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2,428,103

BULLET HANDLING APPARATUS

Filed Jan. 21, 1943

3 Sheets-Sheet 1

FIG. 1

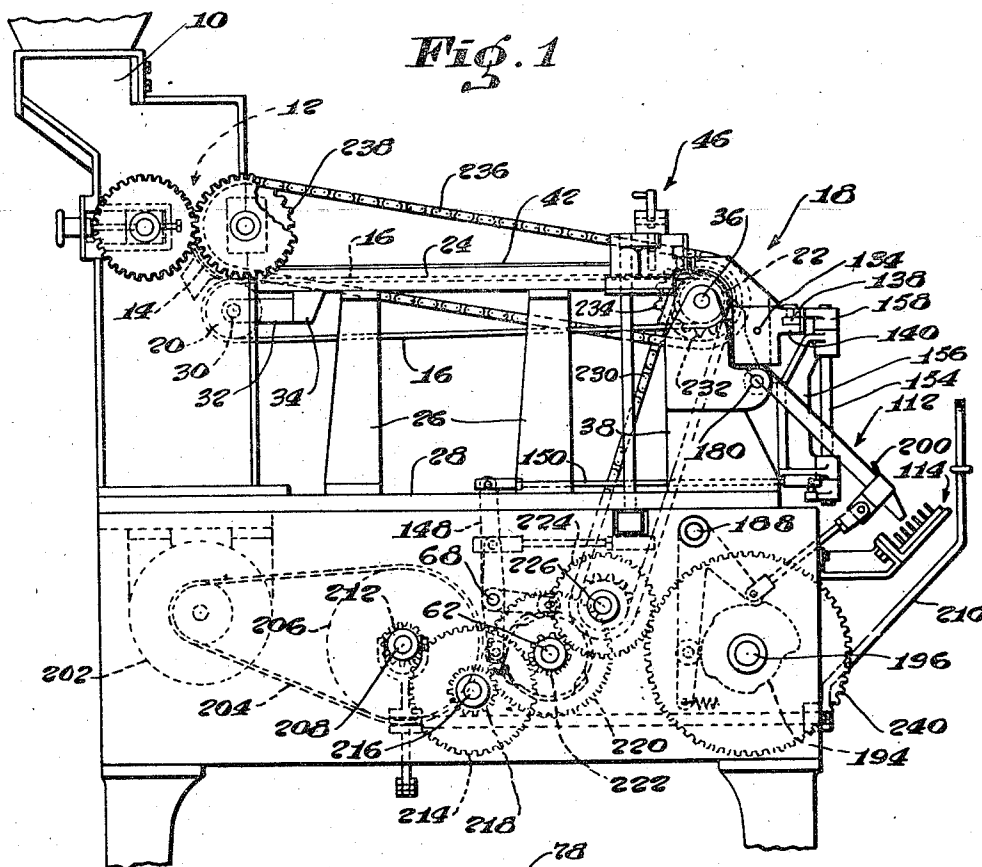
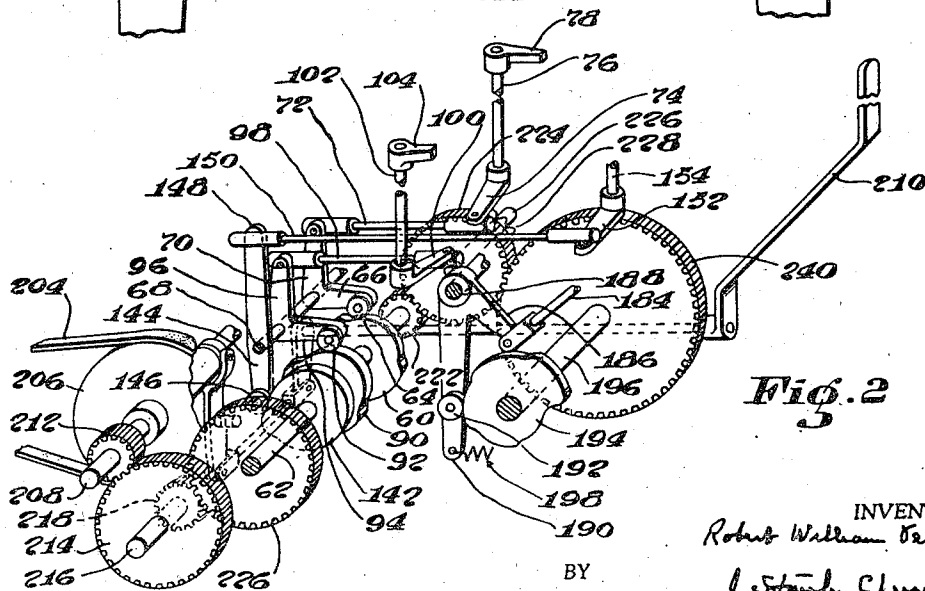


