Feb. 19, 1952 W. E. HASTINGS 2,586,161

MECHANICAL COUNTING DEVICE

Filed Aug. 16, 1946 6 Sheets-Sheet 1

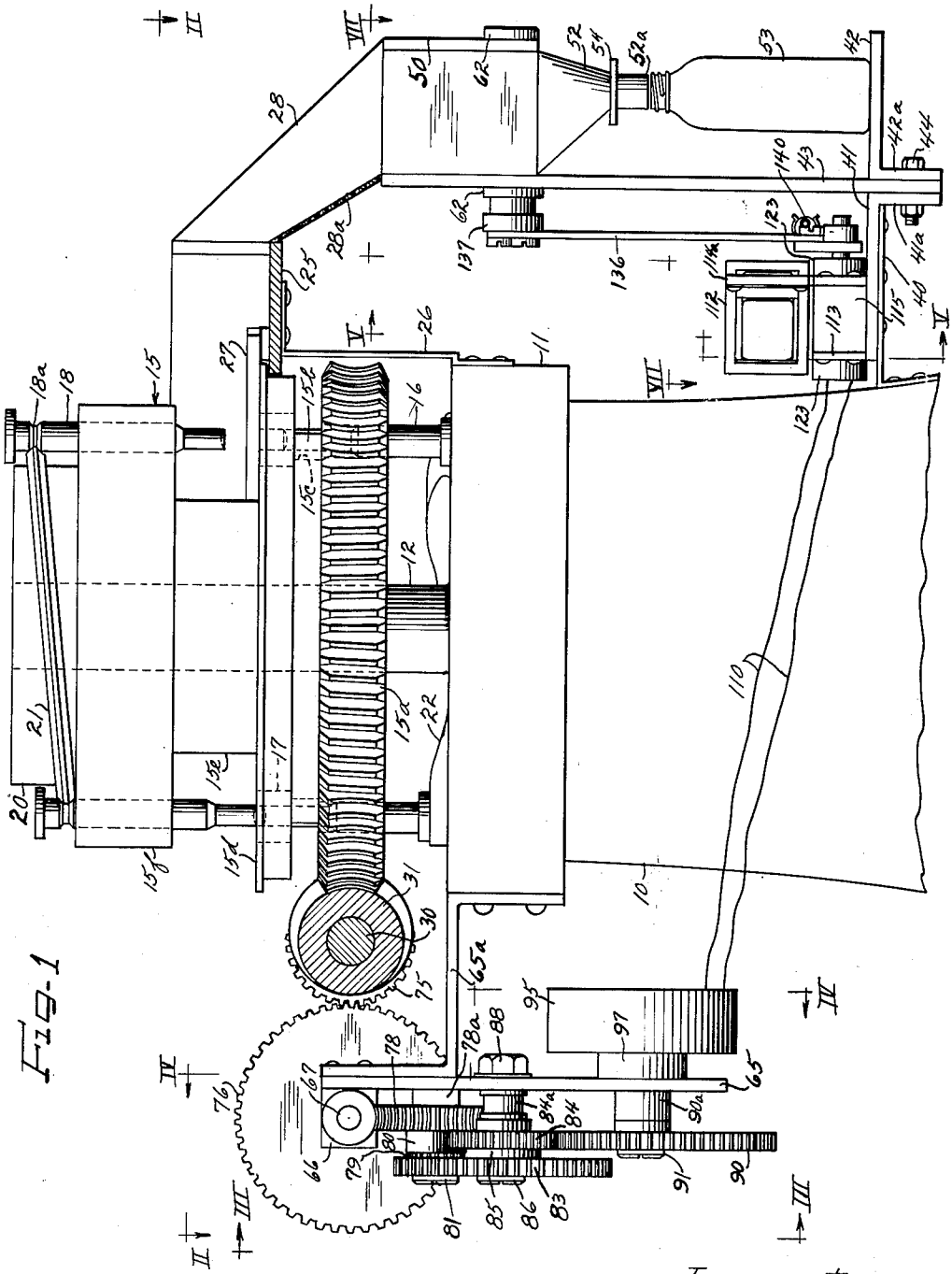


Fig. 1

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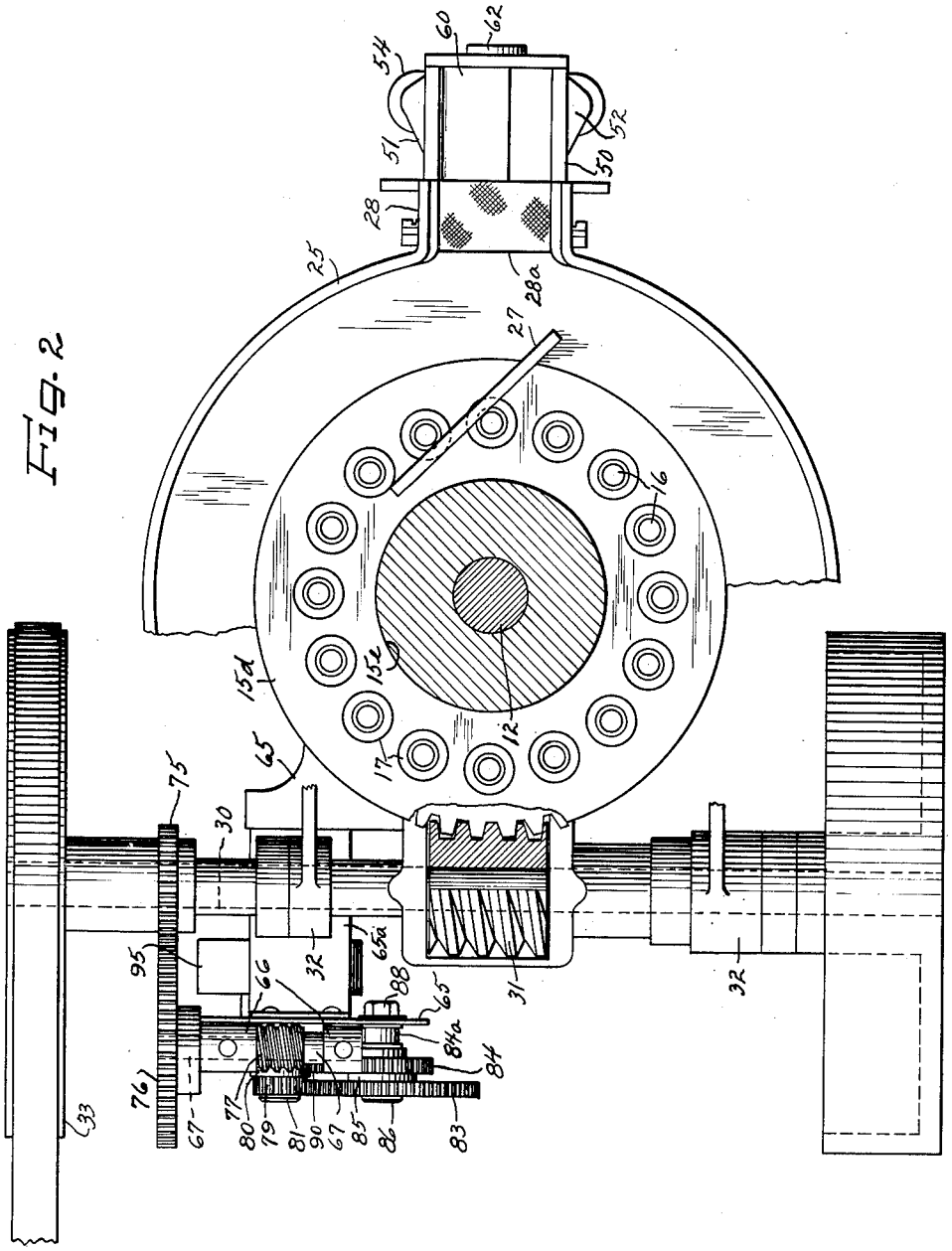
Attys

