K. WEST.

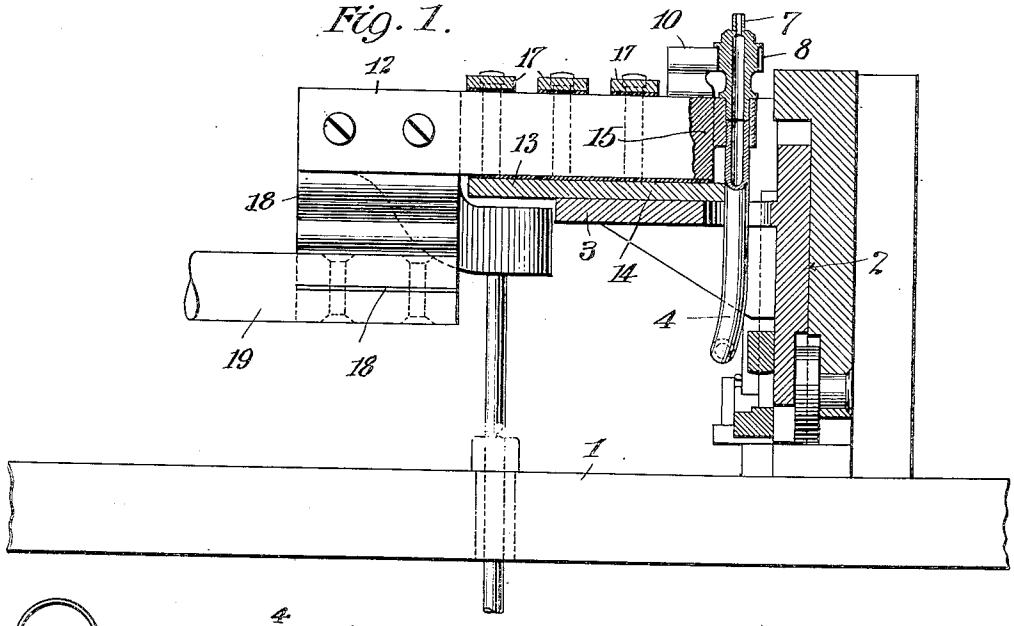
APPARATUS FOR CASTING MOLTEN MATERIAL.

APPLICATION FILED DEC. 28, 1905.

964,722. Patented July 19, 1910.

2 SHEETS—SHEET 1.

Fig. 1.



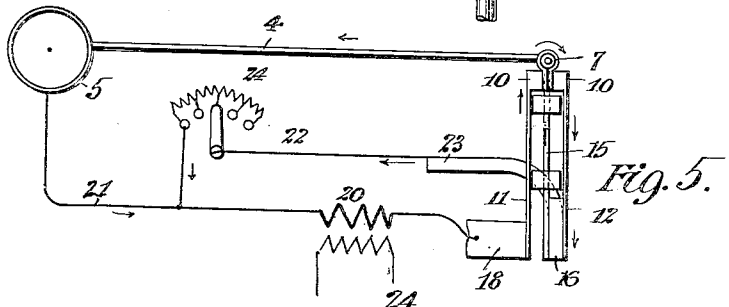
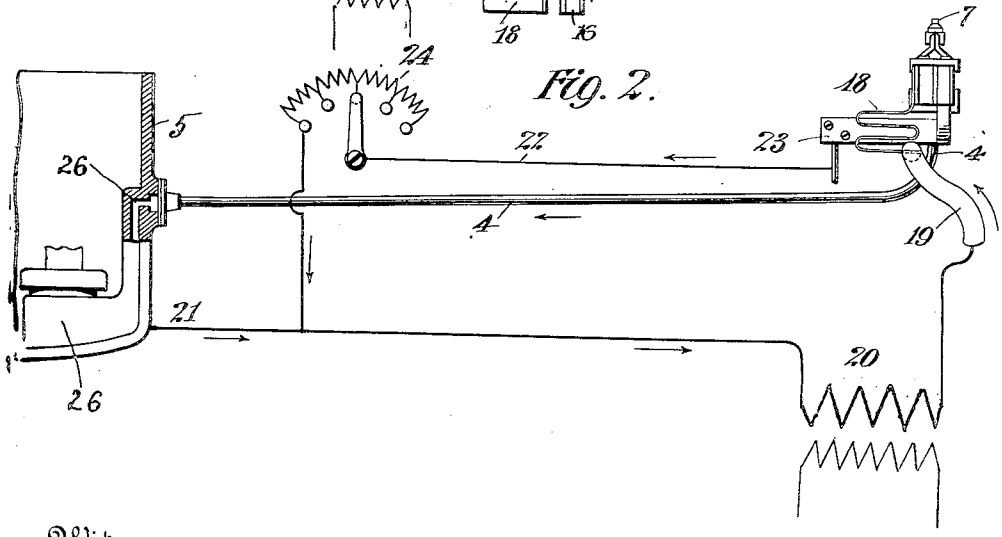


Fig. 5.

