F. W. WINNER.

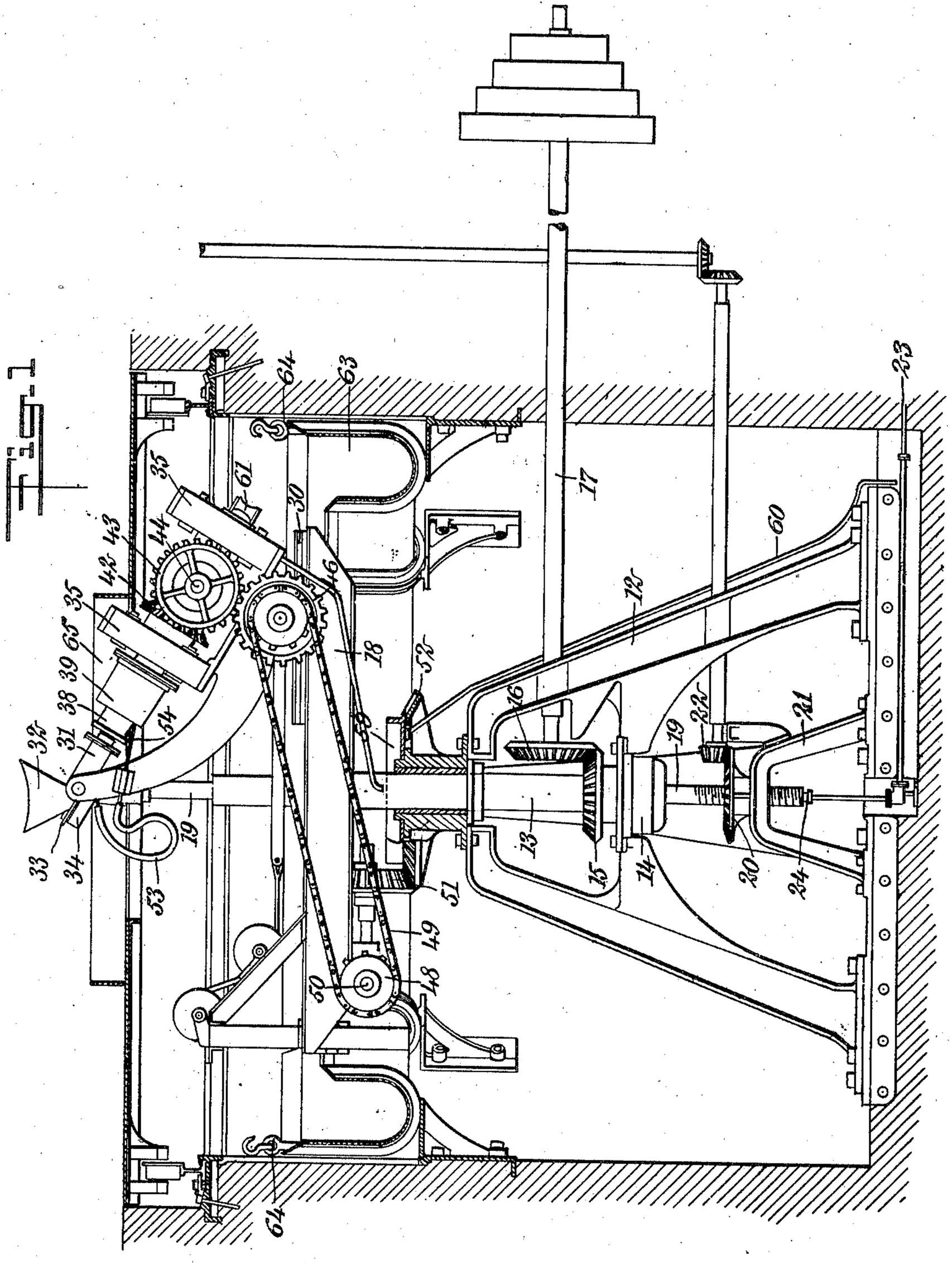
METHOD OF CASTING METAL BARS, WIRES, AND PIPES.

APPLICATION FILED JULY 6, 1907.

950,884.

Patented Mar. 1, 1910.

