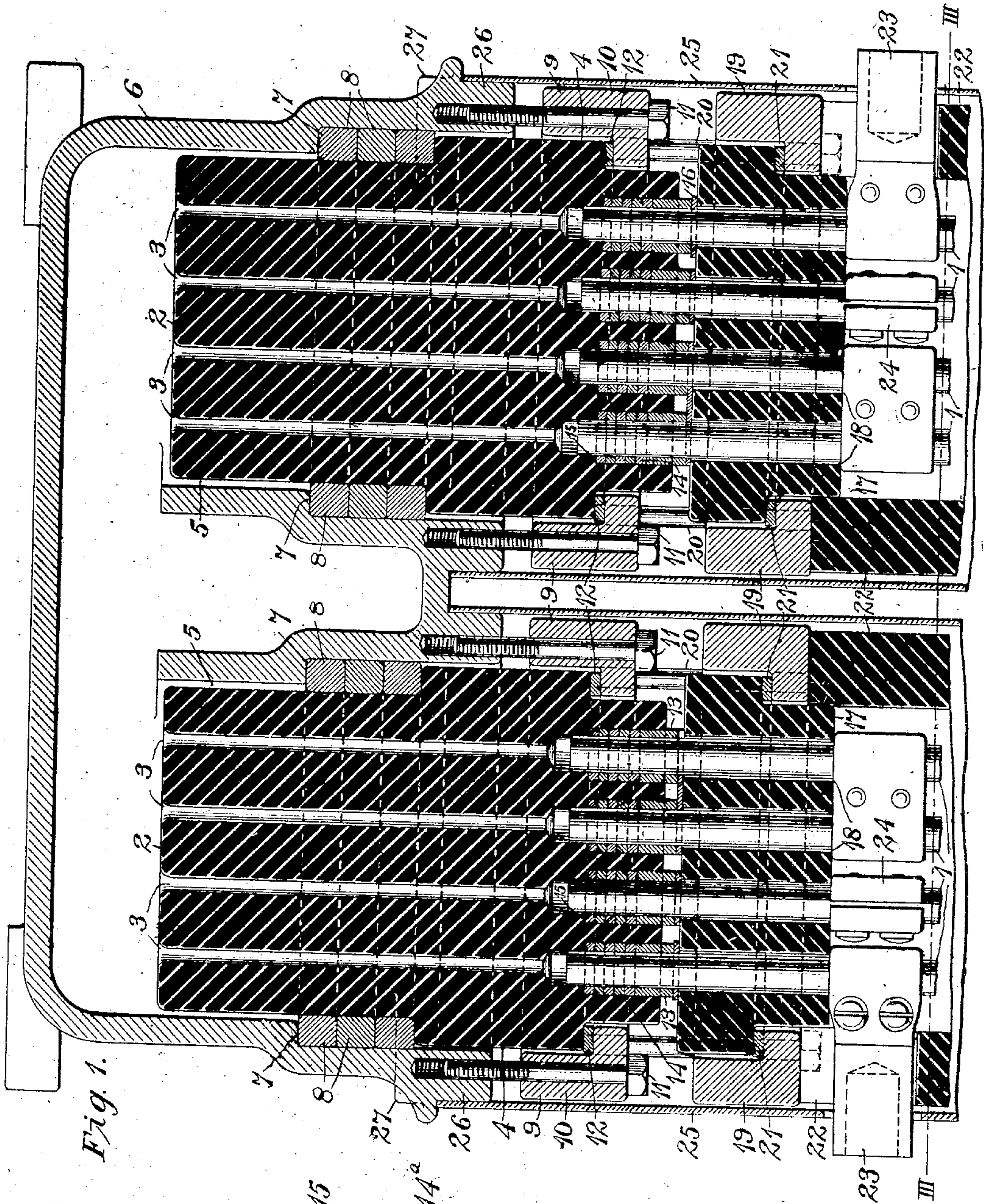


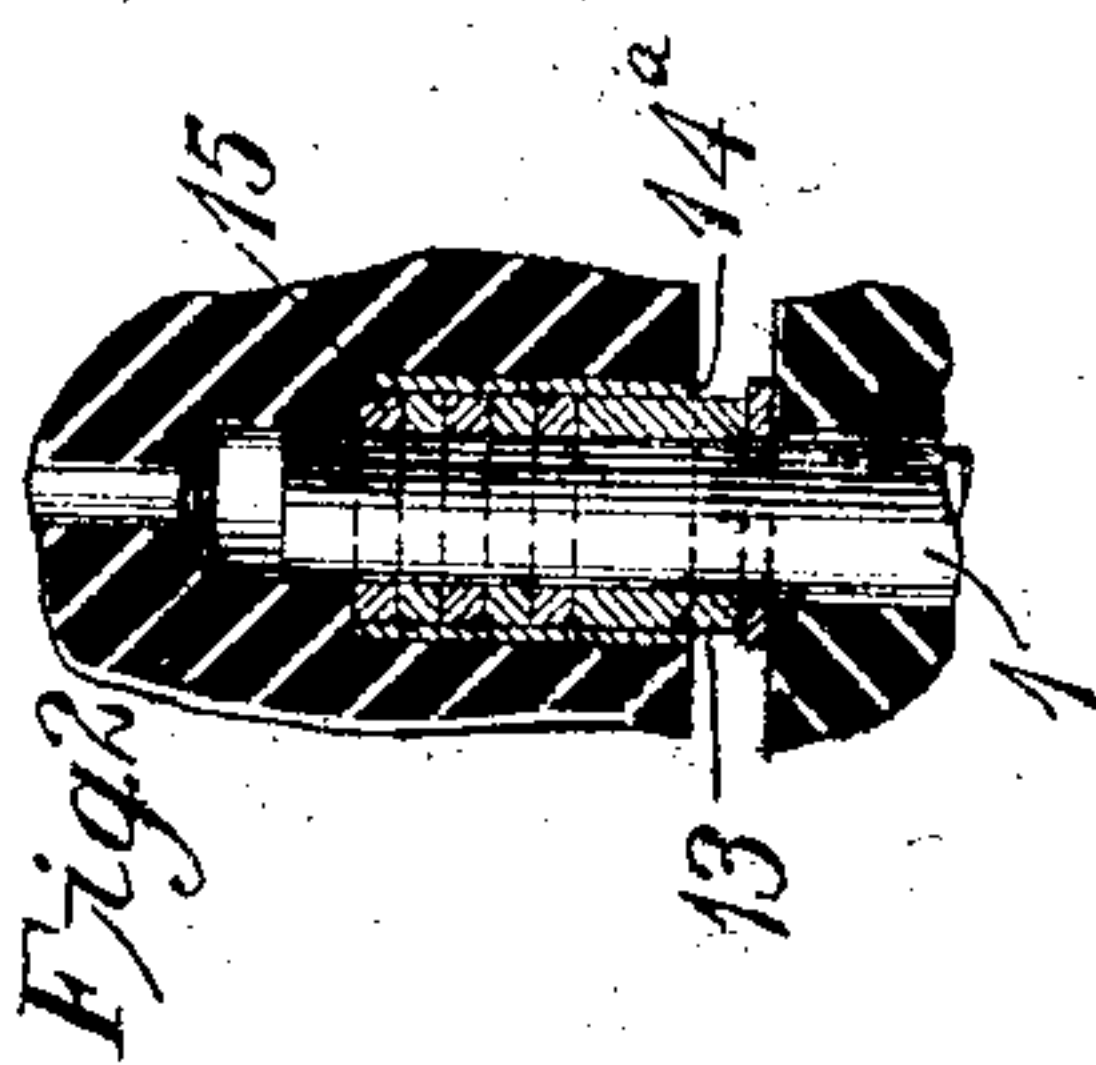
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C. AALBORG.  
ELECTRIC HEATING DEVICE.  
APPLICATION FILED JUNE 8, 1907.

Patented Feb. 23, 1909.  
3 SHEETS—SHEET 1.