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MECHANICAL COUNTING DEVICE

Filed Aug. 16, 1946 6 Sheets-Sheet 2

Fig. 2



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MECHANICAL COUNTING DEVICE

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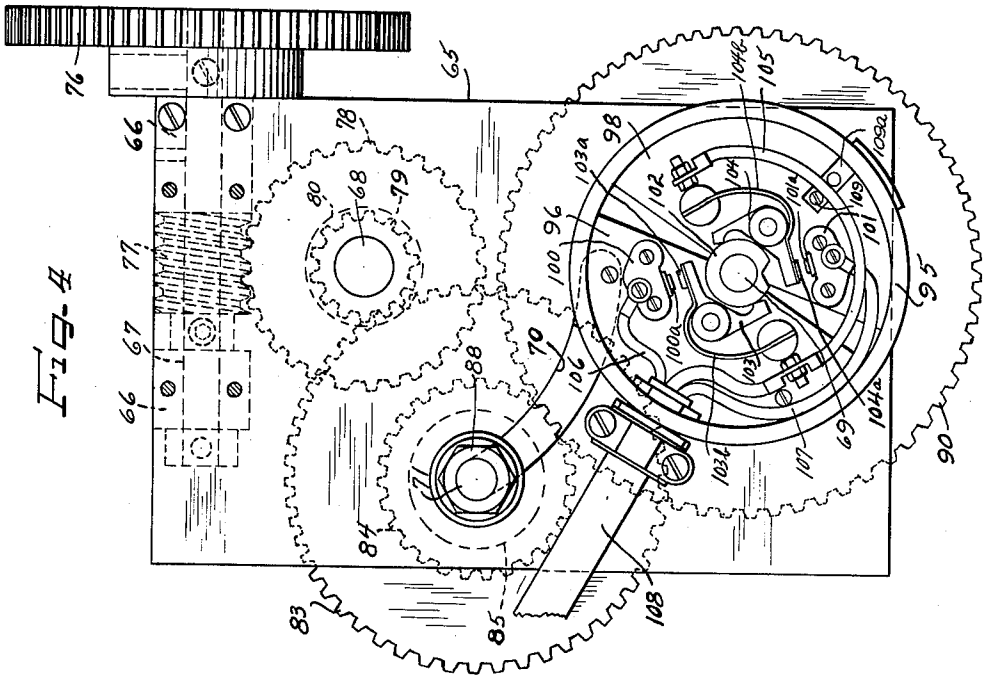


Fig. 4

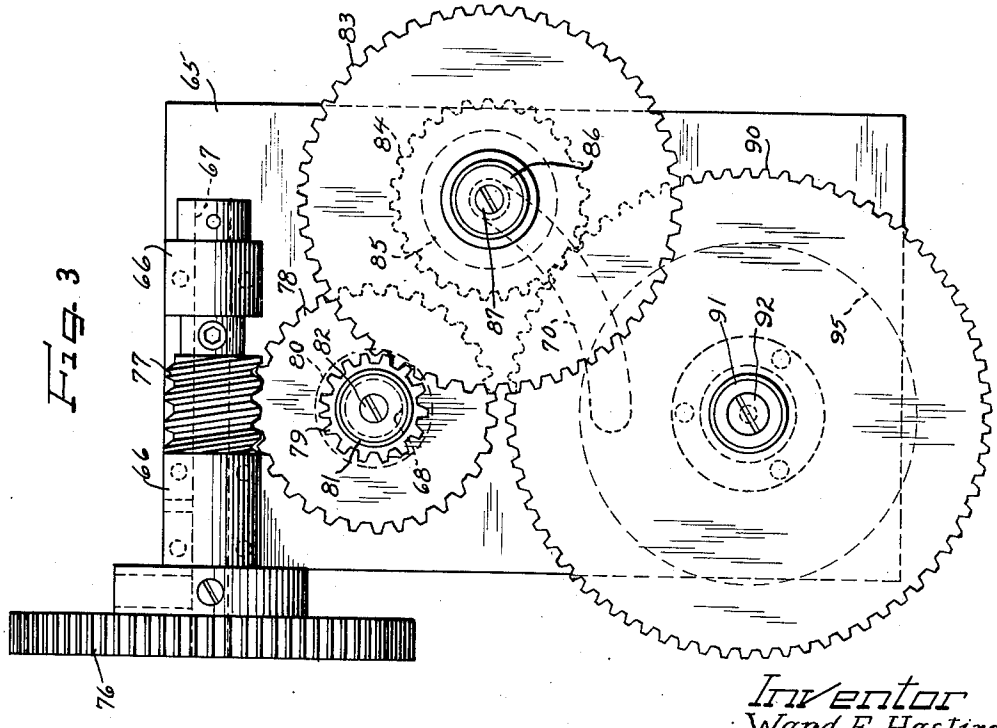


Fig. 3

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MECHANICAL COUNTING DEVICE

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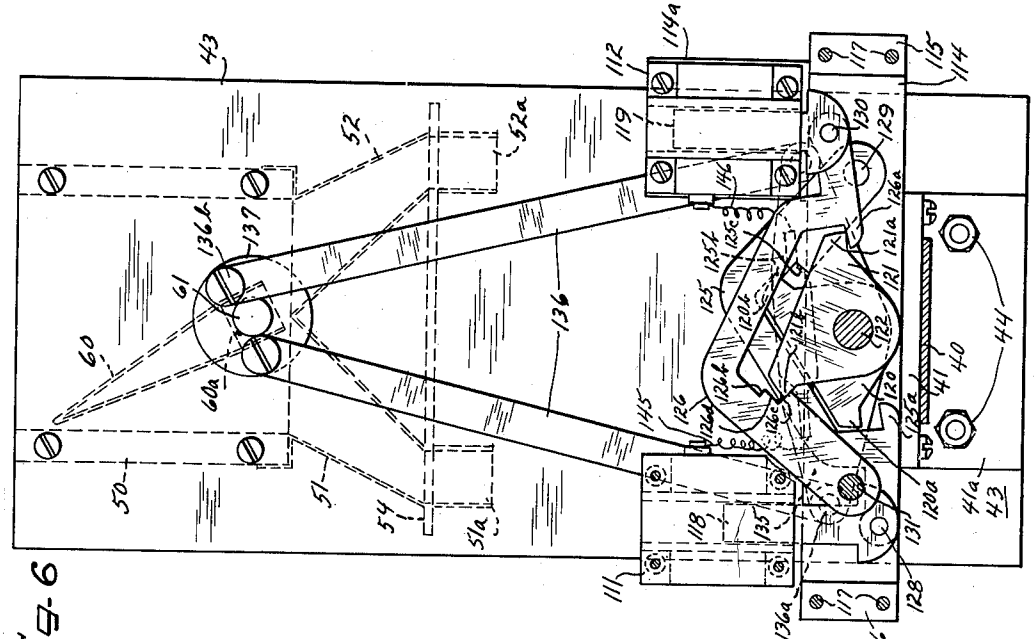


