F. W. LEWIS.

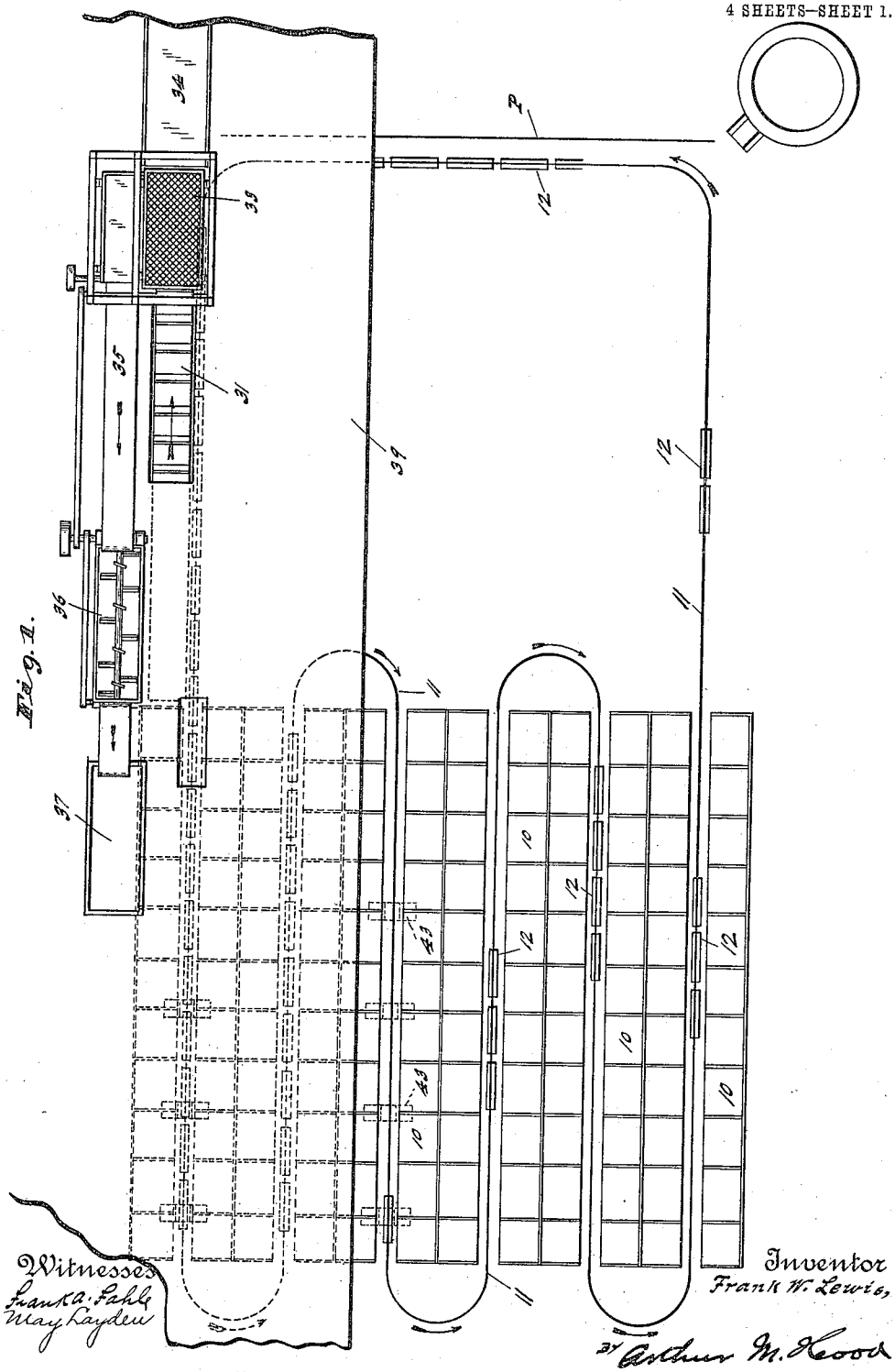
FOUNDRY APPARATUS.

APPLICATION FILED AUG. 2, 1911.

1,069,795.

Patented Aug. 12, 1913.

4 SHEETS—SHEET 1.



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4 SHEETS—SHEET 2.

