No. 819,005. PATENTED APR. 24, 1906.

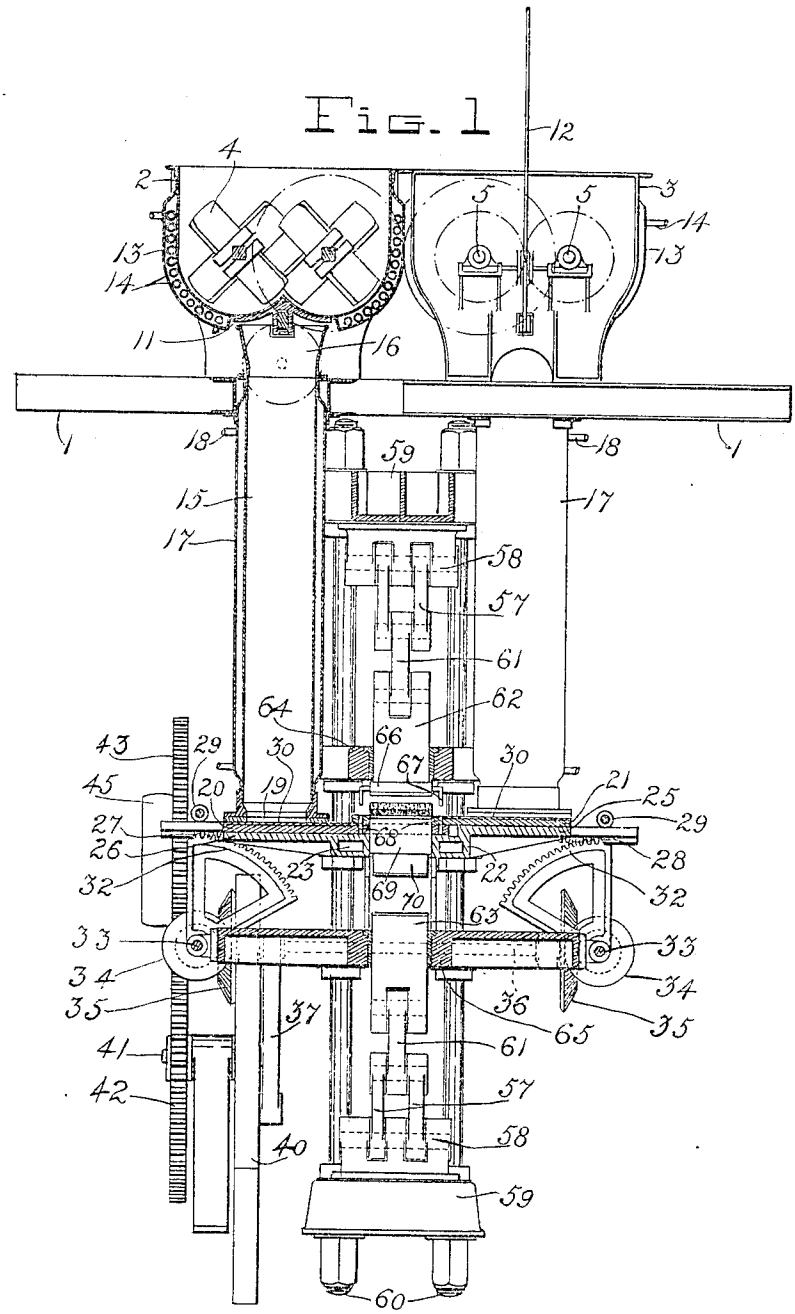
G. W. CRICHFIELD.

PLASTIC BLOCK MACHINE.

APPLICATION FILED MAR. 24, 1905.

5 SHEETS—SHEET 1.

Fig. 1



Witnesses
Richard C. Baringer.
Gracelle Thomas

Inventor
George W. Crichfield.
By his Attorneys
Guthrie and Willink.

