METHOD FOR MANUFACTURING A COMPOSITE CORRUGATED PAPER BOARD

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METHOD FOR MANUFACTURING A COMPOSITE CORRUGATED PAPER BOARD

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ABSTRACT OF THE DISCLOSURE

There are described a method for producing a composite corrugated paper board which may be termed "X-wave type corrugated paper board" for its sectional structure and a method for manufacturing the same. The X-wave type paper board consists of two corrugated sheets of paper interposed between two liner sheets, said corrugated sheets being bonded to each other and to the liner sheets in such a disposition that the ridges of one corrugated sheet are in abutment against the ridges of the other corrugated sheet.

This is a divisional application from applicant's co-pending U.S. patent application Ser. No. 884,279, now abandoned, filed on Dec. 11, 1969.

This invention relates to a composite paper board, and more particularly to a method for manufacturing a composite paper board which may be conveniently termed "X-wave type double wall corrugated paper board."

By "X-wave type," I refer to a double wall paper board having two sheets of fluting or corrugations interposed between two liner sheets instead of three liner sheets as seen in the ordinary double wall paper board. The X-wave type paper board has its two layers or plies of fluting bonded together without being interposed by a liner sheet so that the ridges of one fluting are adhesively secured to the ridges of the other fluting.

The advantages of the X-wave type corrugated board are that it has a cushioning quality which cannot be approached by any double wall paper board heretofore proposed and that, since the intermediate liner sheet may be dispensed with, it allows substantial reduction in the cost of the sheet material to be used.

This invention is directed to a method for manufacturing the X-wave type corrugated paper board, the method being readily carried into practice with conventional, existing corrugating machines in no matter whether such machines be built specifically for handling a double wall paper board with a combination of A and B flutes, or a single faced paper board with an A, B or C flute.

The X-wave type paper board to which the method of the present invention is directed compares in cross-sectional structure with the ordinary double wall corrugated paper board which most commonly incorporates two different types of corrugations, one with an A flute and the other with a B flute. Such prior-art double wall corrugated paper board has the drawback that the ridge-to-groove height of the board obtainable would be about 8 mm. at a maximum with A and B flute combinations. To achieve any greater ridge-to-groove height, it would be literally necessary to rely on larger flutes generally known as M type flute. However, this necessitates the installation of a costly corrugating machine specially designed and built for M type flute. Furthermore, the use of M flute would often result in poorly finished products which may not be sufficiently resistant to flat-crush and of which surface appearance not acceptable due to increased ridge-to-ridge spacing.

The above-noted difficulties may be overcome by arranging two similarly corrugated paper boards, for instance, A and A flute combination, thereby achieving a flute height substantially as great as 10 mm. However, it has heretofore been considered difficult to manufacture either A or B flute double wall corrugated paper board, as the case may be, by means of existing corrugating machines which are normally equipped with two different sets of corrugating rolls, one specifically for A flute and the other for B flute. Where the machine is designed for producing single faced paper boards, it will be necessary to employ an additional machine of the same time in order to make A—A or B—B flute paper boards. This, however, cannot be done without involving considerable equipment cost and taking up too much floor space.

Whereas, it is the primary object of the present invention to provide a method for the production of a composite paper board which has good cushioning quality and resistant to flat-crushing loads.

It is another and important object of the invention to provide a new, useful method for producing X-wave type double wall corrugated paper boards which will eliminate the above mentioned difficulties.

It is a further object of the invention to provide a method for the manufacture of a composite paper sheet of the type described, and which method may be readily carried into practice with use of existing corrugating machines of the conventional design without involving complicated or costly remodelling or rebuilding of the machine.

These and other objects and features of the invention will be better understood from the following description and the appended claims refer to the various figures and in which:

FIG. 1 is a schematic diagram of the machine employed for carrying the method of this invention into practice;

FIG. 2 is a cross section on an enlarged scale of the composite paper sheet produced according to the invention;

FIG. 3 is a view similar to FIG. 2, but showing the composite sheet in half-completed condition; and

FIG. 4 is a schematic diagram on an enlarged scale of a drying section of the machine in FIG. 1.