FIG. 2

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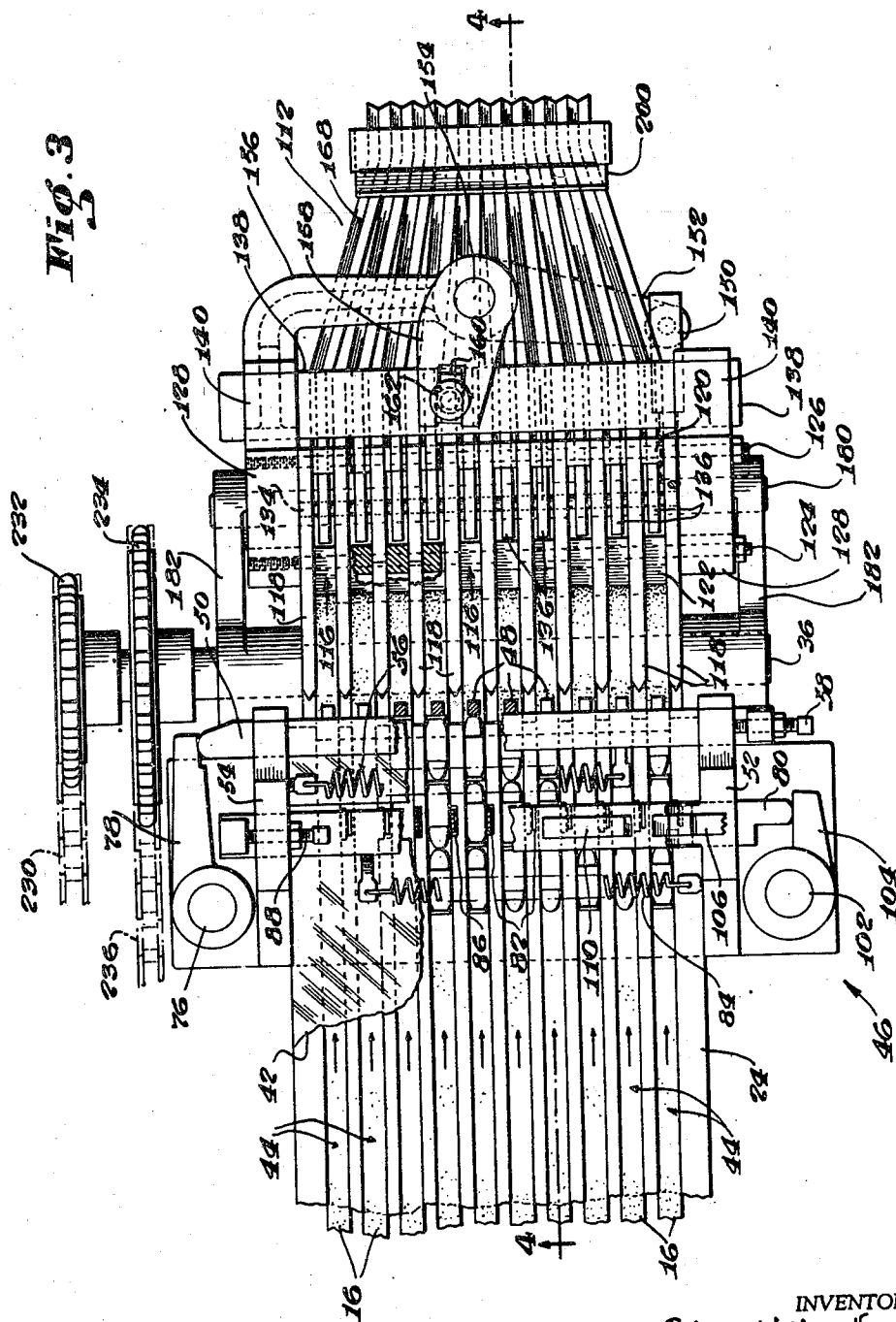
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3 Sheets-Sheet 2



