

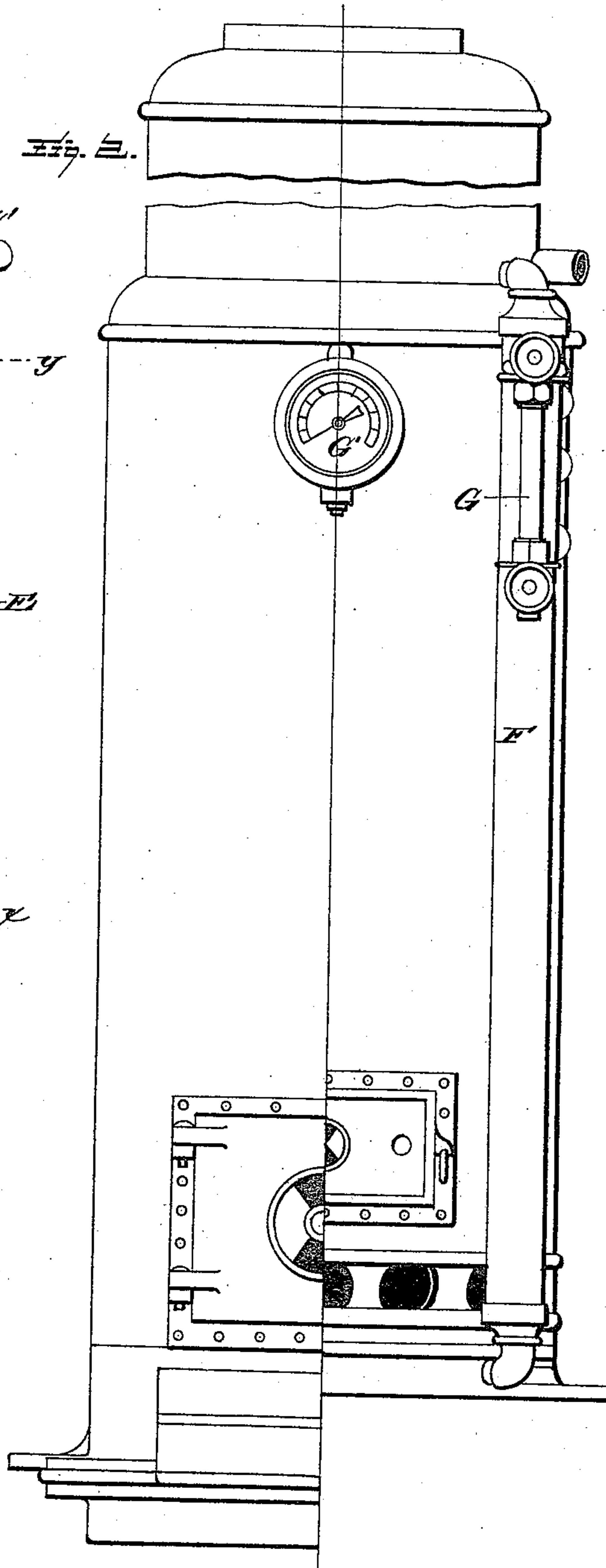
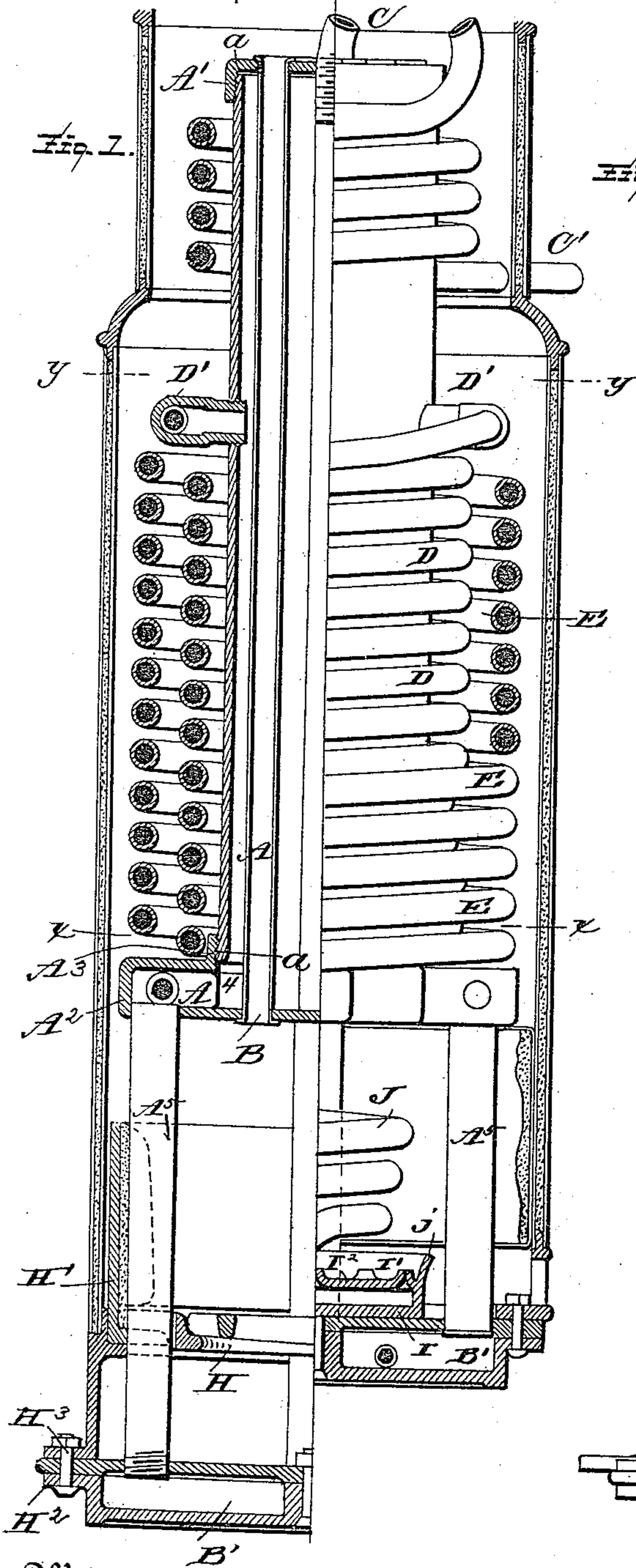
(No Model.)