WITNESSES:  
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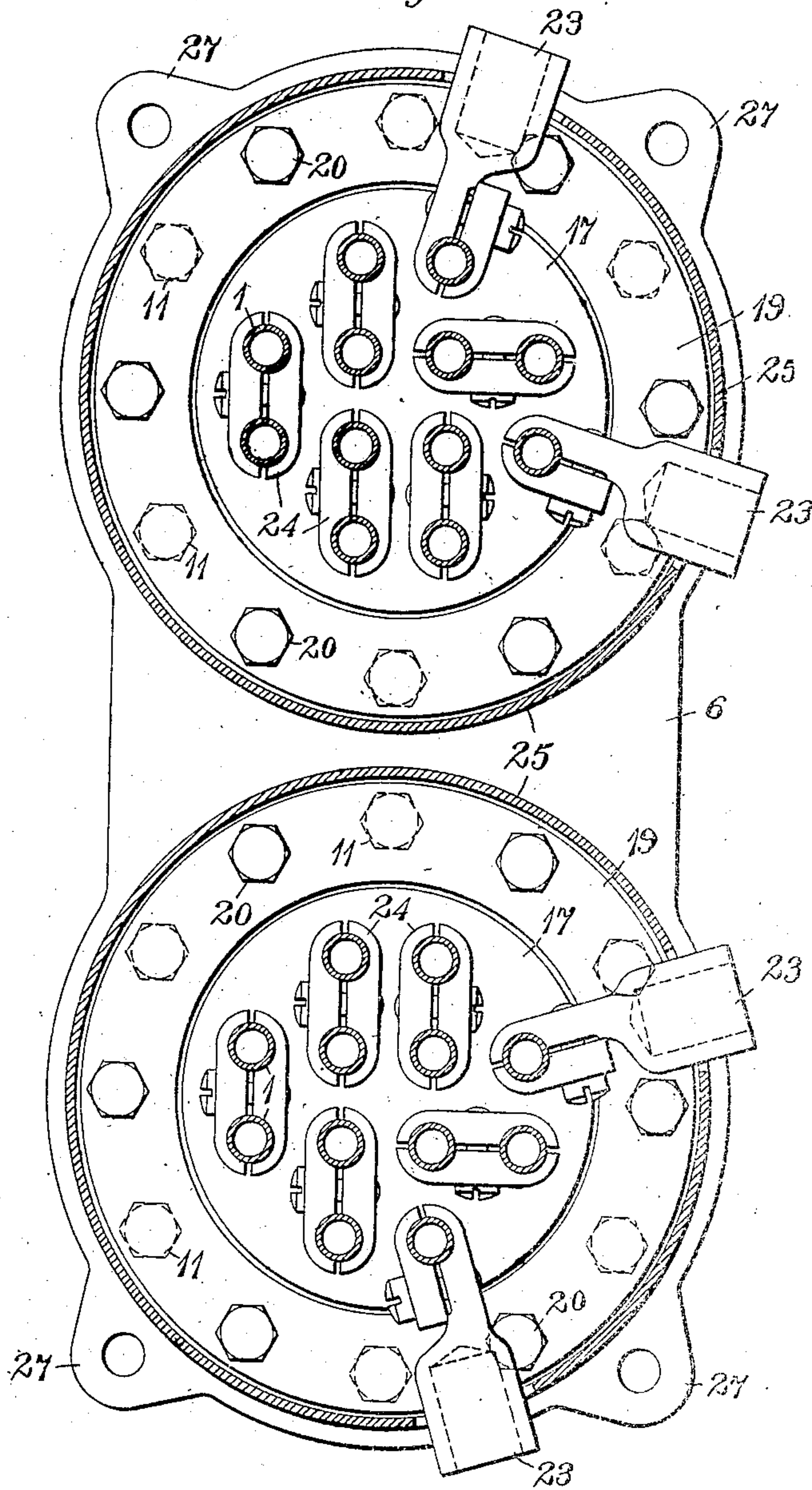


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Fig. 3.



