(No Model.) 4 Sheets—Sheet 1.

F. M. LEAVITT.

CAKE PRESS.

No. 456,656. Patented July 28, 1891.

FIG. 4.

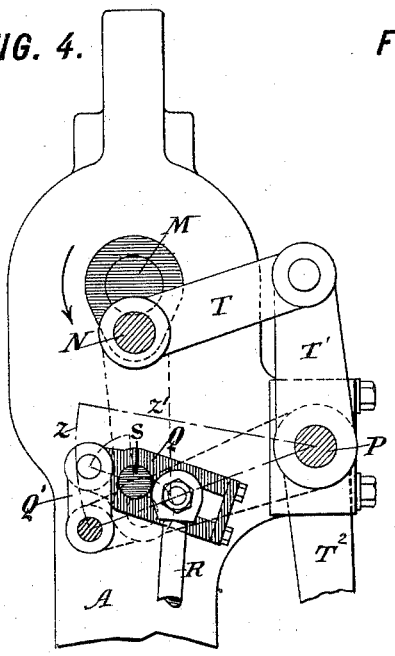

FIG. 1.

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(No Model.) 4 Sheets—Sheet 2.

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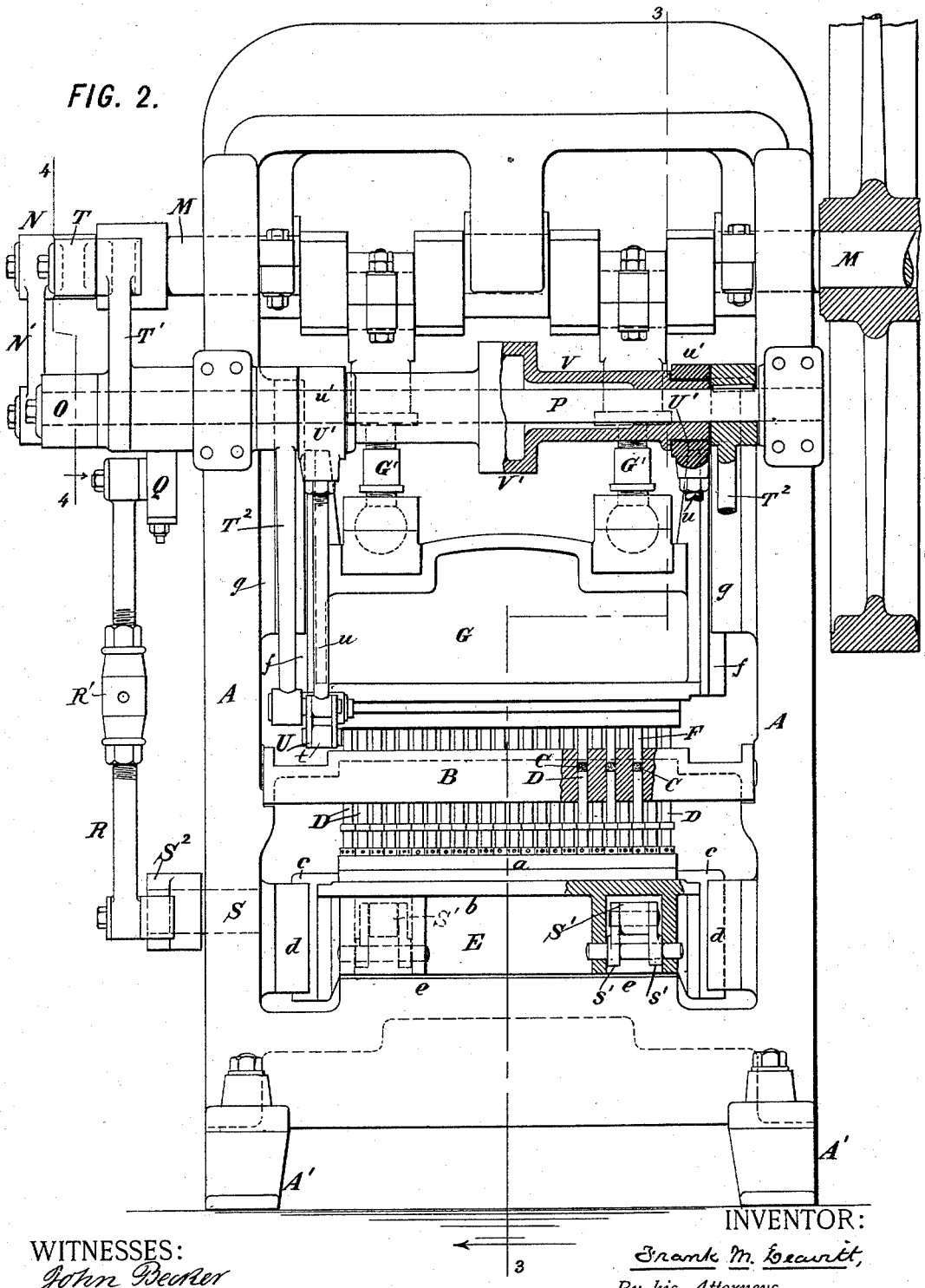
FIG. 2.



