Feb. 26, 1946. C. S. WOOLFORD 2,395,527

FEEDING DEVICE

Filed Dec. 17, 1942 4 Sheets-Sheet 1

Fig. 1

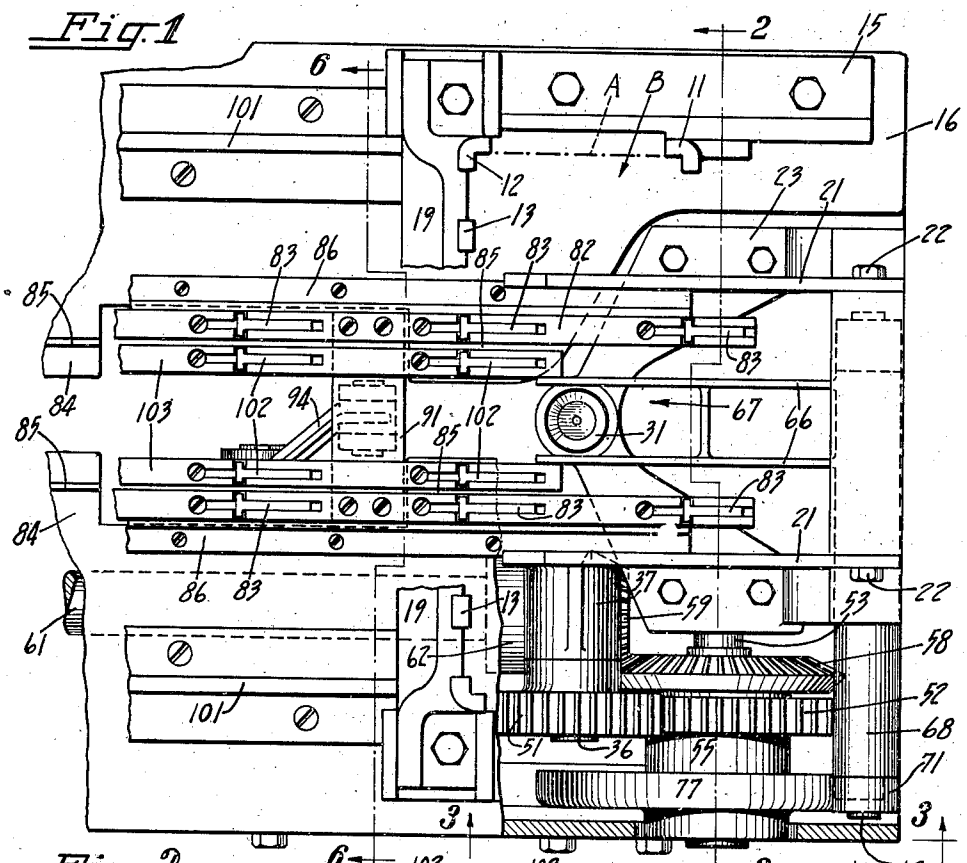
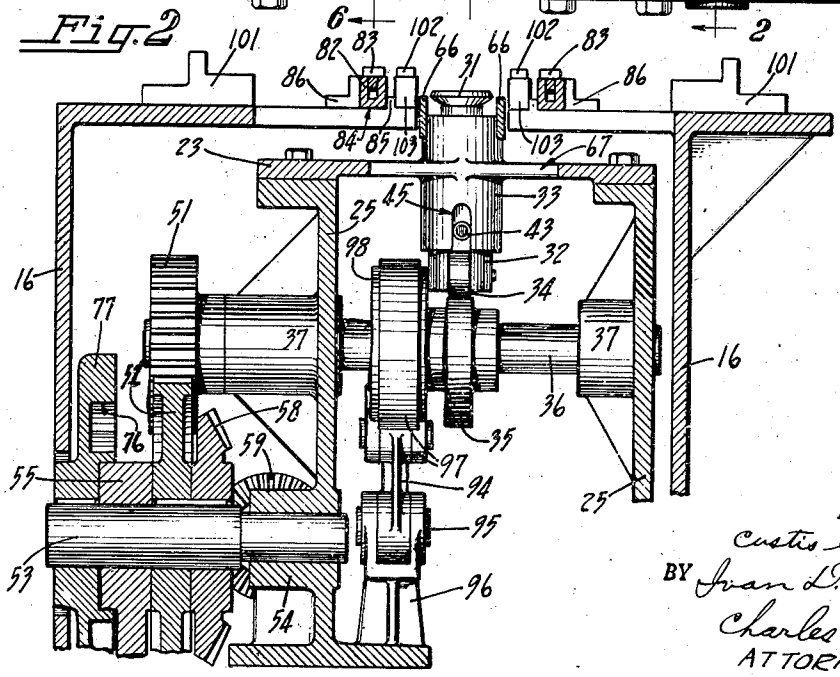


