Feb. 28, 1939. W. A. V. THOMSEN ET AL 2,149,153

PERMANENT WAVING APPARATUS

Filed Sept. 6, 1935 6 Sheets-Sheet 1

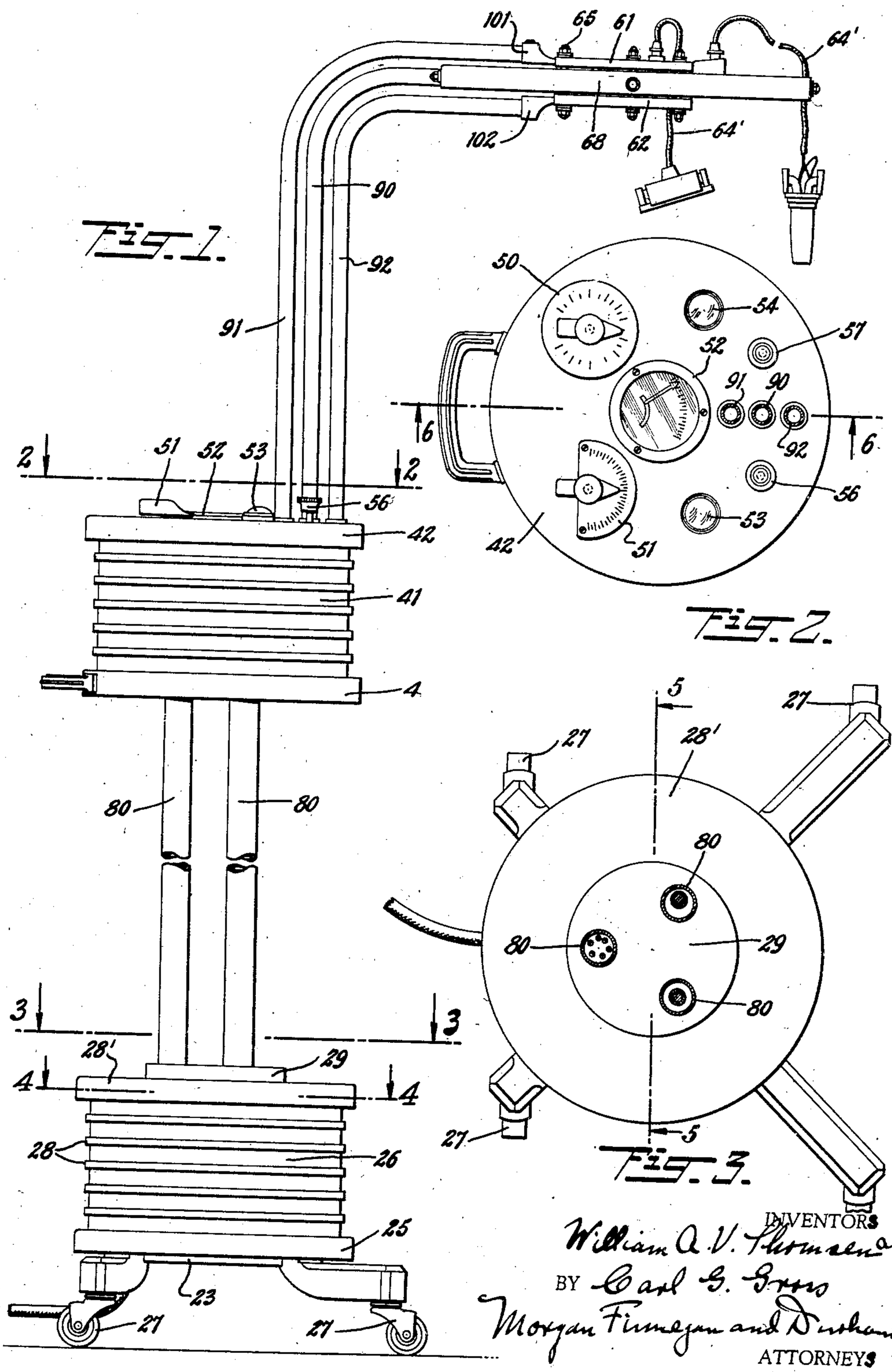

Fig. 1.

Fig. 2.

Fig. 3.

INVENTORS
William A. V. Thomsen and
BY Carl G. Gross
Morgan Finnegan and Durham
ATTORNEYS