4 SHEETS—SHEET 1.



WITNESSES

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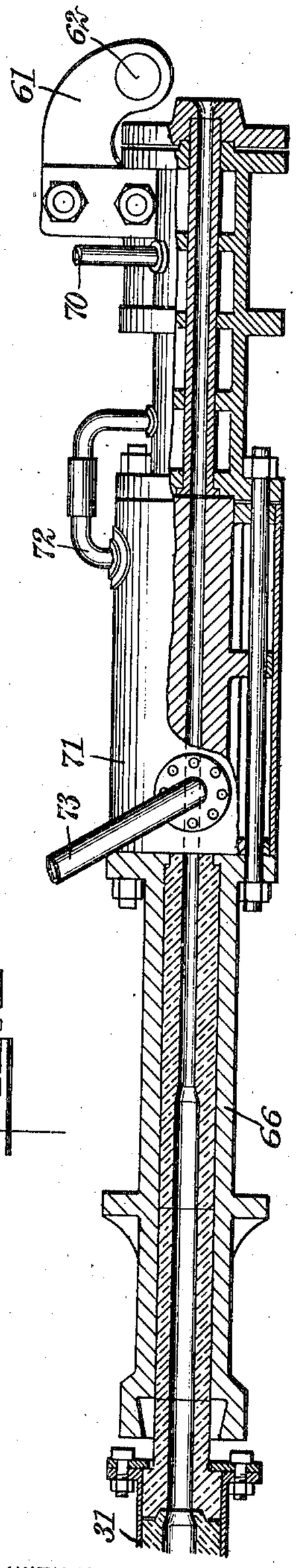

FIG. 2.

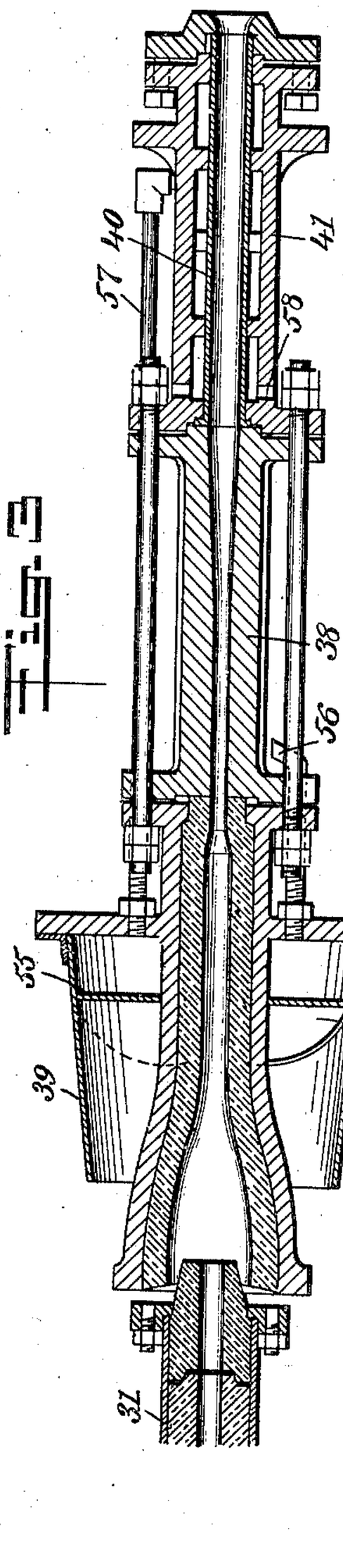

FIG. 3.

