

No. 725,737.

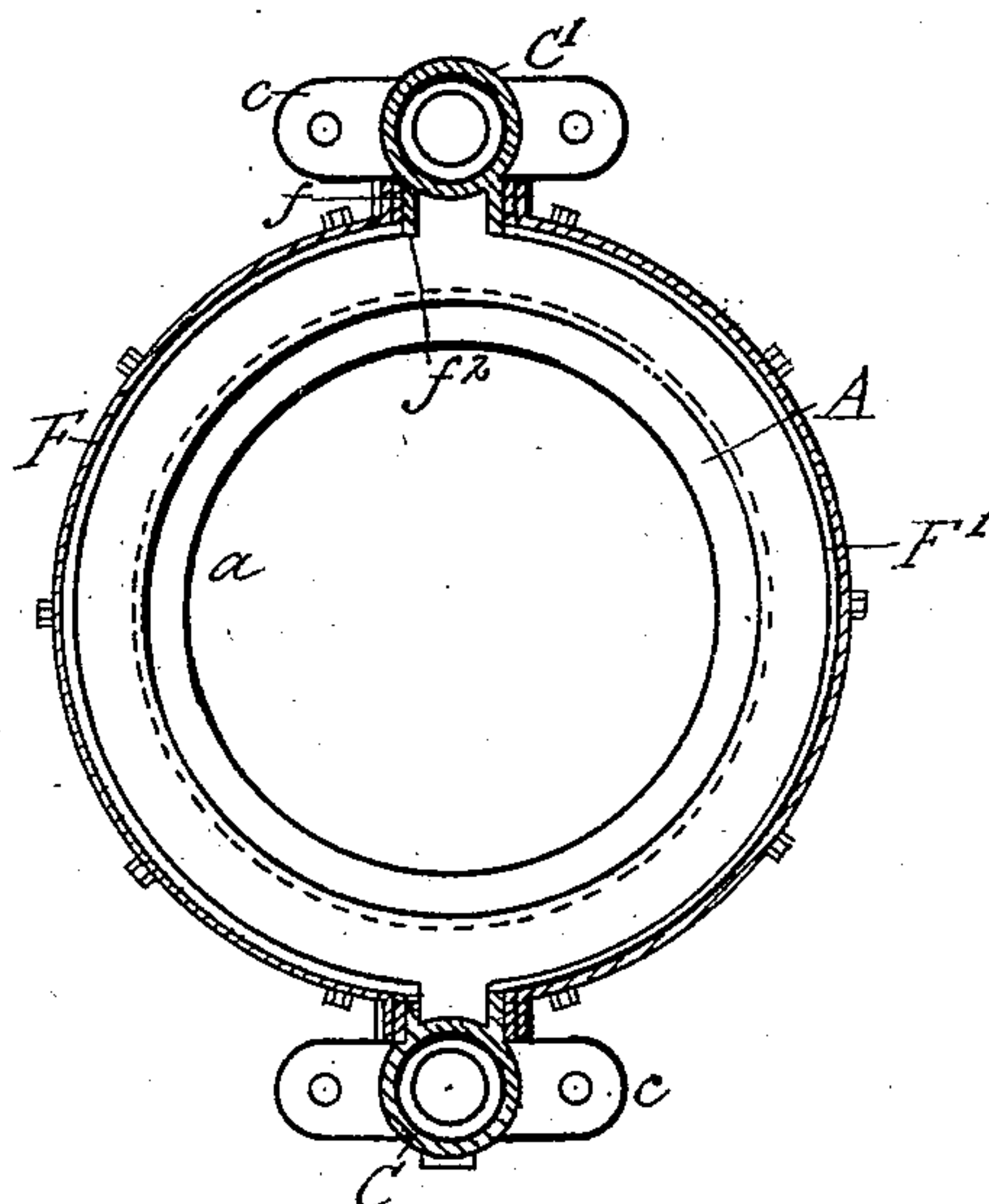
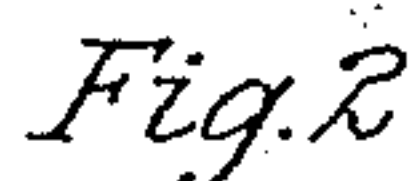
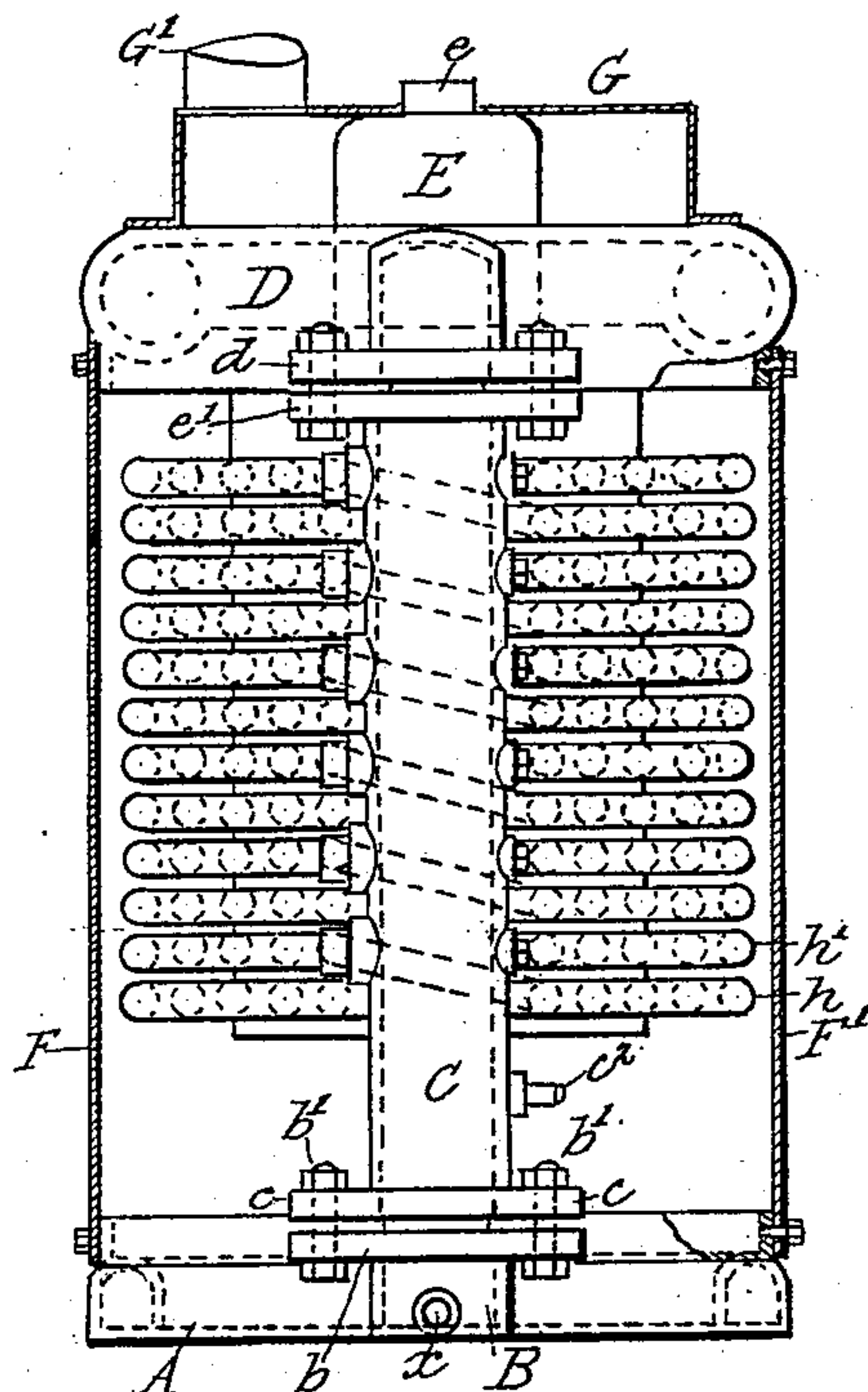
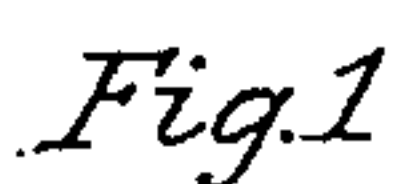
PATENTED APR. 21, 1903.

