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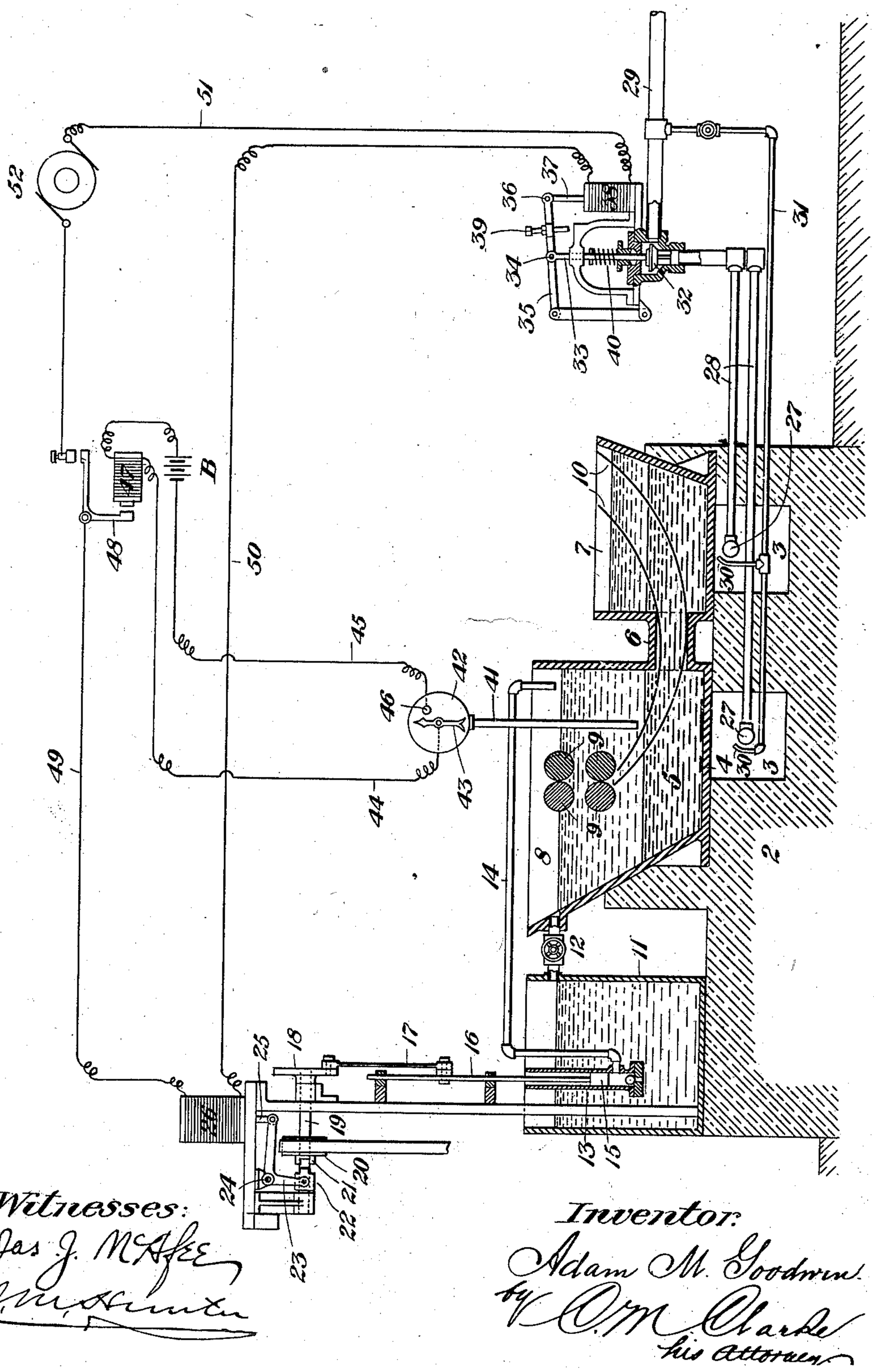
A. M. GOODWIN.

TEMPERATURE REGULATING APPARATUS.

APPLICATION FILED JULY 22, 1903.

NO MODEL.



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UNITED STATES PATENT OFFICE.

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TEMPERATURE-REGULATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 752,768, dated February 23, 1904.

Application filed July 22, 1903. Serial No. 166,535. (No model.)