Fig-6

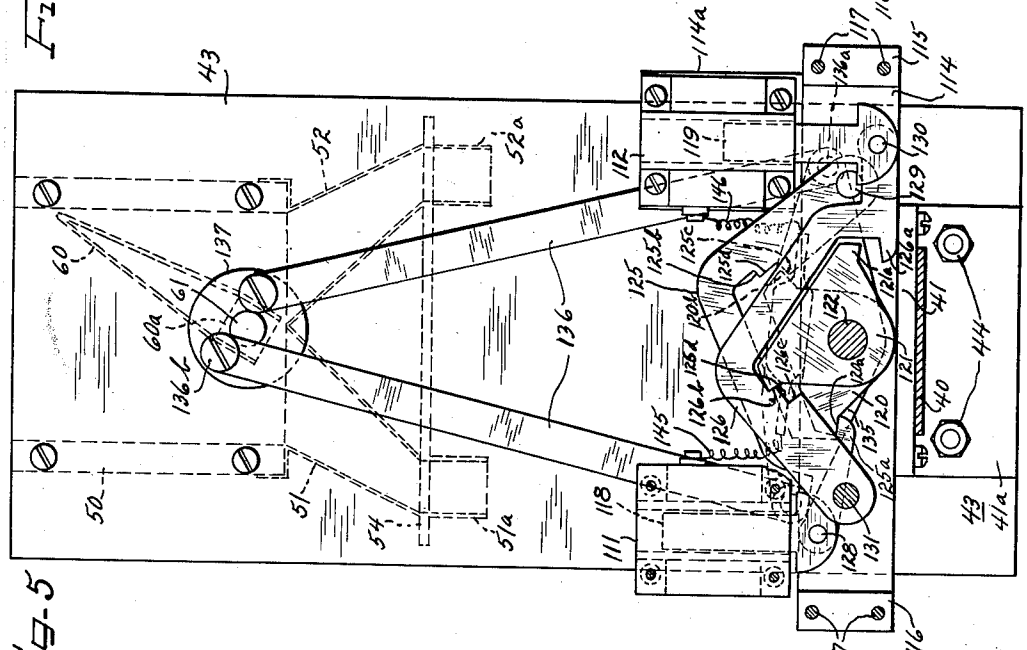


Fig-5

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Fig. 7

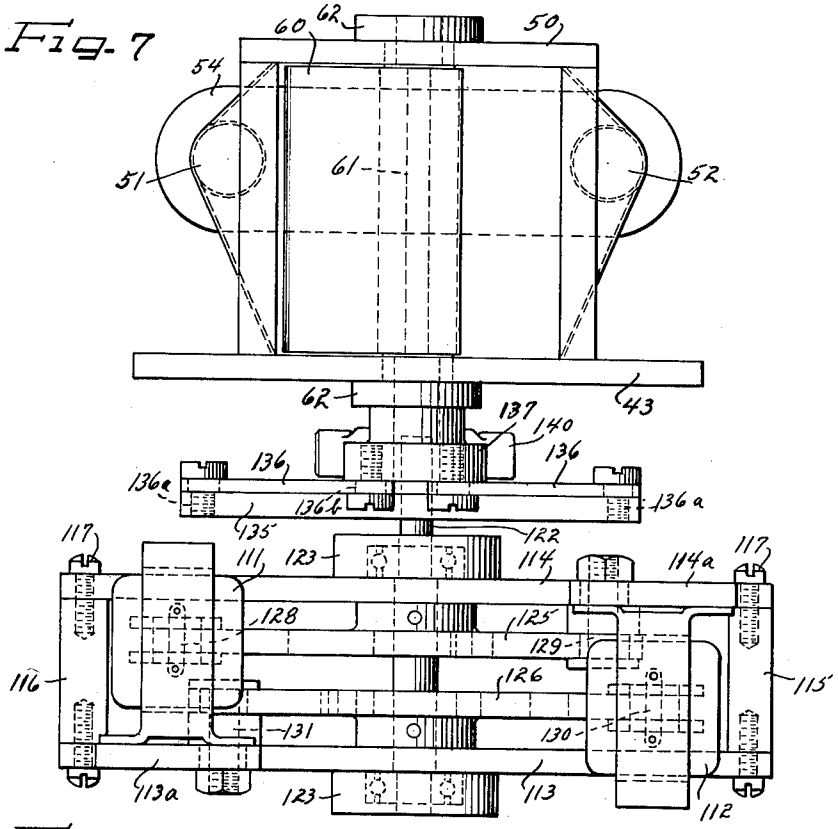
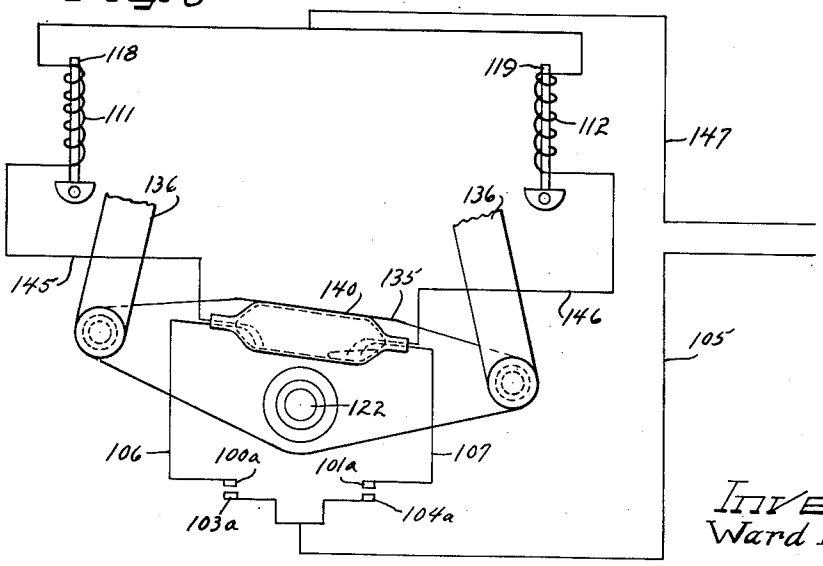


