

Dec. 17, 1940.

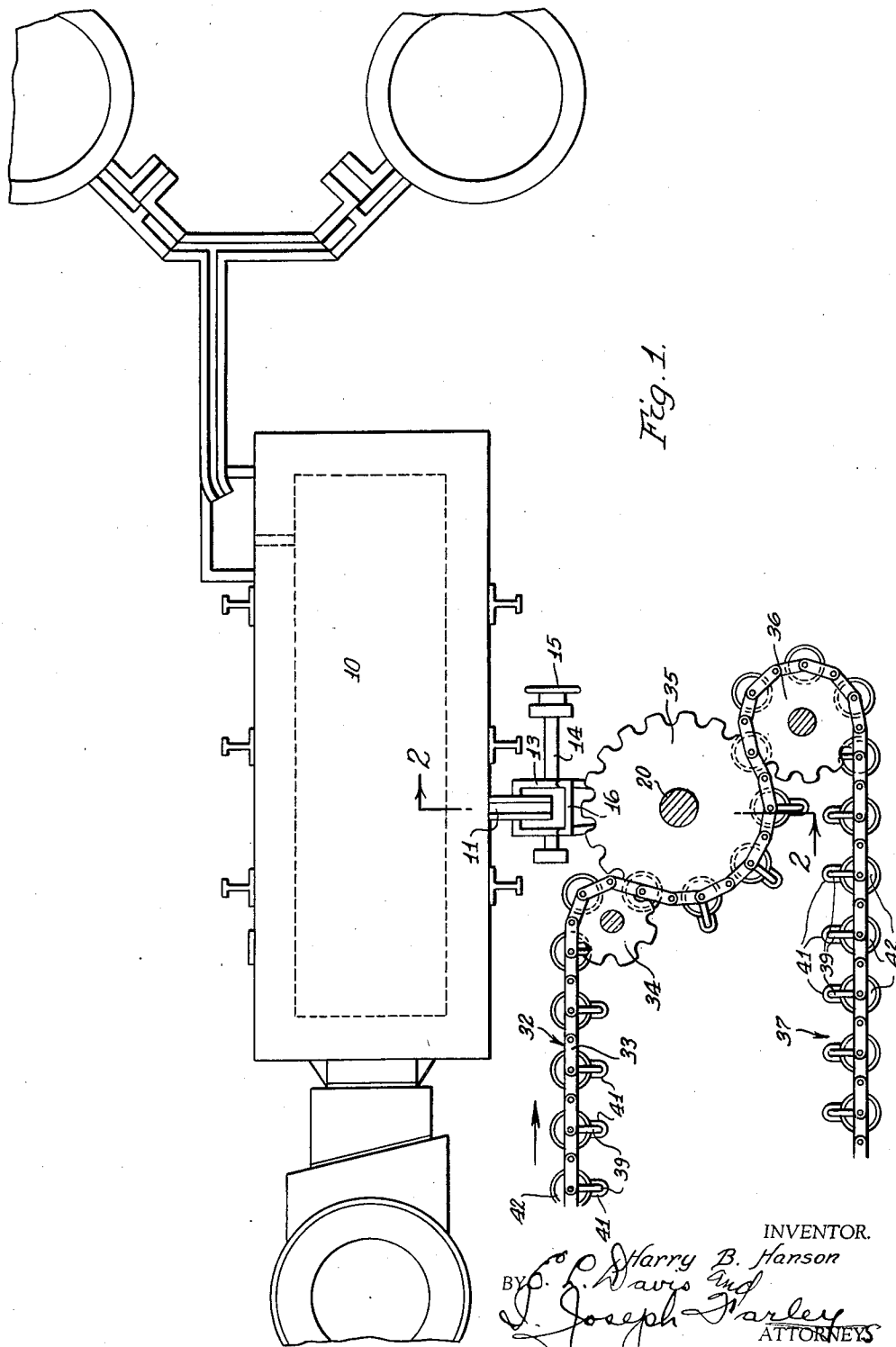
H. B. HANSON

2,225,173

APPARATUS FOR POURING METAL INTO MOLDS

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3 Sheets-Sheet 1