Fig. 2.



Witnesses

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2 SHEETS—SHEET 2.

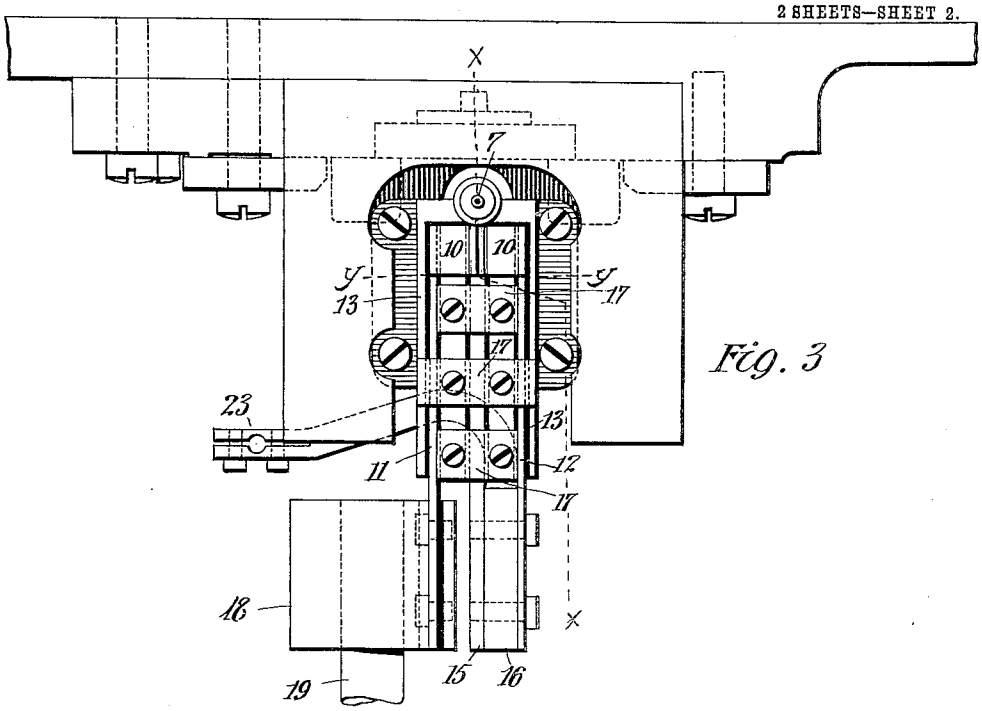

Fig. 3

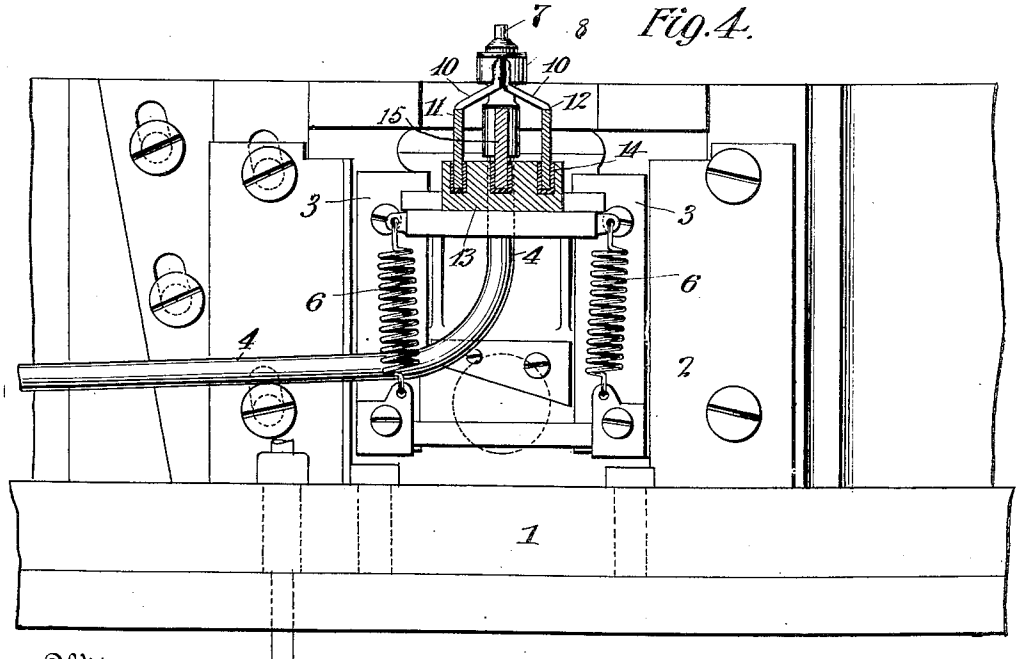

Fig. 4.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR CASTING MOLTEN MATERIAL.

