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54 **Automatic corner tape sticking device for carton sealing machine.**

57 The present invention relates to a cardboard carton sealing machine and, particularly, to an automatic corner tape sticking device provided therewith, characterized in that when a cardboard carton to be sealed passes through the tape cutter heads (12) disposed on upper and lower sides of the frames via conveyer belts (11), adhesive tapes are stuck onto both top and bottom edges of the carton and severed, then, the tapes at the upper and lower corners of the carton are spread and stuck onto the carton by short brushes (13) which are driven to move in a horizontal reciprocating manner over a predetermined distance by pneumatic cylinders disposed on both upper and lower sides; the carton keeps moving on the conveyer belts to pass through long brushes (43) which are operated to move vertically by pneumatic cylinders disposed on both upper and lower sides; during the up and down strokes of the long brushes, the tapes on the sides of both top and bottom ends of the carton are flatly stuck onto the edges of the carton, thus to automatically effect the corner sealing of the carton. The automatic corner tape sticking device for carton sealing machine according to the present invention allows for simplified carton sealing operation which is both fast and economic.

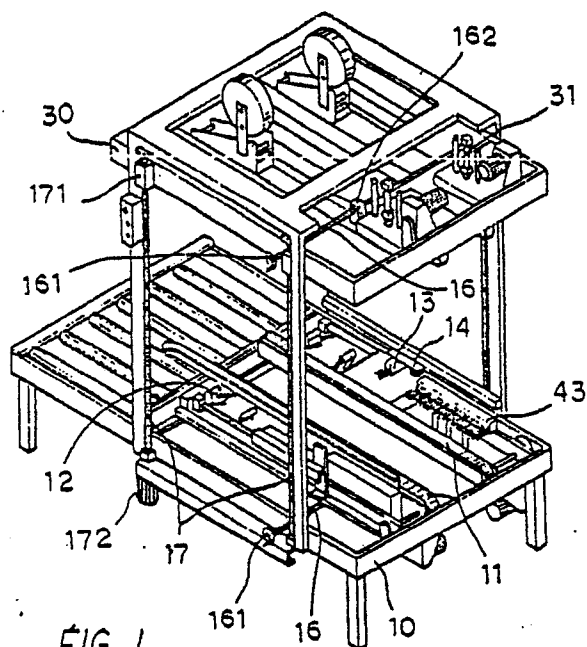


FIG. 1

AUTOMATIC CORNER TAPE STICKING DEVICE FOR CARTON SEALING MACHINE

FIELD OF THE INVENTION

The present invention relates to an automatic corner tape sticking device for a carton sealing machine and, more particularly, to a device used with cardboard cartons, in which, the adhesive tapes on the upper and lower edges thereof are automatically stuck, thereby to have the cartons securely sealed.

DESCRIPTION OF PRIOR ART

In a conventional cardboard carton corner sealing mechanism, such as that disclosed in the Republic of China Patent Application No. 7329876 (Patent No. UM-27051), filed on December 10, 1984, a fixed brush is provided on the tape cutter head; after the tapes are stuck onto the corners of the carton, the fixed brush touches the leading edge of the tapes and has the tapes flatly stuck onto the carton as the latter passes the cutter head; there is also provided with a rotating brush which spreads the trailing edge of the tapes ward so that the tapes are flatly stuck onto the carton; and, finally, there is further provided with a disk brush which is directly driven to rotate by a motor, the rotating movement of the brush, in conjunction with the advancing of the carton, spreading the tapes on the edges of the bottom end of the carton upward, so that the tapes are flatly stuck on the carton. The structure of such corner sealing machines, however, has the drawback that the tapes do not securely stick on the carton, resulting in unsmoothly sticking tapes which are easily peeled off, and that a separate driving motor has to be provided for the disk brush that adds to the overall cost. In particular, when disk brush rotates upward to spread the tapes, a margin will result due to the squeezing by the brush. As a result, the tapes that have been spread by the forward rotating brush will be torn off by the reversing brush hairs, resulting in irregular creases. Thus, making the cartons that have been sealed unsightly and insecure. In another corner sealing device for the carton sealing machine, such as that disclosed in the Republic of China Patent Application No. 7420830, filed on October 5, 1985, a swinging brush is provided at a point intermediate the path of the moving cartons and a rotating brush is provided at the rear end thereof; the tapes are first spread tightly onto the forward edge of the carton from rear to front by the swinging brush; as the carton advancing, the brush spreads the tapes to stick securely from front to rear; then the tapes

on the bottom of the carton are spread to stick tightly by a final upward stroke of the rotating brush. Corner sealing devices of this type, however, still have their disadvantages. Among others, for example, the tapes tend to be sealed unevenly or insecurely.

