April 22, 1947. J. H. WOODBERRY ET AL 2,419,242

CARTRIDGE FEEDER AND ORIENTER

Filed Jan. 1, 1943 2 Sheets-Sheet 1

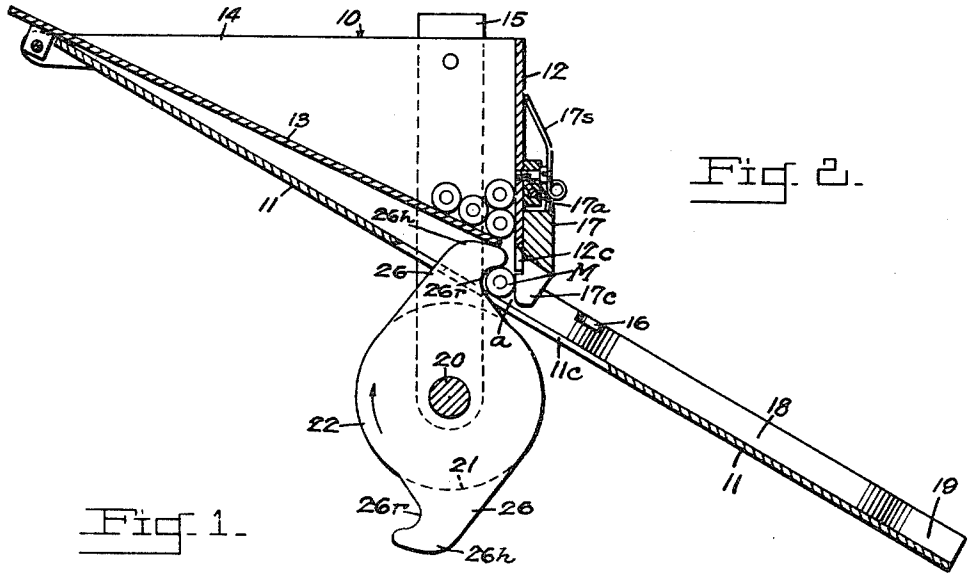
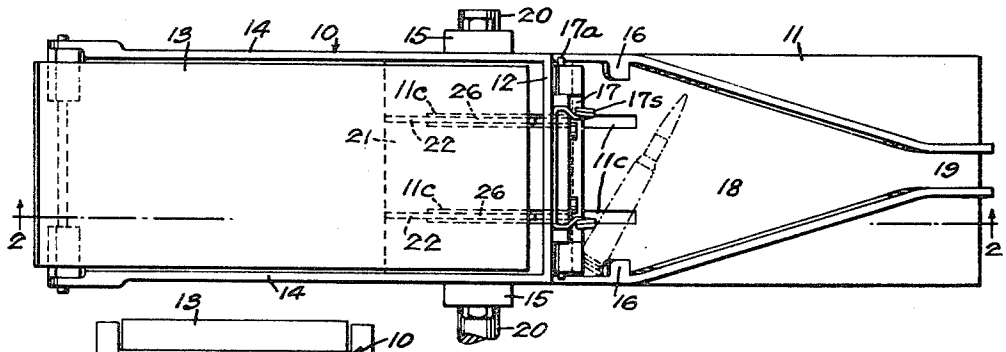


Fig. 2.

Fig. 1.



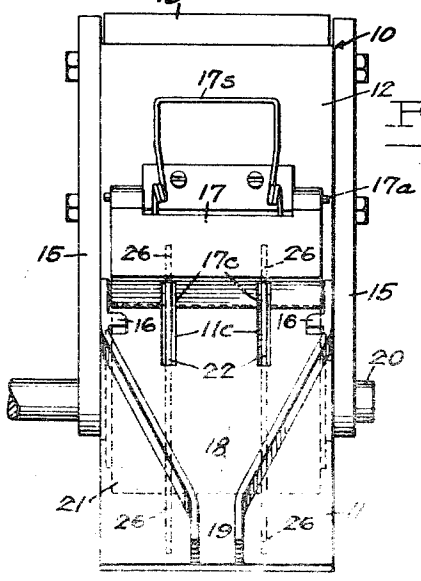


Fig. 3.

