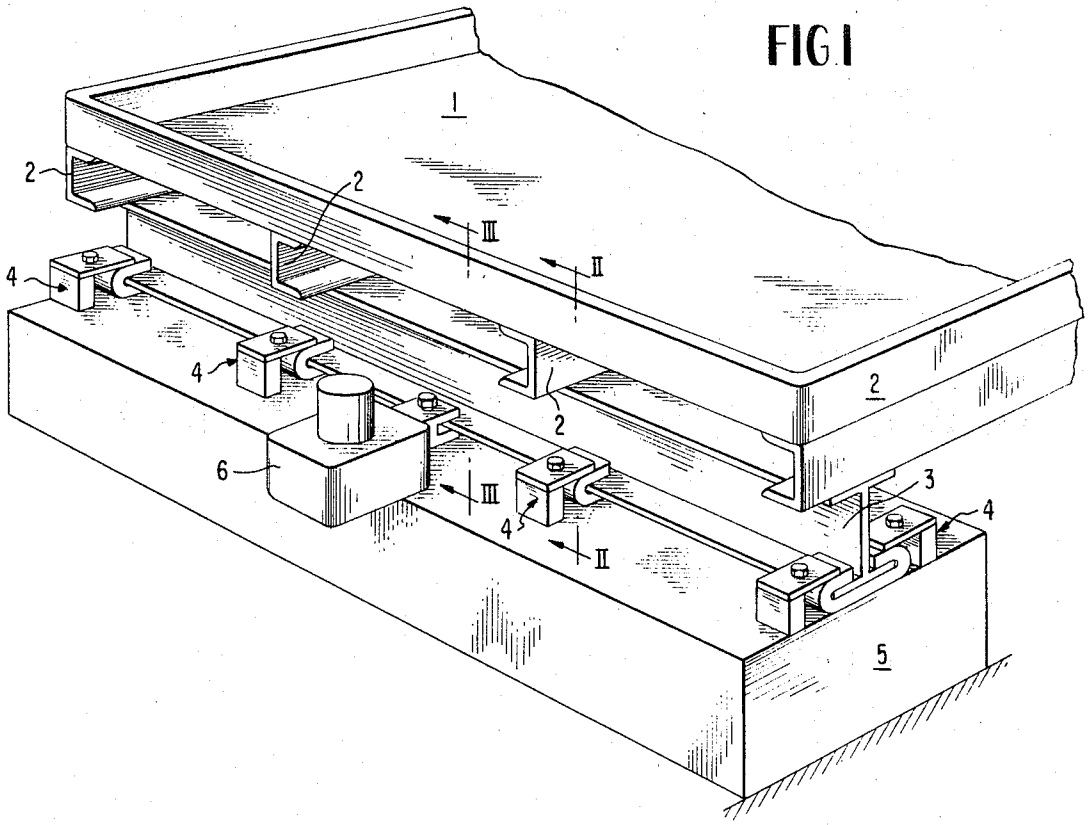
Sept. 15, 1970 E. L. HAPONSKI 3,528,144

CONCRETE CASTING TABLE

Filed July 12, 1966 2 Sheets-Sheet 1

FIG. 1



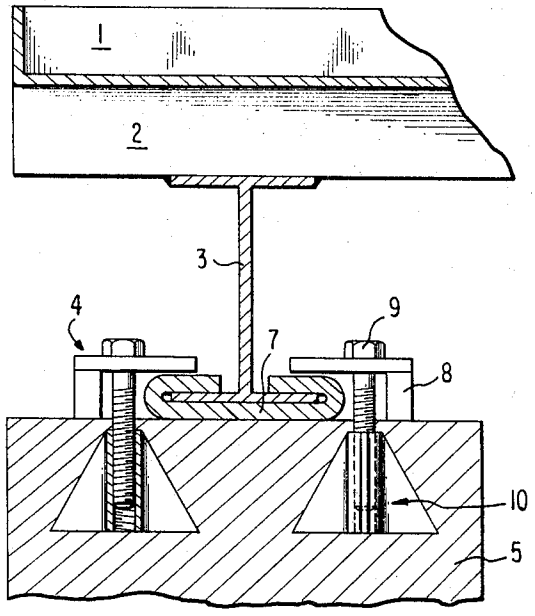


FIG. 2

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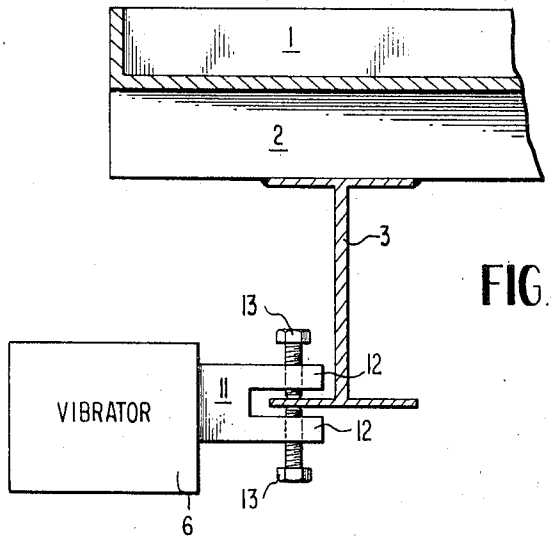
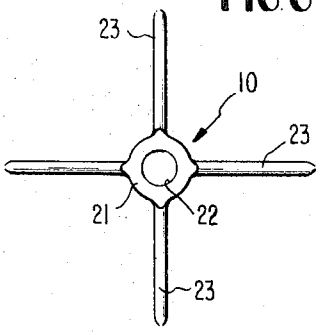


FIG. 3

FIG. 6



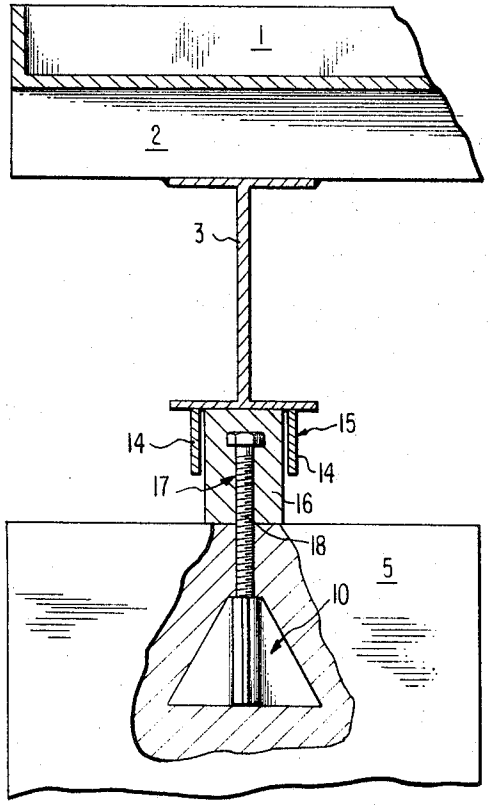


FIG. 4

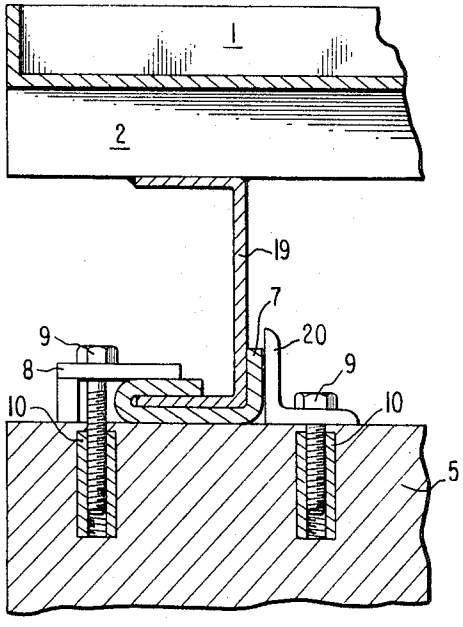


FIG. 5

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3,528,144

CONCRETE CASTING TABLE

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Int. Cl. B28b 7/22
U.S. Cl. 25—41 1 Claim

ABSTRACT OF THE DISCLOSURE

A table for precasting concrete construction panels, wherein the table is mounted for movement with respect to its foundation only in a horizontal plane and a horizontal vibrator is attached to the table for distributing the concrete during pouring and improving its properties, particularly density.

