

No. 715,716.

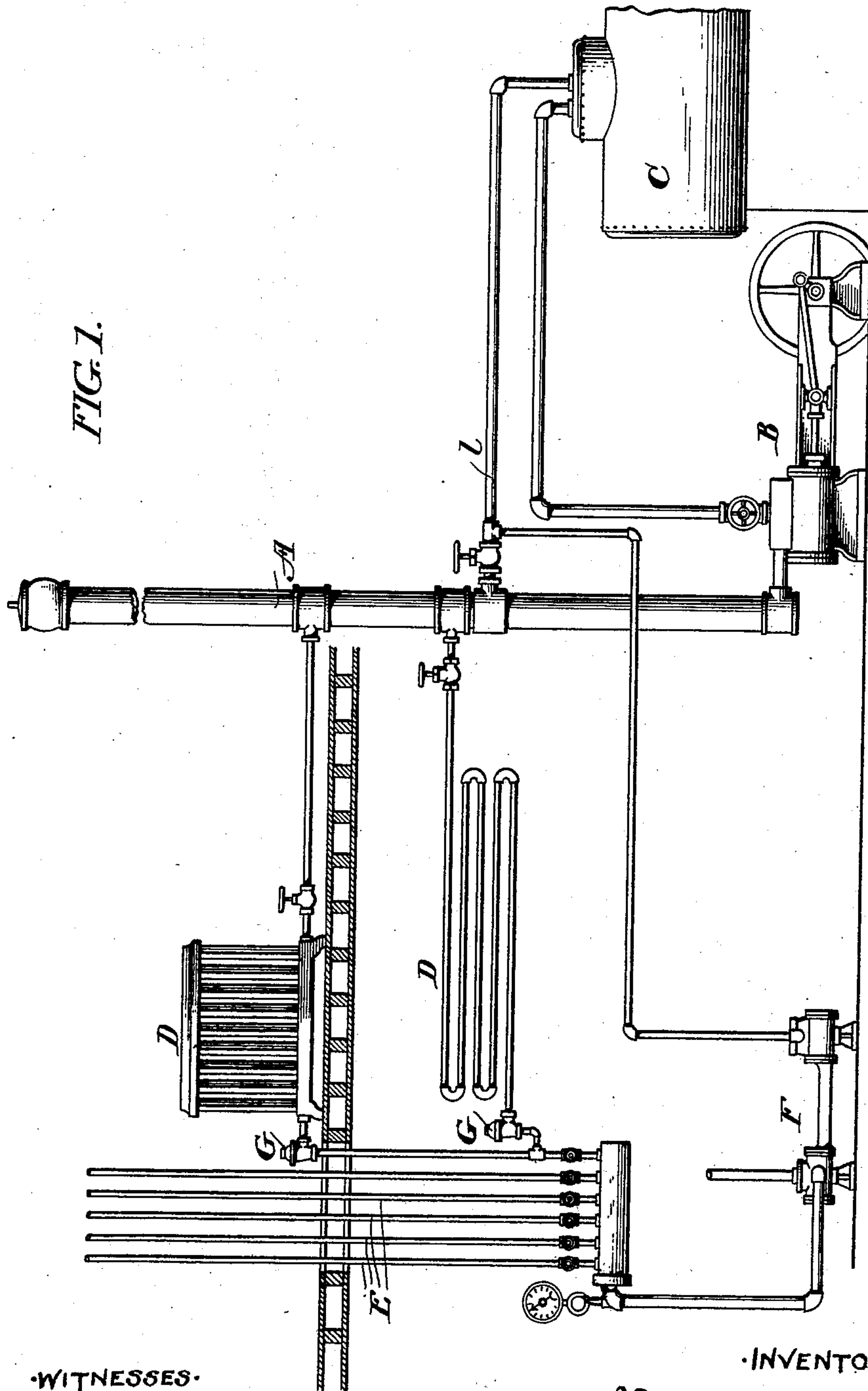
Patented Dec. 9, 1902.

W. WEBSTER.
STEAM HEATING APPARATUS.

(Application filed May 4, 1900.)

(No Model.)

3 Sheets—Sheet 1.



•WITNESSES•

Henry T. Smith
R. M. Kelly

•INVENTOR•

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FIG. 2.