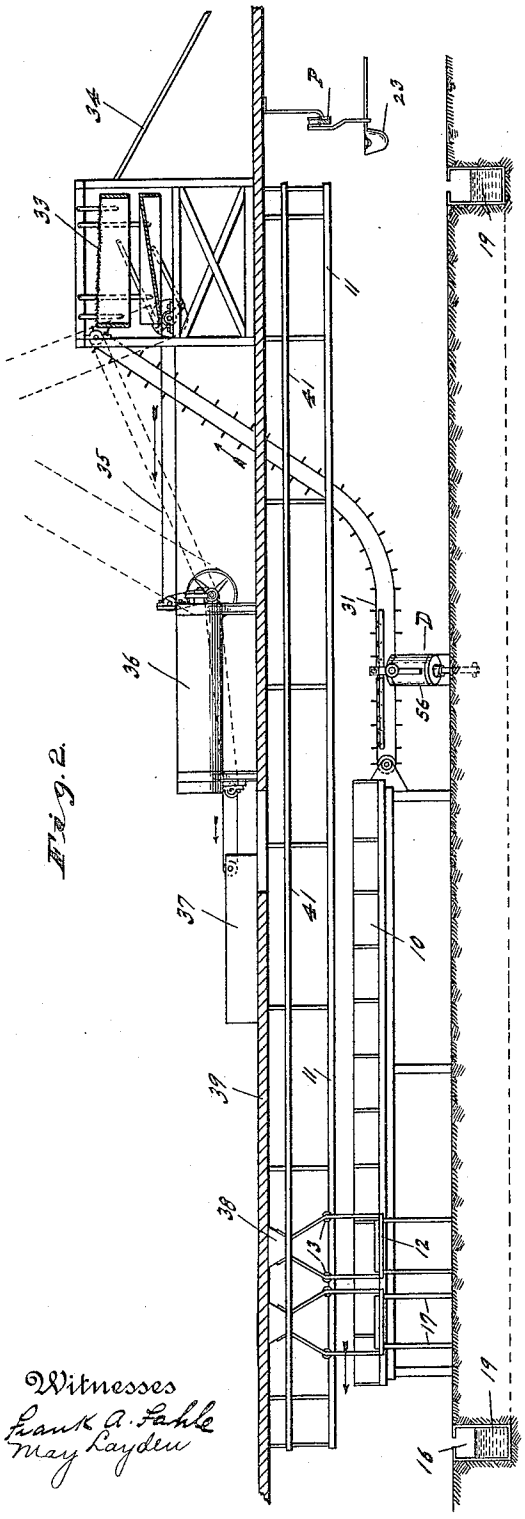

Fig. 2.

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4 SHEETS—SHEET 3.

Fig. 3.

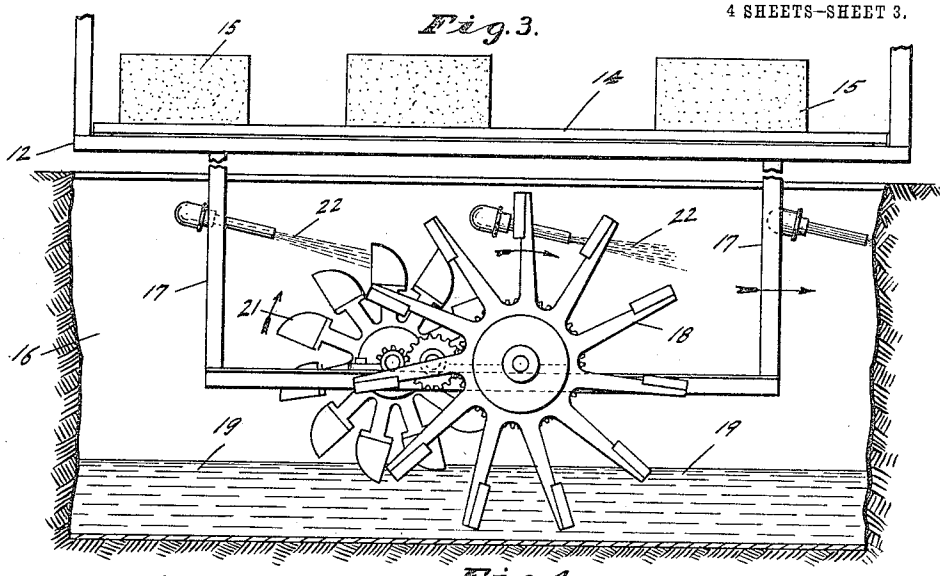


Fig. 4.

