March 9, 1943. W. S. REYNOLDS 2,313,265

RECEPTACLE CHARGING MACHINE

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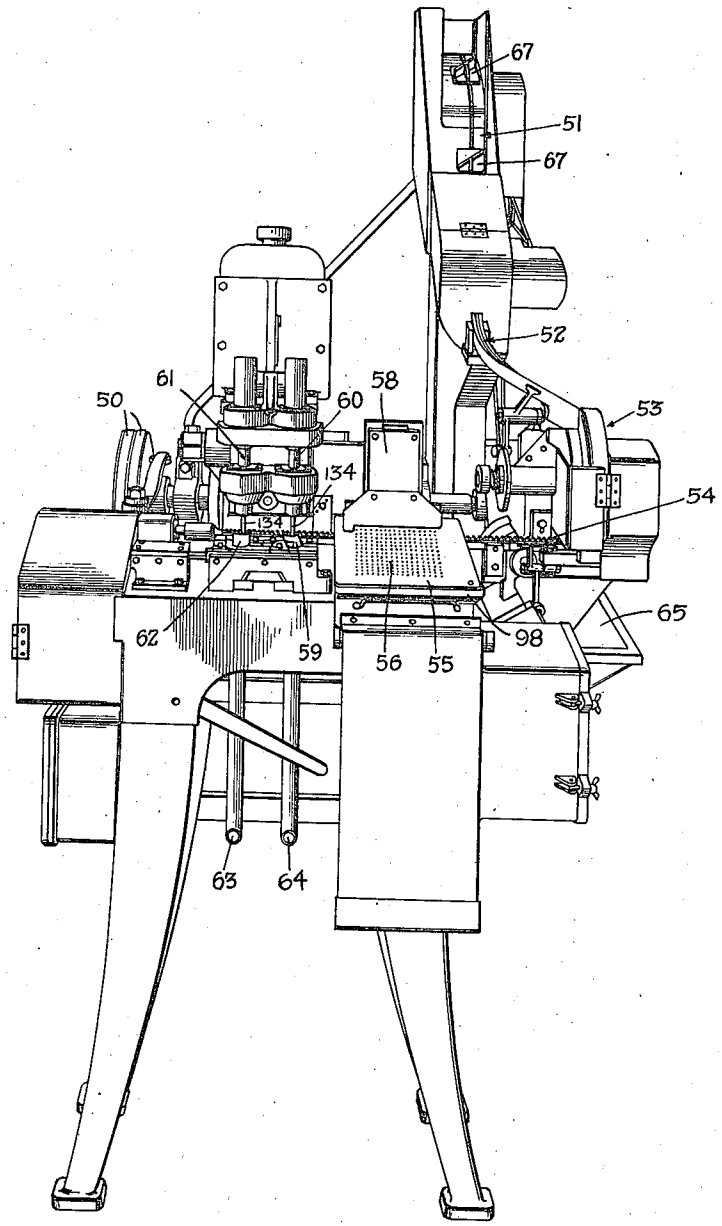
Fig. 1

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RECEPTACLE CHARGING MACHINE

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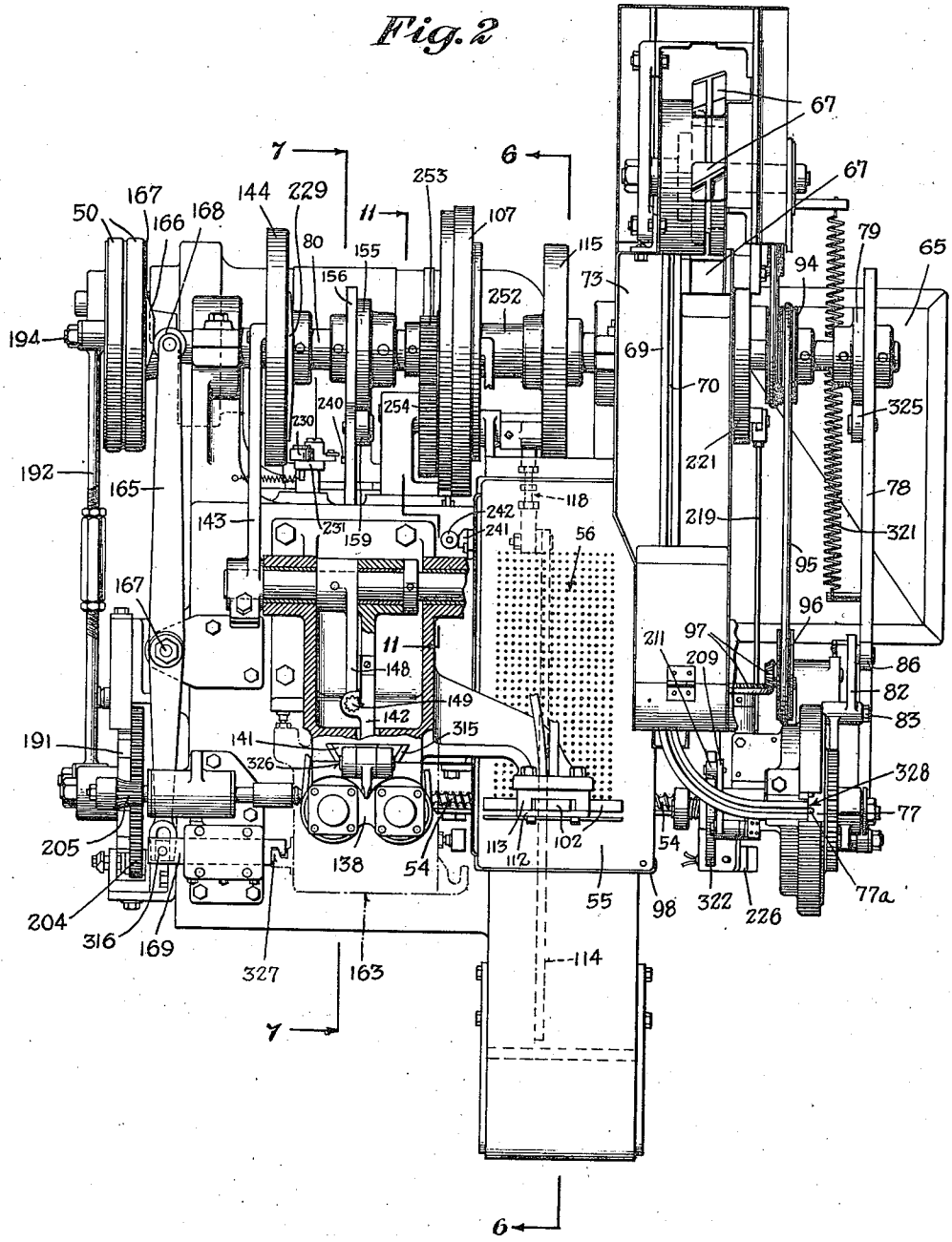
Fig. 2

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RECEPTACLE CHARGING MACHINE

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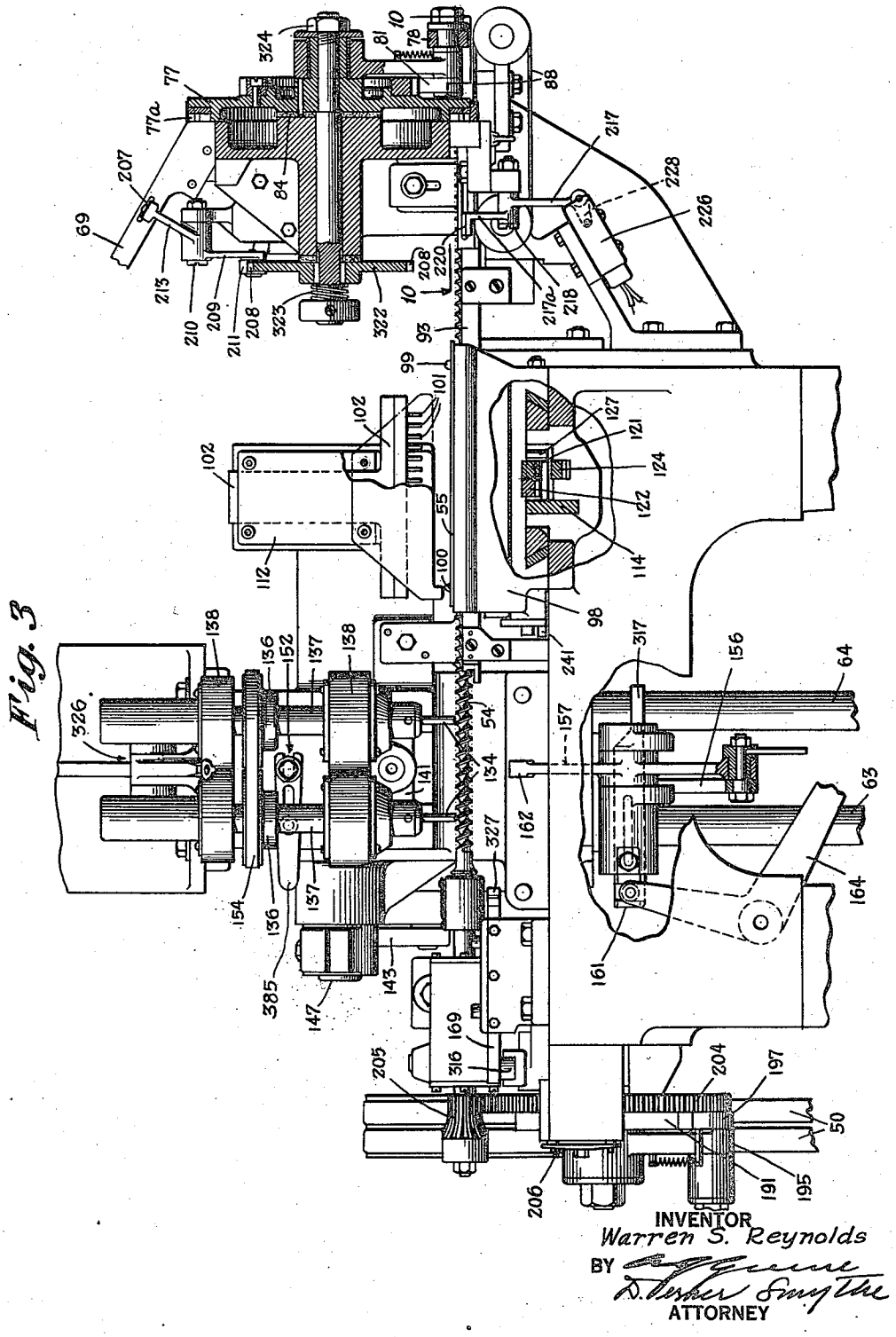


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RECEPTACLE CHARGING MACHINE

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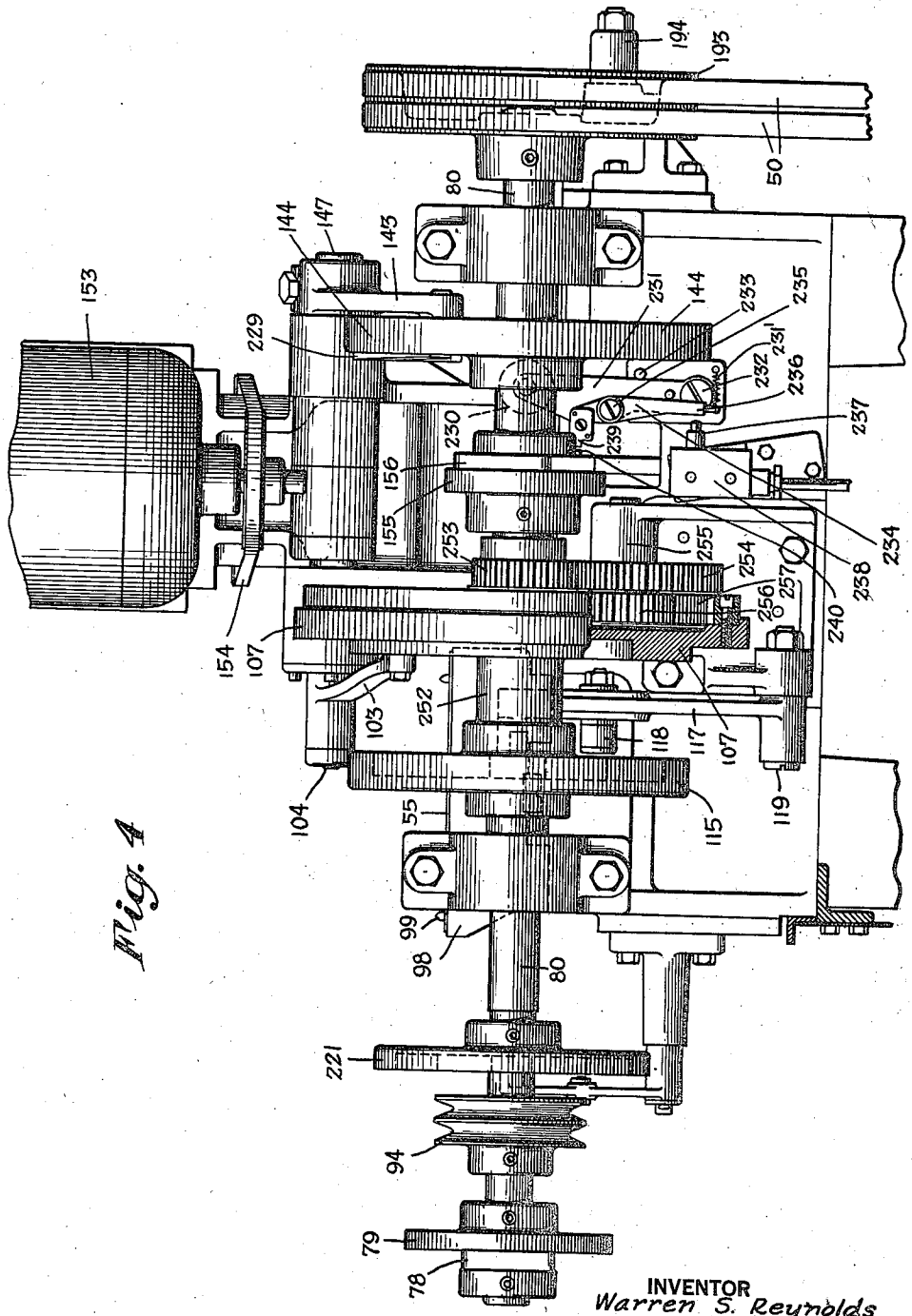


