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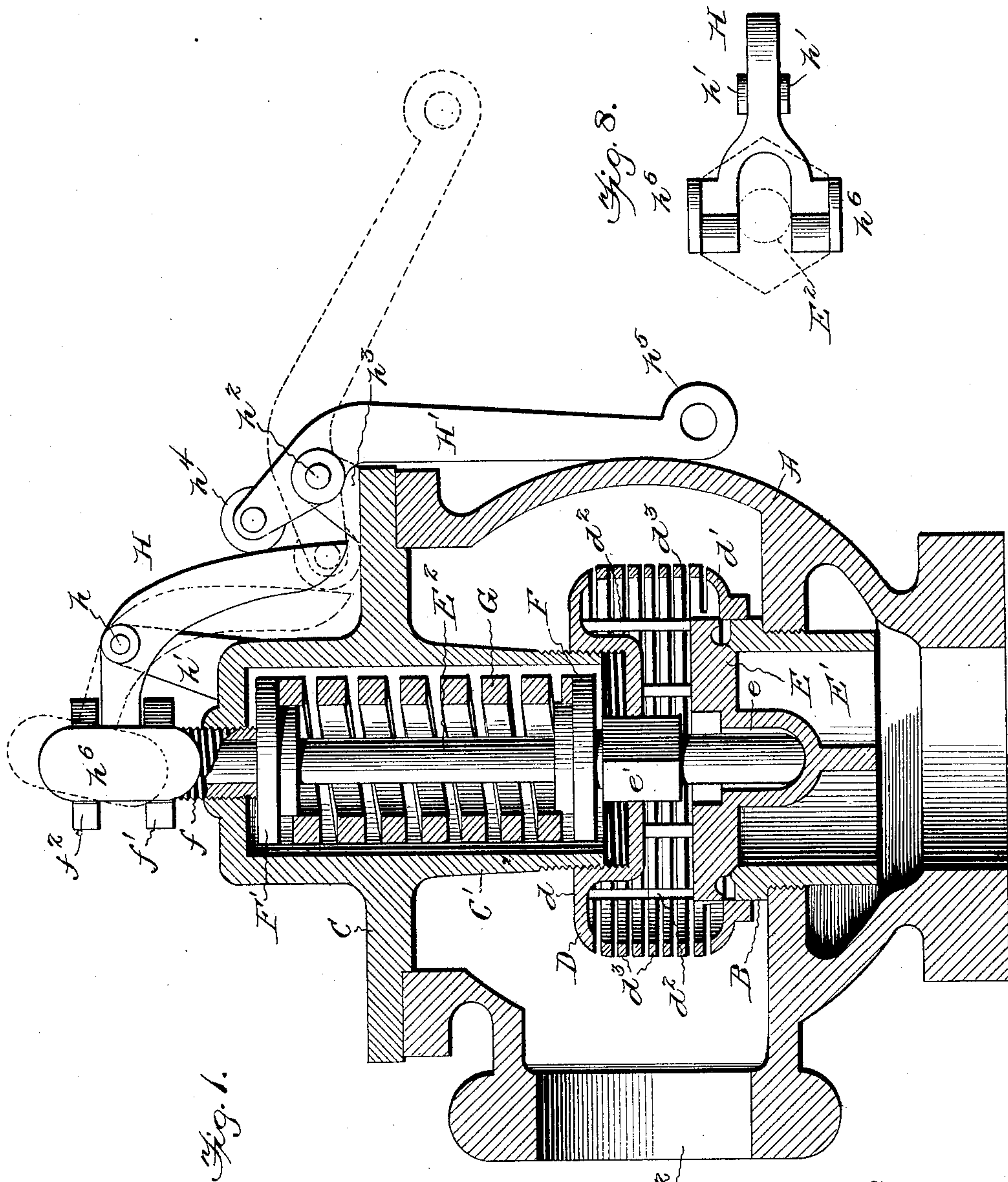
Patented Aug. 21, 1900.

W. E. WOOD.
SAFETY VALVE AND MUFFLER.

(Application filed Oct. 4, 1899.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses
T. L. Mockham
Geo. M. Coppenhaver

