

April 20, 1943.

R. W. SCOTT

2,316,989

POPCORN MACHINE

Filed Oct. 17, 1941

7 Sheets-Sheet 1

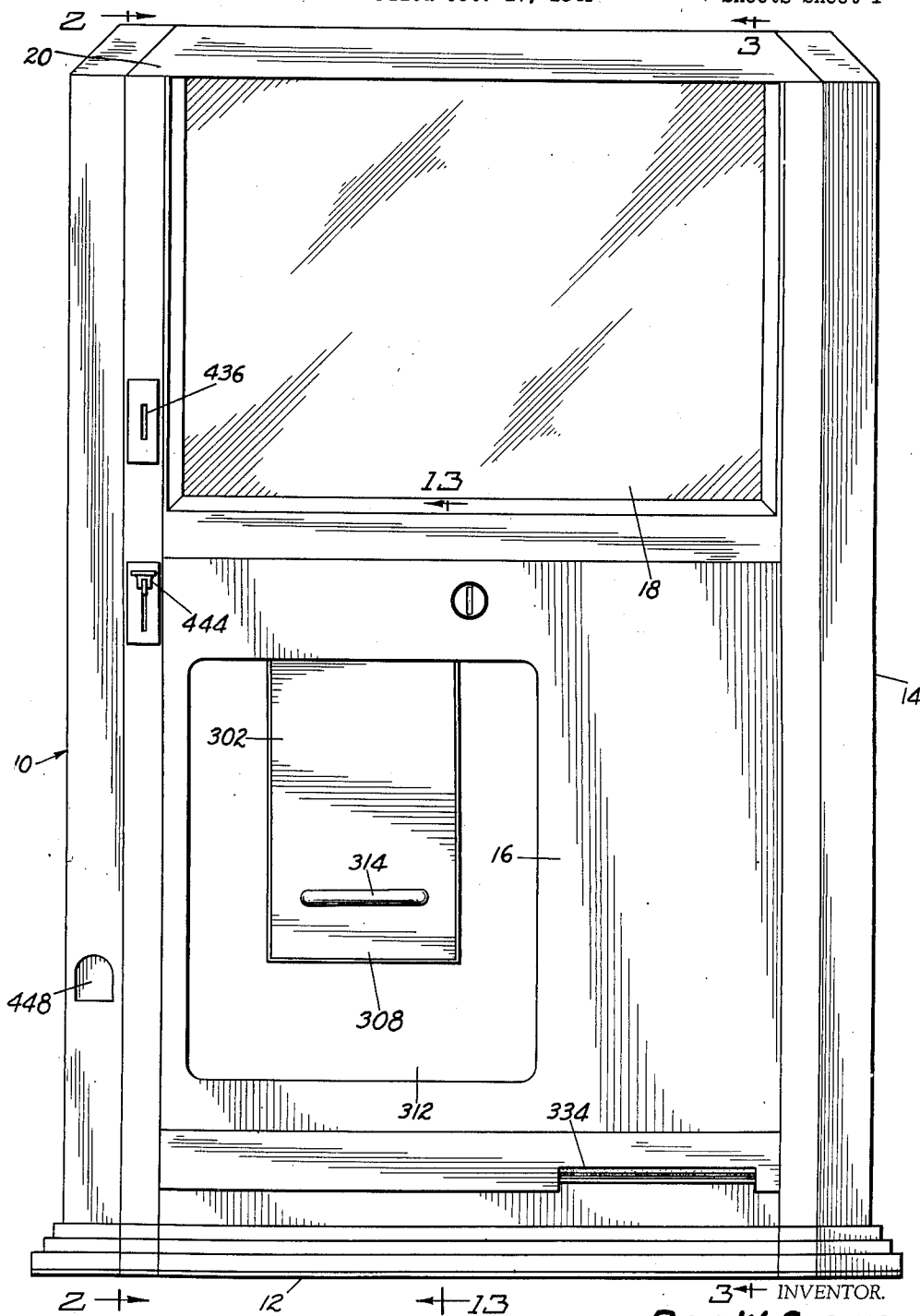


FIG. 1

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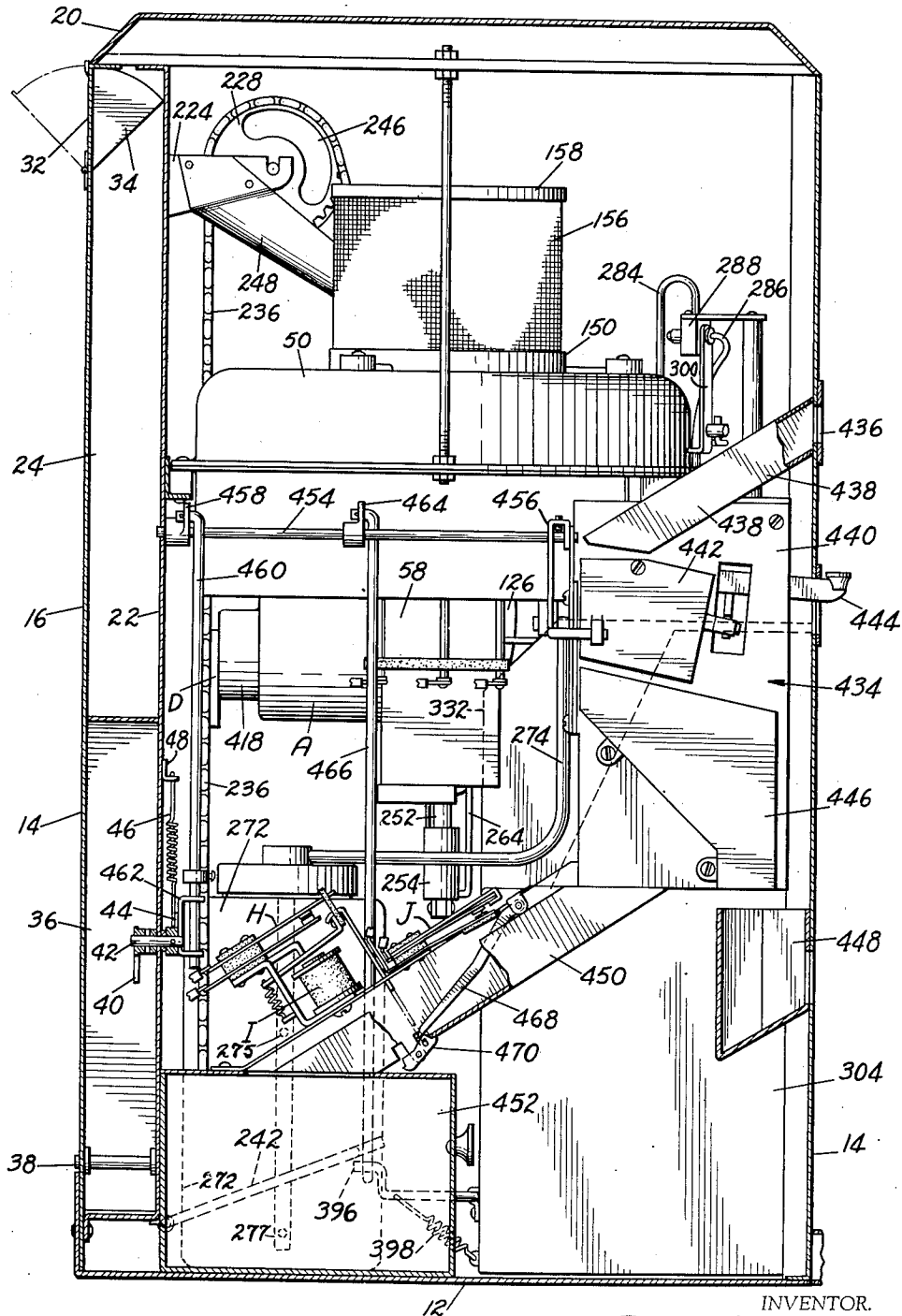
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7 Sheets-Sheet 2