N. S. & E. R. BOWDISH.
TUBULAR BOILER.

2 Sheets—Sheet 1.

No. 440,872.

Patented Nov. 18, 1890.



Witnesses

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(No Model.)

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Fig. 3.

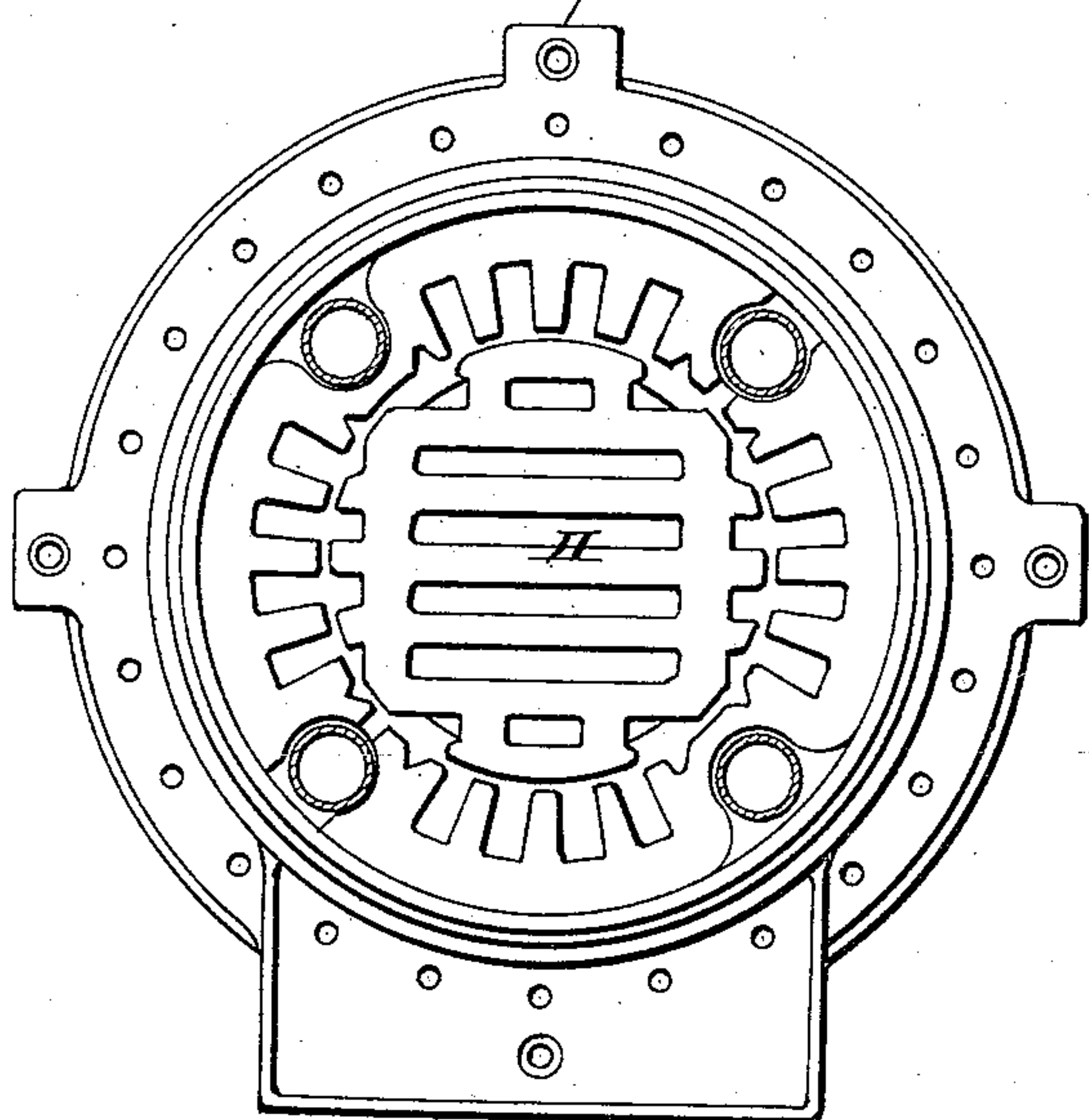


Fig. 4.