Fig. 8



Inventor
Ward E. Hastings

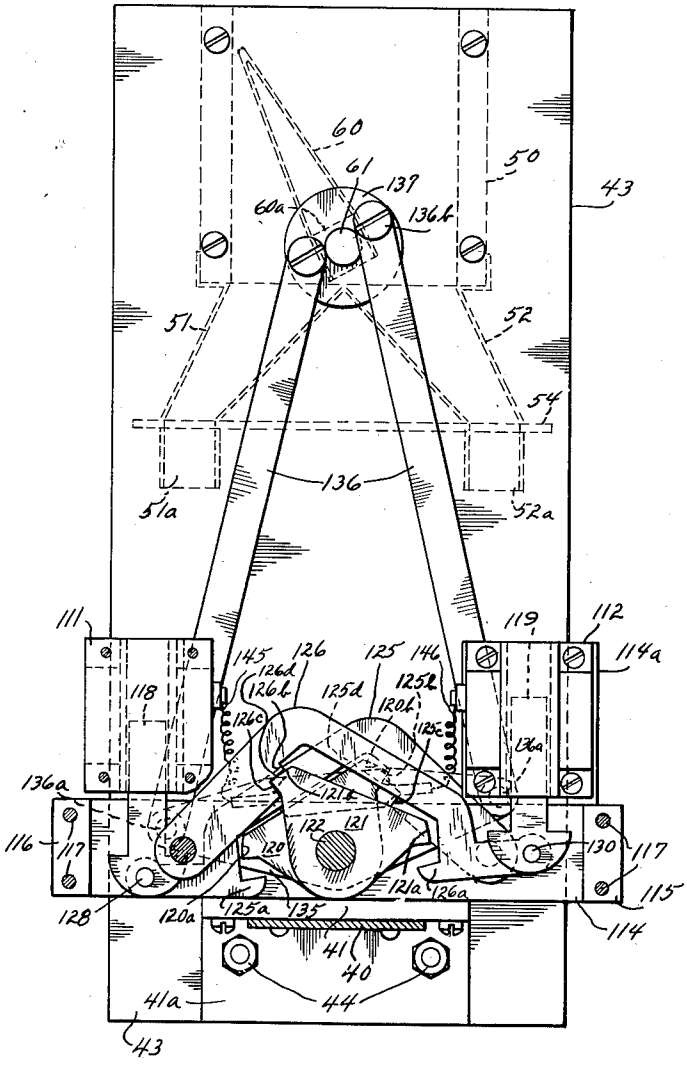
by The Firm of Charles G. Hill Attys

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Filed Aug. 16, 1946 6 Sheets-Sheet 6

Fig. 9



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ATTYS.

Patented Feb. 19, 1952

2,586,161

UNITED STATES PATENT OFFICE

2,586,161

MECHANICAL COUNTING DEVICE

Ward E. Hastings, Chattanooga, Tenn., assignor to The Chattanooga Medicine Co., Chattanooga, Tenn., a corporation of Tennessee

Application August 16, 1946, Serial No. 691,116

8 Claims. (Cl. 193—31)

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This invention relates to a device for the continuous subdivision and segregation into equal portions of particulate or other flowable material continuously delivered from a machine producing such material. A specific form of the device of the present invention is adapted for attachment to a rotary tablet press of conventional type for use in filling bottles or other receptacles with equal number of tablets produced by said press.

The device of the present invention comprises a chute or other conduit for receiving the products of a tablet machine or the like in the form of a stream of tablets or other particulate or flowable material. This chute is provided with a blade pivoted at one edge and located in said chute above a bifurcated channel leading to separate containers or receptacles. The blade is interposed in the path of the products or particles delivered from the tablet press or other producing device and, by reason of a periodic alternation in its angular position, acts to divert the product first to one channel and then to another, the channels delivering the product to suitable receptacles.

The blade is actuated by a mechanism including a drive gear connected directly to or driven directly from the main drive shaft or other moving part of a tablet press or the like. Said drive gear, in its turn, actuates a series of gears that finally actuate a cam shaft having a cam acting on pivoted contactors that operate to actuate two solenoids alternately. The snap action of the solenoids is transmitted through a link system into a sudden reversal of the angular position of the diverting blade pivoted within the chute.

Included within the train of gears connecting the initial drive gear with the gear attached to and driving the cam shaft is an exchangeable gear wheel turning on an idle stud movable in an arc so that gears of various sizes may be substituted to change the ratio of actuation without disturbing the operative connections between the various members of the gear train.

It is, therefore, an important object of the present invention to provide an adjustable measuring device adapted to be driven directly from a tablet press or the like or its source of power and capable of diverting the stream of products produced by said tablet press or the like alternately into each of two channels at intervals exactly synchronized with the delivery of the machine so as to subdivide said product into equal portions of any desired size deposited alternately at two stations.

Another important object of the present invention is to provide a measuring device adapted for use in any type of producing mechanism that delivers a continuous stream of particulate or other flowable material and capable of direct driven connection to said producing device by means including a gear train having one replaceable

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gear for adjusting the ratio of action, a cam operated by power transmitted through said gear train and effective through pivoted contactors to operate solenoids that, in turn, through a lever or link system, operate to vary the position of a pivoted blade disposed in the path of said stream so as to divert said stream alternately into either one of two channels whereby, with proper adjustment, equal deliveries of said product are effected alternately into each of said channels during successive periods.

Other and further objects and features of the present invention will become apparent from the following detailed description and appended claims taken in conjunction with the attached drawings which show, by way of example, a conventional tablet-making machine provided with a measuring device according to the present invention. More particularly:

Figure 1 is a fragmentary side elevational view, with parts shown in section, and other parts broken away, of a measuring device according to the present invention attached to a conventional tablet-making machine, only two sets of opposed upper and lower table punches being shown;

Figure 2 is a transverse horizontal cross-sectional view taken along the line II—II of Figure 1, with certain parts broken away and other parts shown in section otherwise than along the line II—II, and showing molds for a complete set of tablet punches;

Figure 3 is a greatly enlarged side elevational view taken along the line III—III of Figure 1 and showing one side of the gear train of the device of Figure 1 together with supporting means therefor;

Figure 4 is a greatly enlarged side elevational view taken along the line IV—IV of Figure 1, and showing the other side of gear train and a portion of the supporting means therefor;

Figure 5 is a greatly enlarged vertical cross-sectional view, with parts broken away, taken along the line V—V of Figure 1 and showing the lever or link system for actuating the above-mentioned pivoted blade in one operating position;

Figure 6 is a view similar to Figure 5 but showing the lever or link system in a different operating position;

Figure 7 is a greatly enlarged plan view taken along the line VII—VII of Figure 1 and showing the above-mentioned link system together with the chute and its pivoted blade;

Figure 8 is a wiring diagram of the electrical circuit of the device of Figure 1; and

Figure 9 is a view similar to Figures 5 and 6 but showing the lever or link system in still another operating position.

