

Aug. 11, 1964

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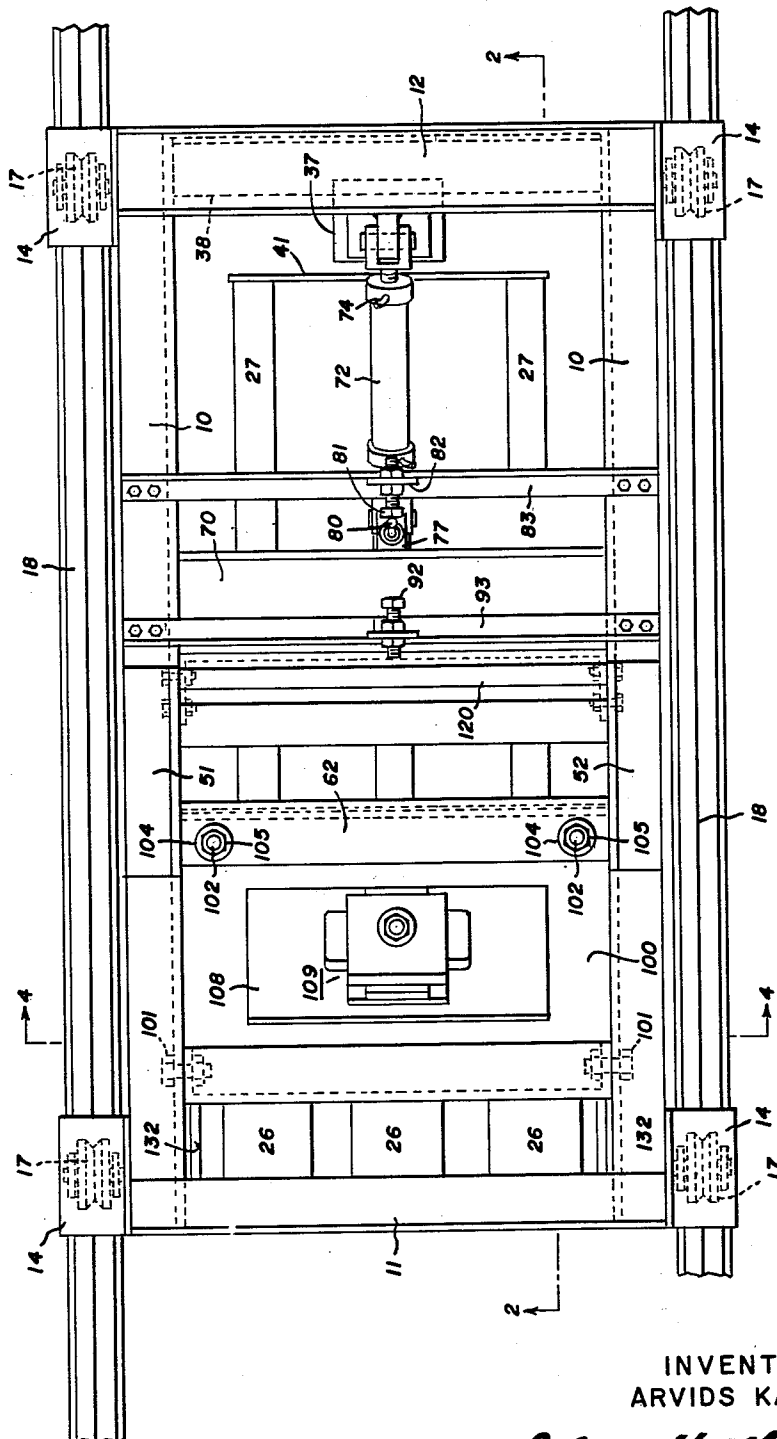
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CONCRETE SLAB FORMING MACHINE

Filed Feb. 13, 1961

3 Sheets-Sheet 1

FIG. 1.



