

No. 670,172.

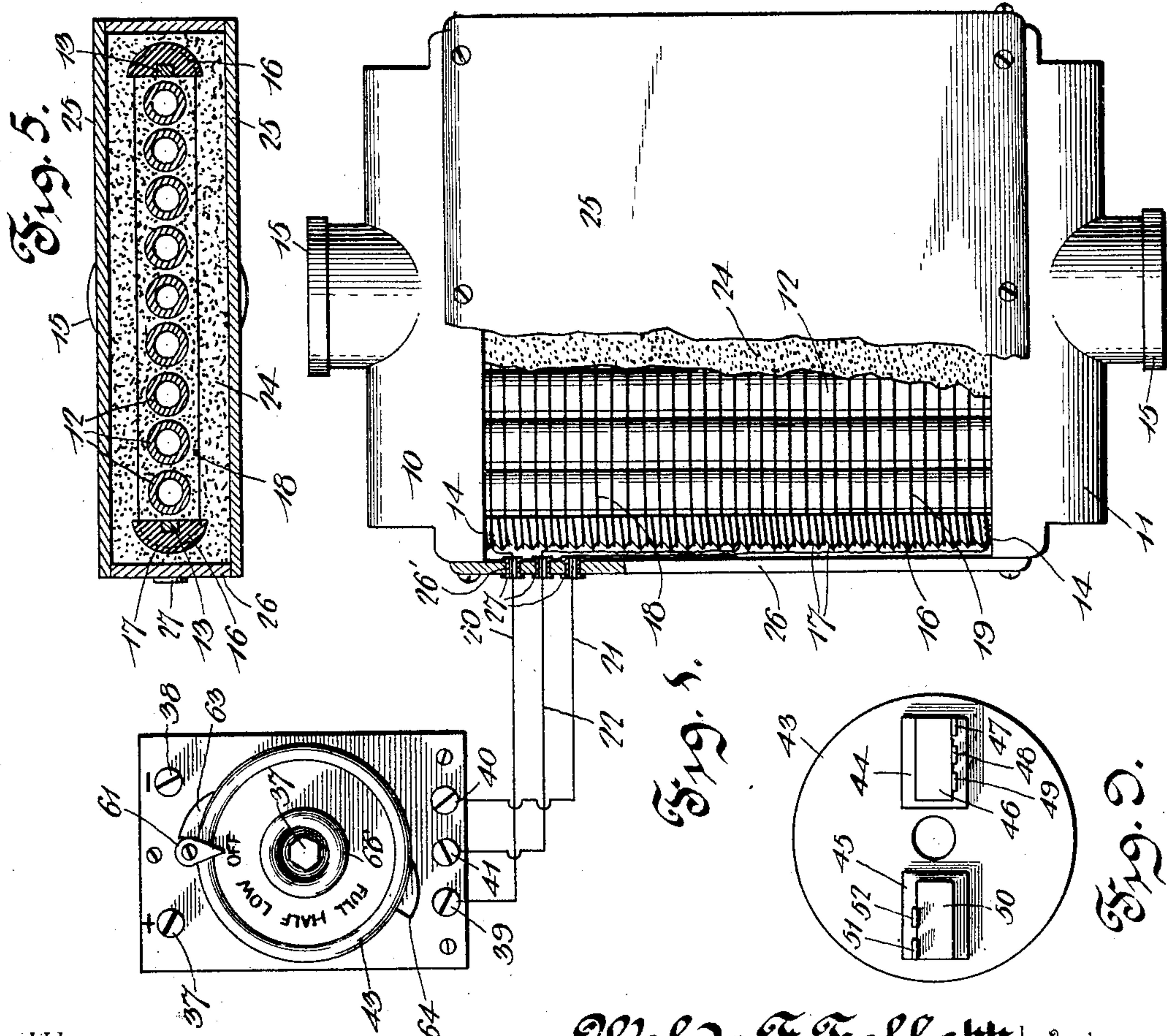