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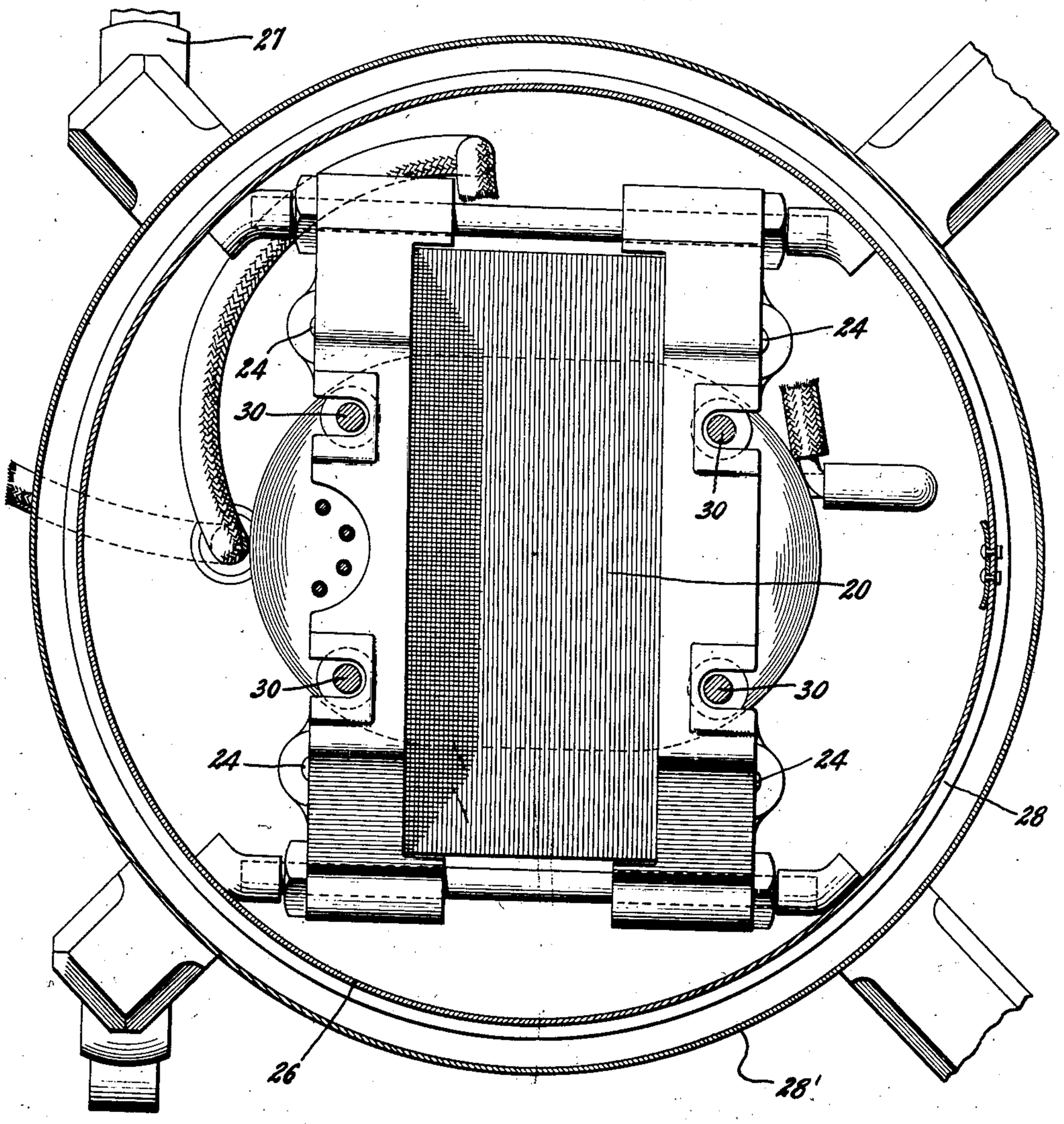

Fig. 4.

INVENTORS
William A. V. Thomsen and
BY Lloyd G. Gross
Morgan Finnegan and Durham
ATTORNEYS

Feb. 28, 1939. W. A. V. THOMSEN ET AL 2,149,153

PERMANENT WAVING APPARATUS

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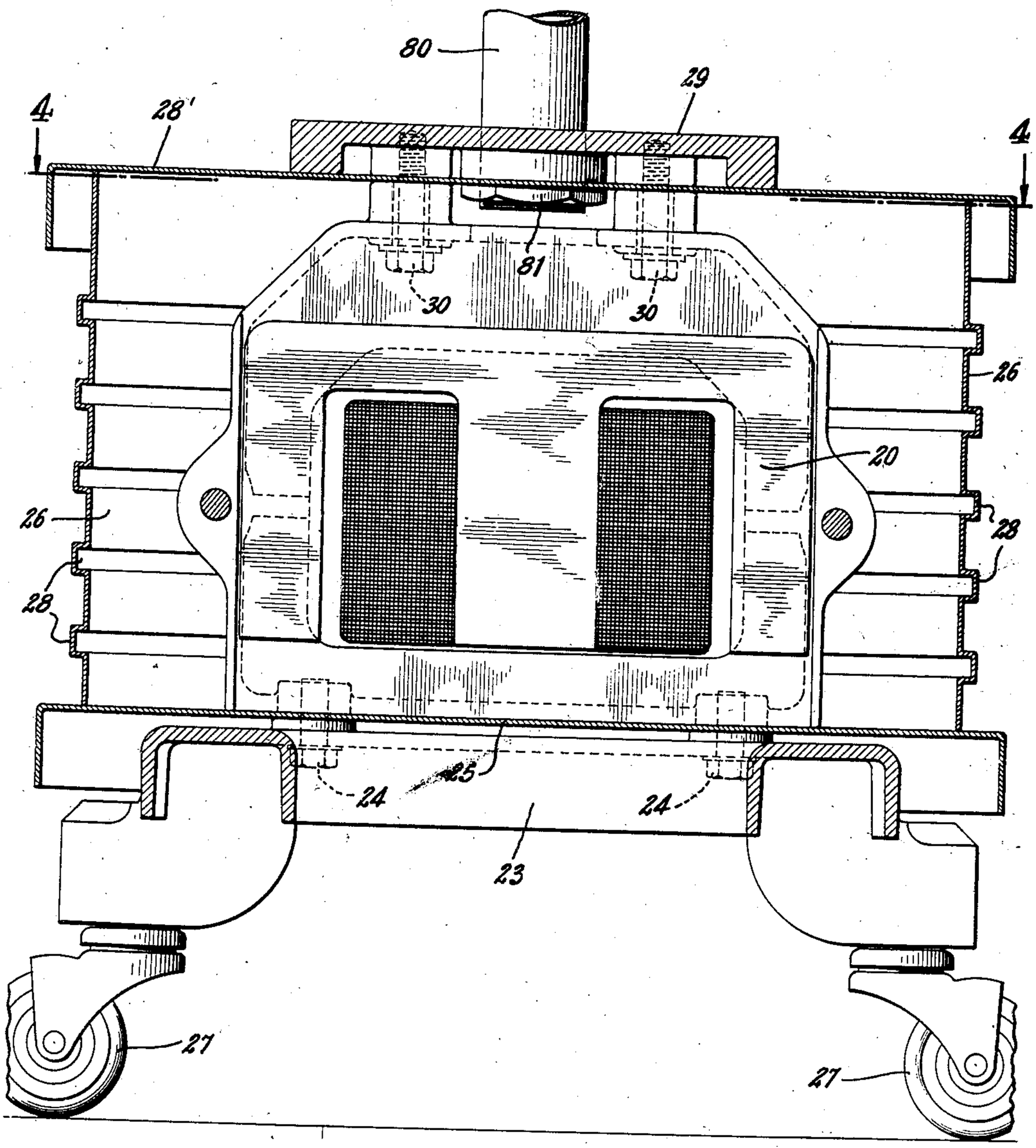

Fig. 3.