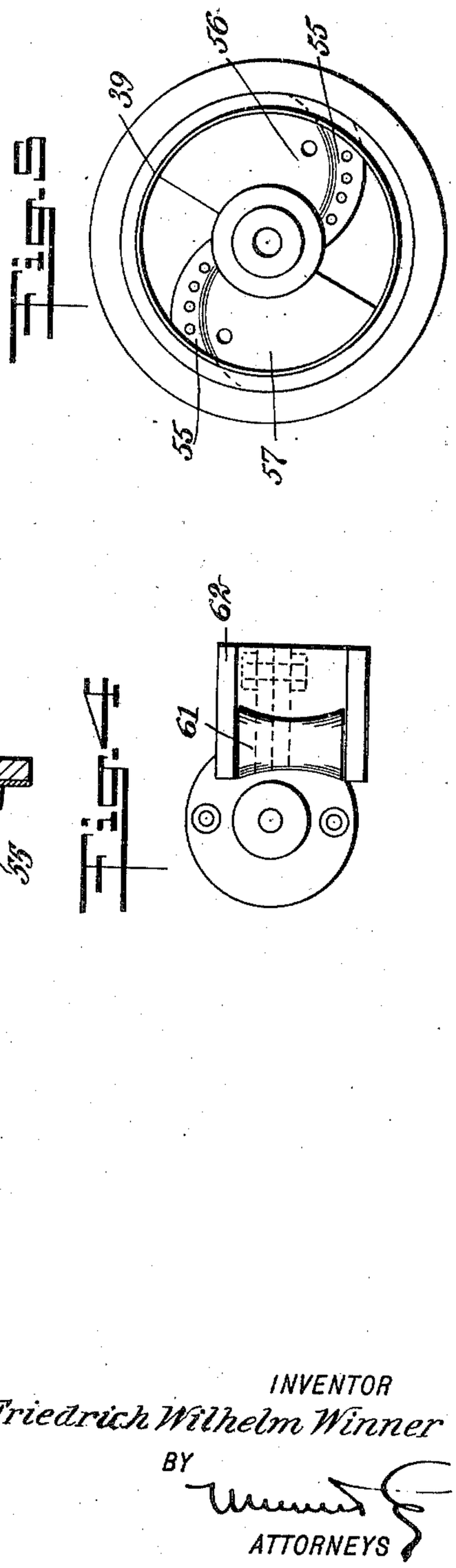

FIG. 4.

FIG. 5.

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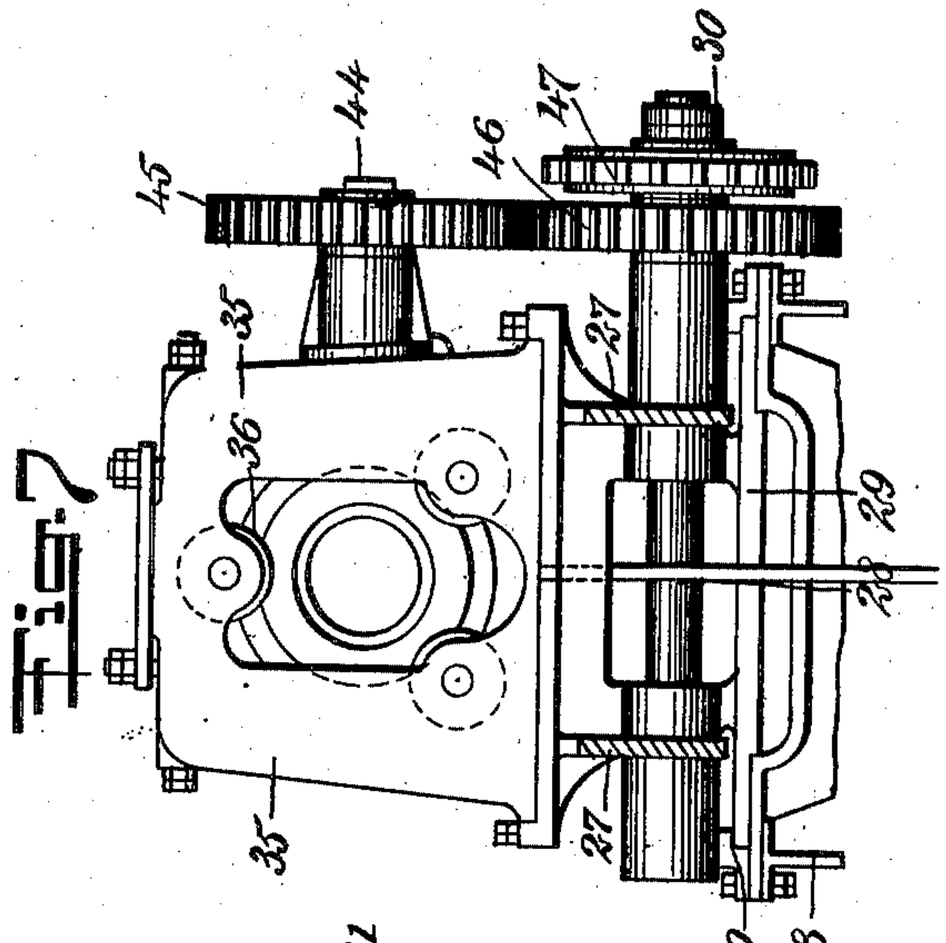

Fig. 7.

