Oct. 23, 1951 W. C. GEORGE 2,572,716

APPARATUS FOR AND PROCESS OF FORMING SINGLE FACED CORRUGATED BOARDS

Filed June 27, 1949 2 SHEETS—SHEET 1

FIG. 1.
CONVENTIONAL PROCESS

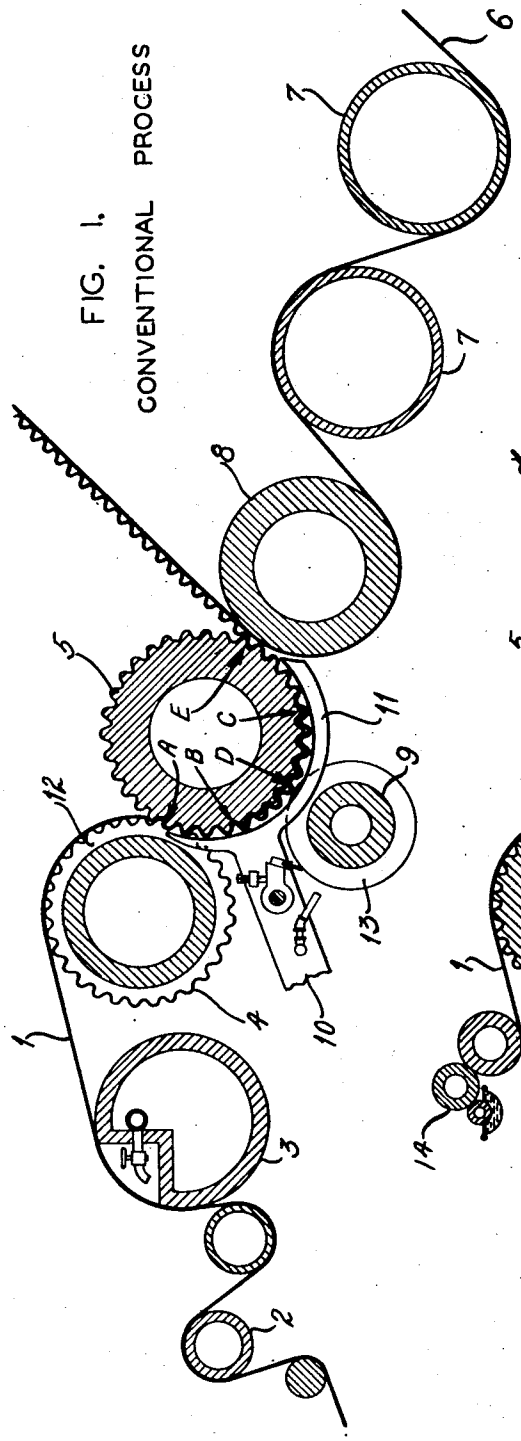
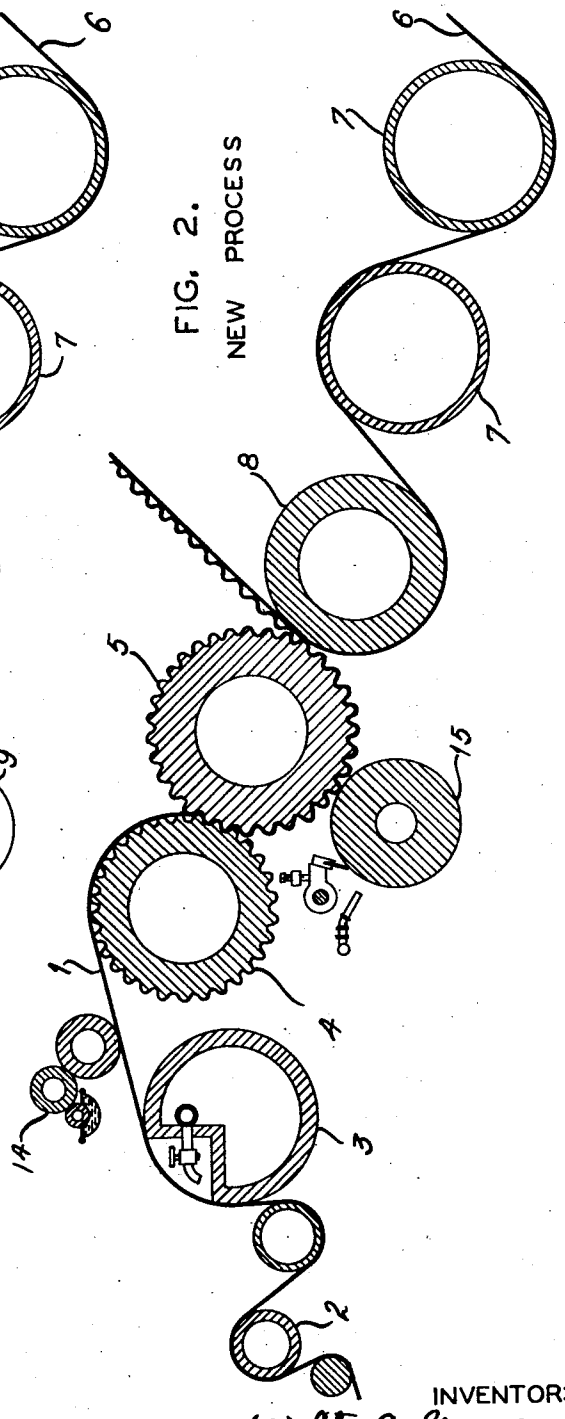