ANDREW B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

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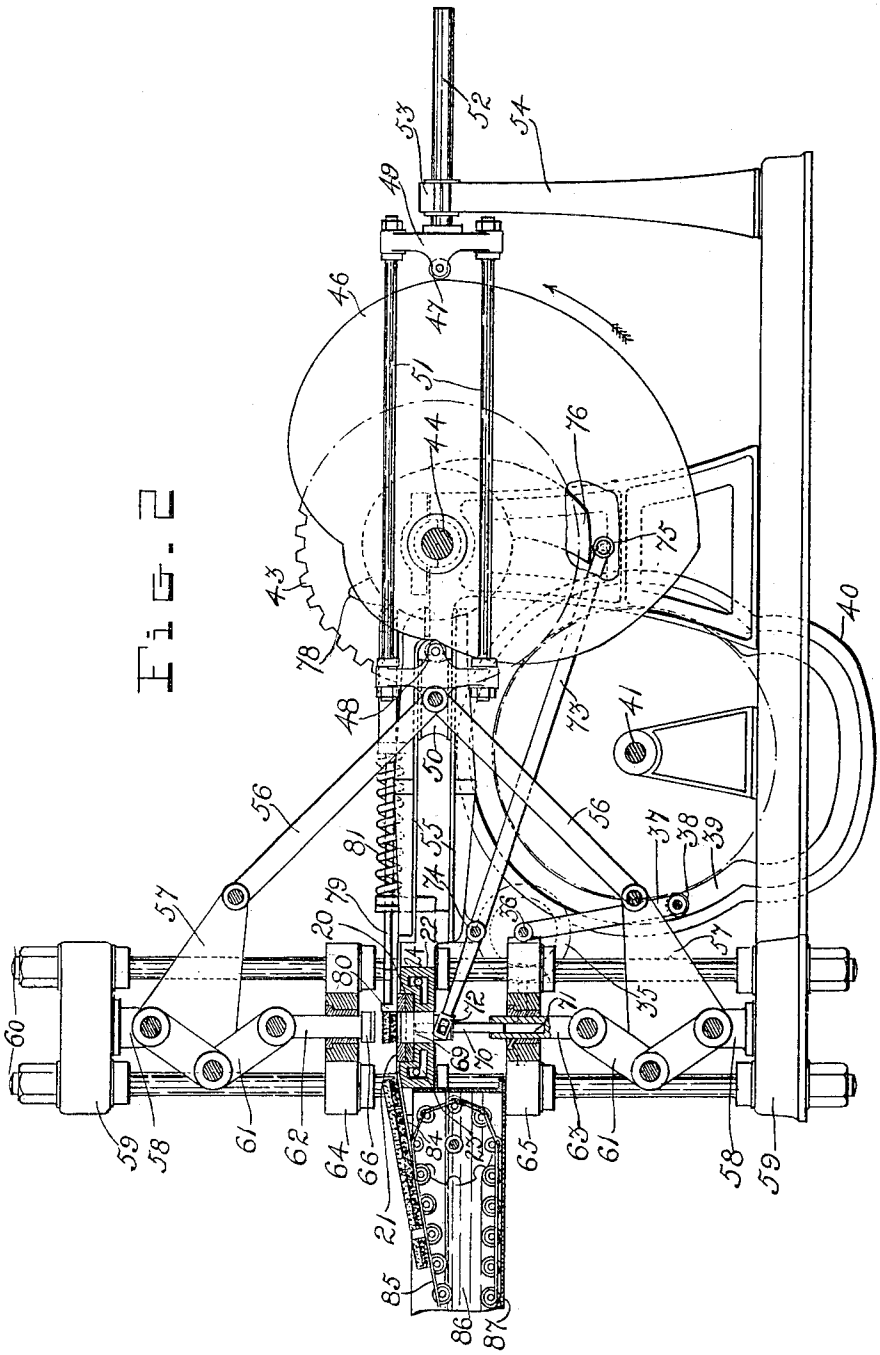
5 SHEETS—SHEET 2.

Fig. 2



Witnesses
Richard C. Ashlinger.
Grace E. Thomas.

Inventor
George W. Crichfield.
By his Attorneys
Guthrie and Willink

ANDREW B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

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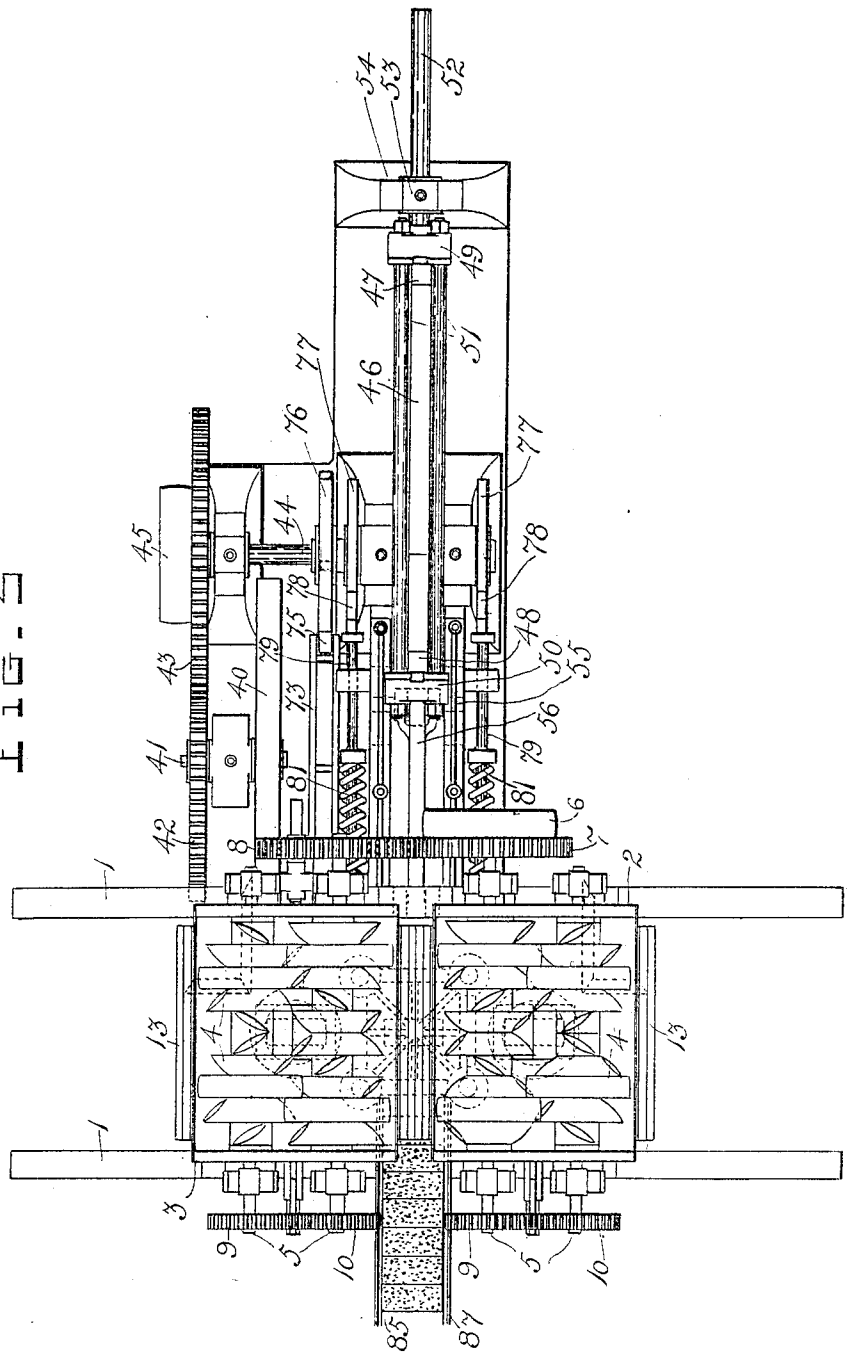
5 SHEETS—SHEET 3.

