

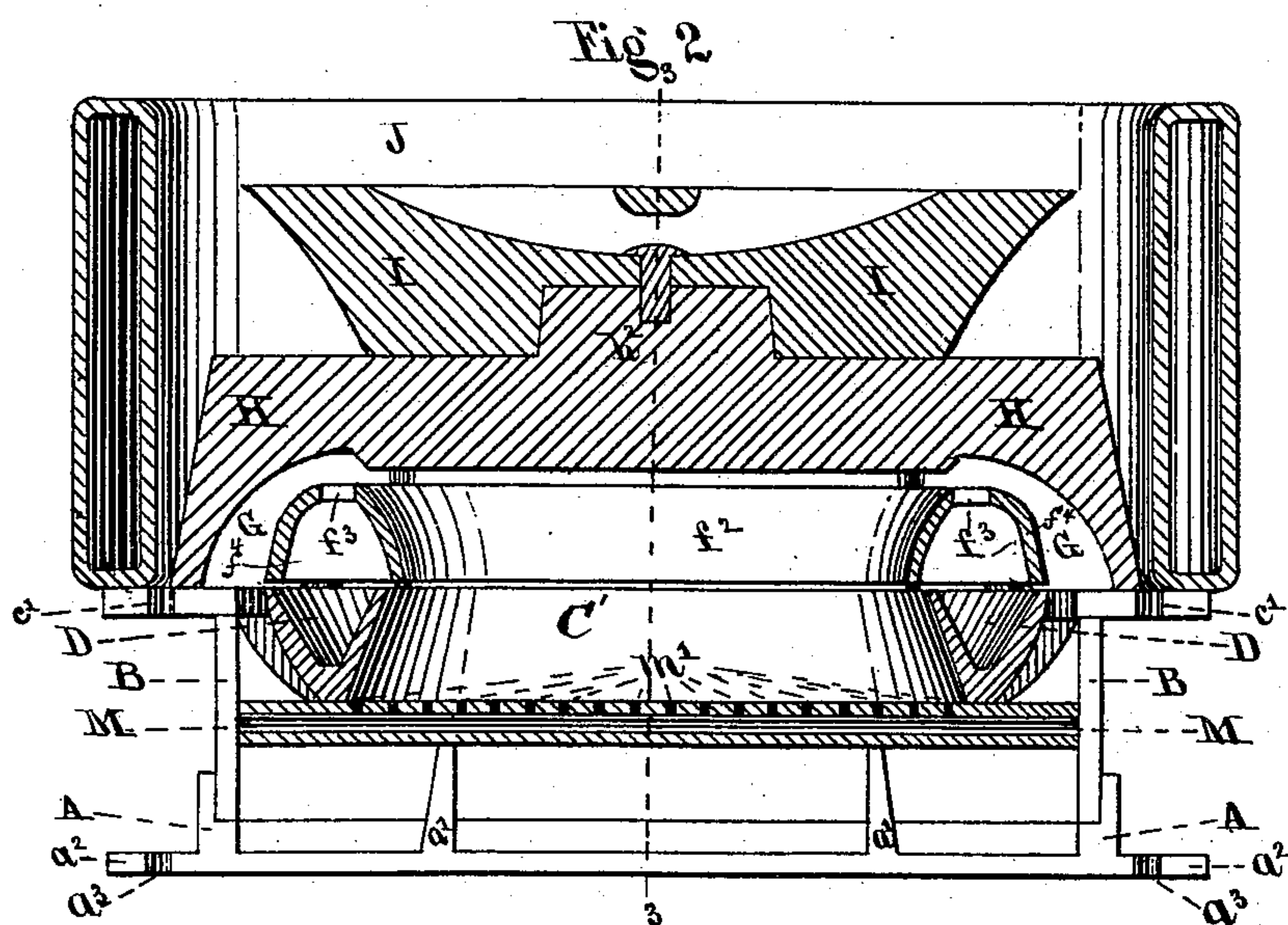
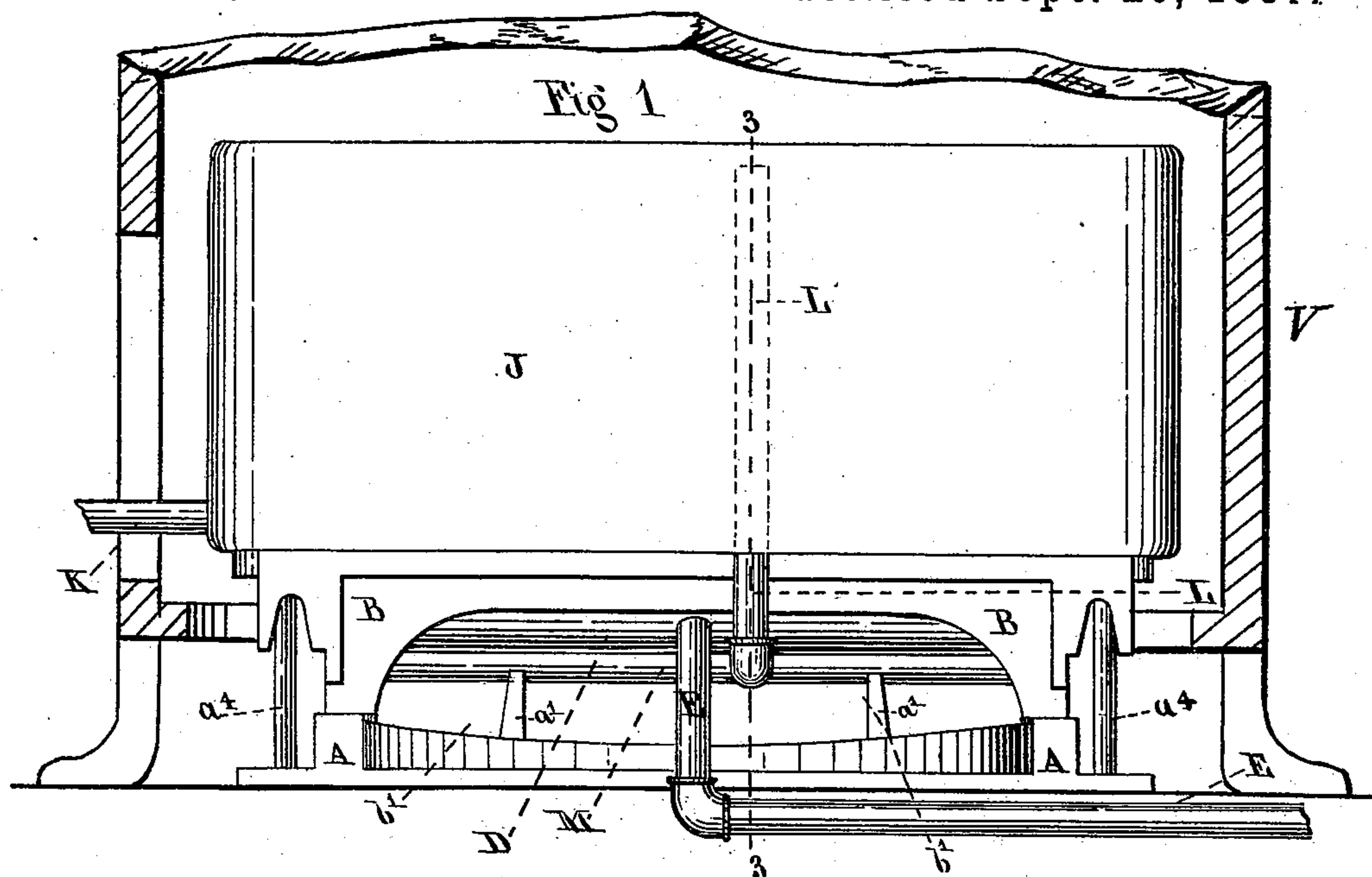
(No Model.)

