April 2, 1957 J. J. PETTIPIECE 2,787,041

BLOCK FORMING MACHINE

Filed April 11, 1955 5 Sheets-Sheet 1

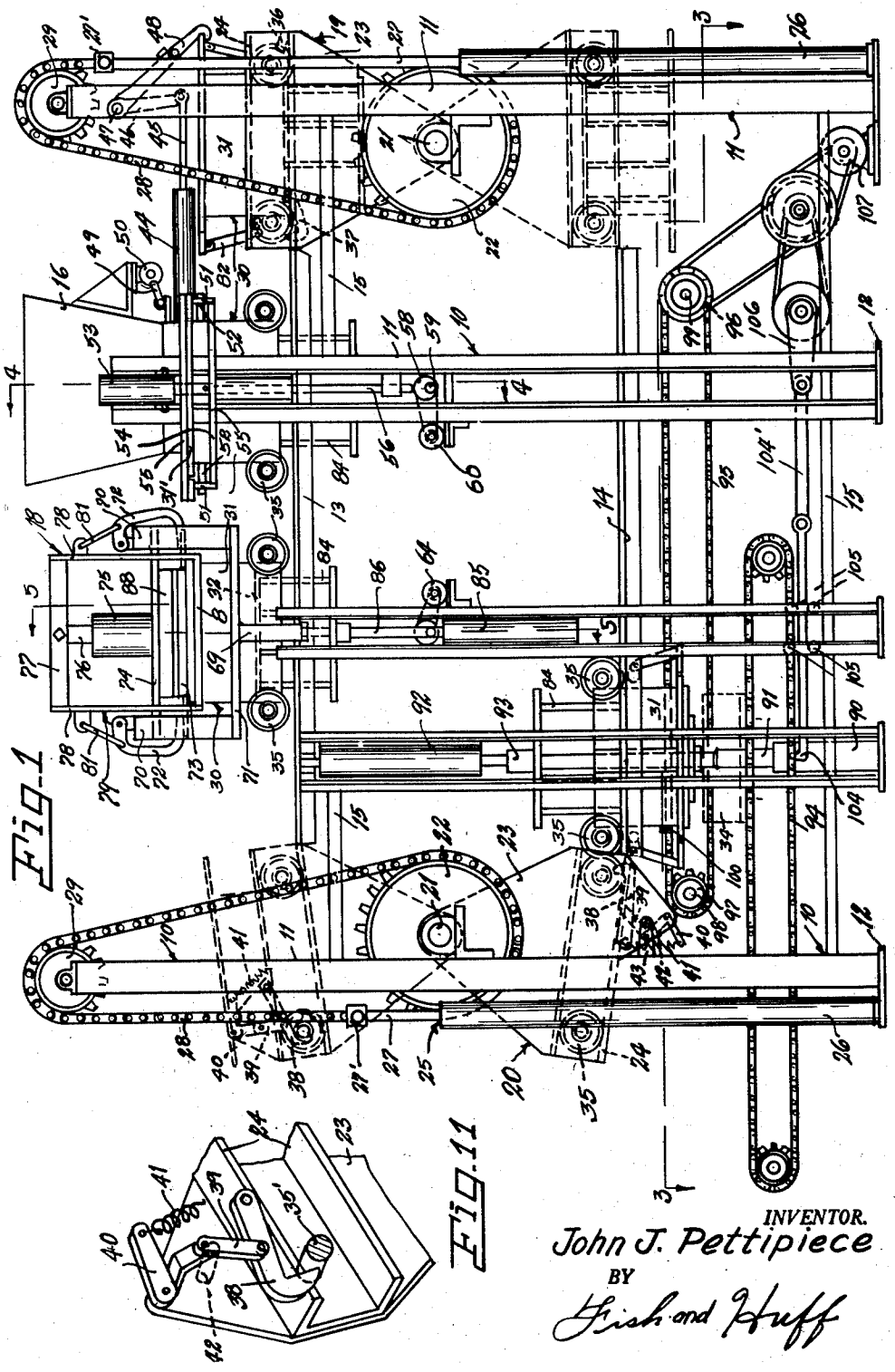


Fig. 1

Fig. 11

INVENTOR.
John J. Pettipiece
BY
Fish and Huff

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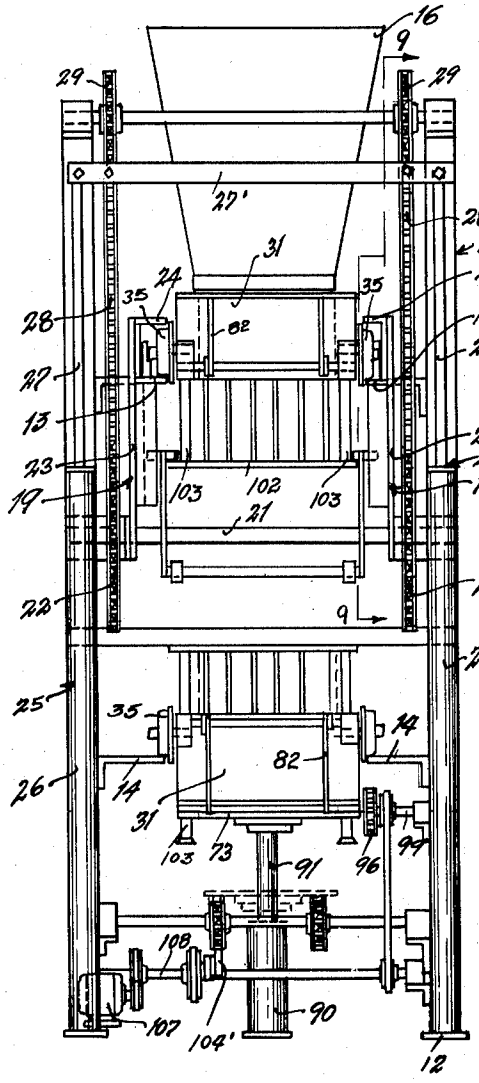


