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CONTROL MECHANISM FOR POPCORN MACHINE

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No. OF CLAIMS 10

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CONTROL MECHANISM FOR POPCORN MACHINE

This invention relates to a machine for the preparation of popcorn, and more particularly to control mechanism therefor, the primary object being to provide a fully automatic machine capable of successive cycles of operation contemplating the dispensing of corn and salt, as well as liquid seasoning into a popping kettle, dumping the popcorn from the kettle and re-initiating successive cycles without operator attention until one of the ingredient supplies becomes exhausted.

It is an important object of the present invention to provide a popcorn machine of the kind employing thermostatic control means for determining the period of time during which popping takes place by initially causing a dumping action when the popping kettle rises to a predetermined temperature, there being apparatus for thereupon feeding a new batch of corn, salt and seasoning into the kettle, whereupon the heating cycle is resumed as soon as the thermostatic means cools to a predetermined temperature.

Another important object of the instant invention is to provide a popcorn machine wherein dumping apparatus is employed having an additional function of initiating automatic feeding of the ingredients to the kettle to the end that successive batches are popped immediately upon reclosing of a heater circuit by operation of the thermostatic means.

A still further object of the present invention is to provide a popcorn machine that employs control

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means responsive to dumping for directing seasoning into the kettle, and to successively provide for dispensing of corn and salt in response to the operation of the feeding of the seasoning.

In the drawings:

Fig. 1 is a schematic, diagrammatical view illustrating a control mechanism for popcorn machines made pursuant to one form of the present invention.

Fig. 2 is a view similar to Fig. 1, illustrating another form of the present invention; and

Fig. 3 is a view similar to Figs. 1 and 2 showing still another embodiment of the instant invention.

The principles of the instant invention do not depend upon any particular mechanical construction insofar as popping kettle 10, corn and salt dispensing means 12 and feeding means 14 for liquid seasoning are concerned. Hence, kettle 10 is shown adapted to dump the popped corn by virtue of a downwardly swingable bottom 16, hinged at 18 and under the direct control of a motor 20 that completes one cycle of rotation each time it swings the bottom downwardly and returns it to the kettle-closing position illustrated in Fig. 1.

Dispensing means 12 is shown merely as including a supply container 22 having slidable gate means 24 under control of solenoid 26 for dumping a measured supply of ingredients to kettle 10 each time solenoid 26 is actuated.

Feeding means 14 includes a seasoning well 28 and a pump 30 for transferring a predetermined amount of seasoning from well 28 to kettle 10 each time motor 32 for pump 30 is energized.

Heating of the kettle 10 to pop the corn is accomplished through use of a heater 34 in bottom 16, the latter of which also houses a thermostatic switch 36 that remains closed as shown until kettle 10 is heated to a predetermined temperature.

During operation of motor 20, its drive shaft simultaneously rotates a pin 38 a complete revolution to actuate poles 40 and 42 of a pair of switches 44 and 46 respectively. Similarly, during rotation of the drive shaft for motor 32, cam 48 rotates to control switches 50 and 52.

Switches 54 and 56 for container 22 and well 28 respectively, remain in the position shown until either the supply of corn or the supply of oil seasoning is depleted, whereupon the same are actuated through any suitable mechanisms (not shown) to shift the poles thereof to the corresponding opposite contacts.

Assuming that kettle 10 contains a batch of raw popcorn, salt and seasoning, and that bottom 16 is fully closed, closing of manual switch 58 energizes heater 34 through the following circuit:

From line 60, through switch 58, wires 62, 64, 66, and 68, heater 34, wires 70 and 72, thermostat 36, and wires 74, 76 and 78 to line 80.

It is to be noted that the resistance of motor 20 as compared with that of thermostat 36 is relatively high; therefore, motor 20 will not operate until thermostatic switch 36 opens.

