June 1, 1937. C. L. SANFORD 2,082,721

CONCRETE BLOCK MACHINE

Filed Sept. 10, 1935 3 Sheets-Sheet 1

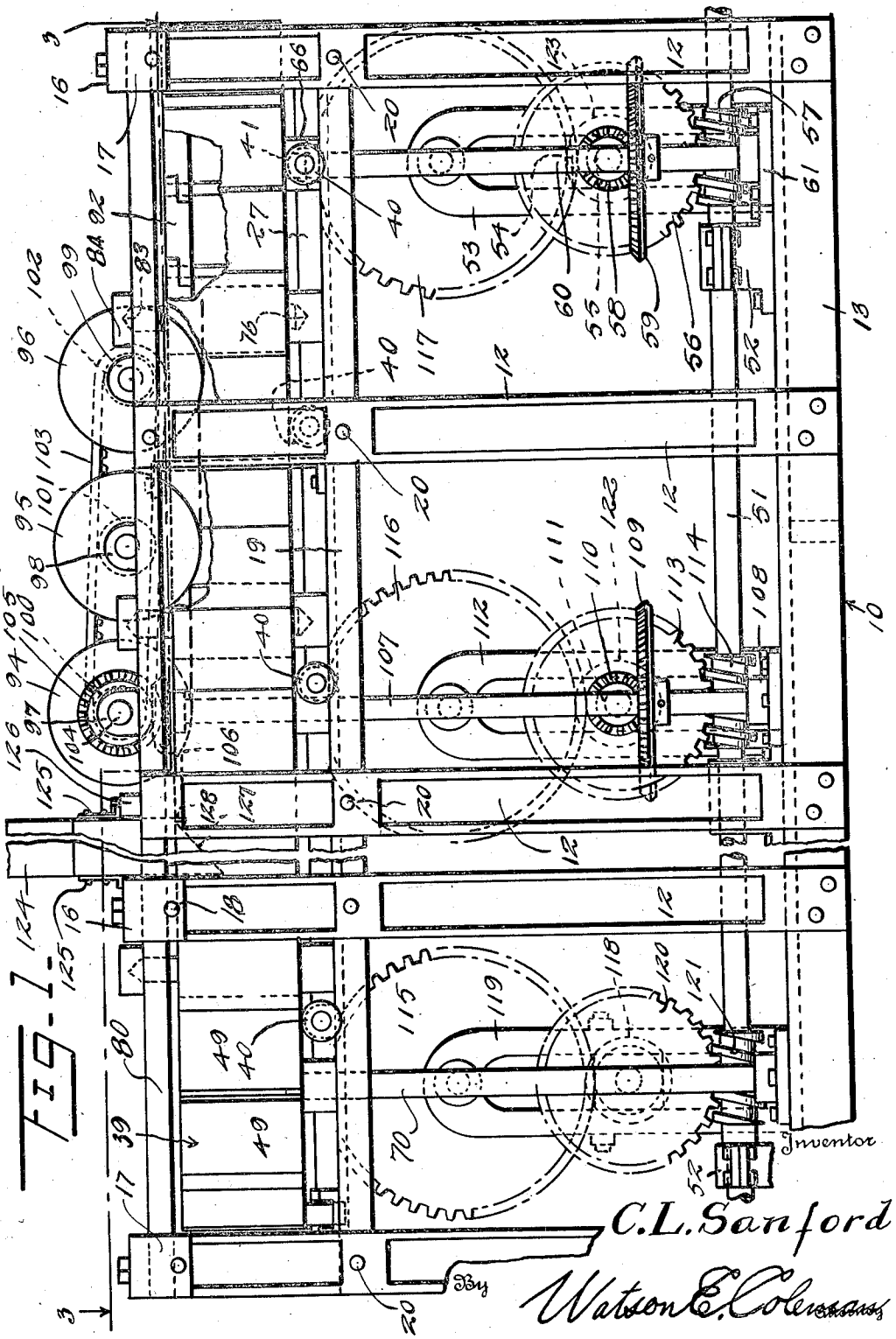


Fig. 1.

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Fig. 2.