Fig. 4

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RECEPTACLE CHARGING MACHINE

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Fig. 5A

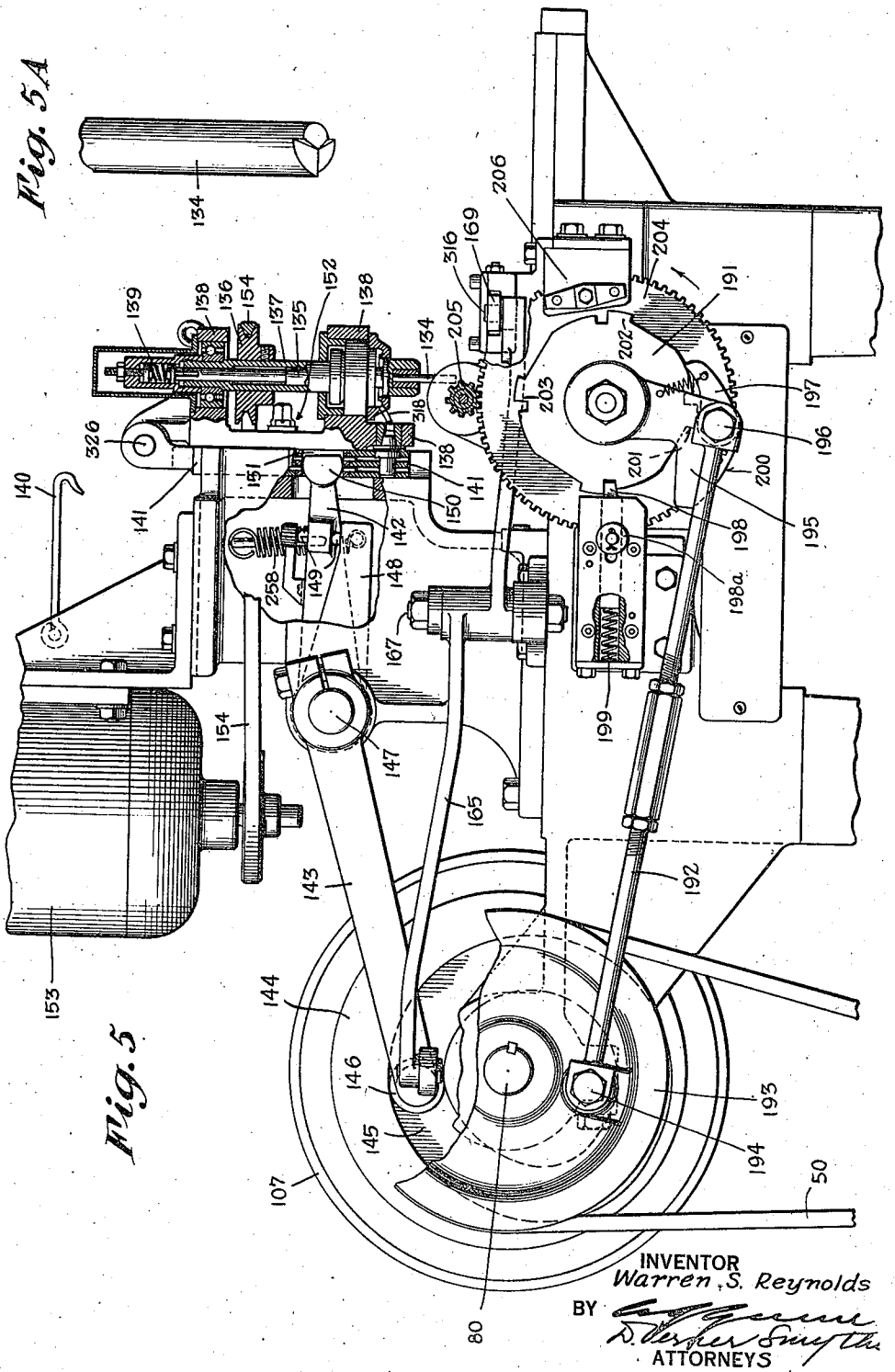


Fig. 5

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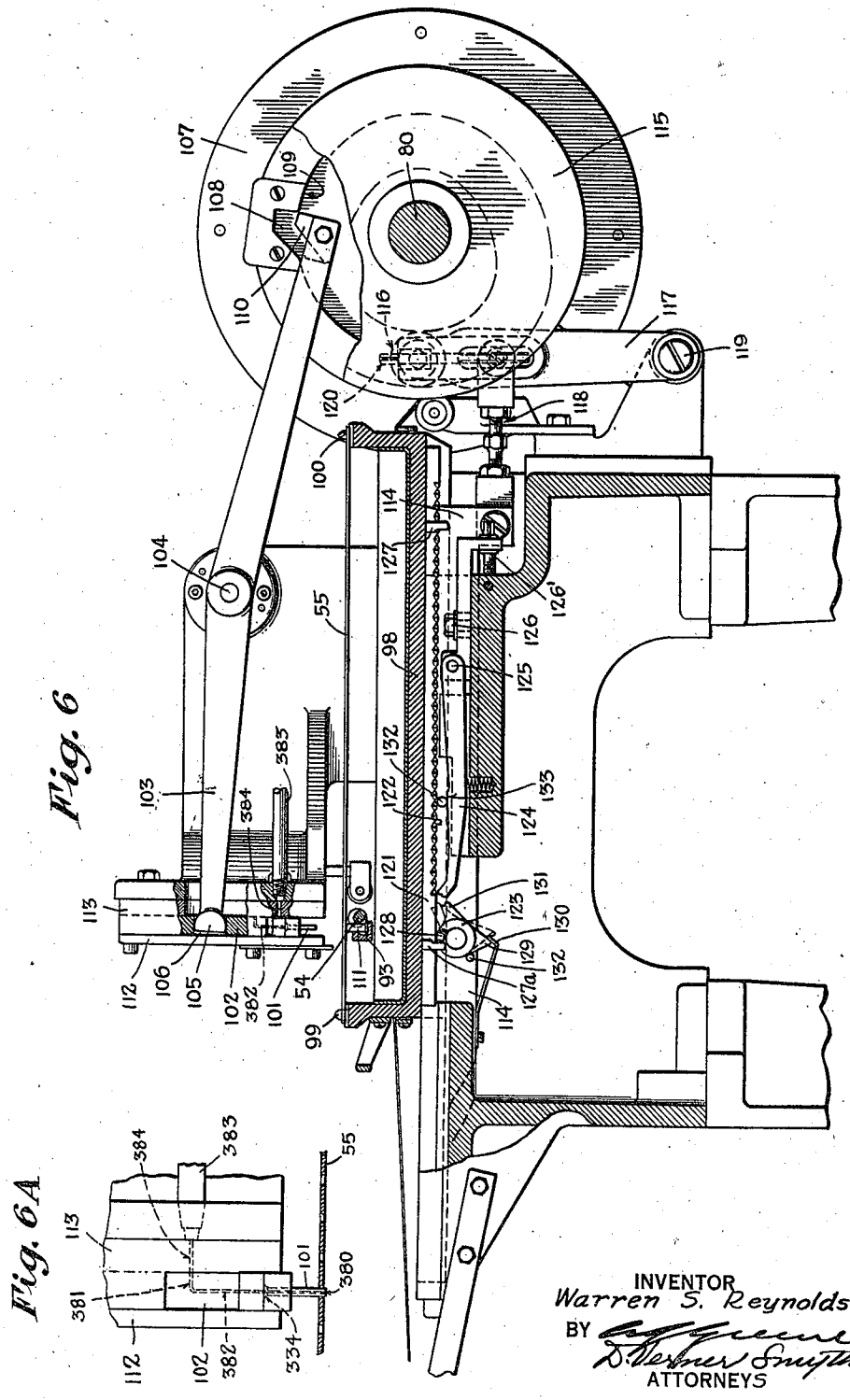


Fig. 6




Fig. 6A

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RECEPTACLE CHARGING MACHINE

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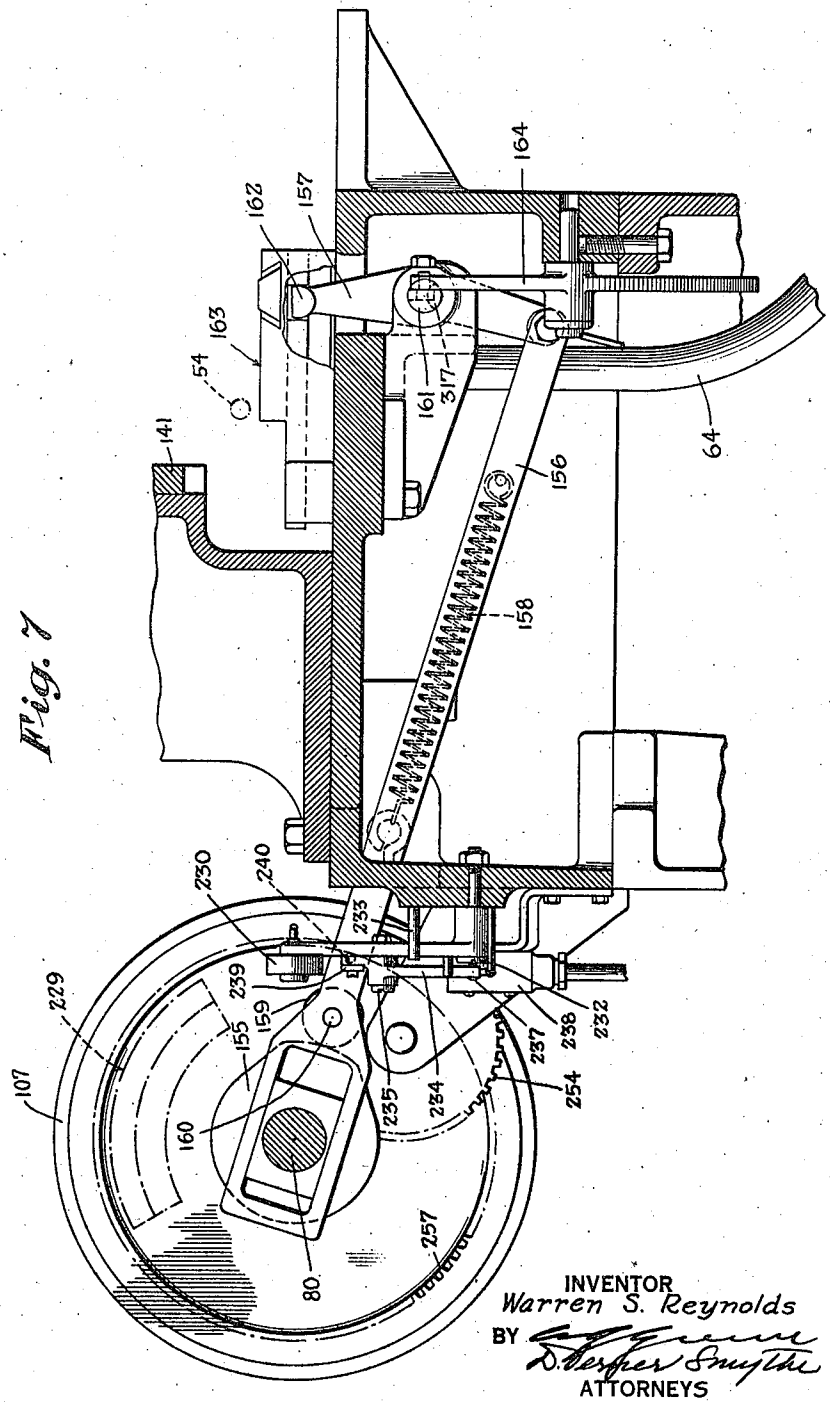


Fig. 7

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RECEPTACLE CHARGING MACHINE

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Fig. 9

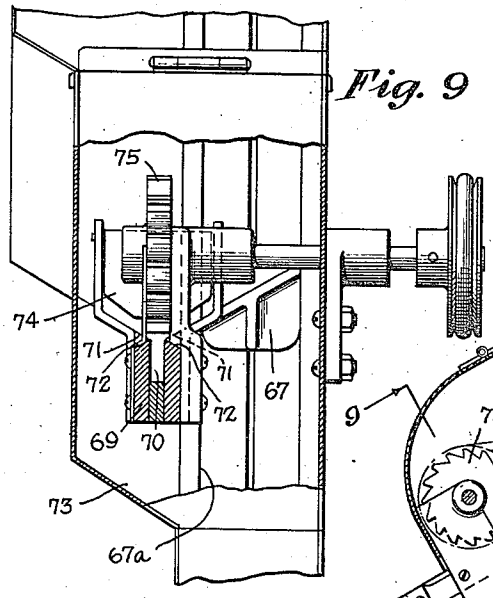


Fig. 8




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RECEPTACLE CHARGING MACHINE

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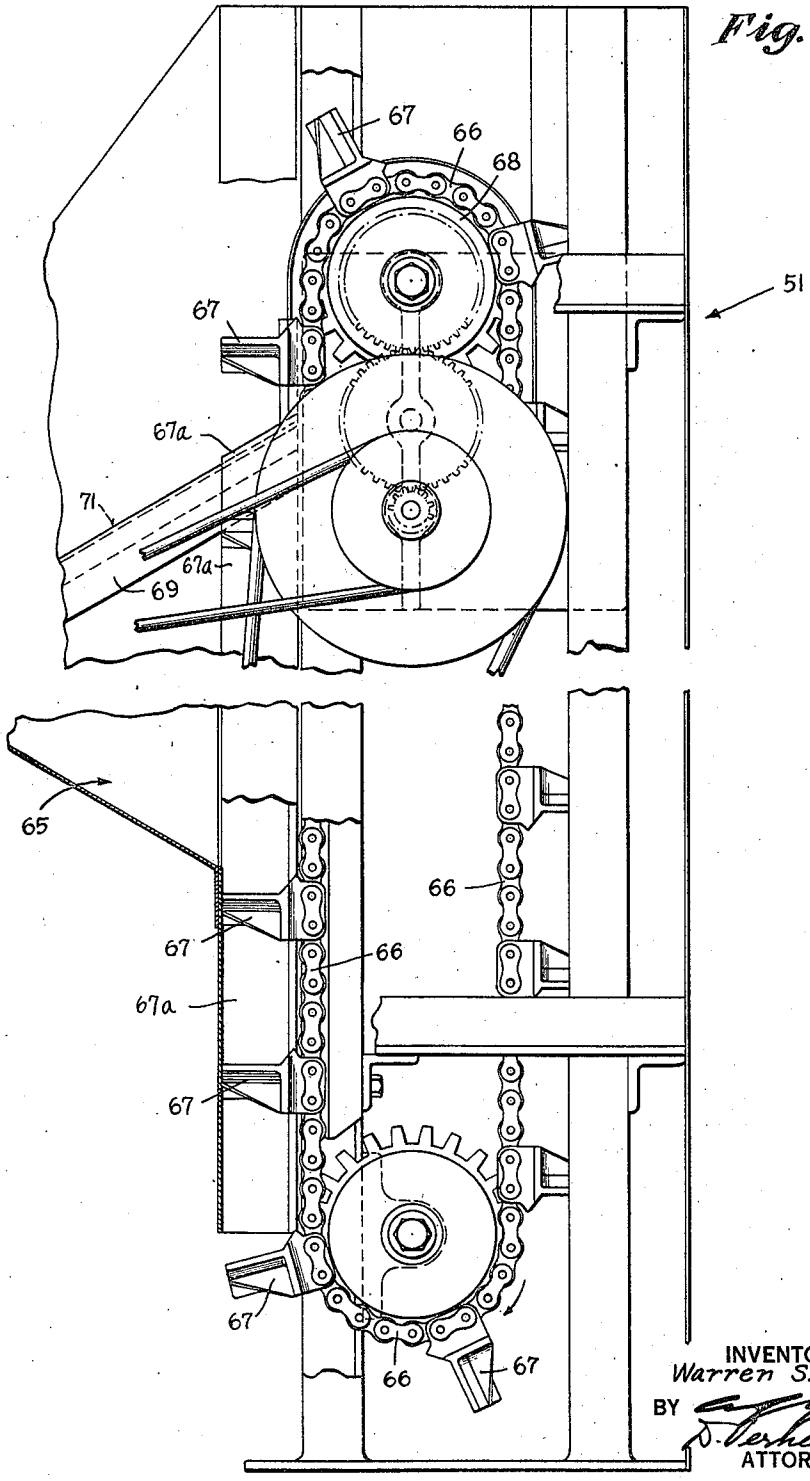
Fig. 8A