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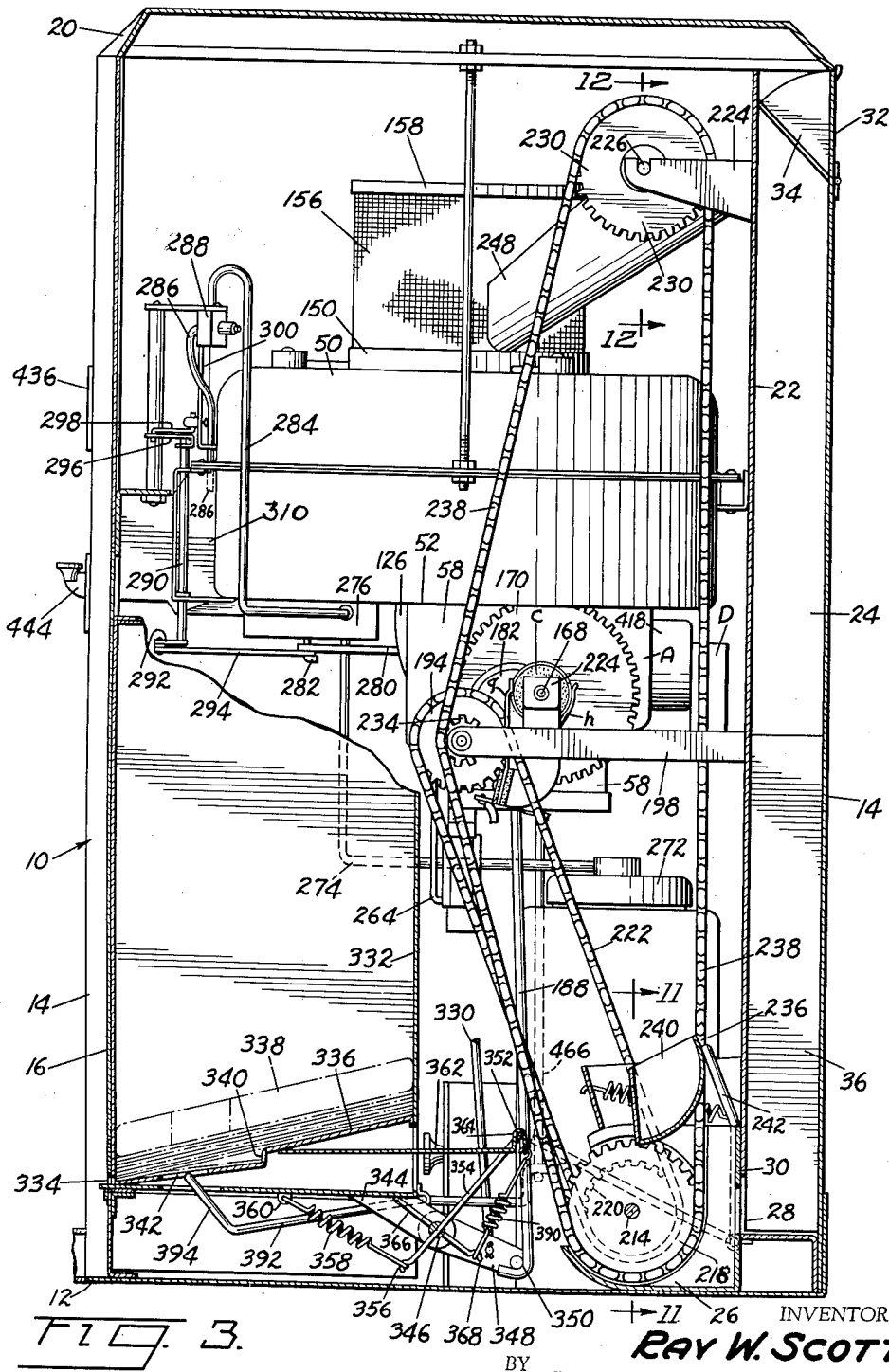
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POPCORN MACHINE

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7 Sheets-Sheet 3



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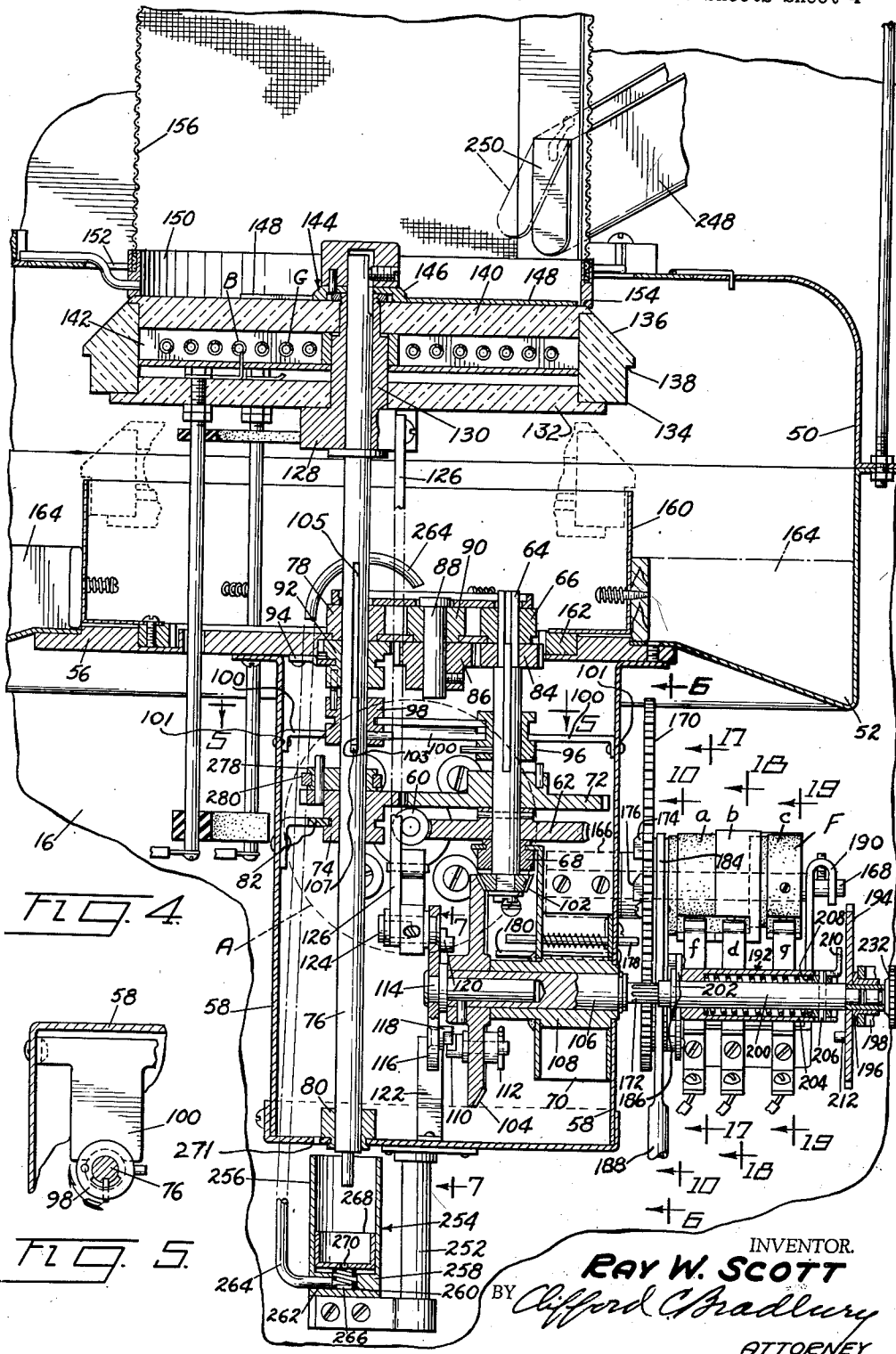
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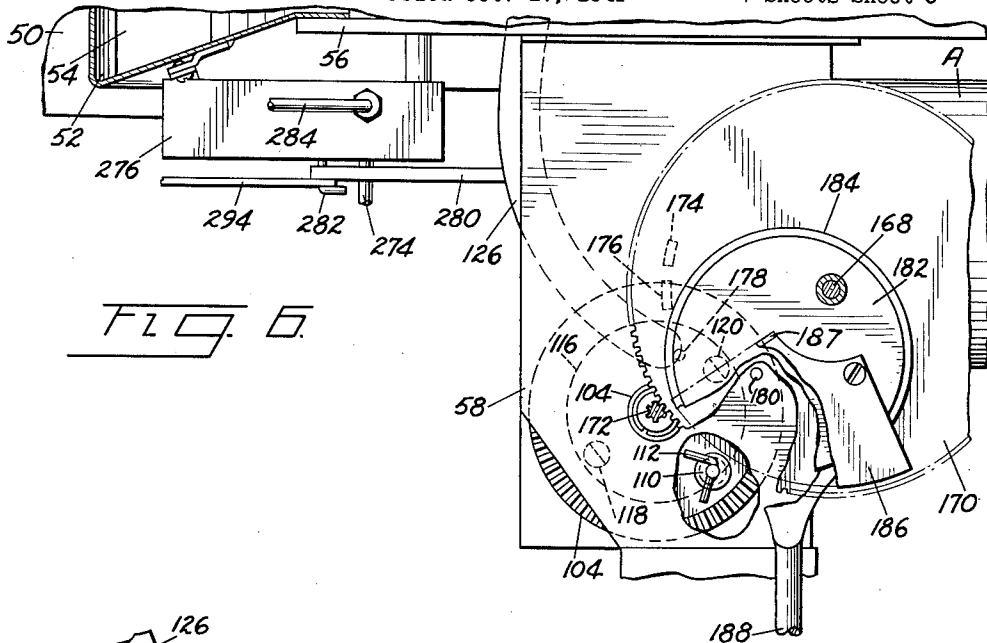