Fig. 2



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FEEDING DEVICE

Filed Dec. 17, 1942 4 Sheets-Sheet 2

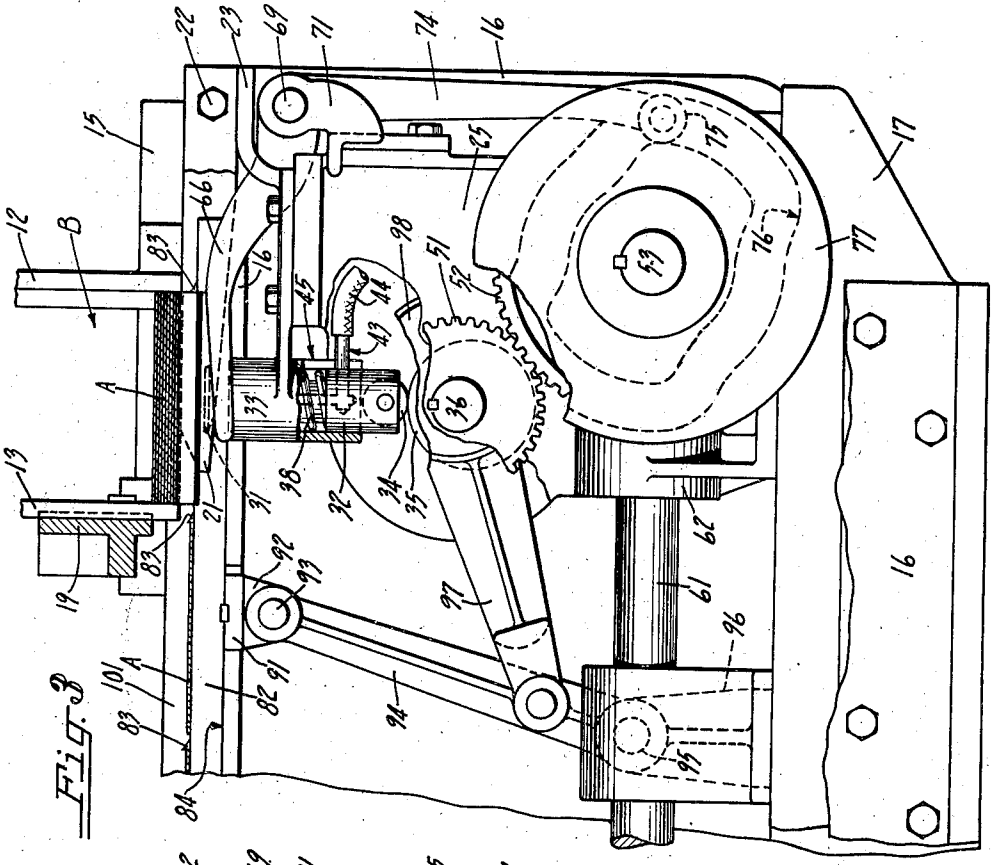


Fig. 3

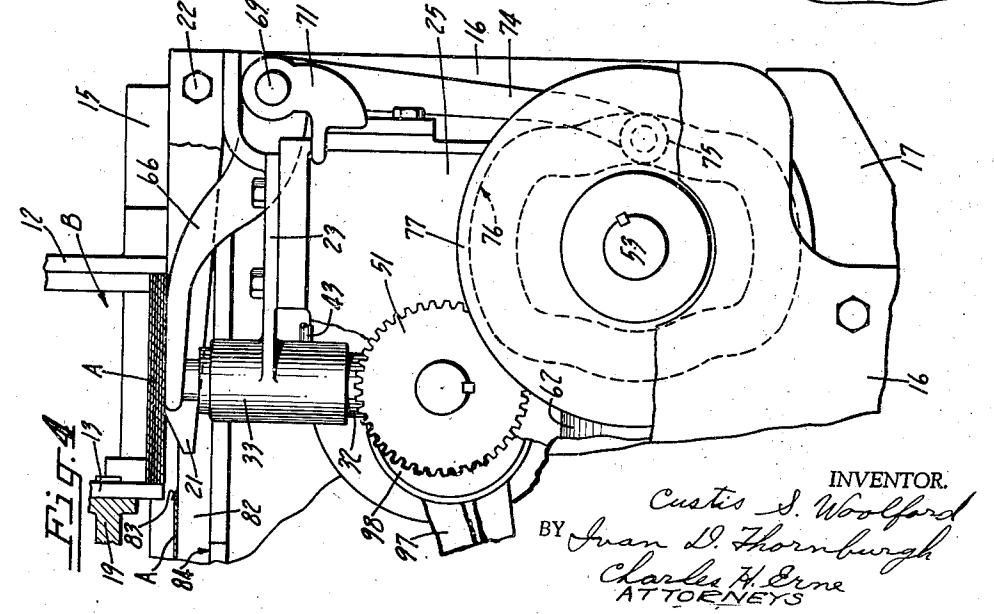