FIG. 2.
NEW PROCESS



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FIG. 3.

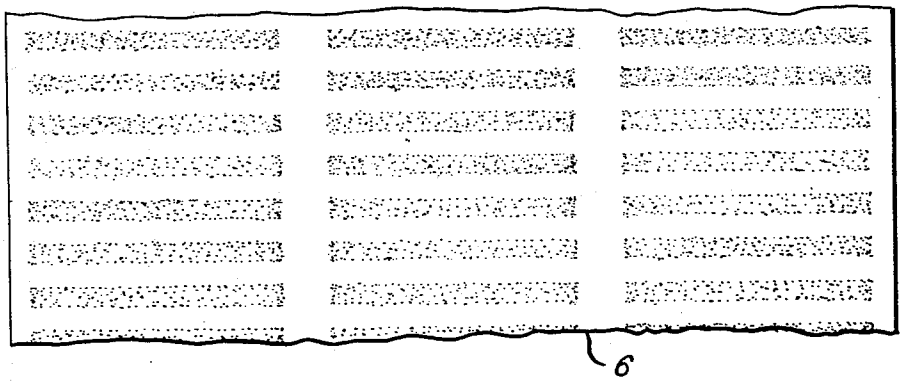


FIG. 4.

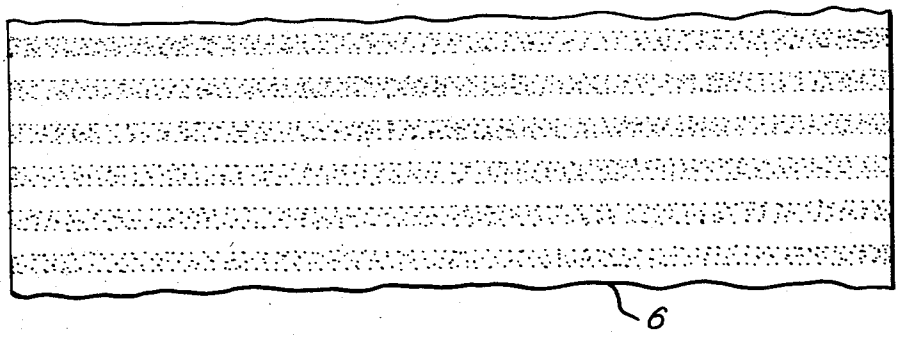
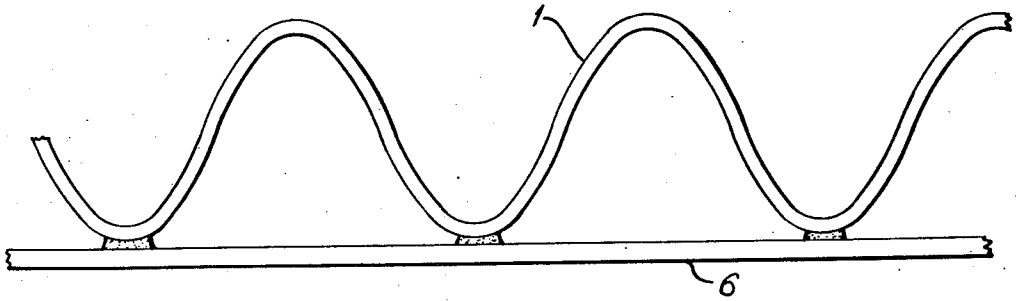


FIG. 5.



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UNITED STATES PATENT OFFICE

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APPARATUS FOR AND PROCESS OF FORMING SINGLE-FACED CORRUGATED BOARD

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8 Claims. (Cl. 154—31)

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The present invention relates to apparatus for and process of forming single faced corrugated paperboard.

In the production of corrugated paperboard, it is desirable to carry out a process and utilize the necessary apparatus so that the resultant corrugated paperboard, which is preferably single faced corrugated paperboard, possesses the characteristics of being uniform and of equal stability throughout regardless as to the length of the formed corrugated paperboard. For instance, it is desirable that the crests and valleys of the corrugated portion of the paperboard all be of uniform height and cross-sectional dimensions and that there be a uniform application of the adhesive to the crests of each corrugation throughout its length so that when the facing sheet is applied to the adhesively coated crests of the corrugated portion of the paperboard, the resultant end product will be a corrugated paperboard wherein the crests and the valleys are all of uniform cross-sectional dimensions and height and the facing will be permanently adhesively secured through every portion thereof that contacts the crests of the corrugations and adhesively secured thereto. In other words, the resultant end product, namely the single faced corrugated board, is uniform in all respects as differing from corrugated board wherein the corrugations are not uniform and the application of the adhesive to the crests of the corrugations is spotty or interrupted and, thus, such corrugated board resulting therefrom is weak in certain portions or places and when made up into cartons or used for other purposes, these weakened portions render the corrugated paperboard ineffective for its intended purpose or purposes and particularly in cartons where such weakness