Oct. 5, 1926. 1,602,172

G. H. A. RUBY

REENFORCED GYPSUM BLOCK MACHINE

Filed Feb. 15, 1926 5 Sheets-Sheet 1

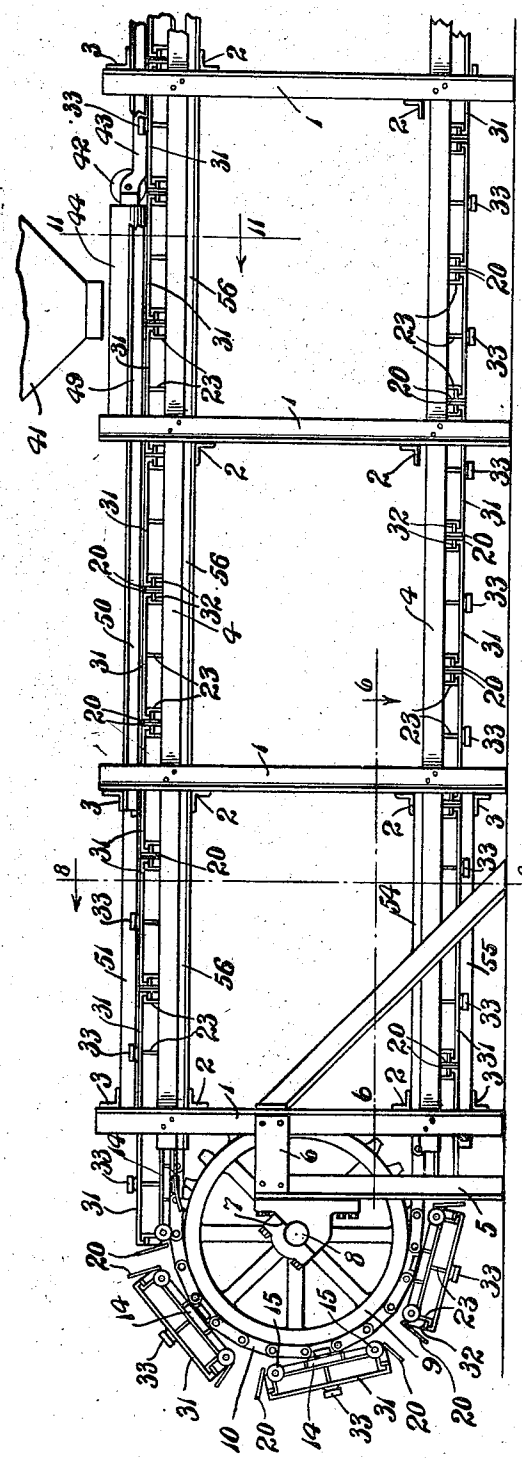


Fig. 1.

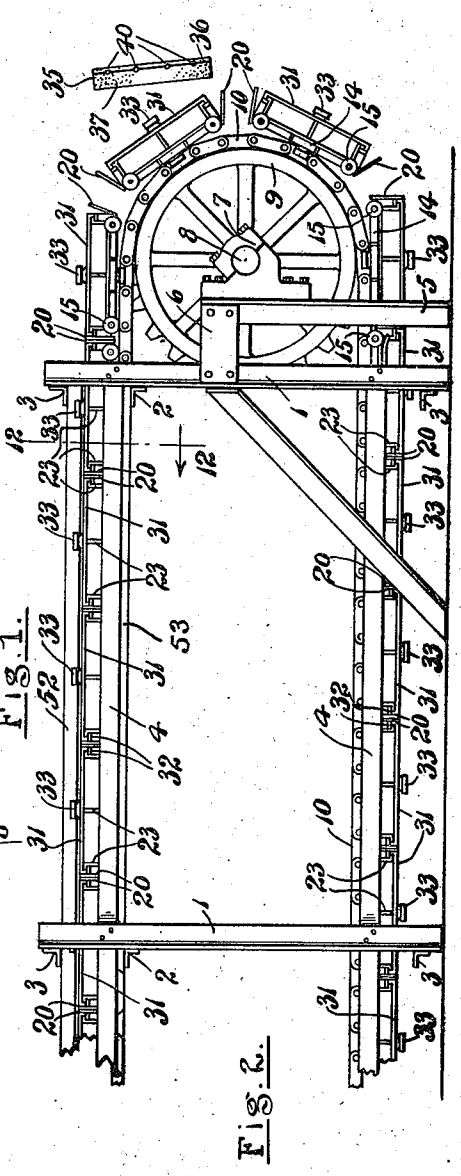


Fig. 2.