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(No Model.) 4 Sheets—Sheet 3.

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CAKE PRESS.

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FIG. 3.

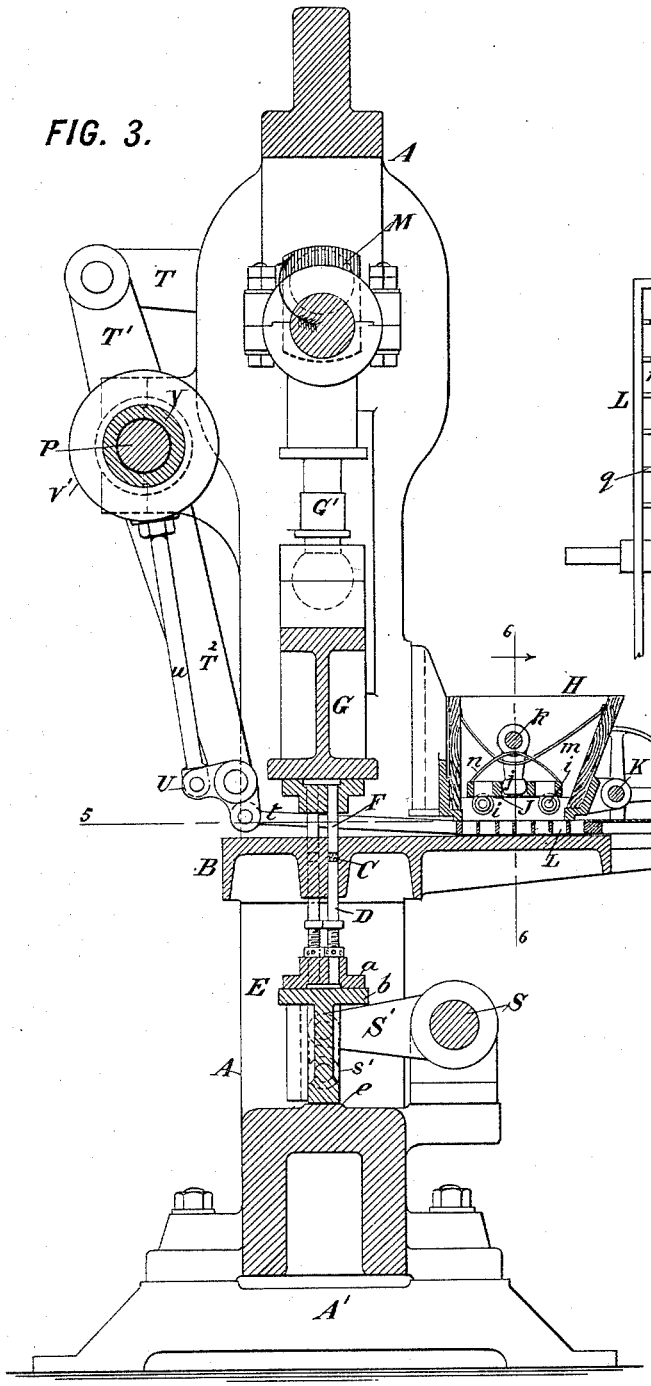
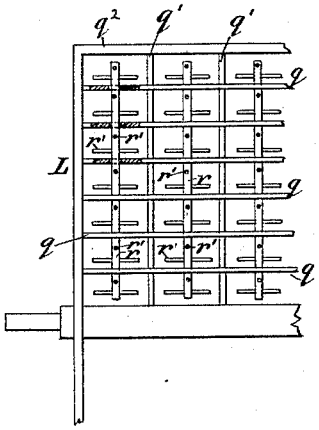


