Feb. 20, 1951 R. T. CHATTERTON 2,541,985

SHEET SEPARATING AND FEEDING MECHANISM

Filed Dec. 19, 1946 2 Sheets-Sheet 1

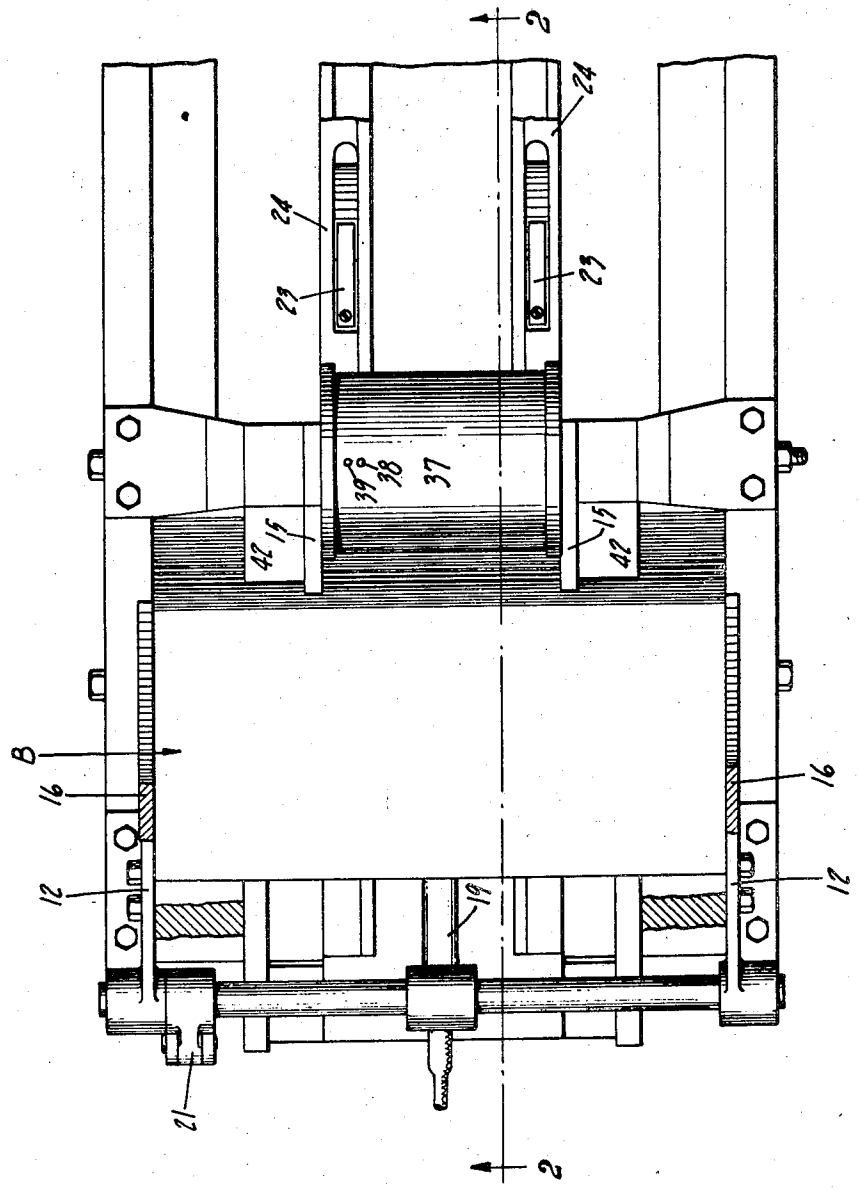


Fig. 1

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Fig. 2

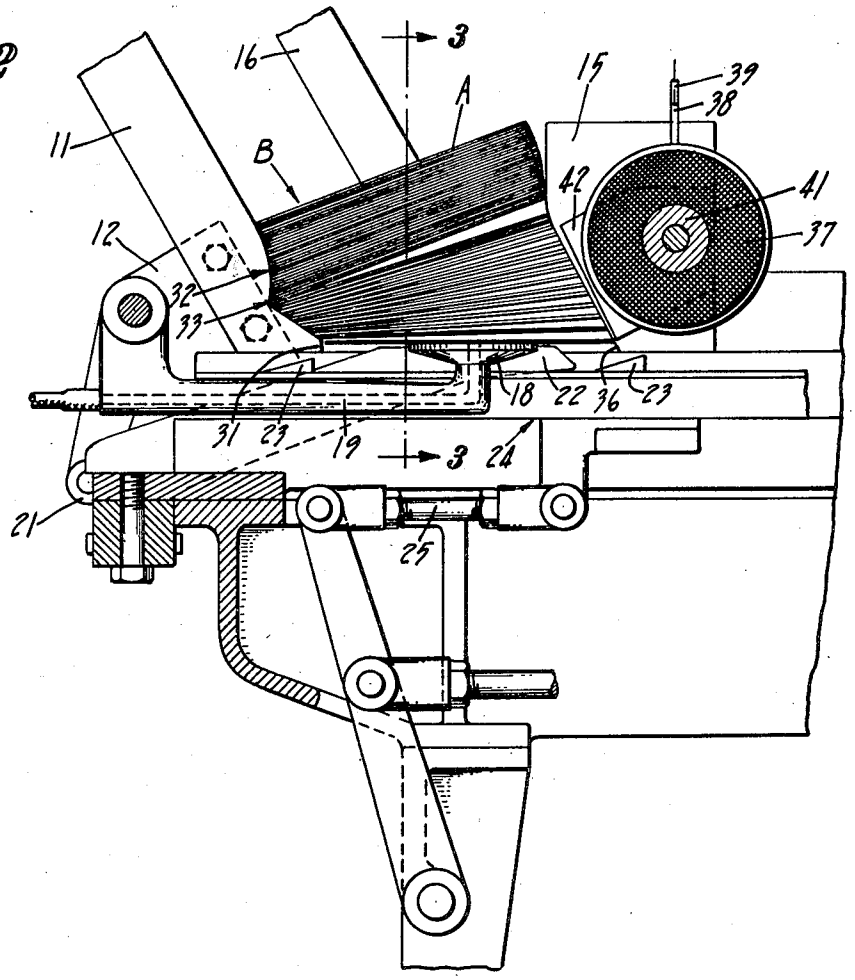
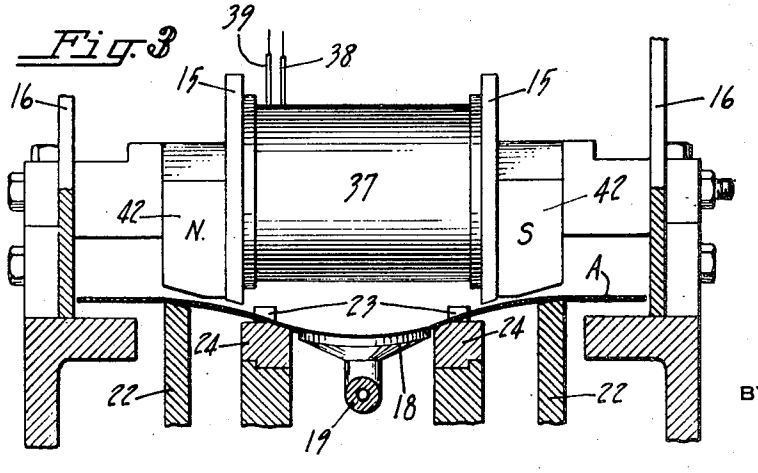


Fig. 3



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Patented Feb. 20, 1951 2,541,985

UNITED STATES PATENT OFFICE

2,541,985

SHEET SEPARATING AND FEEDING MECHANISM

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Application December 19, 1946, Serial No. 717,307

8 Claims. (Cl. 271—44)

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The present invention relates to a feeding mechanism for flat sheet metal blanks or sheets and has particular reference to devices for magnetically fanning out the blanks at the bottom of a stack to separate them preparatory to feeding them from the bottom of the stack.