C. A. MARRDER.
STEAM GENERATOR.

APPLICATION FILED JAN. 16, 1902.

NO MODEL.

4 SHEETS—SHEET 1.



Witnesses
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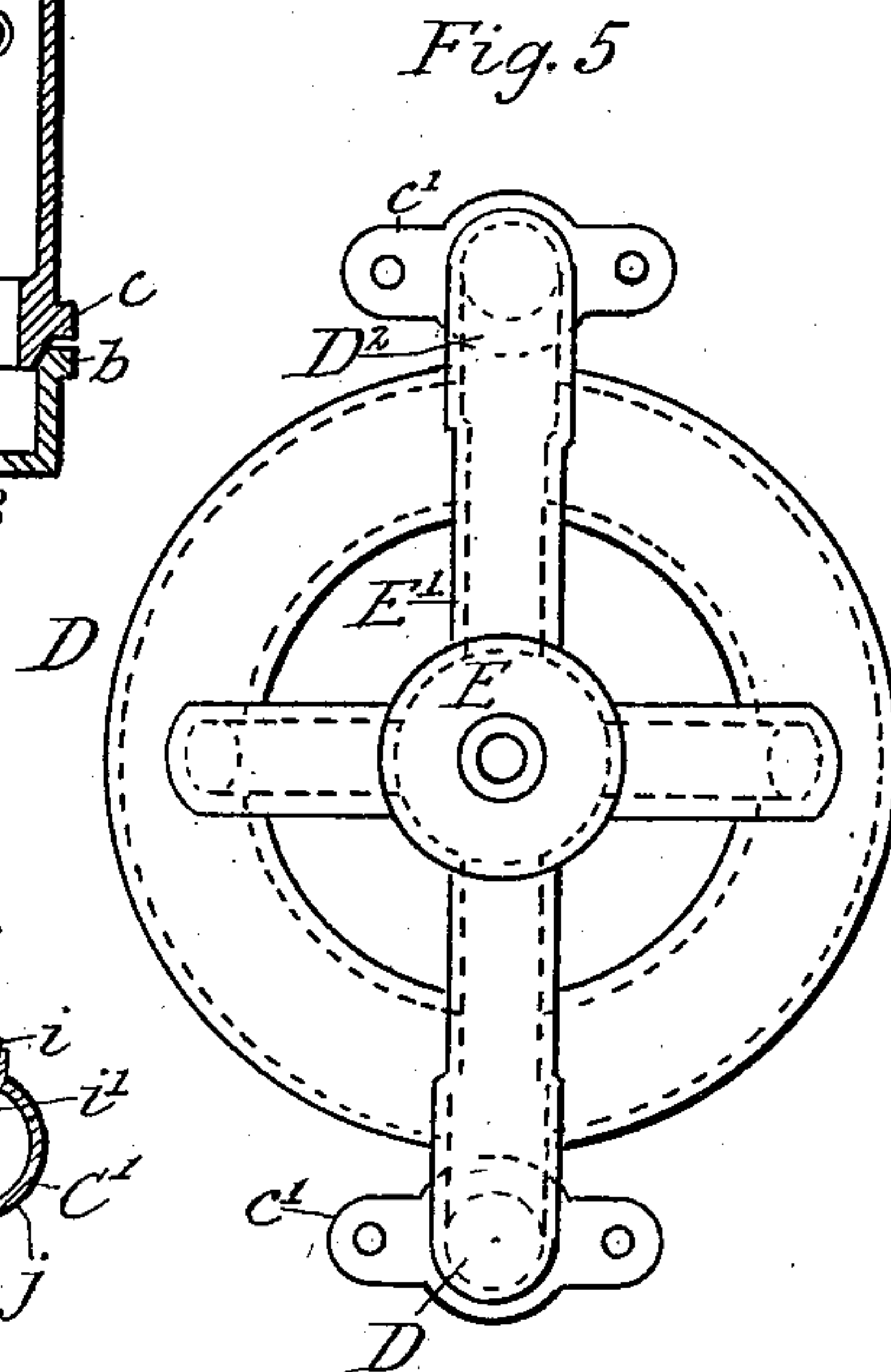