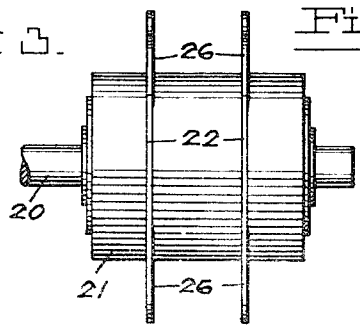


Fig. 4.

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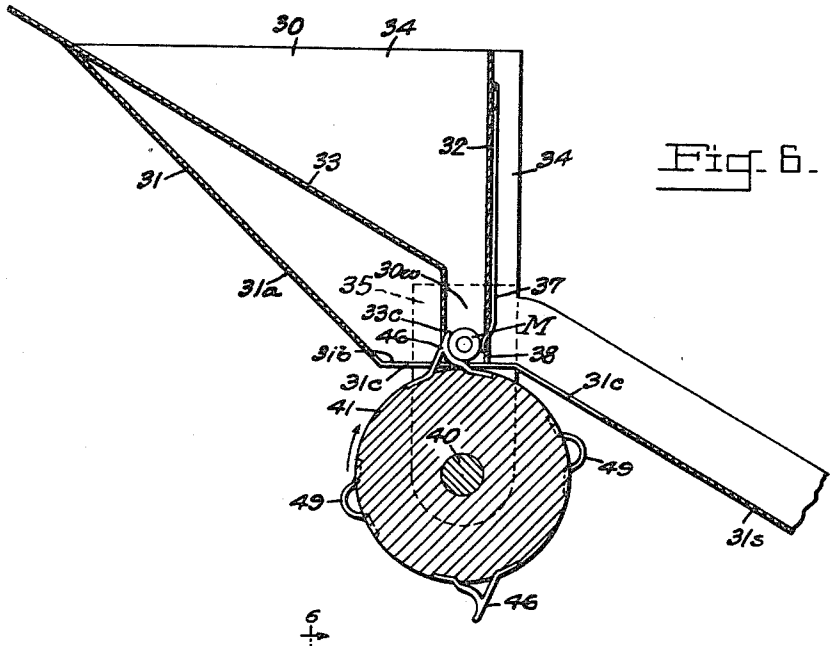


Fig. 6.

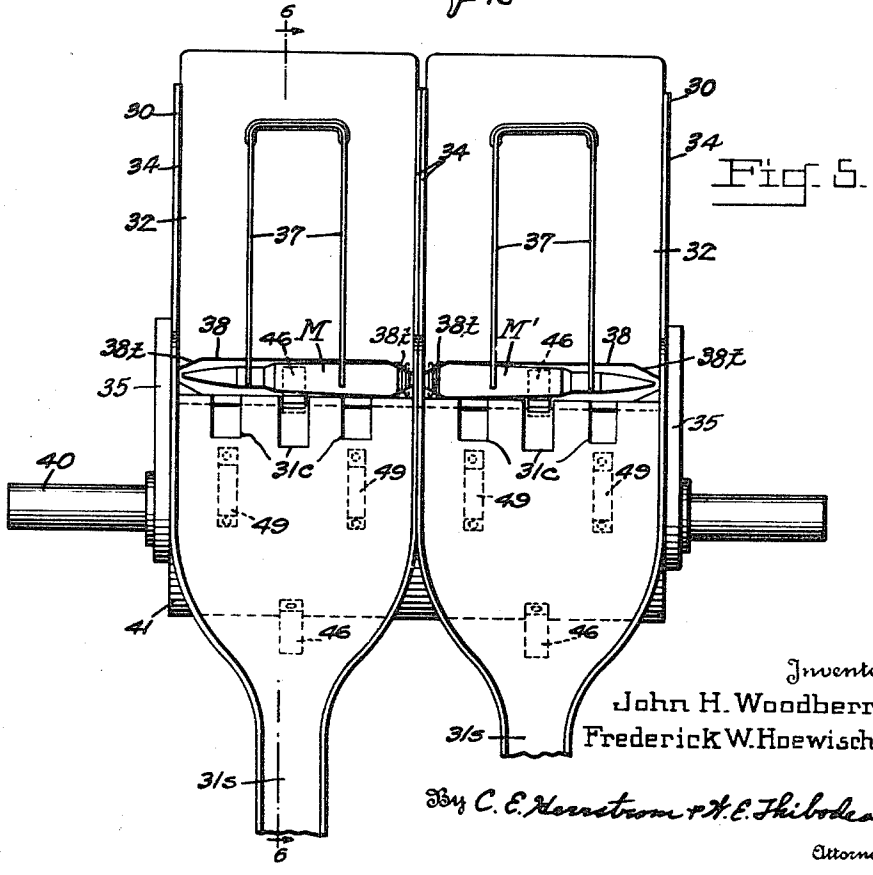


Fig. 5.