INVENTORS
William A. V. Thomsen
BY and Carl G. Gross
Morgan, Finnegan and Durham
ATTORNEYS

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PERMANENT WAVING APPARATUS

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Fig. 6.

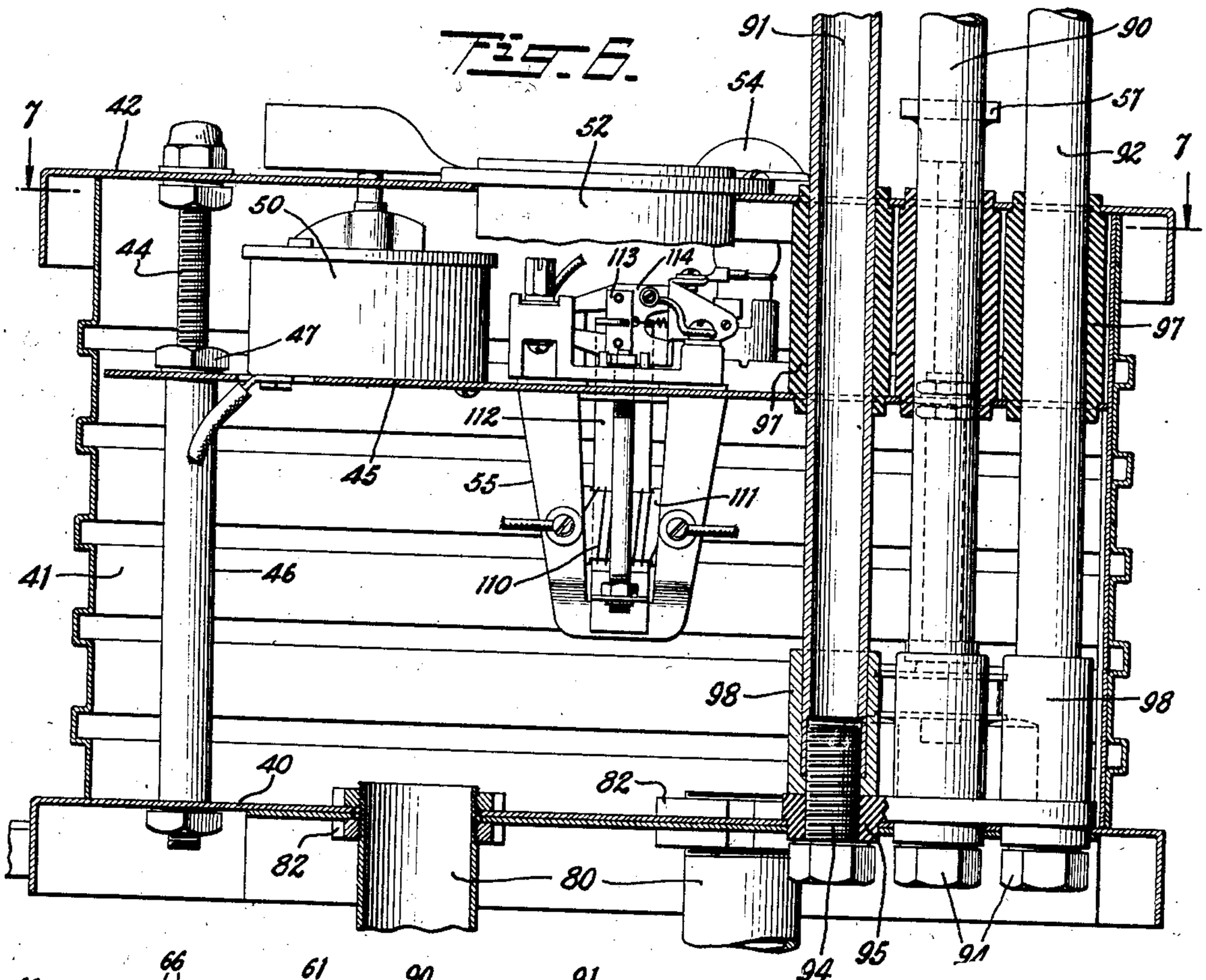
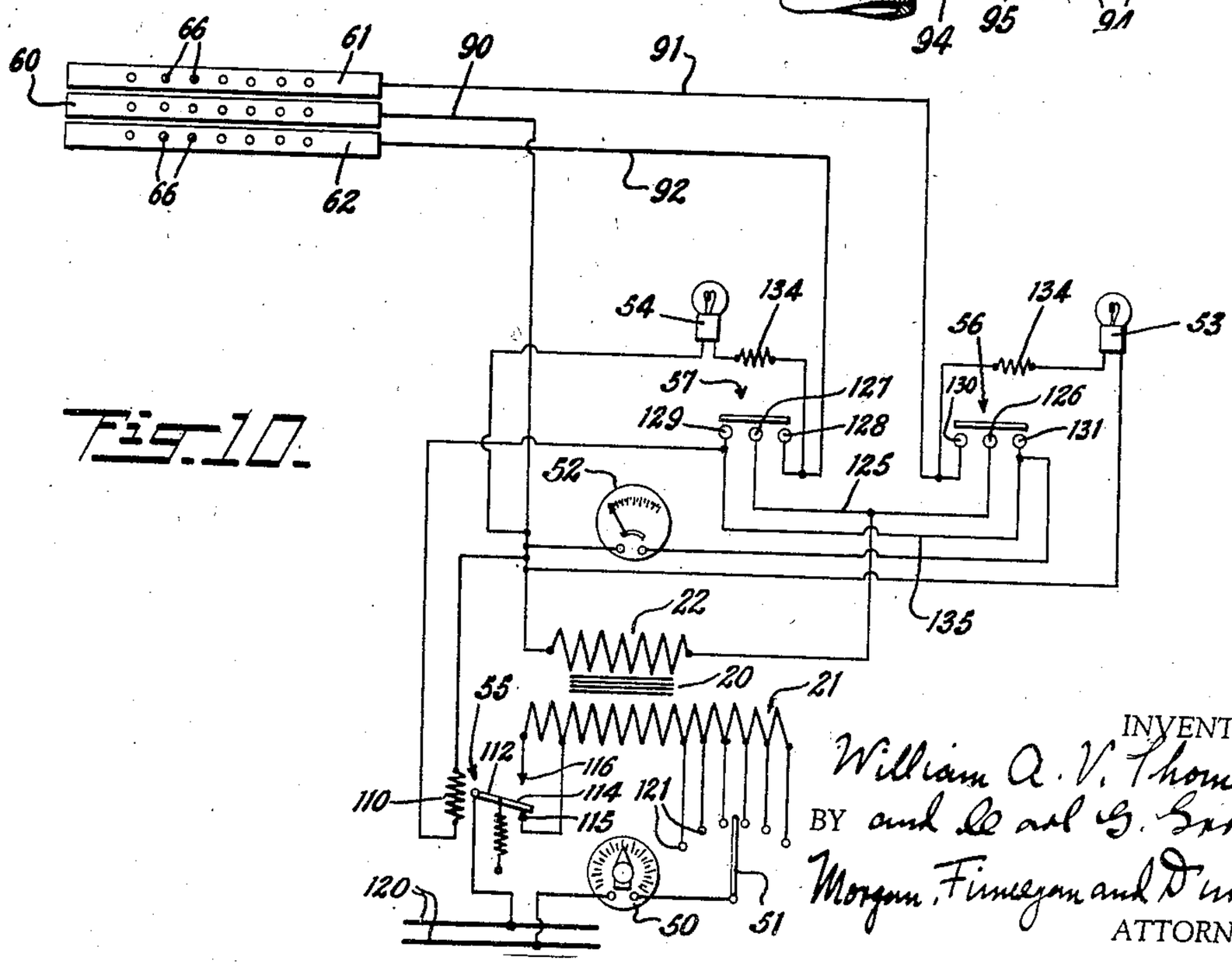


