

Aug. 1, 1933.

W. SCHÄFER

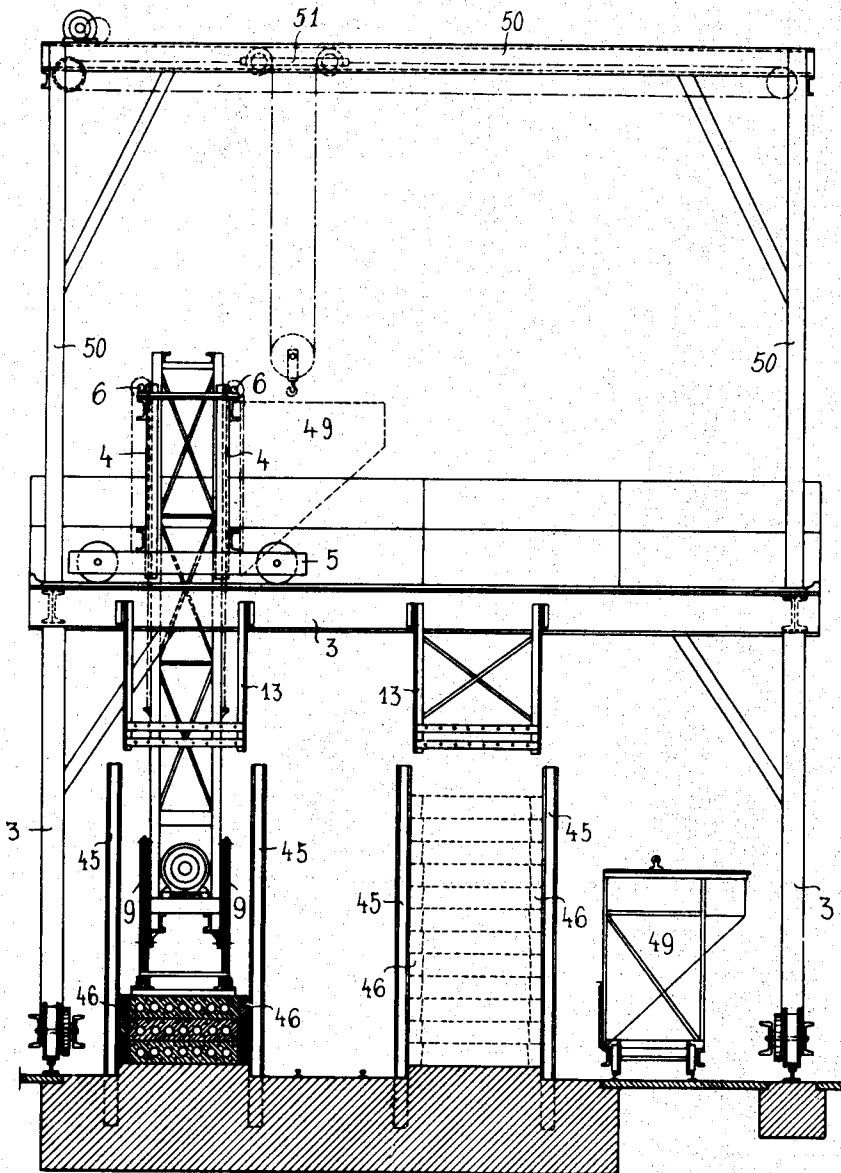
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CONCRETE AND LIKE BLOCK MAKING MACHINE