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CARTRIDGE FEEDER AND ORIENTER

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11 Claims. (Cl. 193—43)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

1

The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment to us of any royalty thereon.

This invention relates to a cartridge feeding device, more particularly, to a device which will feed cartridges singly and oriented with their projectile ends pointed ahead, from a quantity of cartridges thrown promiscuously without regard to orientation in the receiving hopper of the device. In many cartridge handling machines—as, for example, machines which insert single cartridges in individual pockets of canvas or link belts—it is necessary to feed the cartridges singly with their projectile ends pointed forwardly, to the machine. The cartridge feeding device of this invention is designed to feed cartridges singly and oriented, from a massed or heaped quantity of unoriented cartridges, so that such cartridges may be conducted one at a time and properly oriented, to a cartridge handling machine for the desired subsequent operation. The object of this invention is to provide a cartridge feeding device of the character described which will be simple in construction, positive in action, and rapid in operation. For the attainment of this and such other objects as may herein appear or be pointed out, we have shown one embodiment of the invention in the accompanying drawings, wherein:

Fig. 1 is a top view of one form of improved feeder-orientor.

Fig. 2 is a section taken through the mechanism on line 2—2 of Fig. 1.

Fig. 3 is a front view thereof;

Fig. 4 illustrates the finger assembly.

Fig. 5 is a front view of a modified form.

Fig. 6 is a section through the mechanism on line 6—6 of Fig. 5.

Referring first to the embodiment of the invention shown in Figs. 1–4 the cartridges are thrown into a hopper 10 which includes an inclined base plate 11 and a vertical plate 12. Pivotally mounted on base plate 11 at the rim of the hopper is a segregating plate 13 the function of which is to segregate the lowermost cartridge in the hopper, in a manner to be explained, and to agitate the contents of the hopper. Underlying the hopper and spaced a short distance below its base plate and to the left, as viewed in Fig. 2, of vertical front plate 12 is a shaft 20 journaled in end bearings provided in vertical straps 15 depending from the side plates 14 of the hopper. Secured on shaft 20 is a sectional cylindrical hub 21 which supports a pair of parallel plate members 22 spaced apart in planes normal to the shaft as best seen in Fig. 4. The plate members 22 are shaped to provide a plurality of fingers 26 which project beyond the periphery of hub 21, in pairs aligned longitudinally of the hub, two pairs being shown in the

2

drawings, equally spaced around the hub. The base plate 11 has formed therein a pair of parallel slots 11c aligned with the plates 22, through which the fingers 26 pass with clearance. It should be noted that the width of the hopper is slightly more than the length of the cartridge and the plates 22 are spaced from the sides 14 of the hopper, somewhat more than the length of the exposed part of the projectile in the cartridge.

The fingers 26 are shaped, as clearly shown in Fig. 2, to present a hump portion 26h which, as the shaft is turned in a clockwise direction as viewed in Fig. 2, contacts and raises the distal end of segregating plate 13 to the position in which it is shown in Fig. 2. The length of segregating plate 13 is such that, when it is in lowermost position, resting by gravity on base plate 11, there is sufficient distance between its distal edge and the vertical front plate 12 to permit passage of a cartridge, more particularly, the lowermost cartridge in the hopper. But when the segregating plate 13 is slightly raised, as it is when contacted by a finger 26, as shown in Fig. 2, its distal edge approaches the vertical front plate 12, the space between the front plate 12 and the edge of plate 13 decreasing to an extent to block off passage below the plate 13 of all the other cartridges in the hopper. In this way, the lowermost cartridge in the hopper, designated M in Fig. 2, is segregated from the others.

