Feb. 11, 1947. D. D. PEEBLES ET AL 2,415,528

CARTON FILLING MACHINE

Filed Nov. 2, 1942 4 Sheets-Sheet 1

FIG_1_

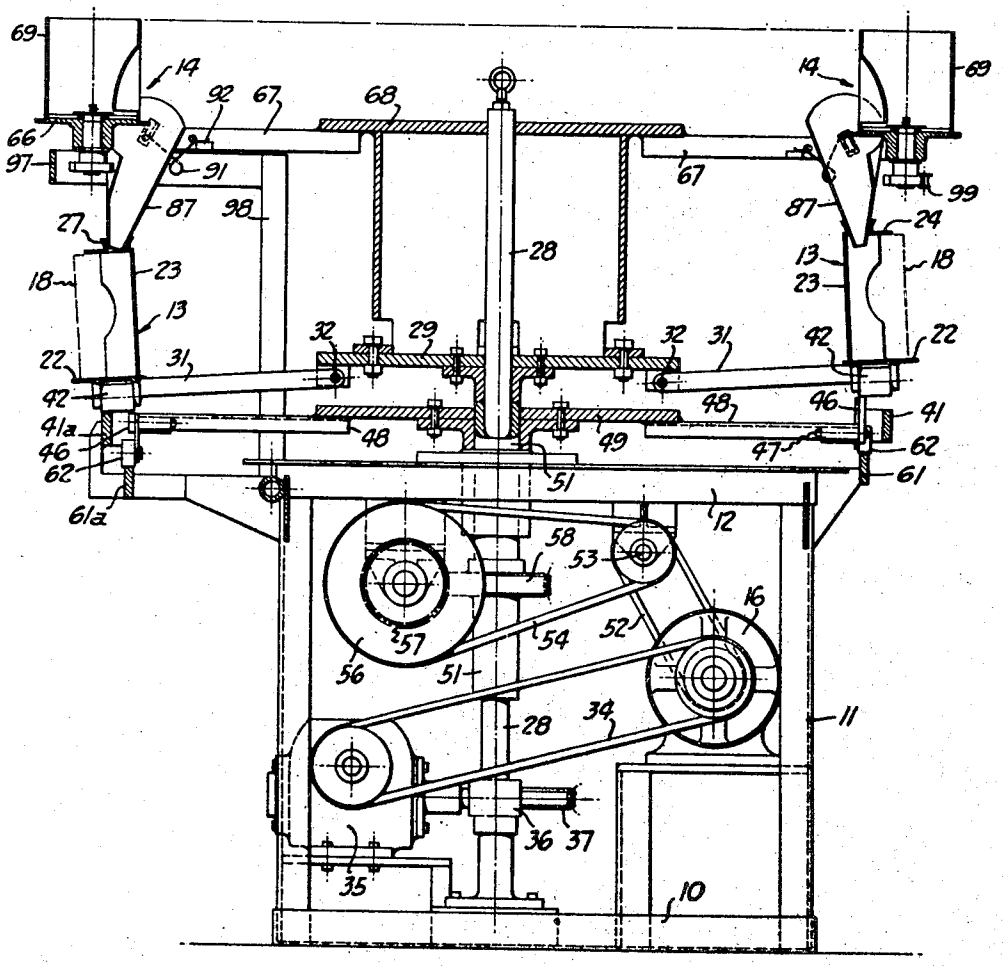
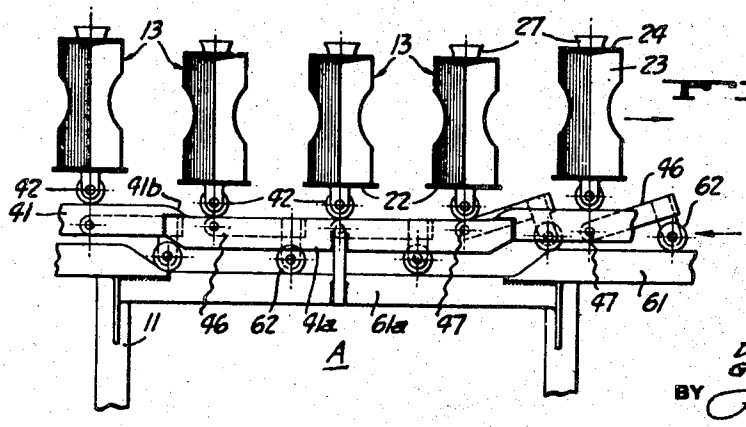