Filed July 7, 1932

5 Sheets-Sheet 1

Fig. 1



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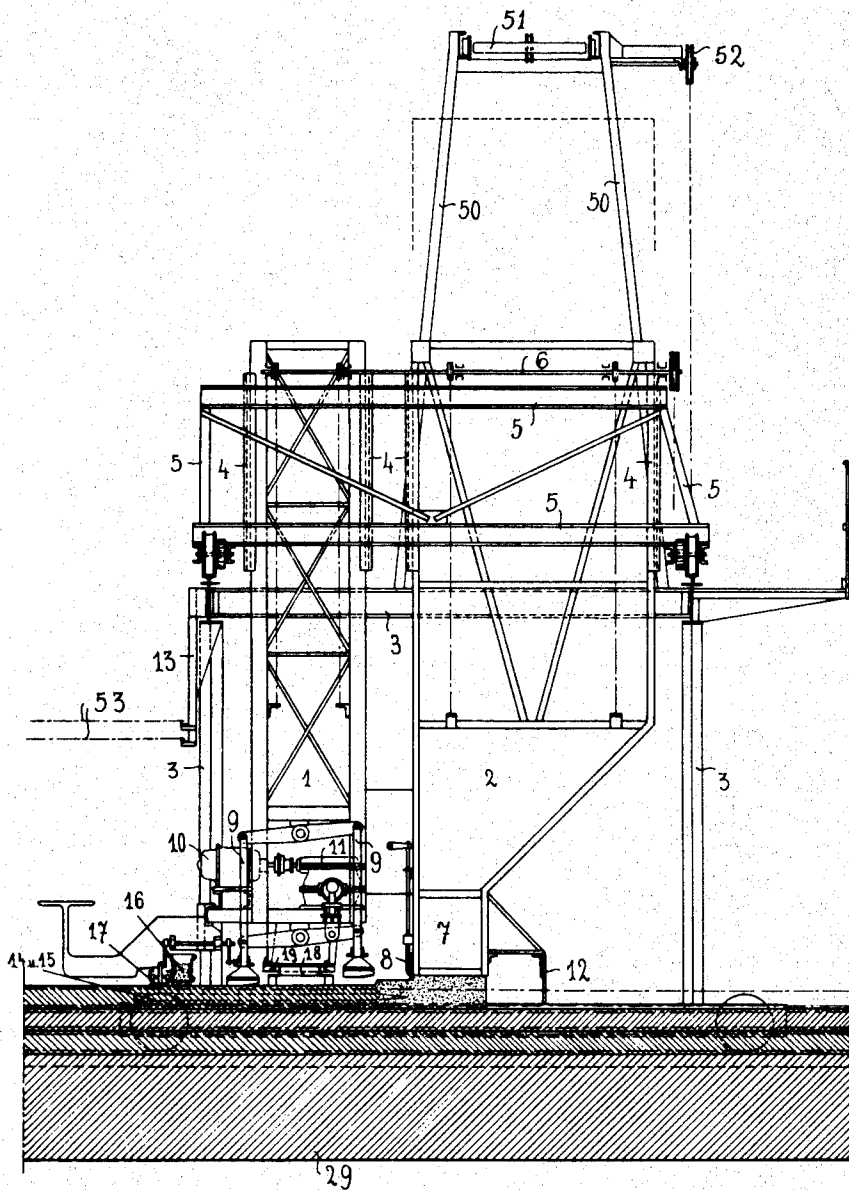
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Fig. 2