Fig. 10.



INVENTORS
William A. V. Thomsen
BY and Carl G. Gross
Morgan, Finnegan and Durham
ATTORNEYS

Feb. 28, 1939. W. A. V. THOMSEN ET AL 2,149,153

PERMANENT WAVING APPARATUS

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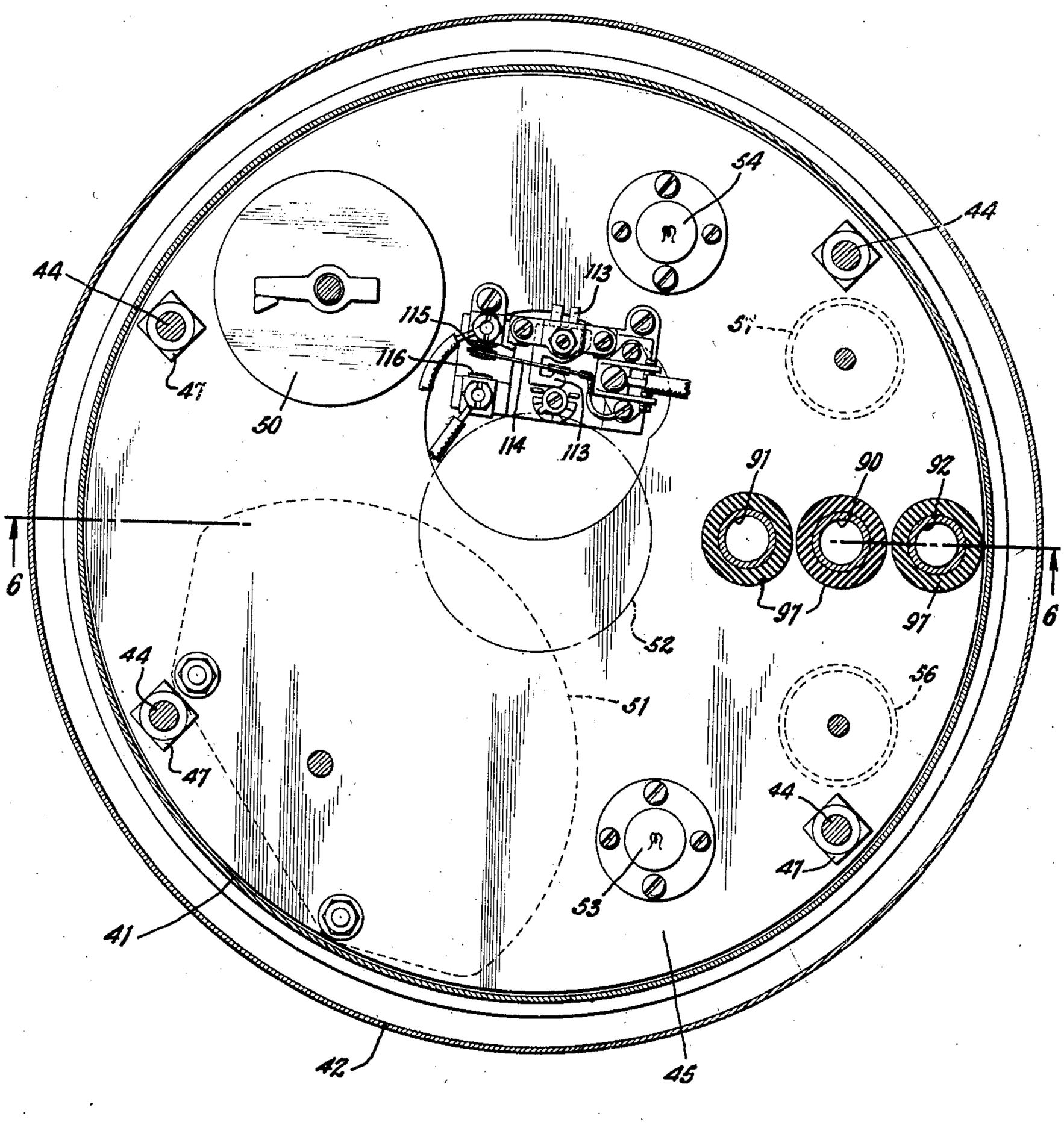
Fig. 7.



