

Sept. 9, 1952

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2,610,040

OPERATING MECHANISM FOR VIBRATING TABLES

Filed July 21, 1951

2 SHEETS—SHEET 1

Fig. 1.

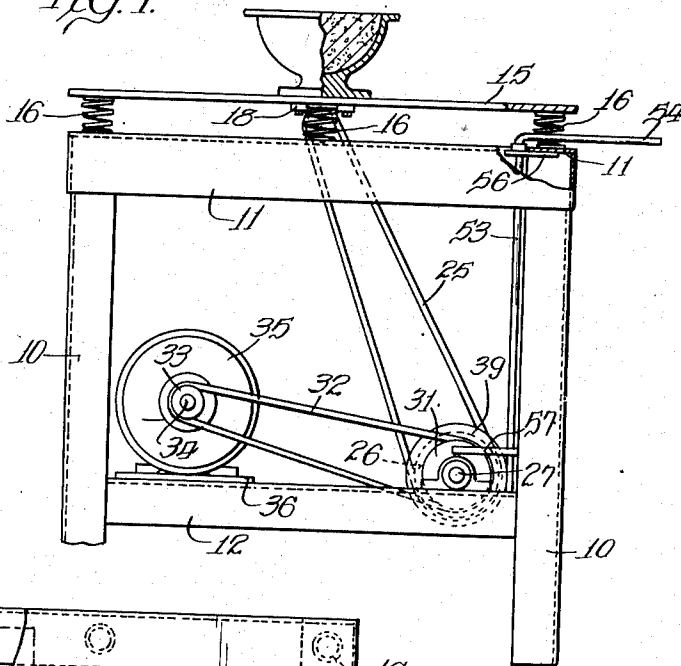


Fig. 2.

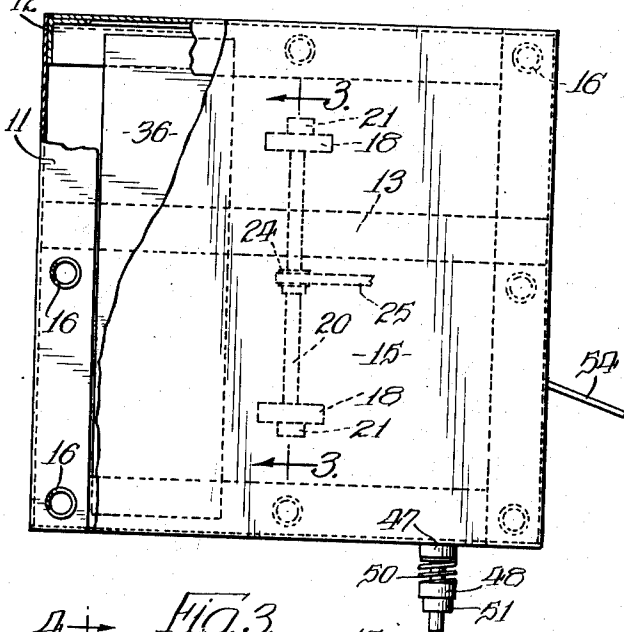


Fig. 4.

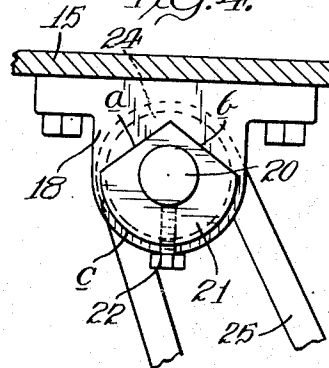
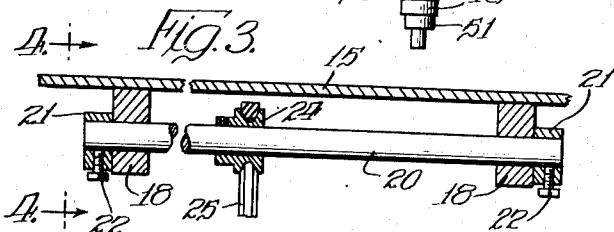


Fig. 3.