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Fig. 3

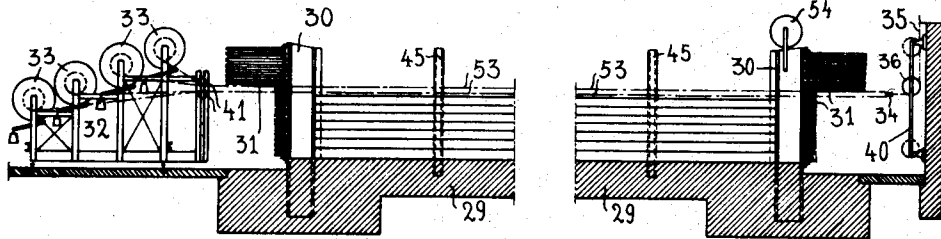


Fig. 4

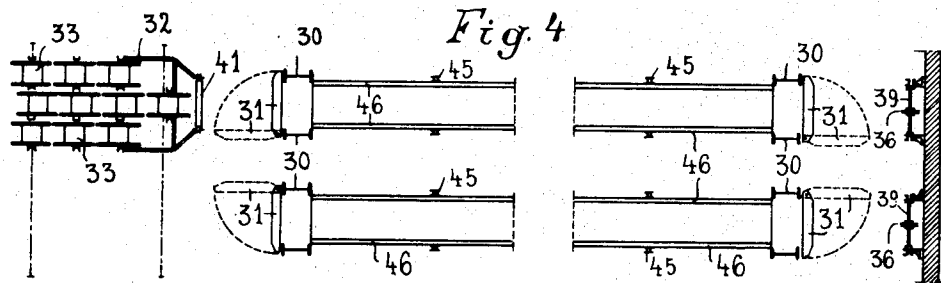


Fig. 5

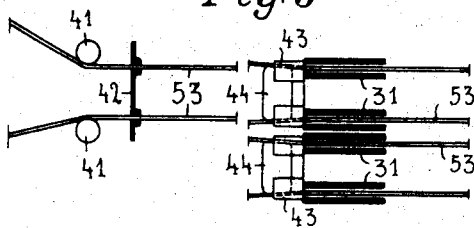


Fig. 6

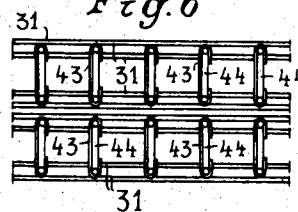
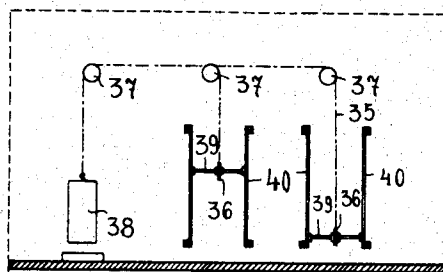


Fig. 7



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Fig. 8

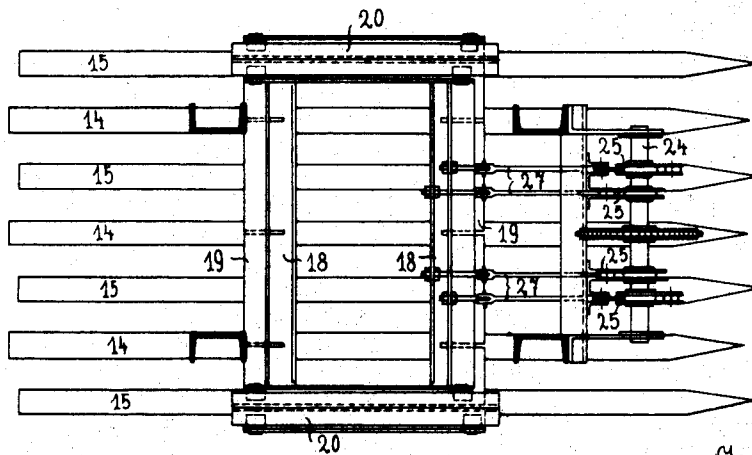
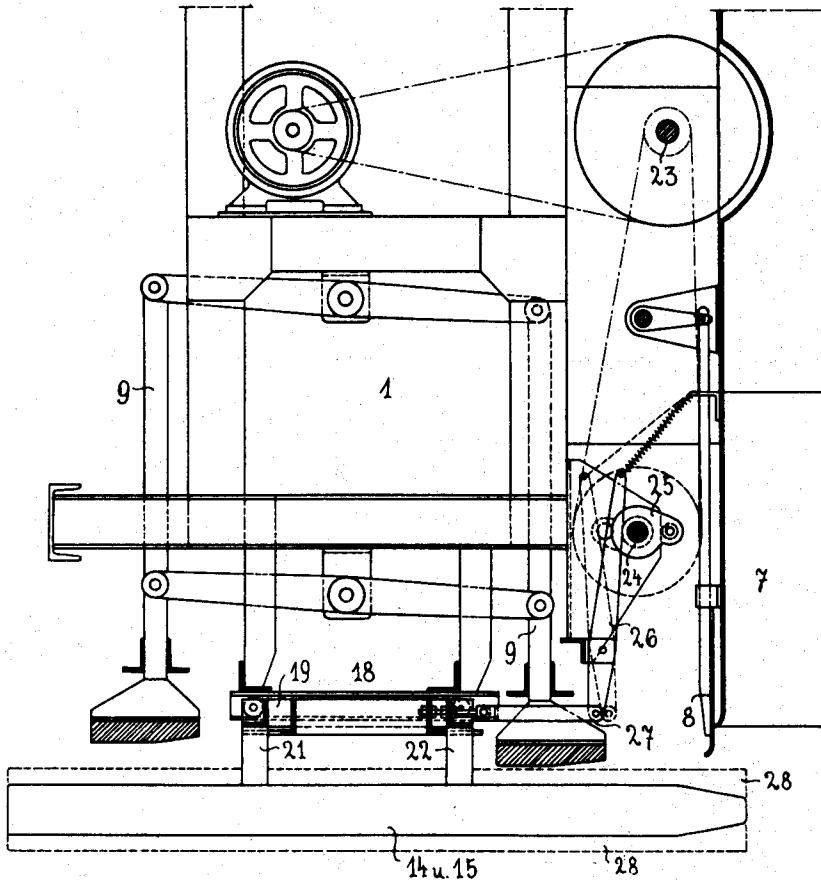


