Nov. 23, 1937. F. MAIER 2,099,900

DOUGHNUT FORMING MACHINE

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Fig. 1.

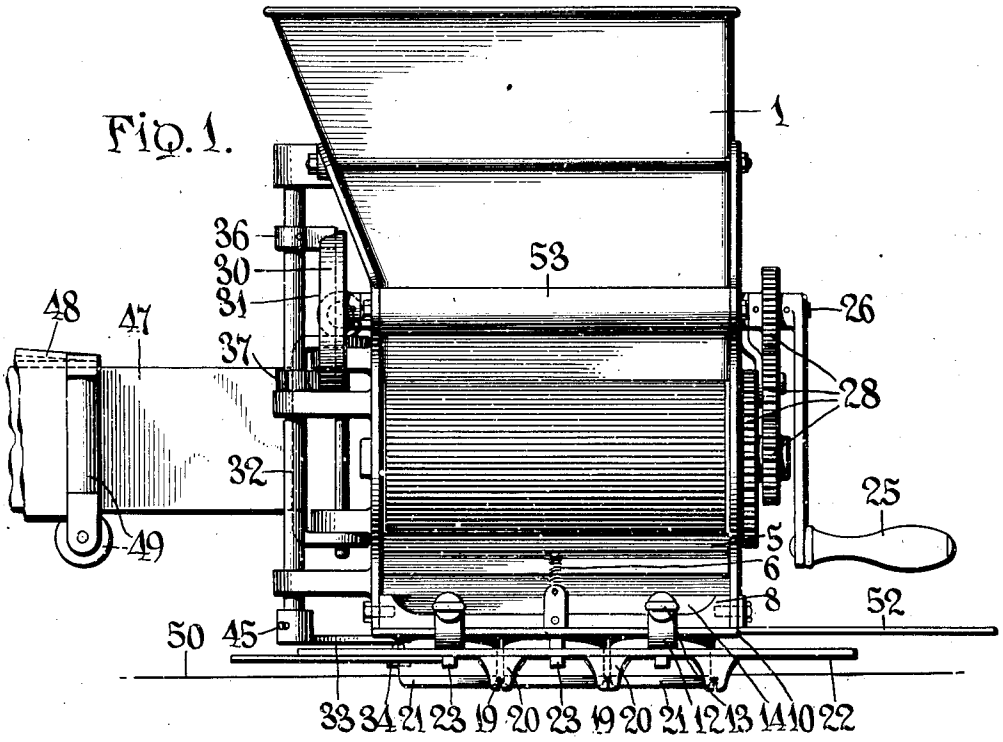
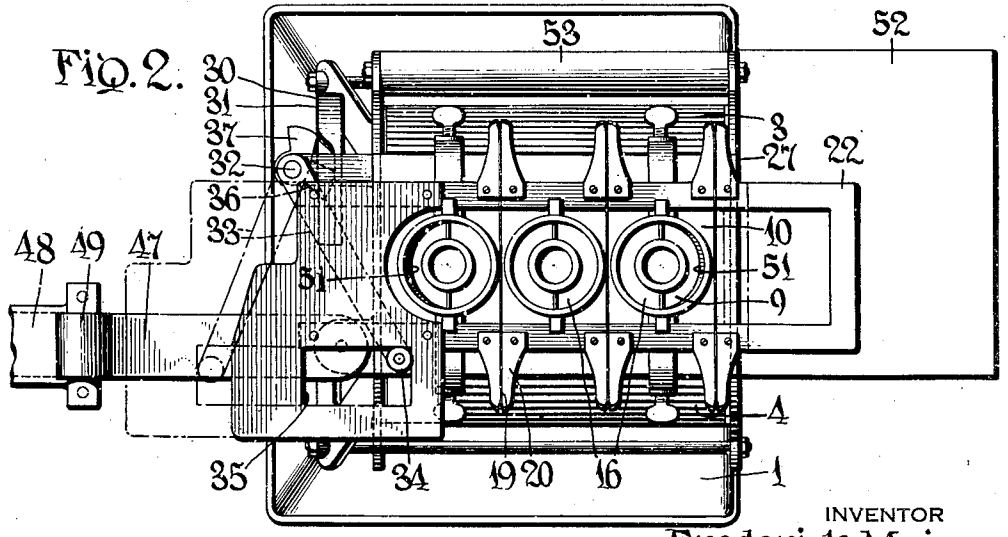


Fig. 2.



