

No. 771,593.

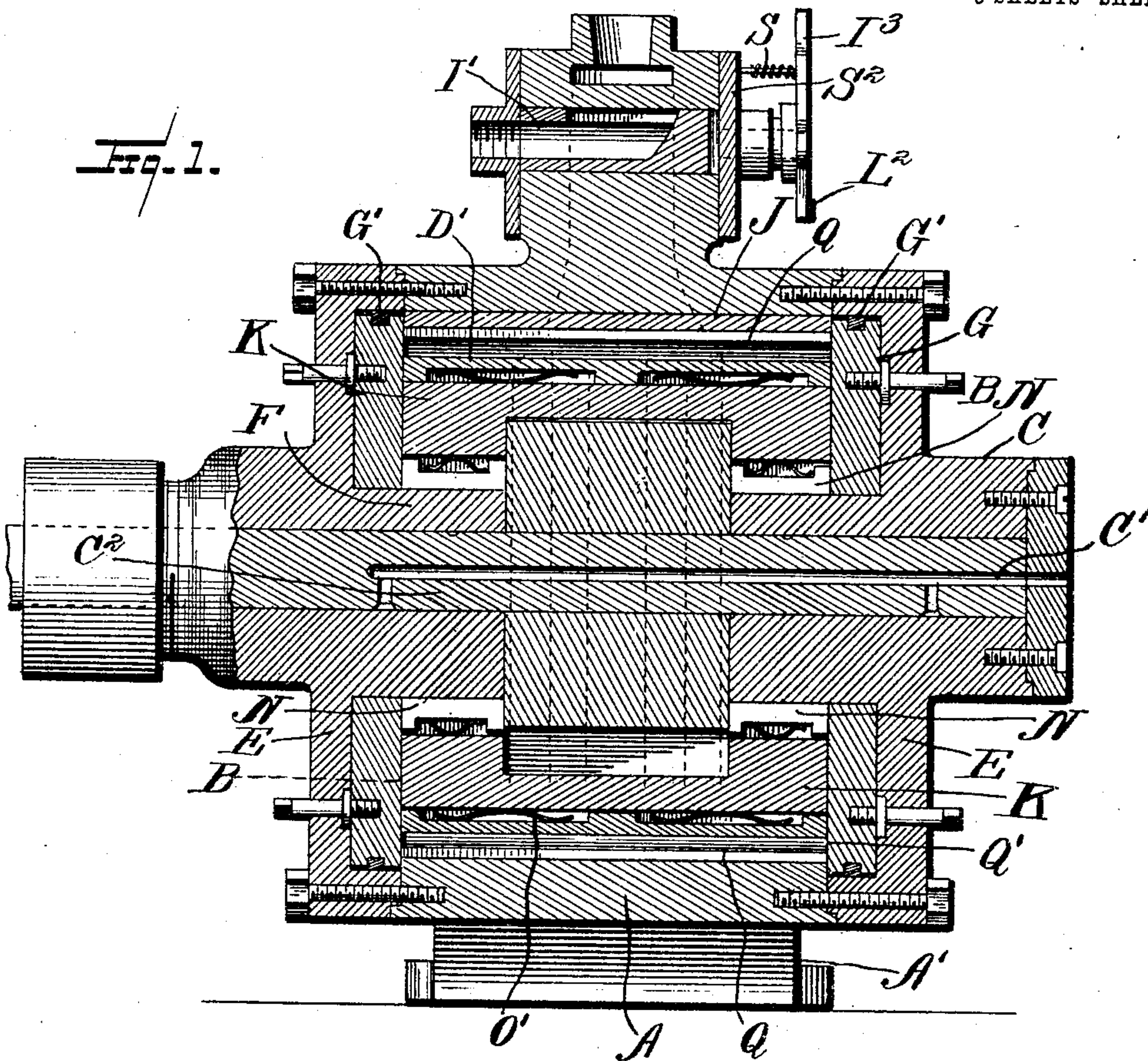
PATENTED OCT. 4, 1904.

G. G. WELSH.  
ROTARY ENGINE.

APPLICATION FILED JUNE 20, 1904.

NO MODEL.