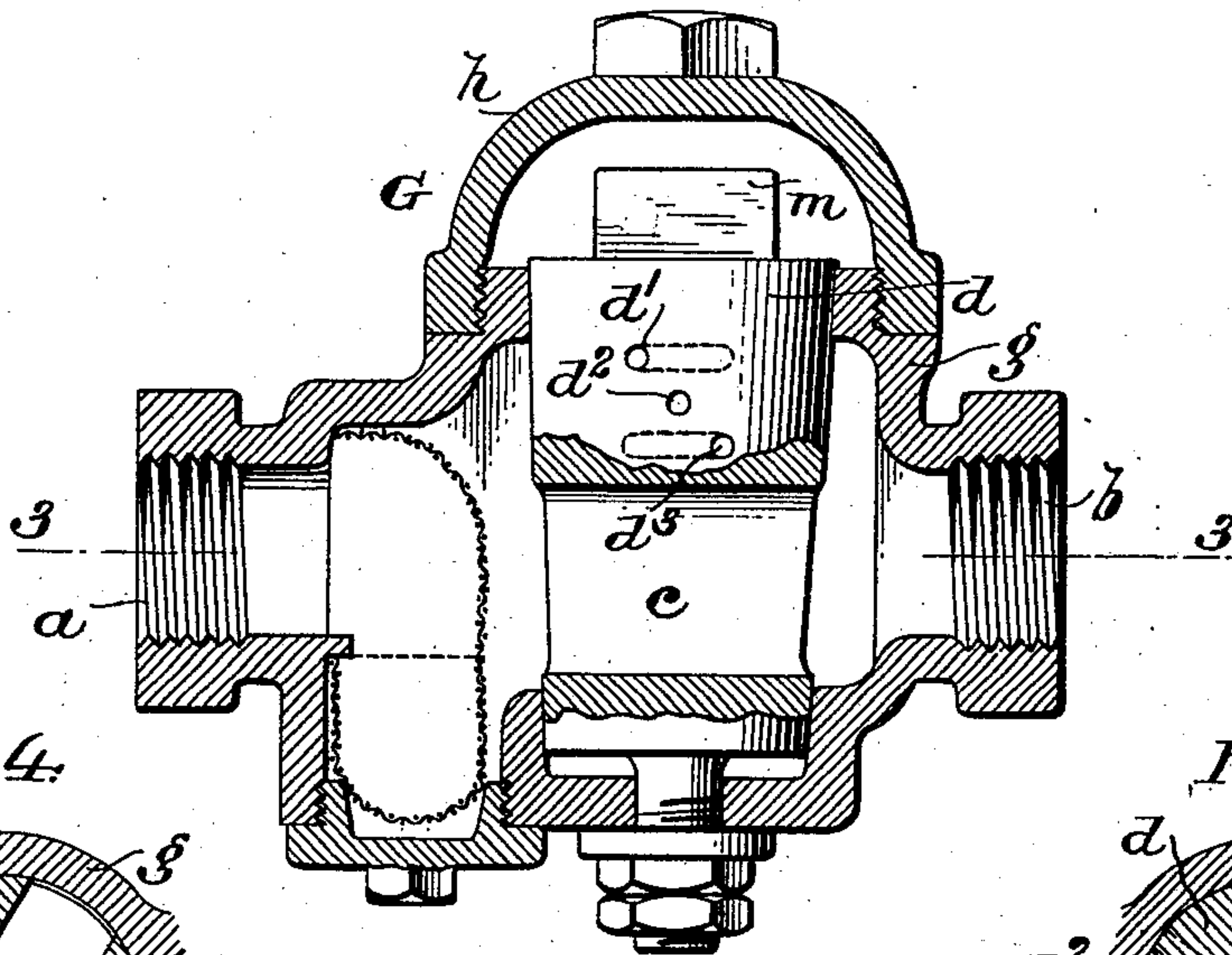


FIG. 4.

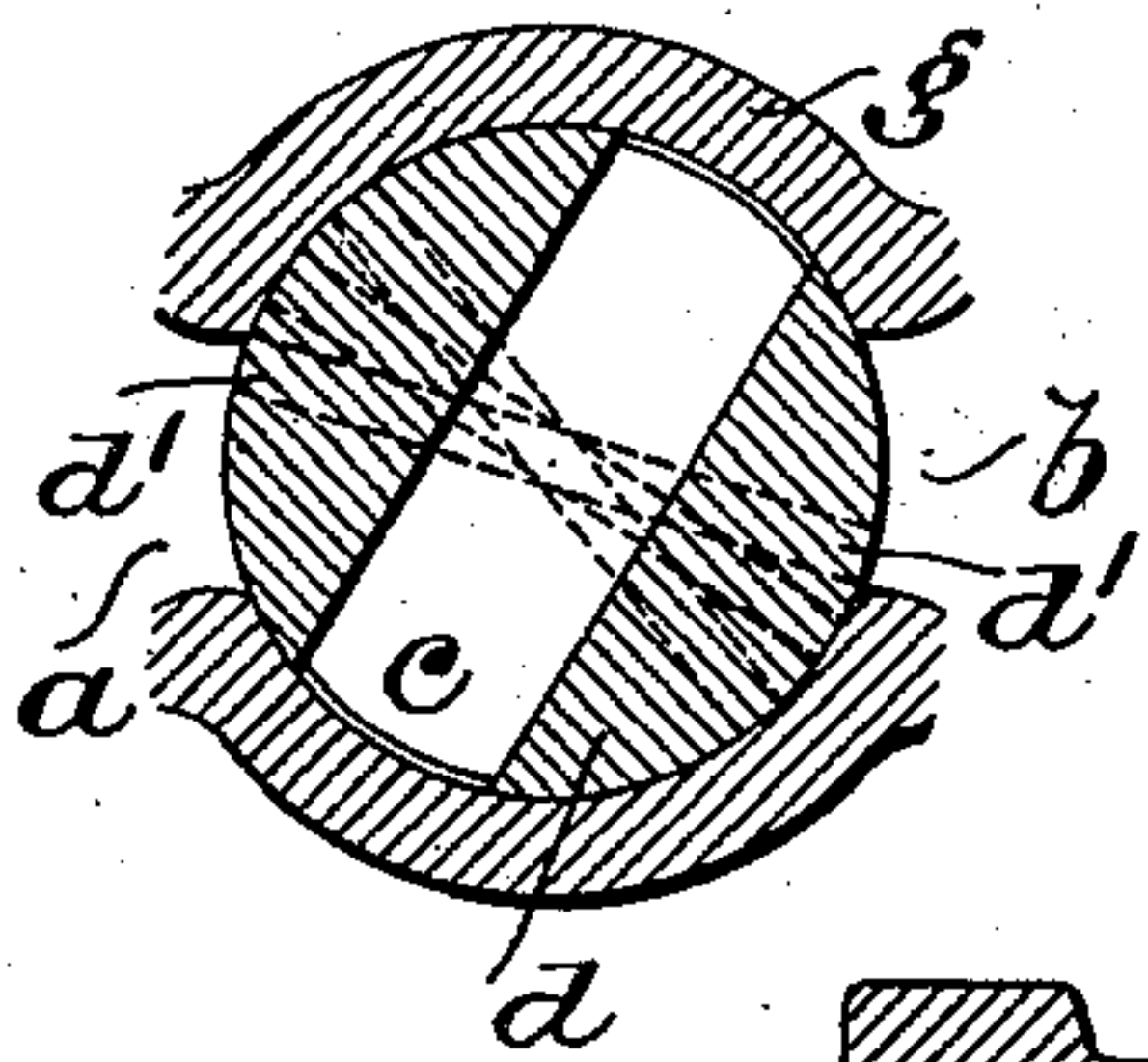


FIG. 5.

