

(No Model.)

2 Sheets--Sheet 1.

M. H. SMITH.
STEAM GENERATOR.

No. 308,388.

Patented Nov. 25, 1884.

FIG 1.

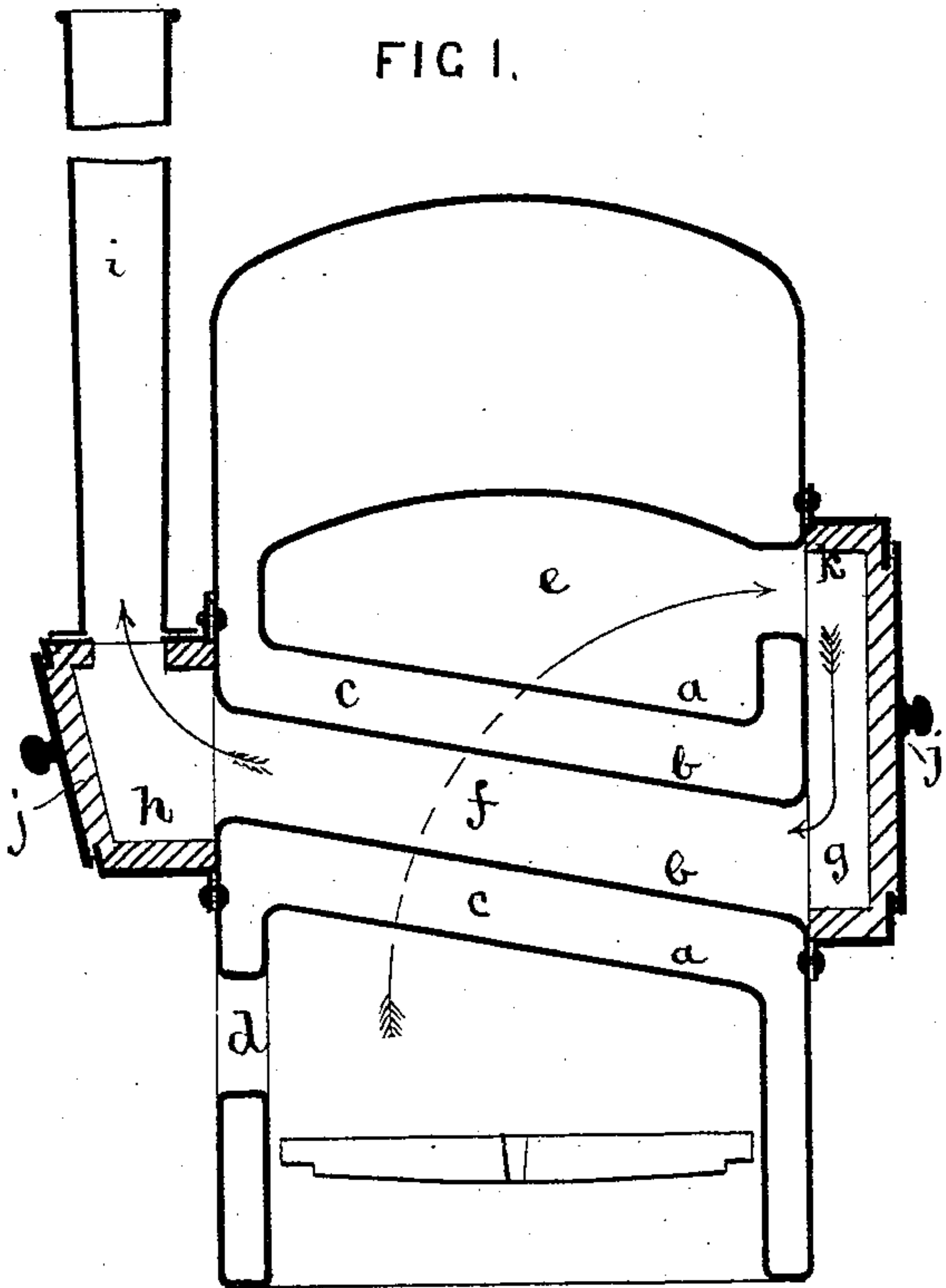


FIG 2.

