May 7, 1940. A. S. T. LAGAARD 2,199,854

DOUGHNUT MACHINE

Filed May 1, 1939 2 Sheets-Sheet 1

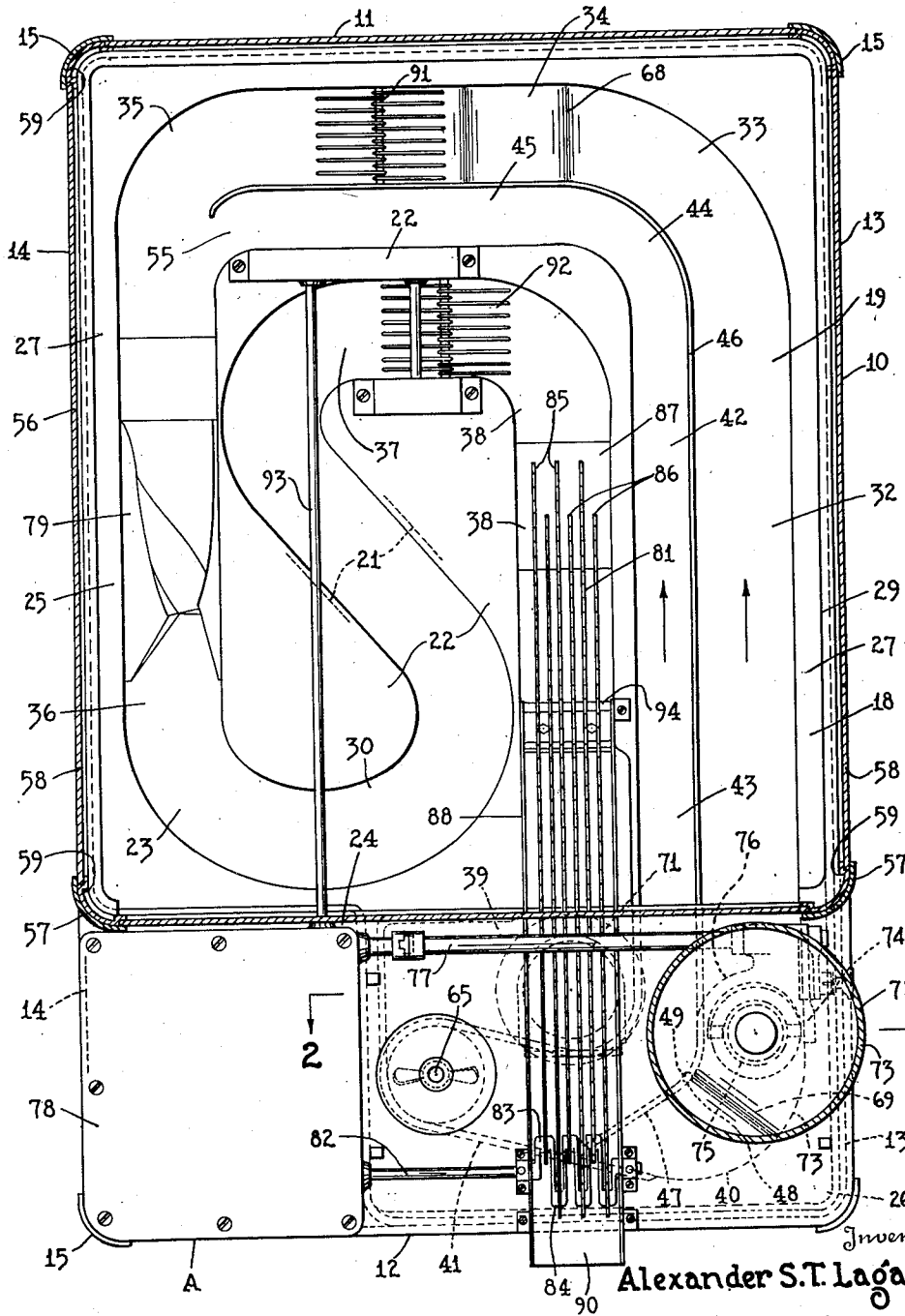


Fig. 1

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Fig. 2

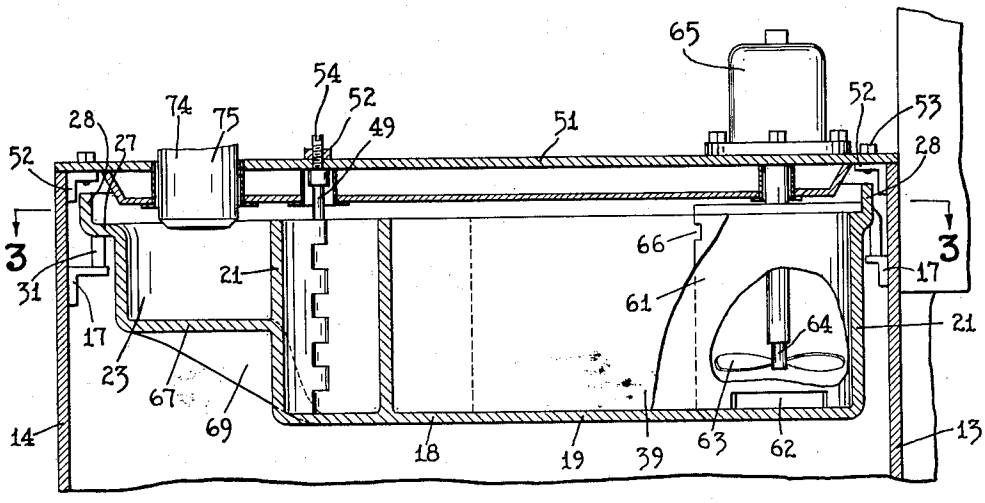
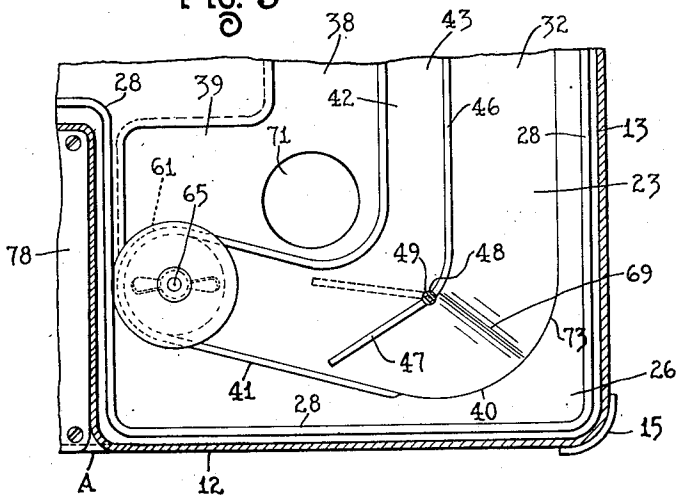


Fig. 3



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DOUGHNUT MACHINE

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8 Claims. (Cl. 53—7)

My invention relates to doughnut machines and has for an object to provide a doughnut machine in which the doughnuts are progressed along a way in a channel through the flow of the cooking liquid therein.

Another object of the invention resides in providing a doughnut machine of such character in which injury to and deformation of the doughnuts is entirely prevented during the cooking thereof.

An object of the invention resides in providing a doughnut machine in which the flow in the way at the locality of the doughnut forming means is relatively slow to prevent injury to and deformation of the doughnuts prior to complete cooking.

Another object of the invention resides in providing the doughnut machine with a turner and in causing the cooking liquid to travel rapidly through the turner to procure positive operation therein.

A still further object of the invention resides in providing a doughnut machine having a channel by-passing the portion of the way in which the raw doughnuts are deposited and conducting a portion of the cooking liquid around the portion of the way in which initial cooking takes place and discharging the same back into the channel at the locality of and in advance of the turner.

