

Sept. 11, 1951

W. W. MAHER ETAL

2,567,223

BLANK SEPARATING AND FEEDING DEVICE

Filed Aug. 10, 1948

3 Sheets-Sheet 1

Fig. 1

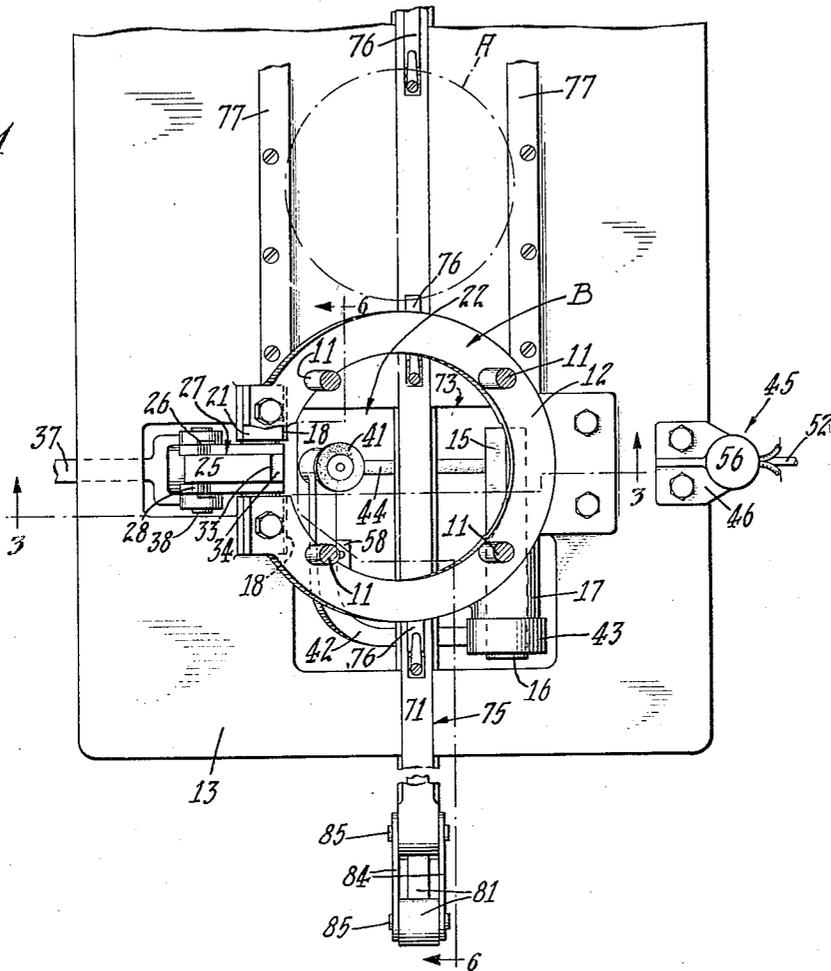
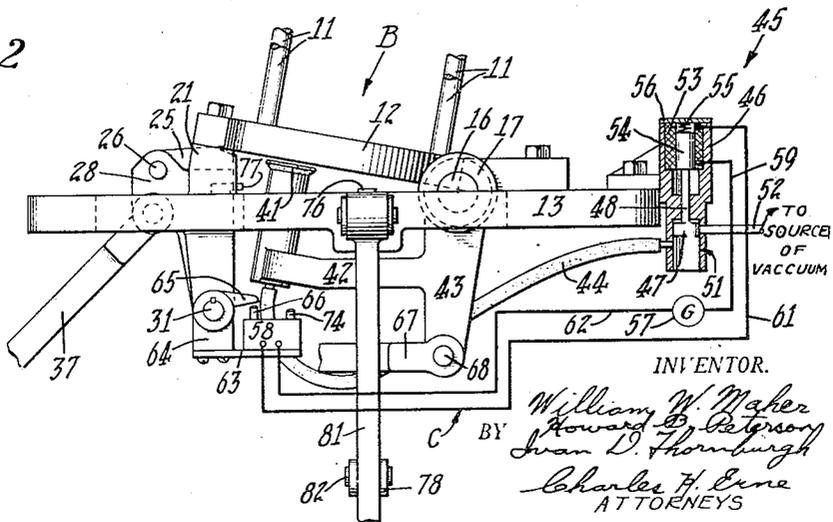