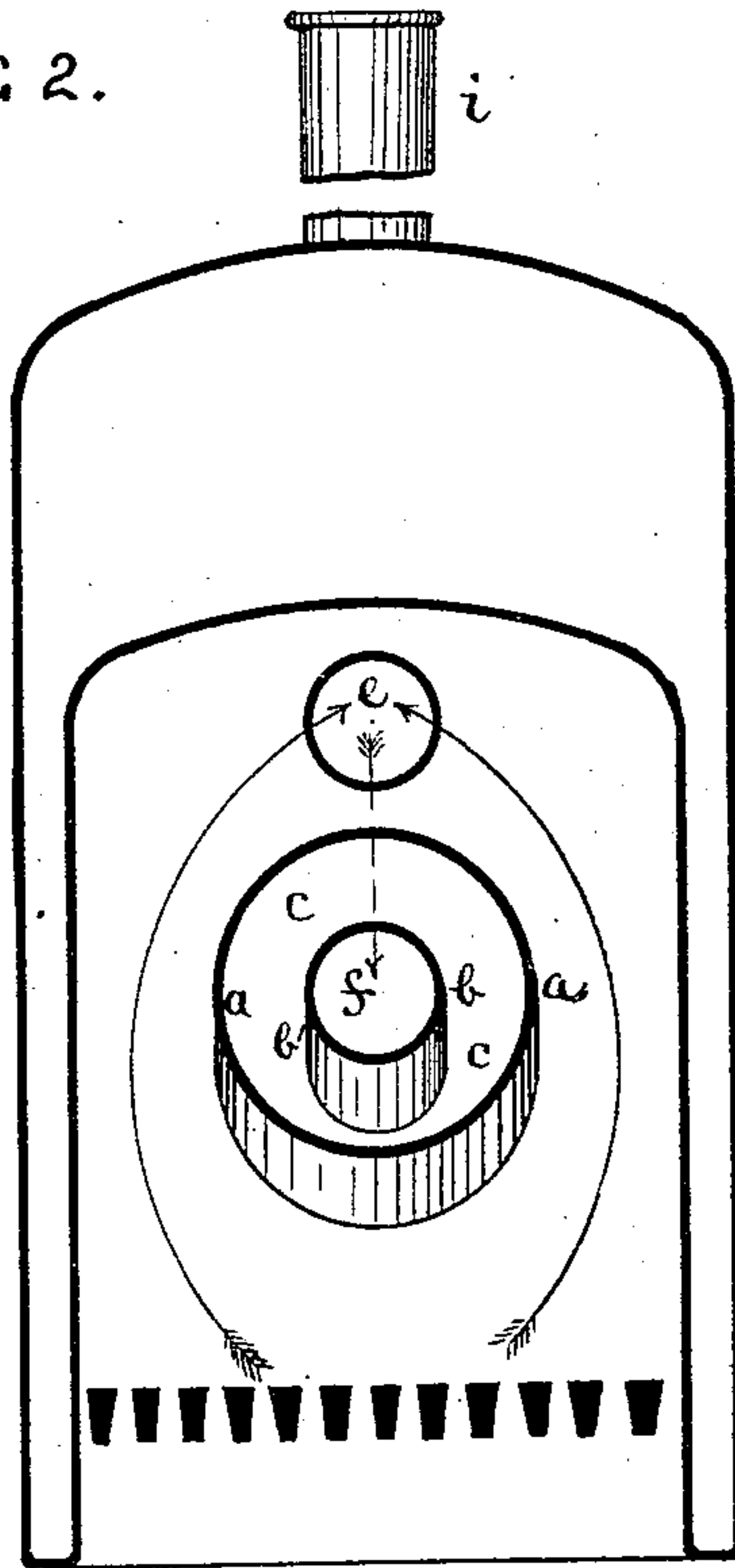
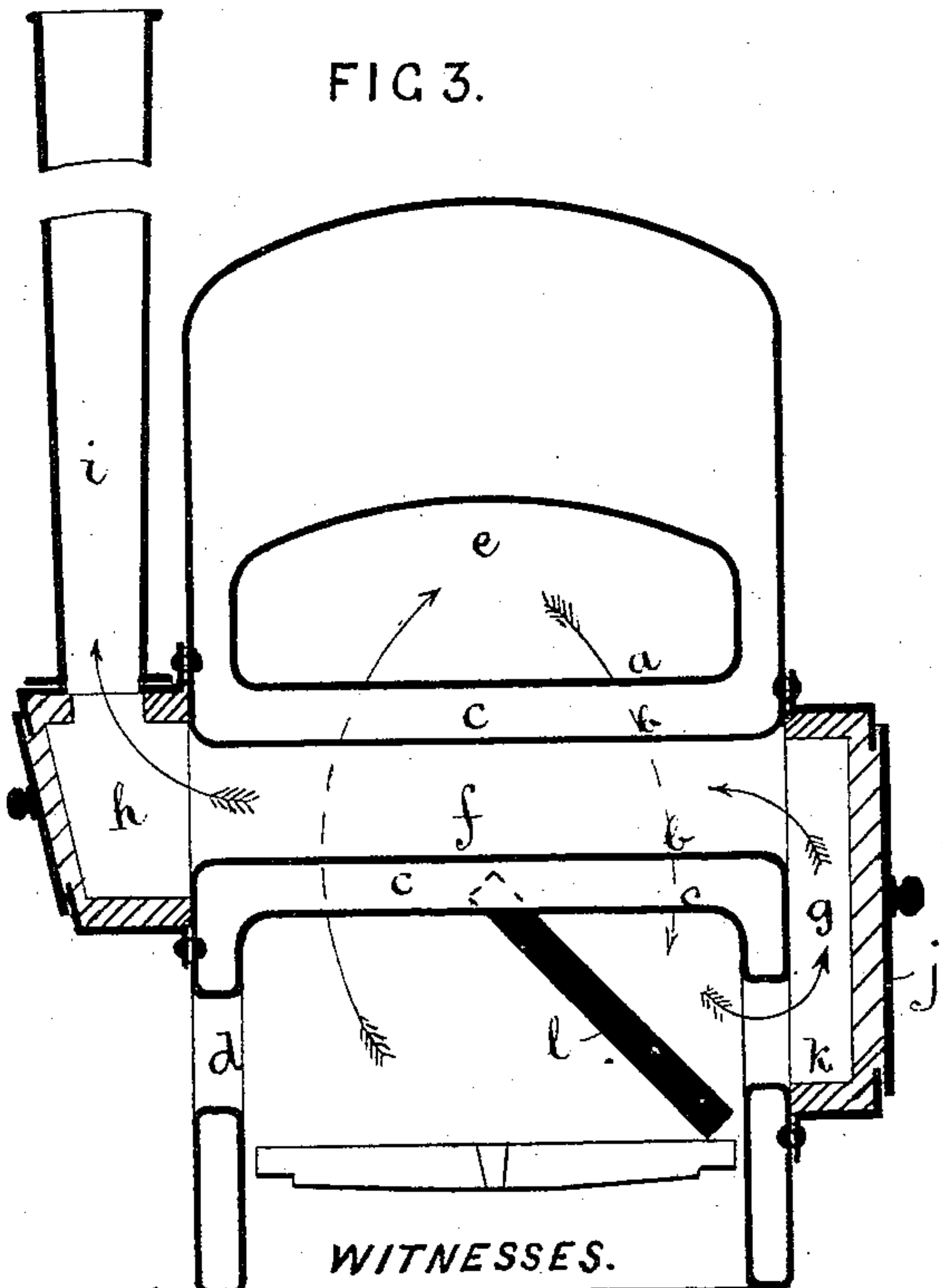