FIG_2_



INVENTORS
DAVID D. PEEBLES
GUY P. HENSLEY
BY Paul D. Flehr
ATTORNEY

Feb. 11, 1947. D. D. PEEBLES ET AL 2,415,528

CARTON FILLING MACHINE

Filed Nov. 2, 1942 4 Sheets-Sheet 2

FIG. 3

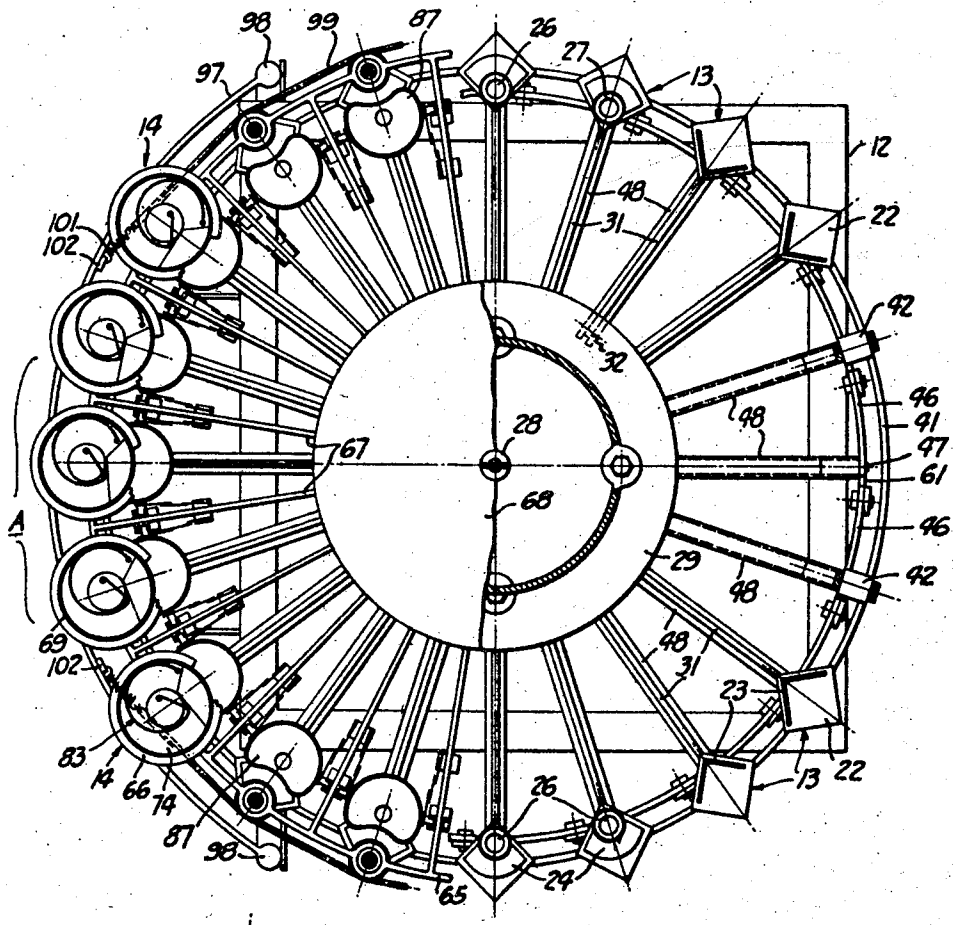
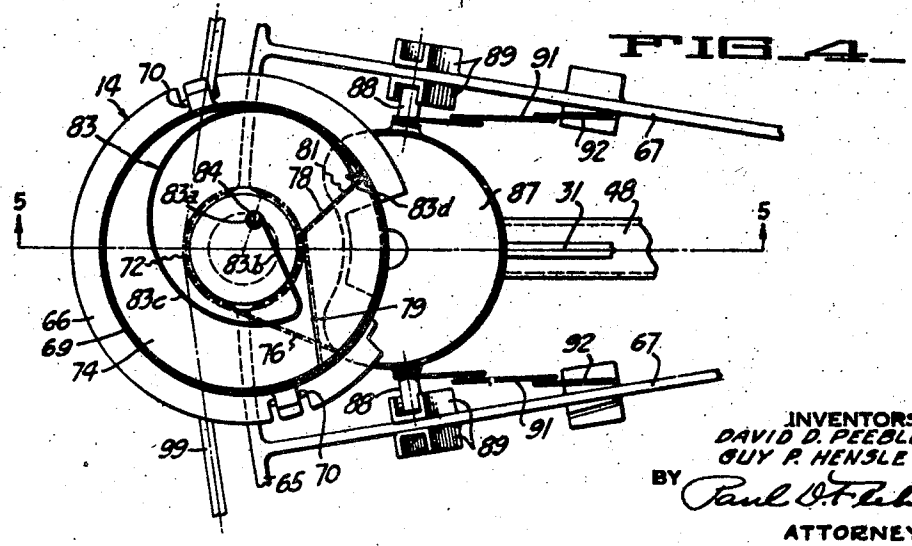


