June 20, 1939. H. W. STUART ET AL 2,162,829

MOLD COATING MECHANISM FOR METALLIC CENTRIFUGAL PIPE MOLDS

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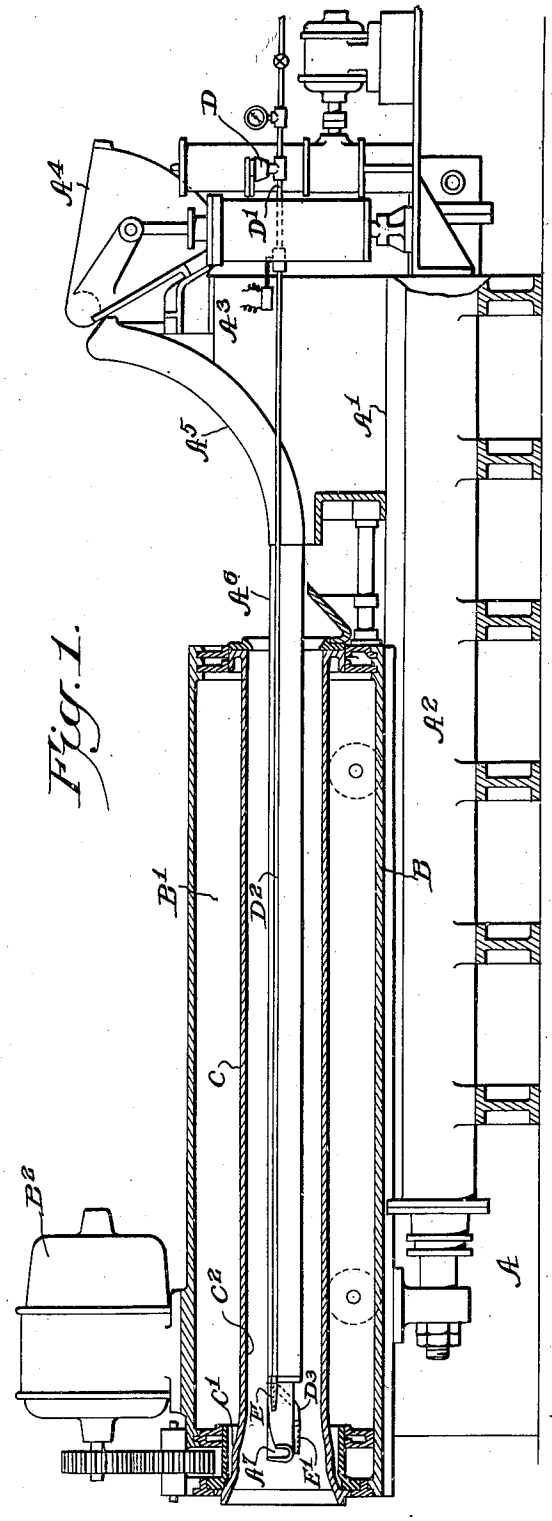

Fig. 1.

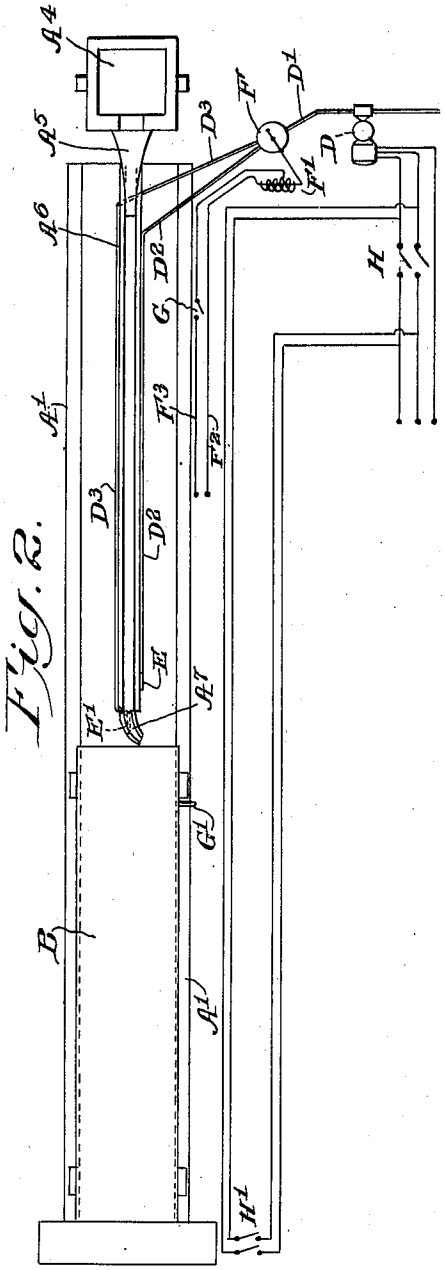

Fig. 2.

