

No. 749,712.

PATENTED JAN. 19, 1904.

C. W. ALLEN.  
ROTARY ENGINE.

APPLICATION FILED MAY 6, 1903.

NO MODEL.

3 SHEETS—SHEET 1.

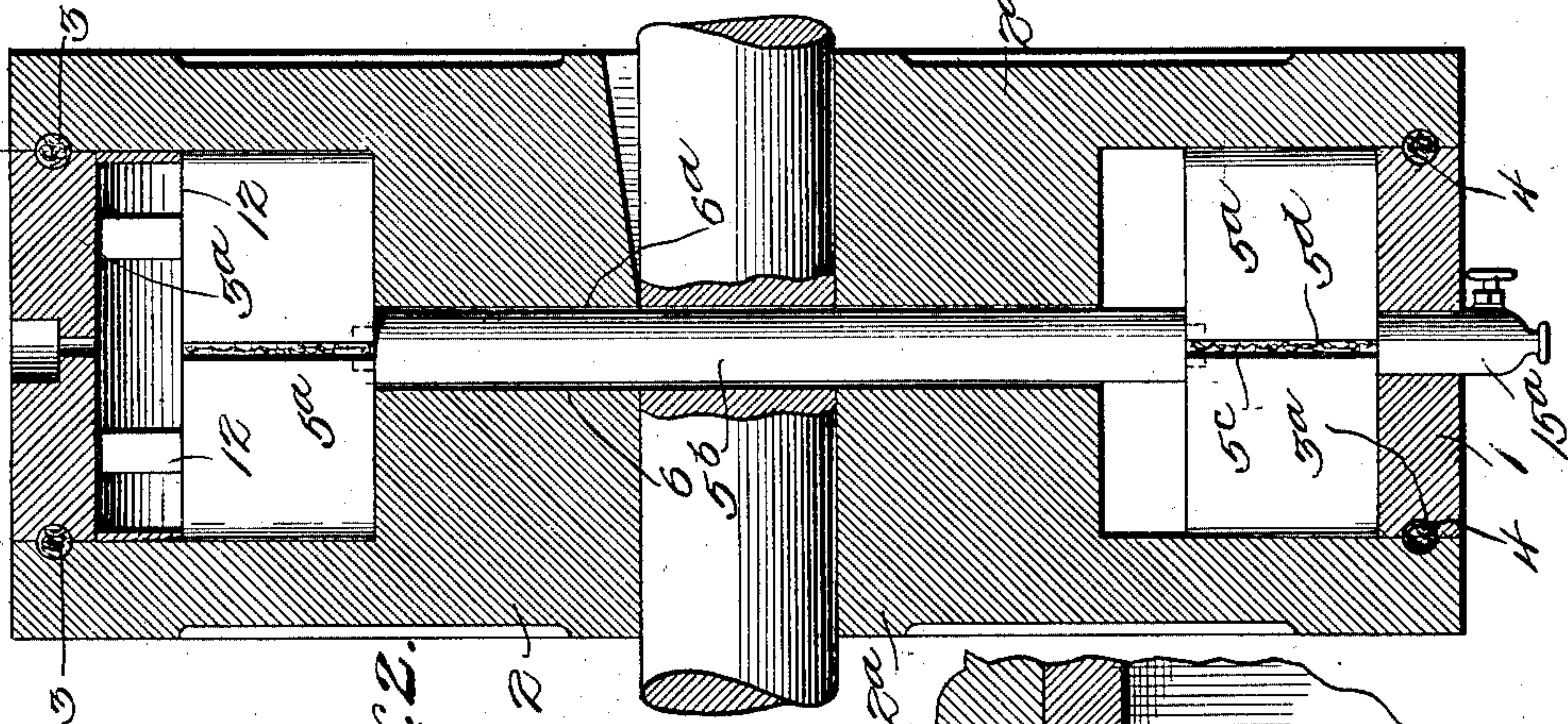


Fig. 2.