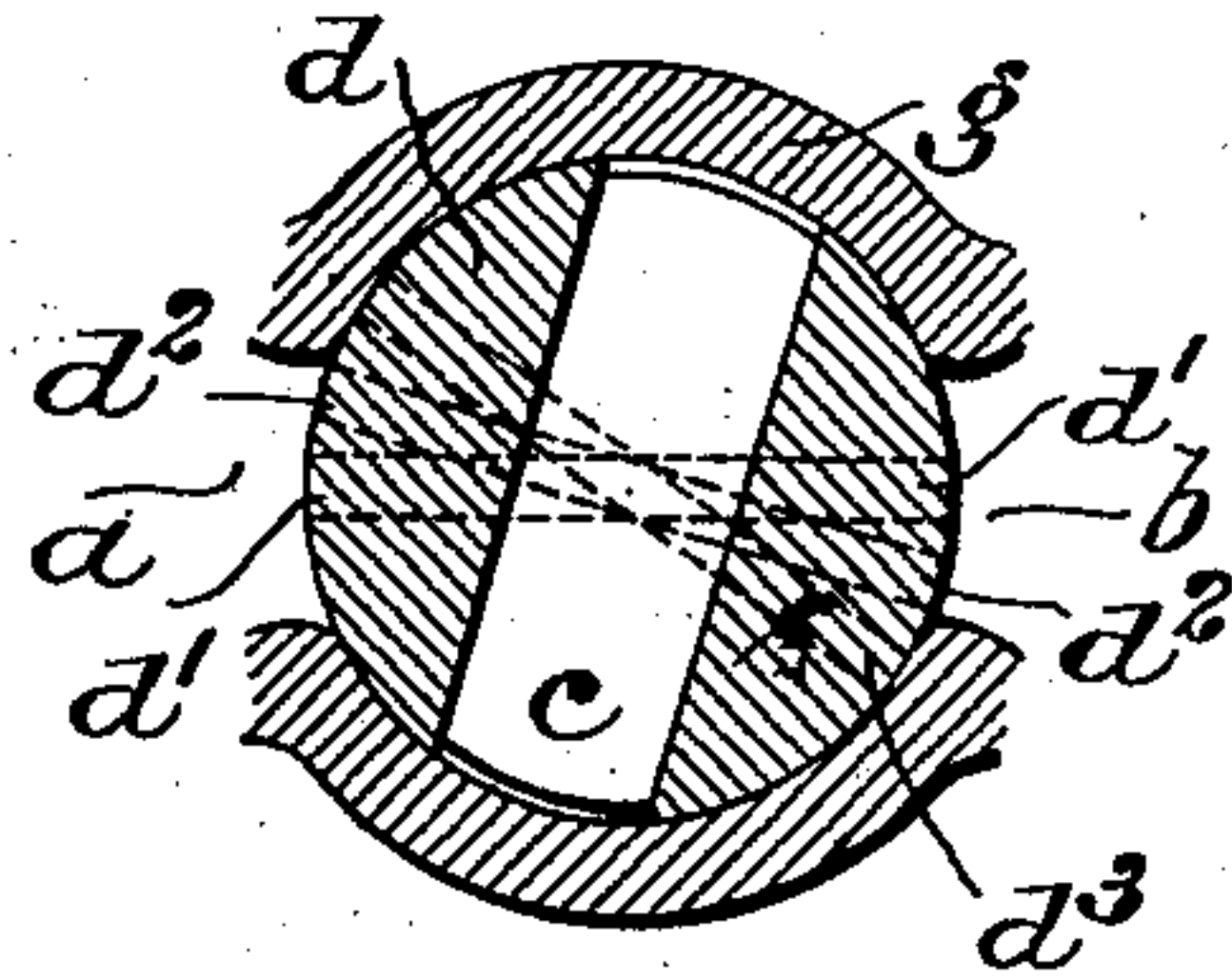


FIG. 3.