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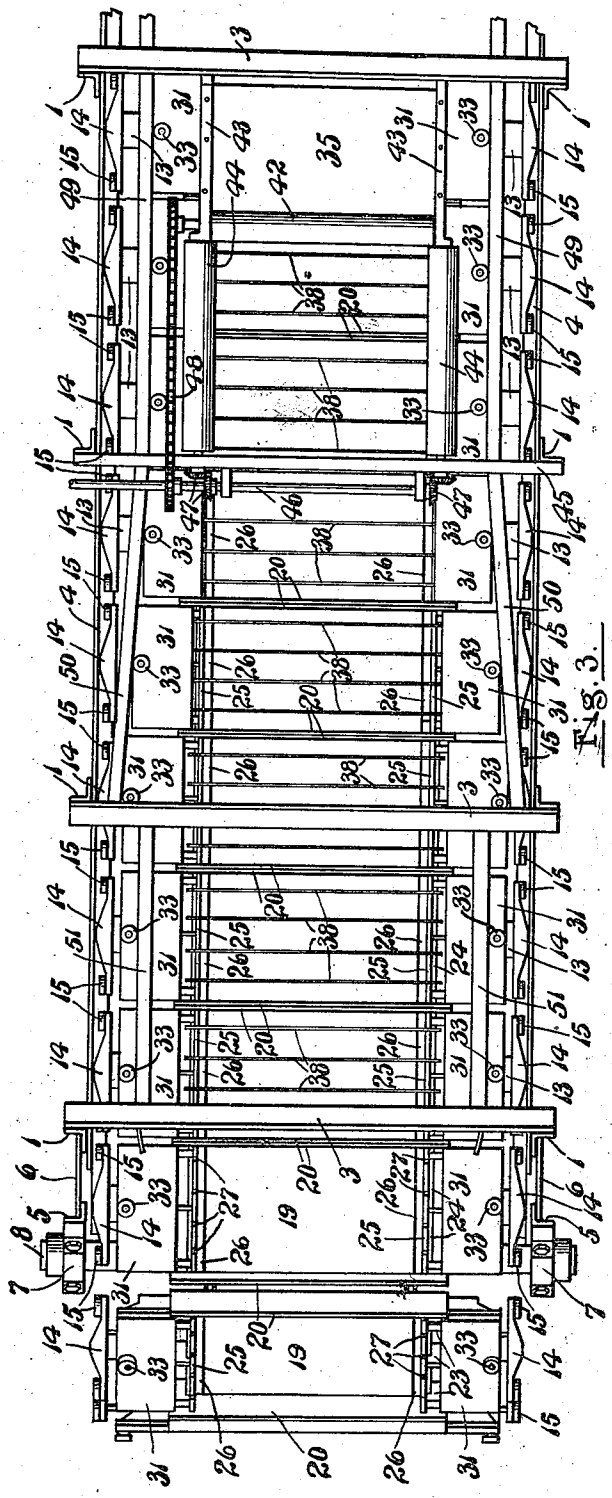


Fig. 3.

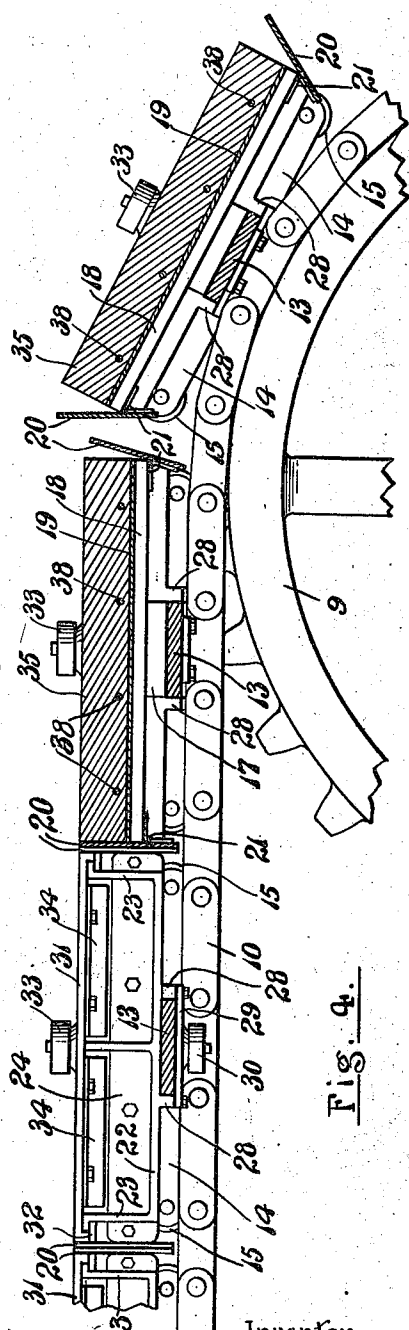


Fig. 4.

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REENFORCED GYPSUM BLOCK MACHINE

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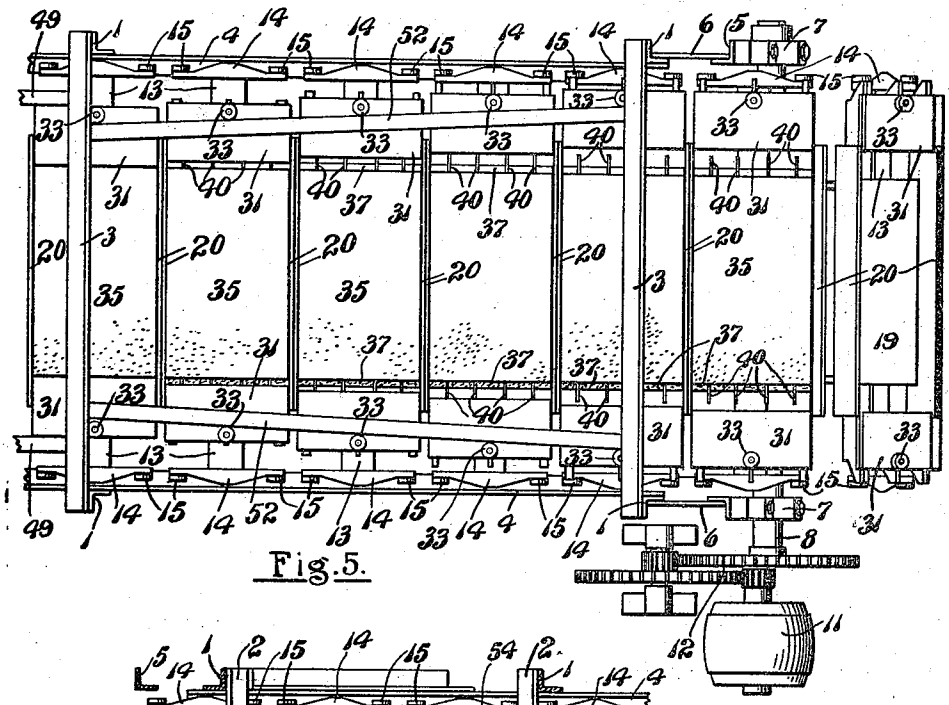


