A case sealer including the usual case sealing devices is automatically adjustable for random size cases. A switching device in the input region of the sealer senses the sizes of the cases entering the sealer, and a brake responsive to the switching device stops any case differing in size from a preceding case. The sealer speeds up in response to the switching device for clearing the sealer of all the cases preceding the different size case, and when the sealer is cleared, an axially movable shaft is adjusted to position cam and follower means for vertically adjusting a frame supporting the sealing devices to fit the height of the different size case. A pair of horizontally adjustable members supported on the frame carry glue applicers and guide rails and are horizontally adjusted by a second cam and follower means to fit the width of the different size case. When the shaft is positioned, the brake is released, and the sealer continues operation.

10 Claims, 6 Drawing Figures
FIG. 6.
AUTOMATIC RANDOM CASE SEALER
THE INVENTIVE IMPROVEMENT

Case sealers are generally known for opening the flaps of cases, applying glue, closing the flaps and pressing them together for sealing the case closed, and such machines are used for a wide variety of cases including corrugated cardboard cartons or boxes containing many different products. Case sealers have also been made adjustable to fit different size cases, but such adjustment has required manual intervention to set widths and heights of various elements of the machine to fit the new size case to be run through the machine. This requires considerable labor in changing the sealer over from one case size to another, and limits the versatility of the processing line leading to the sealer where size changes must be avoided if possible.

The invention involves recognition of a simple and efficient way for making a case sealer automatically adjustable to different size cases so that no manual intervention is necessary. The invention aims at simplicity, economy, and elimination of labor costs in an automatically adjustable case sealer that is simple, inexpensive, and reliable.

SUMMARY OF THE INVENTION

The inventive automatic random case sealer has many of the usual case sealer devices including guide rails, flap openers and closers, glue applicers, and means for pressing glued flaps into sealed engagement, and it improves on previous case sealers by automatically adjusting to different size cases. It includes switch means in an input region of the sealer for sensing the size of each one of the cases entering the sealer and brake means responsive to the switch means for stopping any of the cases differing in size from a preceding one of the cases. Then means responsive to the switch means clears the sealer of all cases preceding the different size case. An axially movable adjusting shaft is positioned after the sealer is cleared, and a vertically adjustable frame supporting the sealing devices is positioned by cam and follower means positioned by the shaft for adjusting the frame to fit the height of the different size case. A pair of horizontally adjustable members supported on the frame carry glue applicers and guide rails for the cases, and second cam and follower means positioned by the frame adjust the horizontal separation of the members to fit the width of the different size case. Means responsive to proper positioning of the shaft releases the brake after positioning of the shaft so that the sealer resumes operation in proper adjustment for the different size case.

DRAWINGS

FIG. 1 is a partially schematic, plan view of a preferred embodiment of the inventive automatic random case sealer;

FIG. 2 is a partially schematic, side elevational view of the sealer of FIG. 1;

FIG. 3 is a fragmentary, enlarged, cross-sectional view of a cam and follower adjustment device of the sealer of FIG. 1, taken along the line 2—2 thereof;

FIG. 4 is a fragmentary, enlarged, cross-sectional view of the cam and follower device of FIG. 3, but taken along the line 4—4 of FIG. 2;

FIG. 5 is a fragmentary, partially schematic, perspective view of operation of adjustment means for the inventive sealer; and

FIG. 6 is an enlarged, cross-sectional view of switching means for the sealer of FIG. 1.

DETAILED DESCRIPTION

Sealer 10 as shown in FIGS. 1 and 2 is one preferred embodiment of many possible applications of the invention for sealing cases including corrugated cardboard cartons or boxes, or any containers having foldable flaps to be glued and sealed. It includes many generally known devices formerly used in case sealers for guiding cases, opening and closing flaps, applying glue, and pressing glued flaps into sealed engagement. It differs from previously known sealers in automatically adjusting such elements to receive random size cases or to change from one size to another automatically without requiring manual intervention.

As shown in FIGS. 1 and 2, sealer 10 includes a main frame 11 supporting an endless drive belt 12 driven by a variable speed motor 13 for moving cases through sealer 10. Cases are received at an input region 14 where they enter sealer 10, and as the cases pass through sealer 10, their side flaps are spread open, their leading and trailing flaps are folded closed, glue is applied to the side flaps which are then folded closed, and the flaps are pressed together to seal the cases closed. The sealed cases exit at an output region 15 and pass on to other equipment, such as a coder, labeler, or pallet stacker. Devices above the upper surface of drive belt 12 accomplish these functions and are adjustable according to the invention for automatically changing from one size case to another.