Fig. 2

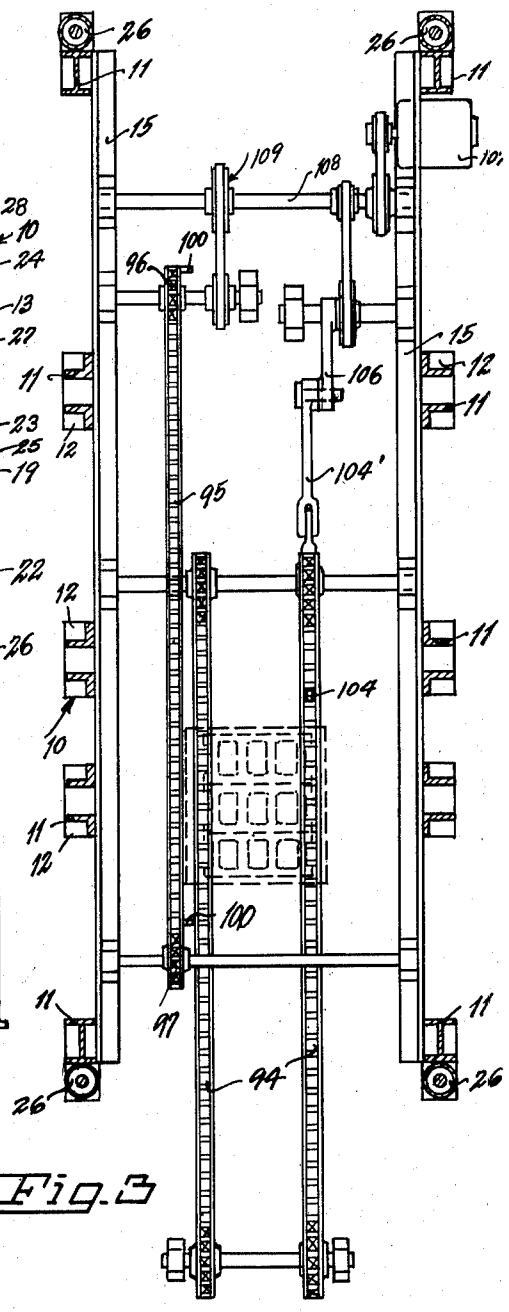


Fig. 3

INVENTOR.
John J. Pettipiece
BY
Fish and Huff

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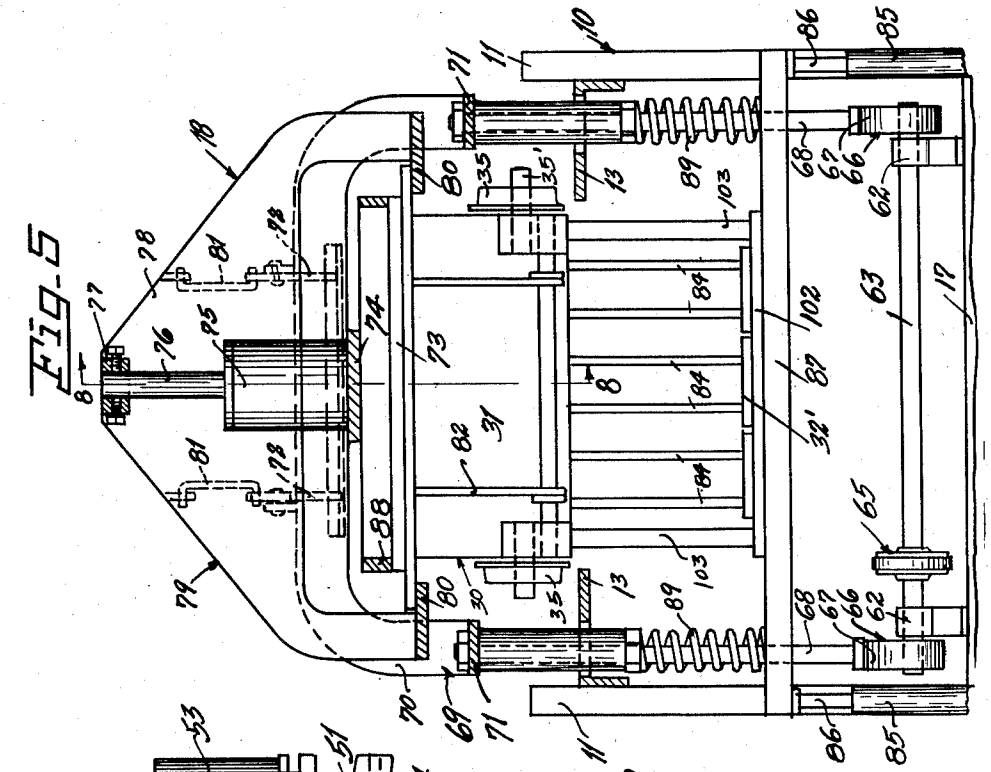