INVENTORS
William A. V. Thomsen and
Earl G. Gross
BY
Morgan, Finnegan and Durham
ATTORNEYS

Feb. 28, 1939. W. A. V. THOMSEN ET AL 2,149,153

PERMANENT WAVING APPARATUS

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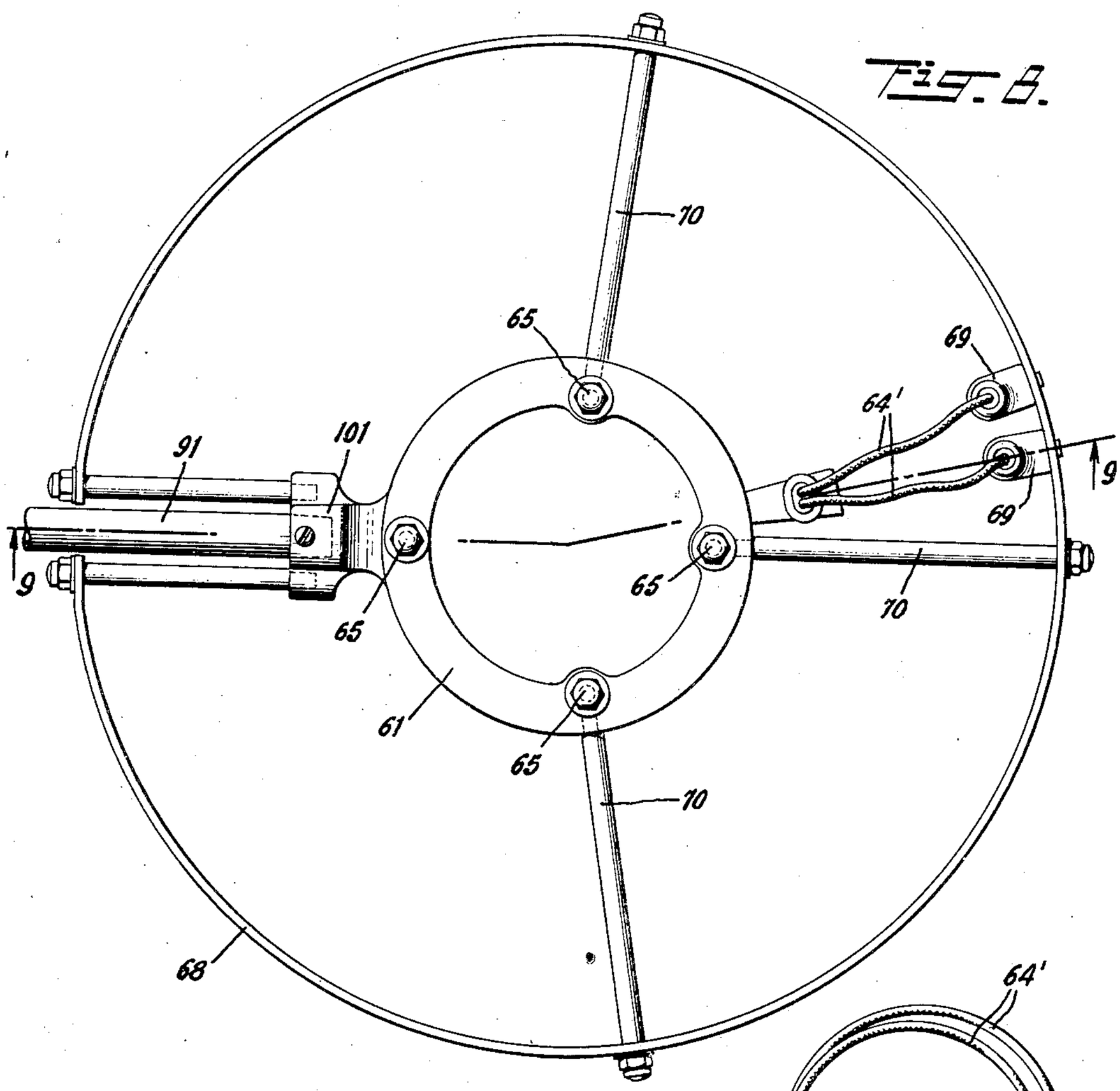
Fig. 8.



