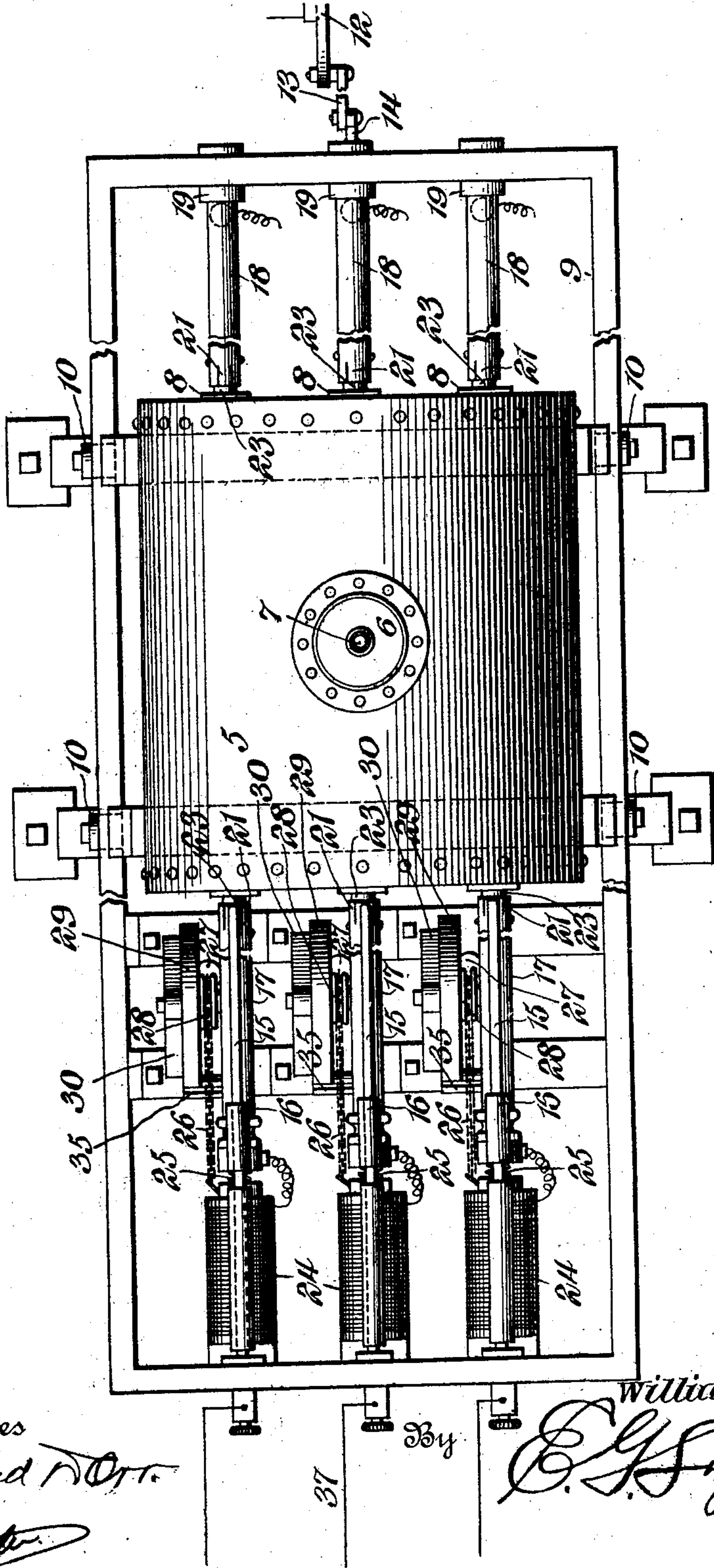


W. W. WONNER.
ELECTRIC ARC STEAM GENERATOR.
APPLICATION FILED MAY 25, 1908.

Patented Mar. 16, 1909.
3 SHEETS—SHEET 1.

915,526.

Fig. 1.