Fig. 2.



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Richard C. Baringer.
Gracelle Thomas

Inventor
George W. Crichfield.

By his Attorneys
Guthrie and Willink.

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5 SHEETS—SHEET 4.

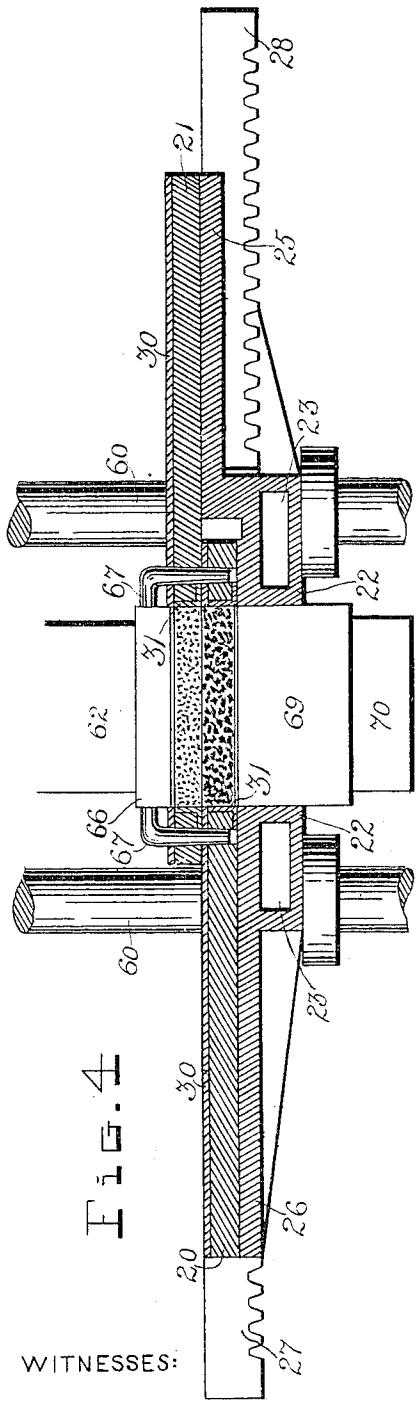

Fig. 4.

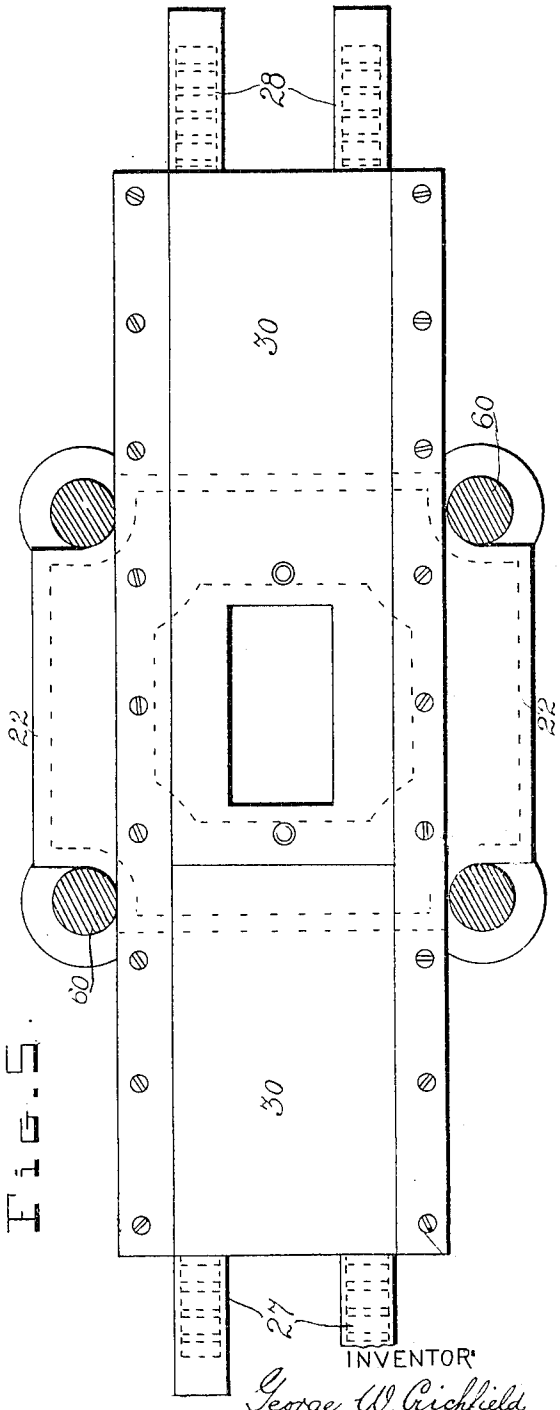

Fig. 5.

