United States Patent

Stork

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[54] BAG-MAKING MACHINE

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[51] **Int. Cl.** **B31b 1/08,** B65b 57/02, B31b 29/74

[58] **Field of Search** ..... 93/8, 27, 35 SB; 53/53

[56] **References Cited**

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[57] **ABSTRACT**

A machine for making bags having cross bottom end closures, comprising an end closure forming station from which each bag moves with the end closure folded over so that an inner half of the end closure lies flat against one side of the bag, a delivery station and, disposed between the stations, a diverter which is controlled by end-closure checking means and is effective to reject faulty moving bags from a conveying path for the bags between the stations, the checking means for said inner half comprising photoelectric reflection sensors cooperating with stationary reflectors for checking any deviation in the position of edges of the inner half from a predetermined desired position as the bags are moved past the checking means, wherein guide means provided in the conveying path for the bags are effective to engage each end closure and erect it to an oblique position so that the said inner half of the end closure is lifted off the said bag side, the reflectors being carried by a bracket disposed such that the reflectors pass between the bag side and the lifted inner half as the bag moves past the checking means.

11 Claims, 2 Drawing Figures

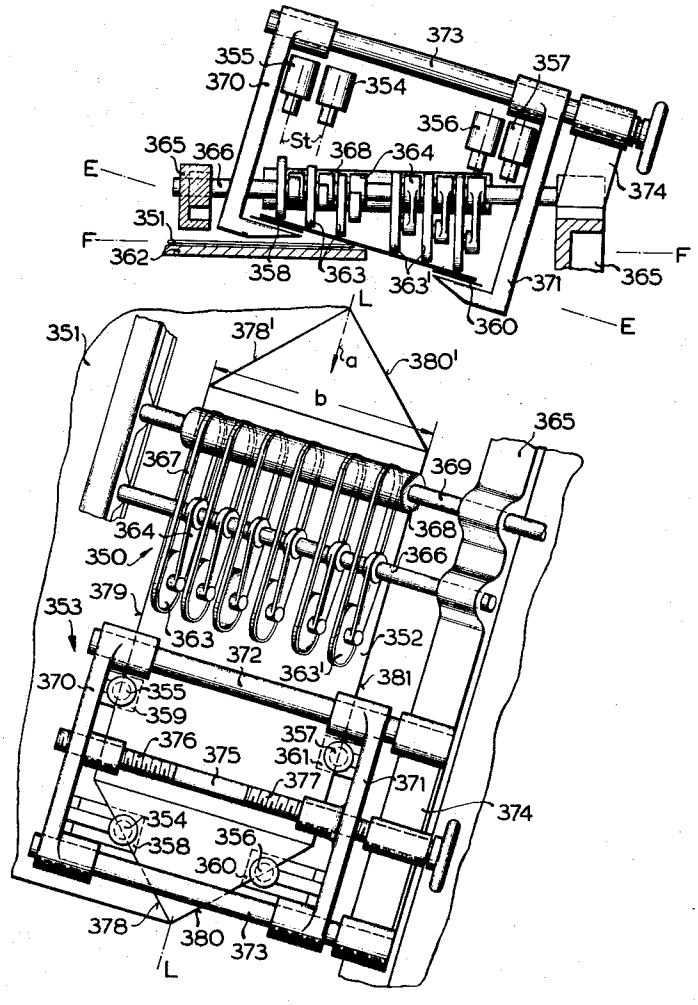
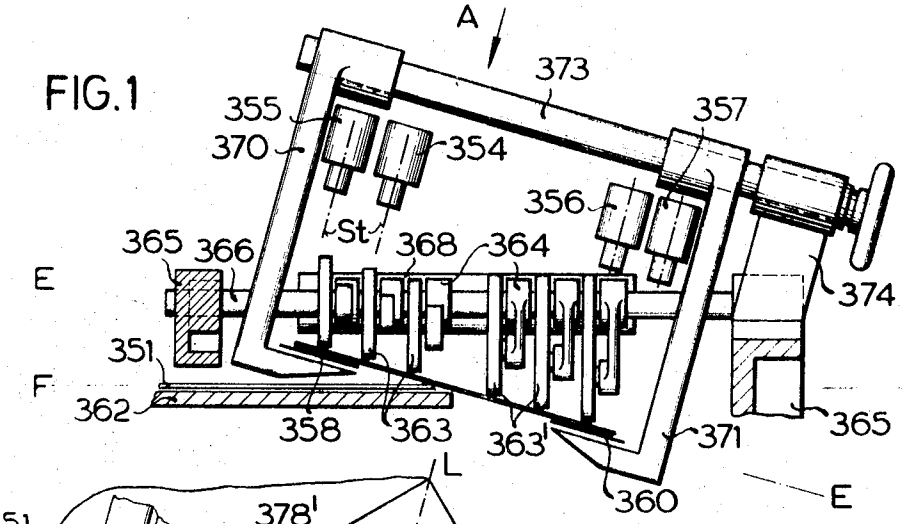


