April 23, 1929. H. A. CUMFER 1,709,934

METHOD FOR MAKING CORRUGATED BOARD

Filed Aug. 16, 1926

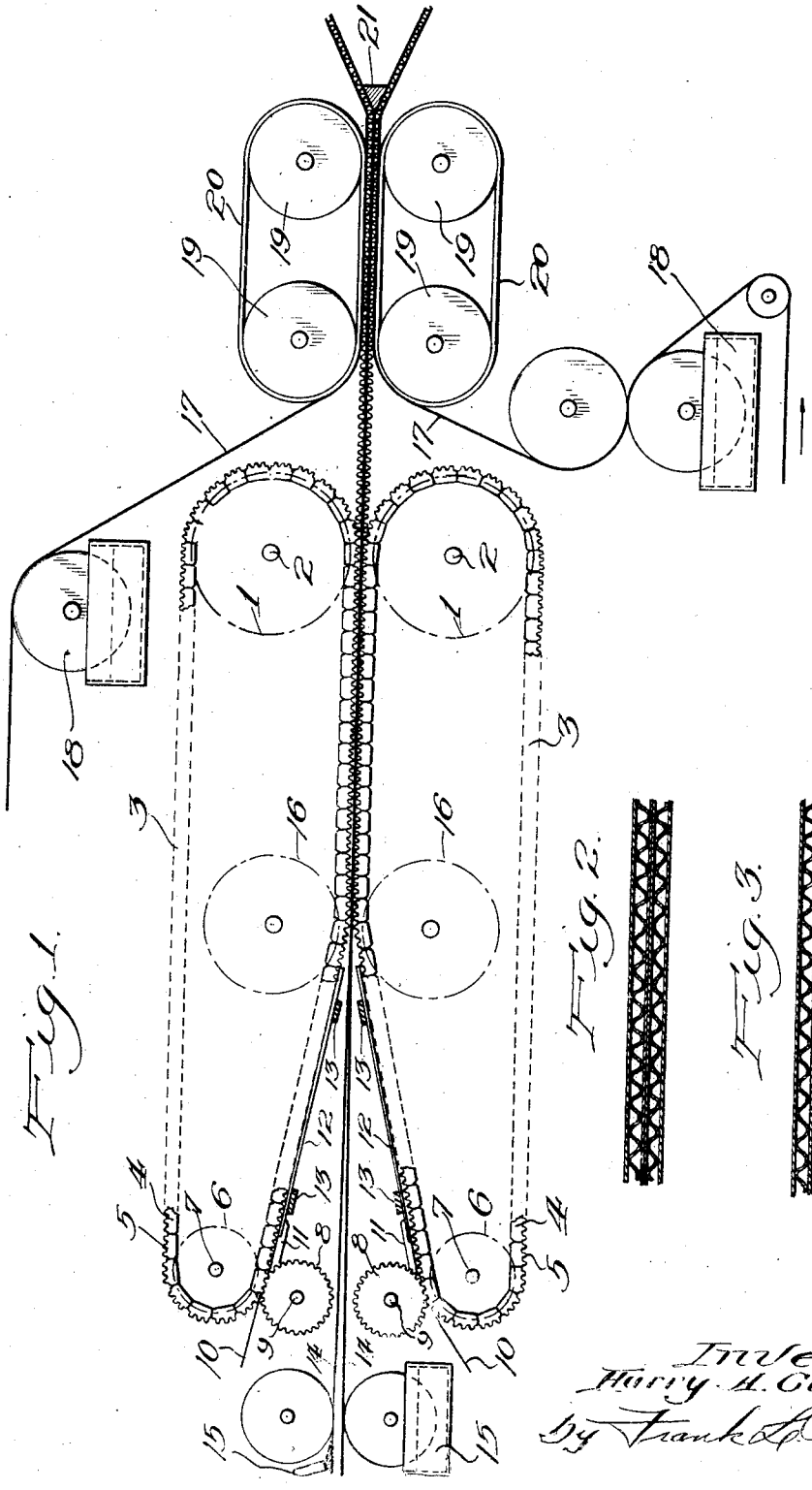


Fig. 1.

Fig. 2.

Fig. 3.

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Patented Apr. 23, 1929. 1,709,934

UNITED STATES PATENT OFFICE.

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METHOD FOR MAKING CORRUGATED BOARD.

Application filed August 16, 1926. Serial No. 129,384.

The present invention relates to the art of making corrugated board, and more particularly involves improvements whereby maximum quantities of corrugated board can be continuously produced in an economical manner.

More particularly, the present invention contemplates the simultaneous production of two independent units or sheets of corrugated board, each comprising surface sheets and inner corrugated sheets.