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Fig. 3.

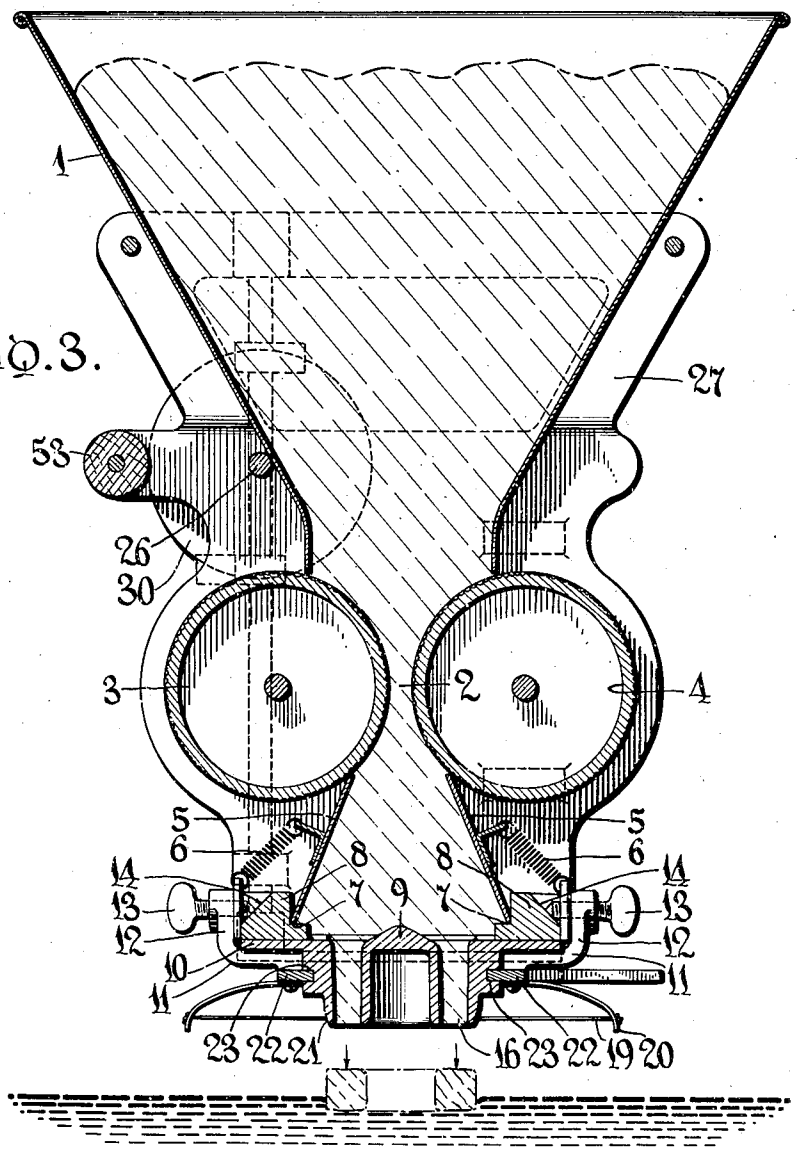
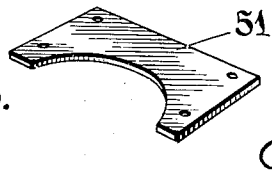


Fig. 5.



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Fig. 6.

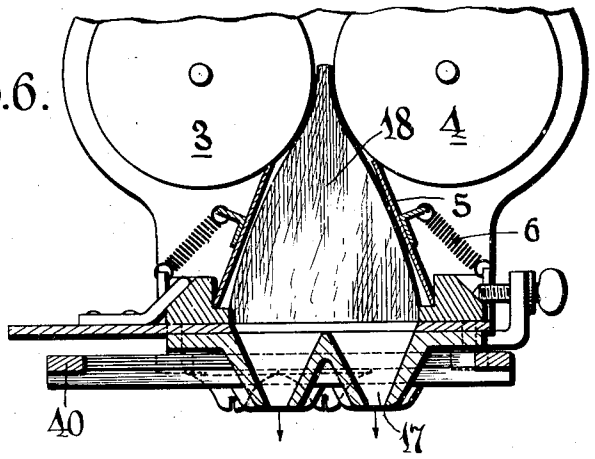


Fig. 7.