The forward portion of each finger 26 is provided with a recess 26r curved to partly encircle cartridge M as shown in Fig. 2. As shaft 20 continues to turn clockwise, the fingers 26 push lowermost cartridge M down inclined base plate 11 to the right in Fig. 2. The lower edge of vertical front plate 12 is spaced from base plate 11 slightly more than the cartridge base diameter, forming a mouth a. Mouth a is normally closed by a gate 17 hinged at its upper end well above the radius of the movement of the fingers 26 at 17a on the plate 12 and provided with a spring 17s which urges the gate clockwise to closing position, as shown. Vertical front plate 12 and the gate 17 are provided with slots, respectively 12c and 17c, through which fingers 26 clear. As fingers 26 push cartridge M rightwardly, see Fig. 2, the cartridge pushes gate 17 in the same direction to open the same sufficiently to permit passage of the cartridge; whereupon the gate is shut, against the cartridges remaining in the hopper, by its spring 17s. The plate 13 will have dropped to its lowermost position at this time.

A single cartridge is thus extracted from the hopper and brought outside, to the right or in front of, the gate. This cartridge will still point in the same direction that it did as the lowermost cartridge (M) in the hopper. A pair of orienting stops or lugs 16 are fixed just outside gate 17 and

at respective sides of the wide end or mouth of a funnel 18 leading down inclined base plate 11 to a spout 19. These lugs are each spaced above the plate 11 sufficiently to permit passage thereunder of the nose of a bullet in a passing cartridge lying across the plate 11, but this spacing from the plate 11 is much less than the diameter of the cartridge base. The result is that the cartridge, shown in Fig. 1, is engaged at its base by one of the lugs and momentarily stopped at the base while still being pushed mid-length by the nearer finger 26, and is thus angularly turned on its primer end to cause its projectile end to point ahead, this being the direction or orientation in which the single cartridges are fed down funnel 18 and out of spout 19.

In the modified form of Figs. 5–6 the hopper 30 is formed by an inclined base plate 31 having an upper sloped portion 31*a*, a short horizontal portion 31*b*, a lower sloped portion or chute 31*s*, a breast plate 33 and a front vertical plate 32. The breast plate 33 is bent as shown in Fig. 6 to form a hopper well 30*w* into which the cartridges fall (down the incline of breast plate 33) and become stacked one above the other. Shaft 40 underlying the horizontal portion 31*b* of the base plate is journaled in bearings in vertical strips 35 depending from side hopper walls 34, and carries a drum 41. Drum 41 is provided midlength with two broad fingers 46, diametrically opposite to each other. The horizontal ledge 31*b* and inclined parts of 31 are provided with elongated slots 31*c* to afford clearance for fingers 46 and lugs 49; also, the vertical portion of breast plate 33 is provided with aligned similar slots 33c.

The front plate 32 is provided near the bottom of hopper well 30*w* with a transversely elongated mouth opening 38 somewhat longer than cartridge length and provided at each end with a narrowed portion 38*t*. To the outside face of front plate 32 is a spring 37 formed of piano wire shaped in the form of an inverted-U, secured at its web portion, as by spot welding or otherwise, to the plate 32 and presenting both its distal ends in the path of cartridges fed through mouth slot 38.

As drum 41 is turned in a clockwise direction as viewed in Fig. 6, a finger 46 contacts the lowermost cartridge in hopper well 30*w*, cartridge M, to turn the cartridge about one end as a pivot. As clearly seen in Fig. 5, the primer end of cartridge M is behind the right narrowed portion 38*t* of opening 38, and is of larger diameter than the clearance of the opening at this point. It will also be noted from Fig. 5 that the finger 46 contacts the cartridge at a point substantially at its center. The finger 46 therefore turns cartridge M about a pivot point at one of narrowed ends 38*t* of opening 38. Both ends of the spring 37 yield to the cartridge, the one farthest from the cartridge base being displaced the most. As the cartridge is turned by the finger 46, its swinging part soon passes under and clears the adjacent arm of spring 37. The other end of the spring 37, which was less displaced by the cartridge, now tends to return to initial position, swinging the base of the cartridge inward from the mouth and operating as a fulcrum upon which the cartridge now rotates its base toward the medial vertical plane of the hopper and chute 31*s* opening, as a result of the moment created by the finger 46 and spring arm nearest the base of the cartridge. The cartridge ultimately slides longitudinally nose first down the chute 31*s*. In this manner the primer end of the cartridge