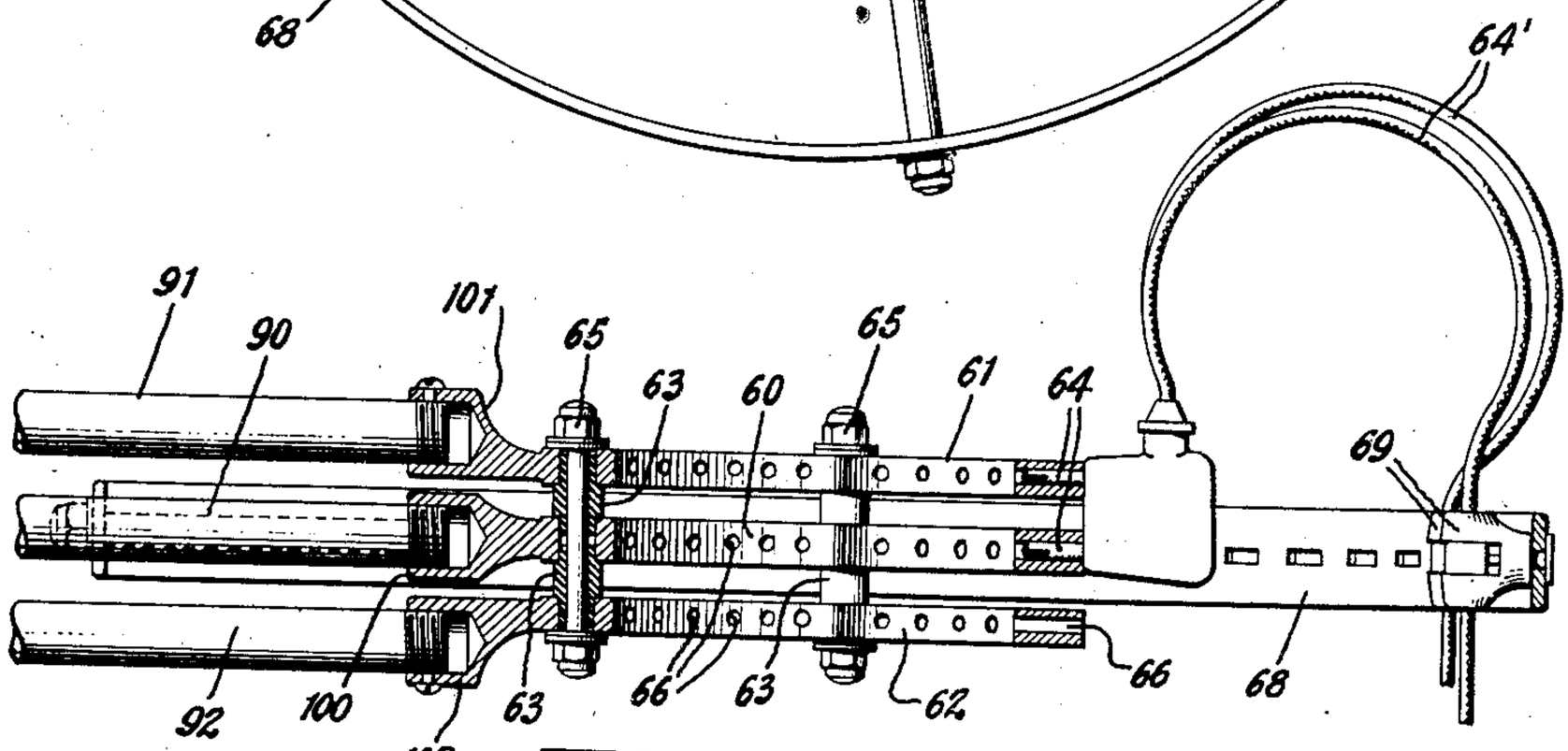


Fig. 9.

INVENTORS
William A. V. Thomsen and
Carl G. Grong
BY Morgan Finnegan and Durham
ATTORNEYS

Patented Feb. 28, 1939 2,149,153

UNITED STATES PATENT OFFICE

2,149,153

PERMANENT WAVING APPARATUS

William A. V. Thomsen, Plainfield, N. J., and Carl G. Gross, Mount Vernon, N. Y., assignors, by mesne assignments, to American Machine & Metals, Inc., New York, N. Y., a corporation of Delaware

Application September 6, 1935, Serial No. 39,398

5 Claims. (Cl. 219—24)

The present invention relates to a novel and improved method of and apparatus for permanent waving.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, construction, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:

Figure 1 is a side elevation of an illustrative embodiment of the present invention;

Figure 2 is a horizontal section taken on the line 2—2 of Fig. 1;

Figure 3 is a horizontal section taken on the line 3—3 of Figure 1;

Figure 4 is a horizontal section taken on the line 4—4 of Figure 1 and showing the transformer within the base casing;

Figure 5 is a vertical section taken on the line 5—5 of Figure 4;

Figure 6 is a vertical section of the instrument panel and control mechanism and is taken on the line 6—6 of Figure 2;

Figure 7 is a horizontal section taken on the line 7—7 of Figure 6;

Figure 8 is a plan view of the power-distributing means and curl heater supporting means;

Figure 9 is a section taken on the line 9—9 of Figure 8; and

Figure 10 is a circuit diagram showing the circuit connections as utilized in connection with the present embodiment.

The present invention provides a novel and improved method of permanent waving in which the heating is accomplished with extreme rapidity and certainty, assuring that the correct degree of heat has been applied to the hair for the correct period of time. The invention has for an object the provision of a permanent waving machine in which a thermal relay may be employed which serves to vary the heating rate after a predetermined period. Another object is the provision of a safe and improved low-voltage permanent waving machine which is adapted to be used with a plurality of kinds of heaters, for instance, spiral and Croquignole heaters, or with a plurality of heaters in independently controllable circuits. Still another object is the provision of an improved permanent waving machine in which a transformer supplies a branched secondary circuit at low voltage and the current flowing in any of the branches is adapted to control the current in the primary circuit. A further object is the provision of a novel and improved, reliable and relatively simple construction of permanent waving machine. The invention further provides a permanent waving machine in which the heaters are rapidly brought to proper operating temperature and thereafter current is supplied to the heaters at a rate just sufficient to maintain proper operating temperature of the heaters for a predeterminable period of time.

