March 31, 1964 J. V. CARSTENS 3,126,562

PRESSER MECHANISM FOR A MACHINE FOR COMBINING TWO MEMBERS, SUCH AS A BOOK AND A COVER

Filed May 23, 1961 3 Sheets-Sheet 1

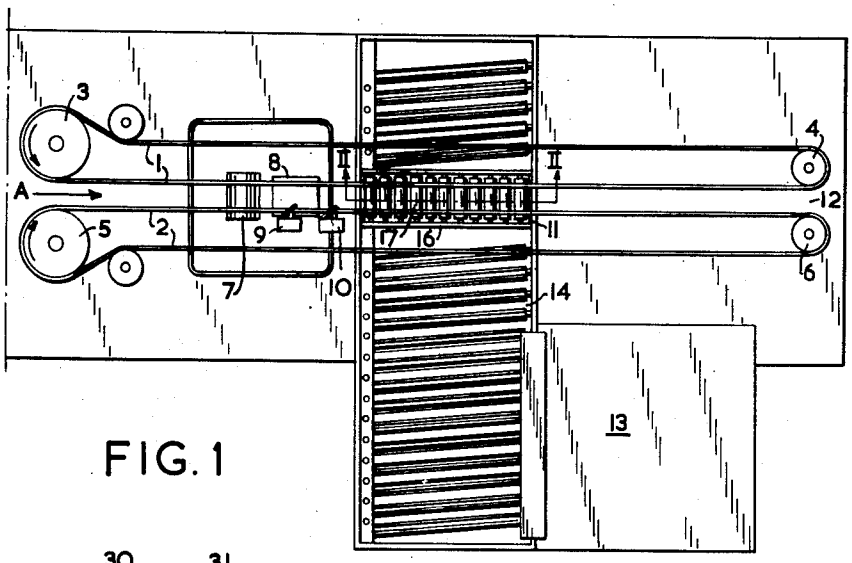


FIG. 1

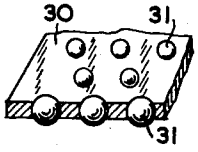


FIG. 3

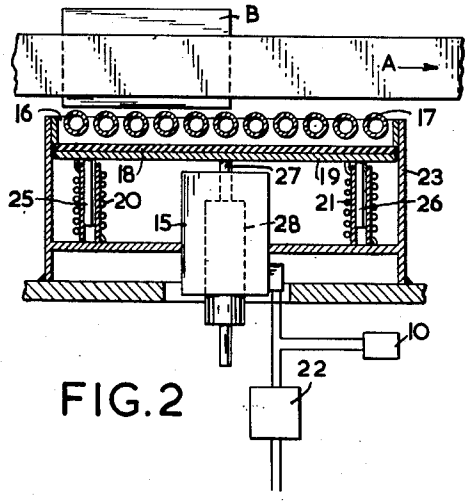


FIG. 2

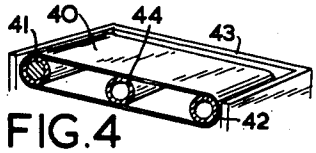


FIG. 4

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Filed May 23, 1961 3 Sheets-Sheet 2