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RECEPTACLE CHARGING MACHINE

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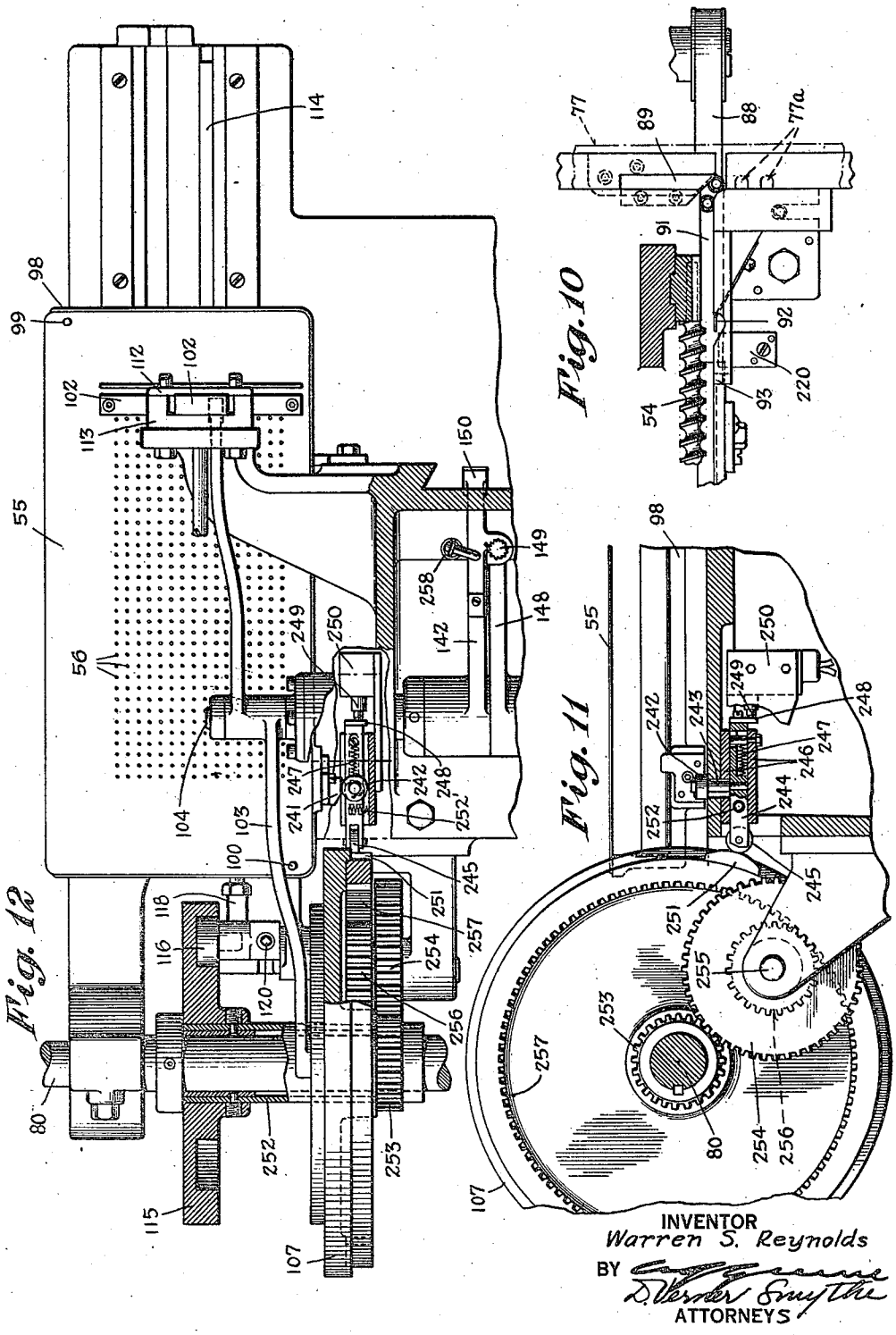


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RECEPTACLE CHARGING MACHINE

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Fig. 14

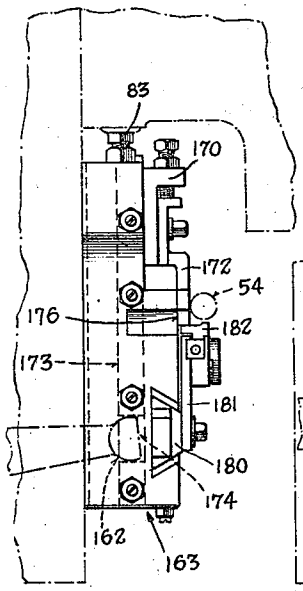



Fig. 13

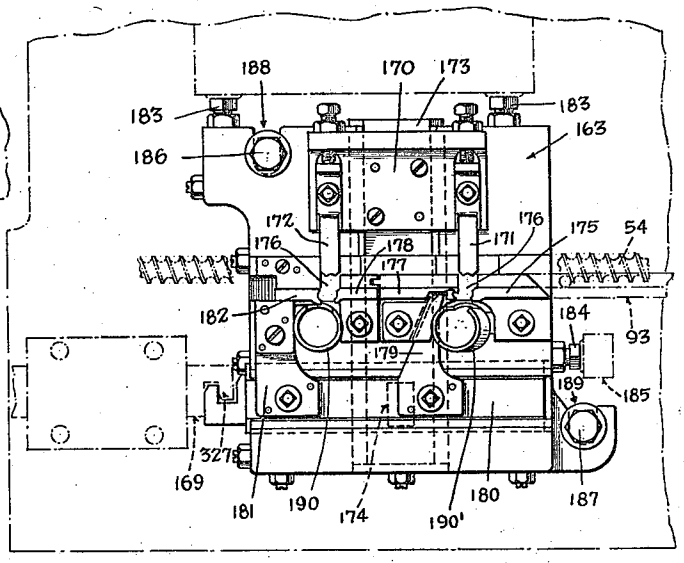
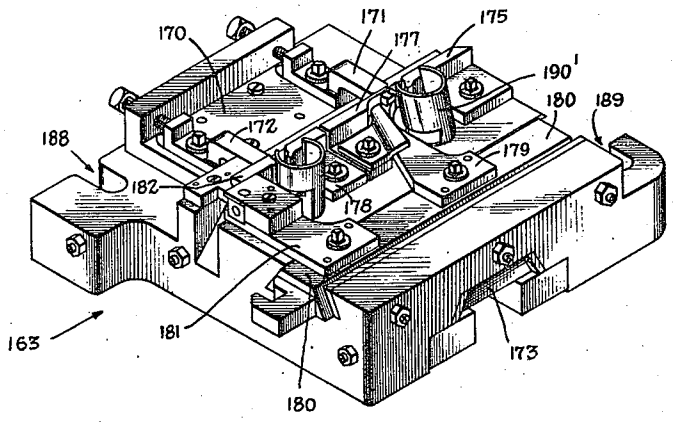



Fig. 15

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RECEPTACLE CHARGING MACHINE

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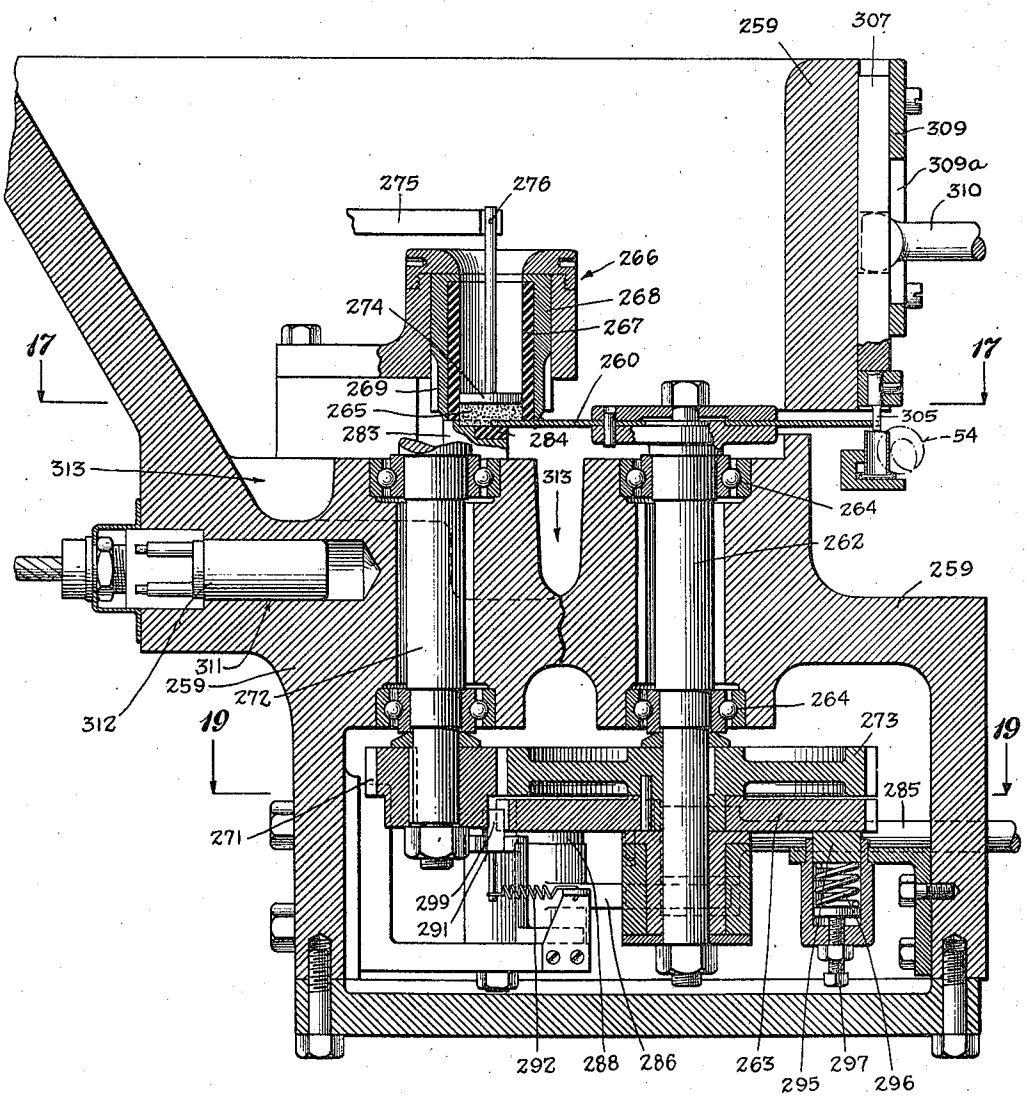
*Fig. 16*

