July 2, 1963

G. W. EVANS

3,095,832

PIE FORMING APPARATUS

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FIG. 1.

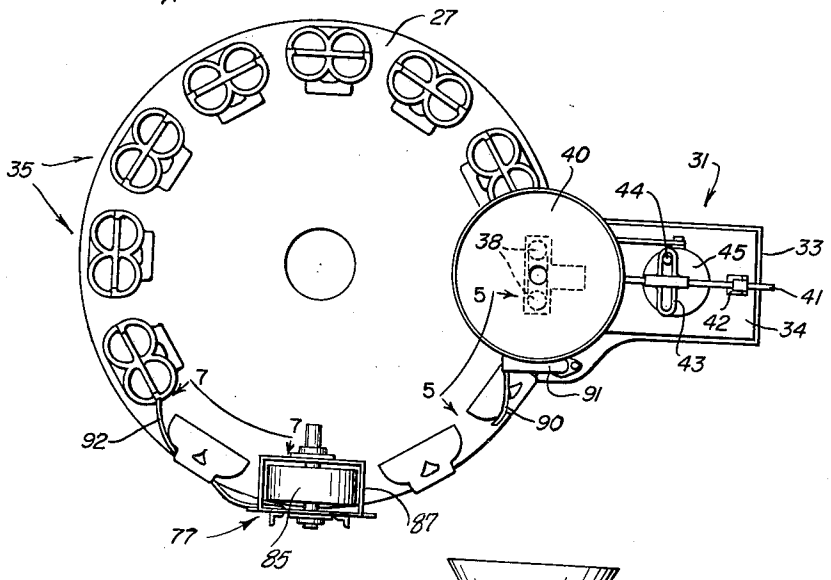
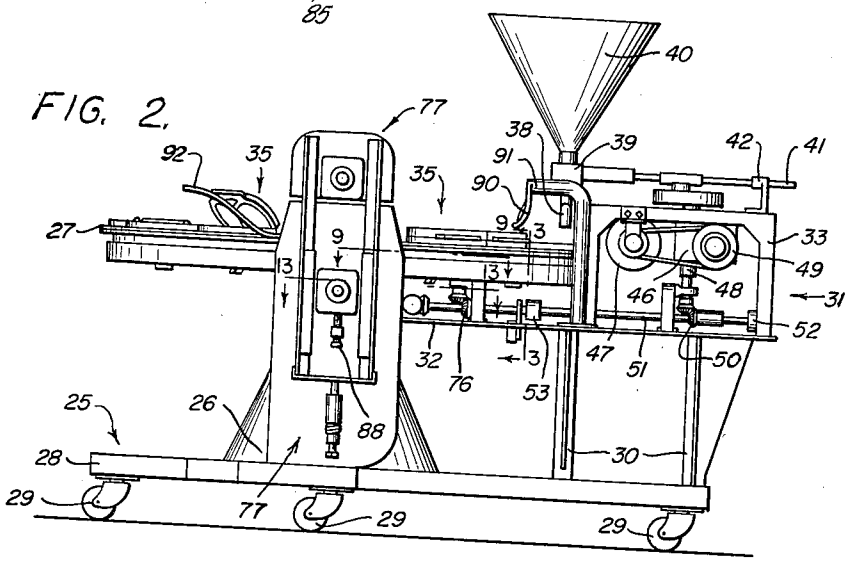


FIG. 2.



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FIG. 3.

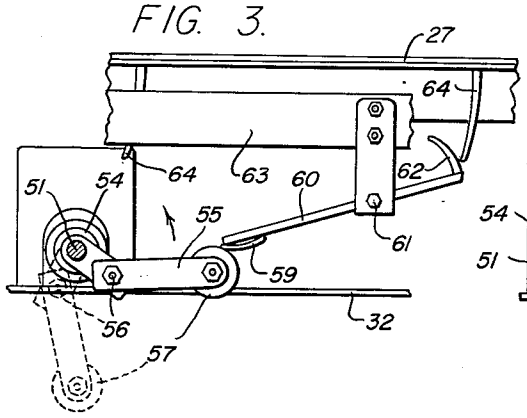


FIG. 4.

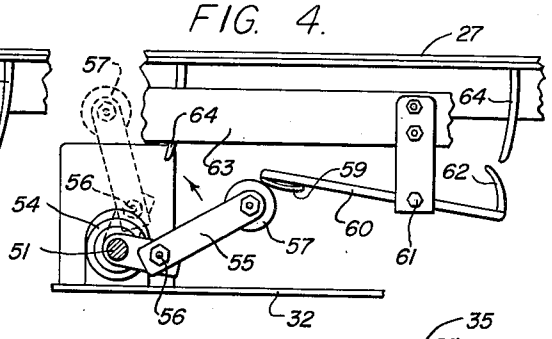


FIG. 5.

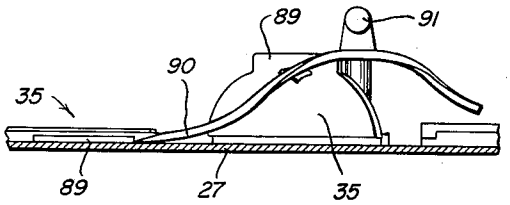


FIG. 6.

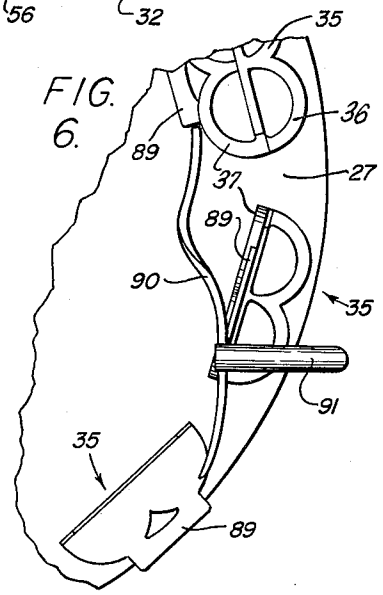


FIG. 7.

