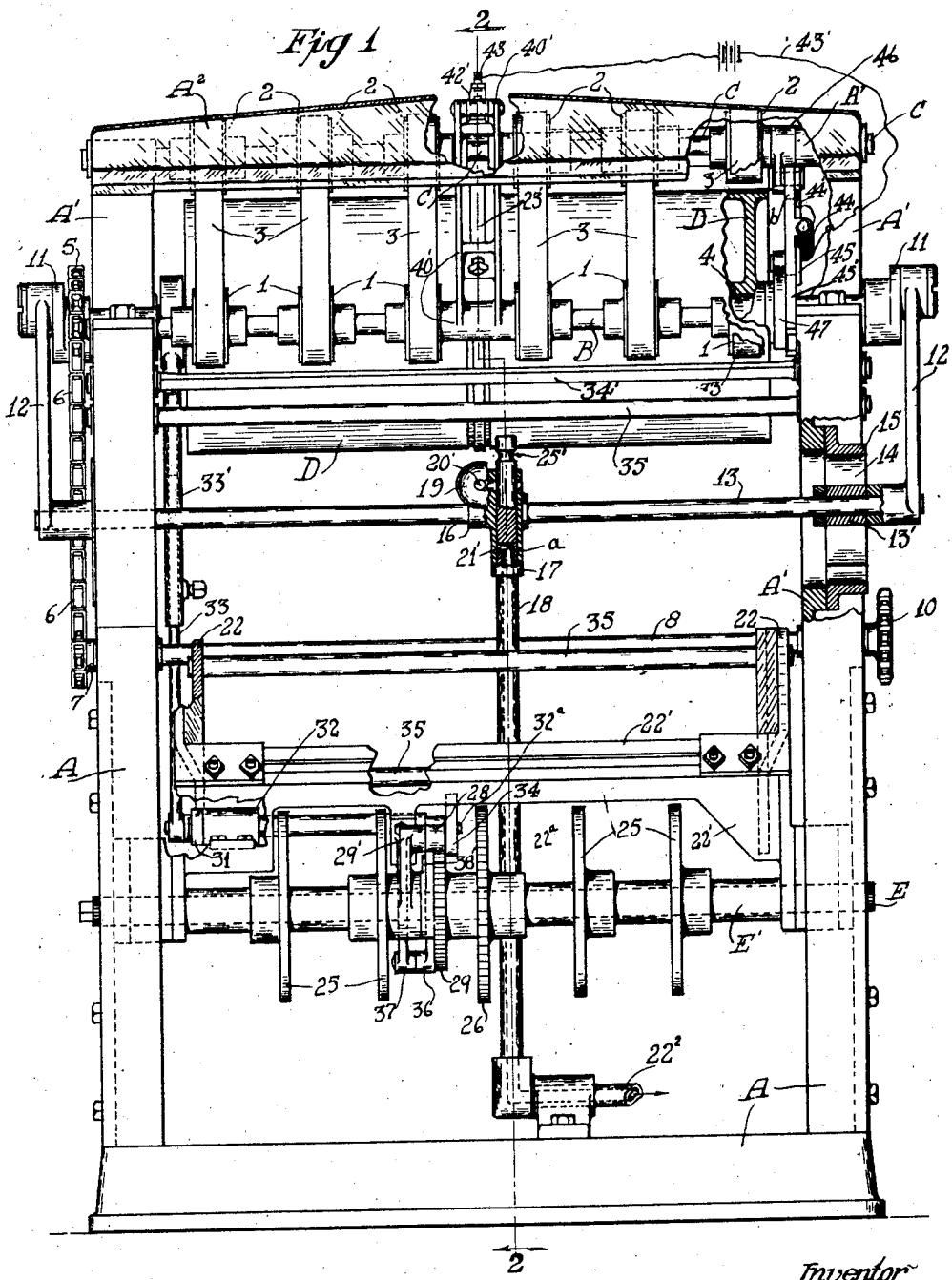
Oct. 30, 1928. 1,689,668

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BLANK FEED MECHANISM

Filed June 4, 1924 3 Sheets-Sheet 1

Fig 1



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BLANK