or defect is indeed detrimental. When cartons or other articles are made of the single faced corrugated paperboard in accordance with the process and by the apparatus embodied in this invention, there are no defects or imperfections as regards the uniform height and uniform cross-sectional dimensions of all of the corrugations and the permanent securement of the facing sheet to the crests of the corrugations by means of a uniform application of an adhesive to these crests.

One of the difficulties in forming corrugations in paperboard which are of uniform height and cross-sectional dimensions is the maintaining of the corrugated strip or sheet in association with one of the corrugating rolls and to prevent any fluffing out of any of the portion of the corrugated

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sheet from its formation by passing through the intermeshing rolls, through the step of applying the adhesive to the crests of the corrugations and until the facing strip is attached to the adhesively coated crests thereof. This difficulty is overcome in the present invention in that the corrugated strip or sheet is positively formed in accordance with the predetermined size and shape teeth or ribs of the corrugating rolls which are of such dimensions both as to depth or height and cross section that the resultant corrugations in the paperboard strip or sheet are all uniform. Then, too, this corrugated sheet is positively temporarily secured and maintained in close contacting relationship with the corrugating roll. The adhesive is applied to the crests of the corrugations while the same are temporarily secured and maintained in very close contact and association with the corrugating roll. When the facing sheet is applied to the adhesively coated crests of the corrugations, the means for temporarily securing and maintaining the corrugated strip in close contacting relationship or association with the corrugating roll, which means in the present invention is a particular type of adhesive having characteristics so that the adhesive qualities, after the facing strip or sheet has been applied to the crests of the corrugations, are destroyed or rendered ineffective whereby the faced corrugated sheet is automatically and very readily released from the corrugating roll.