FIG. 6.

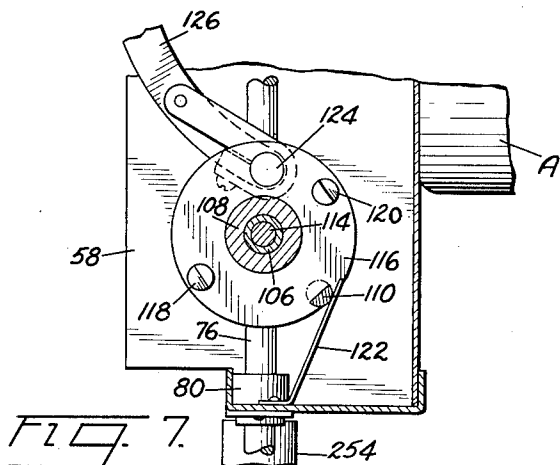


FIG. 7.

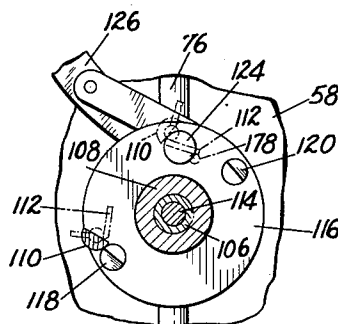


FIG. 8.

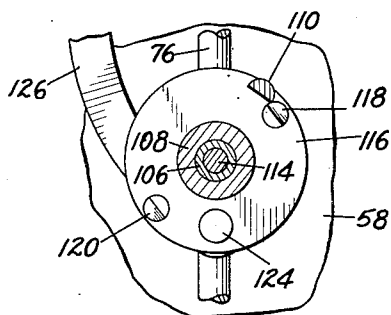


FIG. 9.

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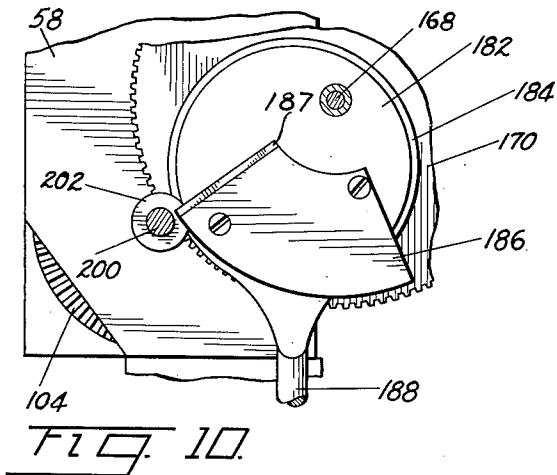
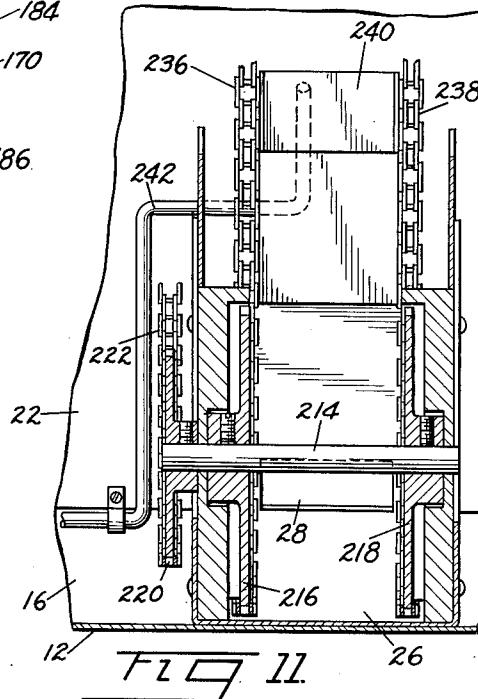
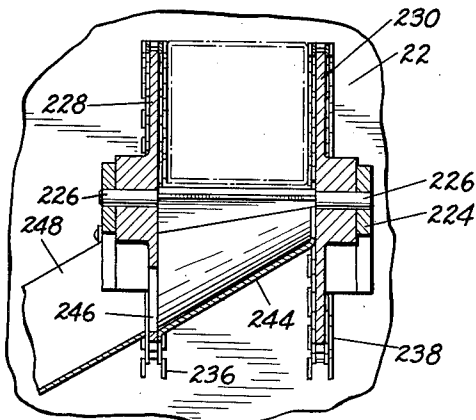
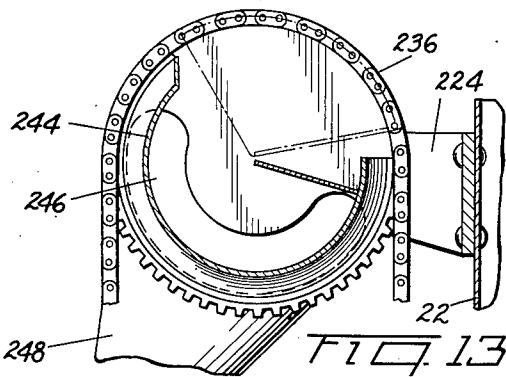
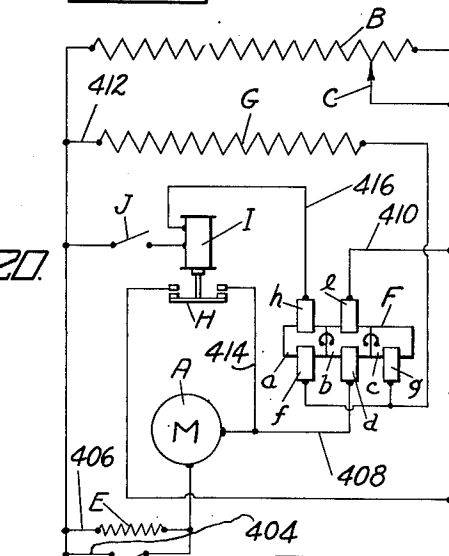


FIG. 20.