Fig. 4

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FEEDING DEVICE

Filed Dec. 17, 1942 4 Sheets-Sheet 3

Fig. 5

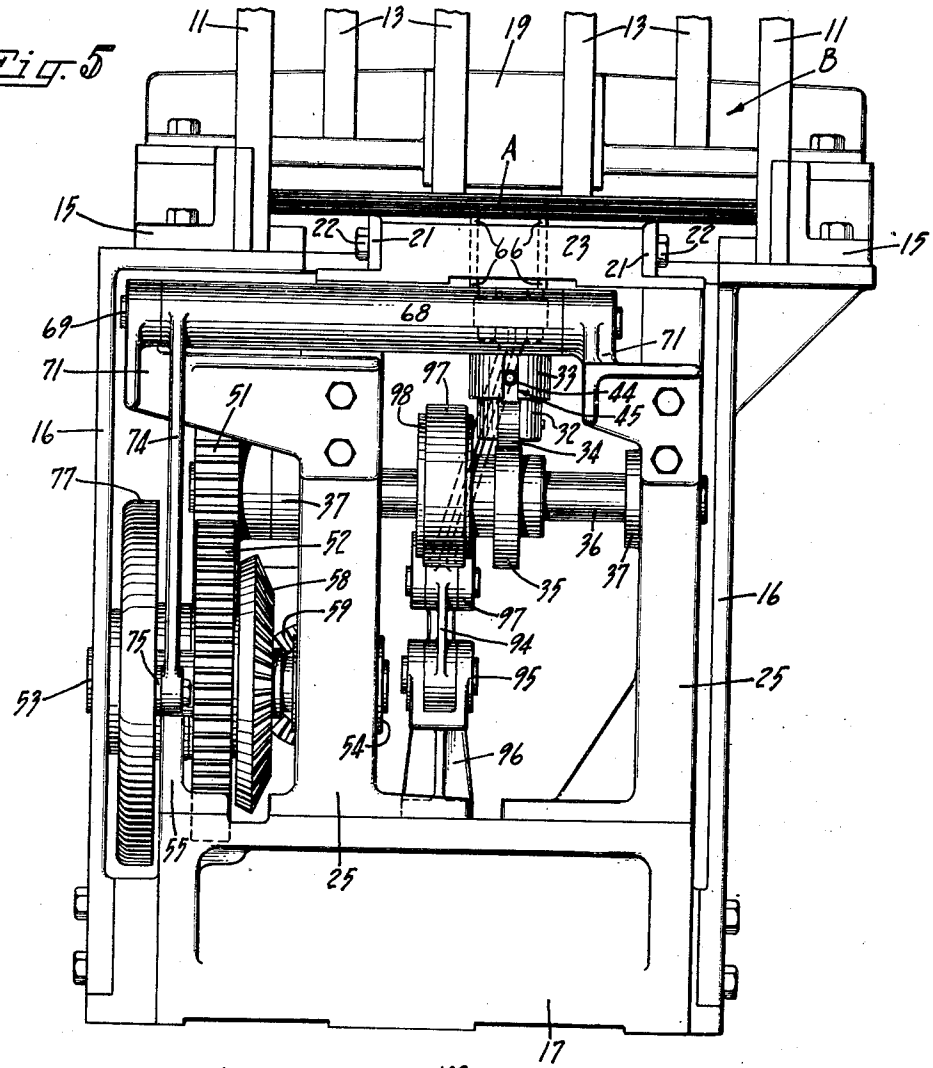
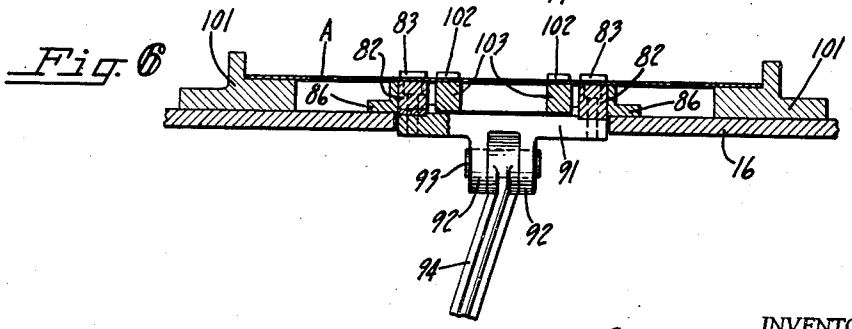