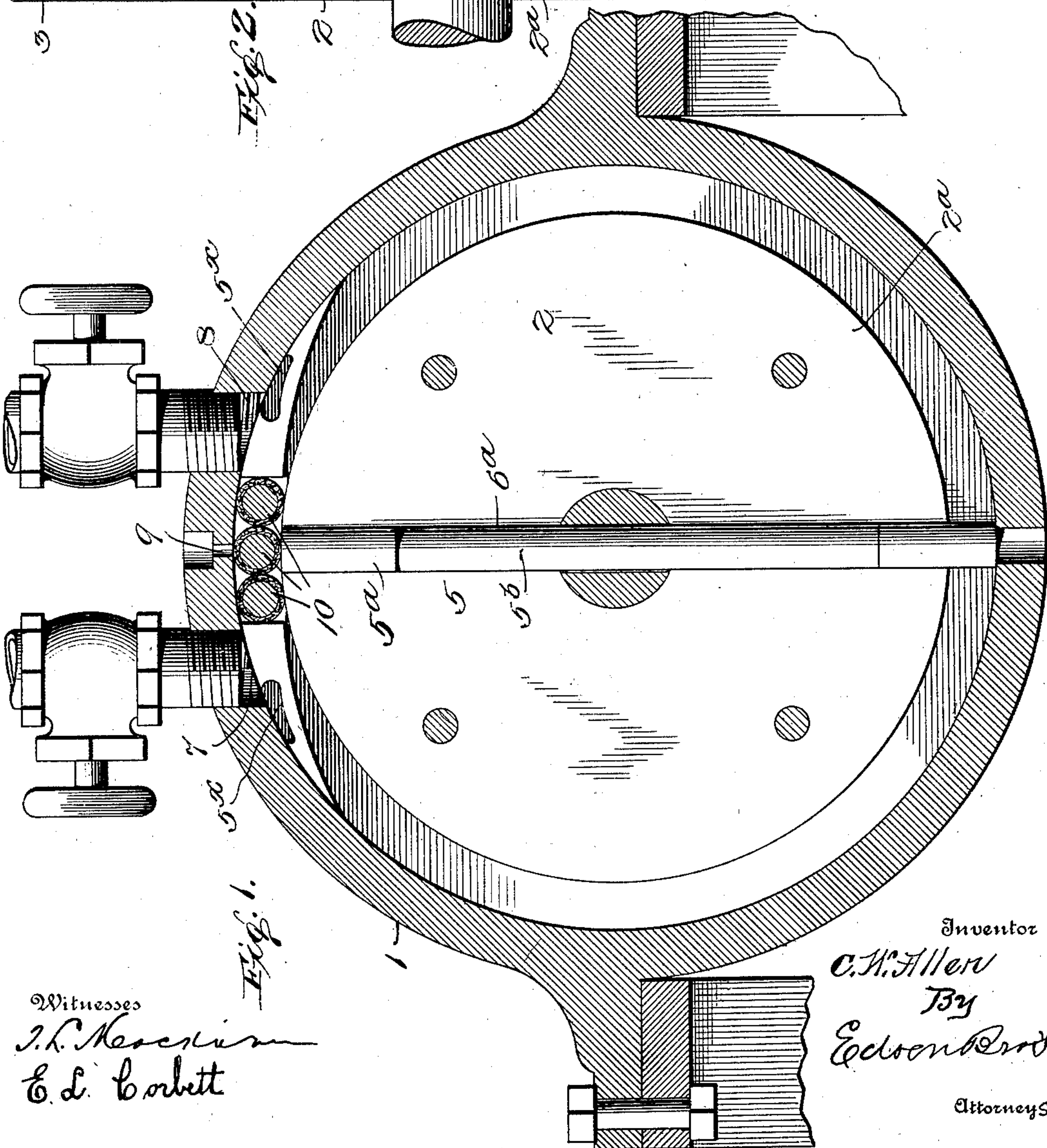


Fig. 1.