In view of the ever-increasing economic activities during recent years, selling of industrial and commercial products requires that the products must be packed and shipped so that they finally get into the market safely. Therefore, packing with a properly sealed carton is one of the key factors to the success of any products. The present invention intends to overcome the disadvantages of the various aforementioned carton sealing machines of the prior art such that conventional cartons for packing products, when processed by the device of the present invention, can be more perfectly sealed to obtain results that are secure, fast and economic.

SUMMARY OF THE INVENTION

In the automatic corner tape sticking device for the cardboard carton sealing machine according to the present invention, when the carton to be sealed passes through the tape cutter heads disposed on the upper and lower sides of the frames via conveyer belts, adhesive tapes are stuck onto both top and bottom edges of the carton and severed; the tapes at the upper and lower corners of the carton are then spread and stuck onto the carton by short brushes which are driven to move in a horizontal reciprocating manner over a predetermined distance by pneumatic cylinders disposed on both upper and lower sides; the carton keeps moving on the conveyer belts to pass through long brushes which are operated to move vertically by pneumatic cylinders disposed on both upper and lower sides; during the up and down strokes of the long brushes, the tapes on the sides of both top and bottom ends of the carton are flatly stuck onto the edges of the carton, thus to automatically effect the corner and side sealing of the carton.

Therefore, it is one of the objects of the present invention to provide an automatic corner tape sticking device for a carton sealing machine that affords integral, consecutive operations for tape sticking, fast handling which are automatically completed.

Another object of the present invention is to provide an automatic corner tape sticking device for a carton sealing machine which affords the function that the device may be adjusted depend-

ing on the size of the cardboard carton so as to accommodate the carton to be sealed.

A further object of the present invention is to provide an automatic corner tape sticking device, in which, the structure is simple, the operations are consecutive, and which needs no added powering equipment.

A still further object of the present invention is to provide an automatic corner tape sticking device such that the packing and carton sealing operations of industrial and commercial products are made faster, more economic, and more dependable to ensure safety during shipping and selling of the products.

From the following detailed descriptions, when taken in conjunction with the accompanying drawings, other objects, advantages, and features will become apparent to those skilled in the art.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view showing the configuration of the automatic corner tape sticking device of the present invention as used with a carton sealing machine.

Fig. 2 is a schematic view showing the configuration and movement of the short brushes provided on the automatic corner tape sticking device of the present invention,

Fig. 3 is a perspective view showing the operations of the short brushes when tape spreading at the corners of the carton is completed,

Fig. 4 is a perspective view showing the configuration of the long brushes provided on the automatic corner tape sticking device of the present invention,

Fig. 5 is a side view showing the successive movements during the operation when tape spreading on the carton is completed,

Fig. 5A is a sectional view showing the configuration of the spring and stud provided on the end portion of the long brushes.

Fig. 6 is a perspective view showing the tapes being spread on the sides of the carton by the long brushes,

Fig. 7 is a schematic view showing the sequence of the consecutive carton sealing operation of the automatic corner tape sticking device used with the carton sealing machine according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Referring to Fig. 1, a cardboard carton sealing machine in shown to include an upper frame 30, a lower frame 10, conveyer belts 11, adhesive tape

cutter heads 12 (symmetrically disposed on both sides of the upper frame 30 and the lower frame 10, respectively), and short brushes 13 and long brushes 43 (also symmetrically disposed on both sides of the upper frame 30 and the lower frame 10, respectively) which are the essential parts of the corner tape sticking device of the present invention, and the structure of operation thereof will be described hereinafter.

The upper and lower frames 30, 10 are provided with screw rods 17 and screw rod receptacles 171 (fixed on the upper frame 30), sprockets being provided under screw rods 17 and interconnected by chains, the end of one of the rods 17 being connected to a motor 172 which drives the rods 17 to move synchronously so as to control the vertical distance between the upper and lower frames 30 and 10 to accommodate operation for sealing cardboard cartons of different sizes (heights).

As shown in Fig. 1, one of the conveyer belts 11 and the members such as the short brush 13, the long brush 43 and the tape cutter head 12, on one side of the frame can be moved horizontally in both directions between the upper and lower frames so as to change the distance between the brushes on both sides. Distance adjustment is effected by means of a transversely disposed screw rod 16 and mating nut 162. When a handle 161 is rotated, said one of the conveyer belts 11 together with the members are manipulated such that its horizontal spacing from the corresponding conveyer belt and the members is adjusted to accommodate the operation for sealing cartons of different sizes (widths).