Fig. 6



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FEEDING DEVICE

Filed Dec. 17, 1942 4 Sheets-Sheet 4

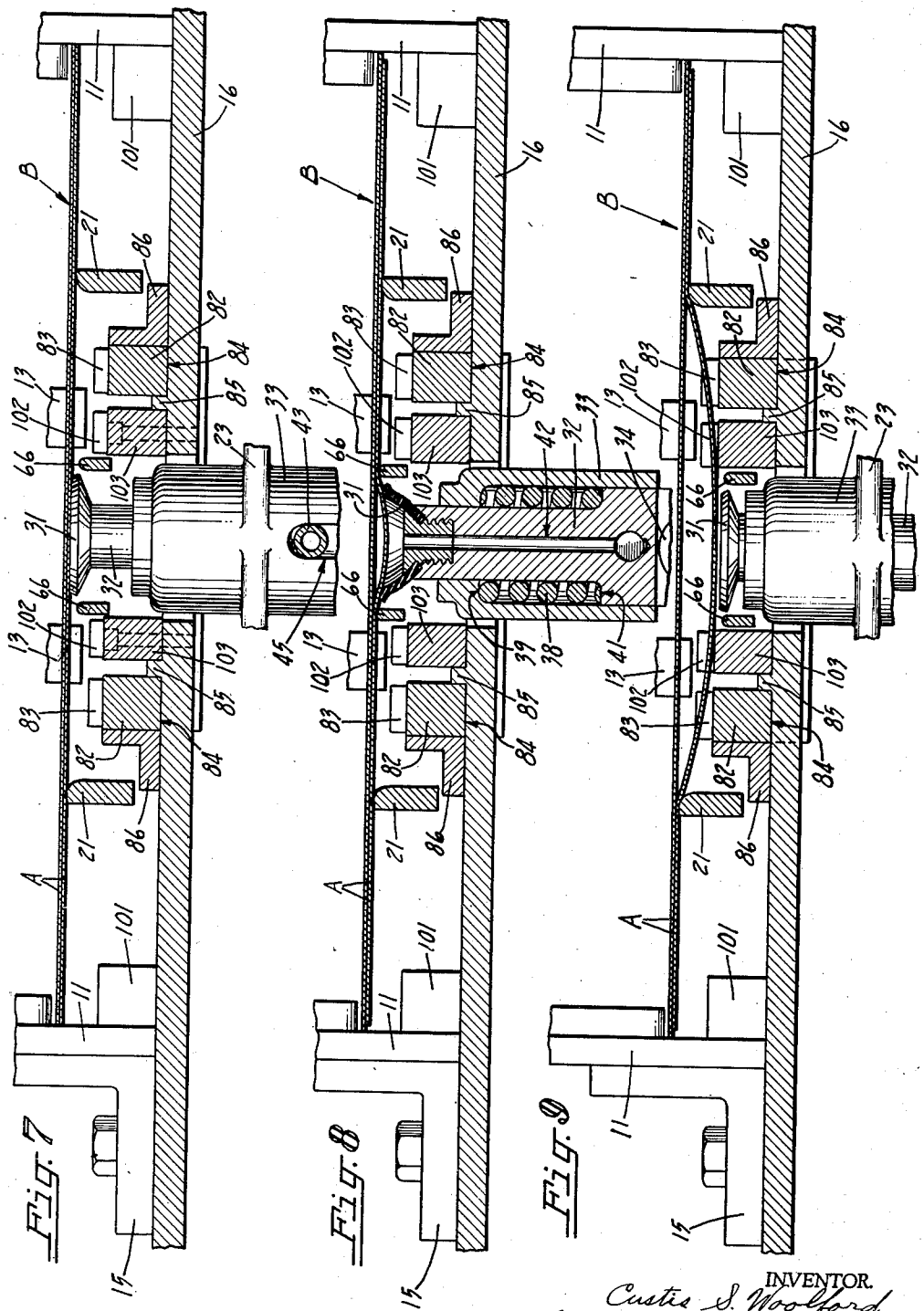


Fig. 7

Fig. 8

Fig. 9

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UNITED STATES PATENT OFFICE

2,395,527

FEEDING DEVICE

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Application December 17, 1942, Serial No. 469,384

3 Claims. (Cl. 271—32)

The present invention relates to feeding devices for sheet material blanks retained in a stack and has particular reference to buckling individual blanks to separate them one from another during the feeding operation.

In the feeding of individual sheet material blanks from a stack of such blanks, the blank next adjacent in the stack often clings to the one being fed and is removed from the stack with the fed blank. This results in the simultaneous advancement of two blanks. When such stuck-together blanks are passed into automatic machines for producing an operation on them, such as for example, the forming of container or can parts therefrom, the double thickness often results in damage being done to the machine.

The instant invention contemplates overcoming this difficulty by providing means for sharply bending or buckling each individual blank in a predetermined locality as it is being removed from the stack so that separation of the blank being fed from the other blanks in the stack will be assured.

An object therefore of the invention is the provision of a feeding device for removing sheet material blanks from a stack of such blanks wherein each individual blank as it is being removed from the stack is bent sharply or buckled throughout a relatively small area in order to insure separation of the blank being fed from the remaining blanks in the stack.

Another object is the provision in such a feeding device of a movable support for the stack of blanks wherein the support engages the blank while it is being buckled to partially separate the blank from the others in the stack and the support is movable away from the separated blank after such a buckling action to allow such a blank to be further separated.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in conjunction with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a top plan view of a feeding device embodying the instant invention, with parts broken away and parts shown in section;