964,722. Specification of Letters Patent. Patented July 19, 1910.

Application filed December 28, 1905. Serial No. 293,649.

To all whom it may concern:

Be it known that I, KIRKE WEST, a citizen of the United States, residing in the borough of Manhattan, New York city, county and State of New York, have invented certain new and useful Improvements in Apparatus for Casting Molten Material, of which the following is such a full, clear, and exact description as will enable any one skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to type casting and soft metal founding and pertains particularly to an apparatus for preventing the molten metal from cooling and hardening in the duct or pipe which connects the melting pot with the mold, and at the same time regulating or controlling the degree of heat of different parts of the mechanism.

In U. S. Patent No. 530,479, granted to G. A. Goodson, Dec. 4th, 1894, there is set forth an apparatus for heating the duct or pipe by a current of electricity, but no means is provided for regulating the degree of heat applied and maintained at different parts of the duct.

It is desirable to maintain a higher temperature at the nozzle or discharge-end of the tube, than at other points thereof, since the tendency of the metal to cool and harden is greater there than elsewhere, and the object of this invention is to provide means for heating the duct as a whole and for varying the proportion of such heat applied to the nozzle, as conditions may require.

A further object of the invention is to provide an electrical apparatus for this purpose which shall be simple, convenient, and efficient in operation.

With these and other objects in view, my invention consists in the construction, combination, location and arrangement of parts, all as will be more fully hereinafter set forth, and then particularly pointed out in the appended claims.

I have illustrated a type of my invention in the accompanying drawings, wherein; Figure 1 is a detail view of part of a casting machine partly in section, the section being along line *x*—*x* of Fig. 3. Fig. 2 is a side elevation showing a diagram of circuits embodying the principles of my invention. Fig. 3 is a top plan view. Fig. 4 is a side elevation partly in section, the section being along line *y*—*y* of Fig. 3. Fig. 5 is a plan view on a small scale of the essential features of my invention.

In carrying out my present invention, I make use of an electric current of considerable strength, preferably obtained from a step-down transformer, and I arrange to have this current flow through the duct and around the nozzle, so as to retain these parts at the proper high temperature. I also provide means whereby the nozzle may be kept at a high degree of temperature, independently of the main duct.

Referring now to the drawings, in which like parts are designated by the same reference sign wherever they occur, 1 denotes the main frame or casing of the machine having vertical ways or guides 2 thereon, in which slides the carrier 3, for the usual molten metal duct 4. As shown in Fig. 2, this part extends transversely from the melting pot 5, and has sufficient resiliency along its length to permit the requisite up and down vibratory movement. At the melting pot the duct 4 is connected by a port passage 25 with the interior of the cylinder of a pump 26. 6 indicate springs by which the nozzle carrier is normally held in its depressed position. These parts constitute the ordinary and well-known construction of the Goodson apparatus and form no part of the present invention.

At the outer end of the duct 4 is the nozzle 7. This nozzle is closely embraced by a strap 8 of suitable electrical conducting material and is insulated from the nozzle by a suitable insulating material, such as mica, but preferably by a coating of oxid, which latter is sufficient for the purposes. The ends of the strap 8 are brought together, as shown in Figs. 3 and 4, and each is then turned down to form a block or part 10. The blocks 10 are connected one to the metal strip 11 and the other to the metal strip 12 to either side of the nozzle. The ends of the strap portion where they join the blocks 10 are insulated in any suitable manner.

The bars 11, 12 are supported in cavities in a base 13, being insulated therefrom by any suitable material 14, and I also provide

a similarly supported and insulated central bar 15 which extends forwardly so as to embrace the nozzle and form an efficient electrical connection therewith. The bars 12 and 15 are electrically connected by a metallic piece 16, as clearly illustrated in Fig. 3.

17, 17, denote insulated straps which are screwed to the base 13, and extend across the various bars so as to firmly hold them in position.

The outer end of the bar 11 has fastened thereto a sinuous or convoluted strap 18, extending downward therefrom in a number of folds or bends, and at its lower end is joined to a fixed conductor or lead 19 from a transformer, or other source of current 20. The other terminal of the transformer is connected to the metal pot which is insulated from the frame of the machine.

In addition to the electrical connections above described, I provide an additional circuit 22 from an extension 23 on the metallic piece 16 above mentioned, to the terminal 21 of the current source 20. In this circuit I include a variable resistance or rheostat 24.