Fig. 2 shows the configuration and operation of the short brushes of the present device, wherein the short brush 13 is provided at a suitable distance behind the cutter head 12 along the path of the conveyer belt 11; an open-ended clamping block 131 on the rear end of the short brush clamps on a chain 132 between a pair of sprockets 141; a gear element 14 is provided on the lower end of one of the sprockets 141; and a toothed rack 151 is in engagement with the gear 14 and driven by a pneumatic cylinder 15 which is connected to form a loop control for reversing direction at predetermined positions, thus allowing the short brush to move reciprocatingly between predetermined positions.

During the operation, when a carton S is moved forward by the conveyer belts, the cylinder 15 drives the rack 151 to move back, thus driving the gear 14 to push forward the short brush 13 clamped on the chain 132: the brush then sweeps over the corner of the tape S, from front to rear, to have the tape flatly stuck on the carton. As the carton S keep moving, the cylinder 15 pushes forward to move the rack 151 forward accordingly, thus driving the chain 132 back. The short brush clamped on

the chain then sweeps over the tape, from rear to front, to have the tape on the rear end of the carton flatly stuck. The operation of sticking the tape on both corners is thus completed. (see Fig. 3).

Figs. 4, 5(5A) show the configuration and operation of the long brushes of the present device, wherein both ends of the bottom side of the long brush 43 are provided with torsional springs 42 (see "P" in the enlarged view for details) and pivotally joined with a driving plate 40 by hinges 41, driving plate 40 being fixedly connected to the upper end of a push rod 311 on a pneumatic cylinder 31. The vertical movement of the cylinder 31 brings the driving plate 40 along with the long brush 43 to move up and down via the push rod 311. Both ends of the long brush 43 are provided with studs 431, the ends thereof being restrained by the upright portions of a U-shaped base plate 33. A raised guide block 401 is provided centrally of said upright portion with one side of the block being of arcuate shape. The up and down movements of the long brush 43 are caused by means of the studs 431 moving around the guide block 401. Since the studs 431 are pressed by springs 4311 provided within stud receptacles 4310 (see Fig. 5A), the resilient pressing action obtained when the studs 431 moving around the guide blocks 401 causes the studs to move closely along the curved sides of the guide blocks. Referring to Fig. 5, there is shown schematically the consecutive lateral movements of the long brush 43 in motion (arrows in Fig. 5 show the positions of the brush movements). The U-shaped base plate 33 is secured by the supports of a bracket 32. The push rod 311 extends through the center of the bottom plate of the bracket 32, then to thread through the bottom portion of the U-shaped base plate to be connected to the bottom portion of the driving plate 40.

During the operation, the carton, after completing the operation as shown in Fig. 3, keeps moving forward with the conveyer belts 11 to reach the long brush provided at suitable position behind the short brush. The driving plate 40 and the long brush 43 are then raised by the push rod 311 through the upward movement of the pneumatic cylinder 31, causing the long brush 43 to sweep, from bottom to top over the tape S₂ on the bottom sides of the carton to have the tape securely stuck on the carton. The long brush 43 moves upward along the guide block 401 to the top end thereof, bringing the brush into an upward upright orientation, thus out of contact with the carton. The cylinder then retracts down in its return stroke, causing the push rod 311 and, hence, the driving plate 40 and the long brush 43 to retract downwardly with it, so that the tape S₂ that has been flatly stuck will not be peeled off in the opposite direction by the long brush 43.

While the structure and the operation of the long brush 43 are described in connection with the long brush provided on the lower frame 10, the structure of the long brush provided on the upper frame 30 is identical with that on the lower frame 10, except that the former is disposed in opposite directions, and that the operation thereof corresponds to the change of direction.

The pneumatic cylinders 31 and 15 which actuate the long brush 43 and short brush 13, respectively, are both powered by a compressor (not shown).

Fig. 6 shows portion of the carton after the tape S₂ being flatly stuck on the side thereof by the long brush.

Fig. 7 shows the consecutive steps of the automatic tape sticking operation of the carton sealing machine according to the present invention, in which, the operation of the long brush 43 and the short brush 13 which constitute the essential structure of the present device has been hereinbefore described in detail.

Owing to the close fitness of the structure and the positive and dependable control, the tape sealed by the automatic corner tape sticking device for the carton sealing machine according to the present invention is free of disadvantages, such as undesired creases, unevenness, and peelings.

It should be understood by those skilled in the art that the present invention may include other forms that can be made in accordance with the spirit of the present invention and within the scope of the claims.

Claims

1. A carton sealing machine including an automatic corner tape sticking device, said device comprising:

a pair of conveyer belts;

two pairs of cutter heads disposed symmetrically on the upper and lower frames of said machine;

two pairs of short brushes disposed symmetrically on said frames at a suitable distance behind said cutter heads; and

two pairs of long brushes disposed symmetrically on said frames at a suitable distance behind said short brushes.