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RECEPTACLE CHARGING MACHINE

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Fig. 17

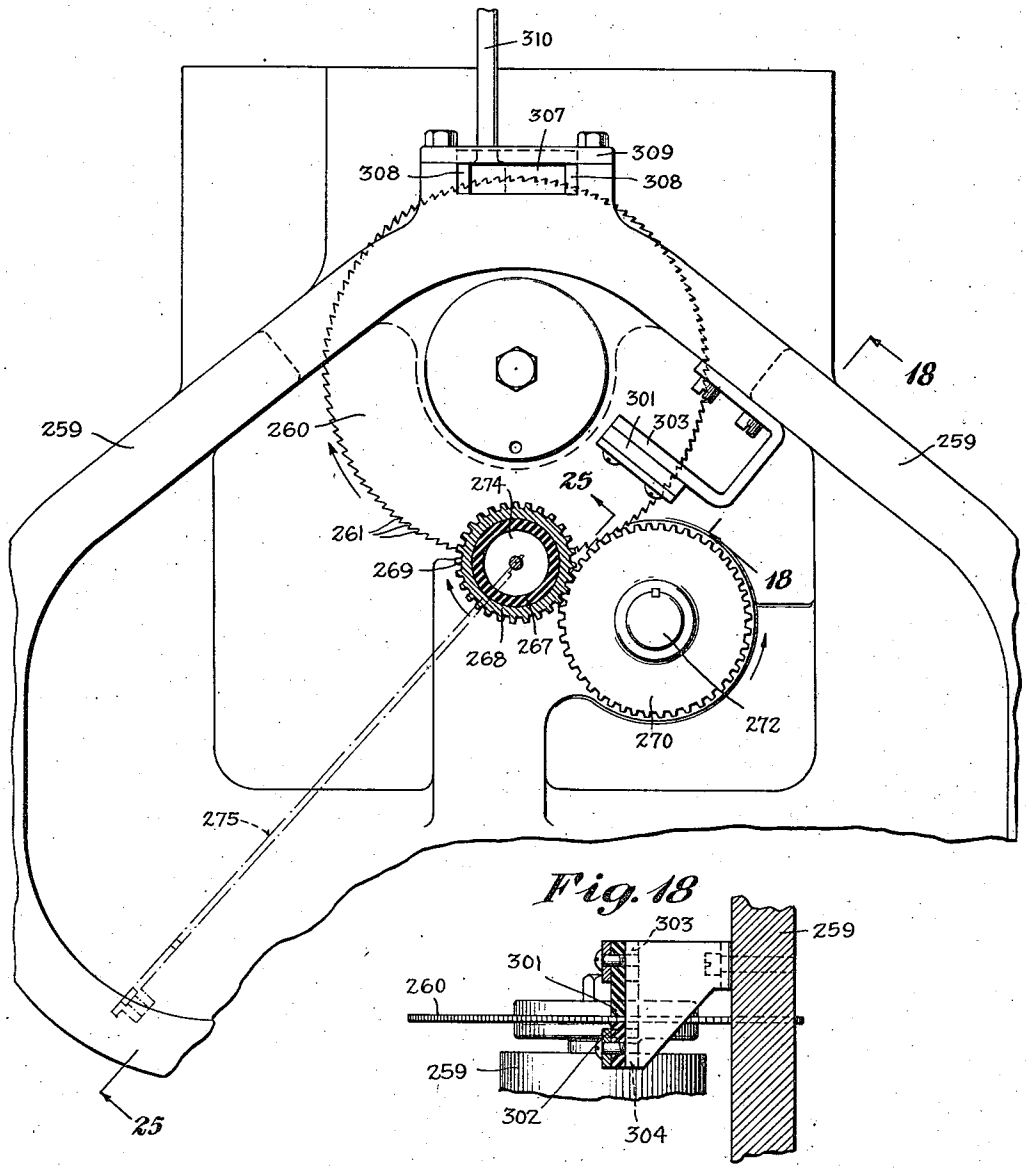


Fig. 18




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RECEPTACLE CHARGING MACHINE

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Fig. 19

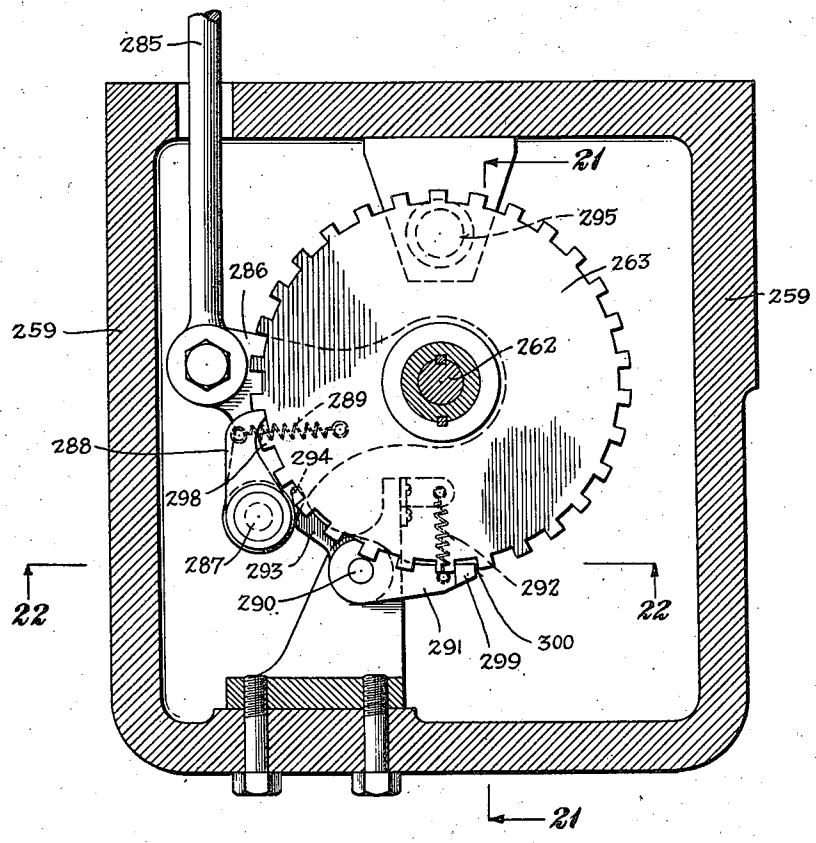


Fig. 27

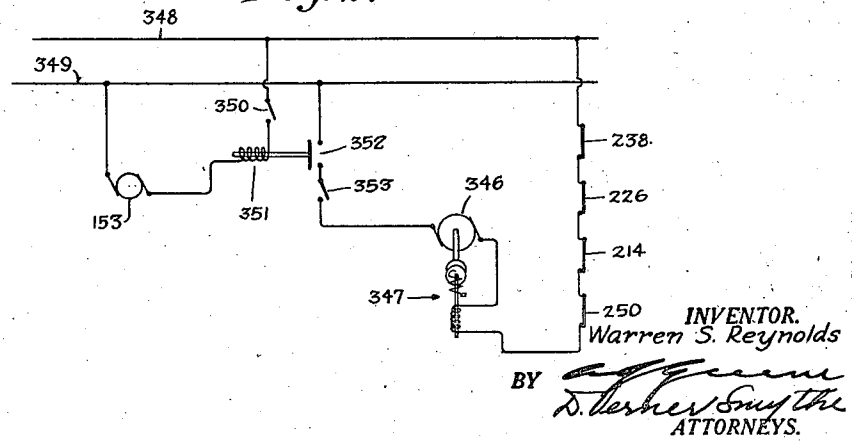


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Fig. 20

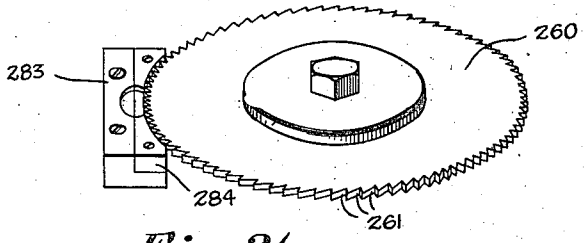



Fig. 21

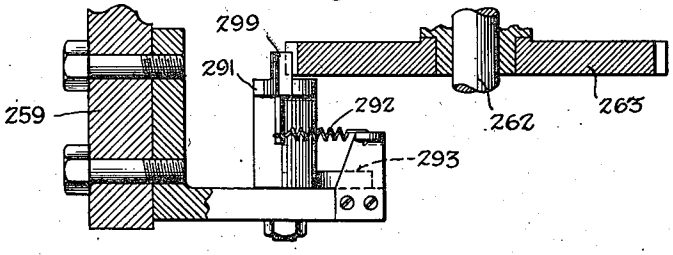
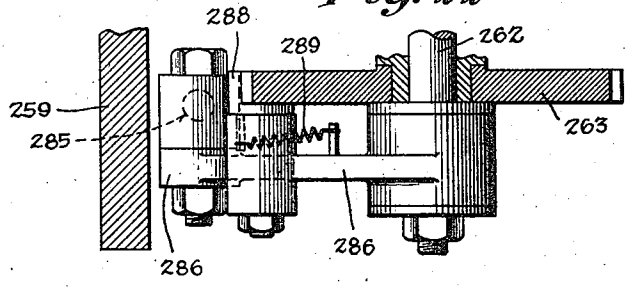



Fig. 22

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RECEPTACLE CHARGING MACHINE

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Fig. 23

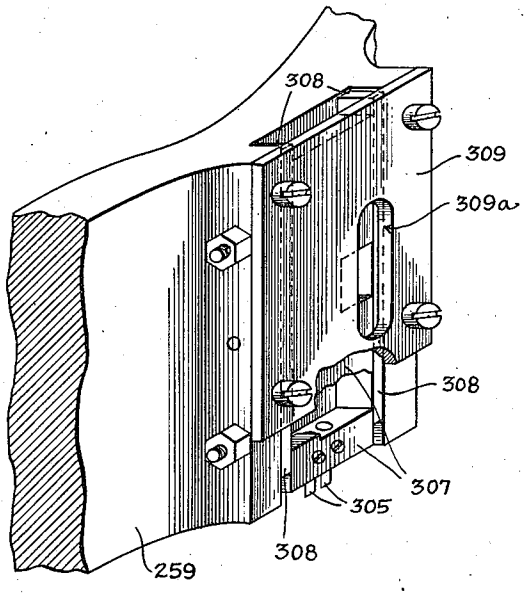



Fig. 24

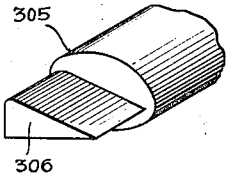



Fig. 25

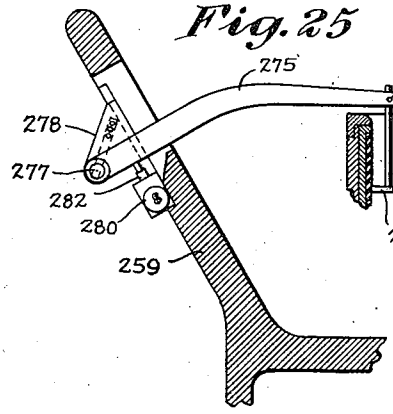
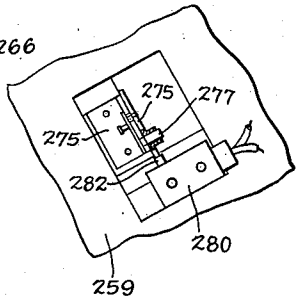



Fig. 26

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Patented Mar. 9, 1943

2,313,265

# UNITED STATES PATENT OFFICE

2,313,265

## RECEPTACLE CHARGING MACHINE

Warren S. Reynolds, Stratford, Conn., assignor to Remington Arms Company, Inc., a corporation of Delaware

Application July 22, 1939, Serial No. 285,847

39 Claims. (Cl. 86—32)

The invention relates generally to a method and machine for placing a measured quantity of a pasty mixture into a receptacle. This problem arises in one instance, for example, in the placing of a priming mixture into a shell or priming cup and particularly into the conventional rim fire shell. It is necessary that an arcuate amount of the mixture be placed in each shell and that it then be put into position in the rim of the shell. One method of doing this has been to put the priming mixture, which is in a pasty form, into the empty shells while the are held in a suitable frame and then to remove the shells from the frame by hand and place them on a rotating table. The table carries the shells containing the loose priming mixture to a clamping means which holds the shells while a suitable means, such as a spinning element, puts the priming mixture into its permanent position in the rim of the shell, as seen, for example, in the U. S. Patent to Olin (No. 887,508).

This method has many disadvantages, which include the danger of the shells overturning and spilling out the loose priming mixture, and the handling of the shells between the charging means and the means to place the mixture into its final position.

One of the objects of the invention is to provide a method and means of loading a pasty or wet mixture into a receptacle, it being understood that the method and means employed are suitable for general application and not limited to the art of priming cups and shells.

Another object is to provide a method of measuring a definite quantity of a mixture which can be subsequently placed into a receptacle.

A further object is to provide a means for feeding, guiding, and positively engaging the receptacles to be filled until the material to be placed therein has been permanently put into position therein and to reduce the amount of handling of the receptacle.

A further object is to provide a machine that will be safe to operate and will prevent the loss of the material to be loaded into the empty receptacle.

A further object is to provide a machine that is readily adjustable and can be adapted easily to various types of receptacles and quantities of mixture to be placed therein.

There are many other objects too numerous to mention that will become apparent in the ensuing description, and it is to be understood that the preceding list of objects is not to be construed as restrictive.

The forms and embodiments hereinafter shown are merely examples of ways in which the invention may be carried out, and it is to be understood that the number of receptacles operated upon can be varied by changing the index and drive ratio means of the various parts.

In the drawings:

Fig. 1 is a perspective front view of the assembled machine having a plate type charger.

Fig. 2 is a plan view of the assembled machine with some portions cut away.

Fig. 3 is a front elevation of a portion of the assembled machine partly in section.

Fig. 4 is a rear elevation of a portion of the machine.

Fig. 5 is an elevation of a portion of the machine partly in section and viewed from the left side.

Fig. 5A is a detail of one of the spinners used for placing the priming mixture into final location.

Fig. 6 is a sectional elevation of a portion of the machine taken at line 6—6 of Fig. 2 viewed from the right.

Fig. 6A is a detail of the air feed means and the plungers.

Fig. 7 is a sectional elevation at line 7—7 of Fig. 2 looking from the left and showing the transfer tool cam and the operator.

Fig. 8 is an end elevation looking from the right, which is partly in section showing the feeding mechanism.

Fig. 8A is an elevation looking from the right, which is partly in section showing the remainder of the feeding means of Fig. 8.

Fig. 9 is a detailed sectional elevation of the feed slide at line 9—9 of Fig. 8.

Fig. 10 is a detailed plan view of the feeding means taken on line 10—10 of Fig. 3.

Fig. 11 is a detailed elevation looking from the left, showing the stopping means for the charging plate carriage taken on line 11—11 of Fig. 2.

Fig. 12 is a detailed plan view of the stopping means for the charging plate carriage.

Fig. 13 is a detailed plan view of the gripping and transfer tool plate.

Fig. 14 is a detailed elevation, looking from the left, of the gripping and transfer tool plate.

Fig. 15 is a perspective view of the gripping and transfer tool block.

Fig. 16 is a sectional elevation of the serrated disc charger.

Fig. 17 is a sectional plan view taken on line

17—17 of Fig. 16 showing the serrated disc and feeder element of the serrated disc charger.

Fig. 18 is a sectional elevation taken at line 18—18 of Fig. 17 showing the construction of the serrated disc wiper plate.

Fig. 19 is a sectional plan view taken at line 19—19 of Fig. 16, showing the details of the pawl operating means for the serrated disc and feeder element.

Fig. 20 is a perspective view of the serrated disc.

Fig. 21 is a sectional elevation of the pawl operating means taken at line 21—21 of Fig. 19.

Fig. 22 is a sectional elevation of the indexing pawl and operating pawl taken at line 22—22 of Fig. 19.

Fig. 23 is a perspective view of the charger punch guide seen at the upper right of the main frame, Fig. 16.

Fig. 24 is a detail perspective at one of the charger punches.

Fig. 25 is a sectional view at line 25—25 of Fig. 17, showing the feeding element plunger lever.

Fig. 26 is a detail of the safety switch operated by the feeding element plunger lever.

Fig. 27 is a wiring diagram of the motor circuit for the machine.