passes through the wider part of the opening 38 with ample clearance. Two units are shown in Fig. 5, the lowermost cartridge in the left unit being designated M and the lowermost cartridge in the right unit being designated M'. Cartridge M is oriented with its projectile end pointing to the left while the projectile end of cartridge M' points to the right. Hence cartridge M will be turned on a point in the right narrowed portion of the opening, while cartridge M' will be turned on a point in the left narrowed portion. In both cases, the projectile end of a cartridge being forced through the opening 38 will be pointed ahead, this being the direction in which the cartridges are fed out of the hopper down chute 31*s*.

As best seen in Fig. 6, there may be provided on drum 41 spaced between each end of the drum 41 and the plane in which the fingers 46 are located, and secured on the drum, lugs 49 which serve when they pass through the respective slots 31*c* in horizontal base plate 31*b*, to periodically raise the heap of cartridges in well 30*w* to ensure that they are properly stacked in the well.

It will be appreciated that with the plate 13 in repose in the hopper of Fig. 2, the cartridges will settle with one immediately before the mouth of the hopper and against the gate 17, and that the rounded points of the hooked fingers 26 will push forwardly and under all cartridges adjacent and excepting the one, thus providing agitation of the hopper content as well as ejecting the single cartridge. The plate 13 serves as a guard to prevent denting of the cartridge walls by the fingers as well as supporting all except the cartridges next to the plate 12 on a surface which slopes at all times toward the front. The lower end edge of the plate 13 moves in an arc which intersects the lefthand lower circumferential surface of the second cartridge from the plate 11 at an angle great enough to obviate any possibility of gouging or jamming of the second cartridge between the front plate 12 and the swinging end of the plate 13.

It should be considered that it is not essential that the plates 12 or 32 be vertical for the functioning of the invention, and they may be inclined inward or outward at their upper parts although there should be a substantial vertical component in the plane of each of these plates.

We claim:

1. A device for feeding and orienting cartridges with their projectile ends pointed in a predetermined direction, in combination, an inclined base plate and a vertical plate defining a hopper between them, a plate resting on the said base plate of the hopper and pivoted near the rim thereof, the length of the said pivoted plate being such as to provide when in lowermost position clearance between its distal edge and the said vertical hopper plate for the width of a single cartridge but less than said width when raised the diameter of one cartridge, a shaft revolubly mounted below the said hopper, a pair of ejectors mounted on the said shaft, the said hopper base plate having slots for the ejectors, the ejectors being arranged so as to contact the said fingers with the underside of the said pivoted plate to raise the plate a sufficient extent to decrease the distance between its distal edge and the said vertical hopper wall to block off passage of all cartridges resting on the said single lowermost cartridge, the said vertical hopper wall being provided at the said inclined hopper base plate with a transversely elongated opening, a hinged plate mounted on the outside

of the said vertical hopper plate and spring pressed to closing position at the opening, the said ejectors being adapted on further rotation thereof to contact the said lowermost cartridge and to push the said cartridge past the said hinged plate and onto the said inclined base plate outside the hopper, a pair of side strips on the said inclined base defining a funnel chute with its widest part at the said elongated hopper opening, and a pair of stop lugs one on each of the said side strips near the said hopper slot, the said lugs being arranged and adapted to be contacted by the primer end of a cartridge, but spaced above the level of the nose of a passing cartridge, whereby the cartridges are angularly turned to point their projectile ends ahead.

2. A device for feeding and orienting cartridges with their projectile ends pointed in a predetermined direction, in combination, an inclined base plate and a vertical plate defining a hopper between them, a shaft disposed below the said hopper, a pair of planiform parallel plate members mounted on the said shaft and shaped to provide a plurality of fingers, the said hopper base plate being provided with slots for the said fingers, the said vertical hopper wall being provided at the said inclined hopper base plate with an elongated opening, a hinged plate mounted on the outside of the said vertical hopper plate and spring pressed to closing position, the said shaped plates being adapted on rotation of the said shaft to contact the lowermost cartridge in the hopper and to push the said cartridge past the said hinged plate and onto the said inclined base plate outside the hopper, the said vertical front plate and the said hinge plate being slotted for the said fingers, a pair of side strips on the said inclined base defining a funnel chute with its widest part at the said elongated hopper opening, and a pair of stop lugs one on each of the said side strips near the said hopper opening, the said stops being shaped, arranged and adapted to be contacted by the cartridge base whereby the cartridges are angularly turned to point their projectile end ahead.