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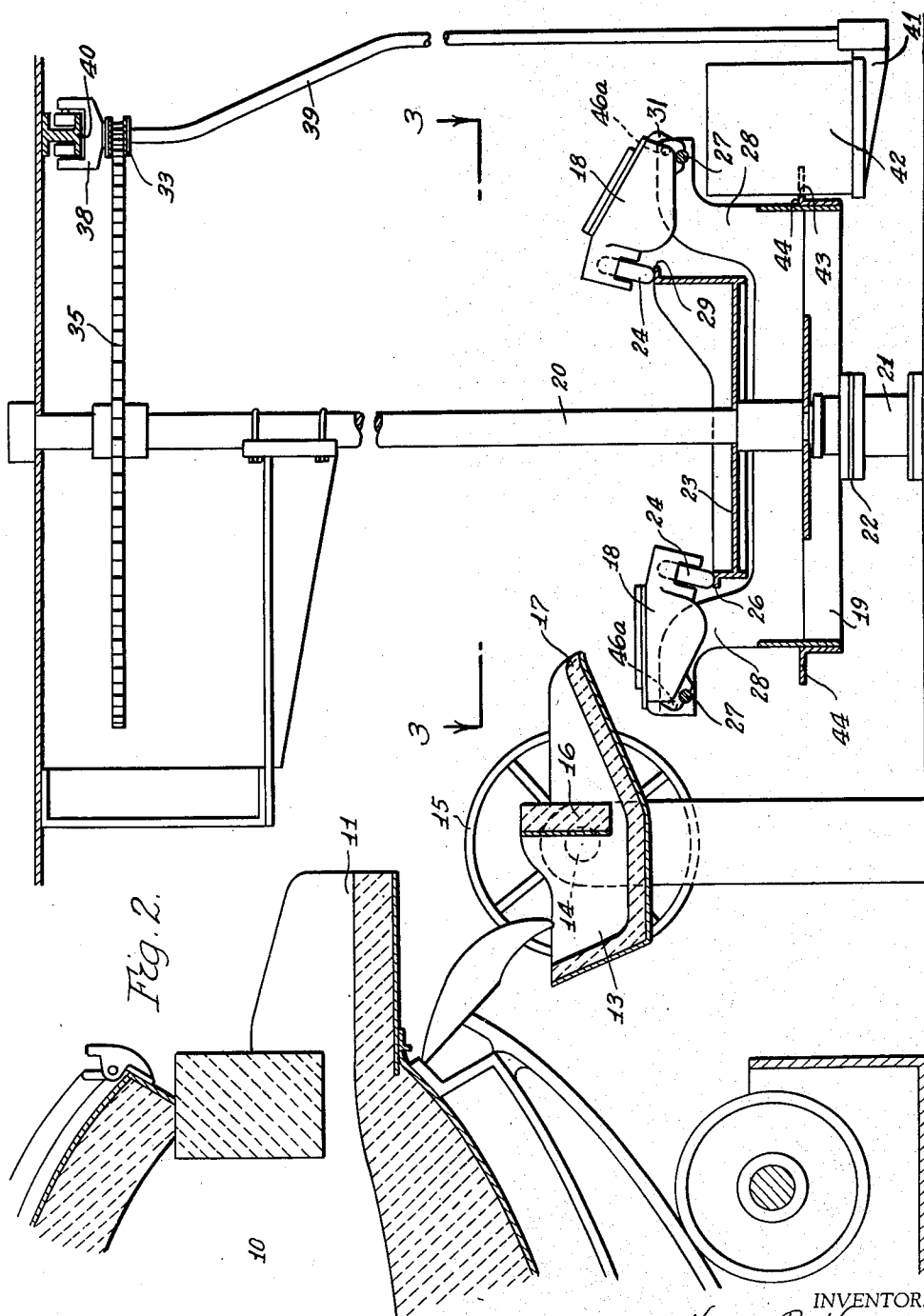
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3 Sheets-Sheet 2