A pair of vertical supports 16 on each side of sealer 10 support a vertically adjustable frame having four upright right legs 17 vertically sliding within frame pieces 16. As shown schematically in FIG. 5 in addition to the illustration of FIGS. 1 and 2, opposite pairs of vertically movable frame legs 17 are joined together by bottom cross pieces 18 and top cross pieces 19, and a longitudinal central bar connects upper cross pieces 19 and extends longitudinally over the center of the feed path of sealer 10. Other cross pieces or longitudinal bars can be added as desired to make a sturdy, boxlike, vertically adjustable frame incorporating vertical legs 17. Bar 20 and upper cross pieces 19 support a compression roller unit 21 for pressing glued flaps into sealing engagement, and the input end of bar 20 has a forward flap tucker that folds down the forward transverse flap of each case.

Vertical adjustment of the frame formed by uprights 17 and cross pieces 18 and 19 is accomplished by axial positioning of adjusting shaft 23 that is axially movable in bearings 24 and is positioned in any desired axial position by a hydro-check air cylinder 25 that is generally known per se. Cams 26 on the upper surface of shaft 23 are engaged by followers 27 so that the vertical position of lower cross piece 18 and the rest of the vertically adjustable frame including uprights 17 and upper cross pieces 19 is adjusted by the axial position of shaft 23 and controlled by cylinder 25. Vertical adjustment of frame uprights 17 also adjusts the height of longitudinal bar 20 so that a case passing through sealer 10 fits snugly under bar 20 to have its forward flap tucked down accurately by flap tucker 22 and to have its glued
flaps pressed into sealed engagement by compression unit 21.

Uprights 17 fit within fixed frame channels 16 as shown in FIG. 4, and caps 61 secure uprights 17 in place. Bearing strips 62 and 63 allow free vertical adjustment of uprights 17.

Adjustable frame uprights 17 also carry horizontally adjustable rods 28 that support side units formed as guide rails 29 supporting a flapper unit 30, and a pair of glue applicators 31. The horizontal separation of guide rails 29 is controlled by rods 28 carrying followers 32 riding in slots 33 in cams 34 supported in brackets 60 fixed to frame members 16. As frame uprights 17 are vertically adjusted, rods 28 are horizontally adjusted under the control of cam slots 33 for horizontally spacing guide rails 29 and the glue applicators 31 and other devices supported on guide rails 29 for fitting to the width of the cases passing through the sealer 10. Guide rails 29 also carry a pair of opposed, tapered input guides 35, side flap opening row rods 36, and side flap closing bow rods 37. Input guides 35 center an incoming case to be guided fairly closely between guide rails 29, and side flap opening row rods 36 have their outward ends fixed to guide rails 29 and their inboard ends transversely slidable in a support channel 38 so that bow rods 36 move freely toward and away from each other as guide rails 29 are adjusted. Side flap closing bow rods 37 are secured to guide rails 29 at pivot points 39 and have their inboard ends slidably secured in a slot 40 in longitudinal bar 20. Flapper 30 has an intermittently rotatable arm 56 that pivots over the path of the cases to tuck the trailing transverse or end flap of each case forward under flap tucker 22 on bar 20.

The automatic adjustment system for sealer 10 includes an automatic random control unit 50 controlling the interaction of various adjustment and control devices. A switch device 41 in input region 14 communicates with control unit 50 and includes a sensing arm 42 spring biased toward fixed guide rail 44. Sensing means 41 is best shown in FIGS. 1 and 6 as including a rod 45 connected to a slotted bracket 64 for pressing arm 42 toward guide rail 44 under the bias of spring 46 tensioned between stop 57 and collar 58 on rod 45. A bevelled step 47 in rod 45 moves longitudinally of casing 48, and a plurality of microswitches 49 are arranged along rod 45 on a support rod 51 to be positioned relative to step 47 as rod 45 moves axially in housing 48. As each case enters sealer 10, arm 42 presses it against guide rail 44, and the width of the case determines which of the microswitches 49 are closed and which of the microswitches 49 are open relative to the step 47 on rod 45. The condition of microswitches 49 relative to each incoming case automatically senses the width of each incoming case, and this information is fed to control unit 50. If each succeeding case has the same width as its predecessor, there is no change in case size, and control unit 50 makes no change in sealer 10. If a case arrives in input region 14 and is sensed by arm 42 and microswitches 49 to have a width either greater or smaller than a preceding case, such a circumstance is automatically signalled to control unit 50 for an adjustment to be made in sealer 10. A brake shoe 52 is then actuated by pneumatic cylinder 53 or other actuator to press the different size case against guide rail 44 and trap the different size case against further progress through sealer 10. At the same time, a changeover process is initiated by control unit 50 based on the size in formation of the different size case as supplied by microswitches 49.

The changeover includes clearing sealer 10 of all the cases ahead of the different size case which is held for an interval against side rail 44 by brake shoe 52. For this, motor 13 is preferably speeded up to drive belt 12 faster for quickly moving the cases preceding the different size case through sealer 10 and out to a downstream receiver. A sensing unit 54 in output region 15 communicates with control unit 50 for sensing the absence of any cases moving through output region 15 at a predetermined interval after actuation of brake 52 to determine that sealer 10 has been cleared of cases. Detection units 54 can be a photoelectric circuit directed across the path of cases through sealer 10, or an electromechanical sensor, or proximity sensing device. When sensors 54 detect that sealer 10 is cleared of cases, control unit 50 slows motor 13 to its normal speed.