FIG. 10.



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(No Model.) 4 Sheets—Sheet 4.

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CAKE PRESS.

No. 456,656. Patented July 28, 1891.

FIG. 5.

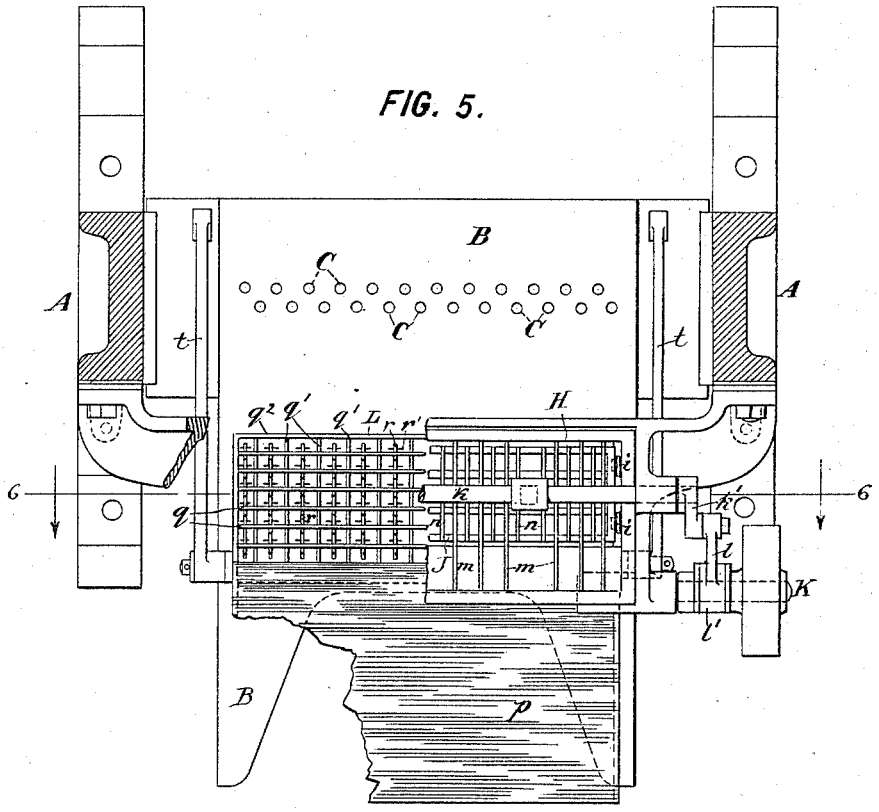


FIG. 6.

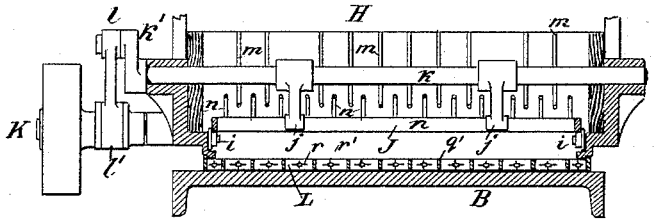


FIG. 7.

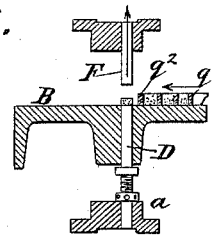


FIG. 8.