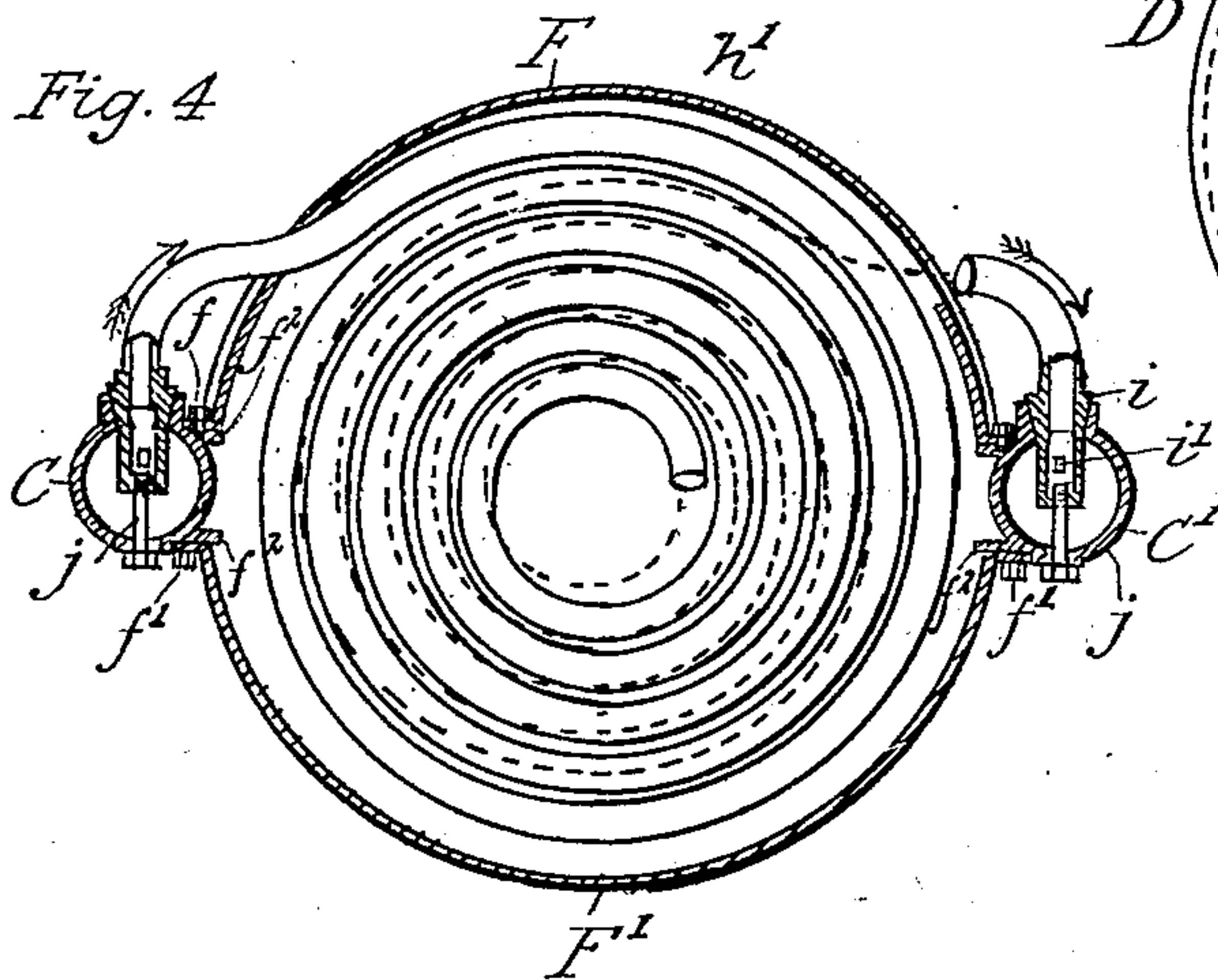
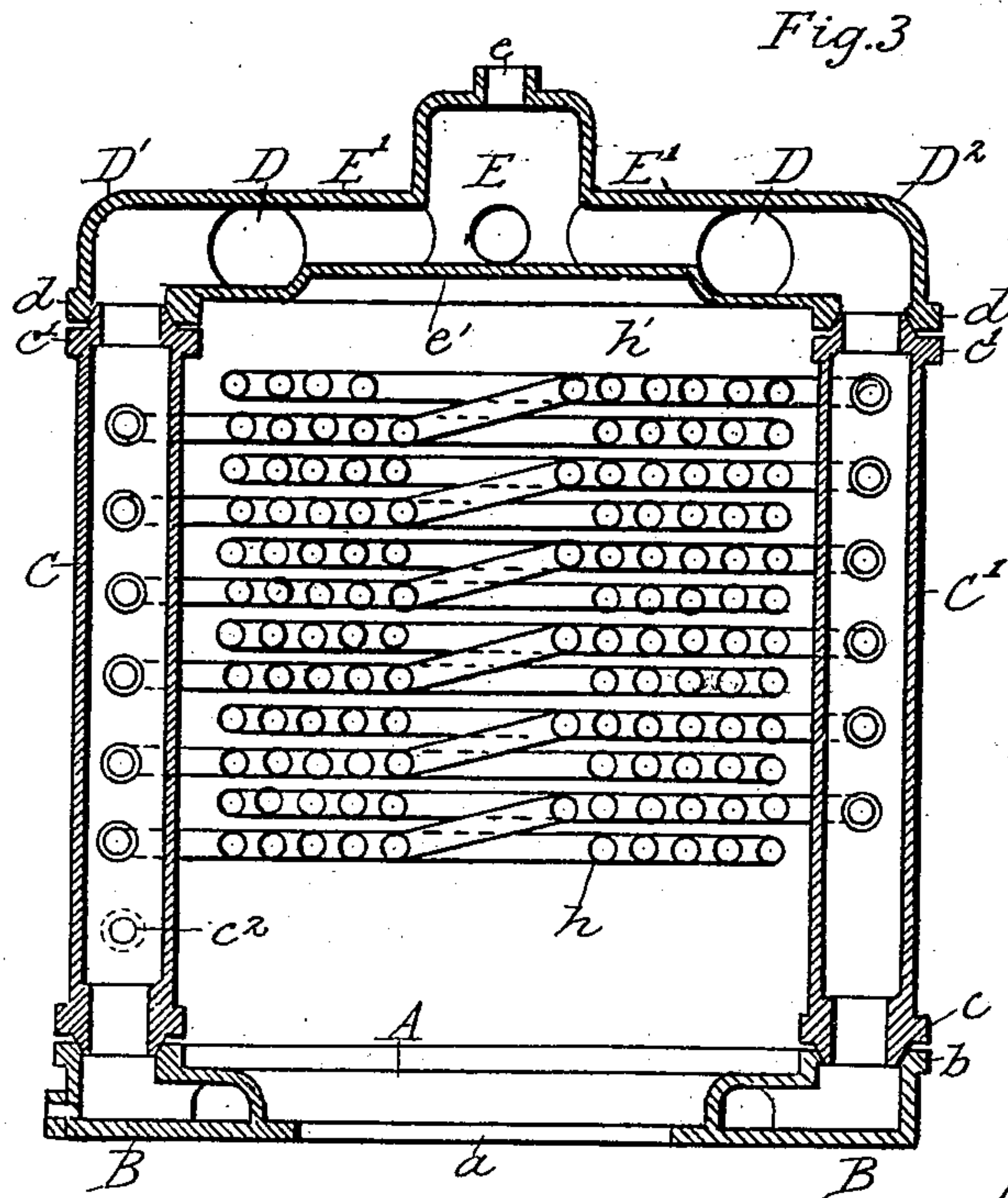
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4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