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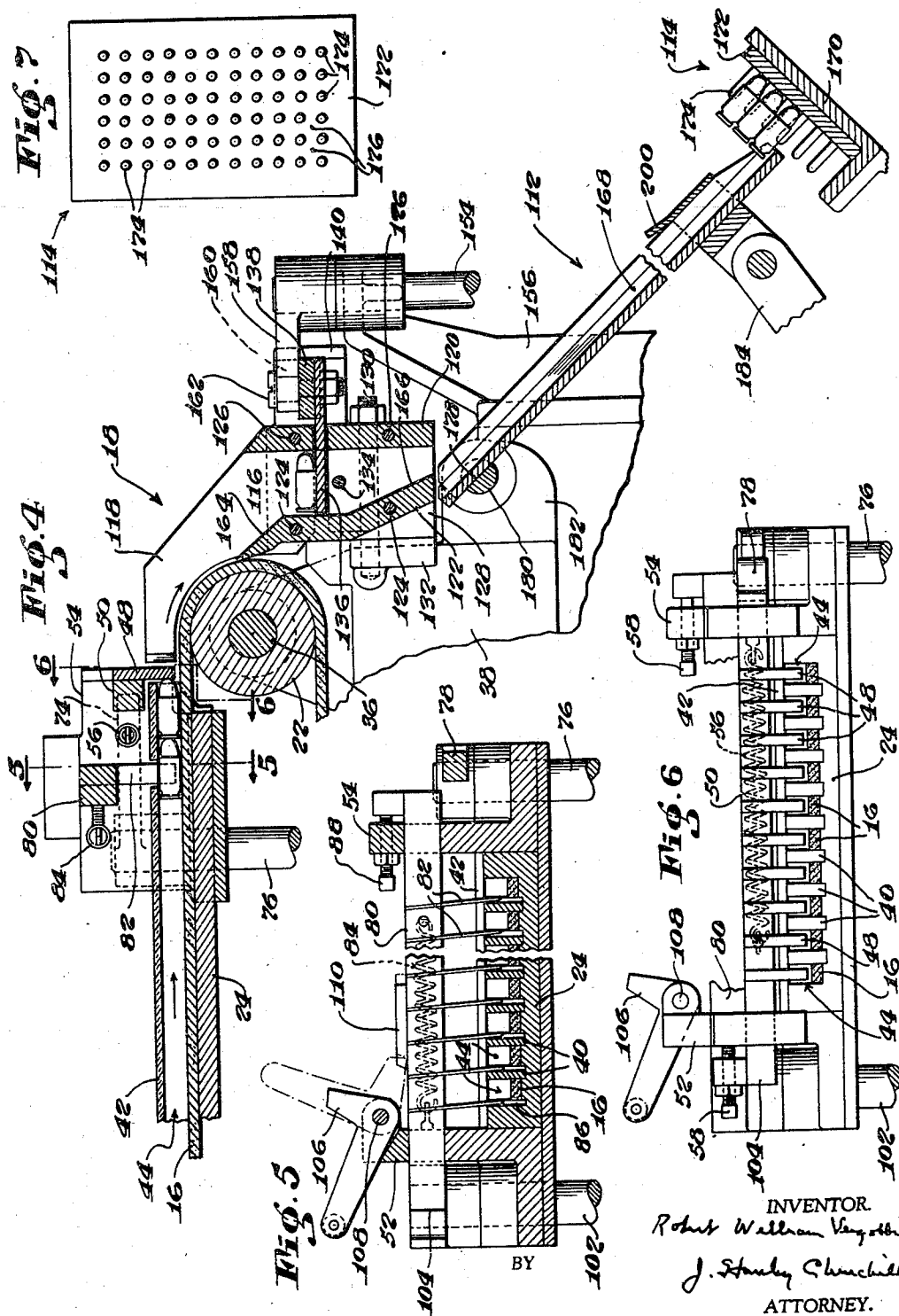
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Filed Jan. 21, 1943

3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE

2,428,103

BULLET HANDLING APPARATUS

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Application January 21, 1943, Serial No. 473,091

6 Claims. (Cl. 86—47)

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This invention relates to apparatus for handling bullets and similar elongated objects.

The invention has for an object to provide novel and improved apparatus for handling bullets or the like, of the type having provision for withdrawing the bullets from a bulk supply thereof to form a plurality of elongated rows of bullets and in which provision is made for orienting the bullets in a novel and improved manner to cause them to extend in the same general direction to facilitate packing thereof.