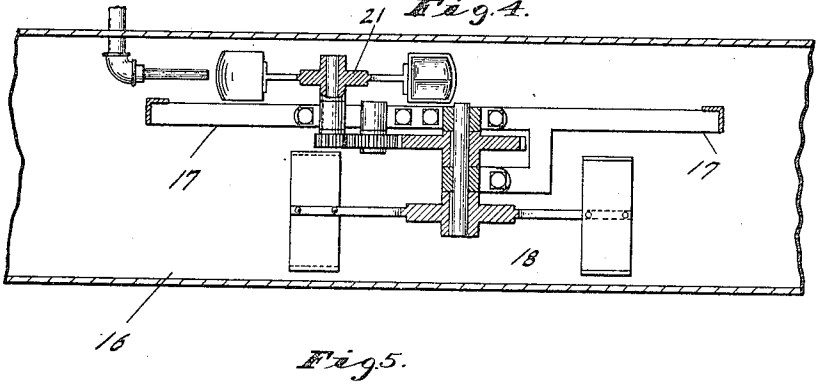
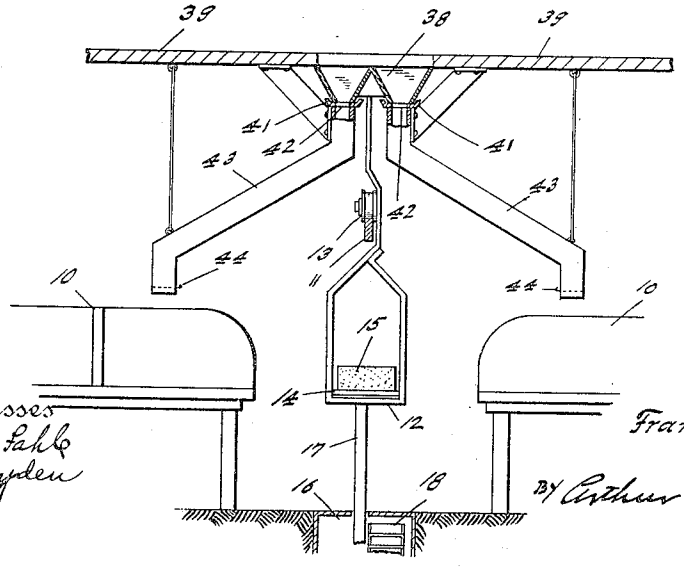


Fig. 5.



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4 SHEETS—SHEET 4.

Fig. 6.

