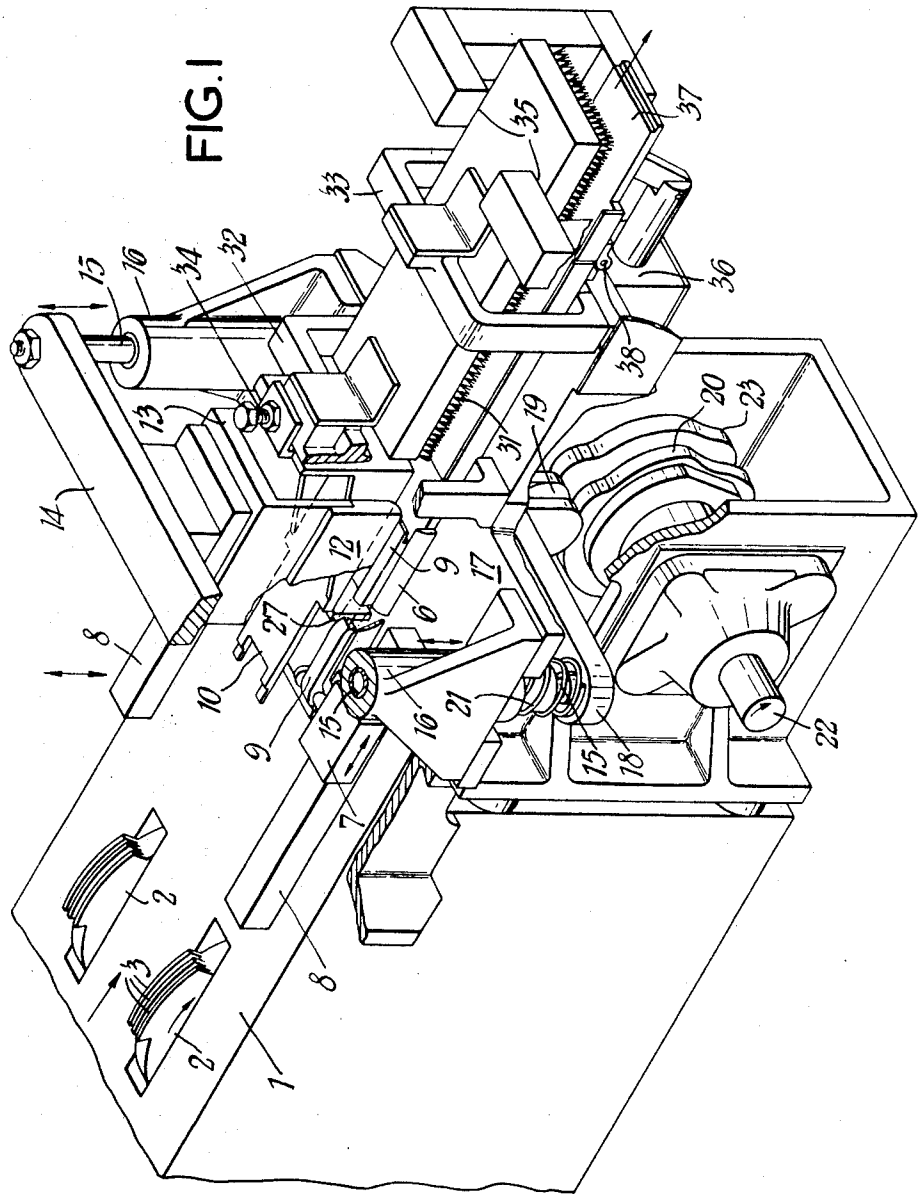
July 7, 1970 D. F. UDALL ET AL 3,518,805

PACKING MACHINERY

Filed March 19, 1968 3 Sheets-Sheet 1

FIG. 1



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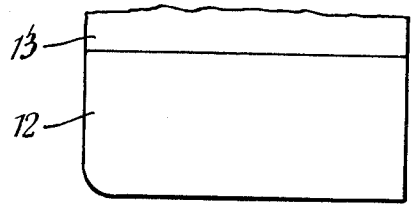