Fig. 6

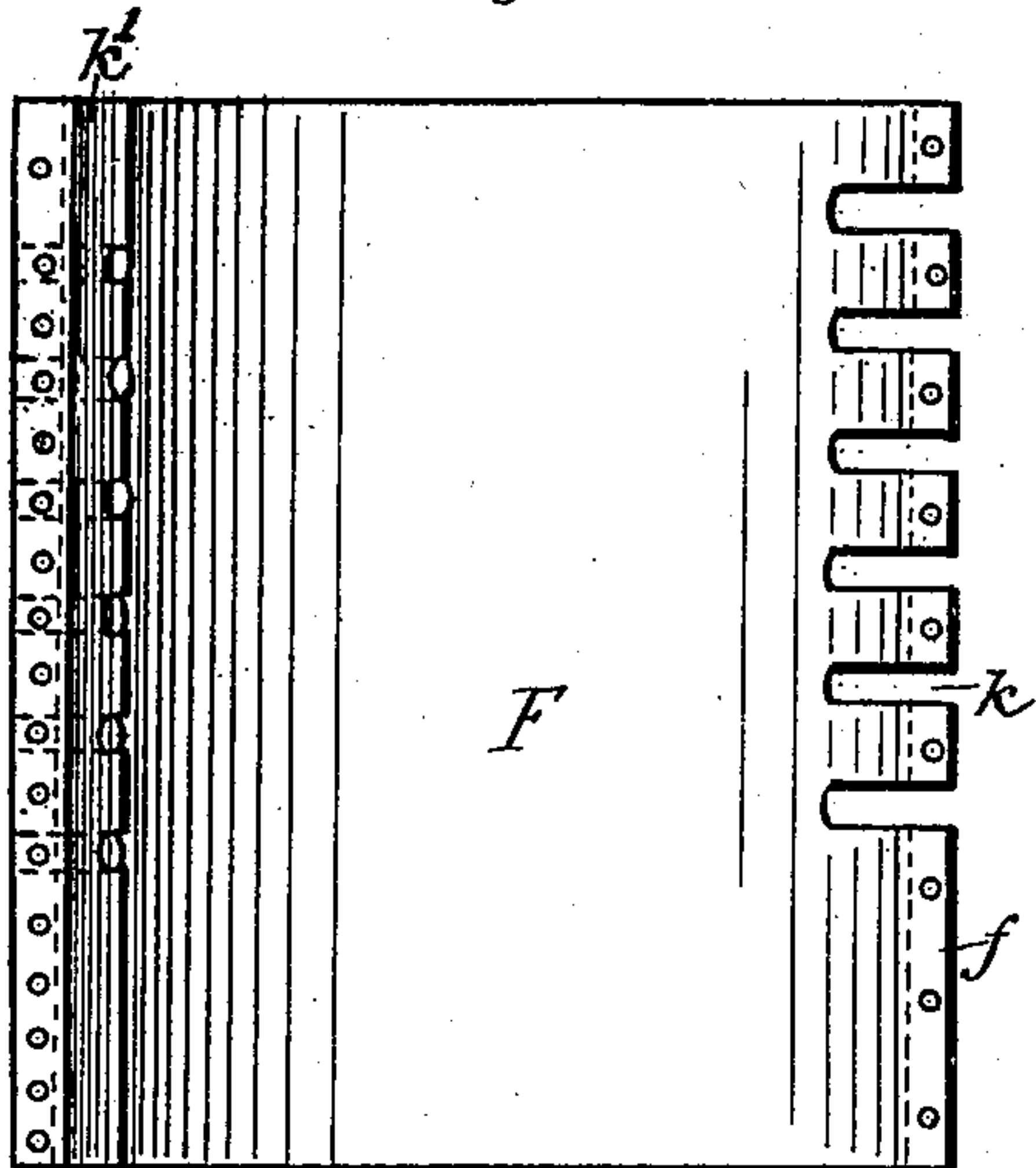


Fig. 7

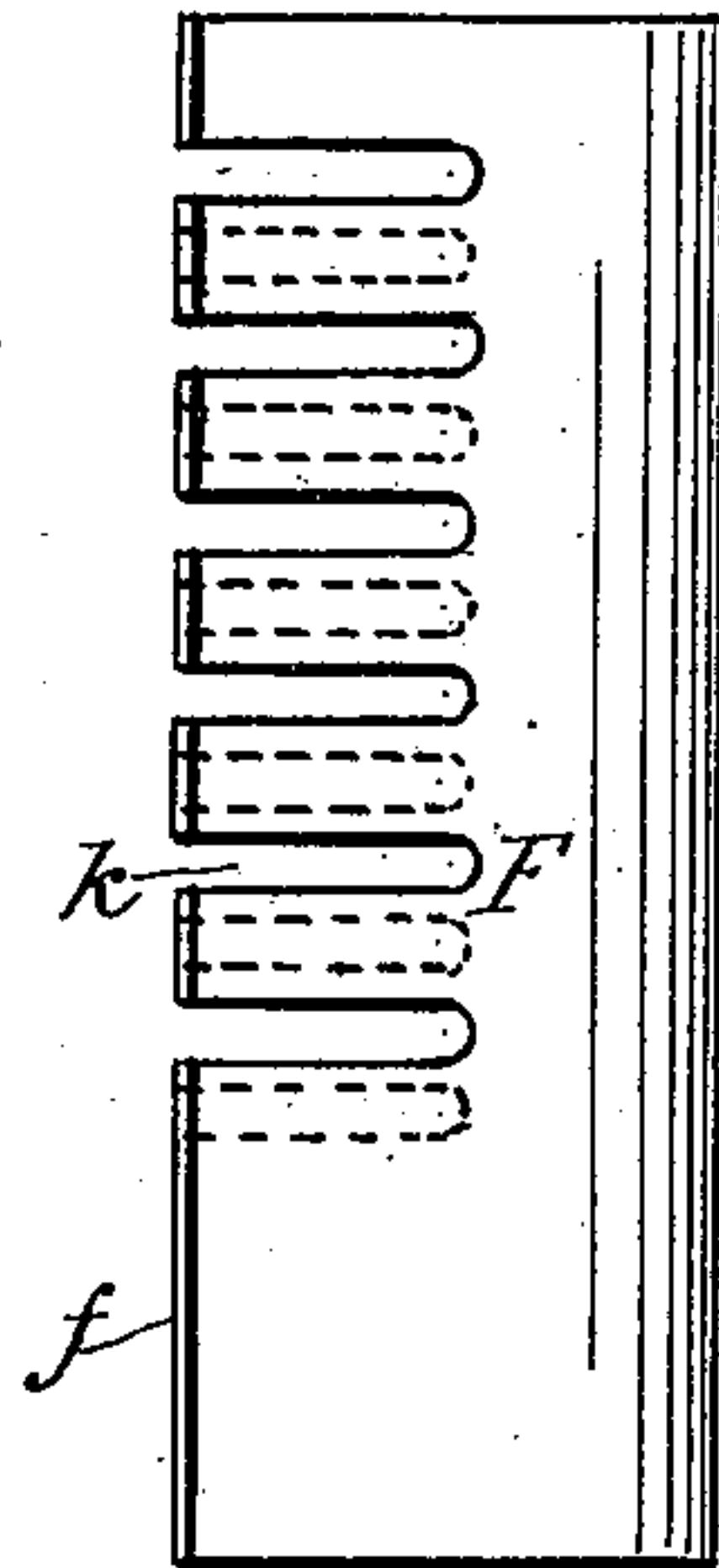


Fig. 9

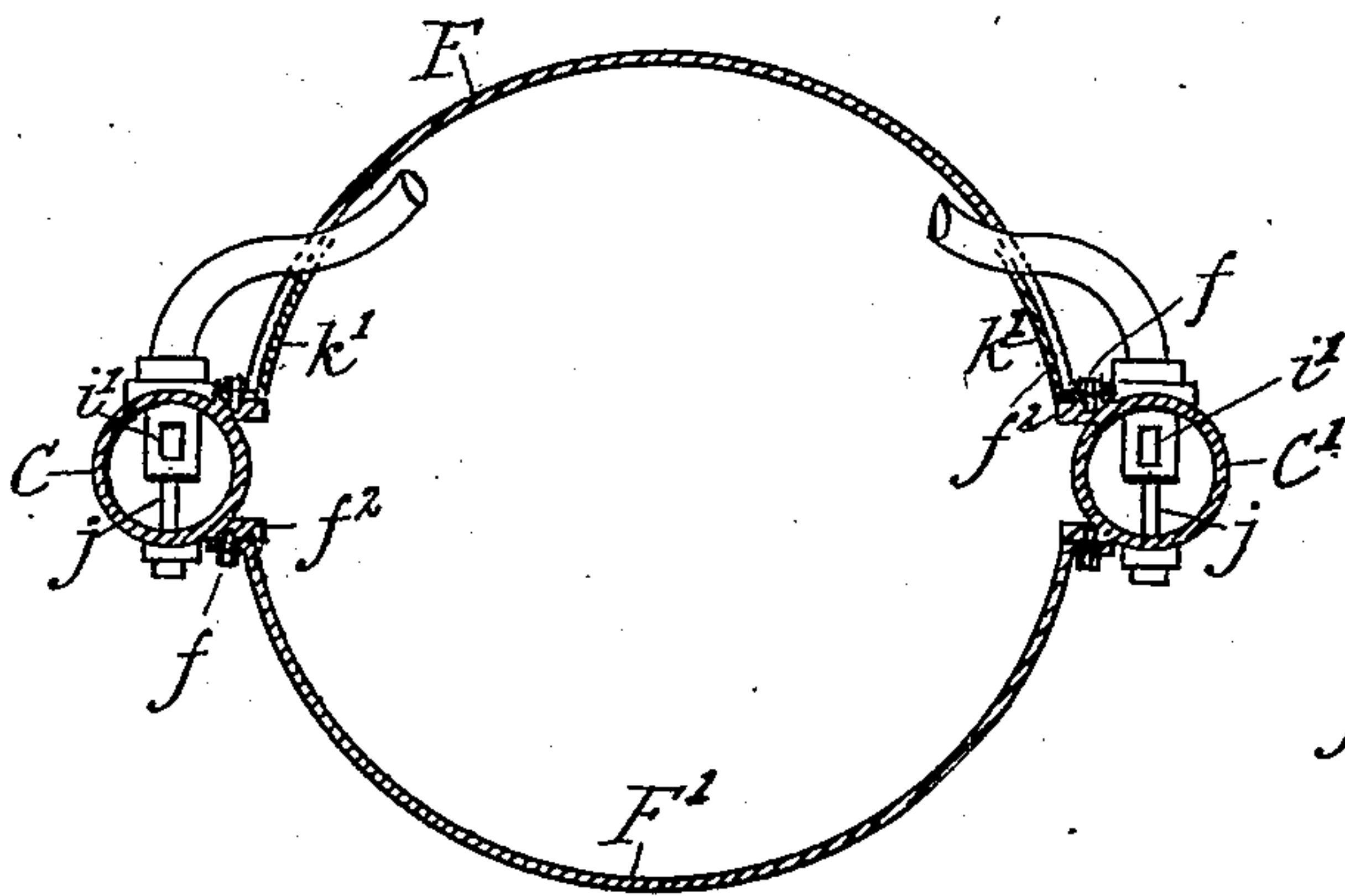