As regards the release of the faced corrugated strip from the corrugating roll, the same is accomplished specifically by means of utilizing an adhesive having a volatilizable solvent embodied therewith, and the adhesive characteristics of this adhesive are destroyed by means of heat and this heat is preferably supplied to the interior of the corrugating roll to which the corrugated and faced paperboard is attached at one point of the revolution of the corrugating roll and immediately released when the facing strip has been applied to the adhesively coated crests of the corrugated strip.

Additionally, the process as embodied in the present invention is extremely simple in that it involves a series of treatment of the one strip of paper to corrugate the same properly and the application of the adhesive to maintain the corrugated strip for a predetermined time or cycle on the corrugating roll and the application of the adhesive to the crests of the corrugations while the said strip is adhesively and firmly secured to the corrugating roll and, subsequently, the application of the facing strip to the ad-

hesively coated crests of the corrugations and immediate release of the adhesive characteristics which holds the corrugated strip on the corrugating roll when the facing strip has been applied to the adhesively coated crests.

Moreover, the apparatus for making the single faced corrugated paperboard is also extremely simple and is totally devoid of the use of strippers and other adjuncts and accessories now used in connection with machines or apparatus for corrugation paperboard. The apparatus consists of a minimum number of parts and a cooperating pair of corrugating rolls which are preferably heated to a temperature of between 300° F.–350° F. and the application of the adhesive so that it will be between one of the corrugating rolls and one face of the initially or normally flat strip that is to be corrugated, and this adhesive serving to maintain the corrugated board on a portion of the corrugating roll and, upon further movement thereof, the adhesive is uniformly applied to the crests of the corrugated paperboard while the same is in contacting fixed adhesive engagement with the rotating corrugating roll and then the simple application of a facing strip or sheet to the coated crests of the corrugations and the automatic release, so to speak, or destruction of the adhesive characteristics for enabling the corrugated strip with the facing firmly applied thereto to readily remove itself from the corrugating roll to which it was previously adhesively secured.

In view of the foregoing, it is an object of the present invention to provide a process and apparatus for making single faced corrugated paperboard wherein the carrying out of the process results in a unique adhesive securement, affixing or attachment of the corrugated strip to one of the corrugating rolls and, while in such adhesively secured engagement with this roll, the crests of the corrugations are adhesively coated uniformly throughout their lengths and, subsequently, the facing strip is applied and the adhesive characteristics of the adhesive are destroyed and the completed faced corrugated board is free from the corrugating roll to which it was previously and adhesively secured.

Another object of the invention is to provide a process and apparatus for the production of single faced corrugated paperboard wherein the height of each of the corrugations and the cross sectional dimensions of each of the corrugations both throughout their length are uniform and a uniform coating of adhesive is applied throughout the length of each corrugation so as to permanently secure the facing strip to the corrugated board and the resultant single faced corrugated paperboard being of uniform strength throughout its entirety.

Another object of the invention is to provide a process and apparatus wherein a unique preferably rotatable applicator for applying the adhesive to the crests of the corrugations of the paperboard is utilized to uniformly apply or coat the adhesive to the crests uninterruptedly throughout their lengths.

Another object of the invention is to provide the utilization of a particular adhesive for temporarily affixing or securing the corrugated paperboard to a portion of a rotating corrugating roller and such adhesive being characterized so that it may predeterminedly and readily lose or have its adhesive characteristics destroyed so as to release the corrugated paperboard from the corrugating roll.