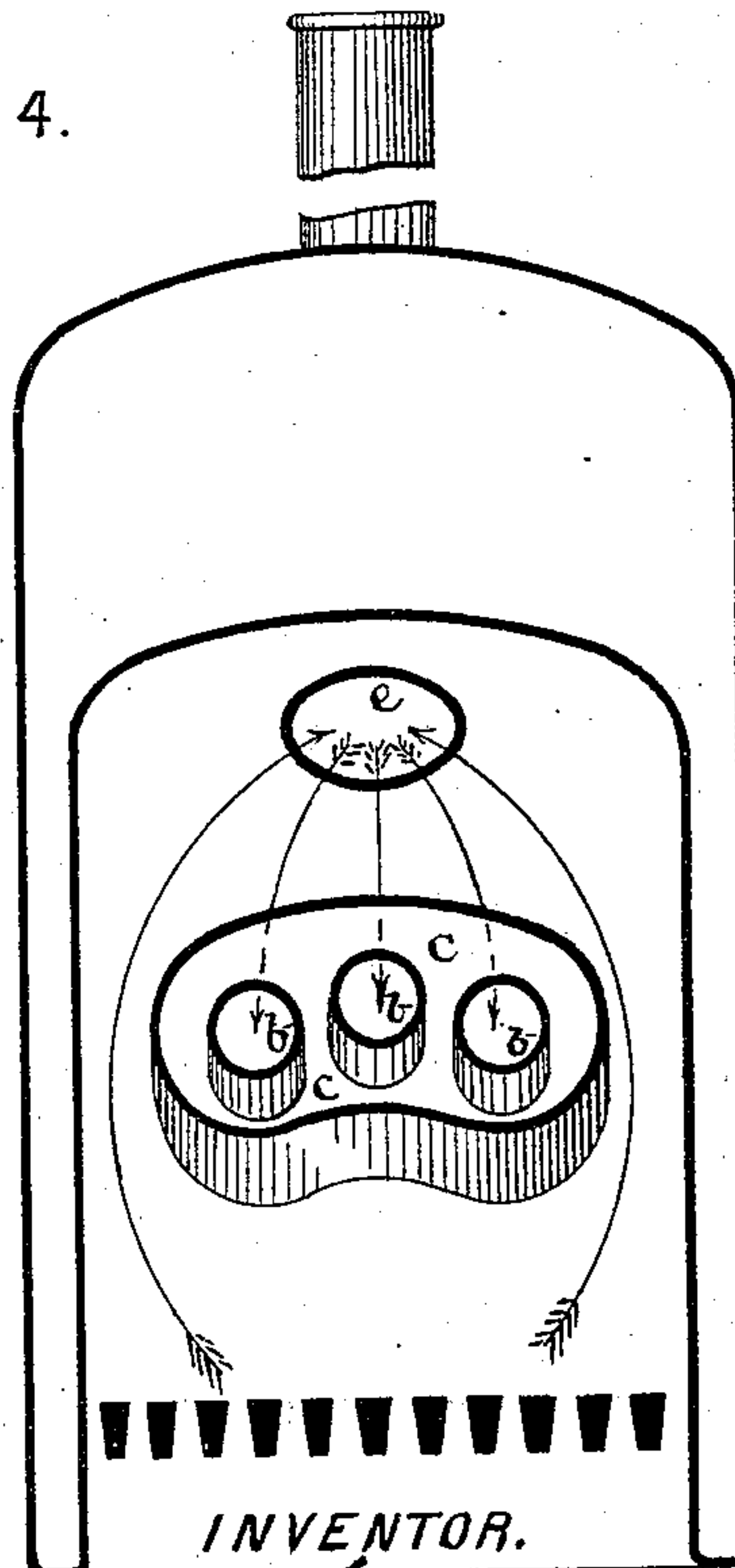
FIG 3.



