Oct. 26, 1954 H. W. SIDMAN 2,692,774

BLANK FEEDING MECHANISM WITH BREAKER UNIT

Filed July 3, 1951 3 Sheets-Sheet 1

Fig. 1

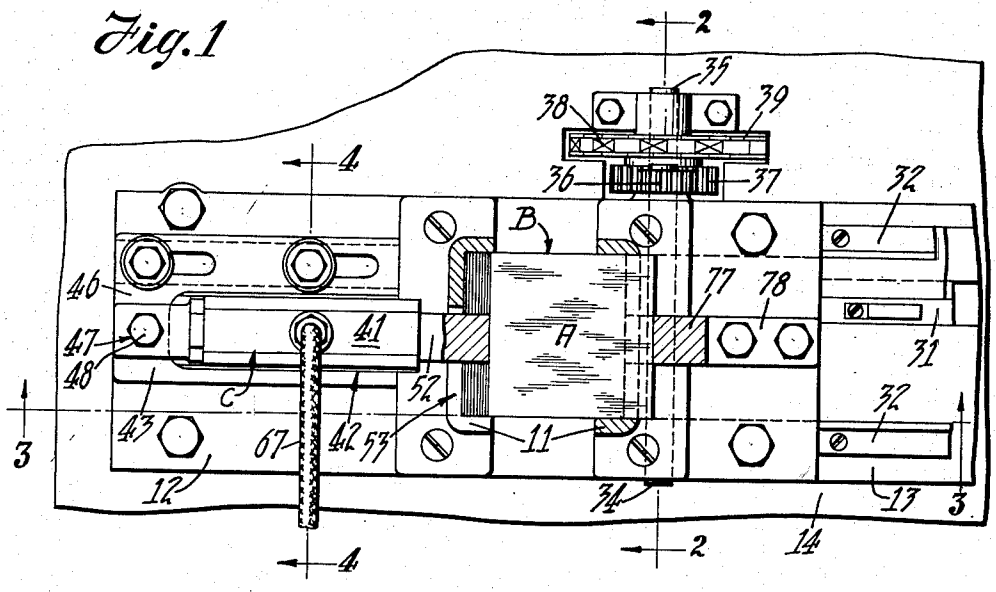
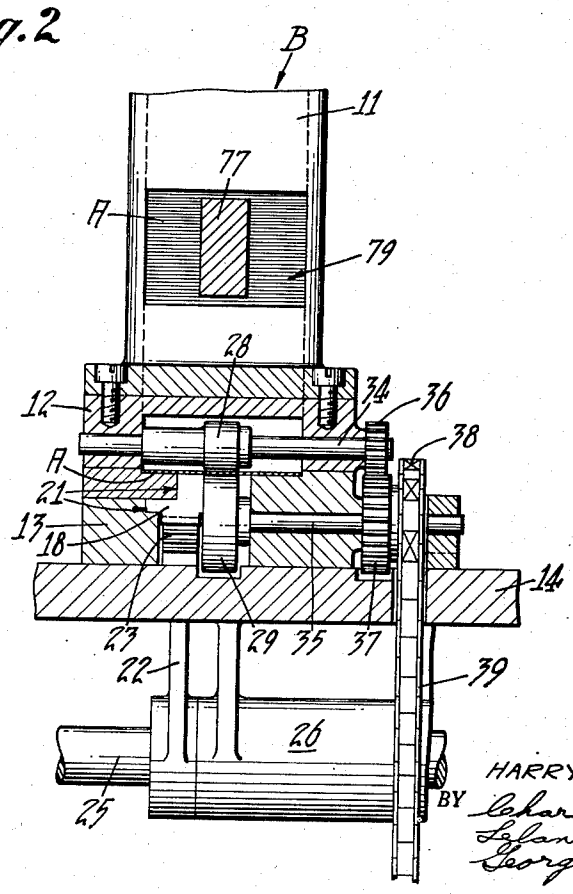