Witnesses
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[Signature]

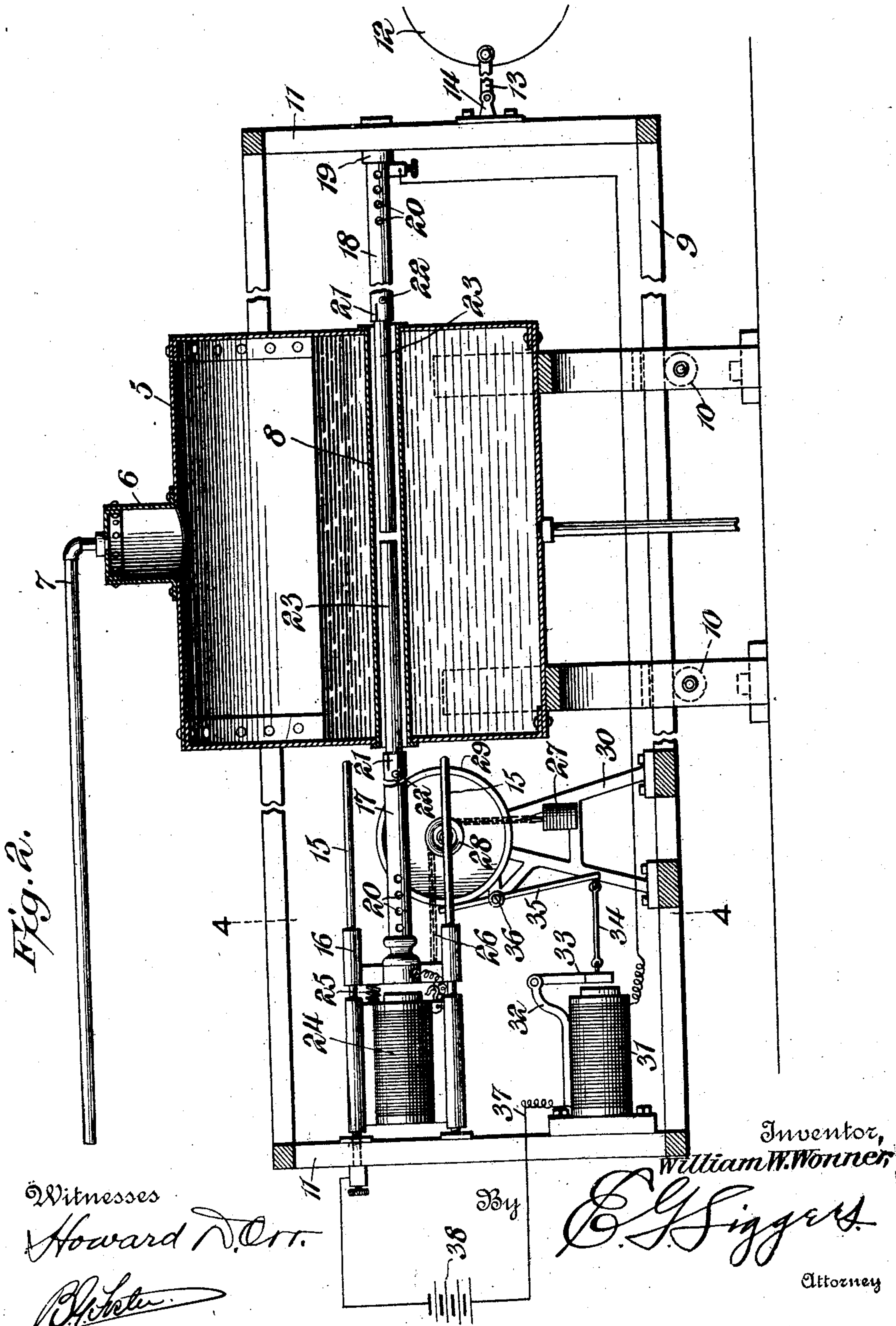
Inventor,
William W. Wonner,
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Attorney

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3 SHEETS—SHEET 3.