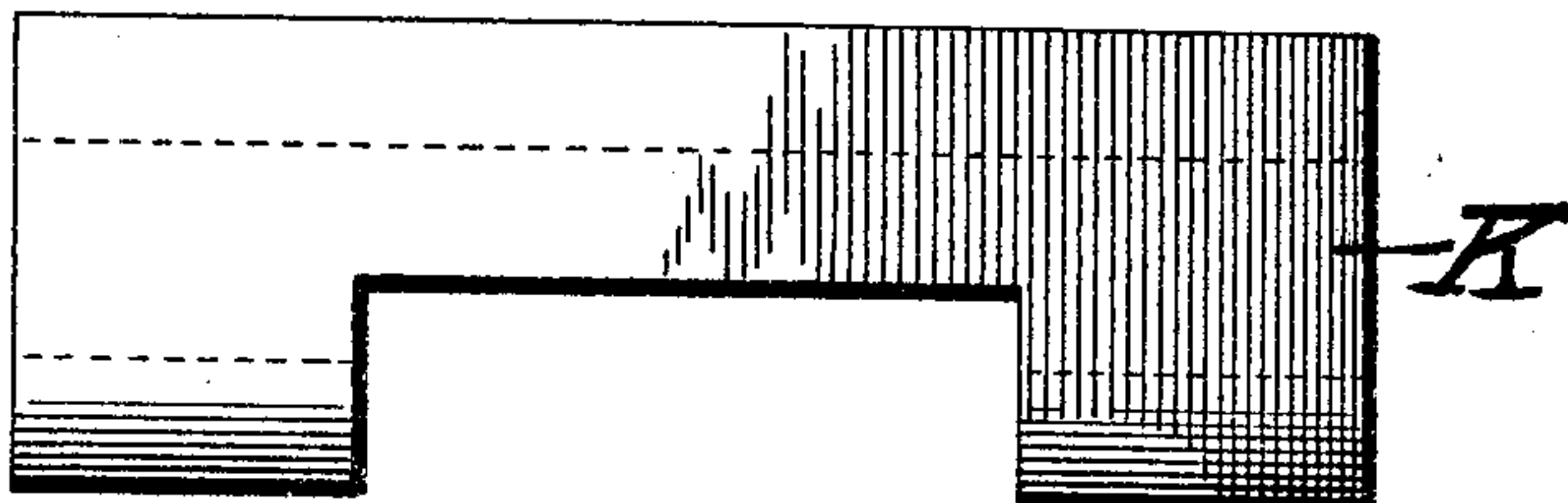
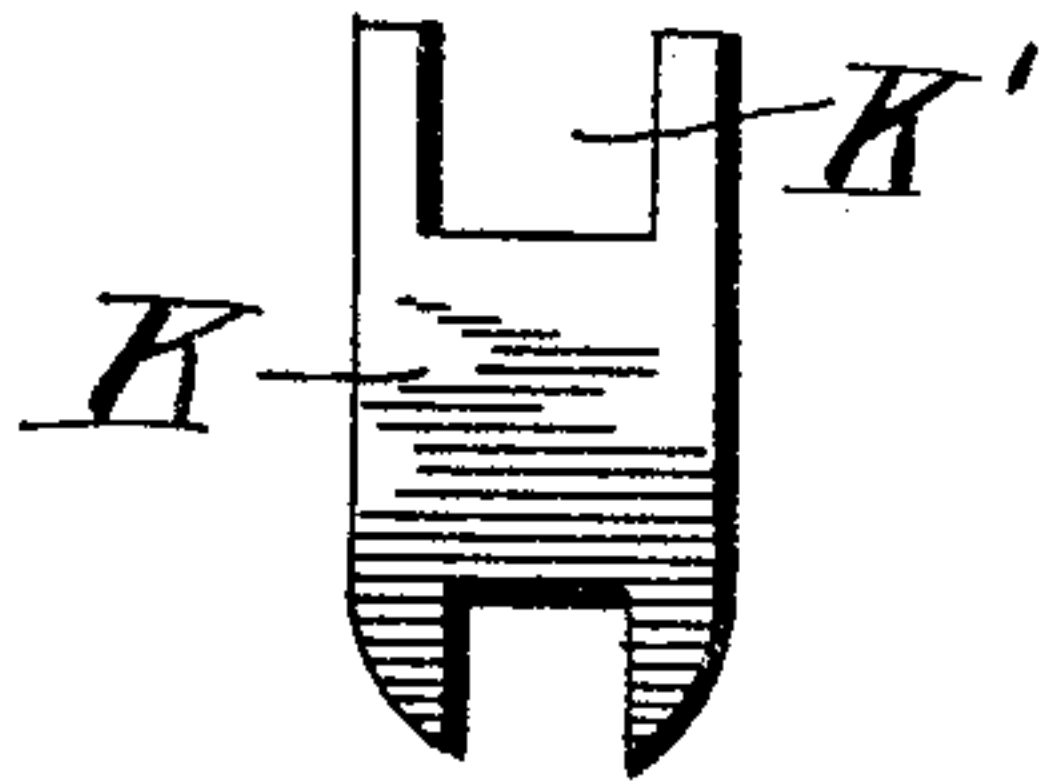
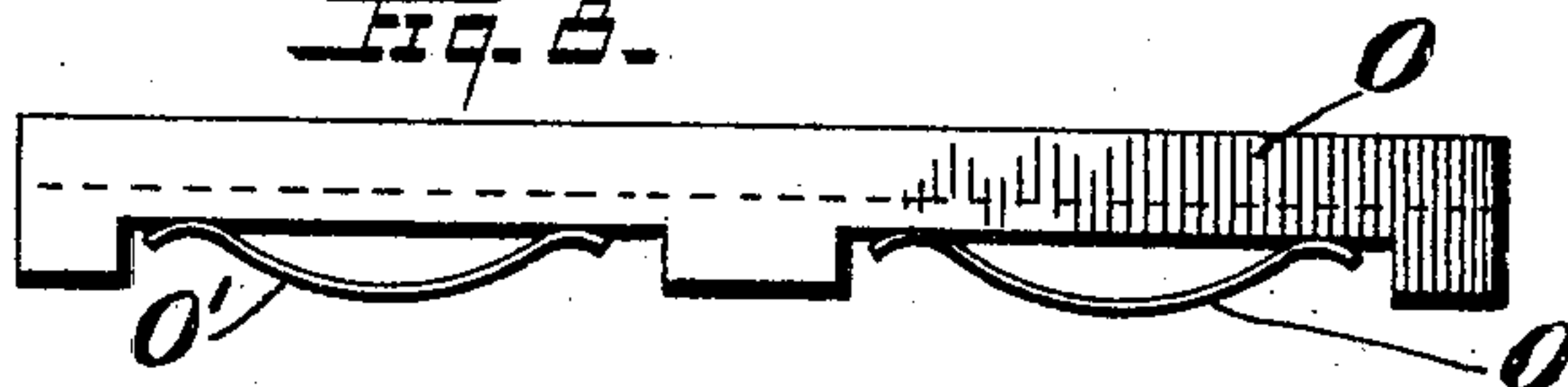
3 SHEETS—SHEET 1.



