Nov. 2, 1943. J. HOHL ET AL 2,333,571

PACKAGING MACHINE

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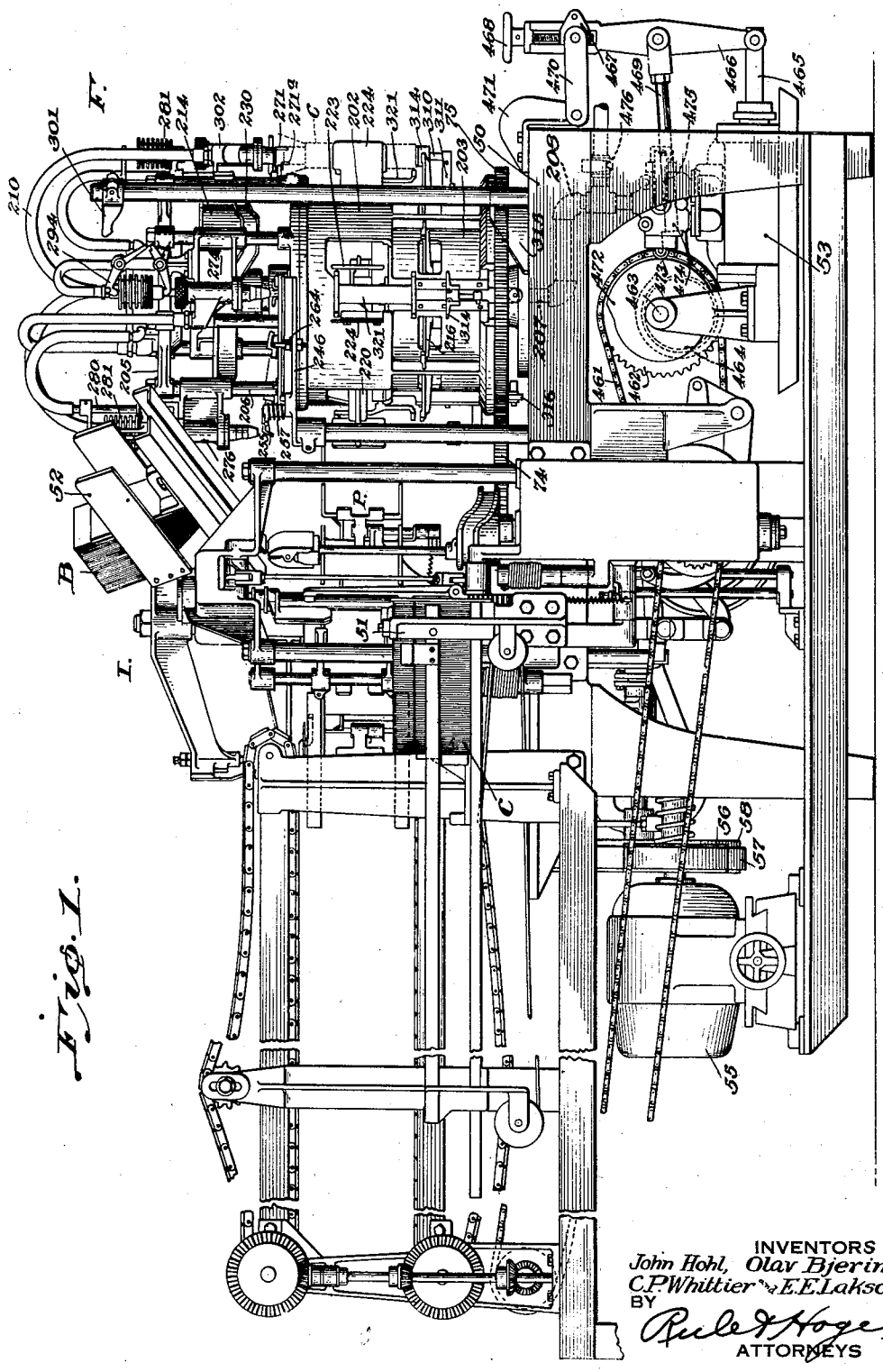


Fig. 1.

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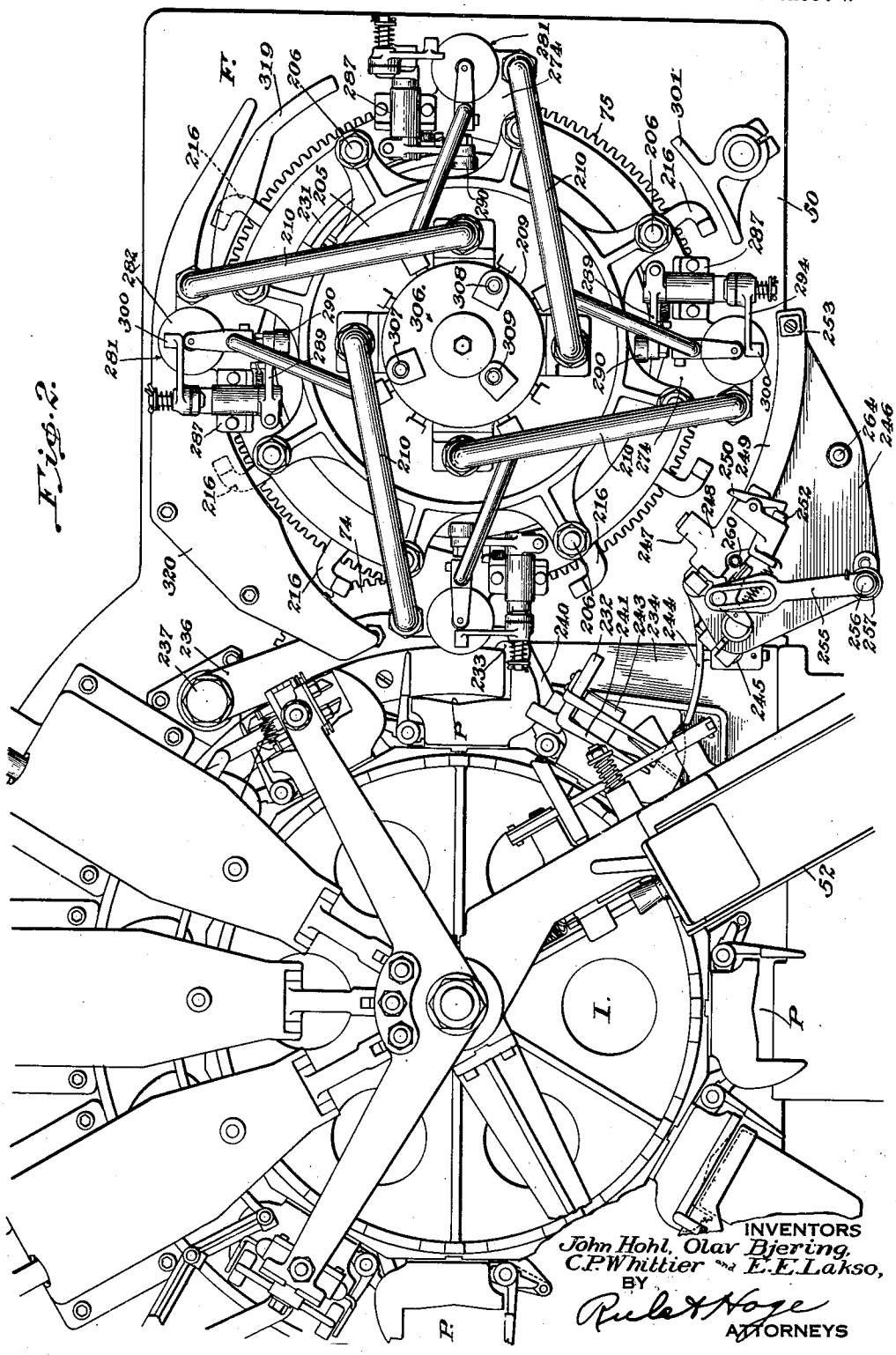


Fig. 2.