In using the casting tables of the prior art, it has required up to 23 men to cast a 1400 sq. foot panel of concrete; with the high cost of labor, this greatly increases the final cost of the product. Most of this labor is used in spreading and smoothing the concrete in the mold. Vibrators are known in the prior art to assist in spreading and settling the concrete; however, there remains very great difficulties in regard to relatively large casting tables. One prior art device employs a relatively large casting table that is periodically picked up and dropped in the vertical direction at a very low frequency. This is some improvement over the relatively inefficient completely manual spreading of the concrete; however, this is not entirely satisfactory. Also, it is known to drag portable vibrators through the concrete to assist in spreading, settling, setting and smoothing of the concrete in the mold; however, this vibrating action is localized and produced a panel not entirely homogeneous, because the path of the vibrator can be seen in the finished panel. The prior art has recognized a need for, but has not produced, a satisfactory self-spreading relatively large casting table.

It is an object of the present invention to provide a more efficient, economical, and satisfactory self-spreading casting table and casting method for relatively large castings.

Another object of the present invention is to provide a casting table and casting method that will vibrate the concrete during casting at a relatively high frequency in only a horizontal plane so that the concrete will be self-spreading in a rapid and advantageous manner, to materially reduce the labor and expense involved in producing a relatively large sheet of concrete.

The casting table of the present invention is mounted for vibration substantially in a horizontal plane and includes driving means for vibrating it in the horizontal plane at relatively high frequencies, that is, frequencies between 5,000 and 12,000 cycles per minute; a particularly advantageous range is between 8,500 and 11,000 cycles per minute. The method of the present invention includes the step of providing a mold, vibrating the mold substantially only on a horizontal plane at relatively high frequency between 5,000–12,000 cycles per minute, preferably 8,500–11,000 c.p.s., pouring the concrete into the mold at a depth of approximately one inch to 12 inches and over an area of at least 100 sq. feet, and continuing the relatively high frequency vibrations in only the horizontal plane to evenly distribute the concrete in the mold by the vibrating action and to produce a sheet or panel of concrete having a density of at least substantially two percent more than an unvibrated sheet or panel of concrete of the same dimensions. In actual experiments, the density of the concrete has been increased between 2 and 5%. Prior art casting tables and methods have employed approximately 23 men to satisfactorily pour a 1400 square foot concrete panel; in actual experiments, the casting table and method of the present invention has satisfactorily used only 5 men to pour a 1000 square foot panel of concrete. The casting table and method of the present invention obtains its improved result by the elimination of raking and moving vibrators, or the like, and it results in a substantial saving in labor costs.

Further object, features and advantages of the present invention will appear from the following description of the accompanying drawing, in which:

FIG. 1 is a partial perspective view of a concrete casting table according to the present invention that is used to perform the method of the present invention;

FIG. 2 is a partial cross-sectional view taken on line II—II of FIG. 1;

FIG. 3 is a partial cross-sectional view taken on line III—III of FIG. 1;

FIG. 4 is a partial cross-sectional view similar to FIG. 2, but of another embodiment of the present invention;

FIG. 5 is a partial cross-sectional view similar to FIGS. 2 and 4, but of still another embodiment of the present invention; and

FIG. 6 is a plan view of a bolt anchoring device used in the embodiments of the present invention.