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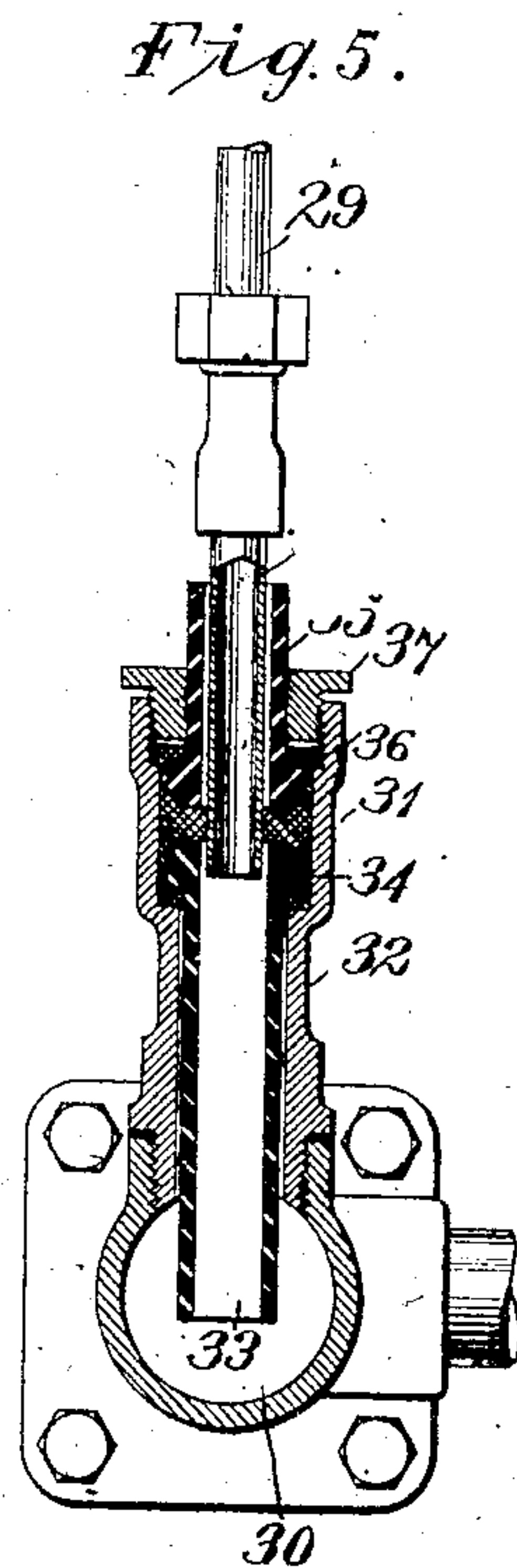
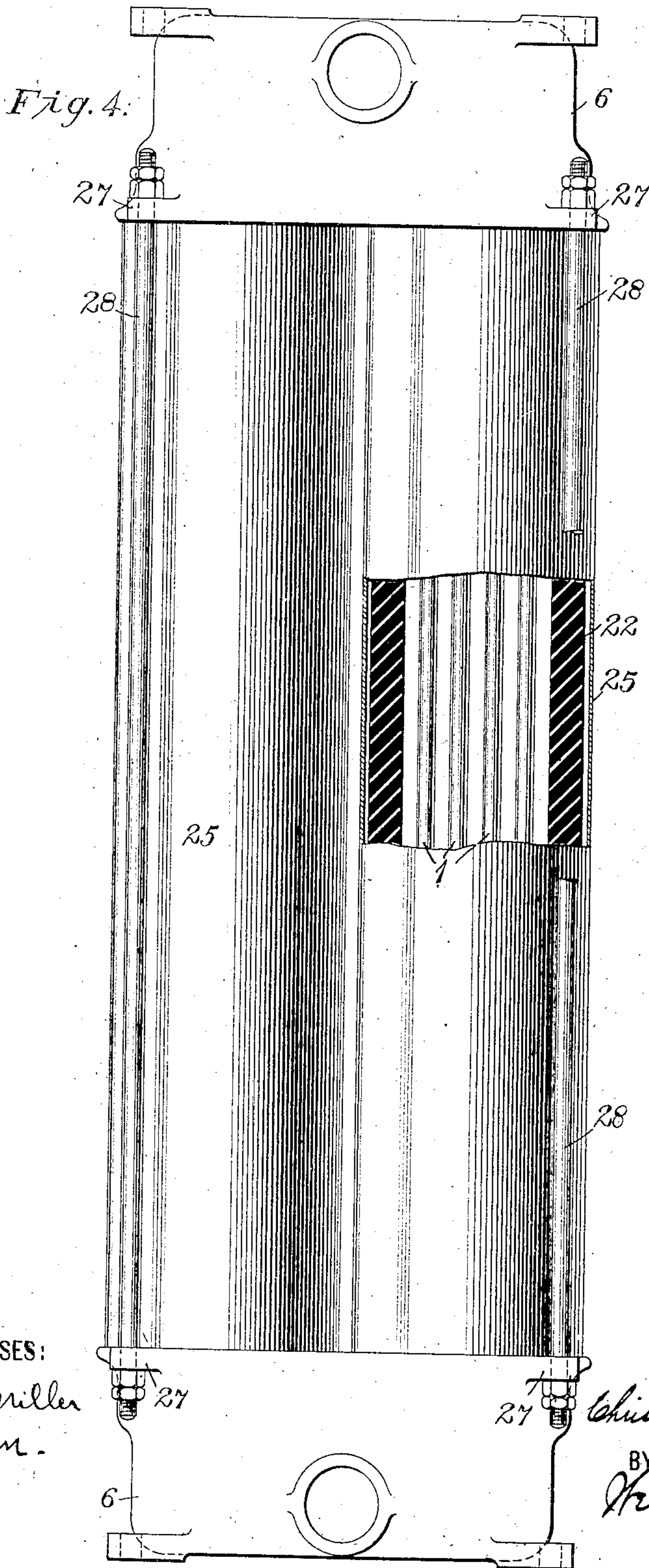
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# UNITED STATES PATENT OFFICE.