3 Sheets—Sheet 1.

J. F. IRONS.
HYDROCARBON BURNER.

No. 370,337.

Patented Sept. 20, 1887.



Witnesses;
Ben. R. Hagar.
M. L. Lynch.

Inventor;
Joseph F. Lums
By James C. Byrne
his Atty

(No Model.)

3 Sheets—Sheet 2.

J. F. IRONS.
HYDROCARBON BURNER.

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Fig 3

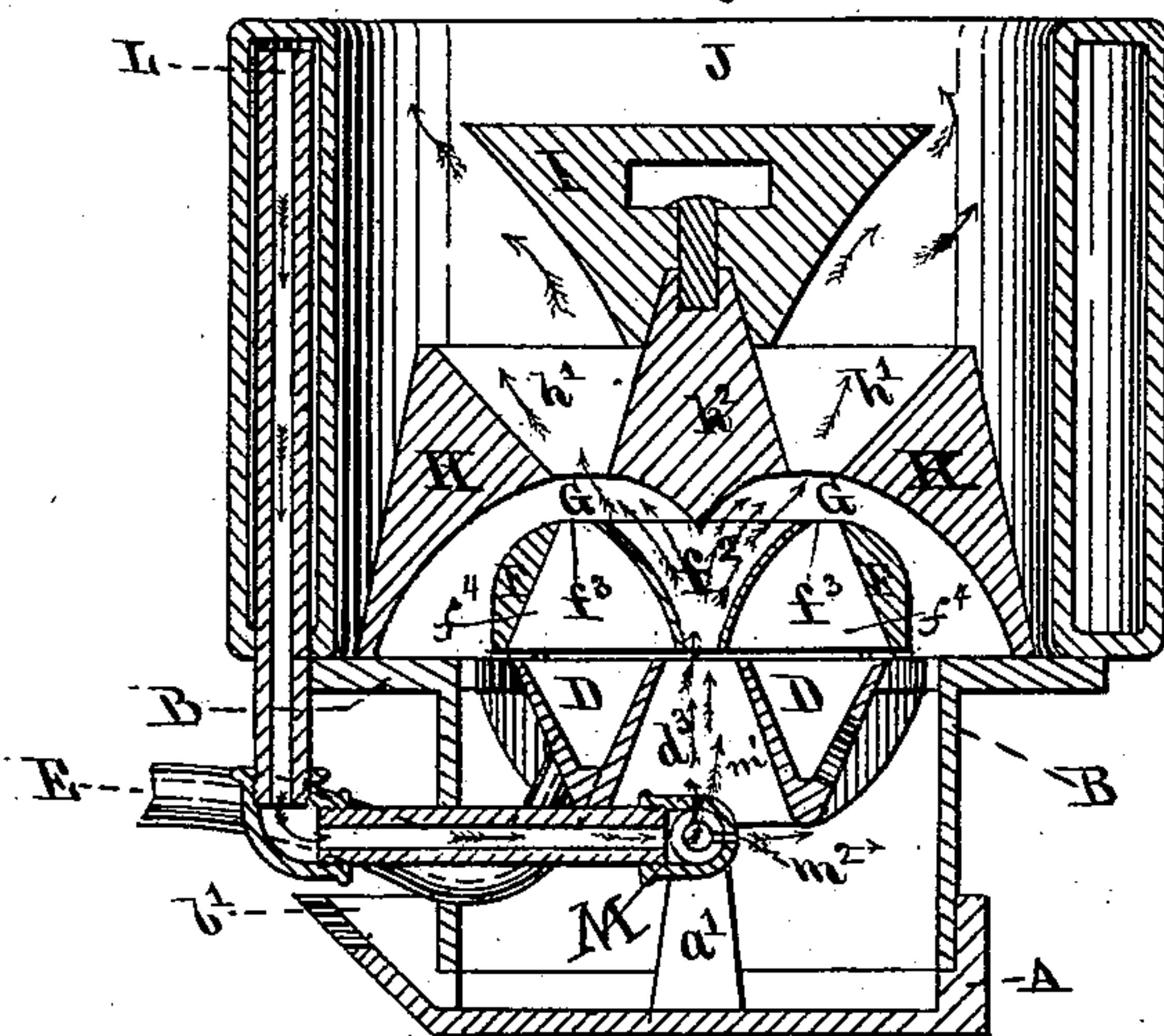


Fig 4