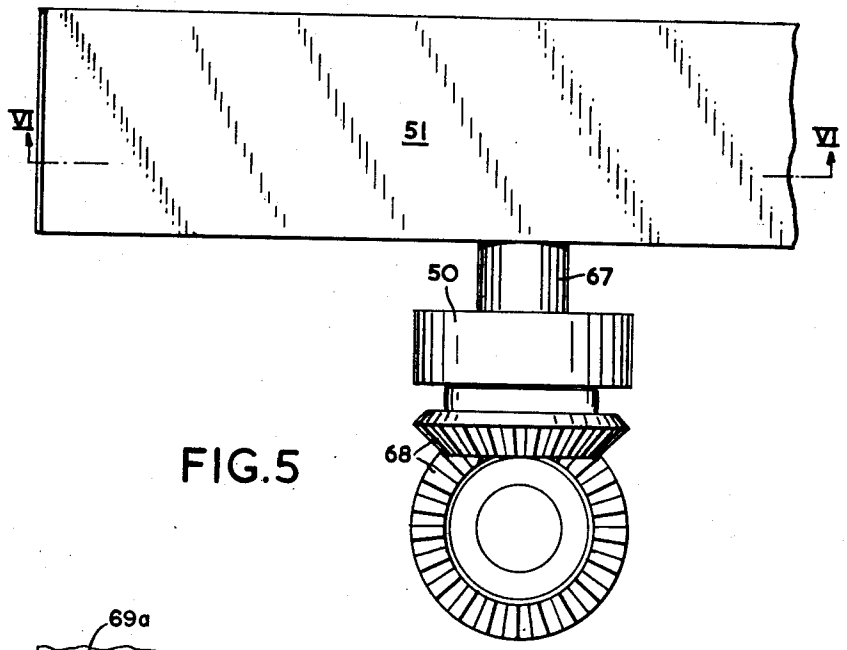


FIG.5

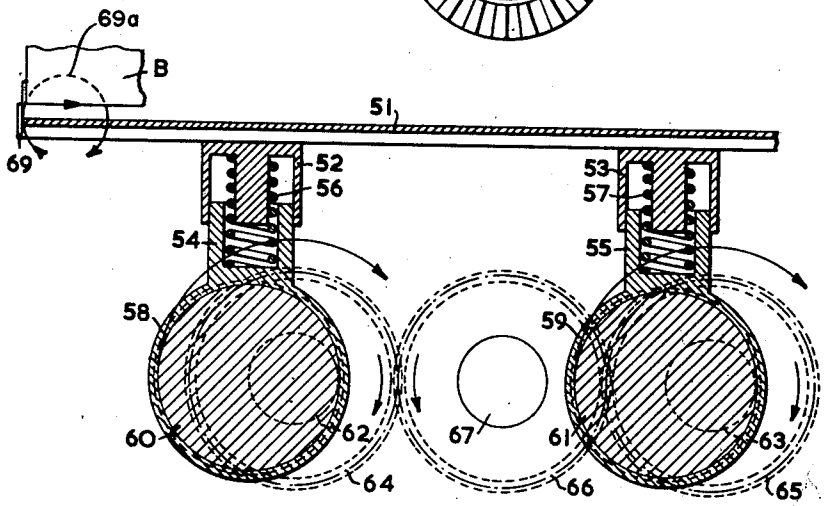


FIG.6

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PRESSER MECHANISM FOR A MACHINE FOR COMBINING TWO MEMBERS, SUCH AS A BOOK AND A COVER

Filed May 23, 1961 3 Sheets-Sheet 3

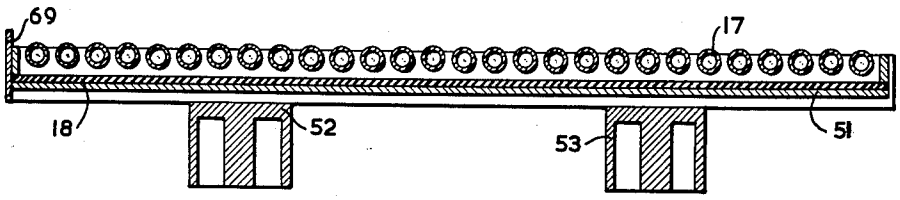


FIG. 7

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PRESSER MECHANISM FOR A MACHINE FOR COMBINING TWO MEMBERS, SUCH AS A BOOK AND A COVER

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Claims priority, application Denmark May 24, 1960
5 Claims. (Cl. 11—4)

The invention relates to a presser mechanism for a machine for combining two members, such as a book and a cover or a paper pad and a cover, which presser mechanism comprises a presser member for applying a horizontally disposed cover to the downwards facing spine of a book. The terms book and cover are in the following used in the broad sense as stated above.