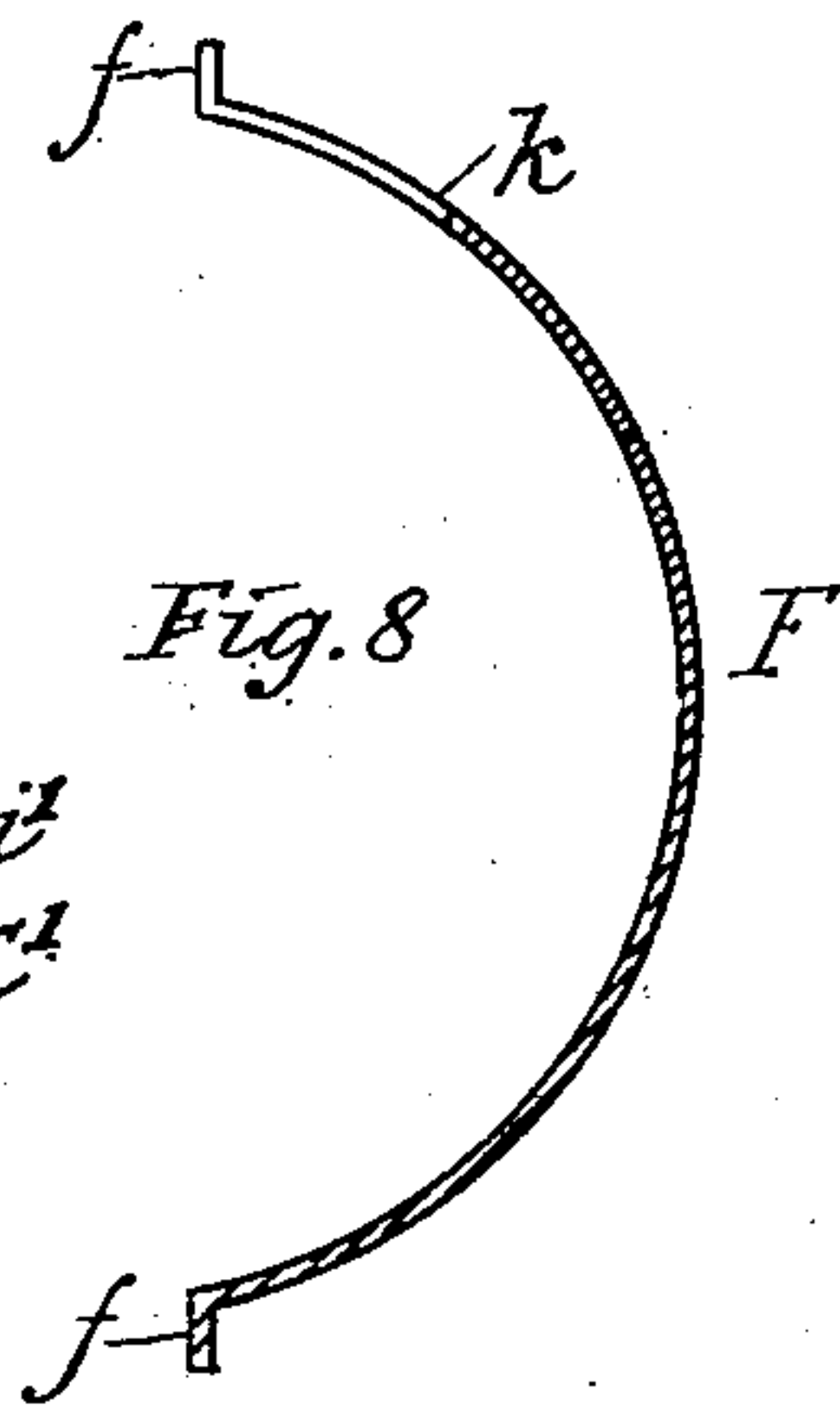


Fig. 8



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4 SHEETS—SHEET 4.