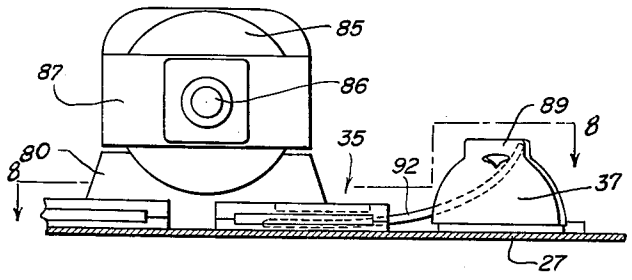
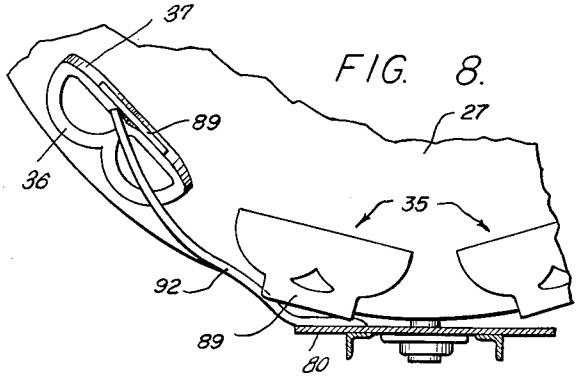


FIG. 8.



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FIG. 9.

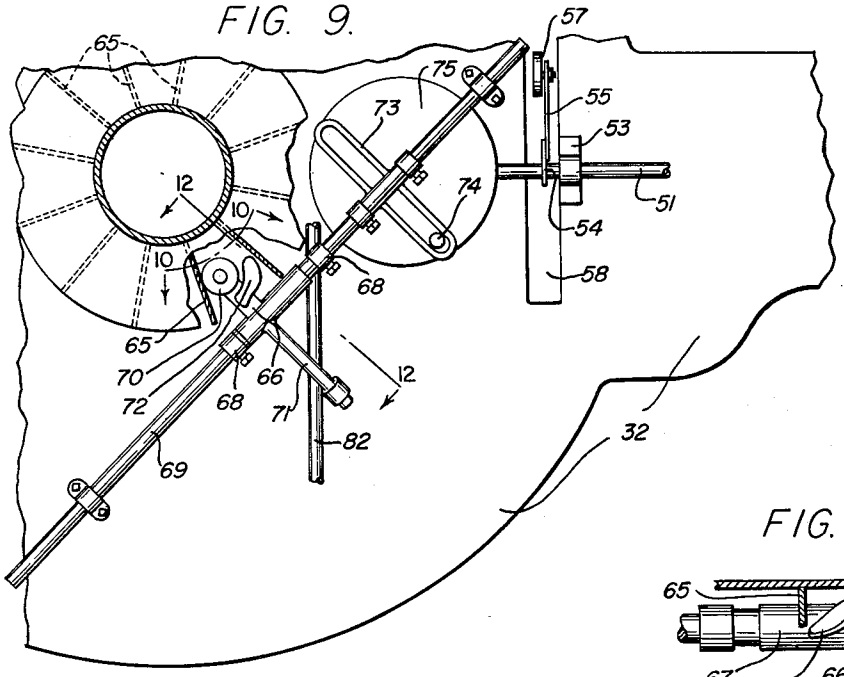


FIG. 10.

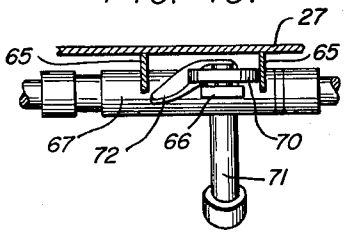


FIG. 13.

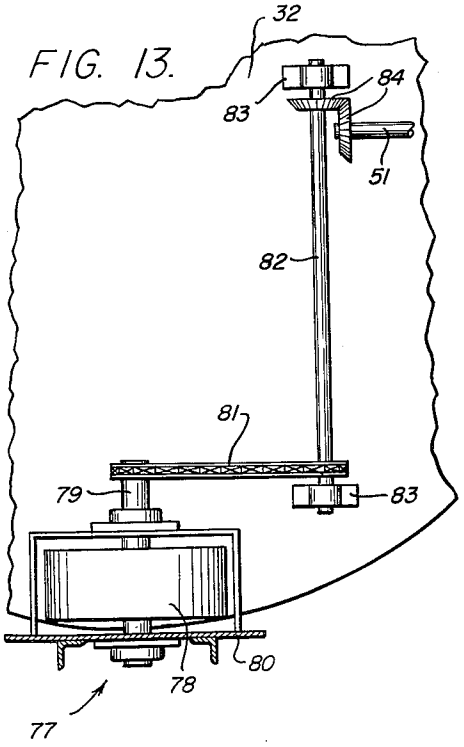


FIG. 11.

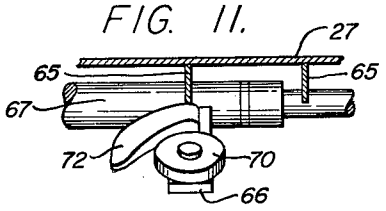
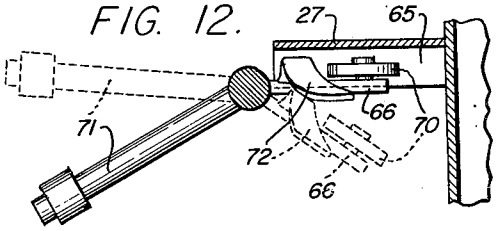


FIG. 12.



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FIG. 14.

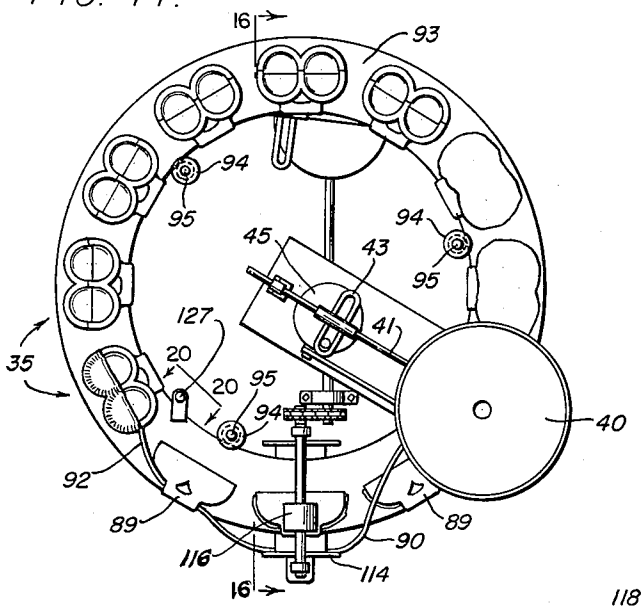


FIG. 15.

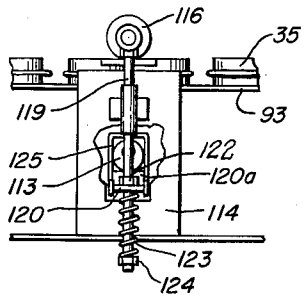


FIG. 16.