Fig. 9

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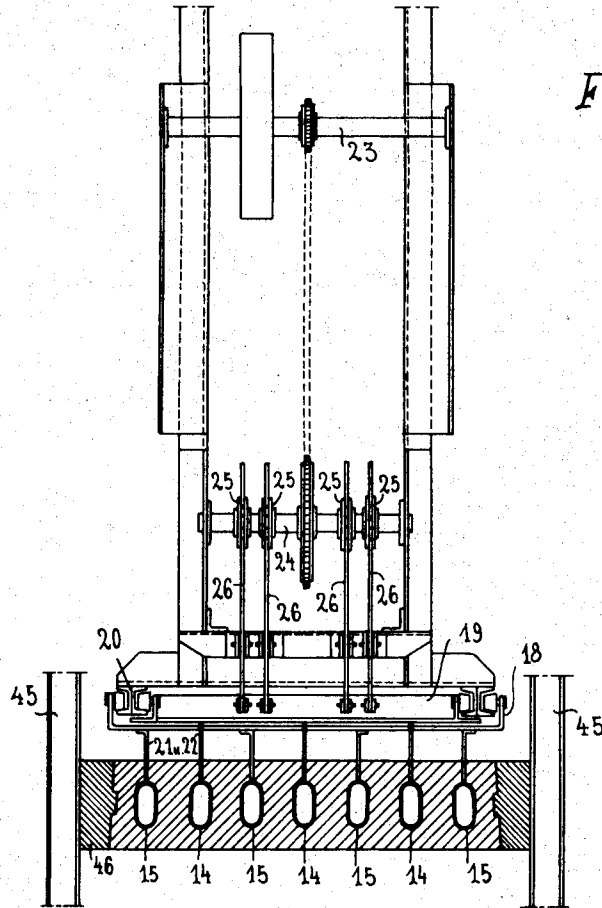


Fig. 10

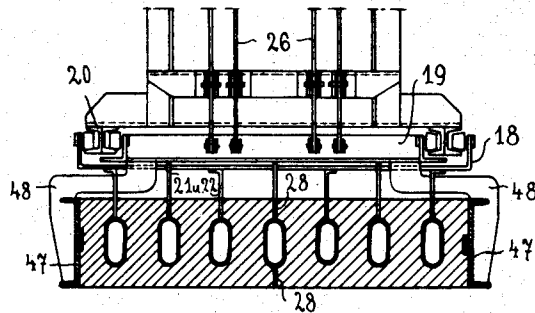


Fig. 11

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# UNITED STATES PATENT OFFICE

