

Oct. 14, 1969

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3,471,910

APPARATUS FOR CASTING CONCRETE PANELS

Filed Dec. 27, 1966

3 Sheets-Sheet 1

FIG. 1

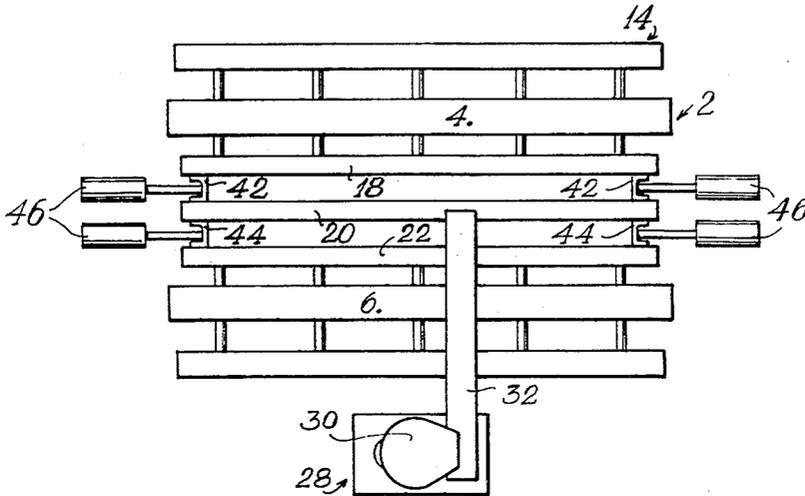
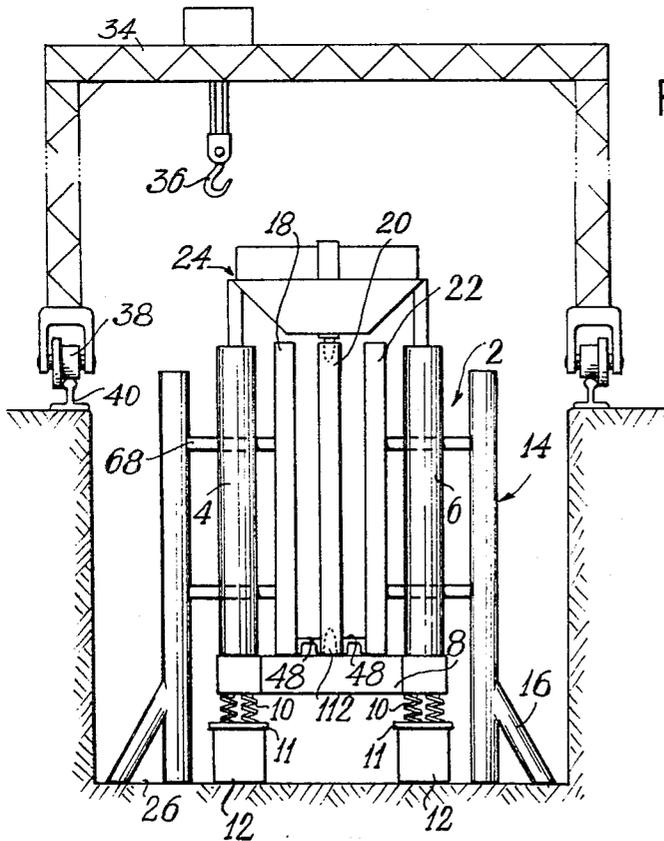