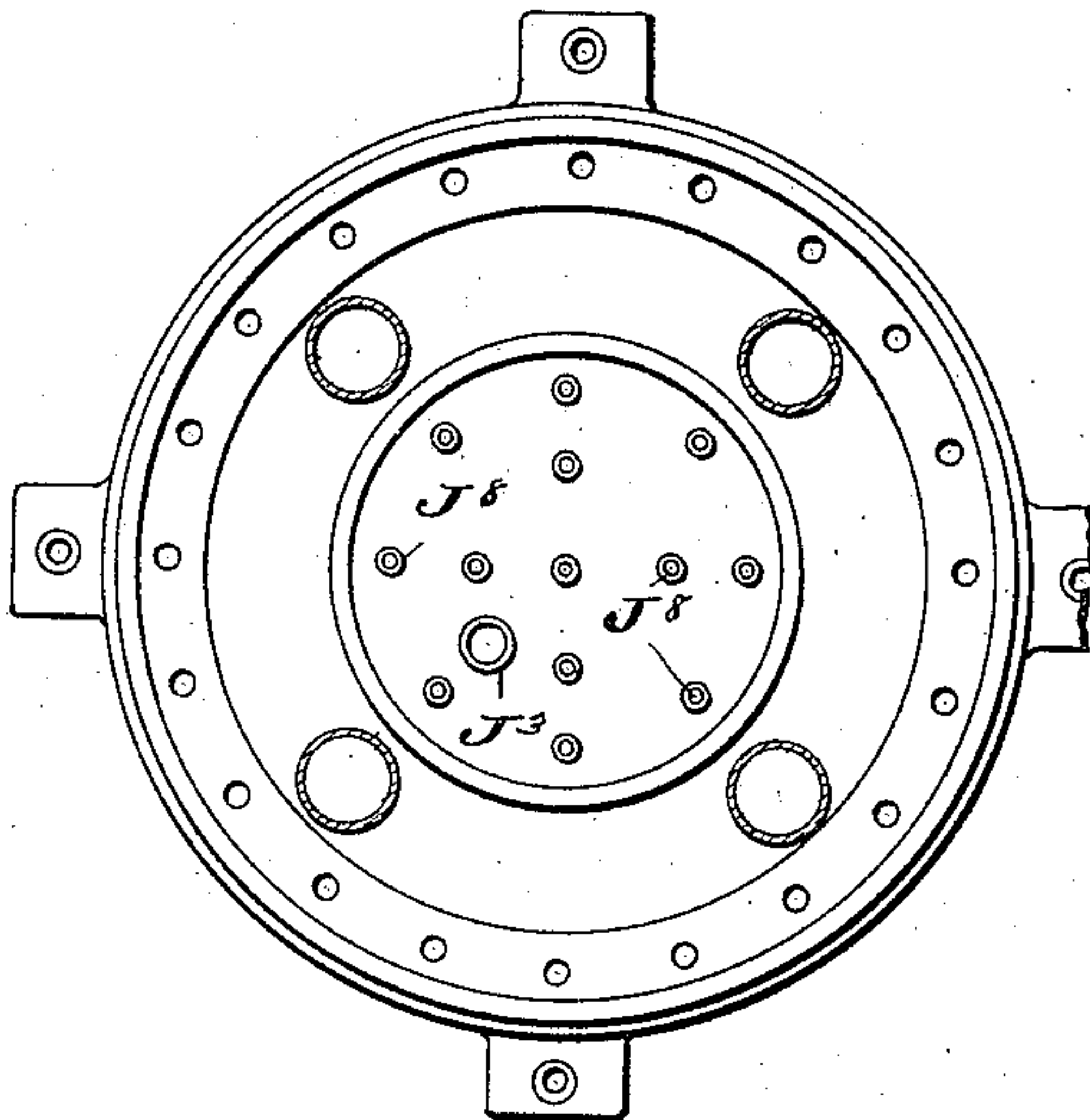


Fig. 5.