1,920,716

## CONCRETE AND LIKE BLOCK MAKING MACHINE

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Application July 7, 1932, Serial No. 621,241,  
and in Germany March 28, 1931

4 Claims. (Cl. 25—41)

This invention relates to improvements in the methods of and means for manufacturing concrete and like blocks, floor plates and the like either with or without reinforcing material, such as wires, rods or expanded metal and with or without cores or hollow spaces therein. The invention is more particularly directed to improvements in the known type of machine for the manufacture of such building blocks, in which the blocks are made in successive piles or layers, usually with a layer of paper or the like separating the blocks of one layer from those of the superposed layer. In such machines it is known to employ a travelling frame or bogie which supports the tamping mechanism and the filling hopper for the concrete or the like. It is also known to provide means for tensioning the reinforcing material, to employ traversing core pieces and to provide removable side plates for the mould into which the concrete is run.

It is characteristic of the known apparatus that all the operations are carried out successively at time intervals and do not automatically follow one another. The methods of operation adopted did not permit of simultaneous and mechanical operation of all the steps at a single forward traverse of the bogie or frame which carried the hopper and the tamping machine.

The chief feature of the present invention resides in the fact that all the necessary operations proceed automatically and uninterruptedly during the forward travel of the bogie and for the entire length of the travel. These operations are:

1. The filling of the concrete into the mould.
2. Tamping the concrete to consolidate it.
3. Applying a smoothing layer and operation.
4. Guiding and supporting the reinforcement at the desired height or heights.
5. Forming the cores and withdrawing the side plates of the mould.
6. Drawing out the reinforcement for the next layer of blocks or plates to be formed.

The apparatus comprises:—

- (a) The travelling bogie or frame.
- (b) The mechanically driven tamping machine.
- (c) Two or more lines of forming beds arranged in parallel and of any desired length.
- (d) A frame at the front end of the forming line for receiving the reinforcing material.
- (e) A device at the rear end for stretching or tensioning the said material.

In operation, before laying the concrete on the first or bottom layer of blocks, the reinforcement for this layer is first drawn out, stretched and

clamped in suitable clamps which also hold the reinforcement in the desired positions. The machine or bogie travels back idle on its return traverse. On its second forward travel, which is its operative movement, after the hopper has been filled, the first layer of plates or blocks is produced and at the same time the reinforcement for the next following layer is drawn out. The operation is repeated either on the same or on a parallel line until the whole pile is formed.

The long plates formed in lines in this manner are divided after adequate setting or hardening of the concrete into the required lengths. The separate layers or long plates are kept apart by an interposed layer of paper or the like.

The improved process is characterized primarily by causing the core pieces which are carried by the bogie in its forward travel to move forwards relatively to the bogie, preferably with a jerking movement, and arranging a tamping action and surface dressing and smoothing device to operate in the rear of the shares which carry the said core pieces. A further characteristic consists in the drawing out of the reinforcement material for the next successive layer during the operative forward travel which lays the concrete or the like in the mould, after the said laying operation the reinforcement being cut and clamped in the desired stretched positions in the mould.

The novel features of the improved method of manufacturing concrete blocks and the apparatus for carrying out that method will be more readily understood from the following description of a suitable form of execution in which two parallel form lines are shown. In these drawings:—

Figure 1 is a section transverse to the lines of the forms.

Figure 2 is a longitudinal section showing the bogie or traversing frame which carries the hopper and tamping machine.

Figure 3 is a longitudinal section showing the arrangement of the reinforcement stretching means at the ends of the lines of forms, the central part of the form lines and the traveling bogie being omitted.

Figure 4 is a diagrammatic plan of Figure 3.

Figure 5 is a detail view showing the reinforcement clamps in section.

Figure 6 is an end view in elevation of the clamps shown in Figure 5.

Figure 7 is a diagrammatic view showing the reinforcement stretching means for holding the reinforcement till it is clamped and cut.