FEED MECHANISM

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Fig 4

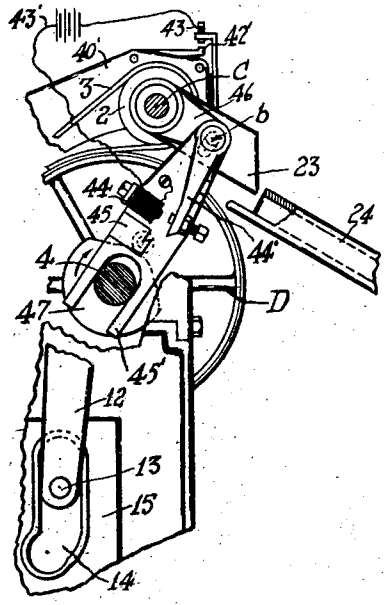


Fig 2

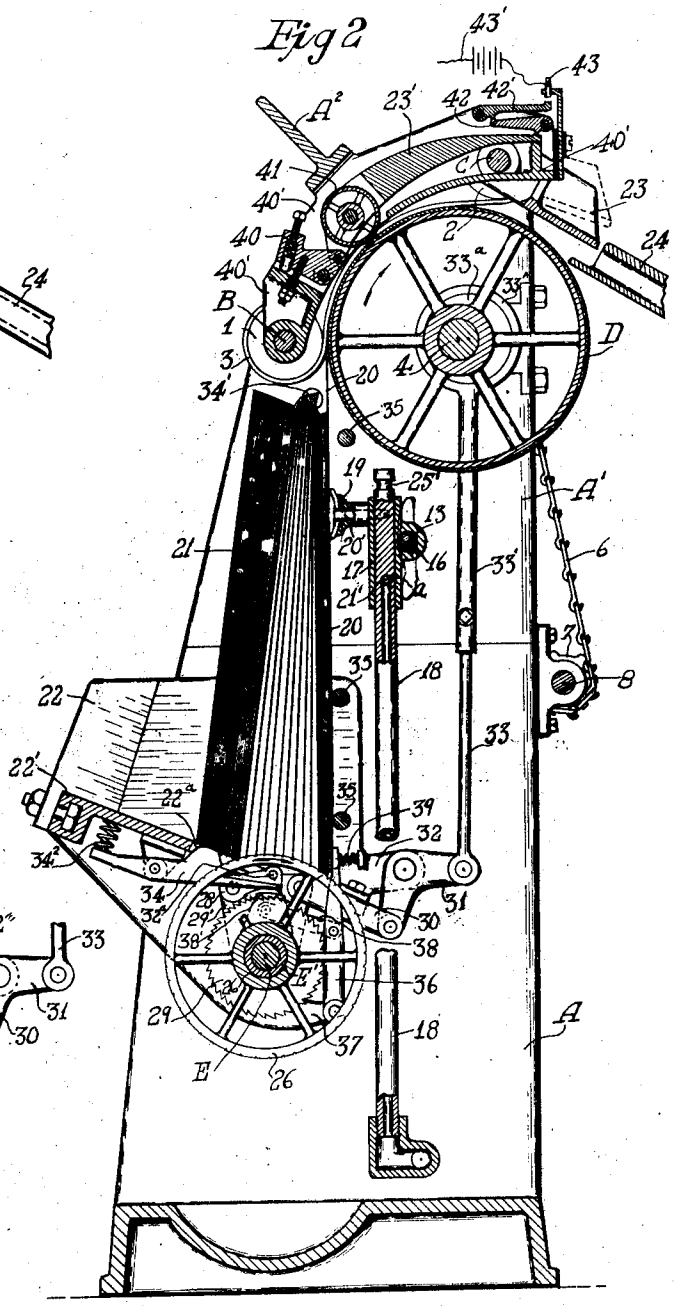
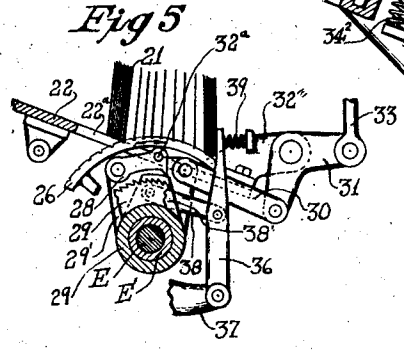


