Sept. 12, 1944. R. W. REID 2,357,850

SHEET FEEDING MECHANISM

Filed June 17, 1941

Fig 1

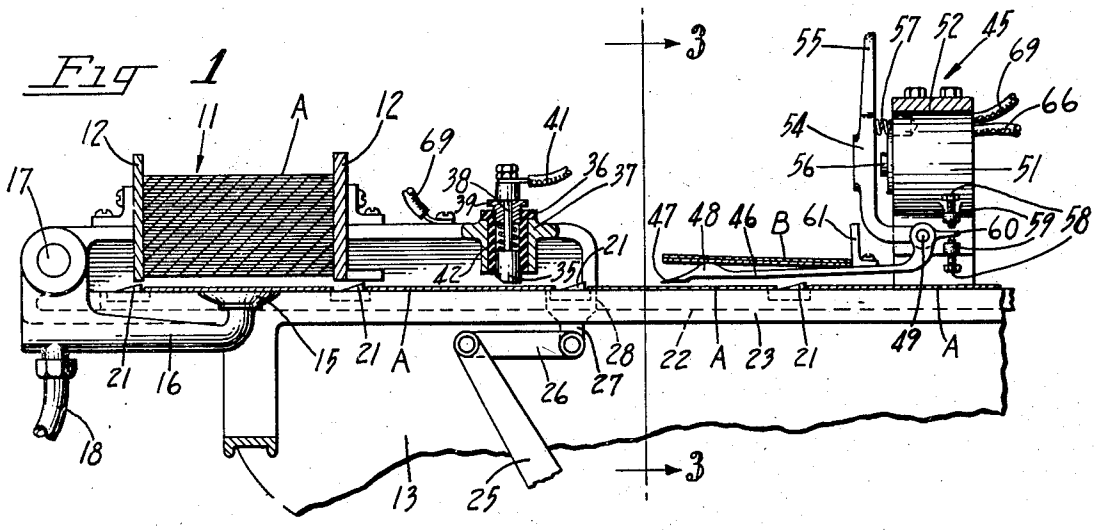


Fig 3

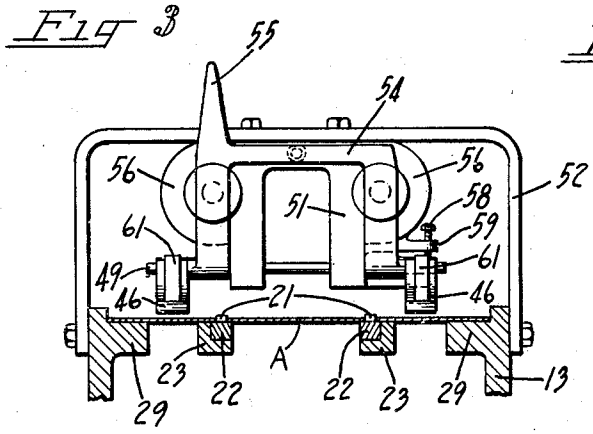


Fig 4

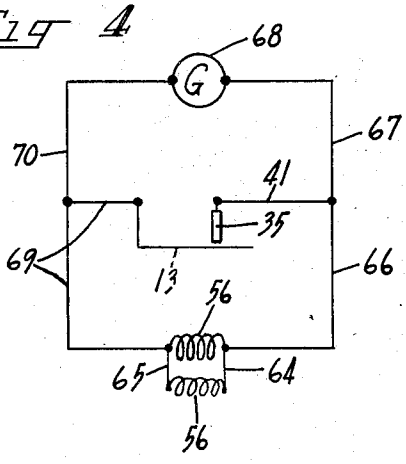
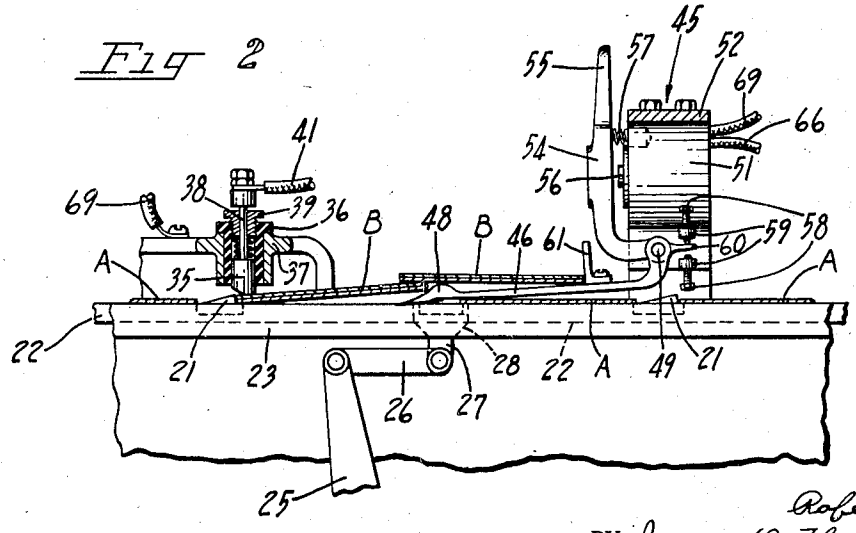