Fig. 2



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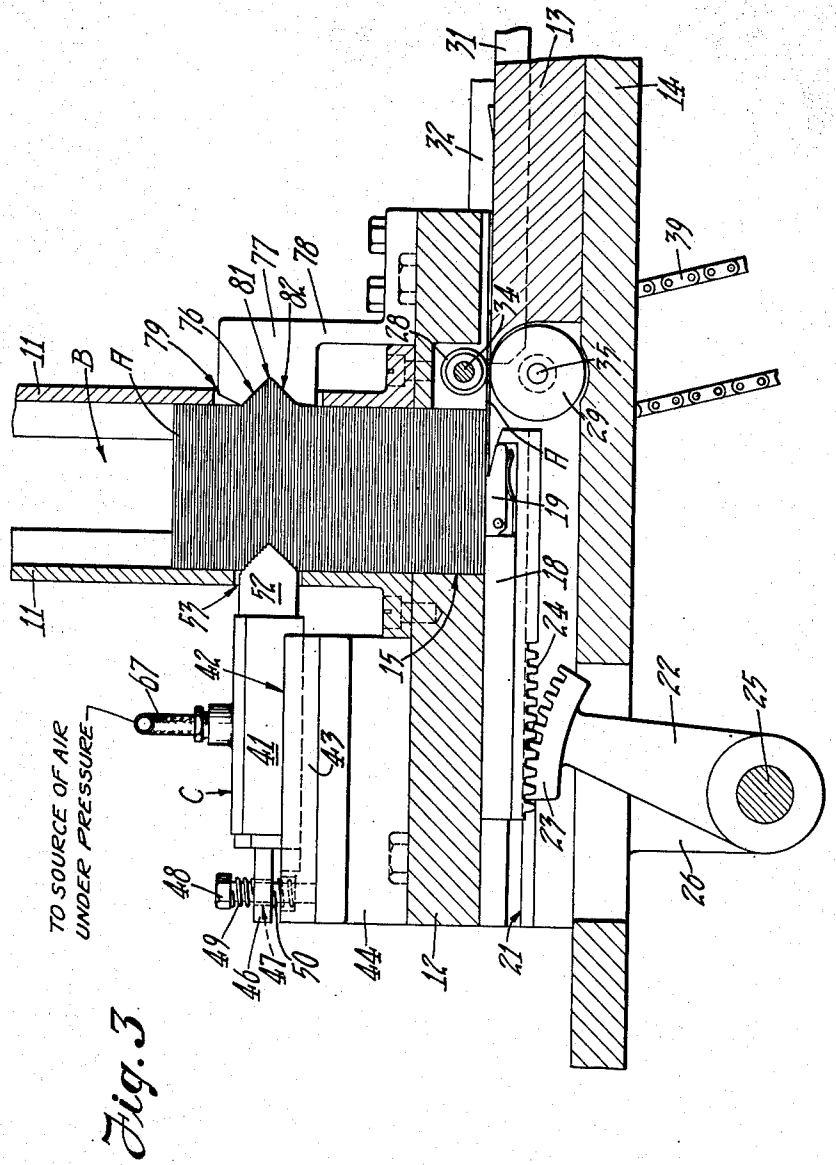