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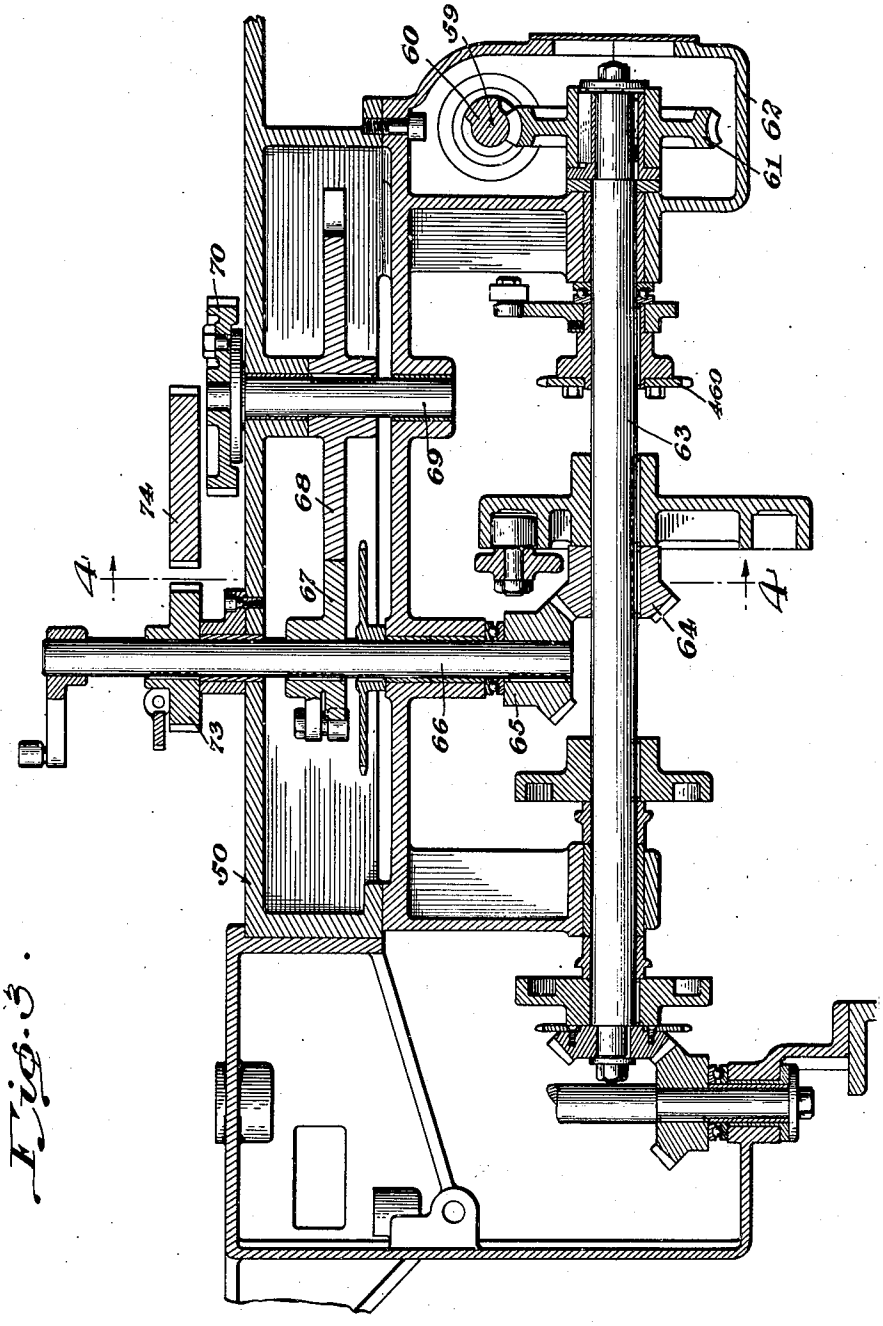


Fig. 3.

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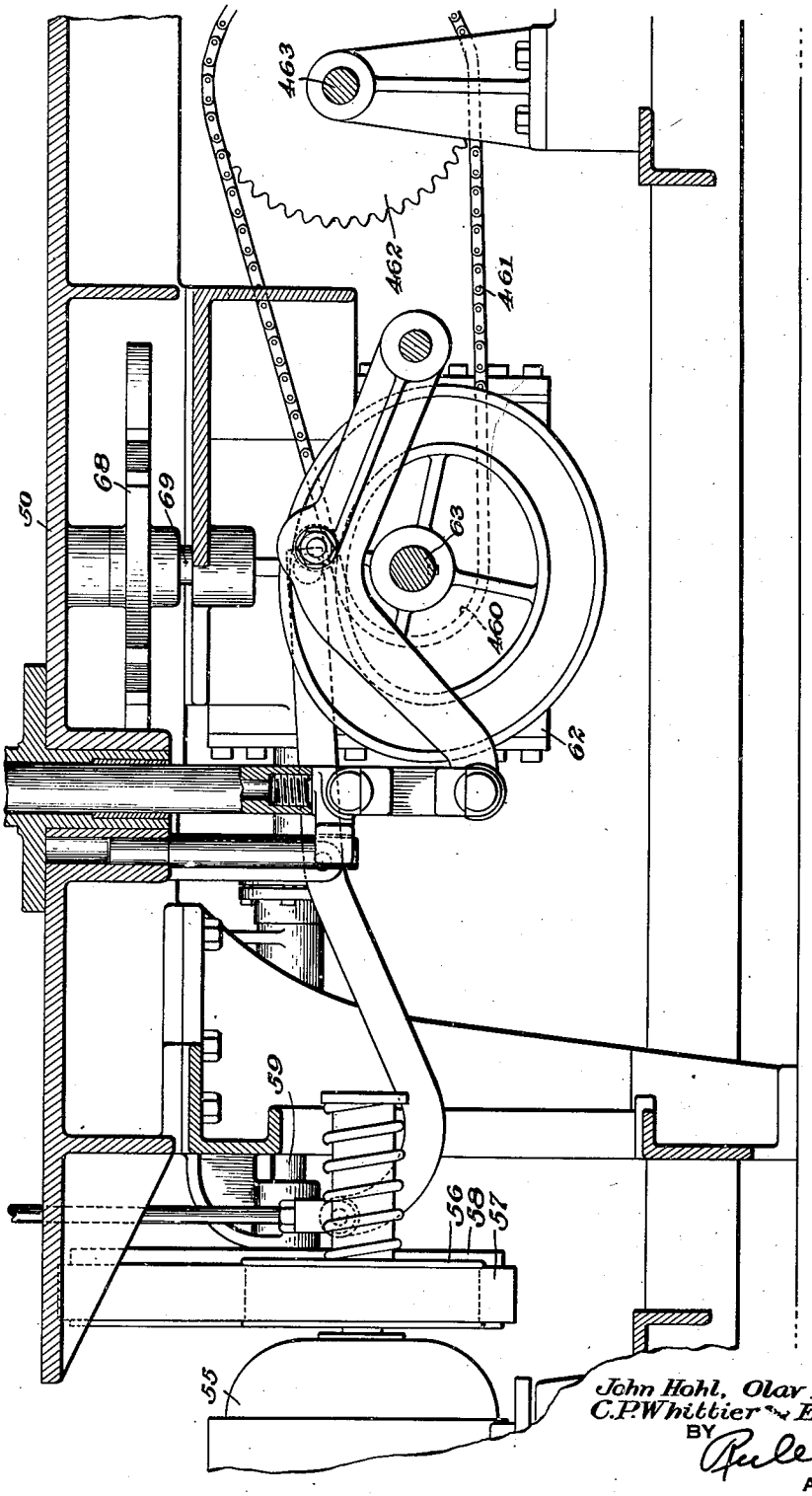


Fig. 4.

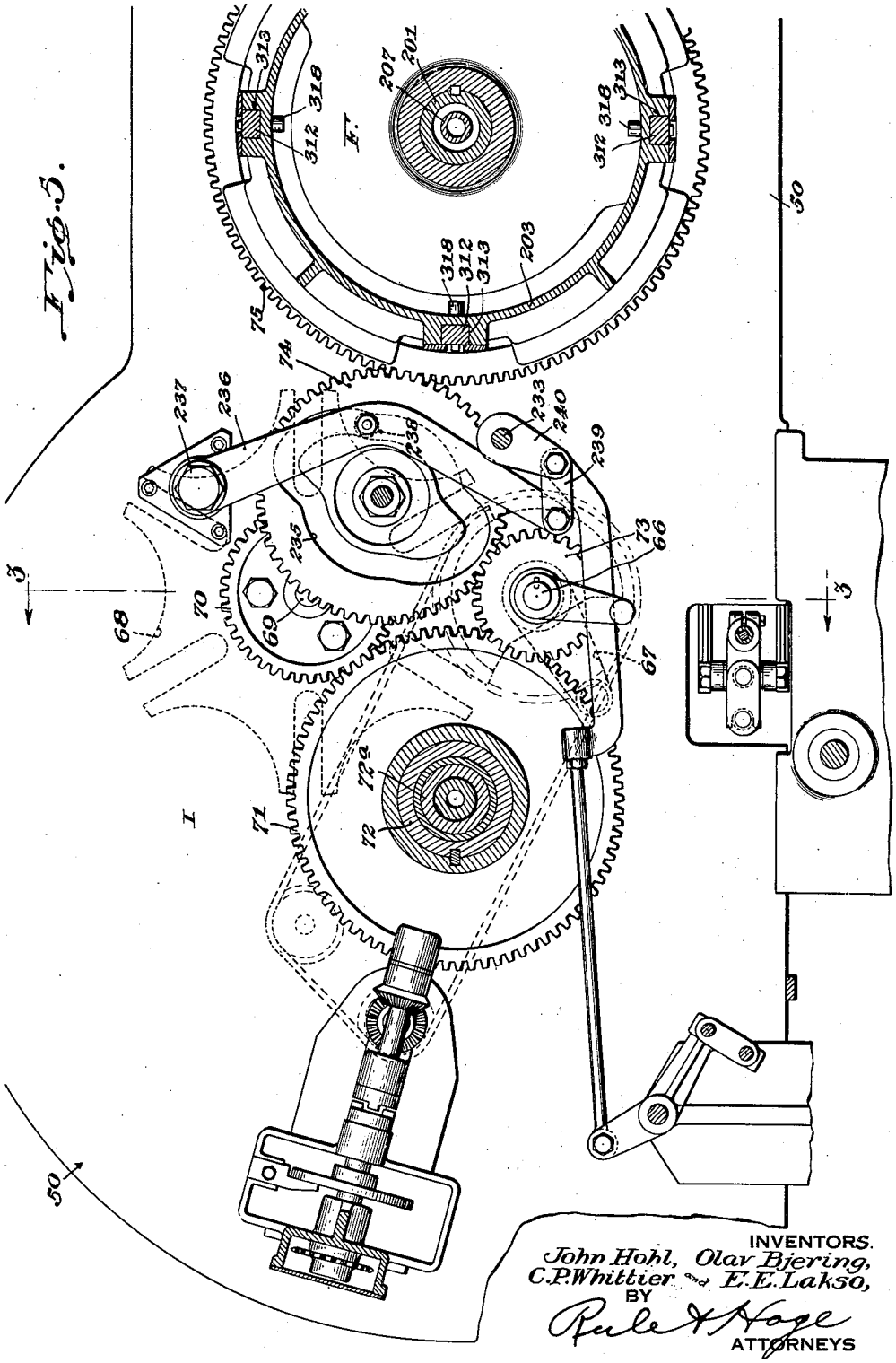
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Filed May 25, 1940 11 Sheets-Sheet 5

Fig. 5.