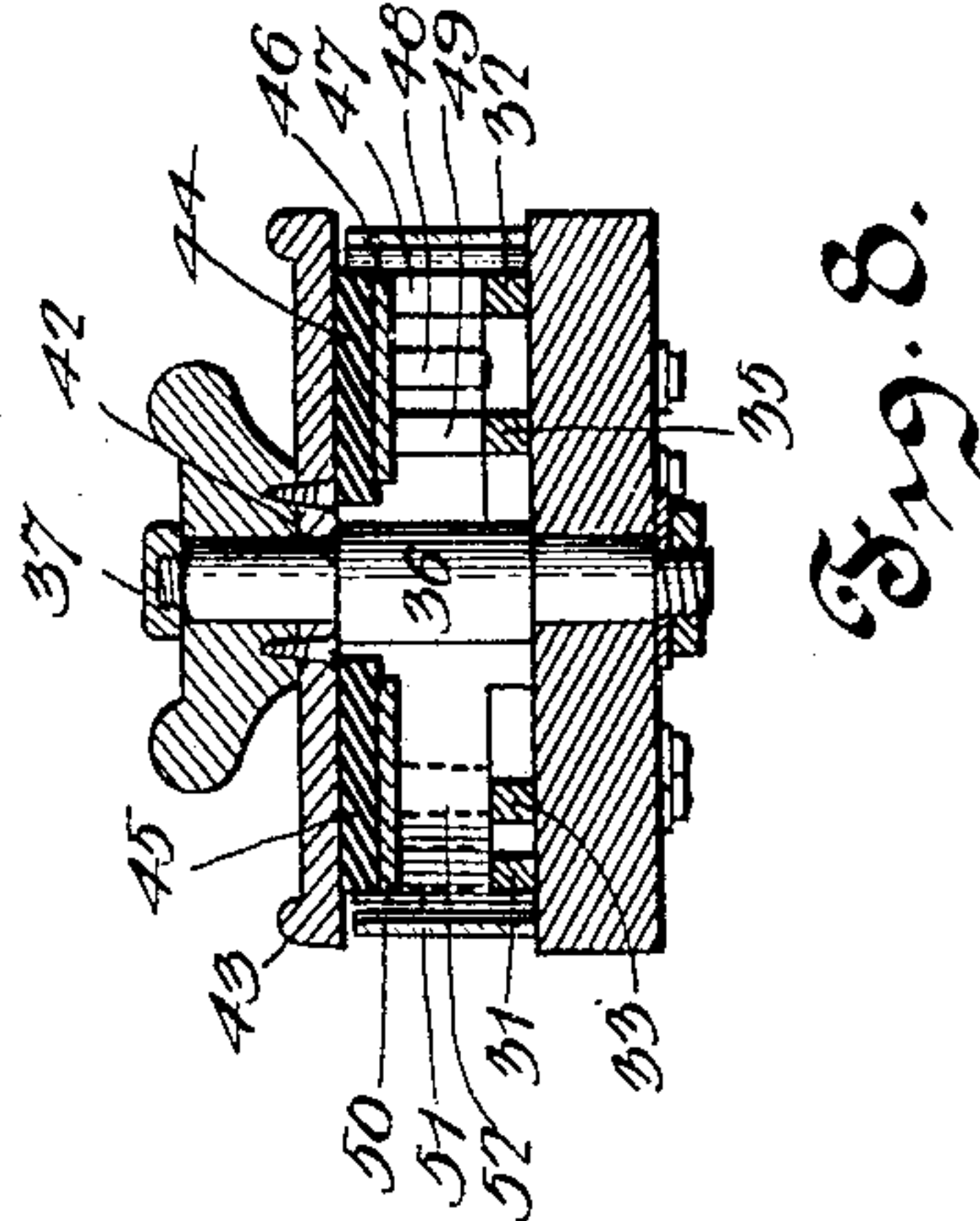