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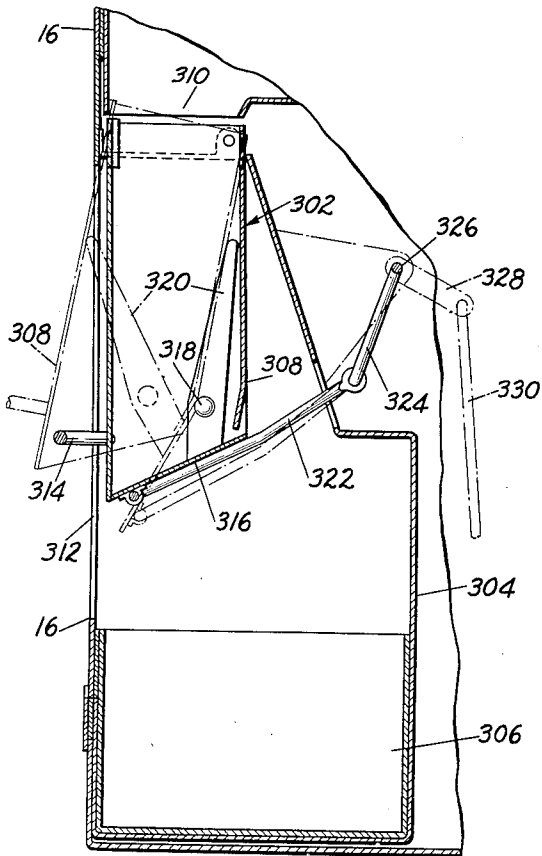


FIG. 14.

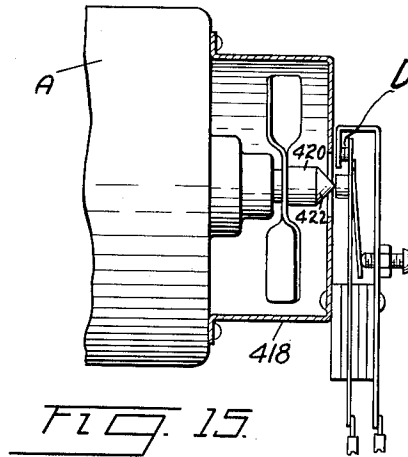


FIG. 15.

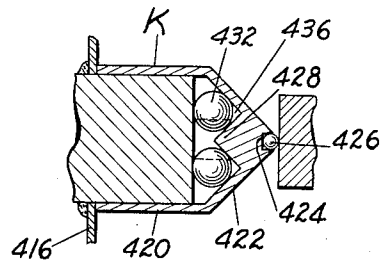


FIG. 16.

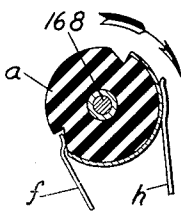


FIG. 17.

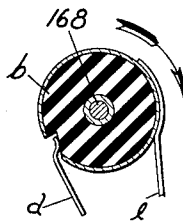


FIG. 18.

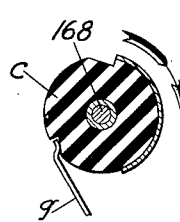


FIG. 19.

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UNITED STATES PATENT OFFICE

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POPCORN MACHINE

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Application October 17, 1941, Serial No. 415,343

11 Claims. (Cl. 53—4)

This invention relates to vending machines. Broadly, the invention comprehends a vending machine wherein several instrumentalities having correlated functions are assembled in a suitable case and are so correlated that upon deposit of a coin in the machine the several component parts of the assembly are automatically operated to raise the temperature of a griddle, to deliver a predetermined quantity of corn to the griddle, to agitate the corn during a popping process, to discharge the corn from the griddle to an easily accessible dumping receptacle, to season the popped corn as it passes from the griddle to the receptacle, and to eject a bag for receiving the popped corn from the dumping receptacle.

An object of the invention is to provide an automatically-operative corn popping machine.

Another object of the invention is to provide a machine for vending popcorn wherein a coin deposited in the machine controls the popping of a predetermined quantity of corn.

Another object of the invention is to provide a corn popping machine automatically set in motion upon deposit of a coin in the machine to increase the temperature of a griddle, to deposit corn on the griddle, to time the popping of the corn, to deliver the popped corn to a readily accessible receptacle, and concomitantly to eject a bag for receiving the popped corn.

Other objects and advantages of the invention will be apparent from the subjoined description taken in connection with the accompanying drawings, forming a part of this specification, in which:

Figure 1 is a front elevation of a vending machine embodying the invention;

Figure 2 is a vertical sectional view substantially on line 2—2 of Figure 1;

Figure 3 is another vertical sectional view substantially on line 3—3 of Figure 1;

Figure 4 is an enlarged fragmentary view illustrating the driving mechanism;

Figure 5 is a detailed view of the griddle shaft and the collar for coupling the shaft to the low- and high-speed gear train;

Figure 6 is an enlarged detailed view, with parts broken away, illustrating the timing gear in starting position;

Figure 7 is a top plan view of the griddle elevator, illustrating the elevator in raised position;

Figure 8 is a similar view illustrating the griddle elevator in position to start the lowering of the griddle;

Figure 9 is a similar view illustrating the posi-

tion of the elevator when the griddle is lowered;

Figure 10 is a fragmentary view, mostly in elevation, illustrating the timing gear and associated parts;

Figure 11 is a fragmentary view, partly in elevation and partly in section, illustrating the conveyer;

Figure 12 is also a fragmentary view, partly in elevation and partly in section, illustrating the conveyer in dumping position;

Figure 13 is a sectional view illustrating the conveyer, the sprockets therefor, and associated chute;

Figure 14 is a sectional view, substantially on line 14—14 of Figure 1, illustrating the popcorn delivery mechanism;

Figure 15 is a fragmentary view illustrating the motor for energizing the apparatus and the make-and-break for the governor circuit;

Figure 16 is a detailed view, in section, illustrating the governor;

Figure 17 is a sectional view of the circuit control drum, substantially on line 17—17 of Figure 4;

Figure 18 is a sectional view of the circuit control drum, substantially on line 18—18 of Figure 4;

Figure 19 is a sectional view of the circuit control drum, substantially on line 19—19 of Figure 4; and

Figure 20 is a diagram of the wiring system.

In this invention, several units are assembled and correlated for automatically popping and subsequently seasoning a predetermined quantity of corn, delivering the finished product to a readily accessible receptacle, and concomitantly ejecting a bag for receiving the popped corn from the receptacle. For specific details of the several units, reference is to be had to the accompanying drawings.

Case

An ornamental case 10 includes a base 12, a metallic body 14 suitably mounted on the base, a removable front panel 16 providing access to various parts of the apparatus, a removable transparent panel 18 providing visual indication of the operation of the apparatus and, a removable top 20 providing access to certain other parts of the apparatus. The base is preferably heavy so as to lend stability to the structure and is ornamented to harmonize with other parts of the case.

Storage compartment

The back of the body 14 has thereon an inner

wall 22, Figures 2 and 3, providing a storage compartment 24 for popcorn, opening into a hopper 26, Figures 3 and 11, as by a slot 28 controlled by a slide gate 30 so as to regulate feeding of the popcorn to the hopper; and suitably arranged in the back of the case 10, adjacent its top, is a filling opening for the storage compartment, normally closed as by a door 32 having on its back a chute 34 movable into position as the door is opened to serve as a convenience in filling the storage compartment; and an inclined false bottom 36 in the storage compartment is pivoted at one end as by a pintle 38, Figure 2, adjacent the discharge slot 28.

The free end of the false bottom is supported by a lever 40 on a stub shaft 42 mounted in the wall 22, and the shaft has secured thereto an arm 44 connected by a spring 46 to a fixed support 48 on the wall 22. This structure serves to yieldingly support the false bottom and the contents of the storage compartment so that when the compartment is empty the arm 44 will have moved through a predetermined angle, the object of which will hereinafter appear.

The driving mechanism

A basin 50, Figure 4, suitably supported in the case 10, has an annular trough 52 in the bottom thereof and a discharge opening 54, Figure 6, for the trough. A plate 56 is secured to the bottom of the basin and a frame 58 is suspended from the plate. A motor A suitably mounted on the frame has keyed or otherwise secured to its armature shaft a worm gear 60 in mesh with a worm wheel 62 secured to a vertically disposed shaft 64 journaled in suitable bearings 66, supported on the plate 56, and 68, supported on a bracket 70 secured to the frame.

The shaft 64 has mounted thereon for free rotation a large gear 72 in mesh with a relatively small gear 74 sleeved on a shaft 76 reciprocable vertically in suitable bearings 78 and 80 supported on the plate 56 and on the frame 58, and a spanner 82 secured to the frame serves to retain the gear 74 constantly in mesh with the gear 72.