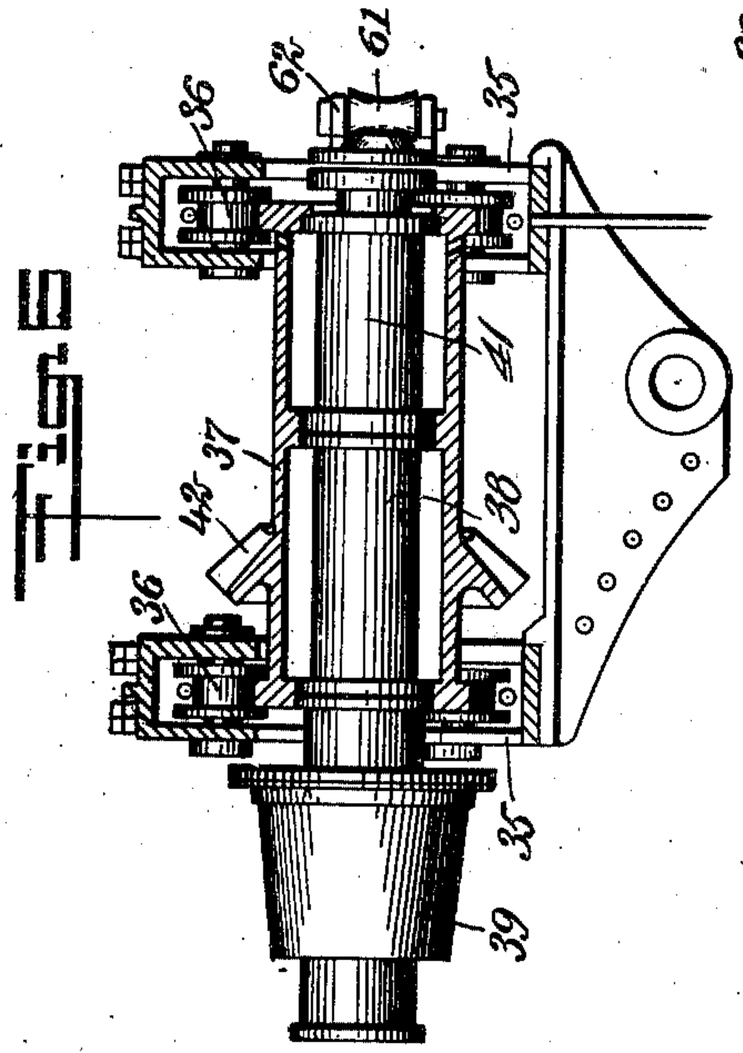

Fig. 5.

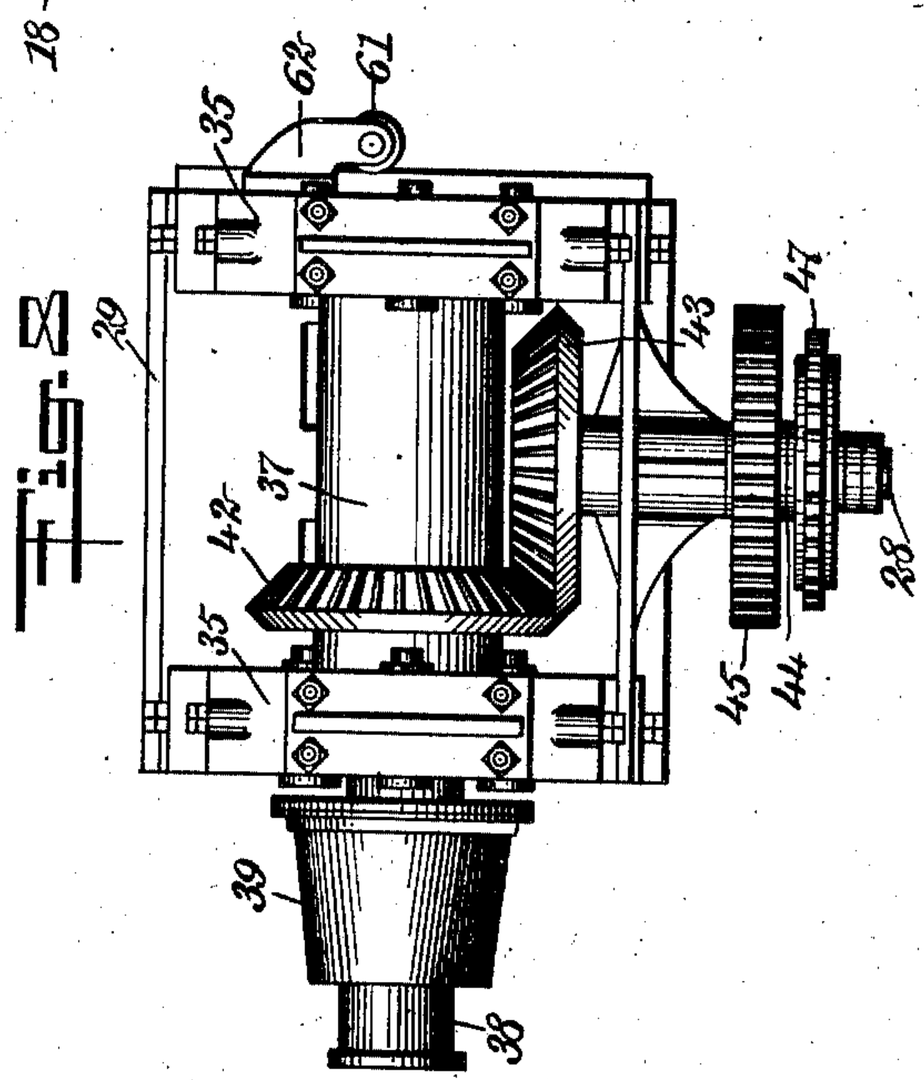

Fig. 8.