Inventor
W. E. Wood
By Alex. Mahon
Attorney

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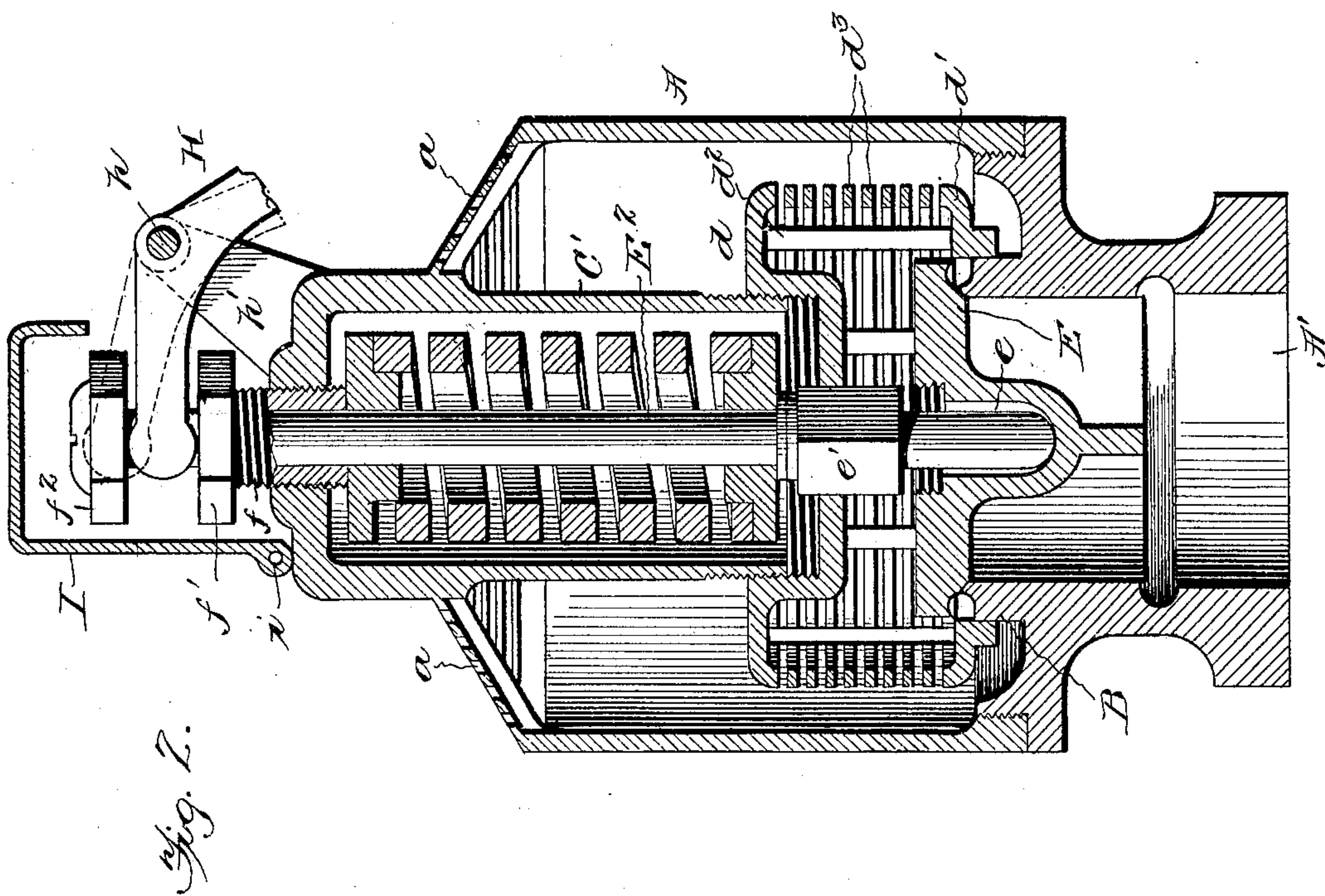