3. A device for feeding and orienting cartridges with their projectile ends pointed in a predetermined direction, in combination, an inclined base plate and a vertical plate defining a hopper between them, a shaft disposed below the said hopper, a centrally located finger mounted on the said shaft, the said hopper base plate being provided with a slot for the said finger, the said vertical hopper wall being provided at the said inclined hopper base plate with an elongated opening of a width commensurate with that of the cartridge, the ends of the opening being narrowed, the distance between opposed sides of the opening at each end being smaller than the cartridge base diameter, a pair of spring wires spaced longitudinally of said opening and spaced from the ends of the opening secured on the outside of the said vertical hopper plate having free ends extending before the opening, the said finger being adapted on rotation of the shaft to contact said lowermost cartridge and to push the said cartridge past either of the said spring wires and onto the said inclined base plate outside the hopper, the said cartridge first turned on an axis through its base in the adjacent narrow part of said opening, whereby both springs yield initially to the cartridge, the one distant from the base yielding to clearing relation with the cartridge but the other remaining engaged with the cartridge as a fulcrum and the finger then turning the cartridge on the last named spring and propelling it endwise through the chute.

4. A device for feeding and orienting conventional cartridges with their projectile ends pointed in a predetermined direction, in combination, an inclined base plate and a vertical plate defining a hopper between them, a well in the said hopper holding a single stack of cartridges, a shaft disposed below the said hopper, an ejector finger mounted on the said shaft, the said hopper base plate being provided with a slot for the said finger, the said hopper being provided at the said inclined hopper base plate with an elongated opening of a width commensurate with that of the cartridge, the ends being narrowed, the distance between opposed sides of the opening at each end being less than the cartridge base diameter, the said finger being adapted on rotation of the shaft to contact said lowermost cartridge and to push the said cartridge onto the said inclined base plate outside the hopper, whereby the said cartridge is turned on an axis adjacent its base in the narrow part of one end of said opening, and the projectile end of the said cartridge pointed ahead.

5. A device for feeding and orienting cartridges with their projectile ends pointed in a predetermined direction, in combination, a front plate, an inclined plate forming a hopper with the said front plate and an inclined chute exterior of the hopper, the said chute being funneled with its wide mouth at the said hopper, the said hopper being formed with an elongated opening for egress of single cartridges, means for feeding single cartridges through the said opening, the width of the said opening being commensurate with that of the cartridge and its ends being narrowed, the distance between opposed sides of the opening at each end being less than the diameter of the cartridge base, whereby the ejected cartridge is turned on an axis adjacent its base in the opening at one end, and the projectile end of the said cartridge pointed ahead.

6. A device for feeding and orienting cartridges with their projectile ends pointed in a predetermined direction, in combination, a hopper provided with an elongated opening for egress of single cartridges, means for feeding single cartridges through the said opening, the width of the said opening being commensurate with that of the cartridge, the ends being formed with narrowed end portions at each corner, the distance between opposed narrowed portions at each end being smaller than the widest cartridge diameter, but shaped and proportioned to permit a projectile nose to pass therebetween, whereby the said cartridge will be turned on an axis through its primer or widest cartridge diameter between the said pair of opposed narrowed portions at one end, and the projectile end of the said cartridge pointed ahead.

7. In an orienting device for identical elongated articles having opposite large and small ends, a hopper having a discharge mouth of a width equal to the individual length of the articles and including upwardly extending front and back plates convergent downwardly toward said mouth, an article support plate constituting the lower side of said mouth and extending outwardly thereof arranged to support an article at the bottom of the hopper and while it is moved translatively through said mouth outward of said mouth in article receiving relation to said mouth, a rotary shaft having an ejector fixed therewith projected a distance radially of the shaft, said shaft being

mounted on an axis in such relation to said mouth that the ejector moves through the hopper and mouth in a path to which the path of articles translated through the mouth on said plate is approximately tangent at the mouth so as to engage the lowermost article in the hopper and translate the same through said mouth, and means including cam-like members carried by the shaft positioned to move likewise through the hopper and said mouth to raise articles in the hopper other than such as may be engaged by the ejector, said plates being slotted for clear movement of the ejector and cam-like means through the hopper, means yieldable to articles propelled by said ejector to retain articles from egress otherwise at said mouth and means operatively associated with the ejector to retard the large end of an ejected article.