Fig. 5.

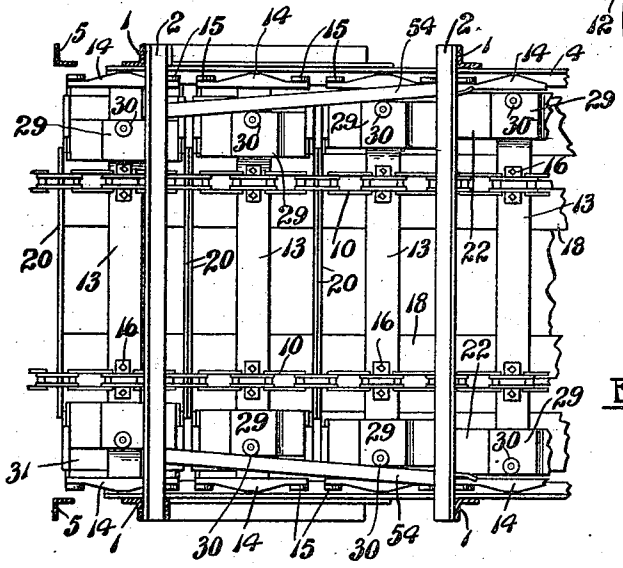


Fig. 6.

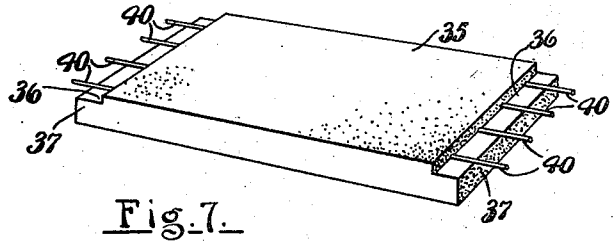


Fig. 7.

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REENFORCED GYPSUM BLOCK MACHINE

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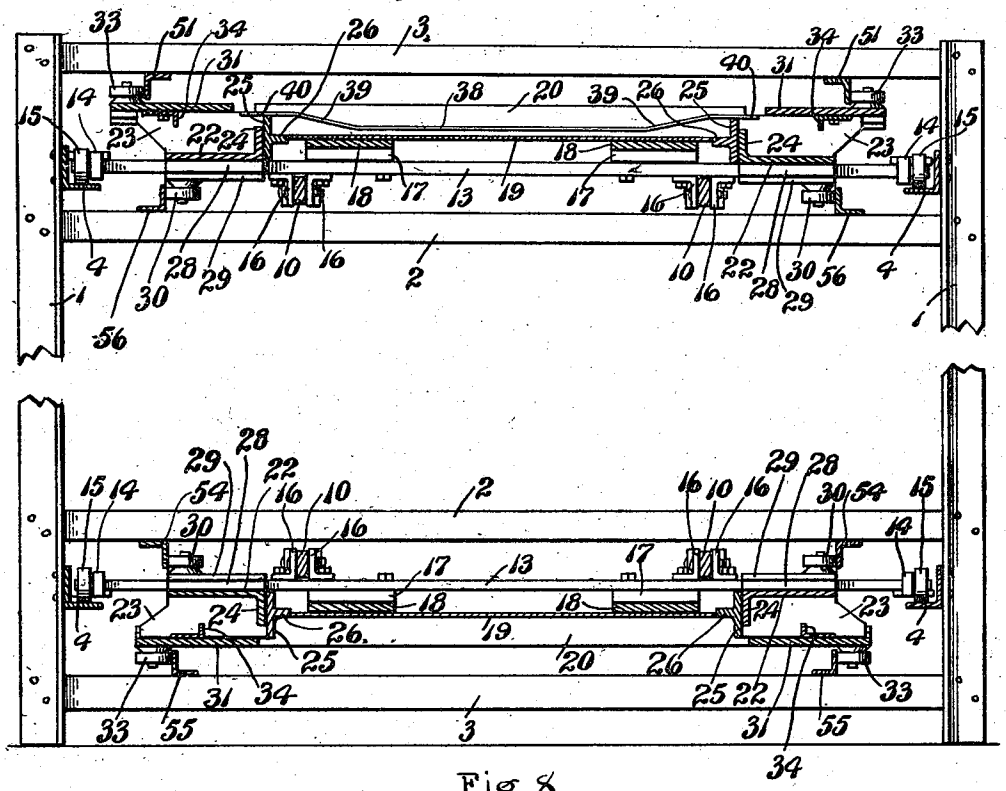


Fig. 8.