2. The device according to claim 1, wherein an open-ended clamping block is provided on the rear end of said short brushes, said block clamping on a chain provided between a pair of sprockets.

3. The device according to claim 2, wherein a gear is provided on the lower end of one of said sprockets, said gear being in engagement with a

toothed rack, and said rack being connected to a pneumatic cylinder which moves in a horizontal manner.

4. The device according to claim 2 or 3, wherein said cylinder is mounted to form a loop control for reversing direction at fixed positions, causing the short brushes to move reciprocatingly between said fixed positions.

5. The device according to claim 1, wherein two torsional springs are provided at suitable positions behind said long brushes which are pivotally joined with a driving plate by two hinges, said driving plate being fixedly connected to one end of a push rod.

6. The device according to claim 5, wherein the other end of said push rod is secured to a pneumatic cylinder, thereby the vertical movement of said cylinder causing the long brushes to move up and down.

7. The device according to claim 1, wherein both ends of said long brushes are provided with studs, said studs being made to have compression force by said torsional springs provided within stud receptacles.

8. The device according to claim 1 or 7, wherein both ends of said studs are restrained by two upright portions of a U-shaped base plate, at the center of said upright portions being provided with guide blocks, the upper edge longitudinally. of one of said blocks being arcuate in shape for guiding the movement of said studs.

9. The device according to claim 8, wherein said U-shaped base plate is fixed by two supports of a bracket, the center of said base plate being provided with a hole which communicates vertically with a hole provided centrally on the bottom plate of said bracket, allowing said push rod to move vertically in said holes, one end of said push rod being secured to said driving plate while the other end thereof being secured to said pneumatic cylinder.

10. The device according to claim 1, wherein said long brushes and the members thereon are mounted in oppositely oriented disposition on the upper and lower frames respectively.

11. The device according to claim 1, wherein screw rods and screw rod receptacles are provided on the frames which are interconnected by a chain and sprockets for synchronous adjustment of the height (longitudinal spacing) between the upper and lower frames.

12. The device according to claim 11, wherein the lower end of one of said screw rods is connected to a motor for actuating the adjustment of said frames.

13. The device according to claim 1, wherein the frames are further provided with screw rods and nuts, so that the width (transversal spacing) be-

tween one of said conveyer belts and the cutter head, short brush and long brush mounted thereon and the other said conveyer belt and said members mounted thereon is controlled by rotating a handle.