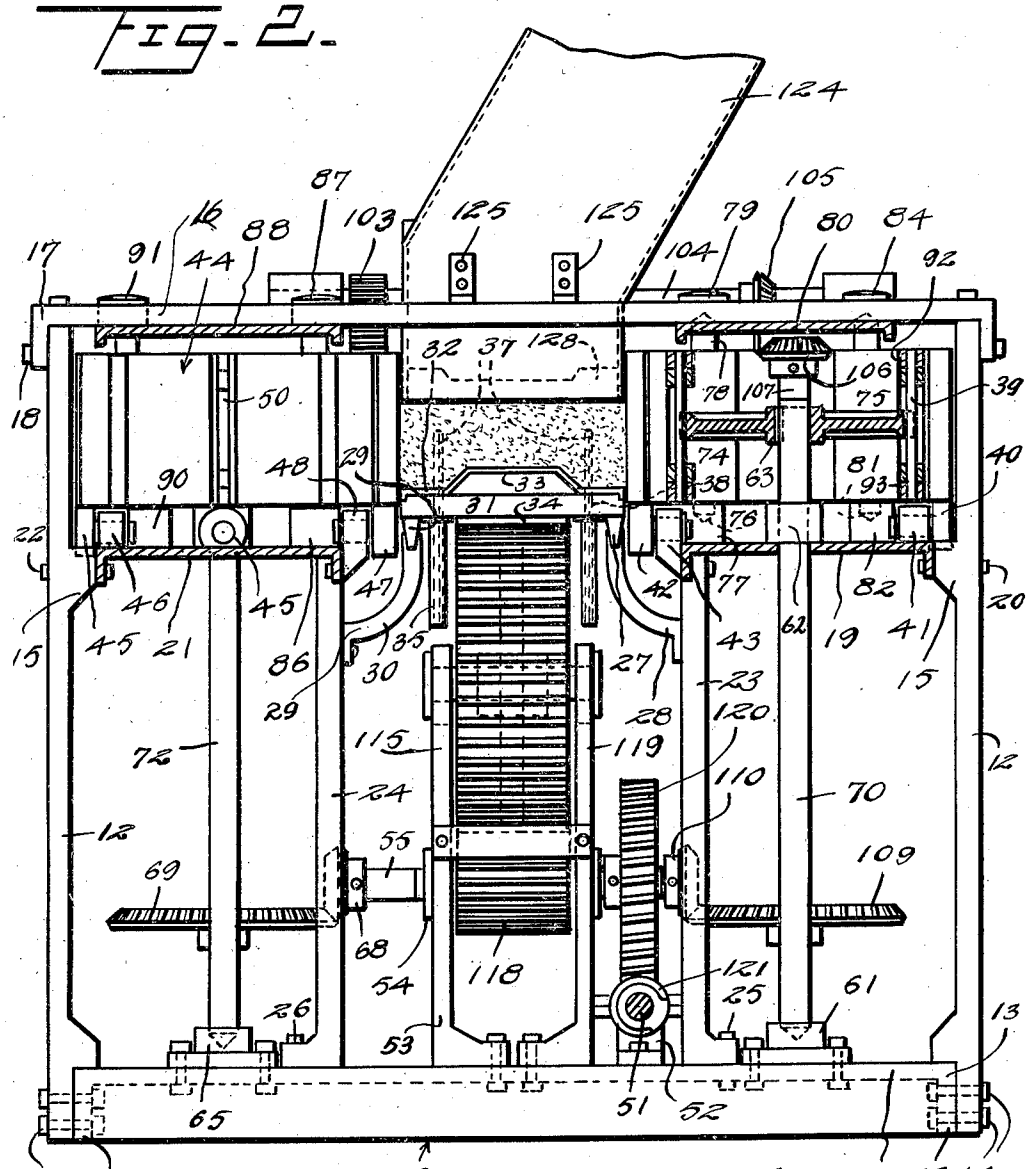
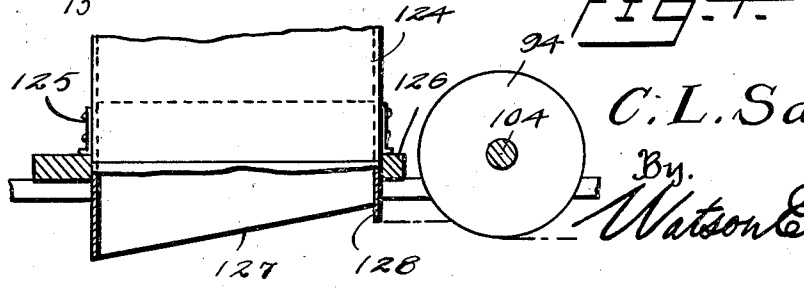


Fig. 4.