By the time kettle 10 is sufficiently hot to cause the thermostat 36 to be actuated, heater 34 com-

mences to cool and motor 20 is immediately energized through the following circuit:

From line 60, through switch 58, wires 62, 64, 66 and 68, heater 34, wires 70 and 82, motor 20, wire 84, pole 40 and contact 86 of switch 44, and wires 88 and 78 to line 80.

Motor 20 dumps bottom 16 and returns it to a position nearly closed before pin 38 moves pole 40 against contact 90 to break the circuit for motor 20 just above traced. Before pin 38 comes to rest, pole 42 is also actuated by pole 40 into engagement with contact 92.

This energizes motor 32 through the following circuit:

From line 60, through switch 58, wires 62, 64 and 94, pole 42 and contact 92 of switch 46, wire 96, switches 50 and 52, motor 32, wires 98 and 100, switch 54, wire 102, switch 56, and wires 104, 76 and 78 to line 80.

Motor 32 pumps seasoning into kettle 10 until cam 48 releases switches 50 and 52, whereupon motor 32 is de-energized and simultaneously, solenoid 26 is energized through the following circuit:

From line 60, through switch 58, wires 62, 64 and 94, pole 42 and contact 92 of switch 46, wire 96, switch 50, wire 106, solenoid 26, wires 108 and 100, switch 54, wire 102, switch 56, and wires 104, 76 and 78 to line 80.

Dumping of ingredients into kettle 10 hastens the cooling of thermostat 36 and as soon as the same re-

closes, motor 20 is again energized through the following circuit:

From line 60, through switch 58, wires 62, 64, 66 and 89, contact 90 and pole 40 of switch 44, wire 84, motor 20, wires 82 and 72, thermostat 36, and wires 74, 76 and 78 to line 80.

As soon as pin 38 slips off pole 40 and assumes the position shown in Fig. 1, the last mentioned circuit for motor 20 is broken, but by this time bottom 16 is fully closed.

Return movement of the pole 42 to the position shown in Fig. 1 energizes motor 32 through the following circuit:

From line 60, through switch 58, wires 62, 64 and 94, pole 42 and contact 110 of switch 46, wire 112, switch 52, motor 32, wires 98 and 100, switch 54, wire 102, switch 56, and wires 104, 76, and 78 to line 80.

Motor 32 does not remain energized sufficiently long to pump any seasoning into kettle 10 for cam 48 soon returns to the position shown in Fig. 1, and as switches 50 and 52 reassume the normal positions illustrated, motor 32 is de-energized.

When switches 54 and 56 respond to exhausted supplies, lamps 114 and 116 respectively are lighted to alert the operator. Operation of either switch 54 or 56 will prevent motor 32 from operating and, therefore, solenoid 26 from being energized. Thus, at no time will corn and salt alone or seasoning alone, be fed into the kettle 10.

In the modification of Fig. 2, the thermostatic switching device 36 of Fig. 1 has been eliminated in favor

of a single pole, double-throw thermostat 236, having its pole engaging contact 204 during popping and in engagement with contact 206 when the kettle 10 has been heated to a predetermined temperature.

Wires 72, 76, 78, 82, 88 and 89 of Fig. 1 are eliminated and new wires 200, 208, 210 and 212 appear in Fig. 2. Otherwise, the machine as depicted in Fig. 2 is the same as in Fig. 1; accordingly, like reference numerals are used to designate identical parts.

Heater 34 in Fig. 2 is energized through the following circuit:

From line 60, through switch 58, wires 62, 64, 66 and 68, heater 34, wire 70, thermostat 236 (via contact 204) and wires 74 and 200 to line 80.

When thermostat 236 moves into engagement with contact 206, motor 20 is energized as follows:

From line 60, through switch 58, wires 62, 64, 66 and 210, motor 20, wire 84, pole 40 and contact 86 of switch 44, wire 212, thermostat 236 (via contact 206) and wires 74 and 200 to line 80.