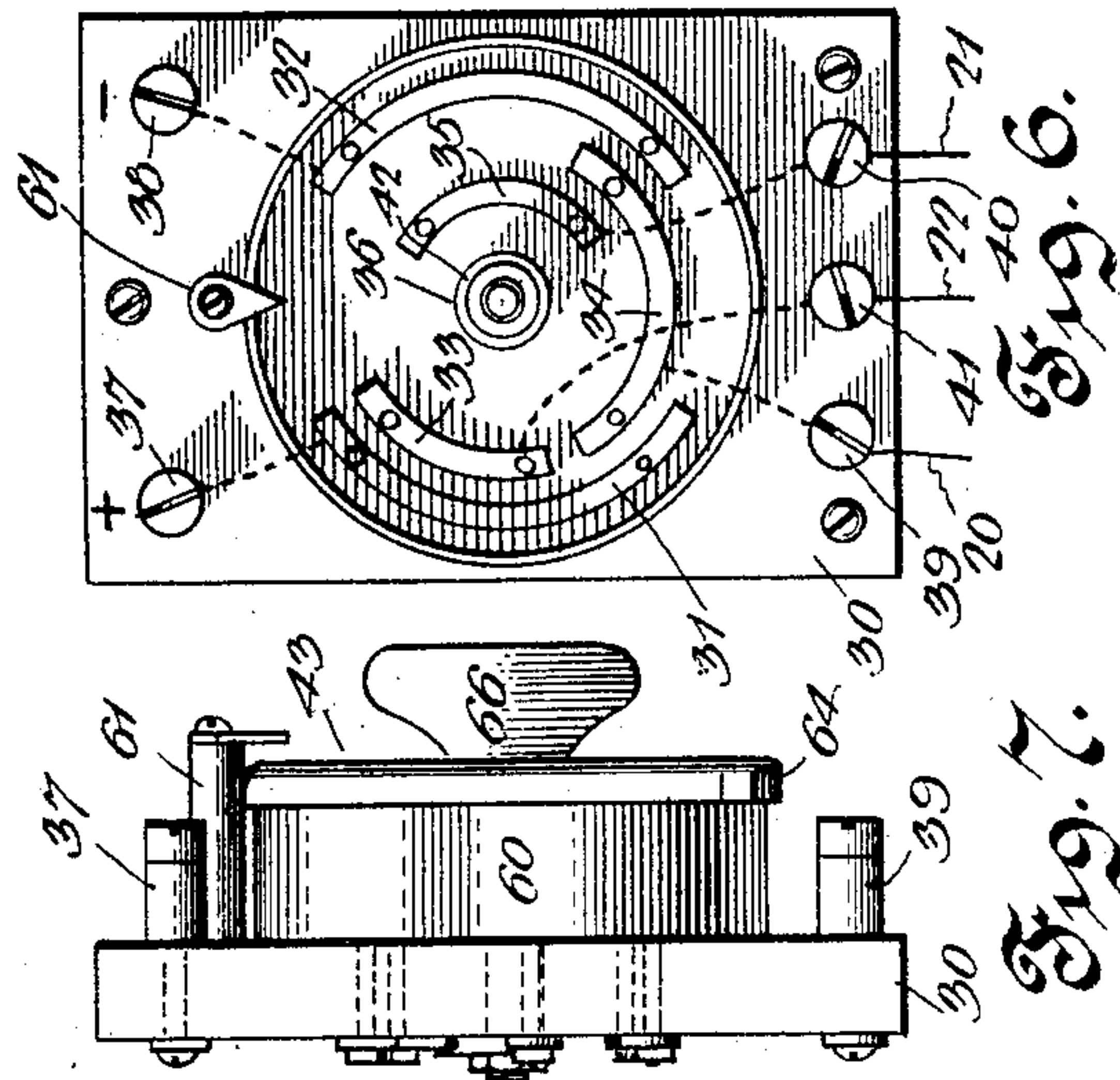
Patented Mar. 19, 1901.