FIG. 2



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FIG. 4

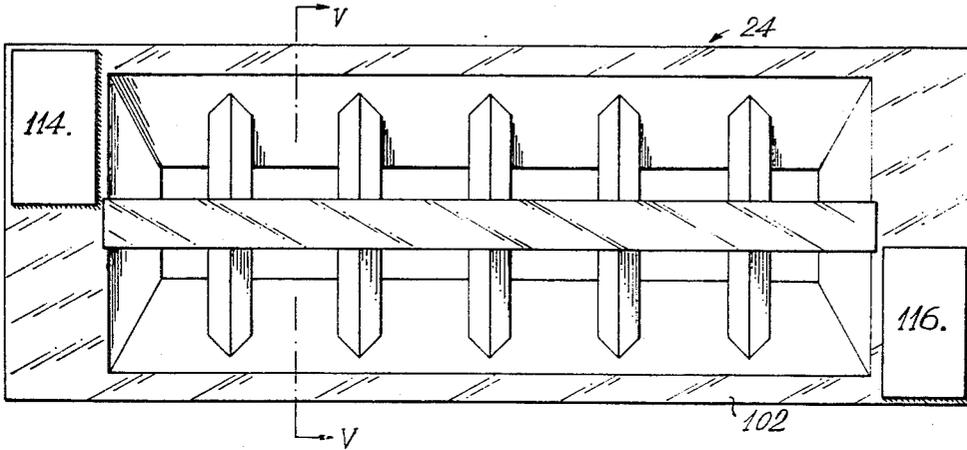
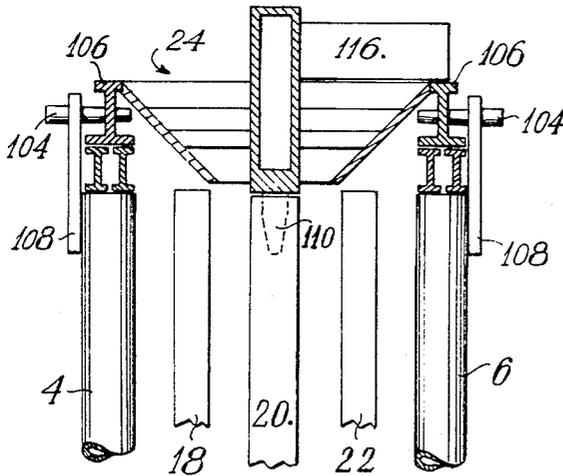


FIG. 5



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**APPARATUS FOR CASTING CONCRETE PANELS**  
 Haim Slavin, 43 Frishman St., Tel Aviv, Israel  
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 Claims priority, application Israel, Jan. 7, 1966,  
 24,935  
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 U.S. Cl. 25—41

9 Claims

## ABSTRACT OF THE DISCLOSURE

Apparatus for casting concrete panels comprises a resiliently mounted frame structure having a pair of side frames and a base frame, at least two (preferably three) vertical mould side plates and two end plates supported on the base frame, and a vibrating head detachably attached to the upper end of the side frames and rigidly bridging same when attached thereto.

The present invention relates to apparatus for casting concrete panels, an object of the invention being to provide a new and improved vertical mould for casting concrete panels on a mass production basis.

Briefly, the invention provides apparatus for casting concrete panels including a resiliently mounted frame structure having a pair of side frames and a base frame, and at least two (preferably three) mould side plates supported in vertical position on the base frame and in spaced relationship with respect to each other between the side frames. The apparatus also includes a vibrating head for vibrating the frame structure and the mould side plates, the vibrating head being detachably attached to the upper end of the side frames and rigidly bridging same when attached.

Further features of the invention will be apparent from the description below.

The invention is herein described with reference to the accompanying drawings which illustrate, somewhat diagrammatically and by way of example only, a preferred embodiment. In the drawings: FIG. 1 is a top plan view of a vertical concrete mould constructed in accordance with the invention, with the vibrator removed; FIG. 2 is an end elevational view of the concrete mould of FIG. 1; FIG. 3 is an enlarged view of a portion of the concrete mould; FIG. 4 is a top plan view of the vibrating head used with the concrete mould of FIG. 1; and FIG. 5 is a longitudinal sectional view through the vibrating head of FIG. 4 and illustrating its mode of attachment to the apparatus.

With reference to the drawings, there is shown a vertical concrete mould including an inner frame structure, generally designated 2, including a pair of side frames 4 and 6 and a base frame 8. Frame structure 2 is resiliently mounted by means of springs 10 and rubber pads 11 interposed between the base frame 8 and concrete pedestals 12 disposed on the ground. Surrounding frame structure 2 is another frame, generally designated 14, which is fixedly secured to the ground and braced by a plurality of braces 16. To distinguish between the resiliently mounted frame structure 2 and the fixed frame structure 14, the former will hereinafter be referred to as the "inner frame" and the latter as the "outer frame."

Mounted on the base 8 of inner frame 2 are three vertical mould side plates 18, 20 and 22. These plates are disposed in side-by-side relationship and define the sides of two moulds each adapted to produce a concrete panel, middle mould side plate 20 being common to the two moulds. Middle plate 20 is fixed, and the two outside mould side plates 18 and 22 are movable toward and away from 20 in order to open and close the mould

and also to vary the thickness of the concrete panel produced by the moulds. This will be described more fully below.

The apparatus further includes a vibrating head, generally designated 24 (FIGS. 2, 4 and 5), attached to and rigidly bridging the tops of the side frames 4 and 6.

