SHEET LAMINATING MACHINE FOR FEEDING LAMINATED SETS TO A PRESS ROLLER
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ABSTRACT OF THE DISCLOSURE

Means for insuring alignment between components of multiple sheets to be laminated. Aligning means consist of a stop engaging the leading edges of the sheets to be laminated as same are fed toward a pressure roller, said stop being moved by said sheets in response to the feeding movement of the sheets themselves toward said roller. Upon reaching said roller the stop is moved downwardly by the roller to a point below the plane of said sheets vertically simultaneously with the commencement of the pressure applying operation by the pressure roller onto said sheets. The stop is then returned to a point of beginning by any convenient means. As soon as it passes beyond the trailing edge of the sheets being laminated it returns to its normal position and is ready for engagement by and guiding of the next following set of sheets to be laminated.

The invention relates to a method for aligning sheets to be laminated, particularly sets thereof consisting of a base and a lining, to the pressure roller on a sheet laminating machine.

In sheet laminating machines, the sheets which consist for example of cardboard, corrugated paper or the like, are guided on conveyor belts to the press roller. Shortly before reaching said roller the lining which consists of cardboard, paper or the like, is placed on said sheet and the sheet and/or lining is provided with an adhesive substance. It is important that the lining and sheet lie exactly one on top of the other since otherwise an after-treatment is required which usually involves cutting with a consequent loss of material. The reference for this laying of the one sheet in register on top of the other is obtained at the sheet edge.

In order to achieve this, both sheets are in prior practice brought to rest against a stop and are then fed in superposed condition to the press roller. A slight pressing may take place at the edge so that the parts do not move against one another. These devices have the disadvantage that the cardboard sheets are stopped at the stop and must then be started again. If no prepressing takes place, then on the way to the press roller, in particular at the starting of the movement, there is danger of a misalignment occurring. On the other hand, if one uses the advantages of the pressing of the edges during the abutment at the stop, then this requires an additional device on the sheet laminating machine.

The purpose of the invention is to feed the sheets which are to be united to the sheet laminating machine by means of pressing to the pressure roller in a manner in which they are caused to fit against one another.

This is done in the method of the invention, for accomplishing an aligned feeding of single laminated sets of base and lining to the press roller on a sheet laminating machine, by providing at least one conveyor belt and at least one stop projecting above said conveyor belt, said stop being provided for the front edge of the laminated sets, which is characterized in that the stop moves in the same direction, at the same or slightly slower speed, as the conveyor belt to said press roller, near which the stop is lowered below the conveyor belt plane.

To perform the method, a sheet laminating machine is used which is characterized in that the stop is arranged alongside of a conveyor belt, or between the parts of a divided conveyor belt, on a slide rail extending in the direction of movement of the conveyor belt and has means for its return from a position behind the press roller to a position in front of the press roller.

One embodiment of the subject matter of the invention is illustrated in the drawings in which:

FIG. 1 is a longitudinal cross-sectional view of the feed portion to the press roller of a sheet laminating machine and
FIG. 2 is a cross section of the conveyor belt along the line II—II of FIG. 1.

The perforated conveyor belt 1 has two parts and slides over vacuum channels 2 underneath the press roller 3. The step 4 is provided between the channels 2, said step being vertically positioned on the shaft 5 and the shaft itself is slidably supported in the rail 6. The feeding of the lining 7 is guided by means 8. The draw-cord 9 is connected to the shaft 5, is placed over the roller 10 and carries the weight 11.

With the conveyor belt halves 1 moving over the vacuum boxes in the direction of the arrow, the sheet 12 which is to be laminated is placed in position and is pulled with said belt by the vacuum acting through the perforations of the belt and any slipping is thereby prevented. Approximately at point A the starting position, the sheet abuts at its front edge the step 4 which projects from below to a plane above the plane of the belt and causes the stop to move leftwardly with the leftward movement of the sheet and belt. The lining 7 is now placed onto the sheet 12 from above and fed in such a manner that its edge also abuts the step 4, the same being accomplished easily and assuming an exactly fitting abutment of the front edges. The moistening or coating system for the adhesive is identified by the numeral 13. The adhesive can be applied as desired onto the lining or onto the sheet or both. During further movement of the belt 1, the stop moving with said belt remains continuously at the front edge of both the sheet 12 and the lining 7. The entire set now slides underneath the press roller 3 whereby said roller first presses the step 4 downwardly so that it pivots around its shaft 5. However, at the same time, the sheet reaches the zone of the press roller 3 and the desired laminating pressure is applied. The sheet is thus clued by the stop up to the last moment. In the case of thin sheets 1, the stop pivots immediately. In the case of thicker sheets, the stop is caused to pivot only when it contacts the stationary belt 14 with its leading edge, moves to a level below the sheet (dash-dotted position of step 4). In all cases the stop is then returned to the starting position by the weight. Under the urging of the tension spring 15, the stop returns to its upward position as soon as the sheet 12 is no longer above same on the conveyor belt 1. The machine is then ready to receive the next sheet.

To prevent the press roller 3 from pressing the step 4 downwardly too suddenly, the step is tapered at 16 on its leading edge.