Fig. 5

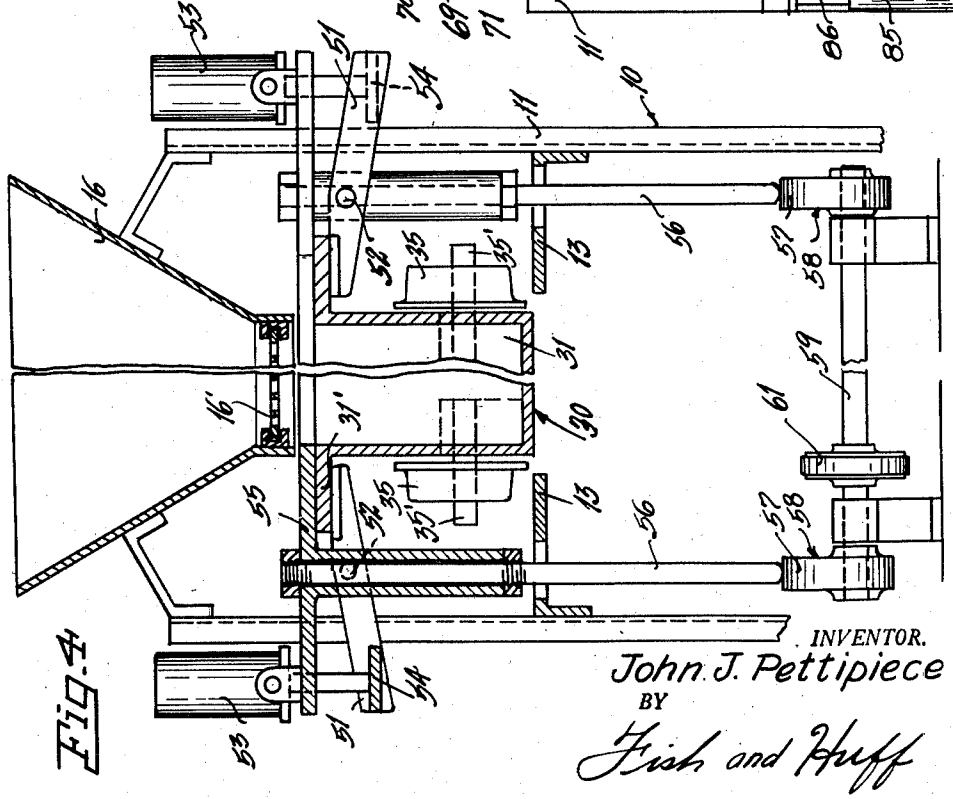


Fig. 4

INVENTOR.
John J. Pettipiece
BY
Fish and Huff

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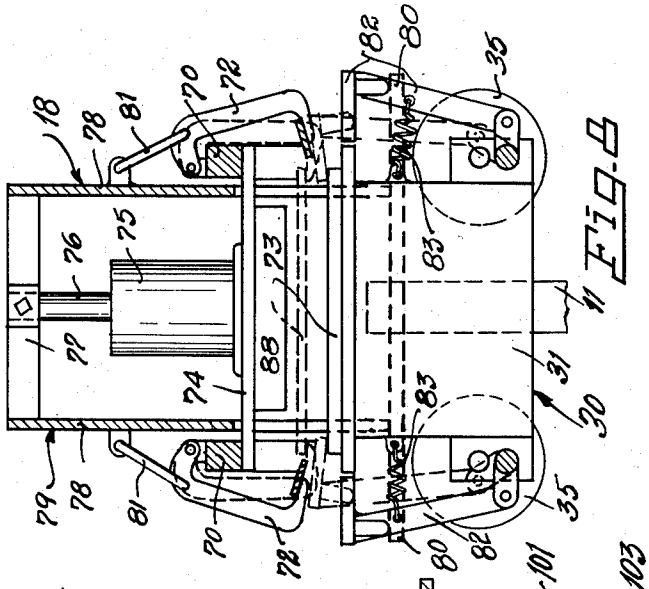


FIG. 8