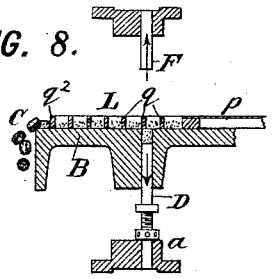
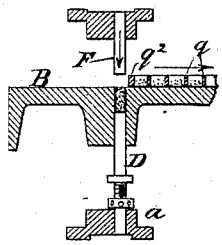


FIG. 9.



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UNITED STATES PATENT OFFICE.

FRANK M. LEAVITT, OF BROOKLYN, NEW YORK.

CAKE-PRESS.

SPECIFICATION forming part of Letters Patent No. 456,656, dated July 28, 1891.

Application filed October 13, 1890. Serial No. 367,902. (No model.)

To all whom it may concern:

Be it known that I, FRANK M. LEAVITT, a citizen of the United States, residing in Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Cake-Presses, of which the following is a specification.

My invention provides a new machine for pressing powdered, granulated, or pasty materials into cakes.

The machine is especially designed and adapted for acting upon naphthaline or other moist granulated material, the particles of which have a continual tendency to adhere together, and which consequently requires constant agitation in order to work it. The machine may, however, be used for various other materials of very different characteristics.

The machine consists, in general, of a table or mold-plate having one or more molds or recesses formed in it, combined with reciprocating plungers for pressing the cakes in the mold or molds by entering the latter from opposite sides, and means for feeding the material into the molds and for delivering the finished cakes from the machine. In each mold works a lower plunger, which constitutes substantially a movable bottom of the mold, while an upper plunger descends from above the mold-table, passing into the mold and pressing the charge of material placed therein, after which it rises and the lower plunger ascends to lift the compressed cake out of the mold. The cake is then pushed off, the bottom plunger descends, and a fresh charge of material is fed into the mold.

Figure 1 of the accompanying drawings is a side elevation of my improved press. Fig. 2 is an elevation of the rear or delivery side thereof, partly broken away in section. Fig. 3 is a vertical transverse section taken on the plane of the line 3 3 in Fig. 2. Fig. 4 is a fragmentary side elevation answering to a portion of Fig. 1, but showing the parts in a different position and partly in section on the line 4 4 in Fig. 2. Fig. 5 is a horizontal section cut generally in the plane of the line 5 5 in Fig. 3, except that the right-hand half of the figure shows the feeding-hopper in plan. Fig. 6 is a vertical section of the feeding-hopper cut in the plane of the line 6 6 in Fig. 3. Figs. 7, 8, and 9 are fragmentary sections in the same plane as Fig. 3, showing the mold-table with the plungers and feeder in three different relative positions. Fig. 10 is a fragmentary plan view on a larger scale of a portion of the feeder.

In the construction of my machine shown in the drawings the frame A is an upright frame consisting, generally, of a supporting bed-piece at the bottom, mounted on feet A′ A′, uprights extending on opposite sides, as shown in Fig. 2, and an arched connecting-piece extending between the uprights at the top. The table B is fixed to and carried by the frame between its uprights and projects considerably toward the front side of the frame. In this table are formed the molds C C, in which the cakes are molded. There may be one or more of these molds, and they may be of any suitable size or shape in order to make the cakes of different sizes and shapes. The molds extend vertically through the table B, being of uniform shape and dimensions from end to end, and in each mold works a lower plunger D, forming a movable bottom to the mold. When the cakes to be molded are small, I prefer to form numerous molds in the table, which may be arranged in staggered order, as shown in Fig. 5. The lower plungers D D, entering these molds, are all fastened to one frame E, (shown as being made of two pieces *a* and *b*, although this is not essential,) which frame is mounted to move or slide vertically, so that all the plungers may be caused to rise within their respective molds. To effect this, the frame E is made at its ends with slideways *c*, sliding in vertical guides *d d*, formed on or applied to the uprights of the frame A. When in the lowermost position, the frame rests on a seat *e*, formed on the connecting base portion of the frame A. This is its position during the operation of compressing the cakes into the molds, so that the thrust due to the compression is transmitted directly through the sliding frame E to the heavier frame A beneath. The frame E is given a vertical movement from time to time sufficient to cause the plungers D D to rise through their molds and lift the compressed cakes out therefrom and onto the top of the table B, ready to be pushed off therefrom, after which the sliding frame E descends again to its rest,

where it dwells during the ensuing compressing operation.