A feature of the invention resides in constructing both channels so that the same are open at the top and readily accessible for cleaning and otherwise.

Other objects of the invention reside in the novel combination and arrangement of parts and in the details of construction hereinafter illustrated and/or described.

In the drawings:

Fig. 1 is a plan sectional view of a doughnut machine illustrating an embodiment of my invention.

Fig. 2 is an elevational sectional view of a portion of the structure shown in Fig. 1 and taken on line 2—2 of Fig. 1.

Fig. 3 is a fragmentary plan sectional view taken on line 3—3 of Fig. 2.

In the operation of doughnut machines in which the doughnuts are progressed along a way through the flow of the cooking liquid considerable difficulty has been encountered where a turner also operated by the flow of the cooking liquid is employed. In such case if a sufficient rate of flow is procured to positively turn the doughnuts the rate is so great that the doughnuts during initial cooking become irregular in shape and flattened out of round. The present invention provides a doughnut machine in which a portion of the cooking liquid from the impelling means is by-passed around the doughnut forming means and a portion of the run following the same and discharged back into the way shortly in advance of the turner.

In the drawings I have shown a doughnut machine A which consists of a case 10 constructed with end walls 11 and 12 and side walls 13 and 14 connected therewith. The case includes uprights 15 disposed at the outer corners of the same which extend throughout the height of the case and to which the various walls are attached. Secured to the various uprights 15 are angle frame members 17 which stiffen the case and which serve as supports for the kettle of the invention.

Within the case 10 is disposed a cooking kettle 18 which is preferably of cast material and which is constructed with a bottom 19 and with vertical walls 21 extending upwardly therefrom. The vertical walls are connected at their upper end with upper walls 22 and the various walls are so arranged as to form a channel 23 which extends throughout the major portion of the kettle and which provides a way along which the doughnuts may travel. The kettle 18 has one corner of the same removed, as designated at 24, leaving a main portion 25 of the width of the case and of a length less than the length thereof. This construction also provides an extension 26 to the kettle which extends up to the end wall 12. The kettle 10 is constructed with a ledge 27 extending about the margin of the same which terminates in a lip 28 projecting upwardly from the extreme edge thereof. A guard 29, on the case 10, issues inwardly from the walls thereof and overlies the lip 28, thereby protecting the same and at the same time being spaced therefrom to retard transmission of heat from the kettle to the case. The kettle 18 is supported on the angle frame members 17 through supporting blocks 31, which are situated at spaced intervals throughout the length thereof.

The channel 23 is arranged to provide a straight run 32 which commences in close proximity to the wall 12 and follows along wall 13. The channel 23, at the end of the run 32, makes a curve 33 which leads into another straight run 34 following along the wall 11. At the end of this run the channel has another curve 35 which leads into still another straight run 36 which follows along the wall 14. At the end of the run 36 the channel is constructed with a

loop 30 which communicates with another loop or run 37. The latter run communicates with a straight run 38 which is parallel with the run 32. The run 38 discharges into a reservoir 39 which is merely an enlargement of said run. From this reservoir a short run 41 is provided which forms part of a loop 40 connected to the beginning of the run 32.

Adjacent the runs 32, 33, 34 and 35 of the channel 23 is another channel 42 which is provided with a straight run 43 disposed between the runs 38 and 32 and parallel therewith. This run communicates with a curved run 44, parallel with the run 33 of channel 23 and with a straight run 45 parallel with the run 34 of the other channel. The channel 42 communicates with the channel 23 at the run 41 and also at the run 35. The channel 42 and the portion of the channel 23, following along the same, are formed by providing a partition 46 in a depression in the kettle 18, which partition extends up to the lever of the walls 22. It will thus be seen that all of the runs of both of the channels are open from above so that access may be had to the interior thereof.