A general description will first be given of one specific embodiment of the invention which is shown in assembled form in Fig. 1. Merely by way of example, the invention is described in conjunction with operation on conventional rim fire shells such as the .22 caliber, it being understood, however, that any type of shell or receptacle may be operated upon, it being merely necessary to change the feeding means to accommodate the shell. In Fig. 1, the plate type of charger is disclosed embodied in the machine; however, the serrated disc type of charger, described later, may be substituted for the plate type of charger. A driving motor (not shown) is located underneath the machine. This motor may be of a conventional type containing a magnetic brake which is released when the motor is energized, it being necessary that the machine come to rest promptly upon stopping. The main driving motor drives a shaft located at the rear of the machine through the pulleys 50 (Fig. 1). At 51 the shells may be picked up from a hopper located at the right of the machine by an endless belt having shell lifting projections and caused to fall onto a guiding means 52 which guides the shells to an inverting device 53, the shell being base upward in the guiding means. The shell inverting device is driven by suitable cam means in such a manner that it delivers two shells to the shell advancing screw 54 for each revolution of the main shaft. The screw thread means 54 moves the shells to the left in a row. Advancing means having projections for engaging the shells can be used in place of a screw thread means, and screw thread means where it appears is to construed broadly enough to include such. The charging plate 55 has transverse and longitudinal rows of apertures, and in the operation of the machine, the apertures 56 in the removable charging plate 55 have previously had a priming mixture rubbed therein. The charging plate 55 is mounted on a carriage 98 which is moved transversely of the screw thread feeding means 54 by suitable indexing means. Located within charging punch head 58 are a group of reciprocating punches which are adapted to enter the apertures 56, thereby pushing the priming mixture contained in the apertures 56 of plate 55 into the rows of shells which have been carried underneath the apertures by the screw thread advancing means 54. Upon the completion of this punching operation, the plate is moved transversely so that another row of filled apertures is underneath the punches. At the same time, the screw feed means has advanced a group of empty shells under the apertures. The filled shells containing the loose priming mixture continue their movement to the left, and as they reach a point under the spinner means at 60, a shell is moved out of the row and clamped under a spinner 134 of spinner means 60. The screw thread advancing means makes two revolutions for each revolution of the main shaft, so that every other shell is removed at spinner means 60, as will be explained in detail later. The spinners 134 at spinner means 60 and 61 are carried on a vertically reciprocating head so that the spinners 134 will enter the clamped shells and cause the loose priming mixture to be forced into final position. The other shell containing the loose priming mixture is carried past spinner means 60 until it reaches a point opposite spinner means 61, whereupon it is removed from the track and the spinner means 61 in a similar manner places the priming mixture into permanent position. It is seen, therefore, that as the machine continues in operation, two shells with the loose priming mixture therein will be grouped simultaneously under the spinner means 60 and 61, and the reciprocating spinner head containing spinner means 60 and 61 will be lowered thereon. During succeeding operations, as the shells are removed from the said screw thread advancing means to a position under the spinners, the new shells will push the completed shells into the delivery tubes at 59 and 62, and the completed shells will emerge from the exits thereof 63, 64 into a suitable receiver (not shown).

*Shell feeding means*

The shell feeding means 51 will now be described in detail. A hopper or some suitable means is provided at 65 (Figs. 2 and 8A) into which the empty shells are placed. The chain 66 having shell lifting projections 67 thereon picks up the empty shells from the hopper and carries them upwardly, the shells being held between the wall 67*a* and the projections 67, the shells sliding off the buckets as the top of wall 67*a* is reached and falling onto the shell guiding means 69. The guiding means 69 has a slot 70 (Fig. 9) which is the width of the body of the shells but is narrower than the rim so that the rims cannot pass therethrough in the embodiment shown. The section of the track upon which the shells first impinge slopes inwardly and downwardly as shown at 71 of Fig. 9, and thus assists the entrance of the shells into the slot. This slope gradually changes until it becomes the reverse thereof or outwardly and downwardly sloping with the outer edge sloping downwardly as at 72. In this manner, the excess shells are caused to fall back into the hopper, being guided by the edges of the shell feed hopper 73. To further remove the excess shells that have not entered into the slot, a swinging gate 74 is placed across the track. A rotating wheel 75 having teeth 76 is also placed across the track to still further assist in the removal of extraneous shells from the guide. A receiver 314 (Fig. 8) is provided to catch the shells that

slide through the track because of improper rims, allowing passage of the shell therethrough. The empty shells supported base upwardly continue their downward movement by gravity in the track or shell guiding means 69 until they reach a point 328 (Fig. 2) at the entrance of the inverting wheel 77. The inverting wheel has a series of recesses 77a (Figs. 2 and 8) shaped to receive the body of the shell, the rim of the shell overlying the periphery of the wheel. The charging wheel 77 is driven by an arm 78 (Fig. 8) which is connected to the cam or eccentric 79 (Fig. 2), said cam causing two complete reciprocations of arm 78 for each revolution of the main shaft. A spring 321 holds the roller 325 against the cam 79. This cam causes the arm 78 to reciprocate twice for each revolution of the main shaft 80 in the embodiment shown.

Referring now to Fig. 8, the reciprocating action of operating arm 78 is transmitted to wheel 77 by means of the spring 320 pressed pawl 81, causing the wheel to turn in a counterclockwise direction as viewed in Fig. 8. The indexing or locking pawl 82 is pivoted at 83. As the arm 78 moves to the left, the wheel 77 is prevented from rotating by the friction means 84, wheel 322, spring 323, nut 324 (Fig. 3). The pawl 81, as the arm 78 moves to the left, slides over a tooth and, after passing same, drops into the next indentation, the friction means just mentioned preventing rotation of the inverting wheel 77. At the same time, a cam 85 contacts roller 86, moving the indexing pawl 82 in a counterclockwise direction and disengaging it from its tooth. Then as the operating lever 78 moves to the right, the wheel 77 is rotated by pawl 81 until the tip 87 of the indexing pawl rides on top of a tooth. At this time, the cam 85 has been removed from under the roller 86, and as the next indentation 87 is reached, drops into the next tooth. Thus it is seen that 81 will continue moving the wheel 77 until the tip 87 engages the next tooth and stops the wheel at the correct point. This point is so chosen that a shell receiving recess 77a is in exact alignment with the slot 70 in the track 69, allowing an empty shell to enter the recess. The spring 321 and roller 325 allow the cam 79 to continue its rotation after indexing pawl 82 has stopped the rotation of the inverting wheel 77, thus preventing damage to the parts. The wheel continues this type of movement until the shell has been delivered to a point 180 degrees from that in which it was received, at which time it will be inverted or base downward. At this point, it will be directly over a moving belt 88 (Figs. 3, 8 and 10). A thin curved piece 89 (Figs. 8 and 10), passing through an annular concentric slot 90 in the wheel, engages the shell and moves it out of the inverting wheel into the passageway 91 (Fig. 10), and onto the moving belt. The passageway 91 is only slightly larger than the shell, thereby preventing the shell from turning over or jamming therein. The empty shell continues in this passageway until it reaches the spring 92, which forces the shell against the screw thread feed means 54. In the event that the shell fails to engage properly, the spring 92 will yield and prevent damage or jamming of the machine at this point. The screw thread feed means 54 positively holds the shell in upright position between the screw feed means and guideway 93. The belt 88 is driven by the main shaft through pulley 94, belt 95, pulley 96 and bevel gears 97. It can thus be seen that the inverting wheel moves twice for each revolution of the main shaft 80, delivering an empty shell to the belt 88 at each movement, and that the screw feed means makes two revolutions for each revolution of the main shaft 80, so that each of the threads in screw 54 will have an empty shell therein positively held between the thread and guide 93. It is also evident that the ratio of the feed means and screw feed can be changed by proper design of the cams to deliver shells at the desired rate to the charging and spinning means.

### Charging Means

The plate charging means will first be described in detail. In this type of charger a flat plate 55 is provided containing transverse and longitudinal rows of apertures 56, as seen in Figs. 3, 6 and 12, the size of these apertures being such that when a pasty priming mixture is rubbed onto the plate and then the excess removed, the apertures will contain the correct amount of priming mixture for each shell. Plate 55 is filled at a point remote from the machine and placed in position on top of the carriage 98, the plate fitting on projections 99 and 100. The carriage at this point is in its extreme forward position so that the first row of apertures will be directly under the punches 101. Punches 101 are carried on a reciprocating means 102 (Figs. 3 and 6), said reciprocating means being operated in a vertical direction by the charger operating arm 103 pivoted at 104. An enlarged head 105 of the arm engages a suitable slot 106 in the reciprocating charger means 102. Charger operating arm 103 is operated by the cam wheel 107 as seen in Figs. 2 and 6. The cam wheel 115 is connected to cam wheel 107 by means of a tube 252 (Figs. 4 and 12) such that 115 and 107 will rotate together, the main shaft 80 serving as a shaft upon which this assembly rotates. Wheel 107 is driven by shaft 80 by means of gear 253 (Figs. 4 and 11) which is keyed to shaft 80, gear 254 meshing with gear 253, said gear 254 being pivoted at 255 on the main frame, gear 256 integrally connected with gear 254 meshing with the internal gear teeth 257 of cam wheel 107. In the specific embodiment shown, the ratio of this gear train is such that eight revolutions of the main driving shaft cause one revolution of 107 and 115. These cam wheels and the ratio of their speed to that of the main shaft may be changed as necessary to give the correct relation between the movement of the charger and the shells in the row in the feeding means. An indentation 108 (Fig. 6) is provided on the interior annular surface 109 of charger operating cam 107. This indentation allows the tip 110 of the charger operating lever 103 to move upwardly abruptly as these parts register. The rapid upward movement of tip 110 causes reciprocating charger means 102 to move downwardly into the apertures 56 of the plate 55 so as to drive the pasty priming mixture contained therein into the empty shells 111 under said apertures. Guiding means 112 and 113 serve to position the reciprocating charging means 102. The plate 55 is carried on the movable carriage 98, said carriage being movable inwardly in a correct relationship to bring a filled set of apertures underneath the punches of each movement. The carriage 98 is moved in the manner about to be described. Carriage operating bar 114 is reciprocated by means of carriage operating cam 115 (Figs. 2 and 6) through roller 116, operating lever 117,

connection 118, to the carriage operating bar 114. The lever 117 is pivoted at 119 to the main frame, and adjusting means 120 is provided so that the stroke of the reciprocating bar may be varied. The carriage operating cam 115 has an interior track adapted to receive the roller 116 (Fig. 6). Attached to the carriage 98 are racks 121 and 122. The teeth of rack 122 are engaged by the carriage operating pawl 123 and the teeth of rack 122 are adapted to be engaged by the carriage indexing pawl 124, the indexing pawl 124 being pivoted at 125, said pivot being adjustably attached to the base, as at 126 and 126'. As the charger carriage is drawn completely to the left when a new plate is placed thereon, the pin 127 will strike projection 128 on the operating pawl 123 and move the pawl counter-clockwise, causing the point 129 to pass over the spring 130 and assume the operative position shown in the dotted lines. The purpose of the spring 130 will be set forth presently. As the operating bar 114 is moved to the right by the cam 115 (Fig. 6), the tip 131 of the operating pawl will engage a tooth in the rack 122 and start the movement of the carriage 98 to the right. At this moment, the pin 132 is effective to hold the indexing pawl 124 out of engagement with its rack 121 because of the raised surface 133 on the indexing pawl. As the operating bar 114 moves further to the right, the indexing pawl will be released and will engage its proper tooth in rack 121, thereby properly stopping and indexing the carriage 98 so that the next row of apertures of the plate 55 will be directly under the charging punches 101. As the carriage 98 is moved inwardly and reaches the last row of apertures, the pin 127a engages the projection 128, rotating the operating pawl 123 in a clockwise direction so that it will assume the position shown in full lines and will not engage the teeth of the rack 122 and therefore insure stopping of the carriage at this point. At the time the carriage 98 reaches this last row of apertures, a suitable stop means also stops the operation of the machine.

On the side of charger carriage 98 is located a cam 241, best seen in Figs. 11 and 12. The cam 241 engages roller 242 which is connected by shaft 243 to the block 244 carrying roller 245. The block is slidable perpendicularly of the carriage in a suitable guide means 246 and is urged in the direction of the main driving shaft 30 by means of a spring 247. A projection 248 is provided for engagement with a switch operator 249 of switch 250 for the purpose which will be presently set forth. A carriage stopping cam 251 is placed on the periphery of the charger punch cam wheel 107. The spring 252' holds the block 244 towards the carriage 98 and thereby removes the roller 245 from the path of the cam 251 until the last row of apertures 56 of the charging plate 55 has been reached, at which point the cam 241 contacts roller 242, moving the block 244 away from the carriage so that roller 245 will be contacted by cam 251, forcing the block 244 against spring 247 and causing projection 248 to contact switch operator 249 to operate switch 250 and stop the machine at the proper point. This causes the machine to automatically stop as the last low of apertures in the charging plate is reached.

The plungers 101 may be mounted on reciprocating plunger means 102 in such a manner that a side play at 334 is provided to insure the registry of the plungers with the apertures in the plate. Plungers 101 may also be provided with an opening 380 which is connected to the opening 381 in the reciprocating means 102 by a passage 382. Air is supplied under pressure from any source through the pipe 383 to the opening 384 in the guide means 113. The apertures 381 and 384 will come into registry after the plungers 101 have passed through the apertures of the charger plate. At this moment, the air pressure supplied by 383 will insure the removal of the primer mixture from the tips of the plungers 101 into the empty shells.

*Priming spinners*

After the shells have had the loose priming mixture placed therein by the charger as just described, it is necessary to move the priming mixture into final position in the rim of the shell, assuming that the shell is of the conventional rim fire type. In the embodiment of the machine being described, there are two spinners used, although it is to be understood that one or any number may be used providing the machine is properly indexed and constructed therefor. The spinners 134 (Figs. 3 and 5) are held in the rapidly rotating spindles 135 by any suitable chuck or holding means, the spindles 135 being driven by the pulleys 136 through the hollow rotating tubes 137 which are suitably mounted on the hinged spindle holding plate 138. The spindles 135 are so mounted in the rotating tubes 137 that they may have a vertical movement therein, the springs 139 serving to hold the spindles in their downward position relative to the tubes 137. In this manner, an obstruction or unevenness will cause a spindle to move upwardly against the tension of its spring 139. The spindle holding plate 138 is hinged at 326 so that it may be raised upwardly to facilitate inspection and removal of the spinners, a hook 140 being provided to hold it in the raised position. A reciprocating plate 141, to which the spindle holding plate 138 is hinged, is reciprocated by a lever 142. The plate 141 reciprocates in suitable guides in the frame of the machine as at 315 (Fig. 2). The spinner head cam 144 operates to reciprocate the intermediate spinner operating lever 143 by means of the internal cam surface 145 and roller 146. The intermediate spinner lever 143 is pivoted by suitable means at shaft 147 and has an oppositely extending arm 148. The arm 148 operates through the adjusting screw 149 to move spinner reciprocating lever 142, the end 150 of arm 142 entering a suitable aperture 151 in the reciprocating plate 141 so as to reciprocate the spinner head in accordance with the action of spinner cam 144, a spring 258 holds lever 148 and 142 in engagement. A quick detaching means of any suitable type may be provided at 152, such that the hinged plate 138 may be readily released and swung to its upward position for the purposes previously set forth. This may take the form of the slidable arm 385 which is locked in place when the plate is in operating position by bolt 152. Arm 385 has a fork end that straddles bolt 152 so that when arm 385 is moved from engagement with 152, bolt 152 will pass through plate 138 as the plate is raised. An electric motor 153 or other suitable driving means is connected by the belt 154 to the pulleys 136 in such a manner that by merely releasing belt 154 and the fastening means 152, the spinner plate assembly 138 may be swung upward. Spinners 134 may be of any conventional design, one example of which is seen in Fig. 5A. At 318

(Fig. 5) there is a guide provided to carry the excess oil away from the shells being worked on.