WITNESSES

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4 SHEETS—SHEET 4.

FIG. 4.

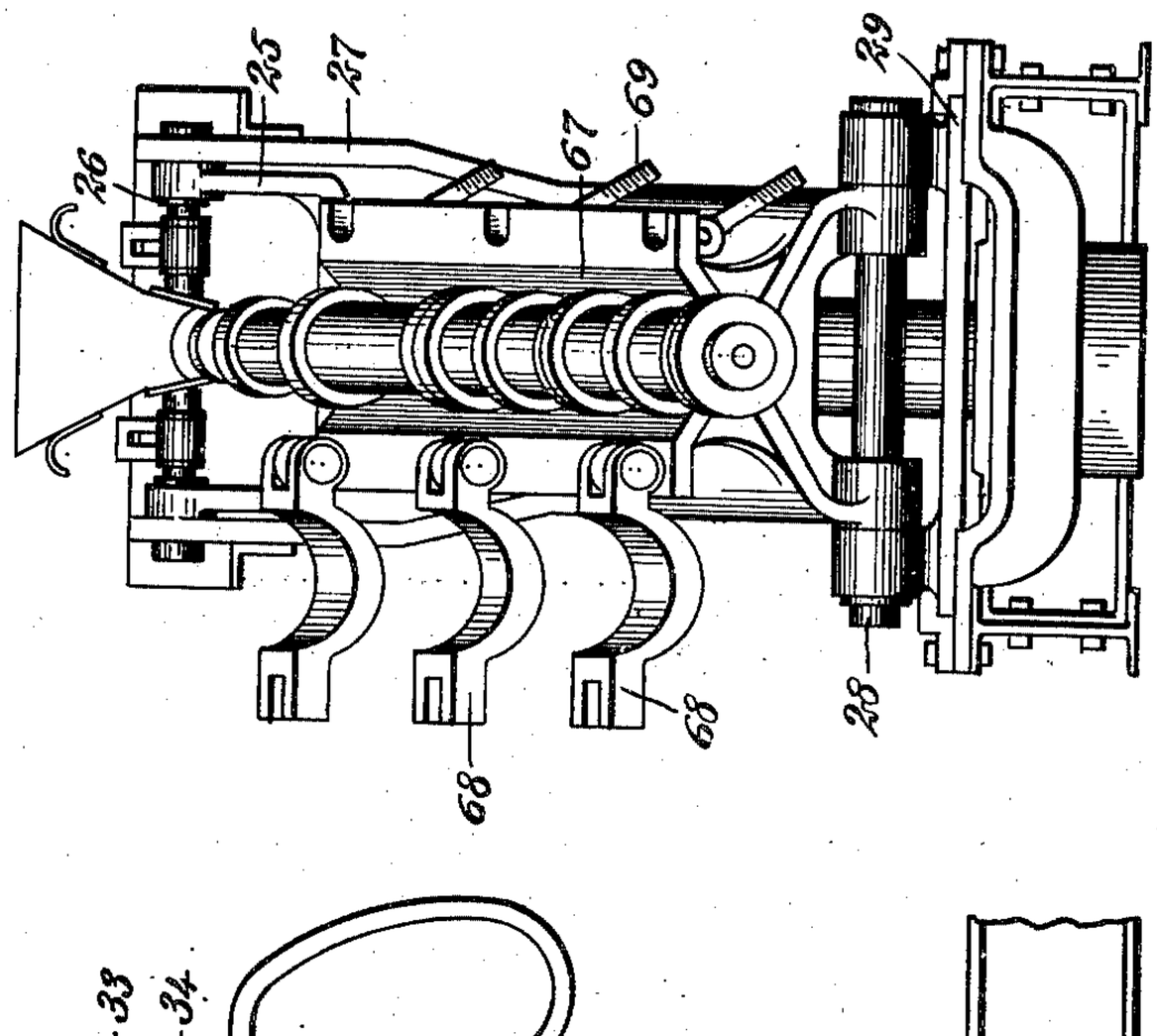
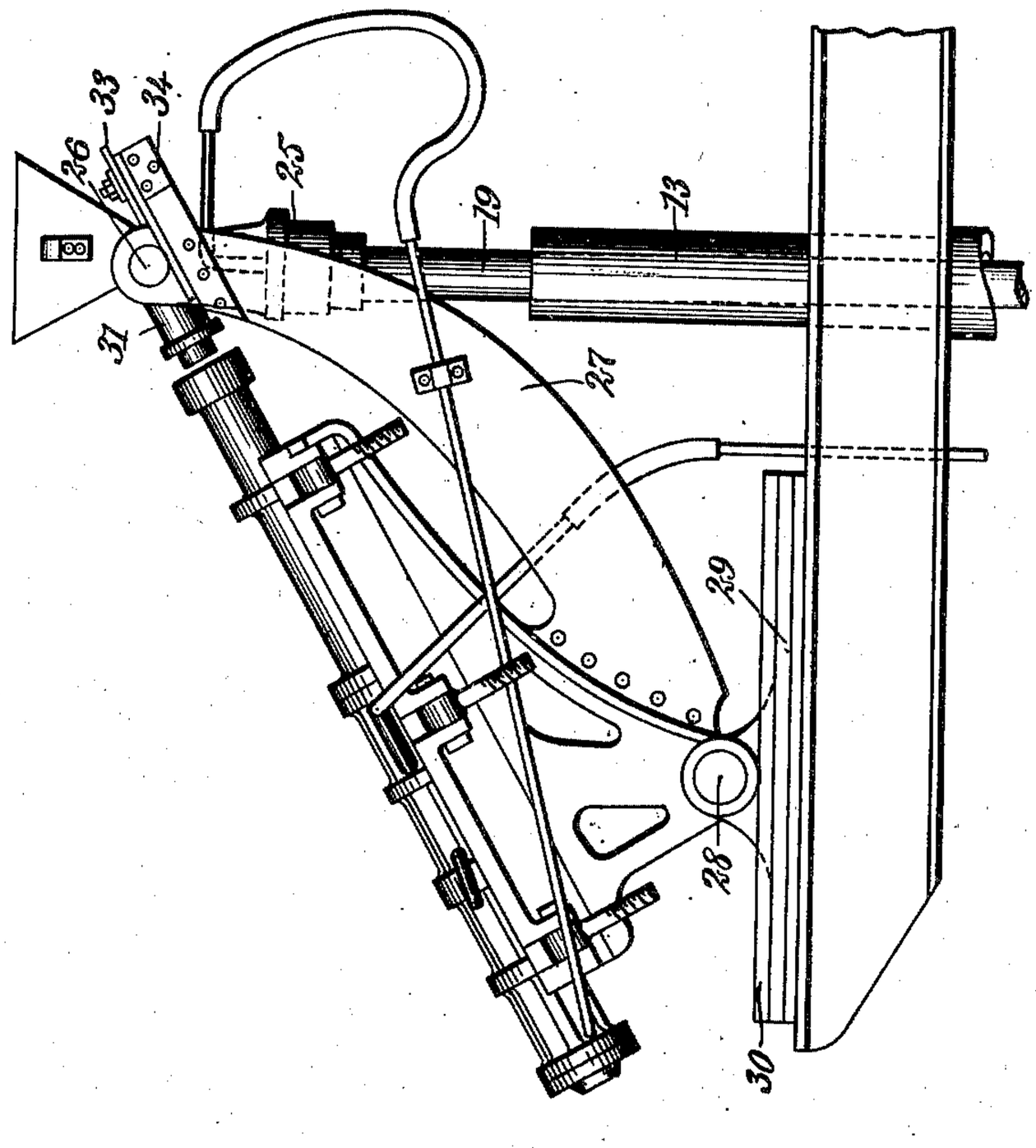


