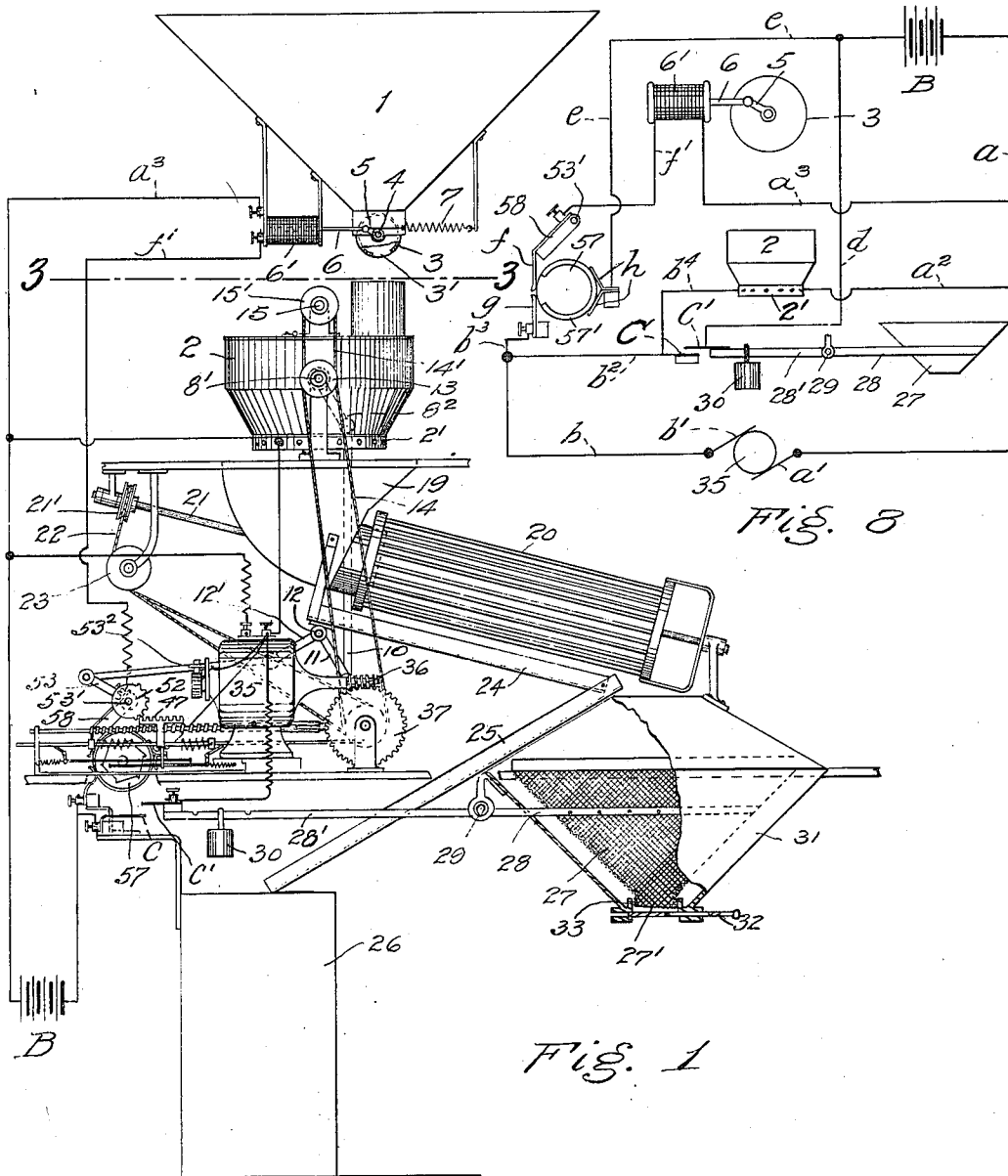


I. T. WOLFE.
CORN POPPING MACHINE.
APPLICATION FILED DEC. 21, 1914.

1,224,347.

Patented May 1, 1917.