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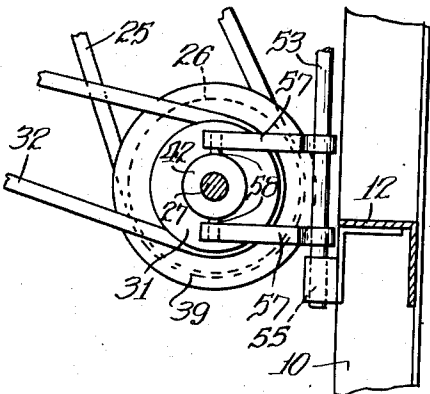
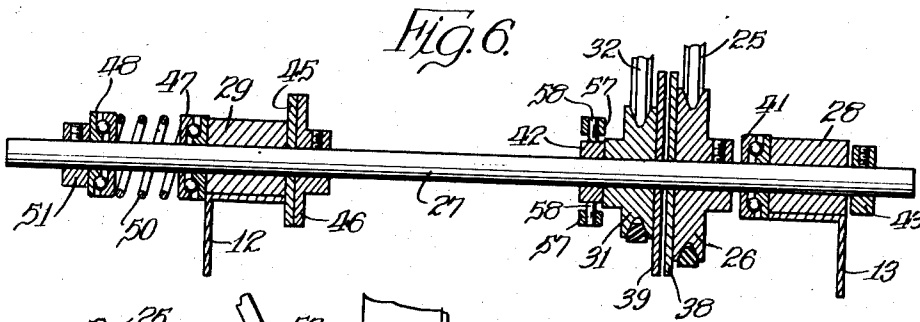
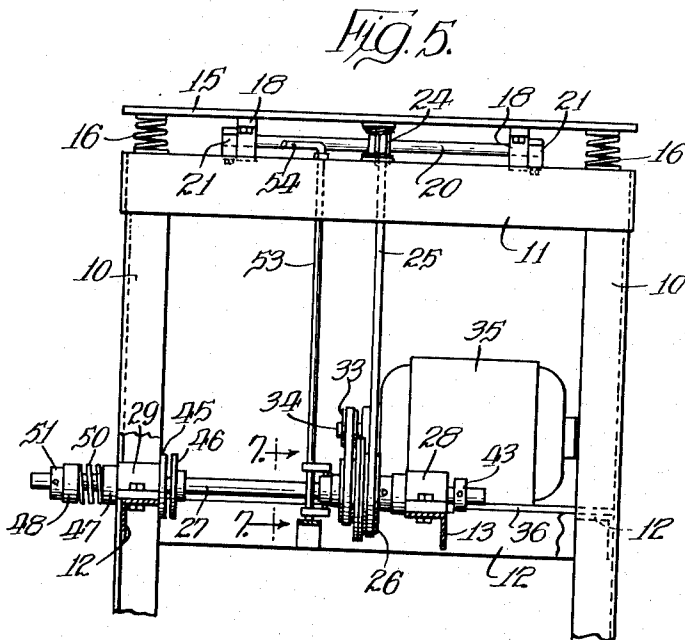
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2 SHEETS—SHEET 2



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OPERATING MECHANISM FOR VIBRATING TABLES

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3 Claims. (Cl. 259-72)

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This invention relates to a vibrating table of the kind whereon may be rested portable molds, single or multiple cavity, for plastic concrete and the like, the purpose being to rapidly shake each mold through a brief period whereby to facilitate the escape of air and excess water from the concrete mix thereby to densify the solid particles in the mix, and greatly expedite the setting of the casting. Such a vibrating table must be sturdy and capable of withstanding rough usage, usually out in the open where the production of concrete castings is to be carried on.

The present vibrating table is advantageous because of its simplicity and sturdiness, and the dependability with which it operates. It consists of but few parts, and the operation thereof is controlled by a single lever which may be swung by pressure from a standing workman's thigh, thereby leaving his hands free to remove any excess concrete from the mold or molds undergoing treatment, keeping the table top clean, etc. The mechanism incorporated into the present table involves a continuously running motor with a clutch incorporated in the drive whereby to transmit vibratory movements to the table top for the desired period of time. It also involves a brake operable when the clutch is disengaged so as to bring the vibrating mechanism to a quick stop. The single control operates to release the brake concurrently with engagement of the clutch, and to set the brake concurrently with disengagement of the clutch.

A suggestive embodiment of this invention in a practical form is illustrated in the accompanying drawing wherein—

Figure 1 is an end elevation of the stand whereon are mounted the operating parts including the vibrating table top;

Fig. 2 is a top plan view of the stand with a portion of the table broken away to exhibit certain parts therebelow;

Fig. 3 is a detail in vertical section, taken on line 3—3 of Fig. 2;

Fig. 4 is a detail in vertical section, taken on line 4—4 of Fig. 3;

Fig. 5 is a front elevation of the stand and table top;

Fig. 6 is an enlarged detail in section of the jack shaft, the bearings therefor, and the various pulleys and collars mounted thereon; and

Fig. 7 is a detail in section, taken on line 7—7 of Fig. 5.