Fig. 3

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Fig. 4

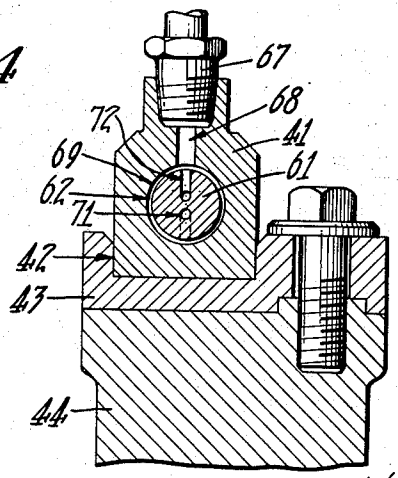


Fig. 5

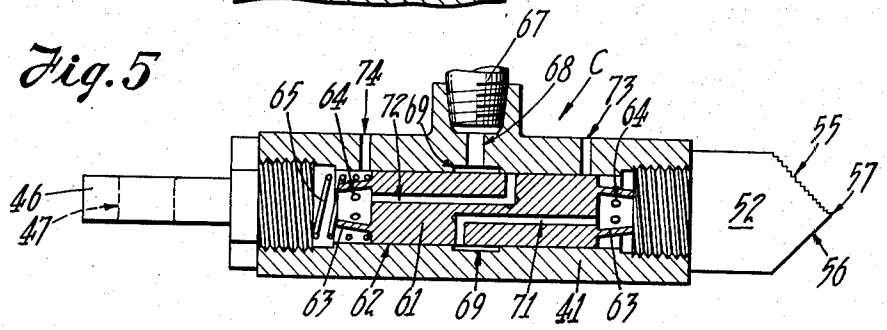


Fig. 6

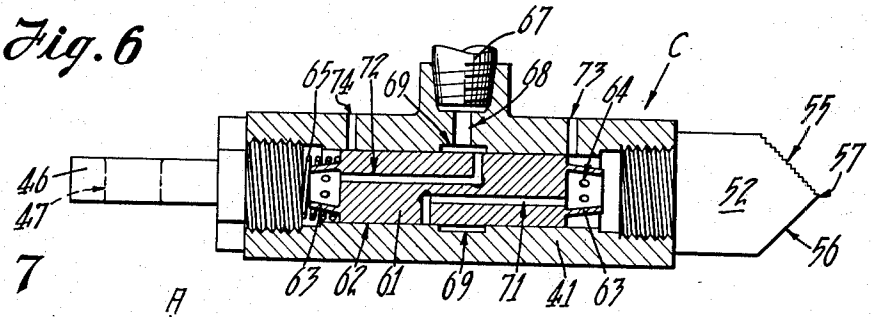
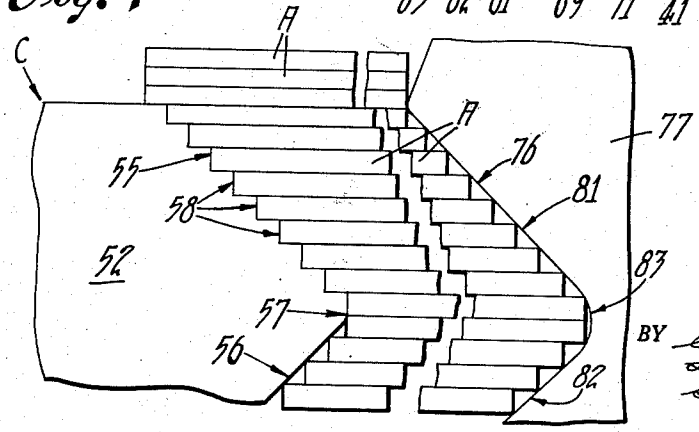


Fig. 7



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UNITED STATES PATENT OFFICE

2,692,774

BLANK FEEDING MECHANISM WITH BREAKER UNIT

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Application July 3, 1951, Serial No. 235,079

6 Claims. (Cl. 271—18)

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The present invention relates to a mechanism for feeding blanks individually from a stack of such blanks and has particular reference to devices for shifting the blanks in the stack relative to each other to break them apart when they become stuck or blocked together.

In the manufacture of fibre containers many operations are performed upon flat blanks which are fed from stacks. Atmospheric conditions, such as heat and humidity, often affect such blanks and cause them to stick together under pressure in a stack with the result that considerable difficulty is experienced in feeding them individually from the stack. In like manner, certain coating materials applied to the blanks cause them to stick together and prevent their individual feeding from a stack. This latter problem of adhesion is also applicable to coated metal blanks and to certain kinds of uncoated metal blanks.

The instant invention contemplates overcoming these difficulties by the provision of devices which operate to break or shake the blanks apart while in stacked formation so that they can be readily fed from the stack individually.

An object of the invention is the provision in a blank feeding mechanism of devices wherein each blank in the stack may be shifted independently of and relative to adjacent blanks in the stack to break it apart from its adjacent blank so that it can be readily fed individually from the stack.