4 SHEETS—SHEET 1.



WITNESSES:
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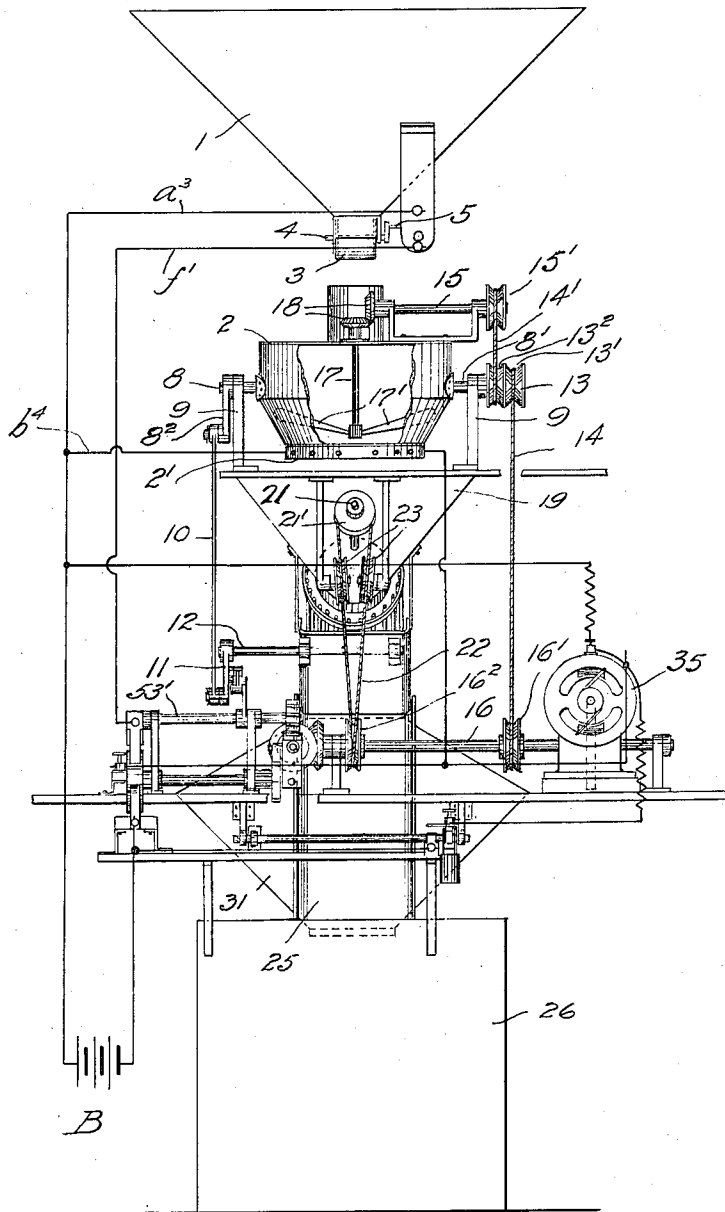


Fig. 2

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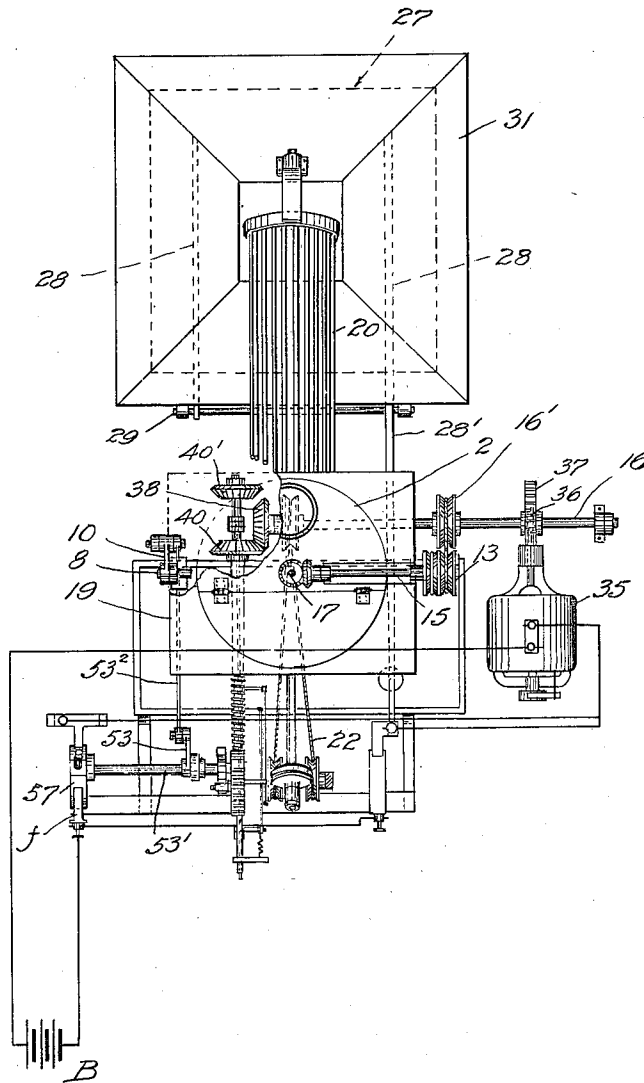
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4 SHEETS—SHEET 3.