The vibrating table comprises a stand having four angle iron legs 10 surmounted by a rectangular frame of angle irons 11, the legs being in-

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terbraced by angle iron rails 12. Between two opposite rails 12 is supported an inner brace 13. The frame legs and braces, at their points of connection, are suitably joined as by welding. A heavy table top 15 of approximately the same dimensions as the stand frame is yieldingly supported thereabove in spaced relation thereto by a plurality of coiled springs 16, arranged one at each corner with one spring therebetween, making a total of eight springs altogether (see Fig. 2). Each spring at its opposite ends is joined to the stand and table top in any suitable manner.

To the underside of the table top 15 is affixed a pair of aligned bearings 18 spaced widely apart and arranged close to its center line (see Fig. 2). A shaft 20 which is journaled for rotation in the bearings supports therebeyond at each of its opposite ends an off-balanced collar 21 which is fixedly secured thereto as by a set screw 22. Each collar is unbalanced with respect to the shaft axis, as by forming a pair of angular flat faces *a* and *b* which are radially much closer to the shaft axis than the concentric portion *c* of the collar periphery. The rotative adjustments of the two collars are alike. When the shaft 20 is rotated, the two off-balanced collars will produce vibrations of considerable amplitude whereby to transmit to the table top 15 a like shaking and vibrating movement.

At a point intermediately of the bearings 18 a grooved pulley 24 is affixed to the shaft, and thereover is fitted an endless belt 25 which runs over a grooved pulley 26 that is carried fast on a jack shaft 27 which is rotatably supported close to the front of the stand, near its opposite ends, by bearings 28 and 29 which are carried on two of the adjacent rails 12 and 13 (see Fig. 6). A second grooved pulley 31 mounted loosely on the jack shaft and spaced slightly from the pulley 26 receives thereover an endless belt 32 which is trained over a grooved drive pulley 33 mounted fast on the shaft 34 of a motor 35 which is supported on a base plate 36 extending between the inner brace 13 and the proximate brace rail 12. By reference to Fig. 1 it will be observed that the motor 34 is located toward the rear of the stand, the jack shaft 27 is located toward its front, and that both are disposed at a low-down point on the stand so that the axes of the motor and jack shaft are in a plane that is generally horizontal. It will be noted further that vertical vibrations which are produced in the table 15 through rotation of the off-balanced shaft 20 are dissipated in and absorbed by the generally verti-

cal belt 25 which is connected with the jack shaft 27 sufficiently loosely to achieve this end.

The jack shaft is so mounted as to have capacity for a slight axial movement. A pair of clutch faces 38 and 39 is carried upon the confronting ends of the pulleys 26 and 31, respectively. When the shaft 27 is shifted rightward, these clutch faces will interengage so as to establish a driving connection between the pulley 31 and the shaft 27, but when in its normal leftward position the drive will be disestablished so that the jack shaft will remain motionless. A thrust bearing 41 is mounted on the shaft 27 adjacent its supporting bearing 28 but normally spaced slightly from the hub of the pulley 26 when the jack shaft is not operating. When the pulley 31 is shifted rightwise, however, in response to axial pressure exerted thereon by a yoke collar 42 that is loose on the shaft, a driving engagement is produced between the clutch faces 38 and 39, thereby to rotate the jackshaft. Further rightward movement of the yoke collar 42 will cause the jack shaft itself to be shifted to the point of the hub of the pulley 26 engaging the thrust bearing 41. Beyond the shaft bearing 28 a collar 43 is affixed to the shaft near its end, largely as a precautionary measure.

The bearing 29 near the opposite end of the jack shaft 27 is flanked on its inner end by a brake disc 45 which is affixed thereto in coacting relation to a brake disc 46 that is mounted fast on the shaft; and on its outer end by an inner thrust bearing 47 spaced from an outer thrust bearing 48 by an intervening compression spring 50. A stop collar 51 affixed to the shaft at the outer end of the outer thrust bearing completes the brake assembly. The spring 50, always under compression, urges the jack shaft leftwise and in so doing separates the pulleys 26 and 31 so as to disestablish any driving connection therebetween; this leftwise shift of the shaft also advances the brake disc 46 fast thereon into engagement with the brake disc 45 that is fast on the bearing 29, thereby acting to brake the shaft and hold it against rotation.