The entry of cooking liquid into the two runs 43 and 32 is controlled by a valve 47, best shown in Figs. 2 and 3. This valve is pivoted at 48 to the end of the partition 46 and is constructed with a pintle 49 projecting upwardly therefrom. This pintle is threaded at its end and extends through a plate 51 covering the exposed portion 40 of the channel 23. This plate is secured to the frame A by means of angles 52 which are secured thereto. Bolts 53, passing through this plate and threaded in the said angles secure the parts in position. The protruding end of the pintle 49 is constructed with a screw driver slot 54 by means of which the same may be rotated. By means of this construction the valve 47 may be held in any adjusted position intermediate the positions shown in full and dotted lines in Fig. 3. The end of the channel 42 is provided with an outlet 55 which communicates with the channel 23 at the run 35 thereof and discharges into the straight run 36 in the same direction as the direction of flow of the cooking liquid therein derived from the runs 32, 33 and 34 of channel 23.

The major portion 25 of the kettle 18 is enclosed by means of a hood 56. This hood utilizes the uprights 15 at the end wall 11 and two other uprights 57 which are attached to the case at the locality of the end of the major portion 25 of the kettle formed by the corner 24. Between these uprights are provided glass panels 58 which are slidably supported in guides 59 whereby the said panels may be removed. The entire hood is enclosed by a top, not shown, which is carried by the uprights 15 and 57. The hood is so designed that the same encloses the runs 33, 34, 35, 36 and 37 of the channel 23 and the major portions of the runs 38 and 32 leaving part of the reservoir 39 and the cover 40 disposed outwardly of said hood. The said hood also encloses a portion of the run 43 of channel 42 and all of the runs 44 and 45 of said channel.

In the reservoir 39 is provided a vertical tubular duct 61 which communicates at its lower end with the bottom of the reservoir 39 through an opening 62. In this duct is disposed a propeller or elevator 63 which is mounted on the armature shaft 64 of a motor 65. The duct 61 communicates at its upper end through an outlet 66 with the run 41 of channel 23, thus discharging the cooking liquid from the reservoir 39 and into the said run of the channel. The cooking liquid, on leaving the run 41, is divided by the valve 47, part flowing through the channel 23 and part flowing through the channel 42. The relative amount of cooking liquid flowing in each channel is determined by the position of the valve 47 which may be arranged to procure any desired proportion in the two channels. The depth of the cooking liquid in the runs 32 and 33 of the channel 23 is considerably less than in the channel 42 and in the remainder of the channel 23. This is accomplished by raising the bottom of the kettle, as illustrated at 67 in Fig. 2. It will thus be comprehended that a small amount of cooking liquid travels through the run 32 and that the velocity of the same is relatively slow. The bottom 67 of run 32 slopes downwardly toward the bottom 19 at the two localities indicated at 68 and 69.

At the lowermost portion of the reservoir 39 is arranged a clean-out 71. This clean-out serves as a sump for collecting crumbs and other solid material formed in the operation of the machine. This construction, forming no particular feature of the invention has not been illustrated in detail.

Situated at the beginning of run 32 of channel 23 is a doughnut former 72 which comprises a receptacle 73 for dough and a cutter 74 connected therewith. Such construction being well known in the art will not be described in detail in this application. The cutter 74 includes a flanged sleeve 75 which severs dough extrusions from the mass contained in the receptacle 73. This sleeve is reciprocated in opposite directions by means of a forked arm 76 which is mounted on a shaft 77. Shaft 77 is operated by a motor and transmission enclosed within a transmission housing 78. Inasmuch as the driving mechanism for the shaft 77 does not form a feature of the instant invention the same has not been illustrated. It will thus readily become apparent that doughnuts extruded from the doughnut former 74 are deposited in the flowing cooking liquid which travels along the run 32 of channel 23 in the direction of the arrow.