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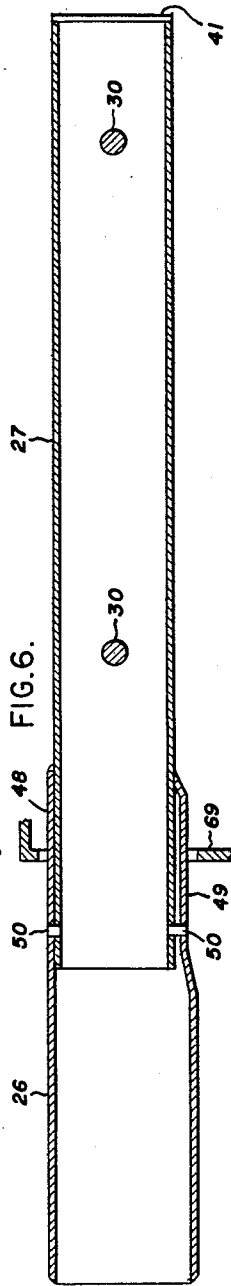
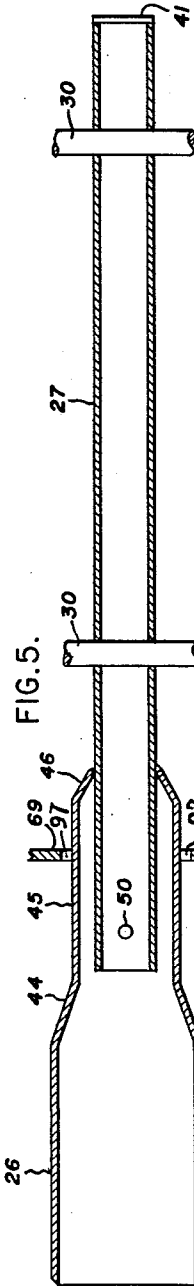
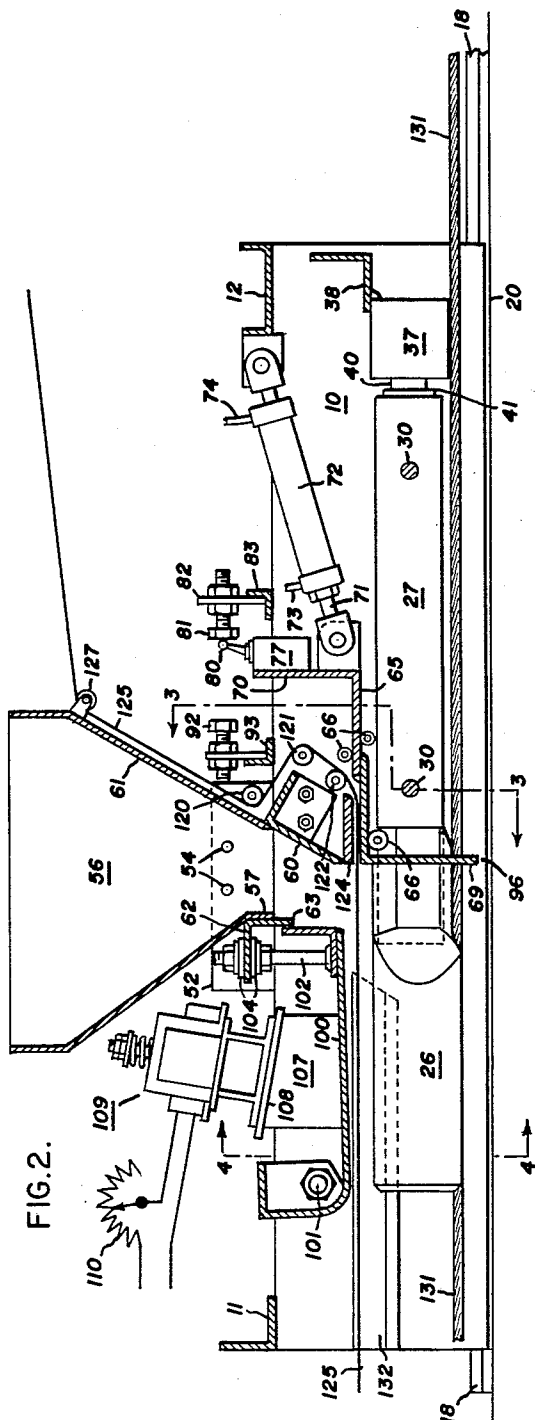
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FIG. 3.