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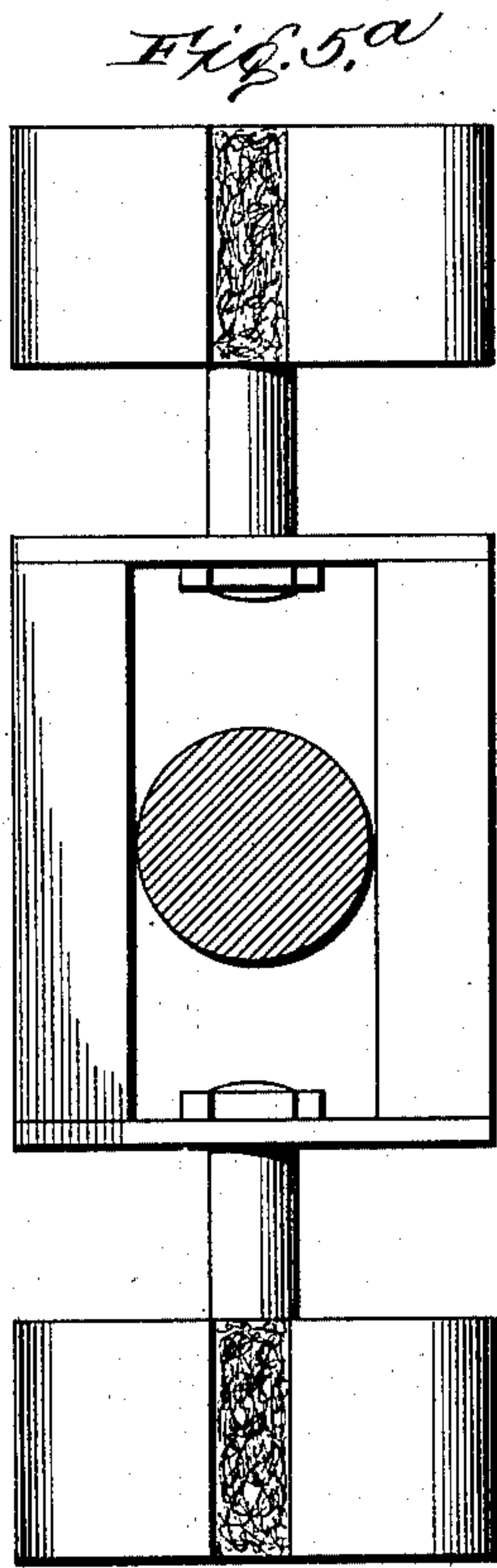
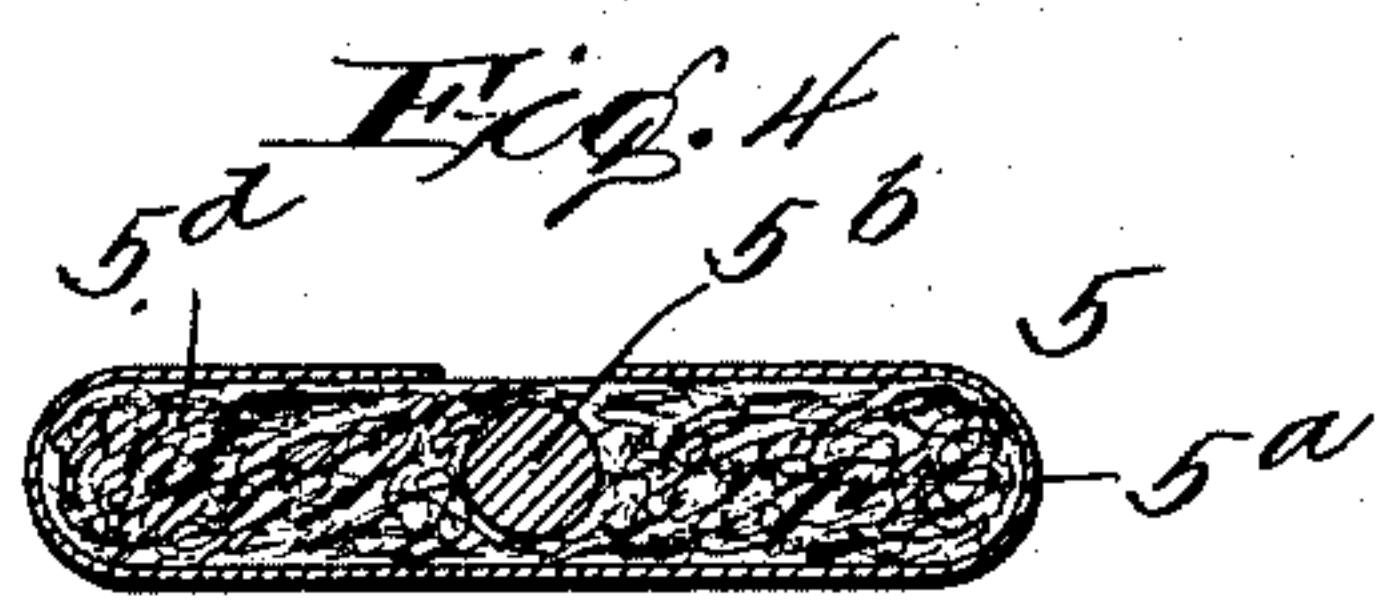
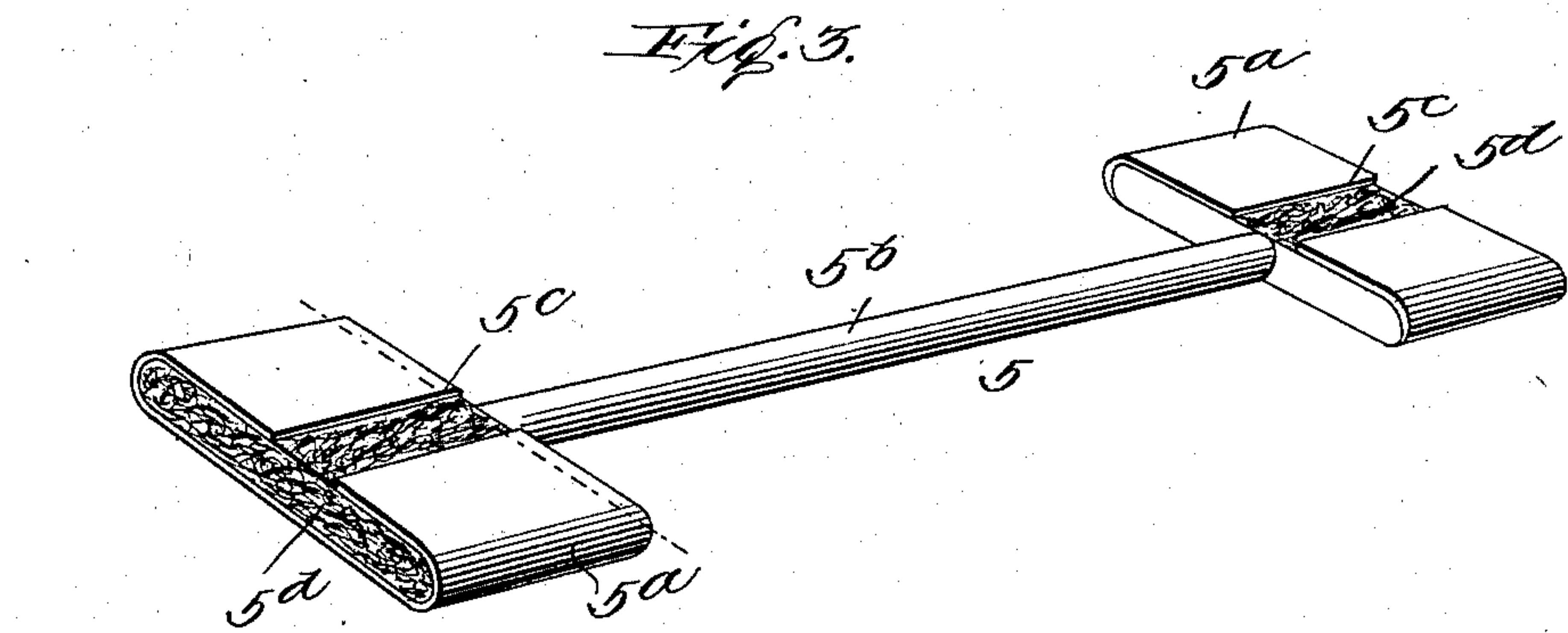
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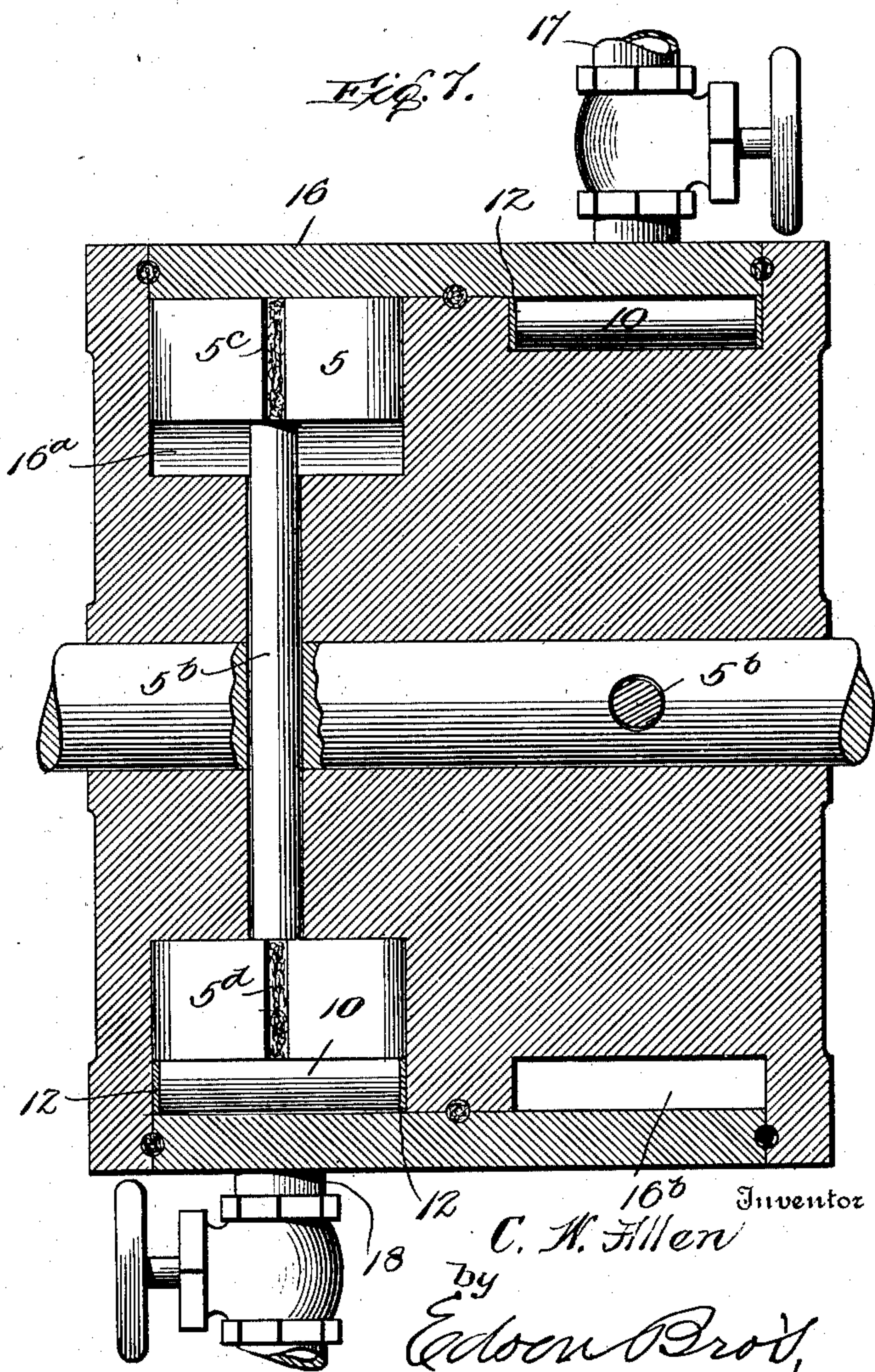
NO MODEL.