Fig. 4.

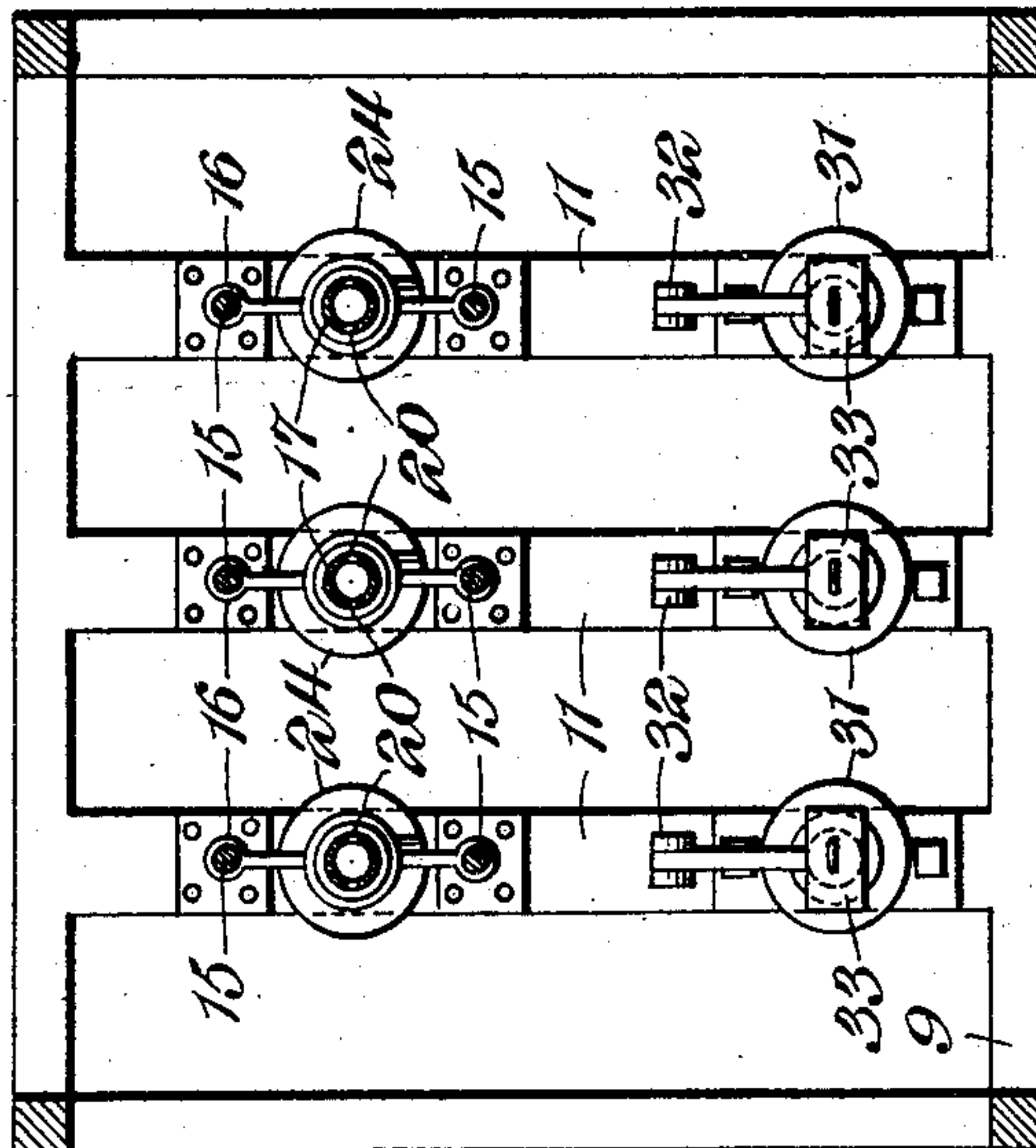