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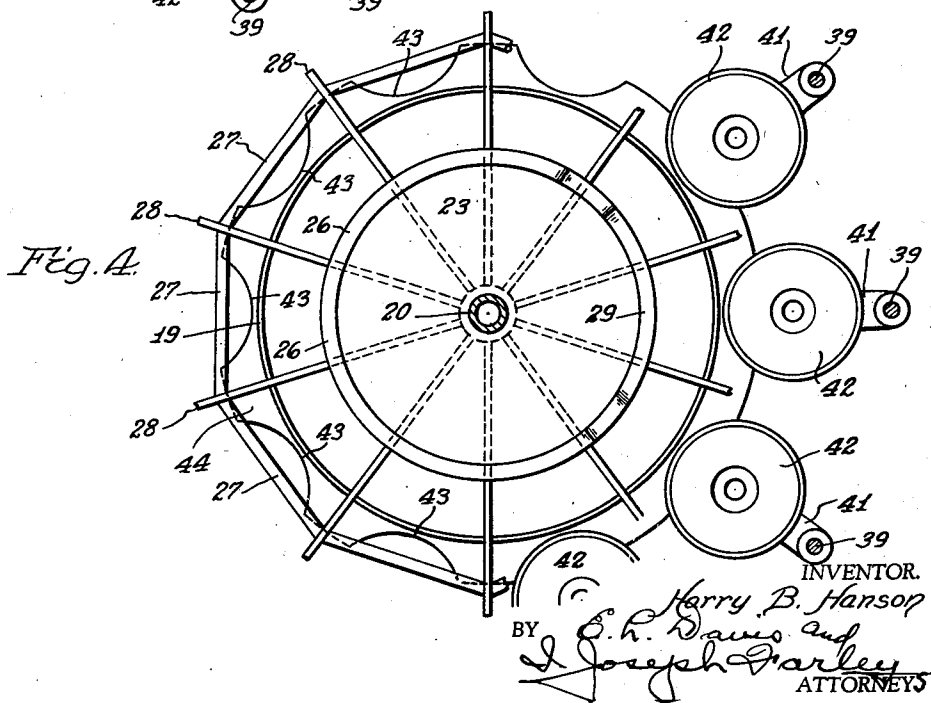
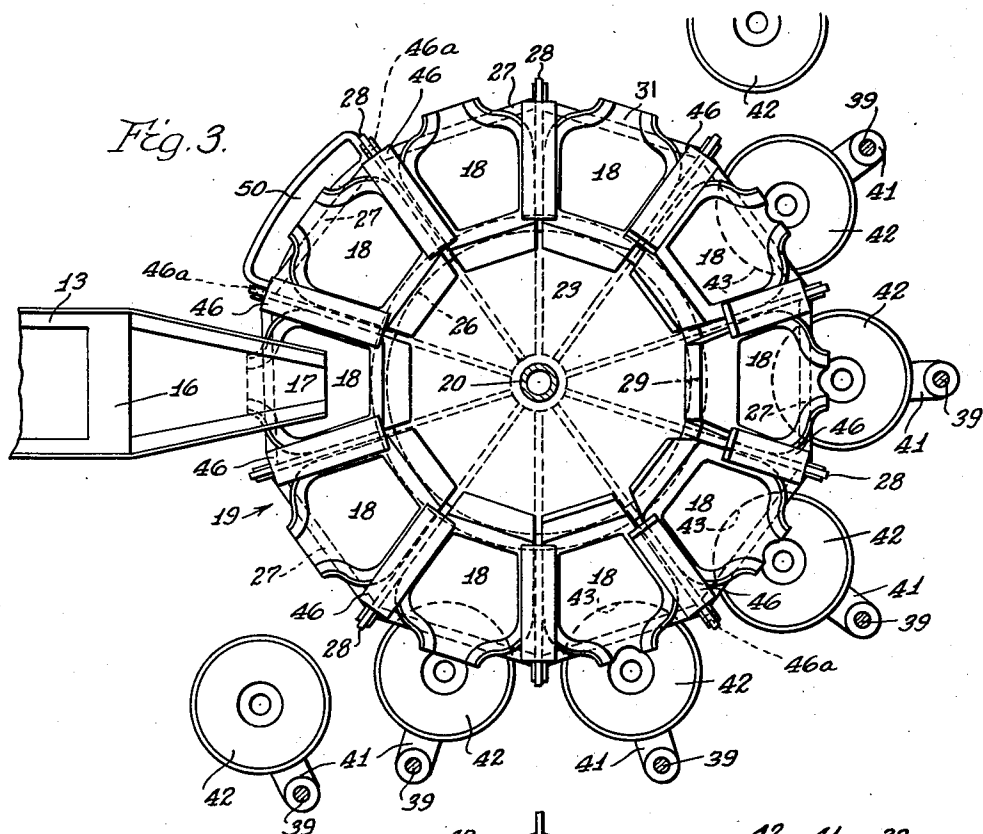
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APPARATUS FOR POURING METAL INTO MOLDS

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3 Sheets-Sheet 3



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APPARATUS FOR POURING METAL INTO
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11 Claims. (Cl. 22—76)

This invention relates to mechanism for pouring and accurately measuring molten metal to accomplish continuous pouring of metal from a melting furnace into molds.