With this general object in view and such others as may hereinafter appear, the invention consists in the bullet handling apparatus and in the various structures, arrangements and combinations of parts hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention, Fig. 1 is a side elevation of bullet handling apparatus embodying the present invention; Fig. 2 is a perspective view illustrating the driving mechanism for the present apparatus; Fig. 3 is a plan view of the orienting mechanism, some of the parts being broken away to more clearly illustrate the invention; Fig. 4 is a side elevation in cross section of Fig. 3, the section being taken on the line 4—4 of Fig. 3; Figs. 5 and 6 are sectional views taken on the lines 5—5 and 6—6 respectively of Fig. 4; and Fig. 7 is a plan view of a bullet holding and transfer member into which the orientated bullets are delivered for a purpose to be hereinafter more fully described.

In general, the present invention contemplates apparatus having provision for withdrawing or releasing elongated cylindrical objects, such as bullets, from a bulk supply thereof, arranging the bullets thus released end to end in a plurality of adjacent elongated rows, without discrimination as to whether the pellet ends of the bullets point forwardly or rearwardly, and then delivering the bullets thus disposed into orienting mechanism designed to cause the bullets to assume a position in which the pellet ends thereof all point in the same direction. The orientated bullets are then guided into a holding and transferring member arranged to support the bullets in a definite uniform and compact group to facilitate transference into a carton or other container.

The present bullet handling apparatus contemplates conveying mechanism for moving a plurality of rows of the bullets or similar elongated objects arranged end to end into position to cooperate with novel and efficient orienting mechanism

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by which the indiscriminately arranged bullets in the several rows are caused to assume a uniform position, i. e., with corresponding ends of the bullets pointing in the same direction. While the bullets may be fed onto the conveying mechanism by hand or otherwise, nevertheless in practice, the present bullet orienting mechanism is designed to be embodied in a bullet handling machine having bullet feeding or releasing mechanism for feeding the bullets upon the conveying mechanism, preferably of the type illustrated and described in a copending application filed by me on even date herewith, Serial No. 473,092, for Bullet handling apparatus, now Patent No. 2,406,176. Inasmuch as the present invention is not concerned with the details of such feeding mechanism, it is sufficient to state that the same comprises the supply hopper 10 having opposed sets of circumferentially grooved wheels 13, 15 associated therewith which cooperate to form cylindrical openings at their points of tangency through which the bullets may pass end to end in the direction of their longitudinal axis and with the bullets in each row indiscriminately arranged as to the direction in which they point.

Referring now to the drawings which illustrate the preferred embodiment of the invention, 10 represents a supply hopper into which a bulk supply of the bullets are deposited and which has associated therewith bullet feeding or releasing mechanism, indicated generally at 12, adapted to release successive bullets therefrom end to end in the direction of their longitudinal axes without discrimination as to whether the pellet ends of the bullets point forwardly or rearwardly. The bullets thus released are guided by a curved plate 14 onto a plurality of continuously moving belts 16 to form a plurality of adjacent elongated rows of bullets for delivery to the orienting device indicated generally at 18.

The individual belts 16 upon which the bullets are carried forwardly end to end in single file columns are arranged to run over pulleys 20, 22 and across a guide plate 24 supported upon brackets 26 attached to the platen 28. The idler pulley 20 is carried on a shaft 30 supported between arms 32 of a bracket 34 depending from the underside of the guide plate 24, and the driving pulley 22 is mounted fast upon a drive shaft 36 journaled in a bracket 38 attached to the platen 28.

The bullets are guided on the belts 16 between rails 40 upstanding from the guide plate 24 which may and preferably will be provided with a transverse top or cover 42 to enable the progress of

the bullets to be observed and to form an enclosure to prevent foreign matter from entering into the guideways 44.