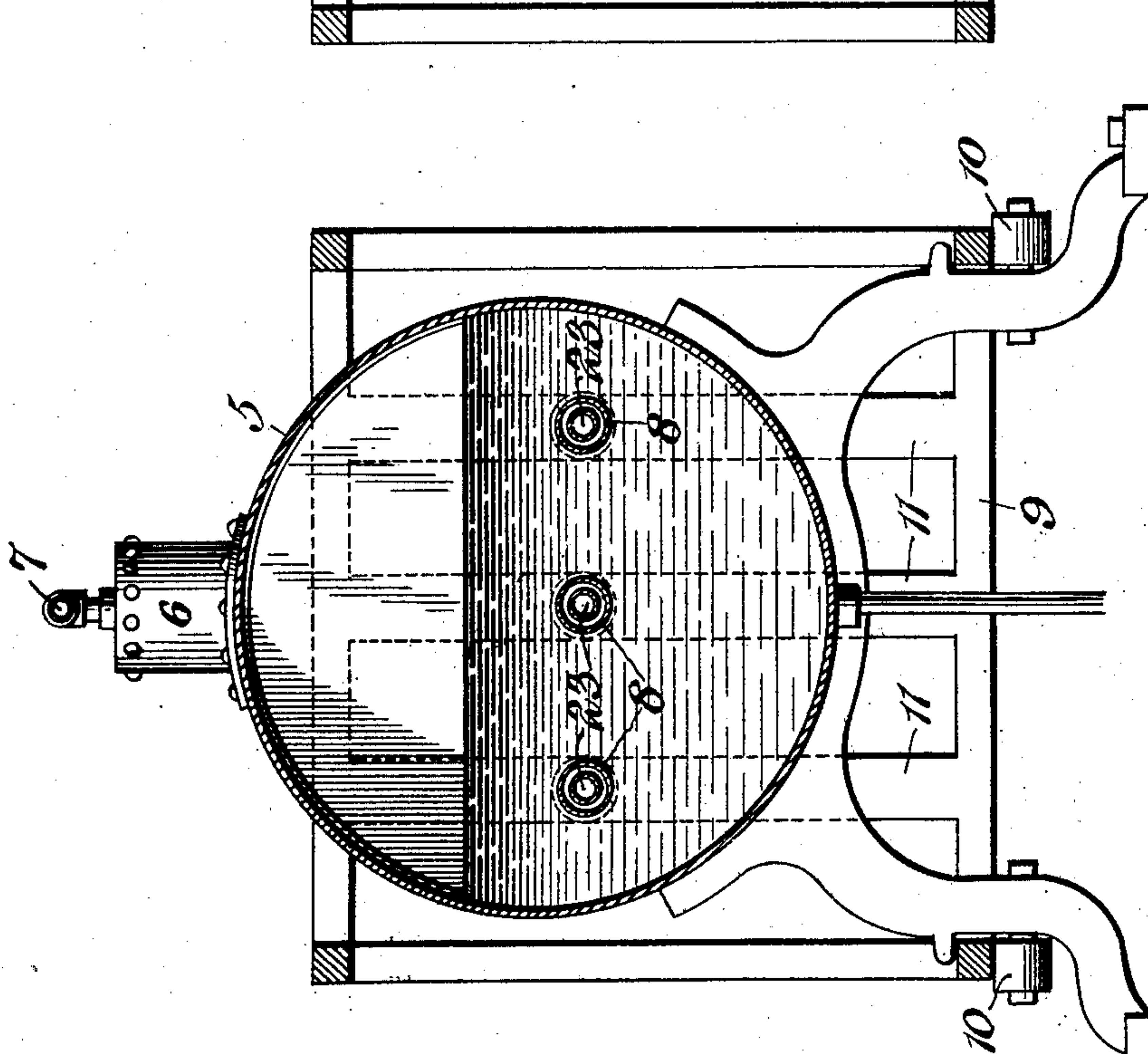


Fig. 3.