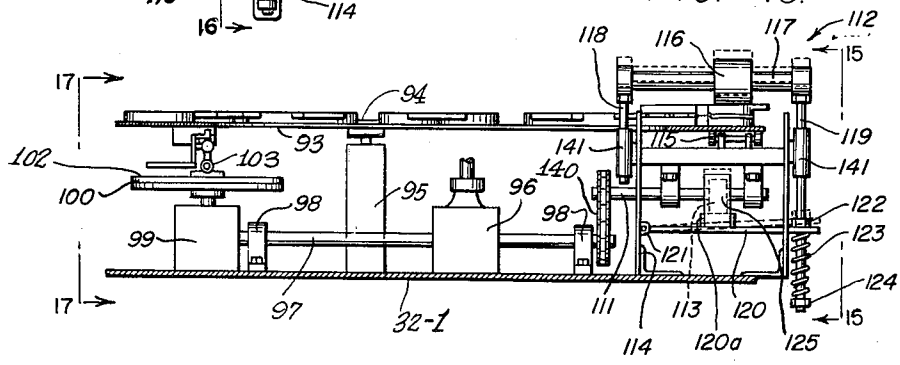


FIG. 17.

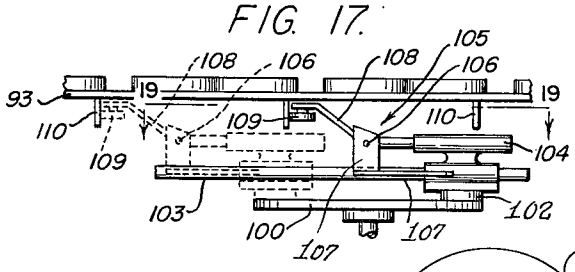


FIG. 18.

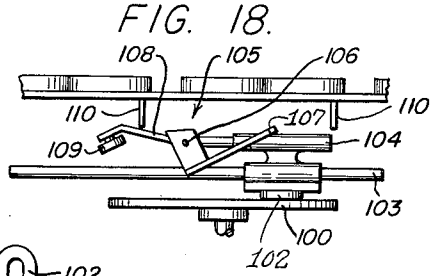
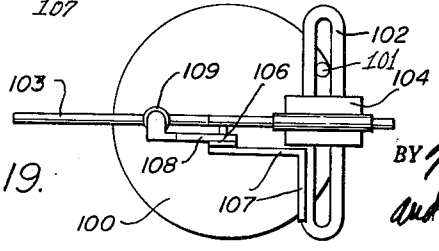


FIG. 19.



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FIG. 20.

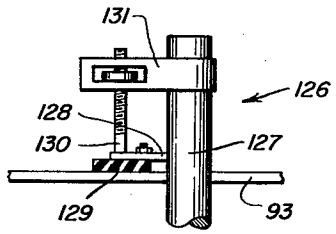


FIG. 21.

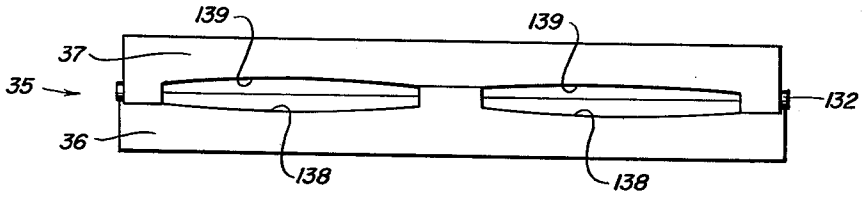
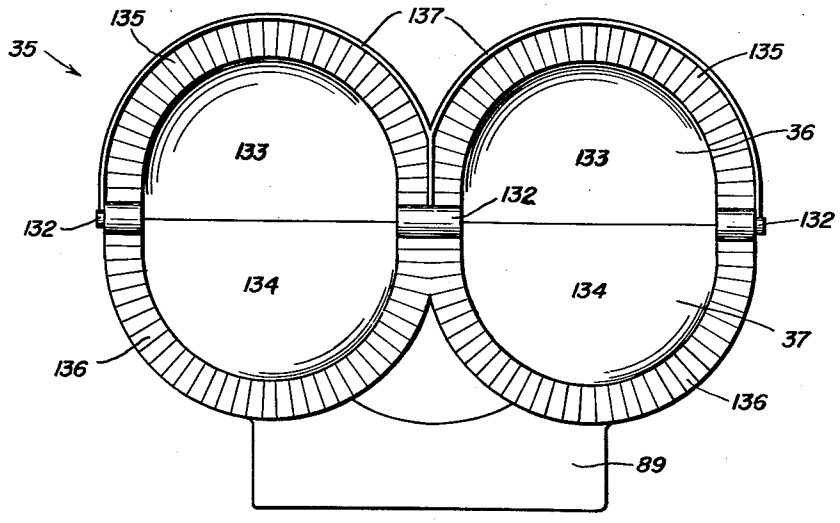


FIG. 22.



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United States Patent Office

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Patented July 2, 1963

3,095,832

PIE FORMING APPARATUS

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Filed June 18, 1958, Ser. No. 742,858
21 Claims. (Cl. 107—1)

This invention pertains to improvements in apparatus for molding products, such as edible products.

More particularly stated this invention relates to apparatus for continuously and automatically molding edible products and to improvements in molds and drives usable in such devices.

Still more particularly stated this invention pertains to improvements in apparatus for the timed and accurate actuation or movement and the accurate positioning of interacting devices, such as improved food molds and mold filling and mold closing and mold compressing and mold opening apparatus.

Specifically stated this invention relates to new and novel and useful improvements in automatic and continuously acting rotary type apparatus for making pies, particularly the type of pies commonly known as "turnover" pies, and to improvements in the molds for making such pies.

In conventional machines of the type very generally contemplated by this invention, it is common practice to use separate molds or dies for forming of articles, thereby determining the capacity of the apparatus by the number of dies and operating stations and the permissible speed of operation of the device. In many rotary types of molding devices the molds move continuously, making it difficult to insert measured quantities of viscous but flowable material, as for example, certain types of pie fillings, into such molds and also making it difficult to manually insert materials, as for example, pie crust dough, into such continuously moving molds.

In various types of devices using dies or molds for the molding of products, it is invariably contemplated that just the correct and predetermined quantity of materials will be inserted into the dies sufficient to produce the desired articles. In those instances where trimming of the formed articles is required, separate trimming dies are normally used.