Provision is made for stopping each line of bullets and for releasing the foremost bullet in each line so as to permit them to enter the orienting device 18 simultaneously in a transverse row while the remainder of each line is held back. As herein shown, a timing and releasing device, indicated generally at 46 is arranged to release successive transverse rows of bullets periodically so as to permit orderly arrangement thereof when they are discharged from the orienting device as will be hereinafter described. The bullets are advanced along their respective belts 16 until the foremost bullet in each line comes to rest against individual stop fingers 48 carried by and depending from a transverse bar 50 arranged to be moved to present the fingers into and out of alignment with the bullets in the guideways 44. As herein illustrated, the transverse bar 50 is slidably mounted in side brackets 52, 54 attached to the forward end of the guide plate 24. A spring 56 is arranged to move the transverse bar 50 in one direction to align the fingers 48 with their respective guideways 44, the bar being adjustably limited in its movement in this direction by a stop screw 58. The bar 50 is arranged to be intermittently moved in the opposite direction to permit the bullets to pass, by connections including a cam 60 mounted on a cam shaft 62 and which is arranged to cooperate with a roller 64 carried by one arm 66 of a bell crank, as best shown in Fig. 2. The bell crank is pivotally mounted on a cross shaft 68 and the second arm 70 thereof is connected by a link 72 to a lever 74 carried at the lower end of a vertically mounted shaft 76. The upper end of the shaft 76 carries an arm 78 arranged to engage one end of the transverse bar 50 to effect movement of the latter to the left, viewing Fig. 6, to permit the bullets to pass through into the orienting device 18 at the proper time.

In order to hold back the remainder of each line of bullets so that only the foremost thereof pass into the orienting device at one time, a second transverse bar 80 is provided which is also slidably mounted in the side brackets 52, 54. The transverse bar 80 is provided with a plurality of depending flat springs 82 arranged to extend into the guideways 44 and the bar 80 is arranged to be moved to the left, viewing Fig. 5, by a spring 84 to dispose the flat springs 82 in sockets 86 cut in the upstanding rails 40, as illustrated, to permit the bullets to pass. A stop screw 88 is provided to limit the movement of the bar 80 to the left, and movement in the opposite direction, which is effected by a cam 90, will cause the flat springs 82 to be yieldingly pressed against the side of their adjacent bullets to hold the rows stationary.

The cam 90 is mounted on the cam shaft 62 and is arranged to cooperate with a roller 92 carried by one arm 94 of a two-armed lever, the second arm 96 of which is connected by a link 98 to an arm 100 on the lower end of a vertical shaft 102. The upper end of the shaft 102 carries an arm 104 arranged to engage one end of the bar 80 to effect movement thereof to the right, viewing Fig. 5.

The cams 60, 90 are designed so that in the operation of the device, when the bar 50 is moved to release the foremost bullets in each line, the bar 80 is moved to hold back the remainder of each line, and after the foremost bullets have

passed into the orienting device, the bar 50 is again moved to present the fingers 48 into alignment with the guideways 44 and the bar 80 is moved to release the lines of bullets and to permit a succeeding group of foremost bullets to be advanced on the continuously moving belts 16 to engage the fingers 48 in readiness for a succeeding cycle of operation of the machine.

When starting the machine, in order to assure that each guideway or reservoir 44 is supplied with a sufficient number of bullets to begin operation, provision is made for rendering the bar 80 ineffective to release any bullets until all the guideways have been provided with bullets from the releasing device. As herein shown, a manually operated latch 106, pivotally mounted at 108 in the side bracket 52, is arranged to be manually rocked to the right, viewing Fig. 5, to the position illustrated in dotted lines therein, in which position the latch 106 will engage a stop member 110 provided on the bar 80 in order to hold the bar back against the tension of the spring 84. Thus, the flat springs 82 are held in position to engage and hold the line of bullets as they are delivered from the hopper, and when a sufficient number of bullets has been supplied to start operation, as may be observed through the transparent cover 42, the latch 106 is rocked back out of the way to permit normal operation of the device, as above described.

From the description thus far it will be observed that a transverse row of bullets comprising the foremost bullet in each line thereof is periodically released by the timing mechanism 46 into the orienting device 18 and that when the bullets arrive at the orienting device they may be pointed either pellet end first or firing end first according to the position in which they were released from the feeding device 12, as above described. The illustrated orienting device 18 is designed to cause the bullets passing therethrough to point in the same direction, that is, with their heavier or pellet ends pointed forwardly and to guide the orientated bullets into a chute 112 arranged to deliver the bullets into a holding and transfer member 114.