SHELL TRANSFER OPERATING LEVER

After the empty shells have been charged with the loose priming mixture, they are advanced in the row by the screw thread feeding means to a point opposite the spinners, in readiness to have the priming mixture permanently put into place. The operating means for the tools which remove the shell from the feeding screw and then grip the shell will now be described. The shell transfer cam 155 (Figs. 2 and 7) operates the shell transfer lever 157. A spring 158 holds the roller 159, pivoted on the intermediate shell transfer lever 156, at 160, against the shell transfer cam 155. The shell transfer lever 157 is pivoted on the shaft 161 (Fig. 3) so that reciprocation of lever 157 will cause movement of the operating end 162 thereof to suitably move the shell transfer means which are contained in the tool block 163. As the tool block 163 is removable for purposes of adjustment and cleaning, as will be explained later, it is necessary that 162 be retractable. This is accomplished by means of the bell crank lever 164 (Fig. 3) which reciprocates the shaft 161, movement of this shaft 161 bringing the cutaway portion 317 (Figs. 3 and 7) into the hub or lever 157 so that the lever will drop downwardly and allow removal of the tool block over the top 162 of lever 157. The shaft 161 is carried on suitable bearings in the base of the machine.

SHELL GRIPPING OPERATING LEVER

After the shell has been removed by the transfer means from the screw thread advancing means, it is necessary that it be clamped in position while the spinners place the priming mixture into its final position. The operating lever 165 therefore is operated by the shell gripping cam 166 (Fig. 2) which is mounted on the wheel 167. The cam 166 contacts the roller 168, moving the lever 165 about its pivot 167 and reciprocating the bar 169 by means of the connection 316 from the lever 165 to bar 169, the bar 169 being suitably held in guides on the frame. The bar 169 has a quickly detachable connection such as at 327 to the operating bar in the tool block carrying the gripping tools.

SHELL TRANSFER AND GRIPPING TOOL ASSEMBLY

When the shell containing the loose priming mixture has been advanced to a point opposite the spinners, the shell is first removed from the screw feeding means, and secondly the shell is clamped underneath the spinner means and held there while the spinner enters the shell and places the loose priming mixture into its permanent position. In the specific embodiment of the machine being described, the shell feeding means 54 rotates twice for every rotation of the main shaft 80. In this manner, every other shell is removed at the first spinner station because the shells are advanced two places for every operation of the shell transfer means and reciprocation of the spinner heads.

Referring now to Fig. 13, the details of the transfer and gripping tools will first be described and then their relation and assembly on the tool block set forth. The shells have been advanced by the screw thread 54 until one is opposite transfer tool 171 which has been moved towards the rear of the machine. Shell transfer tools 171 and 172 are adjustably mounted on the reciprocating slide 170, said slide being reciprocated by means of engagement of the tip 162 of the shell transfer lever 157 in the aperture 174 in the slide 173. The shell transfer means 171 and 172 then move forwardly, carrying one of the shells into engagement with the stationary gripping tool 175. The stationary gripping tool 175 serves as a continuation of the guideway 93, positively engaging the shells between the screw feed means and itself. It is to be noted that as the shell transfer means 171 was moved to the rear of the machine that the shell sliding on the guideway was dropped at this point to the surface 176 and moved inward at this lower lever until the shell contacts the stationary gripping tool 175. The next shell, which is being carried by the screw thread means, will slide across the top of 171 in its travel towards the second shell transfer tool at 172. It is seen therefore that in the specific embodiment shown, every other shell will be removed by shell transfer means 171. A guide means 177 is provided on the tool block to guide the shells traveling towards shell transfer means 172. The shells reaching shell transfer means 172 drop in a similar manner to a lower surface 176 and are carried against a stationary gripping tool 178 by the shell transfer 172. A movable gripping tool 179 is mounted on a gripping tool slide 180. The slide 180 is reciprocated to the right by the action of the shell gripping cam 166 operating through lever 165, bar 169, detachable connection 327, in such a manner that the shell is clamped between movable gripping tool 179 and stationary gripping tool 175. In a similar manner, the movable gripping tool holder 181 grips the shell which has been moved by shell transfer lever 172 against the stationary gripping tool 178. The movable gripping tool holder 181 may have a spring pressed gripping tool 182 carried in the end of the gripping tool holder 181. The spring pressed member is provided due to the difficulty in setting two sets of stationary and two sets of movable tools to exact position. This will prevent damage to the shells because of inaccurate setting of these tools or to misalignment or other means as the operations are carried out. When the shells are so clamped, the spinner assembly, through the operation of the spinner cam 144, lever 142, moves downwardly, and the spinners enter the clamped shells and press the priming mixture permanently into position in the rims of the shells.

The shell transfer slides, the movable gripping tool slide with its tools, and the stationary gripping tools are mounted on a removable block. This is done so that the tools may be removed from the machine and the priming mixture that might have dried out or have been misplaced or other extraneous substance easily cleaned therefrom. It is also possible to have a number of these blocks which may have the gripping tools and shell transfer tools set externally of the machine itself by suitable and well-known forms of jig means. In this manner, a number of the tool blocks may be stored for operations on different types of machines, whereby it is merely necessary to select the desired block. The tool block 163 has two adjustable bolts 183 which abut the frame of the machine in one plane. Bolt 184 abuts another fixed portion of the frame of the machine at 185. In this manner, the tool block 163 is positively located and locked in place by bolts 186 and 187, which enter into open slots 188 and 189 respectively in the tool block, allowing the block to be withdrawn. All of the gripping tools and transfer tools are removably mounted on their

various slides and on the tool block, allowing for easy and ready replacement thereof. Delivery tubes 190 and 190' pierce the block so that after the spinners have entered a shell and permanently pressed the priming mixture into position and the removable grips have released their hold on the shell, that the next shell being moved into position by the shell transfer means will move or push the completed shell into an aperture in the delivery tubes, from where it will fall into a suitable container, either directly or through pipes 63 and 64 leading to the bottom of the machine.

SHELL SCREW FEED OPERATING MEANS

The screw thread means, 54 which advances the shells in a row from the feeding point past the charging means and to the spinner stations, is driven by a pawl wheel 191, driven in turn by the main shaft 80. Referring to Fig. 5, the screw feed intermediate operating lever 192 is connected to one of the pulleys, for example 193, at 194, the intermediate lever 192 being connected to a pawl carrying lever 195, at 196. A pawl 197 is pivoted at 196 on pawl carrying lever 195, the pawl 197 being adapted to engage the teeth in the pawl wheel 191. A spring pressed indexing stop member 198 engages indentations in the pawl wheel 191, indexing and stopping the wheel from rotation while the pawl operating lever is being retracted. A spring 199 urges indexing stop 198 into said teeth, the stop 198 being retracted by the cam surface 200 of the pawl carrying lever 195, engaging the roller 198*a* carried by stop 198. As the intermediate lever 192 is moved to the left (Fig. 5), the pawl carrying lever 195 is rotated in a clockwise direction, the pawl wheel 191 being retained in a stopped position by the engagement of indexing pawl 198 therewith. Continued movement of the pawl carrying lever 195 will cause cam surface 200 to engage the roller 198*a* of indexing stop 198, causing it to be retracted and allowing rotation of 191 as the operating lever 192 reciprocates to the right. At this point, the pawl 197 has engaged behind the next tooth as at 201 and rotates the wheel 191 in a counterclockwise direction, the pawl 198 having been retracted. As the wheel is rotated and indexing pawl 198 is freed from cam surface 200, a tooth 202 is opposite the stop 198 and the wheel is allowed to continue in its rotation until the next tooth 203 is engaged by indexing pawl 198, at which point the intermediate operating lever 192 commences to move in its return direction. The pawl wheel 191 is integrally connected with gear wheel 204, said gear 204 meshing with gear 205, which is integrally connected to the screw feed means 54. The ratio of the gears 204 and 205 is made such that the movement by the pawl operating system 192, 195, 197, will cause the feed screw to make two revolutions for each revolution of the main driving shaft. It is to be understood that this holds true for the specific embodiment shown, and may be varied in accordance with the number of spinners and feeding desired. A suitable braking means engaging the gear wheel 204 is provided at 206, to stop rotation of the wheel at any time the driving means is inoperative, it being desirable to have the parts immediately stop so as to avoid damage to the shells in case of operation of the safety means, and so that the shells will be accurately positioned.

*Stopping and safety means*

Because of the likelihood of shells becoming misplaced, jamming the machine, or not feeding properly, and because it is essential for safety reasons that a complete row of shells be underneath the apertures in the charging plate, it is necessary that certain stop and safety means be embodied in the machine. These means are:

1. A safety means located on the shell guiding means 69 before the inverting wheel is reached to stop the machine in case shells cease feeding in said guide.

2. A stopping means for the machine in the event that the screw feeding means 54 has not been completely filled, said stopping means being located before the charging means is reached by the row of shells in the screw feeding means.

3. A stop means for the machine in the event that a jam occurs or for some reason the shell transfer means sticks in its forward position or otherwise does not operate.

*1. Track stopping means*

Referring particularly to Figs. 3 and 8, a feeler 207 reciprocates in a suitable guide across the shell guiding means 69, to detect the absence of shells therein, and to stop the machine in case of a failure to feed. The friction disc 322 which is keyed to the shaft, upon which the inverting means 77 revolves, has indentations or cam surfaces 208 on its edge. An arm 209 pivoted at 210 having a roller 211 thereon is held against the friction wheel 322 by means of a suitable spring 322'. The arm 209 is connected integrally to arm 213 and carries the feeler 207, reciprocating said feeler in accordance with the indentations in friction wheel 322. A switch 214 with a contact operating means 215 is so located that it may be operated by a projection 216 of lever 209. The feeler 207, as it reciprocates, contacts the shells in the guiding means 69, the reciprocation being limited by the presence of the shells, and said reciprocation being insufficient for the projection 216 to contact operating means 215 of the switch. In the event that there are no shells in its track, the feeler 207 will travel across the track, moving lever 209 in a clockwise direction (Fig. 8) and thus cause projection 216 to press inward on contact operator 215 and open the switch 214, which in turn will stop the main driving motor.

*2. Screw feed stopping means*

In the event that the screw thread feed 54 is not completely filled with empty shells delivered to it from the shell inverting wheel 77, or a stoppage has occurred, it is necessary to stop the machine. Referring to Figs. 3 and 8, a lever 217 is pivoted at 218, having an upstanding arm 217*a* which carries a feeler 220 operating transversely of the screw thread means 54, the feeler 220 being reciprocated by means of the lever 217. The lever 217 is driven by operating rod 219 which is driven from the shell testing cam 221 through a roller 222 (Figs. 2 and 8). The connection between the rod 219 and lever 217 is by means of the collar 223, spring 224, and sleeve 225, said sleeve being loosely mounted on rod 219. A switch 226 having contact operating means 227 is so located that it may be operated by the tip 228 of lever 217. The operation of this stop is as follows: as the rod 219 moves to the left under the influence of cam 221, the collar 223, spring 224, sleeve 225, tend to move lever 217 clockwise. The feeler 220 will move across the path of the empty shells, and if the shell is in place at that point will be prevented from moving all the way across, which will stop tip 228

before it contacts the contact operating means 227 of the switch 226. Absence of shells in the track will allow 220 to travel further in a clockwise direction so that 228 will operate the switch 226, causing the main operating motor to be shut off. By this means, the absence of a shell in the screw feeding means will stop the machine.

*3. Shell transfer stop means*

In the event of a stop or jam at the shell transfer means, it is desirable that the machine be stopped so that the spinners will not come down on a shell that is not properly positioned. As the shell transfer intermediate operating lever 156 is held against the shell transfer cam 155, any stoppage occurring at the shell transfer means will prevent the lever from making contact with the cam 155, the cam continuing its rotation regardless.

Reference will now be made to Figs. 2, 4 and 7. A shell transfer cam stop 229 is provided on the reverse face of spinner cam 144. The shell transfer stop cam is a segmental cam which in its rotation contacts roller 230 carried on lever 231 pivoted at 232 on a suitable bracket attached to the frame. The shell transfer cam stop will cause the lever 231 to rotate in a counter-clockwise direction (as viewed in Fig. 4), said lever being returned by a suitable spring (not shown) until it rests in its normal position against stop pin 233. A lever 234 is pivoted at 235 on the lever 231. This lever is adapted at its lower end 236 to contact the switch operator 237 of the switch 238. A projection 239 on the upper end of lever 234 cooperates with the operating projection 240 on the shell transfer intermediate lever 156. When the shell transfer stop cam contacts roller 230, moving lever 231 counter-clockwise, if the projection 240 on transfer intermediate lever 156 is opposite projection 239 at this time, the lever 234 will be moved in a clockwise direction, and the combined movement of the two will be such that the end 236 of lever 234 will contact switch operator 237, thereby stopping the machine. The location of the cam and projection 240 is such, however, that in the normal operation of the device the intermediate lever 156 will move to the left (Fig. 7), pushing the shell transfer means to the right through the shell transfer lever 157 as previously described. When the shell transfer cam 229 contacts or passes the roller 230, causing the lever 231 to move in a counter-clockwise direction (Fig. 4), contact of projection 239 and projection 240 will not occur, and therefore switch 238 will not be operated. It can be seen therefore that in the event there is a jam or other obstruction at the shell transfer means 171 and 172 of Fig. 13, that the lever 156 will be prevented from following cam 155 as it moves in a clockwise direction (Fig. 7) and therefore not move to the left, and will thus cause the cooperation of the projection 239 and projection 240 to stop the machine.