Fig 5



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BLANK FEED MECHANISM

Filed June 4, 1924 3 Sheets-Sheet 3

Fig 3

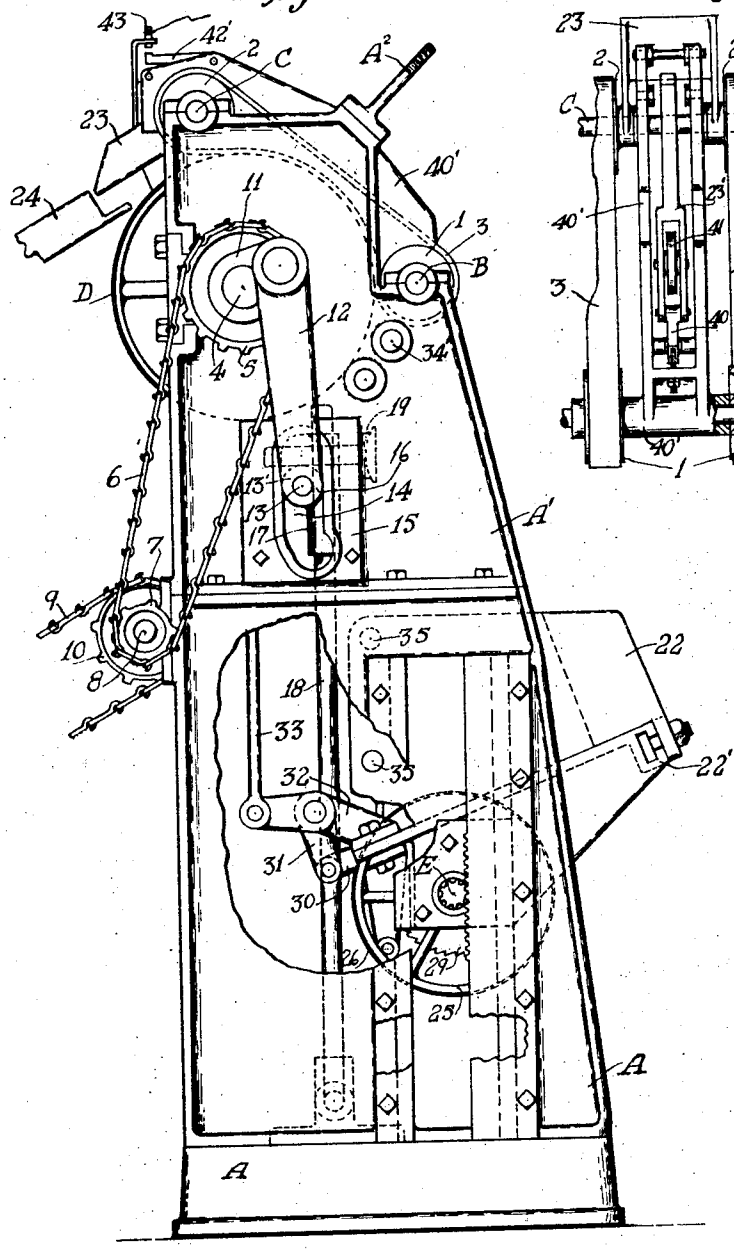


Fig 6

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UNITED STATES PATENT OFFICE.

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BLANK-FEED MECHANISM.

Application filed June 4, 1924. Serial No. 717,853.

The hereinafter described invention comprises automatic means for the delivery or handling of tin plate or sheet metal generally, (commonly known as blanks) and is more particularly designed for use in connection with the feeding of blanks utilized in the manufacture of can bodies and for the feeding of the tin plate or sheet metal blanks to the cutting means of a body blank slitting machine for dividing or cutting the sheet or blank into a number of smaller units of predetermined size or dimension, although it will be understood that the invention is not restricted or limited to the feeding of sheet metal blanks or tin plates to slitting mechanism.

The essential object of the invention is the removal of the sheet metal or tin plate singly from a stack of positioned sheets or plates and delivering the same successively on to a receiving table or platform adapted to direct the sheets to other mechanism for operation thereon, such mechanism usually comprising what is known in the can making art as blank "slitting mechanism" for the sub-dividing of the sheets or metal plates into a plurality of smaller units of predetermined size and to do so without permitting the delivery of more than a single sheet on each operating stroke of the feeding mechanism.

A further object of the invention is the production of an automatically operated apparatus, the co-acting elements of which are so arranged and positioned relative to each other as to permit the elevating means thereof selecting the sheets singly from a stack of sheets or plates and to deliver them accurately into position to be acted upon by other mechanism preferably employed in connection with the manufacture of cans or metallic containers.

A further object of the invention is the production of an automatically operated apparatus simple of construction, positive as to the feeding action thereof, efficient, economical and having a feeding output capacity materially in excess of feeding mechanism known to me at the present time.