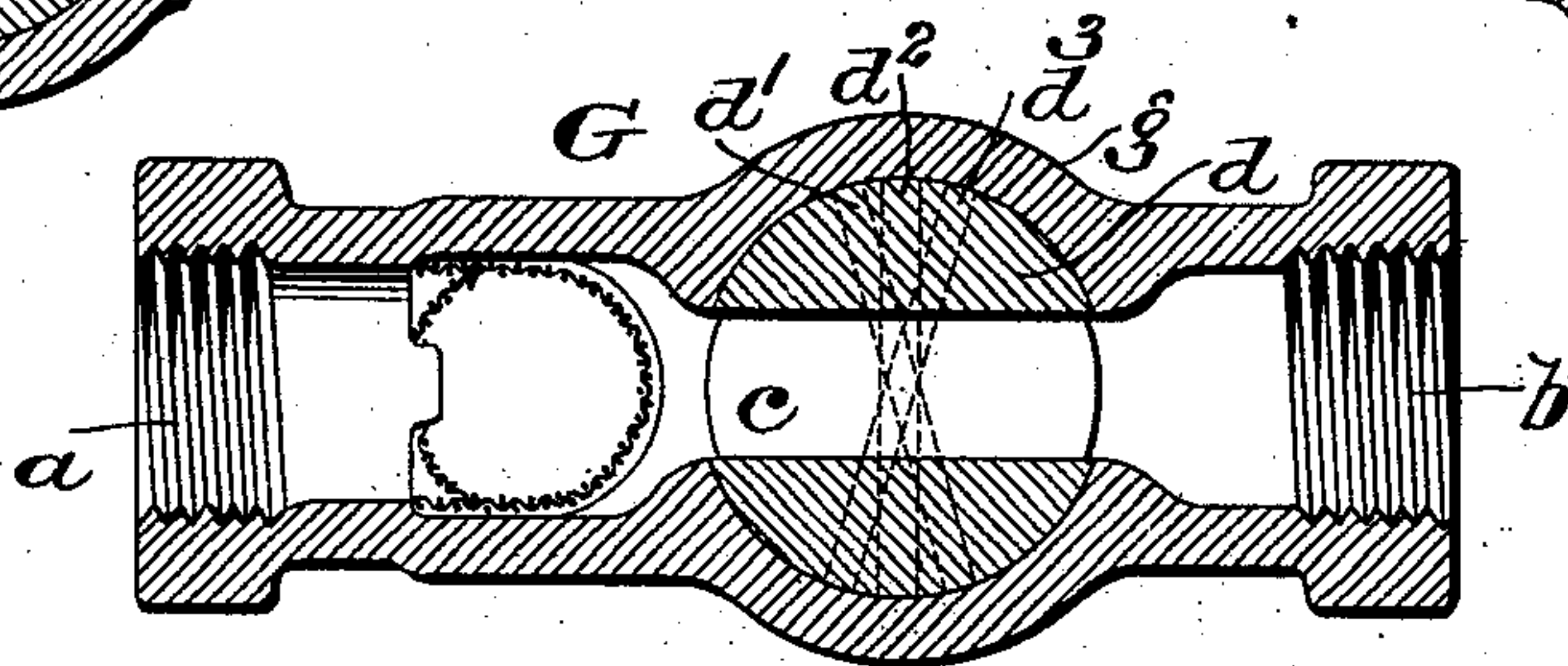
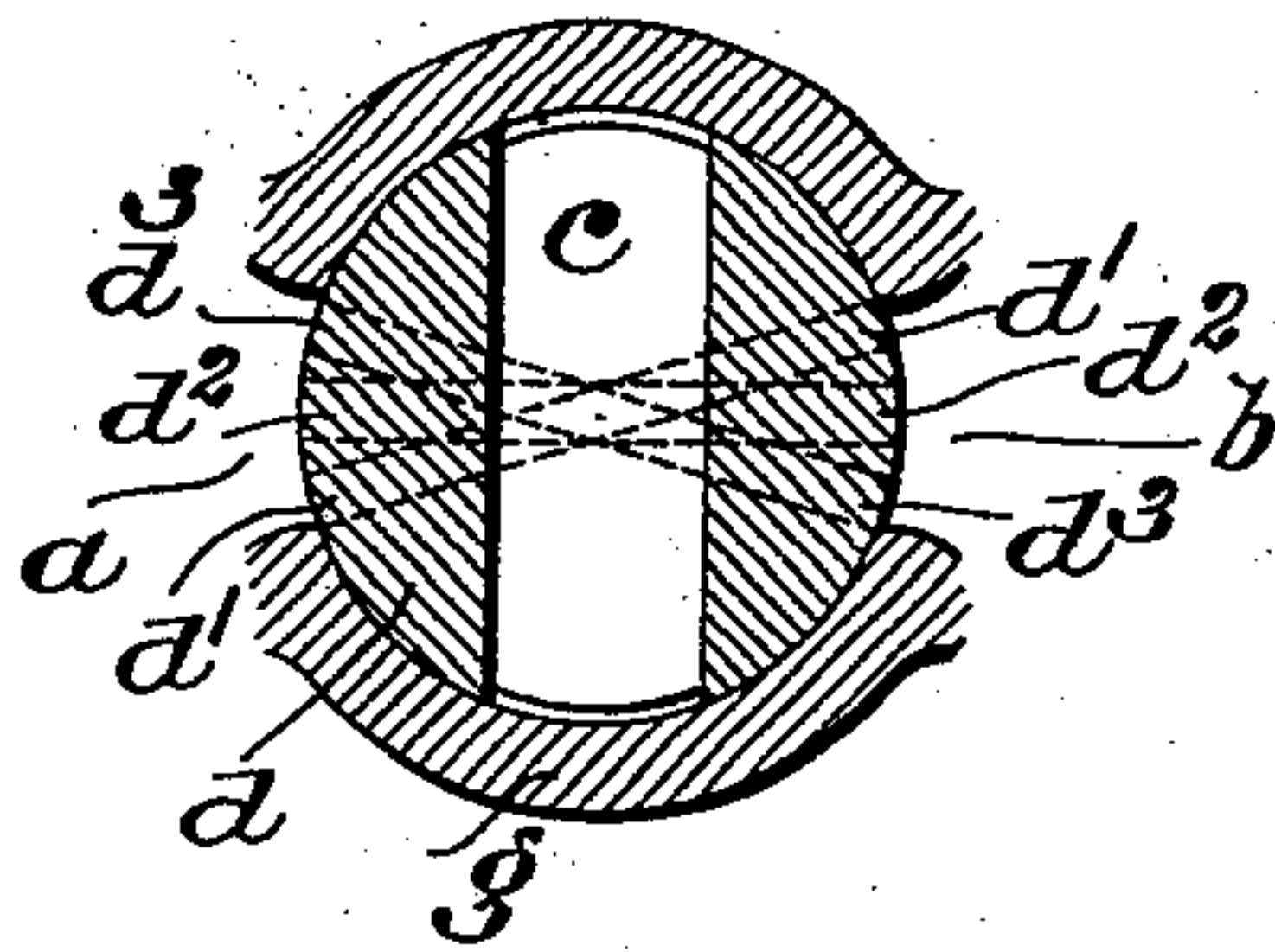


FIG. 6.



WITNESSES.

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(No Model.)