3 SHEETS—SHEET 2.



Witnesses

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3 SHEETS—SHEET 3.

Fig. 6.

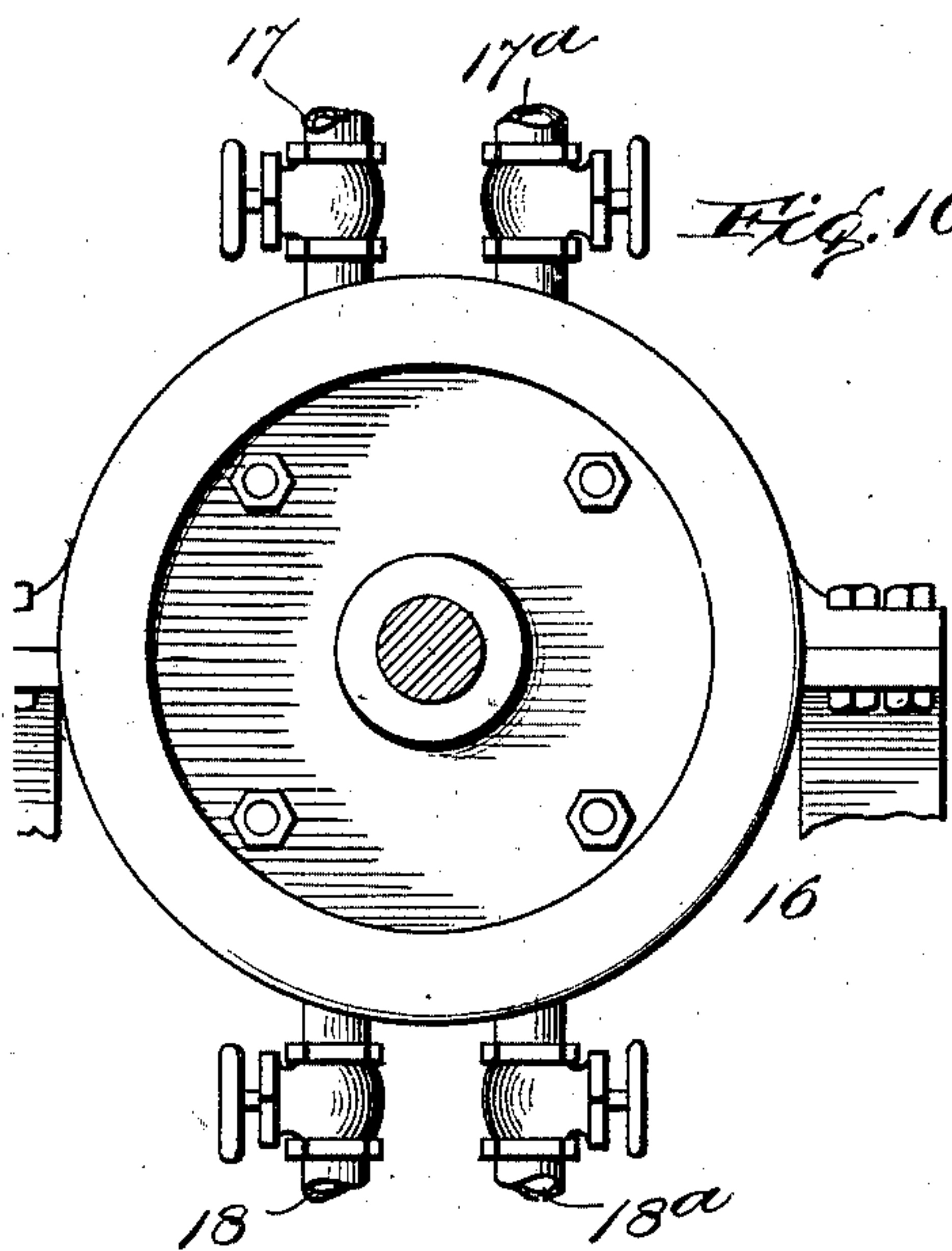
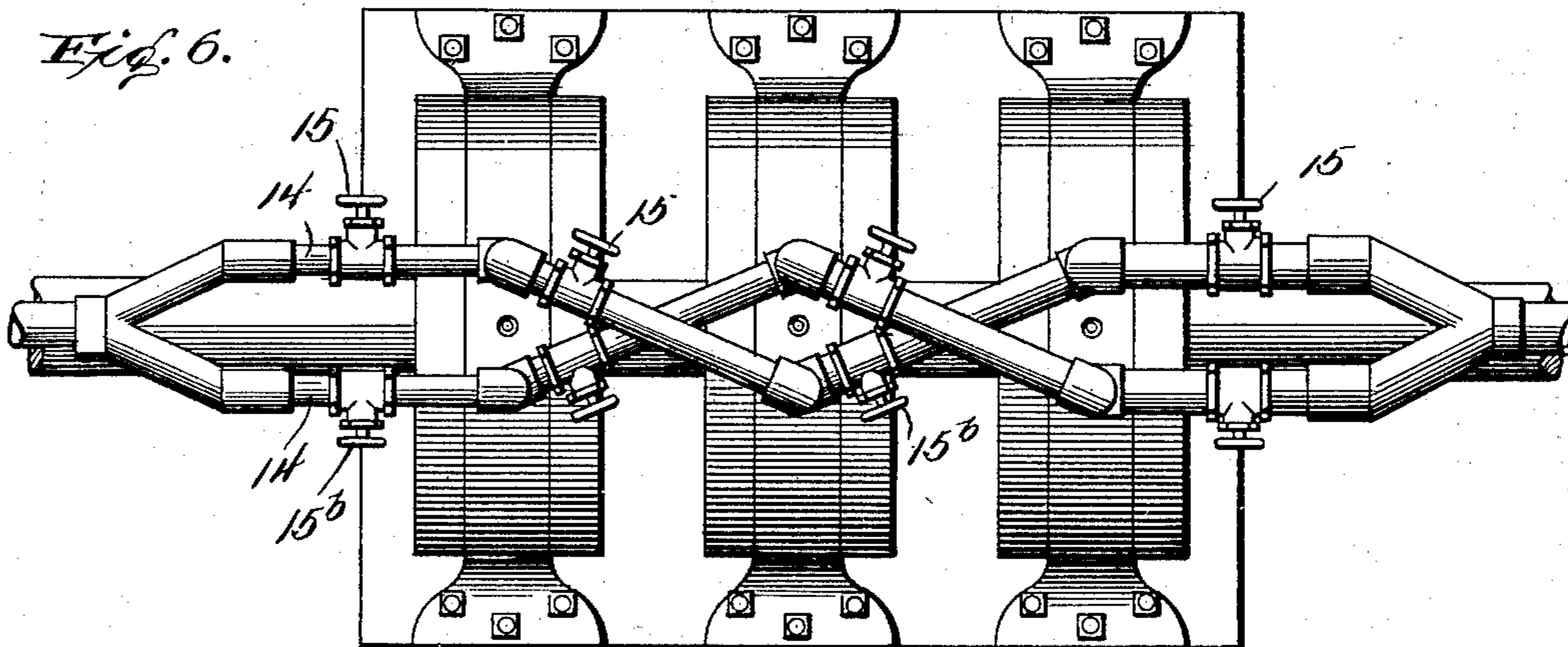