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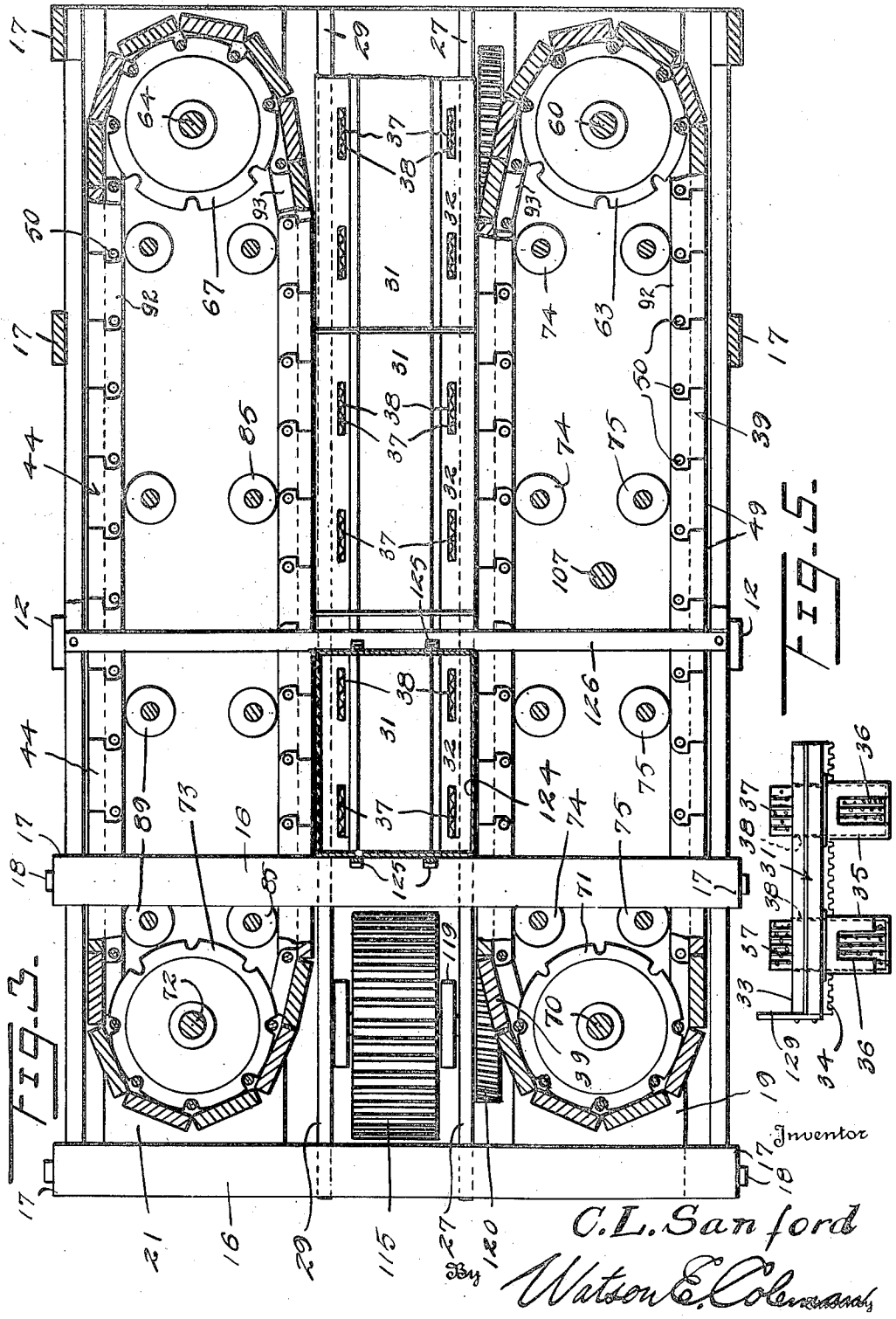


FIG. 5.

FIG. 3.

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UNITED STATES PATENT OFFICE

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CONCRETE BLOCK MACHINE

Charles Lemuel Sanford, Meadville, Pa.