Other objects and advantages of the invention will present themselves and be apparent as the action of the inter-connected working instrumentalities is understood or comprehended from the following description of the operation thereof taken in connection with the accompanying sheets of drawings, illustrating the preferred embodiment of the invention and wherein—

Fig. 1 is a front view in elevation of the apparatus, with certain parts thereof broken away, the stack of sheets or metal blanks being removed from the apparatus for clearness of illustration.

Fig. 2 is a vertical sectional view taken on the irregular line 2—2, Fig. 1 of the drawings, and viewed in the direction of the arrow, disclosing a stack of metal sheets or blanks in position and the innermost one of the stack partly elevated.

Fig. 3 is a side view in elevation partly broken away, disclosing the drive mechanism for actuating the various parts of the apparatus in timed relation and disclosing the mechanism for controlling the feed of the body blanks or metal sheets into position to be acted upon by the elevating means of the apparatus.

Fig. 4 is a broken detailed view in side elevation illustrating the means for controlling the delivery of the sheets or metal blanks from the apparatus in accordance as to whether one or more body blanks or plates are simultaneously elevated from the stack.

Fig. 5 is a broken detailed sectional view in side elevation disclosing the mechanism for advancing the position of the sheets or blanks within the hollow for presenting the same successively to the elevating means.

Fig. 6 is a top plan view illustrating the swinging trip arm for actuating the deflecting means controlling the delivery of sheets or blanks from within the apparatus and disclosing the mounting for said arm.

In the drawings, the letter A is used to designate any suitable form of a base member or frame structure capable of housing and sustaining the feed controlling mechanism for the stack of body blanks or sheets positioned within the magazine or holder therefor, said frame structure being provided with upwardly extended wall members A′ held in spaced relation and connected one

to the other by the transversely disposed tie member A^2, Figs. 1 and 2 and 3 of the drawings. The side member A′ and the connecting tie member A^2 may be said to constitute a super-structure for the base member A of the apparatus and within the said structure there is mounted adjacent the upper end portion thereof a transversely disposed shaft B, which carries a plurality of spaced rollers 1 mounted to rotate thereon. Above the shaft B is mounted a transversely disposed shaft C, which, like the shaft B, has secured thereto a series of spaced rollers 2. Over the rollers 1 and 2 work the friction feed belts 3 adapted to co-act with the surface of an enlarged roller or drum D for receiving and transferring the blanks or sheets of metal from the elevating means of the apparatus to the discharge point thereof, Figs. 1, 2 and 4 of the drawings. This roller or drum D is mounted upon a transversely disposed shaft 4, to one end of which shaft is attached a sprocket wheel 5 adapted to be driven through the medium of a sprocket chain 6 working over the sprocket wheel 5 and a sprocket wheel 7 secured to one end of a transversely disposed shaft 8, the shaft 8 having rotation imparted thereto from any suitable source of power and preferably through the medium of a drive chain 9 working over a sprocket wheel 10 secured to the opposite end of the shaft to that carrying the sprocket wheel 7. It will thus be apparent that power applied to the shaft 8 is transmitted through the drive chain 9 for actuating the shaft 4 carrying the drum or roller D.

To each end of the shaft 4 is mounted a crank 11 carrying the crank arms 12 which at their lower ends carry transversely disposed actuating rod 13, which rod has mounted thereon rollers 13′ which work within a cam slot 14 of the bearing plates 15, secured to the side members A′ of the frame structure, Figs. 1 and 3 of the drawings, so that with the rotary motion of the shaft 4 there is transmitted through the medium of the cranks 11 and the crank arms 12 a reciprocating motion to the actuating rod 13. This rod 13 extends through a bearing 16 centrally mounted with respect thereto, Fig. 2 of the drawings, the said bearing 16 constituting a continuation of a sleeve 17 mounted for reciprocating movement upon a vertically disposed suction pipe 18. The sleeve 17 carries a suction head 19, the face of which is adapted when suction is applied to bear upon the exposed face of the innermost sheet or blank 20 of the stack of blanks or sheets 21 extending within the holder or magazine 22 of the apparatus and which holder or magazine is provided with a downwardly inclined open bottom 22′ and the said suction head is moved toward the exposed face of the innermost blank 20 of the stack of blanks when the actuating rod 13 carrying the sleeve 17 for the suction head is moved upwardly within the cam slot 14 of the bearing plates 15 during the throw of the crank arms 12. The suction head 19 is provided with a port 20′, which, on the full downward movement of the sleeve 17, is adapted to register with a port 21′ of the suction pipe 18, Fig. 1 of the drawing, it being understood that the suction pipe 18 through its continuation 22^2 is connected with a suction pump, not shown. When the port 20′ of the suction head 19 is in registry with the port 21′ of the suction pipe 18, the said suction head is in bearing contact with the exposed face of the innermost blank or sheet 20 and at such time the vacuum is on, so that on the upward movement of the sleeve 17 through the movement of the actuating rod 13, the innermost plate or sheet 20 is lifted from the stack 21 and carried or elevated upwardly until the top portion is placed between the surface of the drum D and the feed belts 3. By reason of the frictional engagement of these parts with the sheet 20 and the rotary motion imparted to the drum B the elevated sheet is moved upwardly over the drum D, being downwardly directed in a plane of curvature by means of a swingingly mounted deflecting attachment 23, which guides or deflects the upper or top of the upwardly moving sheet onto or within a delivery chute 24, Fig. 2 of the drawings.