WITNESSES.

H. C. Huntemann
W. C. Chaffee

FIC 4.



INVENTOR.

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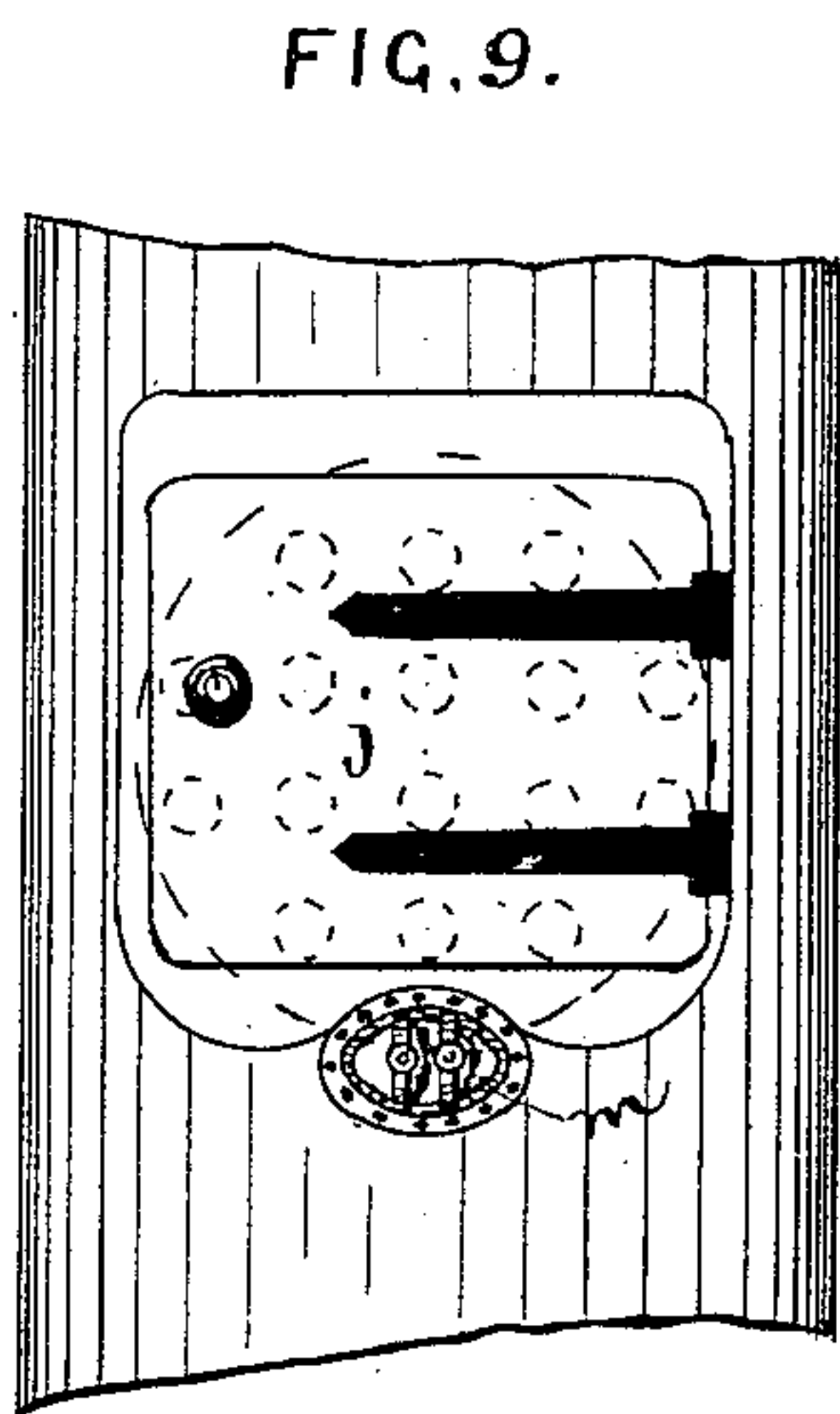
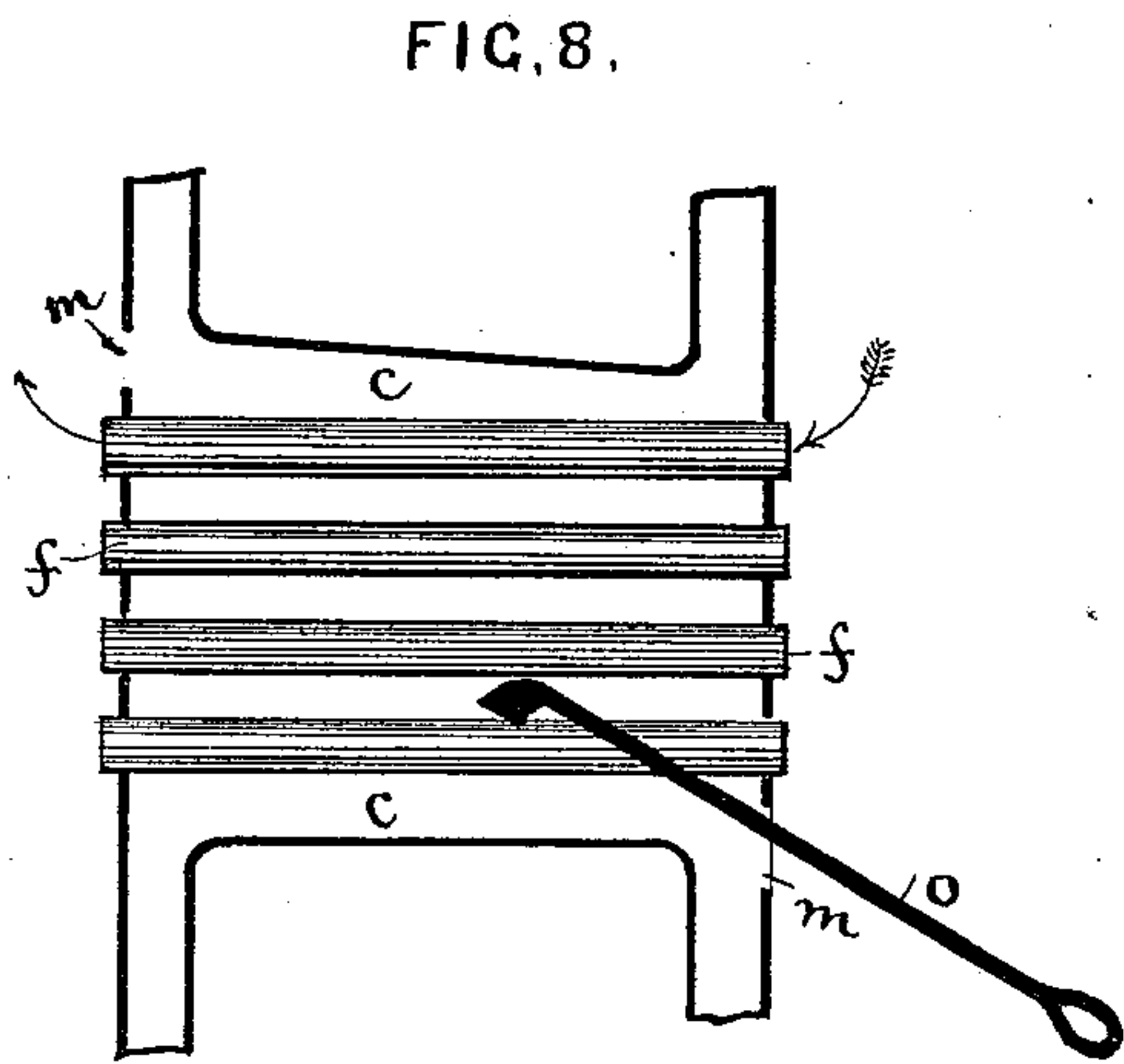