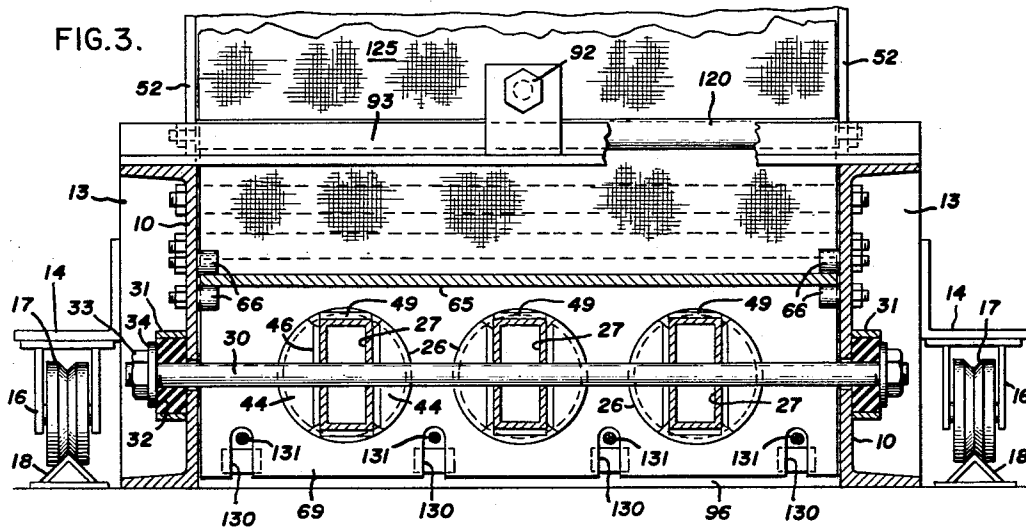


FIG. 4.

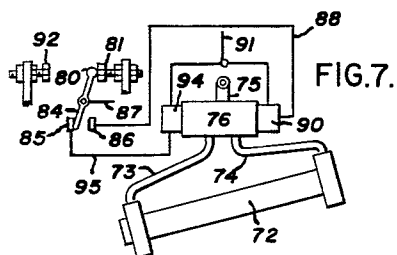
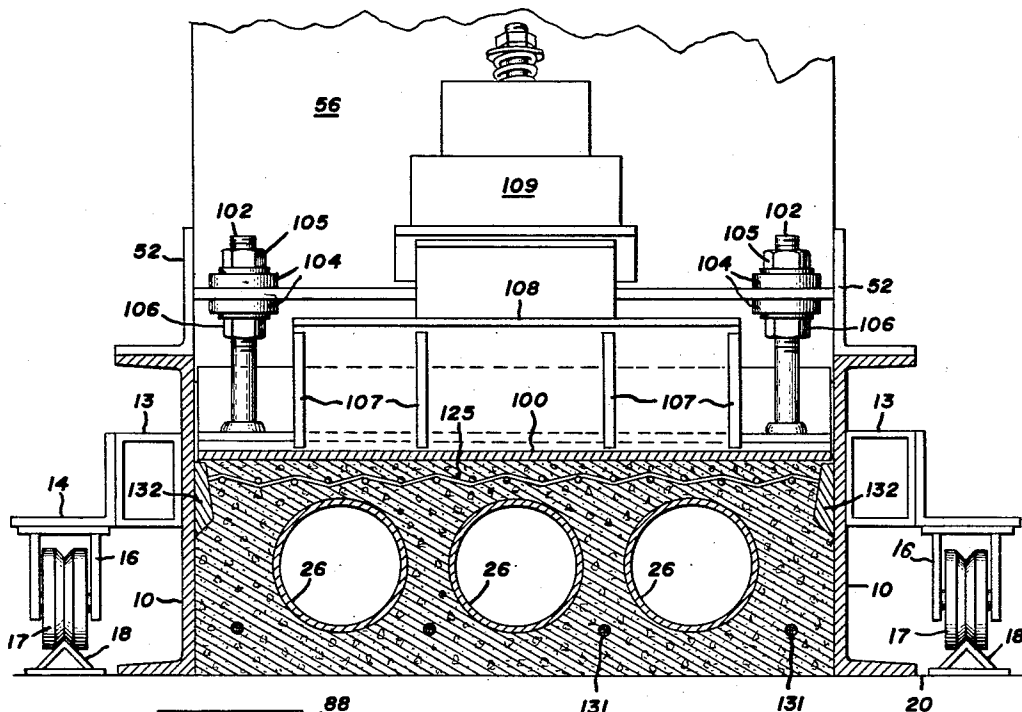


FIG. 7.