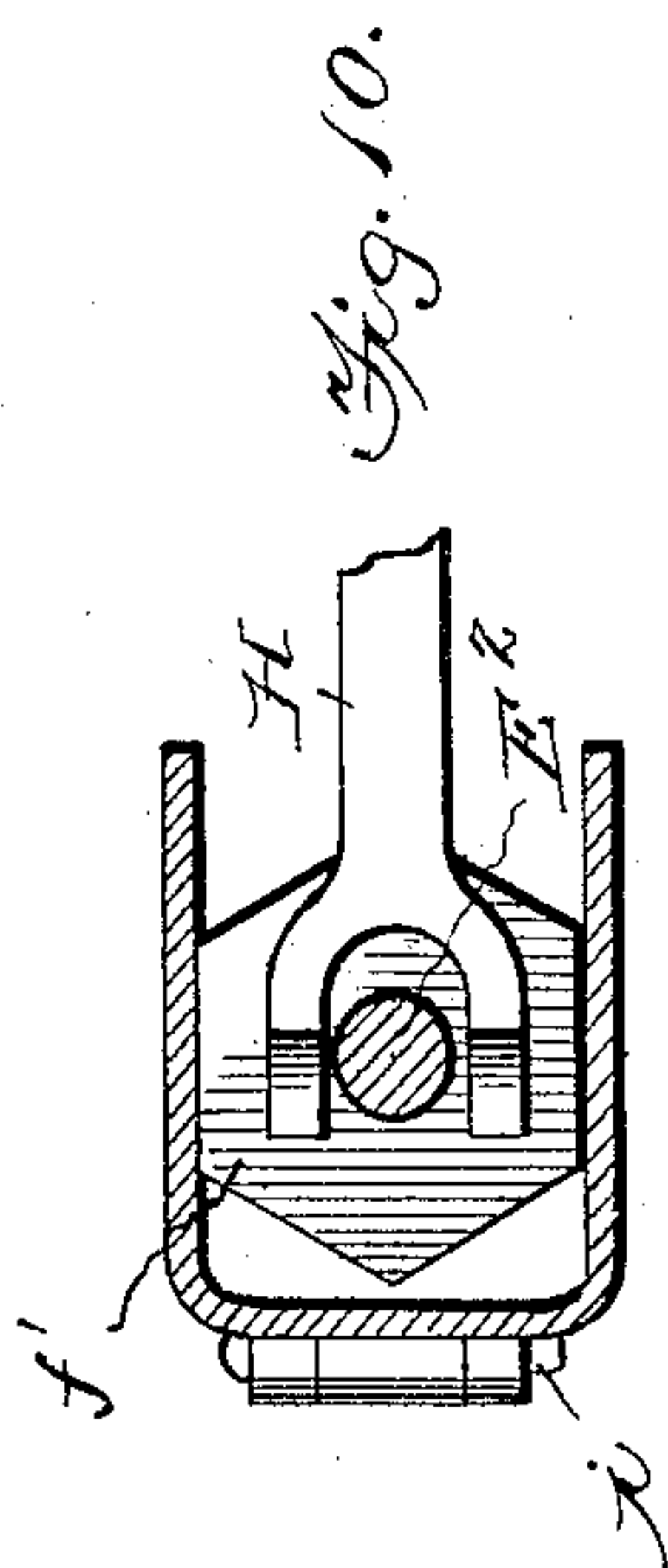
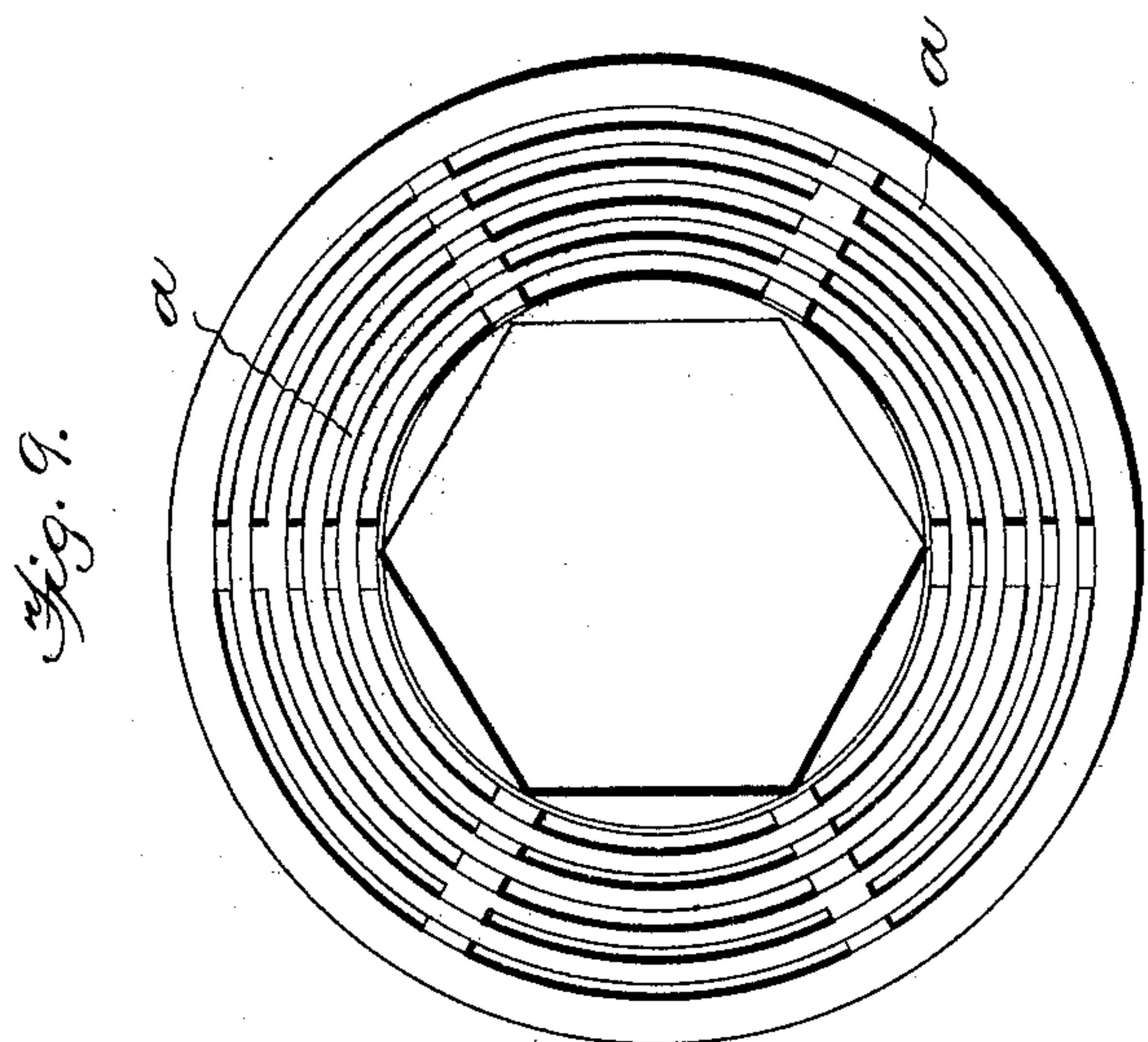
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T. L. Mockman
Geo. M. Copekaver.