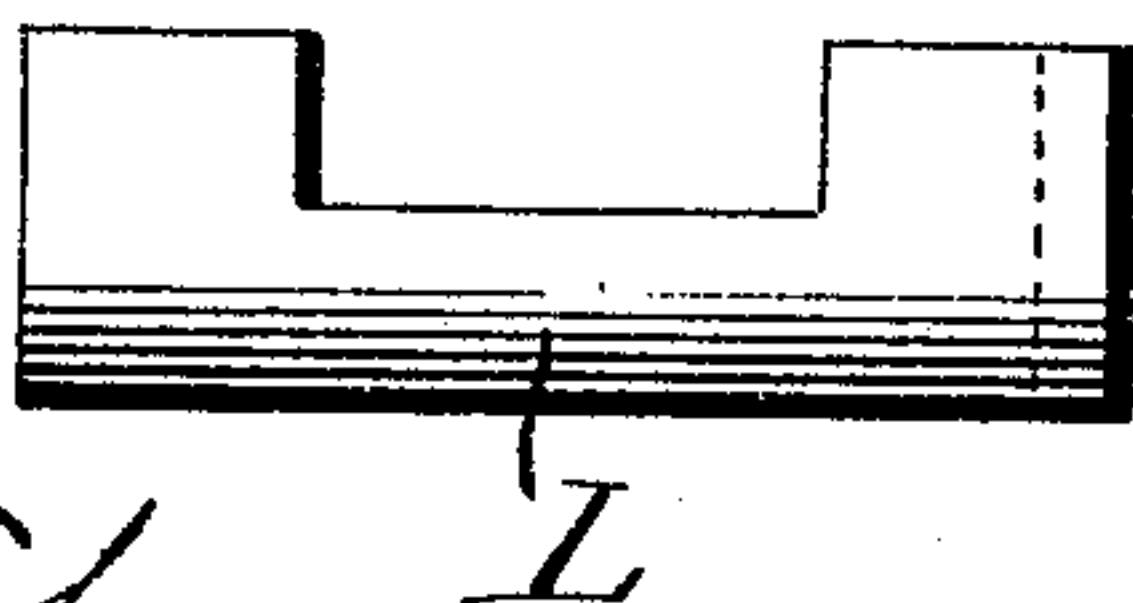
*Fig. 3.*



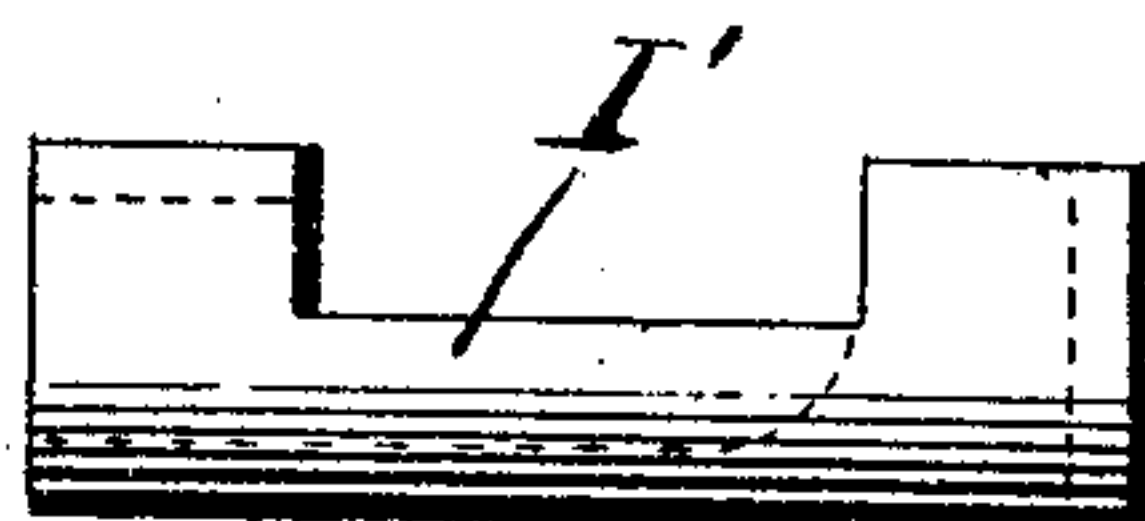
*Fig. 5.*



*Fig. 11.*



*Fig. 10.*



WITNESSES:

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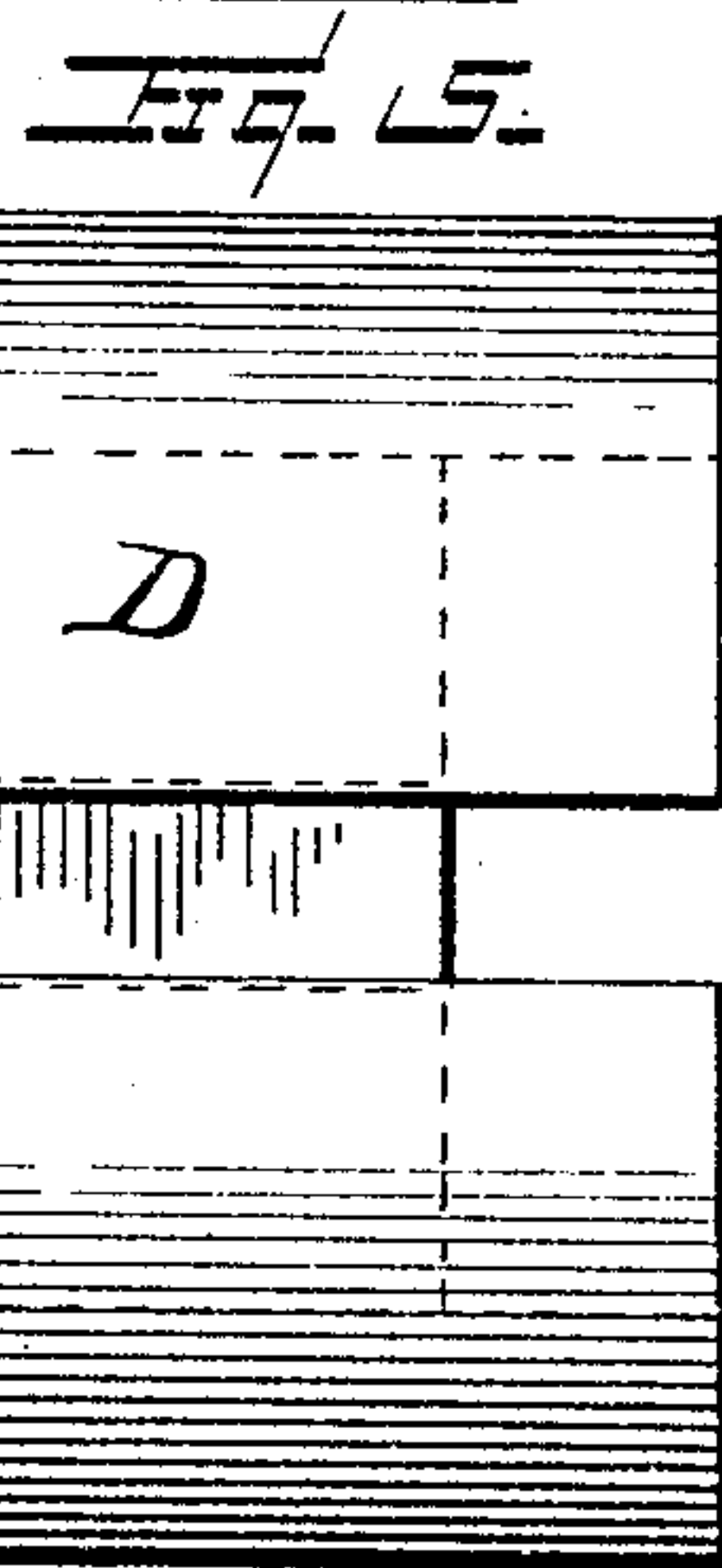
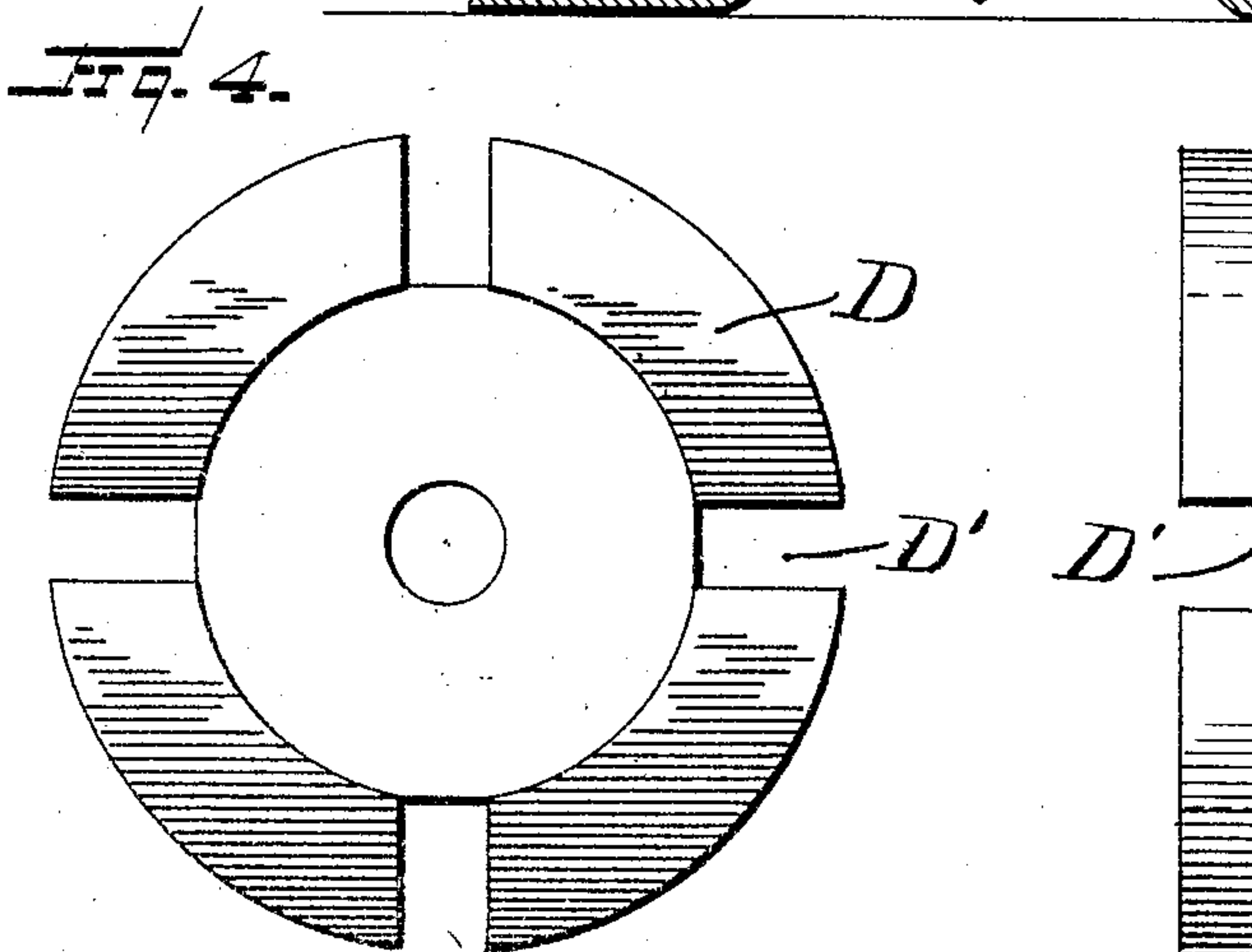