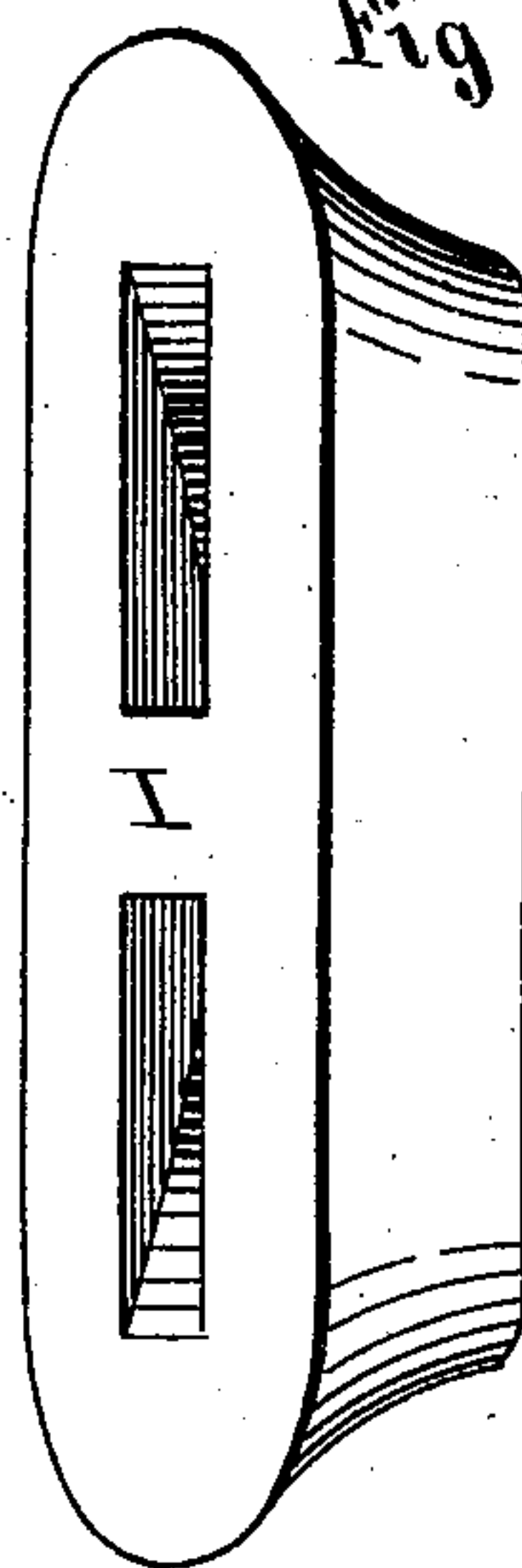


Fig 5

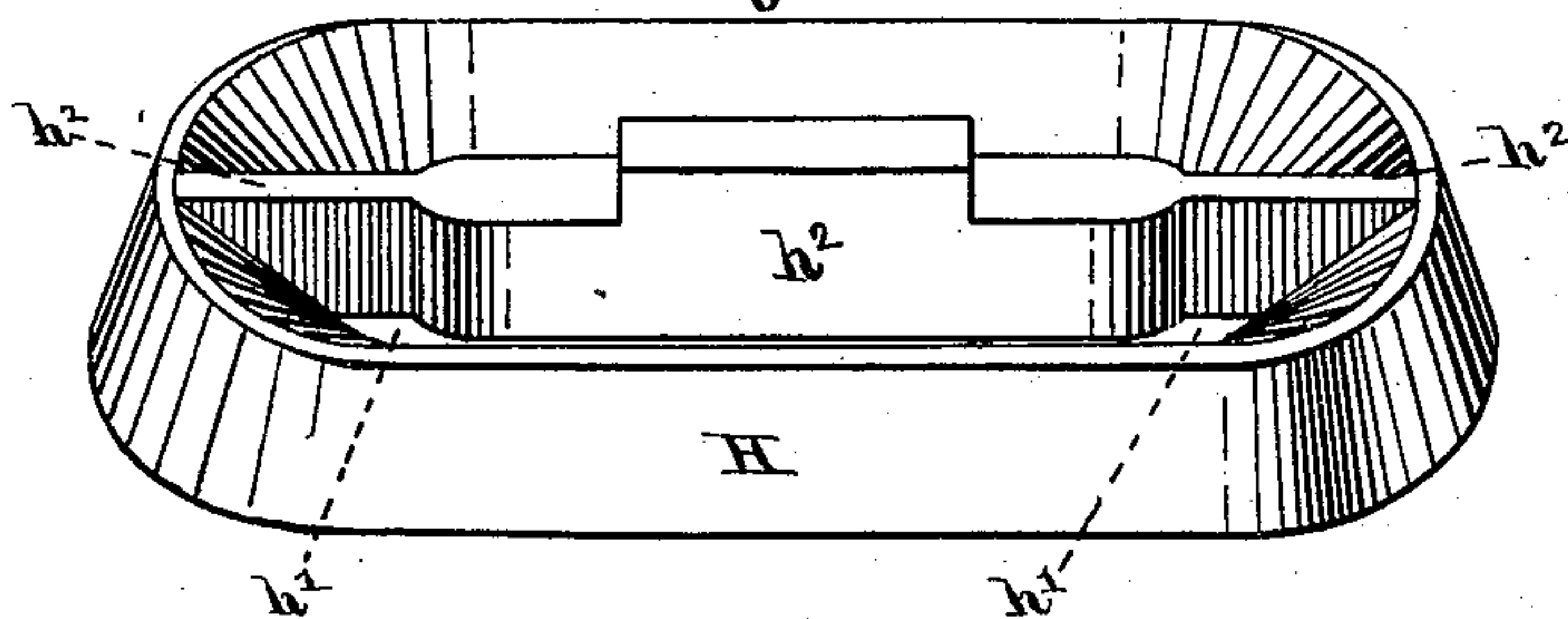


Fig 6

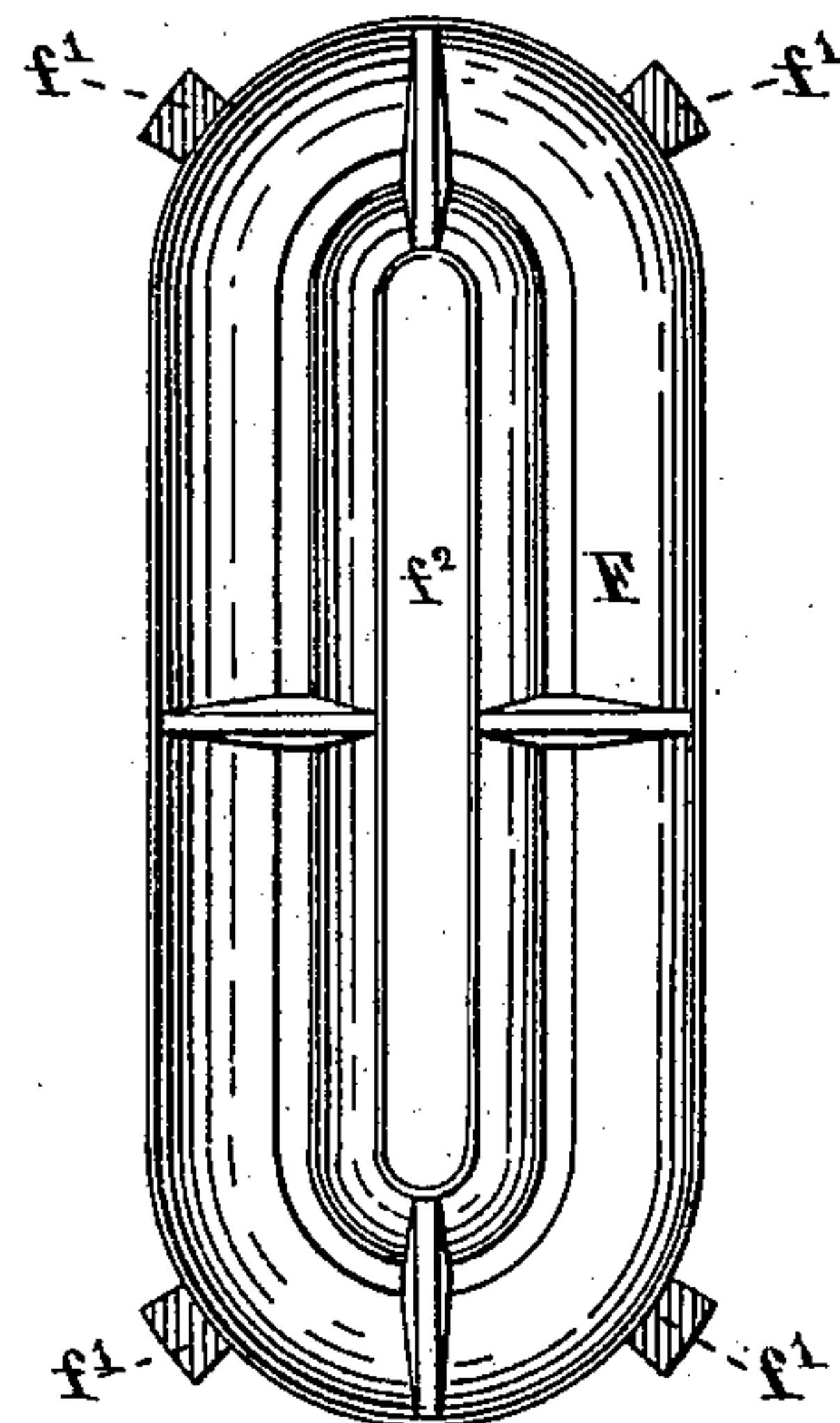
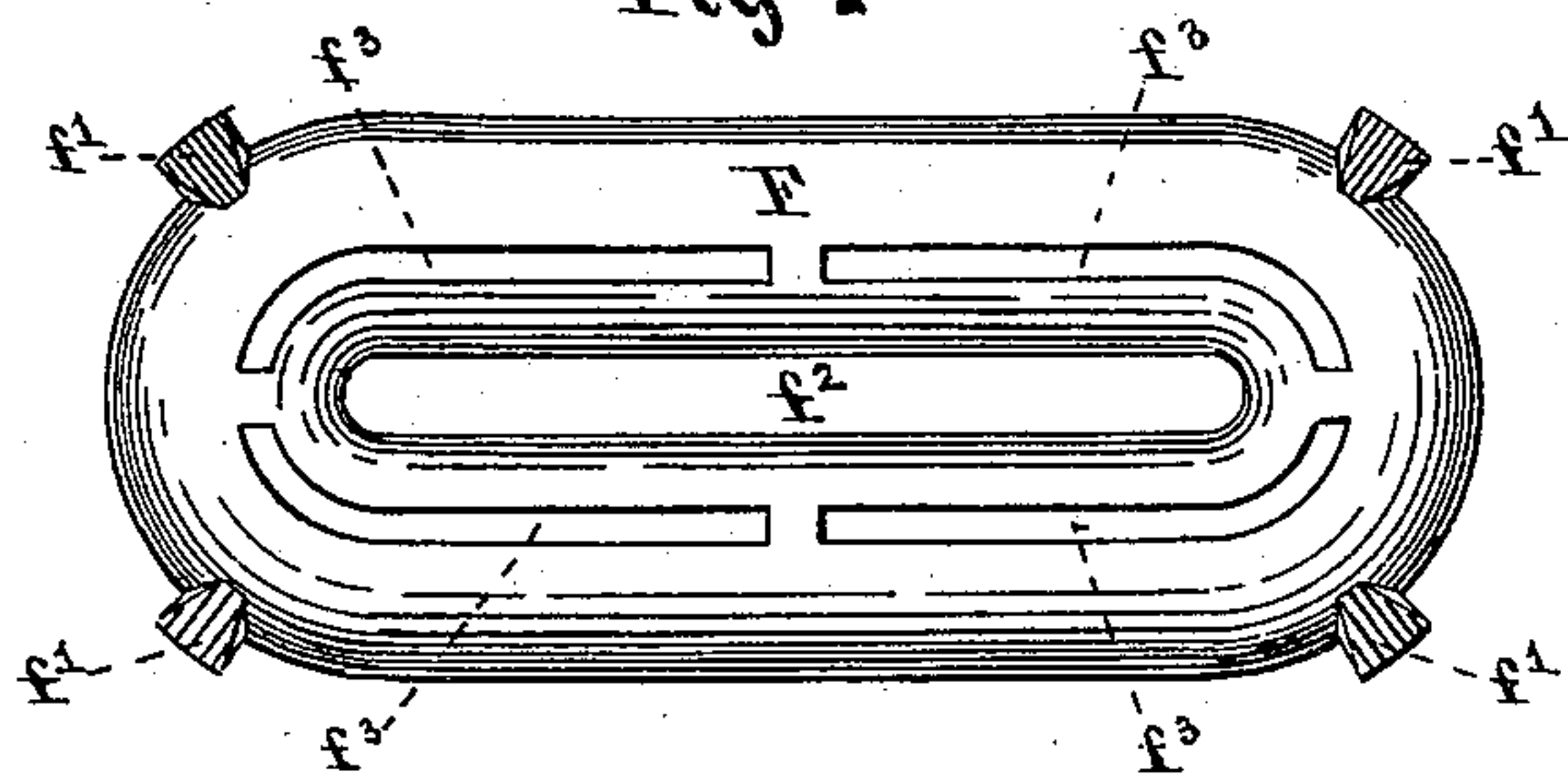