WITNESSES:

Richard C. Baldinger.

Gracelle Thomas

INVENTOR:

George W. Crichfield.

By Guthrie and Willink.

ATTORNEYS

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5 SHEETS—SHEET 5.

Fig. 7

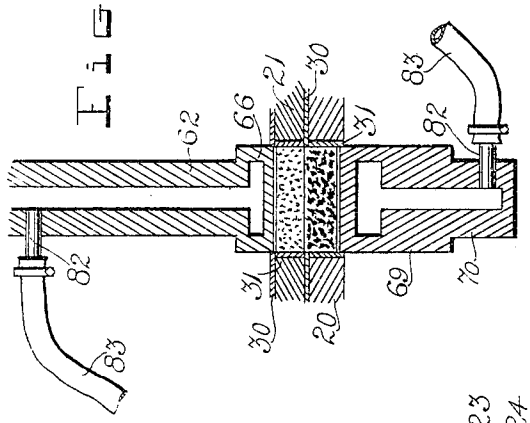


Fig. 8

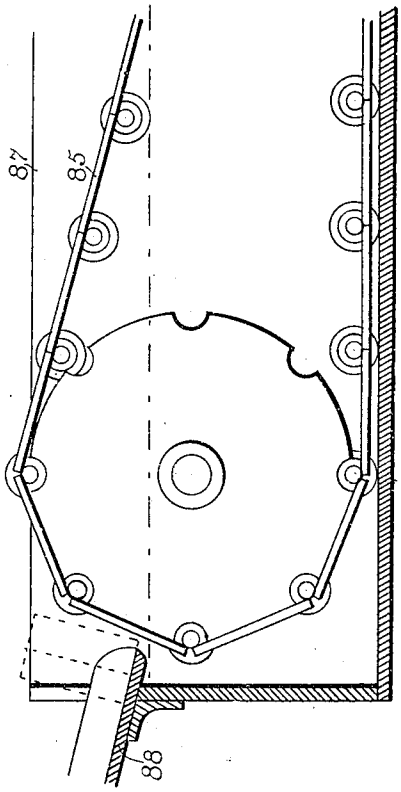
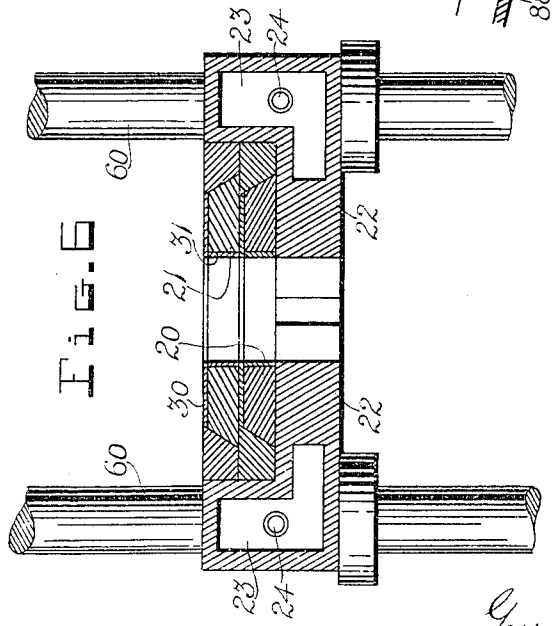


Fig. 6



Witnesses
Richard C. Balinger.
Gracelle Thomas

Inventor
George W. Crichfield
By Guthrie and Willink
Attorneys

UNITED STATES PATENT OFFICE.

GEORGE W. CRICHFIELD, OF JERSEY CITY, NEW JERSEY, ASSIGNOR OF ONE-HALF TO WILLIAM T. S. CRICHFIELD, OF NEW YORK, N. Y.

PLASTIC-BLOCK MACHINE.

No. 819,005. Specification of Letters Patent. Patented April 24, 1906.

Application filed March 24, 1905. Serial No. 251,859.

To all whom it may concern:

Be it known that I, GEORGE W. CRICHFIELD, a citizen of the United States, residing at Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Plastic-Block Machines, of which the following is a specification.

My invention relates to plastic-block machines, and may be appropriately and directly classed with that type of apparatus designed to form bricks or blocks of material in a soft state, which include among the mechanical factors employed devices in which the material is first molded to approximate the desired contour and subsequently reduced by pressure into its final shape and condition as to density. In such machines, therefore, the essential attributes of both molding and pressing appurtenances are required.

The object of my invention is the production of block-forming coöperating contrivances whereby a plurality of layers or block strata are molded independently and then arranged by the operation of the machine contiguously and in predetermined order to be in conclusion pressed together, constituting a single block of given density.

