

Oct. 20, 1953

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MECHANISM FOR FREEING FLAPS AND
CUTOUTS IN CARTON BLANKS

2,655,841

Filed July 19, 1949

3 Sheets-Sheet 1

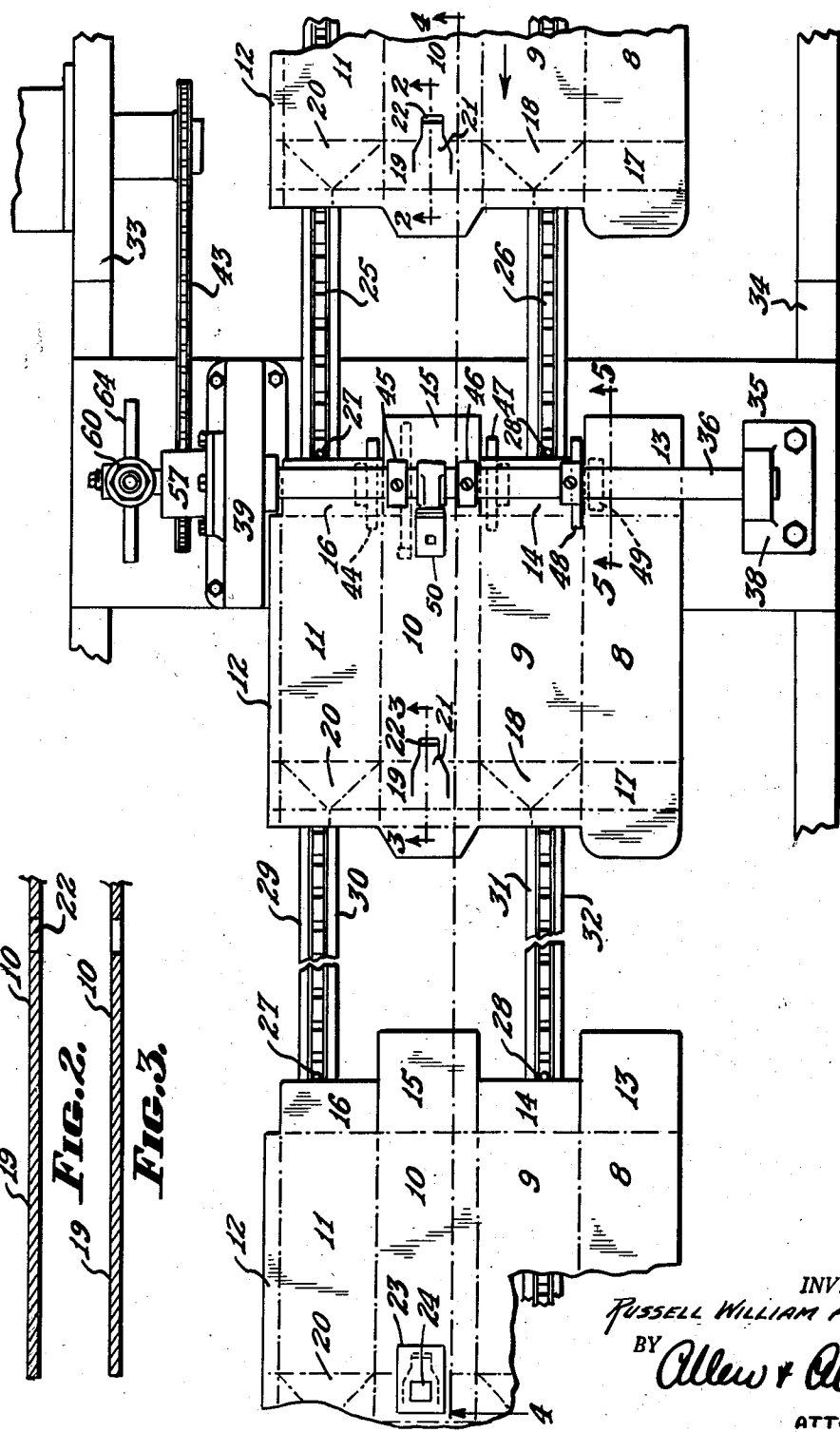


FIG. 1.

FIG. 2.

FIG. 3.