In the run 36 of channel 23 is arranged a twisted tubular turner 79. This turner inverts the doughnuts after the same have been cooked a predetermined length of time so that the said doughnuts may be cooked equally on both sides thereof.

The doughnut machine includes an ejector 81 which is disposed in the run 38 of channel 23. This ejector comprises a shaft 82 which is constantly driven from the transmission within the housing 78. This shaft has mounted on it oppositely extending cranks 83 and 84. Sets of toothed blades 85 and 86 are mounted on the said cranks and are adapted to be alternately raised and lowered as shaft 82 rotates. The lower ends of the blades slide upon a rest 87 which is mounted on the bottom 19 of receptacle 18 in the portion of the run 38 leading from the run 37. As the doughnuts reach the said blades the doughnuts are elevated and progressed upwardly and discharged outwardly of the cooking kettle 18. The ejector 81 is disposed in a trough 88 having a discharge end 90 extending outwardly beyond the kettle. This trough returns the cooking liquid deposited upon the same back into the kettle.

For controlling the rate of travel of doughnuts along the channel 23, two controlling devices 91 and 92 are employed. These controlling de-

vices operate to allow the doughnuts, one at a time, to enter the turner and ejector 81. These control devices are operated by a shaft 93 driven from the transmission within the housing 78 and are moved periodically at predetermined intervals. Inasmuch as any desired construction may be used for this purpose and since this construction does not form a particular feature of the instant invention, the details thereof have not been shown, nor will the same be described. Where the machine is of fairly large capacity the control devices 91 and 92 may be omitted and the rate of flow of the cooking liquid used to time the cooking of the doughnuts.

For controlling the elevation of the cooking liquid in the channel, a dam 94 is employed which extends across the run 38 of channel 23, at the locality of the beginning of the reservoir 39. The cooking liquid, in flowing through the channel 23 passes over this dam and is maintained at a predetermined elevation thereby.

The operation of the invention is obvious. The cooking liquid is brought up to the desired temperature and so maintained throughout the use thereof. Upon energizing motor 65 the cooking liquid is drawn from the reservoir 39 and discharged into the run 41 of channel 23. Here the cooking liquid divides, part going into the run 43 of channel 42 and part passing into the run 32 of channel 23. By properly positioning the valve 47 a sufficiently slow rate of flow of the cooking liquid in run 32 is procured so that deformation of or injury to the doughnut is prevented. From runs 43 and 32 the cooking liquid empties into the run 36 of channel 23 which serves as a third channel in which the rate of flow is considerably greater than in either of the first channels. It will become apparent that where the outlet 55 of channel 42 empties into the channel 23, the rate of flow naturally increases. This is immediately before the turner 79 so that the doughnut upon reaching the turner is forcibly propelled through the same and positive inversion secured. As the doughnuts reach the control devices 91 and 92 the same are released, one at a time, to enter the turner 79 and the ejector 81. In this manner proper timing of the cooking is made possible.

The advantages of my invention are manifest. By means of the additional channel for by-passing a portion of the cooking liquid, the rate of flow of the cooking liquid in the main channel immediately following the forming means is greatly retarded so that injury to the doughnuts is prevented. At the same time sufficient cooking liquid is forced through the machine so that, when the cooking liquid unites at the turner, a sufficient rate of flow is available to properly and positively invert the doughnuts. By arranging both channels open at the top, access thereto may be had and the said channels cleaned and inspected, as desired. By means of the valve, the relative rates of flow in the two channels may be easily determined so that adjustment of the impelling means or the speed of the motor becomes unnecessary.

Changes in the specific form of my invention, as herein disclosed, may be made within the scope of what is claimed without departing from the spirit of my invention.