In its broad aspects, the invention is directed to a method of simultaneously corrugating strips of material and simultaneously uniting said corrugated strips to uncorrugated strips fed between the corrugated strips and united thereto. Adhesive is applied between each corrugated strip and each uncorrugated strip only. The product at this stage comprises a unit exhibiting in cross section two outer corrugated strips and two separated central strips. Surface sheets may then be united with the corrugated strips. Immediately subsequent to the point at which this built-up unit leaves the corrugating machine, a stripper separates the two independent central strips from each other, producing two separate units of corrugated board, each comprising uncorrugated surface sheets and a corrugated center.

As the specific embodiment of the present invention, the sheets to be corrugated are acted upon by the corrugating elements while said sheets are moving toward the horizontal in a plane disposed at an angle to the horizontal, thus reducing friction and rubbing of the corrugating elements against the side walls of the corrugations and eliminating strains normally incident to the corrugating of a sheet while it is moving in a horizontal plane.

Many advantages and objects of the invention will be hereinafter more fully described.

In the drawings,

Fig. 1 is a diagrammatic side elevational view of the apparatus;

Fig. 2 is a cross sectional view of the product before being separated; and

Fig. 3 is a cross sectional view taken through one of the separated units of corrugated board.

Referring more in detail to the drawings, there are two sets of oppositely disposed assemblies functioning to simultaneously corrugate two sheets and cause them to be united to central sheets.

Referring more in detail to the upper assembly, 1 designates sprockets mounted on each end of a shaft 2. These sprockets are adapted to have meshing engagement with endless elements 3. Extending transversely of the assembly and carried by the endless elements are a plurality of connected corrugating bars 4 provided on their upper surfaces with the corrugating ribs 5. The endless elements 3 mesh on their opposite ends with the sprockets 6 mounted on shaft 7. The arrangement is such that the sprockets 6 are of a smaller diameter than the sprockets 1, the upper edges of both sets of sprockets lying in substantially a horizontal plane. The purpose of this will now be described.

Disposed immediately adjacent the sprockets 6 and adapted to have meshing engagement with the corrugating bars 4 is a corrugating roll 8 mounted on the shaft 9. A strip of material designated 10 is fed between the corrugating bars 4 and the corrugating roll 8, and due to the decreased diameter of the sprockets 6, the corrugating bars 4 and the corrugating roll 8 act on said sheet while it is moving in a plane disposed at an angle from the horizontal. One advantage of corrugating a sheet while it is moving in a plane at a substantial angle from the horizontal is to materially decrease friction and strain and prevent the corrugating elements from rubbing against the side walls of the corrugations, which first produces straining and distortion of the fibres and eventually weakening the side walls.

The corrugated sheet is stripped from the roll 8 by means of the stripping fingers 11 disposed in circumferential grooves in the surface of the corrugating roll 8. This newly corrugated sheet may have a tendency to flatten, and to avoid this the newly corrugated sheet is caused to travel downwardly in registering relation with the corrugating ribs 5 on the bars 4. To insure this engaging relation between the newly corrugated sheet and the corrugating bars 4, I may provide spring plates 12 held by suitable cross bars 13, as illustrated.

At this stage, two corrugated sheets are being simultaneously fed downwardly and upwardly toward a point of meeting in a horizontal plane.

Between each set of corrugated strips moving toward each other, there is introduced two strips 14 of plain uncorrugated material. Suitable adhesive is applied to the lower

surface of the lower sheet and the upper surface of the upper sheet by the adhesive applying means designated diagrammatically at 15. No adhesive is applied between the two uncorrugated strips.

The four strips are then fed between the means for imposing pressure, shown diagrammatically at 16, which unites the four sheets together, causing each corrugated strip to adhere to the surface of the uncorrugated strip to which the adhesive has been applied. This unit then moves forward in a horizontal plane, as shown, it being preferable to still maintain the corrugated strips in registering relation with the corrugating bars mounted on the endless elements to prevent flattening or spreading of the corrugations for a considerable distance in the travel of the unit.

The unit then strips from the corrugating elements 4, and at this stage comprises a unit which in cross section exhibits two outer corrugated sheets and two central uncorrugated sheets, which latter are adhesively united to the corrugated strips but are separate relative to each other. It may then be desirable to apply surface sheets to the corrugated sheets. Where this is desired, surface strips, shown at 17, to the surface of which may be applied adhesive by the means illustrated diagrammatically at 18, are fed and united with the corrugated strips by means of the pressure exerted by the rolls 19 and endless belt 20. It is understood, of course, that the illustrations in the drawings are diagrammatic to illustrate the principle of the invention without unnecessarily complicating the drawings.

After leaving the pressure imposing means 19, the unit thus produced comprises in cross section a six-ply sheet (Fig. 2), exhibiting two outer uncorrugated surface sheets, two corrugated sheets attached thereto, and two central sheets attached to the corrugated sheets but separate relative to each other.