Fig 7



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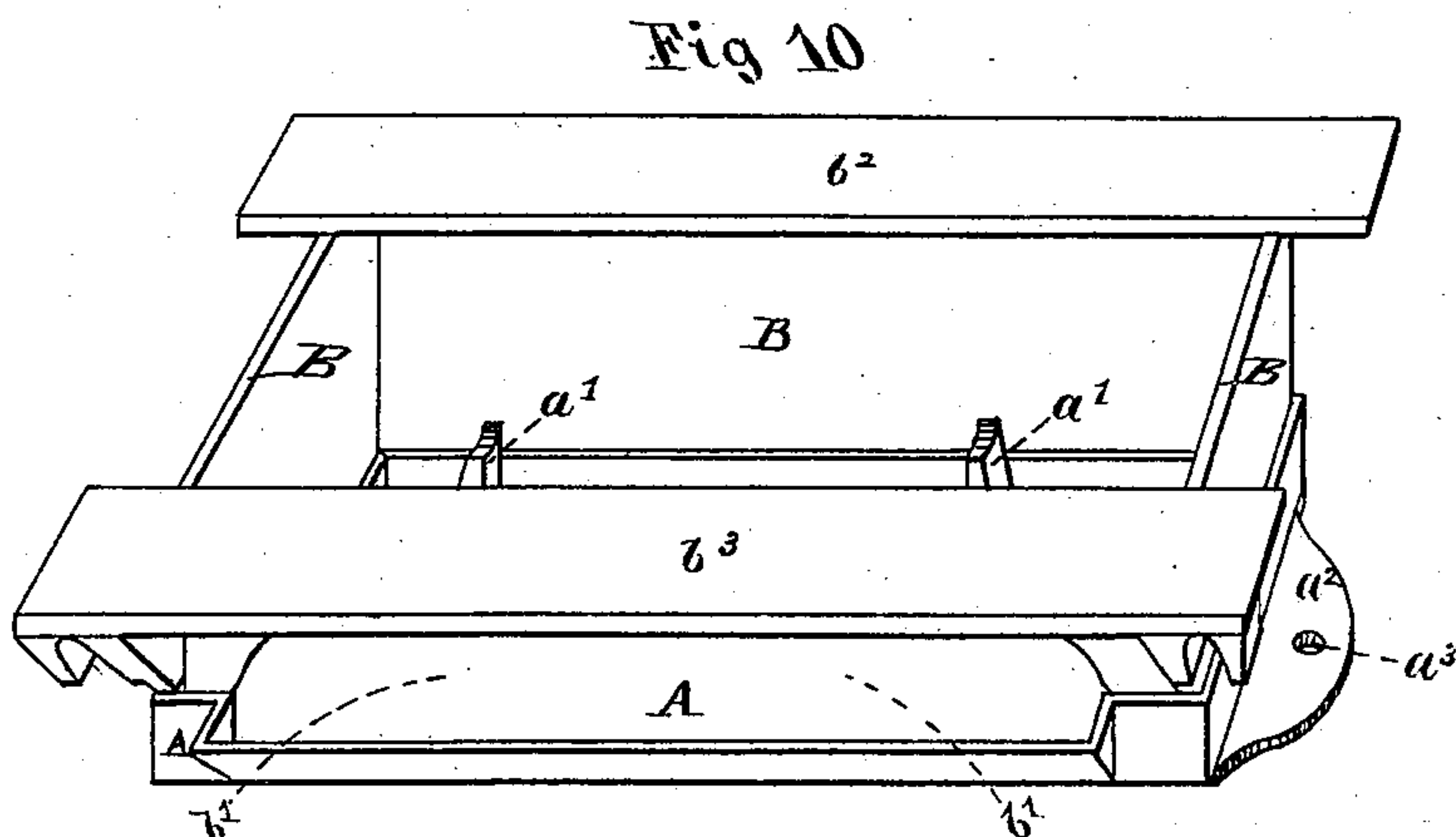
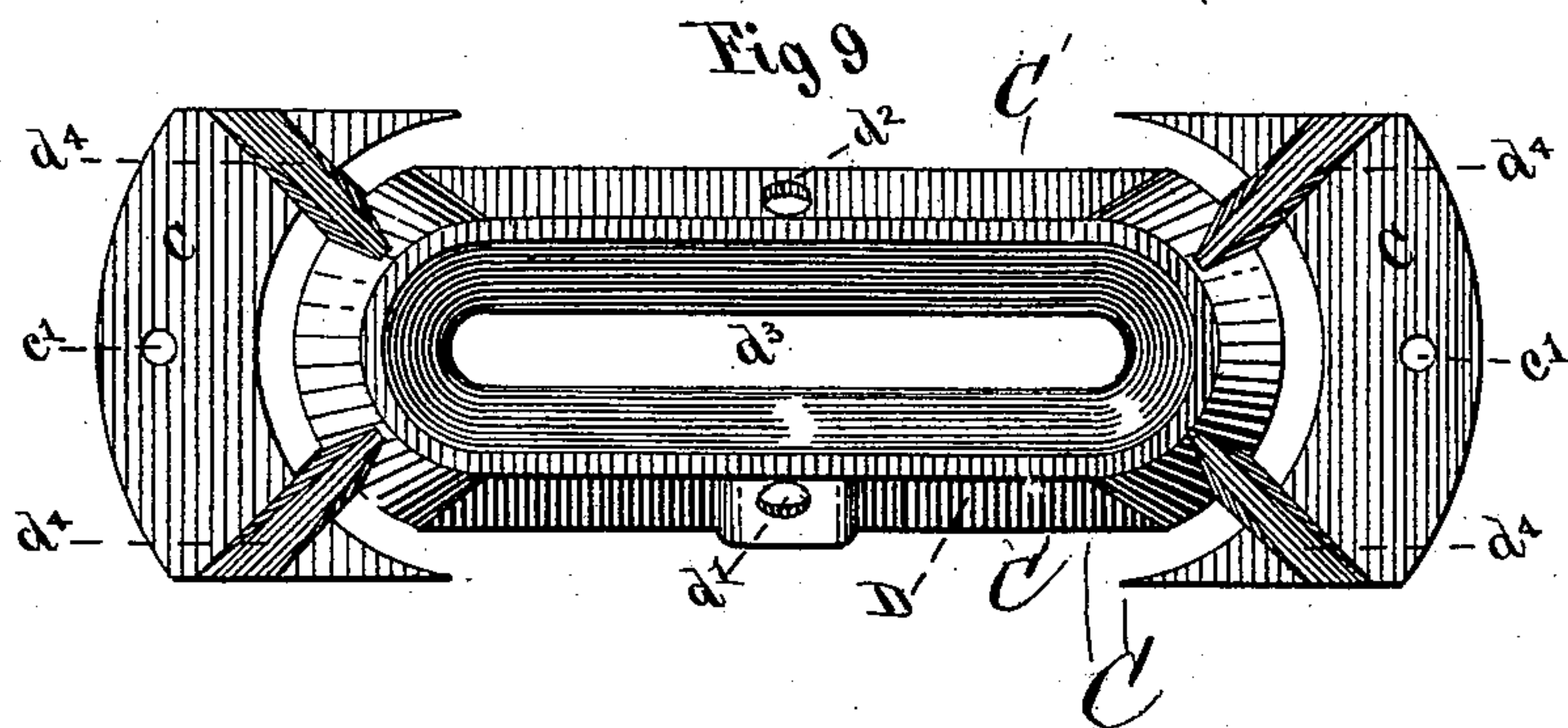