The orienting device, as herein shown, comprises a plurality of separate guideways or chambers 116 formed adjacent the ends of the conveyor belts 16 by partition plates 118 and by front and rear spacing members 120, 122 respectively mounted between the plates 118, the assembled unit being supported upon cross rods 124, 126 extending between end blocks 128. The latter are attached by bolts 130 to lugs 132 extending from either side of the bracket 38. A tripping rod 134 extending transversely through each chamber 116 is disposed in the path of a bullet passing therethrough in a substantially horizontal position so that in operation when a bullet strikes the rod 134 it is tripped or overbalanced in the direction of its heavier or pellet end and continues its travel through the chamber in this position into the chute 112.

Provision is made for assuring a horizontal disposition of the bullets prior to their engagement with the tripping rod 134 and as herein shown, a plurality of relatively narrow horizontally disposed movable fingers or platforms 136 are arranged, in one position of operation, to extend into the chambers 116 immediately above the tripping rod 134 so as to intercept the bullets as they fall and to cause them to come to rest in a horizontal position. The relatively narrow fingers 136 are carried by a transverse bar 138 ar-

ranged to be intermittently moved to move the fingers out of the chambers and into alignment with the partition plates 118 to permit the horizontally disposed bullets to pass and to engage the tripping rod, as above described.

As herein illustrated, the transverse bar 138 is slidably mounted in forwardly extending supports 140 attached to the bracket 38 and is arranged to be moved from one position of operation to another by connections including a cam 142 mounted on the cam shaft 62. One arm 144 of a two-armed lever pivotally mounted on the shaft 68 carries a roller 146 cooperating with the cam 142, and the second arm 148 of the two-armed lever is connected by a link 150 to an arm 152 fast on the lower end of a vertical shaft 154, as best shown in Fig. 1. The vertical shaft 154 is supported in a bearing bracket 156 attached to the bracket 38 and is provided at its upper end with a slotted arm 158 arranged to embrace a slide block 160 carried by a stud 162 fast in the transverse bar 138.

In the operation of the orienting device, when a transverse row of bullets is released by the timing device 46 each bullet passes in a longitudinal direction over the end of its individual belt and into its separate chamber or guideway 116, passing down a sloped portion 164 of the spacing member 122 which directs the bullet to its platform 136 to dispose the bullet at rest in a horizontal position and at right angles to the tripping rod 134. The guideways are of a width such as to confine the bullets to their longitudinal disposition and to prevent lateral movement thereof, and the distance between the front and rear spacing members 120, 122 at the point adjacent the fingers 136 provides sufficient clearance to permit the bullets to lie horizontally, as shown in Fig. 4. When the transverse bar is moved to the left viewing Fig. 3, the bullets roll off their platforms and, in falling they strike the tripping rod 134 at a point approximately in the middle of the bullet. As above stated, the bullets may at this point be disposed with their pellet ends directed either forwardly or rearwardly. However, when the bullet strikes the rod at about the middle of its length, it overbalances in the direction of its heavier or pellet end and passes downwardly to one or the other side of the tripping rod 134. The bullets then fall pellet end first onto the chute 112, being guided thereto by a lower sloping wall 166 of the rear spacing member 122.

When the bullets are released from the orienting device 18 they are arranged to be received in individual V-shaped grooves 168 of the chute 112 which is disposed to guide the bullets into selected rows of the bullet-holding and transfer member 114. The latter comprises a studded tray, movably supported upon an angularly disposed guide bracket 170. As shown in Fig. 7, the holding and transfer member 114 comprises a base portion 172 and a plurality of short pales or studs 174 upstanding therefrom in a plurality of equally spaced rows. The spaces or sockets 176 formed between each four adjacent studs 174 are proportioned to receive the bullets and to support them in a substantially vertical position with the pellet ends extending downwardly so that the peripheries of adjacent bullets supported thereby are substantially touching each other whereby to form a compact and uniform arrangement thereof suitable for transfer to a carton.

The V-shaped grooves 168 of the chute 112 are arranged to converge downwardly, as illustrated in Fig. 3, to guide the bullets into adjacent sockets

176 of the holding and transfer member 114. It will be observed that the number of bullets released into the chute 112, per cycle of operation of the machine, preferably corresponds to the number of spaces 176 in one transverse row of the palet. In order to successively fill adjacent rows of the palet provision is made for automatically moving the delivery end of the chute so that upon completing one cycle of operation to fill one row of the palet, herein shown as the top row, the chute is moved to present the delivery end thereof into a position to fill an adjacent row during the next cycle of operation until, in the illustrated device, the five rows are filled, whereupon the delivery end of the chute is automatically raised to fill the top row of a succeeding holding and transfer member which may be manually presented to the guideway 170.