Inventor
W. E. Wood
By Alex. Mahon
Attorney

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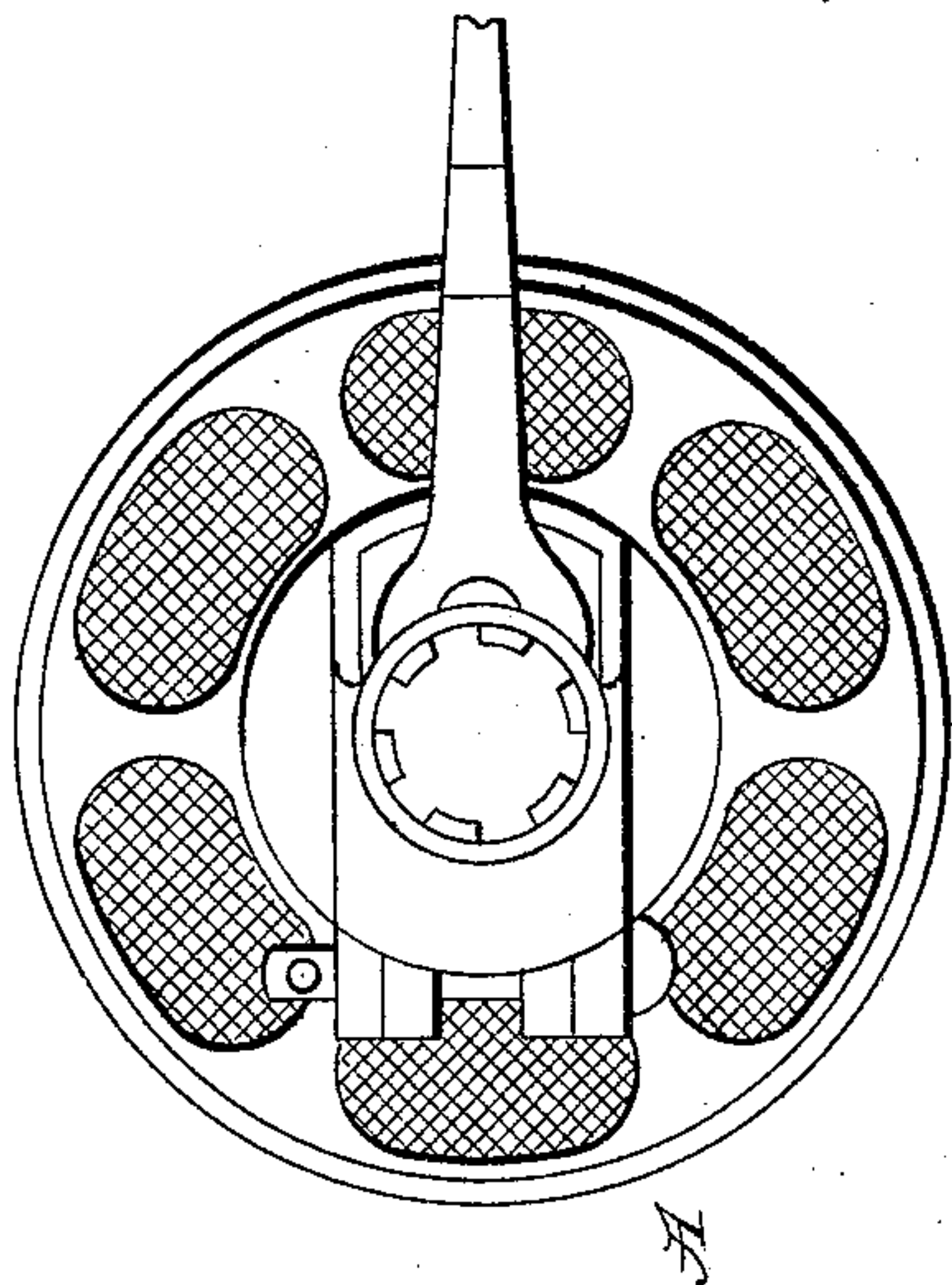
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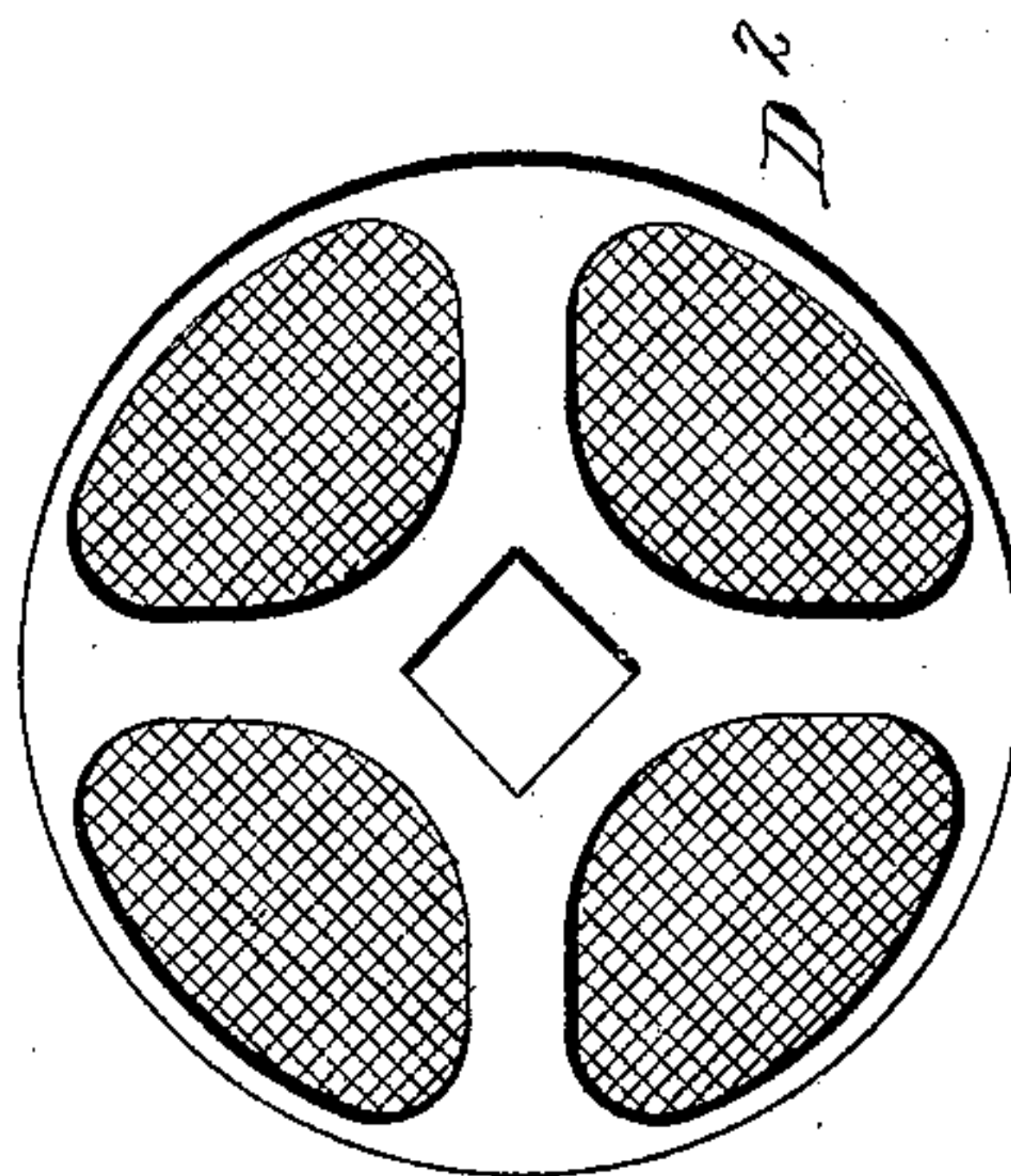
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Fig. 6.