Fig. 10.

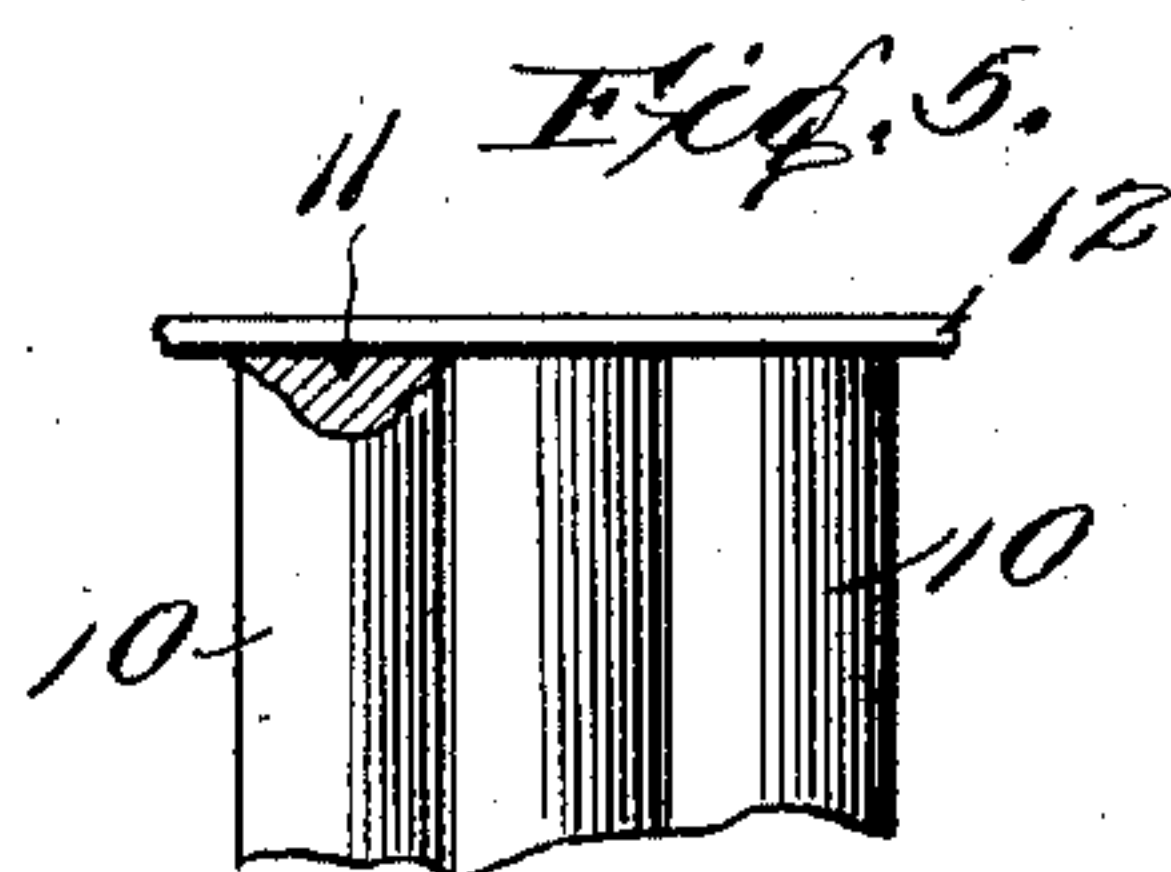


Fig. 5.

Fig. 8.