FIG. 4



INVENTORS
DAVID D. PEEBLES
GUY P. HENSLEY
BY Paul O. Peebles
ATTORNEY

Feb. 11, 1947. D. D. PEEBLES ET AL 2,415,528

CARTON FILLING MACHINE

Filed Nov. 2, 1942 4 Sheets-Sheet 3

FIG. 5

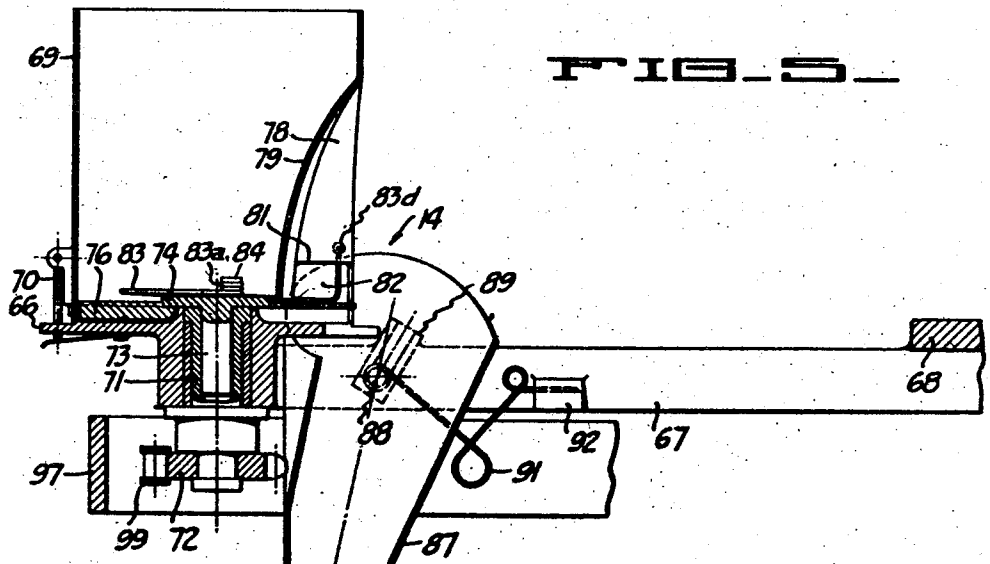
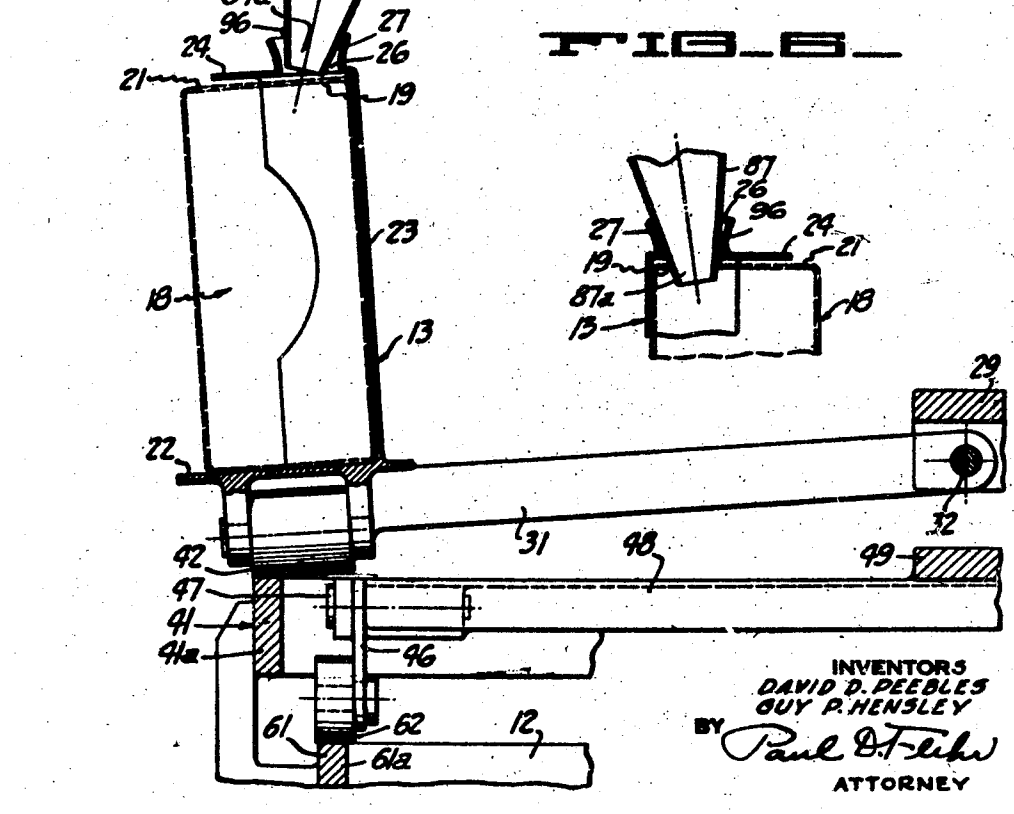