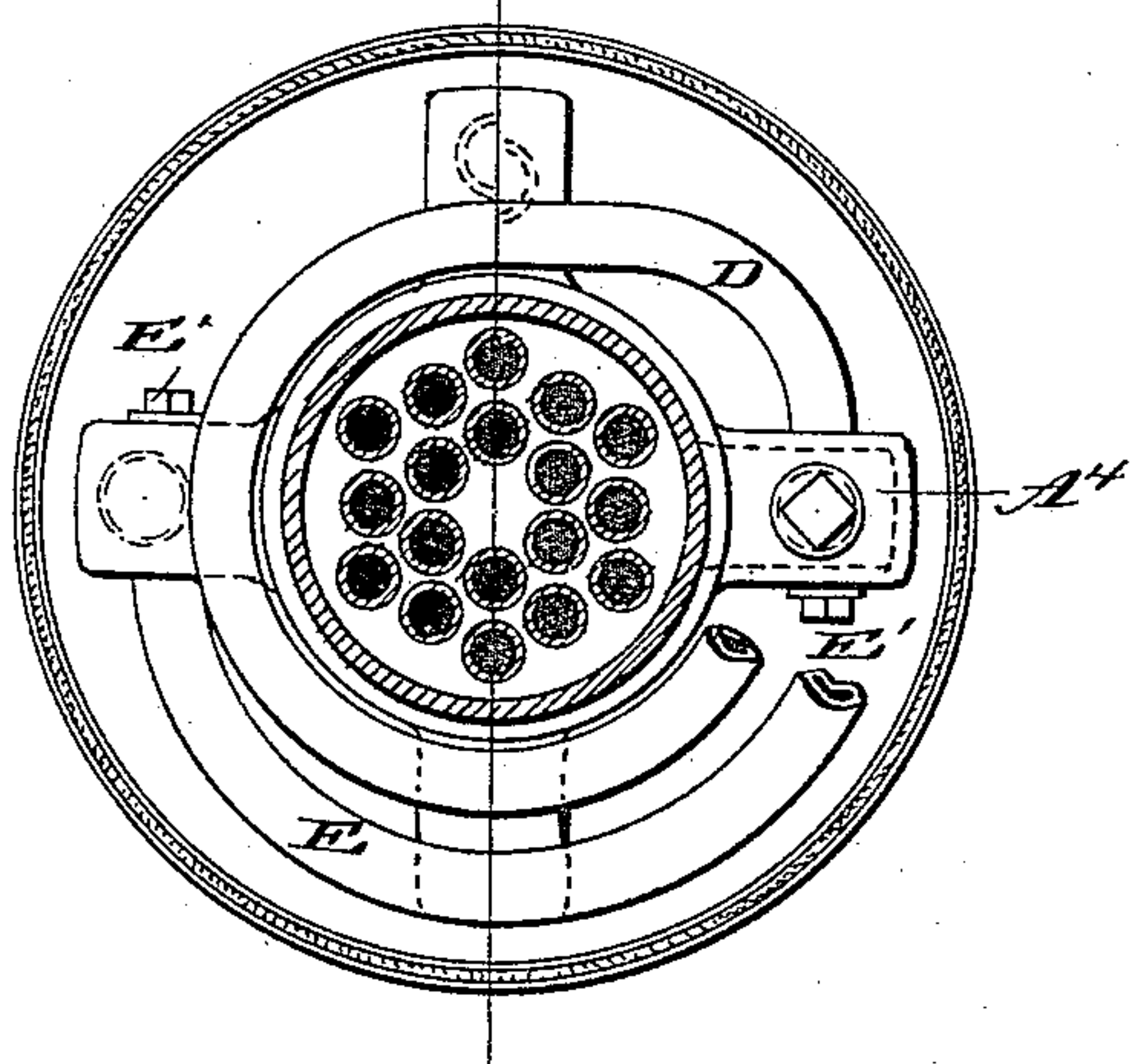