FIG. 5.



WITNESSES

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UNITED STATES PATENT OFFICE.

FRIEDRICH WILHELM WINNER, OF HAN-YANG, CHINA.

METHOD OF CASTING METAL BARS, WIRES, AND PIPES.

950,884. Specification of Letters Patent. Patented Mar. 1, 1910.

Application filed July 8, 1907. Serial No. 382,544.

To all whom it may concern:

Be it known that I, FRIEDRICH WILHELM WINNER, a subject of the German Emperor, and a resident of Han-Yang, China, have invented a new and Improved Method of Casting Metal Bars, Wires, and Pipes, of which the following is a full, clear, and exact description.

This invention is an improved method of casting metal bars, wires, and pipes of any required length and diameter and of any cross-sectional shape, which I do by passing the metal in a molten state into a chilling mold and revolve the mold about a point, whereby the metal after being chilled will be assisted in its discharge from the mold by the centrifugal force developed by the revolution.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of a machine, partly in vertical section, designed to carry out my improved method of casting; Fig. 2 is a sectional view of a chilling mold which is employed in connection with the machine when casting solid bodies; Fig. 3 is a like view of a chilling mold which is used in the casting of hollow forms, as pipe; Fig. 4 is an outer end view of the mold shown in Fig. 2; Fig. 5 is an inner end view of the mold shown in Fig. 3; Fig. 6 shows the mold of Fig. 3 when placed within its casing, the latter being shown in central vertical section; Fig. 7 is a cross-section through the supporting frame of the chilling mold, illustrating the mode in which the latter is mounted; Fig. 8 is a plan of the construction shown in Fig. 6; Fig. 9 is a side elevation of the mold shown in Fig. 2 when placed in operative position; and Fig. 10 is an end view of the construction illustrated in Fig. 9.

In carrying my invention into effect, the casting machine which I preferably employ embodies in its construction a pedestal 12 fixed to a suitable foundation and having a main shaft 13 vertically journaled therein and of hollow construction, the lower end of the shaft resting on a suitable bearing 14, above which the shaft is provided with a fixed bevel gear 15. A corresponding bevel gear 16 meshes with the gear 15 and is attached to a driving shaft 17, by which the machine is set in motion. The main shaft 13 carries a table or platform 18 and receives a hollow shaft 19 which closely fits therein, and is threaded at its lower end, where it receives a bevel gear 20 resting on a suitable support 21. A gear 22 meshes with the gear 20 and is driven through the mechanism shown or other convenient means in adjusting the shaft 19 to the required elevation. In the lower end of the shaft 19 a water supply pipe 23 passes, at which point a water-tight connection is effected by a stuffing box 24. The upper end of the shaft 19 is provided with a yoke 25, in which is journaled a shaft 26, the latter being extended for the adjustment of curved arms 27, which are rigidly connected together at their lower ends, at which point they have a pivotal connection with a shaft 28 journaled on a carriage 29. This carriage, as best seen in Fig. 10, is slidable radially of the driving shaft on the table 18, for which purpose the said table is provided with ways 30. In addition to the arms 27, the shaft 26 carries a nozzle 31 having communication with a casting funnel or hopper 32 which receives the molten metal. The hopper is adjustably supported on a plate 33, which in turn is slidably mounted on angle-irons 34, riveted to the curved arms 27, as best illustrated in Fig. 9. The outer connected ends of the arms 27 are detachable for the purpose of interchanging the chilling molds, and in the case of the mold for making pipe, are provided with hollow heads 35, at opposite ends, having rollers 36 journaled therein, which serve as bearing for a casing 37. Within this casing is fixed a chilling mold 38 constructed in detail as best shown in Fig. 3, wherein it will be observed the mold is made up of a number of sections bolted lengthwise together, the inner section having a collecting receiver 39 for the cooling medium, and registering with the nozzle 31, and the outer section having an inner tube 40 forming a continuation of the passage of the mold, and is covered by a jacket 41. To the casing 37 is fixed a bevel gear 42, which as best shown in Fig. 8, is in mesh with a similar gear 43 fixed to a shaft 44, which shaft also carries a gear 45. This last-named gear meshes with a gear 46 fixed to the shaft 28. Also fixed to the shaft 28 is a sprocket wheel 47, which is driven from a sprocket wheel 48 through the intermediary of a chain 49, the sprocket wheel 48 being secured to a shaft 50 driven by a gear 51 carried by the table 18

and in mesh with a gear 52 fixed centrally at the top of the pedestal 12.

The water which is supplied to the shaft 19 is carried off at its upper end through a hose 53, in connection with a pipe 54 directed into the receiver 39, which is provided with spiral blades 55 which have a pitch such that when revolved the water will be forced through pipes 56 and 57 which lead respectively to the space between the mold 38 and the casing 37 and to the jacket 41 surrounding the outer section of the mold, this jacket having openings 58 through which the water is discharged and meets with the water flowing from the pipe 56, with which it passes through the forward head 35, thence by a suitable conduit to a receptacle 59 seated on the gear 52, the said receptacle having a drain pipe 60 leading therefrom, as shown in Fig. 1.

The mouth of the chill mold, which I form by a hardened flange, is provided with a small roller 61 which is mounted in a bracket 62 fixed either to the mold itself or to the frame of the mold, as best shown in Fig. 8. This roller prevents the ejected material from turning sharply and serves to guide it to a collecting gutter 63 which is made of sheet iron in sections resting on brackets, and is provided with hooks 64 for lifting out the finished product. To accommodate the quantity of ejected material in the collecting gutter, a quantity which varies according to the velocity of the chill, the gutter is made to turn around the main shaft of the machine by suitable means. Directly over the machine a platform 65 is provided, which, as shown in Fig. 1, is mounted on rollers and is parted in the middle in order that the two sections may be shifted from over the machine when desired.

