

May 15, 1945.

R. W. VERGOBBI

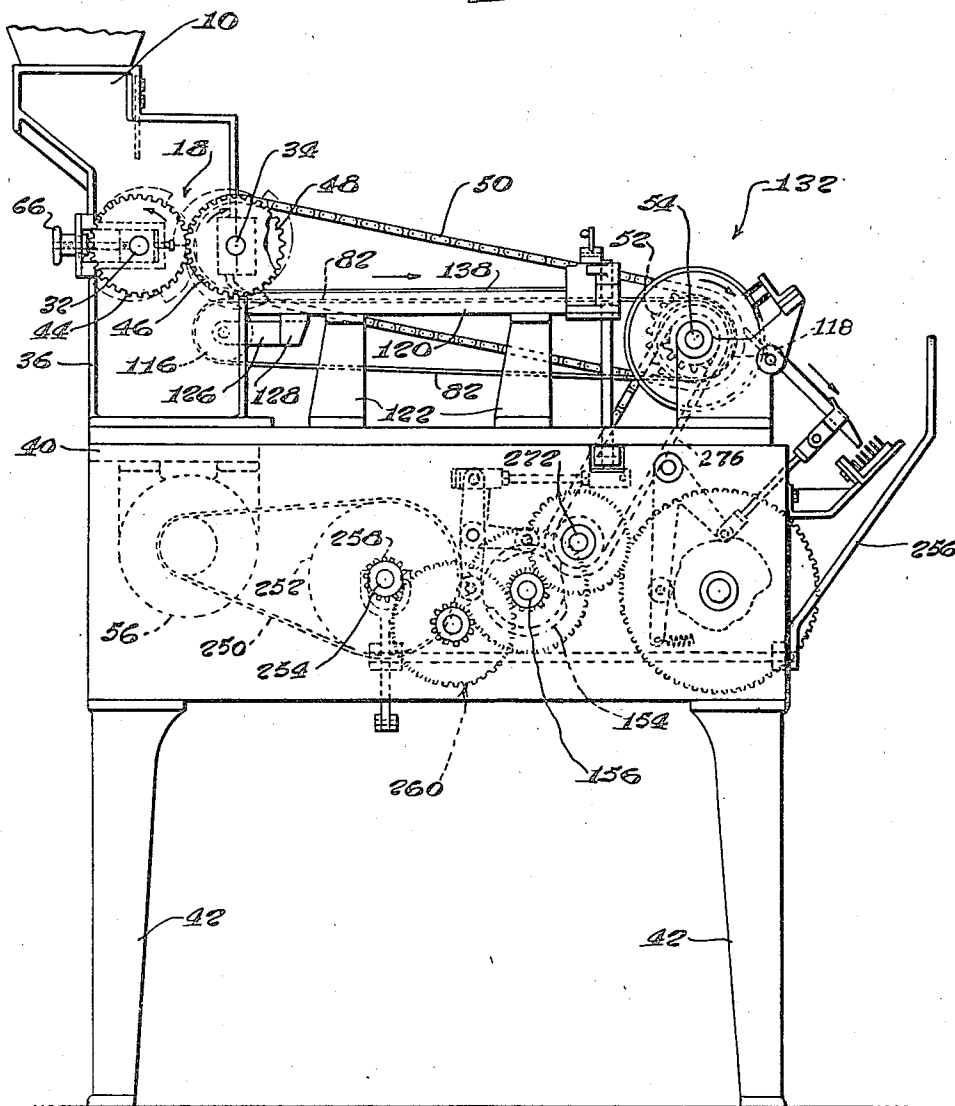
2,376,293

BULLET HANDLING APPARATUS

Original Filed Jan. 21, 1943

3 Sheets-Sheet 1

FIG. 1



INVENTOR.

BY Robert William Vergobbi

J. Stanley Churchill

ATTORNEY

May 15, 1945.