Each mold C is entered by an upper plunger F, which descends from above into the mold for a sufficient distance to compress the loose material therein to a cake of the required density. In Figs. 2 and 3 the plungers are shown fully entered into the molds and the cakes fully compressed. The several plungers F F are all carried by a vertically-sliding frame G, formed at its ends with slideways $f f$, sliding in guides $g g$, formed on the sides of the uprights of the fixed frame. The frame G descends during the time that the frame E is at rest, its plungers entering the molds, pressing the cakes, and immediately rising out of the molds and high above the mold-table and afterward descending again for the next ensuing pressing operation. During the time that the plungers F F are thus elevated above the mold-table the bottom plungers D D ascend to lift out the cakes and the latter are pushed off the table, the bottom plungers then descending and the molds being then filled with fresh material ready to be again compressed into form upon the next descent of the upper plungers. Passing over for the present the means for imparting these relative movements to the upper and lower plungers, I will describe the construction and operation of the feeder.

On the front side of the machine is placed a feed-hopper H, into which the moist granular or other material to be formed into cakes is placed. When this material is very moist or adherent, it is necessary to keep it continually stirred by agitating devices. To effect this I place in the lower part of the hopper a grated false bottom J, mounted at its ends on anti-friction rollers $i i$, and which is kept in continual agitation by being slid forward and back with a rapid movement. This is effected by radial arms $j j$ on a rock-shaft k, which is oscillated by a crank k' on its end, being connected by a link l to an eccentric-strap l', engaging an eccentric formed on a shaft K, to which power is applied through a belt and pulley or otherwise. To prevent any lumps falling through the hopper, the latter is provided with a grating of wires or rods $m m$ to break up any such lumps. A similar but inverted grating of wires $n n$ is carried by the false bottom J, and is reciprocated thereby within the lower part of the grating m. Beneath the hopper H works a sliding frame or grating L, which constitutes the feeder. This feeder slides over the surface of the table B from a position beneath the hopper, as shown in Fig. 3, to a position over the molds, as shown in Fig. 8. It just fills the space between the table and the bottom of the hopper when beneath the latter. The feeder L carries a forward extension in the shape of a flat plate p, flush with its upper surface, which, when the feeder L reciprocates backwardly and thereby passes out from under the hopper, slides beneath the latter and forms a temporary bottom for closing the hopper and preventing any discharge of material from it. The feeder L is constructed, preferably, of an open frame subdivided by bars which constitute a grating, leaving open chambers or cells for the reception of the material. These subdividing bars run, preferably, both longitudinally and laterally, as clearly shown in Figs. 5 and 10, where q are the longitudinal bars, and q' are the lateral ones. To further agitate the material, loose rods $r r$ are arranged to play or slide longitudinally through holes in the bars $q q$. These rods have sufficient end play so that they can be thus slid by their own momentum in consequence of the reciprocation of the feeder. They are provided with cross-pins r', projecting within the cells of the feeder, for stirring the mass of material therein.

When the feeder is in the position shown in Fig. 3, the material falls from the hopper H into its cells, filling them, and the feeder then slides backward, carrying its cells full of material, which is slid over the top of the table until the forward cells have passed over the molds, whereupon the feeder reciprocates forwardly. In passing over the molds some of the material falls from the feeder-cells into the molds, filling the latter and scraping the charge in each mold off flat on top by the return movement of the feeder, so that a certain measured quantity is delivered into each mold. This is the condition shown in Fig. 9. When the feeder comes under the hopper again, it receives sufficient fresh material to refill its cells. The feeder L serves also as a pusher for discharging the finished cakes from the machine. Its rear bar q^2 serves the purpose of such pusher. The bottom plungers D D reach the top of their stroke just before this bar of the pusher reaches the molds, so that the compressed cakes are lifted onto the top of the table. The pusher-bar q^2 then pushes them off the tops of the plungers, and immediately thereafter the plungers D D commence to descend, while the pusher thrusts the cakes along, and they fall off from the rear edge of the table, as shown in Fig. 8. While the plunger D is descending the material is falling from the cells of the feeder into the space thus formed for it in the mold. The plunger D comes to rest before the feeder passes off from the mold, Fig. 9, so that the final movement of the feeder completes the filling of the mold, and as the feeder finally passes off it scrapes off evenly the top of the charge. The upper plunger, which during these operations has been first ascending and then descending, now in its descending movement enters the mold and presses the material therein into a cake, as shown in Fig. 3. When it reascends, the plunger D follows it, the feeder L meanwhile moving backwardly toward the molds, and as soon as the upper plunger has passed clear of the feeder and the lower plunger has moved up flush with the table the feeder enters between them, as