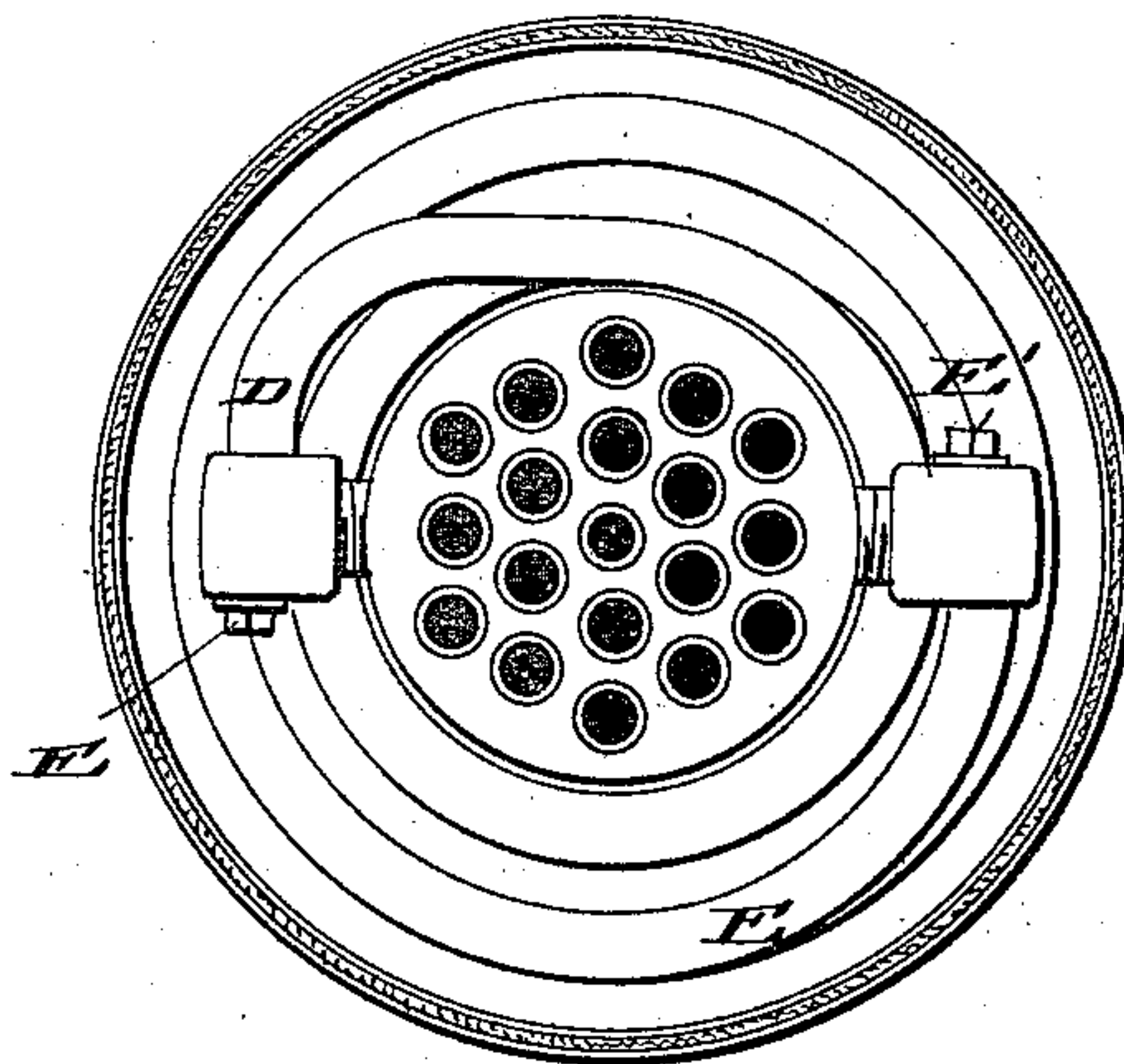