R. W. VERGOBBI

2,376,293

BULLET HANDLING APPARATUS

Original Filed Jan. 21, 1943

3 Sheets-Sheet 2

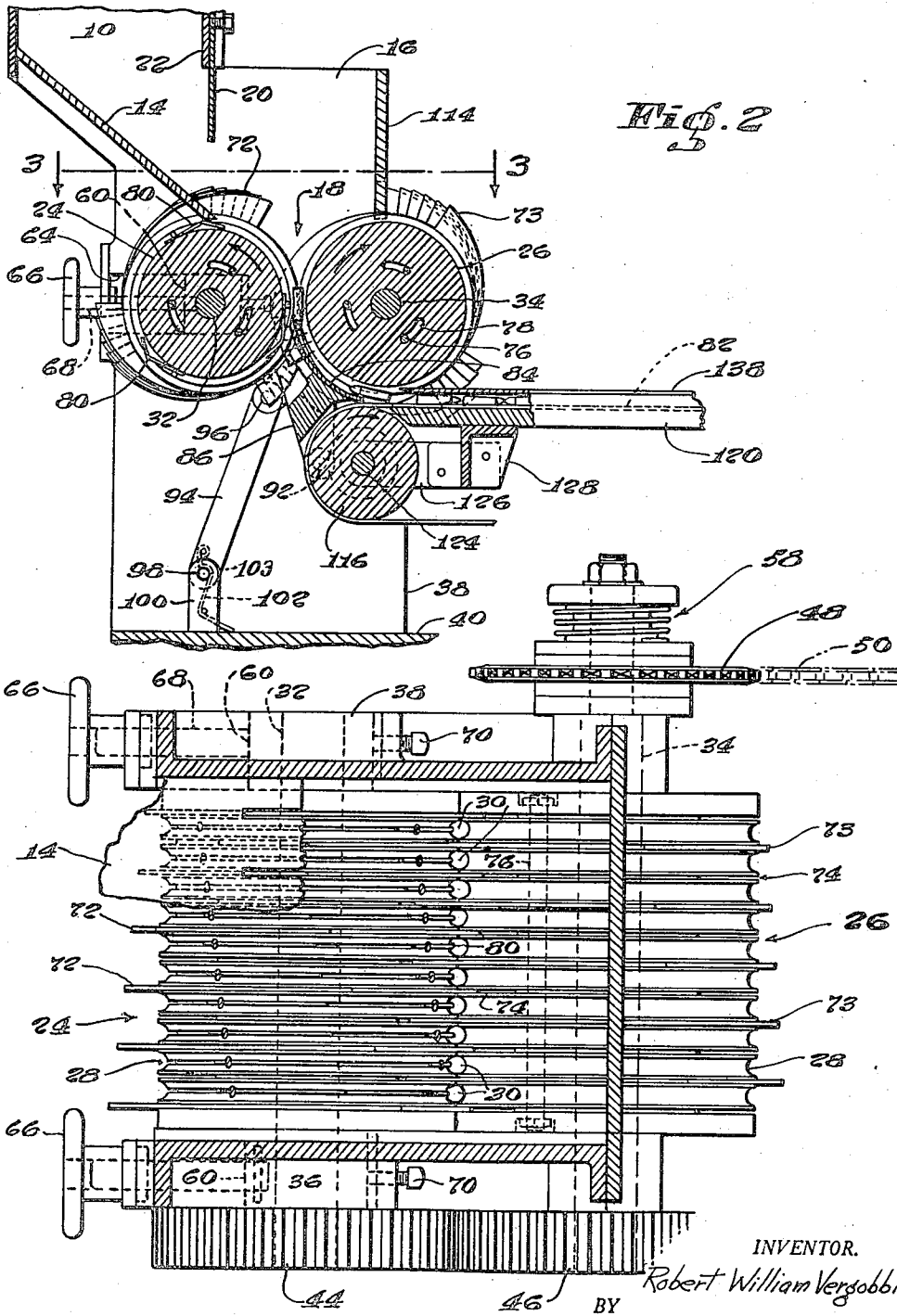


FIG. 2

FIG. 3

INVENTOR.  
Robert William Vergobbi  
BY J. Stanley Churchill  
ATTORNEY

May 15, 1945.