Fig. 10

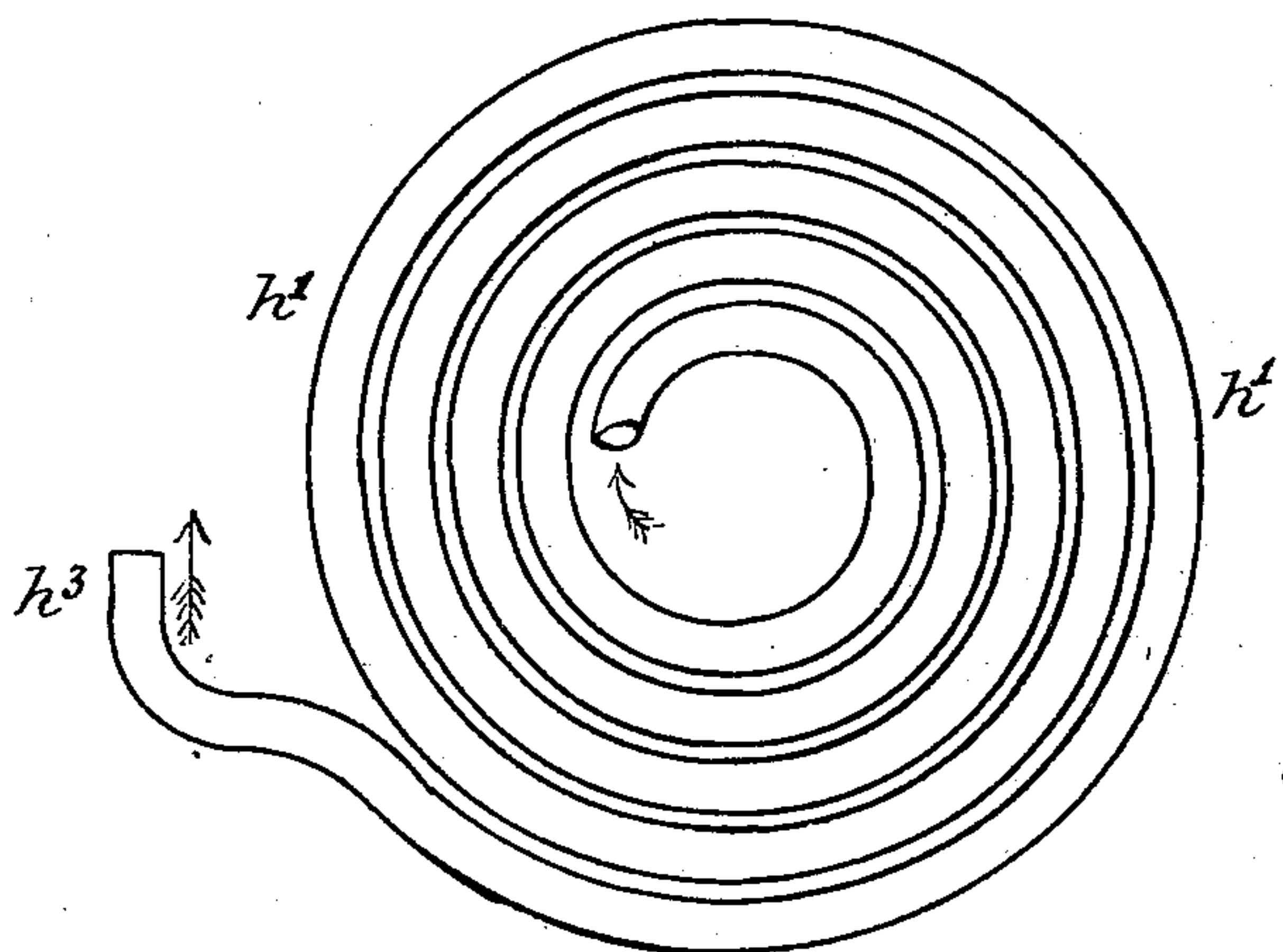


Fig. 13

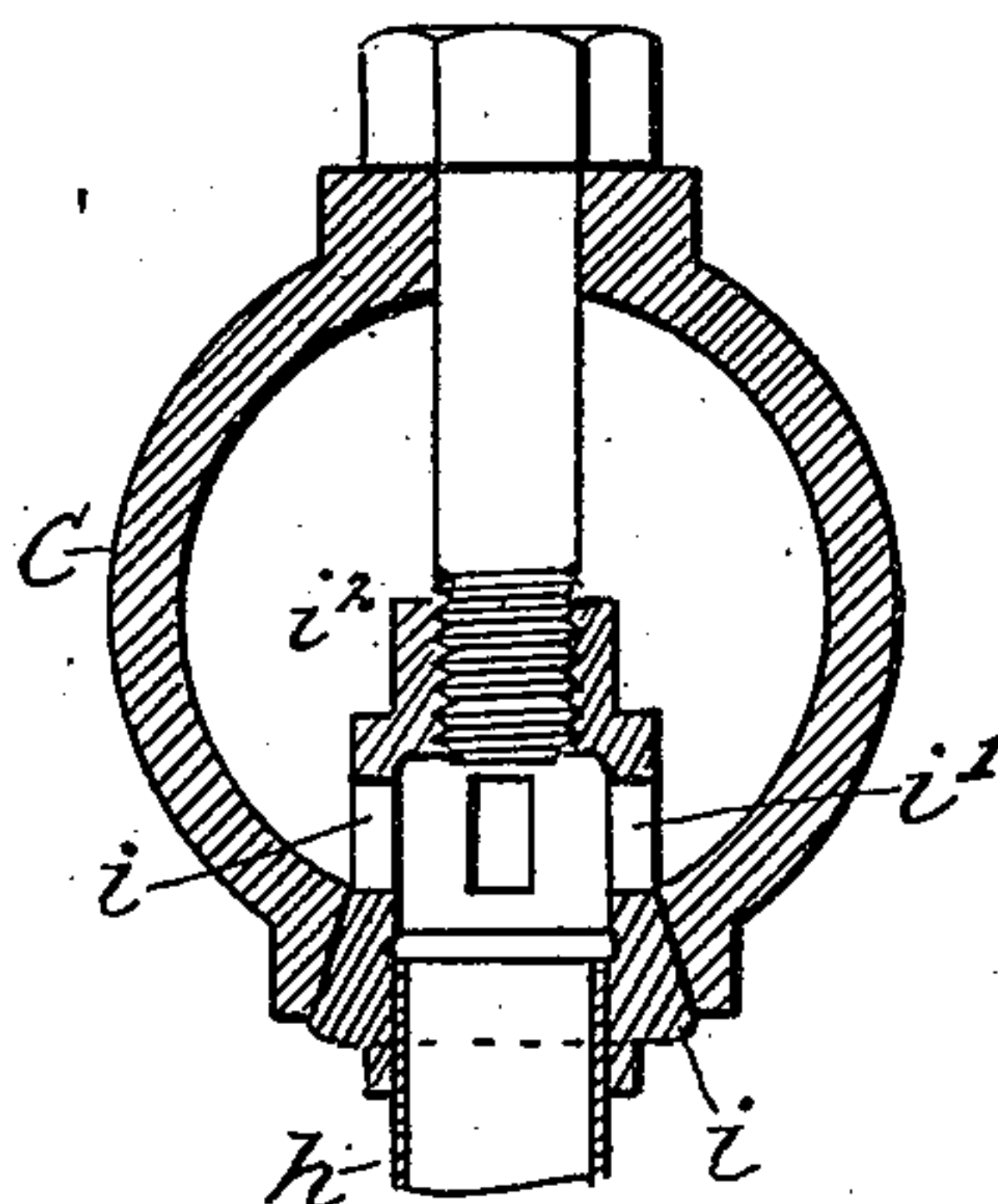
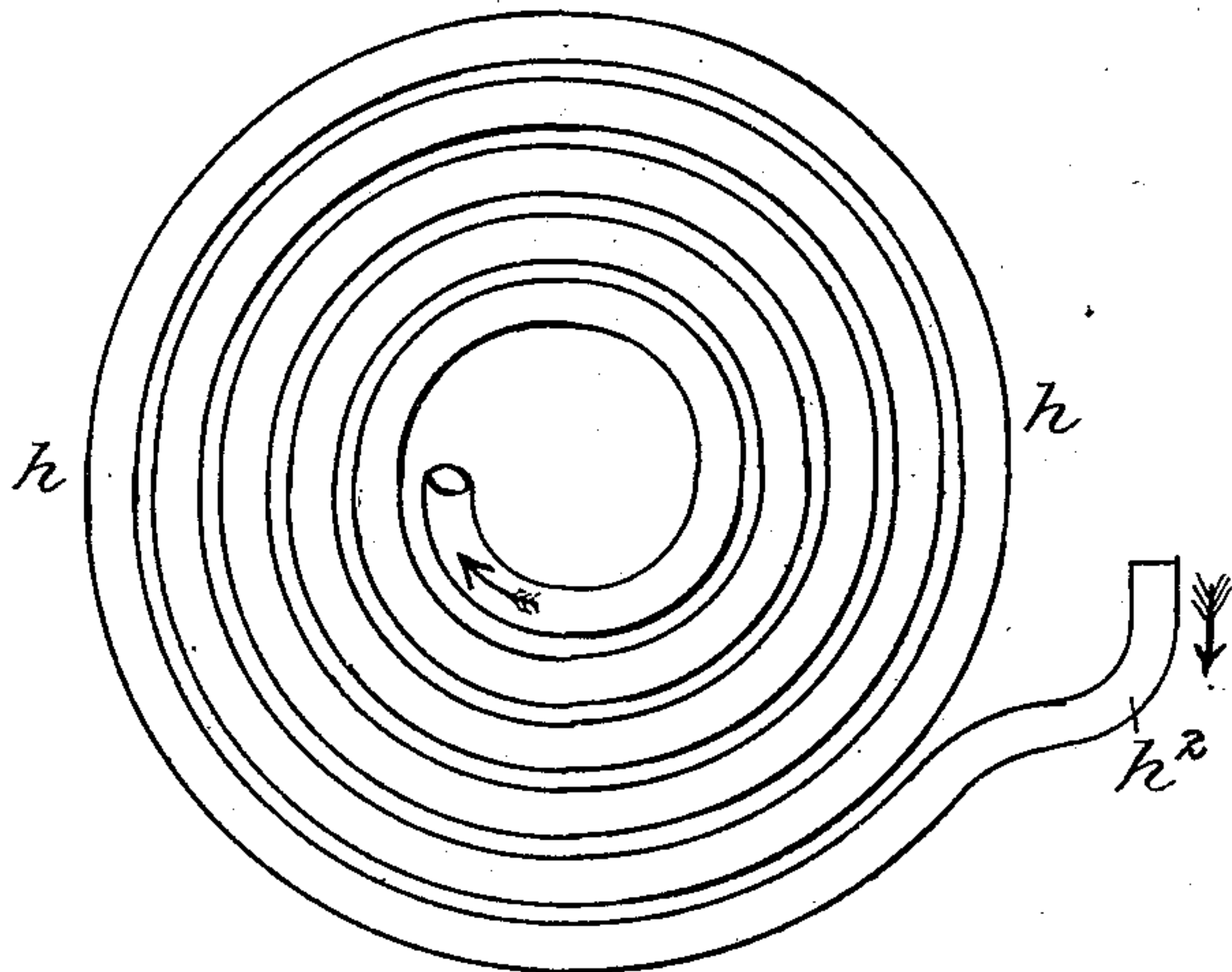