FIG. 6



INVENTORS
DAVID D. PEEBLES
GUY P. HENSLEY
BY Paul D. Fehlow
ATTORNEY

Feb. 11, 1947. D. D. PEEBLES ET AL 2,415,528

CARTON FILLING MACHINE

Filed Nov. 2, 1942 4 Sheets-Sheet 4

FIG-7-

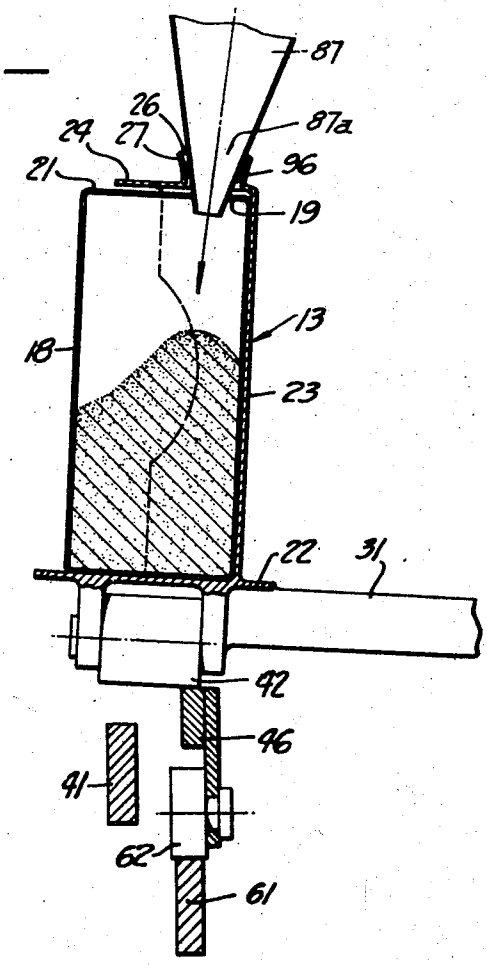
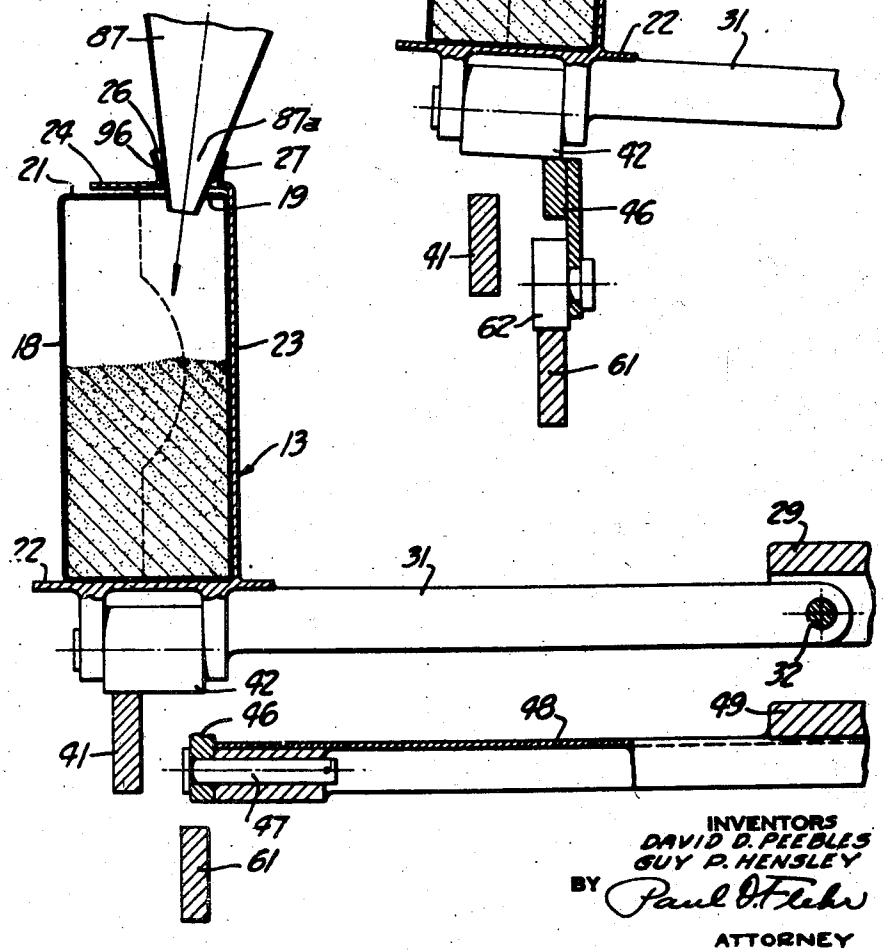