William W. Wonner, Inventor,

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Witnesses
Howard W. Orr.
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UNITED STATES PATENT OFFICE.

WILLIAM W. WONNER, OF YORK, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO MEARL E. KUNKEL, OF ROSSVILLE, PENNSYLVANIA.

ELECTRIC-ARC STEAM-GENERATOR.

No. 915,526.

Specification of Letters Patent.

Patented March 16, 1909.

Application filed May 25, 1908. Serial No. 434,890.

To all whom it may concern:

Be it known that I, WILLIAM W. WONNER, a citizen of the United States, residing at York, in the county of York and State of Pennsylvania, have invented a new and useful Electric-Arc Steam-Generator, of which the following is a specification.

This invention while relating more particularly to means for generating steam in boilers, may also be employed for many analogous purposes, where it is desired to raise the temperature of water or other material.

One of the primary objects is to provide novel electrical mechanism of a simple and practicable character that will quickly produce and effectively maintain a high temperature.

Another object is to provide means that will distribute the heat over a comparatively great area, thereby avoiding the danger of burning out the parts, and insuring a better application of the heat to the medium to be heated.

Still another object is to provide in connection with the above mechanism, means which will secure the proper feed of the electrodes in order to compensate for their wearing and wasting away.

The preferred embodiment of the invention is illustrated in the accompanying drawings, wherein:

Figure 1 is a top plan view of the same. Fig. 2 is a vertical longitudinal sectional view therethrough. Fig. 3 is a cross sectional view. Fig. 4 is a detail sectional view on the line 4—4 of Fig. 2.

Similar reference numerals designate corresponding parts in all the figures of the drawings.

In the embodiment disclosed, the member to be heated is a tubular boiler 5 having a steam dome 6 from which leads a supply pipe 7 that may be connected to any mechanism desired. This boiler is provided with longitudinally disposed open ended fire tubes 8, any number of which may be employed as desired. A reciprocary supporting frame 9 is associated with the boiler, being mounted on rollers 10 or other devices, and has up-
right ends 11, which are located at the opposite ends of and spaced from the boiler 5. This frame is reciprocated by any suitable means, for instance in the present embodiment, a crank wheel 12 is disclosed, to which
is connected a pitman 13 pivoted as shown

at 14 to one end of the frame. On one end of the frame are mounted sets of upper and lower tracks or guide ways 15 on which are slidably mounted carriages 16. These carriages support electrode holders 17 which are alined with the adjacent ends of the tubes 8, and are adapted to enter the same. Other electrode holders 18 are fastened, as shown at 19 to the opposite end of the frame, and are alined with the opposite ends of the tubes, being adapted to enter the same. All of said electrodes are tubular in form, and have at their outer ends lateral ports 20 for the admission of air as hereinafter explained. Their inner ends are longitudinally slitted to provide spring holding fingers 21, and just in rear of said fingers, rivets 22 are placed, which extend across the bores of the holders and constitute stops. Electrodes 23 of any suitable material are employed that are fitted within the fingers 21, and are stopped by the rivets 22. These electrodes are also tubular in form, their bores communicating with the interiors of the holders 17 and 18, and their inner coacting ends being open.

Slidably mounted on each of the sets of the tracks or guides 15 are electro-magnets 24, the carriages 16 constituting armatures for said magnets and normally being held in spaced relation thereto by coiled springs 25. Connected to these electro-magnets by chains 26 are weights 27 that pass over pulleys 28 to which pulleys are fastened brake wheels 29. The weights 27 thus serve to draw the magnets 24 toward the carriages 16, and the pulleys and wheels 29 are mounted on suitable supporting brackets 30. Secured to the end 11 of the frame, which supports the tracks or guides 15 are other electro-magnets 31 on which are mounted brackets 32 carrying pivoted armatures 33 that cooperate with the magnets. These armatures have link connections 34 with levers 35 fulcrumed as shown at 36 on the brackets 30, the upper ends of the levers operating against the wheels 29 and constituting brakes. An electric circuit 37, which includes any suitable source of sufficient electrical energy, shown diagrammatically and designated 38, also includes the electro-magnets 24, the electrode holders and electrodes and the electro-magnets 31, the wire being of course suitably insulated from the frame.