3 Sheets—Sheet 3

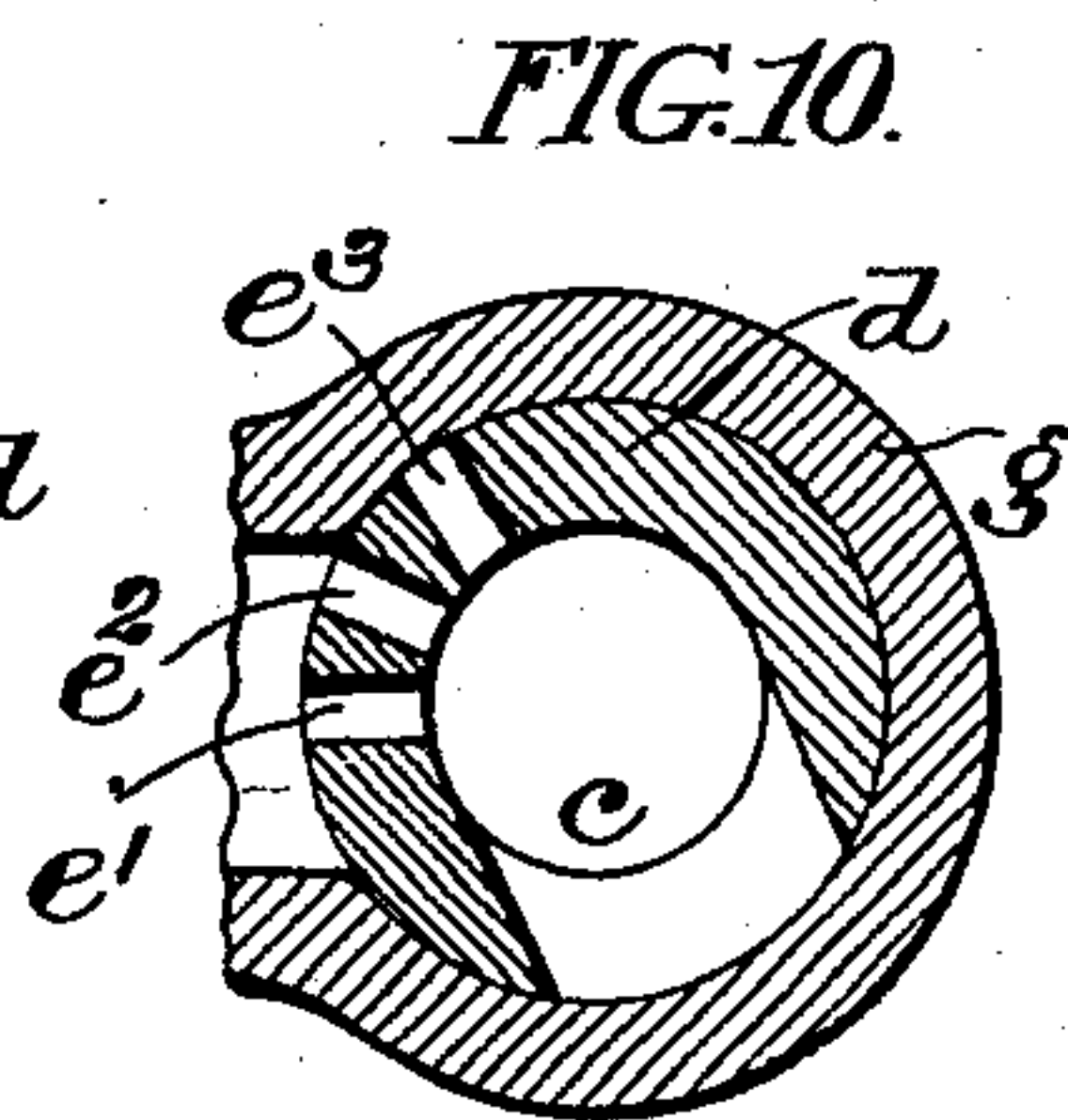
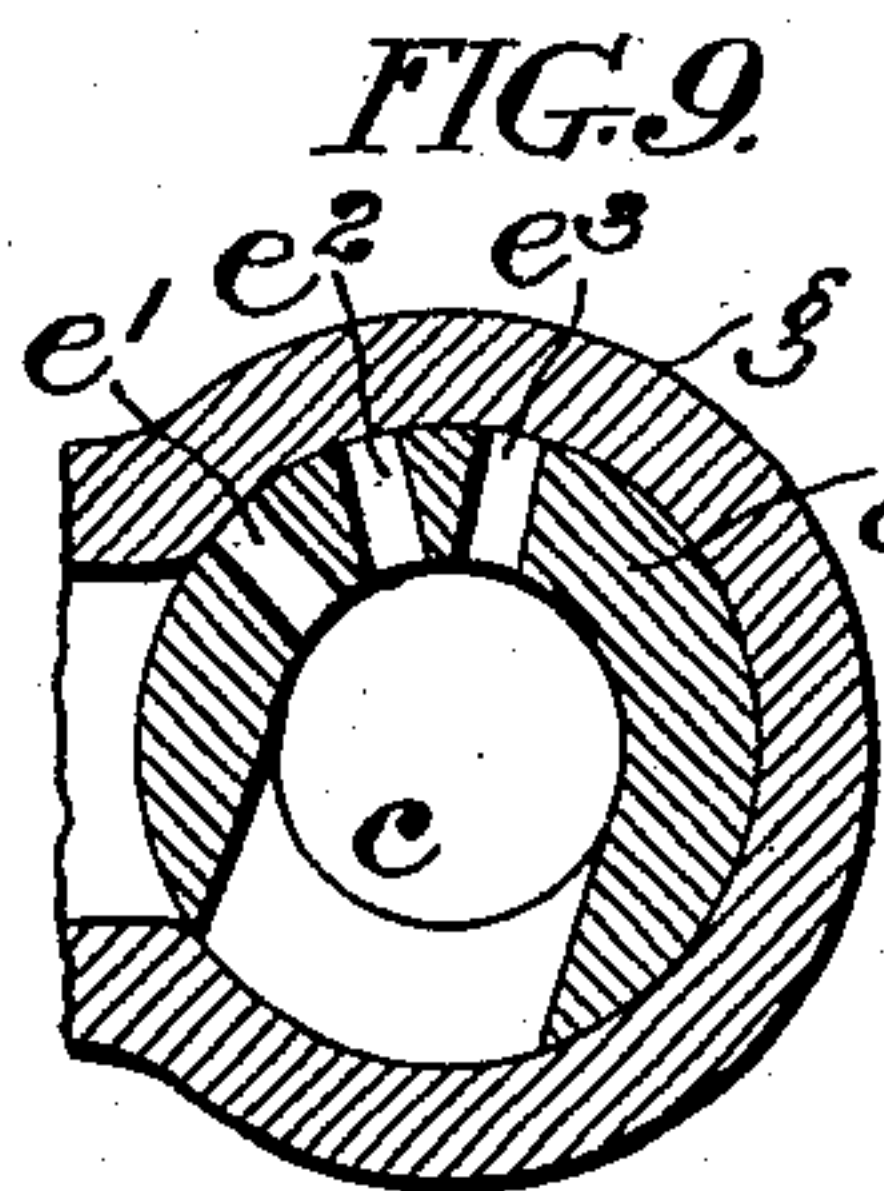