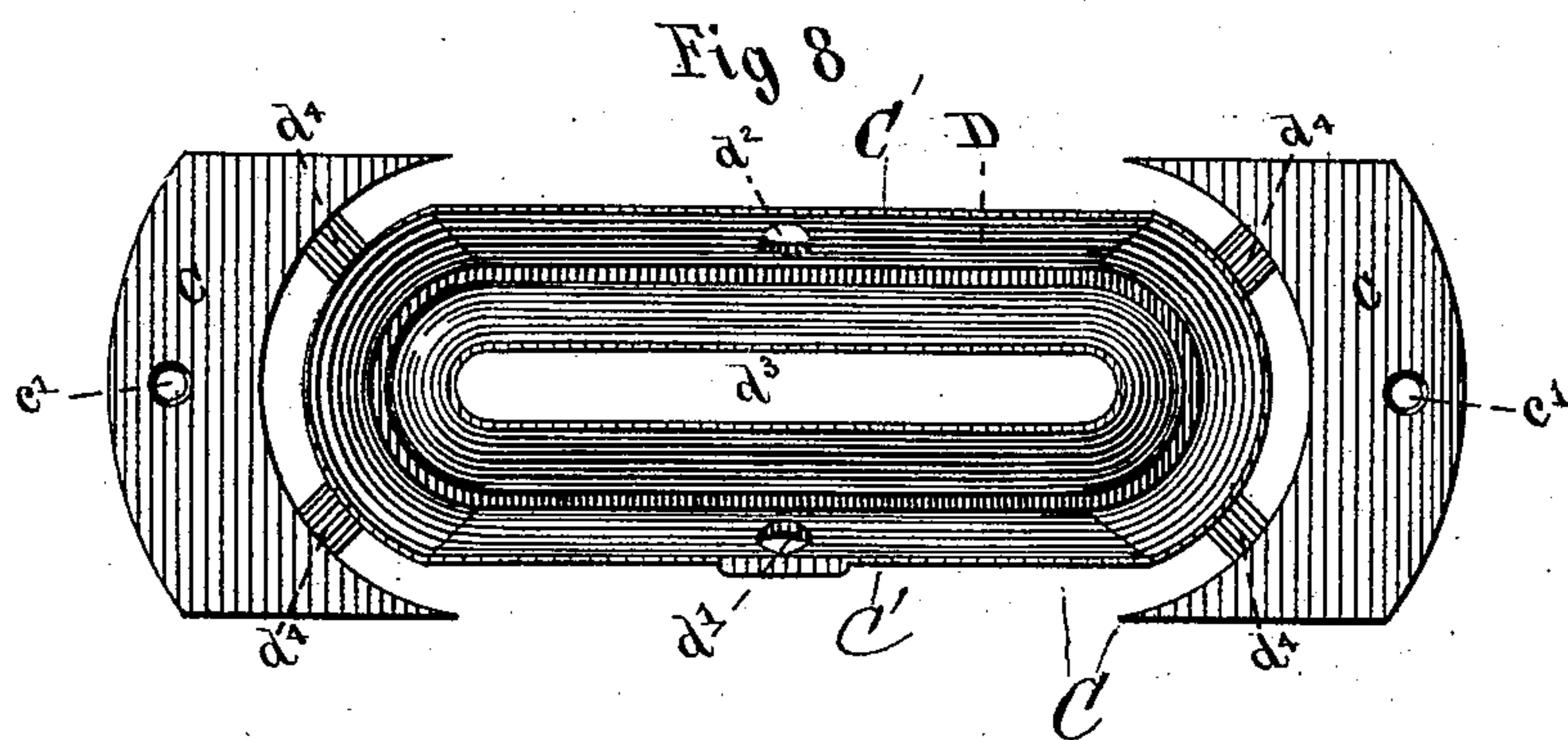
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3 Sheets—Sheet 3.