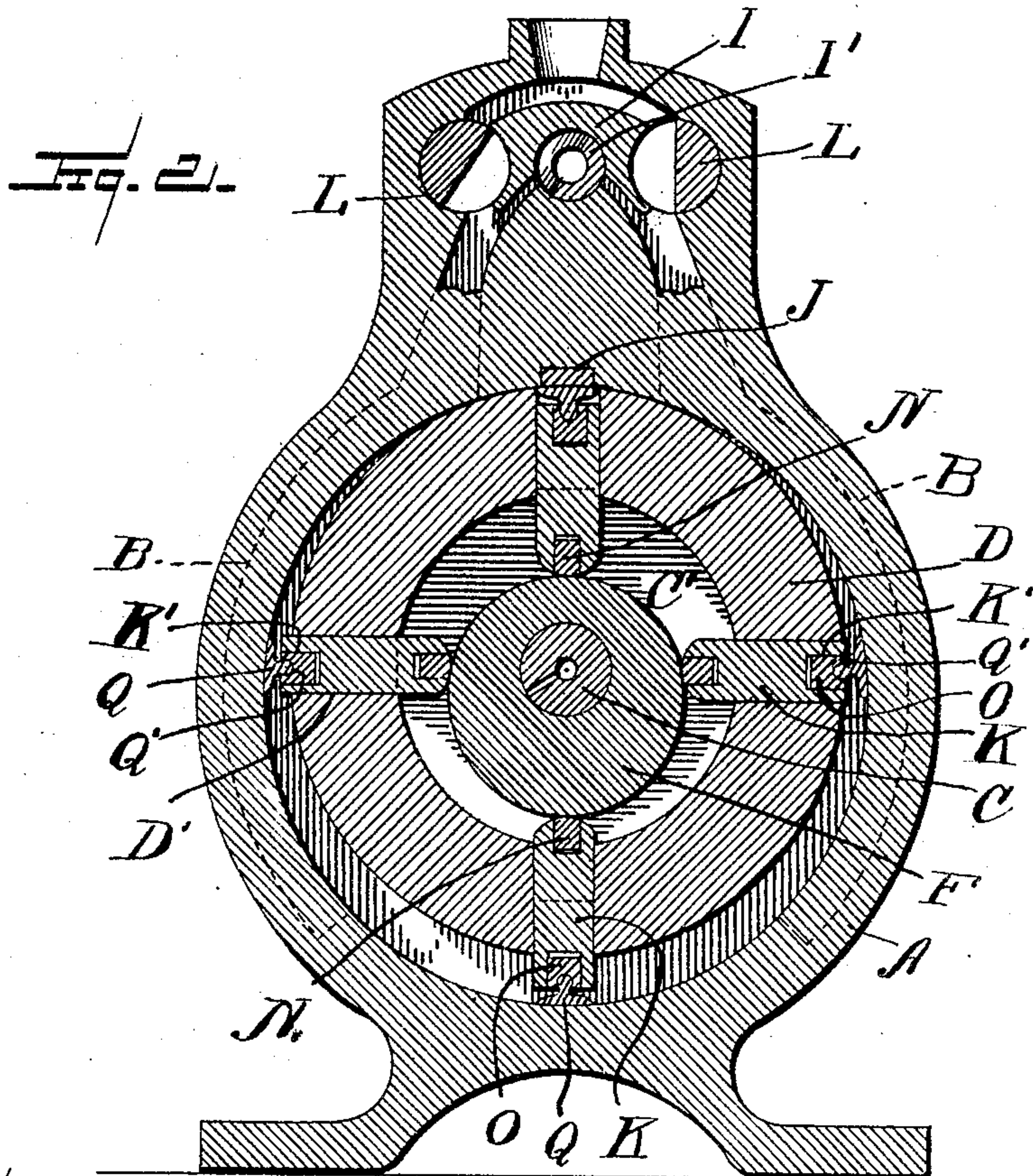
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3 SHEETS—SHEET 2.