FIG-8-



INVENTORS
DAVID D. PEEBLES
GUY P. HENSLEY
BY Paul O. Fleher
ATTORNEY

Patented Feb. 11, 1947 2,415,528

UNITED STATES PATENT OFFICE

2,415,528

CARTON FILLING MACHINE

David D. Peebles, Hillsborough, and Guy P. Hensley, San Francisco, Calif., assignors to Golden State Company, Ltd., San Francisco, Calif., a corporation of Delaware

Application November 2, 1942, Serial No. 464,236

6 Claims. (Cl. 226—72)

1

This invention relates generally to apparatus and methods for filling cartons or containers with various powdered products.

It is an object of the invention to provide an improved apparatus and method of the above character which is particularly adapted to the handling of powders which do not readily flow or pour, as for example powdered milk products.

Another object of the invention is to provide a carton filling apparatus and method which makes possible substantially complete filling of cartons with measured quantities of powder, and which is particularly applicable to cartons of the type having an offset opening in their upper ends.

Another object of the invention is to provide a novel means and method for applying jarring forces to the carton being filled, whereby the body of the powder within the carton is repeatedly shifted laterally to insure complete filling.

Another object of the invention is to provide improved means in a machine of the above character for holding and retaining the cartons while they are being filled, and for releasing them to permit their removal at an unloading position.

Another object of the invention is to provide improved means for feeding a measured quantity of powder to the carton, the feeding means being characterized particularly by its ability to handle materials like whole milk powder, and by the substantial absence of any carry-over of powder from one filling operation to the next.

Further objects of the invention will appear from the following description in which the preferred embodiment has been set forth in detail in conjunction with the accompanying drawings.

Referring to the drawings:

Figure 1 is a side-elevational view, partly in cross-section, illustrating a machine incorporating the present invention.

Figure 2 is a detail showing a portion of the machine in side elevation, and illustrating particularly movement of the carton-holding or supporting devices through unloading and loading positions.

Figure 3 is a plan view of the machine as shown in Figure 1, with certain portions being broken away.

Figure 4 is an enlarged plan view of the powder feeding device.

Figure 5 is an enlarged cross-sectional view in side elevation, taken along the line 5—5 of Figure 4.

Figure 6 is an enlarged cross-sectional detail showing the lower end of the filling spout in

2

engaged position with respect to the upper end of the carton.

Figs. 7 and 8 are diagrammatic views showing the carton filling operations.

The machine as illustrated in the drawings consists generally of the base 10, together with a frame including the supporting structures 11 and the upper horizontal frame 12. In general the operating parts include the carton holding devices 13, and the powder feeding devices 14. The machine is shown being driven by the electric motor 16, which connects with parts to be presently described. The path of movement of the carton-holding devices is circular, and as shown in Figure 3 these devices in their movement pass through the unloading and loading zone A, while during the remaining movement the cartons are being filled.

The machine in this instance is adapted to the handling of pasteboard cartons which are square or rectangular in transverse cross-section, and which are filled through an opening in the top wall. Such a carton 18 is shown in dotted lines in Figures 5 and 6, and it will be noted that the filling opening 19 in this instance is offset laterally from the central axis of the carton, and toward one vertical corner, as shown in Figures 5 and 6. Also the opening 19 is relatively small in cross-sectional area, compared to the area of the top wall 21. Cartons of this type are desirable in the marketing of food products like powdered milk, because of the ease with which the contents can be poured from the carton by the consumer.

The holder 13 has been made to receive a carton 18 of the type described above. Thus the holding device includes the bottom platform 22 upon which the carton rests, and which carries the upright walls 23 ranged at right angles to each other. A top 24 is attached to the upper ends of walls 23 and is provided with an opening 26, surrounded by the flared ring 27. When a carton as described is placed within this holding device, in the manner illustrated in Figure 5, the carton opening 19 is in registry with the opening 26.