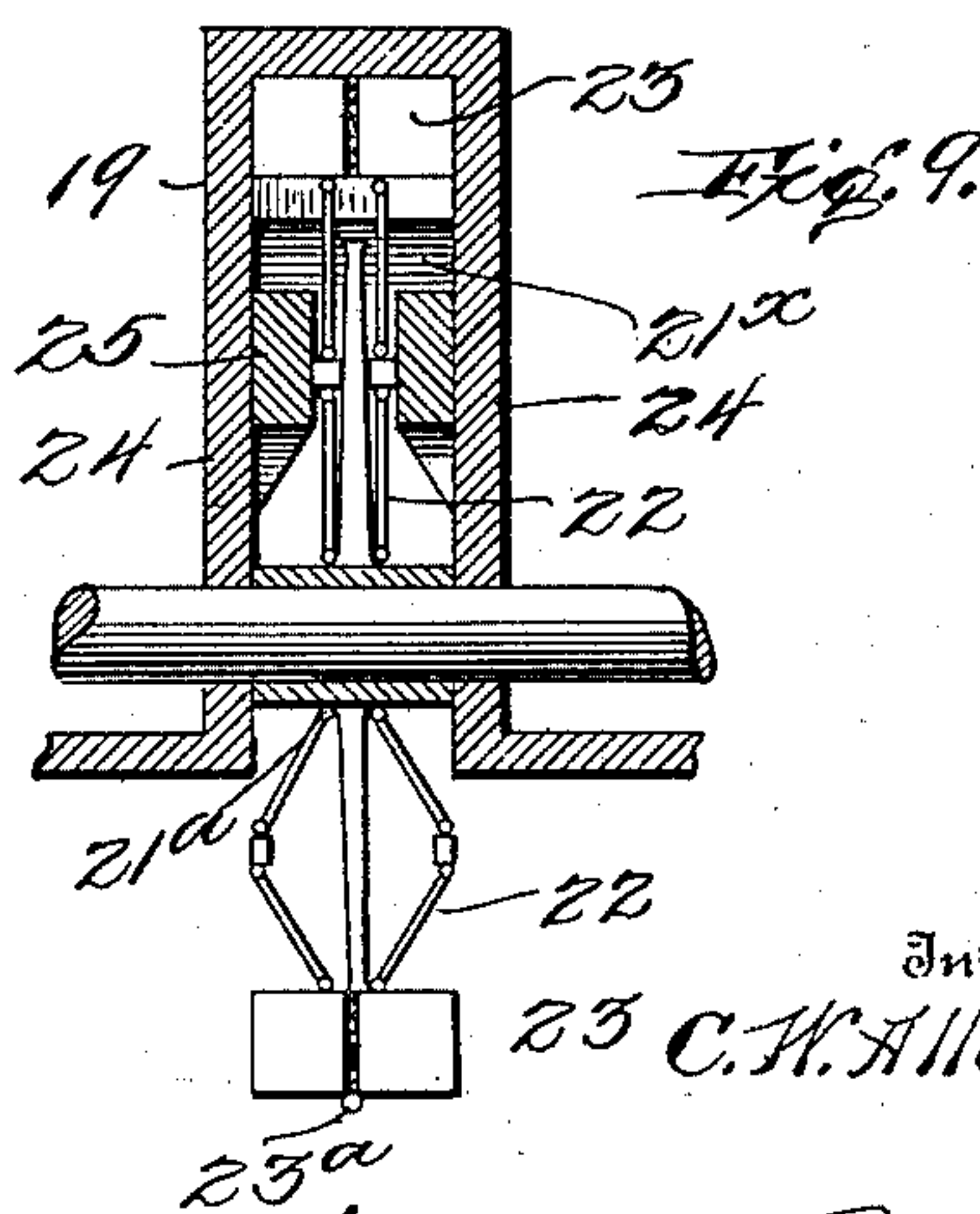
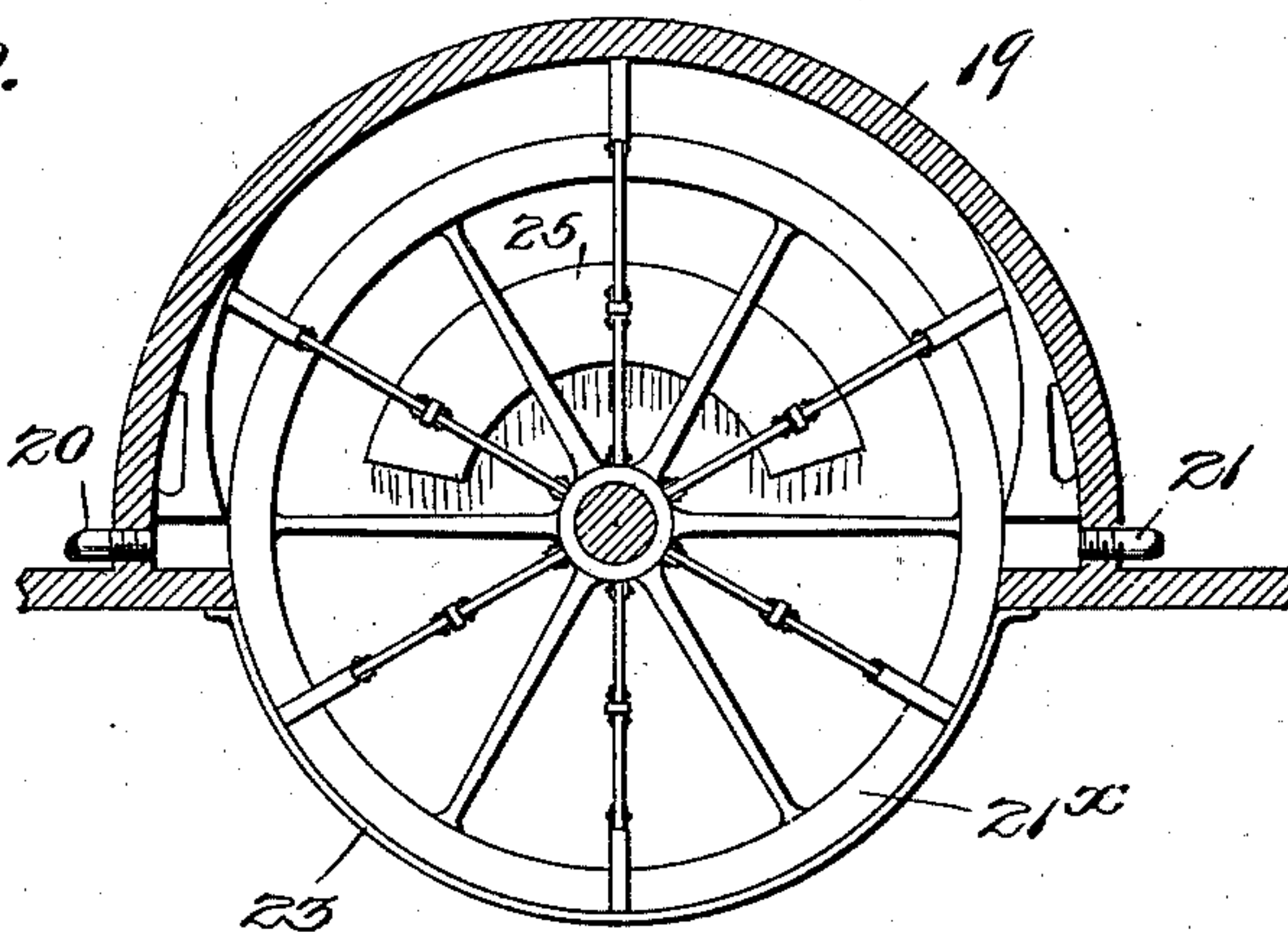