In the known cover applying machines provision is made of a conveying member for feeding the books disposed in vertical planes with their spines downwards. The conveying member may, for example, consist of two conveyor belts, between which the books are retained, or of a number of adjacent pockets. During feeding the books pass a number of different stations for the working of the books. Here shall only be mentioned that two of said stations are a gluing station and a pressure station respectively.

In the pressure station, a presser mechanism leads the cover onto the book, and, in all hitherto known machines cover and book are given the same speed in the direction of the feeding of the books—if desired the speed nil—at the moment when the cover is pressed against the book.

The presser mechanisms are differently constructed dependent on the type of machine concerned, but in any case synchronizing means are provided.

It is an object of the present invention to provide a simple presser mechanism which may be used in machines of a widely different construction without special synchronizing of the two parts, namely, the conveying member and the presser member.

This is according to the invention obtained by the contact-surface of the presser member being constituted of at least one surface arranged for moving in the direction of feed of the book and so mounted that as a consequence of contact between the contact surface and the spine of the books with the cover as an intermediate layer said contact surface follow the movement of the book, irrespective of its sped.

One of the advantages of the presser mechanism according to the invention is that the presser member need not have a speed component in the direction of feed even when the feeding member is moved. This means that in comparison with the known machines one may use the presser member without the synchronizing means which in the known machines is to ensure that the presser member and the feeding member keep pace irrespective of the working speed at which the machine has been adjusted.

In the presser mechanism according to the invention, the friction between the presser member and the cover is appreciably small as compared with that between the cover and the book. It proves that instead of following the prevailing trend towards a thicker glue and the subsequential drawbacks, one may go into the opposite and in several respects more advantageous direction and permit the use of glues of low viscosity without this having any influence on the accurateness of the cover application. In so doing it becomes possible to perform work which cannot be performed with the known machines, for example, the application of the covers to pads by gluing the cover not to the spine of the pad but along a narrow strip along the back of the pad. That this has become possible is simply owing to the circumstance that it is not

the position of the glue and its viscosity which are decisive for whether the cover and the book keep pace also after the initial pressing operation. Principally, there need not at all be any glue because the simultaneous feed of the cover and the book is ensured solely as a consequence of the friction between the book and the cover and the cover and the presser member.

The invention is explained in detail in the following with reference to the acompanying diagrammatical drawing, where:

FIG. 1 shows a presser mechanism according to the invention seen from above and used in connection with a cover-applying machine of the type forming the subject-matter of my co-pending application Serial No. 112,012, filed May 23, 1964, now Patent 3,101,493, issued Aug. 27, 1963,

FIG. 2 shows a sectional view along the line II—II of the presser mechanism shown in FIG. 1 and on an enlarged scale,

FIG. 3 shows a perspective view of another embodiment of the presser member, in which the contact-surface is constituted by parts of balls,

FIG. 4 shows a perspective view of a part of an embodiment of a presser member wherein the contact-surface is constituted by a freely rotatable endless band,

FIG. 5 shows seen from above a third embodiment of a presser mechanism according to the invention,

FIG. 6 shows a sectional view along the line IV—IV in the presser mechanism according to FIG. 5, and

FIG. 7 shows a sectional view like that shown in FIG. 6 of a presser table with friction reducing rollers like those shown in FIG. 2.

In the following the invention is explained and described on the basis of an example in which the presser mechanism according to the invention is used in a cover-applying machine as dealt with in my copending patent application Serial No. 112,012, filed May 23, 1961, but the invention is not restricted thereto, as the presser mechanism may equally well be used in connection with already known cover-applying machines in which there is no relative movement in the feeding direction of the books between the presser mechanism and the feeding device for the books.

In FIG. 1, **1** and **2** designate endless conveyor belts, of which conveyor belt **1** passes around rollers **3** and **4** while conveyor belt **2** passes around rollers **5** and **6**. The two conveyor belts have opposed parallel paths, between which the books are clamped. Means, not shown, for guiding the conveyor belt and exerting a counter-pressure prevent the belts from being pressed away from one another when a book is fed. The direction of travel is indicated by an arrow which in FIG. 1 is located at the place where the books are introduced into the conveying device, to which they arrive in a vertical position with their spines facing downwards, i.e. parallel to the plan of drawing in FIG. 1.