Fig. 12



Fig. 11



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UNITED STATES PATENT OFFICE.

CHARLES A. MARRDER, OF NEW YORK, N. Y.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 725,737, dated April 21, 1903.

Application filed January 16, 1902. Serial No. 90,039. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. MARRDER, a citizen of the United States, residing at New York, borough of Manhattan, and State of New York, have invented certain new and useful Improvements in Steam-Generators, of which the following is a specification.

The invention relates to steam-generators; and its objects are to provide an absolutely safe and reliable boiler, and which, while it takes less space than usual for the amount of steam generated from a given quantity of water, is fully as strong, durable, and serviceable as any boiler or generator which can generate a like amount of steam.

Further objects are to provide a boiler with a good and effective circulation, to prevent scale, and to also construct the same of sections which may be readily taken apart or assembled both for repair and manufacture.

These being the main ends to be achieved, my invention consists of certain features of construction and combinations of parts to be hereinafter described and then claimed.

In the drawings, Figure 1 is a sectional side elevation of a steam generator or boiler embodying my invention, the casing being in section. Fig. 2 is a horizontal section of the lower part of the generator. Fig. 3 is a section of the generator, the casing being omitted, such section being taken longitudinally through the water-columns. Fig. 4 is a horizontal section through the intermediate portion of the generator. Fig. 5 is a plan view of the head of the generator. Figs. 6, 7, and 8 are two side views viewed from different points and a section of one casing-section, respectively. Fig. 9 is a transverse section of the casing and water-columns, showing more particularly certain details. Fig. 10 is a plan of one of the coils, and Fig. 11 is a plan of the other of the coils, of the double or twin spiral-coil unit. Fig. 12 is a side elevation of the double-spiral-coil unit, and Fig. 13 is an enlarged detail section showing the connection of one end of the coil with the water-column.

Referring to the drawings, A indicates the base portion of the steam generator or boiler, preferably, but not necessarily, formed of a hollow or chambered casting of annular form, having a central aperture *a* for admitting

heat from any suitable source into the generator. At diametrically opposite points the base portion A has preferably oppositely-extending elbow-shaped necks B B', provided with flanges *b*. The openings from the base portion may be directly in the top of the base in case no elbows are employed. Bolts *b'* pass through the flanges *b* and through flanges *c* of hollow or tubular uprights or water-columns C C', which at their upper ends are provided with flanges *c'*. A top portion or head D, hollow or chambered, is provided with flanges *d* and with elbow-shaped necks D' D², arranged diametrically on the head. A water-inlet *c*² is located on the lower end of the water-column C. The head D has a steam-dome E, from which through a steam-outlet *e* steam is conducted for use, such dome being formed at the center of a central tubular spider E', which is a part of said head. The bottom of the head—that is to say, the tubular spider—is raised at *e'* below the steam-dome, as shown, so that any condensed steam in the head will flow back to the columns for reheating, and any water which is forced up onto the raised portion by the rapid circulation will also flow back into the columns. The described parts may be said to constitute the framework of the generator and may be readily disconnected or assembled. Taper joints are formed where the ends of the water-columns preferably enter the necks B B' D' D² for facilitating assembly and for permitting a tight closure.

A preferably cylindrical sheet-metal casing is provided, consisting of sections F F', having side flanges *f*, which are secured by removable bolts *f'* to parallel flanges *f*² on the water-column. The base A has an annular flange A', and the head D has an annular flange D³, so that the lower and upper ends may be attached by suitable removable bolts. One section, F, or the other, F', may be removed and replaced whenever needed. On top of the annular head D a sheet-metal hood G is located, the same extending over the tubular spider and steam-dome and having a chimney or smoke-pipe G' for the escape of products of combustion.