An object of the invention is the provision of a feeding mechanism for flat sheet metal blanks wherein the blanks at the bottom of such a stack are magnetically fanned out and separated to facilitate their being fed from the bottom of the stack so that replenishment of the supply of blanks will be at the top of the stack without interfering with the feeding action, thereby insuring continuous feeding of the blanks from the stack.

Another object is the provision of such a feeding mechanism wherein the blanks at the bottom of the stack are supported independently of the other blanks in the stack and along one edge only thus leaving the opposite edge free and unsupported to facilitate the magnetic fanning out and separation of the blanks preparatory to being fed from the bottom of the stack.

Another object is the provision of such a feeding mechanism wherein the magnet means are utilized for fanning out the blanks at the bottom of the stack to separate them preparatory to feeding them from the bottom of the stack, the magnet means being arranged to retain the blanks in their fanned out relation when the mechanism for any reason temporarily ceases operation.

Another object is the provision of such a feeding mechanism which is simple in construction and compact in form so that it may be readily incorporated in existing machines, such as for example can body making machines, printing or lithographing machines, lithograph ovens and many other machines for performing operations on the fed blanks.

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 feeding mechanism embodying the instant invention, with parts broken away and showing blanks in position;

Fig. 2 is a longitudinal sectional view taken substantially along the line 2—2 in Fig. 1, with parts broken away and with blanks shown in side elevation; and

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Fig. 3 is a transverse sectional view taken substantially along the line 3—3 in Fig. 2, with parts broken away.

As a preferred embodiment of the instant invention the drawings illustrate principal parts of a mechanism for feeding sheet metal can body blanks A made preferably of tin plate or the like material, from a stack of such blanks for advancement through a can body making machine.

The stack of blanks A is retained in a magazine B located at the feed-in end of the machine, the stack being disposed in an inclined position to support the load of the major portion of the stack and to facilitate loading or replenishment of the supply of blanks at the top of the stack. This inclined stack is supported on a pair of spaced and parallel inclined support elements or guides 11 which are bolted to brackets 12 secured to the main frame of the machine. The feeding or rear edges of the blanks in the stack engage against these guides. The opposite edges of the blanks near the bottom of the stack engage against a pair of spaced and parallel, non-magnetic vertical support elements or guides 15 which are mounted indirectly on the machine frame. Adjacent their end edges the blanks are retained in stacked formation by inclined side guides 16 secured to the machine frame.

The blanks in the stack are fed individually from the bottom of the stack by conventional devices which first draw the lowermost blank down into a bowed condition and then slide the bowed blank forward from the bottom of the magazine. Such a conventional feeding device is disclosed in Fig. 9 of United States Patent 1,770,041, issued July 8, 1930, to J. F. Peters, on Roll Bodymaker.

Drawing down of the blank is effected preferably by a suction cup 18 which is disposed below the magazine and which is carried on the inner end of a pivoted arm 19. The arm is rocked, to lower and raise the cup, in any suitable manner as by a link 21 actuated in time with the other parts of the machine. Support rails 22 disposed below the magazine hold the blank adjacent its ends during this bowing action.

Advancement of the bowed-down blank is effected preferably by depressible feed dogs 23 carried in a pair of spaced and parallel feed bars 24 which operate in slideways formed in the machine frame. These feed bars are reciprocated in unison in any suitable manner, as for example by a link 25 actuated in time with the other moving parts of the machine.

Provision is made for magnetically separating the blanks A at the bottom of the stack to create a space between them so that the blanks will be

prevented from sticking together while being fed from the magazine. This prevents feeding "doubles" through the machine.

Separation of the blanks A at the bottom of the stack takes place along their inner or forward edges only, while the outer or rear edges of the blanks are supported on a bottom support or short foot member 31 formed on the lower ends of each of the inclined guides 11. These foot members extend inwardly from a curved edge section 32 of the guides 11, the curved edge sections defining a notch or recess 33 in the guides.