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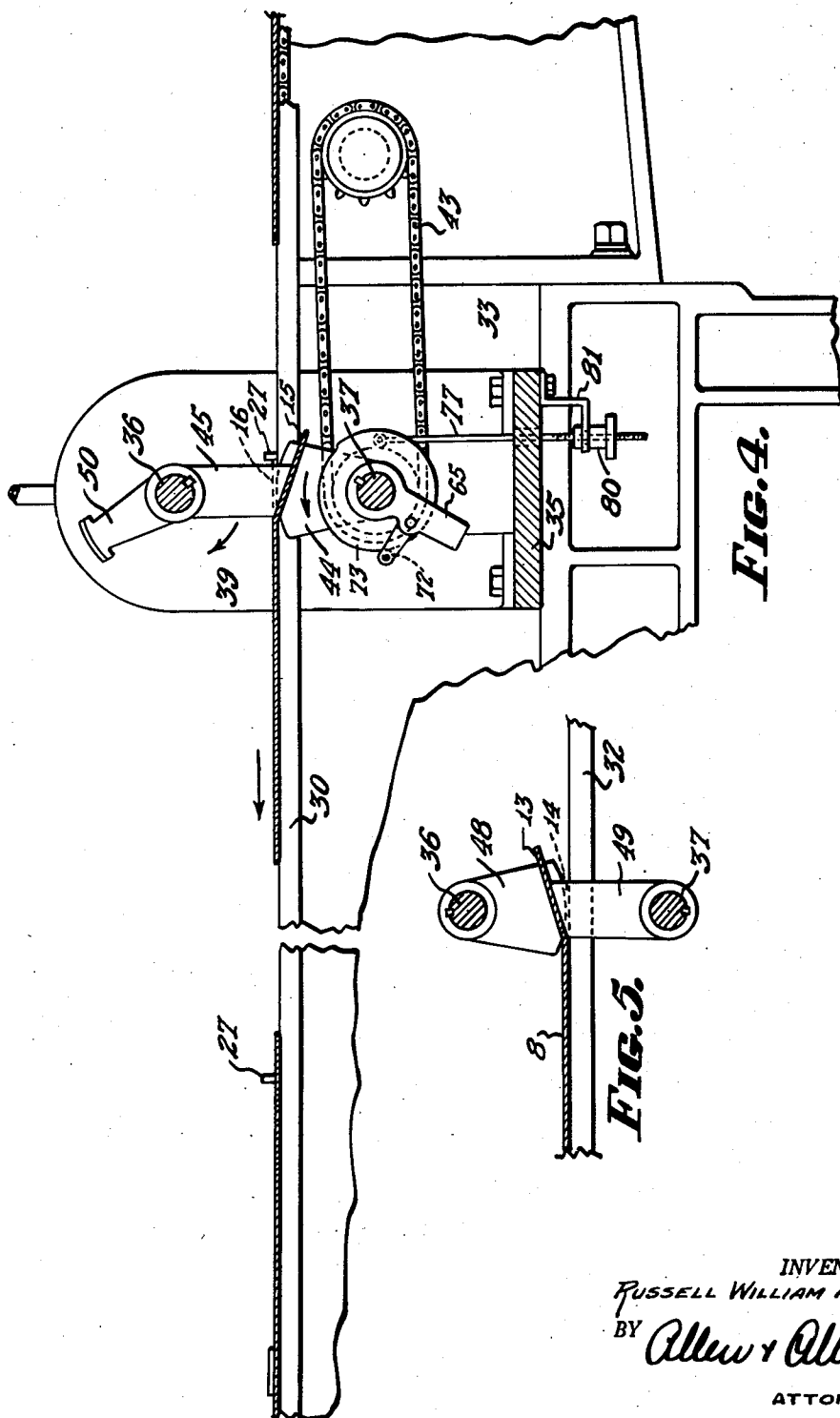
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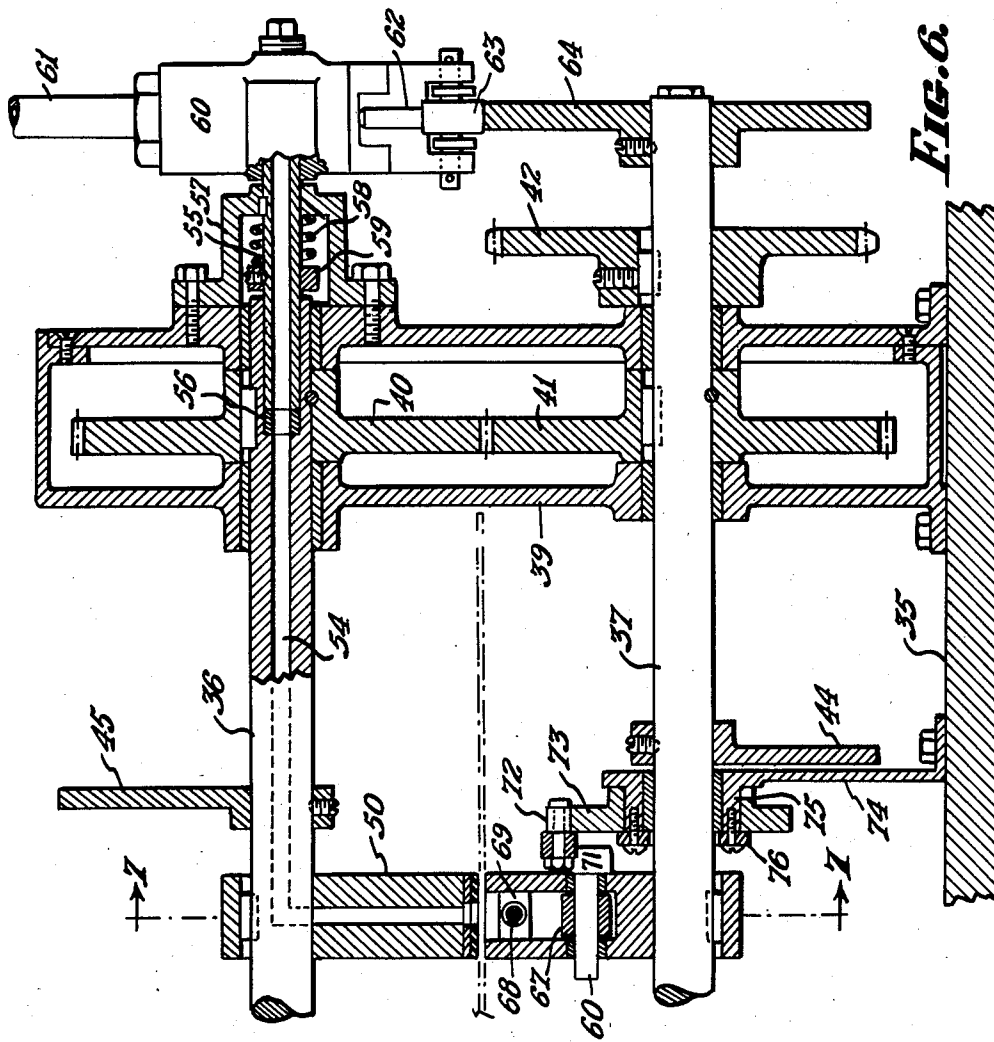