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Fig. 4.

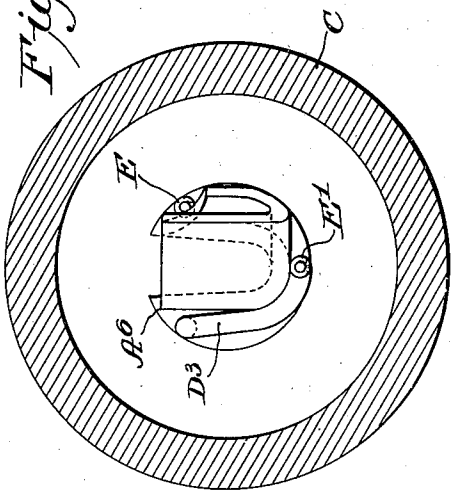


Fig. 5.

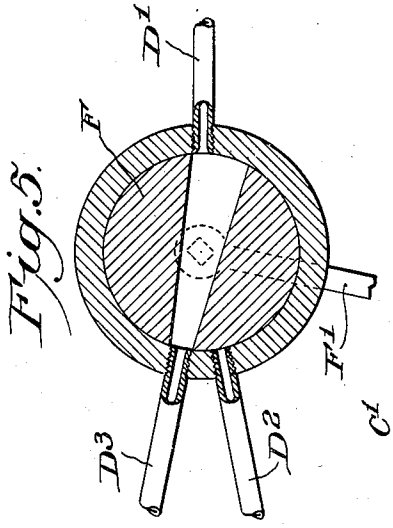
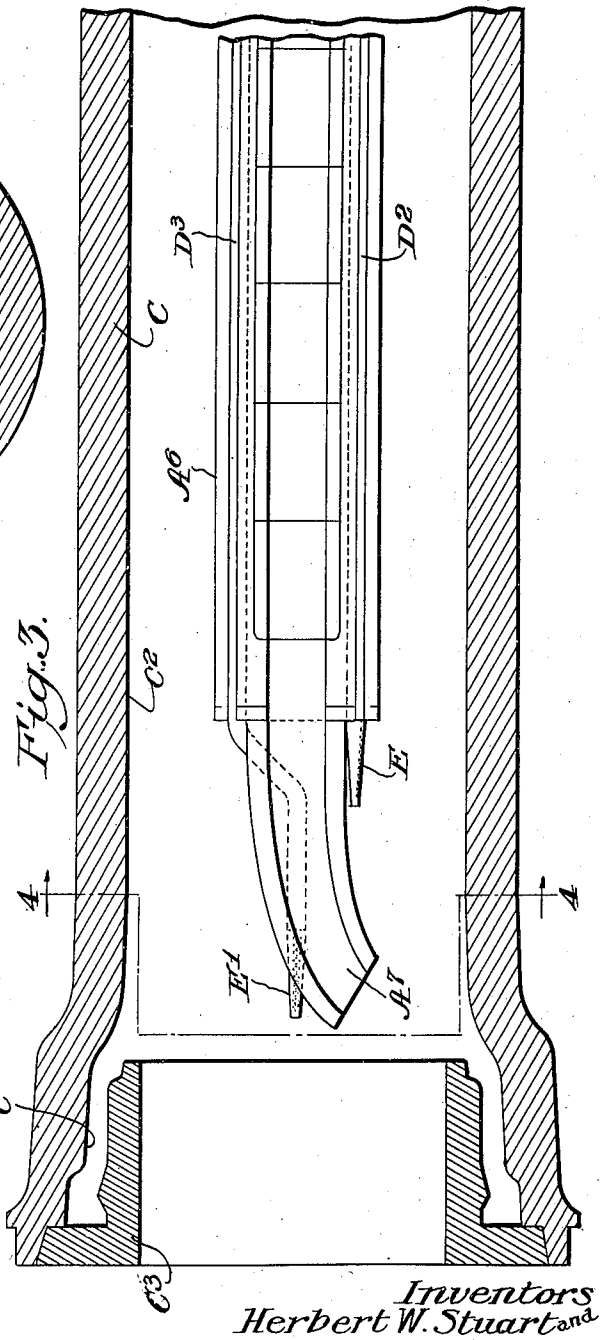


Fig. 3.