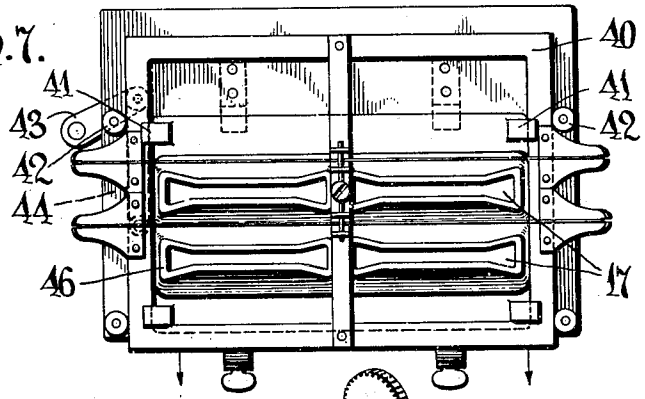


Fig. 4.

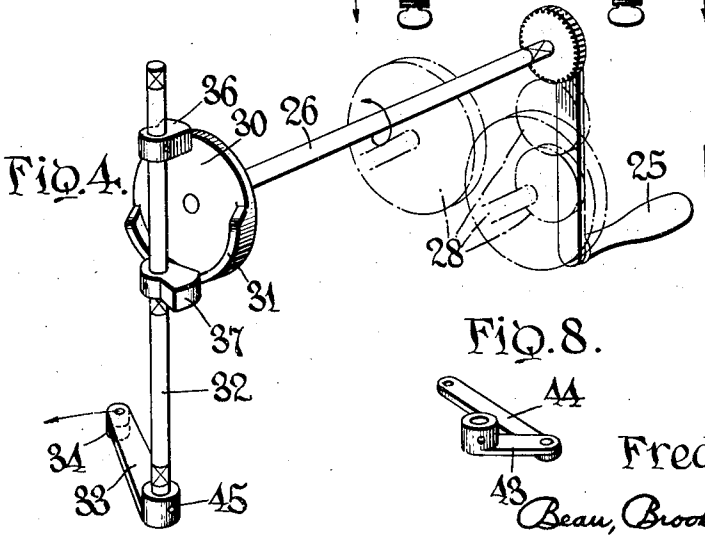


Fig. 9.



Fig. 10.



Fig. 8.

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UNITED STATES PATENT OFFICE

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DOUGHNUT FORMING MACHINE

Frederick Maier, Buffalo, N. Y.

Application June 2, 1936, Serial No. 83,149

5 Claims. (Cl. 107—14)

This invention relates to the bakery art and primarily to an apparatus for forming or shaping doughnuts, and like fried cakes.

It has heretofore been proposed to mold or shape doughnuts by machine methods but their production has been a tedious and slow task and because of the construction of the machines, it has been impractical to deposit a large quantity of raw doughnuts into the cooking bath with sufficient rapidity to insure uniform frying thereof. By the former methods, it has been the practice to remove the doughnuts as they become fried and since the doughnuts in the raw were deposited at wide intervals, it was necessary to leave the remainder of the batch in the bath to continue frying, thus requiring the constant attention of the attendant without assurance that the entire batch of doughnuts will be uniformly fried.

The object of the present invention is to provide a doughnut former or shaper by which a large number of doughnuts may be expeditiously extruded and deposited in the cooking bath so that the entire batch will be subjected to the frying action for substantially the same period and thereby insure uniformity in the finished product.

The invention further resides in the salient features of construction and their arrangements and combination of parts by which the machine is rendered practical in design and economical in construction, and may be expeditiously cleaned and repaired.

A practical embodiment of the invention has been illustrated in the attached drawings wherein

Fig. 1 is a side elevation of the improved doughnut former;

Fig. 2 is a bottom plan view thereof;

Fig. 3 is a vertical transverse section through the machine;

Fig. 4 is a detailed perspective view of the cutter actuating mechanism;

Fig. 5 is a detailed perspective view of a part of the molding plate;

Fig. 6 is a fragmentary vertical sectional view depicting a slightly modified extruding construction;

Fig. 7 is a bottom plan view of the modified form of the invention wherein the design of the extruding port or mouth is altered for the production of bar-like doughnuts or sticks; and

Fig. 8 is a detailed perspective view of a part of the cutter operating mechanism used in the modified showing; and

Figs. 9 and 10 are perspective views of the doughnut sticks in the raw and fried state, respectively.