In the embodiment according to FIG. 1, a mold or casting table **1** is used to cast concrete panels or sheets that are relatively large, for example, 10 feet by 100 feet by 2–6 inches. The mold **1** is reinforced on its bottom by a plurality of rigidly attached cross-members **2**, which may be attached by bolts, rivets, welding or the like. The cross-members **2** are supported on and rigidly attached to a plurality of (only one being shown in FIG. 1) carrier beams **3** that are welded, bolted or the like at right angles to the cross-members **2**, to form a rigid grid-like supporting structure for the bottom of the mold **1**. Connecting means **4** are employed at spaced intervals along the carrier beams **3** for mounting the mold **1**, cross-members **2** and carrier beams **3** for vibrating movement as a unit substantially only in their horizontal plane. The connecting means **4** resiliently connect each of the carrier beams **3** to a corresponding one of a plurality of stationary supports **5**, which are parallel to each other and spaced approximately 10 feet apart; only one support **5** is shown in the drawing with its carrier beam **3**, for purposes of illustration. The stationary supports **5** may be concrete columns supported directly on the floor. Driving means **6** (only one being shown in the drawing) are connected at suitable positions to the mold or supporting structure **2**, **3** to vibrate the mold or casting table at a relatively high frequency, particularly between 5,000–12,000 cycles per minute and most preferably between 8,500 and 11,000 cycles per minute for particularly advantageous results. In FIG. 1, the driving means is shown as a conventional electric or pneumatic external vibrator rigidly attached to the middle of one of the carrier beams **3**. In actual experiments, an external pneumatic vibrator having a weight

of 42 pounds, eccentricity of 6–12 inch pounds and a speed of 6,000–11,000 r.p.m. was used; it is contemplated, however, that other types of vibrators may be used. It is contemplated that other types of carrier beams **3** may be employed, but preferably a rigid I-beam is used. Also, it is contemplated that other types of cross-members **2** may be employed other than the channel beam that is shown, for example, an I or solid beam may be used.

Details of the connecting means **4** are shown in FIG. 2. The connecting means **4** comprise resilient shock absorbing pads or sheets **7**, and releasable clamps having brackets **8**, bolts **9** and threaded anchors **10** for adjustably receiving the bolts **9**. As shown in FIG. 2, the full load of the casting table or mold **1**, cross-members **2** and carrier beam **3** is supported by the sheets of shock absorbing material **7** and directly transferred to the stationary supports **5**. The shock absorbing sheets **7** are constructed of a resilient material that is quite rigid in the vertical direction to substantially prevent any vibration of the casting table **1**, cross-members **2**, and carrier members **3** in the vertical direction, and it is sufficiently resilient in the horizontal direction to readily permit relatively high frequency vibration in a horizontal plane of the carrier beam **3**, cross-members **2**, casting table **1** and the concrete held by the casting table **1**. A particularly suitable shock absorbing material has been found to be neoprene. Preferably, the sheet of shock-absorbing material **7** extends around opposite edges of the bottom flanges of the carrier I-beam **3** and inwardly over the tops of the flanges. The shock absorbing material **7** is held in place by the releasable clamps which comprise the L-shaped holding brackets **8** clampingly moved toward the resilient shock-absorbing material **7** by means of adjustable bolts **9** that are vertically threadably received in threaded anchors **10**, cast in the concrete stationary supports **5**.

The details of the vibrator mounting are shown in FIG. 3. It is contemplated that any conventional external vibrator of a suitable high frequency may be employed in a suitable mounting to vibrate the casting table **1**, cross-members **2** and carrier beams **3**. In FIG. 3, a conventional external vibrator is mounted rigidly on one of the lower flanges of the I-beam **3** by means of a split bracket **11** having cantilever portions **12** threadably receiving locking bolts **13**, or the like. In mounting the vibrator, the cantilever portions **12** are placed above and below the flange of the I-beam **3** and the locking bolts **13** are screwed down tightly to clamp the flange; only one bolt **13** may be used, if desired. It is contemplated that other suitable rigid mounts may be employed for the vibrator **6**.

In the embodiment of the connecting means shown in FIG. 4, like reference numerals have been used throughout the drawing to identify like parts previously described in regard to the embodiment of FIG. 1. At spaced positions along each of the carrier beams **3**, depending guide plates **14** are rigidly secured, by means of welds or the like, to the bottom of the bottom flanges of the carrier beams **3** to form a downwardly opening enclosure **15**. A block of shock absorbing material **16**, which may be of the same type of material used in the sheets **7** of FIG. 2 is received within and held by the downwardly opening enclosure **15**. The block of shock absorbing material has a downwardly opening recess **17** for receiving a suitable adjusting bolt, or the like, **18**. The bolt **18** is adjustably threadably received in a screw threaded anchor **10**, which is embedded in the concrete support **5**.