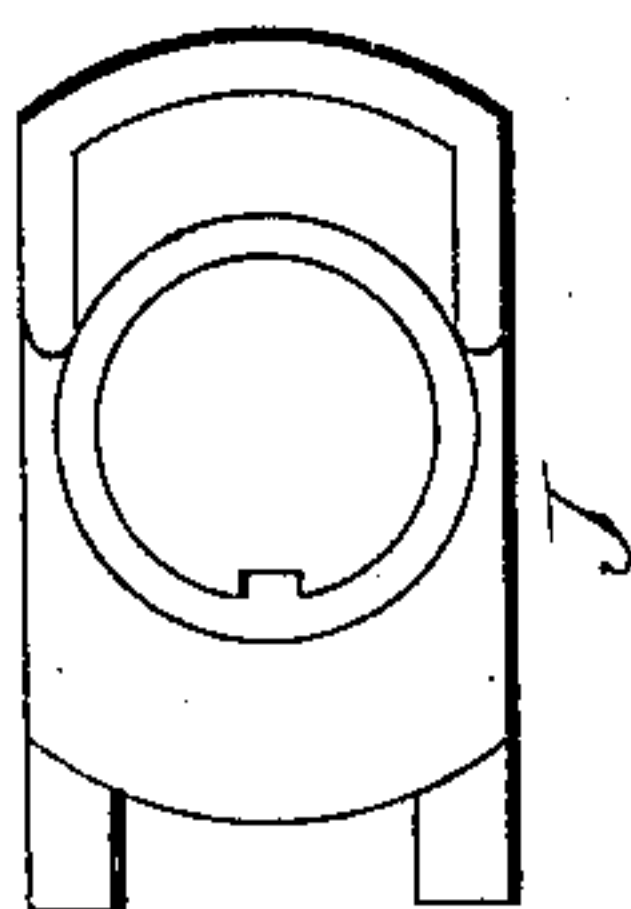
A



D^2

Fig. 5.

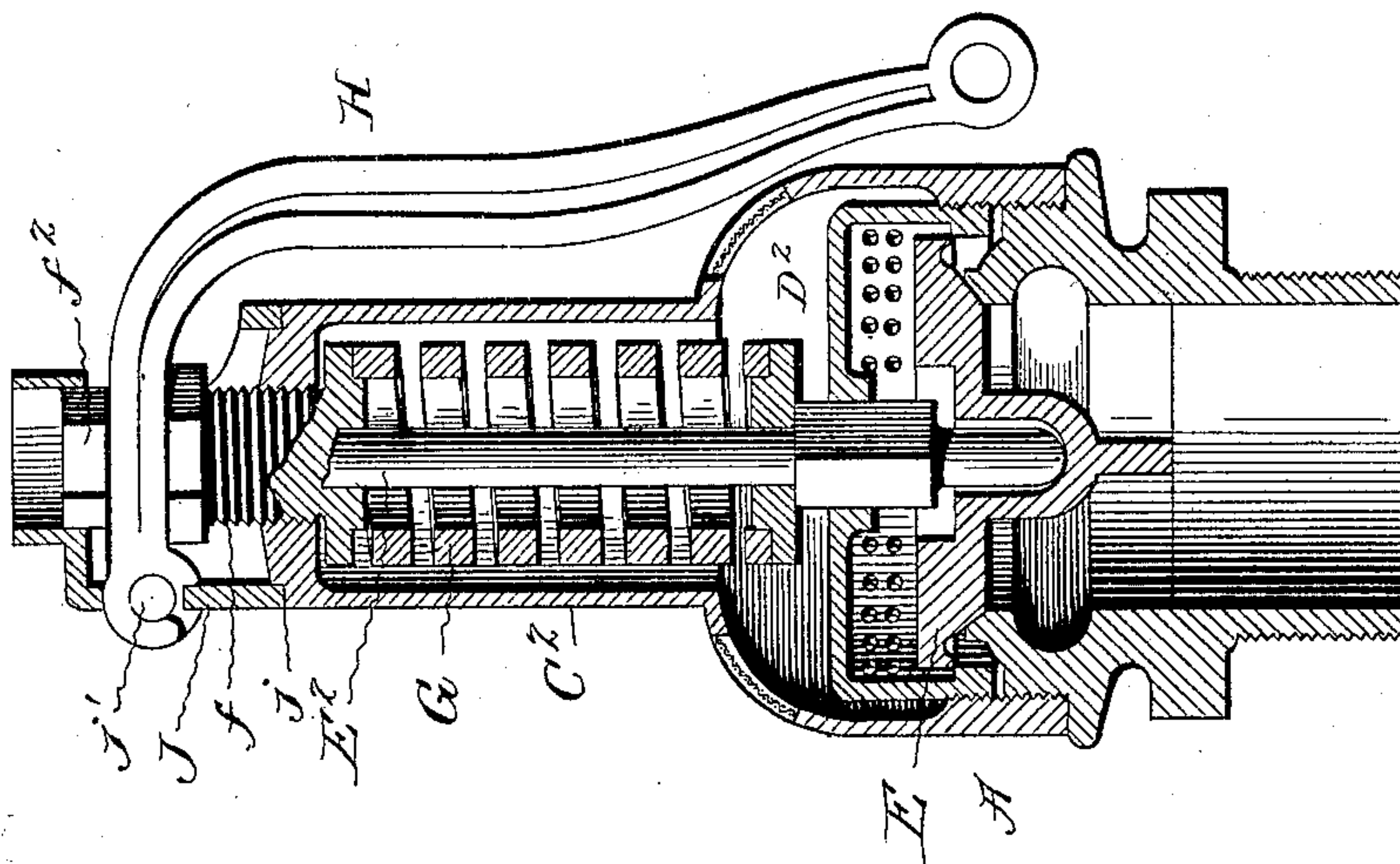
Fig. 4.