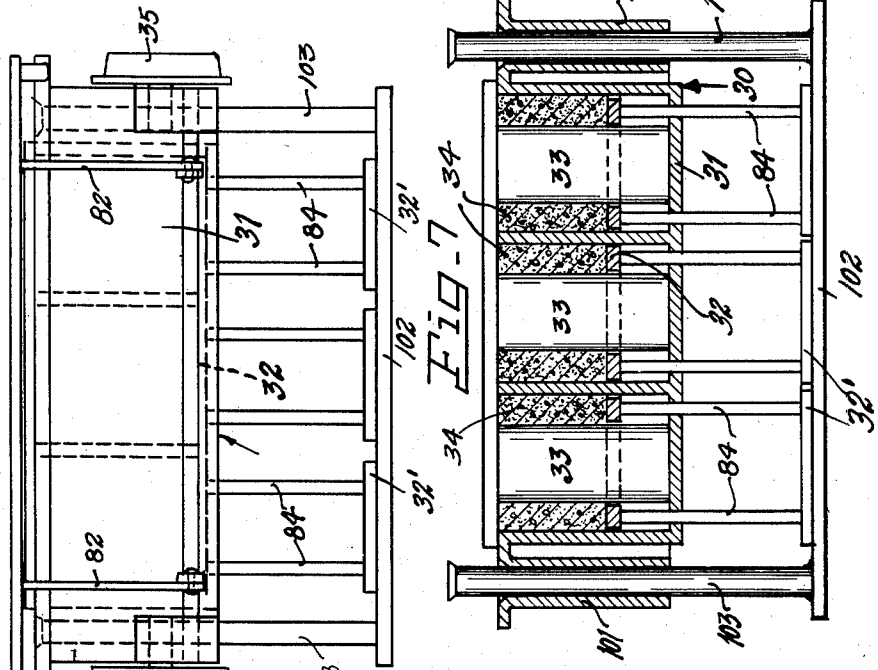


FIG. 7

FIG. 6

INVENTOR.
John J. Pettipiece
BY
Fish and Huff

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Fig. 10

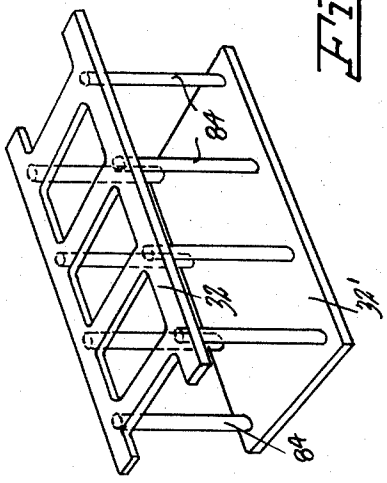
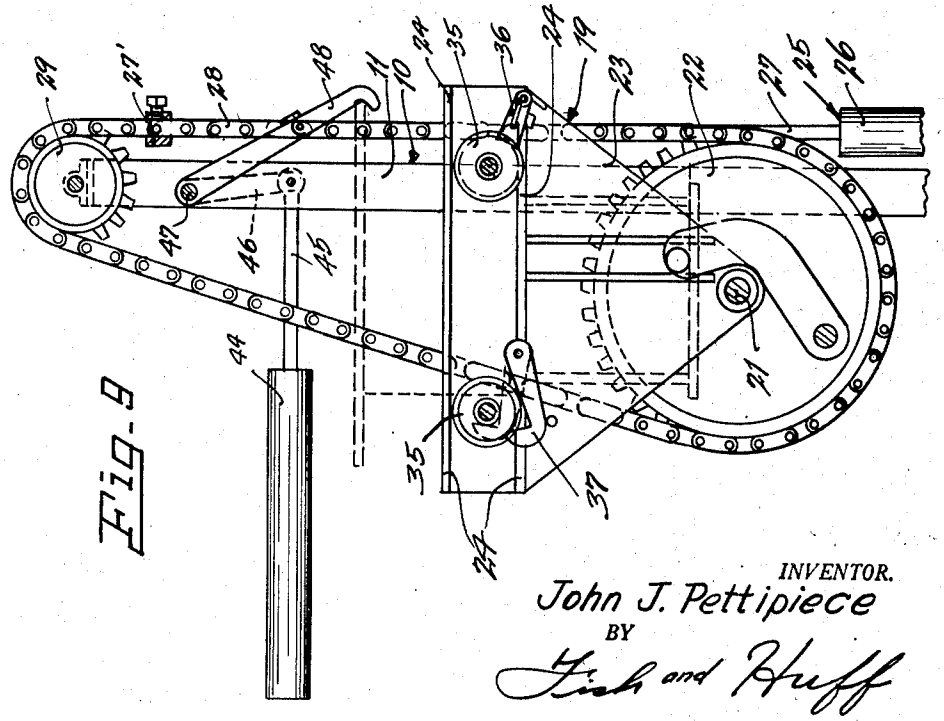