Now as a feature of the present invention, a separating device, shown diagrammatically at 21, is interposed between the two separate uncorrugated inner sheets, thus separating said composite corrugated unit into two separated units, each comprising surface sheets and a central corrugated core, as shown in Fig. 3.

The many advantages of the present invention resulting from the simultaneous production of two complete corrugated units on a single machine will be obvious, but economy in operation and maximum production are two advantages which may be particularly stressed.

It is understood that the present invention is not limited to the production of a six-ply sheet, separating into two separate three-ply sheets, but the invention contemplates the production of corrugated board of any number of plies to be separated into the individual corrugated units wherever the principle of the invention is utilized.

As a feature of the present invention, the adhesive preferably used, is one which possesses waterproofing qualities such for instance, as bitumen and more particularly asphalt and the like. It will be immediately apparent to those skilled in the art that by applying a coating of adhesive possessing waterproofing qualities to desired surfaces of the plain sheet or sheets, that water repellant barriers or areas are thus provided throughout the composite corrugated sheet in the form of continuous films. In addition, the outer surfaces of the corrugated board may be preferably free from any waterproofing material, thus permitting the absorption of a certain amount of moisture, but preventing this moisture from penerating into the body of the composite board.

The invention also contemplates that the corrugated sheets may have been previously impregnated or saturated with the water repellant material, although for the purpose of this invention, it is desirable that the sheets to be corrugated, be relatively dry to avoid sticking and gumming of the corrugated forming means.

I claim as my invention:

1. A process of making corrugated board comprising feeding a plurality of sheets of material to be corrugated in a plane disposed at an angle from the horizontal, acting on said sheets while moving in said plane to produce corrugations therein, introducing between oppositely disposed corrugated sheets two uncorrugated sheets, uniting each of the corrugated shets to one surface of each of the uncorrugated sheets introduced therebetween, to produce a structure in which the uncorrugated sheets are separate relative to each other, and then separating the built-up unit into smaller units by separating same between the unattached uncorrugated sheets.

2. A process of making corrugated board comprising feeding a plurality of sheets of material to be corrugated in a plane disposed at an angle from the horizontal, acting on said sheets while moving in said plane to produce corrugations therein, causing said corrugated sheets to be carried forward in such a manner as to prevent collapsing of the newly formed corrugations, introducing between oppositely disposed corrugated sheets two uncorrugated sheets, uniting each of the corrugated sheets to one surface of each of the uncorrugated sheets introduced therebetween, to produce a structure in which the uncorrugated sheets are separate relative to each other, and then separating the built-up unit into smaller units by separating same between the unattached uncorrugated sheets.

3. A process of making corrugated board which comprises simultaneously and separately corrugating a plurality of sheets of

material, introducing between oppositely disposed corrugated sheets uncorrugated sheets, adhesively uniting a separate uncorrugated sheet to a surface of each of the corrugated sheets to produce a structure in which the uncorrugated sheets are disposed in face to face unattached relationship, and finally separating the built up unit into smaller units by separating same between the unattached uncorrugated sheets.

4. A process of making corrugated board which comprises simultaneously and separately corrugating a plurality of sheets of material, introducing between oppositely disposed corrugated sheets uncorrugated sheets, adhesively uniting a separate uncorrugated sheet to a surface of each of the corrugated sheets to produce a structure in which the uncorrugated sheets are disposed in face to face unattached relationship, thereafter adhesively uniting a second uncorrugated sheet to the exposed portions of each corrugated sheet, and finally separating the built up unit into smaller units by separating same between the unattached uncorrugated sheets.

5. A process of making corrugated board comprising feeding a plurality of sheets of material to be corrugated in a plane disposed at an angle from the horizontal, acting on said sheets while moving in said plane to produce corrugations therein, introducing between oppositely disposed corrugated sheets uncorrugated sheets, uniting each of the corrugated sheets to one surface of each of the uncorrugated sheets introduced therebetween, to produce a structure in which the uncorrugated sheets are separate relative to each other, and then separating the built-up unit into smaller units by separating same between the unattached uncorrugated sheets.

6. A process of making corrugated board which comprises simultaneously and separately feeding separate sheets of material to be corrugated in planes above and below the horizontal to the horizontal, acting on said sheets while moving in said planes to produce corrugations therein, introducing between oppositely disposed corrugated sheets uncorrugated sheets, adhesively uniting a separate uncorrugated sheet to a surface of each of the corrugated sheets to produce a structure in which the uncorrugated sheets are disposed in face to face unattached relationship, and finally separating the built-up unit into smaller units by separating the same between the unattached uncorrugated sheets.

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