J

H

Fig. 3.



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T. L. Mockman
Geo. M. Copenhaver.

Inventor
W. E. Wood
by Alex. Mahon
Attorney

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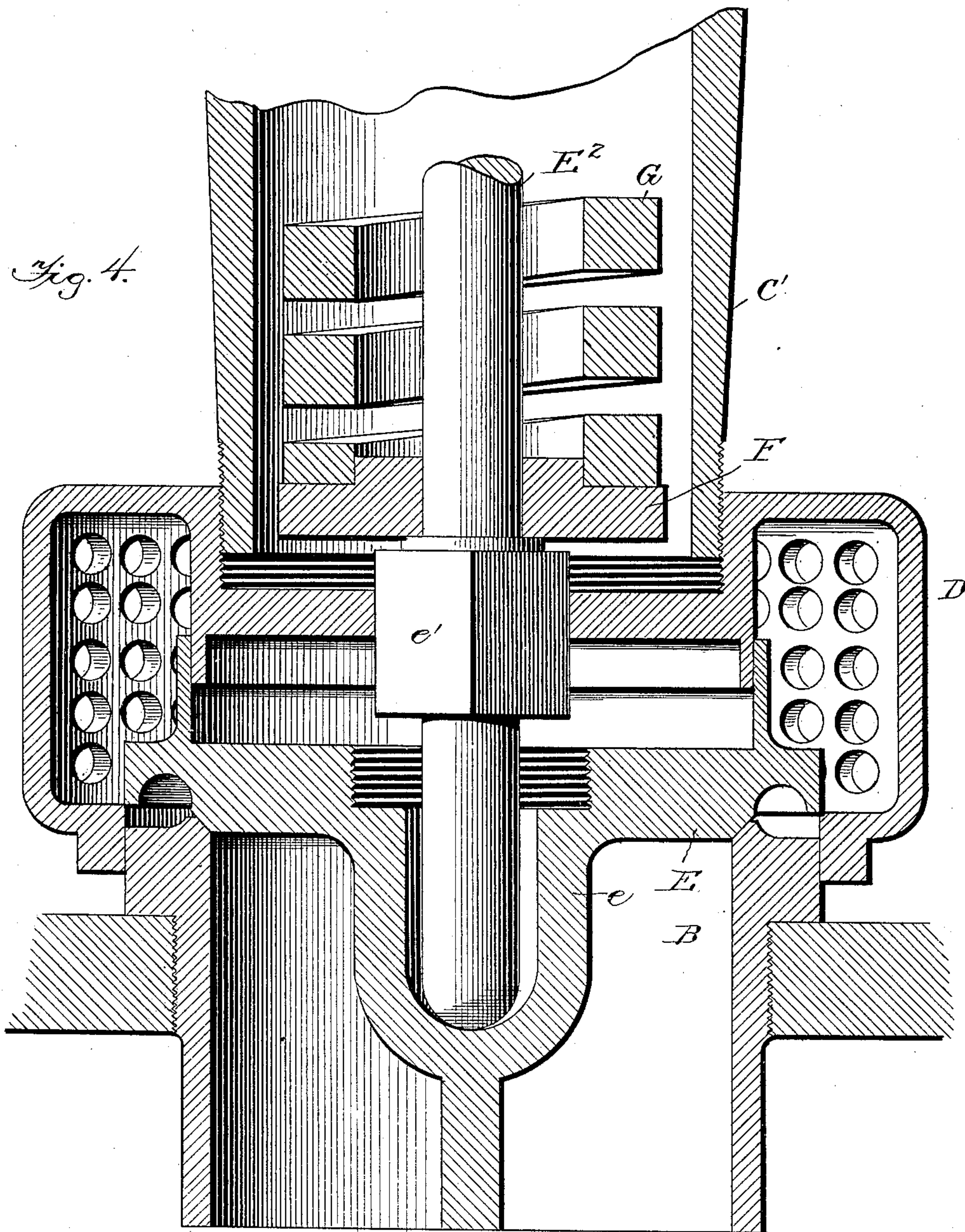
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T. L. Mookham
Geo. M. Cofenhaver.

Inventor

Wm. E. Wood
by Alex. Mahon
Attorney

UNITED STATES PATENT OFFICE.

WILLIAM E. WOOD, OF UTICA, NEW YORK.

SAFETY VALVE AND MUFFLER.

SPECIFICATION forming part of Letters Patent No. 656,237, dated August 21, 1900.

Application filed October 4, 1899. Serial No. 732,535. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. WOOD, a citizen of the United States, residing at Utica, in the county of Oneida and State of New York, have invented certain new and useful Improvements in Safety Valves and Mufflers; 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 improvements in safety valve and muffler for steam-engine, and has for its object to simplify the construction, muffle or reduce the noise of discharge, adjust at a convenient point the period of closing, to provide a simple means for locking all adjustments simultaneously, to provide a simple and effective means of popping the valve by hand and for fastening the same open when desired, and generally to reduce the cost of manufacture.

The invention consists, first, in the combination of a casing surrounding the valve, having openings therein adjustably connected with the main body, a square or irregular shaped central opening in said casing, a spindle provided with an enlargement corresponding to the opening and loosely engaging the same, and means located outside the main body whereby the spindle may be rotated to raise or lower the casing relative to the valve and main body, while permitting the free longitudinal movement of the spindle.

It consists, further, in a combined muffler and blow-down ring for safety-valve provided with a threaded portion to engage a similar thread on the main body and means for imparting a rotary motion to the ring to raise and lower the same relative to the valve, and in certain other novel features in the construction and arrangement of parts, all as hereinafter described.