Fig. 3



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IRA T. WOLFE, OF SEATTLE, WASHINGTON.

CORN-POPPING MACHINE.

1,224,347.

Specification of Letters Patent.

Patented May 1, 1917.

Application filed December 21, 1914. Serial No. 878,273.

To all whom it may concern:

Be it known that I, IRA T. WOLFE, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Corn-Popping Machines, of which the following is a specification.

This invention relates to improvements in corn-popping machines, and its object is the provision of perfected means for regulating the action of a machine of this character to produce the popped corn in quantities according to the demand.

The construction, operation and advantages of the invention will be hereinafter set forth, reference being had to the accompanying drawings, wherein—

Figure 1 is a side elevation of corn-popping apparatus embodying the present invention, the framework which supports the various members of the machine being omitted. Fig. 2 is a front elevation of the same. Fig. 3 is a horizontal section through 3—3 of Fig. 1. Fig. 4 is a plan view of the mechanism through which the corn-feeding and popping devices are periodically actuated. Fig. 5 is a side elevation of Fig. 4 with parts omitted. Fig. 6 is a fragmentary end view of Fig. 4. Fig. 7 is a perspective view of a rotary electric switch shown in the preceding views. Fig. 8 is a diagrammatic view to illustrate the electric wiring of the apparatus.

In the drawings, the reference numeral 1 designates a funnel-shaped hopper which is supplied with unpopped corn and is provided at its lower end with a discharge opening through which the corn is fed into a vessel 2. Such feeding is controlled by a shutter in the nature of a rotary drum 3 inserted in the hopper opening. The drum 3 is provided in its periphery with an opening 3¹ and is mounted on an axle 4 having at one end a crank-arm 5 which is connected with the core-member 6 of a solenoid magnet 6¹ which serves with a spring 7 to impart oscillatory motion to the drum to turn the latter.

The vessel 2 is provided in its bottom with an electric heating device, 2¹, whereby the corn is popped.

Said vessel is provided with trunnions 8 and 8¹ journaled in frame standards 9. One of said trunnions is provided with a crank-arm 8² for connection by a pitman 10

with a crank-arm 11 provided on an oscillatory shaft 12 to afford turning movements to the vessel for dumping the same. On the other trunnion, 8¹, is rotatably mounted a pulley 13 provided with peripheral grooves 13¹ and 13² for endless belts 14 and 14¹ by which rotary motion is transmitted from a grooved pulley 16¹ on a power driven shaft 16 to a pulley 15¹ for rotating the shaft 15. The latter is mounted in bearings secured to the vessel 2 and is employed to drive a shaft 17 disposed axially of said vessel.

18 represents a pair of bevel gears operatively connecting the shafts 15 and 17. 17¹ represents blades carried radially upon the shaft 17 to effect the stirring of the corn within the vessel.