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Filed May 25, 1940 11 Sheets-Sheet 6

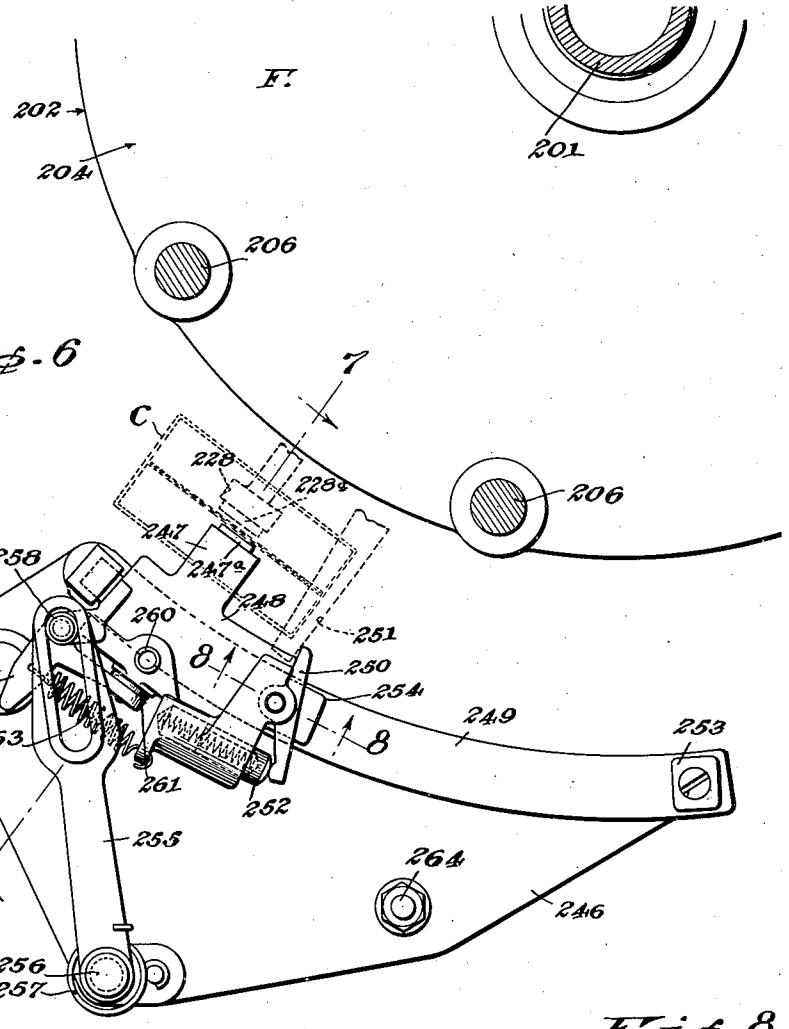


Fig. 6

Fig. 7

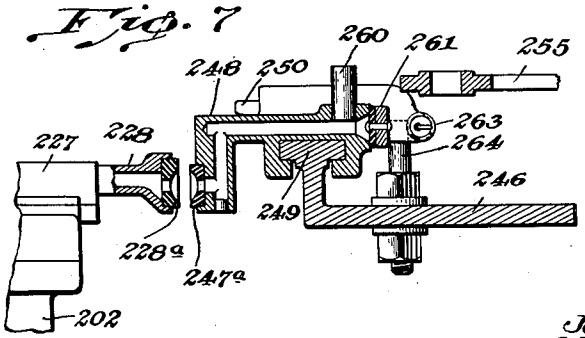
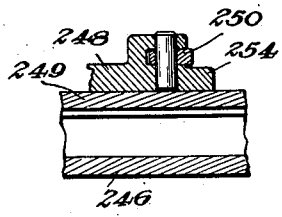


Fig. 8



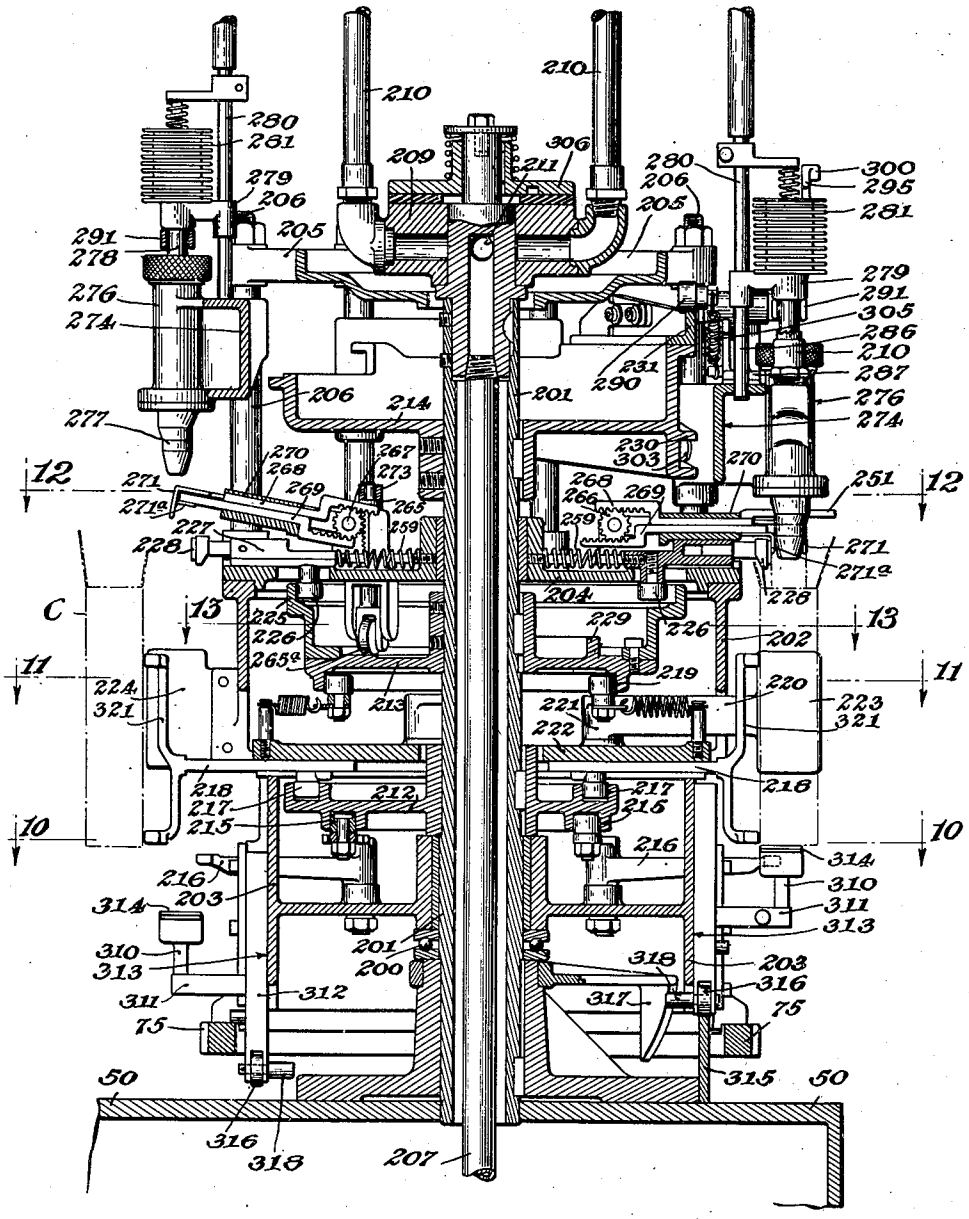
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Filed May 25, 1940 11 Sheets-Sheet 7

Fig. 9



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Nov. 2, 1943. J. HOHL ET AL 2,333,571