In the accompanying drawings, Figure 1 is a transverse section through a casing, showing my invention as applied to stationary or marine type of engines. Fig. 2 is a similar view of the preferred form as applied to locomotives. Fig. 3 is a similar view of the form as applied to portable or farm engines. Fig. 4 is a similar view wherein the valve is provided with an annular ring on its outer face

telescopically engaging a similar ring on the muffler or blow-down to prevent steam-pressure from acting on the top of the valve. Fig. 5 shows one form of muffler-shell or blow-down having a series of openings formed therein and covered with wire-cloth or perforated metal. Fig. 6 is a view of one form of outer muffler, showing the wire-cloth or perforated metal. Figs. 7, 8, and 10 are plan or top views showing different forms of devices for popping the valve by hand and also for locking the parts in position when properly adjusted. Fig. 9 is a plan or top view of the outer muffler-shell, as shown in Fig. 2.

The valve body or casing A, as shown in Fig. 1, is particularly designed for use with a stationary or marine type of engine and is provided with the inlet-opening A' and outlet A².

The valve-seat B is mounted in the casing and secured in position by means of screw-threads in the usual or other preferred manner.

The upper portion of the casing consists of a cap-plate C, having cast integrally therewith a tubular portion C', which extends well down into the casing, as shown in Fig. 1, and to the end of which is attached, by means of a screw connection, the muffler D, the latter being provided with a socket for the reception of said tubular portion, the socket being of sufficient depth to permit vertical adjustment of the combined muffler and blow-down ring.

E designates the valve, and E' the annular seat therefor, the said seat being screwed into a horizontal diaphragm in the lower part of the casing. The valve E is formed with a socket e, in which is stepped the lower end of a rod E², which extends up within the tubular portion C' and through the top thereof, as shown. Said rod is movable longitudinally, and it has near its lower end an angular (preferably square) enlargement e', which fits loosely in a correspondingly-shaped opening provided therefor in the muffler D. Immediately above said enlargement e', within the lower end of the tubular portion C', is a collar F, loosely mounted on the rod E², and in the top of said tubular portion is a similar collar F'. A coiled spring G acts between said collars F F' to press the rod E² down and

close the valve, the collar F being seated on the enlargement e' and the collar F' against the top of the casing.

As a means for adjusting the tension of the spring G a tubular screw f , through which the rod E^2 extends, is fitted in the upper part of the casing and the end thereof has a bearing on the upper collar F'. By adjusting this screw up or down the tension of the spring may be varied at will to hold the valve to its seat with increased or diminished pressure.

It is often desirable to blow or "pop" the valve by hand, and for this purpose a lever H is provided. This lever is fulcrumed at h in bracket arms or standards h' at the top of the casing, and one end thereof is forked (see Fig. 8) and embraces the rod E^2 between the tubular screw f and a nut f^2 on the upper end of the rod, the other end extending down at the side of the tubular portion C' of the casing. It may be operated by any suitable means to release the valve; but in the drawings I show a second lever H', fulcrumed at h^2 in bracket arms or standards h^3 on the casing. The long arm of this lever extends down at the side of the casing and is formed with an eye h^5 or other equivalent means for the convenient attachment of a line or rod, (not shown,) whereby it may be operated from a distance. The upper arm is bent over toward the lever H and works against the same to operate it and release the valve. Preferably the lever H' carries at its upper end an anti-friction-roller h^4 , which contributes toward smoothness of operation and prevents rubbing and grinding in case the parts become rusty. The arrangement of the two levers is such that when the lever H' is operated to the full limit of its movement the arm working against the lever H passes a central line of minimum resistance—that is to say, a point where the direction of resistance changes—after which the force of the spring G holds the parts against a return movement until the lever H' is moved back by hand past said central position, whereupon the spring by expansion returns the two levers to their original or normal position and seats the valve.

It will be understood that the lever H may be provided with a push-rod or be operated directly by hand, the lever H' in such case being omitted; but I prefer the arrangement described, for the reason that it provides a means for setting the parts in "blow-off" position and for holding them in such position as long as desired without any attention from the engineer or attendant.

To enable the hollow screw f to be conveniently adjusted, it is provided with an angular head f' , either square or hexagonal, for the application of a wrench thereto, and the nut f^2 is of similar shape and of corresponding size. In order to prevent said screw and nut from turning to disturb the adjustment, the forked end of the lever H is made broad enough to entirely cover both the head f' and the nut f^2 , and the sides of the arms are pro-

vided with flanges h^6 , which closely embrace both nut and head, so that neither of these parts can turn to disturb the adjustment so long as the lever H is in place.

The muffler D is in the form of a cage, comprising an upper plate d , which is connected with the tubular portion C' of the casing, as already explained, a lower annular blow-down ring d' , which fits around and closely embraces the valve-seat B and is connected with the plate d by a series of ribs or bars d^2 and a series of rings d^3 , attached to and supported by said ribs or bars d^2 , the whole forming a cylindrical cage, into which the steam is discharged on the opening of the valve and from which it escapes through the narrow openings between the rings d^3 into the annular space between the cage and the walls of the valve-casing, being broken up and divided in its passage from the cage, whereby the noise of discharge is muffled or deadened.

The cage or muffler D may be formed in various ways. In the form shown in Fig. 1 it is conveniently made by casting as a solid shell, with the ribs d^2 projecting from the inner wall, and then cutting through the shell circumferentially down to but not through the ribs d^2 , to form the rings d^3 , all the parts being thus integral with each other, or the parts may be formed separately and united in any known or approved manner, as by welding, brazing, or riveting, or instead of cutting through to form rings d^3 , as described, the muffler may be cast in the form of a shell, with or without the ribs d^2 , and then bored or perforated, as shown in Figs. 3 and 4. Instead of boring the perforations, as suggested, the same may be formed by casting. Also, while Figs. 1, 3, and 4 show openings only in the side or cylindrical walls it is clear that they may be formed also in the top and bottom plates, and in Figs. 5, 6, and 9, which represent plan views, I show them formed in the top plates, Figs. 5 and 6 showing openings of larger size covered by wire netting or gauze. It is to be understood that however the openings may be formed or disposed or whether they be large or small they may be covered in whole or in part by wire netting or gauze.