Fig. 2



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Fig. 3

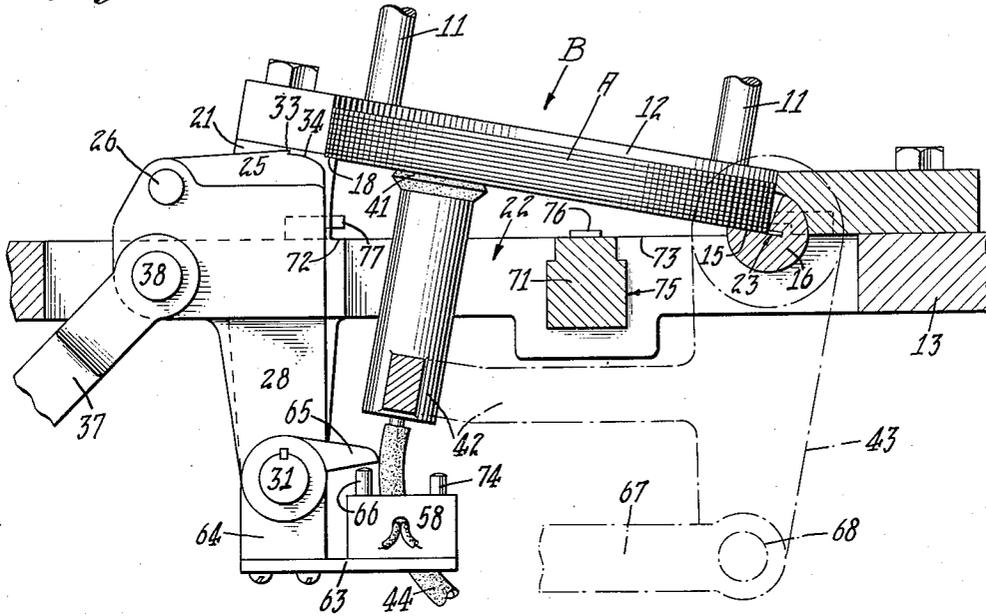
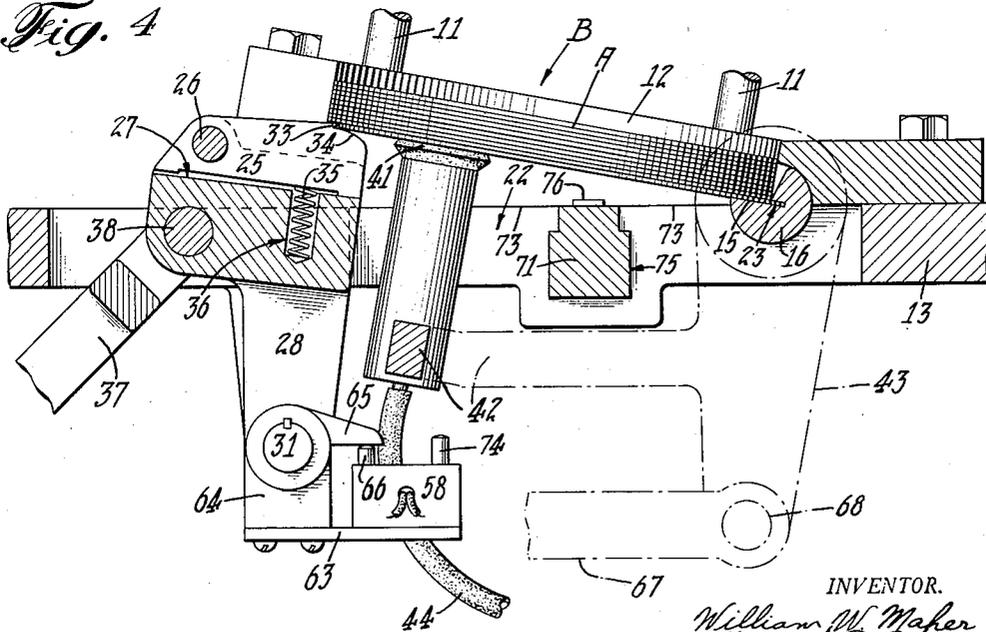