PACKAGING MACHINE

Filed May 25, 1940 11 Sheets-Sheet 8

Fig. 10

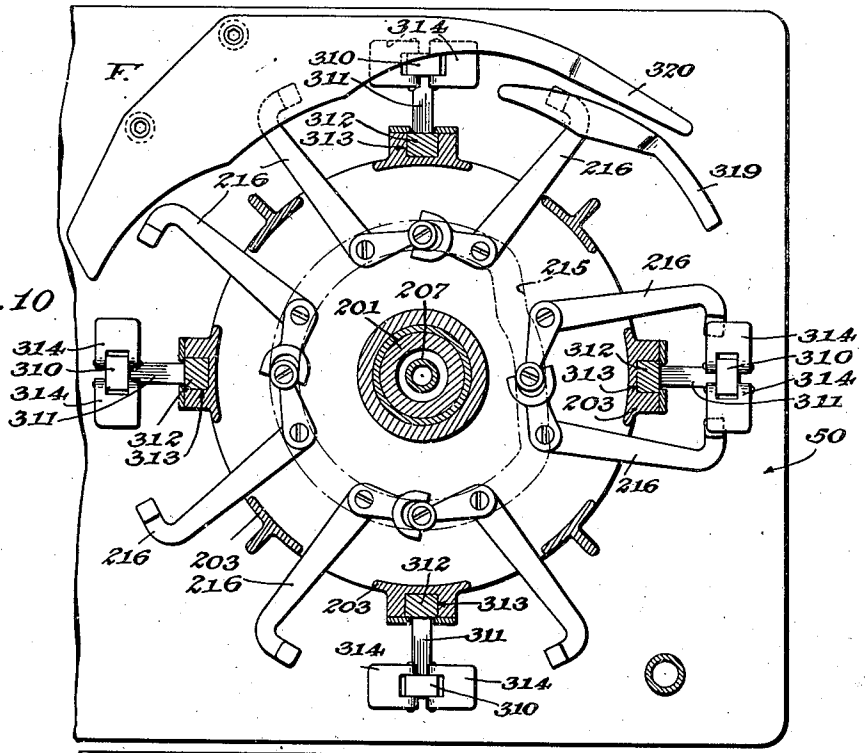
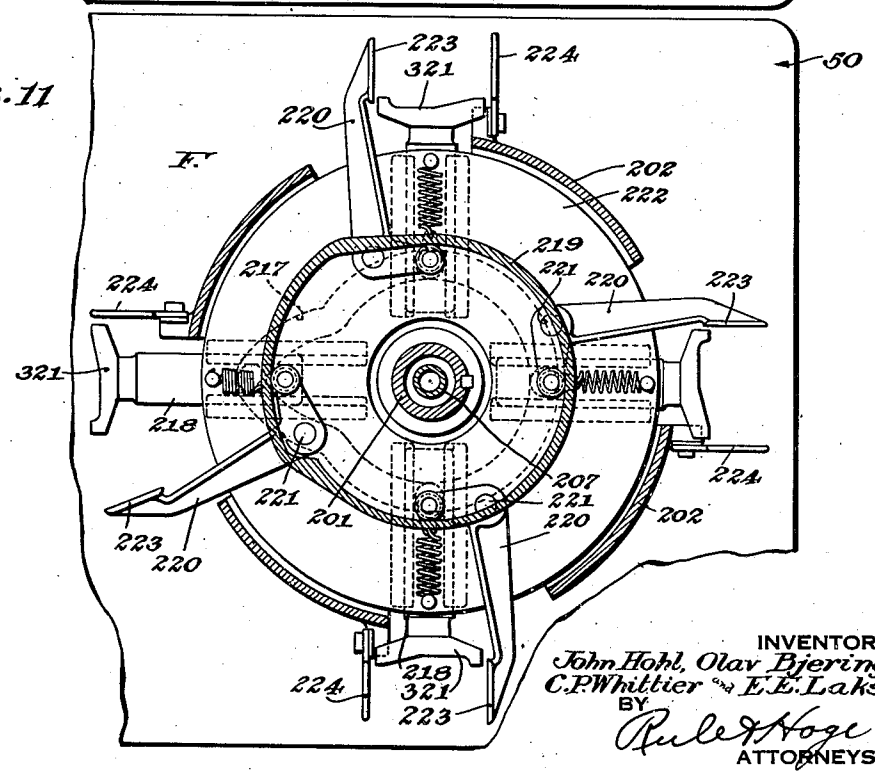


Fig. 11



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Nov. 2, 1943. J. HOHL ET AL 2,333,571

PACKAGING MACHINE

Filed May 25, 1940 11 Sheets-Sheet 9

Fig. 12

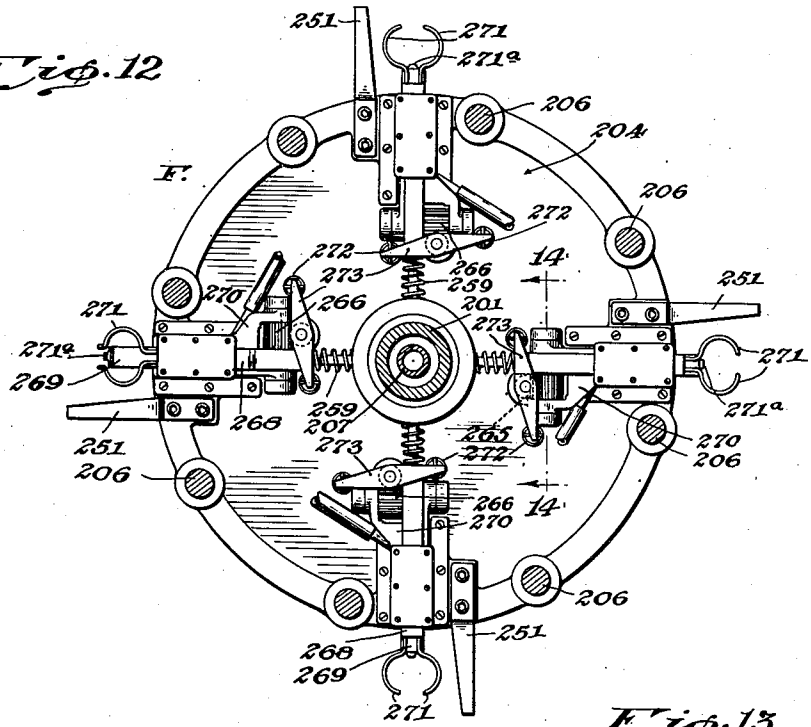


Fig. 13

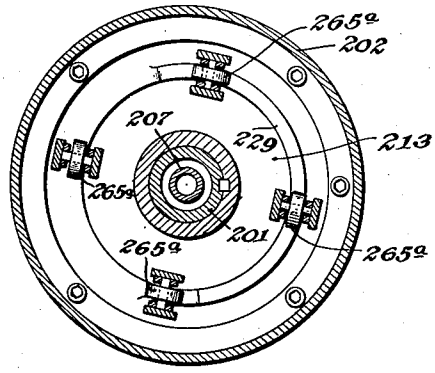
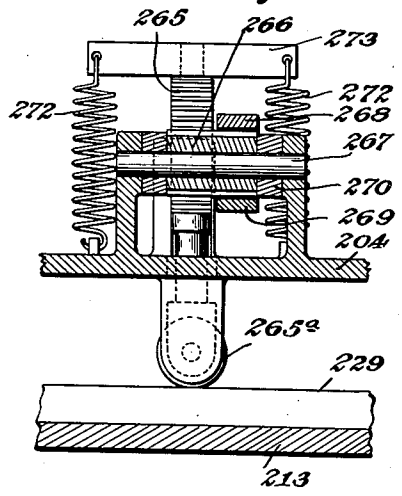


Fig. 14



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Filed May 25, 1940 11 Sheets-Sheet 10