As illustrated, the apparatus is disposed in a pit 26 formed in the ground, and a concrete applicator, generally designated 28, is adapted to reciprocate back and forth on ground level to pour the concrete into the two moulds. The concrete applicator 28 is diagrammatically shown as including a concrete mixer 30 and a conveyor belt 32.

Also disposed over the mould apparatus is a crane 34 supporting a hook 36 which is used for applying and removing the vibrator 24 from the mould. These are also used for introducing a reinforcing wire assembly (not shown) into the moulds, and further, for removing the cast concrete panels and transporting them to another location, all as more fully described in my patent application No. 604,991. Crane 34 is moved longitudinally of the mould apparatus by means of its wheels 38 mounted on tracks 40 provided on each side of the pit 26. Hook 36 is mounted on crane 34 so as to be movable transversely of the apparatus.

The apparatus further includes a pair of end plates 42 provided at the ends of the mould defined by side plates 18 and 20, and a second pair of end plates 44 at the ends of the mould defined by side plates 20 and 22. Both pairs of end plates are movable toward and away from each other by hydraulic, pneumatic or mechanical devices, diagrammatically indicated at 46, for changing the length of the moulds and of the concrete panels cast by the moulds. The moulds further include bottom plates 48, which can also be adjustable, or replaceable with those of different dimensions, for varying the height of the panels produced.

FIG. 3 illustrates the means for moving one of the mould side plates 18 toward and away from the middle mould plate 20 in order to open and close the mould, it being understood that a similar arrangement is provided with respect to the other movable mould side plate 22. For this purpose, the outer frame 14 carries first a plurality of pneumatic or hydraulic motive devices 50 in a horizontal line (there being preferably five, but only one being seen in FIG. 3), and a second plurality of similar devices 52 disposed in a line below devices 50. Each of the devices 50 and 52 includes a cylinder and a movable piston, the piston rods 54 and 56 being connected to cross-beams 58 and 60 which are in turn rigidly connected to each other by vertical beams 62 so that all the elements 58, 60 and 62 move together as a unit. Beams 58 and 60 are yielding coupled to plates 64 and 66, the latter being rigidly secured to a plurality of rods 68 and 70 which pass through the inner frame member 4 and are attached at their opposite ends to movable side plate 18. The yielding couplings between members 58 and 64 and members 60 and 66 include inserts or sheets of resilient material 72 and 74, such as rubber, interposed between these members. Nuts 76 are threaded at the ends of bolts 78 loosely passing through members 58 and 64, a similar arrangement being provided with respect to nuts 80 and bolts 82 yieldingly coupling members 60 and 66 together. The couplings are such that the displacement of piston rods 54 and 56 moves mould plate 18 (rightwardly or leftwardly in FIG. 3) in order to close and open the mould, but the yielding coupling described permits the mould side plate 18 (and the rods 68 and 70 rigid thereto) to vibrate without transmitting the vibrations to the outer frame 14.

For bracing the mould side plate 18 during the period of vibration, a plurality of movable blocks 84 and 86

are supported on plates 88 and 90 rigidly secured to frame member 4 of the inner frame structure. The mould side plate 18 is provided with a plurality of rigidly attached rods 92 and 94 passing through openings in plates 88 and 90. Blocks 84 and 86 are formed with tapering surfaces so that they can be wedged tightly against the ends of rods 92 and 94 when the side plate 18 is exactly positioned and before the vibrating means is to be operated.

The vibrating means 24 includes a vibrator frame 102 which is attached to the top of the inner frame by means of tapered pins 104 passing through depending beams 106 carried by the vibrator frame 102 and plates 108 carried at the upper end of the inner frame 2. The walls of the vibrator frame 102 are trough-shaped for channeling the concrete mix into the spaces between the mould side plates 18, 20 and 22. In addition, the vibrator frame 102 includes a plurality of tapered pins 110 adapted to be received in openings formed at the upper end of the middle mould side plate 20, for securely holding the latter in position. The lower end of the mould plate 20 is also formed with a plurality of openings receiving tapered pins 112 (FIG. 2) carried on the base frame 8 of the inner frame 2. The middle mould plate 20 is thus securely held in position.

A vibrator motor 114 (FIG. 4) is carried at one end of the vibrator 24, and a second vibrator motor 116 is carried at the opposite end, in a diagonally opposed corner with respect to motor 114.