5 In the pouring of molten metal into molds under conditions which will allow a continuous uninterrupted cycle of operations, requires that the amount of metal poured into each mold be measured with reasonable accuracy. It is also im-
10 portant when pouring into small molds that the metal remain in the measuring and pouring receptacles for a minimum of time since if the time is too great, the volume of metal being small, heat therefrom will be very quickly transferred
15 to the container and a detrimental lowering of temperature will result. In fact the time lost in shuttling and positioning small ladles has been considered as contributing to the impracticability of pouring small molds by a continuous method.
20 If metal is to be measured and poured from small ladles they must therefore be very quickly handled. It is also important that there be a definite timing in the pouring of the metal from the time it leaves the furnace to the time it is
25 poured into a mold. Obviously if this elapsed time is not constant the results will not be uniform. However, if mechanism is available to effect continuous pouring of metal from a furnace and to pass it thru a cycle of operations with
30 a definite timing and this timing is adjusted to assure satisfactory results then in successively pouring a plurality of molds each will receive the metal at substantially the same temperature and a uniform product will result.

35 In order that the pouring of a plurality of molds be effected in a manner practical for use with modern production methods it is important that a mechanism be devised which will operate in combination with a conveyor system carrying
40 molds to and from the pouring station. For most effective results the molds should remain on the conveyor at all times and be continuously moving along the path of conveyor travel. Since the above requirement necessitates that the pouring
45 mechanism operate in timed relation with the conveyor there must be some provision whereby the two mechanisms are driven in synchronism.

It is therefore a primary object of the present invention to provide a mechanism which when
50 interposed between a melting furnace and a conveyor line carrying molds, will accurately measure and pour molten metal into said molds without interrupting the continuous travel of said conveyor and will deliver molten metal into said molds
55 under conditions which will assure a satisfactory

molded product while maintaining a rate of production sufficient to satisfy modern factory production standards.

It is another object to provide an automatic mechanism capable of accurately measuring small
5 quantities of molten metal and pouring the same into small molds continuously conveyed past the pouring mechanism, the cycle of operations being such as to effect satisfactory handling of
10 small quantities of molten metal by assuring a satisfactory time interval required to complete the measuring and pouring operations.

It is a further object to provide an automatic measuring and pouring mechanism capable of receiving molten metal continuously poured from a
15 furnace or other source and automatically pouring measured quantities of metal into molds conveyed past said mechanism.

It is another object to provide a pouring mechanism capable of operation in synchronism with
20 a conveyor carrying molds past said mechanism.

It is a further object to make available an automatic pouring mechanism the drive for which is effected from the conveyor carrying molds to
25 be filled thereby assuring synchronism between said conveyor and said mechanism.

The above and other objects of the invention will appear more fully in the following more detailed description and by reference to the accompanying drawings forming a part hereof, and
30 wherein:

Fig. 1 is a plan view showing the several parts of the mechanism herein disclosed, including a furnace, measuring and pouring means and the conveyor carrying the molds.
35

Fig. 2 is a section taken on the line 2—2 of Fig. 1, and shows several parts of the measuring device, the furnace and the conveyor together with the mechanism used to tilt ladles for pouring the
40 molten metal into molds.

Fig. 3 is a horizontal view taken from the line 3—3 of Fig. 2 and shows the rotating turntable with a plurality of pouring and measuring ladles
45 mounted thereon.

Fig. 4 is a view taken on the same line 3—3 of Fig. 2, but in this view the turntable is shown with the pouring ladles removed to indicate more in detail the construction of the table and the means thereon to effect driving contact between
50 the table and the molds carried by the conveyor whereby the pouring mechanism and the conveyor are operated in synchronism.