As the purview of my invention more particularly contemplates the treatment of asphaltic materials, it is also an object to provide means for maintaining those materials in suitable kneadable state until the various shaping functions of the mechanism have been performed thereon.

By the use of my invention there may be made, for example, a paving-block having its tread or wearing-surface composed of ingredients compounded with special regard to the service expected of it, while the base or underlying portion may be of less costly substance in nature and quantity, although perfectly adapted to support the wearing or resistant part.

To illustrate the preferred embodiment of my invention, it has been needful only to represent two molds and the various associated elements actuating them, and the following description of construction and operation is confined to the exemplification of apparatus including but two molds and those adapted to receive material and fashion the block layers simultaneously and of substantially equal thickness. It is believed, however, that it is within the scope of my invention to provide for the original molding of more than two layers individually both as to time and place in the system, the thickness of one layer having no relation to that of another and the final arrangement of layers being either side by side or in superposition, as may be elected by the user to whose order the machine is made.

I accomplish the objects set forth by forming and assembling mechanical parts, as exhibited in the accompanying drawings, of which—

Figure 1 represents a front view, partly in vertical section, to show the mixers and the service-cylinders, with the relative positions of the molds. Fig. 2 is a side view, portions being also sectionally shown, and sets forth the molds and press-operating mechanism and one end of the conveyer for receiving and removing the completed block and for immersing the same in a cooling-tank of water. Fig. 3 is a top plan view of the entire invention. Fig. 4 is an enlarged sectional view of the molds and immediate elements as shown in Fig. 1 to aid in the explanation by more clearly illustrating those pieces. Fig. 5 is a cross-section of the molds and table, the former being in the positions assumed by them when arranged together in order that the layers may be integrated by pressure. Fig. 6 is an enlarged sectional detail view of the block-raising members associated with the lower press-plunger. Those members raise the completed block out of the combined molds. Fig. 7 represents a partly-sectional view of the upper and lower press-plungers and shows the means for heating them; and Fig. 8 illustrates the outer end of the water-tank, with one form of the discharging devices to remove the cooled blocks.

Like numbers are used to designate the same parts throughout.

Upon girders 1 of suitable character and conveniently supported I erect mixers 2 and 3, usually side by side, as shown. Each mixer is provided with the beaters or blades 4 on parallel shafts 5, driven by pulley 6, the main gears 7 and 8, and the transmitting-gears 9 and 10. I do not confine myself to any particular type of mixer, reserving the right to introduce any superior kind of machine for the purpose. Each mixer is provided with a gate 11, opened or closed by

means of the hand-lever 12. (See Fig. 1.) The gearing mentioned is best shown in Fig. 3.

To keep the material sufficiently soft, each mixer is provided with a jacket 13 and steam-coil 14.

Directly beneath each mixer is arranged a vertical service-cylinder 15, having, as ordinarily constructed, a converging mouth 16. Each cylinder 15 is furnished with a jacket 17 and steam-heating pipe 18 to maintain the material at the workable temperature. At its base each cylinder 15 has an outlet 19 of approximately the same area and shape as the superficial extent of the block layers to be molded. Through the outlets 19 the material passes to the molds. In Fig. 1 the mold on the left hand is marked 20 and that on the right hand 21, and the molds are supported and slide longitudinally upon the tables 22, which possess the steam-spaces 23, served by the piping 24, as will be understood. It will be noted that the right-hand extension 25 of the table is higher than the left-hand extension 26 and that the molds have parallel geared racks 27 and 28, which extend downwardly for a distance on the sides of the extensions of the table 22 (see also Figs. 4 and 5) and serve to guide the reciprocative movements of the molds hereinafter. Usually the molds are kept down upon the table extensions at their outer ends by the rollers 29; but it is thought to be clear that the rollers may be replaced by other equivalent devices, if desired. Each mold has a suitable wearing-plate 30, that slides in contact with the outlet 19 of the cylinder 15, and each mold has a lining 31. The wearing-plates and linings are renewable.

To reciprocate the molds, I employ geared segments 32, two for each mold, engaging the side racks 27 27 and 28 28 of the molds. Segments 32 are secured upon rocking shafts 33, and by means of bevel-gears 34 on the rocking shaft and 35 on a transverse shaft 36 the segments are thrown back and forth. Transverse shaft 36 also has a rocking movement imparted to it by the attached arm 37, (see Fig. 2,) that is provided at its free extremity with a roller 38, engaging and traversing the groove 39 of cam-wheel 40, and the cam-wheel is revolved by and supported on the short transverse shaft 41. A gear 42 drives shaft 41 and is itself driven by a like gear 43, fixed upon transverse shaft 44, and which will be referred to again.