Another object is the provision of such a device wherein a very rapid vibrating or shaking movement may be obtained against the blanks in the stack to insure that each succeeding blank in the stack is engaged and moved separately relative to its adjacent blanks to facilitate breaking them apart.

Another object is the provision of such a device wherein the individual blanks are displaced laterally out of edgewise alignment relative to each other and are returned to edgewise alignment after displacement, thereby effecting a two-way or double breaking action which leaves the blanks in a uniformly stacked condition edgewise for efficient feeding individually.

Another object is the provision of such a device wherein the displaced blanks are guided during the breaking operation so that they are effectively returned to edgewise alignment prior to feeding individually from the stack.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying

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drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a top plan view of a feeding mechanism embodying the instant invention, with parts broken away;

Fig. 2 is a transverse section taken substantially along the line 2—2 in Fig. 1, with parts broken away;

Fig. 3 is a longitudinal section taken substantially along the line 3—3 in Fig. 1, with parts broken away;

Fig. 4 is an enlarged transverse sectional detail of a vibrator unit as taken substantially along the line 4—4 in Fig. 1, with parts broken away;

Figs. 5 and 6 are longitudinal sections of the vibrator unit shown in Fig. 4, the two views illustrating certain of the movable parts in different positions; and

Fig. 7 is an enlarged detailed view of the vibrator head and a guide in operation against the edges of blanks in a stack, portions of the head, the guide and the blanks being broken away.

As a preferred or exemplary embodiment of the invention the drawings illustrate a mechanism for individually feeding flat rectangular fibre blanks A from a vertical stack of such blanks located in a magazine B. The magazine B is defined by a pair of oppositely disposed U-shaped upright guide bars 11 (Figs. 1, 2 and 3) which support the stack of blanks A laterally on two opposing sides and thus retain the blanks in stacked position with the edges of the blanks in vertical alignment. The guide bars 11 at their lower ends are secured to a support plate 12 mounted on a bolster 13 carried on a frame member 14 which may be a part of a more elaborate machine. These guide rails 11 partially surround an opening 15 in the support plate 12, which opening constitutes a portion of the magazine B and into which the lower portion of the stack of blanks A extends. The stack is supported on the bolster 13 (see Fig. 2).

The blanks A are fed individually from the bottom of the stack by a reciprocating stroke bar 18 having a spring pressed feed dog 19 located beneath the magazine B. The stroke bar 18 operates in a longitudinal runway 21 formed in the bolster 13. Reciprocation of the stroke bar 18 is effected by a lever arm 22 formed with a segment gear 23 which meshes with rack teeth 24 formed on the stroke bar. The lever arm 22 is mounted on a rocker shaft 25 carried in a bearing 26 which depends from the frame member 14. Actuation of the rocker shaft 25 may be effected

in any suitable manner, such as that disclosed in connection with a similar feeding mechanism shown in United States Patent 2,334,213 issued November 16, 1943, to John H. Murch on Machine for Making Container Parts (see Figs. 9 and 10 of the patent).

On a forward stroke of the stroke bar 18 (toward the right as viewed in Fig. 3), the feed dog 19 engages behind the lowermost blank A in the magazine B and pushes the blank forward from under the stack to remove it from the magazine. During this feeding stroke, the feed dog 19 advances the leading edge portion of the blank into the grip of a pair of rapidly rotating feed rollers 28, 29 which take the blank away from the feed dog and advance it to any suitable place of deposit, such as an auxiliary stroke bar 31 for further advancement between suitable guide rails 32 secured to the bolster 13. The feed rollers 28, 29 are carried on respective shafts 34, 35 journaled in the support plate 12 and the bolster 13 and are rotated in unison by meshing spur gears 36, 37 carried on the shafts. The shaft 35 is driven by a sprocket 38 and a chain 39 in any suitable manner such as that shown in the above mentioned Murch Patent 2,334,213.