FIG. 6.

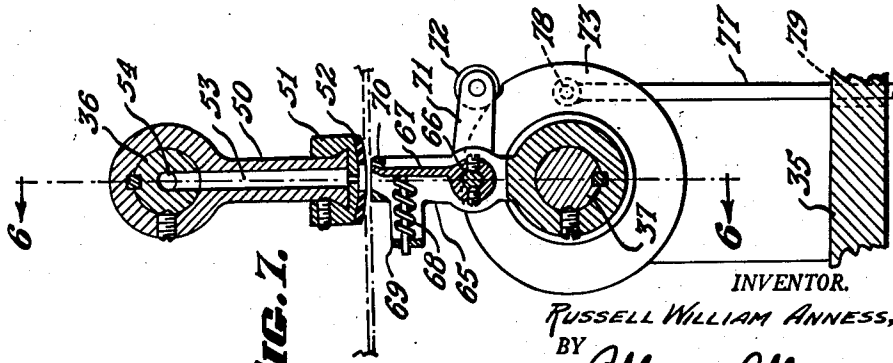


FIG. 7.

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MECHANISM FOR FREEING FLAPS AND
CUTOUTS IN CARTON BLANKS

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Application July 19, 1949, Serial No. 105,544

4 Claims. (Cl. 93—36)

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My invention relates to means for treating carton blanks adapted for installation on any carton folding and gluing machine. As the description proceeds it will be evident that the principles of the invention are of advantage in connection with the preparation of any carton blanks for carton formation and subsequent use, and in particular where cartons are to be erected, closed and sealed by automatic machines. With this in mind, but in order to make an exemplary showing of my invention, I shall describe it in connection with operations performed upon paperboard milk bottle blanks since these present some of the problems in an exaggerated form.