FIG. 2

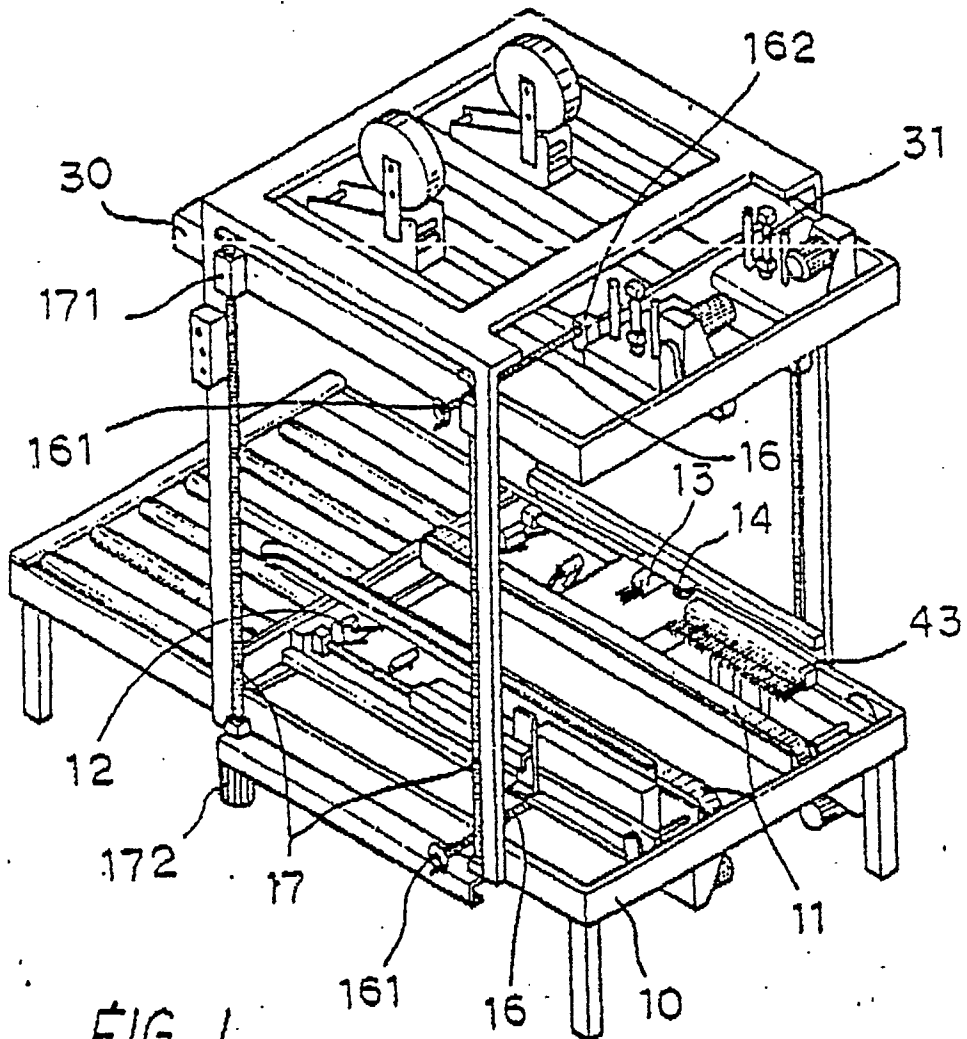
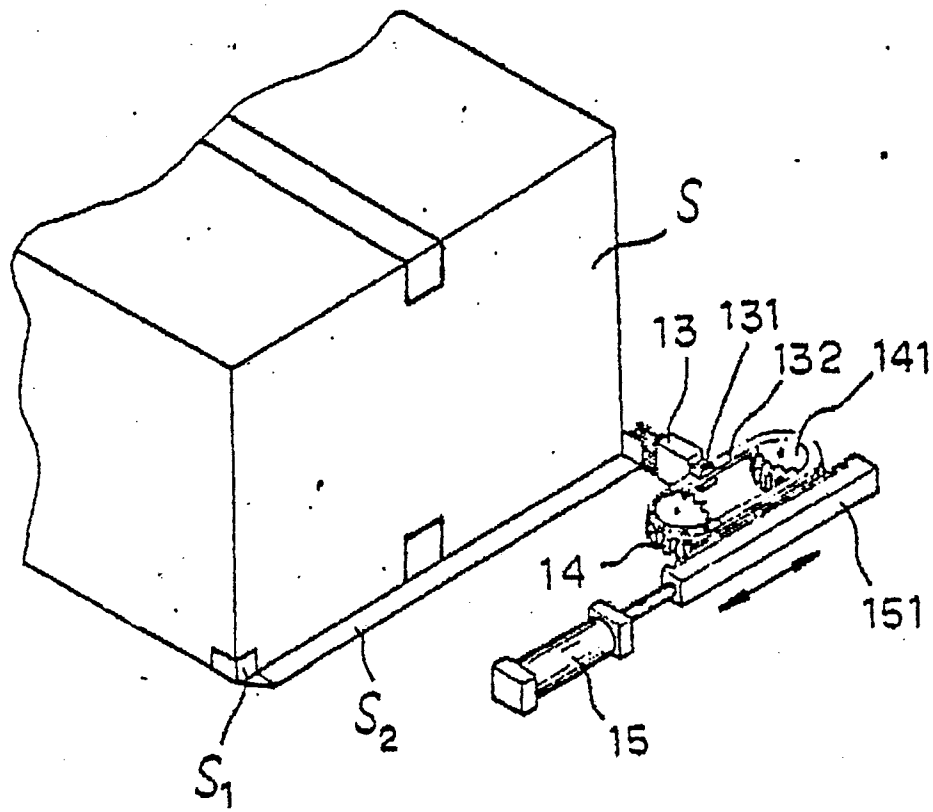