The operation of the apparatus will be apparent from the foregoing description. Assuming that the vibrator 24 is unattached to the apparatus, the side plates 18 and 22 may be moved away from middle plate 20 in order to open the moulds. This is done by operating the hydraulic or pneumatic devices 50, 52 (and similar devices for plate 22). Also, the end plates 42 and 44 may be moved to their open positions by operating devices 46. Usually a reinforcing wire assembly as described in my above-referenced patent application No. 604,991 is then inserted into each of the two moulds, although this is not necessary. The moulds are then closed by the device 50, 52 and 46, and the blocks 84 and 86 are then tightly wedged against rods 92 and 94 to brace the mould side plates 18 and 22 in their closed positions. The vibrating head is attached over the top of the inner frame 2 by means of pins 104, and the mould is now in condition for receiving the concrete and for operating the vibrating means.

The concrete mix is applied through the top of the vibrator 24 where it is channeled by the trough-shaped walls of the vibrator into the moulds between plates 18, 20 and 22, the vibrator being operated during the application of the concrete. In addition, the side plates of the mould are preferably heated so as to accelerate the setting of the concrete.

After the concrete mix has been applied, the vibrator 24 may be detached from the mould and moved to another mould while the concrete sets in the first mould. Once the concrete has set sufficiently so that the panel is rigid (about three hours after filling), the moulds are opened by first releasing blocks 84 and 86 and then withdrawing the side plates 18 and 2, as described earlier.

It will be appreciated that until the vibrator 24 is attached to the mould apparatus, the mould is very flexible in that the side plates may be opened and closed and may be adjusted according to the dimensions of the concrete panel to be produced. However, once the vibrator is attached, there is formed a rigid assembly which vibrates as a unit on springs 10 with all the mould side plates securely held in position against twisting or deformation. In addition, the mould plates are preferably of substantially uniform construction throughout their whole lengths, thus further minimizing deformation or distortion that might be caused by heat or mechanical stresses.

It is to be understood that the described embodiment of the invention is illustrative only, and that many other embodiments, variations and applications of the invention, or the several features thereof disclosed, may be

made without departing from the spirit or scope of the invention as defined in the following claims.

I claim:

1. Apparatus for casting concrete panels comprising a frame structure having a pair of side frames and a base frame, at least two mould side plates supported in vertical position on the base frame and in spaced relationship with respect to each other between said side frames, at least two mould end plates supported in vertical position on the base frame, a resilient mounting for said frame structure, and a vibrating head attached to the upper end of said side frames and rigidly bridging same when attached thereto to form a rigid assembly with the frame structure which vibrates as a unit on said resilient mounting, said vibrating head including trough-shaped walls for channeling the concrete mix into the spaces between the mould side plates.

2. Apparatus as defined in claim 1, wherein said mould end plates are movable toward and away from each other for changing the length of the concrete panel cast by the apparatus.

3. Apparatus for casting concrete panels comprising a frame structure having a pair of side frames and a base frame, at least two mould side plates supported in vertical position on the base frame and in spaced relationship with respect to each other between said side frames, at least one of said side plates being fixed and at least one other being adjustable toward and away from the fixed one, at least two mould end plates supported in vertical position on the base frame, a resilient mounting for said frame structure, and a vibrating head attached to the upper end of said side frames and rigidly bridging same when attached thereto to form a rigid assembly with the frame structure which vibrates as a unit on said resilient mounting, said vibrating head being detachable from said frames for use with another like apparatus while the concrete sets in the first-mentioned apparatus.

4. Apparatus as defined in claim 3, wherein there are at least three vertical mould side plates disposed in side-by-side relationship defining the sides of two moulds each adapted to produce a concrete panel with the middle mould side plate being fixed and said two outside mould side plates being movable toward and away therefrom.

5. Apparatus as defined in claim 4, wherein said vibrating head also engages said middle mould side plate.

6. Apparatus as defined in claim 5, wherein the middle mould side plate is fixed by means of tapered pins carried by said base frame and by said vibrating head.

7. Apparatus as defined in claim 5, wherein said vibrating head includes a vibrator frame attached to said side frames and engaging said middle mould side plate, said vibrator frame having trough-shaped walls for channeling the concrete mix into the spaces between the mould side plates.

8. Apparatus as defined in claim 3, further including an outer frame disposed outside said first-mentioned frame structure said outer frame being fixedly mounted to a supporting surface.

9. Apparatus as defined in claim 8, wherein said outer frame includes motive devices connected to at least one of the mould side plates for moving same.

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