A control whereby the shaft may be manually shifted rightwise counter to the tension of the spring 50 is also provided. As herein shown, this comprises a vertical rod 53 at the front side of the stand and laterally extended at its top end to provide an operating lever 54. Near its lower end the rod is rotatably supported in a bearing 55 that is carried by the front brace rail 12; a bearing plate 56 affixed to the front frame iron 11 furnishes a support for the control rod near its upper end (see Fig. 1).

Affixed to the rod oppositely of the jack shaft 27 is a pair of laterally extending arms 57 constituting a yoke which pivotally mounts a pair of aligned pins 58 in connection with the collar 42 at diametrically opposite points. Whenever the control rod 53 is swung through its short range of movement to shift the collar 42 to the right, it will force the two clutch faces 38 and 39 to interengage, thereby to produce rotation of the jack shaft; while this condition continues the two brake discs 45 and 46 are maintained in separated relation so that the jack shaft is free to operate, the spring 50 meanwhile being placed under an enhanced compression. Upon releasing the control rod, the spring will act to shift the jack shaft leftward to its normal position of rest, and in so doing the clutch connection is broken while the two brake discs become interengaged. The establishment or disestablishment

of the driving connection is accompanied always by a concurrent release or setting of the shaft brake, thereby freeing the shaft for initiation of its operation and subsequently, and checking the shaft rotation quickly at the conclusion of its operation.

In operation, a workman will find it convenient to stand at the front side of the stand with one thigh close to the lever 54 of the control rod. Under the influence of the spring 50 the jack shaft will normally remain in a leftward position where (1) the brake is set and (2) the clutch is disengaged. When the table top 15 has been loaded the workman moves slightly to the left to swing the lever correspondingly, thereby advancing the clutch collar 42 rightwise to produce a corresponding shift of the jack shaft and concurrently (1) release of the brake and (2) engagement of the clutch with consequent operation of the jack shaft. This operation will continue so long as the control lever is held in this leftward position; but when released, as by the workman moving slightly to the right, the spring 50 will shift the jack shaft leftward whereupon the clutch is disengaged and the brake is set to produce a quick stop of the jack shaft. The table top is now still so that the load which has been vibrated is ready for removal and replacement by a new load that is to undergo vibration.

In practice, where molds containing concrete in a plastic state are to be given the vibratory treatment, the off-balanced shaft carried by the table top may be operated at a speed of 3,000 R. P. M. or more for relatively brief periods. The effect on freshly poured concrete in the molds so vibrated is to expel the air and force the water to the surface, thereby densifying the casting and reducing the time for setting to a half or more. As an example, a single vibrating table, 32" x 32", when used to treat multiple cavity molds for slump bricks, will step up the production to as high as 30,000 bricks per day.

I claim:

1. Operating mechanism for an off-balanced vibrating shaft rotatably carried on the under face of a mold supporting table top having a vertically movable resilient mounting on the top of a stand, comprising a jack shaft mounted for rotation on the stand at a relatively low point near the front side thereof, a continuously operated motor having a shaft rotatable about an axis parallel with the jack shaft and mounted on the stand toward the rear side thereof at a relatively low point, a pulley on the motor shaft, a pulley on the off-balanced shaft, two pulleys on the jack shaft, one of said last mentioned pulleys being fixed on the jack shaft to rotate therewith, the other pulley on the jack shaft being mounted for free rotation thereon and for movement axially toward and from the other pulley, coacting clutch faces on the two pulleys on the jack shaft whereby to transmit motion therebetween when the clutch faces are interengaged, an endless belt connecting the motor shaft pulley and the loose pulley on the jack shaft, a second endless belt connecting the fixed pulley on the jack shaft and the off-balanced shaft pulley to produce cooperation thereof with consequent vibrations of the table top vertically of the stand, the endless belt driving the off-balanced shaft being disposed in a generally vertical direction and with sufficient slack endwise thereof to leave the table top free for vibrations vertically of the stand, and control means providing for axially moving the loose pulley on the

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jack shaft toward and from the fixed pulley thereon, whereby to engage and disengage the clutch faces to cause operation and non-operation of the jack shaft and the off-balanced table top shaft.