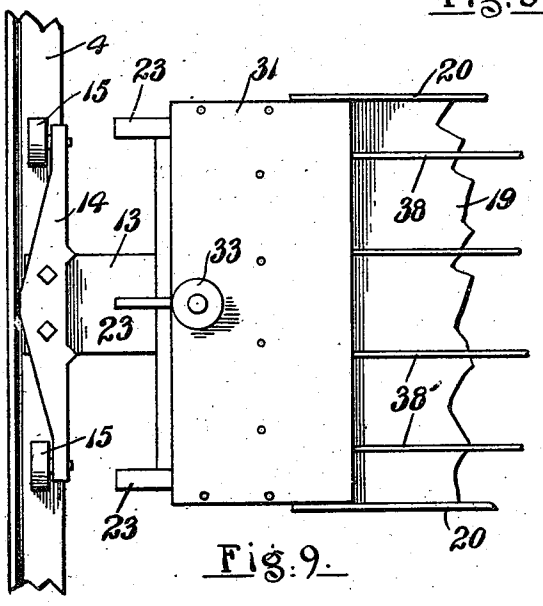


Fig. 9.

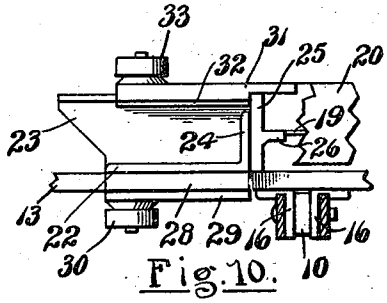


Fig. 10.

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REENFORCED GYPSUM BLOCK MACHINE

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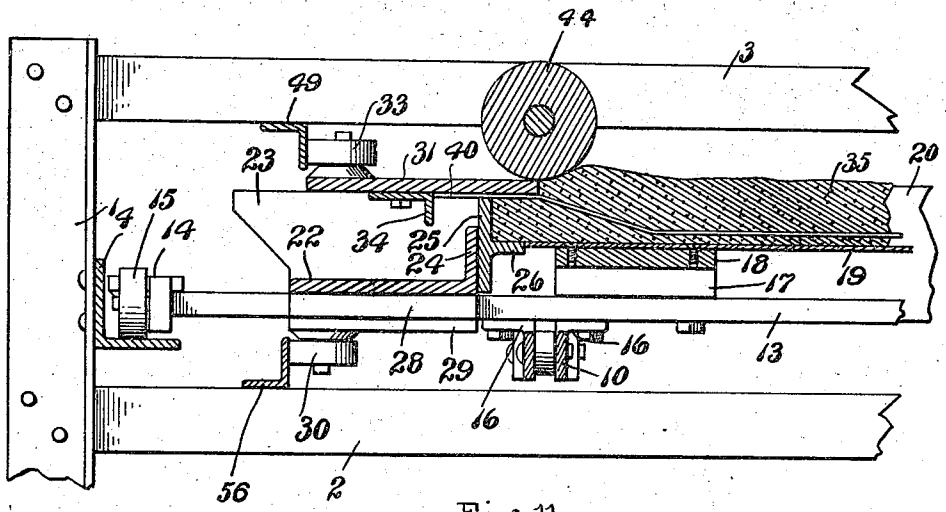


Fig. 11.

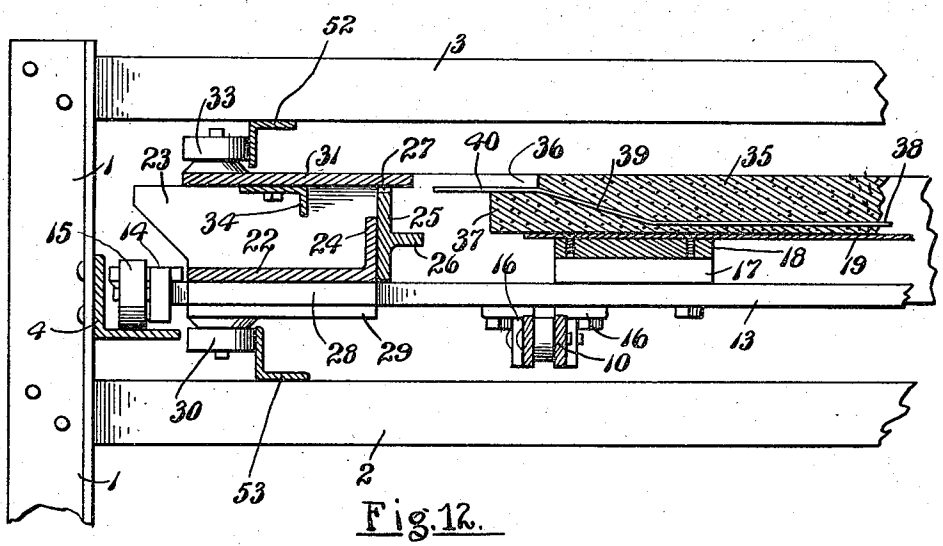


Fig. 12.

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Patented Oct. 5, 1926. 1,602,172

UNITED STATES PATENT OFFICE.

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REENFORCED GYPSUM BLOCK MACHINE.

Application filed February 15, 1926. Serial No. 88,190.