Similarly in the use of dies or molds for the pressure molding of a product, it is common practice to so form such dies or molds as to prevent the escape of the material being molded and thus force the material under pressure throughout the entire mold cavity or cavities.

It is, therefore, a primary objective of this invention to provide a continuously operating and automatic rotary-type apparatus of the intermittently rotating type, having unique and novel drive means and motion arresting means for intermittently moving a rotary conveyor or turntable carrying molds in a step-by-step manner to and through a series of operating stations for receiving pie crust dough, measured quantities of pie filling, for closing the molds, for compressing the molds to precisely form the pies and trim the excess pie crust dough, and to open the molds at the discharge station.

A still further object of this invention is to provide a novel mold compressing and motion arresting means whereby to complete the formation of the product in the molds and to actuate the product shearing portions of the improved molds.

Still another object of this invention is to provide a new, novel and useful multiple cavity, shearing type, sectional mold device adapted for use in the simultaneous forming of a plurality of units of the product to be formed, such as pies, and including provisions to permit the limited expansion of the product out of the mold cavity while the mold is in closed position, without deforming the

predetermined outline of the molded product or rupturing the pie crust.

The reference in this application to the particular usefulness of the invention in apparatus for making or forming pies, such as the type of pies commonly known as "turnover" pies, and the selection of the making of pies as a basis for the description of the preferred embodiment of the invention, is made for the purpose of example and clarity only and is not to be interpreted as a limitation of the invention. Accordingly, the hereinafter contained description of the preferred embodiment of the invention will concern itself primarily with apparatus for the making or forming of pies.

The present invention in improved apparatus for pie making possesses the advantages of relatively simple and relatively inexpensive and efficient automatic and continuously operating apparatus in an intermittently moving, rotary, table-type pie molding device having positively acting table motion and table dwell producing devices synchronized with automatic measuring dispensing means for discharging measured quantities of pie filling material into pie molds which have been lined with filling enrobing material. The present invention also possesses the further advantage of embodying improved sectional pie forming molds and mold closing and compressing means, which molds, due to their unique structure and mode of operation obtain a uniform distribution of the pie filling material in the cavities of the mold intended for the formation of uniformly shaped pies, permit a limited expansion of the product being molded into an expansion portion of the mold, shear the excess enrobing material or pie crust from the configured and adhered overlapping edges of the pie crust used in the pies, and sever, one from another, the adjoining pies formed in a multiple cavity mold.

The foregoing and other objectives, important, novel and useful features and advantages of this invention will become more apparent and be more easily understood upon examination of the following description thereof and the accompanying drawings and appended claims. It should, however, be remembered that, without desire of limitation, the invention will be described and illustrated as the preferred embodiment of using the invention in apparatus for the continuous making of pies. Certain changes and variations in the invention may suggest themselves to those skilled in the pertinent arts upon review of this application, which changes may not, however, depart from the spirit of this invention and may come within the scope of the appended claims.

In the accompanying drawings:

FIGURE 1 is a fragmentary, detailed view, in top plan, of one variant of a pie forming machine embodying the present invention;

FIGURE 2 is a front elevational view, including the mold press and turntable and drive, of the device shown in FIGURE 1;

FIGURE 3 is a fragmentary, detailed, elevational view, to an enlarged scale, of the improved brake or turntable motion arrester of the variant of the invention shown in FIGURE 1, in motion arresting position;

FIGURE 4 is a view similar to the view shown in FIGURE 3, with the stop motion device or motion arrester in released position;

FIGURE 5 is a view taken along line 5—5 of FIGURE 1, showing an elevational view of a mold closing cam or bar for the device of FIGURE 1;

FIGURE 6 is a fragmentary, detailed view, to an enlarged scale, of a portion of FIGURE 1, showing a top plan view of the mold closing cam or bar;

FIGURE 7 is a view taken along line 7—7 of FIGURE 1, showing an elevational view of a mold opening cam or bar and the mold compressor;

FIGURE 8 is a top plan view of the mold opening cam or bar shown in FIGURE 7, and taken on line 8—8 thereof;

FIGURE 9 is a fragmentary, horizontal, sectional view taken along line 9—9 of FIGURE 2, and shows a top plan view of a portion of the turntable drive mechanism housed below the turntable;

FIGURE 10 is a vertical, sectional view taken along line 10—10 of FIGURE 9, showing the turntable actuator mechanism in turntable actuating or driving position;

FIGURE 11 is a view similar to FIGURE 10, showing the turntable actuator mechanism in released and retracting position;

FIGURE 12 is a vertical, radial, section taken transversely of the turntable drive mechanism, showing part of the drive mechanism shown in FIGURE 9;

FIGURE 13 is a horizontal view taken along line 13—13 of FIGURE 2, showing a portion of the mold compressing mechanism and drive therefor positioned below the turntable of the device;

FIGURE 14 is a fragmentary, detailed view, in top plan, of a second variant of a pie forming machine embodying the present invention;

FIGURE 15 is a front elevational view of the modified mold press shown in FIGURE 14;

FIGURE 16 is a fragmentary, detailed, vertical, sectional view taken along line 16—16 of FIGURE 14;

FIGURE 17 is an end elevational view, taken at the left hand end of FIGURE 16, showing a modified form of turntable actuator mechanism in turntable actuating or driving position;

FIGURE 18 is a view similar to FIGURE 17, showing the modified form of turntable actuator mechanism in released and retracting position;

FIGURE 19 is a plan view taken from the standpoint of line 19—19, FIG. 17, showing a modified form of trammel gear or slotted drive bar and wrist pin mechanism for imparting intermittent reciprocal driving movement to the drive mechanism of FIGURE 17;

FIGURE 20 is an elevational view, partially in broken away section, of a modified form of a turntable brake;

FIGURE 21 is a longitudinal rear, elevation view of a multiple cavity sectional mold, showing the product expansion provision of the mold; and

FIGURE 22 is a plan view of the mold shown in FIGURE 21, with the pivotable top section of the mold pivoted to open position.

Referring to the drawings, in which like elements are identified by like numerals, and referring in particular to the variant of the invention shown in FIGURES 1 to 13 of the drawings, 25 represents generally a frame having a pedestal 26 upon which the circular turntable 27 is rotatably mounted in any conventional manner (not shown). Pedestal 26 is supported upon a platform 28 equipped with casters 29 to enable the easy movement of the apparatus. Standards 30, as shown in FIGURE 2, extend upwardly from platform 28 and support the housing 31 for the power unit and drive mechanism of the improved apparatus. Housing 31 includes a base plate 32 underlying turntable 27, and extending outwardly beyond turntable 27, in a limited area, in the variant of the invention shown in FIGURE 1. Framework 33 extending upwardly from base plate 32, supports a cover plate 34 for the housing.