shown in Fig. 7, and pushes off the finished cakes. These operations are repeated continually, one set of cakes being made to each complete reciprocation of the plungers.

I have described the movement of the feeder L as being a continuous sliding movement, reciprocating smoothly from the position shown in Fig. 3 to that shown in Fig. 8. This would answer for non-adherent material; but for material which is liable to stick together or cake while in the cells of the feeder I construct the latter to move forward and back with a succession of jerks, or, more correctly, with short forward and back reciprocating movements superposed upon the general and long or sweeping forward and back reciprocating movement. The material in its cells is thus continually shaken up, and by means of the longitudinally-sliding agitating-rods *r r* (which act after the manner of the agitating devices commonly provided in salt-cellars) the material is thoroughly agitated, and any lumps that may form are continually broken up and the granular character of the material is preserved.

I will now describe the means by which motion is communicated to the several parts.

In the upper part of the fixed frame is mounted a main driving or crank shaft M, to which power may be applied in any suitable way. The frame G and the upper plungers are driven directly from this shaft through the medium of connecting-rods G G′, engaging cranks on the shaft. The rods G′ are preferably constructed to be adjustable in length, in order to vary the extent to which the upper plungers shall enter the molds. The movement of the upper plungers then is a simple pendulous reciprocation, such as a crank-pitman would impart. The frame E, carrying the lower plungers, is driven from the same shaft M, but through a series of intervening parts, by which the movement is modified in order to impart to the plungers an up-and-down movement, occupying about one-half of the revolution of the driving-shaft, and to give them a dwell in their lower position during the remaining portion of its revolution. On one end of the shaft M is a crank N, which connects by a link N′ to a lever O, which is fulcrumed on a shaft P and is loose thereon. The lever O is vibrated by the crank-link through the arc *z* in Fig. 4. Its end is connected by a link Q′ to a lever Q, which turns on a fixed stud *s*. The link Q′ connects with one arm of this lever, while the other arm thereof, which is adjustable in length, is connected to a toggle-rod R, (also preferably made adjustable in length by means of a thimble R′.) The lower end of this rod is connected to the sliding frame E; but instead of slotting the upright frame A to make direct connection therewith (which would necessitate duplicating the mechanisms thus far described on the other end of the machine) the connection is preferably made through a rock-shaft S, having three parallel arms S′ S′ S². The arms S′ S′ project into recesses in the frame E and connect with the latter through links *s′ s′*, as shown in Figs. 2 and 3. The arm S² is jointed to the lower end of the rod R. The shaft M revolves in the direction of the arrow in Figs. 1 and 4. In Fig. 4 the arm O (shown in dotted lines) is fully depressed, and consequently through link Q′ has fully depressed the upper arm of the lever Q, thereby pulling the rod R up to its highest position. This is the position in which the plungers D D are raised, as shown in Fig. 7. In turning from this position to that shown in Fig. 1 the crank raises the lever O to mid-stroke, during which movement the link Q′, pushing against the upper arm of the lever Q, swings this lever around so that it stands vertically, thereby throwing down the rod R. While the crank N is moving from this position to its uppermost position it swings the lever O until its axis is on the line *z′*, Fig. 4. During this movement the lever Q is very slightly affected, since it can be turned to an extent only equal to the divergence of the two arcs *z* and *y* in Fig. 1. As the lever Q is already turned almost exactly in line with the link R, this very slight movement is only sufficient to bring them exactly in line or slightly beyond exact alignment, the downward movement imparted to the rod R being thereby made a very minute fraction of the slight vibratory movement of the lever Q, so that for all practical purposes the rod R and with it the shaft S and frame E stand still. The movement is in fact so slight that the inevitable looseness in the several joints or connections between the parts is not taken up, so that there is in fact no motion imparted to the plunger-frame E. Its state of rest continues during the movement of the crank M from the position shown in Fig. 1 up and over to the diametrically-opposite position. From the latter position down to the bottom of its stroke, as shown in Fig. 4, the lever O is thrown below its mid-stroke and tilts the lever Q, thereby again lifting the rod R and the plunger-frame E. The feeder L is reciprocated by means of levers driven by the crank N. A link T communicates motion from this crank to a lever T′, which is keyed to the shaft P, and thereby turns this shaft. This shaft has fixed to it two arms T² T², working downwardly from near its opposite ends, the lower ends of which are connected through bars *t t* to the sliding feeder L. The pendulous movements imparted to the arms T² from the crank N are thus transmitted to the feeder to give it its sweeping motion from beneath the hopper to its position over the molds. Its short jerky movements superposed upon this sweeping motion are imparted to it by the following means: A small elbow-lever U is pivoted to the lower end of each arm T², and instead of the rods *t t* being connected directly with these arms they are connected thereto by being jointed to the lower arms of the elbow-

