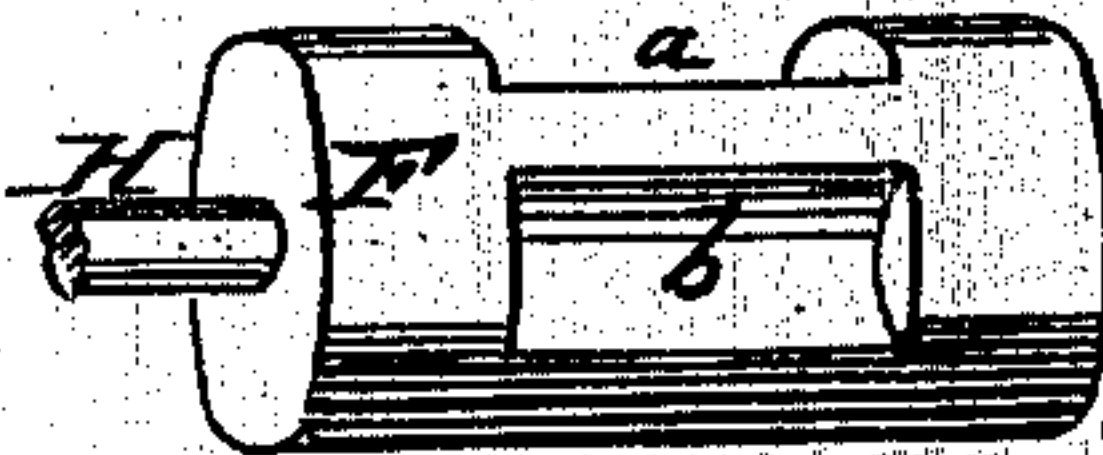


Fig. 7.



Witnesses.

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UNITED STATES PATENT OFFICE.

GEORGE W. BISHOP, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN MECHANISMS FOR REVERSING ENGINES.

Specification forming part of Letters Patent No. 144,731, dated November 18, 1873; application filed October 17, 1873.

To all whom it may concern:

Be it known that I, GEORGE W. BISHOP, of Brooklyn, of Kings county, in the State of New York, have invented certain Improvements in Mechanism for Reversing Engines; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings and to the letters of reference marked thereon.

Previous to my invention it has been suggested to simplify the reversing mechanism of the engine by the substitution, for the complex link-motion usually employed, of a block arranged between the ordinary slide-valve and the engine-ports, and formed with steam-passages, in such a manner that by the placement of the said block in different positions the steam admitted to its ports or passages would be carried to either one or the other of the engine, as desired, to run the engine in one or the other direction; but in all the means suggested so far as a substitute for the link-motion none have proved perfectly successful or come into practical operation on account of the friction created by the steam-pressure on the sliding block or plates, or the complexity of the devices or some other practical objection.

I have devised and thoroughly tested in practice a device or mechanism for reversing the engine which gives perfectly satisfactory results, is exceedingly simple, economic of construction, durable, and not liable to derangement, nor to be affected by any collection of dirt in the working parts.

My invention consists in so forming or arranging duplex passages, which each communicate at one end with the port under the slide-valve, and at the other with the port opening into the cylinder, and so combining with such passages rotatory valve-blocks, that by the placement of said valve-blocks in different positions the steam which is admitted by the slide-valve will be directed into one or another of the said passages, so as to be carried to one or the other end of the cylinder, as may be desired, as will be hereinafter more fully explained.

To enable those skilled in the art to make and use my invention, I will proceed to more fully describe it, referring by letters to the ac-

companying drawings, in which I have shown so much of a locomotive-engine as is necessary to perfectly illustrate my improvement therein.

Figure 1 is a top view with the steam-chest removed, and showing the usual arrangement of ports for, and the ordinary slide-valve by which is permitted, the ingress of the steam to the engine and its escape therefrom. Fig. 2 is a side view of the same. Fig. 3 is a bottom view. Fig. 4 is a vertical longitudinal section at the line $x x$, Fig. 1. Fig. 5 is a similar section, but showing the reversing valve-blocks in another position. Fig. 6 is a detail perspective view of one of the valve-blocks. Fig. 7 is a similar view of the same part, taken from a different point of sight.

In all the figures the same letter of reference designates the same parts.