The shaft 64 also has secured thereto a small gear 84 in mesh with an idler 86 supported on a stub shaft 88 journaled in a bearing 90 on the plate 56. The idler meshes with a small gear 92 sleeved on the reciprocable shaft 76 and held in mesh with the idler by a spanner 94 secured to the plate 56. A collar 96, slidably keyed on the shaft 64 between the gears 72 and 84, is adapted to interlock with the gear 72 so as to couple the gear 72 to the shaft 64, and, correspondingly, a collar 98, slidably keyed to the reciprocable shaft 76 between the gear 74 and the gear 92, is adapted to interlock alternately with the gear 74 and the gear 92 so as to alternately couple the gears 74 and 92 to the reciprocable shaft 76. A yoke 100 pivoted at 101 on the frame 58 interconnects the collars 96 and 98 so that upon elevation of the reciprocable shaft 76 the collar 98 interlocks with the gear 92 to couple the gear 92 to the reciprocable shaft 76. This results in driving the shaft 76 in one direction through the low-speed train of gears 84, 86, and 92, and when the reciprocable shaft 76 is lowered, the collar 98 follows the downward movement of the shaft 76 and releases the gear 92 so as to uncouple the low-speed train and the collar 98 moves the yoke 100 and the collar 96 to interlock the collar 96 with the gear 72, coupling the gear 72 to the shaft 64. This results in driv-

ing the shaft 76 in the opposite direction through the gears 72 and 74, constituting the high-speed train of gears. Inasmuch as the collar 98 has a limited up and down movement, which is much less than the up and down movement of the shaft 76, means are provided in the form of a key 103 positioned in a long keyway 105 in the shaft 76, the key 103 having an extension 107 at its lower end, which engages the under side of the collar 98 to lift this collar when the key is engaged by the lower end of the keyway 105. When the shaft 76 moves downwardly, the key 103 engages the top of an eccentric 278, stopping the movement of the key at this point by permitting the shaft 76 to continue its downward movement through the bore of the collar 98. The keyway in the collar 98, as shown in Figure 5, is of much greater width than the key so that the collar has play about the shaft 76, the purpose of which is to permit the easy engagement of the clutch pins in either direction of rotation.

The shaft 64 has secured thereto a pinion 102 in mesh with a pinion wheel 104 keyed or otherwise secured to a shaft 106 journaled in a suitable bearing 108 supported on the frame 58 and on the bracket 70, and a rotatable dog 110 suitably mounted on the pinion wheel 104 has a trip lever 112. A stub shaft 114, Figures 4, 7, 8 and 9, journaled axially in the shaft 106 has mounted thereon for free rotation a crank disc 116 having thereon diametrically-disposed fixed dogs 118 and 120 for cooperation with the rotatable dog 110 carried on the pinion wheel 104, and a spring latch 122 for holding the crank disc against retrograde movement is provided. The crank disc also has mounted eccentrically thereon a crank pin 124, and a connecting rod 126 connects the crank pin to a bushing 128 receiving the reciprocable shaft 76 so that upon rotation of the crank disc 116 the reciprocable shaft 76 is alternately elevated and lowered.

The corn popping mechanism

The bushing 128, Figure 4, supporting the reciprocable shaft 76 has a concentric sleeve 130, and fitted on this sleeve in abutting relation to the bushing 128 is a disc 132 supporting a ring 134 having a beveled edge 136 and an annular shoulder 138. The ring 134 supports a griddle 140 in spaced relation to the disc 132 so as to provide a housing 142 for the reception of a constant heat element B and a booster G for the constant heat element. A beater 144 suitably secured to the reciprocable shaft for rotation therewith is adapted to wipe over the face of the griddle. Preferably, the beater includes a hub 146 having a plurality of radially extended arms 148 bearing flat against the face of the griddle.

A ring 150, suspended in an opening 152 arranged concentrically in the top of the basin 50, has an annular shoulder 154 for the reception of the griddle 140 when the griddle is in elevated position, and a screened receptacle 156 supported on the ring 150 has a plain top 158. This screen provides for a vision of the corn popping process. When the griddle is lowered, the annular shoulder 138 on the ring 134 supporting the griddle telescopes a sleeve 160, as shown in fragmentary dotted section in Figure 4. The sleeve 160 is secured to a ring gear 162 in mesh with the gear 84 of the low-speed train, and suitably secured to the sleeve 160 is a plurality of blades 164 for sweeping out the trough 52 in the basin 50.

Timing mechanism

A bracket 166, shown in dotted lines in Figure 4, is secured to the back wall of the frame 58 and supports a fixed shaft 168, and a timing gear 170 supported for free rotation on the shaft 168 meshes with a small gear 172 on the shaft 106. The timing gear has thereon cams 174 and 176 for actuation of a spring-pressed plunger 178 cooperating with a fixed pin 180 for tripping and subsequently restoring the lever 112 to actuate the dog 110. The timing gear also has secured thereon an eccentrically disposed circular disc 182, Figures 6 and 10. A collar 184 fitted on this disc has secured thereto a rod 188 detachably connected to a bag delivery apparatus, shown at the lower left-hand part of Figure 3.

A circuit control drum, indicated generally at F, includes three segments: a, b, and c. The segments a and b are fixedly secured to one another and to the timing gear 170 for rotation therewith, and the segment b is adjustably connected to the segment c, preferably by telescoping parts frictionally held together, so as to afford adjustment means for breaking the circuit at any point in the cycle. A bracket 190 suspended from the shaft 168 has mounted thereon brushes d, e, f, g, and h, Figures 17, 18, and 19, cooperating with the segments a, b, and c of the circuit control drum.

Feed mechanism

A coupler 192, Figure 4, is adapted to connect the shaft 106 to a chain driving sprocket 194 supported for rotation on a suitable bearing 196 on a bracket 198 secured to the wall 22, Figure 3. The coupler includes a shaft 200 having one of its ends fitted to the shaft 106 so that the shaft 200 may be driven therefrom and having its other end journaled in the bearing 196 for the sprocket 194. The shaft 200 has thereon a collar 202 and a reciprocable sleeve 204 held against rotation by a pin 206. The sleeve is normally held against the collar 202 by a coil spring 208 surrounding the shaft 200 between the pin and the sleeve, and a lug 210 on the sleeve cooperates with a stop 212 on the sprocket 194 so as to rotate the sprocket. The wedge 186, Figures 4, 6 and 10, having a beveled edge 187 is adapted to be forced between the collar 202 and the end of the coupler 192 when the shaft 168 has rotated to the proper position. This forces the coupler 192 to the right, Figure 4, so that the lug 210 contacts the stop 212, causing the sprocket 194 to rotate with the shaft 200.

A shaft 214, Figures 3 and 11, supported for rotation transversely of the hopper 26, has keyed thereon spaced corresponding sprockets 216 and 218 and also a sprocket 220 connected by a chain belt 222 to the sprocket 194. A bracket 224 adjustably secured to the wall 22, top of Figures 2 and 3, supports a stub shaft 226 having thereon spaced corresponding sprockets 228 and 230, Figure 12, and journaled on the bracket 198 are spaced corresponding idlers 232, Figure 4, and 234, Figure 3. A chain belt 236, Figures 11 and 12, connects the sprocket 216 to the idler 232, Figure 4, and to the sprocket 228, Figure 12, and, correspondingly, a chain belt 238 connects the sprocket 218, the idler 234 and the sprocket 230. A bucket 240, Figures 3 and 11, is pivotally mounted on the chain belts 236 and 238 to swing between the belts, and arranged in the path of the bucket is a lever 242, Figure 3, connected to the coin control mechanism.

The discs of sprockets 228 and 230, Figure 12, are connected by an inclined arcuate plate pro-

viding a short section of a chute 244 opening through the disc of one of the sprockets as indicated at 246, Figures 12 and 13, and having its edges normal to the discs so as to provide for the reception of the bucket 240. A trough 248 has a reception end supported for direct communication with the chute 244 through the opening 246 and a discharge end opening into the screened receptacle 156, and the discharge end is normally closed as by a balanced door 250, Figure 4, to provide against the possibility of return of corn to the trough during the popping process.