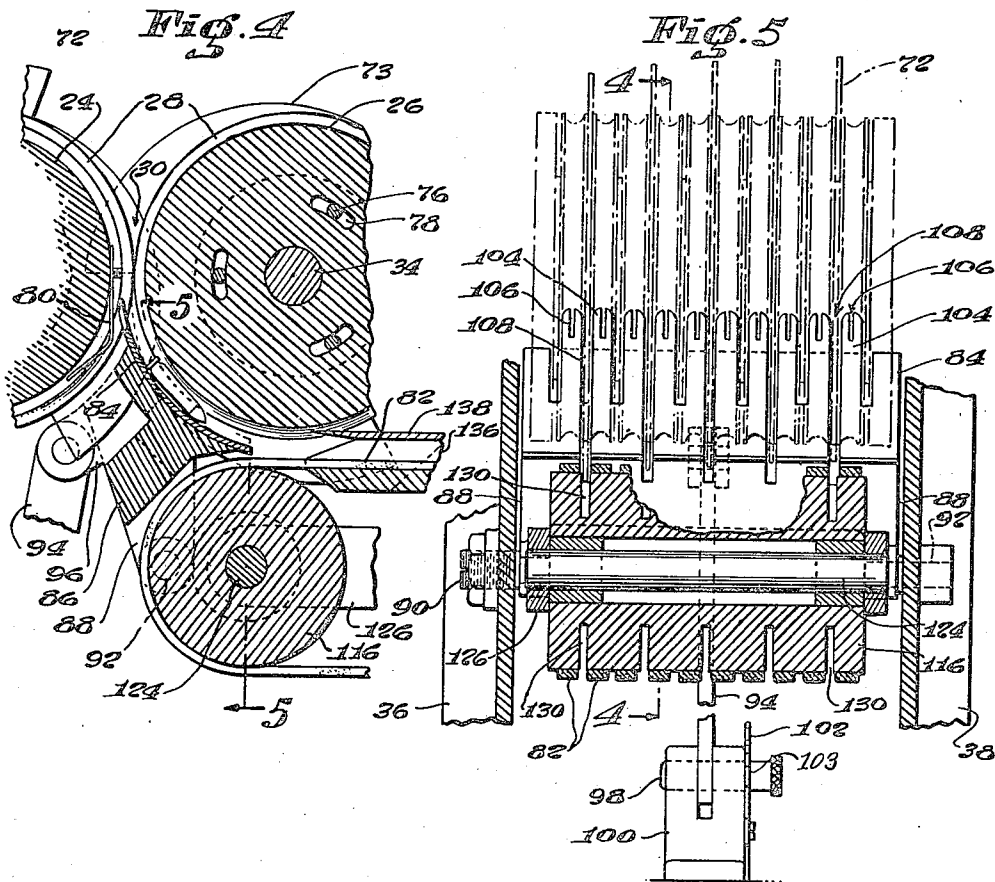
R. W. VERGOBBI

2,376,293

BULLET HANDLING APPARATUS

Original Filed Jan. 21, 1943

3 Sheets-Sheet 3



INVENTOR.  
Robert William Vergobbi  
BY  
J. Stanley Churchill  
ATTORNEY.

# UNITED STATES PATENT OFFICE

2,376,293

## BULLET HANDLING APPARATUS

Robert William Vergobbi, Quincy, Mass., assignor  
to Pneumatic Scale Corporation, Limited,  
Quincy, Mass., a corporation of Massachusetts

Original application January 21, 1943, Serial No.  
473,092. Divided and this application Decem-  
ber 15, 1943, Serial No. 514,405

9 Claims. (Cl. 86—47)

This invention relates to bullet handling apparatus.