In accordance with the preferred manner of carrying out the present invention, the hair is to be heated by the individual resistance heaters, of the so-called spiral or Croquignole type, which may be of any suitable construction, an individual heater being provided for each of the curls to be heated. Electric current is supplied uniformly to these heaters at a relatively low and safe voltage, which in actual practice varies from six to eight volts, heating the resistances and imparting the permanent wave to the curls which have been previously wound under tension on curling rods, and have been moistened with, or are to be subjected to the vapors of, an alkaline hair waving solution. In accordance with the present method the electricity is first supplied to the individual curl heaters at such a voltage as will cause rapid heating of the individual resistance heaters, and the supply of current at this voltage is continued until all of the heaters have reached a predetermined temperature, or is supplied for a predetermined time, thereby heating the heaters to the proper operating temperature necessary for permanent waving. Thereafter, the voltage of the heating current is reduced and continued at a lower voltage until the heating period necessary for the particular hair has terminated, the voltage employed during the second portion of the heating period being sufficient to maintain the heaters at a substantially constant proper operating temperature. In this manner substantial cooling off of the heaters is prevented and also the curls are subjected to very little variation in temperature, and at the same time there is eliminated the multiplicity of switching oprations which are necessary with a closely-set make and break thermostat and which create likelihood of failure.

Preferably, the preliminary heating period is controlled as to duration by means of a thermal relay which normally supplies current to the major portion of the primary of the transformer from which current is supplied to the heaters, and this thermal relay, after it has been in operation for a predetermined period is operated to place additional windings of the transformer primary in circuit, thereby reducing the voltage supplied by the secondary of the transformer and supplying

only enough current to the individual heaters to compensate for their heat loss by radiation and otherwise.

Referring now in detail to the illustrative embodiment of the invention as shown by the accompanying drawings, the embodiment will be described under the several main groupings of its elements, transformer control and distribution, which groupings form parts which are connected together into an integral machine.

The transformer employed is preferably well-regulated and of sufficient capacity to take care of the maximum load of the machine for the duration of the heating period required, and comprises a core 20 on which are wound the primary windings 21 and secondary windings 22. The transformer is bolted to a base casting 23 by means of bolts 24 which also serve to secure the base plate 25 of the transformer casing 26 to the casting 23. The casting 23 may be provided with castors 27 for ease in moving the machine from one place to another. Casing 26 is ribbed, as at 28 to give it greater rigidity and strength, and is also provided with a cover plate 28' secured to the top of the cylindrical casing 26 by means of the plate 29 which is fastened to the transformer frame by means of bolts 30.

The control group of elements is contained within a similar shaped casing positioned directly above the transformer group, and this casing comprises a bottom plate 40, a cylindrical casing member 41, and a top panel or cover plate 42, which parts are held together by means of bolts 44. A sub-panel 45 is also held parallel to the cover or panel 42 by means of spacing sleeves 46 and nuts 47 on bolts 44. Mounted within the casing and supported by means of panels 42 and 45 are a time switch 50, a voltage regulator 51, voltmeter 52, pilot lamps 53 and 54 and a thermal relay 55, as well as the main switches 56 and 57 in the secondary circuit of the apparatus.

The time switch may be of conventional or any suitable construction and is connected in the primary circuit of the apparatus to control the supply of current to the transformer, while the voltage regulator 51 comprises a switch having a plurality of contacts connected to various taps on the transformer primary, whereby the secondary voltage supplied from the transformer may be manually varied as required, or the secondary voltage may be adjusted to a fixed value regardless of the variation from normal line voltage supplied to the primary of the transformer, the secondary voltage supplied from the transformer being determined by reference to the reading of the voltmeter 52.

The pilot lamps 53 and 54 are connected in the secondary circuit with main switches 56 and 57 respectively and current is supplied through these main switches to branch secondary circuits as will be more fully described, the lamps indicating which, if either or both, of the secondary branch circuits is being supplied with current from the transformer.

The distribution group of elements comprises a plurality of bus bars, which are here arranged in the form of superposed concentric annuli 60, 61 and 62, formed of good conducting metal, and spaced apart by means of insulating members 63, while they are firmly held in assembled relation by means of the clamping bolts 65. These annuli are spaced a slight distance apart, and are provided with axially alined holes 66 into which the connector prongs 64 are connected to the various heater supply cords 64' may be inserted for the supply of current to the heaters. The spacing of the annuli is such that the connectors 64 may be connected to bus bar 60 and one or the other of the other bus bars 61 and 62, and in practice, spiral heaters may be connected to bus bars 60 and 61, while Croquignole heaters are connected to bus bars 60 and 62, or the heaters for the forward portion of the customer's head may be connected to bus bars 60 and 61, while those for the rear of the head may be connected to bus bars 60 and 62.

Means are provided for supporting the heaters by means of their connecting cords, and to permit the heaters to be raised or lowered with respect to the apparatus as well as to the customer's head, and for this purpose a supporting ring 68 is provided concentric with the annulus 60, considerably larger than this member and supported thereon by means of the spider bolts 70. Supporting ring 68 is provided with means 69 for securing to it the frictional cord gripping members by which the heater cords are gripped and frictionally supported above the customer's head.

The individual curl heaters may be of any desired construction adapted for use with the particular voltages delivered from the transformer, and are connected to the conducting annuli by means of flexible conductors 64' which are frictionally held at the desired heighth by means of supporting clamps 69. For Croquignole these parts may be of the construction shown in the patent to Gross No. 1,980,680 of 1934.

The control unit is preferably supported on the transformer casing 28 by means of three hollow tubes 80 which are threaded into the plate 29 and securely held there by means of lock nuts 81, while at their upper ends the tubes are also threaded and secured to the bottom plate 40 of the control unit housing by means of the nuts 82. The three tubes are spaced substantially equally distant from each other and form a rigid support for all of the parts of the control unit and those other parts supported thereby.