W. F. FOLLETT.  
ELECTRIC WATER HEATER.

(Application filed Dec. 10, 1900.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses

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2 Sheets—Sheet 2.

Fig. 2.

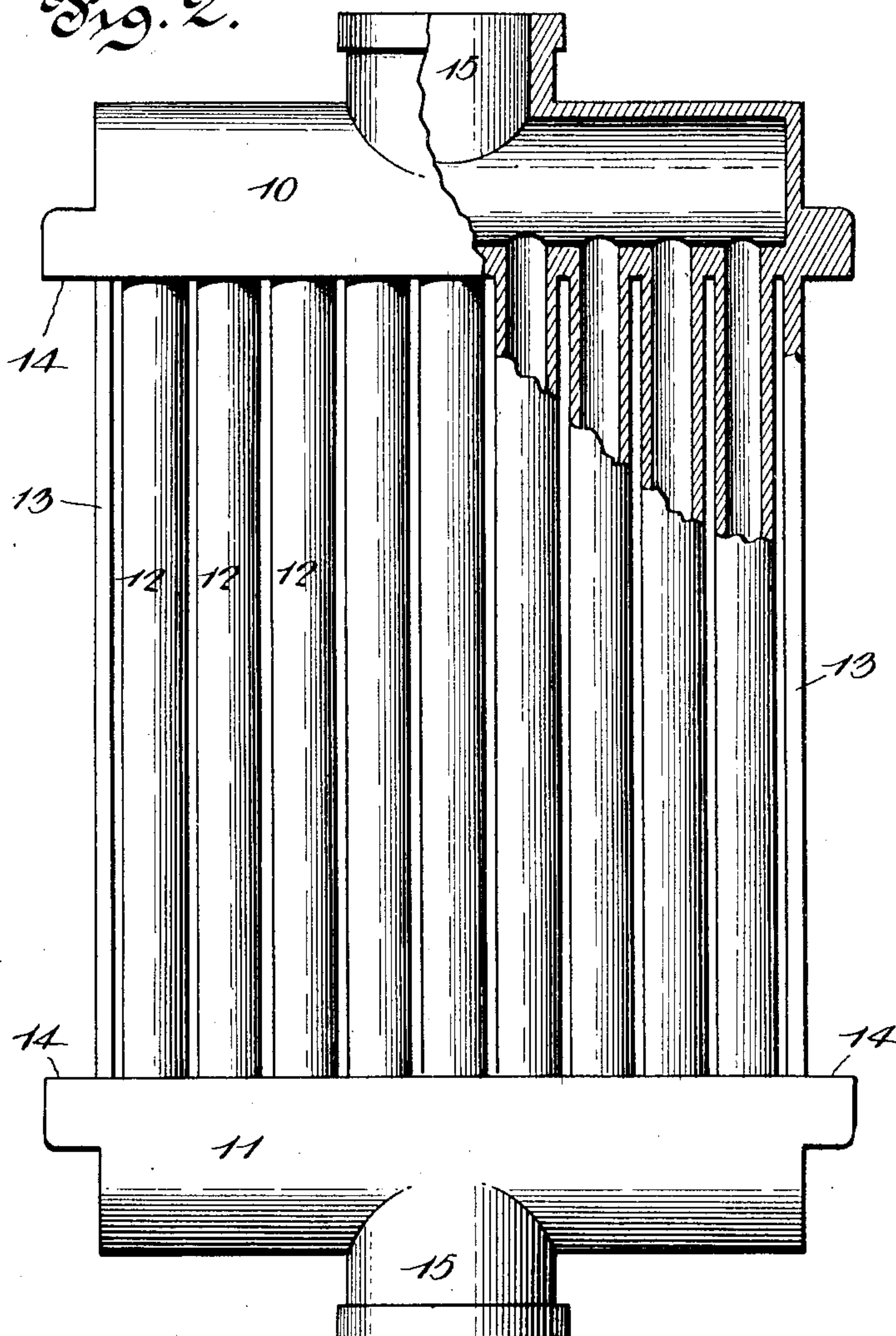


Fig. 3.