levers. The other arms of these levers are connected through rods *u u* to eccentric-straps *u'*, turning on eccentrics U', formed on a sleeve V, which turns loosely over the oscillating shaft P. (See Fig. 2.) This sleeve V is formed with a pulley V' in its middle, over which passes a belt V^2, Fig. 1, by which the sleeve is rapidly revolved. The eccentrics consequently communicate rapid longitudinal reciprocatory movements to the bars *u u*, which are transmitted through the elbow-levers to the rods *t t*, and to the feeder L, which is thus caused to rapidly jerk forward and back during its prolonged reciprocatory movements.

My improved cake-press may be modified in its structural details without departing from the essential features of my invention. For example, instead of imparting a rapid vibration to the elbow-levers U U by means of eccentrics on the sleeve V this reciprocation might be imparted by means of any mechanical movement known to the arts for the generation of rapid reciprocatory motion. The duplication of the lever-arms T^2, elbow-levers U, eccentrics U', &c., is not essential, although preferable for practical reasons. Other means of imparting vibratory movement to the lever O and driving-shaft M may be substituted for the particular means shown. These several suggested variations of my machine are here mentioned only as examples of such changes as might be made, the construction preferred being that which has been shown and described.

Obviously the size and shape of the molds C C and the form to be given to the ends of the compressing-plungers will be governed entirely by the shape and ornamentation that are to be given to the completed cakes.

Essentially only one mold and one pair of plungers need be employed.

I claim as my invention the following-defined novel features and combinations, substantially as hereinbefore specified, namely—

1. The combination of a table having a mold or recess, a lower plunger working through said mold from beneath, an upper plunger entering said mold from above, a feeder for automatically delivering material into said mold, consisting of a rack formed with cells for holding the material arranged to pass successively over the mold, and means for reciprocating the feeder over the mold during the time that the upper plunger is elevated, whereby the successive cells of the feeder in passing over the mold feed successive portions of the material thereinto.

2. The combination of a table having a mold, a lower plunger working through said mold from beneath, an upper plunger entering said mold from above, a supply-hopper mounted over the table in a position remote from said mold, a feeder having cells or openings through it movable over the table and adapted to enter beneath said hopper, and mechanism for reciprocating it from a receiving position under said hopper to a delivering position over the mold.

3. The combination of a table having a mold or recess, a lower plunger working through said mold from beneath, an upper plunger entering said mold from above, an open-bottomed supply-hopper mounted over said table, a feeder mounted to slide over said table adapted to enter beneath the hopper to receive the material therefrom and having a bottom plate adapted to close the bottom of the hopper when the feeder is displaced to the position for delivering the material into the mold, and mechanism for reciprocating said feeder over the mold while the upper plunger is elevated.