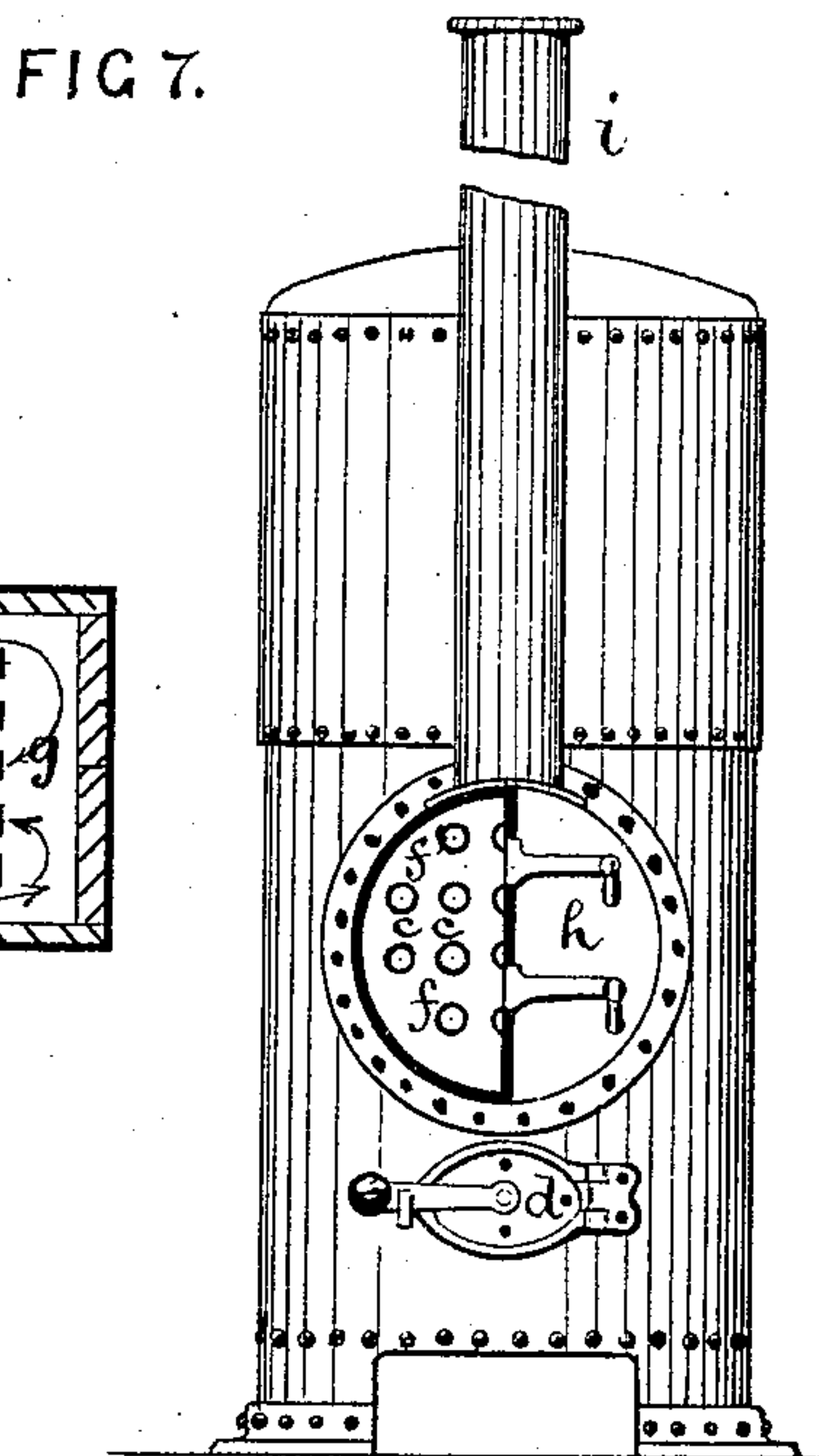
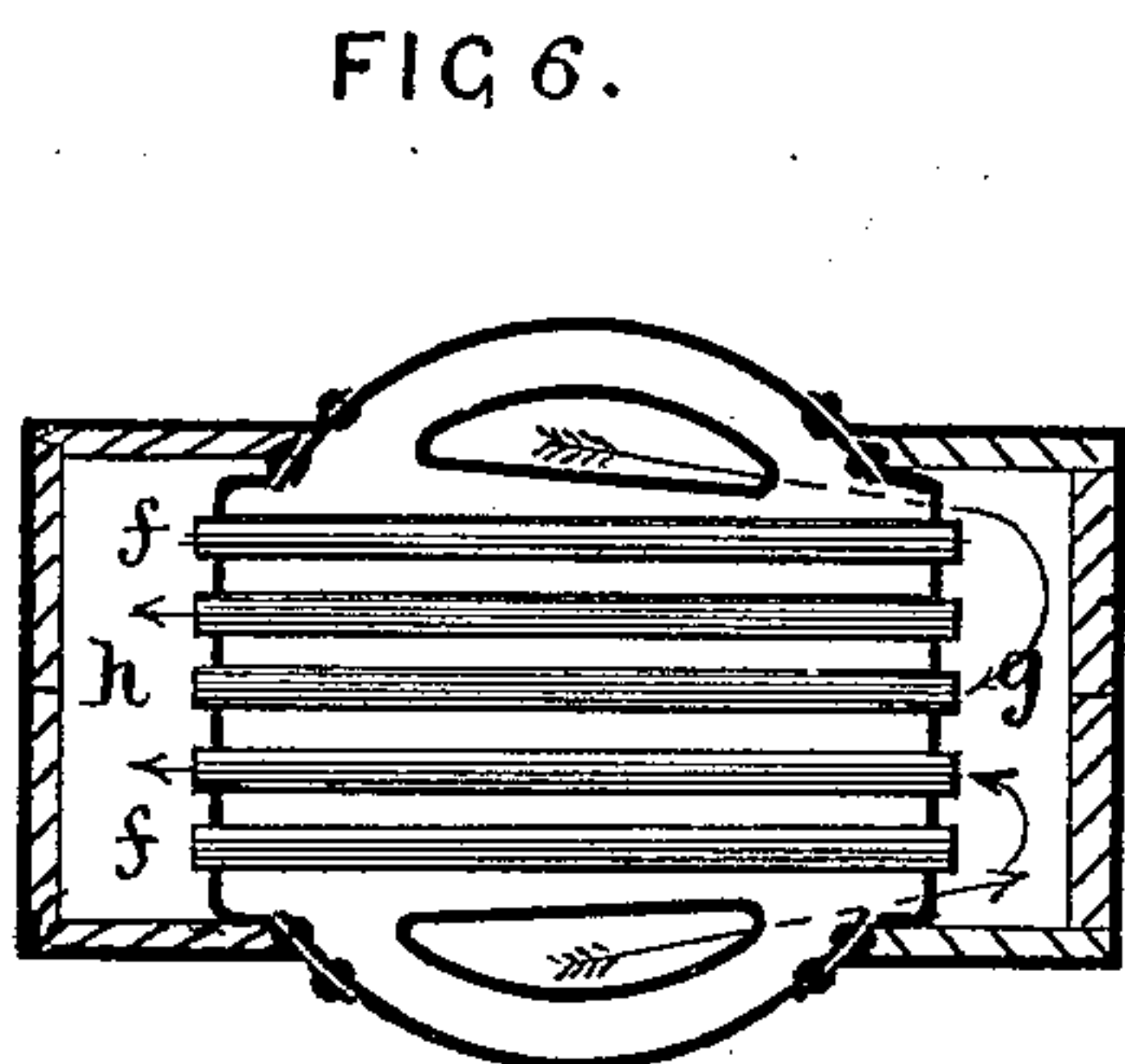