In order to insure that only individual blanks A are fed from the bottom of the magazine B, the blanks within the magazine, at a place immediately adjacent the lower end of the magazine, are individually shifted or displaced laterally relative to each other to break apart any blanks which may be stuck together. This breaking apart of the blanks preferably is effected by a rapidly operating vibrator device C which extends into the magazine B as best shown in Fig. 3.

The vibrator device C includes a generally rectangular slide 41 (see Figs. 1, 3, 4, 5 and 6) which is horizontally disposed adjacent and extends toward the magazine B. The slide operates in an open top slideway 42 so that it may be readily lifted out and swung free of the magazine for removal of blanks therefrom when necessary. The slideway is formed in a longitudinally adjustable plate 43 bolted to a bracket 44 secured to the support plate 12. The outer end of the slide 41 is provided with a horizontally disposed anchor lug 46 which is threaded into the end of the slide and which is formed with a vertical slot or elongated opening 47. The anchor lug 46 is floatingly anchored to a bolt 48 which loosely extends through the slot 47 in the anchor lug 46 and is threaded into the adjustable plate 43. A pair of light compression springs 49, 50 (Fig. 3) coiled around the bolt 48, and disposed one on each side of the anchor lug 46, permit the lug to float relative to the bolt and facilitate lifting of the slide 41 from its slideway 42 when desired.

The inner end of the slide 41 carries a vibrator or breaker head 52 which is threaded into the end of the slide and which extends into the magazine B through an opening 53 (Figs. 1 and 3) in the adjacent magazine guide rail 11. Adjacent one side of the breaker head 52 the opening 53 extends laterally across the guide rail (see Fig. 1) to permit swinging of the slide 41 on its anchor bolt 48 to remove the breaker head from the magazine.

The inner end of the breaker head 52 is wedge shaped or tapered and thus provides an upper angularly disposed face 55 tapering downwardly from the top of the head into the magazine and terminating substantially at the middle of the head (see Figs. 5, 6 and 7) and a lower face 56 tapering upwardly and into the magazine to meet the upper face at a vertex or blunt point 57. The upper face 55 of the head is formed with a plurality of right angled steps 58. The height of the riser of each step 58 is substantially equal to the thickness of a blank A, and each step rest supports a narrow margin of each blank at intervals during the downward movement of blanks over the steps. The lower face of the head 52 is smooth.

The breaker head 52 is rapidly reciprocated or vibrated within the magazine B preferably by a conventional vibrator unit which includes a freely reciprocable plunger 61 (Figs. 4, 5, 6) located within a bore 62 formed in the slide 41. The ends of the plunger are formed with open cups 63 having apertures 64 formed in their side walls. A compression spring 65 is interposed between one end of the plunger and the anchor lug 46 to hold the plunger against the breaker head 52 to facilitate starting the vibration of the plunger.

Vibration of the plunger 61 within the slide 41 preferably is effected by air under pressure by way of a pipe 67 threadedly secured to the slide 41. The pipe leads to any suitable source of compressed air. The slide end of the pipe communicates with a port 68 formed in the slide. The inner end of the port 68 communicates with an annular recess 69 formed in the slide within the bore 62. The recess 69 is adapted to transmit compressed air alternately to and through a pair of channels 71, 72 formed in the plunger 61. The channel 71 extends from the outer face of the plunger near the middle of the plunger to the cup 63 adjacent the breaker head 52. The channel 72 extends from the outer face of the plunger near its middle to the cup 63 adjacent the anchor lug 46.

In the starting position of the plunger 61 as shown in Fig. 5, the channel 71 is in communication with the annular recess 69 and the channel 72 is out of communication with the recess. Hence when compressed air from the pipe 67 flows through the port 68 into the recess 69, it also flows through the channel 71 into the cup 63 at the end of the channel and impinges against the inner end of the breaker head 52. This forces the plunger 61 back toward the opposite end of the bore 62 as shown in Fig. 6.