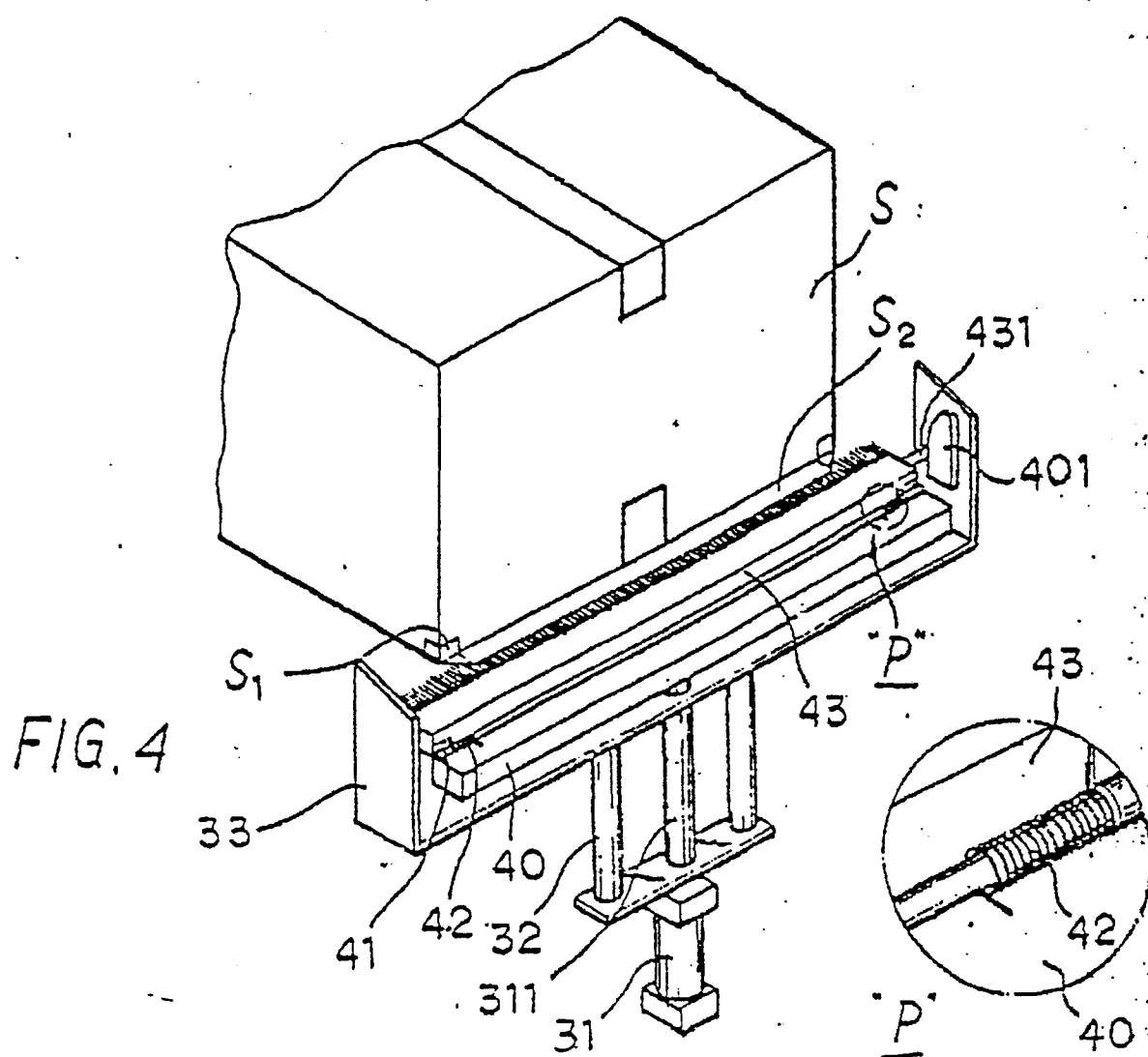
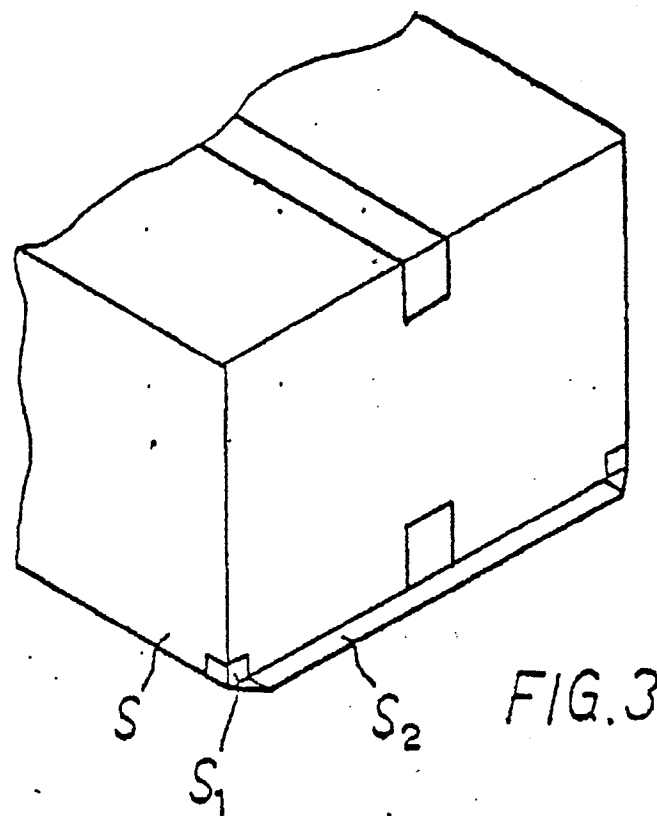