A represents that part of the engine (which is usually cast with the cylinder) which contains the steam-ports and passages that form the communications between the steam-chest and interior of the cylinder, and on which is seated and works, in the usual manner, the ordinary slide-valve B, which permits ingress and egress of the steam through the ports C, C², and D, respectively. In the casting or portion A are formed two cylindrical chambers, E E², (see Fig. 8,) each located, by preference, immediately under one of the steam-ports C C², and in each of which is arranged a cylindrical valve, or what I denominate "a rotatory reversing valve-block," F F². These two valve-blocks are duplicates, are provided with stuffing-boxes G G², and have stems H H², which protrude from the side of A, as seen, and to which are secured the arms I I². These arms are connected by a link, J, and one of them, I, has attached to it a rod, K, which extends to within convenient reach of the engineer, and by which he is enabled to operate the valve-block, as and for the purposes to be presently explained. Each of the steam-ports C C² communicates directly with one of the chambers E E², and from each of said chambers, into which the steam enters from the ports C or C², extend three separate passages, lettered, respectively, L M N and L² M² N², and through which the steam which enters into said chamber from the steam-chest, is either conveyed away directly to that end of the engine nearest the

chamber or passed off to the other end, according to the position in which the valve-blocks $F F^2$ may be set, and as will be presently more fully explained. The passages $L L^2$ extend directly from the chambers $E E^2$ to the cylinder, as shown, while those lettered $M M^2$ each lead into conduits for carrying the steam to the opposite one of the chambers, and those lettered $N N^2$ are for the conveyance into each chamber of the steam which is passed off from the other by the ports $M M^2$, and which, after its entrance into said chamber, passes into one of the ports $L L^2$ of the engine.

The peculiar form of each of the duplicate valve-blocks $F F^2$ is clearly shown in the drawings, and, as will be seen, it is such that when set in one position in their respective chambers $E E^2$ they permit a free communication between the steam-chest and cylinder, through the ports $C L$ and $C^2 L^2$, as seen at Fig. 4; and when set in the other position, as seen at Fig. 5, they cut off this direct communication and permit the steam to pass through the ports $C M$ and $C^2 M^2$, and thence through $N L$ and $N^2 L^2$, thus causing the steam which enters at C to pass over to the other end of the cylinder, and thus reversing the motions of the engine, as clearly illustrated by the arrows in the figures just above referred to. The valve-blocks are cut away at a and b , as shown, for a distance lengthwise about equal to the length of the ports $C C^2$, which is the same as that of the other three ports cut in the chambers $E E^2$; and, as before remarked, the stems or shafts of these blocks or rotatory valves are connected by the arms $I I^2$ and link J . This connection and the arrangement and motions of the valve-blocks are such that the latter always turn in opposite directions in shifting them to one or the other position, as indicated by the arrows in the drawings.

The operation and effect of the machine are so readily understood as to require little explanation.

When the blocks $F F^2$ are set in one position, the steam admitted alternately at each end of the steam-chest passes in the usual manner directly to the adjacent end of the cylinder, as seen at Fig. 4, and when the position of the blocks $F F^2$ is changed by the engineer, which is done readily and instantaneously, the steam admitted at each end of the chest is

carried off to the remotest or opposite end of the cylinder, as illustrated at Fig. 5.

It will be seen that as the blocks $F F^2$ simply turn in the steam-chambers and have exceedingly small bearing-surfaces therein, there will be little or no retarding friction created by the steam-pressure; and that, by reason of the peculiar form and arrangement of the parts, the moment the direction of the admitted steam begins to change its course it assists the turning of said valve-blocks during the balance of their motion or movement to the new position.

I am enabled to pack the working joint perfectly by a very simple form of stuffing-box, as clearly shown.

The shaft I may be extended across the engine, so that by a single rod and lever in the cab the valve-blocks to both cylinders of the locomotive may be operated by the engineer.

Of course the manner of coupling or gearing together the valve-blocks so that they shall always move together and in the proper directions is not material, and many modifications in this and other parts of the machine may be made in carrying out my invention.

It will be seen that by setting the reversing valve-blocks at various points intermediate to the extreme position the amount of steam admitted to the engine will be regulated irrespectively of the throw of the slide-valve, and that by turning them to a point midway the steam may be entirely cut off from the engine.

Having so fully explained my invention that any one skilled in the construction and use of engines can make and use my improvement, what I claim as new, and desire to secure by Letters Patent, is—

The combination, with a single set of ports for receiving the steam from the chest and discharging it into the cylinder, of passages for carrying the steam directly in the different directions and intermediately-seated cylindrical valve-blocks for directing or permitting the passage of the steam in different directions, the whole constructed and operating substantially in the manner and for the purpose described.

In witness whereof I have hereunto set my hand and seal this 10th day of October, 1873.

GEORGE W. BISHOP. [L. S.]

In presence of—

A. ASCHER,
JACOB FELBEL.