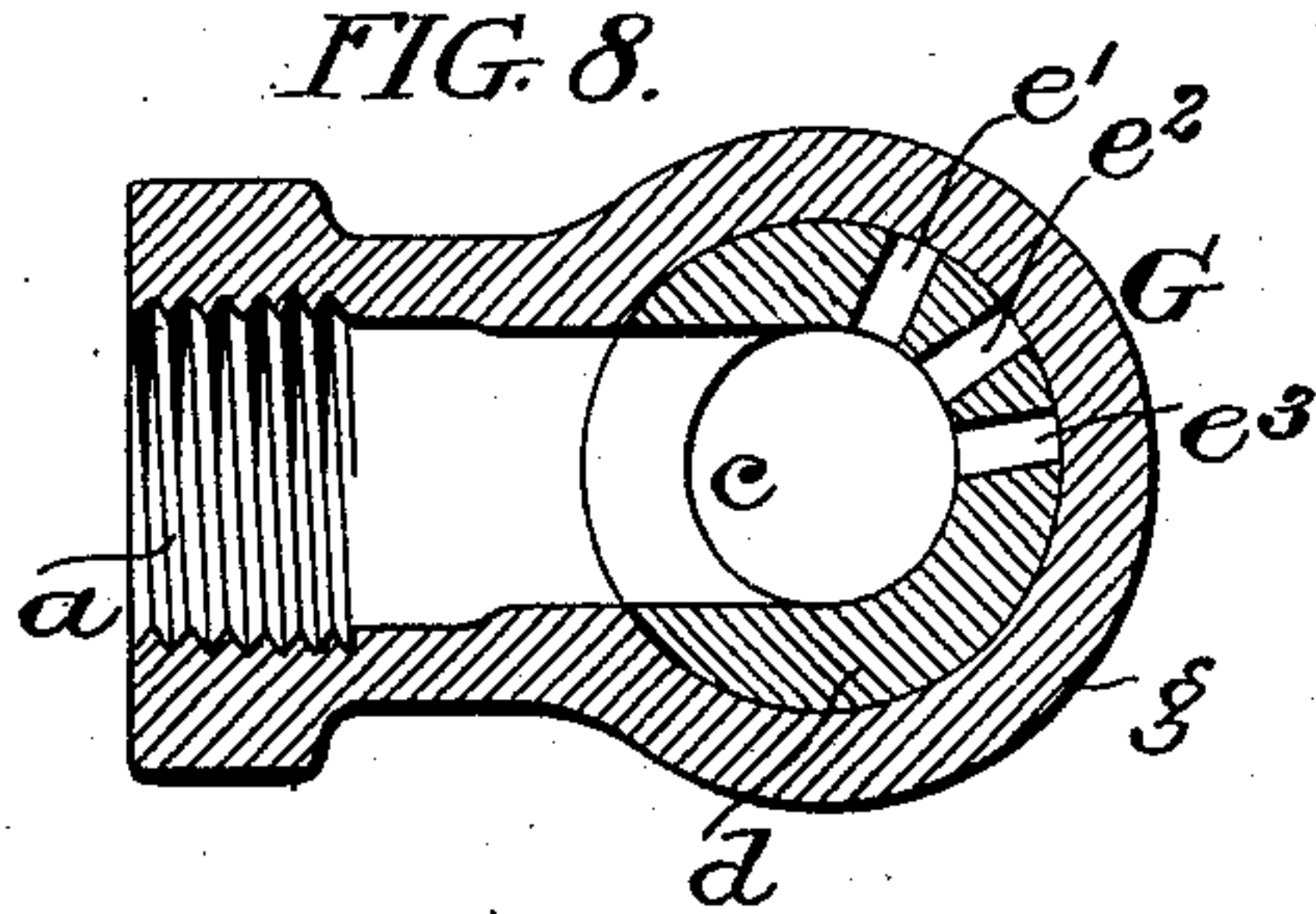
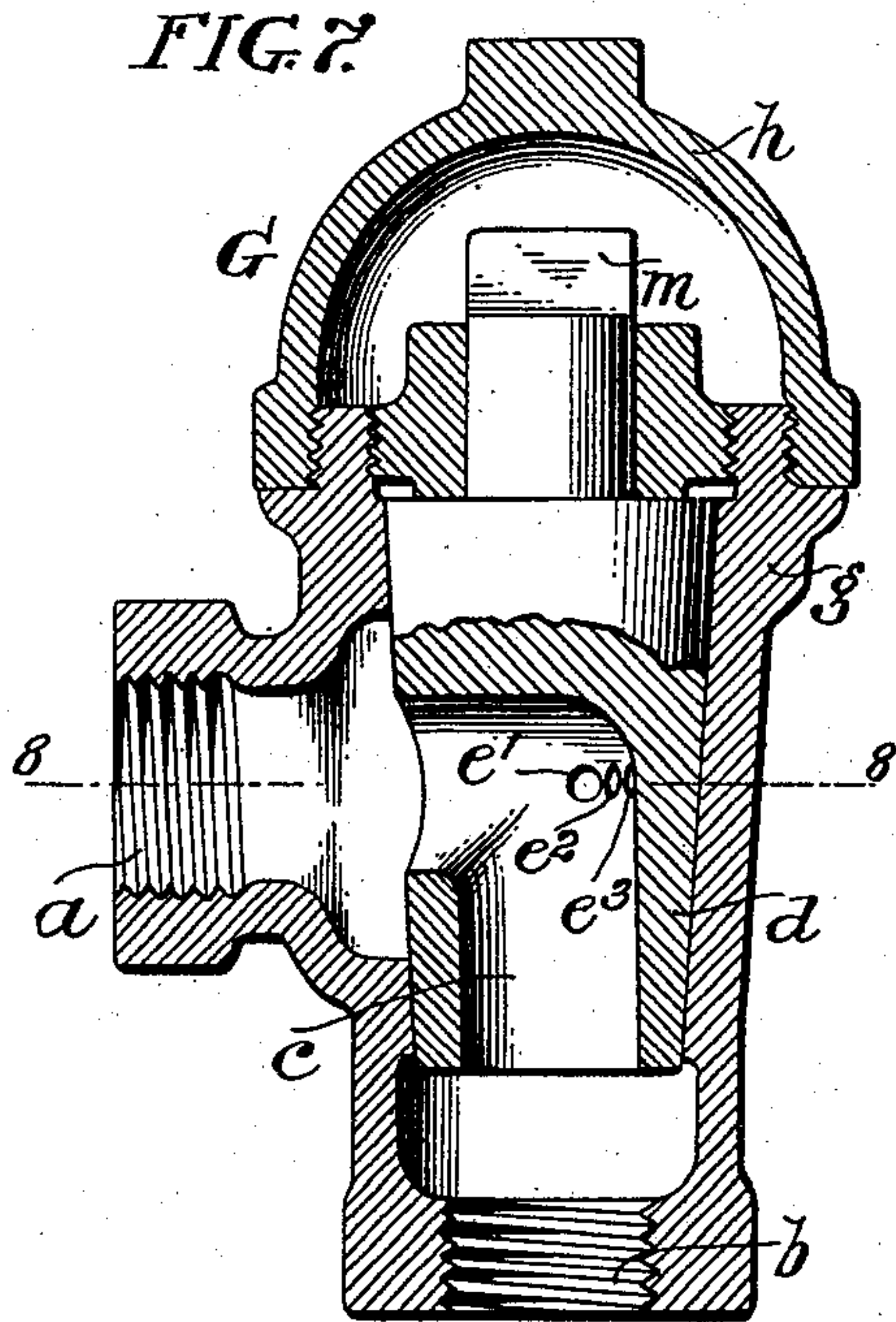
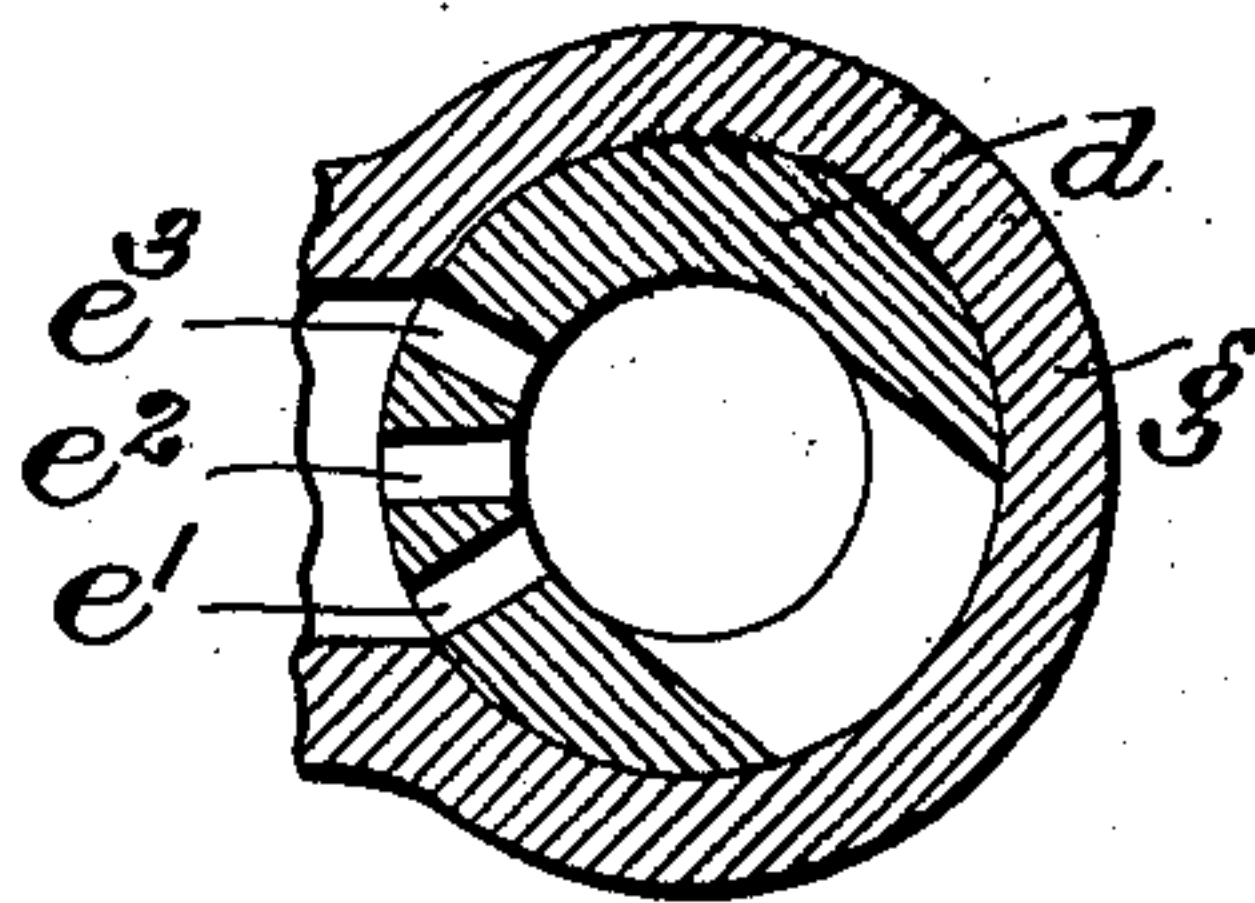