Fig. 9.

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# UNITED STATES PATENT OFFICE.

CHARLES W. ALLEN, OF MERRIMAN, NEBRASKA.

## ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 749,712, dated January 19, 1904.

Application filed May 6, 1903. Serial No. 155,914. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES W. ALLEN, a citizen of the United States, residing at Merriman, in the county of Cherry and State of Nebraska, have invented certain new and useful Improvements in Rotary Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to certain improvements in rotary steam-engines.

It has for its object to provide a suitable motor for driving machinery, &c., and to effect this in a simple and effective manner; and it consists of the combination and arrangement of parts, substantially as herein-after more fully disclosed, and specifically pointed out by the claims.

In the accompanying drawings, illustrating the preferred embodiment of my invention, Figure 1 is a transverse section thereof. Fig. 2 is a vertical section of the same with the packing-rolls removed, disclosing more especially the plates with trunnion-pins or bearings for the support of said packing-rolls. Fig. 3 is a perspective view of the valve or sliding piston-abutment. Fig. 4 is a cross-section of one end of the valve, disclosing more particularly the means for retaining the packing in position thereon. Fig. 5 is an enlarged detached view showing the packing in the form of rolls arranged within the cylinder intermediately of the steam and exhaust ports. Fig. 5<sup>a</sup> is a modification thereof, more particularly of the valve or sliding abutment. Fig. 6 is a modification showing my invention connected up in multiple. Fig. 7 is a still further modification of my invention in sectional elevation. Fig. 8 is also a further modification, and Fig. 9 is a detailed view of one of the valves or sliding abutments of said last-referred-to modification.

It will be understood that latitude is allowed herein as to details, as they may be changed as circumstances suggest without departing from the spirit of my invention and the same still be protected.

In the carrying out of my invention I employ a casing or cylinder 1, adapted to be

suitably supported and held in place, the same having connected up therewith a rotary piston 2, comprising sections 2<sup>a</sup>, opposed to each other upon opposite sides of said cylinder or casing. Said sections of said piston are provided upon the inner faces of their outer enlarged portions with annular grooves or channels 3, facing corresponding grooves or channels 3<sup>a</sup> in the casing or cylinder 1, said grooves or channels receiving suitable packing 4, such as rubber tubing, &c., to form steam-tight joints at those points, said sections of said piston being mounted upon the driving-shaft for transmitting the action thereof to the machinery to be driven. The inner or lesser-diametered portions of said piston-sections receive between the same a sliding valve 5, said lesser-diametered portions of said piston being grooved and recessed, as at 6 6<sup>a</sup>, radially to the axis of said piston to receive said sliding valve and permit of the movement of said valve therein during the rotation of said piston. The piston-sections are also produced with extensions of the recesses formed in the lesser-diametered portions thereof to permit said valve to move from edge to edge of the inner surface of the enlarged portions of said piston to receive the impact of the steam, said valve also passing transversely through an aperture in the shaft and will be further referred to hereinafter. Said casing or cylinder has a live-steam inlet or port 7 and an exhaust-port 8 upon opposite sides of its vertical center, preferably in its upper portion, intermediately of which is provided a lubricating-passage 9, said ports being suitably connected up with a steam-chest or with pipes, one connecting with a steam generator or boiler. Within said casing or cylinder 1 are also formed or provided ribs or ledges 10<sup>x</sup>, preferably depending upon opposite sides of or planes passing through the live-steam and exhaust ports, adapted to conform to an arc eccentric to the general circle or outline of the chamber of the casing or cylinder for engagement with the valve 5, carried by the piston for actuating the same, as in exhausting the steam previously acting upon said valve, as will be readily understood. These ribs or ledges preferably stop a short



distance from each other, the intermediate space between their opposite ends being filled in with a suitable packing, preferably a series of rolls 10, suitably steam-tight packed and hung by means of trunnions or projections 11, projecting from lateral plates 12, suitably secured or cast with the circumferential edges of the casing or cylinder 1. Said ledges or ribs stand inward from the edges of said cylinder or casing in order to avoid frictional contact between the same and the revolving piston, and in order to permit the steam at that point to escape said ribs or ledges are provided with openings or ports 5<sup>x</sup>, the steam finally passing out through the exhaust-port. Also it will be noted that in lieu of the rolls a block of soft metal, such as Babbitt, &c., may be used as packing. It will be observed by this arrangement that contact and friction between the revolving piston and said rolls will be reduced to the minimum, and yet a perfect steam-tight-packed joint will be preserved. Also it will be noted that by this arrangement the exhausting of the steam will be effected gradually from the bases or tapered points of said ledges until the ledges are passed at the maximum depth of said ledges.