Below the vessel 2 is a chute 19 connected to a cylindrical cage or screen 20 mounted upon an inclined shaft 21 which is rotated from the power shaft 16 by a belt 22 passing about pulleys 21¹ and 16² on the respective shafts and guided by the pulleys 23. The contents of the vessel 2 upon being dumped into the chute 19, are caused thereby to enter the higher end of the screen 20; whence the smaller particles, such as have not been popped, escape between the screen-bars into a subjacent trough 24 and thence are delivered by a trough 25 into a container 26. The corn which has been popped will progressively travel the entire length of the screen and be discharged into a basket or receptacle 27. This basket is supported by the arm 28 of a lever, fulcrumed at 29, and in opposition to a weight 30 which is suspended in adjusted position to the lever's other arm 28¹. The basket 27 is of an inverted conical shape and is desirably housed and freely movable in a casing 31 having a discharge opening at the bottom. Provided for said opening is a slidable plate 32 having an aperture therein which, when moved under the discharge opening of the basket, will allow the popped corn being withdrawn.

33 represents a tube supported by the plate 32 and into which the spout 27¹ of the basket extends so that the basket is unconstrained thereby and directs the discharged corn through the plate aperture when the same is presented.

I will now explain the electrically actuated devices and the regulating means therefor which control the operation of the afore-described elements.

35 represents an electric motor receiving its power current from any suitable source, as indicated by battery B in Figs. 3 and 8. One of the circuit leads *a* connects the battery B directly with a motor brush *a*¹ and the other brush *b*¹ of the motor is connected by a wire *b* having branches *b*² and *b*³. The branch *b*² is provided with a stationary terminal C of a switch whose other terminal C¹ is connected to the arm 28¹ of the lever which supports the basket 27. The terminal C¹ is disposed so that when the weight of the basket and its contents are incapable of overcoming the power of weight 30, the latter will affect the lever to move the terminal C¹ into contact with the other terminal C, whereupon the motor circuit is completed through the referred to wires *a*, *b*, *b*², and by a branch wire *d* from terminal C¹ to a main wire *e* to battery.

When this circuit is completed, the motor is actuated and also, through the offices of the branch wires *a*² and *b*⁴ with lines *a* and *e*, the heater 2¹ is energized. The motor 35 drives through the medium of worm 36 and gear wheel 37, the power shaft 16 on which, as shown in Figs. 3 and 4, is a bevel gear-wheel 38. 39 is a shaft having mounted thereon two bevel gear wheels 40 and 40¹ which are adapted to be moved by axially shifting the shaft into engagement with the gear-wheel 38 at diametrically opposite sides to cause the shaft 39 to be alternately driven in opposite directions.

One end of shaft 39 engages a sleeve 42¹ provided on the end of a screw 42 and to rotate the same in unison with the shaft the latter is provided with a pin 39¹ (Fig. 5) engaging in a longitudinal slot 42² provided in said sleeve.

43 represents a shifter rod for shaft 39 to which it is secured for endwise movements between set collars 44. 45 represent set collars secured in adjusted positions to the rod 43 to serve as shoulders to receive end thrusts imparted thereto from springs 46 when the springs are engaged by and sufficiently compressed by a movable nut 47 to overcome the inertia of the shaft 39 and associated parts.

The nut 47 travels on the screw and is provided with a depending lug 47¹ which is apertured to loosely receive drag-rods 48 and 49 which are provided with set collars 48¹ and 49¹ arranged to be encountered by the lug of the nut when the latter approaches the ends of its travel in opposite directions, and in its continued travel the respective rods are moved endwise in opposition to springs 48² and 49².

Bell cranks 50 and 51 are connected to the rods 48 and 49, as shown in Fig. 5, and constitute dogs to engage in notches 43¹ and 43² provided in the shifter rod 43. The springs 48² and 49² act to yieldingly retain the dogs

50 and 51 in engagement with drag-rod 43 to hold the rod in position to maintain one or the other of the gear-wheels 40 or 40¹ in mesh with the gear-wheel 38 which imparts rotary movement thereto. The nut 47 is formed with rack-teeth 47² adapted to engage the teeth of a segmental gear 52 to effect the swinging of an arm 53 carried by a rock-shaft 53¹. The arm 53 is connected by pitman 53² to an arm 12¹ on the shaft 12 to transmit oscillatory motion thereto when the rock shaft is suitably affected through the offices of the nut 47 and the gear 52. By thus oscillating the shaft 12, which is operatively connected by the arm 11 and pitman 10 to the vessel 2, when the nut is approaching the end of one stroke or direction of travel and during the early portion of the nut's travel in a contrary direction, the vessel 2 is first tilted to dump its contents into chute 19 and then is returned to the position in which it is shown in the views.