From this point, the cycle of operation is the same as in Fig. 1 except that upon cooling, wherein thermostat 236 re-engages contact 204, the circuit for operating motor 20 to complete the closing of bottom 16 until pin 38 slips off poles 40-42, is traced as follows:

From line 60, through switch 58, wires 62, 64, 66 and 210, motor 20, wire 84, pole 40 and contact 90 of switch 44, wire 208, thermostat 236 (via contact 204) and wires 74 and 200 to line 80.

It is to be noted that in the form of the invention shown by Fig. 2, motor 20 is not in series

with heater 34 during the dumping cycle, as in Fig. 1. The same is true in the embodiment of Fig. 3, wherein is provided, in lieu of the single thermostatic switch 36 of Fig. 1, a pair of single pole, single-throw, thermostatic switches 336 and 337 within bottom 16 of kettle 10. Switch 336 opens and switch 337 closes upon completion of popping, i.e., a temperature rise to a predetermined level.

Here again, wires 72, 74, 76, 78, 82, 88 and 89 of Fig. 1 have been eliminated and new wires 300, 308, 310, 312, 314 and 316 appear in Fig. 3. Otherwise, the machine shown in Fig. 3 is the same as in Fig. 1 and like reference numerals are employed.

Heater 34 in Fig. 3 is energized through the following circuit:

From line 60, through switch 58, wires 62, 64, 66 and 68, heater 34, wire 70, thermostat 336, and wires 314, 316 and 300 to line 80.

When thermostat 337 closes, motor 20 is energized as follows:

From line 60, through switch 58, wires 62, 64, 66 and 310, motor 20, wire 84, pole 40 and contact 86 of switch 44, wire 312, thermostat 337 and wires 316 and 300 to line 80.

From this point, the cycle of operation is the same as in Fig. 1 except that upon cooling, wherein thermostat 336 recloses, the circuit for operating motor 20 to complete the closing of bottom 16 until pin 38 slips off poles 40-42 is traced as follows:

From line 60, through switch 58, wires 62, 64, 66 and 310, motor 20, wire 84, pole 40 and contact 90 of switch 44, wire 308, thermostat 336, and wires 314, 316 and 300 to line 80.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In a machine for the controlled preparation of popcorn, a popping kettle having an open lowermost end and a swingably mounted bottom thereon, said bottom being movable from a location closing the lowermost end to a location clearing said lowermost end; electrically responsive heater means mounted within the bottom of the kettle in thermal contact therewith for heating the latter and thereby popcorn contained within the kettle when the bottom closes said lowermost end; electrically responsive dumping means operably coupled with the bottom for shifting the latter relative to said kettle to clear said open end and thereby permit the discharge of the contents of the kettle; thermostatically controlled electrical switching means mounted within the bottom of the kettle proximal to said heater means for actuating said heater means when said switching means is in a closed position, said switching means being actuatable from said closed position to an open position responsive to a predetermined elevated temperature parameter of the bottom of said kettle to thereby actuate said heater means and said dumping means simultaneously; a source of electrical power; and electrical circuit means electrically coupling said heater means, said dumping means and said switching means with said source for operating said heater means only while said switching means is in the closed position and for operation of said heater means and said dumping means while said switching means is in said open position, said dumping means including a motor for returning said bottom toward said closing location after said bottom has moved into said clearing location, there being means on said dumping means for deenergizing said motor when said bottom is in a partially closed, contents-retaining location and for interconnecting said motor and said thermostatically controlled switching means in a series relationship with said source until said bottom is in said closing location

thereof, whereby said bottom is moved to the closing location thereof when said last-mentioned switching means moves to its closed position upon cooling.

2. In a machine as set forth in Claim 1, wherein said thermostatically controlled switching means includes a circuit breaker, and said circuit means includes first electrically conductive means for electrically coupling said heater means and said circuit breaker in series and to said source, and second electrically conductive means for electrically coupling said dumping means in parallel with said circuit breaker.