The invention has for an object to provide novel and improved bullet handling apparatus which is adapted to release bullets from a bulk supply thereof, in which they are haphazardly or indiscriminately stored, and to cause the bullets to assume an orderly and uniform arrangement in a simple, positive and expeditious manner, whereby to dispose the bullets in a position such as to facilitate the 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 apparatus for feeding and arranging bullets embodying the present invention; Fig. 2 is a side elevation in cross section of the bullet supply hopper and withdrawing mechanism to be referred to; Fig. 3 is an enlarged plan view, partly in cross section, as viewed from the line 3—3 of Fig. 2; Fig. 4 is an enlarged side elevation in cross section taken on the line 4—4 of Fig. 5 of a detail to be referred to; and Fig. 5 is a view in cross section taken on the line 5—5 of Fig. 4.

The present invention contemplates apparatus for feeding elongated, conical or tapered articles, such as bullets, from a bulk supply thereof to arrange them in end to end relationship without discrimination as to the direction in which the bullets point. In practice, the bullets thus arranged are conveyed in a plurality of elongated rows for presentation to an orienting device arranged to cause the bullets to assume a position in which they all point in the same direction whereby to facilitate the packing thereof.

Referring now to the drawings, which as above stated illustrate the preferred embodiment of the invention, 10 represents a hopper into which a bulk supply of the bullets are deposited. The hopper is provided with a sloping bottom plate 14 which serves to divert the flow of bullets into an offset portion 16, at the lower end of which is disposed the bullet feeding or releasing mechanism indicated generally at 18. An adjustable plate 20 may be attached to an intermediate wall 22 of the hopper, as shown, in order to control the flow of the bullets into the releasing mechanism. The offset portion 16 of the hopper is preferably open at the top so as to enable the

operator to observe the progress of the bullets as they pass into the releasing mechanism 18 and to render the mechanism easily accessible.

The bullet feeding or releasing mechanism 18 as best shown in Figs. 2 and 3, comprises a plurality of pairs of opposed semi-spherically grooved or channeled wheels 24, 26, each pair having their peripheral edges in substantially contiguous engagement so that the semi-spherical or concave grooves 28 of each pair of wheels cooperate to form a substantially circular opening 30 at the point of tangency through which a bullet may pass in a longitudinal direction. The opposed wheels 24, 26 are mounted upon shafts 32, 34 respectively which are journaled in suitable bearings in side frames 36, 38, the latter forming the side walls of the hopper as shown. The side frames 36, 38 are mounted upon the platen 40 of the machine frame which is in turn supported upon legs 42.

Provision is made for rotating the opposed wheels 24, 26 and, as best shown in Figs. 1 and 3, the shafts 32, 34 are geared together to be simultaneously driven in opposed directions by gears 44, 46. The shaft 34 is provided at one end with a sprocket 48 which is connected by a chain 50 to a sprocket 52, see Fig. 1, fast on a drive shaft 54 which may be driven through connections from the motor 56 as will be hereinafter described. It will be observed that the sprocket 48 is loosely mounted on the shaft 34 and is arranged to drive the wheels 24, 26 through a spring-pressed friction clutch unit indicated at 58 which is capable of slipping to prevent damage to the operating parts in the event of a jam. Provision is also preferably made for adjusting the shaft 36 axially with relation to the shaft 34 in order to accurately position the opposed wheels with relation to each other and, as herein shown, the shaft 32 is journaled in slide blocks 60 capable of being adjusted in slide bearings 64 by threaded hand wheels 66 and rods 68. Stop screws 70 provided in the ends of the slide bearings serve to limit the forward movement of the slide blocks so as to present the wheels 24 in cooperative engagement with the wheels 26.