Referring to the drawings, and particularly Figs. 1 and 2, a melting furnace 10, is provided with a spout 11, from which molten metal may
55

be poured into a pouring ladle 13, which is pivotally mounted to tilt on a shaft 14 and adapted to be manually tilted for pouring by a hand wheel 15. The ladle 13, is provided with a skimming device as indicated in Fig. 2, by the weir wall 16. The pouring lip 17 of the ladle 16 projects to a position directly above the circular path of a plurality of measuring and pouring ladles 18. These ladles are carried on a turntable 19 which is mounted for rotation about a shaft 20, suitable supporting means 21 being provided including a thrust bearing 22. The shaft 20 is a stationary shaft and has secured thereto a stationary cam 23. Each of the previously mentioned measuring and pouring ladles 18 has suitably mounted casters 24 (Fig. 2) so positioned as to ride upon a cam track 26. Each of the ladles 18 is positioned and mounted to tilt on a pivot 27 near the outer edge of each ladle, the pivot 27 being mounted on an upwardly extending projection 28 of the turntable 19. It will be evident on inspection of Fig. 2 that, with a suitable shape provided for cam track 26, the pouring ladles 18 will be tilted successively as they pass the high portion 29 of the cam track 26. It is also noted that the pouring ladles 18 are each provided with a pouring lip 31.

Referring to Fig. 1, a conveyor line 32 is shown with a conveyor chain 33 which is guided around a sprocket 34 and onto a central and larger sprocket 35 and finally a third sprocket 36, the chain continuing in its normal line of travel as shown at 37. It is evident on inspection of Fig. 1, that the large central sprocket 35 and the two adjacent sprockets 34 and 36 assure that the chain 33 will be carried in an arc which is nearly the half-circumference of the large central sprocket 35.

Referring to Fig. 2 it is noted that the chain 33 is supported from an overhead track 40 by means of a plurality of conveyor trolleys 38, only one of which is shown in Fig. 2.

The large sprocket 35 is mounted to rotate upon the stationary shaft 20 as will be evident on inspection of Fig. 2. It is also noted that the chain 33 carries vertically positioned support members 39, a plurality of such members being suspended from trolleys 38 below the chain and each of said supports being provided with a platform 41 on which mold 42 is carried. The distribution of these supports and molds along the chain is shown by reference to Fig. 1. Referring both to Figs. 1 and 2, and with consideration of the descriptions just given, it will be apparent that the plurality of molds 42 carried below the chain will be carried in a position adjacent to the outer circumference of the rotating table 19 and on reference to Fig. 4 it will be noted that semi-circular openings 43 are provided to position the molds 42 during their travel around an arc defined by the circumference of the table 19. The semi-circular openings 43 are cut out of a flange member 44 secured around the outside of the table 19. Considering the path of travel of the conveyor and molds as defined by the sprocket 35 it will be evident on inspection of Figs. 2, 3 and 4 that the movement of the conveyor carrying molds 42 will cause the table 19 to rotate. This movement results because of the driving action exerted when the molds 42, moving with the conveyor, contact the openings 43 on the periphery of the table 19. Thus the openings 43 serve both to position the molds under the pouring ladles 18 and to syn-

chronize the movement of the table 18 with the conveyor.

As shown in Fig. 3 a so-called drip shield or deflecting plate 46 is positioned between each of the ladles 18. These deflecting plates 46 overlap adjacent ladles, for the purpose of directing molten metal thereto, and are pivotally mounted on pins 46a (Fig. 2) so that when the ladles 18 are tilted the deflecting plates will be carried with the ladles.

In operation of the mechanism the molds 42 will be carried in position directly under the pouring lips 31 of the ladles 18 for the time during which the conveyor line follows the arc defined by the table 19. As shown in Fig. 3, a plurality of molds 42 are continuously in contact with the turntable and therefore in position to receive metal from the pouring ladles 18, any individual mold being in position for the time it takes to travel the arc above mentioned.

It is possible to start a continuous flow of molten metal from the furnace through the pouring spout 11 into the pouring ladle 13 and by manual operation of the hand wheel 15 to pour molten metal continuously into the measuring and pouring ladles 18 which are carried on the rotating table 19 directly beneath the pouring lip 17 of the ladle 13. It will be noted on reference to Fig. 3 that deflecting plates 46 are so located to overlap the pouring ladles 18 so that as the table is rotated and the plurality of ladles 18 are carried under the large ladle 13 any metal which may be flowing at the time one ladle is substituted for another, will be deflected into one or the other of the adjacent ladles. It is therefore possible to fill the ladles completely and thereby to obtain a measured amount of metal in each ladle, the excess being allowed to overflow into a drip basin 50 (Fig. 3). The cam-track 26 is so shaped as to hold the ladles 18 in a horizontal position during the time they are being filled and as the table 19 is rotated it will carry the ladles around on the stationary cam track 26 which is so formed as to tilt the ladles when they come in position on the arc previously mentioned, at which time the molds 42 will be in position under the pouring lips 31. A mold will thereby receive the entire amount of metal carried by a ladle during the time the mold is in contact with the turntable. It is therefore evident that a continuous line of molds carried by the conveyor may be kept moving past the pouring station provided by the rotating turntable 19 and thereby will be filled with molten metal and carried away on the conveyor line as shown at 37 in Fig. 1.