FIG. 2 shows a book B which is located at the place just where a cover is to be applied to the spine of the book.

The conveyor belts are power-driven, for example, by means of an electric motor, not shown, which drives the rollers **3**, **5** or **4**, **6** at the same speed. The belt speed may for example be from 5–15 meters per minute. The speed may be adjustable but during normal operation the belts run at constant speed independently of speed at which books are introduced at the insertion end.

A book inserted into the conveying device and moving from one end thereof to the other will pass different stations, namely, a gluing station **7**, a drying station **8**, controlling stations **9** and **10**, a pressure station **11** and an end station **12**. The term "station" is here used in a sense other than that in the known machines having stepwise feeding, as the books in the machine here exemplified passes said stations without stopping.

At the first station, the gluing station 7, glue is applied to the downward facing spine of the book from a glue tray by means of a rotary roller. At the next station, the drying station, a partial drying of the glue applied to the spine of the book is effected. At the controlling station 9, the book performs a controlling of a cover feeding device 13 which shall not be described here in detail since it is of a known type and has no bearing on the invention.

At the controlling station 10 the book releases an impulse which initiates a vertical movement and pressing of the cover fed by the cover feeding device towards the overhead disposed glued book spine. The present invention relates to the cover applying mechanism and the aforementioned machine is, therefore, only diagrammatically shown and described as it only illustrates an example of using a cover applying mechanism according to the invention.

In the embodiment of the cover applying or presser mechanism shown in FIGS. 1 and 2, said mechanism consists of a rectangular presser frame 16, the longitudinal direction of which is parallel to the direction of feed of the books, and which carries a number of freely rotatable hollow rollers 17, e.g. of nylon, the axil direction of which being at right angles to the direction of feed of the books. At either end each roller 16 is provided with a bearing pin being located freely rotatable in a hole or a bush bearing in the side bed of the presser frame.

The presser frame 16 is loosely disposed in a guide frame 23 rigidly mounted on the bed 24 of the machine. The presser frame 16 rests on an elastic intermediate layer 18, of for example foam rubber, which in turn rests on a supporting plate 19 guided for moving up and down by means of two telescopic connections 25 and 26, which each are surrounded by a tension spring, 20 and 21, respectively, which tends to keep the supporting plate in its lowermost position.

In the upward direction the supporting plate 19 is actuated by a push rod 27 connected with the armature 28 of an electromagnet 15. The actuation takes place when the contact 10 is made on arrival of a book, whereby current is supplied from a power supply 22, which, for example, may be a rectifier fed from an A.C. mains. When using alternating current, the current should be three phased as it proves that by using a single-phased current, an inaccurateness may occur in the cover application if a sufficiently great amount of electricity fails to be available at the moment when the contact is made. When using direct current this drawback does not occur.

In the embodiment described in connection with FIGS. 1 and 2, the contact-surface of the presser member is constituted by the parts at any time facing upwards of the cylinder faces of the rollers 17. As a consequence of the suspension of the rollers, the friction between the presser member and the cover introduced between said presser member and the spine of the book will become minimal. In practice it has surprisingly proved that this difference in friction is sufficient to ensure that the presser member as soon as contact between the book and the cover has been obtained loses control of the cover so that the cover will travel along with the book and remain exactly in position in relation to the book in which the cover was located during the pressing operation, quite irrespectively of whether glue has been applied to the spine of the book or not. This means that the presser mechanism according to the invention may be used for other purposes where the only object is to ensure an exact correlation of two members which are worked at a later time in the machine. When applying covers to paper pads it is, for example, not desirable to apply the glue along the top edge of the pad, but only to a narrow strip on the back of the pad in the vicinity of said top edge. Such operation cannot be effected in the known cover-applying machines comprising the known presser mechanisms, because their function is based on the fact

that glue has been applied to the spine of the book for retaining the cover as soon as contact has been obtained. By the mechanism according to the invention, the cover is kept in engagement which the spine of the book irrespectively of whether glue has been applied thereto or not, so long as the current through the electromagnet remains. The length of time for the performance of this operation may in a manner known per se be determined by a timing relay. During the continuous feeding of book and cover these two parts may without further measures be kept against each other by means of a stationary presser surface designed in the same manner as the presser member, i.e. with freely rotatable rollers, and the transfer of the cover from the presser mechanism according to the invention and to the subsequent pressing mechanism involves no difficulties and causes no displacement of the cover in relation to the book.