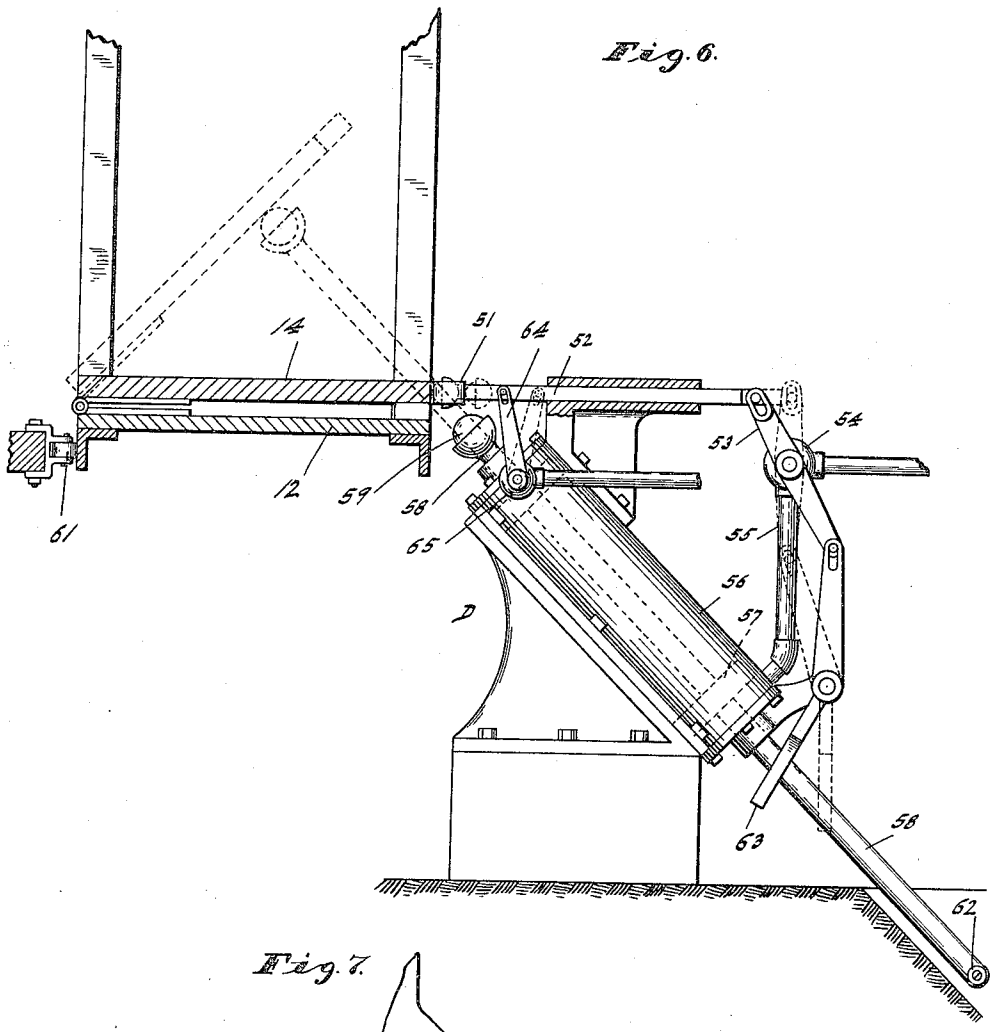
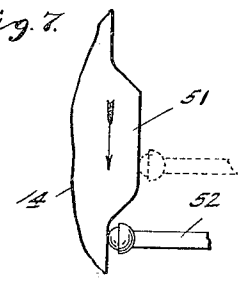


Fig. 7.



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UNITED STATES PATENT OFFICE.

FRANK W. LEWIS, OF INDIANAPOLIS, INDIANA.

FOUNDRY APPARATUS.

1,069,795. Specification of Letters Patent. Patented Aug. 12, 1913.

Application filed August 2, 1911. Serial No. 641,959.

To all whom it may concern:

Be it known that I, FRANK W. LEWIS, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented a new and useful Foundry Apparatus, of which the following is a specification.

In ordinary snap flask molding, the molder is required to handle and lift a very considerable weight of sand during the day, this requiring the expenditure of considerable strength and time. Time is also lost in carrying the molds from the bench and arranging them properly upon the casting floor, and in suspending molding operations during the time of pouring.

It has heretofore been proposed to equip a foundry with an endless carrier arranged to travel adjacent the molders and to receive from them the completed molds, the carrier also passing along a pouring position where the metal is poured into the molds by special operatives. Such apparatus whenever installed, so far as I am aware, has not been successful for the reason that, if the apparatus is of sufficient capacity to serve as many as a hundred molders (the minimum number to be economically served by such an apparatus) the total weight of the load which must be constantly in motion is so enormous that the endless carrier mechanisms heretofore provided soon stretch and wear to such an extent as to be inoperative. Such an apparatus also requires the expenditure of an extravagant amount of power. The entire operation of such an apparatus is also wholly dependent upon a proper operation of each of its elements so that if a single link in the carrier becomes broken or too greatly worn, the entire apparatus must be stopped for repairs, thus throwing out of employment a large number of men.

The object of my present invention is to provide an apparatus of such character that the total load will be carried in comparatively small units, each unit being practically independent of its fellows, so far as motive power is concerned, yet such that if its motive power becomes inefficient or inoperative, the unit will nevertheless be continued in its travels and may be readily extracted and replaced without stopping the entire system.