FIG.1



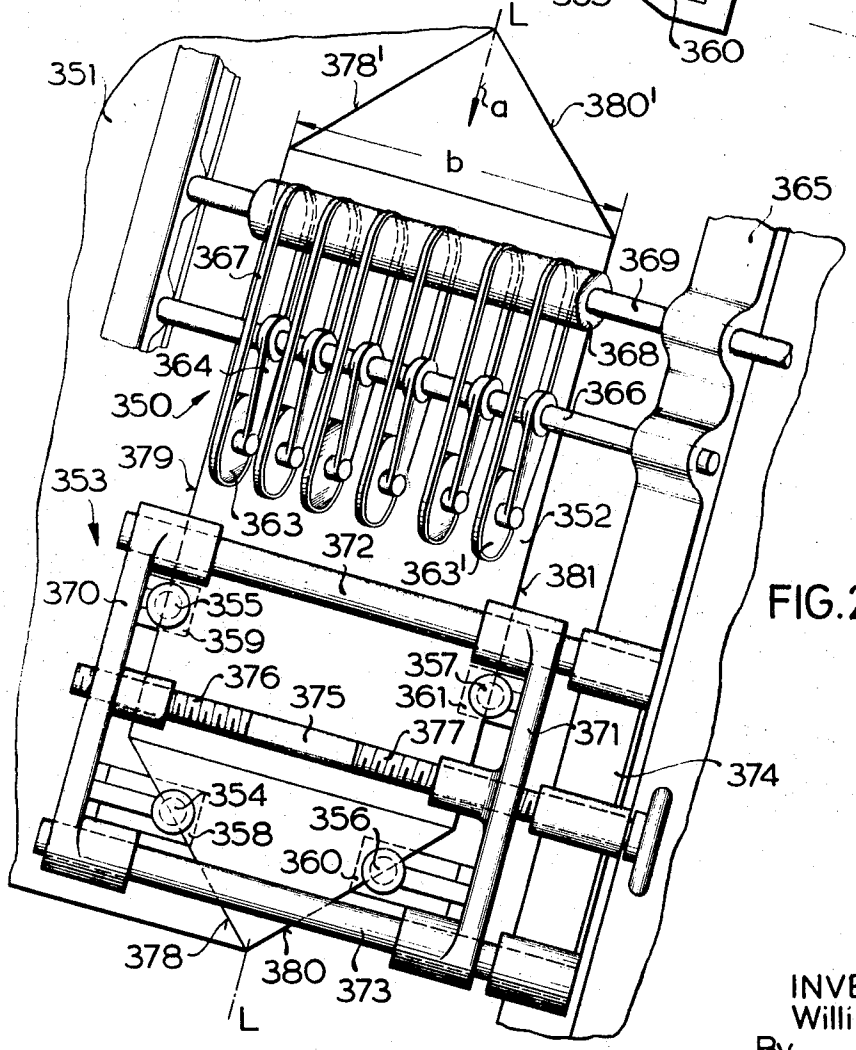


FIG.2

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BAG-MAKING MACHINE

The invention relates to an improvement in or modification of the bagmaking machine forming the subject of prior patent application Ser. No. 684,327 dated Nov. 20, 1967, now U.S. Pat. No. 3,524,389, issued Aug. 18, 1970, which concerns a machine for making bags having cross-bottom end closures, comprising an end-closure forming station, a delivery station and, disposed between them, a diverter which is controlled by end-closure checking means and is effective to reject faulty bags from a conveying path between the stations.