As shown in Figures 1 and 2, the structure there illustrated includes a tablet-press of conventional construction having a frame 10 supported by a base (not shown) and carrying a

table 11 having a stationary spindle 12 mounted thereon for supporting a rotating head generally indicated at 15. The latter is formed with a number of radially projecting rings or annular disks alternately superimposed with smaller rings or neck portions in between forming a structure of several stories and of diameters to suit the coacting mechanism. More particularly, the head 15 includes a lowermost worm gear 15*a* axially apertured around its periphery to receive vertically reciprocating lower tablet punches 16; a constricted portion 15*b* formed with peripheral grooves 15*c* permitting reciprocation of the lower punches 16; a middle portion 15*d* of greater diameter holding tablet molds 17; a constricted portion or neck 15*e*; and an uppermost portion 15*f* of greater diameter axially apertured around its periphery to receive the vertically reciprocating upper tablet punches 18. The spindle 12 projects above the upper portion 15*f* of the head 15 and carries above the latter a collar 20 having a cam ring 21 fitting grooves 18*a* in the upper punches 18 to reciprocate the latter vertically as the head 15 is rotated. A cam track 22 is provided on top of the table 11 to reciprocate the lower tablet punches 16 as the head 15 is rotated.

Powdered material is fed into the molds 17 and there compressed between the punches 16 and 18 to form tablets which are then ejected upwardly by the lower tablet punches 16 while the upper tablet punches 18 are withdrawn upwardly. The ejected tablets are collected at a fixed point in the rotation of the head 15 by means including a gutter 25 (supported by a bracket 26 from the table 11) provided with a finger 27 projecting in over the mold-carrying head part 15*d* to intercept the ejected tablets and cause them to pass over the gutter 25 and to fall into a chute 28 having a screened bottom 28*a* for separating dust from the finished tablets.

The head 15 is driven from a shaft 30 by means of a worm 31 meshing with the worm gear 15*a*. The shaft 30 may be journaled in bearings 32 supported by suitable means (not shown) from the frame 10 and may receive its power from any suitable source, for instance, through a pulley and belt assembly 33.

It will be apparent that in the above-described conventional tablet press the rate of flow of tablets through the chute 28 is directly proportional to the speed of rotation of the driving shaft 30.

As best shown in Figure 1, that portion of the present device operative to effect the actual segregation of the stream of tablets falling through the chute 28 into equal portions is supported from the base 10 by means of a horizontally extending bracket 40; a plate 41 affixed to the top of the plate 40 and having an outer depending flange 41*a*; another horizontally extending plate 42 having an inner depending flange 42*a* opposed to but spaced from the other depending flange 41*a*; and a vertically extending plate 43 projecting above the two plates 41 and 42 and clamped between the depending flanges 41*a* and 42*a* by a bolt and nut 44.

As shown in Figures 1 and 2, the pressed tablets fall from the chute 28 into a box 50 affixed to the outside of the upper end of the plate 43. The box 50 terminates downwardly in two divergent funnels 51 and 52 terminating in spouts such as 52*a* each adapted to discharge into a separate container such as a bottle 53

disposed on the plate 42. A plate 54 serves to rigidify and hold apart the funnels 51 and 52.

The stream of tablets falling through the chute 28 into the box 50 is alternately diverted into either one of the funnels 51 and 52 by knife blade 60 having its lower edge pivotally disposed at the bottom of the box 50 between the openings into the two funnels 51 and 52 (see Figures 5, 6, and 9). More particularly, the knife blade 60 is formed of sheet metal or the like bent back upon itself into narrow V-shape and provided with cross pieces 60*a* across both ends of the V-shaped, otherwise open sides of the knife blade. The cross members 60*a* are attached to a rock shaft 61 projecting through suitable apertures on both sides of the box 50 and journaled in bearings 62 affixed to the outside of the box 50. On that side of the box 50 turned toward the tablet press, the shaft 61 projects beyond its journal 62.

Means are described hereinbelow for synchronizing the pivoting of the knife blade 60 with the production of tablets by the tablet press, so that an equal number of tablets will alternately be diverted into the two funnels 51 and 52 by the blade 60. These means include a train of gears (see Figures 1 to 4) supported from the frame 10 in spaced relationship thereto by a vertical plate 65 having a horizontal portion 65*a* attached to the table 11. The outer upper margin of the plate 65 is provided with aligned bearings 66 for journaling a shaft 67 extending in parallelism with the upper edge of the plate 65. Below the space between the two bearings 66, an idle stud shaft 68 projects from the plate 65 on the same side as the bearings 66. Near the lower margin of the plate 65, and more or less in vertical alignment with the interspace between the bearings 66 and the stub shaft 68, still another stub shaft 69 projects from both sides of the plate 65. To the right of its two shafts 68 and 69 and at an intermediate level, the plate 65 is pierced by an arcuate slot 70 for movably receiving an idle stub shaft 71. The slot 70 is everywhere concentric with the shaft 68, so that the shaft 71 will always be at the same distance from the shaft 68.

Referring now to Figures 1 and 2, it will be noted that adjacently the pulley 33 the main shaft 30 is provided with a gear wheel 75 meshing with a gear wheel 76 attached to an end of the shaft 67 projecting beyond the plate 65, for driving the shaft 67 from the main shaft 30. As shown in Figures 2 to 4, a worm 77 is affixed to the shaft 67 between the bearings 66 and drives a worm gear 78 rotating on the shaft 68 and having a hub 78*a* for spacing the gear from the plate 65. The worm gear 78 is integrally united to a smaller gear wheel 79 by means of a collar 80, which, along with the gear wheel 79, is free to rotate on the shaft 67. The unit formed by the worm gear 78, its hub 78*a*, the collar 80, and the gear wheel 79 is held on the shaft 68 by means of a cap 81 affixed to the end of the shaft 68 by a screw 82.

The gear wheel 79 meshes with a gear wheel 83 rotatable on the shaft 71 and united to a smaller gear wheel 84 through a collar 85 integral with the gear wheels 83 and 84. A cap 86 holds the unit formed by the collar 85, the two gear wheels 83 and 84, and a hub 84*a* for the gear wheel 84 (for spacing the latter from the plate 65) on the shaft 71, being attached to the free end of the shaft by means of a screw 87. The slot 70 being concentric with the shaft 68, the shaft 71 can be moved along the slot without loss

of meshing engagement between the gear wheel 79 and the gear wheel 83. Suitable means 88 are provided for clamping the shaft in any desired position in the slot 70.

The shaft 69 has removably attached thereto a gear wheel 90 meshing with the gear wheel 84. The gear wheel 90 may have any desired number of teeth, depending upon the frequency required for actuation of the pivoted blade 60. The gear wheel 90 is spaced from the plate 65 by a hub 98 and held on the shaft 69 by a cap 91 and a screw 92.