This invention relates to a machine for manufacturing reenforced gypsum blocks. Blocks of this character are used in building, ordinarily, either for the floor, ceiling or roof. These blocks are reenforced lengthwise by use of metal reenforcement such as a number of rods located lengthwise of the block in spaced apart relation, the rods being embedded in the blocks and at each end extending a distance beyond the ends of the blocks.

It is a primary object and purpose of the present invention to provide a machine which can be continuously operated and by means of which reenforced blocks of the character noted made from cementitious material, having as its principal ingredient, gypsum or plaster of Paris, may be produced in large quantity and at very low cost. The labor cost in connection with a machine of this character is reduced to a minimum. It is a further object and purpose to provide a machine automatic in its operation and in which the forms into which the cementitious material is placed will be provided with end members automatically moved into position when desired to partially complete the form, at which time the reenforcing rods are laid therein, thereafter moving another end portion of the form into place so as to complete the form and hold the reenforcing rods against displacement, followed by an automatic outward movement of said ends of the form away from the ends of the block after the cementitious material has been placed in said forms and set and hardened, the blocks completed, this permitting the ready removal of the blocks from the machine after the same have been set and hardened. The machine is fully automatic in all particulars requiring only that the cementitious material shall be fed to it and that the blocks shall be removed therefrom.

For an understanding of the invention by means of which these ends are attained as well as others not at this time specifically enumerated, reference may be had to the following description taken in connection with the accompanying drawings, in which—

Fig. 1 is an elevation of what may be termed the front end of the machine.

Fig. 2 is a like elevation of the other or rear end of the machine.

Fig. 3 is a plan view of the front end portion of the machine, shown in Fig. 1.

Fig. 4 is a fragmentary enlarged elevation and section of the rear end of the machine at which end the completed blocks are delivered from the machine.

Fig. 5 is a plan view of the rear delivery end of the machine.

Fig. 6 is a horizontal plan and section substantially on the plane of line 6—6 of Fig. 1, looking downward.

Fig. 7 is a perspective view of the block made by the machine.

Fig. 8 is a transverse vertical section on the plane of line 8—8 of Fig. 1.

Fig. 9 is a fragmentary enlarged plan of one end of a block form as it appears when ready to receive the cementitious material.

Fig. 10 is a fragmentary side elevation thereof.

Fig. 11 is a fragmentary enlarged transverse vertical section on the plane of line 11—11 of Fig. 1 looking toward the forward end of the machine, as indicated by the arrow, and

Fig. 12 is a similar fragmentary enlarged transverse vertical section on the plane of line 12—12 of Fig. 2, also looking toward the front end of the machine.

Like reference characters refer to like parts in the several figures of the drawings.

In the construction of the machine a frame for carrying the various elements of mechanism is provided including at each side of the machine a number of spaced apart vertical posts 1 which, preferably, are of angle iron. These posts are associated in pairs, one of each pair at one side and one at the opposite side of the machine and are connected together by cross bars 2, as shown, located a distance below the upper ends and also a distance above the lower ends of said posts. In addition, at the front and rear ends of the machine other upper and lower cross bars or rails 3 connect the end posts and those next to the end. These cross bars of angle iron serve not only the purpose of connecting the posts 1 transversely, but also serve other purposes as will later appear in this description. Horizontal upper and lower rails or tracks 4 of angle formation are connected to the posts a short distance above the upper cross rails 2 and a short distance below the lower cross rails 2. These rails 4 have their horizontal

flanges extending inwardly to serve as tracks for the conveying mechanism of the machine.

At each end of the machine and at each side a post 5 is located a short distance from each end post 1, being approximately one half as long as said end post and connected thereto at its upper end by plate 6. Bearings 7 are secured adjacent the upper ends of the posts 5 and two shafts 8 are rotatably mounted in these bearings, one at each end of the machine.

On each shaft two spaced apart large sprocket wheels 9 are secured around which pass endless conveyer chains 10 of suitable construction. The diameter of the wheels 9 is such that the upper runs of said chains are located in substantially the same horizontal plane as the upper track rails 4 and the lower runs of said chains are located in substantially the same horizontal plane as the lower track rails 4. One of the shafts 8, that at the rear end of the machine, is driven by an electric motor 11 through suitable reduction gearing indicated at 12 in Fig. 5. The chains and sprocket wheels 9 move continuously at low speed.

At spaced apart points in the length of the chains 10 bars 13 are located each at each end being equipped with a carriage member 14 having rollers 15 which traverse upper sides of the horizontal flanges of the rails 4, previously described. Each bar has two spaced filler blocks 17 secured thereto over each of which a transverse bar 18 is secured being secured to the filler block 17 substantially midway between its ends. To the bars 18 a bottom plate 19 for a block form is permanently secured. Sides for the form are provided by plates 20 hinged at 21 to the ends of the cross bars 18, as best shown in Fig. 4. The width of a bottom plate 19 is such that when the forms are located horizontally on an upper or lower run of the conveyer chains, the plates 20 at the adjacent sides of two consecutive forms lie against each other. But when the forms pass around the sprocket wheels 9 the same are separated short distances, as shown in Fig. 4, permitting the vertical side plates 20 of the forms to tilt outwardly.