The suction engagement of the head 19 with the plate 20 is broken or destroyed when the port 20′ thereof is brought into registry on the extreme upper stroke of the sleeve 17 with an annular port 25′ formed at the upper end of the suction pipe 18 and the blank or sheet freed from the influence of the vacuum applied to the suction head, the suction pipe 18 being closed beyond the point *a*. The suction head 19 and its vertical movable sleeve 17, taken in connection with the actuating means therefor may be said to constitute a preferred form of elevating means for successively removing blanks or sheets from within the stack holder therefor and placing the same within the sphere of the rotating drum D and the feed belts 1 constituting the feed mechanism.

Within the base structure A of the apparatus is mounted a fixed transversely disposed rod E on which is loosely mounted a sleeve E′ carrying in spaced relation a series of sorting rollers or disks 25 which are keyed to the said sleeve E′. The centrally disposed disk or roller is in the form of a sheet-feeding gear 26, Figs. 1 and 2 of the drawings, the said rollers or disks 25 and the gear 26 being projected upwardly through the open bottom section 22^a of the bottom 22′ of the holder or mechanism 22, the diameter of the gear 26 being slightly

greater than that of the plain surface rollers or disks 25. The said rollers or disks 25 serve as a support for the body blanks or sheets of metal contained within the stack holder or mechanism when the same stand at a relatively inclined vertical position within the hopper or magazine 22, while the gear 26 acts as a time feed device for gradually advancing singly the sheets 20 of the stack 21 into direct vertical position relative to the hopper or magazine 22. The said feed gear 26 is actuated for slow rotary movement through the medium of a pawl 28, which normally engages with a ratchet wheel 29 secured to the sleeve E', Figs. 2 and 5 of the drawings. The pawl 28 is pivoted to an upwardly projected swinging arm 29', the movement of which arm is controlled through the medium of a connecting link 30 by a bell crank 31 pivotally mounted to a bracket 32 and actuated by means of a vertically reciprocating connecting rod 33, the upper looped end 33' of which encircles an eccentric 33^a mounted upon the shaft 4, Fig. 2 of the drawings. The rotary movement of the shaft 4 is thus transmitted for imparting reciprocating movement to the eccentrically mounted connecting rod 33 for actuating the pawl 28 to impart a step rotation to the ratchet wheel 29 and in turn step rotation to the feed gear 26.

The stack or body of blanks when placed within the holder or magazine 22 bear against a spring held fulcrumed arm or lever 34, a portion of which when the magazine is empty projects above the plane of the floor 22' and it is the weight of the stack of sheets, if of sufficient number, placed within the magazine which bearing upon the fulcrumed lever or arm 34, holds the same downwardly pressed and the lower edge of the innermost blank is within the sphere of or in fact to rest between the teeth of the feed gear 26, the upper edge portion of the sheets bearing against the sustaining bar 34'. As rotation is imparted to the feed gear 26 the blanks are first slightly raised and as the movement of the feed gear 26 is continued they are lowered to clear the supporting rod 34' and carried inwardly until they stand in vertical position with the face of the innermost blank resting against the retaining bars 35. The position of the blanks as gradually fed or advanced from an incline to the horizontal into vertical position will be readily understood through reference to Fig. 2 of the drawings. The blanks standing in vertical position are disposed to be successively removed by the action of the suction head 19 and raised or elevated until the upper portion thereof is moved or advanced between the belts 3 and the surface of the drum 4, being frictionally engaged thereby and raised or elevated as previously stated until discharged from the apparatus onto a table or delivery chute 24. As the sheets or blanks of the stack 21 are advanced or moved inwardly by the feed gear 26 into vertical position, the lower end portion of the innermost sheet bears against an upwardly projected spring held arm 36 pivotally mounted for swinging movement to a bracket 37 and connected by a link 38 to a cam plate 38', and as the weight or pressure of the blanks moved into vertical position is gradually increased against the arm 36, the same is forced inwardly, gradually drawing therewith through the medium of the connecting link 38, the cam 38' for engagement with the pawl 28 to lift the same out of engagement with the ratchet wheel 29. With the pawl thus released from its engagement with the ratchet wheel 29, the action of the feed gear 26 is discontinued, on the inner part of the magazine being freed of sheets or blanks, the tension of the spring 39 forces outwardly the arm 36, throwing the cam 38' to release the pawl 28, permitting the same to drop into engagement with the ratchet wheel 29, to resume the feeding of sheets from the front part of the magazine.