FIG. 1



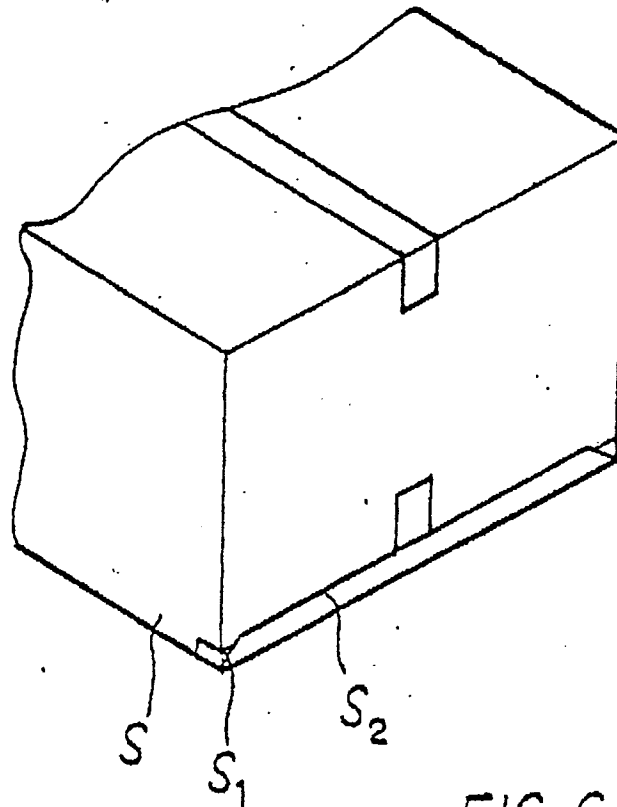


FIG. 6

FIG. 5A

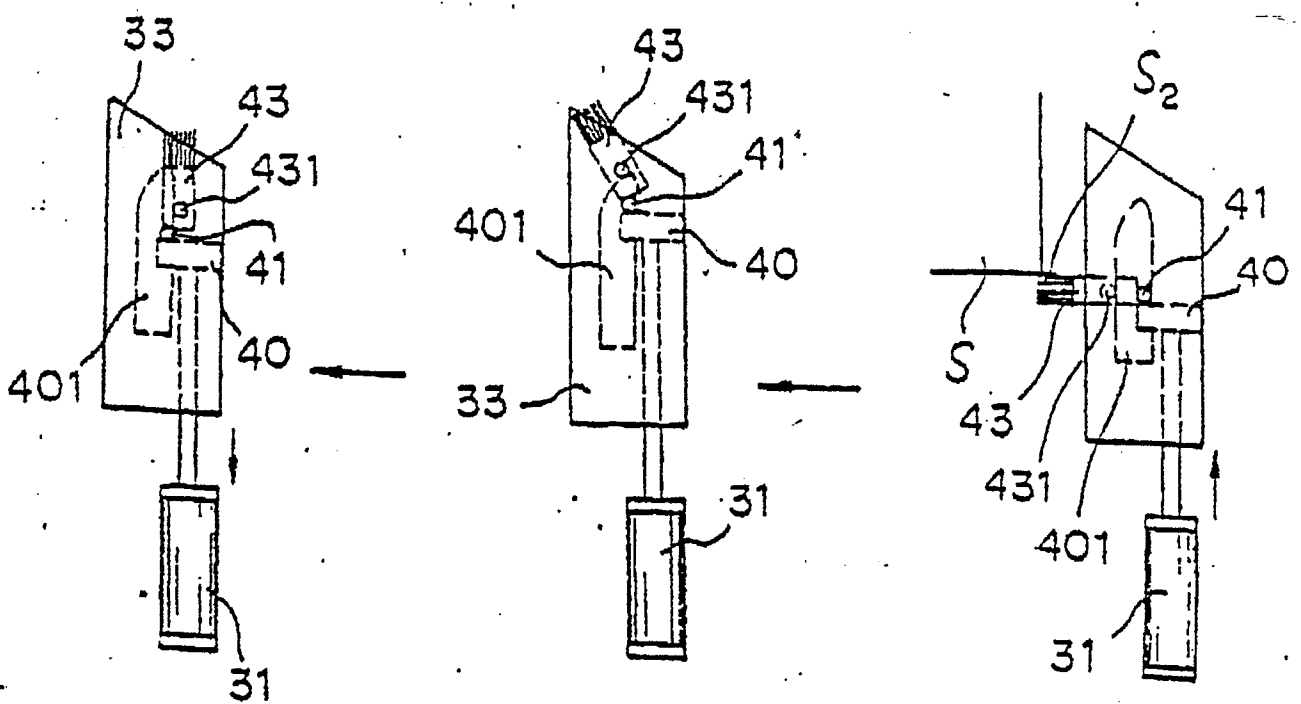
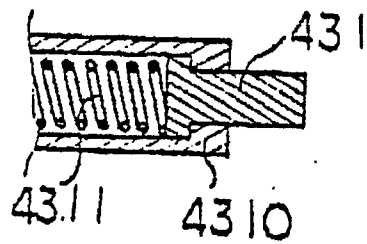