On each end portion of each bar 13 a member having a base 22 is mounted, the same being formed at its inner end with an upturned flange 24 and at opposite side edges and substantially its middle portion with vertical sides and partitions 23. To the inner side of the flange 24 a plate 25 is permanently secured having an inwardly extending flange or rib 26. Each of the plates 25 at its upper edge is notched at spaced apart points at 27 and it is in these notches that the metal reenforcing rods for the blocks are to be laid. The base 22, at its lower side is formed with two spaced apart downwardly extending ribs 28 one passing to each side of the bar 13 on which it is mounted and a plate 29 is located underneath the bar 13 and secured by set screws or other suitable fastenings to the ribs 28, it being evident that the construction described is thus mounted for sliding movement, one at each end of each form. And when moved to inner position the edge of the flange 26 abuts against the end of the plate 19 the upper sides of flanges 26 and plates 19 being flush with each other. A roller 30 mounted on a vertical axis is connected to the plate 29 adjacent its outer edge, as best shown in Figs. 8, 11 and 12.

At the upper side of each of the end constructions for the forms a horizontal plate 31 is mounted and is slidably engaged with out-turned flanges on the sides 23, described, members 32, as shown in Fig. 4, being used to make a secure yet slidable connection of the plates 31 therewith. Each of the plates 31 at its upper side and near its outer end is equipped with a roller 33 mounted to turn about a vertical axis. On the under side of each plate 31 bars 34 of angle formation are permanently secured, as shown in Fig. 11. These are for the purpose of locating the reenforcing rods in the form so as to position the ends of said rods properly and in alignment.

A form when ready to receive cementitious material to make a block has the end members just described moved to and held at inner position, as shown in Fig. 11. The block 35 is to be made, as shown in Fig. 12, at each end and at its upper side with a rabbet 36, each end being reduced in thickness, as indicated at 37. The reenforcing rods 38 have the major portion of their length located parallel to and a short distance from the bottom plates 19 of the form but adjacent each end are bent upwardly and outwardly making the inclined sections 39 which terminate in horizontal end portions 40 extending beyond the ends of the blocks. The reenforcing rods having been placed in the forms as will hereafter appear and the forms being closed and in the position shown in Fig. 11, the cementitious material is delivered into said forms continuously from a suitable hopper 41, shown in Fig. 1.

This delivery of material to the forms occurs on the upper run of the conveyer mechanism a relatively short distance from the so-called front end of the machine. At this point a leveling device is located, similar if not identical in construction with that shown in my Patent No. 1,534,610, issued April 21, 1925. Included in this device is a transverse roller 42 mounted adjacent one end of and between two bars 43, (see Fig. 3) which are secured at one end to an upper cross member 3, each also furnishing a bear-

ing for one end of a roller 44, two of which are located lengthwise of the machine and substantially at the ends of the block forms. These rollers at their front ends have shafts passing through a cross bar 45 connected to two of the vertical posts 1 and are driven from a shaft 46 through suitable beveled gears 47, the roller 42 being likewise driven from the shaft 46 by chain 48. The rollers 44 rotate so as to move any cementitious material coming to them inwardly into the forms and as the forms pass under the roller 42 the cementitious material is leveled and any excess is carried over into the succeeding form.

Means are provided for automatically shifting the position of the upper plate 31 of each end member of the forms and also for shifting the lower member at the end of each form as it is needed for closing or opening the forms at various stages of the progress of the operation. At each side of the leveling device, shown in Figs. 1 and 3, a horizontal bar 49 is secured, being connected at its ends to the upper cross bar 3. Bars 49 are located so that the rollers 33 carried by plates 31 bear against their inner sides, whereby said plates 31 are held at inner position and cannot move outwardly so long as the rollers 33 engage against the bars 49 which parallel the longitudinal axis of the machine. These bars extend nearly the full length of the machine or from the leveling device nearly to the delivery end of the machine. In front of the leveling device and at each side of the machine an upper inclined bar 50 is mounted, its rear end joining substantially with the front end of the adjacent bar 49 while its front end is located farther outward, as best shown in Fig. 3. In front of the bars 50 other bars 51, paralleling the length of the machine, and mounted substantially in alignment with the bars 49. At the rear end of the machine and at each side thereof an upper inclined bar 52 is mounted, as shown in Fig. 5, the front ends of the bars 52 being set inwardly a short distance from the rear ends of the adjacent bars 49. It is evident that when the rollers 33 on the plates 31 come to the bars 52 and ride against the outer sides thereof said plates 31 which have been held at inner position by the bars 49 are gradually moved outward so that when the ends of the bars 52 are reached the plates 31 associated with any particular form are moved outward at each end far enough to completely uncover the projecting ends 40 of the reenforcing rods and the thinner end sections 37 of the blocks. Directly below the bars 52 which are supported by upper cross members 3 similar inclined bars 53 are mounted on the cross members 2 directly below said cross members 3, as shown in Fig. 12, and these engaging with the rollers 30 move the lower members of the ends of the forms outward while the plates 31 are being moved outward by the engagement of rollers 33 with the inclined bars 52, leaving the form substantially as shown in Fig. 12, that is, with each end of a block free. Then when a form starts to turn around the rear end wheels 9 of the machine the vertical sides 20 of said form swing outwardly away from the block, as shown in Fig. 4, permitting a removal of the block from the form. This removal is effected by workmen who grasp the ends of the block under the parts 37 and lift the same off of the bottom plate 19.