The angular enlargement on the rod E^2 serves as a means for vertically adjusting the muffler D, as by turning the rod, which may be effected by the use of any appropriate wrench or other tool applied to the upper projecting end, the muffler will also be turned, and it may thus be screwed up or down to effect a vertical adjustment on the tubular support C'.

The valve and muffler shown in Figs. 1 and 4 is designed more especially for stationary or marine engines. In Fig. 2 I show a modified construction designed for use on locomotives and differing from that shown in Fig. 1 in that the lever H' is omitted and the shape and construction of the valve-casing somewhat varied. The case A has the inlet-opening A' at the bottom; but in place of the out-

let-opening A^2 , I form in the upper part of the case, around the tubular portion C' , a large number of openings a , through which the steam escapes freely to the open air. In this view I show a valve-seat B integral with the case in place of the removable seat shown in Fig. 1; otherwise the construction is similar to that first described.

I designate a protecting cap or housing hinged to the top of the casing at i and adapted to be turned or folded back. This housing affords protection for the coupling between the rod E^2 and the lever H . It may be made to closely embrace the nut f^2 on the rod E^2 and the head f' of the adjusting-screw f to prevent the same from turning and disarranging the adjustment.

In Fig. 3 I show a further modification designed for use on portable or farm engines. In this construction the tubular portion C^2 of the case in which the spring is housed is entirely above the case and does not extend down into the latter, as in the construction shown in Figs. 1, 2, and 4. The valve-seat, the valve, the rod E^2 , the spring for closing the valve, and the means for adjusting the tension of the spring are all constructed and arranged substantially as above described; but in this instance the combined muffler and blow-down ring D^2 consists of an inverted cup, the mouth or open end of which is screwed into the body of the casing around the valve. It is vertically adjustable, the adjustment being effected through the rod E^2 in the manner already described. The upper end of the tubular extension C^2 of the case is formed with a shoulder j , and on said shoulder is mounted an open tubular extension J , the upper end of which is reduced in size and shaped to fit the nut or head f^2 , so as to hold and prevent the latter from turning. The extension J has an opening in one side for the reception of the lever H , which is pivoted or fulcrumed at the opposite side at j' , the lever being forked, as before, to straddle the rod E^2 .

While I have described the part f^2 as a nut on the upper end of the rod E^2 , it is to be understood that the rod may be formed with a solid or integral beaded nut. It is also to be understood that while I have described the different forms or modifications as being designed for different types of engines, either form may be applied to any other type of engine, this being a mere matter of use. Having thus described my invention, I claim—

1. In a safety-valve, the combination of the valve, a muffler, a blow-down ring at one end of said muffler surrounding the valve, and means at the other end for supporting and adjusting said ring.

2. In a safety-valve, the combination with the valve-casing and its valve, of the combined blow-down ring and muffler adjustable in the casing in the direction of movement of the valve, and means for adjusting said ring and muffler from the exterior of the casing.

3. In a pop safety-valve, the combination with the valve and with the blow-down ring the latter being adjustable, of a spring-pressed spindle stepped on the valve to close the same, and having operative connection with the blow-down ring, to adjust the latter, said spindle having an angular head, of a lever for lifting the spindle, with means thereon for engaging the angular head to prevent rotation of the spindle.

4. In a safety-valve, the combination with the valve-casing and its valve, of a longitudinally-movable and rotatable rod or stem stepped on the valve and extending through the casing, a spring acting on said rod or stem to close the valve, and a blow-down ring adjustable in the direction of movement of the valve and operatively connected with said rod or stem whereby said ring is adapted to be rotated to adjust the same from the exterior of the casing.

5. In a safety-valve, the combination with the valve-casing and its valve, of a blow-down ring surrounding the valve and having screw connection with the casing whereby it is adapted to be adjusted in the direction of movement of the valve, a stem or spindle stepped on the valve, a spring acting on said stem to close the valve, said ring and stem having sliding and non-rotatable connection relatively to each other, whereby the ring is adapted to be adjusted by rotating the stem.

6. In a safety-valve, the combination with the valve-casing and its valve, of a blow-down ring having screw connection with the casing, whereby it is adjustable relatively to the valve, and a stem or spindle extending through the casing and having operative connection with said ring, whereby adjustment of the latter may be effected from the exterior of the casing.

7. In a safety-valve, the combination of an adjustable ring surrounding the outer circumference of the valve, a series of arms or perforated wall connected with a central portion, having an irregular-shaped opening at its axis, a threaded portion formed on the casing engaging a corresponding thread formed with the arms or wall, a central spindle formed to fit and engage the irregular-shaped opening for imparting a rotary motion to the arms and permitting a vertical motion of the spindle, and means for turning the spindle at the top and outside the valve-casing substantially as described.

8. In a safety-valve, the combination with the valve and its casing, a longitudinally-movable rod stepped on the valve and projecting from the casing, a spring acting on said rod to close the valve and projecting from the casing, a spring acting on said rod to close the valve, a lever mounted on the case and operatively connected with said rod to relieve the valve, and a lever of the first order fulcrumed on the casing for operating the first said second lever bearing such relation to the first that its operative end passes

a central line so that the resistance of the first-named lever holds the second against return movement.

9. In a pop safety-valve, the combination
5 of the central spindle, a primary lever for lifting the same, a secondary lever acting thereon composed of a long and short arm, with the short arm to bear against the primary lever, and a stop substantially as described, whereby the end of the short arm
10

may pass the dead-center between the secondary and primary lever, and engage the stop as set forth.

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

WILLIAM E. WOOD.

Witnesses:

RALPH G. HARMON,
ALLEN G. WOOD.