Fig. 9



INVENTOR.
John J. Pettipiece
BY
Fish and Huff

United States Patent Office 2,787,041 Patented Apr. 2, 1957

2,787,041

BLOCK FORMING MACHINE

John J. Pettipiece, Casper, Wyo.

Application April 11, 1955, Serial No. 500,343

2 Claims. (Cl. 25—41)

This invention relates to improvements in block forming machines of the type in which a plurality of block molds are successively and automatically filled with a setting or hardening material and compressed during the time they are being conveyed through the machine forming blocks subsequently discharged from the molds.

In machines of this type, it is necessary to successively perform a number of operations to produce blocks such as concrete blocks. Under present day practice, it is conventional to complete the plural operations on one mold box of blocks before commencing with another.

It is therefore one object of the present invention to provide a block machine having a plurality of mold boxes movable along a predetermined path wherein the conventional functions of a concrete block machine are sequentially performed upon each mold box, but wherein all necessary operations are substantially simultaneously performed upon a plurality of mold boxes, thereby providing a machine which discharges a greater number of blocks in a given time.

Another object of the invention lies in the provision of a block machine having improved mobilized mold boxes and means by which the mold boxes are conveyed through the machine.

Another object of the invention lies in the provision of a block machine constructed and arranged in such a manner that the several elements cooperate to produce blocks of superior quality at an increased number per minute.

Another object of the invention lies in the provision of a block machine which is comparatively simple in construction, strong, durable, highly efficient and reliable in use, compact, and which may be manufactured at low cost.

The various important features of the invention will be made clear by the following description, which is to be understood in conjunction with the accompanying drawings showing one embodiment of the invention. It should be understood, however, that the apparatus may be varied in many ways and that many of the elements described and illustrated may be replaced by equivalents. Therefore it is not my intention to limit the invention to the particular embodiment shown and described in this specification, but it is intended to include such like devices as fall within the scope of the appended claims.

In the accompanying drawings wherein like numerals are employed to designate like parts:

Figure 1 is a side elevational view of a concrete block machine embodying the present invention;

Figure 2 is an end elevation of the machine, looking at the right end of Figure 1;

Figure 3 is a horizontal cross section taken on the plane indicated at line 3—3 of Figure 1;

Figure 4 is a fragmentary transverse vertical cross section taken on the plane indicated by line 4—4 of Figure 1;

Figure 5 is a fragmentary transverse vertical cross

section taken on the planes indicated by lines 5—5 of Figure 1;

Figure 6 is an enlarged end view of a mold box;

Figure 7 is a transverse cross sectional view taken through a mold box and upon a scale equal to that of Figure 6;

Figure 8 is a fragmentary longitudinal vertical cross section taken on the plane indicated at line 8—8 of Figure 5;

Figure 9 is a fragmentary vertical cross section taken on the planes indicated by lines 9—9 of Figure 2;

Figure 10 is a perspective view of a pressure plate and its spaced lower plate; and

Figure 11 is a fragmentary perspective view of the inner side face of a mold box transfer mechanism plate showing the latch mechanism associated therewith.

Referring now in detail to the drawings, it will be seen that I have provided a concrete block machine which has a supporting frame 10 consisting of a plurality of transversely spaced vertical side posts 11 provided on their lower ends with feet or plates 12 preferably adapted to be secured to a supporting floor (not shown). The intermediate ones of the posts 11 are secured together by means of longitudinally extending pairs of vertically spaced horizontal upper and lower rails 13 and 14. The end ones of said posts 11 are secured to the intermediate posts by means of longitudinally extending horizontal bracing members 15. At their upper ends, one pair of intermediate posts 11 supports a hopper 16 adapted to contain a plastic coalescent material, for instance a cement mixture, and discharge the material as required into a mold box to be subsequently described. Another pair of the intermediate support posts 11 is provided with a cross beam 17 supporting a pallette applying mechanism 18 adapted to apply a pallette and compress the aggregate in the successive mold boxes.