Means for translation of rotation of the shaft 69 into pivoting movement of the blade 60 includes a contact mechanism. More particularly, the shaft 69 projects through the plate 65 away from the gear wheel 90 to actuate a contact mechanism on the other side of the plate 65 as best illustrated in Figure 4. As shown in the latter figure, and also in Figure 1, the contactor mechanism is enclosed within a generally circular housing 95 open on one side and having on the other side a fixed bottom portion 96 (of electrically insulating material) in the form of a sector of a circle approaching a semicircle in size. This sector rests upon and is connected to a hub-like housing portion 97 that spaces the sector from the plate 65 and is formed so as to accommodate freely the projecting end of the shaft 69. An insulating plate 98 of the same shape as the plate 96 is angularly movable in the bottom of the housing 95 opposite the plate 96. The plate 96 carries a fixed contact bracket 100 having a contact point 100*a*, while the plate 98 carries a fixed contact bracket 101 having a contact point 101*a*. A cam 102 is carried by the free end of the shaft 69 and is capable of moving over the corner margins of the plates 96 and 98 to actuate successively, on rotation, a pivoted contactor 103 on the plate 96 having a contact point 103*a* adapted to coact with the contact point 100*a* and another pivoted contactor 104 on the plate 98 having a contact point 104*a* adapted to coact with the contact point 101*a*. The shape of the cam 102 is such that, on rotation, the cam will cause one pivoted contactor to close and then to break one electrical circuit and thereafter cause the other contactor to close and break another circuit. Further, the cam is so shaped as to permit rotation in both directions.

The two contactors 103 and 104 are both connected in series to one electrical conductor wire 105 through flexible conducting means 103*b* and 104*b*, respectively, while the two contactors 100 and 101 are connected, respectively, to electrical conductor wires 106 and 107. The wires 105, 106, and 107 enter the housing 95 through a conduit 108.

The separation of the positions at which the pivoted contactors 103 and 104 just close or effect electrical contact is theoretically 180° angularly about the cam 102, but actually this position may not give exactly equal intervals of operation of the measuring mechanism. For this reason, the plate 98 can be angularly adjusted (to effect the segregation of exactly equal amounts by the measuring mechanism) and held in adjusted position, as by a finger 109*a* projecting in over the plate 98 from the housing 95 and carrying a screw 109.

Wires 110 lead from the contactors within the housing 95 to a mechanism for pivoting the blade 60 including solenoids 111 and 112 affixed, respectively, to upwardly projecting portions 113*a* and 114*a* of vertical plates 113 and 114 (see Figures 5 to 7 and 9) having their lower edges fixedly resting on the plate 41. The plates 113 and 114 are connected at their ends by means of cross plates 115 and 116 held together by screws 117 to form an elongated rectangular framework parallel with the plate 43. The solenoids 111 and 112 straddle the two ends of this framework, and the solenoid cores 118 (of solenoid 111) and 119 (of solenoid 112) are free to reciprocate downwardly below the solenoid coils into the interspace between the bars 113 and 114.

The solenoids 111 and 112 actuate a rock shaft 122 extending through the middle of the plates 113 and 114 and journaled in bearings 123 on the outside of said plates. More particularly, the rock shaft is actuated through an interlocking link system (shown in Figures 5 to 7 and 9) including two irregularly contoured members 120 and 121 extending in parallelism between the plates 114 and 113 and keyed to the shaft 122 and an upwardly bent elbow-shaped link 125 overlying the member 120 together with another upwardly bent elbow-shaped link 126 overlying the member 121. One end of the link 125 is pivotally connected to the solenoid core 118 at 128, while the other end of the link 125 pivots on a stub shaft 129 attached to the plate 113. One end of the link 126 is pivotally connected to the solenoid core 119 at 130, while the other end pivots on a stub shaft 131 attached to the plate 113. Thus, when the solenoid 112 is energized, the solenoid core 119 moves upward carrying with it that end of the link 126 pivotally attached to the core 119, while the other end of the link 126 pivots about the shaft 131. When the solenoid 111 is energized, the solenoid core 118 moves upward, carrying with it that end of the link 125 pivotally connected to the core 118, while the other end of the link 125 pivots about the shaft 129.

The link 126 is formed on the right lower side with a projecting spur 126*a* capable on upward movement of the link of engaging a spur 121*a* on the member 121. The other lower side of the link 126 is formed with an upper shoulder 126*b* and a lower shoulder 126*c* separated by a surface 126*d* which shoulders are adapted to engage a spur 121*b* extending from the member 121 in the opposite direction from the spur 121*a*. The other member 120 and link 125 are shaped similarly to the member 121 and the link 126. Thus, the member 120 is formed with spurs 120*a* and 120*b*, while the link 125 is formed with a spur 125*a* and shoulders 125*b* and 125*c* separated by a surface 125*d* as described in connection with the other member 120 and link 125.

The coaction between the solenoid 112 with the core 119, the link 126, and the member 121 will become apparent from an inspection of Figures 5, 6, and 9. Figure 5 shows the solenoid core 119 withdrawn from the solenoid 112, the lower right-hand end of the link 126 resting on the plate 41, and the member 121 tilted over to the right with the spur 121*b* resting on the shoulder 126*b*. When the solenoid core 112 is energized, the link 126 pivots around the shaft 131, the link end pivoted to the core 119 at 130 being raised. During the initial rise of the right-hand end of the link 126 (before the spur 126*a* engages the spur 121*a*) only the link is lifted, and the shoulder 126*b* is lifted away from the spur 121*b*, to permit tilting of the member 120*a* to the left on further upward movement of the link 126. Such further upward movement of the link effects engagement of the spur 126*a* with the spur 121*a*, with a consequent tilting of the member 121 to

the left so that the spur 121*b* comes to rest against the shoulder 126*c*, as shown in Figure 6. It will be noted that in this position, the member 121 is locked within the link 126. When the solenoid 112 is de-energized, the core 119 and the link 126 drop down into the position shown in Figure 9 wherein the spur 121*b* still rests on the shoulder 126*c*, but the terminal surface of the spur 121*b* now rests against the surface 126*d* between the two shoulders 126*b* and 126*c*, thus holding the member 121 against leftward movement. When the other link 125 (actuated by the solenoid core 118) goes through the same cycle of movements, shaft 122 is tilted to the right, carrying with it the member 121. Then the spur 121*b* slides over the surface 126*d* and is seated against the shoulder 126*b* as the link 126 descends to the position shown in Figure 5.

It will be noted that the above-described members 120 and 121 together with links 125 and 126 form an interlocking device serving as an actuating means between the solenoids 111 and 112 and the shaft 122, to insure snap actuation of the shaft 122, to lock the members 120, 121 and the links 125 and 126 together when not actuated by the solenoids, and to eliminate all oscillation of the shaft 122 when the solenoids are not actuated.

The shaft 122 carries, outside the plate 113 and the bearing 123 attached thereto, a generally horizontal rocking arm 135. Links 136 have their lower ends pivotally connected at 136*a* to the ends of the rocker arm 135 and their upper arms pivotally connected at 136*b* to a crank 137 affixed to the free end of the shaft 61 projecting through the box 50 and the plate 43.