It is an object of the invention to provide a simple and dependable mechanism for freeing carton flaps from each other so that chance attachment of cut edges of the flaps to each other will not interfere with the closing operations to which the cartons will ultimately be subjected.

In the ordinary manufacture of paperboard cartons, where printed sheets of paperboard are cut and scored on any of the conventional cutting and scoring presses, it frequently happens that by reason of worn dies or vagaries of operation of the cutting and scoring press, adjacent flaps at the end or ends of a seal-end carton will be connected to each other by a thin web of material. It has been the practice in the art to take precautions to free these flaps; but the procedure hitherto adapted has involved the taking of a stack of preformed blanks and the bending of adjacent flaps relative to each other in the stack by hand. Not only is this inconvenient and time consuming, but in the case of cartons for food products where contamination may be a factor, the hand-bending of the flaps is undesirable. So far as I am aware, there has never hitherto been provided any mechanism whereby adjacent flaps may be freed of each other on a carton handling machine, such as a carton folding and gluing machine; and it is one of the objects of my invention to produce a mechanism for this purpose.

It is another object of the invention to provide a mechanism which is simple and positive in its action, which is inexpensive in first cost, and which takes up so little room longitudinally of the machine upon which it is to be installed, that it may be installed on any standard machine without prolongation of the machine length.

In certain types of cartons there are also small tabs or cut-outs which must be removed from the carton blank as an incident to the manufacture of cartons in the finished, knocked down condition. Such tabs or cut-outs are normally

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formed by the die used for cutting and scoring the carton blanks. Ordinarily, the cut-out or tab is produced by a cutting rule which, in the die, is bent to surround the area of the cut-out and has its ends approaching or substantially contacting each other. It is not desirable, however, to have the die so constructed as actually to remove the tabs or cut-outs since under these circumstances the removed material would remain in the cutting die and interfere with subsequent cutting operations. As a consequence, the die is so constructed that the cut-out or tab will remain an integral part of the blank and leave the cutting and scoring press with the blank. Ordinarily this occurs automatically because the ends of the cutting rule do not quite come together, leaving a small portion of the material connecting the tab or cut-out with the main body of the blank. Where the die is so constructed as not to do this, it is common practice to nick the cutting rule in one or more places to provide connections which will insure the tab or cut-out remaining a part of the blank. As a consequence, where blanks contain such tabs or cut-outs there has in the past been a separate operation for their removal which also is time consuming and inconvenient. This is especially true when the tab or cut-out is very small in area, special tools being required for the purpose. So far as I am aware, there has never hitherto been devised any mechanism which, as an appendage to a carton blank treating machine such as a carton folder and gluer, would operate to remove such tabs and cut-outs in a positive and efficient manner. It is an object of this invention to provide such a mechanism.

It is also an object of the invention to provide simple conjoint devices having common driving means for all of the purposes set forth above.

These and other objects of the invention which will be mentioned hereinafter or will be apparent to one skilled in the art upon reading these specifications, I accomplish by that construction and arrangement of parts and in those operations of which I shall now describe an exemplary embodiment, in connection with the paperboard milk bottle set forth above.

Reference is made to the accompanying drawings wherein:

Figure 1 is a plan view of a portion of a carton folding and gluing machine embodying my invention.

Figure 2 is a partial sectional view of a paperboard blank taken along the section line 2—2 in Figure 1, prior to the removal of a cut-out or tab.

Figure 3 is a partial sectional view of a paper-

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board blank taken along the section line 3—3 in Figure 1, after the removal of the tab or cut-out.

Figure 4 is a vertical sectional view of the mechanism of Figure 1 taken along the section line 4—4 in that figure.

Figure 5 is a partial sectional view of a portion of the apparatus taken along the section line 5—5 of Figure 1.

Figure 6 is a transverse sectional view of a portion of the apparatus taken along section line 6—6 of Figure 7.

Figure 7 is a longitudinal sectional view of the same apparatus taken along the section line 7—7 of Figure 6.

Reference is also made to my copending application Serial No. 290,732, filed May 29, 1952 and entitled Mechanism for Freeing Flaps and Cut-Outs and for Breaking Score Lines, wherein certain of the features disclosed herein are claimed.