Fig. 4



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Fig. 5

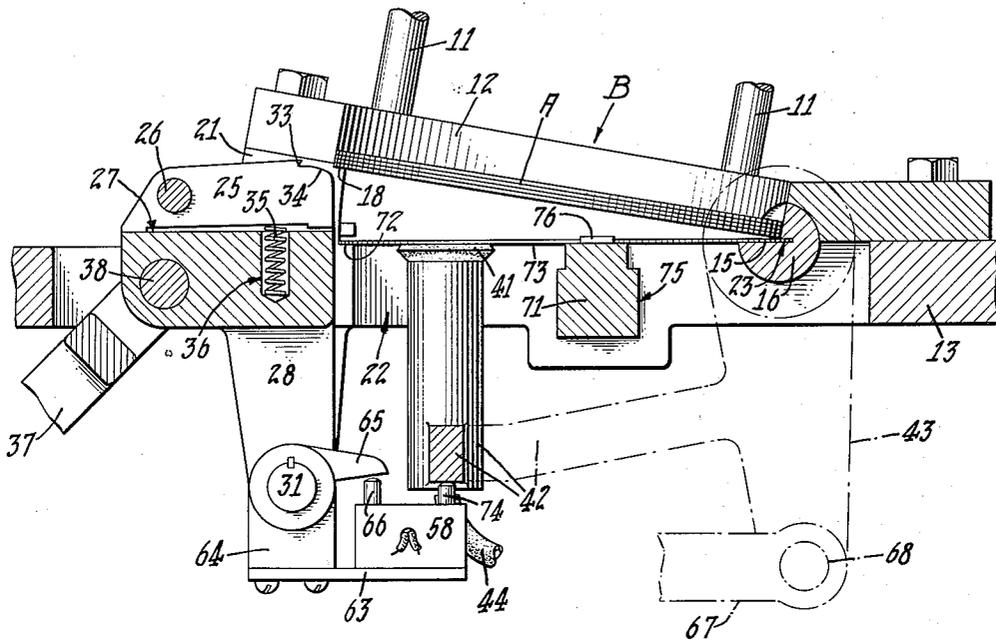


Fig. 6

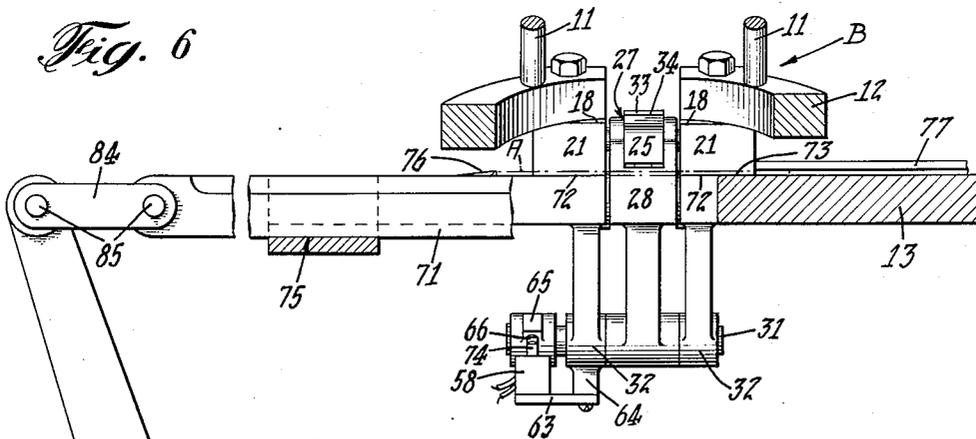
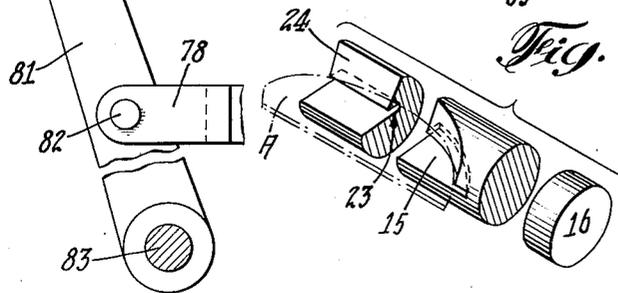


Fig. 7



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2,567,223

BLANK SEPARATING AND FEEDING DEVICE

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Application August 10, 1948, Serial No. 43,458

10 Claims. (Cl. 271—1)

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This invention relates to separating and feeding devices for blanks, discs or substantially flat articles and has particular reference to the separation of individual articles from a stack of articles at high speeds.