The operation is as follows: The machine being put in operation, the molten metal from the melting-pot 5 passes through the duct 4, and up into the nozzle 7 where it enters the mold at each actuation of the machine. At the same time current from the transformer 20 passes through the lead 19, strap 18, bar 11, blocks 10 with their connected strap 8, heating the latter, bar 12, piece 16, where the circuit divides, part of the current returning through the central bar 15 and duct 4, and part returning through the connection 22, and resistance 24. In this way the nozzle is heated, and the current passing through the duct 4 serves to maintain its temperature at a greater or less degree, as desired. The proportion of the heat applied to the nozzle and to the duct 4 can be accurately regulated by manipulating the rheostat 24, which varies the relation of the two branches of the divided circuit and the individual circuit on conductor 19 is regulated by variable resistance on primary side of transformer 20. It is evident that my apparatus does not effect the usual movements of the nozzle on account of the flexible strap 18, and the horizontal direction of the transverse lead 22. I might add that in the actual practice in the use of this arrangement of the electric circuits, I have employed a current of from about 80 to 85 amperes with a voltage of from 1 to 1½ on the heating circuit, under which conditions the main duct 4 can be kept down to a temperature of from about 550 to 650 F., which is quite sufficient for it, while the nozzle 7 is maintained at from about 900 to 1100 degrees F., thereby constantly maintaining the necessary high degree of heat at the point where the molten metal is injected into the mold. One of the important advantages of this particular arrangement is that the main duct 4, which extends over a large part of the apparatus is not kept at such a high degree of heat as to affect the adjacent parts of the mechanism, as would be the case if the very high degree of heat required for the injecting nozzle were maintained substantially throughout the main duct.

Having thus described my invention what I claim is:—

1. In a metal founding apparatus, a duct having a nozzle, a strap surrounding said nozzle, and means for passing a current through a divided circuit including said strap, one branch of which includes said duct.

2. In a metal founding apparatus, a duct having a nozzle, a strap circumferentially surrounding said nozzle and having connections with a transformer, and a branch circuit including said duct.

3. In a metal founding apparatus, a duct having a nozzle, a strap surrounding said nozzle, a pair of conducting bars projecting from said strap, a central bar connected to the nozzle, and means whereby the current from a suitable source is led through said strap and central bar.

4. In a metal founding apparatus, a movable carrier having a nozzle and a transversely extending duct, a strap having a flexible connection, surrounding said nozzle, and means for passing an electric current through said strap and through said duct.

5. In a metal founding apparatus, a movable carrier having a nozzle, a strap surrounding said nozzle, a sinuous strip connected to said strap, and connections between the strap and duct whereby a complete electric circuit is formed through said parts.

6. In a metal founding apparatus, a carrier having a nozzle, a base having insulated bars thereon in proximity to said nozzle, and a conducting strap connecting said bars and passed around said nozzle for heating the same.

7. In a type casting machine, a pump for forcing metal into a mold, a conduit from the pump to the mold, a source of heat, and means whereby the end of the conduit near the mold may receive a greater amount of heat than other parts of the conduit.

8. In a type casting machine, a pump for forcing metal into a mold, a conduit for the metal from the pump to the mold, and means whereby some parts of the conduit may receive a greater amount of heat than other parts of the conduit.

9. In a type casting machine, a pump for forcing metal into a mold, a conduit for the metal from the pump to the mold, an electrical heater, means whereby some parts of

the conduit may receive a greater amount of heat from said heater than other parts of the conduit.

10. In a type casting machine, a metal pot, a metal pipe or connection for the fluid metal from the pot to a mold, a nipple on the delivery end of the pipe, a metal band on the nipple but insulated therefrom, the pipe being in circuit with a source of current, whereby the metal within the pipe is maintained at a desired temperature, and the nipple band being in a second heating circuit, whereby the metal within the nipple is likewise maintained at a desired temperature, and means for regulating the currents in the two circuits to adjust independently the temperature of the pipe and the nipple.

11. In a type casting machine, a metal pot, a metal pipe or connection for the fluid metal from the pot to a mold, a nipple on the delivery end of the pipe at the mold, a metal band on the nipple, the band being insulated from the nipple by a film of metallic oxid, and being in circuit with a source of current, whereby by virtue of the resistance offered to the current by the band, the metal within the nipple is maintained at a desired temperature.

12. In a type casting machine, a pump for forcing fluid metal into a mold, a conduit for the fluid metal from the pump to the mold, a heater for the end of the conduit at the mold, and another heater for the rest of the conduit.

13. In a type casting machine, a pump for forcing fluid metal into a mold, a conduit for the fluid metal from the pump to the mold, means providing an electrical heating current for the end of the conduit at the mold, and means for providing a different electrical heating current for other parts of the conduit.

In testimony whereof, I have hereunto set my hand in the presence of the two subscribing witnesses.

KIRKE WEST.

Witnesses:
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J. MCCULLOCH.