Application September 10, 1935, Serial No. 39,961

10 Claims. (Cl. 25—41)

This invention relates to machines for making of blocks and more particularly for the making of blocks from plastic material such as concrete or the like.

An object of this invention is to provide a concrete block forming machine particularly designed for the purpose of forming one-half of the block illustrated, described and claimed in my copending application, Ser. No. 603,842. In this application there is disclosed a building block of concrete formed of two sections separated throughout their entire extent but connected by longitudinally corrugated metallic ties, the end portions of the ties being embedded in the two sections of the block. In forming such a block as this, one of the sections is first cast or formed and in the process of forming this section, the ends of the corrugated ties are embedded in this section of the block. This block section with its ties is then cured and later the opposed block section is formed by inverting the first named block section and inserting the ties in the mold for forming the second named block section. The particular object of the present invention is to provide a machine whereby the first named block sections may be formed with the ends of the ties embedded therein and to provide a machine of this character which is in a sense automatic in its action and will produce block sections in a continuous stream, the material being discharged onto pallets which are carried successively through the machine, the pallets or molded blocks being discharged at one end, the blocks being removable for curing.

A further object is to provide a machine of this character in which the pallets are separate and independent of each other and guided through the machine by means of rails and provide means positively engaging the pallets and positively shifting them along these rails from the entrance end to the discharge end of the machine.

The above and various other objects and advantages of this invention will in part be described in, and in part be understood from the following detail description of the present preferred embodiment, the same being illustrated in the accompanying drawings wherein:—

Figure 1 is a detail side elevation partly broken away of a device constructed according to an embodiment of this invention.

Figure 2 is an end elevation partly in section of the device.

Figure 3 is a sectional view taken on the line 3—3 of Figure 1, with the pressure rollers removed and with the endless belts partly in section.

Figure 4 is a fragmentary longitudinal section showing the hopper and the first pressure roller.

Figuer 5 is a detail side elevation of one of the pallets.

Referring to the drawings, wherein like numerals of reference designate corresponding parts throughout the several views, the numeral 10 designates generally a base having side flanges 13 and a flat top 11. The base 10 has a plurality of standards or supporting members 12 secured thereto as by bolts 14, which extend along each longitudinal edge thereof and these supports or standards 12 have projections or bosses 15 at a point spaced downwardly from the upper ends thereof, the purpose for which will be hereinafter explained.

The upper ends of the end standards 12 are secured together by bars 16 having right angularly related end portions 17 engaged by bolts 18. A channeled member 19 is secured as by bolts or fastening devices 20 to the bosses 15 at one side of the device and a second channeled member 21 is secured, as by bolts 22, to the bosses 15 at the opposite side of the device. These two channel members 19 and 21 are disposed in substantially parallel relation but laterally spaced from each other and the upper surfaces thereof are in substantially the same plane. The inner edges of the channel members 19 and 21 are supported as by supports 23 and 24 which are secured, as by bolts 25 and 26, to the base 10.

A guide rail 27 is disposed inwardly of the channeled member 19 and is secured to brackets 28 carried by the inner standards or posts 23. A second guide rail 29 parallel to the first guide of the rail is secured to brackets 30 carried by the posts or standards 24. A pallet, generally designated 31, is adapted to slide upon the guide rails 27 and this pallet is preferably constructed of a piece of wood of suitable length and width and is provided on the upper surface thereof with a metal mold plate 32 having an upwardly offset intermediate portion 33. The shape of this plate 31 controls the configuration of the under side of the block which is formed by this machine. The under side of the pallet or block supporting member 31 is provided with a toothed rack 34, the purpose for which will be hereinafter described.

Each pallet 31 is provided with a pair of laterally spaced downwardly extending pockets 35 and the side walls of these pockets are provided with openings 36 below the level of the pallet. These pockets are closed at the lower ends but open

through the surface of the pallet 31. Each mold plate 32 has an opening coinciding with an opening in the pocket, as shown in Figure 2, and tie members 37 intended to be embedded in the concrete block section are adapted to be disposed initially through the openings 38 and extend downwardly into the pockets 35. This tie member 37 is preferably of corrugated sheet metal similar to the tie plate shown and described in my co-pending application, Serial No. 603,842. In the present instance, there are four of these pockets 35 secured to the pallet 31, one pair adjacent each end thereof. These pockets 35 are disposed outwardly of the rack 34 and inwardly of the guides 27 and 29 as shown in Figure 2 so that the pallets 31 may freely move along the guides 27 and 29 through the machine.