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## ELECTRIC HEATING DEVICE.

No. 912,985.

Specification of Letters Patent.

Patented Feb. 23, 1909.

Application filed June 8, 1907. Serial No. 377,929.

*To all whom it may concern:*

Be it known that I, CHRISTIAN AALBORG, a citizen of the United States, and a resident of Wilksburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Electric Heating Devices, of which the following is a specification.

My invention relates to electric heating devices and it has for its object to provide a simple, durable and effective device for heating water and generating steam for various purposes.

When electric and steam locomotives are employed interchangeably for hauling trains of steam heated passenger cars it is necessary to provide a suitable device with which the electric locomotive may be equipped for supplying steam to its train of vehicles in cold weather.

According to my present invention, I provide a steam generator that requires little or no attention from the locomotive driver and may receive its energy, in the form of electric current, from the source which supplies the locomotive driving motors.

Figure 1, of the accompanying drawings, is a sectional elevation of a portion of an electric heating boiler constructed in accordance with my invention. Fig. 2 is a tube packing detail which may be employed in lieu of that shown in Fig. 1. Fig. 3 is a sectional view on the line III—III of Fig. 1 and in a plane at substantially right angles to this figure and Fig. 4 is a view, partially in section but mainly in elevation, of the assembled boiler. Fig. 5 is a sectional view of a modified form of heating device in which a single tube is employed.

Referring to Figs. 1, 2, 3, and 4 of the drawings, the device here illustrated comprises a plurality of fluid-containing tubes 1 divided into two groups, each of which is supported at its ends by substantially cylindrical blocks 2 of insulating material, such as soapstone, through which holes 3 are bored to provide outlets for the tubes. The insulating blocks 2 are provided with annular flanges 4 and their extremities extend into suitable recesses 5 in a pair of heads or end chambers 6, with which the tubes 1 are adapted to communicate. The walls of the recesses 5 are counter-bored to form shoulders 7, and suitable packing rings 8 encircle

the insulating blocks 2 and are interposed between the shoulders 7 and the annular projections 4. Each annular projection 4 is clamped between the adjacent ring 8 and the inwardly extending flange 9 of a clamping ring 10, the latter being adjustably secured to the head or end chamber 6 by means of bolts 11, and packing rings 12 being interposed between the projection and the flange. Steam tight joints are thus formed between the insulating blocks and the end chambers. Short metal sleeves 13 are pressed onto the tubes 1 at a short distance from their extremities and the holes 3 in the insulating blocks 2 are counter-bored to receive the sleeves, steam-packing washers 14 being interposed between the shoulders 15, formed by the counter-bores, and the sleeve 13. It may be desirable to provide a metal sleeve 14<sup>a</sup> as shown in Fig. 2 in order to relieve the insulating blocks 2 from the strains produced by the expansion of the packing. At the other ends of metal sleeves 13 washers 16 are fitted over the tubes 1 and insulating blocks 17, having holes 18 through which the tubes extend, are pressed against the washers 16 by clamping rings 19 similar to the clamping rings 10 and secured thereto by means of bolts 20, compressible washers 21 being interposed between the rings 19 and the insulating blocks 17.