An object of the invention is the provision of a blank, disc or article separating and feeding device wherein a blank is shifted or slid relative to an adjacent blank in a manner so as to prevent scratching of the engaging faces of the blanks and is then engaged by a gripping device for further feeding.

Another object is the provision of a separating device of the character described wherein a blank, disc or article upon being gripped is swung or drawn away from an adjacent blank while one edge of the blank is supported and pivoted without bending or causing damage to the blank.

Another object is the provision of such a separating device wherein the lowermost blank or article in a stack of blanks or articles is shifted on a support ledge into a receiving slot, the width of such a slot being slightly greater than the thickness of the article being fed so that only a single or lowermost blank enters the slot at a time.

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 drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

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

Fig. 2 is an end elevational view of the separating and feeding device illustrated in Fig. 1, showing the device as being viewed from the lower end of the figure with parts in section;

Fig. 3 is an enlarged transverse sectional view taken substantially along the broken line 3—3 in Fig. 1, with parts broken away;

Figs. 4 and 5 are views similar to Fig. 3 with parts shown in different positions during the shifting and the separation of the lowermost blank from a stack of blanks in the magazine;

Fig. 6 is an enlarged longitudinal sectional view taken substantially along the broken line 6—6 in Fig. 1, with parts broken away; and

Fig. 7 is a perspective view drawn to an enlarged scale and illustrating the details of a pivotal support ledge formed adjacent a blank receiving slot on one end of a rock shaft.

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As an exemplary embodiment of the present invention the drawings illustrate a device for separating and feeding blanks, discs or substantially flat articles A (Figs. 3, 4 and 5) from a stack of such blanks retained in a magazine B which is preferably inclined. The blanks A are substantially uniform in thickness and because of the angular position of the magazine are disposed in an inclined position relative to the device. The blanks are fed individually from the bottom of the magazine the lowermost blank in the stack being first slid transversely to separate this blank from the blank next above to prevent feeding "doubles." This lowermost or outermost blank is then swung or pivoted on its edge from its angular position into a horizontal position clear of the stack and into the path of travel of a feeding device disposed adjacent the bottom of the magazine, for removing the blank from the magazine and for feeding it along a straight line path of travel into a can making machine or to any other suitable place of deposit. The drawings disclose a device for feeding circular blanks or discs although the invention is equally well adapted to feeding rectangular or other shaped blanks.

The magazine B comprises a plurality of spaced guide posts 11 secured to an angularly disposed support plate 12 (Figs. 1 and 2). Four of such guide posts 11 extend upwardly from the support plate for holding the stack of blanks in the magazine at an angle. The support plate 12 is mounted on a frame 13 which may constitute the main frame of a more elaborate machine of which the instant device forms a part.

The stack of blanks A while in the magazine rests on a plurality of spaced support ledges which are located adjacent the bottom of the magazine. The lowermost side of the inclined stack of blanks rests on a pivotal support ledge 15 disposed at one side of the device (as viewed at the right in Figs. 3, 4 and 5). The support ledge 15 is formed on the inner end of a cylindrical rock shaft 16 which is pivotally mounted in a bearing 17 formed integral with the support plate 12 (Fig. 1).

At the opposite side of the magazine, the stack of blanks rests on a pair of spaced stationary support ledges 18 (Figs. 1, 3, 5 and 6). These ledges are provided on the inner edges of a pair of raised lugs 21 at one side of the frame 13 bordering upon an opening 22 in the frame.

In the separation of the blanks A from the stack of blanks in the magazine, the lowermost blank A initially is shifted laterally or edgewise relative to its adjacent blank on the support

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ledges 15, 18, which is toward the right (as viewed in Figs. 3 and 4). This shifting of the blanks overcomes the tendency of the blanks to stick and thus permits them to be separated easily thereafter. The relative movement of the blanks is slight and any scratching that might occur due to projecting burrs or other projections on the edges of the blanks when such blanks are metal, would be confined to a small area along the marginal edge.

The shifting of the lowermost blank A preferably occurs when the pivotal support ledge 15 is in its normal or inclined position (Figs. 3 and 4). In this position the blank A finally is shifted free of the stationary support ledges 18 and along the support ledge 15 with the leading or forward edge of the blank entering into a blank receiving slot 23. Such a slot is formed in an abutment wall 24 (see also Fig. 7) of the rock shaft 16 adjacent the support ledge 15 and has a lower side wall of the slot preferably in the plane of the ledge and extending as a continuation of the ledge.