My invention also comprises means by which the molding sand will be automatically separated from the castings; and delivered to a proper tempering mechanism from which it may be delivered to members controlled by the continuously moving carriers to keep filled chutes delivering individually to each molder in such position that a major portion of the sand used by the molder need not be lifted at all except in transferring the completed molds from the bench to the carrier.

While the carrier units may be propelled by motors other than the particular form shown in the drawings, without departing from the spirit of my invention, yet the particular type of motor mechanism which I have illustrated is, I believe, preferable because of the extreme flexibility of its operation.

The accompanying drawings illustrate my invention.

Figure 1 is a plan of a complete equipment with a comparatively small number of the carrying units indicated; Fig. 2 is a vertical section of the complete apparatus on the same scale as Fig. 1; Fig. 3 a side elevation of the motor portion of one of the carrier units; Fig. 4 a horizontal axial section of one of the motor units; Fig. 5 a vertical section at right angles to Fig. 2 and on a larger scale; Fig. 6 an elevation in partial vertical section of the means for automatically discharging the filled molds from the carrier units; Fig. 7 a detail of the valve operating mechanism for the structure shown in Fig. 6.

In the drawings, 10 indicates mold benches which are arranged in any desired manner, dependent upon the shape of the foundry room. Extending adjacent the various benches is an endless track 11 upon which are preferably individually mounted a plurality of carriers 12. Each of these carriers is provided with suitable rollers or other mountings 13 by means of which they may be satisfactorily mounted to travel upon track 11 and each may be conveniently provided with an upwardly swinging platform 14 upon which the completed molds 15 may be placed by the molders as they are completed and as the carriers travel behind them. Arranged beneath track 11 is a water trough 16 which is conveniently formed in the floor of the room and extending downwardly from each carrier 12 is a frame 17 upon which is journaled a paddle wheel 18, the paddles of which are adapted to dip into a suitable depth of water 19 maintained in

the trough 16. The paddle wheel 19 may be driven by any suitable motor but I prefer a water wheel 21 suitably geared to the paddle wheel and so arranged upon frame 17 as to travel successively into the path of water jets 22 discharging into trough 16 and distributed at suitable distances along the length thereof, said jets being placed at such distance apart as to successively operate upon the water wheel to practically continuously rotate the paddle wheel and thereby cause the forward travel of the carrier. The speed of movement of the carrier will, of course, be dependent upon the load thereon and the velocity of the water jets, so that, by controlling the velocity of the water jets, the speed of the carriers along track 11 may be readily controlled. The paddle wheel and its water wheel will be kept constantly wet so as to need no other lubrication. If by chance the motor of any one of the carriers becomes disabled, the two or three succeeding carriers will quickly bank up behind the disabled carrier and the load of the disabled carrier be thus distributed among the succeeding carriers so as not to stop the continual movement of the apparatus and, as the movement of the apparatus is comparatively slow, it will not be at all difficult to extract the disabled motor from its carrier and substitute a new one without stopping the apparatus.

The carriers will be carried in succession along a portion of the track adjacent the pouring track P upon which a suitable pouring apparatus 23 may be mounted to be supplied from a continuous cupola. At a sufficient distance from the pouring position to insure proper cooling of the castings, I arrange, adjacent the path of travel of the carriers 12, a suitable mechanism D for dumping the molds and castings upon a traveling carrier 31 which elevates both sand and castings to a separating screen 33 mounted on the floor above the foundry room. The castings will be discharged from the screen 33 upon a delivery apron 34 and the sand will be delivered from the screen to a carrier 35 which will deliver it to a sand tempering apparatus 36 of any desired well known form, said tempering mechanism delivering the tempered sand to a trough 37 or otherwise from which it may be delivered in any desired manner to successively presented hoppers 38 carried by the several carriers 12 and traveling beneath the floor 39. Automatic mechanism might be provided to deliver the sand from the tempering mechanism to the hoppers 38 but I do not consider it necessary or advisable to illustrate such apparatus in my present application.