J. F. IRONS.
HYDROCARBON BURNER.

No. 370,337.

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Witnesses;
John R. Hagar
M. L. Lynch

Inventor;
Joseph F. Irons
By James C. Boyce
his Atty

UNITED STATES PATENT OFFICE.

JOSEPH F. IRONS, OF BRADFORD, PENNSYLVANIA, ASSIGNOR OF ONE-HALF
TO JAMES W. MILLER, OF SAME PLACE.

HYDROCARBON-BURNER.

SPECIFICATION forming part of Letters Patent No. 370,337, dated September 20, 1887.

Application filed March 15, 1884. Serial No. 124,281. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH F. IRONS, a citizen of the United States, residing at Bradford, in the county of McKean and State of Pennsylvania, have invented certain new and useful Improvements in Hydrocarbon-Burners; 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.

This invention is a device for burning liquid hydrocarbons, and is especially adapted for the use of crude petroleum; and is an improvement upon Letters Patent issued to me October 24, 1882, No. 266,478; and the improvements consist in changing the form of the deflector-plate, in adding a spreader above the deflector and a cap below it, in supplying jets of superheated steam, in adding means for generating such steam, in making the parts so that they will allow expansion when heated, in better proportioning the air-passages, in changing their form, and in making the groove for holding the liquid fuel of a V shape in cross-section. In this device the oil is not burned directly, but is vaporized, and air is thoroughly mixed with the vapors and the mixture burned.

In the drawings, Figure 1 is an elevation of my improved apparatus as arranged in the lower portion of a stove, the latter being partly broken away and partly in section. Fig. 2 is a longitudinal sectional view. Fig. 3 is a longitudinal sectional view taken at right angles to Fig. 2 on the lines 3 3 of Figs. 1 and 2. Figs. 4, 5, 6, 7, 8, 9, and 10 are detail views of separate parts of the apparatus, Figs. 6 and 7 being the upper and lower sides of the same deflector, and Figs. 8 and 9 being upper and lower views of the same grooved casting, known as the "groove-carrier."

A is the base, which is of flat metal with slightly raised sides, and serves as a foundation and support for the other parts of the apparatus, and catches any oil that may overflow at any time. It is provided with two small posts or pillars, a' , which support the perforated steam-pipe hereinafter mentioned. At each end it has the projecting lugs a^2 , provided with bolt-holes a^3 , in which suitable

bolts, a^4 , are inserted for securely fastening together the lower parts of the apparatus. The base A is surmounted by a frame, B, of suitable shape, which is open both at top and bottom and partly open in the front at b' , and through the front b' the necessary air for combustion is admitted. On the top it has the longitudinal plates $b^2 b^3$, which in part form the supports of the deflector and the steam-generator. Sufficient space is left between the plates b^2 and b^3 to admit the groove-carrier C. This groove-carrier is a casting, consisting of an annular elongated central part, C' , four arms, d^4 , extending from the ends thereof, and terminal plates c at the ends of these arms. In these plates are bolt-holes c' , arranged over the bolt-holes a^3 of base A, in order that bolts a^4 may be passed through said holes c' and a^3 , to fasten said groove-carrier to said base, as shown in Fig. 1. An elongated annular groove, D, open at the top, is formed in said central part, C' , surrounding the opening d^3 . Holes d' d^2 are made in the outer wall of groove D on opposite sides of said main part C' of groove carrier or casting C for the ingress and exit of the oil which fills said groove. The oil is admitted into the groove D through the oil-pipe E. Said groove is made of a V shape, and this is a substantial improvement, for it presents a surface of oil proportional to its quantity. The oil-pipe enters said groove at the aperture d' , and opposite said aperture is the hole d^2 . In case any excess of oil is admitted to the groove D, the surplus will escape by the hole d^2 onto the hearth or base-plate A and there be consumed. Air-passages are afforded around the groove-plate D, and, when the groove is made of an oval or circular form, also through its center d^3 . The groove D is supported by the ties d^4 . When the groove-plate is in position in the form of burner illustrated in the drawings, the perforated steam-pipe M is immediately below the central aperture, d^3 , and the escaping jets blow up through said central aperture.

Over the groove-plate is the cap F, which has small legs f' , which support it upon the ties d^4 of the groove-plate D. This cap has a central aperture, f^2 , directly over the aperture d^3 of the groove-plate D, so that the mingled current of steam and air blows up through

such central apertures, d^3 and f^2 , as shown by the ascending arrows in Fig. 3. Such cap F is also provided with the longitudinal apertures f^3 , which correspond with and are directly over the groove D. The ascending stream of air and steam through the aperture f^2 makes a suction through the apertures f^3 , and draws up the vapors from the oil in the groove D.