By reason of the adhesion of a block to the bottom plate 19 of its form it is necessary that the end portions of the block project a distance beyond the end edges of the bottom plates so that workmen removing the block may be enabled to engage underneath the same at its ends to break it loose from said bottom plate 19 of the form in which it is made.

The chains 10 running continuously, it is evident that after a form has been opened automatically and a block has been removed, the forms in open condition pass underneath the wheels 9 at the rear end of the machine and start backward toward the front end of the machine. During this movement back to the front end of the machine the members having base 22 with sides 23 and flange 24 and plate 25 attached thereto, are moved inwardly so that flanges 26 abut against the ends of the plates 19. And at the same time the upper plates 31 are held in outer position and not permitted to move inward at the same time. This inward movement of the member 22 may occur at any desired point in the return of the forms to the front end of the machine and, as shown, in the drawings it occurs just before the forms start to move upwardly around the front wheels 9. The inward movement of the members 22 is effected by two inclined bars 54, shown in Fig. 6, against the inner sides of which the rollers 30 bear, this forcing the said members 22 and attached parts inwardly. But at the same time the rollers 33 on the plates 31 run at the outer side of the bars 55, shown in Figs. 1 and 8. Accordingly, when the forms move upwardly at the front end of the machine around the front wheels 9 they are substantially as they are shown at the upper part of Fig. 8. That is, plates 31 are in outer position and held therein by the bars 51 while the lower parts of these ends of the forms have been moved inwardly and are held in such position by bars 56. Before the rollers 33 pass into engagement with the inclined bars 50 the reenforcing rods are laid in the forms the ends 40 thereof being received in the notches 27 in plates 25. When rollers 33 reach and are acted

upon by the inclined bars 50 plates 31 are moved inwardly to the position shown in Fig. 11, the members 34 striking the ends of the reenforcing rods and properly locating the same so that one end does not extend out farther than any other. From this point the forms ready to receive the cementitious material pass underneath the hopper 41, receive the material which is leveled off by the leveling device described, and thence passed to the rear, the cementitious material setting and hardening during such passage. When the inclined bars 52 and 53 are reached, the ends of the form are moved outwardly as previously described so that each block will be free and may be removed from its form as it passes around the rear sprocket wheels 9 where the vertical side plates 20 of the forms may open.

It is evident that this machine is a continuously operating machine and one with which blocks of the character described, may be very rapidly made. The cost of manufacture of the blocks, other than the material used, is very low, the labor cost being reduced to a minimum. The construction is practical and will produce reenforced blocks of cementitious material very rapidly. Large quantity production is a valuable feature of this machine. The invention is defined in the appended claims and is to be considered comprehensive of all forms of structure coming within their scope.

I claim:

1. A machine of the class described, comprising conveying means, and a plurality of block forms connected to and movable with said conveying means, each of said forms having a base plate, hinged sides, and ends slidably movable toward or away from the base plate, substantially as described.

2. A machine of the class described, comprising endless conveying means, and a plurality of block forms disposed transversely across the conveying means, connected thereto and movable therewith, each of said forms having a base plate, sides hingedly mounted at the side edges of the base plate, and ends movable into abutting engagement with the ends of the base plate, or away therefrom.

3. A machine of the class described, comprising a plurality of spaced apart endless conveying members, a plurality of bars disposed transversly of said conveying members and attached thereto at spaced apart points, a base plate for a block form located over and lengthwise of each bar and connected therewith, sides for the form at each side edge of the base plate, and ends for the forms slidably mounted on said bars movable into and out of abutting engagement with the ends of said base plates.

4. A machine of the class described, comprising a plurality of spaced apart endless conveying members, wheels around which said conveying members pass, a plurality of spaced apart bars connected to and disposed across said conveying members, upper and lower tracks at the ends of said bars, means on the ends of the bars to ride on said tracks, a base plate for a block form disposed longitudinally over each bar and connected thereto, two sides for each form located at each side edge of the base plate, and two ends for each form slidably mounted on each bar one at each end of the base plate to move into and out of abutting engagement therewith.

5. A machine of the class described, comprising a plurality of horizontally located spaced apart endless conveying members, wheels around which said conveying members pass, a plurality of spaced apart bars connected to and located across said conveying members, upper and lower tracks at the ends of said bars, means on the ends of the bars to ride on said tracks, a base plate for a block form disposed longitudinally over each bar and connected thereto, two sides for each form located at the sides edges of the base plate, two ends for each form slidably mounted on each bar one at each end of the base plate to move toward or away from the ends of the base plate, means for moving said ends inwardly to abut against the ends of the base plate at a predetermined point in the travel of each form, and means for moving said ends away from the base plates at a further point in the travel of the form.

6. A machine of the class described, comprising horizontally located endless conveying means, a plurality of block forms disposed across the conveying means and movable therewith, each of said forms having a base plate, sides and ends mounted for movement toward or away from the ends of the base plate, means for moving the ends of the forms away from the base plate as each form passes by a certain predetermined point in its travel with the conveying means, and means for moving the said ends of the forms toward the ends of their respective base plates as each form passes a further predetermined point in its travel with the conveying means.

7. A machine of the class described, comprising horizontally located endless conveying means, a plurality of block forms located across and connected to the conveying means and movable therewith, means for driving said conveying means, a bottom for each form, sides associated with said bottom, ends for each form, means for slidably mounting said ends for movement toward or away from the ends of said bottoms, means for automatically moving said ends away from said bottoms as the conveying means moves past a certain point, and means for moving said ends toward the ends of said bottoms as

said conveying means moves past a further point in its travel.