By reference to Fig. 3 it will be noted that the molten metal poured from lip 17 of ladle 13 is only carried a distance equal to approximately one-third of the circumference of table 19 before the ladle 18 begins to pour metal into a mold 42 positioned under the pouring lip of the ladle. As the table 19 rotates and the conveyor moves the molds in an arcuate path, the ladle 18 is tilted by cam track 26 in a gradually increasing amount until all metal has been poured into the mold. This completion of pouring is accomplished at about mid-position of the arc of contact of the molds with the table. The molds are held in position until the ladles again reach a horizontal non-pouring position. Since the pouring is complete at approximately mid-position of the arc of contact, it will be apparent on inspection of Fig. 3 that by the time a ladle has travelled a little over half the circumference of the

table the entire pouring operation will be completed and therefore the mechanism can be said to provide a very direct path for the molten metal from spout 17 to the mold 42. It is also noted that with a uniform rate of travel for the conveyor the rotation of table 19 will be uniform and therefore the time required to carry metal from spout 17 to the mold will be uniform for successive molds.

With the provision of the drip basin 50 the ladles 18 may be filled completely and the amount of metal thereby accurately measured. Such accuracy is very important in producing satisfactory products from small molds. The drip shields or deflectors 46 are also important in that they enable a continuous flow of metal to be poured from spout 17.

Although the invention has been described as applied to a specific construction found practical in actual use, it is understood that various changes and modifications may be resorted to without changing the fundamental principles as indicated by the scope of the following claims.

I claim:

1. In a mechanism for continuously pouring molten metal into a plurality of molds, a horizontally rotatable turntable, a plurality of measuring and pouring receptacles carried on said turntable, means to tilt said receptacles to positions for receiving metal during the rotation of said turntable and to pour metal therefrom during another portion of the rotation, a conveyor line comprising a conveyor chain, support trolleys for said conveyor chain, mold support means extending downwardly from said trolleys and beneath said conveyor chain, a plurality of sprockets for guiding said conveyor chain, one of said sprockets positioned above said turntable, two adjacent sprockets positioned at the sides of said central sprocket whereby said chain and said downwardly extending support members are carried in an arcuate path coinciding with the circumference of the rotatable turntable and the molds carried thereby are positioned under said tilting receptacles during the portion of the revolution of said turntable which allows pouring of metal from said tilting receptacles to said molds.

2. In a mechanism for measuring and pouring molten metal into molds, a rotatable turntable, a plurality of measuring and pouring receptacles carried near the circumference of said turntable, means to tilt said receptacles in such relation that metal may be poured into said receptacles during a portion of the revolution of said turntable and poured from said receptacles during another portion of the revolution of said turntable, deflecting members one positioned between each of said measuring and pouring receptacles to over-lap adjacent receptacles, a pivot for each of said deflecting members, whereby said deflecting members are lifted with the tilting movement of said measuring receptacles thereby to allow continuous pouring into said receptacles without interference with the relative tilting movement thereof.

3. In a mechanism for continuously pouring molten metal into a plurality of molds, a conveyor line adapted to carry a plurality of molds, a container for molten metal, a horizontally rotatable turntable positioned between said container and said conveyor line in such position that said rotatable turntable is contacted and rotated by movement of said conveyor line, a plurality of measuring and pouring receptacles carried on

said turntable, means to tilt said receptacles to positions for receiving metal during a portion of the rotation of said turntable when said receptacles are adjacent said container and to pour metal therefrom during the portion of the rotation of said turntable when said receptacles are adjacent said conveyor line, whereby a continuous flow of metal from said container is received and measured by said receptacles and poured into said molds on said conveyor line.