Lubricating system

The lubricating system is simplified to the maximum. As shown, a bracket 252, Figure 4, suitably secured to the frame 58, supports a pump 254 below the reciprocable shaft 76 and in axial alignment with the shaft. The pump includes a chamber 256, which is open at one end for the reception of the reciprocable shaft so that the shaft may function as a driving rod and is closed at its other end as by a head 258 having a concentric recess 260 provided with a discharge port 262 having connected thereto a fluid delivery pipe 264 leading to certain parts of the driving mechanism.

A coil spring 266 seated in the recess 260 extends slightly into the cylinder, and a piston 268 reciprocable in the chamber 256 has a concentric opening 270 through its head providing a communication between the chamber and the recess. When the chamber 256 is filled with suitable lubricant upon descent of the reciprocable shaft 76, the port 270 is closed and the piston is advanced on its compression stroke against the resistance of the coil spring 266. This results in ejecting a very small quantity of lubricant from the chamber, through the recess 260, the discharge port 262 and the fluid delivery line 264, to the driving mechanism, and as the shaft 76 ascends, the piston 268 is released and returned to its normal retracted position under the influence of the coil spring 266, and as the piston returns to its retracted position, lubricant is bypassed through the port 270 to that portion of the cylinder forward of the piston so as to load the chamber for subsequent operation. Such lubricant as would otherwise collect in the pan formed by the bottom of the frame 58 is drained back into the chamber 256 through a port 271 through the bottom of the pan to be recirculated by the action of the lubricating pump mechanism.

Seasoning mechanism

The seasoning mechanism includes a reservoir 272, Figures 2 and 3, suitably supported within the case. A fluid delivery line 274 has an opening 275 near the bottom of the reservoir and a second opening 277 about midway between the top and the bottom of the reservoir. The reservoir contains salt water and an oil, and since the salt water is heavier, it remains accessible to the lower opening 275, while the oil remains accessible to opening 277. The openings 275 and 277 are sized to give the desired proportions of salt water and oil, which are together delivered through the delivery line 274 to the inlet port of a reciprocable pump 276 in the cylinder of which the salt water and the oil are thoroughly mixed.

The pump is driven from the eccentric 278, Figure 4, mounted on the gear 74 of the high-speed train, the eccentric being connected as by a driving rod 280 to the wrist pin 282 of the pump, Figure 3. The discharge port of the pump

is connected by a fluid delivery line 284 to an oscillatory nozzle 286 through a suitable joint 288. The nozzle discharges the salt water and oil mixture immediately above and into the conduit 310, Fig. 3, at a position just above the discharge opening 54 and outside of the basin 50, and is oscillated through linkage connecting the nozzle to the pump. As shown, a rockable shaft 290 has on one end a crank 292 connected by a driving rod 294 to the wrist pin 282 of the pump 276, and on the other end of the shaft 290 is a crank 296 connected by a link 298 to a swinging arm 300 embracing the nozzle. As the pump 276 is driven from the eccentric 278 on the gear 74 of the high-speed train, fluid is drawn from the reservoir 272 through the fluid delivery line 274 into the pump and discharged therefrom through the fluid delivery line 284, the joint 288, and the nozzle 286, and during this period the nozzle is oscillated through the linkage connecting the nozzle to the wrist pin 282 of the pump. Since the gear 74 and the eccentric 278 are rotated only during the high-speed rotation of the shaft 76, it follows that the seasoning is pumped only during this high-speed rotation of the shaft 76 and, therefore, only during the delivery of popped corn from the basin 50 into a conduit 310.

Delivery mechanism

The popcorn delivery mechanism indicated generally at 302, Figure 1, includes a housing 304, Figure 14, supported on the back of the removable front panel 16 of the case. A removable receptacle 306 is fitted in the bottom of the housing for the reception of waste, and a hopper 308 is pivotally supported in the top of the housing with its reception end in direct communication with the conduit 310 leading from the discharge opening 54 in the trough 52 in the bottom of the basin 50. The hopper is adapted to swing through an opening 312 in the front panel 16, and a handle 314 is provided to facilitate swinging the hopper. The bottom 316 of the hopper is hinged to the side walls thereof as indicated at 318, and the hinges have elongated arms 320 for wiping the sides of the hopper to prevent adhesion of the popcorn. The bottom 316 is normally held closed by an arm 322 connected by a link 324 to a stub shaft 326. As the hopper swings outwardly through the opening 312, the arm 322 and the link 324 exert pull on the bottom, causing it to swing on its hinges 318, dumping the popped corn contained in the hopper. The stub shaft 326 has thereon an arm 328 connected as by a link or rod 330 to an actuating lever 348, Fig. 3, for a bag delivery mechanism which lever is moved in a counterclockwise rotation each time a bag is delivered as described in the next paragraph. The rotation of the lever 348 moves the link 330 upwardly so that the hopper 308 will be automatically dumped into the waste receptacle 306 prior to each delivery of popcorn to the hopper.

Bag delivery apparatus

The bag delivery apparatus, Figure 3, includes a container 332 secured to the back of the removable front panel 16 of the case and opening through the panel as by a slot 334 adjacent the bottom of the container. Mounted in the container is a plate 336 inclined from the back of the container to the slot 334. This plate provides a support for a stack of bags having imposed thereon a slotted weight 338.

The plate has an offset portion substantially

centrally of its length, and this offset portion has a slot 340 extending transversely of the plate. The plate also has a slot 342 arranged longitudinally thereof and below the slot 340. A bracket 344 secured to the bottom of the container supports a rockable shaft 346 having secured thereto an arm 348 detachably connected as at 350 to the driving rod 188 actuated by the eccentric 182 on the timing gear 170.

A yoke 352 has arms 354 extending diametrically through the shaft 346 and suitably secured against displacement, and the free ends of the arms are deformed to provide hooks 356 for attachment of retractile springs 358 connected to fixed supports 360 on the bottom of the container 332. An ejector 362 has its force-receiving end deformed to provide a transverse groove 364 for the reception of the yoke 352. The other end of the ejector normally rests on the bottom of the inclined plate adjacent the slot 340, and the ejector is guided by the perimeter defining the slot to engage the bottom bag in the stack of bags in the container. A pin 366 extending diametrically through the shaft 346 provides a stop determining the retracted position of the ejector 362, and the pin is deformed to provide a hook 368 for the attachment of a coil spring 390 connected to the force-applying end of the ejector to retain the ejector against displacement.

When pull is exerted on the arm 348 through the driving rod 188, the arm 348 is moved through an angle, and this movement of the arm transmits force through the shaft 346 and the yoke 352 carried by the shaft to the ejector 362, resulting in movement of the ejector through the slot 340 to engage the bottom bag of the stack and to partly eject it through the slot 334 so that it may be easily withdrawn.

A lever 392, pivotally mounted on the container 332 adjacent the bottom thereof, has one of its ends turned upwardly as at 394 to extend through the slot 342 and to engage the bottom bag of the stack of bags, and the other end of the lever is deformed to provide a crank 396, Figure 2. A coil spring 398 connects the crank to a fixed support so as to urge the lever against the bags, and the crank is connected by a rod 466 to the coin control mechanism of the apparatus. When the last bag in the stack is removed from the container, the lever 392 is released and immediately moves, under the influence of the coil spring 398, to transmit force through the rod to the coin control mechanism to the end that a coin deposited in the machine is immediately returned when the supply of bags has been exhausted.

The electrical system

The electrical system for the machine, Figure 20, includes a circuit 402 adapted to be connected to a suitable source of electrical supply, and the constant heat element B and a thermostat C for adjusting the heat element are connected in the circuit. A conductor 404 leading from the first terminal of the source is connected through a make-and-break switch D to one terminal of the electric motor A. A conductor 406 contains a resistance E bridging the switch D and functioning in conjunction with a governor K, hereinafter described, to control the speed of the motor A. This governor is an important factor as will hereinafter appear.

As previously described, the circuit control drum F has three segments: a, b, and c. The segments a and b are fixedly secured to one another for rotation as a unit, and the segment

c is adjustably attached to the other segments so as to break the circuit at any period in the cycle. A conductor 408 connects the second terminal of the motor to the brush d, in wiping engagement with the segment b of the circuit control drum, and a conductor 410 is connected between the brush e, also in wiping engagement with the segment b of the circuit control drum, and the second terminal of the source of current.

