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METHOD FOR CASTING PIPES

Filed May 9, 1931

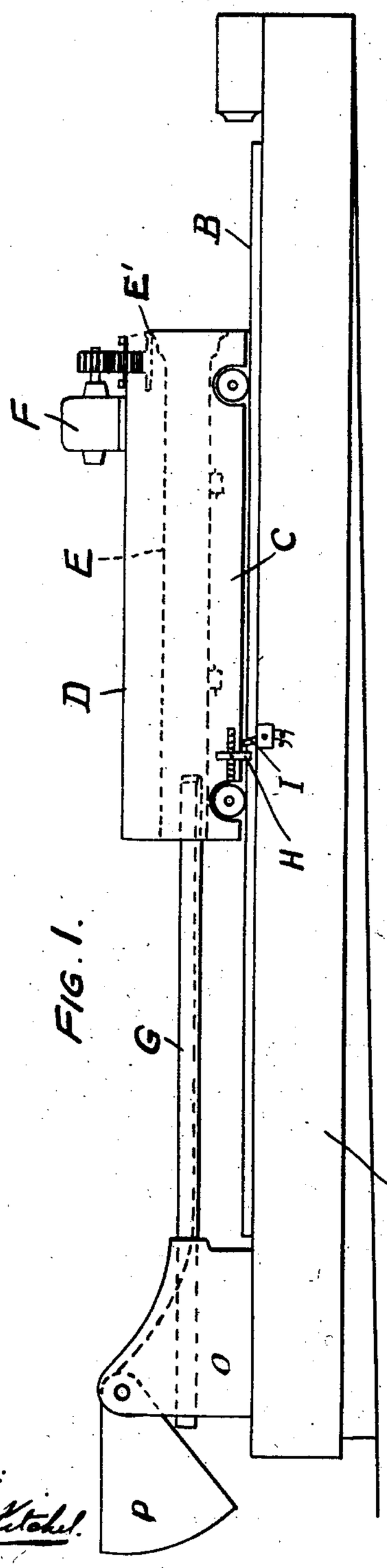

FIG. 1.

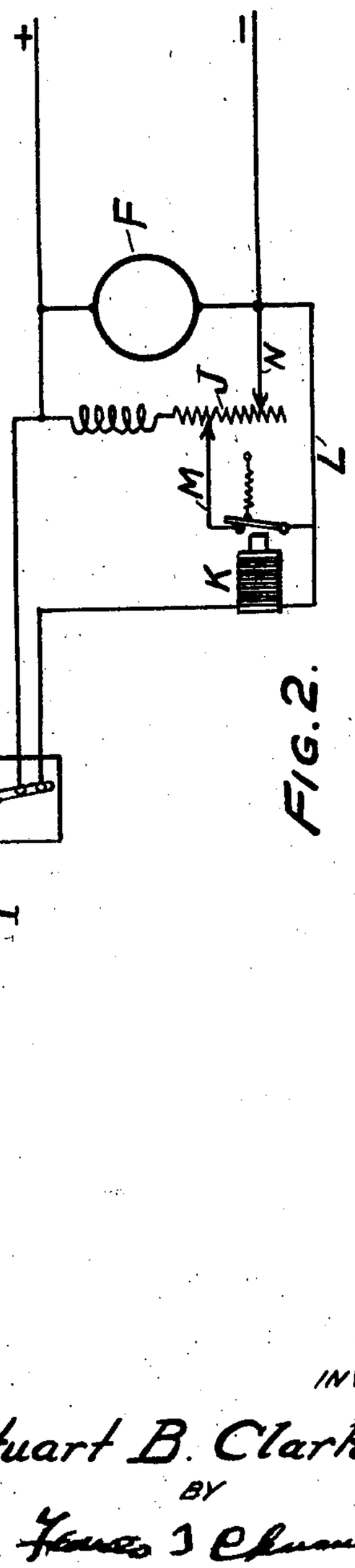

FIG. 2.

WITNESS:

INVENTOR

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UNITED STATES PATENT OFFICE

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METHOD FOR CASTING PIPES

Application filed May 9, 1931. Serial No. 536,159.

My invention has relation to the well known method of casting pipes in which their power driven rotatable mold is associated with a relatively retractable runner for delivering molten metal to the mold, which at the beginning of the casting operation is fully inserted in the mold so as to deliver metal to its remote end and which is retracted during the pouring operation so as to deliver the metal progressively throughout the length of the mold. A typical machine adapted for the practice of this method of casting pipes is described in Patent No. 1,746,374, granted to J. H. Uhrig, February 11, 1930. In the operation of such a machine it is customary to have the mold slightly tilted from the horizontal to facilitate the pouring operation and in consequence the flow of the metal delivered to the rotating mold is influenced not only by the centrifugal force applied to it by the rotating mold but also to some extent by gravity tending to cause the metal to flow in the direction of the lower end of the mold, so that there is a certain longitudinal shifting of the molten metal in the mold during the casting operation which is unobjectionable during the casting of the main body of the pipe but which during the casting of the final end of the pipe sometimes results in the thinning down of this end of the pipe to an objectionable extent.