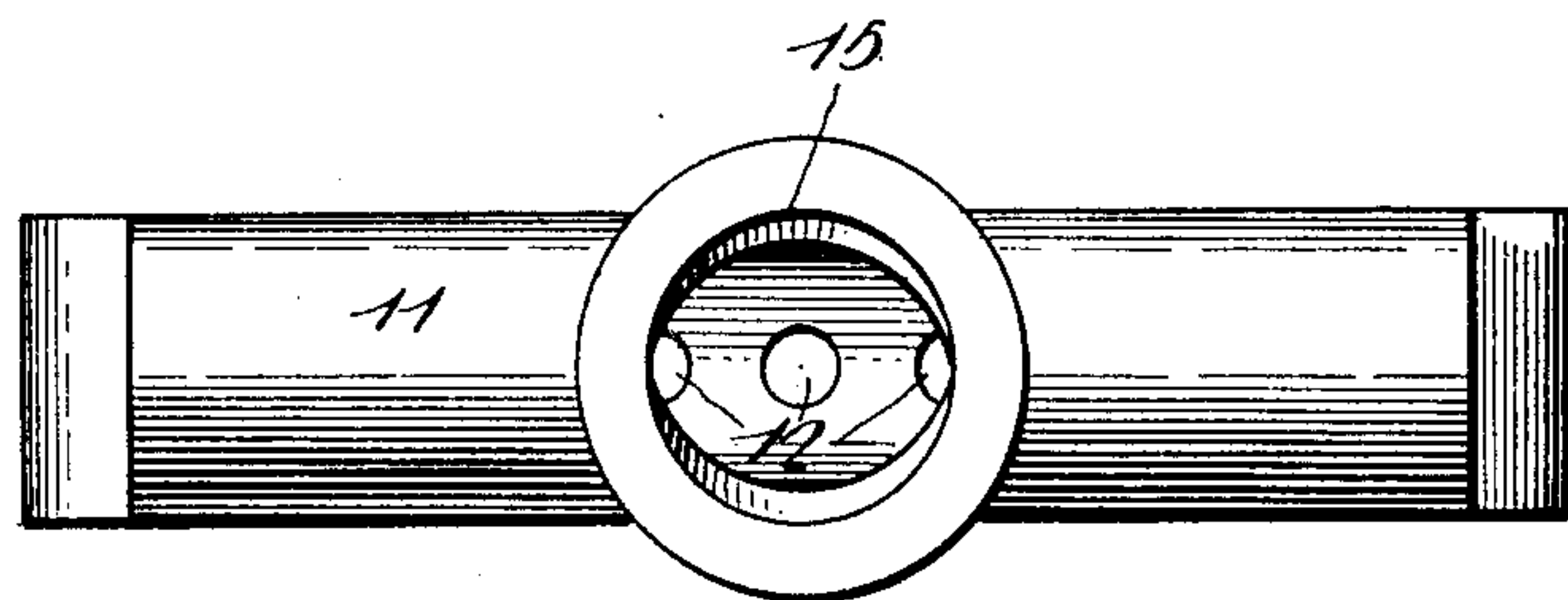
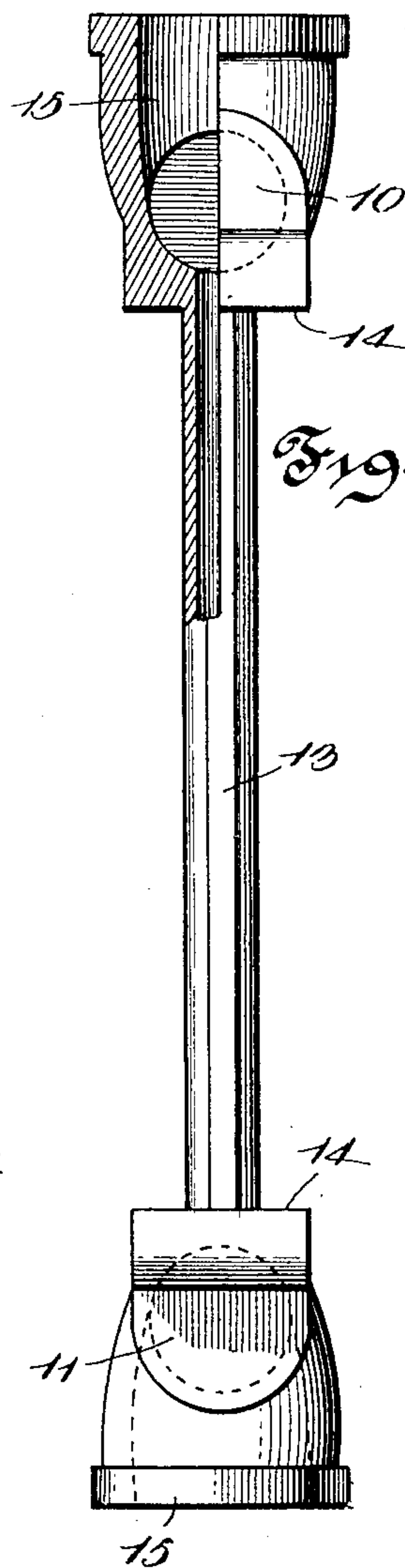