Spiral circulating-coils are located in the casing, the same comprising individual members or units, one of which may be removed or replaced without disturbing any other coil

unit. Each of said units consists of two spiral coils h h' , communicating at the center—that is, the smallest convolutions communicate, so that the circulation in one will be reverse to that in the other. The outer ends h^2 h^3 of the double-spiral-coil units are bent out to form elbows, both extending toward the same side, so that the ends of the coil units may be connected with corresponding sides of the water-columns C C'. For this purpose each end of the double coil is inserted in a tapering chamber-coupling i , having side ports i' . The tapered couplings i are inserted in correspondingly-tapered openings in the water-columns and are drawn tight therein by means of screw-bolts j , which pass through the opposite side of the water-column and screw into screw-threaded necks i^2 of said couplings.

The coils or coil units are preferably stacked above each other, although separated, and their outer ends all pass through the same casing-section, the lower coils of each pair of coils being connected with one column, so that their outer ends may form inlets, and the upper coils with the other column, so that their outer ends may form outlets.

Section F, through which the coils enter, has at each edge circumferential recesses or slots k , which permit the said section to fit in its place, to be removed, and also to permit the coil-pipes to pass. Cover-plates k' are secured to the water-columns by bolts b^2 , which secure the sides of the sections F F' and close the openings which would otherwise be left in the casing between the coils and the water-columns.

The operation is as follows: Water is admitted at the inlet c^2 and may have a level, say, below the upper coil unit, so that the latter forms a superheating-coil. A large contact-surface is presented at the inside of the generator by the spiral coils to the heat and products of combustion entering the generator through the bottom aperture a , and the water in the coils is thereby highly heated and a circulation of the water in the coils effectuated. Each coil unit has its own circulation, the circulating water entering the coil units from column C and leaving at the other column, C'. In each coil unit the circulating water flows from the inlet end of the lower coil spirally toward its center and then rising spirally outward from the inner portion of the upper coil to the outer or outlet end of the same, whence it enters the column C'. In this way a manifold circulation is set up from column to column, thereby bringing the water under the direct action of the generator heat many times. The active circulation of the generator, caused by the ebullition of the water, is from the column C to the column C', the water passing from the inlet ends of the coils connected with the column C to the outlet ends of the coils connected with the column C' and the mingled wet and superheated steam passing up the columns C C' into the head, from whence any water not converted

into steam returns into the columns C C'. The steam generated passes into the steam-dome for use, and the water not converted into steam will flow off of the raised portion e' of the head back into the water-columns, as stated. It will be clear that as the water in column C is not as hot as at corresponding points of height in the column C' the circulation through the coils is from the lower inlet ends of the same, where the water is not so hot, to the upper outlet ends, where the water is hotter. A rapid circulation and separation is thereby formed, so that no sediment will settle in the coils or upper part of the generator, but it will fall into the base A. As the sediment is concentrated in the base; only a slow circulation of the water will take place there; but this is sufficient to maintain approximately the same water-level in the two columns. The sediment may be blown off from time to time through the blow-off x .

By reason of the connection of the columns at top and bottom a circulation between the columns is maintained; but it is quite slow at the bottom. The steam separates from the water in a highly-superheated state and enters the steam-dome, from whence it is led to the motor which uses it. Hood G around the steam-dome maintains a high heat therein.

By the separability of the casing one or the other section may be removed to gain access to the interior of the generator, and only one section has to be removed when it is desired to remove one or more coil units.

This generator is particularly desirable where absolute safety is required with very little attention. It is adapted for automobiles and for steam-heating generally, as the fuel may be either liquid or solid. There will also be a maximum heating effect produced from a given fuel.

Another important feature of the present invention is that the joints for the coils are all unexposed to the direct fire, and hence there can be no burning out at the same.

What I claim as new and of my invention is—

1. In a steam-generator, the combination of a hollow base, water-columns directly connected through their extreme lower ends with the base, a hollow head with which the extreme upper ends of the water-columns are directly connected, whereby a direct connection between the base and head is formed through the water-columns, only, and circulating-coils connecting the water-columns, substantially as set forth.

2. In a steam-generator, the combination of a hollow base, water-columns resting on the base, a hollow head and steam-dome resting on the water-columns, the water-columns being directly connected with the base and head, flanges on the adjacent parts of the water-columns, base and head, fastenings engaging and securing the flanges together, and circulating-coils connecting the columns, substantially as described.

3. In a steam-generator, the combination of a hollow annular base, water-columns resting on and directly connected with the base, a hollow annular head resting on the water-
 5 columns, which are also directly connected with the head, a hollow spider formed within the annular head, a steam-dome at the center of the spider, and circulating-coils connecting the water-columns, substantially as de-
 10 scribed.

4. In a steam-generator, the combination of a casing, water-columns set outside of the casing, and circulating-coils located in the casing, their ends projecting through the cas-
 15 ing, to one side of the plane of the columns, and connected outside of the casing removably with the columns so as to be independently separable from the columns, substan-
 20 tially as described.

5. In a steam-generator, the combination of a hollow base, a hollow head, a casing, water-
 25 columns set outside the casing between and directly connected with the base and head, and circulating-coils located in the casing, their ends projecting through the casing, to one side of the plane of the columns, and con-
 30 nected outside of the casing removably with the columns so as to be independently separable from the columns, substantially as de-
 35 scribed.

6. In a steam-generator, the combination of water-columns provided with tapered open-
 35 ings at one side, circulating-coils between the columns provided with tapered ends inserted into said openings, and screw-bolts passing through the opposite side of the columns and screwing into the tapered ends of the coils for drawing the same tightly into the col-
 40 umns, substantially as described.

7. In a steam-generator, the combination of water-columns, removable circulating-coils connected with the columns, and a removable longitudinally-sectioned casing outside of
 45 tion of the said casing being provided at the

section-joints with slots or openings through which the ends of the coils pass, substan-
 tially as described.

8. In a steam-generator, the combination of water-columns provided with longitudinal
 50 flanges, a casing composed of sections the edges of which are removably secured to the flanges, and circulating-coils located in the casing, the ends thereof extending out through the casing and removably connected with the
 55 columns, substantially as described.

9. In a steam-generator, the combination of water-columns, circulating-coils connecting them, a hollow head, side necks for said head connected with the water-columns, and a
 60 steam-dome, the closed bottom for which is raised above said necks, substantially as de-
 scribed.

10. In a steam-generator, the combination of a hollow base, water-columns, a hollow
 65 head, means for detachably connecting the ends of the water-columns with the base and head respectively, and a casing outside of which the water-columns are located, said casing being detachably connected with the
 70 water-columns, substantially as described.

11. In a steam-generator, a hollow annular base provided with side necks having top openings for the water-columns, and a blow-off opening, substantially as described. 75

12. In a steam-generator, a water-column open from end to end and provided with flanged and tapered ends and openings for the coils, substantially as described.

13. In a steam-generator, a head, diamet-
 80 rical necks on the head, a spider within the head having a bottom raised above the necks, and a central steam-dome on the spider, sub-
 stantially as described.

Signed at New York, N. Y., this 31st day 85
 of December, 1901.

CHARLES A. MARRDER.

Witnesses:

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GEO. L. WHEELLOCK.