Referring more particularly to the drawings, the numeral 1 designates a hopper in which a batch of dough is deposited for feeding downwardly through the restricted throat 2 and between a pair of rollers 3 and 4, which latter further produce a kneading action upon the dough, preliminary to the same passing through the extruding ports. Each roller is provided therebeneath with a scraper plate 5 the upper edge of which is resiliently urged against the periphery of the rollers by springs 6. The plates have their lower edges pivotally supported in seats 7 of transverse frame members 8 where they are removably held by these springs.

The scraper plates define a downwardly flaring passage from the rollers to the extruding or molding plate 9, which latter is provided with a mounting flange 10 that underlies the transverse frame members 8 and is adapted to be clamped thereagainst by jaws 11. The jaws are provided with upright extensions 12 through which pass screws 13, their inner ends being designed to engage upwardly inclined camming faces 14 so that as the screws are turned inwardly, the jaws 11 will be pulled upwardly toward the under side of the transverse frame members for firmly clamping the flanges 10 in position.

The doughnuts may be of the usual circular form and for this reason the extruding plate or die 9 is provided with one or more extruding nozzles 16 with circular ports for imparting a substantially like shape to the raw doughnut as it is extruded or forced therethrough, or the dough ports may be otherwise shaped, such as is shown at 17 in Fig. 7, by which bars or sticks are formed. For ease of description the term "doughnut" is used in an inclusive sense to cover the bar or any other particular shape given to the molded product.

In order to properly distribute the dough as it comes from the rollers 3 and 4 a partition plate 18 (Fig. 6) may be disposed in an upright position between adjacent groups of extruding nozzles so as to extend upwardly from the extruding member and preferably between the rollers so as to divide and insure a proper distribution of the dough. For its passage through the extruding nozzles the dough is put under pressure by the rollers. Consequently, the dough is given a final kneading action by the initial pulling on the dough from the hopper followed by the compressive action.

To complete the formation of the raw doughnut the extruded body is severed at intervals to give the desired depth of body to the doughnut. According to the present disclosure this severance is effected by a cutting wire 19 which is supported under tension by resilient arms 20 and is normally disposed in a plane slightly above the discharge end of the extruding nozzle 9. In order to have the wire pass over the port 16 it is obvious that the wire will have to be additionally tensioned or sprung from its normal position and to accomplish this, means are provided to deflect the cutting wire downwardly for passage over the lower end of the port. This deflection is accomplished according to the present disclosure by a camming surface 21 on the outer lower end of the nozzle 9 and in the path of the wire so that as the latter contacts such camming surface, the wire will ride thereon downwardly against the tension of the spring supporting arms 20, so that at the time the wire passes over the discharge port 16 it will be sufficiently taut to shear off the dough with a clean cut and without tearing into or otherwise mutilating its given shape. The wire supporting arms 20 are carried on a slide or carriage 22 which is slidably mounted in guideways 23 formed in the plate 9. Therefore, the molding plate is removable with the cutter slide as a unit to facilitate cleaning and repairing the same.

Means are provided for automatically actuating the slide with the operation of the rollers 3 and 4. The latter may be driven by any suitable power, the present showing being adapted for manual power by a hand crank 25 which is fixed to a transverse shaft 26 journalled in suitable bearings on the body frame structure 27. The shaft is intergeared with the rollers through the transmission 28 conveniently arranged adjacent one end of the shaft. Fixed on the shaft 26 is a camming disc 30 (Fig. 4) which is provided with an upstanding cam 31 extending thereabout for approximately 180°. This cam is designed to impart oscillatory motion to a vertical shaft 32 on the lower end of which is a crank arm 33 that carries a roller 34 for acting on the cutting wire carriage 22, the latter being formed with an opening 35 to receive the roller. To effect this oscillatory movement of the shaft 32 the latter is provided with a pair of follower arms 36 and 37, and the effective portion of the cam 31 is of sufficient length for a duration of operation such that the cam will leave one follower arm before acting on the companion follower arm to rock the shaft 32 in the opposite direction. Since the disc 30 is being constantly rotated, there will be an alternate rotary motion imparted to the shaft 32, first in one direction, then in the opposite direction.