54 denotes a shaft having mounted thereon a ratchet wheel 55 having, for example, six teeth which are successively engaged by a pawl 56 which is carried by the nut 47 to impart intermittent rotary movements to the shaft 54. Also mounted on this shaft is a wheel 57 provided in its periphery with an electric conducting element 57¹ of a circumferential length, in the present example of approximately 300°, thus leaving a gap of about 60° between the ends of the element and corresponding to at least the spacing between the teeth on the ratchet wheel 55.

58 represents an arm secured to the rock-shaft 53¹ and carries a terminal *f* of a circuit wire *f*¹ which is connected to the winding of the solenoid magnet 6¹. The complementary wire of the magnet is afforded by a branch wire *a*³ of the wire *a*. The terminal *f* is swung down into contact with the wheel 57 when the shaft 53¹ is suitably rocked. A terminal *g* for wire *b*³ is provided to contact with the wheel 57 in proximity to the terminal *f* when the latter contacts with the wheel.

A bifurcated terminal *h* providing two contacts with wheel 57 is also provided and is connected with the wire *e*.

In operation, the motor 35 serves to drive the shaft 16 through the medium of worm and gear wheels 36 and 37 to rotate the bevel gear 38 whence the shaft 39 is driven by bevel gears 40 or 40¹.

The screw 42 is rotated in unison with shaft 39 to cause the nut 47 to travel lengthwise of the screw. As the nut rack-teeth 47² progressively engage the teeth of wheel 52 the shaft 53¹ is turned to swing the arms 53 and 58 from the positions in which they are shown in Fig. 1 to where they are shown in Fig. 5. Such movement of the arm 58 removes the terminal *f* from the wheel 57 to break the circuit of the solenoid magnet 6¹

whereupon the spring 7 acts to turn the shutter 3 to present opening 3¹ thereof within the hopper 1.

As this occurs, the arm 53 effects the tilting of the vessel 2 to dump its contents into the chute 19. During the ultimate travel of the nut 47 it engages against the spring 46 to compress the same until, near the end of the nut's travel, the nut-lug 47¹ engages the collar 49¹ and moves the rod 49 therewith, resulting in the withdrawal of the dog 51 from its engagement with the shifting-rod 43. When thus released, the spring 46 asserts its power to impart endwise movement to the shaft 39 and cause the previously engaged gear 40¹ to be removed from, and the other gear 40 to be brought into, engagement with the driving gear 38. When the rod 43 is thus shifted, it is engaged by the pawl 50 to secure the same against accidental movement such as would uncouple the gears 40 and 38. The last named gears being in mesh, the screw 42 is caused to rotate in an opposite direction, resulting in the nut 47 being moved toward the right (Fig. 5) resulting in the wheel 52 being turned to swing the terminal *f* into contact with the wheel 57 and the arm 53, influencing the vessel 2 to restore it to its upright position, as illustrated in Fig. 1. When the terminal *f* is thus brought into contact with the wheel conductor 57¹, the circuit of the magnet 6¹ is completed to cause the core 6 to exercise a pull on the crank-arm 5 and turn the shutter 3 so as to deposit a quantity of corn into the vessel 2.

When the nut 47 approaches the right-hand end of the screw, the spring 46 is compressed and the dog 50 is disengaged from the shifter-rod 43, resulting in the gear 40¹ being then engaged with the driving gear 38, with a reversal in the turning of the screw and a return movement of the nut.