During this back travel of the plunger, it shifts the channel 71 out of communication with the recess 69 and moves the channel 72 into communication with the recess as shown in Fig. 6. This action reverses the flow of compressed air, cutting off the air from the channel 71 and passing it through the channel 72 and the adjacent cup 63 for impingement against the inner face of the anchor lug 46. The plunger is thus quickly returned to its original position as shown in Fig. 5 in which position the compressed air is cut off from the channel 72 and returned to the channel 71 for a repeat movement of the plunger. Vent channels 73, 74 in the slide 41 near the ends of the slide are provided to exhaust the spent air from the bore 62.

Thus a rapid reciprocation or vibrating action is set up in the plunger 61 and this vibrates the entire slide and the breaker head 52 carried thereon. It is for this purpose that the anchor lug 46 is loosely connected to the anchor bolt 48 through the elongated opening 47 in the anchor lug.

As the breaker head 52 vibrates rapidly within the magazine B, the stepped tapered face 55 of

the head impinges against the adjacent edges of the blanks A in the magazine as they move down by virtue of the removal of the blanks from the bottom of the magazine and thus shifts each blank laterally relative to its adjacent blank, thus displacing the blanks so that their outer edges are thrown out of vertical alignment and thus breaking apart any blanks which tend to stick together. As a blank in the magazine is engaged by the first step 58 in the head face 55 it is displaced a distance equal to the travel of the head. Thus this blank is broken free of the blank next above. Upon a return stroke of the head, the advanced blank falls upon the next lower step and the blank next above falls upon the first step. Thereafter these two blanks (taken as an example) are moved forward simultaneously, the blanks falling upon all of the steps in succession until the vertex 57 of the head is reached.

During this displacement and descending travel of the blanks their opposite edges are guided by a tapered smooth guiding face 76 (Figs. 3 and 7) formed in a stationary guide block 77 (see also Figs. 1 and 2) on a bracket 78 secured to the support plate. The guide block 77 extends into an opening 79 formed in the magazine guide rail 11 opposite the breaker head 52. The taper of the guide face 76 corresponds to the taper of the stepped face 55 of the breaker head 52. This guide face 76 is part of a V-shaped notch 81 (see also Fig. 7) formed in the guide block, the opposite part of the notch being provided with a smooth tapered guiding face 82 which corresponds to the taper of the smooth lower face 56 of the breaker head. The vertex (indicated by the numeral 83) of the notch 81 preferably is rounded or curved as best shown in Fig. 7.

When a blank A reaches the vertex 57 of the breaker head 52, its advancement is temporarily arrested by its position between the vertex 57 and the vertex 83 of the guide notch 81 as shown in Fig. 7, and the blank next above is thereby advanced across the lower blank. Vertical pressure of the upper blanks in the stack as the lower ones are removed forces the lower blank down along the lower guiding face 82 of the guide block 77 and thus pushes the lower blank rearwardly across the blank next above and thereby effects a return displacement of the blank. The blanks below the vertex 57 are thus forced by the lower guiding face 82 of the guide block backwardly against the smooth lower face of the breaker head thus in effect producing a two-direction or double breaking operation. Below the head vertex 57, the blanks move down without lateral displacement relative to each other until they reach the magazine guide rail 11. As the blanks engage the rail the upper blank is displaced in a rearward lateral direction relative to the blank next below until the edges of the blanks are in vertical alignment. Thereafter as the blanks move down through the remainder of the magazine their edges are in vertical alignment and the blanks are fully broken away from each other for proper feeding by the feed dog 19 of the stroke bar 18.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. A mechanism for feeding blanks individually from a stack, comprising in combination a magazine for holding a stack of blanks, feeding means adjacent one end of the magazine for removing the blanks individually from the stack, a breaker element extending into said magazine, said breaker element having a stepped tapered face for engaging against the adjacent edges of the blanks in the stack, each step on said face being substantially equal in height to the thickness of a said blank, means for rapidly reciprocating said breaker element toward and away from the edges of the blanks with a stroke substantially equal to the length of a said step to displace each blank individually and laterally relative to its adjacent blank to break the blanks apart when they are stuck together, and clearance means in said magazine disposed opposite said breaker element to receive said displaced blanks as they progress through said magazine to said feeding means.