A conductor 412, connected with the first terminal of the source, has included in it the booster heating element G and extends through the brushes g and f, the segments a and c and the brush e of the circuit controller to the second terminal of said source. Since the segment a and the brush f are so related that the circuit through them is interrupted in advance of the interruption of the circuit through brush g and segment c, the duration of the flow of current through the booster heater may be regulated to continue for any part of the cycle greater than that determined by the arc of the segment a by the rotative adjustment of the segment c of the circuit controller with respect to the segment a. Thus the amount of heat delivered to the griddle from the heating elements B and G combined may be regulated to suit various voltages of the supply source and various outside temperature conditions, the booster heating element G supplying only that additional amount of heat which is taken up by the corn during the popping operation. The heating element B, which is connected continuously across the circuit, is adjusted to supply just that amount of heat necessary for maintaining the griddle at the proper temperature for popping the corn before the cool grains of corn are deposited on the griddle.

A conductor 414 connects from conductor 408 through normally-open contacts H of magnet I to the second terminal of the source, and a conductor 416 connects from the brush h of the circuit controller through the winding of magnet I and through a normally-open contact of coin-controlled switch J to the first terminal of the source.

The governor

As shown in Figure 15, a housing 418 is suitably secured to one end of the motor and supports the make-and-break switch D. The governor K is interposed between the armature shaft of the motor and the movable member of the make-and-break switch D. The governor includes a shell 420 sleeved on the armature shaft of the motor. The shell has a hollow conical head 422, and in the apex of the head is a recess 424 receiving a hard metallic ball 426 engaging the movable member of the make-and-break switch D. The head 422 also has arranged therein an inverted cone 428 providing, in conjunction with the head, a groove 430, and positioned in this groove are a plurality of balls 432 resting on the end of the shaft. As the motor A increases in speed, centrifugal force causes the balls 432 to move outwardly on the inner conical portion of the head 422, and this movement of the balls is yieldingly resisted by the wall of the conical head 422, resulting in movement of the shell against the movable member of the make-and-break switch D with the consequent opening of the switch contacts. The opening of the contacts increases the resistance of the circuit of the motor; the closing of the contacts decreases the resistance of the circuit of the motor, with the result that the motor assumes a very constant speed, the arrangement being so sensitive

that the contacts assume a vibratory condition, continually opening and closing the circuit.

Coin control mechanism

The coin control mechanism indicated generally at 434, Figure 2, is conventional and, accordingly, only such parts as have a direct relation to the instant invention need be referred to. As shown, the coin control mechanism includes a coin slot 436 suitably arranged on the front of the case. The slot 436 communicates with a chute 438 connected to a coin detector and assorter 440 including a scavenger 442, a lever 444 for manually actuating the scavenger readily accessible on the front of the case, a coin return chute 446 communicating with a return receptacle or cup 448, and a coin delivery or actuating chute 450 communicating with a coin deposit and collection box 452.

A rockable shaft 454 has secured thereto a crank 456 connected to the scavenger 442 for opening the scavenger. The shaft also has secured thereto a crank 458 connected as by a rod 460 and a slidable connection 462 to the arm 44 on the shaft 42 carrying the lever 40 supporting the false bottom 36, and the shaft 454 also has secured thereto a crank 464 connected by a rod 466 to the lever 242 for actuation thereby and also to the crank 396 of the bag delivery mechanism.

The coin delivery chute 450 has arranged therein a lever 468 in the path of a coin deposited in the machine. This lever functions to close the switch J so as to energize the magnet I, and this results in closing the contacts H to complete the circuit. The chute 450 also has therein a pivoted balanced stop 470 so as to insure positive actuation of the contacts H.

Operation

The popcorn vending machine is placed in initial operation by plugging the terminals of the electric circuit 402 into an ordinary 110 volt wall socket. This causes current to flow through the heating element B, bringing it up to its normal operating temperature.

When a customer deposits a coin in the coin slot 436 and presses the lever 444, the coin is either rejected because of the emptiness of the machine of bags or popcorn or, if the machine is in working order, passed through the chute 450 to start the operation of the machine as hereinafter described. If there are no bags in the machine, the end 394 of lever 392, Figure 3, will move upwardly through the influence of spring 398, Figure 2, causing the hooked end 396 to move downwardly, pulling the rod 466 and rotating the shaft 454 with its crank 456, which operates the scavenger 442 to direct the coin into the return chute 446. Likewise, if something has happened during a previous operation to stop the bucket 240 in some position other than its normal position, Figure 3, then the lever 242 will be rotated, in a counterclockwise direction, out of its position shown in Figures 2 and 3, and it is free and will likewise push downwardly on the rod 466 to rotate the shaft 454 and operate the scavenger 442. Likewise, if the supply of unpopped corn has become exhausted, the weight of the corn will have been removed from the false bottom 36, Figures 2 and 3, and its supporting lever 40 will rotate about the pivot 42 under the influence of the spring 46, causing the rod 460 to move upwardly, rotating the shaft 454 and, through its crank 456, operating the scavenger 442 to expel the coin.

If, as previously described, the scavenger permits the coin to pass through the chute 450, the closing of the contacts J energizes the magnet I through a circuit including the brush h, the segments a and b and the brush e of the circuit controller. The energization of the magnet I causes the stop 470 to retain the coin in the chute and, also, closes the contacts H in the circuit of the main motor A, starting the rotation of the circuit control drum F.

As soon as the circuit control drum F has started its rotation, the brush d comes into contact with the segment b, completing a circuit for the motor independent of the contacts H of the magnet I. The circuit of the magnet I may then be interrupted by the passage of the segment a out of contact with the brush h. Upon the deenergization of the magnet I, the stop 470 returns to the position shown in Figure 2 and permits the coin to drop into the collection box 452.

Simultaneously with the starting of the motor A, the rotation of the main driving shaft 64, which is now in continuous drive connection with the motor through pinion 102 and pinion wheel 104, drives the shaft 106 and its connected shaft 200, causing the lug 210 on the coupler 192, which is now pressed to the right by the wedge 186, to engage the stop 212 and to cause the sprocket wheel 194 to rotate. The rotation of sprocket wheel 194 drives the various elevator chain sprockets in a counterclockwise direction, Figure 3, and carries the bucket 240, which was previously filled, upwardly with the chain until it dumps its contents of popcorn into the chute 244 through the trough 248 and the gate 250 onto the griddle 140. The elevator chain sprockets continue their counterclockwise rotation until the wedge 186 passes out from between the end of the movable shell of the coupler 192 and the collar 202, permitting the lug 210 of the coupler to move to the left to a position out of the plane of the stop 212. This disconnection of the elevator chain sprockets occurs just after the bucket 240 has completed one round trip and has become again filled with unpopped corn through its scooping action as it passes across the bottom of the popcorn hopper 26.

The circuit of the booster heating element G was closed through brush f by the first movement of the circuit control drum F and remains closed until the brush g passes off the segment c. The shaft 76 is now rotated at slow speed through the chain of gears 66, 90, and 78, causing the beater arms 148 to agitate the corn while it is popping. These beater arms preferably have their forward edges beveled toward the griddle so that they merely slide under the grains of popcorn, thus causing them to roll in constant contact with a heated surface, exposing all of the surfaces of the grains to maximum contact with the griddle or with the heated surfaces of the beater arms. This phase of the cycle of the machine continues for approximately one minute, during which time the grains of popcorn pop and fill the receptacle 156 in readiness for discharge.

At this stage, the cam 174 on the timing gear 170 has moved under the plunger 178, pushing its opposite end into the path of the trip lever 112, which is carried by the rotating pinion wheel 104. The contact between the plunger 178 and the trip lever 112 rotates the shaft of the trip lever and rotates the dog 110 to such a position that it engages the dog 120, causing the disc 116 to rotate with the pinion wheel 104 for one-half of

a revolution, that is, until the inner end of the trip lever 112 engages the fixed pin 180 to return the dog 110 to its normal position, in which it does not engage either of the dogs 118 or 120.