8. In a machine of the class described, an endless horizontally positioned conveyer, a plurality of block forms located side by side on and across said conveyer, each having a bottom plate, sides and ends, said ends being mounted for movement toward or away from the bottom plates, a bar to which the bottom plate of each form is connected, the ends of the bar extending outwardly beyond the ends of the bottom plate attached to it, and said ends of the form being slidably mounted on said bar, means automatically moving the ends of the form inward against the ends of the bottom plate during the movement of the conveyer, means for automatically moving said ends of the form outward at a later stage of the movement of the conveyer, and means for moving said conveyer.

9. In a machine of the class described, endless horizontally positioned conveying means, a plurality of block forms located side by side on and across the said conveying means, each form including a bottom plate, two sides hinged to swing outward from the said bottom plate, and two ends mounted for movement toward or away from said bottom plate, means for moving said ends toward the bottom plate into abutting engagement therewith during one part of the movement of the conveying means, means for moving said ends outward away from said bottom plate during a different and later part of the movement of said conveying means, and means for driving the conveying means.

10. In a machine of the class described, endless horizontally positioned conveying means, block forms carried thereby, each including a bottom plate, sides, and ends mounted for movement toward or away from the ends of the bottom plate, means for continuously driving the conveying means, means for moving said ends toward the ends of the bottom plate at one point in the travel of the conveying means, and means for moving said ends away from the bottom at a further point in the travel of the conveying means.

11. In a machine of the class described, the combination of a consecutive series of traveling block forms, each of said forms having outwardly and inwardly movable ends, automatic means for moving the ends of successive forms inward at a predetermined point in the path of travel thereof and means for thereafter moving said ends outward at another point in the travel thereof.

12. In a continuously operable block forming machine, the combination of a successive series of traveling forms each having a bottom, sides and movable ends, means engaging successively with said ends to move the same inwardly so as to close the forms successively at their ends, and means operating at a later point in the travel of the forms for successively engaging said ends and moving the same outwardly substantially as described.

13. In a machine of the character described, a combination of a series of traveling forms each having a bottom plate, sides and end members to close the ends of the form, each of said members comprising two parts, one slidably mounted on and over the other, automatic means for moving the lower part of each of said end members into abutting engagement with the ends of the bottom plates of the forms at one point in the travel of said forms, means for moving the upper parts of said end members inwardly at a further point in the travel of said forms, and means for moving both parts of said end members outwardly and away from the ends of said bottom plate at a still further point in the travel of said forms.

14. In a construction of the class described, a form for producing blocks of cementitious material comprising a bottom plate, vertical sides, one at each side edge of the bottom plate, end members for the form, each comprising a lower part mounted for slidable movement toward or away from the ends of the bottom plate and a second upper part slidably mounted on the first lower part of each end member and movable inward or outward with respect to said lower part on which it is mounted, substantially as described.

15. A form for making blocks of cementitious material, comprising an elongated bar, a bottom plate located over and disposed longitudinally of said bar, vertical sides disposed one at each side edge of the bottom plate, a member slidably mounted at each end of the bar and movable toward or away from the adjacent end of said bottom plate, and a second member slidably on and above the first member for inward or outward movement with respect to said form.

16. A form for building blocks made of cementitious material comprising an elongated bar, cross bars connected to said elongated bar in spaced apart relation to each other, a bottom plate attached to said cross bars, sides for the form hingedly connected to the ends of the cross bars, and ends for the form slidably mounted on the end portions of said elongated bar for movement toward or away from the ends of said bottom plate.

17. A form for blocks made of cementitious material, comprising a bottom plate, vertical sides one at each side edge of the bottom plate and end members movably mounted for movement toward or away from each end of the bottom plate, each of said

end members including a vertical part and a flange extending inwardly therefrom, the upper side of said flange lying in the same plane with the upper side of the bottom plate, the inner edges of the said flanges on the ends abutting against the ends of the bottom plate when moved to inner position.

18. A construction containing the elements in combination defined in claim 17, combined with a plate slidably mounted at the upper side of each end member and movable inward or outward thereon with respect to the form, said plate when moved to inner position lying between the sides of the form and extending over said vertical part of the end member on which it is mounted with its lower side located below the upper edges of the sides of the form.

19. A form for blocks made of cementitious material comprising a bottom plate, sides hingedly mounted one at each side edge of the bottom plate so as to be swung outwardly at their upper portions, ends for the form each comprising a lower member and an upper member, said lower member being mounted for slidable movement toward or away from the adjacent end of the bottom plate and said upper member being slidably mounted on the lower member for slidable movement in the same directions, said lower member of each end including a vertical portion formed with a plurality of spaced apart notches in its upper edge and a flange extending inwardly therefrom toward the end of the bottom plate, the upper side of said flange lying in the same plane with the upper side of said bottom plate, and said upper member of each form being movable outwardly so as to uncover the upper notched edge of said vertical portion and being movable inwardly so as to extend at its inner edge a distance inside of the vertical portion and covering the notched upper edge thereof.

20. A construction containing the elements in combination defined in claim 19 and bars attached to the lower side of each of the upper members of said ends, said bars being located at a point outside of the plane of said vertical part of the lower end member.

In testimony whereof I affix my signature.

GEORGE H. A. RUBY.