After the layers are molded by the elements above described the press-plungers are brought into play. To operate the machine, I provide a pulley 45 on the outermost end of shaft 44, and to actuate the plungers I secure a cam 46 upon that shaft, (see Figs. 2 and 3,) customarily at its middle point. As cam 46 revolves its contact with rollers 47 and 48, borne by cross-heads 49 and 50, joined by tie-rods 51, moves in and out the frame-like portion of the machine, consisting of the cross-heads and tie-rods mentioned. It will be observed in Fig. 2 that cross-head 49 has projecting from it the guide-rod 52 and that the rod is arranged to reciprocate in the guide-bearing 53, supported by the pedestal 54, erected upon the bed-plate. From the same Fig. 2 it may be seen that cross-head 50 moves in parallel guides 55 and that the cross-head is pivotally connected with the links 56, the remaining ends of which are pivotally attached to the arms of the bell-crank levers 57. Bearings or fulcrums 58 for the bell-crank levers are provided upon the heads 59 of the press-frame, and those heads are connected by the vertical tie-rods 60. The second arms of the bell-crank levers are connected to links 61, that are in turn pivotally attached to the upper and lower plunger press-bodies 62 and 63. The bodies of the plungers are guided in their vertical reciprocative movements by the guide-bearings 64 and 65, shown in Fig. 2 as secured to the vertical tie-rods 60.

When the press-plungers are operating, it is essential that the combined molds should be accurately positioned with respect to each other. This desired arrangement I insure by equipping the upper plunger-head 66 with downwardly-projecting dowel-pins 67. It is my practice usually to taper the dowels at their ends, (see Fig. 4,) and as they enter the holes 68, with which both molds are provided, those holes are forced to register accurately and the heads of the plungers cannot strike the sides of the hollows of the molds.

Head 66 of the upper plunger is fixed thereon, but the head 69 of the lower plunger is movable up and down with respect to its body 63. It is provided with a stem 70, (see Fig. 2,) the lower end of which fits movably in the socket 71 in the plunger-body. Thus the head 69 may be raised with reference to the body of the plunger by the pivotally-attached ends 72 of levers 73, having the fulcrums 74 on some fixed portion of the machine. As shown also in Fig. 3, the long arms of levers 73 have between them a roller 75, acted upon by the cam-wheel 76, fixed on shaft 44. It may also be explained at this point that the wheels 77, secured on shaft 44, are provided with the cam projections 78, the office of which is to force forwardly the rods 79. (Shown in Figs. 2 and 3.) Rods 79 are attached to a sliding angle piece or head 80. After a predetermined forward movement the ends of rods 79 escape from the cam projections of cam-wheels 77 and the rods are returned to their normal positions by the springs 81, illustrated as coiled about them.

In Fig. 7 I have shown one method of heating the plunger-heads. The pipe-couplings 82 are connected with pieces of steam-hose 83 of more or less length, and this is in turn

joined to any convenient source of steam at the proper temperature.

I do not confine myself to the construction requiring heated plunger-heads. The means for heating those heads may be omitted without difficulty in some instances.

In the operation of my invention materials suitably compounded are served to the mixers 2 and 3. That compound which is prepared to constitute the lower layer of the blocks is deposited in mixer 2 and the top layer composition is contained in mixer 3 as my invention is shown and described herein. The compounds flow from the mixers into and fill cylinders 15, and these vertical columns of material are intended to be of such length as to feed the plastic into the molds at some pressure. All the while the material is maintained in workable condition by the heat of the steam circulating about the mixers, cylinders, and through mold-table 22 and the plunger-heads, if necessary.

The molds are, as shown, flat plates having the openings near their inner ends to receive the material and being solid throughout their remaining portions in order that when they are combined between the plunger-heads the outlets 19 of the cylinders 15 are closed and the flow of material entirely shut off for the time being. Let it be assumed that the molds start from their combined position at the middle of the machine. (See Figs. 3 and 4.) Cam-wheel 40 revolving the eccentric portion of groove 39 causes a forward movement of arm 37 with consequent rocking of shafts 36 and 33 and corresponding excursions of the bevel-gears 34 and geared segments 32. The segments by reason of their described engagement with the racks of the molds draw the molds outwardly into the positions indicated by the broken lines, bringing the hollows of the molds beneath the outlets 19 of the cylinders 15. At once the molds are filled with material under a certain pressure hydrostatically exerted by the vertical columns, as already explained. Continued movement of revolution on the part of cam-wheel 40 results in a return movement of arm 37, and consequently of the segments, and the molds combine once more at the middle of the machine, this time full of material and one above the other. It should here be stated that the concentric portion of the groove 39 is of sufficient length to permit the molds to remain combined during the pressing and ejecting steps explained below.

Being geared together shaft 41, carrying cam-wheel 40, and shaft 44, turning cam 46, rotate with definitely-related velocities, and upon the combining of the molds filled with material the cam 46 moves the cross-heads forwardly and through the links 56 brings into operation the toggle-joints formed by the bell-crank levers and short links 61, thereby forcing the plungers toward each other. As the dowel-pins 67 slightly lead the upper plunger-head, they enter the holes 68 and secure the molds accurately together, and the plunger-heads approaching each other enter the hollows of the molds and compress the two layers, at the same time pressing one to the other until they become practically a single block composed of two differing compositions. Cam 46 is, as shown, of such peripheral contour that the press-plungers are held together during one-quarter of a revolution in order to afford time for the combined layers now compressed to "set"—that is to say, to thoroughly cohere. Then the further revolution of the cam withdraws the plungers, and it is during and at the termination of the withdrawal of the plungers that the greater cam projections 76 of cam-wheels 77 actuate levers 73, thereby raising lower plunger-head 69 from its body through both molds until its upper surface is flush with the upper surface of the top mold and the block is raised entirely free from the molds. For a brief interval the cams 76 hold the plunger head and block in the position described long enough, in fact, for the lesser cam projections 78 to move rods 79 and their head 80 forward. In Fig. 2 it will be noted that the block is thus shifted upon an inclined chute 84 and succeeding blocks advance it down the chute until it is taken upon the conveyer 85. The upper length of the conveyer sags down into the water 86 in tank 87, and the block is cooled for a length of time depending upon the speed and length of the conveyer. Fig. 8 illustrates the end of the conveyer arising from the water bearing the cooled blocks and shows the receiving-plate 88 for removing the blocks. I do not confine myself to the particular conveyer and removing elements drawn, as such are common devices and may be indefinitely modified.