At the ends of the frame 10 I have provided transfer mechanisms 19 and 20. Each said mechanism includes laterally extending rockable shafts 21 which are suitably journaled in bearings carried by the end posts 11. At least one end and preferably both ends of each said shaft carry sprockets 22 fixed thereto. Intermediate the sprockets 22 each shaft 21 is provided with a pair of radially extending spaced support plates 23, each of which is provided on its inner face with a spaced pair of confining rail members 24—24, the radially distant ones of which are disposed to be placed in communication with the ends of lower rails 14 and radially closer ones of which are disposed to be aligned with upper rails 13. It will thus be seen that as the sprockets 22 are rotated, shafts 21 are caused to rock and the plates 23 are moved between the full line positions and the dotted line positions shown in Figure 1.

Means 25, consisting of a pair of hydraulic cylinders 26 having reciprocal piston rod 27 secured to a cross bar 27' fixed on endless chains 28 which are trained about the sprockets 22 and elevated idler sprockets 29 journaled on the upper ends of the end posts 11, are provided for each transfer mechanism 19 and 20. It will thus be seen that as the cylinders 26 are actuated to shift their respective piston rods 27 outwardly or upwardly thereof, the chains 28 are caused to move therewith and rotate the sprockets 22, thus rocking shafts 21 to actuate the transfer mechanisms 19 and 20 between the lower positions and the upper positions. The transfer mechanisms 19 and 20 are provided for transferring mold boxes carried respectively upon the lower rails 14 to the upper rails 13, and the upper rails 13 to the lower rails 14.

The mold boxes indicated in general by the numeral 30 are each substantially formed with a rectangular metal box 31 which is considered to be in the upright

position as shown at the upper side of the block machine traversing the rails 13. In this position, the mold boxes are normally open at their upper ends to receive aggregate from the hopper 16 while disposed thereunder. To prevent discharge of the aggregate from the bottom of the mold boxes, I provide in each one a compression plate 32 which, as seen in Figure 10, is shaped to coincide with the transverse configuration of the block to be formed by the mold box. It will be understood that the mold boxes are formed to produce a number of blocks in each one, preferably three, however, they may be constructed to produce one or more as desired. Each mold box 30 is provided with fixed rigid cores 33 to form the inner configuration of the blocks 34. On the outer side faces of the mold box 30, I provide mobilizing wheels 35—35 which are adapted to cooperate with the rails 13, 14, and 24, to facilitate movement of the mold boxes through the machine as hereinafter described.

The spaced rails 24 on the transfer mechanism plates 23 prevent radial movement of the mold boxes from the transfer mechanism; however, it is necessary to provide means for preventing the mold boxes from rolling off the ends of the rails 24 during transferring movements intermediate the upper and lower rails 13 and 14. To accomplish this, I provide a spring loaded latch 36 and a gravity actuated hook 37 on the transfer mechanism 19. The latch 36 depresses as the wheels 35 roll thereover during movement of the mold boxes 30 onto the rails 24, while the gravity actuated hook 37 hooks over the front axle 35' to prevent its movement off of the ends of the rails 24.

The latch member 36 is spring biased to a latching position, therefore is adapted for pivotal movement to permit entrance of the wheels 35 intermediate the rails 24 and yet prevent their rearward movement therefrom. The hook latch 37 is held by gravity in position to prevent movement of the mold box from its end of the transfer mechanism 19 and to automatically drop as disclosed in the full line position of Figure 9 when the transfer mechanism has reached its extreme upper position wherein the inner rail 24 is in alignment with the rail 13, thus providing means for releasing the mold box 30 for movement onto the rail 13.

On the transfer mechanism 20 at the normally lower ends of the rails 24, I provide a pivotally supported hook 38 which is removably held in position to catch the front axle 35' of the mold boxes by means of a break link 39 with which is associated a bell crank 40 yieldably held by a tension spring 41, to positively position the sections of the link 39 in longitudinal alignment, whereby the latch or hook 38 is releasably disposed in a position to preclude movement of the mold box thereby.

A stationary pin 42 is carried by a projection 43 secured to a rigid member of the frame 10 such as end post 11, and when the transfer mechanism 20 reaches its extreme lower position, shown in full line in Figure 1, the pin 42 breaks the link 39, thus retracting the latch 38 from retaining the axle 35' and permits the mold box 30 to roll from the transfer mechanism 20 by gravity onto the lower rail 14.