FIG. 3

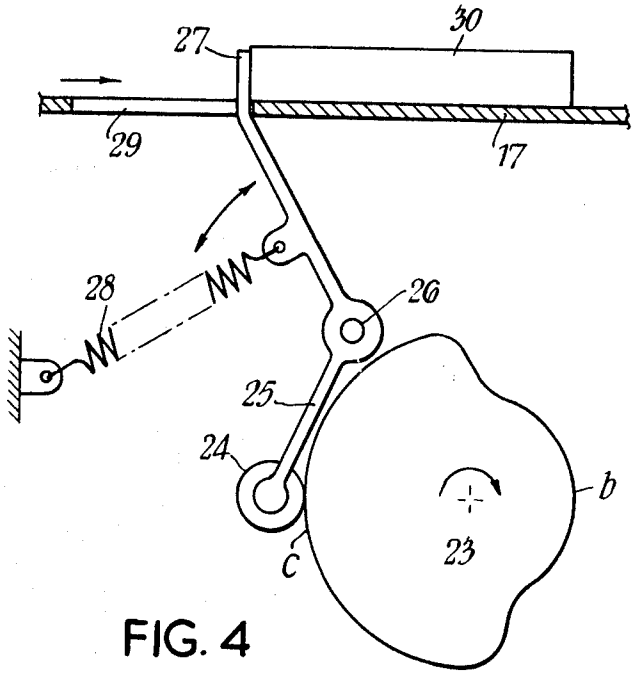


FIG. 4

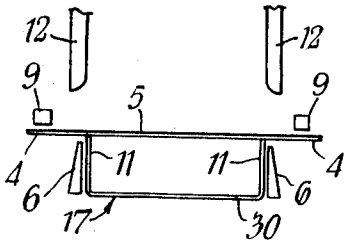


FIG. 2

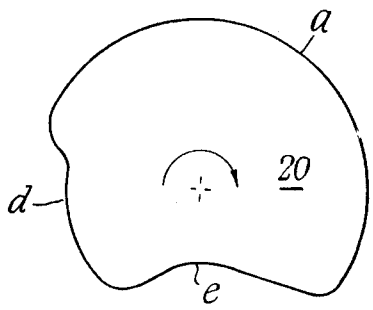


FIG. 5

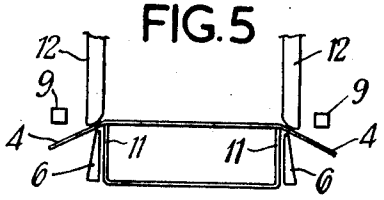
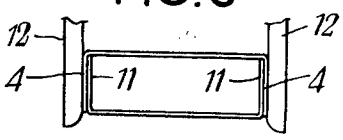


FIG. 6



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PACKING MACHINERY

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Int. Cl. B65b 7/20, 57/02
U.S. Cl. 53—53 8 Claims

ABSTRACT OF THE DISCLOSURE

The invention relates to improved apparatus, for producing longitudinal side seams for securing outer side flaps of a package, in which, in conjunction with means for the application of hot melt or other rapidly acting adhesive to the said flaps, a reciprocatory former device moving in a direction perpendicular to the path of the package through the apparatus is used to fold the said flaps into their required final position.

This invention relates to packing machines, especially such machines for forming hinged-lid cartons for cigarettes or the like.

In conventional machines for packing rectangular blocks into hinged-lid cartons, each block, for instance a block of cigarettes encased in foil, is fed into position on a carton blank and the combination is conveyed through a sequence of folding and adhesive-applying stations where, step-wise, the carton is erected and folded around the block. The conveying system is so arranged that the folds and the adhesive-coated overlapping seams are held firmly in position from the moment they are formed, so that packages of desired configuration and dimensions are obtained on emergence from the machine. During conveyance through the machine, most of the overlapping seams to which adhesive has been applied have time to dry and secure the overlap in position. It is, however, a disadvantage that the last operation in forming the package is the production of adhesive-bonded longitudinal side seams of the package body and lid and these seams may not be dry and secure as the package leaves the conveying system. Conventional machines are therefore provided with a rotating-drum attachment which is furnished with pockets to hold the completed packets firmly in the desired configuration and also with heating means to dry and secure the longitudinal side-seams as the packet moves from a receiving station to an ejection station. These drums are large and cumbersome and, as the rate of rotation must give an adequate drying time for the adhesive, the slowness of this stage limits the rate of the whole packing operation. Since improvements in cigarette-making machines have resulted in increased rates of cigarette manufacture, it is desirable to be able to pack the cigarettes at comparable rates.

An object of the present invention is to provide means whereby the longitudinal side seams of packages, particularly for cigarettes or the like, can be rapidly and reliably secured.

According to the invention, for producing longitudinal side-seams for securing outer side flaps of a hinged-lid carton or like package, use is made, in conjunction with means for the application to the said flaps of a rapidly drying adhesive, particularly an adhesive of the hot-melt type, of a reciprocatory device moving in a direction perpendicular to the path of conveyance of the package through the apparatus, i.e. vertically in the case of a horizontal path, to fold the said flaps, for example downwardly, into their required final position. Such apparatus can be made smaller and faster-acting than the above-described rotating drum, for which it is substituted.

The reciprocatory device may comprise a former, preferably of metal, having side parts which fit substantially accurately the sides of the completed package.

A preferred form of apparatus in accordance with the invention will now be more fully described with reference to the accompanying drawings, in which:

FIG. 1 is a perspective view of the apparatus, some parts being shown broken away.