Having now described my invention and explained the mode of its operation, what I claim is—

1. In a plastic-block machine, the combination with a plurality of mixing-chambers and mixing devices wherein different plastic compounds may be mixed separately, of movable molds, mold-operating mechanism whereby different molds are moved to and from different mixing-chambers enabling the molds to receive different compounds, the said mechanism being adapted to arrange the molds and contents contiguously, and a press constructed to press the contents of different molds together causing them to cohere and form a single body.

2. In a plastic-block machine, the combination with a plurality of mixing-chambers and mixing devices wherein different plastic compounds may be mixed separately, of movable molds, mold-operating mechanism whereby different molds are moved to and from different mixing-chambers enabling the

molds to receive different compounds, the said mechanism being adapted to arrange the molds and contents contiguously, and a press independent of said molds and having plungers normally withdrawn from the molds and constructed to press the contents of different molds together causing them to cohere and form a single body.

3. In a plastic-block machine, the combination with a plurality of mixing-chambers and mixing devices wherein different plastic compounds may be mixed separately, of movable molds, mold-serving means arranged between said chambers and molds whereby the plastic compounds are delivered to said molds under pressure, mold-operating mechanism whereby different molds are moved to and from different mixing-chambers enabling the molds to receive different compounds, the said mechanism being adapted to arrange the molds and contents contiguously, and a press constructed to press the contents of different molds together causing them to cohere and form a single body.

4. In a plastic-block machine, the combination with a plurality of separate mixing-chambers and mixing devices, of movable molds adapted to receive plastic material, mold-serving cylinders vertically disposed and supporting the said mixing-chambers at a distance above the molds whereby plastic materials are delivered to the molds under hydrostatic pressure, mold-operating mechanism whereby the molds and plastic bodies formed in different molds are arranged contiguously, and a press adapted to compress such bodies together in the molds causing them to cohere and form a single body.

5. In a plastic-block machine, the combination with reciprocating molds having like mold-openings through them for the reception of plastic materials, of mold-operating mechanism whereby the molds and the plastic bodies formed in different molds are arranged contiguously, and a press having plungers normally withdrawn entirely from the molds and adapted to enter the mold-openings and to compress the said plastic bodies together causing them to cohere and form a single body.

6. In a plastic-block machine, the combination with a plurality of separate mixing-chambers and mixing devices, of movable molds adapted to receive plastic materials, mold-serving receptacles arranged between the mixing-chambers and molds for delivering the materials to the molds, means for heating the said receptacles, mold-operating mechanism whereby the molds and the plastic bodies formed in different molds are arranged contiguously, and a press adapted to compress the said bodies together in the molds causing them to cohere and form a single body.

7. In a plastic-block machine, the combination with movable molds, of mold-serving receptacles including vertically placed and extended portions fashioned and disposed to deliver plastic to the said molds under hydrostatic pressure exerted by the plastic, mold-guiding and mold-operating mechanism whereby the said molds and plastic bodies separately formed therein are arranged contiguously one above another, and a press adapted to compress such arranged plastic bodies together causing them to cohere and form a single body.

8. In a plastic-block machine, the combination with a table provided with extensions situated at different levels, of molds movable upon the said table extensions, mold-guiding and mold-operating mechanism whereby the said molds and plastic bodies formed separately therein are arranged contiguously one above another, and a press adapted to compress such arranged plastic bodies together causing them to cohere and form a single body.

9. In a plastic-block machine, the combination with a table having extensions situated at different levels, of means for heating the tables, reciprocating molds movable upon the said extensions of the table, mold-guiding and mold-operating mechanism whereby the said molds and plastic bodies formed separately therein are arranged contiguously one above another, and a press adapted to press the contents of different molds together causing them to cohere and form a single body.

10. In a plastic-block machine, the combination with a table having extensions situated at different levels, of molds movable upon the said table extensions, the said molds having openings closed at the bottom by the surface of the table when the molds are at separated positions, mold-guiding and mold-operating mechanism whereby the said molds and plastic bodies formed separately therein are arranged contiguously one above another, and a press adapted to compress such arranged plastic bodies together causing them to cohere and form a single body.

11. In a plastic-block machine, the combination with a table having extensions situated at different levels, of means for heating the table, molds movable upon the said table and extensions, the said molds having openings closed at the bottom by the surface of the table when the molds are in separated positions, mold-guiding and mold-operating mechanism whereby the said molds and plastic bodies formed separately therein are arranged contiguously one above another, and a press adapted to compress such arranged plastic bodies together causing them to cohere and form a single body.