The comparatively small hoppers 38 carried by the carriers 12, traverse endless troughs 41 which are arranged alongside of track 11 and these troughs are provided at suitable intervals with openings 42 which deliver into chutes 43 each leading to a convenient point above one of the mold benches 10, each chute 43 being provided with a suitable valve 44 at its lower end by means of which the flow of sand therefrom to the flasks on the bench may be readily controlled. The number of hoppers 38 being comparatively large, they do not need to be of large individual capacity, being merely large enough to keep filled the various chutes 43, passing over the filled ones without delivering any sand.

In operation:—The various carriers being set in motion by the action of the water jets upon the several water wheels, the carriers are carried in a continuous slowly moving stream behind the molders and the completed molds are deposited thereon. As each completed mold reaches the pouring position it receives its charge of molten metal, and the carriers are then brought successively opposite the dumping mechanism D and a cam 51 carried by each platform 14 engages a plunger 52 and drives it so as to operate a valve lever 53 controlling a valve 54. The valve 54 may be a combined inlet and exhaust valve controlling the flow through pipe 55 leading into the lower end of a cylinder 56 within which is mounted a piston 57. Piston 57 carries a piston rod 58 which at its upper end is provided with a head 59, which may be conveniently a ball rotatably mounted in a suitable socket, and adapted to engage the under end of platform 14 and swing it up to the position indicated in dotted lines in Fig. 6 so as to dump the molds and castings on to the carrier 31 without interrupting the forward movement of the carrier 12. If desired, the thrust of this operation may be taken by a suitable roller 61 arranged adjacent the path of movement of carrier 12 as indicated in Fig. 6. When the upward stroke of the piston 57 has been completed a pin 62 carried by the piston rod 58 operates upon a lever 63 to return valve lever 53 to its normal position, indicated in full lines in Fig. 6. Plunger 52 is connected to lever 53 and connected to said plunger is a lever 64 which controls a second valve 65, like valve 54, and controlling the flow to and from the upper end of cylinder 56. It will be readily understood that a very considerable variety of valve mechanisms may be provided instead of the particular form shown. The molds and castings having been deposited upon the carrier 31, the emptied carrier will proceed on its way for refilling and the sand and the castings will be separated and the sand returned to the system in the manner already described.

I claim as my invention:

1. A foundry apparatus comprising an endless track, a water trough paralleling the

track, a plurality of carriers movably mounted on the track, a plurality of paddle wheels each rotatably mounted upon one of the carriers within the water trough, and means for independently rotating said paddle wheels to propel their carriers.

2. A foundry apparatus comprising a multiplicity of molders' benches, an endless track arranged adjacent said benches, a water trough paralleling the track, a plurality of mold carriers movably mounted on the track, a plurality of paddle wheels each rotatably mounted upon one of the carriers within the water trough, and means for independently rotating said paddle wheels to propel their carriers, the said molders' benches being so arranged relative to the track that completed molds may be readily transferred from the benches to any one of the carriers traversing the track.

3. A foundry apparatus comprising an endless track, a water trough paralleling the track, a plurality of carriers movably mounted on the track, a plurality of paddle wheels each rotatably mounted upon one of the carriers within the water trough, a driving wheel geared to each water wheel, and a plurality of water jets arranged in conjunction with said water trough in position to deliver water jets to said driving wheels in succession as they successively pass into, through and out of the ranges of said jets.

4. A foundry apparatus comprising a multiplicity of molders' benches, an endless track arranged adjacent said benches, a water trough paralleling the track, a plurality of mold carriers movably mounted on the track, a plurality of paddle wheels each rotatably mounted upon one of the carriers within the water trough, a driving wheel geared to each water wheel, and a plurality of water jets arranged in conjunction with said water trough in position to deliver water jets to said driving wheels in succession as they successively pass into, through and out of the ranges of said jets, the said molders' benches being so arranged relative to the track that completed molds may be readily transferred from the benches to any one of the carriers traversing the track.

5. The combination of a track, a water trough paralleling the track, a carrier movably mounted on the track, a paddle wheel rotatably mounted upon the carrier within the trough, and means arranged alongside the trough for rotating the paddle wheel.

6. The combination of a track, a water trough paralleling the track, a carrier movably mounted on the track, a paddle wheel rotatably mounted upon the carrier within the trough, a driving wheel geared to the paddle wheel, and a plurality of water jets arranged along the trough in position to successively direct water jets upon the driving wheel as the same is driven, by the action of the paddle wheel, into, through and beyond the ranges of said water jets.