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CONCRETE SLAB FORMING MACHINE

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1 Claim. (Cl. 25—41)

This invention relates to a machine for forming elongated slabs of concrete. Pre-formed, reenforced concrete slabs are used extensively in the construction of buildings and there are in use machines for forming these slabs. The disadvantages of the machines now in use are that they involve bulky heavy structure of complicated and costly arrangements. They do not provide adequate controls for varying the compaction and flow of concrete to provide for proper density of the formed slabs regardless of variations in the concrete materials.

This invention has as an object a particularly simple and compact structure economical to build and operate, and which functions to form a slab of desired uniform density.

The invention consists in the novel features and in the combinations and constructions hereinafter set forth and claimed.

In describing this invention, reference is had to the accompanying drawings in which like characters designate corresponding parts in all the views.

In the drawings—

FIGURE 1 is a top plan view of a machine embodying my invention.

FIGURE 2 is a lengthwise sectional view taken on line 2—2, FIGURE 1.

FIGURE 3 is an enlarged vertical sectional view taken on line 3—3, FIGURE 2.

FIGURE 4 is an enlarged vertical sectional view taken on line 4—4, FIGURES 1 and 2.

FIGURE 5 is a transverse sectional view of a core member.

FIGURE 6 is a vertical sectional view of a core member.

FIGURE 7 is a schematic diagram of the control circuit for the ramming plate.

The machine consists of a carriage having side members 10 of channel formation extending in parallel spaced relation and so maintained by a front cross member 11, and a rear cross member 12. Box shaped members 13 are welded to the side members 10 at the forward and rear ends thereof. Angle plates 14 are welded to the box members 13. U-shaped wheel brackets 16 are welded to the angle brackets 14, and wheels 17 are journaled between the legs of the brackets 16.

20 designates a flat surface, such as a floor surface. Rails 18 are fixedly mounted on the floor surface for receiving the wheels 17. With this arrangement, the carriage is movable on the wheels 17 in a lengthwise direction along the rails 18. The side members 10 depend from the wheel supporting structures and terminate at their lower edges in close proximity to the floor surface 20. The side members serve as a form for the side edges of the formed slab.

A plurality of core forming members are mounted in the carriage in spaced apart relation between the side members 10. These core members extend parallel to the side members 10, and consist of tubular members 26, each of which is secured to an elongated member 27, here shown of rectangular cross section and having a ver-

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tical dimension substantially twice the width. These core supporting members 27 are fixedly mounted on rods 30 extending transversely through the core supporting tubes 27, and outwardly through enlarged openings in the side members 10. Cylindrical flanges 31 are fixed to the side members 10 in concentric relation to the rods 30 for the reception of rubber disks 32 apertured to receive the rods. The rods 30 are prevented from lateral movement by nuts 33 threaded on the ends of the rods against washers 34 abutting against the outer faces of the rubber disks 32. Because of the enlarged openings in the side members 10 and the rubber disks 32, the core members 26 are mounted in the carriage for yielding movement relative thereto. The supporting tubes 27 and the core members 26 are reciprocated in a direction lengthwise of the carriage. This reciprocation may be effected by a vibrator unit 37 fixedly mounted to a cross member 38, the ends of which are secured to the side members 10, the plunger 40 of the vibrator being connected to a plate 41 extending transversely of the carriage and fixedly secured to the ends of the tubular core supporting members 27. The vibrator unit effects reciprocation of the core members at relatively high speed.