An endless tractor belt 39 is disposed above the base 10 and has the lower edge thereof riding on rollers 40 carried by bearings 41 secured to one side of the channel member 19. The lower edge of the tractor belt 39 also engages inner rollers 42 carried by bearings 43 secured to the inner edge of the channel member 19. In this manner, the belt 39 is supported in upstanding position with its inner edge substantially parallel with the guide rail 27.

A second parallel tractor belt 44 is supported on outer rollers 45 carried by bearings 46 and on inner rollers 47 carried by bearings 48. The bearings 46 and 48 are secured to the outer and inner edges of the channel member 21. The tractor belts 39 and 44 are of a construction similar to the type used for tractors, being provided with plates 49 hingedly connected together by pins 50. The pins 50 form inwardly extending projections or teeth by means of which the belts 39 and 44 may be moved.

A drive shaft 51 is journalled in bearings 52 mounted on the base 10 and extends longitudinally of the base and is adapted to be connected at one end to a suitable source of power. A pair of brackets 53 are secured to the base 10 adjacent one end thereof and these brackets 53 carry a bearing 54 in which a shaft 55 is journalled. The shaft 55 has a worm gear 56 secured thereto which meshes with a worm 57 secured to the drive shaft 51. The shaft 55 also has a bevelled gear 58 secured thereto which meshes with a horizontally disposed bevelled gear 59 secured to a vertically disposed caterpillar belt driving shaft 60. The lower end of the driving shaft 60 is journalled in a bearing 61 secured to the base 10 and a bearing 62 is carried by the channeled member 19 and the shaft 60 extends vertically through this upper bearing 62. The upper end of the shaft 60 is provided with a sprocket wheel 63 which is disposed within the caterpillar or tractor belt 39 and engages the belt at one end of the frame. A second belt driving shaft 64, mounted in the same manner as shaft 60, is disposed parallel to the shaft 60 but laterally spaced therefrom has its lower end journalled in a bearing 65 secured to the base 10 and extends vertically through a bearing 66 carried by the channeled member 21. This shaft 64 has a sprocket wheel 67 secured at its upper end which engages at one end of the caterpillar or endless belt 44 and forms a driving means for the belt 44. The shaft 64 is driven by means identically the same as the driving means for shaft 60 and is driven from the opposite end of the shaft 55. This bevelled gear meshes with a bevelled gear secured to the shaft 64.

An idler shaft 70 is journalled in the frame structure and has a sprocket wheel 71 at its upper end which engages within the caterpillar or tractor belt 39 at the end opposite from the sprocket wheel 63. A second idler shaft 72 is journalled in the opposite side of the frame and is provided with a sprocket wheel 73 engaging within the opposite end of the caterpillar or tractor belt 44. A plurality of rollers 74 engage on the inner run of the belt 39 and a plurality of outer rollers 75 engage within the outer run of the belt 39.

The rollers 74 are provided at their lower ends with trunnions 76 engaging in bearings 77 secured to the channeled member 19 and the upper ends of the rollers 74 are provided with trunnions 78 engaging in bearings 79 carried by an upper channel member 80. The outer rollers 75 have trunnions 81 journalled in bearings 82 carried by the outer portion of the channel member 19 and upper trunnions 83 carried by the rollers 75 are journalled in bearings 84 secured to the upper channel member 80. This upper channel member 80 is secured to the cross bars 16 as by bolts or other fastening devices.

The belt 44 is held in vertical position with the intermediate portion thereof of the inside run by means of rollers 85 rotatably carried by bearings 86 and 87. The bearings 86 are secured to the lower channel member 21 and the bearings 87 are secured to an upper channel member 88, fastened by means of bolts or the like, to the cross bars 16 in the same manner as the channel member 18. Outer rollers 89 are rotatably carried by bearings 90 and 91, the bearing 90 being secured to the lower channel member 21 and the upper bearing 91 being secured to the upper channel member 88. As shown in Figure 3, the endless belts 39 and 44 have straight outer runs and the inner runs thereof are parallel one with another for a considerable portion of their length with the end portions of the runs inclined outwardly so that at the intake end of the device, the pallets 31 can be readily started into the machine and at the outlet or discharge end the plates 49 forming the belts will be drawn away from the sides of the block on the pallet 31. This drawing away of the plates from the pallet is relatively gradual so that there will not be any tendency for the material of which the blocks are formed to stick to the plates 49. The rollers 74, 75, 85 and 89 engage upper and lower ribs 92 and 93 respectively, which extend along the upper and lower edges of the plates 49 and form a track to engage the rollers.