Fig. 15

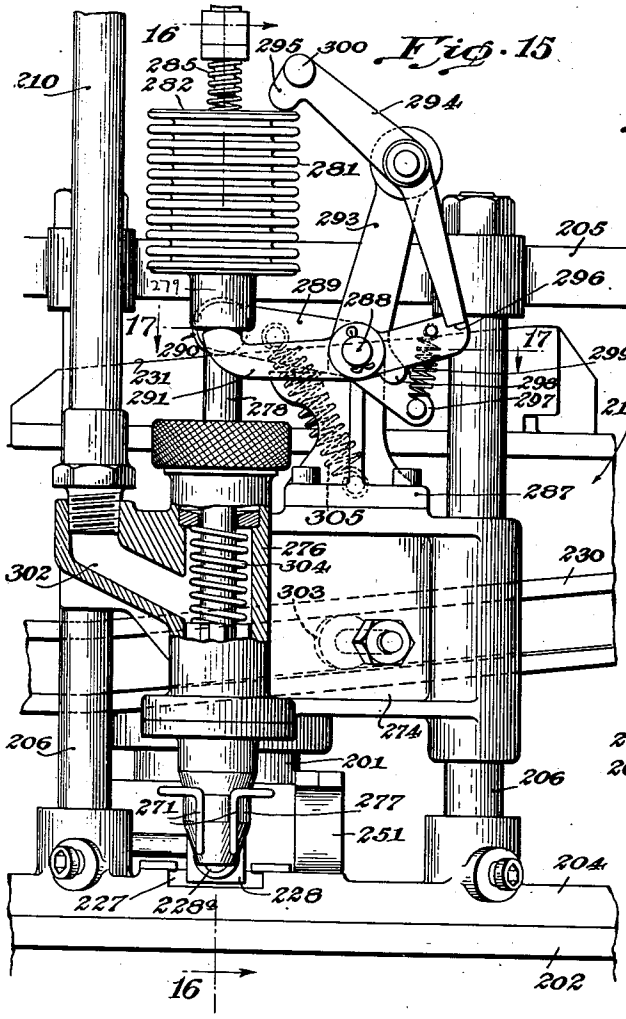


Fig. 16

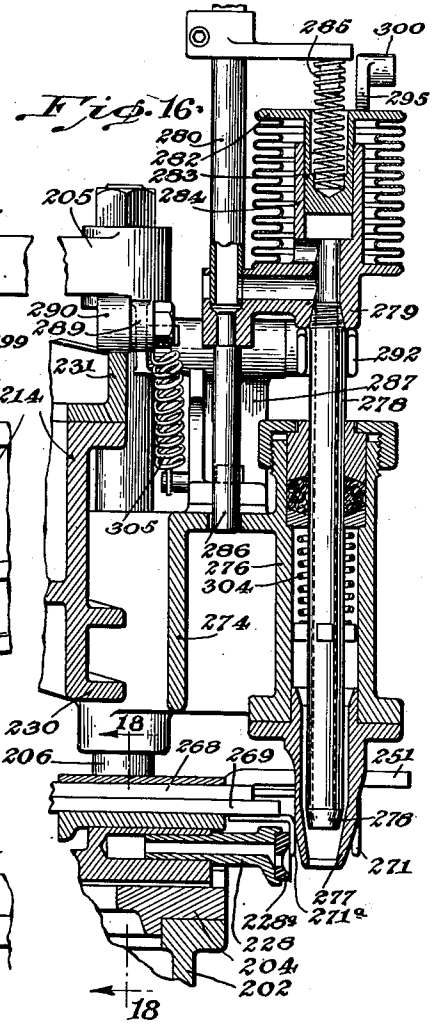


Fig. 17

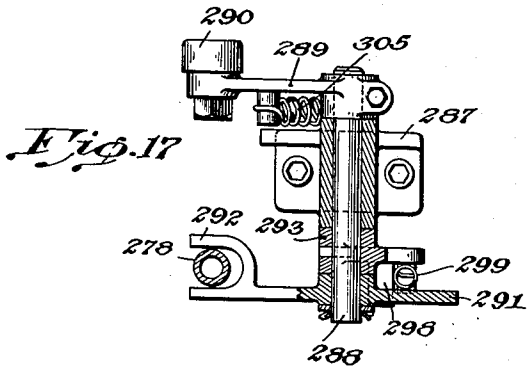
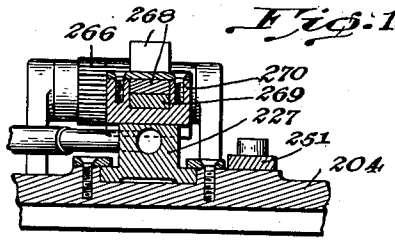


Fig. 18



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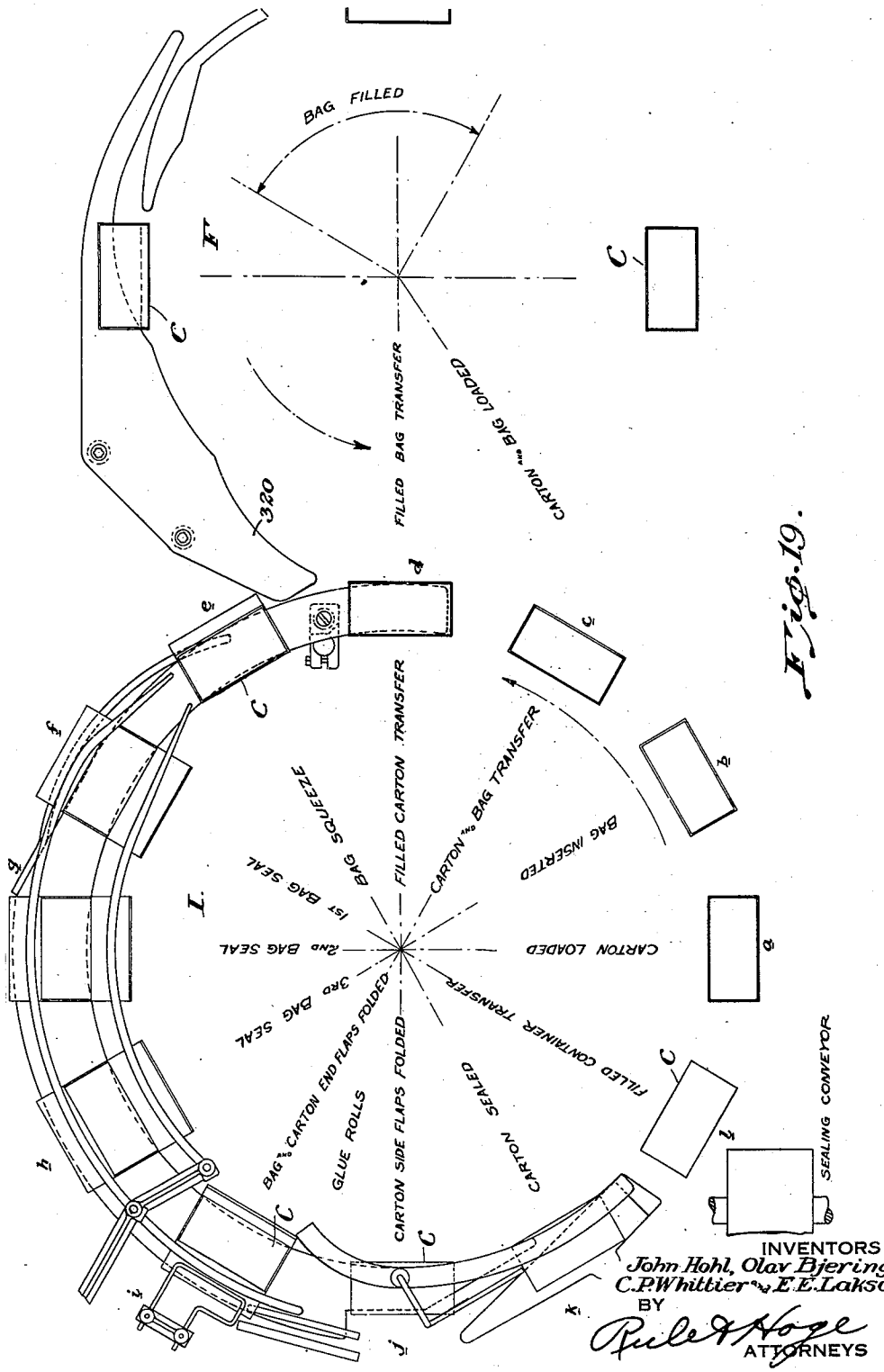


Fig. 19.

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Patented Nov. 2, 1943

2,333,571

UNITED STATES PATENT OFFICE

2,333,571

PACKAGING MACHINE

John Hohl, Olav Bjering, and Charlton P. Whittier, Toledo, Ohio, and Eino E. Lakso, Fitchburg, Mass., assignors to Owens-Illinois Glass Company, a corporation of Ohio

Application May 25, 1940, Serial No. 337,262

14 Claims. (Cl. 226—61)

Our invention relates to apparatus for packaging commodities including materials such as oil or other liquids, and materials in pulverized, granulated, comminuted or other form. In its preferred form as herein illustrated, the invention is embodied in an automatic machine for taking collapsed or folded cartons from a magazine, opening the cartons, placing flexible bags, while empty and collapsed, within the opened cartons, filling the bags, sealing them, and thereafter sealing the cartons.

Our invention relates particularly to means for opening the mouth of a bag after it has been placed within the carton, means for blowing air into the bag for expanding it prior to the filling operation, means for introducing a measured quantity of a commodity such as oil or other liquid into the expanded bag, blowing means for dissipating any foam resulting from the filling operation, and automatic means for preventing the discharge of a liquid from the filling nozzle when a bag is missing.

An object of our invention is to provide novel and improved mechanism for effecting these operations in a reliable and efficient manner.

Other objects of the invention will appear hereinafter.

Referring to the accompanying drawings:

Fig. 1 is a side elevation of a machine embodying the principles of our invention;

Fig. 2 is a partial top plan view of the two turrets;

Fig. 3 is a vertical section through the machine base, showing the Geneva drive, the main cam shaft and associated gearing, the section being taken at the line 3—3 on Fig. 5;

Fig. 4 is a section at the line 4—4 on Fig. 3;

Fig. 5 is a sectional plan of the base of the machine, showing the main driving mechanism;

Fig. 6 is a plan view of vacuum mechanism for opening the bags preparatory to the filling operation;

Figs. 7 and 8 are sections at the lines 7—7 and 8—8 respectively on Fig. 6;

Fig. 9 is a vertical section of the filling turret;

Figs. 10, 11, 12 and 13 are sections at the correspondingly designated lines on Fig. 9;

Fig. 14 is a section at the line 14—14 on Fig. 12;

Fig. 15 is a part-sectional front elevation of a filling nozzle and associated mechanism;

Fig. 16 is a section at the line 16—16 on Fig. 15;

Fig. 17 is a section at the line 17—17 on Fig. 15;

Fig. 18 is a section at the line 18—18 on Fig. 16;

Fig. 19 is a diagrammatic chart indicating the various steps in the operation of the machine.

The machine as herein illustrated is particularly designed and adapted for packaging a liquid such as oil and will be described in detail as used for this purpose although it will be understood that it may be used for packaging other materials.

General construction

Referring particularly to Figs. 1, 2 and 19, the machine comprises a turret I, herein referred to as the intermittent turret, which is intermittently rotated step by step and a turret F, herein referred to as the filling turret, which is rotated continuously. The turrets are mounted side by side for rotation about vertical axes, being supported on the machine base 50. The intermittent turret carries an annular series of bag holding units (the machine as herein shown comprising 12 such units), each of which is brought to the 12 stations designated *a* to *l* inclusive (Fig. 19) by the step rotation of the turret.