The width of the slot 23 may be uniform for its full depth or it may be wider inside of the blank receiving entrance. In either case the minimum width of such a receiving slot is slightly larger than the thickness of a single blank being fed but less in width than the thickness of two such blanks. This restricts the reception to one blank at a time and prevents the feeding of "doubles."

The separating and shifting of the lowermost blank A is effected by a separating finger 25 (Figs. 1, 3, 4 and 6) located and movable at one side of the magazine B between the stationary support ledges 18. Such a separating finger is yieldable and is carried on a pivot pin 26 within a slot 27 formed in the upper end of a movable mounting 28. This movable mounting is secured at its lower end to a shaft 31 pivotally carried in bearings 32 on the main frame 13.

The separating finger 25 adjacent its forward end is formed with a step or feed shoulder 33 which preferably is equal in height to the thickness of a blank to be separated. The base of the step, i. e. the top surface of the finger forward of the step provides a blank engaging ledge 34 sloping forward and merging into a rounded inner edge (Figs. 3, 4 and 5).

The separating finger 25 normally is held in a raised position in the slot 27 by a spring 35 which is carried in a bore 36 in the mounting 28 (Figs. 4 and 5). When the separating finger 25 moves forward in a blank separating and shifting operation, the inner edge of the finger passes beneath the lowermost blank A in the stack of blanks and the blank engaging ledge 34 gradually moves into yielding and supporting engagement with the blank. The ledge 34 continues to support the lowermost blank as the feed shoulder 33 engages the edge of such a blank and shifts it on the support ledges 15, 18 and finally shifts it free of the stationary ledges and into the blank receiving slot 23 in the rock shaft 16 (Fig. 4).

The movable mounting 28 is actuated by a lever 37 in any suitable manner, in time with the other operations of the machine. This lever is connected at its upper end to the movable mounting by a pivot pin 38.

The shifted blank A now is ready to be separated from its adjacent blank in the stack of blanks and to be swung from its inclined position shown in Fig. 4 to the horizontal position

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illustrated in Fig. 5. This is accomplished by gripping the bottom face of the shifted lowermost blank and simultaneously drawing or swinging the blank downward while rotating or pivoting its edge about the axis of the rock shaft 16. Such pivoting action during separation of the blank prevents the slot engaging edge of the blank from becoming bent or otherwise deformed.

Suitable gripper means are provided such as a suction cup 41 of the conventional form which engages, grips and holds the blank during its separation. Such a cup is located beneath the magazine and is movable relative thereto and to the blanks A within the opening 22 in the main frame. The suction cup 41 is mounted on the upper end of an extension 42 of a rocker arm 43 secured to the outer end of the rock shaft 16 (Figs. 1 and 2).

The suction cup 41 normally is in a raised position adjacent the lowermost blank in the stack of blanks. This suction cup has no gripping or drawing effect upon the blank until after the blank has been shifted as best illustrated in Fig. 4. A source of vacuum then is connected to the suction cup for gripping the blank and holding it while it is drawn downward away from its adjacent blank.

Provision is made for connecting the source of vacuum with the suction cup 41. This is effected by means of a flexible tube 44 connected at one end to the extension 42 through which communication is had with the cup 41. The opposite end of the tube 44 leads to a vacuum supply valve 45 (Fig. 2) including a valve housing 46 which is bolted to the main frame 13. The valve 45 preferably is of the slide valve type having a valve slide 47. The valve slide is formed or secured to the lower end of a vertical valve stem 48 and is movable in a bore 51 of the housing 46.

The valve slide 47 normally is in a raised position (Fig. 2) closing off the inlet end of a supply pipe 52 which leads from any suitable source of vacuum. With the valve slide in the position just described the tube 44 is in communication with the housing bore 51 and is open to the atmosphere at the lower end of the bore.

The source of vacuum is connected to the suction cup 41 through the shifting of the valve slide 47 in the bore 51 and this is brought about by de-energizing a normally energized electric solenoid 53 enclosed within the valve housing. This solenoid has a movable core 54 which is connected to or formed as an integral part of the upper end of the valve stem 48. The core is maintained under pressure of a compression spring 55 interposed between the upper end of the core and a cap 56 of the valve housing.