4. In a cake-press, the combination, with a mold and compressing-plungers, of a supply-hopper, a feeder for transferring material from said hopper and delivering it to the mold, and means for keeping the material in the hopper loosened, consisting of a loosely-mounted false bottom in the lower part thereof, and mechanism for reciprocating said false bottom.

5. In a cake-press, the combination, with a mold and compressing-plungers, of a supply-hopper, a feeder for transferring material from said hopper and delivering it to the mold, and means for preventing the caking or adherence of the material in the hopper, consisting of a grating of pendent bars within the hopper, a relatively-movable grating of arched bars projecting up between said pendent bars, and driving mechanism for reciprocating one of said gratings relatively to the other.

6. In a cake-press, the combination, with a mold and compressing-plungers, of a supply-hopper, a feeder for transferring material from said hopper and delivering it to the mold, consisting of a reciprocating part formed with cells or openings for holding the material, and means for preventing the caking or adherence of the material in said cells, consisting of loosely-mounted stirrers carried thereby and movable in the direction of movement of the feeder, whereby they are agitated by the reciprocatory movement of the feeder.

7. The combination of a table having a mold or recess, compressing-plungers working therein, a feeder consisting of a plate sliding over said table, and driving mechanism therefor, consisting of a crank, a lever-arm vibrated thereby, and a link connecting said lever to the feeder.

8. The combination of a table having a mold or recess, compressing-plungers working therein, a feeder consisting of a plate sliding over said table, and driving mechanism therefor, consisting of a crank, a lever-arm vibrated thereby, an elbow-lever pivoted to said lever, a link connecting one arm of said elbow-lever to said feeder, a connecting-rod jointed to the other arm of said elbow-lever and extending toward the fulcrum of said lever, and an eccentric or equivalent driving device

for imparting rapid reciprocatory movements through said connecting-rod to said elbow-lever.

9. The combination of a table having a mold, a lower plunger working through said mold, an upper plunger entering said mold from above, driving mechanism for imparting reciprocatory movements to said upper plunger, and driving mechanism for imparting to said lower plunger a rising-and-falling movement succeeded by a rest, the latter mechanism consisting of a rotative crank and vibrating levers, and connecting rods or links interposed between said crank and the lower plunger to communicate the movement thereto, relatively arranged to take up within themselves a portion of the movement transmitted from the crank, whereby during such portion of the movement of the crank the lower plunger is held at rest.

10. The combination of a table having a mold, a lower plunger working through said mold, an upper plunger entering said mold from above, and driving mechanism for moving said plungers, consisting of a driving crank-shaft, a pitman connection between a crank thereof and the upper plunger, whereby the latter is driven with a simple pendulous reciprocation, and a connection between a crank of said shaft and a lower plunger, consisting of a lever connected to said crank to be vibrated thereby, a second lever, a link connecting the first and second levers for vibrating the latter from the former, and a toggle-rod jointed to the second lever and connected to the lower plunger, the said levers and their interposed link and toggle-rod being relatively arranged to impart to the toggle-rod approximately its entire thrust during one portion of the vibratory movement of said first lever and to take up within themselves approximately the entire remaining movement of said lever, whereby the rod and lower plunger are held practically motionless during such remainder of the movement.

11. The combination of a table having a mold, a lower plunger working through said mold, an upper plunger entering said mold from above, and driving mechanism for said plungers, consisting of a crank-shaft M, pitman G′ for communicating motion therefrom to the lower plunger, lever O, link N′, connecting it to a crank N on said shaft, second lever Q, link Q′, connecting its one arm to said first lever, and toggle-rod R, connecting its other arm to the lower plunger, the said levers and interposed link relatively proportioned and arranged so that when the lever Q and rod R are extended the arcs *z* and *y*, described, respectively, by the lever O and link Q′, shall approximately coincide.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

FRANK M. LEAVITT.

Witnesses:
MAURICE TILTON,
FRANK C. B. PAGE.