In Figure 1 I have shown paperboard blanks for milk bottles in several positions. These blanks are cut and scored to provide body walls 8, 9, 10 and 11 articulated together, the wall 11 being provided with a glue flap 12. At one end of the carton seal-end-type flaps 13, 14, 15 and 16 are articulated by score lines to the lower ends of the body walls.

At the opposite ends of the body wall there are elements 17, 18, 19 and 20 in the nature of extensions, articulated to the body walls and to each other, and scored to provide a gable-top closure with an upstanding rib and closure flaps as is well understood in the paper milk bottle art. In one of the body walls, such as the body wall 10, and in the adjacent element 19, a lift-tab 21 is formed by a substantially U-shaped cut; but at the base of the U there is formed a small tab or cut-out 22 which is designed to be removed entirely from the carton blank. Later on in the carton folding and gluing machine, a cover member 23 having a hole 24 will be spotted over this portion of the wall 10 and element 19 so as to cover the tab 21. It will be understood by those familiar with the paper milk bottle art that when the carton has been formed, filled and closed and the user desires to dispense milk from it, he will engage the tab 21 and lift it, thereby uncovering the hole 24 as a pouring orifice. The removal of the tab 22 facilitates the engagement of the lower part of the tab 21 by the fingernail for the lifting of the tab. A mechanism for spotting the element 23 on the carton forms no part of the present invention and has not been illustrated herein. The mechanism hereinafter described serves the purpose of freeing the bottom seal-end closure flaps 13, 14, 15 and 16 from each other, and also the purpose of removing the small tab 22 from the blank. This is accomplished prior to the folding and gluing of the blank to make a knocked-down tubular carton structure; and the machine part of which is illustrated in the figures herein is conceived as a standard carton folding and gluing-machine for this purpose.

The machine will be further understood to have an initial hopper and feeding means. Preferably these are of the form described and claimed in my copending application Serial No. 105,543 filed July 19, 1949 and entitled Timed Feeding Device for Carton Blanks, although other types of feeders may be employed. The carton blanks, fed from such a hopper, will be delivered to means for carrying them through the machine. Such means are shown in an exemplary fashion

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in Figure 1 as comprising a pair of chains 25 and 26, forming the main conveyor chains of the machine and provided with lugs 27 and 28 engaging the trailing ends of the carton blanks and serving to move them. In connection with such chains rails 29, 30, 31 and 32 are ordinarily provided. Main side frames of the machine are indicated at 33 and 34. The mechanism herein described may be located at any part of the machine in which the blanks are still in unfolded condition, but is preferably located adjacent the feed hopper.

For the purpose of freeing the flaps 13, 14, 15 and 16 from each other, I journal across the machine an upper and a lower shaft. On these shafts I affix cooperating pairs of rotating elements, there being an element to engage edge portions of two adjacent flaps. As to such a pair of elements, one will be an anvil member or support designed to prevent displacement of the flap which it engages, while the cooperating member engaging the next adjacent flap will be so shaped as to depress or raise the said flap with respect to the supported flap. Whether any particular flap is raised or lowered with respect to its adjacent flap, will depend upon the selection and placement of the elements just described, and this selection and placement may be chosen in accordance with particular circumstances appertaining to each such flap. For example, it will be apparent in Figure 1 that the lugs 27 and 28 engage the flaps 14 and 16, and that these flaps overlie the chains 25 and 26. Thus the flaps 14 and 16 cannot be lowered by bending, and if an attempt were made to raise them, the result might be their disengagement from the lugs 27 and 28. Ordinarily therefore I employ in connection with flaps 14 and 16 supporting members from underneath to prevent displacement of these flaps or supporting members from above for the same purpose. The other two flaps 13 and 15 may then be displaced upwardly or downwardly, as the case may be, and there will be a shearing action at the line of cuts between the several flaps.

There is a lateral platform 35 extending across the machine. The upper and lower shafts mentioned, and indicated at 36 and 37, are journaled at one end in a bearing bracket 38. At the other end, as most clearly shown in Figure 6, they are journaled in a gear housing 39 and are connected within the housing by gears 40 and 41. The shaft 37 bears a sprocket 42 beyond the gear housing, which sprocket is connected by a chain 43 to the main drive of the folding and gluing machine so that the shafts 36 and 37 will be rotated in timed relationship to the other elements of the machine.