The valve 5, before referred to, consists of elliptical-shaped receptacles or closures 5<sup>a</sup>, having openings through their bottoms to receive the cylindric stem or rod 5<sup>b</sup>, said closures or receptacles having their casings produced with slots or partially left open at one side, as at 5<sup>c</sup>, to permit of the expansion or contraction of said closure under the action of the steam, &c. Within said closure or cups is placed a suitable packing 5<sup>d</sup> for the purpose of effecting steam-tight joints between the same and the walls of the chamber of the cylinder or casing. This of course permits of the ready renewal of said packing when required. The piston casing or cylinder is provided in its bottom portion with a petcock 15<sup>a</sup> for the discharge of the water of condensation.

In the modification as illustrated in Fig. 5<sup>a</sup> it will be observed that in lieu of the valve above referred to I may employ a valve 13, adapted to straddle the engine or driving-shaft, the operation of which is readily apparent.

In the modification as illustrated in Fig. 6 I have shown the engine connected up in multiple, a series of pipes 14 having branches 14<sup>a</sup>, two of each being connected with each cylinder or casing in line with the steam and exhaust ports and said pipes being provided with series of valves or cocks 15 15<sup>b</sup>. Said pipes initially receive steam from a boiler or other suitable source and adapted to finally exhaust the same after having passed through the series of piston-cylinders. This arrangement permits of the delivery of the steam to each of said piston-cylinders and the actuation of each of their pistons. Consequently the driving of the shaft by each or all of said pistons increases the driving power. The course of

the steam to said piston-cylinders is indicated by arrows, with the cocks or valves adjusted accordingly.

As shown in Fig. 7, I may employ a cylinder 16, having two parallel chambers 16<sup>a</sup> 16<sup>b</sup>, with steam supply and exhaust ports 17 17<sup>a</sup> and 18 18<sup>a</sup>, respectively, communicating with said chambers, the same supplying and exhausting, as indicated by two series of arrows. By means of this arrangement pressure on the shaft is equalized.

In the modification as shown in Fig. 8 I may use in lieu of the cylinder as above described a semicircular chamber 19, having suitable valved supply and exhaust pipes 20 21. A wheel 21<sup>x</sup> in this instance is used, having pivoted or connected to pins 21<sup>a</sup>, secured to the spokes thereof, a series of knuckle-jointed levers 22, carrying valves or abutments 23, arranged to slide in said semicircular chamber and receive the impact of the steam. In planes parallel with said semicircular chamber and arranged upon opposite sides of said wheel I arrange plates or disks 24, having opposed cam projections 25, adapted to engage said knuckle-jointed levers to collapse said knuckle-jointed levers for throwing the abutments or valves into said chamber in receiving the action of the steam, said valve thus acted upon driving the wheel, with its shaft, for transmitting the driving power. To retain the valves or abutments, together with their knuckle-jointed levers, after said valves have been withdrawn from said semicircular chamber in position or against deflection by centrifugal action, suitable means is provided for that purpose—as, for instance, by means of a wire or guard 23 spanning the exposed peripheral edge portions of said valves or abutments. It will be understood that by means of the aforesaid arrangement of valves the course of the steam and its action upon the valves or sliding abutments can be readily reversed, thus providing for the corresponding reversal of the action of the piston and its shaft.

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

1. A rotary engine comprising a piston carrying a sliding valve and a cylinder having upon its inner surface ledges or ribs arranged on opposite sides of the steam and exhaust ports and adapted to form passages therebetween establishing communication between the cylinder or casing-chamber and said steam-exhaust ports, respectively, said ribs having lateral openings therethrough near their base and standing inward from the lateral edges of said casing or cylinder.

2. A rotary engine comprising a piston carrying a sliding valve, a cylinder or casing having, upon opposite sides of the steam and exhaust ports, ribs or ledges arranged eccentrically with the general outline of the cylinder.



der-chamber, with their opposed ends or edges spaced apart, said ledges or ribs being laterally removed from the corresponding edges of said casing or cylinder and having lateral openings or ports therethrough, near their bases, and steam-tight packing arranged between said spaced-apart ends or edges or ribs.

3. A rotary engine comprising a piston carrying a sliding valve and a casing having upon its inner surface ledges or ribs arranged eccentrically to the general circle or interior of the chamber of said casing, and packing-rolls contacting with each other and hung between the opposite edges or ends of said ledges or ribs, in contact with said piston.

4. A rotary engine comprising a casing having its interior surface provided with ledges or ribs arranged in eccentric lines with the general outline of the chamber of said casing and having arranged between their opposite ends packing-rolls, and a piston carrying a sliding valve, said valve comprising closures or receptacles provided with suitable packing.

5. In a rotary engine, a piston sliding valve comprising a rod or bar and closures or receptacles adapted to receive said bar or rod and supplied with packing.

6. In a rotary engine, a piston-valve comprising a rod or bar and closures or receptacles supplied with packing and having their casings open at one side, said casings receiving the ends of said rod or bar through their bottoms.

7. In a rotary engine, the combination of a series of piston-cylinders and a series of pistons carrying sliding valves each comprising closures containing packing and a rod or

bar let into the bottoms of said closures and a series of valved pipes effecting connection between each of said cylinders and with a suitable steam-supply source and adapted to exhaust beyond said series of piston-cylinders.

8. A rotary engine, comprising a piston-cylinder, a valved piston having a sliding valve, comprising a rod and closures containing packing and adapted to receive the ends of said rod, said rod passing through the piston-bearing shaft, steam supply and exhaust pipes, adapted to effect the steam-supply to said piston-cylinder and also to exhaust said steam-supply therefrom upon the completion of the rotation of such piston.

9. In a rotary engine, a piston-cylinder having upon opposite sides of the steam and exhaust ports, ledges or ribs, laterally removed from the corresponding edges of said cylinder and having lateral ports therethrough near their bases, said ledges adapted to form passages therebetween establishing communication between the chamber of said cylinder and said steam and exhaust ports, respectively, steam-tight packing arranged between the opposed ends or edges of said ledges or ribs, a piston carrying a sliding valve adapted to engage said ledges or ribs and packing, and valved steam supply and exhaust pipes communicating with said cylinder-chamber.

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

CHARLES W. ALLEN.

Witnesses:

EDITH F. EVERS,  
J. WM. MISTER.