An intermediate post 11 is provided with a longitudinally extending horizontally disposed cylinder 44, having a piston rod 45 which extends toward the receiving end of the machine (on the right as viewed in Figures 1 and 9).

The end of the piston rod 45 is pivotally attached to an arm 46 rigidly united on the end of a rock shaft 47 journaled on the end posts 11 and carrying a hook 48 pivoted intermediate its length and adapted to break in one direction only and remain rigid while moving said mold boxes into the machine. As the cylinder 44 is energized and the piston rod is drawn inwardly, the rock shaft 47 is caused to rotate in a clockwise direction as seen in Figure 9, causing the hook 48 to swing inwardly of the machine and thereby shift the mold boxes successively from the transfer mechanism 19 onto the upper rails 13. Opposed movement of the piston rod 45 causes reverse rocking of the shaft 47, and the hook 48 breaks at its pivot point to return to the hooking position seen in Figures 1 and 9 in full line.

At its bottom, the hopper 16 is provided with a grate 16' which is agitated by means of a pitman rod 49 driven by an electric motor 50 carried on the hopper 16. During the filling operation, the mold box 30 is raised from the rails 13 by means of vertically tiltable levers 51 which are pivoted at 52 on a vibrating frame 55, and are actuated by spaced hydraulic cylinders 53 to the lifting position as shown in full line of Figure 4. Inspection of Figures 1 and 4 will reveal that the lifting levers 51 operate in longitudinally spaced pairs which are united by means of longitudinal parallel tie bars 54. The inner ends of the levers 51 are adapted to extend under the flanges 31' of the metal box 31 to lift the box so that its wheels 35 are raised from the rails 13, and the flanges 31' are disposed in face to face engagement with the vibrating frame 55.

Rigidly secured to and depending from the vibrating frame 55 are pitman rods 56 having cam follower rings 57 which encircle eccentric cams 58 driven by camshaft 59 operably connected to a motor 60 by means of a conventional belt and pulley transmission arrangement 61.

The vibration is continued during the filling of the mold box 30 to insure proper distribution of the aggregate. During the filling operation of a mold box, the transfer mechanism 19 is lowered to the dotted position of Figure 1 to receive a second mold box 30 from rails 14, and in succession, the second mold box is raised by movement of the transfer mechanism 19 to the full line position of Figure 1. Actuation of cylinder 44 advances the mold box from the transfer mechanism 19 onto the rail 13 and this movement pushes the first mold box from a position beneath the hopper 16 to a position under the mechanism 18, which position is the compression position.

Carried by the cross beam 17 are spaced bearings 62—62 which carry a second cam shaft 63 operably interconnected to the motor 64 by means of a conventional belt and pulley transmission 65. At its ends, the cam shaft 63 carries eccentric cams 66 which are operably associated with cam rings 67 carried on the lower ends of push rods 68 supporting a vibrating frame 69 at their upper ends. The frame 69 consists of a pair of laterally extending longitudinally spaced frame members 70 which are united at their ends by yokes 71 to which the push rods 68 are secured. Intermediate their lengths, the frame members 70 pivotally support laterally spaced pairs of pallette-supporting hooks 72 which are adapted to support a pallette 73 when in their normal positions, as indicated by broken lines of Figure 8.

Midway the lengths of and under the frame members 70, I provide a longitudinally extending support beam 74 which is rigidly united thereto and supports a hydraulic ram 75 having its piston rod 76 associated with a cross head 77. The ends of the cross head 77 are secured to side plates 78 of a yoke 79. At its lower end, the yoke 79 is provided with longitudinally extending parallel inturned flanges 80 which are adapted to fit under the flanges 31' of the metal box 31, and raise the mold box 30 from the rails 13, as indicated in Figure 5. Obviously, rotation of the cam shaft 63 will impart vibrating movement to the compressing and pallette applying mechanism 18.

Inspection of Figure 8 will reveal that the hooks 72 are united by links 81 to the side plates 78 of the yoke 79, and upward movement of the yoke 79 will cause the hooks 72 to move to the full line positions of Figure 8, wherein the pallette 73 is released to fall upon the top of the mold box 30. It will also be noted that the

flanges 80 extend under the pallette-locking fingers 82 carried by the mold boxes 30, and as the flange 80 is raised, the locking fingers are moved from the full line position of Figure 8 to the dotted line position thereof, wherein they hook over the pallette 73 to maintain the pallette in covering relation to the mold box 30.

Springs 83 extend between the body of the metal box 31 and the fingers 82 to yieldably maintain them alternately in the full line and the broken line positions.