FIG. 2 is an elevation of a main cam to a larger scale,

FIG. 3 is a diagrammatic view illustrating the operation of a retaining plate, and

FIGS. 4, 5 and 6 are diagrams showing successive stages in the operation of the apparatus.

The apparatus illustrated is intended for effecting the final operation in the production of cigarette packages of the hinged-lid carton type referred to above. The apparatus may therefore be attached to the exit end of an otherwise conventional machine for producing such packages. From this machine, each package, completed except for the sealing of the longitudinal side flaps of the body and hinged lid, is fed by means (not shown) over a surface **1** and between adhesive-applicator wheels **2**. For example, the packages may be urged forward between guide-walls by a driven overhead endless chain with spaced pendant stops. As the chain and stops retract upwards, the forwarding is taken over by a reciprocatory mechanism hereinafter referred to. Each wheel **2** has three parallel arcuate flanges **3** formed with slightly concave edge surfaces. At this stage, the package is in the condition which it will retain until the stage of FIG. 4 is reached, i.e. the side flaps **4** of the package body and hinged lid extend outwardly in the same plane as the upper face **5** of the said body. Consequently three strips of adhesive are applied along the undersurfaces of the flags **4** by the flanges **3** which pick up the adhesive in conventional manner from a bath of molten or liquid adhesive material disposed under the surface **1**. The concave edge surfaces of the flanges **3** produce on the paper surfaces of the flaps **4** neat beads of adhesive of adequate thickness to ensure that the adhesive properties of the said material are not prematurely lost due to drying.

The adhesive material is preferably of the so-called "hot-melt" type. Such materials are solid at normal ambient temperatures, but melt to form liquids of low viscosity. On cooling, the molten material passes rapidly through a highly viscous, highly adhesive state before returning to the solid state. However, other known rapidly-acting adhesive materials which will provide a reliable seam may be employed.

The package thus fed between the wheels **3** passes between two side guides **6** forming part of a reciprocatory assembly. The guides **6** are connected to sliding blocks **7** which are reciprocated longitudinally on side rails **8** as part of a conventional forwarding mechanism which is not shown. The reciprocatory assembly also comprises upper members **9** under which the side flaps **4** pass (FIG. 4) and by which the latter are retained in position and alignment. This assembly further comprises transfer members such as pushers or transfer pawls (not shown) which automatically engage the rear of the package and are retractably mounted on the blocks **7** under the members **9** as part of the forwarding mechanism. Held between the side guides **6**, which retain in position the inner, previously upwardly folded, side flaps **11** of the package, the package is urged forward by the transfer members and passes under a fixed guide member **10** for the body of the package to a position where it is operated upon to complete its production by mechanism now to be de-

scribed. The member **10** is provided on its underside with a smooth, abrasion-resistant coating, for example of nylon, to reduce friction and minimise risk of marking the upper face of the package.

The mechanism for completing the production of the package comprises a vertically reciprocatable former consisting of side plates **12** attached to a yoke **13** which is supported from a cross piece **14**. The ends of the cross piece are supported in turn on two vertical posts **15** which are slidably guided in columns **16** mounted on a base plate **17** forming part of the rigid frame of the apparatus. Fixed to the lower ends of the posts **15** is a cross piece **18** which extends under the base plate **17** and carries below its mid length a cam-follower **19** engaging with the edge of a main cam **20**. The cross piece **18**, and with it the parts **15, 14, 13** and **12**, are urged downwardly by compression springs **21** acting between the said cross piece **18** and the lower ends of the columns **16**.

The cam **20** is fast upon a driving shaft **22** which is rotated in timed relation with the main packaging machine and which also carries a cam **23**, engaged as shown in FIG. 3, by a follower **24** not seen in FIG. 1. The follower **24** is carried by one arm of a cranked lever **25** which is pivotally mounted at **26** and whose other arm carries a transverse plate **27**. The lever **25** is rockable by the cam **23**, against a loading spring **28**, between an inoperative position retracted below the plate **17** and the position illustrated, in which it extends up through a slot **29** in the said plate, so that the plate **27**, now vertical, engages and retains the rear end of the package **30** in position below the former **12, 13**.

The manner of operation of this part of the apparatus is as follows: As the side-guides **6** advance with a package towards the right in FIG. 1, the cam **20** is in engagement with the follower by its main lobe *a* which has a constant radius over a substantial proportion of its periphery. Consequently, the former **12, 13** is in its normal, fully raised, position, the springs **21** being under full compression. The cam **23** is in engagement with the follower **24** by its part *b* of minimum radius, so that the retaining plate **27** is below the plate **17**. When the side guides **6** and package reach the end of their movement to the right, the lobe *c* on the cam **23** comes into engagement with the follower **24** and the plate **27** is raised to engage the rear end of the package **30** as shown in FIG. 3. At this stage, the package is firmly held in place on all six sides, above by the guide **10**, below by the base plate **17**, at the lateral sides by the guides **6** (FIG. 4), at the rear by the plate **27** and at the front by abutment against the preceding package.