As indicated by the arrows in Fig. 2, the opposed grooved wheels 24, 26 are rotated in a direction opposite to the direction of movement of the bullets therebetween so as to tend to lift the mass of bullets upwardly and to keep them in motion until they assume a vertical position in alignment with the circular openings 30 whereupon such bullets fall through the openings by gravity. In order to assist the bullets to assume

the proper position to enable them to fall through the openings 30 in a longitudinal direction, provision is made for agitating and guiding the mass of bullets during the rotation of the wheels 24, 26. As herein shown, eccentric members 72, 73 are provided between alternate wheels of each group or set of wheels 24, 26 and as best shown in Figs. 2 and 3, the eccentric members 72 mounted between alternate wheels of one set, 24, pass between spaces 74 formed between the opposing set 26. Each eccentric member 72 is provided with a plurality of high points, herein shown as three, and successive eccentric members are also preferably set back or fanned out with relation to each other around the circumference of the wheels, as clearly illustrated in Fig. 2, so that in operation, as successive high points of the eccentrics rotate upwardly through the mass of bullets, they operate to progressively agitate the mass and tend to lift those bullets which are horizontally disposed in the hopper to cause them to assume a substantially vertical position. Thus, in operation, those bullets adjacent the openings 30 which are in a substantially vertical position are free to fall by gravity through such openings to be separated from the mass of bullets in the hopper. The second group of eccentric members 73 are similarly disposed between the alternate wheels of the set 26 mounted on the shaft 34 except that the members 73 are disposed between different alternate wheels to enable them to pass between the spaces formed between the opposing set of wheels 24 as clearly shown in Fig. 3. All of the wheels, and the eccentrics disposed therebetween are adjustably mounted with relation to each other, being held in assembled relation by elongated bolts 76 which pass through slotted openings 78 formed in the wheels and the eccentrics as shown in Figs. 2 and 3. With this construction it will be seen that in the operation of the machine, the eccentrics act as combs or rakes to comb through the mass of bullets and to guide them into the grooves 28 in a longitudinal position so that they may pass through the openings 30.

In order to further assist in guiding the bullets into the spherical openings 30 formed between opposed pairs of wheels, bent pieces of spring wire 80 are secured at suitable spaced intervals in the grooves 28 of one set of wheels 24. In operation, the spring members 80 yieldingly press against and gently raise those bullets which approach the opening 30 in an improper position so as to enable them to become agitated with the mass until they assume a vertical position. For example, if two bullets coming down opposed grooves 28 meet above the opening 30 so that further progress is impeded, the spring member 80 will effect separation thereof, lifting one upwardly and permitting the remaining bullet to fall through. Also, in the event that a pair of bullets should become hooked together by the grooved portions adjacent their firing ends, the gentle raising movement effected by the springs 80 will tend to yieldingly lift the pair upwardly to enable them to become disengaged in the mass, thus avoiding blocking of the opening 30 and clearing a path for subsequent properly positioned bullets to fall through.

From the description thus far it will be observed that the present feeding or releasing mechanism is operative to release elongated cylindrical objects such as bullets, either of the tapered or conical form or those bullets which are of

substantially uniform cross section throughout their length.

After the bullets pass through the openings 30, provision is made for guiding them from their vertical position into a horizontal position and to transfer them onto horizontally disposed feed belts 82 and as herein shown, this is accomplished by a guide member 84. The guide member, as herein shown, comprises a curved plate supported substantially concentrically to the set of wheels 26 and down which the bullets slide end to end after passing through the openings 30. During their travel down the plate the bullets are supported laterally between the grooves or channels 28 of their respective wheels 26. The bullets thus being fed in their axially aligned position slide onto their individual belts 82 upon which they are carried forwardly end to end in single file but without discrimination as to which end of a bullet comprises the forward end.

As herein shown, the guide plate 84 is attached to a supporting bracket 86 provided with arms 88 mounted on studs 90, 92 extending from the side frames 36, 38 respectively. The bracket 86 is retained in operative position with respect to the wheels 26 by an arm 94 connected at one end to a lug 96 at the rear of the bracket 86 and connected at its other end to a stud 98 journaled in a bearing bracket 100 attached to the platen 40. With this construction it will be seen that no relative movement of the parts is permitted when assembled in operative position, as shown. However, provision is made for quickly and easily moving the guide plate out of its operative position in the event of a jam. As herein illustrated, the stud 98 is detachably retained in the bracket 100 by a curved spring member 102 which is mounted to yieldingly press into a groove 103 formed in the stud 98 so as to prevent withdrawal thereof. In operation, the set of wheels 24 is first moved back out of the way by turning the hand wheels 66 and then by manually pressing the spring 102 out of the groove 103, the stud 98 may be withdrawn. The arm 94 is thus released so that the supporting bracket 86 may be rocked backwardly on its pivots 90, 92 out of its operative position.