Instead of being constituted of parts of circular-cylindrical rollers, the surface of engagement of the presser member may be constituted by parts of ball faces, as shown in FIG. 3, which illustrates part of a presser member in perspective view and partial section. The presser member comprises a presser frame 30 arranged as a holder for a number of balls 31, which for example may consist of nylon and are located freely rotatable in the holder 30. The balls may be disposed in parallel rows, the balls of two adjacent rows being displaced in such manner in relation to each other that one ball in one row is located opposite a space between two balls in the adjacent row. The use of balls offers the advantage that the friction is reduced in all directions, while the use of rollers offers the advantage that the pressing operation is effected along a line.

FIG. 4 shows another embodiment of a presser member the contact surface of which is constituted by a conveyor belt 40 passing around two rollers 41 and 42 rotatably mounted in a presser frame 43 in the same manner as the rollers in the presser frame 16 in FIG. 2. Provision may be made of one or more intermediate supporting rollers 44. This embodiment affords the advantage that the pressing is carried out along a surface.

In the embodiments heretofore described of the presser mechanism according to the invention, the desired freedom of movement for the contact-surface of the presser member is obtained by parts constituting or comprising the contact-surface being freely rotable. It is, however, also possible to use the principle of the invention even if the presser member is driven positively. This is illustrated by the example in FIGS. 5 and 6. Here, the surface of engagement of the presser member is constituted by a presser table 51 driven via a slip clutch 50, the surface of said presser table having preferably a low frictional coefficient. The presser table 51 is carried and driven such as it will appear from the section shown in FIG. 5. To the underside of the presser table 51 are secured two hollow cylinders 52 and 53 which in combination with two other hollow cylinders 54 and 55 form two telescopic connections each being internally provided with a pressure spring 56 and 57. The cyclic movement of the table 51 is provided by means of an eccentric mechanism, each of the hollow cylinders 54 and 55 being rigidly connected with a cylindrical ring 58 and 59, respectively, lying around, but rotatably in relation to, a circular disc 60 and 61, respectively, secured eccentrically to the shaft, 62 and 63, respectively, of gear wheels 64 and 65, which are in engagement with a common driving gear 66, the shaft 67 of which being via the slip clutch 50, FIG. 5, connected with a driving mechanism 68. The presser table 51 comprises a follower 69, for example a rail, protruding above the contact-surface of the presser table and being secured at the rearmost end thereof.

The presser mechanism which is shown in FIGS. 5 and 6, operates in the following manner. An arriving book actuates, as described in connection with FIG.

1, a switch device which in any known manner causes the gear wheel **68** to be rotated one revolution via the slip clutch **50**. When the gear wheel **66** starts moving anticlockwise, the individual points of the presser table **51** move along a circular arc, such as is indicated to the left-hand side of the figure. The speed of the presser table **51** exceeds that of the feeding of the books. When, during this movement the rail **69** catches the trailing end of the book B as shown in thin line at **69***a* the horizontal speed of the presser member is checked and the presser member loses control of the horizontal feeding of the cover. At the moment when the presser table **51** hits a book B the movement of the presser table turns into a rectilinear movement as the telescopic connections **52, 54** and **53, 55** are compressed. As the friction between the contact-surface of the table **51** and the cover, not shown, located between the presser table **51** and the book B is smaller than the friction between the cover and the book B, the presser table **51** can be displaced in rleation to the book B without disarranging the cover in relation to the book. When the speed component of the table in the direction of travel of the book becomes smaller than the speed component of the book in the same direction, the book and the presser table are again displaced in relation to each other but oppositely and gradually the presser table **51** lets go of the book B, and returns to its initial position.