2. A mechanism for feeding blanks individually from a stack, comprising in combination a magazine for holding a stack of blanks, feeding means adjacent one end of the magazine for removing the blanks individually from the stack, a breaker element extending into said magazine, said breaker element having a tapered face provided with a plurality of descending steps, each of said steps comprising a riser of a height substantially equal to the thickness of a blank and a rest surface for engaging against the adjacent edges and for supporting the adjoining margins, respectively, of the blanks in the stack, means for rapidly reciprocating said breaker element with a stroke substantially equal to the length of a said step rest toward and away from the edges of the blanks to displace each blank individually and laterally relative to its adjacent blank to break the blanks apart when they are stuck together, and a sloping guide in said magazine disposed opposite and substantially parallel to said breaker element to guide a displaced blank without distorting it.

3. A mechanism for feeding blanks individually from a stack, comprising in combination a magazine for holding a stack of blanks, feeding means adjacent one end of the magazine for removing the blanks individually from the stack, a vibrator member extending toward said magazine, a floating anchor mounting for said vibrator member at one end thereof, a breaker head on said vibrator member at its opposite end, said breaker head extending into said magazine and having a stepped tapered face for engaging against the adjacent edges of the blanks in the stack, and means for rapidly vibrating said vibrator member toward and away from said magazine to displace each blank individually and laterally relative to its adjacent blank to break the blanks apart when they are stuck together to facilitate feeding of the blanks individually from the magazine.

4. A mechanism for feeding blanks individually from a stack, comprising in combination a magazine for holding a stack of blanks, feeding means adjacent one end of the magazine for removing the blanks individually from the stack, an open top slideway extending toward said magazine, a vibrator slide member removably disposed in said slideway to facilitate swinging of said member out of operating position, a floating anchor mounting for said vibrator member at one end thereof, a breaker head on said vibrator member at its opposite end, said breaker head extend-

ing into said magazine and having a stepped tapered face for engaging against the adjacent edges of the blanks in the stack, and means for rapidly vibrating said vibrator member toward and away from said magazine to displace each blank individually and laterally relative to its adjacent blank to break the blanks apart when they are stuck together to facilitate feeding of the blanks individually from the magazine.

5. A mechanism for feeding blanks individually from a stack, comprising in combination a magazine for holding a stack of blanks, feeding means adjacent one end of the magazine for removing the blanks individually from the stack, a wedge shaped breaker element extending into said magazine for engaging against the adjacent edges of the blanks in the stack, means for rapidly reciprocating said breaker element toward and away from the edges of the blanks with a stroke equal in length to a fraction of the depth of extension of the breaker element into said magazine to displace each blank out of edgewise alignment individually and in one direction relative to its adjacent blank to break the blanks apart when they are stuck together, and a stationary guide block having a notch corresponding to the wedge shape of said breaker element, the guiding faces of said notch being disposed opposite and substantially parallel to the faces of said breaker element for guiding the displaced blanks edgewise in said one direction and then edgewise in an opposite direction as they move through said magazine past said breaker element preparatory to removal from the stack by said feeding means.

6. A mechanism for feeding blanks individually from a stack, comprising in combination a magazine for holding a stack of blanks, feeding means adjacent one end of the magazine for removing the blanks individually from the stack, a wedge shaped breaker element extending into said magazine, said breaker element having a tapered stepped breaking face and a reversely tapered smooth guiding face, each step in said stepped breaking face having a riser and a rest surface for engaging against the adjacent edges and adjoining margins, respectively, of the blanks in the stack, means for rapidly reciprocating said breaker element toward and away from the edges of the blanks with a stroke equal substantially to the length of a said step rest to displace each blank out of edgewise alignment individually and in one direction relative to its adjacent blank to break the blanks apart when they are stuck together, and a stationary guide block opposite said breaker element, said block having a pair of smooth guiding faces substantially parallel to the breaker and guiding faces of said breaker element for guiding the blanks as they move through said magazine first in one direction as they pass along the stepped face of said breaker element and then in a reverse direction as they continue along the smooth guiding face of said breaker element preparatory to removal from the stack by said feeding means.

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