Fig. 4.

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# UNITED STATES PATENT OFFICE.

WALDO F. FOLLETT, OF NEW HAVEN, CONNECTICUT.

## ELECTRIC WATER-HEATER.

SPECIFICATION forming part of Letters Patent No. 670,172, dated March 19, 1901.

Application filed December 10, 1900. Serial No. 39,378. (No model.)

*To all whom it may concern:*

Be it known that I, WALDO F. FOLLETT, a citizen of the United States, residing at New Haven, in the county of New Haven and State of Connecticut, have invented a new and useful Electric Water-Heater, of which the following is a specification.

This invention relates to electric heaters in general, and more particularly to heaters for water, one object of the invention being to provide a cheap, simple, and efficient construction which may take the place of the usual coal-burning water-heater used in a system of hot-water heating or may be used for local heating, as preferred.

A further object of the invention is to provide a heater wherein there will be an efficient circulation and wherein the heating resistance-coils will be so arranged as to be protected from injury and to prevent short-circuiting.

Additional objects of the invention relate to the means for varying the relative connections of the coils to vary the temperature and to the specific construction of the parts of the device, the objects and advantages of which will be apparent from the following description.

In the drawings forming a portion of this specification, and in which like numerals of reference indicate similar parts in the several views, Figure 1 is an elevation showing the heater partly broken away to illustrate the arrangement of the resistance-coils and illustrating the arrangement of the switch. Fig. 2 is an elevation showing the metal main casting which contains the water to be heated, a portion thereof being shown in section to illustrate the arrangement of the pipes. Fig. 3 is an end elevation showing a portion of one of the heads and one of the pipes in section. Fig. 4 is a top plan view of the casting. Fig. 5 is a transverse section through the complete heater, showing the arrangement of the wire-supporters, the cement insulating material, and the inclosing plates. Fig. 6 is a plan view of the switch with the top thereof removed. Fig. 7 is a side elevation of the complete switch. Fig. 8 is a transverse section taken centrally through the switch. Fig. 9 is a bottom plan view of the switch-plate with the brushes thereon.

Referring now to the drawings, the present heater consists of a main casting comprising two similar heads 10 and 11, which are hollow and are disposed parallel, the mutually-adjacent faces of the heads being flat, as shown in Fig. 3, and lying parallel. Connecting the said mutually-adjacent faces of the heads are pipes or tubes 12, separated by interspaces, as illustrated, and which pipes or tubes communicate at opposite ends with the heads, which latter are hollow. The external diameters of the pipes or tubes are equal and are somewhat less than the widths of the heads, so that they are spaced inwardly from the side edges of the heads.

Spaced from the outermost pipes or tubes by interspaces substantially equal to the spacing of the tubes one from another are transversely-rectangular uprights or supporting-bars 13, and beyond these bars are formed end flanges 14, the projection of which beyond the bars 13 is equal to the inward spacing of the tubes from the side edges of the heads.

Centrally of the outer faces of the heads 10 and 11 are formed tubular sockets 15, adapted to receive pipe connections to convey the heated water from and the cooled water back to the heater.