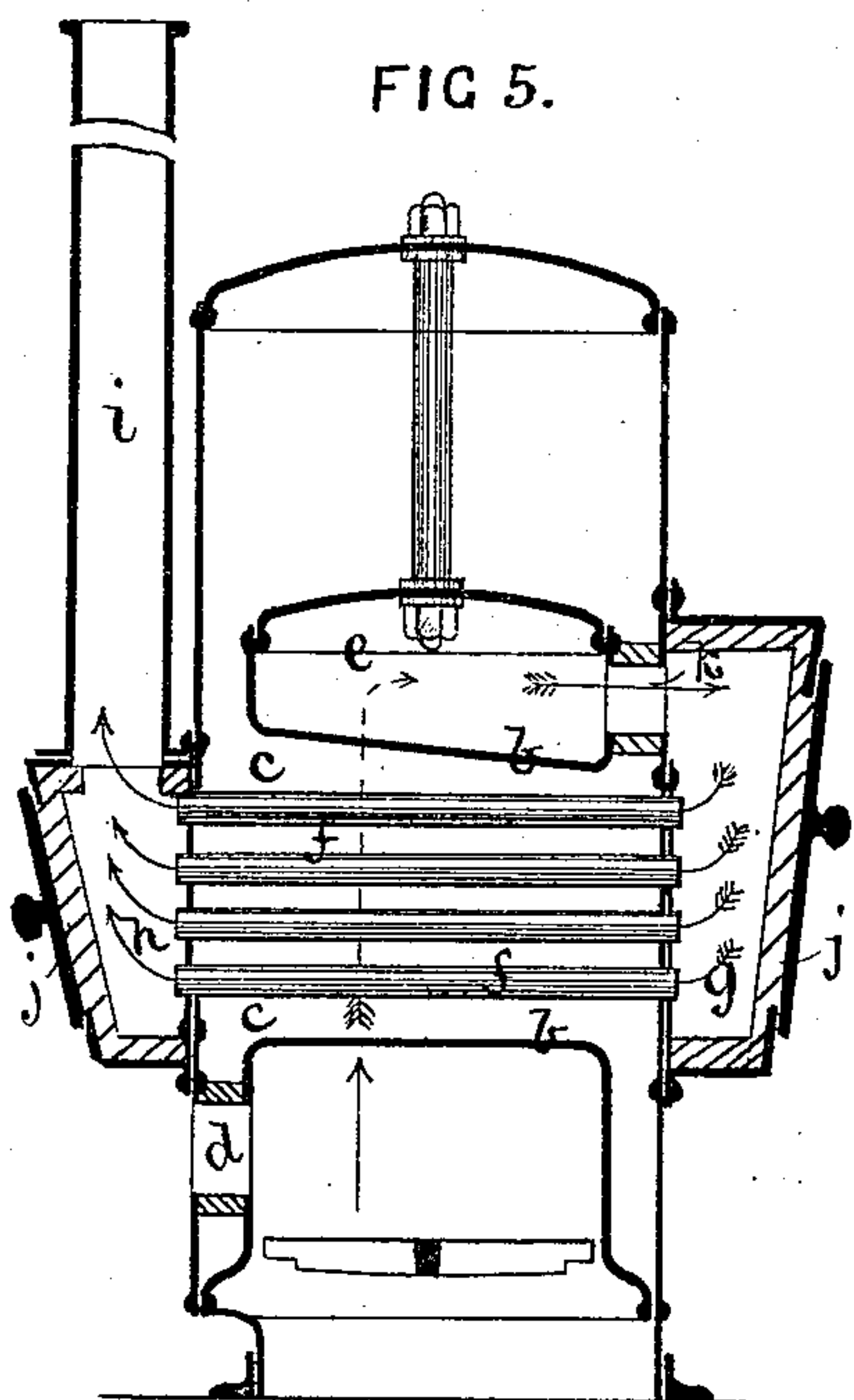
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2 Sheets—Sheet 2.