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

Figs. 3 and 4 are side elevations as viewed along a plane indicated by the line 3—3 in Fig. 1, with parts broken away and parts shown in section, the two views being illustrative of different positions of certain of the moving parts of the device;

Fig. 5 is an end elevation as viewed from the right in Fig. 1;

Fig. 6 is a transverse sectional detail taken substantially along the broken line 6—6 in Fig. 1, with parts broken away; and

Figs. 7, 8 and 9 are enlarged transverse sectional views showing different stages in removing a blank from a stack of such blanks.

As a preferred embodiment of the instant invention the drawings illustrate a device for feeding sheet metal can body blanks A (Figs. 3 and 5) from a stack of such blanks retained in a magazine B. The blanks are fed individually from the bottom of the magazine and are advanced along a straight line path of travel into a can making machine or to any other suitable place of deposit, as desired.

The blanks A are retained within the magazine in stacked order by a plurality of vertical guide rods, which include a pair of rear corner posts 11 (Figs. 1, 3 and 5) a pair of front corner posts 12, and a plurality of intermediate posts 13 disposed between the two front corner posts. The two rear corner posts 11 are secured to angle brackets 15 which are bolted to a pair of side frames 16 which constitute part of the main frame of the device. These frames are bolted to a base plate 17. The two front corner posts 12 and their intermediate posts 13 are secured to a bridge member 19 which extends across the machine and which has its ends bolted to the side frames.

The stack of blanks A within the magazine is supported on a pair of spaced and parallel, stationary stack support rails 21 which are secured by bolts 22 to a horizontal support bracket 23. This bracket is secured to a pair of spaced and parallel inner or auxiliary frame legs 25 which are bolted to the base plate 17.

As an incident to feeding the blanks from the bottom of the magazine, the lowermost blank is partially separated from the blanks next above by drawing or bowing it downwardly. This bowing of the blank is effected by a suction cup 31 which is beneath and near the geometric center of a blank in the magazine.