Each solenoid 111 and 112 has one terminal connected to one end of a tilt-type mercury switch 140 disposed on the upper surface of the rocking arm 135, so that the contactors, in making contact, pass the current through the mercury switch to the solenoids. As the solenoid is energized, the linkage previously described tilts the mercury switch and immediately breaks the contact to release the solenoid while the contactors are still in contact in their respective positions. Thus the provision of the tilt-type mercury switch permits the use of a slow moving cam to make contact, the breaking of the circuits being made rapidly. As a result, the contact points are assured of long life, no large sparks are formed on opening of the contacts, the solenoids are energized only for a short period of time, and the wear of the mechanism will be minimized, being effected solely by the slowly moving cam.

The electrical circuit is shown diagrammatically in Figure 8 as including a wire 105 connected to the one pole of a source electricity (not shown) and branching out to the contact points 103*a* and 104*a* which are thus connected in parallel. From the contact point 100*a* cooperating with the contact point 103*a*, a wire 106 leads to one end of the mercury switch 140, while another wire 107 leads from the contact point 101*a* cooperating with the contact point 104*a* to the other end of the mercury switch 140. In the latter, current can flow through the mercury (when the switch is tilted to the left) from the wire 106 to a wire 145 (of which the coil for the solenoid 111 is a part), while current can flow through the mercury (when the switch is tilted to the right, as shown in Figure 8) from the wire 107 to a wire 146 (of which the coil for the solenoid 112 is a part). Both the wires 145 and 146 are connected to a wire 147 leading to the other pole of said source of electric power.

It will be noted that the pivoting of the blade 60 is strictly synchronized with the production of tablets in the tablet press, for the shaft 30 driving the tablet press also drives the mechanism actuating the blade 60 and including, in sequence, the gear wheel 76 (driven by the gear wheel 75 on the shaft 30), the shaft 67, the worm 77, the worm gear 78, the gear wheel 79, the gear wheel 83, the gear wheel 84, the gear wheel 90, the shaft 69, the cam 102 actuating alternately the pivoted contactors 103 and 104 to energize alternately the solenoids 111 and 112 that alternately rock the shaft 122 in opposite directions through the agency of the links 125 and 126 and the pivot members 120 and 121, the rock arm 135 (affixed to the shaft 122), the links 136, the crank 137 and finally the rock shaft 61 on which the blade 60 is fixed. The rate of actuation of the pivoted blade is determined by the ratios of the various gears ahead of the cam 102, for the rate of revolution of this cam determines how often the solenoids are energized to actuate the link system serving to pivot the blade 60. This ratio of actuation can be varied by substituting various gear wheels 90 having different numbers of teeth. Note that the shaft 71 can be adjusted in various positions in the slots 70 so that the gear wheel 84 can mesh with various gear wheels 90 of different sizes without disturbing the meshing engagement between the gear wheel 82 and the gear wheel 83.

An example is given as follows of the method of calculating the ratio of actuation of the pivoted blade for a gear wheel 90 having a given number of teeth.

If there are sixteen tablet molds 17 in the head portion 15*d* and the latter includes a gear wheel 15*a* having 52 teeth which in turn is driven by a triple-thread worm 31, then the main shaft 30 will make 52:3=17⅓ revolutions while sixteen tablets are being produced or 52 revolutions while 48 tablets are being produced. If the gear wheel 75 on the shaft 30 has 48 teeth, and if the gear wheel 76 on the shaft 67 has 52 teeth, the shaft 67 will rotate 48 times while 48 tablets are being produced, which makes the ratio one tablet for each revolution of the shaft 67.

If the worm 77 on the shaft 67 is a single-thread worm driving a 50-tooth worm wheel 78 rotating as one with a 25-tooth gear wheel 79 driving a 100-tooth gear wheel 83 rotating as one with a 50-tooth gear wheel 84 in turn driving an exchangeable gear wheel 90 having a permissible minimum of 25 teeth and a permissible maximum of 125 teeth, we find that for the minimum and maximum number of teeth in the gear wheel, the ratios are, respectively, as follows:

$$\frac{1\times25\times50}{50\times100\times25}=\frac{1}{100}$$ revolutions of change gear per tablet

$$\frac{1\times25\times50}{50\times100\times125}=\frac{1}{500}$$ revolutions of change gear per tablet

Since electrical contact occurs twice for each revolution of the shaft 69 on which the exchangeable gear 90 is mounted, and since such contact is the point of origin of the actuation of the pivoting means for the blade 60, it follows that for the exchangeable gear having 25 teeth, the number of tablets produced between alternations in position of the blade 60 will be 100:2=50, while for a gear wheel 90 having 125 teeth the number of tablets produced between alternations in position of the blade 60 will be 500:2=250.

Further changes may be made by altering the ratios between, for instance, 75 and 76. For in-

stance, if gear 76 has 104 teeth instead of 52, the tablet counts for each alternation in position of the blade 60 will be doubled so that an exchangeable gear having 25 teeth would count 100 tablets and an exchangeable gear 90 having 125 teeth would count 500 tablets.

It is also possible to use a wide-faced exchangeable gear 90 meshing with the gear 83 instead of with the gear 84 in which case the count (with the gear 76 having 104 teeth) would be 50 tablets per alternation when the gear 90 has 25 teeth. It will thus be seen that various means may be employed to obtain actuation of the electrical circuit at proper intervals, without sacrificing precise equalization of segregated quantities.

Accuracy of counting depends not only on precise timing of the pivoting of the blade 60 but also on the type of interruption of the stream of falling particles or other flowable material. The manner of interruption is important because in the stream of falling particles, particularly when the falling particles are relatively large, the particles tend to react irregularly when impinging upon any surface in their path, certain particles tending to bounce one way and other particles tending to bounce another way. It is apparent that the surface presented to such impingement at the moment when the blade 60 pivots should be as small as possible, and that the time within which such impingement could possibly occur should be as short as possible. It is for this reason that I have provided a thin relatively sharp-edged blade pivoted at its lower edge and capable of cutting rapidly through the stream of falling particles to provide a sharp cut-off point separating those particles which have been travelling in one direction from particles which are to travel in the other direction. In this connection, attention is directed to the operation of the solenoid-link system that actually effects pivoting of the blade 60. Note that when, for instance, the solenoid core 119 is energized to lift the link 126, the initial movement of the link 126 (up to the point where the spur 126*a* engages the spur 12 *a* from below) involves only overcoming the weight of the link 126 and the core 119 which permits rapid acceleration. Further upward movement of the link 126 under the influence of the core 119 is resisted only by friction, for the tilting of the member 121 and the lifting of the link 126 rock the shaft 122 permits the link 125 and the core 118 to drop and permits the member 120 to tilt. Hence, the link or lever system snaps quickly from one position to another to tilt the blade 60 to divert the falling tablets from one funnel to another. Further, at the termination of each solenoid action, the spurs 120*b* and 121*b* (pointing in opposite directions) rest, respectively, on the shoulders 125*b* and 126*c* to lock the shaft 122 against oscillation and prevent bouncing of the blade 60. Note also that as the rocker arm 135 is tilted when one of the solenoids is energized, the mercury switch 140 on the rocker arm tilts therewith, thus breaking the circuit energizing the solenoid as soon as the solenoid has moved a predetermined distance. This action occurs rapidly and permits only a brief flow of current upon the closing of the electrical circuit by one of the pivoted contactors. There is, therefore, no tendency to arcing or burning at the contactors, which might give rise to faulty action.