A series of multiple cavity, sectional molds 35, each having a base 36 and a complementary lid or cover section 37 pivoted thereto, are mounted in uniform spacing on the upper surface of turntable 27 along the circular outer peripheral edge thereof with the pivoted arrangement of the molds 35 positioned inwardly toward the axis of rotation of the turntable. As thus mounted, molds 35 may be moved by turntable 27 in a circular path, which path underlies the discharge nozzles 38 operatively depending from a metering type pump or valve 39 supported below and communicating with the lower interior portion of pie filling material hopper 40.

Metering device 39 may be of the reciprocating type, driven by reciprocating rod 41, suitably supported at 42, and reciprocated by a crank motion drive consisting of slotted yoke 43 carried by rod 41 and wrist pin 44 carried on rotary plate 45. Plate 45 is supported above cover plate 34 by speed reducer 46 housed inside housing 31. Speed reducer 46 is powered by motor 47 through drive belt 48 and driven pulley 49. The described arrangement contemplates the actuation of pump or valve 39 so as to intermittently discharge measured quantities of material withdrawn from hopper 40 through nozzles 38 into the pie molds, in a manner hereinafter to be described.

Gear reducer 46 is also drivingly connected, as by beveled gearing at 50 to rotary drive shaft 51, suitably mounted within housing 31 on bearings 52 and 53 fixed to and supported on base plate 32. Collar 54, as shown in FIGURES 3 and 4, is suitably attached to and carried by shaft 51 inwardly of bearing 53 and in turn carries hinged cam arm 55 adjustably hinged at 56 and provided at its outer end with cam roller 57. Cam arm 55 is rotated by shaft 51 through slot 58 in base plate 32 and is adapted once in each revolution thereof to cause the engagement of cam roller 57 with a counter weight type cam follower 59 carried on turntable brake lever 60. Brake lever 60 is pivoted at 61, to raise the cam follower 59 and tilt lever 60, thereby lowering the brake dog 62 fixed to the end of pivoted brake lever 60 opposite the cam follower 59. Pivot 61 is carried by brake frame 63 suitably supported on base plate 32. Brake dog or lug 62, is curved rearwardly toward pivot 61 and when in raised position, at which time cam roller 57 and the counter weight type cam follower 59 are out of engagement, engages a ratchet-type brake tooth or motion stop bar 64, depending from the under side of turntable 27 near the outer edge thereof to stop the rotary motion of turntable 27. Upon the raising of cam follower 59 by cam roller 57, lever 60 tilts on pivot 61 and lowers brake lug or dog 62 away from engagement with brake stops or brake ratchet bars 64, thereby releasing turntable 27 for further rotary motion. Adjustment of the hinged cam arm 55 at 56 enables a degree of adjustment or timing of the intermittent operation of the described braking mechanism.

To rotate the turntable 27 intermittently through alternating periods of motion and dwell, the underside of turntable 27, as shown in FIGURES 9, 10, 11 and 12, is provided centrally with a series of radially extending and uniformly spaced depending drive bars or driving ratchet elements 65, equal in number to the molds 35 and the brake bars or stops 64. The drive bars 65 are accurately positioned arcuately with respect to the molds 35 and brake stops 64. Pawl arm 66, which is suitably pivoted on yoke 67, which yoke is in turn pivoted intermediate collars 68 on reciprocable shaft 69, is provided on its inner end with a roller 70 for drivingly engaging the turntable drive bars 65 when the roller 70 is in elevated position. Opposite the pawl arm 66 and also carried by yoke 67 there is provided an adjustable weight 71 to normally raise roller 70 into operative driving position by the pivoting of yoke 67 on shaft 69 during the reciprocation of shaft 69.

To rotate table 27 shaft 69 is moved forwardly from right to left as viewed in FIGURE 9, drivingly engaging roller 70 with a forwardly positioned drive bar 65, thereby causing table 27 to rotate about its vertical axis. Upon the reverse movement of shaft 69, cam plate 72 engages the lower edge of a rearwardly positioned drive bar 65, causing the lowering of roller 70 by pivoting yoke 67 on shaft 69 as cam plate 72 slides through below the engaged drive bar 65, thereby to permit the rearward movement of roller 70 past the first rearwardly positioned drive bar 65. Cam plate 72 and roller 70

are so proportioned that the roller 70 is thus movable rearwardly below a rearwardly positioned driving bar 65, whereupon the disengagement of cam plate 72 with bar 65 again permits the roller 70 to be pivoted upwardly by counterweight 71 into driving position against a drive bar 65. Slotted yoke 73 carried by shaft 69 is drivingly connected to rotating wrist pin 74 carried on rotary crank plate 75. Crank plate 75 is driven by drive shaft 51 through beveled gearing at 76.

To completely close the molds 35, there is provided a mold compressor generally identified by the numeral 77. Compressor 77 overlaps the edge of turntable 27. Mold compressor 77, as shown in FIGURES 2 and 13 includes a lower driven wheel 78 mounted on shaft 79 journaled to frame 80 fixed to base 28. Compressor wheel 78 supportingly engages the lower surface of turntable 27 immediately below the path of travel of molds 35, and is driven by a chain drive generally identified by number 81. Chain drive 81 is powered by shaft 82 supported by suitable pillow blocks 83 on base plate 32 and is geared to the main drive shaft 51 at 84. The rotation of driven wheel 78 is such as to oppose the rotary motion of turntable 27, which rotary motion is imparted to the turntable by driving pawl 66. The compressor 77 also includes a compressor idler wheel 85, FIG. 7, carried by shaft 86 which is journaled in a wheel carriage 87 secured to frame 80. Compressor wheel 85 overhangs the path of travel of molds 35 and rides along the upper surface of the closed molds 35 as they pass below. The space between compressor wheels 78 and 85 may be adjusted by the suitable adjustment of screw 88, FIG. 2 so arranged as to raise or lower the journals for the compressor wheel 78.

Molds 35 which are in open position while passing the filling station below hopper 40, are moved by turntable 27 to a mold closing station where a cam follower 89 formed integrally with the lid or closure section 37 of each mold 35 engages a mold closing cam track element 90, FIGS. 1, 2, 5, and 6. Cam track 90 overhangs the outer edge portion of turntable 27 between hopper 40 and compressor 77 and is rigidly supported on frame 33 by bracket 91. Cam track 90, which extends toward compressor 77, is of such configuration as to engage the underside of cam follower 89 while mold 37 is on open position, and gradually pivots lid 37 upwardly beyond a vertical position to cause lid 37 to drop with considerable impact into closed position upon mold base 36.