To all whom it may concern:

Be it known that I, ADAM M. GOODWIN, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Temperature-Regulating Apparatus, of which the following is a specification, reference being had to the accompanying drawing, forming part of this application, which shows in sectional elevation a tin-coating apparatus provided with my improved temperature-controlled fuel and oil supply regulating device.

My improvement relates to apparatus for coating sheet-iron with tin; and it has for its object to automatically regulate the temperature of the metal-bath and also of the superimposed body of oil, so as to prevent too rapid deterioration, deoxygenation, or destruction of the oil due to the excessive heat. Ordinarily the temperature of the oil should be maintained at from 375° to 395° Fahrenheit, and if the temperature materially exceeds such a degree the waste of oil becomes excessive, resulting in considerable loss. My invention is designed to prevent such loss, so that the apparatus may be continuously operated as economically as possible.

Referring now to the drawing, wherein the invention is illustrated, 2 represents a furnace structure having the combustion chamber or chambers 3, above which is set the tank 4, containing the bath of molten metal 5 and provided with a transverse depressed bridge 6, extending somewhat below the normal level of the metal-bath. The purpose of this construction is to provide separate oil-compartments 7 8, in which are contained separate bodies of oil resting upon the surface of the molten metal. Within the compartment 8 are located one or more pairs of feed-rollers 9 9, to which by guides 10 the plate is directed after having been introduced downwardly into the first compartment 7.

The foregoing construction is well known and does not, *per se*, form any portion of my present invention.

11 is a tank or reservoir containing oil connected with the chamber 8 by a pipe 12, preferably provided with a valve, which allows the hot oil in chamber 8 to flow back to tank 11 when cold oil is introduced, the hot oil always remaining at the top. For the purpose of supplying cold oil to the chamber 8, either to renew the supply therein or to reduce the temperature of the oil in said chamber, I have provided a pump 13 of any suitable construction, from which by a pipe 14 the oil may be conveyed to the chamber 8 whenever desired. The plunger or piston 15 of the pump 13 is connected by its rod 16 with a pitman 17, attached to a driving-crank 18, mounted on shaft 19.

20 is a driven pulley loosely mounted on shaft 19 and provided with a clutch portion 21, with which a sliding clutch 22, splined to shaft 19, is adapted to engage, so that when the clutches are brought into engagement the pump will be actuated and cold oil caused to flow into the chamber 8.

23 is a bell-crank lever pivoted at 24, one arm of which lever engages clutch 22, while to the other end is attached a bar 25, provided with an armature adapted to be moved by a solenoid-magnet 26. When the magnet is energized, the clutches will be engaged, resulting in the desired feeding of the oil.

Located in the furnace chamber or chambers 3 are fluid-fuel burners 27, supplied by pipes 28 from a main 29, pilot-light burners 30 being also connected with the main by pipe 31. The supply of fuel to the burner is controlled by one or more valves 32, interposed in the line of pipe and provided with a stem 33, connected at 34 with a lever 35, connected at 36 with a bar 37 of the armature of a solenoid-magnet 38. The bar 35 is provided with a temper-screw 39, by which its downward motion may be arrested or gaged, the stem 33 also being provided, if desired, with a coiled spring 40, by which the valve will be normally raised from its seat.

Immersed in the bath of oil within the chamber 8 is the bar 41 of a pyrometer having the usual indicating-dial 42 and needle or indicator 43. To the indicator at the center in any

suitable manner is connected one of the conductors, 44, of an electric circuit, the terminal of the other conductor, 45, being provided with a contact-point 46, with which the indicator or a supplemental contact-arm actuated thereby will make contact when the oil in chamber 8 has been heated to an excessive degree. A circuit is then established through battery B, energizing magnet 47, which in turn actuates armature 48, so as to close a circuit through the conductors, which energizes the main magnets 26 and 38. These magnets are connected in series by suitable conductors 49, 50, and 51 with a generating source of electrical energy 52, as a dynamo.

It will be understood that either of the magnets 26 or 38 may be cut out, so as to operate the fuel-burners 27 or the pump 13 alone, and such an operation is contemplated by my invention, although ordinarily the best results may be had by controlling the flow of fuel and the supply of oil at the same time.

In place of pumping oil into the chamber 8 the pump may be adapted to supply a stream of cold air or other cooling fluid into the bath of oil, and I reserve the right to such adaptation of the invention.