Many details of construction may be varied within a wide range without departing from the principles of this invention and without sacrificing the advantages mentioned hereinabove,

and it is therefore not my purpose to limit the patent granted on this invention otherwise than necessitated by the scope of the appended claims.

I claim as my invention:

1. In a mechanical counting device for particulate material, a box-like structure having vertically extending lateral walls defining a main flow channel for receiving a stream of said particulate material, means for delivering said particulate material to said main flow channel during normal operation of the device, means moving proportionally to the delivering means, V-shaped means closely adjacent the lower extremity of the box-like structure dividing said main flow channel into two separate flow channels, a rock shaft journaled in opposed lateral walls of said box-like structure adjacent the lower extremity of the box-like structure and projecting externally of the box on one side, a sharp-edged blade secured to said rock shaft within said box-like structure, a crank on said rock shaft externally of the box-like structure, a system of levers acting on said crank to move said blade first against one and then against the other of said lateral walls, solenoids for actuating said lever system, and means responsive to said proportionally moving means to actuate said solenoids in synchronization with said moving means.

2. In a mechanical counting device for particulate material, a conduit receiving a main stream of said material bifurcated so as to be capable of delivering streaming material into either one of two channels, a pivoted blade disposed in said conduit above the point of bifurcation so as to be capable of diverting said stream into either one of said two channels, means for pivoting said blade including a rock shaft, means for translating tilting movement of said rock shaft into tilting movement of said blade, a lever system for operating said rock shaft including first and second lever means for alternately tilting said shaft, respectively, in a first angular direction and in a second and opposite angular direction, said first lever means being capable of locking said shaft against any tilting at the moment of termination of said tilting movement and of holding said rock shaft against tilting in said second direction before initiation and after termination of said tilting movement, and separate electrical means for actuating said first lever means and said second lever means.

3. In a mechanical counting device for particulate material, a conduit for receiving a main stream of said material bifurcated so as to be capable of delivering streaming material into either one of two channels, a pivoted blade disposed in said conduit above the point of bifurcation so as to be capable of diverting said stream into either one of said channels, means for pivoting said blade including a rock shaft, means for translating tilting movement of said rock shaft into tilting movement of said blade, a lever system for operating said rock shaft including first and second lever means for alternately tilting said shaft through a limited arc, respectively, in a first angular direction and in a second and opposite angular direction, said first lever means being capable of locking said shaft against any tilting at the moment of termination of said tilting movement of said rock shaft and of holding said rock shaft against tilting in said first direction before initiation and after termination of said tilting movement, said second lever means being capable of locking said shaft against any tilting at the moment of termination of said tilt-

ing movement and of holding said rock shaft against tilting in said second direction before initiation and after termination of said tilting movement, separate electrical means for actuating said first and said second lever means, and switch means actuated by said rock shaft for terminating the actuation by said electrical means of said two lever means when said rock shaft has been tilted over a predetermined arc in said first angular direction and in said second angular direction.

4. In a mechanical counting device for particulate material, a conduit for receiving a main stream of said material bifurcated so as to be capable of delivering streaming material into either one of two channels, a pivoted blade disposed in said conduit above the point of bifurcation so as to be capable of diverting said stream into either one of said two channels, means for pivoting said blade including a rock shaft, means for translating tilting movement of said rock shaft into tilting movement of said blade, first and second rocker members on said rock shaft, first and second one-armed levers overlying, respectively, said first and said second rocker and pivoted, respectively, one on each side of said rock shaft, said levers being capable on upward movement of tilting said rockers over a predetermined limited arc toward the pivoted ends of said levers and of locking said rockers against tilting in any direction at the moment of termination of said upward movement, said levers further being capable of holding said rockers against tilting in the direction of the pivoted ends of said levers before initiation and after termination of upward movement of said levers, separate electrical means for actuating said first and second levers, and switch means actuated by the tilting of said rock shaft to terminate the action of said electrical actuating means when said rock shaft has been tilted by either one of said levers through said predetermined arc.

5. In a mechanical counting device for particulate material, a conduit for receiving a main stream of said material bifurcated so as to be capable of delivering streaming material into either one of two channels, a pivoted blade disposed in said conduit above the point of bifurcation so as to be capable of diverting said stream into either one of said two channels, a lever system for pivoting said blade alternately in opposite angular directions to divert said stream alternately into said two channels, electrical means for actuating said lever system, and switch means operated by said lever system for terminating the action of said electrical actuating means when said blade has pivoted through a predetermined arc in either one of said angular directions.

6. In a mechanical counting device for particulate material including a conduit for receiving a main stream of said material bifurcated so as to be capable of delivering streaming material into either one of two channels and a pivoted blade disposed in said conduit above the point of bifurcation so as to be capable of diverting said stream into either one of said two channels and a lever system for pivoting said blade to divert said stream alternately into said two channels and electrical means for actuating said lever system, a mechanical timing means for said electrical actuating means including a gear train with adjustable ratio of action adapted to be synchronized with the delivery of said main stream whereby a delivery of a predetermined amount of said product is effected into each of said channels at alternate periods.

7. In a mechanical counting device for particulate material including a conduit for receiving a main stream of said material bifurcated so as to be capable of delivering streaming material into either one of two channels and a pivoted blade disposed in said conduit above the point of bifurcation so as to be capable of diverting said stream into either one of said two channels and a lever system for pivoting said blade to divert said stream alternately into either of said two channels and electrical means for actuating said lever system, a timing means for said electrical actuating means including first switch means for initiating operation of said electrical means, a rotatable cam for actuating said first switch means, a second switch operated by said lever system for terminating operation of said electrical means, and mechanical means for rotating said cam adapted to be synchronized with the delivery of said main stream whereby delivery of said product is effected into each of said channels at alternate periods.

8. In a mechanical counting device for particulate material including a conduit for receiving a main stream of said material bifurcated so as to be capable of delivering streaming material into either one of two channels and a pivoted blade disposed in said conduit above the point of bifurcation so as to be capable of diverting said stream into either one of said two channels and wherein timing means synchronized with the delivery of said main stream of material is utilized for actuating the blade to effectuate delivery of said material into each of said channels at alternate periods, means adapted for pivoting said blade including a rock shaft, means adapted for translating tilting movement of said rock shaft into tilting movement of said blade, first and second rocker members on said rock shaft, first and second one-armed levers overlying, respectively, said first and second rocker members and pivoted, respectively, one on each side of said rock shaft, said levers being capable on upward movement thereof of tilting said rocker members over a predetermined limited arc toward the pivoted ends of said levers and locking said rocker members against tilting in any direction at the moment of termination of said upward movement, said levers further being capable of holding said rocker members against tilting in the direction of the pivoted ends of said levers before initiation and after termination of upward movement of said levers, and electric means controlled by said timing means for actuating said first and second levers.

WARD E. HASTINGS.

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