A suitable spring can be provided in place of the weight 11 and, in the same manner, the spring 15 can be replaced by a weight. Depending on the width of the sheet, several stops can be provided which are then arranged on both sides of the conveyor belt or in corresponding spaces between belt sections.

Thus the unit makes it possible to feed sheet and lining components to the press roller with their front edges in exact alignment and without stopping of the same during such feeding. Also no special device is required to remove
the stop since this is done directly by the press roller itself immediately as the pressing commences. A gripping device which takes the stop with it can be arranged on the conveyor belt for very light sheets which have a slight curl to them and are to be laminated. The sheets first abut the standing stop and then slide on the belt together with the stop to the press roller. The belt in this instance does not run over a vacuum box.

The stationary trip 14 can be constructed as an electric switch which is connected to a magnet arranged below the stop. As soon as the magnet comes into contact with the stop, the magnet is energized and the stop is caused to pivot as before and comes to rest with its top below the conveyor belt plane so that the stop can return to the point A.

Should for some reason a sheet 12 which has glue on its upper surface not receive a lining, the sheet would wind up on the press roller 3 and contaminate same. This would lead to prolonged operation interruptions. For this reason, a known sheet control apparatus, for example a photocell 17, is desirably arranged near the lining feed, and electrically connected to a magnet 18. As long as no lining interrupts the beam of light to the photocell, the magnet 18 remains energized. Thus, the magnet, with its magnetic field, retains the weight in its normal position 19 so that the stop will not be moved by the sheet 12 until a lining, ready to be sent off, is present.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In a sheet laminating machine having press roller means thereon, conveyor means for supplying the sheets to be laminated to said press roller means and adhesive applicator means for applying an adhesive to at least one of said sheets to be laminated, a method for aligning the sheets to be laminated, the steps comprising:
   - moving the leading edge of a plurality of sheets into engagement with a movable stop at a starting position to align the leading edge of said sheets to be laminated;
   - moving said stop along said conveyor means toward said press roller means while maintaining the engagement of said stop with said leading edge to thereby maintain said alignment up to and until said leading edge is engaged by said press roller means; and
   - removing said stop from engagement with said leading edge and returning same to said starting position.

2. In a sheet laminating machine having press roller means thereon, conveyor means for supplying the sheets to be laminated to said press roller means and adhesive applicator means for applying an adhesive to at least one of said sheets to be laminated, an alignment apparatus, comprising:
   - elongated track means extending longitudinally coextensively with said conveyor means between a starting position and said press roller means;
   - stop means mounted on said track means for movement therealong between said starting position and said press roller means and including aligning means projecting into the path of said conveyor means and adapted to engage the leading edge of said sheets to be laminated for alignment thereof, said alignment being maintained from said starting position up to and until said leading edge is engaged by said press roller means; and
   - trip means for moving said aligning means out of engagement with said leading edge of said sheets to be laminated when said leading edge is engaged by said press roller means.

3. An alignment apparatus according to claim 2, wherein said stop means comprises shaft means supported for longitudinal movement along said track means and a stop, a portion of which is pivotally secured to said shaft means and having an aligning portion engaging said leading edge and pivotal about the axis of said shaft means out of the path of said leading edge when said aligning means engages said press roller means.

4. An alignment apparatus according to claim 3, wherein said trip means comprises a stationary bar positioned between said track means and said conveyor means and in the path of said aligning portion of said stop to effect said pivoting of said aligning portion out of the path of said leading edge.

5. An alignment apparatus according to claim 3, wherein said conveyor means comprises a pair of side-by-side conveyors having a space therebetween and means for gripping one of the sheets to be laminated to prevent same from slipping relative thereto and at least one conveyor for feeding a liner to said starting position; wherein said track means and said shaft means are positioned below the conveyor surface of said pair of side-by-side conveyors; and wherein said aligning portion of said stop extends upwardly from said shaft means between said pair of conveyors to a position of engagement with said leading edge of each of said sheets to be laminated for alignment thereof.

6. An alignment apparatus according to claim 5, wherein said stop is pushed toward said press roller means along said track means by said leading edge.

7. An alignment apparatus according to claim 5, wherein said aligning portion of said stop is movable between said pair of conveyors beneath said press roller means; and wherein said aligning portion has an incline on its leading edge over which said press roller means runs to pivot said aligning portion.

8. An alignment apparatus according to claim 2, wherein said trip means includes return means connected to said stop means for yielding to the movement of said means when said aligning means is engaged by said leading edge of said sheets to be laminated so that when said aligning means is moved out of said path of said leading edge, said stop means will move back along said track means by said return means to said starting position.

9. An alignment apparatus according to claim 8, wherein said return means comprises a pulley positioned adjacent said starting position a cable secured at one end to said stop means and extending over said pulley and a weight freely hanging from said pulley, said weight being moved vertically in response to said movement of said stop means to thereby effect a return of said stop means to said starting position when said said aligning means is moved out of engagement of said leading edge.

10. An alignment apparatus according to claim 2, including a magnet positioned below said weight and switching means responsive to the presence of a liner at said starting position for controlling the energizing of said magnet to permit said stop means to move along said track means only when a liner is present at said starting position.

11. An alignment apparatus according to claim 2, wherein said trip means includes means for moving said aligning means out of the path of movement of said leading edge approximately simultaneously when said leading edge is engaged by said press roller means.

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