The rotation of the disc 116 pulls downwardly on the connecting rod 126, which carries with it the bushing 128 and the shaft 76. This lowers the griddle, opening the circumferential crevice between the receptacle and the outer edge of the griddle and permitting the popped corn to be ejected therethrough into the basin 50. At the same time, the lowering of the shaft 76 causes the collar 98 to disengage the slow-speed gear 92 and to engage the high-speed gear 74, thus causing the shaft 76 to rotate at a high speed in a direction opposite to that in which it was rotating at slow speed. The beater now rotates at high speed in the opposite direction to its original rotation, thus presenting the blunt edges of the beater arms to the popped grains of corn, wiping the corn off the griddle and into the basin 50.

The popped corn now in the bottom of the basin 50 is swept by the continuously rotating blades 164 through the conduit 310 into the hopper 308. Simultaneously with the high-speed operation of the shaft 76, the eccentric 278 starts the fluid seasoning pump 276 and the nozzle shaking linkages, causing the seasoning to be sprayed upon the popped corn just as it falls out of the basin 50 through the conduit 310.

When the timing gear 170 has made substantially one-half of a revolution, that is, when the cycle of the machine is substantially one-half completed, the eccentrically-operated rod 188 has caused the bag ejector to move its full stroke to the left, Figure 3, pushing the lower bag of the pile outwardly through the slot 334 to a position where it can be grasped by the customer. The customer now places the bag over the mouth of the hopper 308 and pulls forward on the handle 314, allowing the popped corn within the hopper to be dumped into the bag.

During the first half of the revolution of the timing gear 170, the operation of the rod 188 through the linkages heretofore described has caused the hopper bottom 316 automatically to open for the purpose of dumping into the receptacle 306 to prevent the possibility of unpopped corn or of previously delivered popcorn left in the hopper from interfering with the delivery into the hopper of only that corn which has been popped in the instant cycle.

When the timing gear and its associated circuit control drum F have returned to their normal positions, the circuit of the motor A is interrupted by the brush d passing off its segment b. When this happens, all of the operating circuits of the machine are inoperative excepting that of the constant heating element B, which, as before described, remains energized to keep the temperature of the griddle at just the proper heat for starting the popping operation.

While my invention is herein shown and described with respect to a specific embodiment, it is to be understood that I do not desire to be unduly limited thereto, the structure being subject to modification without departing from the spirit or scope of my invention.

I claim:

1. In a popcorn popping machine, in combination, a griddle, a beater having a radial arm lying adjacent and in contact with the surface of said griddle, said arm having one edge beveled toward the surface of the griddle and the other

edge extending substantially normal to the surface of the griddle, means to rotate said beater arm slowly in one direction for rolling unpopped corn in contact with the surface of the griddle and the upper surface of said arm, and means to rotate said arm more rapidly in the opposite direction to push popped corn off the griddle.

2. In a popcorn popping machine, in combination, a storage compartment for unpopped corn, an elevator bucket for lifting unpopped corn from said storage compartment, a receptacle for unpopped corn, means for conveying unpopped corn from said elevator bucket to said receptacle, a heated griddle forming the base of said receptacle and on which the corn becomes popped within the receptacle, means for separating the receptacle and the griddle to form a gap between them, and means for ejecting popped corn from said receptacle and said griddle through the gap formed between them.

3. In a popcorn popping machine, in combination, a storage compartment for unpopped corn, an elevator bucket for lifting unpopped corn from said storage compartment, a receptacle for unpopped corn, means for conveying unpopped corn from said elevator bucket to said receptacle, a heated griddle forming the base of said receptacle and on which the corn becomes popped within the receptacle, means for separating the receptacle and the griddle to form a gap between them, means for ejecting popped corn from said receptacle and said griddle through the gap formed between them, a circumferential gutter beneath said griddle for receiving the popped corn from the griddle, said gutter having a delivery opening therein, a blade movable along said gutter to push the popped corn to the delivery opening in the gutter, and a hopper for receiving popped corn from said gutter.

4. In a popcorn popping machine, in combination, a storage compartment for unpopped corn, an elevator bucket for lifting unpopped corn from said storage compartment, a receptacle for unpopped corn, means for conveying unpopped corn from said elevator bucket to said receptacle, a heated griddle forming the base of said receptacle and on which the corn becomes popped within the receptacle, means for separating the receptacle and the griddle to form a gap between them, means for ejecting popped corn from said receptacle and said griddle through the gap formed between them, a circumferential gutter beneath said griddle for receiving the popped corn from the griddle, said gutter having a delivery opening therein, a blade movable along said gutter to push the popped corn to the delivery opening in the gutter, a hopper for receiving popped corn from said gutter, and means located above the opening between said gutter and said hopper for delivering seasoning onto the popped corn as it passes from said gutter into said hopper.

5. In a popcorn popping machine, in combination, a storage compartment for unpopped corn, an elevator bucket for lifting unpopped corn from said storage compartment, a receptacle for unpopped corn, means for conveying unpopped corn from said elevator bucket to said receptacle, a heated griddle forming the base of said receptacle and on which the corn becomes popped within the receptacle, means for separating the receptacle and the griddle to form a gap between them, means for ejecting popped corn from said receptacle and said griddle through the gap formed between them, a circumferential gut-

ter beneath said griddle for receiving the popped corn from the griddle, said gutter having a delivery opening therein, a blade movable along said gutter to push the popped corn to the delivery opening in the gutter, a hopper for receiving popped corn from said gutter, and means located above the opening between said gutter and said hopper for delivering seasoning onto the popped corn as it passes from said gutter into said hopper, an automatic sequence mechanism for timing the delivery of seasoning only to that time required for the popped corn to pass from said gutter into said hopper.

6. In a popcorn popping machine, in combination, a griddle, an electrical heating element for said griddle proportioned to maintain the temperature of said griddle at constant heat necessary for popping corn when no unpopped corn is resting upon said griddle, a second electrical heating element for said griddle, and means to connect said second heating element in circuit with a source of current only for the duration of the popping operation, said second heating element being proportioned to supply the heat absorbed by the grains of corn during the popping operation, a beater traveling in contact with the upper surface of said griddle, whereby said beater is maintained at substantially the same temperature as that of the griddle, whereby said beater receives heat from each of said heating elements and imparts heat to the grains of corn while serving to roll the grains in contact with either the griddle or the beater until the grains are popped.

7. In a popcorn popping machine, in combination, a griddle, a source of current, a first electrical heating element connected in circuit with said source of current, a second electrical heating element normally disconnected from circuit with said source of current, the first electrical heating element being in heat-conducting association with said griddle and with said second heating element and being so proportioned as to maintain said griddle and said second heating element at substantially the temperature necessary for popping corn when no corn is delivered to said griddle, said second heating element being so associated with said griddle and so proportioned as to maintain said griddle at substantially its constant temperature during the presence of corn on said griddle, and means for maintaining the connection of said second heating element with said source while the corn on said griddle is popping.

8. In a popcorn popping machine, in combination, a corn popping receptacle, a beater in said receptacle rotatable upon a substantially vertical axis, means to rotate said beater at slow speed for rolling the grains of unpopped corn in said receptacle, and means for rotating said beater at a much higher speed for ejecting popped corn from said receptacle.

9. In a popcorn popping machine, in combination, a corn popping receptacle, a beater in said receptacle rotatable upon a substantially vertical axis, means to rotate said beater at slow speed for rolling the grains of unpopped corn in said receptacle, and means for rotating said beater at a much higher speed and in the opposite direction for ejecting popped corn from said receptacle.

10. In a seasoning feeder for an automatic popcorn popping machine, a reservoir, a tube extending downwardly into said reservoir and having two openings into it, one near the bottom of

said reservoir and the other near the middle of said reservoir, means for pumping seasoning out of said reservoir for delivery onto popped corn, whereby when said reservoir contains two solutions such as salt water and an oil having different specific gravities the lower of said openings will deliver salt water into said tube while the upper of said openings will deliver oil into said tube.

11. In a seasoning feeder for an automatic popcorn popping machine, a reservoir containing salt water in its lower portion and an oil floated

5 on the salt water, a tube extending into said reservoir and having two openings, one into the part of said reservoir containing salt water and the other into the part of said reservoir containing oil, a pump connected with said tube adapted to draw salt water and oil from said reservoir and having a chamber in which the salt water and the oil are thoroughly mixed, and a discharge pipe from said pump for delivering the mixture of salt water and oil onto the freshly popped corn in said machine.

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