When solid forms are to be cast in accordance with my improved process, the chilling mold 38 is replaced by a chilling mold 66. For this purpose the detachable end portions of the arms 27, as shown in Fig. 6, are replaced by those shown in Fig. 9, wherein it will be observed they provide a trough 67 on their upper faces, to which are hinged a number of keepers 68 having slotted ends adapted to receive bolts 69 in locking the mold 66 in place. In this mold the nozzle 31 is made approximately continuous therewith, and the coiling medium is introduced into the jacket of the last section of the mold through a pipe 70, and flows inwardly into a casing 71 through a pipe 72. The casing 71 surrounds an intermediate section of the mold and is provided with a discharge pipe 73 at its inner end. It will be observed from Figs. 2 and 3 that the bore or passage for the metal in both molds, as also the nozzle 31, is lined with a fireproof material, ordinarily clay, up to those sections of the molds which are water cooled, which latter sections resist the heat sufficiently when wholly constructed of metal.

In the operation of the machine the shaft 19 is adjusted to carry the casting funnel or hopper and the inner end of the chill mold to the required elevation, which depends upon the rate of discharge of the finished product into the trough or gutter 63, this rate of discharge being controlled by the revolution of the mold about the shaft 19, which tends to eject the bar or pipe by centrifugal action. If the chill mold be revolved about its longitudinal axis, as in the case of the mold 38, the metal will be forced outwardly by centrifugal force, and an article such as a pipe will result, the thickness of the walls of the pipe depending of course upon the velocity of this axial revolution. The product as it is delivered into the gutter will be continuously coiled, in which condition it is removed by the hooks 64.

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

1. The herein described process of casting a continuous length of metal, which consists in passing said metal in the molten state into a chilling mold, and swinging said mold about a point at the outside of the limits thereof, whereby the metal, after being chilled, will be ejected from the mold by the centrifugal force developed by the swinging action.

2. The herein described process of casting a continuous length of metal, which consists in passing said metal in the molten state into a chilling mold, revolving said mold about its longitudinal axis, and swinging said mold about a point to eject the metal from the mold by the centrifugal force developed by the swinging action.

3. The herein described process of casting a continuous length of metal, which consists in passing said metal in the molten state, into a chilling mold, swinging said mold about a point, whereby the metal will be ejected from the mold by the centrifugal force developed by the swinging action, and coiling said metal as it is ejected.

4. The herein-described process of casting a bar, which consists in passing molten metal to form the bar, into a chilling device and swinging the device about a point such that the metal will flow continuously through said device and outwardly from the axis of revolution.

5. The herein-described process of casting a bar, which consists in passing molten metal to form the bar, into one end of a chilling device and swinging the device about the point from which the metal flows to eject it from the opposite end of the device.

6. The herein-described process of casting a pipe, which consists in passing molten

metal to form the pipe, into one end of a chilling device, swinging the device about the point from which the metal flows, and revolving the device about its longitudinal axis.

7. The herein-described process of casting a continuous length of metal, which consists in passing said metal in a molten state into a mold, swinging the mold about a point such that the metal will flow outwardly from the axis of revolution, and passing a cooling medium about the mold in the opposite direction to the flow of the metal.

8. The herein-described process of casting a continuous length of metal, which consists in passing the metal in a molten state into a mold, swinging the mold laterally from a point such that the metal will flow outwardly about the axis of revolution, and passing a cooling medium about the mold.

9. The herein-described process of casting a continuous length of metal, which consists in passing the metal in a molten state through a chilling mold, swinging the mold laterally about a point such that the metal will flow outwardly from the axis of revolution, and coiling the metal as it is discharged on a receiver.

10. The herein-described process of casting a continuous length of metal, which consists in passing the metal in a molten state continuously through a chilling mold, and swinging the mold about the point at which the metal is introduced.

11. The herein-described process of casting a continuous length of metal, which consists in passing the molten metal into an outwardly and downwardly inclined chilling mold, and swinging said mold having an uninterrupted passage about a point adjacent to which the metal is introduced to cause it to travel through said passage.

12. The herein-described process of casting a continuous length of metal, which consists in passing the molten metal into a chilling mold and swinging said mold about a point to eject the metal from the mold as fast as it is introduced therein.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

Han-Yang, 12th day of August, 1907.

FRIEDR. WILHELM WINNER.

Witnesses:

Jos. SCHURHARN,

F. HEISY.