Figure 8 is an enlarged sectional elevation and Figure 9 is a sectional plan showing the stamping machine and core operating mechanism.

Figure 10 is an end elevation of the tamping machine and shows the form in section.

Figure 11 is a view similar to the lower part of Figure 10 and shows a modified form in which the side plates of the form are moved with the core pieces. In this figure also the long plate is divided in two parts longitudinally.

The apparatus comprises the tamping machine proper *q* and a concrete hopper 2 rigidly connected therewith. These parts are mounted on a travelling frame or bogie 3 which is provided with forward and rearward travelling gear, the forward direction of travel being from left to right in Figure 2.

To enable the tamping machine and hopper to work alternatively on one or other of the two parallel lines of forms, which are shown between the uprights 45 in Figure 1, these parts are traversible transversely on the bogie 3. Suitable locking means may be provided to arrest the transverse traversing frame 5 directly over one or other of the form lines. The transverse travel of the frame 5 is effected by hand from a crank or the like operable from a platform 5*b*. The longitudinal travel of the main bogie or frame 3 is effected by power in any well known manner.

The laying and tamping of the blocks or plates is carried out in layers superposed one on the other, for which purpose the tamping machine and hopper are also adapted to be raised or lowered. Guide bars 4 fixed on the traversing frame 5 guide the vertical movement of the frame which supports the tamping machine and hopper 2 whilst the actual hoisting is effected by the gear indicated at 6 (Figs. 1 and 2). For regulating the outflow of concrete from the hopper 2 a slide 8 is adjustably mounted on the outflow branch 7.

The concrete blocks are tamped by the stamping feet 9 operated from an electric motor 10 through the gear indicated at 11. A guide plate 12 located in front of the outflow branch in the forward direction of travel of the bogie 3 is provided for holding the reinforcement indicated as wires or rods 53 in the proper planes whilst the concrete is being filled in place. At the rear side of the bogie 3, there is a device 13 for drawing out the wires for the next following layer during the laying of the concrete on any given layer. The round or oval tubes 14, 15 are located beneath the level of the stamping heads 9 at about the mid-height of the block and these tubes are supported on shares 21, 22 which plough through the concrete. These tubes are for the purpose of forming the cores or hollow spaces within the blocks. The shares 21, 22 penetrate the concrete between the front and the rear stamping head 9. The furrow made by the shares is thus tamped by the rear tamping head. In the rear of the rearward stamping head 9, there is a container 16 for fine cement or grouting which is laid on the tamped surface of the block and spread and smoothed over by a smoother 17 (see Fig. 2) which is operated in any well known manner to give a properly finished surface to the block.

The shares 21, 22 are fixed to frame bars 18, 19 which are guided in the runner girder 20—the tubes 15 being fixed to the frame 18 and the tubes 14 to the frame 19. A shaft 24 driven from a counter shaft 23 by suitable chain drive carries four cams 25 which operate the levers 26 alternately. These levers 26 are connected by

connecting rods 27 with the frames 18 and 19 so that the said frames are moved alternately and similarly the two tube groups, 14 and 15 are also alternately moved. This movement is relative to the forward travel of the bogie 3 and is preferably of a rapid or jerking nature. In this manner it is possible to form the cores or hollow spaces in the blocks, as it is found on trial that with a steady forward movement of the tubes in company with the bogie, the concrete passing from the hopper 2 is not allowed to settle on the bottom of the mould but is carried along with the tubes. It is also of advantage to arrange the tubes in groups, two or more, as this tends further to prevent defective settling of the concrete and ensures a good solid block being formed.

As mentioned above the furrow made by the shares 21 and 22 in the upper part of the block is subsequently tamped out and smoothed over by the action of the rear tamping head 9 and the smoothing material from the container 16 together with the action of the smoothing piece 17.

If required one or more cutter shares 28 may be fixed to the movable frames 18, 19 for the purpose of separating the plate longitudinally into any desired number of parallel lengths. The spacing of these shares determines the width of the blocks moulded.