When sealer 10 is cleared of cases as detected by sensors 54, cylinder 25 is actuated by control unit 50 to position shaft 23 axially to the correct position for the size of case detected by microswitches 49. This automatically adjusts cams 26 and followers 27 for vertical positioning of frame members 17 and for horizontal spacing of guide rails 29, glue applicators 31, and other horizontally adjustable devices as described above. Slots 33 in cams 34 are properly shaped so that both the height and the width of adjustable devices in sealer 10 fit the different size case held back by brake shoe 52. A detector 55 positioned along one of the vertically adjustable frame members 17 senses the vertical position of an arm 59 (FIG. 1) carried on one of the vertical legs 17 and determines that shaft 23 and the members adjusted by positioning of shaft 23 have reached the proper position corresponding to the case size detected by microswitches 49 and feeds back this fact to control unit 50. Detector 55 can be a series of microswitches arranged such as microswitches 49 to operate relative to arm 59 on vertical frame member 17, or can be any of a variety of position-detecting devices arranged alongside shaft 23 or any member positioned in response to the positioning of shaft 23 to signal control unit 50 that adjustment of shaft 23 corresponds to the case size detected by microswitches 49.

Then control unit 50 signals the release of brake shoe 52 to admit the different size case to sealer 10 so that the different size case proceeds at the normal speed through sealer 10. If the cases subsequent to the different size case have the same size as the different size case, sealer 10 continues to operate without further adjustment until another case arrives at input region 14 with a size different from its predecessors.

Sealer 10 can accommodate many different sizes of cases merely by having the required adjustment ranges, the proper surfaces for cams 26 and 33 and the required number of microswitches 49. Guide rails 29 and other horizontally adjustable devices can be either widened or narrowed with increased height, merely by changing the shape of cam slot 33 to fit the height and width of the cases to be run through sealer 10. There are many different ways that switching and sensing can be accomplished in the inventive sealer, and vertical and horizontal adjustments can be made by a variety of cams and followers.

Persons wishing to practice the invention should remember that other embodiments and variations can be
adapted to particular circumstances. Even though one point of view is necessarily chosen in describing and defining the invention, this should not inhibit broader or related embodiments going beyond the semantic orientation of this application but falling within the spirit of the invention. For example, those skilled in the art will appreciate the many possible variations in control units, sensing equipment, cams and followers, shaft positioning cylinders, drive units, and other devices within the spirit of the invention.

I claim:

1. In an automatic random case sealer having devices including guide rails, flap opening and closing means, glue applicators, and means for pressing glued flaps into sealed engagement, the improvement comprising:
   a. switch means in an input region of said sealer for sensing the size of each one of said cases entering said sealer;
   b. brake means responsive to said switch means for stopping any one of said cases differing in size from a preceding one of said cases;
   c. means responsive to said switch means for clearing said sealer of all of said cases preceding said different size case;
   d. an axially movable adjusting shaft;
   e. means responsive to said clearing means for positioning said shaft;
   f. a vertically adjustable frame supporting said devices;
   g. first cam and follower means positioned by said shaft for adjusting said frame to fit the height of said different size case;
   h. a pair of horizontally adjustable members supported on said frame and carrying said glue applicators and said guide rails for said cases;
   i. second cam and follower means positioned by said frame for adjusting the horizontal separation of said members to fit the width of said different size case; and
   j. means responsive to said positioning of said shaft for releasing said brake means after said positioning of said shaft.

2. The improvement of claim 1 including a fixed side rail in said input region and wherein said switch means includes an arm biased for pressing each of said cases against said side rail and a plurality of switches arranged to sense the position of said arm for sensing the width of each of said cases.

3. The improvement of claim 2 wherein said brake means includes a brake shoe for holding said different size case against said fixed side rail.

4. The improvement of claim 1 wherein said clearing means includes means for speeding up the movement of said preceding cases through said sealer, means for sensing the absence of said preceding cases in an output region of said sealer, and means responsive to said absence sensing means for resuming normal speed of said sealer.

5. The improvement of claim 4 wherein said brake releasing means includes means for sensing said positioning of said shaft.

6. The improvement of claim 5 wherein said positioning sensing means is arranged for sensing the positioning of an element positioned by said shaft.

7. The improvement of claim 4 including a fixed side rail in said input region and wherein said switch means includes an arm biased for pressing each of said cases against said side rail and a plurality of switches arranged to sense the position of said arm for sensing the width of each of said cases.

8. The improvement of claim 7 wherein said brake means includes a brake shoe for holding said different size case against said fixed side rail.

9. The improvement of claim 8 wherein said brake releasing means includes means for sensing said positioning of said shaft.

10. The improvement of claim 9 wherein said positioning sensing means is arranged for sensing the positioning of an element positioned by said shaft.

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