The present invention aims to provide equipment which permits more efficient checking of the end closures.

According to the invention, a machine for making bags having cross-bottom end closures comprises an end-closure forming station from which each bag moves with the end closure folded over so that an inner half of the end closure lies flat against one side of the bag, a delivery station and, disposed between the stations, a diverter which is controlled by end-closure checking means and is effective to reject faulty moving bags from a conveying path for the bags between the stations, the checking means for said inner half comprising photoelectric reflection sensors cooperating with stationary reflectors for checking any deviation in the position of edges of the inner half from a predetermined desired position as the bags are moved past the checking means, wherein guide means provided in the conveying path for the bags are effective to engage each end closure and erect it to an oblique position so that the said inner half of the end closure is lifted off the said bag side, the reflectors being carried by a bracket disposed such that the reflectors pass between the bag side and the lifted inner half as the bag moves past the checking means. Preferably, the guide means are effective to engage the outer half of each end closure for the purpose of erecting the entire end closure to an oblique position. It is also preferred that the guide means engage the end closure from above so as to depress the outer half of each end closure, the stiffness that is imparted to each end closure at the forming station as a result of various folding operations ensuring that depression of the outer half will cause the inner half to be lifted.

The guide means preferably comprise one or more rollers turning at the same speed and in the same direction as the moving bags and effective to roll on and depress the outer half of each end closure. Compared with stationary guide rails, such rollers have the advantage that they will only rarely cause displacement of any flaps or labels that were previously freshly stuck over the folds of the end closure for the purpose of reinforcing the latter.

By reason of the different breadths of end closures for various bags that are likely to be made by the machine, it is advisable to use a plurality of rollers rather than just one, the rollers then being spaced from one another to suit the largest breadth of end closure that may be encountered. Such a set of a plurality of rollers need not be adjusted for different bag sizes because it is clearly also in a position to engage narrower end closures.

The rollers may have equal diameters and be rotatable on shafts which are in a staggered arrangement corresponding to the oblique position of the end closures, each roller being driven by a belt from a drive shaft that is common to all the rollers. The advantage of having only a single drive shaft can, however, be obtained only if all the rollers have the same diameter.

To permit the oblique position for the end closures to be set, the shaft for each roller may be carried at an end of a lever, the levers being independently pivotable and fixable on a common pivot so as to set the desired staggered arrangement for the shafts.

In an alternative embodiment, the rollers may be independently rotatable on a common shaft and have different diameters corresponding to the oblique position of the end closures. In this case, the rollers would have to be driven at different speeds, for example by means of a stepped disc and drive belts, so that the peripheral speed of all the rollers is the same and equal to the speed of movement of the bags.

For the purpose of maintaining very close tolerances when sensing the edges of the end closures with the aid of photoelectric reflection sensors, it is desireable that the reflector should underlie the inner half of the end closure as closely as possible, irrespective of the breadth of the end closure. With this aim in mind, the aforementioned bracket preferably carries all the sensors and reflectors for scanning the inner half of each end closure and in such a way that the light beams are normal to the oblique end closure. Of course the face of the reflector will in this case be parallel to the oblique end closure and it can therefore be brought very closely beneath the end closure.