Fig 2



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SHEET FEEDING MECHANISM

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3 Claims. (Cl. 209—88)

The present invention relates to sheet feeding mechanism and has particular reference to devices for detecting and sorting out sheets that stick together and are fed as one.

An object of the invention is the provision in a sheet feeding mechanism of improved devices of simplified construction wherein sheets of an abnormal thickness and sheets which stick together are quickly and accurately detected and sorted out from among other sheets passing through the mechanism at exceedingly high speeds so that damage will be prevented to the machine to which the sheets are fed.

Another object is the provision of such devices wherein a pick-up feature may be manually operated so that sheets other than abnormal sheets may be periodically picked up for inspection and the like.

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 drawing, discloses a preferred embodiment thereof.

Referring to the drawing:

Figure 1 is a longitudinal section through a sheet feeding mechanism embodying the instant invention, with parts broken away;

Fig. 2 is a fragmentary view similar to Fig. 1 showing certain of the movable parts in a different position;

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

Fig. 4 is a wiring diagram of the electric apparatus used in the mechanism.

As a preferred embodiment of the instant invention the drawing illustrates the feeding mechanism of a can body making machine of the character disclosed in United States Patent 1,625,091, issued April 19, 1927, to John F. Peters. In such a machine sheet metal can body blanks A are fed from a stack of such blanks and are advanced along a straight line path of travel into the machine for operations incident to forming the blanks into can bodies.

The stack of blanks A preferably are retained in a magazine 11 (Fig. 1) which includes vertical rails 12 for holding the blanks in place. These rails are secured in a frame 13 which constitutes the main frame of the machine.

The blanks A preferably are fed from the bottom of the stack and for this purpose the lowermost blank in the stack first is drawn down or separated from the other blanks so that it may be readily engaged. Separation of the blanks is effected by a vacuum cup 15 which is secured to the inner end of an arm 16 mounted on a pivot shaft 17 carried in suitable bearings formed in the machine frame. The shaft and the arm mounted thereon may be rocked in any suitable manner in time with the other moving parts of the mechanism to shift the vacuum cup into and out of engagement with the lowermost blank in the stack.

Vacuumizing of the cup 15 to draw the blank down is effected by way of a passageway in the arm and a flexible tube 18 which is connected to the arm. The tube leads from any suitable source of supply of vacuum. This is a usual bodymaker feed mechanism construction.

The separated blank A is advanced along its path of travel into the machine in a step-by-step or intermittent fashion by spring held feed dogs 21 which are spaced along a pair of spaced and parallel feed bars 22. The feed bars slide in slideways 23 (see also Fig. 3) secured to the main frame 13. These feed bars are reciprocated through a forward feeding stroke and thence through a return stroke by a lever 25 which is connected by a link 26 to a lug 27 depending from a cross rail 28 which ties the feed bars together. The lever 25 may be actuated in any suitable manner in time with the other moving parts of the machine. Guide rails 29 (Fig. 3) formed on the machine frame 13 provide a runway for guiding the blanks A into the machine.