The operation of the structure is substan-

tially as follows. If the current is cut off from the apparatus, the weights 27 drawing against the electro-magnets 24 will bring the inner ends of the electrodes 23 into engagement. If now a current of electricity is passed through the circuit, the magnets 31 will be energized. Consequently their armatures 33 will be attracted, the levers 35 will thus be swung, and the wheels 29 will be clamped against rotation. The electro-magnets 24 will also be energized, thus drawing the carriages 16 toward the same and causing the electrodes 23 to separate. Consequently electric arcs will be formed between the different sets of electrodes and within the fire tubes 8 of the boiler. As the frame is reciprocated, these arcs will thus be caused to move longitudinally within the tubes, distributing the heat more completely through the same and also avoiding the danger of burning out the tubes. In addition to this, inasmuch as the electrode holders and electrodes are hollow, the intense heat at the inner ends of the latter, will cause currents of air to pass inwardly through the ports 20, and from the ends of the electrodes, and this air passing outwardly, will carry the heat along the tubes, and thus further distribute said heat. As the electrodes continue to separate, due to their wearing away, the current will of course be weakened, thus weakening the force of the electro-magnets 31, and consequently of the brake levers 35 upon the brake wheels 29. When therefore this force falls below a certain amount, the weights 27 will overcome the braking action, causing the magnets 24 to move toward the carriages 16. These carriages therefore will move inwardly, causing the electrodes to be brought closer together. It will therefore be noted that the mechanism is entirely automatic in its character and requires no attention except the renewal of the electrodes.

From the foregoing, it is thought that the construction, operation and many advantages of the herein described invention will be apparent to those skilled in the art, without further description, and it will be understood that various changes in the size, shape, proportion, and minor details of construction, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is:—

1. In an electric heating mechanism of the character set forth, a member to be heated and hollow electrodes associated with said member to heat the same, said electrodes having co-acting open ends and being provided with means for admitting a heat-distributing medium into said electrodes.

2. In electric heating mechanism of the character set forth, the combination with

relatively movable hollow electrode holders having ports that communicate with their interiors, of hollow coacting electrodes carried by the holders and having bores that communicate with the interiors of the holders and have their adjacent ends open.

3. In electric heating mechanism of the character set forth, the combination with a heater having a tube therethrough, of electrode holders located at opposite ends of the heater and alined with the tube, said holders being hollow and having ports that communicate with their interiors, and hollow electrodes carried by the holders and having bores that communicate with the interiors of the holders and have their adjacent ends open.

4. In electric heating mechanism of the character set forth, the combination with a heater having a tube therethrough, of electrode holders located at opposite ends of the heater and alined with the tube, and electrodes carried by the holders and having their coacting ends located within the tube.

5. In electric heating mechanism of the character set forth, the combination with a member to be heated, of means associated with the member for creating an electric arc, and means for causing said arc to move with respect to the member.

6. In electric heating mechanism of the character set forth, the combination with a boiler having a tube, of means for creating an electric arc in the tube, and means for moving said arc longitudinally within the tube.

7. In electric heating mechanism of the character set forth, the combination with a member to be heated, of a movable support associated therewith, and means for forming an electric arc for heating the member, said means being mounted on the support.

8. In electric heating mechanism of the character set forth, the combination with a member to be heated, of a movable support extending beyond opposite ends of said member, and coacting electrodes mounted on the opposite portions of the supports and constituting means for creating an arc that heats said member and travels along the same on the movement of the support.

9. In electric heating mechanism of the character set forth, the combination with a boiler having a fire tube, of a movable support extending beyond opposite ends of the boiler, electrodes mounted on the support and having coacting ends located within the boiler, said electrodes moving with the support to move an arc created therewith longitudinally within the tube.