The distributing annuli or bus bars 60, 61 and 62 and the supporting ring 68 are supported on the control unit housing by means of the tubes 90, 91 and 92 which are formed of good conducting material and form the conductors connecting the several annuli with the current supply within the control housing 41. Tubes 90, 91 and 92 are bolted by means of bolts 94 to a plate of insulating material 95 secured to the bottom plate 40 of the control housing and are insulated from the metal of the cover 42 and the sub-panel 45 by means of insulating bushings 97. At their lower ends, tubes 90, 91 and 92 are fitted into connecting sleeves 98 which in turn are connected to the transformer taps through a switch to be described. At their upper ends, the tubes 90, 91 and 92 are threaded into the enlarged and threaded rear portions 100, 101 and 102 of annuli 60, 61 and 62 respectively, to form a good electrical connection with the annuli.

The thermal relay 55 is so constructed and arranged that for any particular line voltage the relay is held in one position for a predetermined period of time and is then moved to another position for the remainder of even a long heating period, so that during the first portion of the heating period current is supplied to the heaters at the high voltage and is thereafter supplied at the low voltage. This is accomplished by using a bi-metal strip to actuate the relay contacts and providing a constantly

energized heater for the bimetal strip so positioned that when the relay contacts are moved to reduce the transformer output voltage, the bimetal strip is moved into closer proximity to its heater and is heated even more notwithstanding the lower voltage.

As embodied, the heater comprises a coil of resistance wire 110 wound on a mica support 111 which is positioned close to the bimetal actuating strip 112. Strip 112 is connected through toggles 113 to the contact arm 114 which is adapted to contact with either contact 115 or 116 and is normally held in contact with contact 115 when the bimetal strip is unheated.

Referring now to the circuit diagram shown in Figure 10, current is supplied to the apparatus from mains 120 at the usual line voltage of 120 or 220 volts. One side of the line is connected to the contact arm 51 through a time switch 50 by which the duration of the heating is determined, while the other side of the line is connected to the contact arm 112 of the thermal relay 55. The transformer primary windings are tapped on both ends; at one end being connected to contacts 115 and 116, while at the other end the plurality of taps are connected to a plurality of contacts 121 to be selectively connected with the contact arm 51 to produce the standard secondary voltage as determined by voltmeter 52 and thus compensate for any variations in line voltage. At one end, the secondary of the transformer is connected to the tubular conductor 90, while at its other end it is connected to a common conductor 125 connected with switch contacts 126 and 127 of switches 56 and 57.

One of the switches 57 is provided with other contacts 128 and 129, which on closure of the switch are connected to the supply contact 127, while the other switch 56 is similarly provided with contacts 130 and 131, which may be similarly connected to supply contacts 126. Contact 130 is connected to tubular conductor 91, while contact 128 is connected to tubular conductor 92, and pilot lights 53 and 54 are connected to contacts 130 and 128, respectively, and to a common conductor 90. Suitable resistances 134 may be provided in series with the pilot lights to properly reduce the applied voltage. Contacts 129 and 131 are interconnected by a conductor 135, to which and the conductor 90 is connected the volt meter 52 and the heating coil 110 of the thermal relay 55.

When the device is set in operation, the individual curl heaters are properly positioned about the individual wound curls, the time switch 50 is set to interrupt the current supply at the completion of of the proper heating period and either or both of the main secondary switches 56 and 57 are closed to supply current to the individual heaters receiving their power from the bus bars 60, 61, 62. The pilot lights 53 and 54 show which of the branch circuits is supplied with current, and the volt meter 52 is read to determine whether the proper voltage is being delivered. If necessary, the regulating switch 51 is adjusted to bring the secondary voltage to the desired value. The closure of either of the main switches 56 or 57 energizes the heating coil 110 of relay 55, and after a predetermined time, the bi-metal strip 112 is moved into contact with contact 116 cutting in the additional turns of the primary winding 21 and reducing the secondary voltage so that the heating of the curls continues at a substantially uniform temperature, just enough current being supplied at the reduced voltage to compensate for the normal heat radiation of the heaters.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What we claim is:—

1. A permanent waving machine including in combination a common bus bar, a plurality of adjacent bus bars, a transformer having one terminal connected to the common bus bar, a plurality of switches through which the other transformer terminal is connected to the other bus bars, a thermal relay controlling the primary winding of the transformer to reduce the secondary voltage after a short period of operation and a plurality of permanent waving heaters connected to said common bus bar and to one or the other of the adjacent bus bars.

2. A permanent waving machine including in combination a common bus bar, a plurality of adjacent bus bars, a transformer having one terminal connected to the common bus bar, a plurality of switches through which the other transformer terminal is connected to the other bus bars, a thermal relay connectable to either of two taps in the primary winding of the transformer for varying the secondary voltage, and a plurality of permanent waving heaters connected to said common bus bar and to one or the other of the adjacent bus bars.

3. In a permanent waving heating machine, the combination of a plurality of individual curl heaters and means for supplying current to said heaters at either of two voltages, including a transformer having a tapped primary, a heating resistance energized by current from the secondary of the transformer, a relay thermally actuated by the heat of said resistance to vary the primary connection from one tap to another, said resistance and relay cooperating to reduce the secondary voltage after a predetermined period.

4. In a permanent waving heating machine, the combination of a plurality of individual curl heaters, and means for supplying current to said heaters at either of two voltages, including a heating resistance, a relay thermally actuated by the heat of said resistance and connected to reduce the voltage upon heating of the resistance, said relay including a bimetal strip moved relatively closer to the resistance by heating to reduce the voltage.

5. In a permanent waving heating machine, the combination of a plurality of individual curl heaters, and means for supplying current to said heaters at either of two voltages, including a heating resistance, a relay thermally actuated by the heat of said resistance and connected to reduce the voltage upon heating of the resistance, said relay including a thermosensitive element moved towards said resistance on heating whereby the voltage remains reduced for the remainder of the heating period.

WILLIAM A. V. THOMSEN.
C. G. GROSS.