The operation is as follows: The temperature of the oil in chamber 8 having been raised above the normal or desired heat, so as to cause the pyrometer-contacts to be established, the magnet 26 becomes energized, throwing in the clutch and causing the pump to supply cold oil, thereby immediately reducing the temperature of the main bath in chamber 8. Simultaneously, by the energy of magnet 38, the valve 32 is seated or lowered, cutting off the supply of fuel to the burner, permitting the temperature of both the metal 5 and the superimposed oil to be reduced by natural radiation. After the temperature of the oil has been sufficiently reduced the pyrometer will operate to break the circuit, whereupon the pump 13 will cease to operate and the fuel-supply will be reëstablished. These conditions will continue until the oil again becomes too hot, when the operation will be repeated and continue as long as the apparatus is in use.

The device is very efficient and reliable in operation, it is simple and economical in construction, and is found to effectually reduce the cost of tinning plates on account of the great saving of oil.

While the apparatus as constructed has given good results, I do not desire to be limited to the exact design or details of construction or arrangement of the parts, as it is obvious that various changes or modifications may be made therein by the skilled mechanic, and all such are to be considered as within the scope of the following claims.

Having described my invention, what I claim is—

1. The combination with a melting-tank provided with means for coating sheet metal, and a heating device therefor, of a valve adapted to control the supply of fuel to the heating device, a magnet connected with said valve, and a circuit for the magnet, with means actuated by variations in the temperature of the contents of the melting-tank for making and breaking the circuit through said magnet, whereby the contents of the tank are maintained and applied to the sheet metal at a constant temperature, substantially as set forth.

2. The combination with a melting-tank provided with means for coating sheet metal, and a heating device therefor, of a valve adapted to control the supply of fuel to the heating device, a magnet connected with said valve, a circuit for the magnet, and a pyrometer immersed in the contents of the melting-tank and provided with terminals of said circuit adapted to be connected by operation of the pyrometer, whereby the contents of the tank are maintained and applied to the sheet metal at a constant temperature, substantially as set forth.

3. The combination with a melting-tank provided with means for coating sheet metal, of a device for furnishing fluid thereto, means for actuating said device, and means controlled by variations in the temperature of the contents of the tank for controlling said actuating means, whereby said fluid will be maintained at substantially the same temperature, substantially as set forth.

4. The combination with a melting-tank provided with means for coating sheet metal, of a device for delivering fluid thereto, means for intermittently actuating said device, a magnet and lever adapted to control the operation of said means, and means adapted to be actuated by variations in the temperature of the contents of the tank for making and breaking a circuit through said magnet, whereby said fluid will be maintained at substantially the same temperature, substantially as set forth.

5. The combination with a melting-tank provided with means for coating sheet metal, of a device for delivering fluid thereto, means for intermittently actuating said device, a magnet and lever adapted to control said means, and a pyrometer immersed in the contents of said tank and provided with circuit-terminals adapted to be connected and disconnected by operation of the pyrometer, whereby a circuit is established and broken through said magnet to control the actuating means, substantially as set forth.

6. The combination with a melting-tank provided with means for coating sheet metal, of a supplemental reservoir, a pump therefor provided with a supply-pipe for the tank, a driving-shaft and operating connections for the pump, a driving-pulley and friction-clutch mechanism, a lever connected therewith, a magnet provided with an armature connected with said lever, and means controlled by va-

riations in the temperature of the contents of the tank for making and breaking a circuit through said magnet to control the operation of the pump, substantially as set forth.

7. The combination with a melting-tank provided with means for coating sheet metal, of a supplemental reservoir, a pump therefor provided with a supply-pipe for the tank, a driving-shaft and operating connections for the pump, a driving-pulley and friction-clutch mechanism, a lever connected therewith, a magnet provided with an armature connected with said lever, a generator connected with said magnet, an intervening switch, a magnet adapted to actuate said switch, and a pyrometer provided with contact-terminals and connections to said magnet, whereby the main circuit is established or broken by variations in the temperature of the contents of the tank, substantially as set forth.

8. The combination with a melting-tank provided with means for coating sheet metal, of a heating device therefor and means for supplying fluid to the tank, a magnet for controlling the fuel-supply, a magnet for controlling the operation of the fluid-supplying means, a generator connected in series with said magnet, a switch, a magnet adapted to actuate said switch, and a device controlled by variations in the temperature of the contents of the tank and provided with contact-terminals, with connections therefrom to said controlling-magnet, whereby the contents of the tank will be maintained at substantially the same temperature, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

ADAM M. GOODWIN.

Witnesses:

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