Referring to the accompanying drawings, and first to FIG. 1, the reference numeral 11 designates a roll of liner sheet, 12 a preheating roll for the liner sheet 11, and the reference numeral 13 designates a pressure roll for corrugating rolls 14 and 15. The corrugating rolls 14 and 15 are toothed at the same pitch and are meshed with each other, the lower surface of the roll 14 engaging with a finger member 16. The reference numeral 17 designates as adhesive applicator roll revolving dipping in adhesive material in a container 18. In contact with the adhesive a applicator roll 17, there are provided, a roll 19 and a doctor. Such construction of the corrugating section of a corrugating machine is conventional but serviceable for carrying out the method of the instant invention.

According to my invention, two sheets of paper 21 and 22 are brought together and passed between the corrugating rolls for forming corrugations of the same time in the web of the paper sheets. The reference numeral 22 indicates guide rolls for the sheets of paper to be corrugated and 23 indicates a pair of belts for conveying upward the composite sheet of single faced corrugated paper board formed through the corrugating section. Designated by the reference numeral 23 is an overhead bridge where the composite paper sheet conveyed through the belts 23 may accumulate in a pleated form as shown in FIG. 1. The composite sheet is then heated to
a suitable temperature while it is passed around a preheating roll 25, and is then passed to an adhesive applicator roll 26 where adhesive is applied to the ridges of the lower one of the corrugated sheets 21 and 21' on a line transverse of the direction of the corrugations formed in the paper web. The reference numerals 27, 28 and 29 indicate a scratching roll, a doctor and a container of adhesive material, respectively. The composite sheet is then guided into a first drying section generally indicated by the reference numeral 30. Before entering the drying section 30, the lower one of the corrugated sheets is provided with a facing sheet 31 which has been heated to a suitable temperature by a preheating roll 32 and guided by a guide roll 33. The drying section 30 comprises a series of hot plates 34 which are heated to a suitable temperature by suitable means such as steam or electricity, and a belt 35 which is supportedly mounted on pulleys and preferably provided with a tensioning means as indicated at 36 in FIGS. 1 and 4.

FIG. 3 shows a cross section of a half-completed composite sheet as at the entrance of the drying section 30. It will be seen that the composite sheet at this stage consists of two single faced boards with the ridges of one board intimately engaged with the grooves of the other board.

According to the present invention, the two superimposed paper boards are once separated from each other before they are bonded together in such a disposition as shown in FIG. 2. This is performed, for example, by passing the lower one of the superimposed boards and applying from beneath adhesive material to the ridges of the upper board on a line perpendicular to the direction of corrugations formed in the paper web by means of an adhesive applicator assembly which preferably comprises as shown in FIGS. 1 and 4 an adhesive applicator roll 37, a scratching roll 38 and a doctor 39 with supply of adhesive material from an adhesive container indicated by the reference numeral 40. Immediately before the two single faced boards are brought together again, their advancing movements are controlled by control rolls 41 and 41' toothed at the same pitch as of the corrugations formed in the paper webs so that the ridges of the lower board are brought into abutting relationship with the ridges of the upper board as shown in FIG. 2 when the two boards are securely bonded together.

The composite sheet of X-wave type paper board thus obtained is then passed through of pair of vertically arranged guide rolls 44 to a second drying section 45 having a construction similar to the first drying section mentioned hereinbefore.

The composite sheet, after being dried, is passed through a cooling section 47 and a scoring device in the manner familiar in the art and finally cut into suitable lengths by a cutter 49.

It will be clear from the foregoing that the method according to my invention may be carried out with the use of a conventional corrugating machine in combination with additional sheet-movement controlling rolls and an adhesive applicator assembly arranged in the midway of the prolonged drying section of the machine.

While there has been described what are considered to be preferred embodiments of the invention, it will be understood that many changes and modifications may be made without departing from the essential spirit of the invention.

What is claimed is:

1. A method for producing a composite paper board which comprises the steps of passing between a pair of toothed corrugating rolls two sheets of paper material in superimposed relationship with each other whereby to form corrugations of the same pitch in the webs of the sheets; facing the sides of the superimposed corrugated sheets to provide a pair of identical single faced paper boards; causing the pair of paper boards to part from each other; applying an adhesive compound to the ridges of the corrugated paper boards; and bonding the two boards in such a disposition that the ridges of one board come into abutment against the ridge of the other board.

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