FIG. 11.



WITNESSES:
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By his attorney
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UNITED STATES PATENT OFFICE.

WARREN WEBSTER, OF MERCHANTVILLE, NEW JERSEY, ASSIGNOR TO THE AMERICAN STEAM HEATING SPECIALTY COMPANY, OF CAMDEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

STEAM HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 715,716, dated December 9, 1902.

Application filed May 4, 1900. Serial No. 15,492. (No model.)

To all whom it may concern:

Be it known that I, WARREN WEBSTER, of Merchantville, Camden county, New Jersey, have invented an Improvement in Steam Heating Apparatus, of which the following is a specification.

My invention relates to steam heating apparatus; and it consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings.

In steam-heating systems in which circulation is effected or controlled by means of a partial vacuum or lower pressure created in the returns or outlets from the radiators or heaters much difficulty has been experienced in obtaining an effective circulation throughout all parts of the system owing to the liability of the steam to be "short-circuited" or drawn in excess through portions of the piping by the suction. Such "short-circuiting" not only results in defective circulation and distribution of heat, but causes a large waste of steam. To obviate this, it is necessary to partially close or throttle certain of the valves, and a part of these valves must be throttled to such an extent as to form a very small thoroughfare, and the size of this thoroughfare must be different in differently-located valves. With an ordinary hand-valve, such as is commonly used, this careful throttling to form a small thoroughfare cannot practically be obtained, since the ordinary valve passage-way is of such size that a very nice adjustment must be made to obtain the desired closure. It results that even when such valves are adjusted with great care they are usually too widely open to effectively control the circulation.