For the rotation of the holding device 13, the machine is provided with a vertical shaft 28, to which is secured the rotating spider or wheel 29. A plurality of arms 31 extend radially from wheel 29, and have their outer ends secured to the holding devices 13, as shown in Figure 5. The inner ends of arms 31 have pivotal connections 32 with the periphery of wheel 29, so that arms 31 together with the holding devices 13 can swing in vertical planes. The level of pivotal connections

32 is well below the center of the cartons 18, when these cartons are applied to the holding devices 13. Shaft 28 is driven at a desired rate by motor 16, which is connected to shaft 28 through the belt 34, gear box 35, worm 36, and the worm gear 37 attached to shaft 28.

The carton holders are carried by tracking means including the circular track bar or rail 41 which is rigidly attached to the frame of the machine by suitable structural members. Each of the holding devices has a roller 42 carried below the bottom wall 22 (Figure 5) and this roller is adapted to engage the upper edge of the rail 41. A minor segmental portion of the rail is interrupted as shown in Figure 2, and is bridged across by rail portion 41*a*, the latter having its upper edge at a lower level than the main rail 41. The sloped ends 41*b* of the main bar portion 41 facilitate movement of the rollers 42 down upon the upper edge of rail 41*a*, and then back to the main rail 41, as illustrated in Figure 2. This has the effect of dropping the level of the carton-holding devices 13 as shown in Figure 2, while they pass through the unloading and loading zone.

The mechanism for applying jarring forces is arranged so that jarring is discontinued while the holding devices pass through the unloading and loading zone. The particular type of mechanism illustrated consists of a plurality of camming levers 46, which have pivotal connections 47 with the outer ends of arms 48. Arms 48 in turn are attached to and extend radially from the spider or wheel 49, and which is secured to the hollow shaft 51. Shaft 51 and wheel 49 are driven in a direction opposite to that of wheel 29, by drive mechanism which in this instance includes belt 52, countershaft 53, belt 54, and pulley 56, worm 57, and worm gear 58 upon shaft 51. As the camming levers 46 rotate, their upper inclined edges engage the rollers 42, thus causing the holding devices 13 to be periodically raised and dropped. As each holding device is dropped its roller 42 strikes the upper edge of bar 41, thus causing the holding device and the carton held by the same, to be jarred.

Camming levers 46 are retained in their operating positions by the circular track bar or rail 61, which is likewise rigidly attached to the machine frame. Each of the levers carries a roller 62, engaging the upper edge of rail 61. Rail 61 is likewise interrupted as shown in Figure 2, and the gap between the ends is bridged by the lower railer 61*a*. This causes the levers 46 to drop down to horizontal or out-of-the way position to prevent raising and lowering of the carton-holding devices as the latter progress through the unloading and loading zone.

Each of the feeding devices 14 is designed to receive a predetermined quantity of powder, and to feed this powder at a relatively uniform rate to the carton. Also it is preferably adapted to minimize the carry-over of powder from one operation to the next, thus making the filling of the cartons more precise, and minimizing contamination by exposure of powder to the atmosphere for a considerable period of time. As shown in Figures 4 and 5, this device consists of a base 66 which is generally circular in contour as viewed in plan, and which is attached to the radially extending arms 67, and ring 65. These arms and ring in turn are carried by the spider plate 68, which is fixed to and rotates with the shaft 28. Carried by the base 66 there is a cylindrical shaped shell 69, which together with the base forms a bin for receiving powder. The shell is removably secured to its associated base by suitable means such as the releasable bails 70. Extending centrally through the base there is a rotatable sleeve 71, the lower end of which is secured to a sprocket 72. Sleeve 71 is adapted to removably receive and to drive a stud 73, which is attached to the center of a disc 74. The lower side of this disc carries a vane 76 which sweeps through the space between the disc and the upper surface of base 66. Preferably the clearance between the periphery of disc 66 and the adjacent walls of the shell 69, and also the clearance between the edges of vane 76, the shell, and the adjacent surfaces of base 66, are relatively small to avoid accumulations of powder. As will be presently explained means is provided for rotating the sprocket 72 during a filling operation.

The shell 69 varies from cylindrical shape to the extent that on its inner side it is provided with the connecting inset walls 78 and 79. The lower edge 81 of wall 78 stops short of the upper surface of disc 74, thus affording a vertical gap 82 through which powder is fed from the bin. The lower edge of wall 79 terminates in close proximity with the upper surface of disc 74. Immediately above the disc 74 there is an agitator 83 in the form of a curved spring wire. This wire has an eye 83*a* at its inner end adapted to be loosely engaged over a pin 84, carried eccentrically upon the upper face of disc 74. The wire is also bent to provide a radial portion 83*b* extending outwardly from the eye 83*a*, an arcuate portion 83*c* which stops short of extending 360°, and an upturned free end portion 83*d*. When this agitator is positioned upon the disc with eye 83*a* engaged with pin 84, the outer end of portion 83*b* is in close proximity with the adjacent face of wall 79, while the upturned end portion 83*d* extends vertically across the gap 82, and is adapted to slidably engage the adjacent inner surface of wall 78. The eccentricity of pin 84 is such that when the disc 74 is rotated by the turning of sprocket 72, the agitator is gyrated and caused to sweep repeatedly across the upper surface of the disc, and the upturned end portion 83*d* is recurrently reciprocated across the gap 82 to prevent blocking. In order to permit powder fed through gap 82 to fall clear, the base is cut away on a suitable outline, as for example as shown in Figure 4.