Fig. 6.



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UNITED STATES PATENT OFFICE.

NELSON S. BOWDISH AND EDWARD R. BOWDISH, OF SKANEATELES, NEW YORK.

TUBULAR BOILER.

SPECIFICATION forming part of Letters Patent No. 440,872, dated November 18, 1890.

Application filed January 8, 1890. Serial No. 336,271. (No model.)

To all whom it may concern:

Be it known that we, NELSON S. BOWDISH and EDWARD R. BOWDISH, citizens of the United States, residing at Skaneateles, in the county of Onondaga, State of New York, have invented certain new and useful Improvements in Tubular Boilers, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to certain new and useful improvements in boilers; and it has for its object, among others, to provide a boiler adapted for use either for burning oil or coal. It aims also at improvements in the details of construction of the various parts.

Other objects and advantages of the invention will appear in the following description, and the novel features thereof will be particularly pointed out in the claims.

The invention is clearly illustrated in the accompanying drawings, which, with the letters of reference marked thereon, form a part of the specification, and in which—

Figure 1 is a vertical section with parts in side elevation illustrating our improvements, showing upon one side the boiler arranged for burning coal, and for burning oil upon the other. Fig. 2 is a side elevation showing the two arrangements illustrated in Fig. 1. Fig. 3 is a top plan of the grates. Fig. 4 is a like view of the oil-burner. Fig. 5 is a cross-section on the line $x x$ of Fig. 1, and Fig. 6 is a cross-section on the line $y y$ of Fig. 1.

Like letters of reference refer to like parts in all the figures of the drawings.

Referring now to the details of the drawings by letter, A designates a drum of any suitable construction and the required size, screw-threaded at its upper and lower ends, as shown at a , and at its upper end provided with a detachable cap A' , interiorly threaded and engaging the threads on the upper end of the drum.

A^2 is a cap or fitting or head at the lower end, having an interiorly-headed flange A^3 , engaging the threads on said end of the drum.

Bare the tubes extending through the drum and through the heads thereof, to which latter they are secured by expanding, or in any other suitable manner. The lower head A^2

has a plurality of hollow projections A^4 , in the under side of each of which are secured pipes A^5 , which serve the double purpose of supporting the drum and connecting it to a hollow base B' , to which the lower ends of said pipe are secured, preferably by screw-threaded engagement, as shown in Fig. 1. The upper head A' has connected therewith one end of a coil C, which is coiled around the upper end of the drum and forms a superheater, the other end of the pipe forming the coil leading to the engine, said end being designated by the letter C' .

To the hollow projections A^4 of the cap A^2 is secured the lower end of the coil D, and to the opposite one of these hollow projections or lugs is secured the lower end of the outer coil E, these coils being arranged one within the other and surrounding the drum, as illustrated best in Fig. 1. The upper ends of these coils are secured in the castings or nipples D' , which are screw-threaded into the drum A just below the water-line of the boiler. The ends of these coils are secured in any suitable manner in the lugs or castings—as, for instance, by expanding, and the holes opposite to them are stopped or filled with screw-plugs E' , as seen best in Figs. 5 and 6.