Occasionally a blank B of abnormal thickness or two blanks A sticking together as a unit blank B will be among the blanks in the magazine and will be fed from the stack in the usual manner. Provision is made to detect these blanks and to divert them from the regular path of travel through the feeding mechanism to prevent them from entering the machine where they might entail damage to certain of the machine parts.

The detecting of the blanks B is effected by a detector button 35 (Figs. 1 and 2) which is disposed above a guide rail 29 along one side of the feeding mechanism and above the path of travel of the blanks adjacent the magazine. The button is carried in an electrical insulator bushing 36 mounted in a boss 37 formed on the machine frame. The button is formed with a stem 38 which extends up through an adjusting nut 39 threaded into the insulator bushing. Above the nut 39 the stem 38 is connected to an electric wire 41.

A compression spring 42 surrounds the stem 38 and is interposed between the nut 39 and the button 35 and thus provides a yieldable backing

for the button. The nut 39 is adjusted so that the space between the bottom of the button and the top of the blank guide rail 29 is slightly greater than the normal thickness of one blank A but less than the thickness of a double thickness blank B.

Hence normal thickness blanks A will readily pass under the detector button 35 but a double thickness or abnormal thickness blank B while passing along the runway guide rails 29 will engage the button 35. When engaging the button the blank becomes a part of an electric grounding circuit which includes a pick-up device 45, which operates to pick up the blank and thus remove it from the runway. This grounding circuit will be hereinafter explained in connection with the wiring diagram in Fig. 4.

The pick-up device 45 includes a pair of spaced and parallel skids 46 which are normally disposed in a substantially horizontal position just above the path of travel of the blanks along the runway guide rails 29. The skids are located adjacent the detector button 35. The forward or free end of each skid is formed with a curved sharp point 47 which merges into a blank retaining projection 48. The opposite ends of the skids are mounted on a pivot shaft 49 carried in a housing 51 located above the path of travel of the blanks and secured to a bridge member 52 bolted to the main frame 13.

The skid pivot shaft 49 also carries a substantially vertical inverted U-shaped arm 54 having a handle 55. The arm is normally held under the attraction of a pair of normally energized electro-magnets 56 disposed in the housing 51. Hence as long as the magnets 56 remain energized the arm 54 will be attracted to them and thus holds the skids 46 in their normal horizontal position as shown in Fig. 1.

In this normal position of the skids 46, the normal blanks A readily pass under them while the blanks are advancing along the runway. However, when an abnormal blank B is detected by the detector button 35, the magnets are immediately deenergized. This frees the arm 54 and a compression spring 57 disposed between the arm and the housing 51 rocks the arm outwardly.

The rocking of the arm 54 also rocks the skids 46 and thus lowers the forward free ends of the skids into and below the path of travel of the blanks along the runway. The timing of this rocking action is such as to lower the skids into the space between the advancing blanks and directly in front of the detected abnormal blank B as shown in Fig. 2. This rocking movement of the skids is limited by a pair of adjusting screws 58 secured in lugs 59 formed on the housing 51. The screws alternately engage opposite sides of a lug 60 on one of the skids to restrict the movement of both skids.

Thus the advancing abnormal blank B rides up over the sharp pointed ends 47 of the lowered skids and slides up onto the top of the skids where it rests on the retaining projection 48. A back stop 61 on each skid holds the picked up blank in position. When the abnormal blank is well on the skids, such blank has advanced well clear of the detector button 35 and this causes the magnets to be re-energized.

The re-energizing of the magnets 56 again attracts the arm 54 against the resistance of the compression spring 57 and this raises the skids and the blank carried thereon up out of the path of travel of the blanks so that the next blanks in line if normal, will pass under the skids. It should be understood that this action is very rapid and that a blank only started to ride up onto the skids will be fully on the skids before they are lifted up out of the way. Such a construction of sorting device is designed for high speed operation and has been successfully operated at 400 blanks per minute.

An abnormal blank B picked up by the skids 46 remains in place thereon and may be removed manually when desired. If more than one such blank is detected in succession such blanks slide up on the skids and form a stack, the last detected blank sliding up under the others to take the bottom position in the stack as shown in Fig. 2. The retaining projection 48 facilitates this stacking action as well as serving to retain the blanks in a substantially level position so that they will remain in a stack form when the skids are lowered to pick up a newly detected blank.