As illustrated in Fig. 4, the upper portion of the chute 112 is secured to a flattened portion 178 of a cross shaft 180 rockingly mounted in opposed arms 182 of the bracket 38 and the lower portion of the chute is connected by a link 184 to one arm 186 of a cam lever, see Fig. 2, pivotally mounted on a cross shaft 188. The second arm 190 of the cam lever carries a roller 192 which cooperates with a cam 194 mounted fast on a slowly rotating cam shaft 196. A spring 198 may be provided to hold the roller 192 against its cam. As shown in Figs. 1 and 2, the cam 194 is provided with five progressively increased cam surfaces, and the cam is driven in timed relation to the timing device 46 and to the movement of the transverse bar 138 for releasing the bullets into the chute 112 so that each time a row of bullets is delivered to the holding and transfer member, the chute is moved a distance corresponding to one row until the last row is filled whereupon a sharp drop in the cam surface operates to raise the chute into a position to fill the top row of a succeeding holding and transfer member. An upper guide plate 200 may be provided on the chute adjacent the point of minimum convergence where the V-shaped grooves change from an angular to a straight line, as shown, in order to prevent the relatively swiftly traveling bullets from being diverted out of the chute at this point.

The machine may be driven through connections from a motor 202, and, as shown in Figs. 1 and 2, the motor is connected by a belt 204 to a clutch pulley 206 mounted on a shaft 208 and which is arranged to be engaged and disengaged into and from driving relation to the shaft 208 by connections including a clutch handle 210, as illustrated. The shaft 208 is provided with a pinion 212 which meshes with a gear 214 on an intermediate shaft 216 and the latter is provided with a pinion 218 cooperating with a gear 220 fast on the cam shaft 62. The driving mechanism from the cam shaft 62 to the driving pulley shaft 36 over which the conveyer belts 16 run includes a pinion 222 on the shaft 62, a gear 224 on an intermediate shaft 226, and a sprocket 228 connected by a chain 230 to a sprocket 232 fast on the shaft 36. The shaft 36 is also provided with a sprocket 234 which is connected by a chain 236 to a sprocket 238 for driving the bullet feeding or releasing mechanism 12, as hereinbefore described. The slower moving cam shaft 196 is provided with a large gear 240 which meshes with the gear 224 on the shaft 226, the pinion 222 completing the train to drive the shaft 196 at a ratio of five to one with the cam shaft 62 for the purpose described.

In practice, when a holding and transfer member is filled, the operator may take a carton or other container in one hand and place it in an inverted position over the bullets supported in the holding and transfer member while holding the latter in the other hand, and by simply inverting the carton and holding and transfer member as a unit, the holding and transfer member may then be lifted and the bullets are transferred into the container in a uniform, compact and predetermined arrangement.

In the operation of the machine, the bullets are released from the hopper 10 to present them in longitudinal rows, end to end, in the guideways 44 without discrimination as to whether the pellet ends point forwardly or backwardly. The lines of bullets thus arranged are then advanced on the continuously moving belts 16 until they reach the timing and releasing mechanism 46 where they are brought to rest. The timing mechanism 46 is adapted to periodically release the foremost bullet in each line thereof to form a transverse row which is permitted to pass into the orienting device 18. The orienting device causes the bullets to all point in the same direction, that is, with their pellet ends extended forwardly whereupon the orientated bullets are discharged onto a chute 112 which is arranged to guide the bullets into the holding and transfer member having provision for supporting a plurality of adjacent rows of bullets. During each cycle of operation, one row of bullets is fed into the holding and transfer member, and upon delivery of one row, the delivery end of the chute is moved to present it into alignment with the next adjacent row in the holding and transfer member until the last row is filled, whereupon the chute is moved to fill the first row of a succeeding holding and transfer member which has been manually moved into position.