As clearly shown in Fig. 5, the upper portion of the guide plate 84 is shaped in the form of a plurality of fingers 104 having slots 106 formed therein for the passage of the bent wire spring members 80, the spaces 108 between the fingers 104 providing clearance for the eccentric disks 72, 73. The plate supporting bracket 86 is also provided with slots for passage of the eccentric disks as are the front wall 114 of the hopper and the bottom plate 14, as shown in Fig. 2.

The individual belts 82 upon which the bullets are carried forwardly in single file and arranged end to end, run over pulleys 116, 118 and across a guide plate 120 supported upon brackets 122 attached to the platen 40. The idler pulley 116 is carried on a shaft 124 supported between arms 126 of a bracket 128 depending from the underside of the guide plate 120, and may be provided with grooved portions 130, as shown, to permit passage of the eccentric disks 73 therethrough. The driven pulley 118 is mounted fast upon the drive shaft 54 and is formed integrally with the orienting device, indicated generally at 132. For the purposes of the present invention it is believed sufficient to state that the orienting device comprises a plurality of spaced circular disks 134 between which the individual bullets are received

and carried up to permit them to swing around so that each bullet will point downwardly.

The bullets are guided on the belts 82 between rails 136 upstanding from the guide plate 120 which may and preferably will be provided with a transparent top or cover 138 whereby to enable the progress of the bullets to be observed and to enclose the guideways to prevent foreign matter from entering therein.

As above stated, the machine may be driven through connections from a motor 56 and, as shown herein, the motor is connected by a belt 250 to a clutch pulley 252 mounted on a shaft 254 and which is arranged to be engaged and disengaged in driving relation to the shaft 254 by connection including a clutch handle 256 as clearly shown in Fig. 1. The shaft 254 is connected by a gear train, indicated generally at 260, to a shaft 272. The shaft 272 is connected to the hopper drive shaft 54 by a chain and sprocket connection 276, as shown in Fig. 1.

In the operation of the machine it will be observed that the bullets in the supply hopper 10 are selectively released therefrom by the releasing mechanism 18 to present the bullets in longitudinal rows, end to end, on the belts 82 without discrimination as to whether the bullets point forwardly or backwardly. The lines of bullets thus being advanced on the continuously moving belts 82 are presented to the orienting device above referred to by which the bullets are caused to assume a position in which they all extend in the same direction whereby to facilitate the packing thereof.

From the above description it will be observed that the present apparatus is particularly adapted for handling elongated tapered articles such as bullets in a simple and expeditious manner to cause them to assume a uniform and compact arrangement to facilitate the packing thereof.

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.

This application is a division of my copending application Serial No. 473,092, filed January 21, 1943.

Having thus described the invention, what is claimed is:

1. In a bullet handling machine, in combination, a supply hopper for containing a bulk supply of the bullets, and means associated therewith for continuously releasing successive bullets therefrom end to end in the direction of their longitudinal axis, said releasing means including a pair of circumferentially grooved wheels having their peripheral edges in tangential engagement cooperating to form openings through which the bullets may pass in longitudinal direction only.

2. In a bullet handling machine, in combination, a supply hopper for containing a bulk supply of the bullets, and means associated therewith for continuously releasing successive bullets therefrom end to end in the direction of their longitudinal axis, in a plurality of paths, said releasing means including a pair of opposed sets of circumferentially grooved wheels having their peripheral edges in tangential engagement cooperating to form cylindrical openings through which the bullets may pass in a longitudinal direction only.