After the sheets delivered into the magazine or hopper have been advanced inwardly to such a point as to be moved out of contact with the upwardly projected portion of the fulcrum arm 34 the tension of the spring 34^2 swings upwardly the inner end of the said arm or lever to bear against a pin or stud 32^a and lift the pawl 28 out of engagement with the ratchet wheel 29, thus discontinuing the feed of body blanks and by so doing indicating to the attendant that an additional supply of blanks or metal sheets must be placed within the magazine or holder.

At times, during the operation of the apparatus, there is raised or elevated from within the stack holder or magazine a sheet or blank of a thickness in excess of the accepted thickness for the blanks or sheets of metal, or by reason of a gummy condition of the sheets there may be adhering of one sheet to the other and thus two sheets be raised simultaneously through the action of the suction elevating means from within the stack or holder. It is undesirable that sheets of excess thickness or for two sheets to be delivered from within the apparatus to the place of deposit designed for sheets of proper thickness and to prevent the occurrence of this, I have provided a simple form of mechanism for throwing out or deflecting sheets of excessive thickness or two adhering sheets, the equivalent of a sheet of excessive thickness. For this purpose, there is provided the trip arm 23' before referred to, the lower end of which arm is bifurcated and pivotally mounted to a projecting stud or bracket 40 of an open arcuated frame

40′, which frame is loosely mounted upon the shafts B and C centrally thereof, Fig. 6 of the drawing. Within the bifurcated portion of the arm 23′ is mounted a gauge roller 41, the distance between the periphery of the said gauge roller 41 and the surface of the drum D being equal to that of the thickness of a single sheet of proper thickness to pass therebetween. In case a sheet of undue thickness or two adhering sheets are raised by the action of the suction elevating means and delivered between the feed belts 3 and the surface of the drum D, the same when brought for movement beneath the gauge roller 41 will force the same outwardly and by so doing swing upwardly the free end of the trip arm 23′, the action of which is to throw upwardly the pivoted lever 42 to lift the pivoted switch 42′ and place the same into engagement with the contact 43 of an electrical circuit 43′ for closing the magnet 44 and energizing the same to draw inwardly an armature 44′, which, when drawn inwardly places the lower end thereof in position immediately above the notched portion 45 of an arm 45′ and which arm at its upper end is slotted at *b* for loose mounting upon a crank arm 46 projected from the shaft C, Figs. 1 and 4 of the drawing, the lower end of the arm 45′ on which is mounted the magnet 44 and equally so, swingingly mounted the armature 44′ is bifurcated to straddle the shaft 4. On the shaft 4 is mounted a cam 47, which during the rotary motion of the shaft 4 acts to raise and lower the arm 45′, but it will be understood that when the armature 44′ is out of engagement with the magnet 44 there is no movement of the arm 45′ transmitted to the crank arm 46 and the arm 45′ at such times being an idle one. However, when the armature 44′ is positioned for engagement with the notched portion 45 the upward throw of the arm 45′ is transmitted to the crank arm 46 for oscillating the shaft C to raise or swing upwardly the deflecting plate 23, which plate when swung upwardly releases the downward deflecting pressure onto the outwardly moving sheets or blanks, so that the same spring upwardly so to speak and move from within the machine or apparatus on a line above that of the chute 24 and thus remain separate from sheets of proper thickness discharging from the apparatus. Of course, after a sheet of excess thickness or two adhering sheets have been discharged from the apparatus above the chute 24 the upward pressure onto the gauge roller is released, when the trip arm 23′ falls by gravity and the lever 42 falling therewith causes a dropping of the switch 42′ to break connection with the contact 43, thus opening the electrical circuit and releasing the armature 44′ which swings outwardly by gravity and the deflecting plate 23 lowers to normal position for guiding or directing the outflowing sheets within the chute or runway 24.