4. A device for pouring molten metal into molds comprising a rotatable turntable, a plurality of pouring ladles carried on said turntable, a conveyor line for carrying said molds movable in an arcuate path adjacent the periphery of said turntable, projecting portions around the circumference of said turntable shaped to form a sole synchronizing and driving connection between said moving conveyor and said turntable and serving to rotate said turntable solely by contact with said molds carried on said moving conveyor, said projecting portions also shaped to position said molds relative to said pouring ladles in position to receive metal poured from said pouring ladles during the travel of said conveyor in said arcuate path.

5. In a device for continuously pouring molten metal into molds successively presented to said device, a rotatable turntable, a plurality of pouring ladles positioned to be carried in a circular path on rotation of said turntable, a conveyor line for carrying said molds movable in an arcuate path adjacent the periphery of said turntable, projecting portions around the circumference of said turntable shaped to form sole synchronizing and driving connection between said moving conveyor and said turntable and serving to rotate said turntable solely by contact with said molds carried on said moving conveyor, said projecting portions also shaped to position said molds relative to said pouring ladles in position to receive metal poured from said pouring ladles during the travel of said conveyor in said arcuate path.

6. A means for measuring and pouring molten metal into molds carried by a continuously moving conveyor line characterized by a rotatable turntable carrying a plurality of measuring and pouring ladles near the circumference thereof, said conveyor line having a path following an arcuate portion of the circumference of said turntable, projecting portions around the circumference of said turntable shaped to form a sole driving connection between said continuously moving conveyor line and said turntable by contact with said molds carried by said conveyor, and said projecting portions also formed to successively position said molds to receive molten metal from said pouring ladles as said turntable is rotated by contact of said molds with said projecting portions.

7. The combination with a mechanism for pouring molten metal of, a conveyor line, a rotatable turntable, a plurality of pouring receptacles carried near the circumference of said turntable, projecting portions around the circumference of said turntable serving to guide said conveyor in a path of travel coinciding with the arcuate path of the circumference of said turntable and also shaped and positioned to provide the sole driving connection between said turntable and said conveyor by contact with said molds on said conveyor, thereby to rotate said turntable synchronously with movement of said conveyor whereby molds carried on said con-

veyor are successively positioned under said pouring receptacles to receive molten metal during rotation of said table and travel of said conveyor.

- 5 8. A device for measuring and pouring molten metal into molds which are carried by a continuously moving conveyor line having a rotatable turntable carrying a plurality of measuring and pouring ladles in a circular path on said 10 turntable, said conveyor line having an arcuate path adjacent the circular path of said pouring ladles characterized by projecting portions around the circumference of said turntable serving as contacting members affording said conveyor as a sole driving means for said turntable 15 and said projections also shaped to guide and position said molds to said pouring ladles to receive molten metal therefrom during continuous movement adjacent said rotatable turntable.
- 20 9. In a device for continuously pouring molten metal into molds carried by a continuously moving conveyor, said device having a horizontally rotating turntable, a plurality of pouring ladles pivotally mounted on said turntable, pouring lips 25 extending from each of said ladles characterized by means to control the tilting movement of said ladles to position said ladles to pour or receive molten metal, and projecting portions on said turntable formed to contact said molds carried 30 on said conveyor whereby said turntable is rotated solely by movement of said conveyor, and said projections in such position relative to said pouring lips as to successively guide said molds

into position to receive molten metal from the pouring lips of said ladles as said conveyor carries said molds adjacent said turntable.

10. A mechanism for continuously pouring molten metal into successively presented molds 5 comprising a conveyor line for carrying said molds, a rotatable turntable, a plurality of pouring receptacles carried on said turntable, projecting portions extending from the circumference of said turntable serving as a sole driving 10 connection between said conveyor line and said turntable and positioned to guide said molds into location to receive molten metal poured from said pouring receptacles as said conveyor line continuously carries molds past said turn- 15 table.

11. In a pouring device for successively pouring molten metal into a plurality of molds, a horizontally rotatable turntable, a plurality of measuring and pouring receptacles carried on 20 said turntable, means to tilt said receptacles to positions for receiving metal during a portion of the rotation of said turntable and to pour metal therefrom during another portion of the rotation, a conveyor line, mold support means on said 25 conveyor line, projecting members adjacent the circumference of said rotatable turntable in such position as to be contacted by molds carried on said conveyor line and to effect a sole driving connection between said conveyor line 30 and said turntable.

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