Beneath each of the feed devices 14 there is a hopper or spout 87 for the purpose of directing powder into the carton. In the arrangement illustrated each spout is capable of a limited movement to accommodate the motion applied to the carton-holding device, and to releasably engage the carton during the filling period. Thus the sides of each spout are provided with studs 88 which loosely engage in grooved retaining members 89 attached to arms 67. Light wire springs 91, which are anchored at 92 to the arms 67, engage the studs 88 in order to yieldably urge the spout downwardly. The lower reduced end portion 87*a* of the spout fits loosely within the flared ring 27, and is dimensioned so that it may enter the carton opening 19. The dimensioning of the parts is such that when an associated carton holder is lowered for passing through the unloading and loading zone, the lower end of the spout 87 is retracted with respect to the carton, as shown in Figure 5. However, when the carton holder is elevated by engagement with the rail or bar 41, the lower end of the spout is caused to enter the opening 19, as shown in Figure 6,

thus effectively locking the carton to the holder, and insuring the discharge of powder into the carton. As shown in Figures 5 and 6 it is desirable to provide the lower end portion 87*a* of the spout with an annular bead 96, thus facilitating relative cocking between the spout and the associated holder to accommodate the raising and dropping movement during filling.

In order to rotate the sprocket 72 during the filling period, we provide a curved bar 97 (Figures 1 and 3) having its ends attached to the stationary upright members 98. A sprocket chain 99 extends about the upper portion of the machine, and has its ends attached to tension springs 101, which in turn are anchored at 102 to the bar 97. Assuming that the carton holders are rotating in a counterclockwise direction as viewed in Figure 3, as a particular sprocket approaches the chain 99 the sprocket teeth engage the chain to rotate the sprocket and its associated feed disc 74. The powder discharged from the bin drops into the spout 87, and flows into the carton being filled.

Operation of the machine, and the carrying out of the present method, can be outlined as follows: A suitable automatic measuring or weighing device is utilized in conjunction with the machine for supplying correctly measured quantities of powder and for delivering these measured quantities successively to the bins. A bin receives its measured amount of powder immediately as the associated carton holder passes beyond the unloading and loading zone A.

It will be presumed that an operator is standing in the proximity of the unloading and loading zone A, for the purpose of removing filled cartons as they enter this zone, and to introduce cartons for filling. The inclination of a carton holder is sufficient to retain a carton in place, without the necessity of manual retention until the holder has left the loading zone and has entered the filling zone. As the holder leaves the loading zone it is elevated to substantially vertical position, and at the same time as previously described the lower end of spout 87 enters the opening 19, to lock the carton in place. Now as the holder progresses through the filling period together with its associated feed device and hopper, it is repeatedly raised and dropped with a jarring action, while at the same time the feed device causes a substantially continuous stream of powder to be delivered into the carton. By the time the carton has progressed to the end of the filling period, all of the powder will have been discharged from the powder bin and the carton will be substantially filled with the powder. Now as the holder enters the unloading and loading zone A, the holder drops down as previously described, the lower end of spout 87 automatically retracts from the carton opening 19, and the filled carton is removed.

Reference has been made to the use of cartons of the type having an offset opening in its upper end. If it is attempted to fill such a carton with powder, accompanied by simple jarring or vibrating action, it is difficult if not impossible to completely fill the carton, due to a tendency of the powder to pile up immediately below the opening. In the present instance the jarring action and the motion applied to the container for jarring, overcomes this difficulty by causing a lateral shifting of the mass of powder within the carton. This action can be best understood by reference to Figures 7 and 8. Figure 7 shows a carton in an elevated position immediately before it is dropped.

Figure 8 shows the same carton after it has been dropped, and immediately after it has struck the rail 41. In Figure 7 the incoming powder is shown piling up somewhat, in a region below the opening 19. Figure 8 shows that due to the jarring action there has been a lateral shifting or redistribution of the powder within the carton, so that this piling up of powder no longer exists. This lateral shifting of the powder is caused by the outward swinging motion of the carton as it drops to the point of receiving a jar, and which in turn results in the fact that the carton holder swings about the pivotal connection 32 of the associated arm 31. As a result of this action there is recurrent shifting of the mass of powder within the carton, up until the carton is completely filled, and this insures filling that corner of the carton near the top wall and farthest from the opening 19. In addition to securing a lateral shifting of the body of powder within the carton, the jarring action also causes some settling of the powder, which in turn aids in securing a finished product which is substantially completely filled with powder.