While it is perhaps obvious that the tendency of the molten metal to flow longitudinally in the mold can be counteracted to a large extent by increasing the speed of rotation of the mold, it has been found that material increase in the rotative speed of the mold over that found to be efficient in practice brings about a tendency to slip between the mold and the casting, which is apt to result in a defective casting.

The object of my invention is to provide an improved method whereby the liability of the process as heretofore carried on to produce pipes with thin or defective final ends can be greatly diminished and this I have found can be accomplished by increasing the rotative speed of the mold during the pouring of the final end of the pipe only, so as to materially diminish the tendency to longitudinal downward flow of the metal during this stage of the casting operation and thereby insure that to a much greater extent than heretofore the metal poured into this final end of the mold will have a greatly diminished tendency towards gravital flow in the mold and I have discovered that this increased rotative speed of the mold during the final stage of the pouring of the pipe can be effected without material tendency to cause a slip between the mold and the casting. My invention therefore consists, broadly speaking, in the improvement in the described method of centrifugal casting of pipe which consists in increasing the rotative speed of the mold during the final stages of the pipe casting operation so as to counteract to a large degree the tendency of the metal to flow gravitally during this stage of the casting operation.

In practice I have found it desirable and practicable to increase the speed of rotation of the mold in many instances during the casting of the final end of the pipe to an extent of from 5 to 50% approximately of the normal speed of rotation during the greater part of the casting operation. The extent to which the mold rotation is increased and the location of such point of increase with reference to relative position of mold and runner depends largely on the fluidity of the iron and other variable characteristics of the iron and casting conditions. For a concrete example, in the casting of a six inch pipe I increase the speed of rotation during this stage of the casting operation from the normal speed of 500 revolutions per minute to 600 revolutions per minute, with the result that the production of defective pipes is materially reduced.

To provide for the most efficient application of my improved method I have devised automatically acting means for increasing the speed of rotation of the mold during the final stage of the pipe casting operation and for this purpose I provide a device arranged to operate in timed relation with the retractive movements of the mold and runner and so connected with the rotating driv-

ing means of the mold as to speed up this rotative means during this final stage of the casting operation this improved mechanism forms the subject matter of my divisional application, filed Nov. 5, 1931, Serial No. 573,085.

My invention will be better understood as described in connection with the drawing forming part of this specification, in which

Figure 1 is a diagrammatic illustration of a centrifugal pipe casting machine of the type to which my invention pertains and of automatic means for actuating the switch at a given point in the travel of the mold, and

Figure 2 is a diagrammatic showing of an electric system for controlling the speed of the motor.

In the drawing, A indicates the base of the machine which supports tracks or runners indicated at B, upon which a carriage C is movable, the tracks being inclined, as indicated, to an angle of about 2° to a horizontal plane. The carriage C supports a water box D, through which extends the centrifugal pipe mold E and the end E^1 of the mold is gear connected with a variable speed electric motor, indicated at F, so as to rotate the mold. G indicates the runner through which molten metal is poured into the mold, this runner being supported on the base of the machine by a frame O, which also supports the tilting iron ladle P. This runner is of such length that its delivery end when the carriage is moved to the extreme upper position extends nearly to the remote end of the mold. H is a switch operating finger, capable of longitudinal adjustment, secured to the mold carriage and I is an electric switch, mounted on the base A, and connecting electrically with the control panel of motor F. As shown in Fig. 2, the field of the motor has in series with it a variable resistance J. The switch I is normally closed, which energizes a solenoid switch K to hold it in closed position, and the field circuit is from the line through line L, switch K, line M, a portion of resistance J, the field and back to the other side of the line. The amount of resistance cut in here determines the speed of the motor, it being understood that the greater the resistance in the field circuit the greater the speed of the motor.

In operation, the mold, being moved to the position in which the runner extends through its length, is actuated at normal speed by the variable speed electric motor F and metal is delivered to the runner G by ladle P and passes through it to the remote end of the mold. The carriage supporting the mold is then retracted at regulated speed so that the pouring of the metal progresses throughout the length of the mold. When the carriage has reached the position in which the operating finger H engages the actuating arm of switch I, the circuit controlling switch K is broken. Thereafter the field circuit is compelled to take a path from the line through a variable connection N to the resistance J. This cuts in an adjustable amount of extra resistance and the motor speeds up as desired to rotate the mold more rapidly.

The speed of the mold can of course be increased by hand manipulation of field rheostat controls.

After the rotation speed of mold has been increased, such increased speed should be maintained until the pouring is complete.

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

In the method of casting pipe in which molten metal is delivered to a rapidly rotating mold maintained at a fixed slight angle of inclination to a horizontal plane through a relatively retractable runner which delivers molten metal progressively toward and to the upper end of the inclined mold, the improvement which consists in increasing the rotative speed of the mold during the casting of the final end of the pipe so as to counteract to a large extent the tendency to a gravital flow of the metal in the mold during this stage of the casting operation.

STUART B. CLARK.