In the particular embodiment shown in Figure 1, the lower shaft bears a segmental supporting element 44 which will underlie the edge of flap 16 which is adjacent flap 15. The upper shaft 37 bears a pair of deflecting elements 45 and 46 which will act to bend flap 15 downwardly. The lower shaft carries a segmental supporting element 47 underlying that edge of flap 14 which is adjacent flap 15. The upper shaft bears a segmental supporting element 48 overlying that edge of flap 14 which lies adjacent flap 13. The lower shaft bears an upwardly acting deflecting element 49 which underlies that edge of flap 13 which is adjacent flap 14.

It will be understood that these supporting and deflecting elements may be made adjustable along the length of the shafts 36 and 37 so that

the machine may be stepped up for freeing the flaps of different sizes of cartons. The shapes of the supporting and deflecting elements will be best appreciated from Figures 4 and 5. The supporting elements 48 of Figure 5 or 44 of Figure 4 are segmental in shape having an operating edge of circular form about the axes of their respective shafts as a center. These elements do not deflect the flaps which they engage but merely support them during the action of the deflecting elements next to be described. The deflecting element 49 of Figure 5 or 45 of Figure 4 is a radially extending member having an operating edge which lies aslant as shown. The direction of motion of the supporting and deflecting elements is indicated in Figures 4 and 5 by arrows. The rotation of the shafts 36 and 37 is timed with the movement of the blanks and it will be evident from both of these figures that as these elements come into position with relationship to the flaps, a supporting element will hold the edge of one flap against deflection while a deflecting element will deflect the adjacent edge of the next flap in such a way as to produce a shearing action positively disconnecting adjacent edges of the flaps from each other, and breaking any connecting webs that may exist therebetween. By reason of the flexibility of the flaps, it is quite possible to deflect one edge of flap 13, by way of example, while the opposite edge of the same flap is held in channel-shaped side guides conventional in carton folding and gluing machines but not shown in the drawings herein.

In my mechanism, the same shafts 36 and 37 operate means for the positive removal of tabs or cut-outs such as discussed above. To this end I provide on the shaft 36 an element 50 which is so positioned on the shaft longitudinally and radially that its end will turn into a position coincident with the tab or cut-out 22 of the carton blank. This element 50 has a head 51, as most clearly shown in Figure 7, which head may have, if desired, a friction facing 52. Both the head and the member 50 are perforated as at 53 for the passage of air, and this perforation connects with a passageway 54 in the shaft 36. At the end of the shaft, as most clearly shown in Figure 6, I provide an internal sleeve 55 engaged in an enlargement of the perforation or bore 54 in the shaft. A packing gland 56 is engaged between the end of the sleeve 55 and the shoulder of the bore in the shaft. The sleeve 55 passes outwardly from the gear box 39 through a fitting 57. Within this fitting I provide a coil spring 58 bearing against a collar 59 on the sleeve 55, and serving to keep the sleeve pressed against the gland member 56.

The sleeve 55 is connected with a valve 60 supplied with air or other gas under pressure through a conduit 61, from a suitable source (not illustrated). The valve has an operating element 62 provided with a cam follower 63. The cam follower bears against a cam element 64 affixed to the shaft 37, and the coaction of these parts is such that a blast of gas will issue from the orifice in the head 51 of the member 50 when this member has turned into the position illustrated in Figures 6 and 7 and lies directly above the tab or cut-out 22. The result of the blast of gas is to deflect the tab or cut-out downwardly, or even to blow it out entirely if it is free enough.

For detachment I provide a positive gripper which pulls the tab off or away from the blank and which will next be described. This gripper comprises a body 65 attached to the shaft 37 in

such radial position as to coact with the member 50 in the way shown in Figures 6 and 7. The body 65 is hollow. Within it I pivot as at 66 a gripping finger 67, biased to gripping position by a spring 68 engaging it and an abutment 69 on the body 65. The end of the gripping finger 67 coacts with a gripping surface 70, also formed on the body 65. The pivoting shaft 66 of the gripping finger 67 extends outwardly from the body 65 and is provided with a lever arm 71 and a cam following roller 72. This cam following roller bears against the surface of a cam 73 and is actuated thereby so as to move the gripping finger 67 from non-gripping to gripping position. Since the element 65 will be rotating with the shaft 37 the cam member 73 must be stationary, and to this end I mount it on a bracket 74 affixed to the platform 35. For adjustment purposes, the cam is rotatively mounted on a sleeve 75 on the bracket and held in place by a flange 76. The adjustment means for the cam comprises a rod 77 pivoted thereto as at 78, extending downwardly through a perforation 79 in the platform 35 and actuated, (as shown in Figure 4) by a thumb screw 80 mounted on a bracket 81 affixed to the platform 35 and engaging a threaded end of the rod 77. The adjusting nut 80 is, of course, rotatively mounted on the bracket 81 but is not axially movable with respect thereto.