A series of pressure rollers 94, 95 and 96 are journalled in bearings 97, 98 and 99 respectively, which are secured to the channel members 80 and 88. The pressure rollers have gear wheels 100, 101, and 102 secured thereto and a toothed belt 103 is trained over these gears so that all of these pressure rollers will turn at the same speed. Preferably, the first pressure roller 94 has the axis thereof slightly higher than the second pressure roller 95 and the second pressure roller 95 has the axis thereof slightly higher than the last or finishing roller 96 so that the concrete or plastic material will be gradually compressed as it moves beneath the pressure rollers.

The first pressure roller 94 has a shaft 104 which is provided with a bevelled gear 105 meshing with a bevelled gear 106 carried by the upper end of a roller drive shaft 107 which extends vertically in the frame structure and is journalled at its lower end in a bearing 108. A bevelled gear 109 is secured to the driving shaft 107 and meshes

with a bevelled gear 110 secured to a shaft 111 journalled in uprights 112. A worm gear 113 is secured to the shaft 111 and meshes with a worm 114 secured to the power shaft 51.

The pallet 31 is moved along the space between the two belts 39 and 44 by means of driving gears 115, 116 and 117. The gear 115 is rotated by a driving gear 118 rotatably carried by uprights 119 and the gear 118 is driven by a worm gear 120 meshing with a worm 121 carried by the power shaft 51. The gear 116 meshes with a gear 122 carried by the shaft 111 which is rotated by the worm gear 113 meshing with the worm 114. The pallet moving gear 117 meshes with a driving gear 123 secured to the shaft 55 which is driven by the worm gear 56 meshing with the worm 57 on the power shaft 51.

The material which is discharged onto the pallets 31 passes through a hopper 124 which is supported between the side portions of the frame, being provided with brackets or lugs 125 of substantially L-shaped construction which, at one side, engage an intermediate side bar 16 and at the opposite side engage a relatively narrow side bar 126. The hopper 124 is provided with an upwardly and forwardly inclined lower edge portion 127 and the forward wall or edge of the hopper 124 has a downwardly projecting portion 128 which is adapted to initially form a channel in the material as the pallets move therebeneath.

In the operation of this device, the power shaft 51 is connected to a suitable source of power supply, such as a motor or other power means, and when the shaft 51 rotates, the pallet moving gears 115, 116, and 117 will be rotated so that when the first pallet 31 is started in between the tractor belts 39 and 44, the gear 115 will engage the rack 34 on the bottom of the pallet. The pallet moving gears are all of the same diameter and are all rotating at the same speed so that the pallet will move through the machine at an even rate. Initially the first pallet is passed beneath the hopper 124 without any material being deposited thereon so that the vertical wall 129 carried by the rear end of the pallet 31 will form the front wall for the succeeding pallet which also carries a vertical wall 129 at its rear end. The plastic material is discharged upon the pallets in a continuous stream and the forward end portion 128 of the hopper serves as a rake or scraper to level off the loose material before the pallet passes beneath the first pressure roller 94. This pressure roller 94 will initially compact the loose material and this material will be increasingly compacted by the succeeding pressure rollers 95 and 96. As the filled pallet moves to the discharge end of the device the pallets with the compressed material thereon are removed and placed in a drying chamber or other place where the plastic material may set. It will, of course, be understood that each pallet has four corrugated tie members 37, which are partially embedded in the block formed on top of the pallet 31.

The empty pallets are fed to the intake end of the machine by any suitable means and the filled pallets are removed by any suitable means and the mold plates with the molded material thereon are removed from the pallets and set aside for the concrete to cure while the pallets are returned to the other end of the machine for re-use.