10. In electric heating mechanism of the character set forth, the combination with a member to be heated, of a movable support associated therewith, means for forming an electric arc for heating the member, said means being mounted on the support, and

means for moving the support and thereby the arc-forming means.

11. In electric heating mechanism of the character set forth, the combination with a boiler having a fire tube extending there-
5 through, of a reciprocatory frame extending beyond opposite ends of the boiler, alined coaxing electrodes mounted on the frame and projecting into the tube from opposite
10 ends, and means for reciprocating the frame.

12. In electric heating mechanism of the character set forth, the combination with a member to be heated, of a movable support,
15 relatively movable arc-forming devices mounted on the support, and means for effecting the relative movement of the devices to create an arc when a current of electricity is passed through said devices.

13. In electric heating mechanism of the character set forth, the combination with a member to be heated, of a movable support,
20 relatively movable coaxing electrodes mounted on the support, and means for automatically separating the electrodes when a current of electricity is passed through the
25 same.

14. In electric heating mechanism of the character set forth, the combination with a member to be heated, of a reciprocatory
30 frame, coaxing electrode holders mounted on the frame, one of said electrode holders being movable on the frame, an electro-magnet for effecting the movement of said holders, and a circuit that includes the holders
35 and magnet.

15. In electric heating mechanism of the character set forth, the combination with a boiler having a longitudinal fire tube, of a
40 frame extending beyond opposite ends of the boiler, tracks or guides mounted on one end of the frame, an electrode holder mounted on one end of the frame in line with the tube, another electrode holder slidably mounted
45 on the tracks or guides and disposed in line with the tube, an electro-magnet associated with the sliding electrode, and a circuit that includes the electrode holder and the magnet.

16. In electric heating mechanism of the character set forth, the combination with a member to be heated, of a movable support,
50 relatively movable arc-forming devices mounted on the support, means adjustable on the support for causing the relative movement of the arc-forming devices, and automatic mechanism for adjusting said means.
55

17. In electric heating mechanism of the character set forth, the combination with a member to be heated, of a movable support, relatively movable arc-forming devices

mounted on the support, means movable to- 60 ward and from the devices for relatively moving the same, a device for urging said means toward said devices, and mechanism for controlling the movement of said means by said urging device. 65

18. In electric heating mechanism of the character set forth, the combination with a member to be heated, of a movable support, relatively movable arc-forming devices
70 mounted on the support, means movable toward and from the devices for relatively moving the same, a device for urging the means toward said devices, a brake for governing the movement of said device, and au-
75 tomatic means controlling the operation of the brake.

19. In electric heating mechanism of the character set forth, the combination with a boiler having a fire tube, of relatively mov-
80 able arc-forming devices extending into the tube, a magnet for effecting the relative movement of the devices, said magnet being movable toward and from the devices, a weight for moving the magnet toward the
85 devices, a brake controlling the movement of the magnet, an electro-magnet connected to the brake, and a circuit including the mag-
nets and the arc-forming devices.

20. In electric heating mechanism of the character set forth, the combination with a boiler having a fire tube, of a reciprocatory
90 frame associated with the boiler and extending on opposite sides of the same, a stationary electrode holder mounted on the frame and alined with one end of the tube, tracks
95 or guides on the opposite end of the frame, another electrode holder slidably mounted on the tracks or guides and alined with the other end of the tube, an electro-magnet slid-
100 ably mounted on the tracks or guides and cooperating with the slidable holder, means connected to the electro-magnet for effecting its sliding movement, a brake wheel operated
105 by said means, another electro-magnet, an armature cooperating with the second electro-magnet, a brake connected to the arma-
110 ture and operating on the brake wheel, a circuit that includes the electro-magnets and the electrode holders, and means for effecting the reciprocation of the frame.

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

WILLIAM W. WONNER.

Witnesses:

WILLIAM A. MILLER,
NACWILL WONNER.