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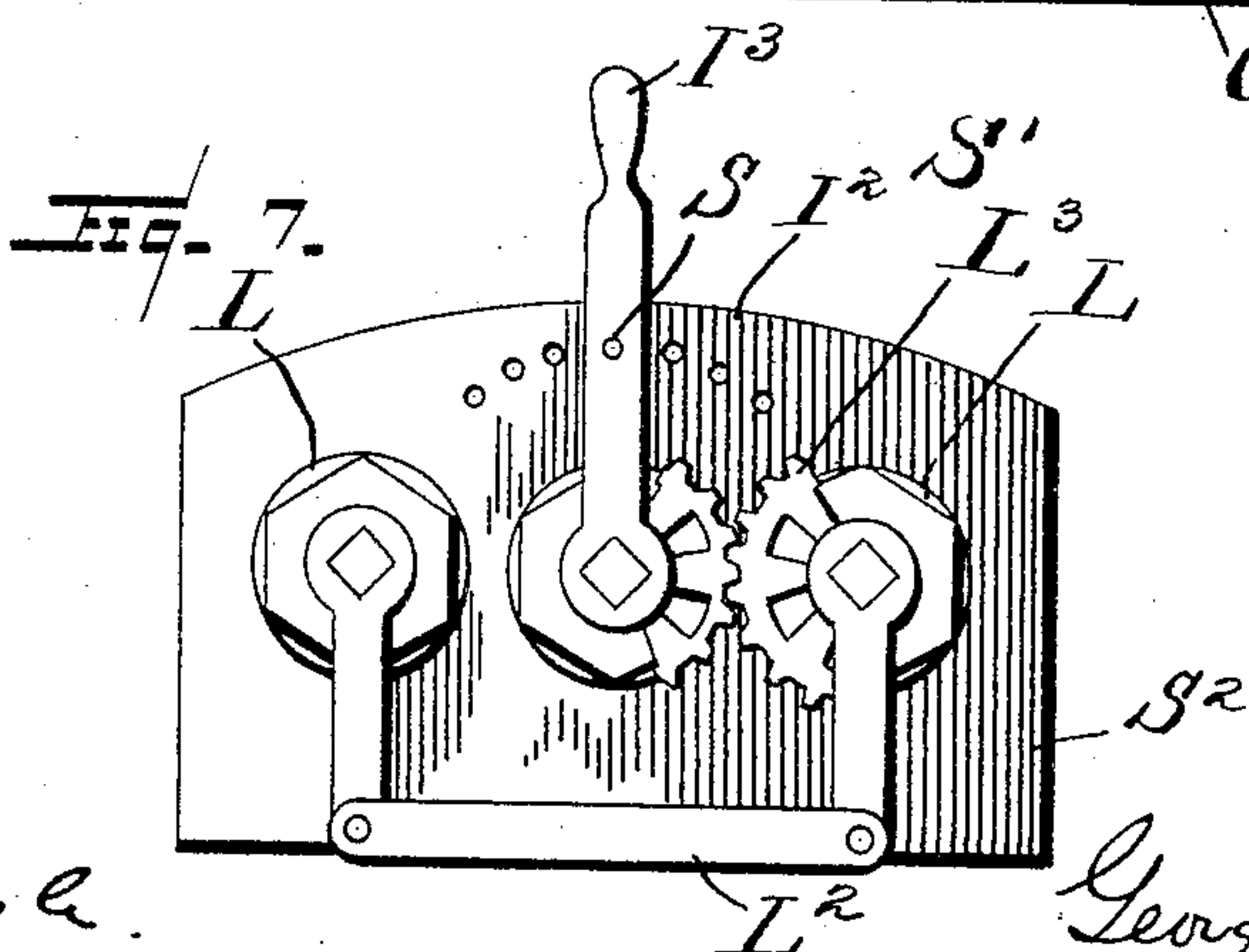
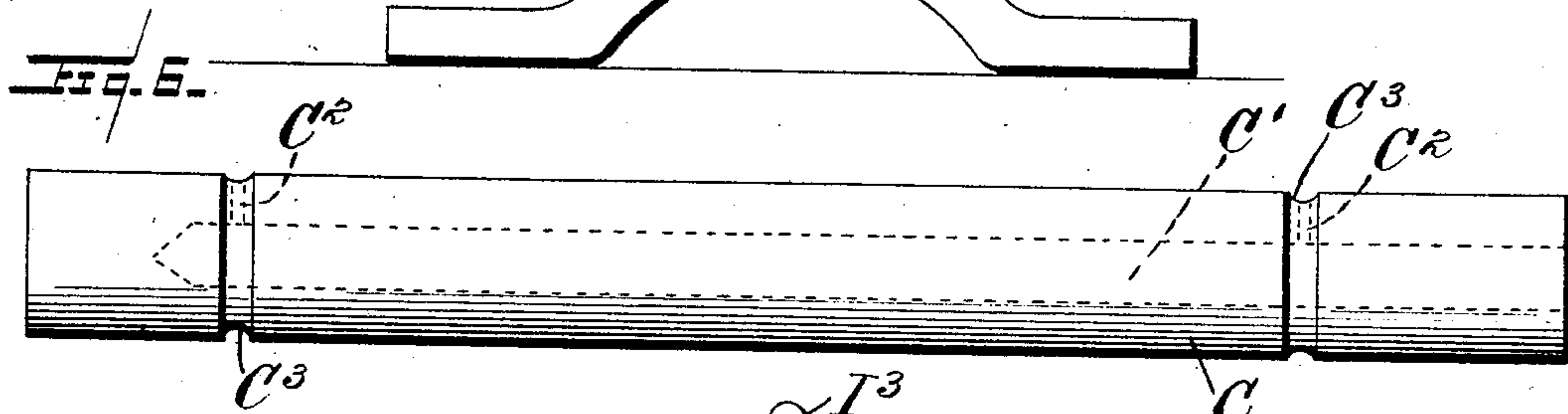
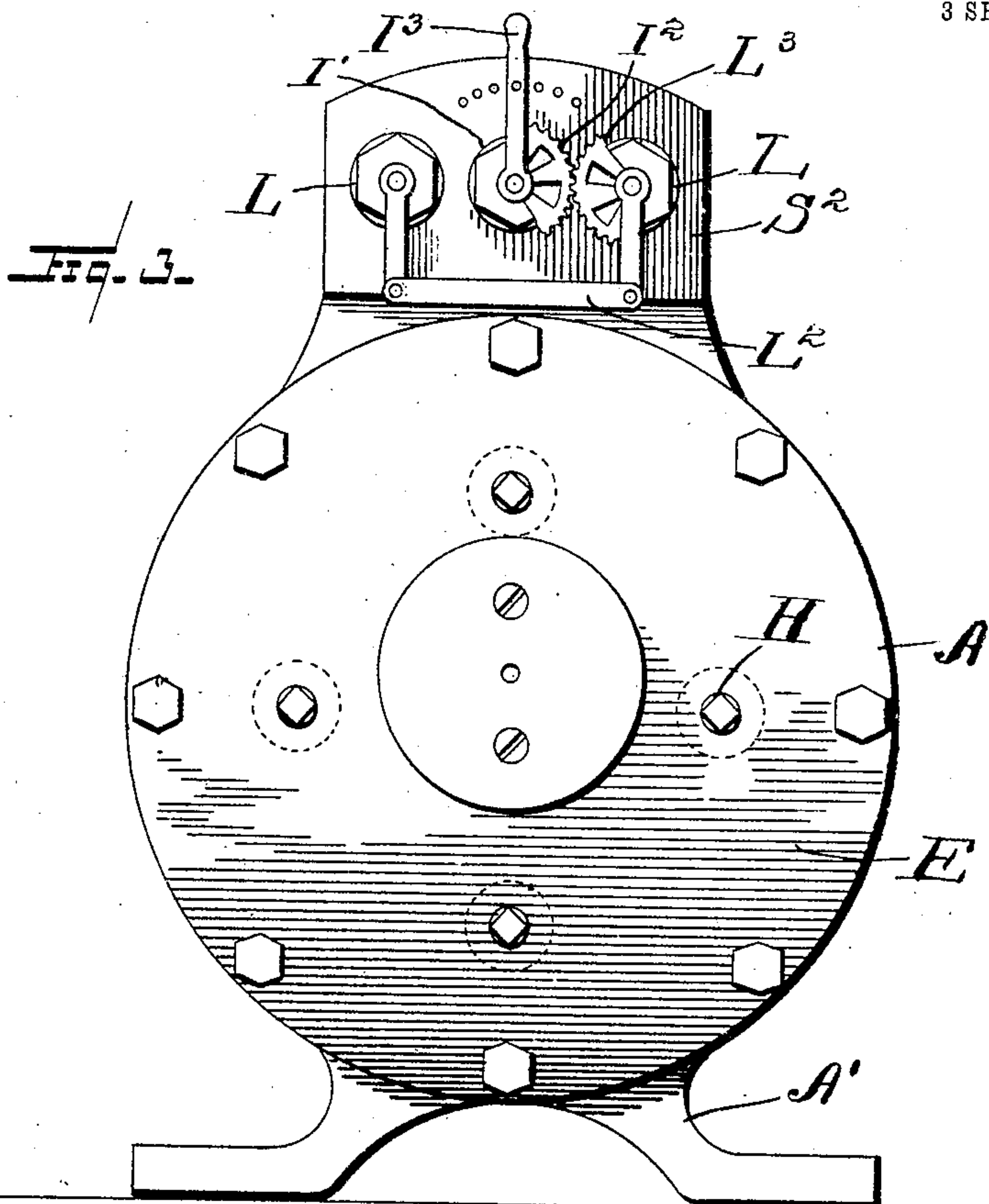
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3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