The contact-surface of the presser table **51** is preferably of the type having low friction against the cover. An example is shown in FIG. 7 wherein the reference numbers correspond with the same reference numbers in FIGS. 2 and 6.

The circumstance that the pressure moves rearwards in relation to the book before the pressure against the book ceases, may be used for transferring the book and cover to a subsequent conveyor device so that displacement of the book and cover in relation to each other, for example, when using glue of a low initial power of adhesion, is avoided. The said subsequent conveyor device may consist of a frame comprising resiliently journalled presser rollers of the same type as those of the pressure frame in FIG. 2.

By adjusting the position of the books in relation to the presser table, care is expediently taken that the presser table **51** with the cover as an intermediate layer comes into engagement against the book at the time when the presser table has a movement component only in the vertical direction or at any rate in the immediate vicinity of said point. Hereby is avoided that the presser table imparts to the light cover a horizontal movement during the short moment before the contact has been established between book and cover.

Various other alterations and modifications than those described may be made in the present invention without departing from the spirit and scope thereof, and it is desired that any and all such modifications be considered within the purview of the present invention except as limited by the hereinafter appended claims.

Having thus described my invention, I claim:

1. A presser mechanism for a machine for applying a cover onto a booklike object said presser mechanism comprising an at least vertically movable presser member for controlling the application of a horizontally disposed cover to the downwards facing spine of a book fed edgewise over and along the presser mechanism, means for automatically moving said presser member, and means for clamping and feeding said book over and along said presser mechanism, said presser member having a contact surface the friction of which against the cover is less than the friction between the cover and the spine of the book to which the cover has been applied so that the presser member loses control over the cover when said cover registers with the book.

2. A cover applying presser mechanism as claimed in claim 1 wherein the presser member comprises at least one freely movable surface element.

3. A presser mechanism for a machine for applying a cover onto a booklike object, said pressed mechanism comprising an at least vertically movable presser member for controlling the application of a horizontally disposed cover to the downward facing spine of a book fed edgewise over and along the presser mechanism, means for clamping and feeding the book over and along said presser mechanism, said presser member having a contact surface the friction of which against the cover is less than the friction between the cover and the spine of the book to which the cover has been applied so that the presser member looses control over the cover when said cover registers with the book, said presser member further comprising a vertically movable frame with at least one freely movable surface element, an electromagnetic means for moving said frame vertically.

4. A presser mechanism for a machine for applying a cover onto a booklike object, said presser mechanism comprising an at least vertically movable presser member for controlling the application of a horizontally disposed cover to the downward facing spine of a book fed edgewise over and along the presser mechanism, said presser member having a contact surface the friction of which against the cover is less than the friction between the cover and the spine of the book to which the cover has been applied so that the presser member looses control over the cover when said cover registers with the book, the presser member further comprising a rail fixed at the trailing end of the presser member for contacting the trailing end of a book onto which a cover is to be applied, means being provided for driving said presser member cyclically, said means including a slip clutch permitting the speed of the presser member in the horizontal direction to be checked when contact between said rail and said book is obtained, and resilient means permitting vertical movement of the contact surface of said presser member to be checked at the moment when contact is obtained between cover and book.

5. A presser mechanism for a machine for applying a cover onto a booklike object, said presser mechanism comprising an at least vertically movable presser member for controlling the application of a horizontally disposed cover to the downward facing spine of a book fed edgewise over and along the presser mechanism, said presser member having a contact surface the friction of which against the cover is less than the friction between the cover and the spine of the book to which the cover has been applied so that the presser member looses control over the cover when said cover registers with the book, the presser member further comprising a rail fixed at the end of the presser member for contacting the end of a book onto which a cover is to be applied, means being provided for driving said presser member cyclically, said means including a device permitting the speed of the presser member in the horizontal direction to be checked when contact between said rail and said book is obtained, and resilient means permitting vertical movement of the contact surface of said presser member to be checked when contact is obtained between cover and book.

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