FIG. 5

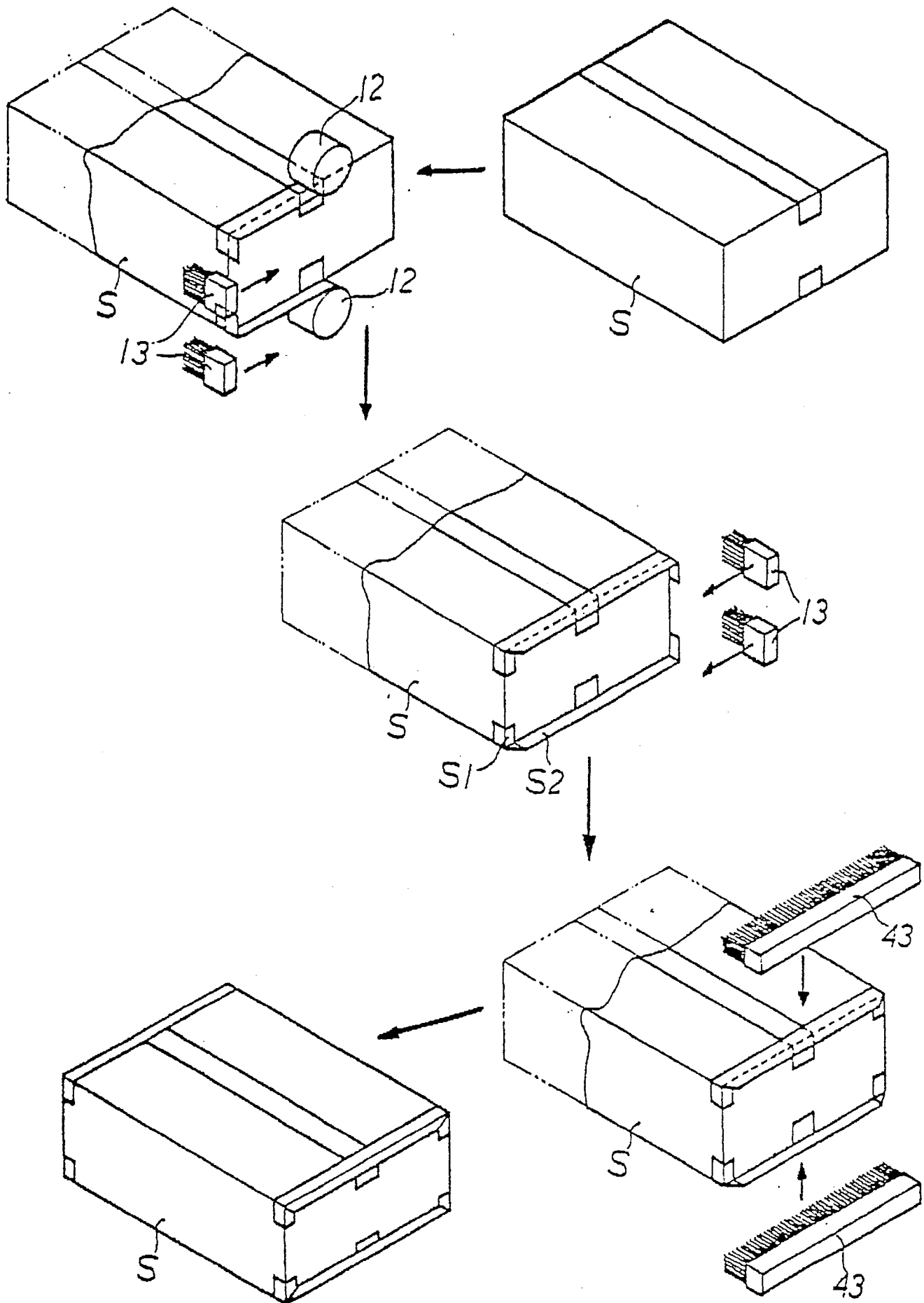


FIG. 7



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	FR-A-1 474 009 (SERVICE D'EXPLOITATION INDUSTRIELLE DES TABACS ET DES ALLUMETTES) * Page 3, column 1, line 33 - page 4, column 1, line 20; figures 1-10 *	1, 10	B 65 B 51/06
Y	---	11-13	
Y	US-A-3 199 262 (MILLER) * Column 2, lines 12-32; figure 1 *	11, 12	
Y	US-A-4 238 269 (DEERING) * Column 3, lines 5-30; figure 1 *	13	

The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 02-09-1987	Examiner CLAEYS H.C.M.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	