3. In a machine as set forth in Claim 2, wherein said dumping means includes structure operably coupled with said bottom and disposed for shifting the latter to a contents discharging condition during a first phase of the operation of said dumping means, for shifting the bottom to a partially closed and contents retaining position during a second phase of said operation, and for shifting said bottom to a fully closed position during a third phase of said operation wherein the kettle is in its normal popping condition.

4. In a machine as set forth in Claim 3, wherein said second conductive means includes an electrical switching device having a pair of contacts respectively coupled electrically with opposite sides of said source and a shiftable pole piece operably coupled with said dumping means and normally in engagement with one of said contacts which is electrically coupled to the same side of said source as said circuit breaker, said pole piece being in engagement with said one contact during said first and second phases of the operating cycle of said dumping means, said pole piece being shiftable into engagement with the other of said contacts at the conclusion of said second phase of the operating cycle of said dumping means and said pole piece being shiftable back into engagement with said one contact at the conclusion of said third phase of the operating cycle of said dumping means.

5. In a machine as set forth in Claim 4, wherein said circuit breaker is disposed within said bottom and movable into the closed position thereof upon cooling of the bottom for initiating said third phase of the operating cycle of said dumping means and re-actuating said heater means.

6. In a machine as set forth in Claim 5, wherein is provided popcorn storage means; dispensing means having gate means thereon shiftable from a closed to an open position placing said storage means in communication with said kettle; electrically responsive transfer means operably coupled with said gate means for shifting the latter into the open position thereof for delivering popcorn from said dispensing means into the kettle; electrically switching mechanism operably coupled with said dumping means and said switching device; and electrical circuit structure electrically coupling said transfer means and said switching mechanism with said source in operable arrangement for operation of said transfer means at the conclusion of said second phase of the cycle of operation of said dumping means.

7. In a machine as set forth in Claim 6, wherein said switching mechanism includes a first and second switch, each having a pair of contacts and a shiftable pole piece normally in engagement with one of said contacts but shiftable into engagement with the other of said contacts, the pole piece of said first switch being electrically coupled with a side of said source and operably coupled with said dumping means for shifting into engagement with said one contact of said first switch at the conclusion of said second phase of the cycle of operation of said dumping means, said one contact of each of said first and second switches being electrically coupled with said other contact of the other of said first and second switches, said transfer means being electrically coupled in series between the pole piece of said second switch and the opposite side of said source, the pole piece of said second switch being shiftable into engagement with said other contact of said second switch during a phase of the operating cycle of said transfer means following the delivery of popcorn to the kettle.

8. In a machine as set forth in Claim 7, wherein is provided seasoning holding means; electrically responsive feeding means operably coupled with said holding means for delivering seasoning from the latter into the kettle; electrically switching apparatus operably coupled with said transfer means; and electrical circuit equipment electrically coupling said feeding means and said switching apparatus with said source in operable arrangement for operation of said feeding means during a phase of the operating cycle of said transfer means following said delivery by the latter of popcorn to the kettle.

9. In a machine as set forth in Claim 8, wherein said switching apparatus includes a third switch having a pair of contacts and a shiftable pole piece normally in engagement with one of said contacts but shiftable into engagement with the other of said contacts, the pole piece of said third switch being electrically coupled with said other contact of said first switch, said one contact of said third switch being electrically coupled with said one contact of said second switch, said dispensing means being electrically coupled in series between said other contact of said third switch and said opposite side of said source, the pole piece of said third switch being operably coupled with said transfer means for shifting into engagement with said other contact of said third switch during a phase of the operating cycle of said transfer means following said delivery by the latter of popcorn to the kettle.