A stack of cartons C is held in a magazine 51 near the station *a* and as each unit of the intermittent turret is brought to said station, a carton is transferred from the magazine to the turret. The carton as it enters the pocket at station *a* is squared up, that is, opened to rectangular form. At station *b* a flexible, collapsed bag B is drawn from a stationary magazine 52 into position within the open carton.

When the carton with the bag therein reaches station *c*, it is transferred to the filling turret F which comprises an annular series of bag filling units, herein shown as four in number. As the carton with the bag therein rotates with the filling turret, the mouth of the bag is opened and the bag itself is blown out to the walls of the carton. A measured charge of oil supplied through a pump 53 (Fig. 1) is then introduced into the bag, after which a jet of air blows down the foam formed during the filling operation.

Following this, the filled package is transferred back to the intermittent turret at station *d*. As the carton advances step by step with the turret I, folding and sealing operations take place. As these form no part of the invention herein claimed, they are not disclosed in detail.

Driving mechanism

Referring particularly to Figs. 1, 3, 4 and 5, the driving mechanism will now be described. The machine is driven by an electric motor 55 (Figs. 1 and 4). A pulley 56 on the motor shaft operates through a belt 57 to drive a pulley 58 on a sectional shaft 59, one section of which comprises a worm 60 (Fig. 3) which drives a worm

wheel 61 within a gear case 62. The worm wheel 61 is keyed to the main cam shaft 63 and rotates it continuously. The cam shaft operates through bevel gears 64 and 65 to rotate a vertical shaft 66 which operates a Geneva drive. The latter is of conventional construction and includes a driving element 67 which is keyed to the shaft 66 and operates during each rotation to engage a radial slot in the Geneva gear 68 and impart a step rotation to said gear and the shaft 69 to which the gear is keyed. A gear pinion 70 (Figs. 3 and 5) on the shaft 69 drives a gear 71 keyed to the hub 72 of the intermittent turret I, thereby rotating the turret step by step about a stationary tubular column 72ª supported on the machine base.

Motion is transmitted from the shaft 66 (Figs. 3 and 5) for rotating the filling turret continuously, through a train of gears including a pinion 73 keyed to the shaft 66, a gear 74 running in mesh with the pinion 73, and a ring gear 75 on the turret F.

Filling turret

The general construction of the filling turret will be understood by reference to Figs. 1, 2 and 9 to 12. The turret is mounted on ball bearings 200 (Fig. 9) for continuous rotation about a stationary tubular column 201 rising from the machine base 50. The turret includes a cylindrical housing comprising an upper section 202 and a lower section 203 of somewhat smaller diameter integral therewith. A plate 204 forms the top of the housing. A spider plate 205 at the top of the turret is attached to the upper ends of an annular series of posts or rods 206 fixed to and rising from the cover plate 204.

Extending upwardly through the tubular column 201 is an oil pipe 207 forming part of a pipe line 208 (Fig. 1) extending from the pump 53 for conducting oil to the filling heads. An oil distributing head 209 (Fig. 9) is mounted to rotate with the turret. Pipes 210 lead from the distributing head to the filling heads and are periodically brought into communication with the oil pipe 207 through a port opening 211.

Attached to the center column 201 are cam plates 212, 213 and 214 formed with cam tracks or cams for effecting various operations as set forth hereinafter. The cam plate 212 is formed with a cam track 215 on its under face for operating pairs of arms 216 (Fig. 10) for folding in the bottom end flaps of the cartons as hereinafter set forth. The cam plate 212 is formed on its upper face with a cam track 217 for operating radial slides 218 with pusher devices 321 for transferring the filled bags and cartons to the intermittent turret. The cam plate 213 is formed on its under surface with a cam track 219 (Figs. 9, 11) which operates arms 220 in the form of bell cranks pivoted at 221 on a plate 222 between the sections 202 and 203 of the turret housing. The arms 220 are formed with plates 223, each of which forms one side or wing of a package-holding pocket, the other side of which comprises a plate 224 having a fixed mounting on the housing section 202.

Attached to the upper face of the cam plate 213 is a cam ring 225 forming a cam track on which run cam rolls 226 on slides 227 which carry suction heads 228 comprised in the means for opening the mouths of the bags prior to the filling operation. The cam plate 213 is also formed on its upper face with a cam track 229 (Figs. 9 and 13) which operates mechanism as hereinafter described for holding the bag open during the filling operation.

The cam plate 214 is formed with a cam track 230 for actuating the filling heads. The cam plate 214 also has mounted thereon a cam 231 for actuating valve mechanism in the filling heads as set forth hereinafter. The filling turret carries four filling units and is continuously rotated at such speed that each unit receives an empty package, comprising a carton with a bag therein, from the intermittent turret for each step rotation of the latter, four such packages being filled on the filling turret during each complete rotation thereof.

Transfer of empty package to filling turret

After a bag has been inserted in the carton at station *b* as above described, the turret I is indexed to bring the empty package (carton and bag) to station *c*. While the turret is at rest in this position the package is transferred and loaded on the continuously rotating filling turret. This transfer is effected by mechanism shown in Figs. 2 and 5. Such mechanism includes a transfer arm or bracket 232 fixed to a short vertical rock shaft 233 journalled in a bracket 234 on the machine base. Means for rocking the transfer arm comprises a cam track 235 (Fig. 5) formed in the upper face of the continuously rotating gear 74. A rock arm 236 is mounted on the machine base to swing on a pivot 237. The arm carries a cam roll 238 running in the cam track 235. A link 239 connects the free end of the arm with a rock arm 240 fixed to the lower end of the rock shaft 233. The transfer arm 232 is provided with means including fingers 241 and a bottom plate 243 to support the package during the transfer.

While the turret is at rest the cam 235 operates to swing the transfer arm about the axis of the shaft 233, thereby carrying the package to the filling turret. During this transfer the package is prevented from being thrown out of position by centrifugal force by means of an arc-shaped guide bar 244 (Fig. 2).

At the completion of the transfer movement the empty package is gripped between the holding plates 224 and 223 (Fig. 11) above described. The rotation of the filling turret is so timed that the plate 224 engages the side of the carton just after the transfer arm completes its transfer movement. Immediately after this the swinging plate or wing 223, which during the transfer is in its open position to receive the package, is swung back to grp the package. At the same time the transfer arm 232 is returned to position for receiving the next package. The return movement of the transfer arm takes place during the indexing of the turret I so that the pocket P from which the package has been removed is carried out of the way before the transfer arm is returned.

Opening the bag

Immediately after the package has been transferred to the filling turret, the mouth of the bag is opened by mechanism now to be described, to permit the filling nozzle to be inserted. Referring to Figs. 2 and 6 to 8, such mechanism is carried on a stationary plate 246 on which is mounted a suction head 247 adapted to be oscillated in an arcuate path concentric with the axis of the filling turret. The suction heads 228 on the filling turret are adapted to be brought in line with the head 247 by the rotation of the turret.

The suction head 247 is formed on a slide block

248 mounted to slide on an arc-shaped guide rail 249 formed on the plate 246, said rail being concentric with the turret. A dog 250 pivoted to the slide block 248 projects into the path of arms 251 (Figs. 6 and 12), said arms being mounted on the rotating turret and individual to the filling units. A spring-actuated boss 252 holds the dog 250 in the path of the arms 251. When the rotation of the turret brings a suction head 228 to the dotted line position (Fig. 6) it is in substantial alignment with the suction head 247, with the upper end of an empty bag between the suction cups 228a and 247a carried by said heads. The arm 251 now engages the dog 250 and thereby causes the head 248 to travel with the turret until arrested by a stop 253 engaging an abutment 254 on the slide block. The continued movement of the turret causes the arm 251 to swing the dog 250 about its pivot, forcing the spring boss 252 inwardly against the tension of its spring until the dog is disengaged from the arm 251. The slide block 248 is then returned by a rock arm 255 pivoted at 256 to the plate 246 and held under tension by a coil spring 257. The free end of said arm is slotted to engage a pin 258 on the slide block.

When the suction heads 247 and 228 are brought into substantial alignment as shown in Fig. 6, the head 228 is projected radially outward to grip the mouth end of the bag between the suction cups, the cam 225 (Fig. 9) being shaped to permit this outward movement under the influence of a coil spring 259 operating through the slide block 227. The suction head 247 is in a suction line including a pipe 260 leading to a source of vacuum (not shown). After the suction heads have been brought into register with the bag therebetween, suction is applied to the head 247 so that the opposite sides of the bag are gripped by the suction cups. In this connection it is to be noted that suction has been applied previously to the head 228 for holding the bag while being advanced to the Fig. 6 position. During the forward travel of the slide block 248, the suction head 228 is drawn inwardly by means of its cam 225, thereby opening the bag to a certain extent. In order to release the suction head 247 and permit the bag to continue its travel beyond the opening station, a relief valve 261 is provided in the suction line leading to the head 247. This valve is carried on a bell crank lever 262 fulcrumed on the pin 258. A coil spring 263 holds the valve closed. A stop 264 on the plate 246 extends into the path of the bell crank 262 and is so positioned that it will engage the bell crank and open the relief valve just before the slide block 248 is arrested by the stop 253. This opening of the relief valve breaks the vacuum and thus releases the vacuum head 247 from the bag, allowing the latter to continue its travel while the slide block 248 returns.