Although Figs. 1 and 3 illustrate only one end of my improved heating device, both ends are substantially alike, as the outline of Fig. 4 indicates, and each set of tubes is preferably surrounded by a heat-insulating sleeve 22, and is supplied with electric current through terminals 23 and connectors 24. A circuit is established from one terminal, which is attached to one of the tubes near an insulating ring 17, along the tube to the insulating ring at the opposite end, thence, through a connector, to another tube, and so on through the several tubes of the boiler.

It will be readily understood that the circuit connections of the tubes may be varied materially within the scope of my invention and that they are determined by the length of the tubes and the material of which they are constructed. The heads or end chambers 6 are each provided with taps to which inlet and outlet pipes may be connected.

The heating-insulating sleeves 22 may preferably be protected by means of sheet



metal sleeves 25 which are fitted over flanges 26 and extend from one end chamber to the other. The heads or end chambers are provided with ears 27 and are secured to each other by tie bolts 28 which are intended to relieve the tubes 1 from the strains to which they would otherwise be subjected.

In operation, water is supplied to one of the end chambers, passes thence through the tubes 1 which are heated by the electric current passing through them at the same time, and enters the opposite end chamber in the form of steam. Steam may be maintained in this head or end chamber under considerable pressure if sufficient electrical energy is supplied to the tubes and if the water in the opposite end chamber is maintained under pressure.

Reference may now be had to Fig. 5 in which a single tube 29 replaces the tubes 1 of the other figures and a chamber 30 corresponds to the pressure heads 6, a special tap 31 being provided for establishing a communication between the two parts. This tap comprises a stuffing box 32 which projects from the walls of the chamber with which it communicates and is provided with an insulating sleeve 33 having an end flange or collar 34, the outer extremity of the stuffing box being counter-bored to receive this flange or collar. A second insulating sleeve 35, having an end flange 36, is secured to the stuffing box by a bushing 37 which is fitted over the tube and engages the flange 36 and is screw-threaded into the outer extremity of the stuffing box. A short length of pipe 38 for connecting the stuffing box to the tube 29, extends through the sleeve 35 and enters the sleeve 33 for a short distance. Suitable steam-packing is introduced into the stuffing box around the pipe 38 and between the ends of the insulating tubes.

Since modifications in the size and arrangement of details may be effected within the scope of my invention, I desire that only such limitations be imposed as are indicated in the appended claims.

I claim as my invention:

1. In an electric heating device, the combination with a plurality of current-conducting fluid-containing tubes and an insulating block in which the tubes are seated at each end of the device, of fluid-pressure heads or chambers which communicate with

the tubes and make tight joints with the insulating blocks.

2. In an electric heating device, the combination with current conducting tubes and end members of electric-insulating and heat-resisting material, of pressure heads or chambers with which the tubes communicate, and means for providing a steam tight joint between the end members and the chamber walls and also electrically separating the tubes from the heads or chambers.

3. In an electric heating device, the combination with a plurality of similar liquid containing tubes of conducting material and an insulating block in which the tubes are seated at each end of the device, of terminal pieces for electrically connecting the tubes in a predetermined relation and pressure heads fitted onto the insulating blocks to form chambers which communicate with the tubes.

4. In an electric heating device, the combination with two fluid-pressure chambers each of which has an opening in one wall, fluid-containing tubes communicating with said chambers, and insulating blocks seated in said openings and provided with holes to receive the ends of the tubes, of means for electrically connecting the tubes in a predetermined relation.

5. In an electric heating device, the combination with a pair of fluid-pressure chambers, each having a plurality of openings, and groups of fluid-containing tubes communicating therewith, of blocks or heads having holes to receive the tubes and constructed of electric-insulating and heat-resisting material, and means for securing the blocks or heads in the openings in the chambers.

6. In an electric heating device, the combination with a pair of fluid-pressure chambers, each having a plurality of openings and groups of fluid-containing tubes communicating therewith, of soapstone blocks or heads having holes to receive the tubes, and means for securing the blocks or heads to the chambers.

In testimony whereof, I have hereunto subscribed my name this 29th day of May, 1907.

CHRISTIAN AALBORG.

Witnesses:

J. R. SPURRIER,  
BIRNEY HINES.