GEORGE G. WELSH, OF SWISSVALE, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO THOMAS C. RANKIN, OF SWISSVALE, PENNSYLVANIA.

## ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 771,593, dated October 4, 1904.

Application filed June 20, 1904. Serial No. 213,286. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE G. WELSH, a citizen of the United States, residing at Swissvale, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Rotary Engines; and I do declare the following to be a full, clear, and exact description of the invention, such as it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters marked thereon, which form a part of this specification.

This invention relates to new and useful improvements in rotary engines; and the object of the invention is to produce an expansion-engine which may be run by steam, air, or water, and in carrying out my invention it is my purpose to generally improve upon and render more efficient this class of inventions.

My invention is illustrated in the accompanying drawings, which, with the letters of reference marked thereon, form a part of this application, and in which drawings similar letters of reference indicate like parts in the several views, in which—

Figure 1 is a vertical central sectional view through my improved engine. Fig. 2 is a central cross-sectional view through the engine. Fig. 3 is an end view of the engine. Fig. 4 is an enlarged detail view of one end of the piston, and Fig. 5 is a side elevation of the piston. Fig. 6 is a detail view of the shaft. Fig. 7 is an enlarged detail view showing the lever and gear mechanism for reversing the engine. Fig. 8 is a side elevation of one of the blades. Fig. 9 is an edge view of the blade. Fig. 10 is a detail view of one of the reversing-valves, and Fig. 11 is a detail view of a valve.

Reference now being had to the details of the drawings by letter, A designates the casing, which is of a general cylindrical shape, having supporting-legs A' and steam-ports B formed in the inner surface of the casing, which may be utilized both as exhaust and feed passage-ways, accordingly as the engine is driven forward or reversed.