Above the cap F is the chamber G, in which the hydrocarbon vapors are thoroughly mixed with the steam and air. Supported upon the ends c of the groove-plate, and upon the top plates, b^2 b^3 , of the frame B, is the deflector H, (shown separately in Fig. 5,) which has the apertures h' , corresponding with and directly over the apertures f^3 in the cap F. The deflector H fits closely on the top of the box, it being desirable that all the air consumed by the burner shall pass under such deflector and through the mixing-chamber G. The central part of the deflector h^2 is made of a wedge shape on its lower side, and is so placed that it presents its sharp edge to the ascending stream of air and steam and divides it so as to throw half to each side. The bevels on the side of the sharp edge may be made concave, as shown at Fig. 3. If made too concave, they have a tendency to throw this stream of air and gas down into the apertures f^3 ; but they should be so proportioned as to form a suction through said apertures f^3 .

On the central part, h^2 , of the deflector H is fastened the spreader I, which is made of the shape shown in Fig. 4 of the drawings. Its purpose is to spread the flame. The steam-generator J is made to surmount the box, and surrounds the deflector and spreader. It is provided with the water-pipe K, which is connected to the water-pipes where water-works are established, or to a tank having sufficient head—say three feet—of water. Said steam-generator also has the steam-escape pipe L, which commences near the top of the generator J, so as to take the lightest and driest portions of the steam. It passes downward through the generator, and by suitable connections it conducts the steam to the perforated pipe M, which rests upon the pillars a' on the base-plate A. The upper part of the steam-pipe M has a row of minute perforations, m' , directly under the central aperture, d^3 , of the groove-plate D, and on the side directly under the hole d^2 is another minute perforation, m^2 , from which a jet of steam escapes and scatters the blaze of any thick or tarry matter or any overflow of oil from the groove D.

The whole apparatus is made of the proportions necessary for the work it is designed to accomplish.

The smallest sizes will be of such dimensions that the whole apparatus, including the steam-generator J, can be placed within the fire-box of ordinary stoves.

I prefer to make the steam-generator J of cast-iron, with thick sides similar to those generally used in water-backs of stoves.

There will be no stop-cock on the escape-pipe L, and consequently there can never be any very great or dangerous pressure of steam within the generator J, as the steam freely escapes as fast as it is formed.

When the apparatus is to be first lighted, a few drops of oil are allowed to escape through the hole d^2 and drop onto the base A. An ignited match or piece of paper or some other fibrous substance is placed in such oil, and this will give sufficient heat to warm up the groove D and vaporize the oil therein, and give draft enough to draw in air to mingle therewith, and the mixed air and vapor will ignite. The combustion quickly but gradually becomes intense. A little water is let on through the water-pipe K into the steam-generator J, and the apparatus is soon heated. The water is rapidly converted into steam, and adds to the draft and thorough mixing of the vapors with the air and the intensity of the combustion.

When the oil which has been allowed to overflow on the base A is all consumed, the flame will be around the spreader I, but will not extend down into the mixing-chamber G; but sufficient heat will be radiated downward and conducted through the substance of the deflector H and the cap F to vaporize the oil in the groove D as fast as it is admitted. If any overflow occurs, it will be immediately ignited on the hearth and the jet m^2 will scatter the flame, and it will be thrown up through the different apertures. In some cases it may be desirable, with very heavy oil, to allow sufficient overflow to keep some oil continually burning upon the base A, thereby heating the bottom of the groove D and better vaporizing the oil. By this arrangement perfect combustion of the oil is secured and great heat is obtained with comparatively small consumption of fuel. The apparatus is very compact and readily inserted in proper positions.

It will be observed by reference to Figs. 2 and 3 that the cap F is elevated slightly above the grooved plate D, and its outer passage, f^4 , flares slightly more than the groove D. Openings f^3 form a continuation of said passage f^4 through the top of cap F. This construction allows a thin current of air to flow over the edges of the groove D, thus better mixing with the vapors arising from the liquid oil. By suspending the groove-plate D from the side pieces, and having this placed upon the frame B, a free expansion of the parts is allowed when they become heated.

V, Fig. 1, designates the lower portion of a stove partly in section and partly broken away, showing the arrangement of the burner underneath.

I am aware that it is not broadly new to make use of an oil-groove in combination with a pipe which discharges steam into a space surrounded by said groove. I am also aware that it is not new to combine deflectors with such an oil-groove and steam-inlet, the said deflectors operating to direct the current of the burning va-

pors from the oil and steam first in one direction and then in another. These constructions and combinations I do not broadly claim.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. An annular cap, F, having a central aperture, f^2 , and another aperture or passage, f^4 , exterior to said passage f^2 , in combination with a casting or groove-carrier having an annular oil-groove, D, and a central aperture, d^3 , arranged as shown, and a pipe discharging steam into apertures d^3 and f^2 , substantially as set forth.

2. In combination with an annular oil-groove surrounding a central opening, and perforated pipe M, discharging through the central opening of said groove, the deflector H, above said groove, and the spreader I, mounted on said deflector, substantially as set forth.

3. In combination with a casting or groove-carrier having the oil-groove, and the cap F, having openings f^3 in its top for the upward passage of the vaporized oil, the deflector H, having openings h' arranged, respectively, above said openings f^3 , and the spreader I, mounted on said deflector, substantially as set forth.

4. The steam-pipe M, provided on its upper face with a row of perforations, m' , and a single perforation, m^2 , in combination with a groove-carrier or casting having an annular oil-groove, D, which has a central opening over said row of perforations, and a hole, d^2 , above said perforation m^2 , substantially as and for the purpose set forth.

5. A deflector, H, provided with a central part, h^2 , which is V-shaped on its under side, in combination with an oil-groove and pipe discharging steam, arranged below it, and a deflector, I, which is supported on said central portion, h^2 , the vapors from the hydrocarbon-burner being divided by the under side of said deflector ascending through said openings h' in the latter and being turned still farther to each side by said spreader, substantially as set forth.

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

JOSEPH F. IRONS.

Witnesses:

JAMES C. BOZEL,
M. L. LYNCH.