To apply compressing pressure to the blocks being formed, I provide depending rods 84 on the compression plate 32, which carry a lower plate 32'. A hydraulic ram 85 is carried by the frame 10, and its piston rod 86 carries a cross bar 87 which is adapted to lift upwardly on the lower plate 32' and apply compressing pressure to the compression plate 32 while forcing the pallette 73 upwardly against the frame member 88 depending from the support beam 74. It will be noted that the push rods 68 extend through apertures in the cross bar 87, and compression springs 89 acting as snubbers are disposed between the yoke 71 and the cross bar 87. This compression movement causes the aggregate in the mold boxes to coalesce sufficiently to hold its shape when ejected from the mold box.

It will thus be seen that advancement of the third mold box 31 from the transfer mechanism 19 onto the rails 13 will advance the second mold box into the compression position, and the first mold box will then be advanced onto the transfer mechanism 20.

Operation of the second transfer mechanism 20 removes the mold box to the lower position wherein it is released to roll onto the rails 14 for positioning in the ejection or discharge position below the compression position. In this position, the fingers 82 are released after the support ram 90 is energized to raise its piston rod 91 to a position wherein it will support the pallette 73 of the inverted mold box 30. This is best seen in Figure 2 of the drawing. A pair of laterally spaced ejection rams 92 are adapted to lower a transverse bar 93 to bear upon the plate 32', thus forcing the compression plate 32 downwardly through the mold box and thereby ejecting or removing the molded block 34 from the mold box. The support ram 90 applies only sufficient pressure to the pallette to support the block, and no compression pressure is applied to the block during this ejection action. The pallette is seen to be placed upon a divided chain conveyor 94 which carries the blocks on the pallette away to a storing position.

To advance the mold box 30 along the rails 14, I provide a driven chain 95 trained about a pair of sprockets 96 and 97 spaced longitudinally of and secured to shafts 98 and 99 journaled on the frame at any suitable location. The chain 95 is provided with lugs 100 suitably spaced thereon to provide stops to insure proper location of the mold boxes 30 for ejection of the blocks, and energizing means for moving the boxes along the rail 14 into the transfer mechanism 19.

A closer inspection of Figures 5, 6, and 7 will reveal that the mold boxes are provided with tubes 101—101 disposed therein, and the mold box plate 102 is provided with a pair of tubes or rods 103—103 axially aligned and telescopically united with the tubes 101 to provide guide means for movement of the plate 32.

The chain conveyor 94 is successively actuated to remove the blocks 34 from below the discharge ram 92. This is accomplished by means of a hook 104 pivotally connected to a pitman rod 104' and is guided between rollers 105—105 journaled on a post 11 and actuated by means of a bell crank 106 driven by an electric motor 107 which is operably connected to a main shaft 108 suitably journaled on the frame 10. The main shaft 108 is also operably interconnected with the shaft 99 by means of a conventional pulley and belt transmission 109 adapted to drive the driven chain 95 in direct ratio to the successive movements of the conveyor chains 94 so that the mold boxes are moved from the discharge position into the transfer mechanism 19 while a successive mold box is being moved to the discharge position and the discharged blocks 34 are being moved from thereunder.

It will thus be seen that I have provided a new and improved concrete block machine adapted to simultaneously effect all of the necessary functions for producing concrete blocks from a plurality of successive mold boxes and thereby increase the rate of production of the machine.

Having thus described my invention, I claim:

1. A block machine comprising a frame having longitudinally extending laterally spaced upper and lower pairs of parallel rails; mold boxes having external wheels associated with said rails for supporting and mobilizing said boxes; laterally extending rock shafts journalled at the ends of said frame; transfer devices rigid with said rock shafts and including rails disposed to cooperate with said upper and lower rails to receive therefrom and discharge thereon mold boxes; automatic latches carried by said transfer devices for securing said mold boxes thereon during transfer movement; and power means for advancing said mold boxes on said rails and actuating said rock shafts.

2. In a block machine, transfer mechanism comprising laterally extending rock shafts journalled on the frame of said machine, radially extending plates fixed to said rock shaft in spaced relation; rails on said plates to receive mobilizing means on and support a mold box; and latch means associated with said plate and adapted to control movement of said mold boxes along said rails.

References Cited in the file of this patent

UNITED STATES PATENTS

801,799	Le Hew	Oct. 10, 1905
1,280,575	Stehm	Oct. 1, 1918
1,602,172	Ruby	Oct. 5, 1926
1,717,676	Garvin et al.	June 18, 1929
1,829,795	Garvin	Nov. 3, 1931
2,027,165	Grubman	Jan. 7, 1936
2,298,446	White	Oct. 13, 1942
2,653,371	Kruse	Sept. 29, 1953
2,713,709	Wright	July 26, 1955