Directly opposite the foot member 31 of the inclined guides 11, the vertical support guides 15 are formed with inwardly inclined or undercut edge or track sections 36 for the unsupported inner edges of the blanks A at the bottom of the magazine. Between the vertical support guides 15 and adjacent the inclined edge sections 36 there is a continuously energized electro-magnet 37 which is connected by wires 38, 39 to any suitable source of electric energy. This magnet is formed with a hardened steel core 41 which extends through the vertical support guides 15 and a pair of hardened steel pole pieces 42 which are carried on the outer ends of the core adjacent the guides 15. The magnet sets up a magnetic field adjacent the non-magnetic track sections 36 of the guides 15.

The inner faces of the pole pieces 42 are flat and are disposed at an acute angle to and in spaced relation to the path of travel of the blanks A moving along the inclined tracks 36, the upper ends of the pole pieces being spaced a greater distance from the tracks 36 than the lower ends as best shown in Fig. 2. Thus a decreasing air gap is provided between the edges of the passing blanks A and the pole pieces.

The air gap between the blank edge and the magnet is effective as a reluctance gap for each individual blank and the flux density in the space will be less than that within the blanks. The effect of this is to prevent adjacent blanks approaching too closely together. However, the flux density in the blanks varies in accordance with the distance between the edge of the individual blanks and the angularly disposed face of the magnet pole pieces, the greater flux density being in the blanks nearest the magnet. This therefore provides a definite separation of each individual blank while in the separation zone, and causes the bottom blank to be positioned accurately for removal by the suction cup 18 (see Fig. 2).

In operation the rear edges of the blanks A, at the bottom of the stack supported in the magazine, ride down along the curved edge sections 32 of the inclined support guides 11 and enter the notches 33 where they come to rest in a supported condition on the foot members 31. This movement of the rear edges of the blanks causes the forward edges of the blanks to ride down along the inner edges of the vertical support guides 15 and thus fall unsupported into the space defined by the inclined edge or track sections 36 of these vertical guides. The falling blank pivots on its supported rear edge using the notches 33 as a pivot or fulcrum.

As the forward edges of the blanks pass into the space adjacent the track sections 36 of the vertical non-magnetic support guides 15, they enter the magnetic field of the magnet 37. This entrance of the unsupported blank edges into the magnet field is accompanied by a magnetic flux which pulls the blanks into contact with the

tracks 36 and which passes into the blanks and thereby separates and causes them to fan out, as best shown in Fig. 1. The rear edges of the blanks are still supported on the foot members 31 of the rear inclined guides 11.

The magnetic field retains the blanks at the bottom of the stack in this separated fanned-out condition, while the suction cup 18 bows down the lowermost separated blank in the stack and the feed dogs 23 remove and advance the blank as hereinbefore explained. In this manner the separation of the blanks at the bottom of the stack in no way interferes with replenishment of the supply of blanks at the top of the stack. In other words new blanks are supplied without in any way interfering with removal of the blanks from the bottom of the stack. This insures continuous feeding of the blanks individually from the bottom of the stack without the possibility of feeding a "double."

In case of temporary failure of electric energy for the magnet 37, the hardened steel core and pole pieces retain sufficient magnetism to maintain the magnetic field and thus retain the blanks at the bottom of the stack in their separated fanned-out relation so that immediate collapse of the stack is prevented.

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 feeding mechanism for flat sheet metal blanks, the combination of support means located beneath and supporting a stack of blanks adjacent its bottom and along one side with adjacent blanks along the supported side resting on each other with the opposite side unsupported, and magnet means disposed opposite said support means and on the unsupported side of said stack for fanning out the unsupported side of said supported blanks at the bottom of the stack to separate the blanks preparatory to feeding them individually from the bottom of the stack.

2. In a feeding mechanism for flat sheet metal blanks, the combination of a magazine for maintaining the blanks in stacked formation, bottom support means located on one side of said magazine for supporting said stack adjacent its bottom and with the blanks resting on and supporting one another adjacent said support means leaving the other side unsupported, and magnet means arranged beyond the unsupported blank edges on the opposite side of said magazine for fanning out the supported blanks at the bottom of the magazine on the side adjacent said magnet means to separate the blanks preparatory to feeding them from said magazine.