It will be seen that upon proper adjustment of the cam 73, it will so operate the gripping finger 67 that when the blast of gas from the member 50 has deflected the tab or cut-out 22, the tab or cut-out will be engaged between the end of the finger 67 and the gripping surface 70. The shape of the cam 73 is such that this gripping action persists during a considerable part of rotation of the member 55; and during this rotation, the gripped tab is pulled off or away from the carton blank. Thereafter the shape of the cam 73 is such as to release the gripping engagement and the removed tab will then be deposited by the gripping mechanism in a container or chute (not shown) associated with the platform 35.

By the provision of the relatively simple timed mechanism hereinabove described, which may readily be installed on any conventional carton blank treating machine, I have arranged not only for the automatic freeing of adjacent closure flaps from each other, but also for the positive removal of cut-outs or tabs from the blanks. It will be understood that the invention is not limited to the treatment of cartons or carton blanks of the precise form shown in the drawings; but the elements described may be moved along the shafts 36 and 37 to positions to accommodate the blanks of different sizes; that the supporting deflector and tab removal elements may be multiplied as desired to free any number of flaps from adjacent flaps, and to remove any number of tabs or cut-outs with which a particular blank may be provided. While the operating elements have been shown as acting upon seal-end closure flaps at the trailing edge of a carton blank, it will be understood that the mechanism may be timed in such a way as to cause these elements or similar ones to act upon closure flaps at the leading edge of the carton blank or at both edges, depending upon the type of carton blank being treated. Thus various modifications may be made in my invention without departing from the spirit of it. Having described my invention in an exemplary embodiment, what I claim as new and desire to secure by Letters Patent is:

1. In a device for treating carton blanks, a conveyor for moving carton blanks in timed sequence, a pair of shafts extending transverse said conveyor, one on either side thereof, and driven in timed sequence therewith, an operating element positioned on one of said shafts timed to coincide with a cut-out in carton blanks moving along said conveyor and perforated to deliver a blast of gas thereto, and a similarly positioned operating element on the other of said shafts having mechanically actuated gripping means for engaging and removing a cut-out deflected by said blast of gas, and means to deliver the said blast of gas through said perforated element.

2. The structure claimed in claim 1 wherein said last mentioned means comprises a connection between the perforation in said first mentioned operating element and a gas delivering perforation in the shaft upon which it is mounted, which last mentioned perforation in turn is connected with a supply of gas under pressure through a valve, and wherein said valve is mechanically actuated to deliver a blast of gas under pressure at the time of coincidence of said operating element with said cut-out.

3. The structure claimed in claim 1 wherein said last mentioned means comprises a connection between the perforation in said first mentioned operating element and a gas delivering perforation in the shaft upon which it is mounted, which last mentioned perforation in turn is connected with a supply of gas under pressure through a valve, and wherein said valve is mechanically actuated to deliver a blast of gas under pressure at the time of coincidence of said operating element with said cut-out, and wherein said second mentioned operating element is provided with a gripping abutment and a cooperating pivoted gripping finger which finger is me-

chanically actuated to grip against said abutment a cut-out deflected by said blast of gas, and to remove said cut-out during further rotation of said second mentioned operating member.

4. The structure claimed in claim 1 wherein said last mentioned means comprises a connection between the perforation in said first mentioned operating element and a gas delivering perforation in the shaft upon which it is mounted, which last mentioned perforation in turn is connected with a supply of gas under pressure through a valve, and wherein said valve is mechanically actuated to deliver a blast of gas under pressure at the time of coincidence of said operating element with said cut-out, and wherein said second mentioned operating element is provided with a gripping abutment and a cooperating pivoted gripping finger which finger is mechanically actuated to grip against said abutment a cut-out deflected by said blast of gas, and to remove said cut-out during further rotation of said second mentioned operating member, said gripping finger having an operating arm with a cam follower bearing against a cam surrounding the shaft on which said second mentioned operating member is mounted and wherein an adjustable means is provided for holding said cam in a fixed position for the operating of said lever arm.

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