Having described my invention, what I claim as new and desire to protect by Letters Patent is:

1. In a doughnut machine, a kettle having a channel providing a circuitous way along which the doughnuts are progressed through the flow of the cooking liquid, forming means for depositing raw doughnuts at one locality in said way, a turner for inverting the doughnuts at another locality in the way, impelling means disposed in advance of the forming means and causing flow of the cooking liquid in the channel and a second channel in said kettle connected to the first channel at a locality between the impelling means and forming means, and receiving a portion of the cooking liquid delivered by the impelling means, said second channel forming a by-pass for by-passing the cooking liquid past a portion of the first channel and discharging the same into said first channel at a locality in advance of said turner.

2. In a doughnut machine, a kettle having a channel providing a circuitous way along which the doughnuts are progressed through the flow of the cooking liquid, forming means for depositing raw doughnuts at one locality in said way, said way having a run following the forming means in which initial cooking of the doughnut takes place, a turner following said run for inverting the doughnuts, impelling means in advance of the forming means and causing flow of the cooking liquid in the channel and a second channel in said kettle by-passing the forming means and said run and receiving a portion of the cooking liquid moved by said impelling means and discharging the same into the first named channel in advance of the turner.

3. In a doughnut machine, a kettle, said kettle having two spaced parallel channels, means for impelling the flow of cooking liquid through both of said channels, forming means for depositing raw doughnuts in one of said channels, a third channel into which the first and second channel discharge, and a turner in the third channel.

4. In a doughnut machine, a kettle having a channel open at the top and providing a circuitous way along which the doughnuts are progressed through the flow of the cooking liquid, forming means for depositing doughnuts at one locality in said way, a turner for inverting the doughnuts at another locality in the way, impelling means disposed in advance of the forming means and causing flow of the cooking liquid in the channel, and a second channel open at the top and disposed adjacent said first channel, said second channel being connected to the first channel at a locality between the impelling means and the forming means and receiving a portion of the cooking liquid progressed by the impelling means, said second channel discharging into the first channel at a locality in advance of said turner.

5. In a doughnut machine, a kettle having a channel providing a circuitous way along which the doughnuts are progressed through the flow of the cooking liquid, forming means for depositing raw doughnuts at one locality in said way, a turner for inverting the doughnuts at another locality in the way, impelling means disposed in advance of the forming means and causing flow of the cooking liquid in the channel, and a second channel in said kettle connected to the first channel and by-passing a portion of the cooking liquid past the forming means.

6. In a doughnut machine, a kettle having a channel providing a circuitous way along which the doughnuts are progressed through the flow of the cooking liquid, forming means for de-

positing raw doughnuts at one locality in said way, a turner for inverting the doughnuts at another locality in the way, impelling means disposed in advance of the forming means and causing flow of the cooking liquid in the channel and a second channel in said kettle connected to the first channel at a locality between the impelling means and forming means, and receiving a portion of the cooking liquid delivered by the impelling means, said second channel forming a by-pass for by-passing the cooking liquid past a portion of the first channel and discharging the same into said first channel at a locality in advance of said turner, and means for regulating the amount of cooking liquid passing through the first named channel.

7. In a doughnut machine, a kettle having an elongated depression therein open from the top, a partition in said depression forming therein two channels, one of said channels forming a way along which doughnuts are progressed through the flow of cooking liquid, forming means for depositing the doughnuts in said way at a locality near one end of said partition, a turner for inverting said doughnuts and disposed in said way at a locality beyond the other end of said partition, impelling means for impelling the flow of cooking liquid in both of said channels, the cooking liquid in both of said channels uniting in advance of said turner and jointly passing therethrough, said turner operating through the flow of the cooking liquid.

8. In a doughnut machine, a kettle having a channel providing a circuitous way along which the doughnuts are progressed through the flow of the cooking liquid, forming means for depositing raw doughnuts at one locality in said way, said way having a run following the forming means in which initial cooking of the doughnut takes place, a turner following said run and operating through the flow of the cooking liquid, impelling means for causing flow of the cooking liquid in the channel and means for procuring a relatively slow flow of cooking liquid at the locality of said forming means and in said run and for procuring relatively rapid flow of the cooking liquid through said turner.

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