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UNITED STATES PATENT OFFICE

2,162,829

MOLD COATING MECHANISM FOR METALLIC CENTRIFUGAL PIPE MOLDS

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3 Claims. (Cl. 22—65)

Our invention relates to pipe casting and mold coating apparatus of the general character of that described in the Russell and Langenberg Patent 1,949,433, comprising a relatively retractable metallic centrifugal pipe mold, a runner for delivering molten metal to said mold progressively as the mold is retracted with regard to the runner and means for directing a jet of carrier gas charged with finely divided particles of mold coating material against the inner surface of the mold as it is retracted and in advance of the contact of the molten metal delivered by the runner to the coated portions of the mold. In the construction and operation of the apparatus as described in the said patent, it has been found advisable to so locate the jet nozzle for the carrier gas that the jet of carrier gas will not impinge to any considerable extent upon the surface of the molten metal being built up upon the surface of the mold and, for example, in the case of a bell ended mold, the jet nozzle would be located so far from the spout through which the molten metal issues from the runner that when the spout is in position to deliver molten metal to the bell the nozzle will be so far removed as not to properly coat that portion of the cylindrical portion of the mold immediately adjacent to the bell and while it is theoretically practical to so manipulate the mold that this portion can be coated before the pouring of the metal begins, such manipulation would require much skill on the part of the operator and considerable delay in the casting operation as a whole and the object of our invention is to provide improved means whereby such manipulation and loss of time can be avoided while, at the same time, all portions of the cylindrical portion of the mold can be provided with a continuous coating and, in the case of a bell ended mold, a useful amount of coating material introduced into the bell and, generally speaking, our invention consists in providing in a machine of the character indicated, in addition to the jet nozzle used in the coating of the major portion of the mold and located so far in the rear of the spout as to avoid the impingement of any major portion of the jet upon the metal delivered to the mold, a second jet nozzle located close to the delivery end of the spout and so that, in the case of a bell ended mold, this additional jet nozzle will be in position to direct its jet of charged carrier gas against the end of the cylindrical portion of the mold adjacent to the bell when the spout is in position to deliver molten metal to the bell; our invention further comprehending the provision of means for initiating and cutting off the current of charged carrier gas from either jet nozzle at will. By preference, we connect both jet nozzles with a common source of a current of charged carrier gas and provide a switch-like valve by which said current can be directed at will to either jet nozzle.

While our invention is especially adapted for use in connection with bell ended pipe molds, it is also usable for straight cylindrical molds in that it enables the entire mold surface to be properly coated in advance of the casting with a minimum of manipulation of the parts or use of extraneous means to apply coating to the end portion of the mold.

Our invention and its mode of operation will be best understood as described in connection with the drawings forming part of this specification in which

Figure 1 is a longitudinal sectional elevation of the pipe casting and mold coating apparatus with the runner for molten metal shown in full and the jet nozzles for charged carrier gas shown in proper relative position, the apparatus being in the position in which the spout of the runner is located when delivering molten metal to the bell portion of the mold. It will be understood that in the casting of pipe in a bell ended mold a core, not shown in our drawing, is inserted in the bell end of the mold.

Figure 2 is a diagrammatic plan view of the apparatus indicating the wiring and electric switches for the control of the charged stream of carrier gas, including a switch-like valve for shifting the current of charged gas from one jet nozzle to the other.

Figure 3 is a horizontal section on an enlarged scale through the bell end of the mold and adjacent cylindrical portion thereof, showing also the position of the spout of the runner and of the two jet nozzles for carrier gas as they are relatively located at the beginning of the pouring operation.

Figure 4 is a cross-section on the line 4—4 of Fig. 3, and

Figure 5 is a sectional view of the switch valve.

A indicates the base of the machine supporting tracks, as indicated at A^1, for the mold carriage, a cylinder A^2 for imparting longitudinal motion to the mold, a column A^3 for supporting a ladle, indicated at A^4, and a chute A^5 for delivering molten metal to a runner A^6, also supported at its end on the base of the machine. B indicates the mold carriage supporting a water

box B^1 and means for supporting the centrifugal mold indicated at C and also supporting a motor B^2 for rotating the mold. The mold C, as indicated, has a bell portion, as indicated at C^1, and a cylindrical portion, indicated at C^2, and in use is provided with a core at its bell end, as indicated at C^3 in Fig. 3. At D we have indicated apparatus for leading finely divided mold coating material to a jet of carrier gas, as is indicated in the Russell and Langenberg Patent 1,949,433, D^1 indicating a pipe secured to the runner for conveying the current of charged carrier gas to the jet nozzles by means of which the mold is coated. As shown, the pipe D^1 is forked, as indicated at D^2, D^3, the pipe D^2 leading to the jet nozzle E located in the usual space at such a distance in the rear of the spout of the runner that the coating material delivered by it will not impinge to any material extent upon the molten metal as it is built up upon the surface of the mold. To the extent above indicated and with the exception of the fork in the pipe D^1, the apparatus is practically identical with that shown and described in the Russell and Langenberg Patent, 1,949,433, and need not, therefore, be more particularly described.