A mold opening cam track 92, FIGS. 1, 2, 7, and 8, secured to frame 80 of mold compressor 77, overhangs the outer peripheral portion of turntable 27 on the side of the compressor 77 opposite from the closing cam 90. Opening cam track 92 is of such configuration and arrangement as to engage the underside of the cam track follower 89 of molds 35 and pivot the associated closed mold lids 37 upwardly beyond a vertical position to cause the lids 37 to thence drop into an open position.

Another variant of the invention is shown in FIGURES 14 to 20. As shown in FIGURE 14, the central portion of the turntable has been removed leaving a circular ring 93 carrying the molds 35 on its flat upper surface adjacent the outer peripheral edge with the molds 35 arranged in the same manner as hereinbefore described with respect to turntable 27. Turntable ring 93 is supported for rotary motion about a vertical axis by three suitably constructed and positioned idler rollers 94 centeringly engaging the inner circular edge of turntable ring 93. Rollers 94 are pivotally carried at the upper ends of standards 95 extending upwardly from base plate 32–1. In the variant of the invention shown in FIGURE 14, base plate 32–1 extends completely below the turntable 93.

The modification of the invention shown in FIGURE 14 includes a variation in the mold compressor and in the turntable drive and in the positioning of the motor enclosing section of the housing for the drive mechanisms. In FIGURE 14, the section of the drive housing containing motor 47 and carrying the slotted yoke drive 43 for metering pump 39 is positioned inwardly from hopper 40 toward the axis of rotation of the ring type turntable 93. The reciprocating shaft 69 and the associated turntable drive arrangement, including the pawl 66, have been eliminated. Similarly the turntable brake mechanism, including the brake lever 60, has also been eliminated from the form of the invention illustrated in FIGURE 14. According to FIGURE 14, power is supplied from speed reducer 46, shown in FIGURE 2, to the gear box 96 which in turn drives shaft 97 supported by pillow blocks 98 on base plate 32–1.

As shown in FIGURES 16 to 19, one end of drive shaft 97 is operatively connected, through gear box 99, to crank table 100 supported on gear box 99 below turntable ring 93. Crank table 100 carries wrist pin 101, FIG. 9, which engages the slot in slotted yoke 102 slidably carried on slide bar 103 suitably fixed to base plate 32–1 in any desirable manner, as for example, support standards (not shown). Bracket 104 fixed to and carried centrally above yoke 102 in turn pivotally carries a counterbalanced pawl arm 105 on horizontal pivot pin 106. Pawl arm assembly 105 includes the downwardly and rearwardly extending, counterweight, free end 107, viewing FIGURES 17 and 18 from left to right. Assembly 105 also includes the work engaging upwardly and forwardly extending end 108 terminating in forwardly positioned pawl roller 109.

In driving position the counterweight end 107 maintains pawl roller 109 in upwardly pivoted position immediately below turnable 93. In that position, upon the driving advancement of yoke 102, roller 109 engages one of a series of equally spaced and radially extending turntable drive bars 110 depending from the lower side of table 93, and urges the table 93 forwardly through the driving stroke of yoke 102, see the dotted line position in FIG. 17. Upon the retraction of yoke 102 the upwardly extending end 108 of pawl arm 105 engages the lower edge of a next rearwardly positioned drive bar 110, causing the end 108 to pivot downwardly, permitting the pawl roller 109 to be retracted rearwardly past the next rearwardly positioned drive bar 110, whereupon the counterweight 107 again raises roller 109 into the initial operating position but against the driving side of the driving bar which has just been passed. Drive bars 110 are equal in number to the molds 35 carried by ring 93 and are so positioned as to assure the stopping of the molds in desired position at the various work stations.

Chain drive 140 drivingly connects the power shaft 97 and cam shaft 111 of modified mold compressor 112 of FIGURE 16. Cam shaft 111 carrying the cam 113 is supported in suitable bearings on frame 114 extending upwardly from base plate 32–1. Turntable support idler rollers 115 are carried on frame 114 below and in supporting engagement with the outer peripheral portion of table 93 below the path of molds 35. Mold compressor wheel 116 overlies the path of travel of molds 35 and is pivotally carried by shaft 117 and extends radially above and traverses turntable 93 above compressor frame 114. Shaft 117 is supported for vertical reciprocal motion on standards 118 and 119 telescopically fitted into guide bearings 141. The vertical reciprocating movement of shaft 117 and wheel 116, permits the intermittent movement of wheel 116 into mold compressing position upon a mold stationed below wheel 116 on table 93. The assembly of standards 118 and 119 and shaft 117 are urged downwardly by rocker arm 120 which is pivoted at one end at 121 to frame 114 and is operatively connected at its opposite end to the lower portion of standard 119 between an adjustment nut 122 and the upper end of compressed spring 123. Spring 123 is telescoped over the lower end of standard 119 and held in position

by nut 124 threaded to the end of standard 119, whereby the compression of spring 123 may be adjusted. Adjustment of nut 122 permits variation in the stroke pressure exerted by wheel 116 upon a closed mold 35 stationed therebelow. Standard 119 and associated shaft 117 and wheel 116 are vertically reciprocated upon the rotation of cam 113, by reason of the fact that such cam, acting against cam plate 120*a*, forces rocker arm 120 downwardly against spring 123, causing such spring to urge standard 119, and the compression wheel 116 carried thereby, downwardly, to press firmly against the top of the mold 35, which not only serves to clip off overhanging fringes of dough from such mold, but also serves as a very effective brake to stop rotation of the turntable 93.

Upon further rotation of cam 113, yoke 125, FIG. 15, which encompasses such cam and is rigidly secured to cam plate 120*a*, raises rocker arm 120 and compression wheel 116 above the path of travel of the molds 35; thereby permitting free rotation of turntable 93 to bring the next mold under wheel 116.

Screwing nut 122 upwardly on standard 119 raises compression wheel 116 relative to the turntable, while screwing it downwardly lowers such compression relative to the turntable. This adjustment enables close timing of the braking action of the compression wheel relative to the several molds 35.

In addition to compressor wheel 116 acting as an effective brake to stop the rotary motion of table 93, there is preferably provided an auxiliary, friction type of preset brake 126, FIG. 20, mounted on standard 127 which extends upwardly from base plate 32–1. Flexible bracket 128 secured to standard 127 carries a rubber brake shoe 129 adapted to frictionally engage the upper surface of table 93 with more or less pressure regulated by adjustment of a screw 130 carried by bracket 131 on standard 127 and operatively connected to the brake shoe.