The resistance-coils employed are wound between the heads of the casting, and in order that they may be held spaced from the tubes 12 insulating spool-sections 16 are employed, these sections being each semicylindrical in form, and in their curvilinear faces are cut threads 17. These threads are so cut that if the two sections were placed with their flat faces in contact there would be produced a cylinder having a continuous helical groove from one end to the other thereof. Thus when the two sections are separated and disposed, as shown, upon the rods or bars 13 the arcuate grooves of one section correspond to the grooves of the other section. Longitudinally of the flat faces of the sections 16 are formed grooves which permit of the sections being securely fitted to the bars 13 to prevent rotation thereon, the ends of the sections closely fitting against the inner faces of the heads. After the supporting spool-sections are put in place the resistance-coils are wound in the grooves thereof. In the present instance there are shown two coils 18 and 19,



the former being wound from the upper ends of the spool-sections half-way of their lengths, while the second coil is wound upon the remaining portions of the spool-sections. From the upper end of the coil 18 there leads a wire 20, and from the lower end of the lower coil there leads a wire 21, while a third wire 22 is connected with the mutually adjacent ends of the two coils to provide for connecting them in multiple, as hereinafter described, as well as in series.

Filled in between the tubes 12 is a filling 24, of cement, this cement being also disposed to inclose the resistance-coils and extending to lie flush with the side and end faces of the heads of the casting, and covering this cement are side plates 25 and end plates 26, which act in connection with the heads to completely inclose the cement, the coils, and the tubes. In one of the end plates are formed perforations 26', having insulating-bushings 27 therein, and through these bushings are passed the conducting-wires 20, 21, and 22.

It will be noted that in the present instance the heads and tubes, with the supporting-bars, are formed integral, although it will of course be understood that they may be formed separately and then connected, if desired. In connection with this portion of the apparatus above described there is employed a switch designed for manipulation to send an energizing-current through the two coils in series, through the first coil alone, or through the two coils in multiple, as preferred, to vary the heating effect of the apparatus. The switch consists of a base-plate 30, of insulating material, and upon the base are mounted a number of segmental contact-strips 31, 32, 33, 34, and 35, disposed about a common center, at which point there is disposed a stud 36 for supporting the switch-plate, hereinafter described. The contact-strips 31 and 32 may be termed the "line-contacts," as they are connected with binding-posts 37 and 38, to which the feed or line wires are connected, while the remaining strips may be termed the "coil-contacts," for the reason that the conducting-wires 20, 21, and 22 are connected thereto. The wires 20, 21, and 22 are attached directly to binding-posts 39, 40, and 41, the strip 33 being connected to post 41, the strip 34 to the post 39, and the strip 35 to the post 40. The stud 36 has its upper end reduced to form a shoulder 42, and upon this reduced portion and resting on the shoulder is a switch-plate 43. On the under face of the switch-plate, which is rotatable with the stud, are secured insulating-blocks 44 and 45 at diametrically opposite points of the plate. On the block 44 there is disposed a plate 46, having three contact-fingers so spaced that they may be brought into contact with strips 32, 34, and 35, these fingers being shown at 47, 48, and 49, respectively. Upon the block 45 is disposed a plate 50, having fingers 51 and 52, adapted for contact with strips 31 and 33 or with 31 and 34, depending upon the position