In our improved construction we locate a second jet nozzle, indicated at E^1, close to the delivery end of the spout of the runner which we have indicated at A^7, locating it preferably close to and to one side of the spout and, as shown, the pipe D^3 leads to this jet nozzle and a switch valve F is located at the fork of the pipe system for shifting the current of carrier gas from the pipe D^2 to the pipe D^3 or from pipe D^3 to D^2. At F^1 we have indicated electro-magnetic means for shifting the valve F and, as shown, we have indicated that this electro-magnetic means is energized and controlled by current delivered through the wires F^2 and F^3, connected to a source of electricity, not shown, by means of a limit switch indicated at G and actuated by a finger G^1, secured to the mold, and so located that as the mold passes through the position in which it is adapted to receive molten metal at its bell end the electro-magnetic means will be actuated to shift the valve F to the position in which it will connect the pipes D^1 and D^3 and as the mold begins its movement over the runner the valve will be shifted to connect the pipes D^1 and D^2.

As is the usual practice, our improved apparatus involves the regulation and control of the feed of finely divided dry coating material by an operator located in the neighborhood of the ladle end of the apparatus as by a system of electric switches, indicated at H, and also by an operative located near the other end of the machine by another system of switches, as indicated at H^1.

In operation the mold is first brought to the position indicated in Fig. 1, with the spout A^7 of the runner A^6 in position to deliver molten metal into the space between the core C^3 and the end of its bell portion C^1. In moving to this position the finger G^1 actuates the limit switch G to connect the pipes D^1 and D^3. After placing the core in the mold the operator at that end of the machine, through the switches indicated at H^1, sets the feeding mechanism in operation with the result that the nozzle E^1 deposits upon the end of the cylindrical portion C^2 of the mold adjacent to the bell a band of coating material and at the same time directs a portion of its coating material into the bell of the mold. When the coating has reached the proper thickness the feeding mechanism can be stopped and the ladle A^4 operated to deliver metal to the chute A^5 and the runner A^6 or, instead of stopping the feed mechanism, it may be kept in operation until the molten metal is actually issuing through the spout of the runner and poured sufficiently to fill the bell of the mold. As soon as the bell portion of the mold is filled with molten metal the mold is given an outward movement over the runner and, through the finger G^1, trips the limit switch G so as to actuate the electro-magnetic means to shift the valve F to connect the pipes D^1 and D^2 and, the feeding mechanism being in full operation, the supply to the front nozzle E^1 is cut off and the coating material is delivered through the rear nozzle E so that at the beginning of its operation the coating formed by it will contact with the band of coating deposited on the end of the cylindrical portion of the mold by the front nozzle E^1 and thereafter progressively coat the mold as the casting operation continues.

Having now described our invention, what we claim as new and desire to secure by Letters Patent, is:

1. In a centrifugal pipe casting machine comprising a rotatable mold of cylindrical form, a runner for delivering molten metal to the mold having a spout at its end through which the metal issues, means for imparting relatively reciprocable motion to said runner and mold and means for projecting a jet of carrier gas charged with particles of finely divided dry mold coating material progressively against the inner surface of the mold, the improvement which consists in securing to the end of the runner a jet nozzle for charged carrier gas positioned close to the delivery end of the spout of the runner and so as to direct its jet against the end portion of the cylindrical portion of the mold when the mold is in starting position and in also securing to the runner a second jet nozzle for charged carrier gas located at the rear of said first named nozzle and at such a distance therefrom that the front edge of the coating deposited by it upon the mold will contact with the rear edge of the coating deposited upon the mold by the first named nozzle, said carrier gas nozzles being connected with means for providing them with currents of charged carrier gas and control mechanism whereby the currents of charged carrier gas can be initiated and cut off from either jet nozzle at will.

2. In a centrifugal pipe casting machine comprising a rotatable mold of cylindrical form provided with a bell end, a runner for delivering molten metal to the mold having a spout at its end through which the metal issues, means for imparting relatively reciprocable motion to said runner and mold and means for projecting a jet of carrier gas charged with particles of finely divided dry mold coating material progressively against the inner surface of the mold, the improvement which consists in securing to the end of the runner a jet nozzle for charged carrier gas so positioned with regard to the spout of the runner that when the said runner spout is in position to deliver molten metal to the bell portion of the mold the carrier gas nozzle will be in position to direct its charged jet of carrier gas against that portion of the cylindrical surface of the mold immediately adjacent to the beginning of the bell portion of the mold and partly into said bell portion of the mold and in also securing to the runner a second jet nozzle for charged carrier gas located at the rear of said first named nozzle and at such

a distance therefrom that the front edge of the coating deposited by it upon the mold will contact with the rear edge of the coating deposited upon the mold by the first named nozzle, said carrier gas nozzles being connected with means for providing them with currents of charged carrier gas and control mechanism whereby the currents of charged carrier gas can be initiated and cut off from either jet nozzle at will.

3. Apparatus as called for in claim 1, comprising a single source of charged carrier gas and switch-like valve mechanism for directing the current of charged carrier gas from said source to either jet nozzle at will.

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