As shown in FIGURES 21 and 22, the multiple cavity molds 35 include a base section 36 and a complementary cover section 37 pivotally connected at three aligned pivot points 132 at the rear adjacent edges of mold sections 36 and 37. The pivot arrangement for lid sections 37 is such as to permit the pivoting of lid sections 37 from a horizontal closed position. Mold base 36 and mold cover 37 are each provided with complementary opposed cavities or rounded depressions 133 and 134 respectively. The cavities are substantially semicircular in plan as viewed in FIGURE 22. Cavities 133 and 134 are bordered along their curved edges by horizontal and substantially semicircular and complementary matrix faces 135 and 136 respectively. A vertically disposed shearing flange 137 extends upwardly from the outer peripheral curved edge of matrix face 135 to engage the peripheral curved edge of the matrix face 136 of mold cover section 37. The the outer free surfaces of mold covers 37, opposite the pivots 132 are provided with an integrally formed cam follower element 89. As shown in FIGURE 21, the matrix faces 135 and 136 do not extend along the rear straight edges 138 and 139 defining the rear peripheral and adjacent edges of the complementary cavities 133 and 134. Opposed edges 138 and 139 are curved away from the horizontal axis of pivots 132, to thereby form an escape opening for the materials being compressed in the molds.

In the operation of the improved apparatus, pie crust dough cut to approximately the shape of an open sectional mold 35 is covered over the open mold at a station ahead of the supply hopper 40 during a period of dwell of the turntable. The covered molds are then moved in sequence in a step-by-step motion to the filling station below the nozzles 38, where each mold is stopped in sequence during sequential periods of dwell of the conveyor, to receive measured quantities of pie filling material deposited in the pie crust lined cavities 133 of mold base 36. As those filled molds are next moved away from nozzles 38, the cam followers 89 engage the cover closing cam 90. As the turntable moves clockwise, as viewed in FIGURES 1 and 14, the mold lid 37 is pivoted upwardly by cam 90 until it reaches a vertical position whereupon it closes by gravity action upon the mold base 36, covering the deposited pie filling with the section of pie crust originally cover over the mold cover section 37, and at least partially forming the pies within the mold.

After the molds 35 have thus been closed, the molds 35 travel to the mold compressors 77 or 112. While traveling through the mold compressors the cover sections 37 are tightly pressed down against shearing flanges 137 of base sections 36 of molds 35 to thereby firmly mold the pies and shear-off any excess pie crust around the curved matrix faces of mold sections 36 and 37. Upon leaving mold compressors 77 or 112, the cam followers 89 of the molds 35 engage cam track 92. Upon the continued movement of molds 35, cam track 92 raises the lid sections 37 to a substantially vertical position, whereupon the lid sections 37 drop by gravity to a mold open position, and the pies are ready for removal from the molds.

From the foregoing description of this invention and from the accompanying drawings, it will be apparent that this invention realizes the introductorily enumerated objectives respecting the improvements in apparatus for forming pies. It will similarly be apparent that the invention also possesses the hereinbefore listed advantages and provides a new, novel and useful apparatus for continuously and automatically forming edible products, such as pies.

Having thus described and illustrated the preferred embodiments of this invention in several variants thereof in an improved apparatus for forming pies, the invention is not to be interpreted as being restricted to the specifically illustrated and described variants or embodiments as set forth in the drawings and as hereinbefore described, except insofar as is necessitated by the appended claims and the disclosures of the prior art.

The invention is hereby claimed as follows:

1. A machine for forming pies, comprising, in combination, frame means, hopper means for pie filling material mounted upon said frame means, measuring dispensing means mounted on said hopper means and having downwardly directed nozzle means for intermittently dispensing measured quantities of pie filling from said hopper means, an intermittently operable endless conveyor having regular alternating periods of dwell and movement, sequentially spaced mold means carried by said conveyor in a path below said nozzle means, said mold means stopping below said nozzle means during a period of dwell of said conveyor means, drive means for intermittently moving said conveyor with regular and alternating periods of dwell and movement, and brake means for accurately stopping successive mold means below said nozzle means during respective periods of dwell of said conveyor, and said drive further including means to actuate said dispensing means to periodically dispense measured quantities of pie filling into said mold means below said nozzle means.

2. The machine of claim 1, wherein the brake means comprises pawl and ratchet means, the ratchet means depending from the conveyor.

3. The machine of claim 2, wherein the pawl means is pivotally mounted below the conveyor and is counterbalanced so as to engage the ratchet means on counter movement, and wherein there are provided cam follower means associated with the pawl means and cam means operable on said cam follower means to disengage said pawl means from said ratchet means.

4. The machine of claim 1, wherein the brake means comprises coacting compression rollers below and above the conveyor, respectively, and in the path of the mold

means at a position corresponding to the dwell position thereof, and means for forcibly actuating said rollers into mold compression relationship at timed intervals corresponding to the dwell periods of said conveyor.

5. The machine of claim 4, wherein the roller-actuating means comprises cam means actuated in synchronism with the conveyor.

6. The machine of claim 4, wherein the roller-actuating means comprises cam means actuated in synchronism with the conveyor.

7. In combination, sequentially spaced mold means, a mold filling device, a mold closing device, a mold compressing device, a mold opening device, an endless conveyor carrying said mold means and arranged to progressively move said mold means into operative relation with the foregoing devices in the order mentioned, drive means for intermittently moving said conveyor, and brake means for stopping the respective movements of said conveyor, said drive means including a series of drive members depending from said conveyor at regular intervals corresponding to the spacing of said mold means thereon, a reciprocating drive disposed below said conveyor and adapted to sequentially engage successive drive members throughout successive drive strokes of its reciprocative movement, and means for reciprocating said drive through strokes substantially corresponding to the said spacing of the mold means.

8. The combination of claim 7, wherein the conveyor comprises a turntable; wherein the mold means comprise a series of individual molds positioned at regular intervals upon and circumferentially of said turntable; wherein the mold compressing device comprises a compression wheel arranged to exert downward pressure upon said molds, successively, in their closed positions; and wherein the brake means comprises cam means for lowering and raising said compression wheel in timed sequence relative to the rotation of said turntable.

9. The combination of claim 8, wherein the cam means includes a rocker arm, a yoke adjustably secured to said rocker arm, a cam operable between said rocker arm and said yoke, and means for adjusting said yoke toward and away from said cam.

10. The machine of claim 7, wherein the brake means comprises pawl and ratchet means, the ratchet means depending from the conveyor.