3. In a feeding mechanism for flat sheet metal blanks, the combination of a magazine having oppositely disposed guides for maintaining blanks in stacked formation between them, said guides on one side of said magazine having bottom support means for supporting a plurality of the blanks at the bottom of the stack along one edge, said guides on the opposite side of the magazine being undercut for the free passage of the adjacent unsupported edges of the blanks at the bottom of the stack, and magnet means arranged adjacent the undercut guides for fanning out the unsup-

ported edges of the blanks at the bottom of the stack to separate the blanks preparatory to feeding them from said magazine.

4. In a feeding mechanism for flat sheet metal blanks, the combination of a magazine having oppositely disposed guides for maintaining blanks in stacked formation between them, said guides on one side of said magazine being disposed in an inclined position to facilitate loading of the blanks into the magazine and for supporting the load of the major portion of the stack and having bottom support means for supporting a plurality of the blanks at the bottom of the stack along one edge, said guides on the opposite side of the magazine being undercut for the free passage of the adjacent unsupported edges of the blanks at the bottom of the stack, and magnet means arranged adjacent the undercut guides for fanning out the unsupported edges of the blanks at the bottom of the stack to separate the blanks preparatory to feeding them from said magazine.

5. In a feeding mechanism for flat sheet metal blanks, the combination of support means for supporting a stack of blanks adjacent its bottom and on one side by supporting each blank on the next adjacent blank on that side with the opposite side unsupported, magnet means disposed opposite said support means on the opposite side of the stack and adjacent the unsupported edges for fanning out the supported blanks at the bottom of the stack to separate the blanks, holding means located below the bottom of the stack and out of the influence of said magnet means, means for drawing the lowermost separated blank down below the bottom of the stack and onto said holding means, and feeding means for engaging said drawn-down blank and for feeding it along said holding means and beneath said magnet means.

6. In a feeding mechanism for sheet metal blanks, the combination of a magazine having oppositely disposed guides for maintaining blanks therebetween in stacked formation, a said guide on one side of said magazine being disposed in an inclined position for supporting said stack, said inclined guide having a notch in its guiding surface merging into a foot member located at the bottom of said guide, said foot member supporting a predetermined quantity of sheets on one side of the stack, a said guide on the opposite side of the magazine having a guiding surface for engaging the sheets as they pass into said notch said guide surface merging into an inclined undercut wall for guiding the blanks at the bottom of the stack supported on said foot, and magnet means located adjacent said undercut surface for fanning out the unsupported edges of the blanks on said foot to separate the blanks preparatory to feeding them from the bottom of the stack.

7. In a feeding mechanism for flat sheet metal blanks, the combination of means for holding a stack of blanks in a predetermined position by supporting one side on a surface extending beneath the stack with the other side of the blanks unsupported, non-magnetic guides having inclined guiding faces located adjacent the unsupported side of the blanks for aligning the adjacent blank edges, and magnet means located on the same side of the stack as said guides, said magnet means having pole pieces disposed in spaced relation to one another and having faces set back from and at an acute angle to the guiding faces of said guides for providing an air gap between the aligned and unsupported blank edges and said magnet means for fanning out the blanks at the bottom of the stack, said air gap being smallest at the bottom to provide a maximum flux density in the lowermost blank for accurately positioning it for removal from the bottom of the stack.

8. In a feeding mechanism for flat sheet metal blanks, the combination of a magazine having oppositely disposed guides for maintaining blanks in stacked formation between them, said guides on one side of said magazine having bottom support means for supporting a plurality of the blanks at the bottom of the stack along one edge, said guides on the opposite side of the magazine being undercut for the free passage of the adjacent unsupported edges of the blanks at the bottom of the stack, and an electro-magnet arranged adjacent the undercut guides for fanning out the unsupported edges of the blanks at the bottom of the stack to separate the blanks preparatory to feeding them from said magazine, said electro-magnet having a core and pole pieces of hardened steel for maintaining a magnetic flux in the fanned-out or separated edges of the blanks when temporarily the electric current energizing said electro-magnet is cut off.

ROBERT T. CHATTERTON.

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