12. In a plastic-block machine, the combination with a table having extensions situated at different levels, of means for heating

the table, molds movable upon the said table and its extensions, the said molds having openings closed at the bottom by the surface of the table when the molds are in separated positions, mold-serving receptacles fashioned and disposed to deliver plastic to the said openings in the molds, means for heating said receptacles, mold-guiding and mold-operating mechanism whereby the said molds and plastic bodies separately formed therein are arranged contiguously one above another, and a press adapted to compress such arranged plastic bodies together causing them to cohere and form a single body.

13. In a plastic-block machine, the combination with a table having extensions situated at different levels and a middle opening, of molds movable upon the said table and extensions, the said molds having openings closed at the bottom by the surface of the table when the molds are at separated positions, mold-guiding and mold-operating mechanism whereby the said molds and plastic bodies formed separately therein are arranged contiguously one above another and both above the middle opening of the said table, and a press having upper and lower plunger-heads adapted to enter the openings in the molds and table and compress such arranged plastic bodies together causing them to cohere and form a single body.

14. In a plastic-block machine, the combination with a table having extensions situated at different levels and a middle opening, of molds movable upon the said table and extensions, the said molds having openings closed at the bottom by the surface of the table when the molds are at separated positions, mold-guiding and mold-operating mechanism whereby the said molds and plastic bodies formed separately therein are arranged contiguously one above another and both above the middle opening of the table, a press having upper and lower plunger-heads adapted to enter the openings in the molds and table and compress such arranged plastic bodies together causing them to cohere and form a single body, press-actuating devices, and gearing interposed between the said devices and mold-operating mechanism constraining the said molds and press to move with predetermined relation to each other.

15. In a plastic-block machine, the combination with movable molds, of mold-operating mechanism whereby plastic bodies formed in different molds are carried by the molds and arranged contiguously, a press adapted to compress such arranged bodies together causing them to cohere and to form a single body, and press-actuating devices including contrivances constructed and disposed to maintain the force of the press at its maximum upon the said plastic bodies for a time until the material is set.

16. In a plastic-block machine, the combination with reciprocating molds having like mold-openings through them for the reception of plastic materials, of mold-operating mechanism whereby the molds and the plastic bodies formed in different molds are arranged contiguously, a press having plungers normally withdrawn from the molds and adapted to enter the mold-openings and to compress the said plastic bodies together causing them to cohere and to form a single body, and a block-ejector constructed to free the cohered bodies from the molds.

17. In a plastic-block machine, the combination with movable molds, of mold-operating mechanism whereby the plastic bodies formed in different molds are carried by the molds and arranged contiguously, a press adapted to compress such arranged bodies together causing them to cohere and to form a single body, the plunger of the said press having an independently-movable presser-head, and means for moving the said presser-head with respect to the plunger of the press and to the said molds thereby ejecting the cohered bodies.

18. In a plastic-block machine, the combination with reciprocating molds having mold-openings, of mold-operating mechanism whereby the openings in the molds are moved to register with each other, a press having plungers adapted to enter the said mold-openings, and a presser-head borne by one of the plungers and independently movable, and means constructed to move the said presser-head through the mold-openings to eject a plastic block formed therein.

19. In a plastic-block machine, the combination with movable molds having openings, of mold-operating mechanism whereby the openings in the molds are moved to register with each other, a block-ejector, a block-shifting device constructed and arranged to shift the block to one side of the registered mold-openings, and gearing interposed between the said mold-operating mechanism and the block-ejector and block-shifting device constraining the said mold-operating mechanism, block-ejector and block-shifting device to move with predetermined relation to each other.

20. In a plastic-block machine, the combination with reciprocating molds, of mold-guiding devices constructed and arranged to guide the molds horizontally, mold-operating mechanism whereby the said molds and plastic bodies therein are arranged one above another, and a press adapted to compress the contents of the molds thus arranged whereby the contents of different molds cohere and form a single body.

21. In a plastic-block machine, the combination with bottomless reciprocating molds, of mold-guiding devices constructed and arranged to guide the molds horizontally, mold-

operating mechanism, the said mold-guiding devices being supported at different levels whereby the said operating mechanism arranges the molds and contents one above another, and a press adapted to compress the contents within the molds whereby the contents of different molds cohere and form a single body.

22. In a plastic-block machine, the combination with bottomless reciprocating molds, of mold-guiding devices constructed and arranged to guide the molds horizontally, mold-operating mechanism, the said mold-guiding devices being supported at different levels whereby the said operating mechanism arranges the molds and contents one above another, a press adapted to enter the molds and to compress the contents together, and press-actuating devices including means constructed and disposed to maintain pressure upon the contents of the molds temporarily whereby the material sets under pressure.

23. In a plastic-block machine, the combination with a plurality of mixing-chambers and mixing devices for mixing different compounds separately, of bottomless molds, mold-guiding and mold-operating means whereby the molds are reciprocated and arranged one above another, a press adapted to enter the molds when thus arranged, press-actuating mechanism, the said molds having portions adapted to close the mouths of the mixing-chambers, the said mold-operating means including contrivances for holding the molds temporarily stationary at the limits of their reciprocating movements, and gearing connecting the said press-actuating mechanism and mold-operating means constraining the press and molds to move with respect to each other at predetermined rates of speed.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE W. CRICHFIELD.

Witnesses:
JAMES F. MCMANUS,
W. J. BROWNE.