The normally energized solenoid 53 is connected into an electric circuit C. Such a circuit includes a generator 57 or other suitable means for supplying electric current to the circuit and a switch 58 for opening and closing the circuit (Fig. 2). A lead wire 59 connects the generator to one side of the solenoid 53, a connecting wire 61 connects the solenoid 53 to the switch 58 and a return wire 62 connects the switch 58 to the generator 57. The switch 58 is mounted on a bracket 63 secured to a depending lug 64 on the bearing 32 (see also Fig. 6).

Hence under normal machine operations the switch 58 is closed and current from the generator passing along the lead wire passes through the solenoid 53 for energizing it and then along the connecting wire 61 to and through the closed switch 58 and returning along the return wire

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62 to the generator 57. This maintains the vacuum supply valve slide 47 in its normally raised and closed position as previously described.

The actuation of the switch 58 is effected in time with the shifting of the blank A. For this purpose a switch actuating finger 65 is provided which is secured to one end of the shaft 31. Thus as the movable mounting 28 is rocked inwardly during the shifting operation as previously described, the actuating finger is rocked downwardly and is engageable with a switch element 66 of the normally closed switch 58 for opening it and this breaks the circuit C (Fig. 4).

Breaking of the circuit C de-energizes the solenoid 53 and thus permits the valve slide 47 to move downwardly in the housing bore 51. This opens the vacuum supply valve 45, uncovering the inlet end of the supply pipe 52 and thus brings it into communication with the tube 44. The suction cup 41 now is connected to the source of vacuum and the cup grips and holds the shifted blank A.

The shifted and gripped blank A is held in place while the movable mounting 28 moves back through a return stroke. When this mounting is clear of the blank, the latter is swung from its inclined position illustrated in Fig. 4 to the horizontal position shown in Fig. 5. This is effected by actuating the rocker arm 43.

Rocker arm 43 is actuated by a lever 67 in any suitable manner, in time with the movement of the lever 37. The lever 67 is connected at its outer end to the rocker arm 43 by a pivot pin 68.

During the swinging and lowering action of the shifted blank A, the suction cup 41 continues its hold on the blank A. Simultaneously with this swinging action, the arm 43 rotates the shaft 16 and the support ledge 15 and slot 23 formed therein and thus allows the blank to remain flat without any bending during the swinging movement. Upon reaching its horizontal position best illustrated in Fig. 5, the blank A is brought to rest momentarily on a reciprocating feed bar 71 and supporting edges 72, 73 on two adjoining side edges of the opening 22 of the main frame 13. The blank A now is ready to be released from the grip of the suction cup 41.

Hence as the rocker arm 43 is swung to the right (Fig. 5), the extension 42 moves down and engages and actuates a switch element 74 of the switch 58 for reclosing the circuit C. Electric current for the generator 57 thence flows through the circuit and re-energizes the solenoid 53 for effecting the lifting of the valve slide 47 in the housing bore 51 against the pressure of the spring 55 to its normally raised position. This closes the valve 45 shutting off the inlet end of the supply pipe 52 (Fig. 2).

With the valve slide 47 returned to its normal position the valve inlet end of the tube 44 is uncovered and in communication with the atmosphere through the open end of the bore 51. This vents the tube 44 and releases the grip of the suction cup 41 on the blank A.

The separated and released blank A now is ready to be fed from the bottom end of the magazine B. This is effected by the reciprocating feed bar 71 which is movable in a slideway 75 formed in the main frame 13 (Figs. 1, 5, and 6). The bar 71 carries a plurality of spaced feed dogs 76 which are yieldably mounted in the bar. The feed dog 76 (shown to the left of the magazine Fig. 6) is engageable with a blank A during a forward or feeding stroke of the bar 71 to feed

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the blank from the magazine and advance it along a straight line path of travel on the main frame 13, as for example, to a position as illustrated by the dot and dash outline (Fig. 1). The blank remains here temporarily during a return stroke of the bar and thereafter is advanced intermittently during the next and subsequent feeding strokes of the bar by the adjacent feed dogs along the path of travel into a can making machine or other suitable place of deposit.

The blanks A are guided along the straight line path of travel by grooved guides 77 which are secured to the top surface of the frame 13 (Figs. 1, 2 and 6).