It will be obvious from the foregoing that an exceedingly practical and simple machine has been disclosed whereby concrete blocks may be formed continuously in a manner whereby the usual form molds may be eliminated, it being only necessary to have a mold plate 32 for each block which is left engaged with the compressed material until the material has properly set, whereupon the mold plate may be removed and used again. The pallets 31 in their movement through the machine ride on the rails or guide members 27 and 29.

I claim:—

1. A block forming machine comprising a frame, guide means in the frame, a pallet member slidably engaging the guide means, a toothed rack on the underside of the pallet, gears rotatably carried by the frame and engaging the rack to move the pallet along the guide means, means for rotating said gears, means for discharging a plastic material on the pallet, and means disposed on opposite sides of the pallet and movable therewith to retain the plastic material on the pallet during the movement of the pallet along the guide means.

2. A block forming machine comprising a frame, guide means in the frame, a pallet member slidably engaging the guide means, a toothed rack secured to said pallet, gear means carried by the frame and engaging said rack to move the pallet along the guide means, driving means for said gear means, a pair of endless wall members disposed one on each side of the pallet, means for movably supporting said wall members in the frame in a position whereby one run of each of the wall members will be disposed adjacent the pallet, driving means for said wall members, and means for progressively compressing the material on the pallet during the movement thereof along the guide means.

3. In a block forming machine, a removable mold comprising a relatively flat member, an end wall secured to one end of the member and a plurality of receptacles secured to the underside of the member for holding tie members in a position whereby a portion of said tie members will project above the top of the flat member, said flat member having openings therethrough communicating with the receptacles.

4. In a block forming machine, a pallet comprising a plate, an end wall secured to one end of the plate, said plate having a plurality of openings therethrough, a plurality of receptacles secured to the underside of the plate, said openings communicating with the receptacles whereby tie members may be disposed within the receptacle with a portion of the tie members projecting above the top of the plate.

5. In a block forming machine, a pallet member, a vertically disposed wall at one end of the pallet member, said pallet member having a plurality of openings therethrough, a plurality of receptacles secured to the underside of the pallet member, said openings communicating with the receptacles and a toothed rack extending longitudinally of the pallet and disposed between pairs of said receptacles.

6. In a block forming machine, a pallet for receiving plastic material thereon, the pallet having apertures therethrough, and means for holding tie members inserted in said apertures and projected above the upper face of the pallet.

7. In a block forming machine, a pallet having an upstanding wall at one end having a plurality of apertures extending through the pallet, and means coacting with said apertures to support a series of tie members in said apertures with their lower ends below the rear wall of the pallet

whereby the tie members may be embedded within the material deposited upon the pallet.

8. A block forming machine, comprising a supporting frame, a pair of guide rails supported on the frame, a pair of endless elements disposed one on each side of the rails, means for supporting the inner flight of each endless element against inward movement, the inner flights of the endless elements being disposed closely adjacent said rails, a hopper discharging into the space between said rails, the rear wall of the hopper being lower than the front wall and acting as a strike-off plate, a series of pallets adapted to be disposed upon the rails, each pallet having rack teeth on its lower face, a series of wheels disposed below the path of movement of the pallets and having teeth engaging the pallets whereby to shift the pallets longitudinally along the rails, means for driving said toothed wheels and the laterally disposed endless elements at the same speed, and a series of compressing rollers mounted in said frame in advance of the hopper and adapted to compress the material disposed on the pallets from the hopper, the rollers being disposed each nearer to the pallets than the next adjacent rear rollers.

9. In a block forming machine, a pallet, the pallet having apertures therethrough, means below the apertures for holding tie members inserted in said apertures and projected above the upper face of the pallet, and a mold plate disposed upon the pallet and having apertures coinciding with the apertures in the pallet whereby said tie members may be inserted through the mold plate and into said holding means.

10. A block forming machine, comprising a frame, a pair of guide rails supported on the frame, a plurality of pallet members independent of each other but slidably engaging the guide rails, means carried by the frame for positively engaging the pallets against slippage and moving the pallets along the guide means, means for discharging plastic material successively on the pallets, a pair of endless wall members disposed in each side of the path of movement of the pallets, means for supporting the wall members in a position whereby one run of each of the wall members will be disposed closely adjacent the side edges of the pallets, and means moving said wall members at substantially the same rate of speed as the speed of movement of the pallet along the guide rails.

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