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WITNESSES.

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UNITED STATES PATENT OFFICE.

MICHAEL HOLROYD SMITH, OF HALIFAX, COUNTY OF YORK, ENGLAND.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 308,388, dated November 25, 1884.

Application filed February 12, 1884. (No model.) Patented in England June 9, 1883, No. 2,890.

To all whom it may concern:

Be it known that I, MICHAEL HOLROYD SMITH, a subject of Her Majesty the Queen of Great Britain, residing at Halifax, in the county of York, England, have invented a certain new and useful Improvement in Hot-Water Boilers and Steam-Generators, of which the following is a specification.

This invention relates, principally, to vertical cylindrical boilers for heating water or generating steam, so designed as to afford great facilities for constructing or putting together of the various parts, large capacity of furnace and heating-surface, full and convenient access to the fire flue or flues for the purpose of cleaning, repairing, and replacing the same.

To clearly explain my said invention, and to show how the same may be practically carried into effect, reference is made to the accompanying drawings, which form part of this specification, and in which—

Figure 1 represents a side sectional elevation of a vertical boiler made in accordance with my invention. Fig. 2 represents a front sectional elevation of same. Fig. 3 represents a side sectional elevation of a vertical boiler, in which a horizontal fire-flue and a baffling-plate are shown. Fig. 4 represents a front sectional elevation of a boiler with three fire-tubes incased by a nearly-oval water-way. Figs. 5, 6, and 7 represent, respectively, a side sectional elevation, a plan of the flues, and a back elevation in a boiler in which there are sixteen fire-tubes. Figs. 8 and 9 represent, on an enlarged scale, the details of construction by which any incrustation or scale may be readily removed.

In all the figures like letters of reference refer to corresponding parts of the apparatus.

The construction shown in Figs. 1 and 2 consists of a vertical cylindrical boiler with domed fire-box, having its sides forming the outer and inner shell or water-way connected by means of two concentric tubes, *a a* and *b b*, the space *c c* between the two tubes being a water-way, the interior of the inner tube, *b b*, forming a fire-flue. The concentric tubes *a* and *b* are placed across the furnace preferably at an angle or incline, so as to secure free circulation of the water, and also provide a convenient room underneath it for the fire-door *d* at one side of the boiler. The exit or

apertures for the heated gases is formed near the crown of the furnace at *e*, and such exit and also the open end of the fire-tube *f* are covered and inclosed by an outer casing forming a combustion-chamber, *g*. The other and opposite end of the fire-tube *f* is inclosed by means of an outer smoke-box, *h*, in connection with which is the funnel of chimney *i*. The combustion-chamber *g* and the smoke-box *h* are each fire-clay-lined, as shown, and provided with doors *j*, so that when the latter are open there is a free and unobstructed way through the fire-tube for cleaning, repairing, or replacing the tube. The course of the flame and heated gases is from the fire-grate to and around the cross tubular water-way *c c*; thence to the crown *e* of the furnace, and by way of the outlet *k* to the combustion-chamber *g*; thence to and through the fire-flue *f*, and to the smoke-box *h* and funnel or chimney *i*, as shown by the line of arrows.

In Fig. 3 an extended course for the flame and heated gases is obtained by the use of an inclined baffler-plate, *l*, placed within the furnace, the outlet *k* being behind the said plate, so that the flame passes upward from the grate to and around a portion of the cross water-way tube *c* to the crown *e* of the fire-box; thence downward, and so again across the other portion of the water-way tube to the back of the inclined baffler-plate *l*, and through the outlet *k* to the combustion-chamber *g*; thence to and along the fire-tube *f* to the smoke-box *h* and chimney *i* on the opposite side.

In lieu of the cylindrical cross water-way and one main fire-tube within the same I sometimes employ one or more cylindrical elliptical or other shaped cross water-way tubes or water-ways, as illustrated by Figs. 4, 5, 6, 7, and 8, and have two or more longitudinal fire-flues therein; but further reference need not be made to these forms, as they will be readily understood from the previous description and from the letters of reference marked thereon.

For the purpose of removing any incrustation, scale, or sediment that may form or settle upon the outside of the fire-flues, I provide suitable hand-holes, *m m*, for the introduction of a scraper or other cleaning device, *o*, said hand-holes and scraper being most clearly shown in Figs. 8 and 9 of the drawings.

Having thus fully described my invention

and explained how it may be practically employed, what I claim, and desire to secure by Letters Patent, is—

1. In a steam-generator having cross water-ways, as *c*, the combination of fire-flue *f*, doors *j*, and combustion-chamber *g*, and smoke-box *h*, arranged upon opposite sides of the boiler at either end of said fire-flue, each having fire-clay lining, substantially as described, and for the purpose set forth.

2. In a steam-generator substantially as described, the cross water-ways *c*, the grate and

dome, the chambers *k* and *g*, the fire-flue *f*, formed by the walls of the water-ways, and connecting the combustion-chamber *g*, smoke-box *h*, and the chimney *i*, all combined and arranged to serve with the doors *j* and *d*, as set forth. 15

MICHAEL HOLROYD SMITH.

Witnesses:

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