8. The structure of claim 7 for cased ammunition wherein two said ejectors are mounted on the shaft, spaced longitudinally of the shaft a distance equal to a substantial part of the length of the case and spaced from the sides of the hopper more than the length of the exposed part of the projectile, and wherein said yieldable means constitutes a gate means on the hopper having an edge extending into the path of ejected cartridges close to the mouth of the hopper parallel to the support plate and movable in said parallel relation by an engaged cartridge to an open position, and said retarding means constitutes a stop device spaced longitudinally in the chute from the gate constructed to selectively engage the cartridge base while the cartridge is being propelled by the ejectors whereby its rotative and translative motion will be accelerated.

9. In an article orienting device the combination of a hopper for articles with distinctive ends said hopper having a mouth shaped to pass transversely laid articles irrespective of orientation, ejector means to engage the lowermost article in the hopper intermediate of its length, a positive stop adjacent each side of the mouth to selectively engage predetermined distinctive ends of articles, a yielding detent spaced inwardly of each positive stop constructed to yield to ejected articles in a direction to clear an engaged article after predetermined swinging movement of the article around one stop, and a chute constructed to hold the articles for endwise movement therein, and having a wide mouth to receive an article transversely disposed and rotating in a plane with its axis.

10. In a device for feeding and orienting cartridges with their projectile ends pointed in a predetermined direction, a hopper comprising a front plate and a back plate converging downwardly and a bottom support for cartridges between the two plates extending forwardly from the hopper, said front plate having a mouth opening thereon immediately over said bottom support and transversely elongated to afford a width commensurate with the length of the cartridge, the ends of said opening being narrowed, the distance between upper and lower edges of the narrow parts at each end being less than the diameter of the larger cartridge end, a pair of spring wires secured on the outside of the said front plate above said mouth having free ends inwardly of the narrowed ends of the mouth blocking passage of the lowermost cartridge from

said mouth, a finger revolubly mounted below the hopper movable through the bottom of the hopper spaced from said wires, to contact the lowermost cartridge and to push said cartridge past the spring wires on to the said forward part of said bottom support outside the hopper, whereby the base of said cartridge is initially engaged and retarded by one narrowed end of the opening and the cartridge initially turned on an axis transverse to its longitudinal axis at its base and the projectile end of the cartridge swung forwardly so that one of said wires is cleared and whereby the second wire will then press the base of the cartridge rearwardly and to an intermediate position in said mouth opening.

11. A device for feeding and orienting cartridges with their projectile ends pointed in a predetermined direction, in combination, an inclined base plate and an upstanding plate convergent downwardly toward the base plate defining a hopper having a transversely elongated mouth opening between them, a plate resting on the said base plate of the hopper initially and pivoted near the rim thereof, the length of the said pivoted plate being such as to provide clearance between its distal edge and the second named plate for the width of a single cartridge, a shaft disposed below the said hopper, a pair of transversely aligned ejector fingers mounted on the said shaft, the said base plate being provided with slots for the said fingers, the said fingers being formed with a hump portion and an advanced recess, the said fingers being adapted on rotation of the said shaft to contact the said hump with the underside of the said pivoted plate to raise the plate a sufficient extent to decrease the distance between its distal edge and the said vertical hopper wall to block off passage of all cartridges resting on the said single lowermost cartridge, a gate hinged on the outside of the upstanding plate and spring pressed to closing position at said mouth, the said fingers adapted on rotation thereof to contact the said recess portion of its fingers with the said lowermost cartridge and to push the said cartridge past the said gate, the said upstanding plate and the said gate being slotted for clearance of the said fingers, means defining a funnel chute with its widest part at the said mouth opening, and a pair of stop lugs one on each side of the said chute near the said mouth opening, the said stops being adapted to be contacted by one distinctive cartridge end but arranged and shaped to clear the other end whereby the cartridges are angularly turned to point the unengaged end ahead.

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