FIGURES 5 and 6 illustrate the manner in which the circular core members 26 are fixed to the supporting members 27. The sides of the cores 26 are tapered inwardly, as at 44, and flattened as at 45, to extend parallel with the sides of the supporting members 27 to provide a transverse width less than the transverse dimension of the forming portion of the cores 26, see FIGURES 3 and 5. The ends of the flattened areas 45 are bent further inwardly, as at 46, and are welded to the sides of the members 27.

Referring to FIGURE 6, the top portion of the cores 26 extends rearwardly, as at 48, in overlapping relation to the upper side of the tubular members 27, and the bottom portion of the core members is bent upwardly and flattened, as at 49, for overlying the bottom walls of the members 27. The core member is attached by plug welding, as at 50.

With this arrangement, the rear portion of the core member is of reduced transverse dimension to provide adequate discharge of the cementitious material from the supply hopper between the cores.

There is an angle plate 52 fixedly secured to the top flange of each of the side members 10. The vertically disposed leg of this plate is apertured to receive bolts 54 extending through the side walls of a supply hopper 56. In this manner, the hopper 56 is readily detachable from the carriage, and the hopper is formed with a transversely extending discharge passage 57 positioned to discharge cementitious material between the side members 10 and the rear portion of the core members 26.

An angle member is fixedly secured to the side members 10 and has a depending flange 60 forming a continuation of the rear inclined wall 61 of the hopper. An angle member 62 is also fixed between the plates 52 and has a flange 63 depending vertically and forming a continuation of the forward wall of the hopper discharge passage 57.

A plate 65 is mounted between the side members 10, and is supported by rollers 66 secured to the inner surface of the side members for reciprocation in a direction lengthwise thereof. This plate has a depending flange 69 apertured to receive the rear portions of the cores 26.

This flange 69 extends transversely between the side members and serves as a ramming plate. The plate 65 is formed with an upwardly extending flange 70 to which is operatively connected a piston rod 71 movable in a cylinder 72 connected to the upper rear cross member 12, see FIGURE 2. Conduits 73, 74, connected to the forward and rear ends of the cylinders, are alternately connected to a supply 75 of fluid under pressure, through a solenoid valve 76. The valve 76 is actuated by a switch 77 mounted on the vertical flange 70 of plate 65, in such manner that the actuator 80 of the switch engages an adjustable stop screw 81 mounted in a plate 82 fixed to a cross member 83 secured at its ends to the side members 10.

In FIGURES 1, 2 and 7, the switch actuator 80 is shown as contacting the screw 81. Slight further rearward movement of the plate 69 will effect movement of the switch contact 84 out of engagement with the contact 85 and into engagement with contact 86. This establishes a circuit from the source 87, contacts 84, 86, wire 88, coil 90 of solenoid valve 76, to the return side of the line 91. This effects actuation of the valve 76 to exhaust the line 73 and apply pressure to the rear end of the cylinder 72 through the line 74 to effect forward movement of the ramming blade 69. This forward movement continues until the switch actuator engages a stop screw 92 carried by a cross member 93 to move contact 84 into engagement with contact 85 to energize coil 94 through wire 95. By adjusting the stop screws 81, 92, the magnitude of the stroke of the ramming plate 69 may be varied.

This arrangement effects lengthwise reciprocation of the ramming plate 69 to move the cementitious material discharged from the hopper 56 forwardly about the core members 26, and this movement effects a gradual rearward movement to the carriage on the rails 18.

The lower edge of the ramming plate 69 terminates a short distance above the floor line 20 to provide a space 96. The apertures formed in the ramming plate 69 are of greater diameter than the rear portions of the core members 26. For example, in the structure shown, the core members 26 are of cylindrical form and the circular apertures in plate 69 are comparable to the diameter of the cores 26. This provides a space 97 at each side of the rear portions 45 of the cores. These spaces provide for the escape of some of the concrete material upon the forward movement of the ramming plate. The space 96 between the lower edge of the ramming plate and the floor line provides for the escape material in that area where it is most dense because of the weight of the material above. This arrangement in conjunction with the variable structure of the ramming plate provides for controlling the density of the form slab. The excess material discharged through the spaces 96, 97 falls to the floor 20 and is spread uniformly by the ramming plate 69 as the carriage is moved rearwardly. This forms a more uniform texture to the under surface of the formed slab.