In a preferred form of the invention, the bracket is adjustable in a direction parallel to the oblique end closure. In this way the sensors and reflectors can be set to any desired breadth of end closure without having to make separate adjustments to each sensor and reflector. The checking means for the outer half of each end closure may also comprise photoelectric reflection sensors and reflectors carried on a common further bracket that is also adjustable in a direction parallel to the oblique end closure. This permits the checking means for the outer half of the end closure to consist of the same components arranged in mirror image to the components of the checking means for the inner half. Both brackets may be mounted on a common fixed guide for displacement in a direction parallel to the oblique end closure and adjustable to move in opposite sensors by means of a spindle provided with left-hand and right-hand screw threads. This considerably simplifies adjustment of the checking means to suit different breadths of end closures for different sizes of bags made by the machine.

An example of the invention is illustrated in the accompanying diagrammatic drawings, wherein:

FIG. **1** is a front elevation of end-closure checking means for a bagmaking machine, and

FIG. **2** is a plan view of the checking means taken in the direction of the arrow A in FIG. **1**.

The end-closure checking means for cross-bottom bags comprise means **350** in the conveying path of each bag **351** for erecting the end closure **352** of the bag from a flat position F—F at which an inner half of the end closure lies on one side of the bag, to an oblique position E—E inclined, say, 15° to 20° to the side of the bag. The checking means also comprise equipment **353**, including photoelectric reflection sensors **354, 355, 356** and **357** cooperating with associated stationary reflectors **358, 359, 360** and **361** for detecting any deviation in the position of edges of the end closure from a predetermined desired position as the bags are moved past the sensors in the direction of the arrow *a*. The erecting means **350** and the equipment **353** are arranged downstream (as viewed in relation to the direction of bag movement) of an end-closure forming station (not shown) and upstream of a delivery station (not shown), the arrangement being such that each bag **351** with its end closure **352** fed along a machine table **362** will move through under same.

The erecting means **350** comprise a set of rollers **363, 363'** which extends over a distance equivalent to the largest breadth *b* of end closure that may be encountered. Each roller **363, 363'** is rotatably mounted at the free end of a lever **364**. All the levers **364** are clamped to a common shaft **366** fixed to a machine frame **365** and they can be independently swung to a desired rotary position and then clamped in this position. The rollers have equal diameters. The shafts on which the rollers rotate and which are carried at the ends of the levers **364** can be staggered in a vertical plane so that, as shown in FIG. **1**, all the rollers will contact an imaginary plane E—E which is inclined to the horizontal conveying plane F—F of the bags and which conforms to the oblique position to which the end closures of the bags are to be erected. The plane E—E passes through the longitudinal centerline L—L of the end closure, the 'inner' half of which is on the left-hand side of this centerline and lies on the side of the bag. The roller arrangement is such that the group of rollers **363** is on the left-hand side of the centerline L—L of the end closure of each bag arriving at the

checking station while the rollers **363'** are located to the right of the centerline. As each bag arrives at the checking station, the rollers **363'** will depress the outer half of the end-closure, this outer half projecting beyond and therefore not being supported by the machine table **362**, whereby the entire end closure will be erected to an oblique position in the plane E—E. The rollers **363** guide the inner half of the bag closure as this inner half is being lifted off the side of the bag.

The rollers **363, 363'** are driven by belts **367** from a common drive roller **368** of which the shaft **369** is mounted in the machine frame **365** and coupled to the drive of the entire bag-making machine. The peripheral speed of the rollers is equal to the conveying speed of the bags and of course their direction of rotation is such that the parts that make contact with a bag are moving in the same direction as the bag.

The equipment **353** comprises two brackets **370, 371** which support the photoelectric sensors and associated reflectors. The brackets are displaceable towards and away from one another along guide rods **372, 373**, i.e., parallel to the oblique plane E—E. The guide rods extend across each end closure and are mounted in the machine frame **365** by means of bearing blocks **374**. The brackets **370, 371** are located symmetrically with respect to the longitudinal center line L—L of the end closure and are adjustable with respect to the center line by means of a spindle **375** which has a right-hand screw thread **376** and a left-hand screw thread **377** engaging in respective nuts carried by the brackets. In this way, rotation of the spindle will cause the brackets to be adjusted in unison but in opposite directions.