After the operation of the suction heads, which opens the bag part way, it is opened further and held open independently of said heads by the following mechanism. Referring to Figs. 9 and 12 to 14, the cam 229 actuates a vertical rack bar 265 which carries a roll 265a running on the cam. The rack bar is formed with rack teeth engaging a pinion 266 on a shaft 267. Rack bars 268 and 269 are mounted for reciprocating movement lengthwise in guideways formed in an arm 270 which is fulcrumed to rock about the axis of the shaft 267. Said rack bars engage the upper and lower sides respectively of the pinion 266 and are provided respectively at their forward ends with spreader fingers 271 and 271a to enter the mouth of the partly opened bag, open it further to receive the filling nozzle, and hold it open. The forward ends of the fingers 271 and 271a are extended downwardly to enter the bag. The upper fingers are bowed as shown in Figs. 12 and 15 to permit entrance of the filling nozzle.

The arm 270 carrying the rack bars is held in an upwardly and outwardly inclined position as shown in Fig. 9 at the left-hand side of the turret. After the suction heads open the bag as above described, the cam 229 operates to move the rack bar 265 upwardly. The initial upward movement of the rack bar swings the arm 270 downwardly to horizontal position between the vacuum heads, thereby causing the fingers 271 and 271a to enter the open end of the bag. Continued upward movement of the rack bar 265 then operates to slide the bars 268 and 269 in the arm 270, the upper bar moving outwardly and the lower bar inwardly, thereby spreading the fingers 271 and 271a as shown at the right-hand side of Fig. 9. The bag is held open in this manner until after it has been filled. The vacuum heads 228, 247 may operate to partly open the mouth of the bag, and after this initial opening the fingers 271 and 271a are brought into operation for further expanding or fully opening the mouth of the bag to receive the filling nozzle.

After the bag has been filled and the nozzle withdrawn, the rack bar 265 is lowered to withdraw the bag opening device. This lowering of the rack bar is effected by a pair of springs 272 (Fig. 14) attached at their upper ends to a crossarm 273 on the upper end of the rack bar 265, said springs serving to maintain the cam roll in engagement at all times with the cam. When the rack bar 265 moves downward it first moves the arms 269 and 270 lengthwise to draw the fingers 271 and 271a together and thereafter swings the arm 270 upward to clear the bag.

Expanding and filling the bag

After the mouth of the bag has been opened, the filling nozzle is introduced and air blown through the nozzle to expand the bag prior to the introduction of the oil. When the bag is expanded, there is a slight air pressure built up therein which operates a safety mechanism for automatically controlling the admission of oil to the bag and thereby serving as the safety means to prevent oil from being discharged through the filling nozzle unless a bag is positioned on the nozzle to receive it.

Referring to Figs. 1, 2, 9 and 15 to 18, there are four bag-filling units on the filling turret, each comprising a head or casting 274 mounted for up and down movement on a pair of the posts 206. This head is formed with a cylinder 276 to the lower end of which is attached a nozzle 277. Extending longitudinally through the cylinder 276 and projecting downward into the nozzle is a tubular plunger or rod 278 movable up and down in the cylinder and serving as a valve for shutting off the flow of oil through the nozzle and also serving as a conduit through which air is blown into the bag for expanding it preliminary to the filling operation. The plunger has a screw-threaded connection at its upper end with a head-piece 279, the latter also having a connection with a pipe 280 which forms part of an air line extending through the head-piece 279 to the plunger 278. A bellows 281 is connected at its lower end to the head 279. The upper end of the bellows comprises a plate 282

formed with a tubular extension 283 projecting downward within a tubular extension 284 of the head 279. The bellows is held under compression by a coil spring 285 extending into the tubular extension 283. A guide post 286 fixed to the head 279, and extending downwardly therefrom has sliding contact with the head 274.

The bellows 281 is actuated by air pressure built up in the bag and operates through the following mechanism to control the admission of oil to the bag. Mounted on the filling head is a bracket 287 (Figs. 15, 17) in which is journalled a rock shaft 288. A rock arm 289 fixed to the shaft carries a cam roll 290 which runs on the cam 231. A lever 291 is fulcrumed on the shaft 288 and has one end 292 bifurcated to straddle the plunger rod 278 and engage beneath the head 279. A rock arm 293 is fixed to the rock shaft 288 and extends upwardly therefrom. A lever 294 is pivoted on the upper end of the arm 293 and is formed at its upper end with a lug 295 which overhangs the bellows. The lower arm of the lever 294 serves as a latch to engage a recess 296 at the end of the lever 291. The rock arm 293 is formed with an extension 297 with a stop lug 298 thereon to engage beneath the lever 291. A light coil tension spring 299 is connected between the extension 297 and the lever 291.

The operation of the safety mechanism just described is as follows:

When the filling nozzle has been projected into the open mouth of the bag, air under pressure is admitted through the air line 280 and tubular plunger 278 to the bag, thereby expanding the latter and at the same time applying air pressure within the bellows 281. The expansive force of the air in the bellows causes the plate 282 to bear against the lug 295, thereby holding the latch lever 294 in engagement with the lever 291. As the turret rotates, the cam roll 290 rides along the inclined cam 231 so that the arm 289, shaft 288 and arm 293 are rocked in a clockwise direction (Fig. 15) and operate through the latch lever 294 to rock the lever 291, thereby lifting the plunger head 279 and valve plunger 278. The lower tapered end 278' of the valve plunger, which serves as a valve, is thus lifted away from the tapered wall of the nozzle 277 to permit a charge of oil to be introduced into the bag.

If there is no bag in position on the nozzle when the air valve is opened, there will be no pressure built up in the bellows. The latch lever 294 therefore will not operatively engage the lever 291 but will be carried outwardly beyond the latter by the movement of the arm 293 when the shaft 288 is rocked. As the spring 299 is too weak to rock the lever 291 and lift the plunger head, the plunger remains in its lowered position so that the valve 278' remains closed, preventing oil from being discharged through the filling nozzle.

As there is a possibility that the initial puff of air supplied to the plunger 278 would operate the bellows and cause the latch lever 294 to be held in operative position, the following additional safety means is provided. A boss 300 on the upper end of the lever 294 is carried beneath a guard rail 301 (Fig. 2) as the filling nozzle approaches the filling position, thereby preventing the bellows from moving the latch lever to operative position. As said lever moves beyond the guard rail 301 before the expansion of the bag is completed, it does not prevent the bellows from functioning as a safety means.

After the bag has been expanded in the manner above described a measured quantity of oil is forced through the filling nozzle into the bag, the oil being conveyed from the pump 53 through the line 208 (Fig. 1) and pipe 207 (Fig. 9) to the distributing head 209 which admits the oil to the pipe 210 individual to the filling head to which the bag is connected. As shown in Fig. 15 the pipe 210 opens into a port 302 communicating with the cylinder 276. The filling head 274 carries a cam roll 303 (Fig. 15) which runs on the cam track 230, the latter serving as heretofore noted to lift and lower the filling head and nozzle. After a charge of oil has been introduced into the bag the cam roll 290 runs off the cam 231, permitting the plunger 278 to be lowered by a coil spring 304 within the oil cylinder 276. A coil spring 305 holds the cam roll 290 on its cam. While the bag is being filled, the package is gripped between the plates 223, 224 (Fig. 11). The cam 219 is shaped to prevent any substantial gripping pressure of said plates on the carton while the bag is being inflated before the oil is introduced, thereby permitting the carton to float and adjust itself to the bag as the latter is expanded. This prevents the bag from being torn or pulled off the filling nozzle while being expanded.

After a bag has been filled and before the filling nozzle has been withdrawn therefrom, a puff of air is supplied through the valve plunger 278 for the purpose of blowing off or dissipating the foam which sometimes accumulates on the oil in the bag as a result of the filling operation. The supply of air for this purpose may be controlled by a non-rotating disk valve 306 (Figs. 2 and 9) mounted above the rotating distributing head 209. The air is transmitted through an air line 307 (Fig. 2) to the valve 306 and thence to the pipe 280 leading to the blowing head. The air for expanding the bag is controlled in a similar manner by the valve 306, the air being conveyed to said valve through an air pressure pipe 308 (Fig. 2). The vacuum line 309 leading to the suction heads 228 for opening the mouths of the bags also extends to the valve 306. It will be noted that the pipe lines 307, 308 and 309 are at different radial distances from the center of the valve, permitting the flow of air through said lines to be controlled independently through the distributing head 209 in a conventional manner.

While the bag is being expanded prior to the filling operation the bottom of the bag is squared or flattened by the following mechanism.

Referring to Figs. 9 and 10, supports 310 for engagement with the bottoms of the bags are carried on arms 311 projecting outward from vertical slides or posts 312 adapted to move up and down in slideways 313 formed on the housing 203. Hinged to the support 310 is a pair of wings 314 which extend outward horizontally in the plane of the support 310 and are free to be swung upwardly in a manner presently to be described. An inclined cam track 315 (Figs. 1 and 9) mounted on the machine base is positioned to engage a cam roll 316 on each slide 312 and thereby lift the support 310, as shown at the right in Fig. 9, into the lower open end of the carton and thereby engage the bottom of the bag which is being blown and cause it to be squared up or flattened. Thereafter the arms 216 (Figs. 9 and 10) associated with the slide which has just been lifted are swung inward by the cam 215 to a position in which their free ends extend

beneath the wings 314 as shown at the right in Fig. 10. The arms 216 as they swing inward engage the bottom end flaps on the narrow panels of the carton and fold them inwardly beneath the bag.