In the embodiment according to FIG. 5, like reference numerals are used to identify the like parts of the previous embodiments. A plurality of channel shaped carrier beams **19** are rigidly secured to the under portion of the cross-members **2** in substantially the same manner as the carrier beam **3** of the FIG. 1 embodiment, only one cross-member and only one carrier beam being shown. The lower flange of the carrier beam **19** is resiliently held by the shock absorbing material **7**, which in turn is clamped by the bracket **8**, bolt **9** and anchor **10** in the same manner as one of the flanges of the carrier beams **3** in the FIG. 1 embodiment. The other side of the carrier beam **19** resiliently rests against the upturned end portion of the shock absorbing sheets **7**, which is held in place by an L-shaped bracket **20** clamped to the stationary support **5** by means of the bolt **9** and anchor **10**.

In FIG. 6, the anchor **10** is shown as comprising a sleeve **21** internally threaded at **22** and a plurality of radially extending substantially triangular flanges **23**, which securely hold the anchor **10** within the concrete support **5**, particularly against axial or rotational movement.

In the operation of the present device, according to the method of the present invention, a suitable mold **1** is provided to produce a relatively large concrete panel or sheet, for example, 100 feet by 10 feet by 4 inches. The mold **1** or casting table is reinforced by the rib structure comprising the cross-members **2** and carrier beams **3**, **19** and supported with respect to the stationary support **4** by the connecting means **7**, **8**, **9**, **10** or **14**, **13**, **16**, **17**, **18** and **19**, or **7**, **8**, **9**, **10** and **20** for substantially only vibration in only a horizontal plane at a relatively high frequency between 5,000 and 12,000 cycles per minute, preferably between 8,500 and 11,000 cycles per minute. Thereafter, the concrete is poured into the mold **1** while the mold is vibrated at the above-mentioned frequency. The concrete may be rapidly poured in any one place in the mold, because the relatively high frequency vibration of the mold **1** in its horizontal plane will produce a rapid self-spreading action of the concrete so that the concrete rapidly and evenly spreads out throughout the mold **1**. The vibrating is continued for a considerable time after the concrete is poured to evenly distribute the concrete, settle the concrete, and produce a sheet or panel of concrete having at least a density of substantially 2 percent to 5 percent more than an unvibrated sheet or panel of concrete having the same dimensions. With the above method and operation, panels of 1,000 square feet have been cast in a rapid, satisfactory manner on a production basis with only five men; heretofore, the same casting without the present invention would employ approximately 20 men on a production basis. Also, actual experiments of casting panels according to the above method and using the casting tables of the present invention have produced concrete panels that have a very smooth finish, high density, extremely close tolerances, and greatly improved strengths. On a production basis, total tolerances of $\frac{1}{16}$ of an inch have been maintained for 10 feet wide precast concrete building panels used in the construction of prefabricated buildings.

The above embodiments have been shown and described only as examples of the present invention; other modifications and embodiments according to the broad aspects of the invention are contemplated within the spirit and scope of the present invention as defined by the following claim.

I claim:

1. A concrete casting table, comprising table means for casting relatively large concrete panels, and having surrounding sides extending generally vertically upwardly to a free edge forming a generally open topped mold; a relatively stationary support; connecting means for mounting said table means for vibrations relative to said stationary support in substantially only a horizontal plane for substantially preventing said table means from vibrating relative to said stationary support in a substantially vertical direction; driving means for vibrating said table means relative to said stationary support only in a substantially horizontal plane at a relative high frequency; said connecting means including a plurality of substantially parallel rigid beams rigidly secured to the bottom of said table means, resilient means of shock absorbing material between each of said beams and said support for transmitting substantially the full load of said table directly to said stationary support, said shock absorbing material being in the form of a sheet extending beneath, around opposite sides and over the lower flanges of each

of said beams, said connecting means including releasable means comprising a bracket for clamping said sheets of shock absorbing material downwardly against said flanges, and screw threaded means for moving said bracket relative to said stationary support.

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U.S. Cl. X.R.

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