of the switch-plate. The fingers are so positioned that when the switch-plate is rotated to contact the fingers 47 and 49 with strips 32 and 35 and with the finger 48 from contact with strip 34 and with the fingers 51 and 52 in contact with strips 31 and 34 then the circuit will be from the post 37 to strip 31, finger 51, plate 50, finger 52, strip 34, post 39, wire 20, to the upper end of the upper coil, through the two coils in series, wire 21, post 40, strip 35, finger 49, plate 46, finger 47, and strip 32 to post 38. The entire current thus flows through the two resistance-coils in series. When the heating effect is to be increased, the switch-plate is further rotated until fingers 51 and 52 are moved so that finger 52 rests on strip 33. The current then flows from post 37 to strip 31, finger 51, plate 50, finger 52, strip 33, and wire 22 to the mutually-connected ends of the two resistance-coils, then through the lower coil to wire 21 to post 40, the lower coil being thus alone in circuit, with the result that there is a greater rate of flow of current and the resistance-coil is raised to a higher degree of temperature. If the switch-plate is now turned until the fingers 47, 48, and 49 rest upon the strips 32, 34, and 35, respectively, the fingers 51 and 52 will remain upon the strips 31 and 33, when the flow will be from post 37 to the mutually-connected ends of the two coils in the same manner as above described, at which point the current will divide, a portion flowing through the upper coil and through the wire 20 to the post 39 and strip 34 and the remainder flowing through the lower coil and through the wire 21 to post 40 and strip 35. The current from strips 34 and 35 flows through fingers 48 and 49 to plate 46 and thence through finger 47 to strip 32 and post 38. When the switch is in this adjustment, it will be seen that the two resistance-coils are connected in multiple, so that the resistance is further reduced and the rate of flow of current is increased, with the result of a greater heating effect. When the switch-plate is adjusted with all of the contact-fingers off of the contact-strips 31 and 32, then there is no flow through the resistance-coils. The contact-strips are inclosed by a wall 60 upon the base of the switch, and exterior to this wall is a post 61, at the upper end of which is an index. The upper face of the switch-plate is marked with the words "Full," "Half," "Low," and "Off," corresponding to the positions of the fingers, and when the plate is rotated to bring a word under the index the fingers are in position to secure corresponding results in the heater. The post 60 forms also a stop in the path of movement of outwardly-directed lugs 63 and 64 on the periphery of the switch-plate, these lugs acting to stop the plate when the switch is off and when it is full, respectively. A thumb-piece 66 is disposed against the upper face of the switch-plate, to which it is secured by means of screws, as shown, passed upwardly through the switch-plate, said thumb-piece



having an opening therethrough which receives the reduced portion of the stud 36. The thumb-piece is further prevented from displacement by means of a nut 37, which is engaged with the end of the stud.

It will be understood that in practice the resistance-coils may be divided into as many sections as desired and a corresponding switch used and that various other modifications may be made without departing from the spirit of the invention.

What is claimed is—

1. An electric heater comprising spaced hollow heads, tubes connecting the heads and separated by interspaces, a resistance-coil wound between the heads and encircling the tubes, covering-plates secured to the heads and inclosing the coil, and means for holding the coil spaced between the tubes and covering-plates.

2. An electric heater comprising spaced hollow heads having means for conveying fluid from one to the other, said means being spaced inwardly from the side and end faces of the heads, a resistance-coil wound between the heads and encircling the conveying means, covering-plates secured to the heads and inclosing the coil, and means for holding the coil spaced between the conveying means and the covering-plates.

3. An electric heater comprising spaced hollow heads, means connecting the heads for conveying fluid from one to the other insulating spool-sections held adjacent said conveying means and projecting laterally therebeyond, said spool-sections having grooves therein, the grooves of one spool-section forming helical continuations of the grooves of the other section, and a resistance-coil wound in said grooves and spaced from the conveying means.

4. An electric heater comprising spaced hollow heads, means connecting the heads for

conveying fluid from one to the other, insulating spool-sections held adjacent to said conveying means and projecting therebeyond, said sections having grooves therein, the grooves of one section forming helical continuations of the grooves of the other section, a coil wound in the grooves and held by the spool-sections spaced from the conveying means, and covering-plates connected with the heads and inclosing the coil.

5. An electric heater comprising spaced hollow heads having means connected therewith for conveying fluid from one to the other, supporting-rods disposed adjacent to the said means, insulating spool-sections engaged with the rods and projecting laterally beyond said means, said sections having grooves therein, the grooves of one section forming helical continuations of the grooves of the other section, a resistance-coil wound in the grooves of the spool-sections and a protecting-covering for the coil.

6. An electric heater comprising spaced hollow heads having tubes connecting them for conveying fluid from one to the other, supporting-rods connecting the heads and spaced outwardly from the outermost tubes, insulating spool-sections engaged with the rods, said sections having grooves formed therein, the grooves of one section forming continuations of the grooves of the other section, a resistance-coil wound in the grooves, an insulating-filling inclosing the coil, and covering-plates secured to the heads and inclosing the space therebetween.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

WALDO F. FOLLETT.

Witnesses:

GEORGE M. BROOKS,  
JAMES BISHOP.