The feed bar 71 is operated in the slideway 75 in time with the other operations of the machine and more particularly with the actuation of the levers 37 and 67. For this purpose a feed bar operating lever 78 is provided. This lever is connected to a rock lever 81 by a pivot pin 82 (Figs. 1, 2 and 6). The rock lever 81 is pivoted at its lower end on a shaft 83 which is mounted in any suitable manner in the machine main frame. The upper end of this rock lever is connected to an end of the feed bar 71 through links 84 on pivot pins 85.

Following the feeding of the blank A from the magazine B, the lever 67 is operated to rock or rotate the rock shaft 16 for returning it to its normal and inclined position as best illustrated in Figs. 3 and 4. This action simultaneously returns the suction cup 41 to its raised and normal position adjacent a succeeding or lowermost blank in the stack of blanks in readiness for gripping it as the operations of the device are repeated.

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.

We claim:

1. In a separating device for blanks, discs or other substantially flat articles, the combination of a magazine, a stationary support ledge at one side and a movable support ledge at the opposite side of said magazine for holding a stack of blanks within the magazine, a separating finger movable into engagement with the outermost blank at one end of said stack for shifting the leading edge of said outermost blank onto and over said movable support ledge and simultaneously freeing said outer most blank from said stationary ledge, gripper means movable relative to said magazine and engageable with a shifted blank, and means for moving said movable support ledge and said gripper means simultaneously and in the same direction for separating the shifted blank from an adjacent blank in said magazine.

2. In a separating device for blanks, discs or other substantially flat articles, the combination of a magazine, a stationary support ledge and a movable support ledge disposed in spaced relation at opposite sides of said magazine for holding a stack of blanks within the magazine, an abutment wall adjacent said movable support ledge and having a slot formed therein, a separating finger movable adjacent said stationary support ledge at one side of said magazine and engageable with an edge of the outermost blank

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for shifting the edge of the blank free from said stationary support ledge and the opposite edge of the blank over said oppositely disposed movable support ledge into said slot, gripper means movable relative to said magazine and engageable with a shifted blank, and means for moving said movable support ledge and said gripper means simultaneously and in the same direction for separating the blank from other blanks in said magazine.

3. In a separating device for blanks, discs or other substantially flat articles, the combination of a magazine, a stationary and a movable support ledge oppositely disposed in said magazine for holding a stack of blanks within the magazine, an abutment wall having a slot therein adjacent said movable support ledge, a separating finger and a movable mounting for said finger located at one side of said magazine adjacent said stationary ledge, said separating finger being engageable with an edge of the lowermost blank for shifting the opposite edge of the blank on said movable ledge into said slot and simultaneously freeing the blank from the other of said support ledges, gripper means movable relative to said magazine and engageable with a shifted blank, and means for moving said movable ledge and said gripper means simultaneously and in the same direction for separating the blank from an adjacent blank in the stack of blanks within the magazine.

4. In a separating device for blanks, discs or other substantially flat articles, the combination of a magazine, support ledges in said magazine comprising a pair of spaced stationary support ledges at one side of said magazine and at least a single movable support ledge at the opposite side of said magazine cooperating for holding a stack of blanks within the magazine, a movable mounting located at one side of said magazine between said pair of support ledges, an abutment wall adjacent said movable support ledge and having a slot formed therein, a yieldable separating finger carried on said mounting and engageable with an edge of the lowermost blank for shifting the blank on said single movable support ledge and for freeing the blank from the other of said support ledges, and gripper means movable relative to said magazine and engageable with a shifted blank, and means for moving said movable support ledge and said gripper means simultaneously and in the same direction for separating the blank from an adjacent blank in the stack of blanks within the magazine.

5. In a separating device for blanks, discs or other substantially flat articles, the combination of a magazine, a support ledge pivotally mounted at one side of said magazine, stationary support ledges at the opposite side of said magazine and cooperating with said pivotally mounted support ledge for holding a stack of blanks within the magazine, an abutment wall adjacent said pivotally mounted support ledge and having a slot formed therein, a separating finger movable adjacent said stationary support ledges at one side of said magazine and engageable with an edge of the lowermost blank for shifting the blank free from said stationary support ledges and an opposite edge of the blank over said pivotally mounted support ledge and into said slot, gripper means movable relative to said magazine and engageable with the shifted blank, and means for oscillating said pivotally mounted support ledge and said gripper means simultaneously and in the same direction for swinging the blank

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with said pivotally mounted ledge for separating the blank from other blanks in the magazine.