When it is purposely desired to pick out an advancing blank for inspection the skids may be lowered manually by pushing forward on the handle 55. This rocks the skids in the same manner as when the magnets are deenergized. As soon as the pressure is released on the handle the skids will again rise by the magnetic attraction between the magnets and the arm 54.

Referring now to the wiring diagram in Fig. 4 it will be seen that the magnets 56 are connected together by wires 64, 65. Wire 64 is also connected by a wire 66 to the wire 41 of the detector button 35. The wire 41 is also connected by a wire 67 to a source of electric energy such as a generator 68. The opposite side of the magnets are connected by a wire 69 to the main frame 13 of the machine and this wire 69 is also connected by a wire 70 to the generator.

Hence as long as normal thickness blanks A are passing under the detector button 35 the button will not be engaged and electric energy from the generator 68 will continue to flow through the magnets to maintain them energized. However, when an abnormal blank B engages the detector button 35, the magnet circuit is grounded or short circuited and the energy from the generator passes through the detector button and the blank, and is grounded by way of the machine frame. It is this grounding of the circuit that de-energizes the magnets 56 and permits the spring 57 to depress the skids 46 to pick up the abnormal blank. This grounding of the circuit insures and promotes quick acting and highly efficient operation of the pick-up device 45.

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 sheet feeding mechanism, the combination of a frame, means in said frame for advancing sheets along a predetermined path of travel, a detector button disposed above the path of travel of the sheets a distance slightly greater than the normal thickness of a sheet and engageable by an abnormal sheet which is thicker than a normal sheet, a skid normally disposed adjacent the path of travel of the sheets, means for moving said skid into the path of the sheets

for picking up abnormal sheets when such sheets are detected by said button, means on said skid for arresting movement of the detected abnormal sheets and for maintaining the same in stack formation thereon, an operating arm on said skid, an electro-magnet attracting said arm for holding it and said skid in their normal positions, and electric means operatively connecting said magnet with said detector button whereby said skid is moved into sheet pick-up position while an abnormal sheet engages said detector button, and is raised to normal position when said button is again disengaged.

2. In a sheet feeding mechanism, the combination of a frame, means in said frame for advancing sheets along a predetermined path of travel, a yieldable detector button disposed above the path of travel of the sheets a distance slightly greater than the normal thickness of a sheet and engageable by an abnormal sheet which is thicker than a normal sheet, a skid normally disposed adjacent the path of travel of the sheets and movable into the path of the sheets for picking up abnormal sheets when such sheets are detected by said button, means operatively connected to said skid for arresting movement of the detected abnormal sheets and for maintaining the same in stack formation thereon, an operating arm on said skid, an electro-magnet attracting said arm for holding it and said skid in their normal positions, electric means connecting said magnet with said detector button and with said frame to ground said magnet when an abnormal sheet engages the detector button so that the skid will move into sheet pick-up position, and means on said operating arm for actuating said skid manually and against the attraction of said magnet so that sheets may be picked up and collected upon said skid while the feeding mechanism is in motion.

3. In a sheet feeding mechanism, the combination of a frame, means in said frame for advancing sheets along a predetermined path of travel, a yieldable detector button disposed above the path of travel of the sheets a distance slightly greater than the normal thickness of a sheet and engageable by an abnormal sheet which is thicker than a normal sheet, a skid normally disposed adjacent the path of travel of the sheets, means movable into the path of the sheets and operatively connected to said skid and deflecting an abnormal sheet when such is detected by said button, elements on said skid for arresting the advance of the detected abnormal sheets and for holding the same in stack formation thereon, an operating arm on said skid, an electro-magnet attracting said arm for holding it and said skid in their normal positions, and electric means connecting said magnet with said detector button to deenergize said magnet while an abnormal sheet engages the detector button so that the skid will then move into sheet pick-up position, said electric means being further operative to energize said magnet again when said button is disengaged to raise said skid to normal inoperative position.

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