During the last portion of each travel of the nut toward the left (Fig. 5) the pawl 56 which is carried by the nut engages a tooth of the ratchet wheel 55 to give a partial turn to the same, so that the conductor 57¹ is revolvably moved into and out of contact with the terminal *g* and into corresponding position with respect to the terminal *f* when the latter is swung down. By such devices, series of currents pass through the circuits which include the above named terminals when the conductor 57¹ is presented thereto, and when the gap between the ends of the conductor is opposed to the terminals, the respective circuits are incomplete.

Accordingly, there is a cessation of electrical impulses and the resulting inaction of the hopper shutter 3 when such terminals are not in contact with said conductor.

In the present example, a succession of five operations is performed by the referred

to members, and they remain idle during the interim that the portion of the periphery of wheel 57 which is unprovided with a conductor is subjected to the referred to terminals and during the time which would elapse for the nut to travel the length of the screw 42 and return.

The switch contacts C and C¹ are in open condition when the weight of the popped corn within the basket 27 is sufficient to overcome the counterweight 30 and, under such a condition, the motor is out of circuit when the wheel 57 is in the rotary position indicated in Fig. 8; that is to say—with the part of the wheel 57 intermediate the ends of the conductor 57¹. The heater circuit (including wires *b*⁴ and *a*²) is thereupon also out of circuit and the popping of corn in the vessel 2 is temporarily interrupted. When the basket 27 is, however, relieved of some of its weight, the weight 30 will cause the lever arm 28¹ to swing down with the contact C¹ to close the switch C—C¹ and render the heater operative by a current which may be traced as follows:— from battery through wire *d*, switch C—C¹, wires *b*², *b*⁴ to heater and thence by wires *a*², *a*, back to battery. Simultaneously, the motor circuit passes, as above, to the switch and thence by wires *b*², *b* to motor and back to battery by wire *a*.

The motor being thus energized, becomes operative to actuate the screw 42, as above explained, and by which the nut is operated to impart a turning movement to the wheel 57 and thereby turn the wheel 57 into position to render the conductor 57¹ effective with respect to the motor, and the various other parts of the apparatus.

A summary of the actions of the apparatus may be stated as follows: First, tipping of the lever 28—28¹ by a decrease in the weight of the contents of basket 27 closes switch C—C¹ which remains closed until the basket sinks under weight of a new supply of corn; second, motor and heater operate during the first cycle of travel of the nut 47 to allow the heater to be in condition to pop the corn and to turn the wheel 57 so that the conductor-plate 57¹ thereof is brought into contact with terminal *g* and into position to be engaged by the terminal *f* (when it is swung down), whereupon corn is fed to the vessel 2 and popping occurs in the following cycle.

Five batches of corn will then be successively popped in and dumped from the vessel 2 regardless of when the basket 27 settles down. The quantity of corn required in the basket 27 to tilt the lever 28—28¹ is regulated by adjusting the weight 30 on the beam.

What I claim as my invention, is—

1. In a machine of the class described, corn-popping devices, an electric circuit con-

trolling said devices, a receptacle for popped corn, and means operatively connected with said receptacle for closing said circuit in response to a decrease below a predetermined amount of the corn in said receptacle and for opening said circuit in response to the increase above a predetermined amount of the corn in said receptacle.

2. In a machine of the class described, normally inoperative corn-popping devices, means for operating said devices, a receptacle for popped corn, and means actuated by a variation in the weight of corn in said receptacle for controlling said operating means.

3. In a machine of the class described, the combination with a vessel in which corn is popped, of a hopper for supplying corn to said vessel, a receptacle for popped corn, an instrument normally inoperative for controlling the discharge of said hopper, a motor, means actuated by a variation in the weight of corn in said receptacle for governing said motor, and means for continuing the operation of said motor for a predetermined period of action after said governing means has been actuated by an overweight of corn in said receptacle to stop said motor.

4. In a corn-popping machine, a hopper, a shutter for said hopper, an electric circuit, an electro-magnet included in said circuit, a movable element adapted to be attracted by said magnet and operatively connected with said shutter, means for opening and closing said circuit, and mechanical means for controlling the aforesaid means whereby the hopper-shutter is caused to be successively moved into open position between relatively extended periods of rest.