From the above description it will be observed that the present apparatus is adapted for orientation and arrangement of various elongated articles including either tapered or conical bullets as well as those bullets which are of uniform cross section throughout their length.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. A bullet orienting and delivering apparatus, comprising: an orienting device adapted to receive a simultaneously advanced transverse row of bullets having their horizontal axes parallel but indiscriminately arranged as to whether the pellets ends are directed forwardly or rearwardly, and including means to release a row of said bullets in unison with the pellet ends of said bullets pointing downward; an inclined chute pivotally mounted adjacent its upper end having grooves therein for receiving a row of bullets released from said orienting device, a member for supporting a bullet receiving holding and transfer member closely adjacent the discharge end of said chute, said holding and transfer member having a plurality of transversely arranged rows of pockets, each transverse row being adapted to receive a row of bullets released from said orienting device; means for moving the discharge end of said chute in a stepwise manner from one transverse row of pockets to an adjacent row of pockets of said holding and transfer

member; and means interconnecting said means releasing a row of bullets from said orienting device and said means moving said inclined chute for operation in timed relationship so that a row of bullets is released for every changed position of said chute.

2. A bullet orienting and delivering apparatus, comprising: an orienting device including means defining a plurality of transversely aligned chambers, each chamber being adapted to receive one of a simultaneously delivered row of bullets, having their horizontal axes parallel but indiscriminately arranged as to whether the pellet ends are directed forwardly or rearwardly, a plurality of horizontally extending fingers, one for each of said chambers, for supporting said bullets in a horizontal plane, means for moving said fingers in unison in a direction transverse to the horizontal axes of said bullets so as to allow said bullets to fall, and a tripping rod positioned in each of said chambers so that a falling bullet contacts said rod substantially medially of the length of said bullet and is tilted by gravity so as to pass from said orienting device with its heavier end pointing downward; a pivotally mounted inclined chute having grooves therein registering with the discharge end of each of said chambers for receiving a row of bullets released therefrom; a member for supporting a bullet receiving holding and transfer member closely adjacent the discharge end of said chute, said holding and transfer member having a plurality of transversely arranged rows of pockets, each transverse row being adapted to receive a row of bullets released from said orienting device; means for moving the discharge end of said chute in a stepwise manner from an upper to an adjacent lower transverse row of pockets of said holding and transfer member, and in a continuous manner from the lowermost row of pockets of one holding and transfer member to the uppermost row of a subsequently positioned holding and transfer member; and means interconnecting said means moving said fingers in unison and the means moving said inclined chute for operation in timed relationship so that a row of bullets is released for every changed position of said chute.

3. A bullet delivering device, comprising: an inclined chute pivotally mounted adjacent its upper end having a plurality of longitudinal grooves therein adapted to receive a row of oriented bullets; a member for supporting a bullet receiving holding and transfer member closely adjacent the discharge end of said chute, said holding and transfer member having a plurality of transversely arranged rows of pockets, each transverse row being adapted to receive a row of bullets discharged from said inclined chute; and means for moving the discharge end of said chute in a stepwise manner from one row of said pockets to an adjacent row of said pockets.

4. A bullet delivering device, comprising: an inclined chute pivotally mounted adjacent its upper end having a plurality of longitudinal grooves therein adapted to receive a row of oriented bullets; a member for supporting a bullet receiving holding and transfer member, closely adjacent the discharge end of said chute, said holding and transfer member having a plurality of transversely arranged rows of pockets, each transverse row being adapted to receive a row of bullets discharged from said inclined chute; and means including a cam for moving the discharge end of said chute in a stepwise manner from one

row of said pockets to an adjacent row of said pockets.

5. A bullet delivering device, comprising: an inclined chute pivotally mounted adjacent its upper end having a plurality of longitudinal grooves therein adapted to receive a row of oriented bullets; a member for supporting a bullet receiving holding and transfer member closely adjacent the discharge end of said chute, said holding and transfer member having a plurality of transversely arranged rows of pockets, each transverse row being adapted to receive a row of bullets discharged from said inclined chute; and means including a cam having a series of dwells of progressively decreasing radius for moving the discharge end of said chute in a stepwise manner from one row of said pockets to an adjacent row of said pockets.

6. A bullet delivering device, comprising: an inclined chute pivotally mounted adjacent its upper end having a plurality of longitudinal grooves therein adapted to receive a row of oriented bullets; a member for supporting a bullet receiving holding and transfer member closely adjacent the discharge end of said chute, said holding and transfer member having a plurality of transversely arranged rows of pockets, each transverse row being adapted to receive a row of bullets discharged from said inclined chute;

and means for moving the discharge end of said inclined chute in a stepwise manner from a first row of pockets of said holding and transfer member to each adjacent row of pockets of said holding and transfer member, and then in a continuous manner from the last row of pockets of said holding and transfer member to a first row of a subsequently positioned holding and transfer member.

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