ELECTRICAL CIRCUIT

The spinner motor switch may be so connected to a suitable relay that the spinner motor must be operating before the main operating motor operating drive shaft 80 may be started, thereby insuring rotation of the spinners when the machine is operating. In Fig. 27 is shown one form that the electrical circuit may take for the machine. Lines 348 and 349 constitute a source of power for the motors, and spinner motor 153 is connected thereto through the switch 350, and the relay operating solenoid 351. When the switch 350 is closed to energize spinner motor 153, the solenoid 351 is energized, closing switch 352, rendering the circuit for the main driving motor 346 in condition so that the closing of the main switch 353 will supply energy to the main driving motor 346, providing that the safety switches 214, 226, 238 and 250 are closed. After switch 352 has been closed through the energization of solenoid 351, the main operating switch 353 may be closed, energizing motor 346, which energization also serves to energize the magnetic brake release arrangement shown diagrammatically at 347, releasing the magnetic brake. Thereafter the opening of any of the safety switches mentioned will cause a stoppage of the motor. Switch 353 may be of any of the conventional types requiring resetting, for example, after each time that the motor 346 becomes de-energized through the opening of any of the safety switches or through the failure of current in the spinner motor circuit.

SUMMARY OF OPERATION

A summary of operation of the machine as illustrated in Fig. 1 will now be given, using the specific embodiment just described as one example of a manner of carrying it forth, but it is to be understood that different combinations of driving speeds, number of spinners, and number of apertures and punches in the charging means may be used.

The empty shells are picked up by the shell lifting projections 67 on the endless chain 66 (Fig. 8*a*) from where they impinge on the guiding means 69 as they slide from the projections 67, entering said track in a base-upward position. The swinging gate at 74 and rapidly revolving wheel 75 serve to remove the extraneous shells from the track and cause them to slide back into the container 65, where they may be picked up again by the projections 67. The shells slide down the guiding means 69, passing the stop means feeler 207, which will detect an absence of shells in the track due to a stoppage in this track and shut the machine off in case of such stoppage. The empty shells enter the recesses 77*a* in the inverting wheel 77. The inverting wheel 77 is moved two places for each rotation of the main shaft 80, the rotation of inverting wheel 77 being accomplished by the operating lever 78, pawl mechanism 81, and indexing means 82. As the shells reach the lower position of the inverting wheel 77, they are forced out of the recesses 77*a* of the inverting wheel by the thin removing plate 89 (Fig. 10) which operates in the annular slot 90 of the inverting wheel 77. As the shells are removed from the inverting wheel, they are carried forward in the passageway 91 by the belt 88 until they are engaged by the screw thread 54. A feeler means 220 immediately thereafter serves to detect the absence of a shell in one of the threads of the screw thread means 54, so that in the event of such absence the machine will be stopped. The shells are carried forward then by the screw thread means 54 until they are under the charging plate 55. In the specific embodiment shown, this charging plate has 16 apertures in each transverse row, which have been previously filled with a pasty priming mixture. The punches 101 of the charger reciprocate in the guides 112 and 113, being operated by the charger operating lever 103 which is reciprocated by the means 108 and 110 from the cam wheel 107. The cam wheel 107 is driven

from the main shaft 80 through the gear train 253, 254, 256, and internal teeth 257 of wheel 107. This gear train gives a ratio of eight to one, so that with every eight revolutions of the main shaft, there will be one reciprocation of the charger punches. Then, as the screw feed means makes two revolutions for every revolution of the main shaft, and as the inverting wheel 77 delivers two shells for each revolution of the main shaft, there will be sixteen empty shells under a row of sixteen apertures in the charging plate, said empty shells having the mixture placed therein as the charging punches 101 enter the filled apertures 56 of the charging plate. After the mixture in one row of the charging plate has been removed, it is necessary that the next filled row be moved underneath the charging punches 101. This is accomplished by means of the reciprocation of the charger carriage reciprocating and operating bar 114, which is reciprocated by the cam wheel 115, which is integrally connected with the cam wheel 107 and therefore makes one reciprocation for every eight revolutions of the main shaft 80. The carriage is moved by means of the pawl 123 carried on the bar 114, and is indexed accurately in position under the punches by the indexing pawl 124. As the last row of holes of the charging plate has had the priming mixture punched out thereof, the projection 127a has moved pawl 123 clockwise so as to disengage it from the carriage 98. At the same time, a stop cam 241 mounted on the carriage 98 has engaged the roller 242 (Fig. 12), moving the roller 245 into the path of cam 251, which operates switch 250 (Fig. 11) and shuts the machine down so that the operator may place a new charging plate thereon. This prevents damage to the punches and allows the operator to tend a number of machines, because the automatic stopping thereof will serve as a signal that the plate requires recharging. The shells are advanced toward the spinners by the screw thread 54, and as they reach the spinners the shell transfer means 171 and 172 will move the shells from the feed means 54 into position to be clamped by the stationary and movable gripping tools 175, 179, 178 and 181 (Fig. 13). As previously explained, the shell transfer tools make one revolution for each revolution of the main shaft, and the screw thread means 54 makes two revolutions for each revolution of the main shaft, so that shell transfer means 171 removes every other shell from the screw thread means. This necessitates, of course, that shell transfer means 172 be so spaced from 171 that it will catch the alternate shell that is carried past transfer means 171, the shell transfer means 171 and 172 being operated by the main shaft through the intermediate lever 156, cam roller 159, cam 155, spring 158, the lever 156 serving to reciprocating bell crank 157.

As explained under "Stopping means," in the event that the shell transfer means is jammed and prevented from going forward, the projection 240 (Fig. 4) will strike projection 239 as lever 231 is moved by the shell transfer stop cam 224, so that end 236 of lever 234 will operate switch 238.

The movable gripping tools 179 and 181 are operated from the main shaft by means of lever 165, cam 166, and detachable connection 327. The bar 180 carrying the movable gripping tools is reciprocated once for each revolution of the main shaft, the relative rotation of cam 166 being such that the shell will be gripped between the stationary and movable gripping tools after it has been placed in position by the shell transfer means 171 and 172. While the shell is held in this clamped position, the spinners 134 carried by the hinge plate 138 and reciprocating plate 141 enter the shells and the rapidly rotating spinners 134 press the loose priming mixture into place in the rim of the shell. The reciprocating plate 141 is reciprocated once each revolution of the main shaft by the intermediate lever 143 which is reciprocated by cam wheel 144 and roller 146. The intermediate lever 148 in turn reciprocates lever 142 through the adjusting screw 149 and spring 258 to the enlarged end of lever 142 entering an aperture 151 in plate 141.

*Serrated disc charger*

In Figs. 16 to 26 inclusive there is illustrated an alternative form of charging means. This form of charging device may replace the plate charger previously described, it being merely necessary to replace certain of the cams on the main operating shaft with cams suitable for the operation of the serrated disc charger. In general, the serrated disc charger has a rotating disc which may have indentations or serrations which, for example, may take the form similar to those of a circular saw. The disc is rotated through a column of the pasty priming mixture. At the same time, the column of priming mixture is rotated into the teeth or serrations. At another point of the periphery of the serrated disc, suitable plungers remove the pastry priming mixture from the serrations into an empty shell in the row advanced by the screw thread feeding means. The details of the construction of the serrated disc charger will be described first, and then its positioning in the priming machine.

Referring now to Fig. 16, 259 may be a heavy cast steel base, and the rotating circular disc 260 (Figs. 16, 17 and 20) may have sawtooth or similar indentations or serrations 261 in the edge thereof. The disc 260 is mounted on a shaft 262 which is driven by a pawl wheel 263. The shaft 262 may be suitably mounted in the base 259 by means of the ball bearings 264. The pasty priming mixture 265 is placed in a hollow circular member generally shown at 266, 267 being a rubber (or similar material) liner inside of the circular hollow member 268. The hollow circular member 268 has external gear teeth 269 meshing with a gear 270 (Fig. 17), which in turn is driven by gear 271 (Fig. 16) through shaft 272. The gear 271 is driven by gear 273 mounted on shaft 262 and turned by pawl wheel 263. In this manner, it can be seen that the column of pasty priming mixture 265 contained in the rotating circular hollow member 268 will be rotated relatively to the serrated disc 260, the plunger 274 serving to force the priming mixture downwardly in the circular hollow member and against the circular disc 260. The plunger 274 is suitably mounted on arm 275 (Figs. 16 and 25) by a pivoted connection 276. The arm 275 is pivoted at 277 to a suitable bracket 278 fastened to the base 259. A stop switch is provided at 280 to stop the machine when the priming mixture has been used up, the switch 280 being operated through contact of the lever 275 with the switch operator 282 (Figs. 25 and 26). At the under side of hollow circular member 267, a block 283 is located having a rubber inset 284 (Figs. 16 and 20). The pawl wheel 263 is driven by a ratchet and pawl arrangement more clearly shown in Figs. 19, 21 and 22. Reciprocating arm 285 is suitably connected to a cam on the main shaft

80 of the priming machine such that it will make one reciprocation for each revolution of the main shaft, provision being made in a conventional manner for over-travel of the rod 285 after the indexing pawl has operated. A pawl carrier 286 is mounted on shaft 262. Pivotedly mounted on the pawl carrier 286 and pawl stud 287 is the operating pawl 288 which is urged into engagement with the teeth by spring 289. At 290 there is pivoted an indexing pawl 291 which is urged into engagement with the teeth by spring 292. On an arm 293, integral with the shaft 290, which is in turn integral with indexing pawl 291, there is located a cam surface 294 adapted to be engaged by a part of the pawl carrier 286. A friction brake 295 (Figs. 16 and 19) is pressed into engagement with the pawl wheel 263 by spring 296 and adjusted by screw means 297. In the view shown in Fig. 19, the operating arm 285 has reached the end of its stroke (upwardly as viewed in Fig. 19) and is ready to move in a counterclockwise direction. As this occurs, the pawl wheel 263 will be held from rotation by the brake 295, and the pawl 288 will pass over a tooth as at 298 due to the yielding of spring 289. As this occurs, the cam surface 294 of indexing pawl lever 293 will be contacted by the pivot 287 or other portion of the pawl carrier 286, rotating it in a clockwise direction and disengaging the indexing pawl 299 from a pawl tooth as shown at 300. Further movement of the pawl carrier 286 will allow the tip of pawl 288 to pass over the tooth and drop into the next indentation. After this occurs, the arm 285 will reverse its direction, and start to move in an upwardly direction (as viewed in Fig. 19), driving pawl carrier 286 in a clockwise direction. Thereupon the pawl 288 will commence rotation of wheel 263, indexing pawl 291 being disengaged from the teeth of the pawl wheel until the tip of the indexing pawl is over a tooth, at which time the cam surface 294 will be released from engagement with 286, and as the pawl wheel continues its rotation the indexing pawl 299 will enter the next tooth. The pawl wheel 263 will continue in its rotation until the edge of the next tooth comes against the tip 299 of indexing pawl 291, at which point the wheel will be positively stopped and indexed.

The necessity for this accurate indexing will appear presently.

A wiper means is provided at 301, 302 (Fig. 18) suitably supported in brackets 303, 304. The wiper means 301 and 302 may be of rubber or other suitable material and serves to contact the serrated disc 260 so as to remove the excess priming mixture therefrom. The empty shells are carried by the screw thread advancing means 54 (Fig. 16) under the punches 305, which cooperate with the serrations in the serrated disc 260 to remove the pasty priming mixture therefrom, from where it will drop into the empty shell. The punches 305 (Figs. 16, 23 and 24) are so shaped as to cooperate accurately with the serrations 261 of the disc 260. In the specific embodiment shown, the shape of punch 305 as at 306 (Fig. 24) is that of the sawtooth shape of the serrated disc. The punches are carried on a reciprocating plate 307, slidably mounted in the guides 308 of the casing 259, a plate 309 holding the reciprocating plate 307 in place. There is an opening 309a in plate 309 adapted to receive a reciprocating arm 310 which is operated by a cam located on the main cam shaft, similar to arm 103 (Fig. 6). The serrations of the disc 260 must register accurately with the punches 305, and for this reason the indexing means at 291 has been provided. The casing 259 has suitable apertures 311 adapted to receive some type of heater means 312, which may be electrically operated. A trough 313 is provided in the main housing, into which water or other humidifying liquid may be placed. Then, if a cover be placed over the opening of 259 such as a piece of muslin or other impervious cloth, the heat generated by the heater 312 will tend to evaporate the liquid and maintain a humid atmosphere within the area wherein the priming mixture is located, and prevent drying up of the same, such as is the case when priming mixture is exposed to the air, producing a dangerous condition. In the operation of the charger device of this form, the serrated disc charger takes the place of the charging head previously described, and fits over the guide rail 93 and the screw thread advancing means 54. Priming mixture is placed in the circular hollow member 267, the plunger 274 put into position, and the machine started. The rotation of the serrated disc in a clockwise direction (Fig. 17) and the hollow circular member 267, also in a clockwise direction, forces the pasty priming mixture into the serrations 261 of disc 260. The reciprocation of arm 310 engaging the serrations 261 places the priming mixture into the shells in the screw thread advancing means which have been moved there from the shell feeding means. As previously set forth, the charger plungers make one reciprocation for each revolution of the main shaft, and the operating arm 285 makes one revolution for each revolution of the main shaft. Therefore, as the screw thread 54 makes two revolutions, two empty shells will be placed underneath the two plungers at each revolution of the shaft and will receive a charge of the priming mixture. It is evident that any combination of plungers may be used, provided the device is properly indexed. In this embodiment of the charger mechanism, the operator does not have to charge each plate separately, but merely has to keep the receptacle 267 filled with the pasty priming mixture.

It is seen therefore that a new and improved method has been provided to measure a quantity of a material and to place it into a receptacle. It is to be understood that the specific embodiments shown are merely examples of manners in which the invention may be carried out.

The number of shells to be operated on at the same time and the feeding and charging combinations will govern the indexing and cams to be used.

It will be apparent that the complete machine comprises many parts and performs several functions, any of which might be performed separately or in conjunction with mechanisms differing from those herein described, and that throughout, the description and drawings are directed to representative embodiments of inventions susceptible of many modifications, all falling within the scope of the appended claims, which are to be broadly construed.

What is claimed is:

1. In the priming of shells, the method comprising the steps of positively engaging and continuously advancing the shells to be primed, advancing a serrated element into a pasty priming mixture and moving the pasty priming mixture into the serrations, moving the pasty priming mixture from the serrations into the shells, and then moving the priming mixture into final position in the shell.

2. In the placing of a pasty mass into a receptacle, the method comprising the steps of advancing a serrated element into the pasty mass, the relative motion of the mass and element being such that the element is both moved along and into the mass to fill the serrations with the pasty mass, and then moving the pasty mass from the serrations into a receptacle.

3. In the placing of a pasty mass into a receptacle, the method comprising the steps of advancing a serrated element into the mass and at the same time advancing the pasty mass into the serrated element, then moving the pasty mass from the serrations into a receptacle.

4. In the priming of shells, the method comprising the steps of positively engaging and advancing the shells to be primed, advancing an element with a serrated periphery into a pasty priming mixture and moving the pasty priming mixture into the serrations, moving the pasty priming mixture from the serrations into the shells, and then moving the priming mixture into final position in the shell.