From the foregoing it will be noted that provision is made for controlling the feed or delivery of the sheets or blanks in accordance with the thickness thereof so that oversized sheets are thrown out of the machine for delivery at a point separate from that at which are deposited the blanks or sheets of proper thickness; that means are provided for automatically cutting out the inward feed of the blanks within the hopper or magazine 22 on a given number of blanks being placed in proper vertical position for the elevation or removal thereof singly from the hopper to within the sphere of the delivery means of the apparatus, and that means are provided for automatically discontinuing the inward feed of the blanks within the hopper on the stack of blanks being carried or advanced inwardly beyond a certain point so as to notify or advise the operator of the machine that a fresh supply or stack of blanks are to be placed within the magazine or holder.

While the invention has been described in its preferred embodiment it will be understood that there is no intent to limit or restrict the invention to the details of construction and the details of the interworking parts herein described and illustrated in the drawings, but, on the contrary, I wish to be understood as claiming the invention as broadly as the state of the art will warrant.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. An apparatus for the described purpose comprising a holder adapted to contain a stack of blanks, means for initially separating successively the lower edges of said blanks and re-stacking them within said holder; and means for successively removing the re-stacked blanks from said holder.

2. In an apparatus for the described purpose, a holder adapted to contain a stack of blanks, and means for successively separating the lower edges of and re-stacking said blanks within said holder.

3. In an apparatus for the described purpose, a holder having a portion adapted to receive a stack of blanks, means for initially separating successively the lower edges of said blanks, shifting the separated blanks to a second portion of said holder, and re-stacking them in said second portion.

4. In an apparatus for the described purpose, a holder adapted to contain a stack of substantially vertically disposed blanks, and means for successively separating the lower edges of and re-stacking said blanks within said holder.

5. In an apparatus for the described pur-

pose, a holder adapted to contain a stack of substantially vertically disposed blanks, and a gear for separating said blanks at their lower edges and for re-stacking the same.

6. In an apparatus for the described purpose, a holder adapted to contain a stack of blanks, and a gear for relatively moving said blanks one upon another in said holder.

7. In an apparatus for the described purpose, a holder adapted to contain a stack of blanks, and a gear for separating and relatively moving said blanks one upon another in said holder.

8. In an apparatus for the described purpose, a holder adapted to contain a stack of vertically disposed blanks, a movable member for supporting said blanks by engagement with the lower edges thereof, and means for successively spacing apart the bottom edges of said blanks within said holder.

9. In an apparatus for the described purpose; a holder having a portion adapted to contain a stack of blanks, means for shifting the lower parts only of said blanks to a second portion of said holder, and devices for controlling the operation of said shifting means in accordance with the number of blanks within the first mentioned portion of said holder.

10. In an apparatus for the described purpose; a holder having a portion adapted to contain a stack of blanks, means for shifting said blanks sidewise to a second portion of said holder, and devices for controlling the operation of said shifting means in accordance with the number of blanks within the second mentioned portion of said holder.

11. In an apparatus for the described purpose, a holder having a portion adapted to contain a stack of blanks, means for successively removing said blanks from a second portion of said holder, and means for spacing apart and shifting said blanks from the first mentioned portion of said holder into the sphere of action of said removing means.

12. An apparatus for the described purpose comprising a holder adapted to contain a stack of substantially vertically disposed blanks, means for spacing apart the bottom edges of the blanks, and means for imparting continuous linear movement to the endmost blank of the stack to remove said blank from said holder.

13. An apparatus for the described purpose comprising a holder adapted to contain a stack of substantially vertically disposed blanks, means for separating the endmost blank from the stack and suction means for removing the endmost separated blank of said stack by a continuous upward movement.

14. An apparatus for the described purpose comprising a holder adapted to contain a stack of substantially vertically disposed blanks, means for initially moving the endmost blank of said stack away from the succeeding blank, and means for engaging the moving blank and removing it from said holder by a continuation of its initial movement.

15. An apparatus for the described purpose comprising a holder adapted to contain a stack of substantially vertically disposed blanks, means for initially moving the endmost blank away from the following blank, and means for moving the endmost blank of said stack vertically, and means for engaging the moving blank and carrying it out of said holder and into a substantially horizontal position.