We claim:

1. In apparatus for the filling of cartons or containers with powder, a holding device adapted to receive a carton to be filled, a member adapted to be rotated upon a vertical axis at a pre-determined speed, an arm pivotally attached to said member and extending radially from the same, the outer end of said arm being fixed to said holding device, tracking means serving to carry said supporting device as the same moves in a circular path, an arcuate portion of said tracking means forming an unloading and loading zone where cartons can be applied to the holding device and where filled cartons can be removed, the remaining arcuate portion of the tracking means constituting a filling zone, means for supplying a stream of powder to the carton being carried by the holding device as the holding device passes through said filling zone, means for recurrently raising and dropping the supporting devices as the same moves through said filling zone, and a structure forming a part of said tracking means and providing a rigid abutment against which the holding devices are adapted to strike when dropped to jar the same, the pivotal connection of said arm to said rotatable member being on a level substantially below the level of the center of the carton when applied to the supporting device, whereby the center of the container swings downwardly and outwardly while being dropped from its uppermost position to impact said structure.

2. In apparatus for the filling of cartons or containers with powder, a member rotatable upon a vertical axis, a plurality of arms pivotally connected to said member and extending outwardly in a general radial direction, carton holding devices attached to the outer ends of said arms, a circular supporting rail for the container-supporting devices, means for feeding a stream of powder to containers carried by the holding devices, as the devices move over the rail in a circular path, and means for recurrently raising and dropping the devices to impact the rail, said last means comprising a plurality of camming levers adapted to engage the carton holding devices, means for moving said camming levers in a circular path beneath the container-supporting devices, means for retaining said cam levers in raised operation positions for the major portion of the circular path of the holding devices and

for lowering the same to an inoperative position for the remaining portion of its circular path.

3. An apparatus as in claim 2 in which the means for moving the camming levers between operative and inoperative positions includes a secondary circular track or rail supporting the movable ends of the camming levers, one segmental portion of the secondary rail being at a level to retain the camming levers in their operative position, and another segmental portion being at a lower level to permit the camming levers to drop to inoperative positions.

4. In a carton filling apparatus, a carton holding device adapted to move through a filling zone, and a feeding device for supplying a stream of powder to the carton, said feeding device including a powder bin having a lower base, a rotatable feeding disc disposed upon the base, one wall of the bin having a slot extending upwardly from the upper face of the disc for discharge of powder, and an agitator eccentrically connected to the disc and having a portion reciprocating across said slot.

5. In a carton filling apparatus, a carton holding device adapted to move through a filling zone, and a feeding device for supplying a stream of powder to the carton, said feeding device including a powder bin having a lower base, a rotatable feeding disc disposed upon the base, one wall of the bin having a slot extending upwardly from the upper face of the disc for discharge of powder, a pin carried by the upper face of the disc and eccentric with respect to the same, and an agitator engaging said pin and disposed immediately above the disc, the agitator comprising a spring wire having a portion extending in a general radial direction from the pin, a curved portion extending for more than 180° and less than 360°, and an upturned end portion disposed adjacent said slot.

6. In apparatus for the filling of cartons or containers with powder, a plurality of holding devices each adapted to receive a carton, means for continuously moving the devices along a predetermined path through a loading zone in which cartons can be applied to the devices and a filling zone in which the cartons receive powder, each of said devices being capable of raising and lowering movement, the lowering movement being in a non-vertical direction with a horizontal component toward one side, means for supplying a stream of powder to each carton while the carton passes through said filling zone, said means serving to deposit the powder to one side of the central axis of the carton, means for recurrently raising and dropping the holding devices as the same are moved through said filling zone, and means forming a fixed rigid abutment against which the holding devices strike at the end of their dropping movement, the jarring thus applied to the carton serving to laterally shift the body of powder within the same in a direction toward that side of the carton opposite to the first mentioned side.

DAVID D. PEEBLES.
GUY P. HENSLEY.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,949,536	Ferguson	Mar. 6, 1934
1,943,013	Gangler	Jan. 9, 1934
2,010,220	Cocks	Aug. 6, 1935
2,303,122	Chapman	Dec. 1, 1942
2,000,648	Kellett	May 7, 1935

OTHER REFERENCES

Ex parte Whitelaw, 219 O. G. 1237.