10. In a machine as set forth in Claim 9, wherein said transfer means and said dispensing means have a common electrical coupling to said opposite side of said source, and there are interposed in series with said coupling fourth and fifth normally closed electrical switches, said fourth switch being operably associated with said popcorn storage means and adapted to open when the latter is exhausted of popcorn, said fifth switch being operably associated with said seasoning holding means and adapted to open when the latter is exhausted of seasoning.

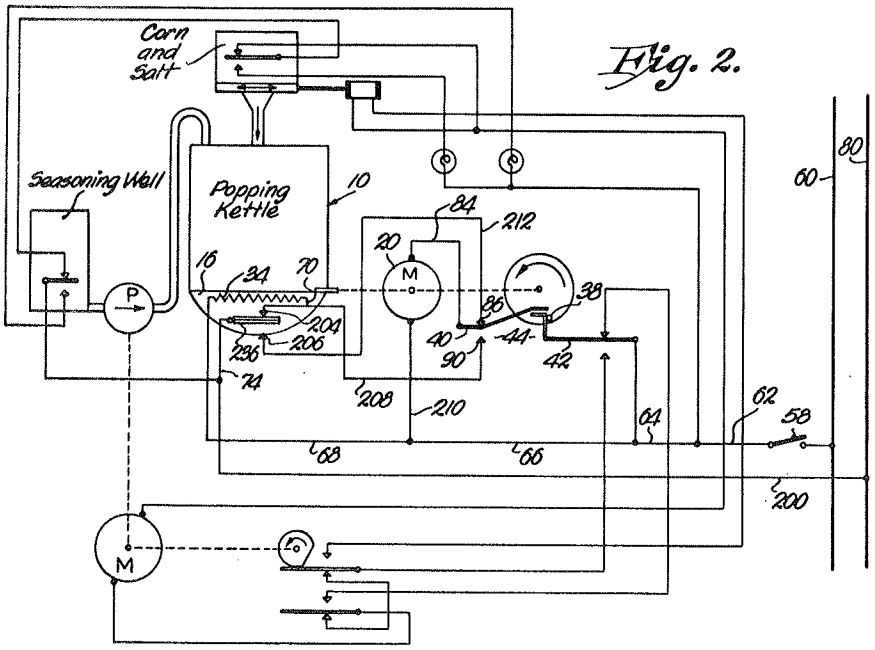
Corn and Salt
Seasoning Well
Popping Kettle
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Fig. 2.

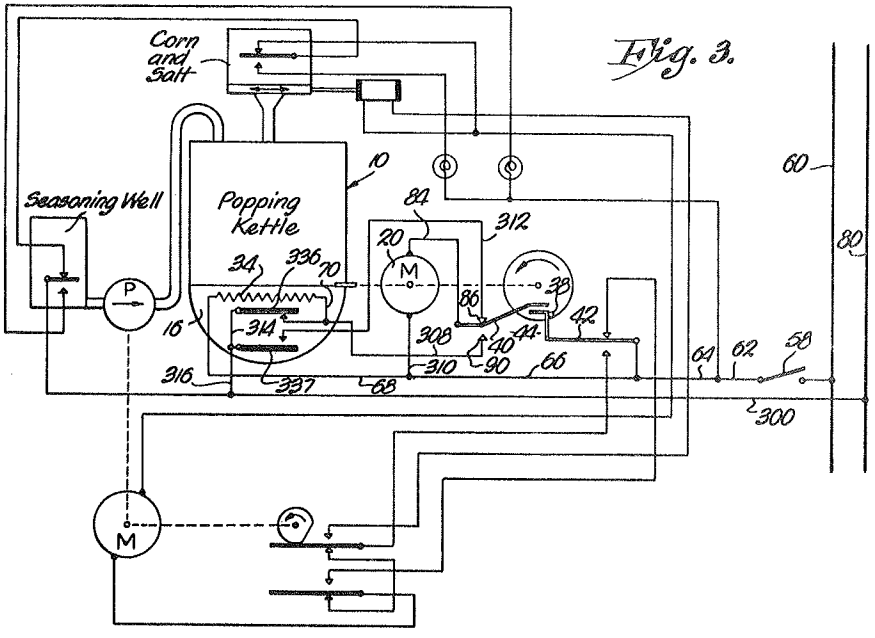
Corn and Salt
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Fig. 3.