The suction cup 31 is carried on the upper end of a vertical shouldered stem 32 (Figs. 3 and 8) which slides in a bearing 33 formed on the support bracket 23. The lower end of the stem carries a cam roller 34 which rests on and operates against an edge cam 35 (see also Fig. 5) mounted on a constantly rotating cam shaft 36

journaled in bearings 37 formed on the inner frame legs 25. The cam roller is maintained in engagement with the cam by a compression spring 38 which surrounds the shouldered portion of the stem within the bearing 33 and is interposed between a shoulder 39 in the bearing and a shoulder 41 on the stem.

A passageway or port 42 (Fig. 8) in the stem 32 connects the cup with a coupling 43 which is threaded into the side of the stem. The coupling carries one end of a flexible tube 44 which leads from any suitable source of vacuum supply controlled by a valve of the type which is usual in vacuum cup feeding devices. The coupling extends through a vertical slot 45 in the slide bearing 33 and this construction prevents the stem from rotating in the bearing.

The cam shaft 36 is rotated by way of a spur gear 51 which is mounted on an outer end of the shaft. The gear meshes with and is driven by a spur gear 52 mounted on a short jack shaft 53 journaled in an inner bearing 54 formed in the adjacent inner frame legs 25 and in an outer bearing bracket 55 bolted to the base plate 17. The jack shaft is rotated by a bevel gear 58 which is mounted thereon and which meshes with a main driving pinion 59 carried on a main drive shaft 61 journaled in a bearing 62 formed in the adjacent inner frame leg 25. The main shaft is driven from any suitable source of power.

Hence through the gear train connection with the main shaft 61 just described, the suction cup cam 35 is continuously rotated. This operating through the cam roller 34, raises the suction cup 31 through an upward or idle stroke. Following this action the spring 38 moves the cup downward through a working stroke in time with the other moving parts of the mechanism.

Working in conjunction with the moving suction cup 31, is a pair of spaced and parallel, movable support arms 66 (Figs. 1, 2 and 3) disposed one on each side of the suction cup and closely adjacent thereto. These support arms extend up through an opening 67 formed in the support bracket 23. The outer ends of the arms are connected with a long transverse hub 68 (see also Fig. 5) which is mounted for free rocking movement on a pivot shaft 69 the ends of which are carried in bearing brackets 71 bolted to the inner frame legs 25.

The hub 68 is formed with a depending rock lever 74 which carries at its lower end a cam roller 75. This roller operates in a cam groove 76 of a face cam 77 keyed onto the outer end of the jack shaft 53. The cam 77 is timed with the suction cup cam 35.

Hence, when the suction cup 31 moves up into engagement with the lowermost blank A of the stack in the magazine B, as shown in Fig. 7, the vacuum control valve (not shown) is opened to connect the cup with the source of vacuum and this exhausts the air from the cup and thereby results in a clinging of the lowermost blank to the cup. Immediately thereafter the support arms 66 move up and come to rest in engagement with this said lowermost blank, as shown in Fig. 4.

The support arms 66 remain in this blank supporting position while the suction cup 31 moves down through an initial portion of its working stroke. In moving down, the cup draws down the middle portion only of the blank, i. e., that portion between the two support arms 66, bringing the blank into a sharply bowed or buckled condition, as shown in Fig. 8. This resulting sharp bend in the blank permits air to flow into the space between the bowed portion of the lowermost blank and the blank next above and thereby insures positive separation of that part of the two lower blanks at such locality disposed between the support arms.

After such a preliminary or partial separation of these two adjacent blanks, the support arms 66 move downwardly as the suction cup 31 moves but at a slightly greater speed. This permits the cup to draw the lowermost blank down into a greater bowed condition, the curving of the blank taking place between the stationary support rails 21, as shown in Fig. 9. This action insures full separation of the lowermost blank from the one immediately thereabove in the stack.

At the completion of this bowing action on the blank the cup 31 and the support arms 66 slightly below it come to rest in the position shown in Fig. 9. When this position is reached, the vacuum within the cup is broken in the usual manner by way of the control valve, thus releasing the cup hold on the blank. The blank springs back enough to form the small space between the sheet and the cup but the sheet remains in its bowed condition, being held in part by the weight of the blanks in the stack. The bowed sheet is ready for removal from the magazine.