The form line proper consists of a concrete bed 29 with upright columns 30 at its ends (see Figs. 3 and 4) and these columns are very securely fixed in a suitable concrete bed. The columns 30 have at their outer sides rotatable clamping carrier bars 31 mounted thereon in which the previously stretched reinforcement is held and clamped.

In front of the commencement of the forming line, that is to the left of Figure 3, there is located a frame 32 which is shown as furnished with the number of spools of wire which it is desired to insert in the blocks to be formed. The spools 33 are indicated as suitably braked to provide a certain amount of tension when the wire is drawn off. The frame 32 is traversible in a direction at right angles to the line of forward movement of the bogie 3 and can thus be brought into operative position opposite either of the lines. At the opposite end of the line of forms and attached either to the wall of the building or to a special frame 40 there is arranged the means used for stretching the reinforcement wires or the like.

The reinforcing wires drawn forwards by the travelling bogie 3 and indicated by the reference letter 53 are led up to a small cross bar 34 and fastened thereto. This cross bar 34 is connected to a wire or like rope 35 which passes over a roller 36 movable transversely and then over a guide roll 37 to a tension weight 38. The roll 36 is movably mounted on a shaft 39 which may be adjusted to the desired height in side guides 40 depending upon the height of the layer at which the concrete is being laid. The drawing and stretching of the reinforcement is effected as follows:

The reinforcing wires 53 are drawn off from the spools 33 by hand and laid around the guide rolls 41, then through the guide plates 42 (Figure 5). Both the guide rolls 41 and the guide plate 42 are adjustable as to height. The ends of these wires are fixed to the frame 13 and when laying the first set of reinforcing wires the bogie 3 is travelled forwards without laying any concrete. The ends of the wires are then taken from the frame 13 and fixed to the cross bar 34. The

tension weight 38 is then brought into action and the wires are thus stretched. It will be understood that before fixing the wires to the cross bar 34, the wires are threaded through the guide plate 12 (see Fig. 2) and the guide plate 42 (Fig. 5) as well as the roller 36 are brought to the level of the layer it is desired to form.

After the wires have been tensioned in pairs, the clamp carrier pieces 31 hinged to the columns 30 are rotated about 90 degrees so that they come to rest on the opposite column 30. Thereupon clamping bars or hoops 43 are passed over each of the wires of a pair and wedges 44 driven home between the wires, 53. The wires 53 are now cut off at both ends just outside of the wedges 44. The carrier bars 31 then take the tension of the wires and transmit this tension to the columns 30. In Figure 3 the state of the parts when the reinforcing means is all ready laid and stretched in place to receive the eight layer is shown.

On each of the lines of forms there are shown a number of girder bars 45 which are set in holes in the concrete bed and can be readily removed when desired. After the paper or like separating layer is laid on the bottom of the mould and the wires stretched as described, the side boards 46 are laid against the girder bars 45 and the line of forming is ready to receive the concrete by a travel of the bogie in the direction from left to right in Figure 3. The paper for the separating layer is unwound from a suitable roll at the end of the forming line and is simply drawn off and cut after being laid in place. The stamping machine and the filling hopper 2 are set to the height for the next layer and the operation proceeds as described above. The blocks are tamped over the previously formed layer which in the meantime has set or hardened sufficiently to withstand the action of the tamping feet without causing damage.

The forming line may be so designed that both the girder bars 45 and the side plates 46 are dispensed with. In this case the side boards are replaced by two side ploughs 47 which by a connecting member 48 are fixed to the frames 19. These plough pieces 47 thus share in the relative forward step movement of the tubes 14.

In this case the separate lines of forming may be brought much closer, say to a distance apart of 5-10 cms. and a large number of parallel lines of forms may be arranged on a given floor area.

The filling of the hopper 2 is effected by means of a traversing container 49 which carries the concrete from the mixing machine to the position in which the tamping machine is operating without stopping the forward travel of the stamp or bogie 3.