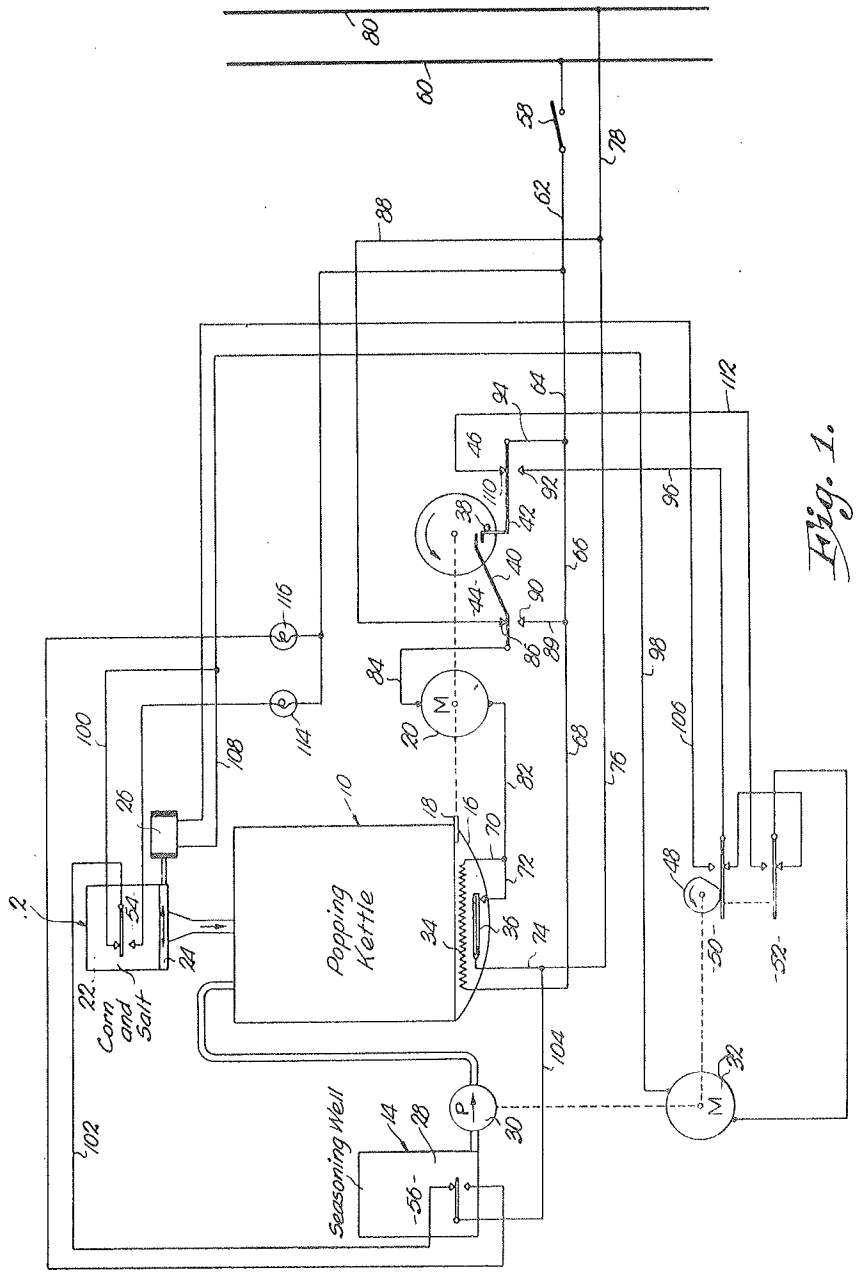

Fig. 1.