5. In a machine of the class described, a tiltable vessel, an electric heater therefor, a hopper arranged to discharge into said vessel, means to open and close the discharge opening of the hopper, a circuit for said heater, a switch for the circuit, mechanical means to periodically effect the tilting of said vessel and also influencing the first-named means whereby the same is actuated for the discharge of corn from the hopper only between certain tilting movements of the vessel, and is rendered idle between other like movements thereof.

6. In a machine of the class described, a vessel, a heater therefor, means to supply corn for popping to said heater, a receptacle, and means to deliver the contents of said vessel to the receptacle, an electric motor, electric circuits for said motor and for operating said heater, a switch included in said circuits, devices operated by the weight of corn delivered to said receptacle for regulating the opening and closing of said switch to render the heater respectively in-

operative and operative, and means operated by the motor to effect the operation of the first named means and also of the heater independently of the office of said switch.

7. In a machine of the class described, a vessel, an electric heater therefor, a hopper, electrically actuated means for controlling the delivery of corn from the latter into said vessel, a receptacle for the corn popped in said vessel, electrical circuits connected with the heater and said means, a switch included in said circuits, and means operatively connected to the receptacle whereby the decrease in the weight of the contents thereof will effect the closing of said switch to complete said circuits, and when such weight is increased the switch is thereby opened to break the circuits.

8. In apparatus of the class described, a hopper, a shutter therefor, a spring tending to yieldingly hold the shutter in closed position, a solenoid operatively connected to said shutter, a tiltable vessel, an electric heater provided for said vessel, an electric motor, mechanical connections between the motor and said vessel for periodically tilting the same, electric circuits connected with said solenoid and the heater, and means included in said circuit and operated by said motor whereby the circuit of the solenoid is periodically energized to effect the opening of said shutter in opposition to said spring.

9. A machine of the class described, comprising a corn popper, actuating mechanism for said corn popper, an electric circuit controlling said actuating mechanism, a receptacle for popped corn, and means for opening and closing said circuit in response to a variation in the weight of popped corn in said receptacle.

10. A machine of the class described, comprising a hopper for raw corn, a corn popper, means for discharging corn from said hopper into said corn popper, electrically actuated means for operating said popper, a receptacle for popped corn, and a switch actuated by a variation in the weight of corn in said receptacle for governing said electrically actuated popper operating means.

11. A machine of the class described, comprising a hopper for raw corn, a corn popper, means for discharging corn from said hopper into said corn popper, a receptacle for popped corn, electrically operated mechanism for actuating said corn popper, a circuit connected with said mechanism, means actuated by a variation in the weight of corn in said receptacle for governing said circuit and means for continuing the operation of said corn popper for a predetermined period of action after said governing means has been actuated by an overweight of corn in said receptacle to stop said popper.

12. A machine of the class described, comprising a corn popper, a receptacle for popped corn, electrically operated mechanism for actuating said corn popper, a circuit connected with said mechanism, means
5 actuated by a variation in the weight of corn in said receptacle for governing said circuit, and means for continuing the operation of said corn popper for a predetermined period
10 of action after said governing means has been actuated by an overweight of corn in said receptacle to stop said popper.

13. A machine of the class described, comprising a hopper for raw corn, a corn popper, electrically operated means for delivering corn from said hopper into said corn
15 popper, an electric heater associated with said corn popper, an electric circuit connected with said electrically operated delivering means and with said heater, and
20 timing mechanism associated with said circuit whereby said heater is permitted to be-

come heated after said circuit is closed before corn is delivered into said popper.

14. A machine of the class described, comprising a hopper for raw corn, a corn popper, means for delivering corn from said
25 hopper to said corn popper, a receptacle for popped corn, an electric heater associated with said corn popper, a stirring device in
30 said corn popper, a motor, an electric circuit connected with said motor and with said heater, a switch, and means associated with said receptacle for popped corn for
opening and closing said switch in response
35 to a variation in the weight of the corn in said receptacle above or below a predetermined amount.

Signed at Seattle, Washington, this 1st day of December, 1914.

IRA T. WOLFE.

Witnesses:

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HORACE BARNES.