Mounted in suitable bearings which are provided with stuffing-boxes is a shaft C, to which a hollow cylindrical piston D is fixed. Fixed to each cylinder-head E is a cam member F, in which said shaft turns, and suitable screws are provided for fastening the heads to the casing of the cylinder. Intermediate the cylinder-heads and the piston are suitable packing-heads G, about which are packing-rings G', and screws H pass through the cylinder-heads and are adapted to adjust said packing-heads. Said piston has series of radial slots or recesses D', (shown clearly in the detail view of the drawings,) in which the longitudinally-movable blades K are mounted. The inner end of each of said blades has a movable spring-actuated bearing-block N, which is preferably convexed upon its outer edge, where it contacts with the cam F and upon which it rides as the cylinder rotates in one direction or the other. The outer end of each of said blades has a recess K', adapted to receive a block O, against which springs O', seated in each of said recesses, are adapted to bear for the purpose of holding the contact-shoes Q snugly against the inner circumference of the cylinder as the piston rotates. Said shoes (designated in the drawings by letters Q) have ball-and-socket connection Q' with the spring-pressed blocks O, whereby the contacting surface of the shoe may at all times during the rotary movement of the piston wipe against the inner circumference of the cylinder. A packing-bar J is seated in the inner circumference of the cylinder in the upper portion of the same and intermediate the inlet and exhaust passage-ways, as shown clearly in the sectional view of the drawings. Said passage-ways B communicate with a valve-regulated opening I, having a valve I' mounted therein, and exhaust-valves L are mounted one upon each side of the central valve I', and said valves are adapted to be moved in unison by means of the following mechanism: Fixed to each valve L is an arm L', which arms are connected together by means of a link L<sup>2</sup>, and fixed to one of said valves L is a segment-gear L<sup>3</sup>,



which is in mesh with a segment-gear  $I^2$ , fixed to the valve  $I'$ , and a suitable operating-lever  $I^3$  is also fixed to the valve  $I'$ , whereby as said lever is thrown in one direction or the other  
 5 said valves  $L$  will be turned accordingly for the purpose of opening and closing one or the other of said valves  $L$ , accordingly as the engine is driven forward or reversed. In order to hold the lever  $I^2$  in an adjusted position, a  
 10 spring-pressed pin  $S$  is provided which is normally held in one or the other of the holes  $S'$  in the face of the valve-casing  $S^2$ . The shaft contains a longitudinal bore  $C'$ , from which radiate branching ducts  $C^2$ , which lead into  
 15 the annular recesses  $C^3$ , and an oil-cup is adapted to be connected to the end of said passage-way, whereby oil may be fed into the shaft and allowed to pass through the apertures and to lubricate the parts of the engine.

20 The operation of my invention will be readily understood, and it will be observed that the piston will have a perfect rotary movement and the blades reciprocate during the rotary movement of the piston and affording  
 25 a mechanism which may be easily and quickly reversed, the valves being so regulated with relation to one another as to throw the proper exhaust-ports open when the engine is driven forward or reversed.

30 While I have shown a particular detailed construction of apparatus embodying the features of my invention, it will be understood that I may vary the details of construction, if desired, without in any way departing from  
 35 the spirit of the invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A rotary eccentric - piston engine comprising a casing, a shaft journaled therein, a  
 40 piston rotating with said shaft, fixed cams positioned within the casing and in which the shaft turns, series of reciprocal blades riding upon the circumferences of said cams, the  
 45 outer ends of said blades being recessed, a spring-pressed block carried by each of said recesses, a rocking shoe seated in each of said blocks and adapted to wipe against the inner circumference of the cylinder as the piston  
 50 rotates, and valve-regulated mechanism with

passage-ways, whereby the engine may be driven forward or reversed, as set forth.

2. A rotary eccentric - piston engine comprising a casing, a shaft journaled therein, a piston rotating with said shaft, fixed cams  
 55 positioned within the casing and in which the shaft turns, series of reciprocal blades riding upon the circumferences of said cams, the inner ends of said blades having movable contact-blocks adapted to ride upon the circum-  
 60 ferences of said cams, the outer ends of the blades having recesses, spring-pressed blocks mounted, one in each of said recesses in the outer ends of the blades, the outer face of each of said spring-pressed blocks having a  
 65 concaved groove, a shoe having a cylindrical beaded portion adapted to have a bearing in the recess in said spring-pressed block, said shoe being designed to wipe against the inner circumference of the cylinder during the rotary  
 70 movement of the piston, and valve-regulated mechanism with passage-ways so arranged that the engine may be driven forward or reversed, as set forth.

3. A rotary eccentric - piston engine comprising a casing, a shaft journaled therein, a  
 75 piston rotating with said shaft, fixed cams positioned within the casing and in which the shaft turns, series of reciprocal blades riding upon the circumferences of said cams, a rock-  
 80 ing shoe carried in the outer end of each of said blades and adapted to wipe against the inner circumference of the cylinder as the piston rotates, a bearing-block mounted in a recess in the inner end of each blade and adapted  
 85 to ride upon one of said cams, the inner circumference of the cylinder having grooved passage-ways, exhaust-valves with ports therein, and a supply-valve, link connections between said exhaust-valves, segment-gear con-  
 90 nections between one of said exhaust-valves and the supply-valve, and a lever for operating said supply-valve, as set forth.

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

GEORGE G. WELSH.

Witnesses:

JAMES V. SHAFFER,  
 WM. A. KNORR.