3. In a bullet handling machine, in combination, a supply hopper for containing a bulk supply of the bullets, and means associated there-

with for continuously releasing successive bullets therefrom end to end in the direction of their longitudinal axis, in a plurality of paths, said releasing means including a pair of opposed sets of circumferentially grooved wheels having their peripheral edges in tangential engagement cooperating to form cylindrical openings through which the bullets may pass in a longitudinal direction only, said wheels being rotated in a direction opposite to the travel of the bullets therebetween, and a plurality of spaced eccentric disks carried by said wheels for agitating the mass of bullets in the hopper and for guiding them into said openings.

4. In a bullet handling machine, in combination, a supply hopper for containing a bulk supply of the bullets, and means associated therewith for continuously releasing successive bullets therefrom end to end in the direction of their longitudinal axis, in a plurality of paths, said releasing means including a pair of opposed sets of circumferentially grooved wheels having their peripheral edges in tangential engagement cooperating to form cylindrical openings through which the bullets may pass in a longitudinal direction only, said wheels being rotated in a direction opposite to the travel of the bullets therebetween, and a plurality of spaced eccentric disks carried by said wheels for agitating the mass of bullets in the hopper and for guiding them into said openings, one set of said wheels being provided with spring members arranged to yieldingly engage improperly positioned bullets at the mouth of said openings and to clear the openings for subsequent properly positioned bullets to pass through.

5. In a bullet handling machine, in combination, a supply hopper for containing a bulk supply of the bullets, and means associated therewith for continuously releasing successive bullets therefrom end to end in the direction of their longitudinal axis, in a plurality of paths, said releasing means including a pair of opposed sets of circumferentially grooved wheels having their peripheral edges in tangential engagement cooperating to form cylindrical openings through which the bullets may pass in a longitudinal direction only, said wheels being rotated in a direction opposite to the travel of the bullets therebetween.

6. In a bullet handling machine, in combination, a supply hopper for containing a bulk supply of the bullets, and means associated therewith for continuously releasing successive bullets therefrom end to end in the direction of their longitudinal axis, said releasing means including a pair of circumferentially grooved wheels having their peripheral edges in tangential engagement cooperating to form openings through which the bullets may pass in longitudinal direction only, and means for guiding said bullets as they pass through said openings to present the bullets in a substantial horizontal position.

7. In a bullet handling machine, in combination, a supply hopper for containing a bulk supply of the bullets, and means associated therewith for continuously releasing successive bullets therefrom end to end in the direction of their longitudinal axis, in a plurality of paths, said releasing means including a pair of opposed sets of circumferentially grooved wheels having their peripheral edges in tangential engagement cooperating to form cylindrical openings through which the bullets may pass in a longitudinal direction only, and a guide member cooperating with the peripheral grooves of one set of wheels

to guide said bullets from a substantially vertical position as they pass through said openings to a substantially horizontal position.

8. In a bullet handling machine, in combination, a supply hopper for containing a bulk supply of the bullets, and means associated therewith for continuously releasing successive bullets therefrom end to end in the direction of their longitudinal axis, in a plurality of paths, said releasing means including a pair of opposed sets of circumferentially grooved wheels having their peripheral edges in tangential engagement cooperating to form cylindrical openings through which the bullets may pass in a longitudinal direction only, and a guide member cooperating with the peripheral grooves of one set of wheels to guide said bullets from a substantially vertical position as they pass through said openings to a substantially horizontal position, said guide mem-

ber being mounted to permit a relatively quick release thereof in the event of a jam between said wheels.

9. In a bullet handling machine, in combination, a supply hopper for containing a bulk supply of the bullets, and means associated therewith for continuously releasing successive bullets therefrom end to end in the direction of their longitudinal axis, in a plurality of paths, said releasing means including a pair of opposed sets of circumferentially grooved wheels having their peripheral edges in tangential engagement cooperating to form cylindrical openings through which the bullets may pass in a longitudinal direction only, one of said wheels being mounted to permit axial adjustment thereof to accurately position the opposed wheels with relation to each other.

ROBERT WILLIAM VERGOBBI.