11. The machine of claim 10, wherein the pawl means is pivotally mounted below the conveyor and is counterbalanced so as to engage the ratchet means on counter movement, and wherein there are provided cam follower means associated with the pawl means and cam means operable on said cam follower means to disengage said pawl means from said ratchet means.

12. The machine of claim 7, wherein the brake means comprises coacting compression rollers below and above the conveyor, respectively, and in the path of the mold means at a position corresponding to the dwell position thereof, and means for forcibly actuating said rollers into mold compression relationship at timed intervals corresponding to the dwell periods of said conveyor.

13. The combination with a turntable and mold filling means for filling closable mold means carried on said turntable, said mold means having a base section and a complementary cover section, of first cam means for moving said cover section into position to cover said base section, compressing means for compressing said cover section on said base section, second cam means for uncovering said cover section from said base section, and drive means for intermittently driving said turntable for conveying said mold means through predetermined periods of motion and periods of dwell along a path wherein said mold means while open are one after another first positioned during successive periods of dwell of said turntable in filling position with respect to said filling means and thereafter closed by said first cam means and thereafter compressed by said compressing means and thereafter opened by said second cam means, said drive means including a series of drive members depending from said turntable at regular intervals corresponding to the spacing of said mold means thereon, a reciprocating drive disposed below said turntable and adapted to sequentially engage successive drive members throughout successive drive strokes of its reciprocative movement, and means for reciprocating said drive through strokes substantially corresponding to the said spacing of the mold means.

14. In a device of the character described, a base, a horizontal turntable rotatably mounted on said base, a series of closed sectional molds carried on said turntable adjacent the peripheral portion thereof, means for intermittently rotating said turntable in one direction, a compression wheel mounted above the path of travel of said closed sectional molds for compressing said molds against said turntable while said molds pass below said compression wheel, a turntable bracing wheel mounted below said compression wheel and said turntable for engaging the underside of said turntable below said compression wheel to absorb the thrust of said compression wheel upon said turntable when said compression wheel compresses said molds, and drive means for rotating said bracing wheel and for positively stopping said turntable at the termination of each of the intermittent movements thereof.

15. The device of claim 14, wherein the drive means comprises drive bar means depending from said turntable and extending radially thereof, reciprocating drive shaft means below said turntable, and pawl means pivotally carried by said drive shaft means for reciprocating movement therewith and for drivingly engaging said drive bar means when said pawl means is pivoted toward said turntable and is moved in one direction of its reciprocating movement.

16. In a device of the character described, a base, a circular turntable rotatably mounted upon said base, drive bar means depending from said turntable and extending radially thereof reciprocating drive shaft means below said turntable, and pawl means pivotally carried by said drive shaft means for reciprocating movement therewith and for drivingly engaging said drive bar means when said pawl means is pivoted toward said turntable and is moved in one direction of its reciprocating movement.

17. In a device of the character described, a base, a turntable rotatably mounted upon said base, brake ratchet bar means depending from said turntable and extending inwardly from the outer peripheral portion of said turntable, pawl means pivotally supported below said turntable, means for counterbalancing said pawl means to engage one end of said pawl means with said ratchet bar means when the pawl means is pivoted in response to said counterbalancing means, cam follower means on said pawl means, and rotatable cam means for engaging said cam follower means to overcome the means for counterbalancing said pawl means and pivot said pawl means out of engagement with said ratchet bar means.

18. In a device of the character described, a base, a turntable rotatably mounted on said base, drive means for intermittently rotating said turntable, a brake shoe positioned adjacent a portion of said turntable and supported on adjustable means, and brake shoe adjustment means for urging said brake shoe into braking engagement with said turntable and maintaining said brake shoe in such adjusted braking engagement with said turntable.

19. In a device of the character described, a base, a horizontal turntable rotatably mounted on said base, a series of closed sectional molds carried on said turntable adjacent the peripheral portion thereof, means for intermittently rotating said turntable in one direction, a compression wheel mounted for reciprocal vertical movement above the path of travel of said closed sectional molds for compressing said molds against said turntable while said molds come to rest below said compression wheel, driving

means for reciprocating said compression wheel in synchronism with the periods of dwell of said intermittently rotating turntable, and turntable support means for engaging the underside of said turntable below said compression wheel to absorb the thrust of said compression wheel upon said turntable when said compression wheel compresses said molds.

20. In a device of the character described, a base, a turntable rotatably mounted upon said base, drive bar means depending from said turntable and extending radially outwardly from the central portion of said turntable, reciprocating drive shaft means below said turntable, drive pawl means pivotally carried by said drive shaft means for reciprocating movement therewith and for drivingly engaging said drive bar means when said drive pawl means is pivoted toward said turntable and is reciprocably moved in one direction of its reciprocating movement, brake ratchet bar means depending from said turntable and extending inwardly from the outer peripheral portion of said turntable, brake pawl means pivotally supported below said turntable, means for counterbalancing said brake pawl means to engage one end of said brake pawl means with said brake ratchet bar means when said brake pawl means is pivoted in response to said counterbalancing means, cam follower means on said brake pawl means, adjustable and rotatable cam means for engaging said cam follower means to overcome the means for counterbalancing said brake pawl means and pivot said brake pawl means out of engagement with said brake ratchet bar means, and synchronized drive means for driving said reciprocating drive shaft and

said rotatable cam means in timed relation one to another, whereby to cause said brake pawl means to engage said brake ratchet means and stop the rotary motion of the turntable upon the completion of the driving action of said drive pawl means and to release said brake pawl means from said brake ratchet means preceding the commencement of the driving action of said driving pawl means.

21. The combination of claim 13 wherein the turntable has a circular central opening, and there are spaced rollers rotatably mounted on said base and supportingly and centeringly engaging the inner peripheral edge of said turntable.

References Cited in the file of this patent

UNITED STATES PATENTS

740,346	Williams	Sept. 29, 1903
745,972	Robinson	Dec. 1, 1903
817,488	Hutchinson	Apr. 10, 1906
1,596,652	Giovannetti	Aug. 17, 1926
1,814,485	Moss	July 14, 1931
1,854,850	Linkenauger	Apr. 19, 1932
2,123,230	Clark et al.	July 12, 1938
2,377,936	Harriss et al.	June 12, 1945
2,494,236	Goldstein	Jan. 10, 1950
2,800,038	Jonson	July 23, 1957
2,832,235	Denman	Apr. 29, 1958
2,855,867	Zeitlin	Oct. 14, 1958
2,893,542	Watkins et al.	July 7, 1959