The follower **19** then passes on to a part *d* of the cam **20** of smaller radius, so that the former **12, 13** descends partially under the influence of the springs **21**, i.e. to the position shown in FIG. 5, thereby depressing the flaps **4** to such an extent that the inner flaps **11** are held by the said flaps **4** to the body of the package. The side guides **6** return to the left-hand limit of their movement in order to engage a further package. During this movement, the plate **27** prevents the package **20** from being drawn back by the guides **6**. As the right-hand ends of the guides **6** clear the package left under the former **12, 13**, the follower **19** engages the part *e* of the cam **30** of smallest diameter, so that the former is depressed further, to the position shown in FIG. 6, thereby pressing the adhesive coated flaps **4** firmly against the flaps **11** and completing the closure of the package. The plates **12** are preferably made of highly finished brass, which has been found to avoid marking of the flaps **4** as the former descends. By the re-engagement of the followers **19** and **24** with the portions *a* and *b* of the cams **20** and **23**, respectively, the former **12, 13** is returned to its uppermost position and the plate **27** to its retracted position. A fresh cycle of operations commences upon the next package which, in its advance, pushes forward the package just completed.

The completed package, in abutting relation with the preceding package, then passes under a brush **31** which serves in per se known manner to retard the packages. The brush is supported from the frame by bridge pieces **32, 33**. The bridge piece **32** also supports the guide member **10**. As shown in FIG. 1, the means of support preferably includes a screw **34** by which the height of the member **10** can be readily adjusted to suit packages of different thicknesses.

Finally, the package, while still under the brush **31**, reaches a testing station where means are provided for detecting imperfectly sealed packages. As diagrammatically indicated in FIG. 1, such means may comprise downwardly view photo-electric devices at **35** arranged to detect projecting flaps **4**. These devices control the operation by a solenoid **36** of a track section **37** which is hinged at **38** so that it can be swung down momentarily to reject a faulty package downwardly. Normally, however, the packages continue to be pushed forwards from under the brush **31**, in the direction of the arrow, onto an exit conveyor (not shown).

Apparatus such as has been described above, although compact, is effective and can easily keep pace with the main machine. For example rates of 2,600 packaged cigarettes per minute, or higher, can be attained without difficulty arising in the said apparatus.

Various modifications are possible: Thus the former could itself be designed to engage and hold the top of the package, the member **10** being dispensed with or curtailed. The vertical movement of the former could be effected by means of two cams acting upon followers on the lower ends of the parts **15**. The spring loading on the former could be provided by a tension spring arranged to draw the crosspiece **14** downwardly. The former could indeed be actuated by other mechanical means or by electromagnetic, pneumatic or hydraulic means. The packages could be conveyed through the apparatus by an intermittently driven conveyor belt.

We claim:

1. Apparatus for producing longitudinal side seams for securing outer side flaps of a package, comprising in combination with means for the application of rapidly acting adhesive to the flaps, a reciprocatory former device moving in a direction perpendicular to the path of package through the apparatus to fold the flaps into their required final position, a retractable member provided for engaging automatically behind the package after it has advanced to the reciprocatory device and for retaining the package at the rear while it is operated upon by the device, a cam controlling the movement of the retaining member and cam means controlling the movement of the reciprocatory device being rotated in unison.

2. Apparatus according to claim **1**, wherein the reciprocatory former device comprises side parts which fits substantially accurately the sides of the completed package.

3. Apparatus according to claim **1**, wherein the reciprocatory device is spring-loaded in the direction for effecting the folding and is operatively engaged with cam means by which its reciprocatory movement is controlled.

4. Apparatus according to claim **1**, wherein the reciprocatory device is supported by a cross piece bridging the path of the package through the apparatus and supported at its ends by slidably mounted posts operatively engaged with cam means.

5. Apparatus according to claim **1**, comprising a fixed guide member under which the package passes to the position in which it is operated upon by the reciprocatory device.

6. Apparatus according to claim **1**, comprising a retarding brush past which the completed package advances from the reciprocatory device.

7. Apparatus according to claim **1**, comprising means for detecting and rejecting a package with a defective side seam past which the completed package advances from the reciprocatory device.

8. Apparatus according to claim **1**, wherein the reciprocatory device is arranged to operate upon the package

in two steps, namely a first step in which it depresses the flaps to some extent, and a second step in which it folds the flaps into their final position.

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U.S. Cl. X.R.

53—374, 376