16. An apparatus for the described purpose comprising a holder adapted to contain a stack of substantially vertically disposed blanks, means for spacing apart the bottom edges of the blanks, means for initially moving the endmost blank of said stack vertically, a revolving drum positioned to engage the upper end portion of the moving blank, and means for causing said blank to follow the surface of said drum into a substantially horizontal position.

17. An apparatus for the described purpose comprising a holder adapted to contain a stack of substantially vertically disposed blanks, a gear for feeding the bottom edges of the blanks, means for initially moving the endmost blank of said stack vertically, a revolving drum positioned above said holder, and a flexible belt adapted to follow the surface of said drum from a substantially vertical position to a substantially horizontal position, said drum and said belt being adapted to grip the upper end portion of the moving blank to carry said blank out of said holder and into a substantially horizontal position.

18. In an apparatus for the described purpose, a holder adapted to contain a stack of blanks in upright position resting on their bottom edges, a member adapted to be brought into contact with the surface of the endmost blank of said stack, means for causing said member to adhere to said surface, and mechanism for moving said member to slide said blank from said holder in the plane of said surface.

19. In an apparatus for the described purpose, a holder adapted to contain a stack of blanks in upright position resting on their bottom edges, a member positioned to engage the surface of the endmost blank of said stack, means for causing said member to adhere to said surface, mechanism for moving said member to slide said blank from said holder in the plane of said surface, and means for destroying the adhesion between said member and said blank when the latter is partially removed from the holder.

20. In an apparatus for the described pur-

pose, a holder adapted to contain a stack of blanks in upright position resting on their bottom edges, means for preliminarily separating the outermost blank from the stack, a movable member adapted to traverse the surface of the endmost blank of said stack, and means for causing said member periodically to adhesively engage said surface to partially remove said blank from said holder.

21. In an apparatus for the described purpose, a holder adapted to contain a stack of blanks in upright position resting on their bottom edges, means for preliminarily separating the outermost blank from the stack, a reciprocating member adapted to traverse the surface of the endmost blank of said stack, and means for causing said member to adhesively engage said surface during one portion of its movement to partially remove said blank from said holder.

22. In an apparatus for the described purpose, a holder adapted to contain a blank, a reciprocable suction member adapted to engage the surface of the said blank, a ported suction pipe on which said suction member slides and mechanism for moving said member to partially remove said blank from the holder by a sliding movement in the plane of said surface.

23. In an apparatus for the described purpose, a holder adapted to contain a blank, a movable suction member adapted to traverse the surface of said blank, and means, including a suction pipe on which the suction member is guided in its traversing movement, for partially exhausting said member to cause it to adhesively engage said surface to move said blank.

24. In an apparatus for the described purpose, a holder adapted to contain a blank, a reciprocating suction member adapted to traverse the surface of said blank, and a ported suction pipe on which the suction member slides and is guided for creating a partial vacuum within said member during its movement in one direction to cause it to engage and move said blank, said pipe having means for destroying said partial vacuum during the movement of said member in the other direction.

25. In an apparatus for the described purpose, a holder adapted to contain a blank, a reciprocating suction member adapted to traverse the surface of said blank, a guiding suction pipe for the suction member for moving said member into contact with said blank at one end of its stroke, and means operating through said pipe for creating a partial vacuum within said member while in contact with said blank to cause it to adhere to and move the same.

26. In an apparatus for the described purpose, a holder adapted to contain a blank, a movable suction cup adapted to traverse the surface of said blank, a suction pipe guiding said cup and a valve carried by said cup and said pipe and adapted to periodically connect the interior of said cup with said pipe, thereby producing a partial vacuum within said cup to cause it to adhere to and move said blank.

27. In an apparatus for the described purpose, a holder adapted to contain a blank, a movable suction cup adapted to traverse the surface of said blank, a suction pipe forming a slide for said cup, and a valve controlled by the movement of said cup and adapted to periodically connect the interior of said cup with said pipe, thereby producing a partial vacuum within said cup to cause it to adhere to and move said blank.

28. In an apparatus for the described purpose, a holder adapted to contain a stack of blanks in upright position resting on their bottom edges, means for preliminarily separating the endmost blank from the stack, and means for adhesively engaging the surface of the endmost separated blank of said stack and sliding said blank upward relative to said holder by a movement in a direction parallel with the plane of said surface.

In testimony whereof I have signed my name to this specification.

JAMES A. GRAY.