After the bag has been filled, the slide 312 runs off its lifting cam 315 and is positively moved downward by a stationary cam 317 (Fig. 9) which engages the upper side of a pin 318 on the slide bar. As the support 310 is thus moved downward, the wings 314 swing upwardly about their pivots, permitting them to be carried below the arms 216, leaving the bag supported on said arms.

As the filled bag advances with the rotating turret, it is carried over a stationary supporting plate 319. The arms 216 are then spread apart by the cam 215. As the carton rides along the support 319 the bottom flap, which is extending downward from the outer side of the carton, moves along the outer edge of the plate 319 and passes between said plate and a supporting plate 320. The inner edge of the plate 320 is of such contour that it gradually folds said outer flap inwardly, the plate then forming a bottom support for the carton. Thereafter the carton is transferred back to the intermittent turret and the package completed and discharged from the machine.

Pumping mechanism

The pump 53 is driven from the main cam shaft 63 (Fig. 3) through driving mechanism including a sprocket wheel 460 on said shaft, a sprocket chain 461 (Fig. 1) and a sprocket wheel 462 keyed to a shaft 463 which carries an eccentric 464. The piston rod 465 of the pump is connected to the lower end of a lever 466 pivotally connected to an adjusting block 467 adjustable up and down in the lever by means of a hand wheel 468. A connecting rod 469 connects the lever 466 with the eccentric 464. A link 470 connects the block 467 with a bracket 471 on the machine frame. A cam 472 on the shaft 463 engages a cam roll 473 on the valve stem of the pump valve 474.

The continuous rotation of the shaft 463 operates to reciprocate the piston of the pump 53, causing it during each stroke to force a measured charge of oil through the oil line 208 and the nozzle at the filling station, thereby introducing a charge of oil into the bag at said station. The oil is drawn into the pump through an intake pipe 475. A relief valve 476 is provided to prevent excess pressure when the valve in the filling nozzle is held closed as occurs when a package is missing at the filling station. The amount of oil in a charge may be adjustably regulated by the hand wheel 468.

Modifications may be resorted to within the spirit and scope of our invention.

We claim:

1. Packaging mechanism comprising a bag holding device, a traveling support on which said device is mounted and by which the bag is carried forward in a predetermined path, and means for opening the mouth of the bag, said means including a gripping device carried with the traveling support arranged to engage one side of the bag, a second gripping device mounted separately from said traveling support and arranged to engage the opposite side of the bag, means for causing said second device to travel with the bag through a predetermined distance while said devices grip the bag, means for then releasing said second gripping device and stopping its travel with the bag while the said support continues its travel and the bag continues its forward movement therewith in said predetermined path, and means for moving said devices apart while traveling with the bag and thereby opening the mouth of the bag.

2. Packaging apparatus comprising, in combination, a device for holding a collapsed bag, a carrier on which said holding device is mounted, means for rotating said carrier about an axis, bag opening means including suction heads, one said head mounted to rotate with said carrier, the other head mounted separately from the carrier and movable in an arc concentric with said axis, and means for causing said second head to travel with the first head through a predetermined arc.

3. Packaging apparatus comprising, in combination, a device for holding a collapsed bag, a carrier on which said holding device is mounted, means for rotating said carrier about an axis, bag opening means including suction heads, one said head mounted to rotate with said carrier, the other head mounted separately from the carrier and movable in an arc concentric with said axis, means for causing said second head to travel with the first head through a predetermined arc, means for applying suction within said heads while traveling through said arc, and means for drawing said heads apart during said travel for opening the mouth of the bag.

4. The combination of a turret, means for rotating it, a holding device on the turret for holding a collapsed bag, means for opening the mouth of the bag comprising a suction head carried on the turret and arranged to engage one side of the bag adjacent the mouth thereof, a second suction head mounted independently of the turret for oscillation in an arc concentric with the turret, said second head being arranged to engage the bag opposite said first head when the latter is brought to a predetermined position by the rotation of the turret, means to connect said second head for movement with the turret while said heads are in engagement with the bag, means for applying suction to said heads while traveling with the bag, and means for moving said heads away from each other in a direction transverse to their direction of travel with the bag for opening the mouth of the bag.

5. The combination of a turret, means for rotating it about a vertical axis, a bag holder thereon, a suction head on the turret, a second suction head, a stationary support on which said second head is mounted for movement in an arc concentric with said axis, an arm on the turret arranged to engage said second head and cause it to travel with the turret through a predetermined arc, automatic means for releasing said second head, and spring means for returning it.

6. Packaging apparatus comprising a turret, means for rotating it, a bag holding device on the turret, means for opening the mouth of the bag comprising a pair of parallel slide bars, fingers carried by and extending at an angle to said bars, means for rocking said bars as a unit and thereby swinging the fingers into the mouth of the bag, means for sliding one of said bars lengthwise relatively to the other and thereby spreading the fingers, a filling nozzle, and means for projecting it between said fingers into the open mouth of the bag.

7. Packaging mechanism comprising a bag holding device, a traveling support on which said device is mounted, and means for opening the mouth of the bag, said means including a gripping device carried with the traveling support

arranged to engage one side of the bag, a second gripping device mounted separately from said traveling support and arranged to engage the opposite side of the bag, means for causing said second device to travel with the bag through a predetermined distance while said devices grip the bag, and means for moving said devices apart while traveling with the bag and thereby opening the mouth of the bag, each said gripping device comprising a suction cup, means for applying suction within said cups, and means for breaking the suction and releasing the cups.

8. A bag filling machine comprising in combination means for supporting a collapsed bag having an open upper end, a nozzle, means operable automatically to periodically move the nozzle relative to the bag supporting means to an operative position in which the nozzle is projected into the open end of the bag, means for expanding the bag and building up a pressure therein, means for supplying a liquid through the nozzle into the bag, a valve in the nozzle controlling said supply, and means operable by the pressure built up within the bag for opening said valve.

9. A bag filling machine comprising in combination a bag filling unit, means for presenting bags in succession to said unit, the latter including a nozzle, means providing with said nozzle a line through which liquid is conveyed to the bags, a valve in said line, means for closing the valve and thereby closing said line, means for introducing the nozzle into the open end of a bag, means for building up a pressure within the bag, automatic mechanism for opening the valve after the nozzle has entered a bag, and means controlling said valve opening mechanism and actuated by said pressure to render said mechanism operative, said last mentioned means being operable to prevent the opening of said valve before said pressure has been built up within the bag.

10. A bag filling machine comprising in combination a traveling support, a bag filling unit carried on said support, means for presenting bags in succession to said unit, the said unit including a nozzle, automatic means for introducing the nozzle into the open end of a bag, means providing with the nozzle a line through which liquid is conveyed to the bag, means for blowing air through the nozzle into the bag and expanding the bag, means for then flowing a measured quantity of liquid through said line into the expanded bag, a stationary cam, a valve in said line controlling the flow of said liquid through the nozzle, mechanism providing operating connections between said cam and the valve and operable automatically to open the valve after the bag has been expanded, and means operable by said air pressure to control said mechanism and maintain said operating connections and for preventing the opening of the valve before said pressure has been built up within the bag.

11. Bag filling apparatus comprising a nozzle, means for blowing air through the nozzle into a collapsed bag for expanding the bag and building up an air pressure therein, a valve in the nozzle, mechanism for operating the valve, a bellows actuated by said air pressure and controlling the operation of said mechanism, and means for flowing liquid through the open valve into the container.

12. The combination of means providing a support for a collapsed bag, a filling nozzle mounted for up and down movement relative to said support, means for lowering the nozzle and thereby projecting it into the open end of the bag, a tubular plunger extending downward into the nozzle and movable up and down within the nozzle, the lower end of the plunger being arranged to seat on the inner walls of the nozzle and close the latter when the plunger is lowered, means for blowing air through the plunger into a bag on the nozzle and thereby expanding the bag and building up a pressure therein, an expansible bellows, means providing communication between the plunger and bellows for transmitting said air pressure to the bellows, mechanism controlled by said bellows for lifting the plunger, and means for supplying a liquid through the nozzle into the bag while the plunger is lifted.

13. Packaging apparatus comprising means for supporting a collapsed bag in upright position, a filling nozzle spaced above the bag, means for opening the mouth of the bag comprising fingers, means to project said fingers into the mouth of the bag, means for then spreading said fingers to open said mouth, and means brought into operation after said spreading of the fingers to project the nozzle from said first mentioned position downward between said fingers and into the mouth of the bag while the latter is held open by said fingers.

14. Bag filling apparatus comprising a nozzle, means for introducing the nozzle into the open upper end of a collapsed bag, means for blowing air through the nozzle into the bag for expanding it, means for flattening and squaring the bottom end of the bag while the bag is being expanded, including a bottom support directly beneath and spaced below the nozzle and bag, means for lifting said support into position to engage the bottom of the bag concurrently with said expanding of the bag, arms for supporting the bag, means for moving said arms into position beneath and close to the said bottom support, and means for thereafter withdrawing the bottom support downward and leaving the expanded bag supported on said arms.

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