6. In a separating device for blanks, discs or other substantially flat articles, the combination of a magazine, stationary and movable support ledges adjacent said magazine for holding a stack of blanks within the magazine, one of said support ledges being movable and having an abutment wall thereon formed with a blank receiving slot, one side wall of said slot extending from and lying in the plane of said ledge, said slot having a widthwise restricted entrance for the entry of only an edge of a single blank at a time, a separating finger movable adjacent said magazine and engageable with an edge of an individual blank for shifting an opposite edge of the blank on said movable support ledge laterally relative to the next blank in the stack and into said slot and for freeing the shifted blank from the stationary support ledges, and a suction cup movable relative to said magazine and engageable with a shifted blank, and means for moving said movable support ledge and said suction cup simultaneously and in the same direction for separating the shifted blank from other blanks in the magazine.

7. In a separating device for blanks, discs or other substantially flat articles, the combination of a magazine, a support ledge pivotally mounted at one side of said magazine, stationary support ledges at the opposite side of said magazine and cooperating with said pivotally mounted support ledge for holding a stack of blanks within the magazine, said pivotally mounted support ledge having an abutment wall thereon and a blank receiving slot formed in said abutment wall, one side wall of said slot being common to and in the plane of said ledge, the width of said slot being greater than the thickness of one and less than the thickness of two blanks thus limiting the entry to a single blank at a time, a separating finger movable adjacent said stationary support ledges at one side of said magazine and engageable with an edge of the lowermost blank for shifting the blank free from said stationary support ledges and over said pivotally mounted support ledge into said slot, gripper means movable relative to said magazine and engageable with the shifted blank, and means for moving said gripper means and for simultaneously rotating said pivotally mounted support ledge for swinging the blank with said pivotally mounted ledge and said slot for separating the blank from other blanks in the magazine.

8. In a separating device for blanks, discs or other substantially flat articles, the combination of a magazine, a rock shaft pivotally mounted at one side of said magazine, a support ledge formed on said shaft and extending into said magazine, said shaft having a blank receiving slot adjacent said ledge and having one side wall of said slot extending as a continuation of said ledge, stationary support ledges at the opposite side of said magazine and cooperating with said slotted shaft support ledge for holding a stack of blanks within the magazine, a separating finger movable between said stationary support ledges at one side of said magazine and engageable with an edge of the lowermost blank for supporting it and for shifting the blank free from said stationary support ledges and over said shaft support ledge into said slot, a movable rocker arm secured to said rock shaft, and gripper means mounted on an extension of said rocker arm and engageable with the shifted blank, said

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gripper means being movable relative to said magazine through the actuation of said rocker arm for swinging the gripped blank disposed on said shaft support ledge and in said slot about the axis of said shaft for separating the blank from other blanks in the magazine.

9. In a separating and feeding device for blanks, discs or other substantially flat articles, the combination of a magazine, a plurality of support ledges disposed adjacent said magazine on opposite sides thereof for holding a stack of blanks within the magazine, one of said support ledges being movable and having an abutment wall thereon and a blank receiving slot formed in said wall, a separating finger movable at a side of said magazine opposite said movable ledge and engageable with an edge of the lowermost blank in the stack for shifting the opposite edge of the blank on said movable support ledge into said slot and for freeing the blank from the other of said support ledges, a suction cup movable relative to said magazine and engageable with a shifted blank, means for moving said movable support ledge and said suction cup simultaneously and in the same direction for separating the shifted blank from an adjacent blank in said stack, and feed means located adjacent said magazine and operable in time with the movement of said suction cup and movable ledge for feeding the separated blank from said magazine.

10. In a separating and feeding device for blanks, discs or other substantially flat articles, the combination of a magazine, a plurality of support ledges disposed adjacent said magazine on opposite sides thereof for holding a stack of blanks within the magazine, one of said support ledges being movable and having an abutment wall thereon and a blank receiving slot

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formed in said wall, a separating finger movable at one side of said magazine and engageable with an edge of the lowermost blank in the stack for shifting the opposite edge of the blank on said movable support ledge and for freeing the blank from the other of said support ledges, a suction cup movable relative to said magazine and engageable with a shifted blank, means for moving said movable support ledge and said suction cup simultaneously and in the same direction for separating the blank from an adjacent blank in said magazine, and vacuum control means actuated in time with the movements of the said separating finger said movable ledge and said suction cup for opening and closing a source of vacuum to said suction cup for effecting the separation of said shifted blank.

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