2. Operating mechanism for an off-balanced vibrating shaft rotatably carried on the under face of a mold supporting table top having a vertically movable resilient mounting on the top of a stand, comprising a jack shaft mounted for rotation on the stand at a relatively low point near the front side thereof, the mounting for the jack shaft permitting limited axial movement thereof, a continuously operated motor having a shaft rotatable about an axis parallel with the jack shaft and mounted on the stand toward the rear side thereof at a relatively low point, a pulley on the motor shaft, a pulley on the off-balanced shaft, two pulleys on the jack shaft, one of said last mentioned pulleys being fixed on the jack shaft to rotate therewith, the other pulley on the jack shaft being mounted for free rotation thereon and for movement axially toward and from the other pulley, coacting clutch faces on the two pulleys on the jack shaft whereby to transmit motion therebetween when the clutch faces are interengaged, an endless belt connecting the motor shaft pulley and the loose pulley on the jack shaft, a second endless belt connecting the fixed pulley on the jack shaft and the off-balanced shaft pulley to produce cooperation thereof with consequent vibrations of the table top vertically of the stand, the endless belt driving the off-balanced shaft being disposed in a generally vertical direction and with sufficient slack endwise thereof to leave the table top free for vibrations vertically of the stand, control means providing for axially moving the loose pulley on the jack shaft toward and from the fixed pulley thereon, whereby to engage and disengage the clutch faces to cause operation and non-operation of the jack shaft and the off-balanced table top shaft, a compression spring urging the jack shaft axially in one direction, and a brake comprising two coacting parts, one fast on the jack shaft and the other fixed with respect to said stand, and one of said parts normally interengaging with the other when the jack shaft is shifted axially in response to tension of the spring whereby to hold the jack shaft against rotation, the control means, when operated to axially move said loose pulley on the jack shaft to cause engagement of the clutch faces of said pulleys, shifting the jack shaft counter to tension of said spring and thereby releasing the brake and freeing the jack shaft for operation.

3. Operating mechanism for an off-balanced vibrating shaft rotatably carried on the under face of a mold supporting table top having a vertically movable resilient mounting on the top of a stand, comprising a jack shaft mounted for rotation on the stand at a relatively low point near the front side thereof, the mounting for the jack shaft permitting limited axial movement

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thereof, a continuously operated motor having a shaft rotatable about an axis parallel with the jack shaft and mounted on the stand toward the rear side thereof at a relatively low point, a pulley on the motor shaft, a pulley on the off-balanced shaft, two pulleys on the jack shaft, one of said last mentioned pulleys being fixed on the jack shaft to rotate therewith, the other pulley on the jack shaft being mounted for free rotation thereon and for movement axially toward and from the other pulley, coacting clutch faces on the two pulleys on the jack shaft whereby to transmit motion therebetween when the clutch faces are interengaged, an endless belt connecting the motor shaft pulley and the loose pulley on the jack shaft, a second endless belt connecting the fixed pulley on the jack shaft and the off-balanced shaft pulley to produce cooperation thereof with consequent vibrations of the table top vertically of the stand, the endless belt driving the off-balanced shaft being disposed in a generally vertical direction and with sufficient slack endwise thereof to leave the table top free for vibrations vertically of the stand, control means providing for axially moving the loose pulley on the jack shaft toward and from the fixed pulley thereon, whereby to engage and disengage the clutch faces to cause operation and non-operation of the jack shaft and the off-balanced table top shaft, a thrust bearing on one end portion of the jack shaft, a thrust bearing on the stand, a coiled compression spring extending about said end portion of the jack shaft between said thrust bearings, said spring urging the jack shaft axially in one direction, and a brake comprising two coacting parts, one fast on the jack shaft and the other fixed with respect to said stand, and one of said parts normally interengaging with the other when the jack shaft is shifted axially in response to tension of the spring whereby to hold the jack shaft against rotation, the control means, when operated to axially move said loose pulley on the jack shaft to cause engagement of the clutch faces of said pulleys, shifting the jack shaft counter to tension of said spring and thereby releasing the brake and freeing the jack shaft for operation.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,352,225	Sargent	Sept. 7, 1920
1,363,275	Sargent	Dec. 28, 1920
1,908,104	Bell	May 9, 1933
2,269,788	Schenk	Jan. 13, 1942

FOREIGN PATENTS

Number	Country	Date
819,492	France	Oct. 19, 1937