The bracket **370** carries the sensors **354** and **355** with associated reflectors **358** and **359** for scanning the inner half of each end-closure, the sensing beams *St* being directed normal to the oblique plane E—E containing the erected end closure. The reflectors **358, 359** are fixed to lateral flanges of the brackets in the manner indicated in FIG. **1** so that, as each bag passes the checking station, these flanges will enter the space between the side of the bag and the inner half of the oblique end-closure, this causing the sensing beams *St* to be interrupted. The senser **354** is intended to scan the inclined edges **378, 378'** of the inner half of each end closure while the senser **355** serves to scan the edge **379**.

The sensors **356, 357** and associated reflectors **360, 361** serve to scan the edges **380, 380'** and **381**, respectively, of the outer half of each end closure. They are carried by the bracket **371** in an arrangement which is a mirror image of that of the corresponding components of the checking means for the inner half of the end closure, thereby providing a symmetrical arrangement with respect to the centerline L—L. This symmetrical arrangement will not be upset when the brackets **370, 371** are adjusted by turning the spindle **375** to suit a different breadth of end closure.

If the end-closure forming station that precedes the illustrated checking apparatus produces the end closures so that they come to underlie a side of the bag, it will be clear that the checking apparatus can be readily modified so that it lies beneath the conveying plane F—F of the bags.

What is claimed is:

1 A machine for making bags having cross-bottom end closures, comprising an end-closure forming station from which each bag moves with the end closure folded over so that an inner half of the end closure lies flat against one side of the bag, a delivery station and, disposed between the stations, a diverter which is controlled by end-closure checking means and is effective to reject faulty moving bags from a conveying path for the bags between the stations, the checking means for said inner half comprising photoelectric reflection senseis cooperating with stationary reflectors for checking any deviation is the position of edges of the inner half from a predetermined desired position as the bags are moved past the checking means, wherein guide means provided in the conveying path for the bags are effective to engage each end closure and erect it to an oblique position so that the said inner half of the end closure is lifted off the said bag side, the reflectors being carried by a bracket disposed such that the reflectors pass between the bag side and the lifted inner half as the bag moves past the checking means.

2. A machine according to claim **1**, wherein said guide means are effective to engage the outer half of each end closure.

3. A machine according to claim **2**, wherein the guide means comprise one or more rollers turning at the same speed and in the same direction as the moving bags and effective to roll on and depress the outer half of each end closure.

4. A machine according to claim **3**, wherein the guide means comprise a plurality of rollers spaced to suit the largest breadth of end closure that may be encountered.

5. A machine according to claim **4**, wherein the rollers have equal diameters and turn on shafts which are in a staggered arrangement corresponding to the oblique position of the end closures.

6. A machine according to claim **5**, wherein the shaft for each roller is carried at an end of a lever, the levers being independently pivotable and fixable on a common pivot.

7. A machine according to claim **4**, wherein the rollers independently turn on a common shaft, have different diameters corresponding to the oblique position of the end closures and are driven at different speeds so that their peripheral speeds are the same and equal to the speed of movement of the bags.

8. A machine according to claim **1**, wherein the sensors and reflectors are fixed to a common said bracket so that the light beams are normal to the oblique end closure.

9. A machine according to claim **8**, wherein the bracket is adjustable in a direction parallel to the oblique end closure.

10. A machine according to claim **1**, wherein the checking means for the outer half of each end closure also comprise photoelectric reflection sensors and reflectors carried by a common further bracket that is adjustable in a direction parallel to the oblique end closure.

11. A machine according to claim **10**, wherein the bracket carrying the checking means for the outer half of each end closure and the bracket carrying the checking means for the inner half of each end closure are mounted on a common fixed guide for displacement in a direction parallel to the oblique end closure and are adjustable to move in opposite senses by means of a spindle provided with left-hand and right-hand screw threads.

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