In the modification shown in Figs. 6 and 7 the cutter carriage 40 is supported by guiding lugs 41 and rollers 42, which guide parts are mounted on the molding plate 46. Reciprocatory motion may be imparted to the carriage by a crank arm 43 having its outer end connected to the carriage by a link 44 so as to accommodate the arcuate movement of the arm. This arm, like arm 33, is fixed to the shaft 32 and has oscillatory motion imparted thereto in a manner similar to that heretofore described. It is, therefore, desired to replaceably attach the arms 33 and 43 by a pin 45 to permit interchangeability thereof. Likewise the molding plates 9 and 46 are interchangeable with their respective cutter carriages, and in this connection, it will be noted that the carriage 40 moves transversely of the machine and as distinguished from the movement of carriage 22.

In operation the dough having been deposited in the hopper 1 is fed downwardly between the rollers 3 and 4 and between the resiliently mounted scraper plates 5 to the extruding nozzles 16, the dough being distributed transversely of the machine by the upright partition plate 18. As the rollers are turned from the power shaft 26, the motion translating mechanism, embodying the cam 31 and the follower arms 36 and 37, serves to reciprocate the cutter carriage for bringing the cutting wires across the nozzle ports to sever the shaped dough at proper intervals. In Fig. 2 three extruding nozzles have been illustrated of circular shape while in Fig. 6 four nozzles have been depicted. It has been found in practice to narrow the outer arcs of the outside nozzle openings of the row, as by superimposing reducing plates 51 to overhang the nozzle openings with a crescent exposure (Fig. 2), in order to extrude round doughnuts. These plates appear desirable for uniformity in product as extruded under pressure. Also it has been found better to enlarge the ends of the bar openings 17 in order to give the raw sticks the shape indicated in Fig. 9, because the fried product (depicted in Fig. 10) will cook to a more uniform thickness throughout. Since the wires cut off the raw doughnuts on each stroke across the nozzles, it will be obvious that the operator may expeditiously form his raw doughnuts and discharge them into the frying bath in rapid order to avoid those first deposited being cooked to any great extent before the remainder of the batch has been deposited.

To facilitate this depositing operation the doughnut former may be mounted upon a crane-like structure and provided with a handle 53 by which it may be moved over the frying bath, and by way of illustration this mounting may be accomplished by an arm having an outer section 47 telescopically extensible in an inner section 48 into which it may be guided by friction rollers 49. This supporting structure forms a part of the subject matter of my co-pending application.

Consequently by the present arrangement the doughnut former may be moved or swung from a position away from the tank 50 which contains the frying bath and the dough supply replenished. Thereafter the machine is returned to a depositing position over a frying bath and within a short interval of time the dough may be quickly shaped into the raw doughnuts, row upon row. A splash plate 52 will protect the hand from the hot grease as the doughnuts are deposited.

While the present construction has been described with great detail, it is obvious that the inventive principles herein involved may assume other physical forms and embodiments and, therefore, it is not the intention to restrict the scope of the present invention thereby.

What is claimed:

1. A doughnut forming machine comprising a frame having a hopper, an extruding plate removably supported on the frame beneath the hopper, means for feeding dough from the hopper through the extruding plate, said extruding plate having nozzles extending downwardly therefrom, and means movably supported by said plate for severing the extruded dough, said severing means and said plate being removable as a unit.

2. A doughnut forming machine comprising a frame having a hopper, a pair of rollers receiving dough from the hopper, an extruding plate removably supported on the frame beneath the rollers, said extruding plate having nozzles extending downwardly therefrom, means movably supported by said plate for severing the extruded dough, said severing means and said plate being removable as a unit, and means on the frame for reciprocating said severing means, said reciprocating means being operatively connected to the severing means in a manner to permit removal of the unit.

3. A doughnut forming machine comprising a frame having a hopper, an extruding die supported beneath the hopper, means for feeding the dough from the hopper through the die, means for clamping the die on the frame, a carriage movably mounted on the die and removable as a unit therewith from the machine, means on the frame detachably connected to the carriage for operating it and permitting removal of the unit and a cutter supported by the carriage for severing the extruded dough.

4. A doughnut forming machine having a hopper, means for feeding the dough from the hopper, a removable extruding nozzle receiving the dough so fed, means carried by the nozzle for severing the extruded dough, and means for reciprocating the severing means across the nozzle.

5. A doughnut forming machine comprising a frame having a hopper, an extruding die supported beneath the hopper, means for feeding the dough from the hopper through the die, means removably securing the die to the frame, severing means movably supported on the die and removable from the frame with the die as a unit, and means mounted on the frame for operating the severing mean, said severing means having a part interlocking with said operating means for establishing a driving connection therebetween and permitting disconnection of the severing means from the operating means when the unit is removed from the frame.

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