A suitable surrounding jacket is provided, that shown consisting of an inner and outer wall with a filling of asbestos or other suitable non-conducting material E^2 , the jacket being formed in sections detachably held together, as clearly illustrated in Fig. 1. The hollow base B' forms the feed-water heater, absorbing the heat radiated by the fire above it, the pipe A^5 being connected therewith, as above described, and affording communication between the same and the space inclosed by the lower head or cap A^2 , as shown in said Fig. 1. The number of tubes or coils may of course be varied without departing from the spirit of the invention, and other modifications in detail may be resorted to—such, for instance, the heads may be secured to the drum by means of a ring flanged on the drum and the heads secured thereto. The hollow projections, instead of being integral with the lower head, may be formed separate and riveted or bolted to place. The superheating-

coil may be omitted, if desired, and the pipes A⁵ may sometimes be omitted, although it is preferred to use them.

The boiler should of course be provided with the usual valves, gages, and other appliances necessary to the successful operation of the same, some of such parts being shown in Fig. 2, the pipe F connecting the steam-space of the boiler with the hollow base and the water-gage G and steam-gage G' being of any known construction.

A boiler constructed as above described is adapted for use either with coal or oil, it being simply necessary to substitute one form of furnace for the other. In the drawings we have shown at the left of Fig. 1 and in plan in Fig. 3 a grate H for burning coal, this grate being of any known construction and arranged within the fire-pot H', the bottom of the support of the fire-pot being secured to the flanges H² of the hollow base by means of suitable securing means—as the bolts or rivets H³—bolts being preferred to allow of the ready removal of the base to attach an oil-burner when desired. Suitable feed and ash-pit doors are of course provided.

At the right of Fig. 1 and in plan in Fig. 4 we have shown one form of oil-burner which we employ in connection with our boiler. It consists of a supporting-ring I, formed with upwardly-extending ribs or teats I', within which is supported a smaller ring or disk I², as shown in Fig. 1, forming a space into which the gas flows after having been generated in the spiral coil J, (the heat from the burner passing around and through the coil to convert the oil into gas,) and is distributed to the small openings J³. (Shown in Fig. 4.) The upwardly-extending flange j serves to hold what oil is allowed to pass over when the flame is first started. This first oil burns to heat the coil so that it will convert the oil into gas. The coil J passes upward through the combustion-chamber or fire-pot, and is fed with oil from any suitable source, (not shown,) the lower end being connected to the burner, as shown at J³ in Fig. 4.

The same construction of boiler serves with either the coal or oil burner.

What we claim as new is—

1. The combination, with the drum and its tubes, of the coil surrounding the drum and connected therewith at its upper end and at

its lower end connected with hollow projections at the lower end of the drum, substantially as described.

2. The combination, with the drum and its tubes, of the nipples attached to the drum near its upper end, the cap at the lower end provided with hollow projections, and the coils connected at their lower ends with the projections and at their upper ends to the nipples, substantially as specified.

3. The combination, with the drum and its tubes, of the nipples tapped into the drum near its upper end, the hollow projections at the lower end of the drum, the coils surrounding the drum and connected with said nipples and projections, and the superheating-coil around the upper end of the drum, substantially as specified.

4. The combination, with the drum, the hollow projections, and the hollow base, of the coils connected with the drum and hollow projections, and the vertical tubes connected with the projections and with the hollow base, substantially as and for the purpose specified.

5. The combination, with a boiler having a coil surrounding the drum and tubes and a superheating-coil surrounding the upper end of the drum and provided with connections to the engine, of an oil-burning furnace arranged beneath the same and formed with a depression to hold oil, and a spiral coil connected with the depression and extended through the fire-pot to the furnace, substantially as described.

6. The combination, with the boiler having a coil surrounding the drum and tubes, and a superheating-coil around the upper end of the drum and connected with the engine and the hollow base, of the vertical pipes connecting the boiler with the hollow base and the oil-burner supported upon the said base, and a spiral coil connected with the burner and with a suitable source of supply and having one end extended through the combustion-chamber of the furnace, substantially as shown and described.

In testimony whereof we affix our signatures in presence of two witnesses.

NELSON S. BOWDISH.
EDWARD R. BOWDISH.

Witnesses:

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B. F. PETHERAM.