5. In a machine for priming empty shells, the combination of a screw thread advancing means for engaging and moving the shells to be primed, means to place the priming loosely into the shells, and means to move the priming into final position in the shells after they have been further advanced.

6. In a machine for priming shells containing loose priming mixture, the combination comprising: advancing means having shell engaging means to advance the shells in rows; means to remove the shells from the advancing means; clamping means to hold the shell so removed; and a reciprocating vertical rotating plunger for entering the shell while so clamped to move the priming mixture into position.

7. In a machine for priming shells, the combination comprising: advancing means having shell engaging means to advance the shells in rows; means to loosely put a priming mixture into the shells while in the row; means to remove the shells from the advancing means; clamping means to hold the shell so removed; and a reciprocating vertical rotating plunger for entering the shell and moving the priming mixture into position.

8. In a machine for priming shells, the combination comprising: advancing means having shell engaging means to engage and move the shells in rows; a feeding device containing the priming mixture; a serrated element, the serrated element and feeding device being so mounted that the serrated element and feeding device are moved both along and into each other to thereby fill the serrations with the priming mixture; means for moving the priming mixture from the serrated element loosely into the shells; means to move the loose priming mixture into final position in the shells after they have been further advanced in the row.

9. In a machine for placing priming mixture into shells, the combination comprising: advancing means having shell engaging means to engage and move the shells in rows; a serrated circular disc, the serrations of which are adapted to receive the desired quantity of the priming mixture; a feeding means adapted to receive the priming mixture; means for rotating the serrated disc through priming mixture placed in the feeding means; means to rotate the feeding element in the same direction as the serrated disc whereby the serrations will be filled with the priming mixture; and means for moving the priming mixture into the shells.

10. In a machine for placing priming mixture into shells, the combination comprising: a plate having rows of apertures adapted to receive the priming mixture; a reciprocating plunger to eject the mixture from an aperture into a shell thereunder; means to move the plate after each reciprocation of the plunger to bring a filled aperture thereunder; and means to replace the filled shell with an empty shell before the next reciprocation of the plunger.

11. In a machine for placing priming mixture into shells, the combination comprising: a plate having transverse and longitudinal rows of apertures adapted to receive the priming mixture; a group of reciprocating plungers to eject the mixture from a transverse row of the apertures into shells thereunder; means to move the plate after each reciprocation of the plungers to bring a filled row of apertures thereunder; and means to advance empty shells under said apertures in readiness for the next reciprocation of the plungers.

12. In a machine for placing priming mixture into a receptacle, the combination including: an element having apertures adapted to receive the priming mixture; a hollow reciprocating plunger cooperating with an aperture of said element to eject the priming mixture therefrom into a receptacle thereuonder; means to supply a fluid medium to the hollow plunger to assist in the moving of the priming mixture into the receptacle.

13. In a machine for placing priming mixture into a receptacle, the combination including: an element having apertures adapted to receive the priming mixture; a hollow reciprocating plunger cooperating with one of said apertures to eject the priming mixture therefrom into a receptacle thereunder; guide means for the reciprocating plunger; means to supply a fluid medium to the hollow plunger including valve means in the plunger and in the guide means which come into operative position after the plunger has passed through the aperture, to assist in removal of the priming mixture into the receptacle.

14. In a machine for placing a priming mixture into shells, a plate having rows of apertures therein adapted to receive the priming mixture; a reciprocating plunger to eject the priming mixture therefrom into a shell thereunder; means to move the plate after each reciprocation of the plunger so that a filled aperture is thereunder, and means to stop the machine after the last aperture in the plate has had the priming mixture removed therefrom.

15. In a machine for placing priming mixture into shells, a plate having rows of apertures therein adapted to receive the priming mixture; a reciprocating plunger to eject the priming mixture therefrom into a shell thereunder; means to move the plate after each reciprocation of the plunger so that a filled aperture is thereunder; a cam operatively connected to the plate; a switch; a switch operator adapted to be engaged by said cam; a second cam operated at the same frequency as the reciprocating plunger, whereby after the last aperture has had the mixture removed therefrom, the first mentioned cam operatively connected to the plate will move the switch operator in the way of the second mentioned cam so that at the next operation thereof the switch operator will operate the switch to stop the machine.

16. In a machine for supplying measured quantities of a material to a receptacle, the combination comprising: a serrated element, each serration being adapted to receive the desired quantity of the material; a feeding element to receive the material to be measured, the serrated and feeding elements being so mounted that the serrated and feeding elements are moved both along and into each other to thereby fill the serrations with the material; and means for removing the material from the serrations into the receptacle.

17. In a machine for supplying measured quantities of a material to a receptacle, the combination comprising: a serrated circular disc, the serrations of which are adapted to receive a desired quantity of the material; a feeding means receiving the material to be measured; means for rotating the serrated disc through the material in said feeding means; means to rotate the feeding element in the some direction as the serrated disc, whereby the serrations will be filled with the material; and means for removing the material from the serrations into the receptacle.

18. In a machine for supplying measured quantities of a material to a receptacle, the combination comprising: a disc having a saw tooth edge; a hollow circular member receiving the material to be measured; means for rotating the saw tooth disc through the material in said hollow circular member; means for rotating the hollow circular member and the material therein in the same direction as the saw tooth disc, whereby the material will be forced into the saw teeth; and means for removing the material from the saw teeth into a receptacle.

19. In apparatus for feeding shells having a rim to an advancing means having shell engaging means to move the shells in rows: a downwardly sloping guiding means having a slot the width of the shell body and narrower than the rim; means to feed the shells over the guiding means whereby they will fall thereon, only those entering the slot in correct position being retained therein; a rotating disc with recesses to receive the shells sliding down the slot, the rotating disc delivering the shells in upright position to the advancing means; means to place the priming material loosely into the shells while in the rows; and means to move the priming material into final position in the shells after they have been further advanced in the row.

20. In apparatus for feeding shells having a rim: a sloping guide having a slot the width of the shell body and narrower than the rim, the top surface of the guide also sloping inwardly and downwardly toward the slot; means to feed empty shells onto the guide, the inwardly sloping surface assisting the entrance of the shell body into the guide slot, the inwardly sloping surface changing to an outward and downwardly sloping surface at a point remote from the impingement of the empty shells on the guide to assist in the removal of the extraneous shells from the track.

21. In apparatus for feeding shells having a rim: a sloping guide having a slot the width of the shell body and narrower than the rim, the top surface of the guide sloping inwardly and downwardly toward the slot; means to feed empty shells onto the guide, the inwardly sloping surface assisting the entrance of the shell body into the guide slot, the inwardly sloping surface changing to an outward and downwardly sloping surface to assist in the removal of the extraneous shells from the track; and means to remove the excess shells from the guide.

22. In apparatus for feeding shells having a rim: a sloping guide having a slot the width of the shell bodies; a means to cause empty shells to impinge upon the sloping guide, some of the empty shells entering the slot and being prevented from passing through the slot by the rim of the shell; and means to remove the excess shells from the guide.

23. In apparatus for feeding shells having a rim: a sloping guide having a slot the width of the shell bodies and narrower than the rim; a means to cause empty shells to impinge upon the sloping guide, some of the empty shells entering the slot and being prevented from passing through the slot by the rim of the shells; and a rotating toothed wheel overlying the guide to remove the excess shells from the guide.

24. In apparatus for feeding shells having a rim: a sloping guide having a slot the width of the shell bodies and narrower than the rim; a means to cause empty shells to impinge upon the sloping guide, some of the empty shells entering the slot and being prevented from passing through the slot by the rim of the shell; and a swinging gate overlying the guide assisting in removal of the excess shells from the guide.

25. In apparatus for feeding shells having a rim: a sloping guide having a slot the width of the shell bodies; a means to cause the empty shells to impinge upon the sloping guide, some of the empty shells entering the slot and being prevented from passing through the slot by the rim of the shell; a swinging gate to assist in the removal of excess shells; and a rotating toothed wheel to remove the remainder of the excess shells from the guide.

26. In apparatus for feeding shells having a rim to an advancing means having shell engaging means: a downwardly sloping guiding means having a slot the width of the shell body and narrower than the rim; means to feed the shells over the guiding means whereby they will fall thereon, only those entering the slot in correct position being retained therein; a rotating disc with recesses to receive the shells sliding down the slot, the rotating disc delivering the shells in upright position to the advancing means.

27. In apparatus for feeding shells having a rim to an advancing means having shell engaging means: a downwardly sloping guiding means having a slot the width of the shell body and narrower than the rim; means to feed the empty shells over the guiding means whereby they will fall on the guiding means, only those entering the slot in correct position being retained therein, a rotating disc with recesses to receive the shells sliding down the guiding means, the rotating disc delivering the shells in upright position to the shell advancing means being so related that one shell is fed into every engaging means of the advancing means.

28. In apparatus for feeding shells having a rim to an advancing means having shell engaging means: a downwardly sloping guide means having a slot the width of the shell body and narrower than the rim; means to feed the empty shells over the guiding means whereby they will fall thereon, only those entering the slot in correct position being retained therein; a rotating disc with recesses to receive the shells sliding down the guiding means, the rotating disc delivering the shells in upright position to the advancing means, a stop means for the apparatus on the guiding means comprising a reciprocatory arm actuated transversely of the guiding means,

the arm being connected to a means for stopping the apparatus if the absence of shells allows the said arm to travel across the guiding means.

29. In apparatus for feeding articles: an inverting wheel having recesses open from one side of the wheel and extending radially inward from the periphery adapted to receive and hold the articles delivered thereto, the recess opening being substantially the width of the article body, the axis of the articles delivered being substantially parallel to said side, said side of the wheel also having a continuous concentric annular slot intersecting the said open recesses and extending inwardly substantially the depth thereof; a fixed blade at a point opposite to that of delivery of the article to the wheel and entering said annular slot to remove the articles therefrom as the wheel is rotated.

30. In apparatus for feeding articles: an inverting wheel having recesses open from one side of the wheel and extending radially inward from the periphery adapted to receive and hold the articles delivered thereto, the recess opening being substantially the width of the article body, the axis of the articles delivered being substantially parallel to said side, said side of the wheel also having a continuous concentric annular slot intersecting the said open recesses and extending inwardly substantially the depth thereof, a fixed blade at a point opposite to that of delivery of the article to the wheel and entering said annular slot to remove the articles therefrom as the wheel is rotated; a guide for the articles as they are moved from the wheel; a belt to carry the articles along in the guide until reaching an advancing means having article engaging means; a spring located adjacent the guide opposite the beginning of the advancing means to urge the articles into the advancing means engaging means, and at the same time being yieldable in case of failure to feed into the advancing means.

31. In a shell priming machine: advancing means with shell engaging means; means reciprocating transversely of the advancing means and adapted to be limited in its reciprocation by the presence of shells in the advancing means; switch means controlling the advancing means; an operative connection between the reciprocating means and the switch so that the absence of a shell in an advancing engaging means will allow an increased travel of the reciprocating means thereby operating the switch and stopping the advancing means.

32. In a machine for priming shells: shell moving means; a stationary clamping member; a movable member for clamping a shell between the stationary and movable clamping member after having been moved into engagement with the stationary clamping member by the shell moving means; said shell moving means, movable clamping means and stationary clamping means being mounted adjustably on an interchangeable and removable mount whereby the shell moving means, movable and stationary clamps may be easily adjusted for the shell to be processed.

33. In a machine for placing loose priming mixture into a shell: means for advancing the shells in rows; means to remove the shells from the row; adjustable clamping means to hold the shell so removed; a reciprocating vertical rotating plunger for entering the shell while so clamped to move the priming mixture into final position, said clamping means being mounted on a removable block so that the clamping and guide means can be readily adjusted to fit the shell to be processed.

34. In a machine for placing loose priming mixture into a shell: a common means for operating the various parts; means for advancing the shells in rows; means to remove the shells from the row; stationary and movable clamping means mounted on an interchangeable removable block to hold the shell so removed; a reciprocating vertical rotating plunger for entering the shell while so clamped, the movable clamping means being mounted on a reciprocating means in the removable block, the said reciprocating means having a quickly detachable connection with the common operaitng means to facilitate removal of the block.

35. In a machine for measuring the priming mixture to be placed in empty shells: a feeding element containing the priming mixture; a rotating serrated disc in cooperative relationship with the feeding element for measuring the priming mixture; an enclosed receptacle including a base for mounting and enclosing the feeding element and the serrated disc, the base having a trough adapted to contain a humidifying liquid; heater means in the base to vaporize the liquid and thereby to humidify the interior of the receptacle.

36. In a machine for placing loose priming mixture into permanent position in shells: advancing means having shell engaging means to advance the shells in rows; a plurality of reciprocating rotating means for moving the loose priming mixture into place in the shells; means to move the shells from the advancing means into position under the rotating means, the surface of the first transfer means while it is moving a shell into position serving as a guide for the succeeding shells as the advancing means moves said succeeding shells toward the other rotating means.

37. In a machine for priming shells: a main operating shaft; a cut-off controlling the operation of the machine; a cut-off operator mounted on a lever; shell advancing means; means to transfer the shell from the advancing means; reciprocating means for operating the means to transfer the shell, said reciprocating means having a projection thereon adapted to engage the cut-off operator; a cam operated by the main shaft for moving the cut-off operator lever, the combined action of the projection and the cam causing the cut-off operator to operate the cut-off, said cam being so related to the reciprocating means that in normal operation the projection on the reciprocating means does not contact the cut-off operator.

38. In the control circuit for a machine for placing priming in empty shells, the combination comprising: a motor for driving means to place the priming into final position in the shell; a main motor driving means for the machine; a circuit for the first mentioned motor including a starting switch and a switch operator therein; a circuit for the main driving motor including a switch operated by said switch operator of the first mentioned motor circuit; a starting switch and safety switches in the main motor circuit, whereby after the first mentioned circuit is energized the main circuit can be energized which will cause operation of the main driving motor until any one of the safety switches or the starting switch is opened to de-energize the main driving motor circuit.

39. In the control circuit for a machine for placing priming in empty shells, the combination comprising: a motor for driving means to place the priming into final position in the shell; a main driving means for the machine; a circuit for the first mentioned motor including a starting switch and a switch operator therein; a circuit for the main driving motor including a switch operated by said switch operator of the first mentioned motor circuit; a starting switch and safety switches in the main motor circuit; a magnetic braking means for the main driving motor connected in said main circuit, whereby after the first mentioned circuit is energized the main circuit can be energized which will release the magnetic brake, allowing operation of the main driving motor until any one of the safety switches or the starting switch is opened to de-energize the circuit.

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