Over the bogie structure there is a top or upper frame 50 which receives a travelling crane 51 (Figs. 1 and 2). The travel of the crane is effected by the chain and wheel 52 and the hoisting movement by motor. All the parts are attended to form the platform 5 b.

By means of this hoisting device the container 49 is raised from the ground, brought to the hopper and emptied. It will be understood that if desired the storage silos for the materials of which the concrete is made as well as the mixing machine may be mounted on the travelling bogie 3 and the prepared concrete then supplied direct from the mixer to the hopper 2. In this case the operations involved in filling the hopper are dispensed with.

By means of the method and apparatus herein

described it is possible to manufacture by mass production methods concrete and like building blocks in any desired length, width and thickness and provided with properly stretched reinforcement and through going cores whilst the quality of the blocks is both firm and uniform.

What I claim is:

1. An apparatus for making concrete and like building blocks, floor plates and the like, comprising in combination a movable main-frame adapted to travel along slowly and steadily, a bogie carried by the main-frame and adapted to move transversely towards the path of the main-frame, two mould-walls forming the mould and movably mounted at the lower end of the bogie, two groups of core-pieces movably carried by the bogie between the mould-walls, a movable mounting-frame (18) carrying the mould-walls and the one group of the core-pieces, a second movable mounting-frame for carrying the second group of core-pieces, a supporting frame fixed to the bogie and supporting the two movable mounting-frames, an eccentric arrangement, joining rods and driving levers, all mounted on the bogie to impart an alternate jerking motion to the two groups of core-pieces and the mould-walls, an auxiliary frame carried by the main-frame to move transversely towards the path of the main-frame, a tamping machine with tampers carried by the bogie and means for driving the main-frame, the bogie, the tamping machine and the eccentric arrangement.

2. In the apparatus as claimed in claim 1, in connection with the mounting-frame and the groups of core-pieces, at least one separating-blade fixed to the mounting-frame for the one group of core-pieces and carrying out a jerking motion together with the latter to separate the concrete block in its longitudinal direction.

3. An apparatus for making concrete and like building blocks, floor plates and the like, comprising in combination a movable main-frame adapted to travel along slowly and steadily, a bogie carried by the main-frame and adapted to move transversely towards the path of the main-frame, two mould-walls forming the mould and movably mounted at the lower end of the bogie, two groups of core-pieces movably carried by the bogie between the mould-walls, a movable mounting-frame (18) carrying the mould-walls and the one group of the core-pieces, a second movable mounting-frame for carrying the second group of core-pieces, a supporting frame fixed to the bogie and supporting the two movable mounting-frames, an eccentric arrangement, joining rods and driving levers, all mounted on the bogie to impart an alternate jerking motion to the two groups of core-pieces and the mould-walls, an auxiliary frame carried by the main-frame to move transversely towards the path of the main-frame, a tamping machine with tampers carried by the bogie and means for driving the main-frame, the bogie, the tamping machine and the eccentric arrangement, wire-spools arranged adjustably in a vertical direction at the one end of the path of the bogie and carrying wire material for reinforcing the concrete blocks to be made, rotatable tensioning yokes (31) adjustably mounted at both ends of the path of the bogie-path and showing openings for the passage of the reinforcing elements passed along in the mould over the whole path of the bogie in tensioned condition, means for clamping the tensioned reinforcing elements at the one tensioning yoke, a connecting bar (34) ar-



ranged at the end of the path opposite to the wire-spools and serving for fixing the wires to be stretched, a guiding pulley (36) adjustably mounted in a vertical direction, drawing organs and tensioning weights for putting under tension the connecting bar and the reinforcing elements respectively.

combination of a bogie, the mould for the concrete blocks and a tamping device, of a container (16) for fine cement, a smoother (17) arranged behind the container and smoothing the fine cement for producing a finished surface to the tamped building blocks and means for operating the tamping device and the smoother.

4. In the apparatus as claimed in claim 3, in

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