Removal of the bowed blank from the magazine is brought about preferably by a pair of spaced and parallel feed bars 82 having depressible feed fingers or dogs 83 spaced at intervals along their lengths. These feed bars are located adjacent the outer sides of the movable support arms 66 and slide longitudinally on a top surface 84 of the side frames 16. The bars are maintained in proper position on the slide surface by upwardly extending shoulder projections 85 formed on the frames and which engage the inner face of the feed bars. On the outer sides, the bars slide along guide rails 86 which are bolted to the side frames.

The two feed bars 82 are reciprocated in unison, through a forward or working stroke and thence through a return stroke, by way of a tie block 91 (Figs. 1, 3 and 6) to which the bars are secured. The tie block is formed with a pair of depending lugs 92 which carry a pivot pin 93 pivotally connecting with the upper end of an actuating lever 94. The lower end of the lever is mounted on a pivot pin 95 which is carried in a bearing bracket 96 bolted to the base plate 17. Intermediate its length the lever is connected to an eccentric arm 97 of an eccentric 98. The eccentric is keyed onto the cam shaft 36. Through this eccentric the lever is rocked and the feed bars are shifted through their feeding and return strokes in time with the other moving parts of the device.

The drawing down of the lowermost blank A in the magazine B takes place while the feed bars 82 are in a retracted position at the end of a return stroke and are ready to begin the next forward stroke. In this position the rear or outer feed fingers 83 are in back of the magazine.

Hence when a blank is drawn down, as hereinbefore explained, its bent or bowed portion is disposed in front of and in the path of travel of the feed fingers 83, as best shown in Figs. 1, 3 and 9. Thus when the feed bars move forward through a feeding stroke, the adjacent fingers 83

engage the bowed down blank and push it forward and out of the magazine from beneath the remaining blanks retained therein. The blank is guided by side guides 101 which are bolted to the tops of the side frames 16.

After removal of the blank from the magazine it is advanced by the feed bars 82 in a step-by-step movement along the guides 101 to any suitable place of deposit, as hereinbefore explained. After each step of advancement the blanks are held by pairs of holding fingers 102 against their return with the feed bars 82. These holding fingers are depressible to permit of the advancement of the blanks thereover. The holding fingers are located at spaced intervals in a pair of spaced and parallel stationary holding bars 103 which are secured to the tops of the side frames 16. These bars are disposed parallel with the feed bars 82 and are located one each between the feed bars and the movable support arms 66.

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. In a mechanism for feeding and separating sheet material blanks from a stack of such blanks, the combination of a magazine for retaining the stack of blanks, separating means disposed adjacent an outer blank in the stack for partially separating it from the stack, a pivotally mounted substantially vertically movable support for engaging the said blank on opposite sides of said separating means for restricting flexure of the blank to a relatively small area, the resulting sharp bending of the blank separating it in part from the blank next adjacent in the stack, and means for pivotally moving said support in a substantially vertical path of travel to remove the support from the blank to allow for separation of a greater blank area, by said separating means preparatory to feeding said partially separated blank from the magazine.

2. In a mechanism for feeding and separating sheet material blanks from a stack of such blanks, the combination of a magazine for retaining the stack of blanks, a movable suction cup disposed adjacent an outer blank in the stack for drawing a part of the blank away from the stack, a pivotally mounted substantially vertically movable support for engaging the said blank on opposite sides of said suction cup for restricting flexure of the blank to a relatively small area, the resulting sharp bending of the blank separating it in part from the blank next adjacent in the stack, and means pivotally moving said support in a substantially vertical path of travel to remove the support from the blank to allow for separation of a greater area of the blank, by said suction cup preparatory to feeding said partially separated blank from the magazine.

3. In a mechanism for feeding and separating sheet material blanks from a stack of such blanks, the combination of a magazine for retaining the stack of blanks, a movable suction cup disposed beneath said magazine for drawing a part of an individual blank down into the path of travel of a blank feeding means, a pair of pivotally mounted substantially vertically movable support arms for engaging the said blank on opposite sides of said suction cup for restricting the drawn down area of the blank so that a sharp curving of the blank takes place in the restricted area to separate a localized area of the blank from the adjacent blank in the stack, and means for pivotally rocking said support arms in a substantially vertical path of travel to shift said support arms away from the blank to allow for further separation of a greater area of the blank by said suction cup prior to its removal from the magazine by said blank feeding means.

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