It is the object of my invention to enable the system to be easily and expeditiously adjusted to provide thoroughfares of proper sizes throughout the system for a uniform circulation and to enable the thoroughfares to be varied to any desired extent without the exercise of any special care or skill.

In carrying out my invention I employ in combination with the radiators or heaters and means to create a partial vacuum or lower pressure in the outlets or returns thereof

of a valve device, interposed between the outlets of the radiators and the means to create the partial vacuum, and having a main thoroughfare of relatively large area and an auxiliary thoroughfare of relatively small area so arranged that it may be opened when the main thoroughfare is closed. Ordinary adjustments can be effected by opening the main thoroughfare to a greater or less extent; but when a very small thoroughfare is required the valve is operated to close the main thoroughfare and open the small auxiliary passage-way, thus permitting a restricted suction from the heater or radiator. By constructing this restricted auxiliary thoroughfare of a series of small passage-ways so arranged that one or more thereof may be opened the area of the small auxiliary thoroughfare may be varied with great ease.

In the drawings, Figure 1 is a diagrammatic view of a steam heating apparatus embodying my invention. Fig. 2 is a vertical sectional view of the valve for controlling the discharge and suction from the radiators or heaters. Figs. 3, 4, 5, and 6 are horizontal sectional views of the same, showing the various adjustments of the valve. Fig. 7 is a vertical sectional view of another form of valve for controlling the discharge and suction. Figs. 8, 9, 10, and 11 are horizontal sectional views of the same, showing various adjustments thereof.

A is the source of steam-supply—in this case, an exhaust-pipe from an engine B. Live steam may, however, be supplied direct from a boiler C through the usual supply-pipe L.

D D are the radiators or heaters connected with the source of steam-supply in the usual manner.

E E are the returns from the heaters.

F is a vacuum-pump or other means for creating a partial vacuum or lower pressure connected with the returns.

G G are the valve devices interposed between the outlets of the radiators or heaters and the vacuum-creating device F. These valve devices are provided with a main thoroughfare c of relatively large area and an auxiliary thoroughfare of relatively small

area so arranged with reference to the main thoroughfare that it may be opened when the latter is closed. The particular construction of this valve device in other respects is not essential to the invention, and in the drawings I have illustrated different forms in which the valve may be constructed. In the construction shown in Figs. 2 to 6 the valve consists of the body *g*, having the inlet *a* and outlet *b*, the bonnet or cap *h*, and the valve-piece *d*, fitting in the body and provided with the main thoroughfare *c* and the small auxiliary thoroughfare, which is composed of a series of small passage-ways *d'* *d*² *d*³, arranged transversely to the main passage-way and at a slight angle to one another, so that their openings will be in different axial planes. When the plug *d* is turned so that the main passage-way *c* is opened, these auxiliary passage-ways will be transverse to the inlet and outlet, and consequently will be closed, as shown in Fig. 3. By turning the plug *d* the passage-way *c* may be closed and one or more of the small auxiliary passage-ways *d'* *d*² *d*³ may be opened. In Fig. 4 the plug is shown turned to open the first passage-way *d'* only. This will afford a very restricted thoroughfare through the valve. By turning the plug a slight distance farther, as in Fig. 5, the second passage-way *d*² will also be opened, thus affording a less restricted thoroughfare, and by turning the plug still farther, as in Fig. 6, the third passage-way *d*³ may also be opened.

No great care or accuracy of adjustment is required in regulating the valve-plug, as the restricted passage-ways positively limit the extent of thoroughfare, and it is only necessary to turn the plug to the extent required to open one or more of those passage-ways as may be desired. Such adjustment could obviously not be obtained by merely closing the passage-way *c* to a greater or less extent, because as that passage-way is necessarily of comparatively large area a very careful adjustment would be necessary to close the thoroughfare to the desired extent of restriction, and in practical use such nice adjustment is not possible and the valve is closed or open to too great an extent. The plug may be adjusted or turned in any convenient manner. I have shown it in each construction provided on the top with a non-circular lug *m*, adapted to receive a key, which may be applied when the bonnet *h* is removed.

The construction shown in Figs. 7 to 11 is especially adapted for angle-valves. In this case the passage-way *c* in the valve-plug *d* is

angular, entering the side and leading through the bottom, and the side wall of the plug substantially opposite to the side entrance of the passage-way is provided with small openings *e'* *e*² *e*³, which form the restricted auxiliary passage-way. By turning the plug *d* the passage-way *c* may be opened or closed or one or more of the small auxiliary passage-ways *e'* *e*² *e*³ may be opened.

Other forms of valve devices suitable for carrying out my invention may be employed, and I do not mean to limit myself to the particular forms shown or to other details of construction.

The valve devices *G* throughout the system may be adjusted to suit the particular requirements, those through which a free discharge and full suction is required being adjusted with the main thoroughfare *c* open and those through which a very small discharge and limited suction is desired being adjusted with one or more of the restricted passage-ways open and the main thoroughfare closed. In this way the system may be operated with uniform and equalized circulation throughout and without liability of short-circuiting or waste of steam.

What I claim as new, and desire to secure by Letters Patent, is as follows:

In a steam heating apparatus, the combination of radiating devices, returns leading therefrom, means to create a partial vacuum or lower pressure in said returns and statically-adjustable valve devices located in said returns embracing an adjustable valve-piece having a main thoroughfare of maximum area, and an auxiliary thoroughfare of variable area so disposed with reference to the main thoroughfare of maximum area as to be closed when said main thoroughfare is open and vice versa composed of a series of relatively small passage-ways so located with reference to one another that one or more of said small passage-ways may be opened by turning the valve-piece to regulate the size of said auxiliary thoroughfare when said main thoroughfare is closed, whereby the suction through said valve to any radiator or series of radiators may be statically regulated by the adjustment of the size of said auxiliary thoroughfare to suit the position of the radiators and the conditions of operation.

In testimony of which invention I have hereunto set my hand.

WARREN WEBSTER.

Witnesses:

WALTER B. HUMPHREYS,
THEO. L. WEBSTER.