7. In a foundry apparatus, the combination of an endless track, a plurality of independent mold carriers traversing said track, independent means for driving each of said carriers along the track, and dumping mechanism arranged adjacent said track to act upon the carriers in succession to discharge the contents thereof.

8. In a foundry apparatus, the combination of a track, a carrier movably mounted on said track, a water trough paralleling the track, and means within the water trough for propelling the carrier along its track.

9. In a foundry apparatus, the combination of an endless track, a plurality of independent but longitudinally coöperating carriers movably mounted on said track and each formed to receive one or more molds, a multiplicity of molders' benches arranged alongside said track each in position such that a molder may readily transfer completed molds from the bench to a mold carrier moving along the track, a multiplicity of motors each mounted upon a mold carrier and each having a motive capacity exceeding that required for the propulsion of its carrier and applied load, and means for independently energizing the several motors.

10. In a foundry apparatus, the combination of an endless track, a plurality of independent but longitudinally coöperating carriers movably mounted on said track and each formed to receive one or more molds, a multiplicity of molders' benches arranged alongside said track each in position such that a molder may readily transfer completed molds from the bench to a mold carrier moving along the track, a multiplicity of motors each mounted for ready removal upon a mold carrier and each having a motive capacity exceeding that required for the propulsion of its carrier and applied load, and means for independently energizing the several motors.

11. In a foundry apparatus, the combination of an endless track, a plurality of independent but longitudinally coöperating carriers movably mounted on said track and each formed to receive one or more molds, a multiplicity of molders' benches arranged alongside said track each in position such that a molder may readily transfer completed molds from the bench to a mold carrier moving along the track, a multiplicity of motors each mounted upon a mold carrier and each having a motive capacity exceeding that required for the propulsion of its carrier and applied load, and a multiplicity of means arranged alongside said track for successively energizing the several motors.

12. In a foundry apparatus, the combination of an endless track, a plurality of inde-

pendent but longitudinally coöperating carriers movably mounted on said track and each formed to receive one or more molds, a multiplicity of molders' benches arranged alongside said track each in position such that a molder may readily transfer completed molds from the bench to a mold carrier moving along the track, a multiplicity of motors each mounted for ready removal upon a mold carrier and each having a motive capacity exceeding that required for the propulsion of its carrier and applied load, and a multiplicity of means arranged alongside said track for successively energizing the several motors.

13. In a foundry apparatus, the combination of an endless track, a plurality of independent but longitudinally coöperating carriers movably mounted on said track and each formed to receive one or more molds, a multiplicity of motors each mounted upon a mold carrier and each having a motive capacity exceeding that required for the propulsion of its carrier and applied load, and means for independently energizing the several motors.

14. In a foundry apparatus, the combination of an endless track, a plurality of independent but longitudinally coöperating carriers movably mounted on said track and each formed to receive one or more molds, a multiplicity of motors each mounted for ready removal upon a mold carrier and each having a motive capacity exceeding that required for the propulsion of its carrier and applied load, and means for independently energizing the several motors.

15. In a foundry apparatus, the combination of an endless track, a plurality of independent but longitudinally coöperating carriers movably mounted on said track and each formed to receive one or more molds, a multiplicity of motors each mounted upon a mold carrier and each having a motive capacity exceeding that required for the propulsion of its carrier and applied load, and a multiplicity of means arranged alongside said track for successively energizing the several motors.

16. In a foundry apparatus, the combination of an endless track, a plurality of independent but longitudinally coöperating carriers movably mounted on said track and each formed to receive one or more molds, a multiplicity of motors each mounted for ready removal upon a mold carrier and each having a motive capacity exceeding that required for the propulsion of its carrier and applied load, and a multiplicity of means arranged alongside said track for successively energizing the several motors.

In witness whereof, I have hereunto set my hand and seal at Indianapolis, Indiana, this 29th day of July, A. D. one thousand nine hundred and eleven.

FRANK W. LEWIS. [L. S.]

Witnesses:
ARTHUR M. HOOD,
FRANK A. FAHLE.