A compression plate 100 is positioned between the side members 10 above the forming cores 26. The plate 100 is pivotally mounted at its forward end on bolts 101 carried by the side members. Studs 102 are secured to the rear portion of the plate 100 and extend upwardly through the clearance holes in the top flange of the angle member 62. Resilient washers 104 are positioned on the studs 102 for engagement with the upper and lower surfaces of the flange 62, and adjusting nuts 105, 106, are provided for vertically adjusting the normal position of the rear portion of the plate 100. Vertically disposed plates 107 are attached to the plate 100 and support a transversely extending inclined plate 108, on which there is mounted a vibrating unit 109 which serves to effect rapid vibration of the plate 100 toward and from the core members 26. The vibrating unit is supplied with a variable source of power, whereby the magnitude of vibration imparted to the plate 100 may be varied. In the

case of an electrically operated vibrating unit, a variable resistance 110 may be employed to vary the power to the unit.

A roller 120 is journaled between the angle plates 52 to the rear of the hopper 56. Similar rolls 121, 122, are journaled between the side members 10. A horizontally disposed plate 124 extends transversely between the side members 10 to which it is affixed at its ends and spaced slightly above the plate 65. The rolls 120, 121, 122, serve to guide a reinforcing mesh 125 between the plates 65, 124, so that the mesh is embedded in the upper portion of the formed slab, the mesh extending above the core members 26 and below the plate 100. The mesh is supplied from a suitable supply and is trained over a roll 127 mounted on the rear side of the hopper 56.

Referring to FIGURE 3, the ramming plate 69 is formed with a plurality of slots 130 extending upwardly from its lower edge. The purpose of these slots is to receive reinforcing rods 131 which are embedded in the lower portion of the formed slab. Keys 132 are affixed to the inner surfaces of the side members 10, see FIGURE 4, to form recessions at the upper side edges of the formed slab for interlocking with adjacent slabs when the slabs are in place.

The cementitious material is deposited in the hopper 56 and descends through the discharge passage 57 about the rear portions of the cores 26. The plate 69 is reciprocated by the cylinder structure 72, forcing the cementitious material forward about the cores 26 and simultaneously moving the carriage rearwardly. During this operation, the cores 26 are vibrated in an axial direction at relatively high speed by the vibrator unit 37, and the plate 100 is vibrated vertically at relatively high speed to compress the cementitious material about the core members. By regulating the length of the stroke of the ramming plate 69 and the magnitude of the vibration of the cores 26 and the compression plate 100, any desired density in the finished form may be obtained.

What I claim is:

A concrete slab forming machine for continuously forming cored concrete slabs comprising a carriage mounted for movement over a flat surface, said carriage having a pair of spaced apart depending side members, the lower edges of said side members terminating in spaced proximity to said flat surface, a top plate carried by said carriage between said side members a spaced distance upwardly from said flat surface, said side members and top plate forming in conjunction with said flat surface a mold cavity, a plurality of axially extending, parallel, spaced apart, core members carried by said carriage and extending into said mold cavity, said core members being spaced from said flat surface, side members, and top plate, a hopper for cementitious material mounted on said carriage and having a discharge passage adjacent the rear ends of said core members to discharge said cementitious materials in said mold cavity around the rear ends of the core members, a reciprocating ram plate normally located rearwardly of said discharge passage, said ram plate being formed with a plurality of oversize clearance apertures for said core members, power means for advancing and retracting said ram plate toward and away from said core members to compact cementitious material deposited in said mold cavity from said hopper about said core members, excessive cementitious material passing through said apertures during the advance of said ram plate, said ram plate terminating a spaced distance above said surface whereby to pre-lay said cementitious material on said surface during the advance movement of said ram plate, power vibrating means for vibrating said top plate and power vibrating means for vibrating said core members to compact said cementitious material in said mold cavity during the advance stroke of said ram plate, said carriage being moved rearwardly solely in response to the reactive force applied to said ram plate during said advance stroke by the compacting of said cementitious material, and

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means for varying the stroke of said ram plate and means
on each of the vibrating means for varying the magnitude
of said power vibrating means.

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