A further object of this invention is to provide

a process for making single faced corrugated board adaptable for a wider choice of adhesive since the strippers used in the conventional method are definite obstacles against the use of certain types, particularly those of high solid content and quick drying.

A still further object of this invention is to provide an adhesive to be applied to the surface of a corrugating material for bonding said corrugating material to a corrugating roll, said adhesive maintaining this bond until a liner sheet is attached, after which time the adhesive becomes wholly inoperative.

With the above and other objects in view, the invention consists in the process and apparatus hereinafter fully described, the apparatus being illustrated in the accompanying drawings, and the process and apparatus being pointed out in the claims hereto appended, it being understood that various changes in the process and apparatus, within the scope of the claims, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, which form part of this specification and wherein like numerals and letters refer to like parts wherever they occur:

Fig. 1 is a diagrammatic view showing the operations that are common to the conventional process,

Fig. 2 is a diagrammatic view showing the operations that are common to the new process,

Fig. 3 is a plan view showing the glue traces on the liner sheet in the conventional process,

Fig. 4 is a plan view showing the continuous glue traces on the liner sheet in the new process, and

Fig. 5 is a cross-sectional view of the finished board made by the new process taken at any point along the length of the corrugations.

Conventional process

It is believed that the invention can best be understood by setting forth the conventional process of making single faced corrugated board. The essential steps of the process commonly practiced are as follows.

A corrugating medium or corrugating material 1 is drawn over idler rolls 2 and over a steaming device 3, thence in a substantially S-shaped path over a top corrugating roll 4 and then between said corrugating roll 4 and a bottom corrugating roll 5, the corrugating material 1 being corrugated during its travel between the intermeshing corrugations of the top corrugating roll 4 and the bottom corrugating roll 5.

A liner sheet 6 comes from a suitable supply roll (not shown) and passes around preheater rolls 7 and thence around a heated pressure roll 8 which presses the liner sheet 6 against the crests of the corrugations of the corrugated sheet or corrugated member just before said corrugated sheet 1 leaves the bottom corrugating roll 5.

The liner sheet 6 is secured to the corrugated sheet 1 by means of an adhesive or glue supplied by a glue roll 9 located beneath the bottom corrugating roll 5 in position for applying the glue to the crests of the corrugations of the corrugated sheet as it passes around the bottom corrugating roll 5.

The apparatus is provided with a series of stationary strippers 10 that are spaced apart longitudinally of the top corrugating roll 4 and the bottom corrugating roll 5. The strippers

10 have fingers 11 located in annular grooves 12 and 13 provided therefor in the top corrugating roll 4 and the glue roll 9 respectively. These fingers 11 strip the corrugated sheet 1 from the top corrugating roll 4 guide it on to the bottom corrugating roll 5, and hold said corrugated sheet 1 snugly in the corrugations of the bottom corrugating roll 5 during its travel from point A to point B. The fingers 11 of stripper 10 are designed to allow the straw sheet 1 to recede slightly or "fluff out" from the bottom corrugating roll from point B to point C so that the crests of the corrugations may contact a film of glue at point D supplied by the glue roll 9. Thereafter, the fingers 11 of the stripper 10 guide the corrugated sheet 1 back snugly into the corrugations of the bottom corrugating roll 5 at point C and hold said corrugated sheet 1 thereto until the corrugated sheet 1 reaches a point E where it is guided between the bottom corrugating roll 5 and the pressure roll 8 and is joined with the liner sheet 6.

There are many objections to the arrangement thus far described. One is that it requires the use of strippers 10 having fingers 11 thereon spaced apart longitudinally of the top corrugating roll 4 and the bottom corrugating roll 5 at intervals of 4 inches for A-flute board and 2 inches for B-flute board. This requires annular grooves 12 and 13 in the top corrugating roll 4 and the glue roll 9 respectively. These grooves result in a discontinuous glue line across the length of the corrugations of the board (see Fig. 3) with resulting loss of bond strength. This is an unavoidable deficiency in all processes in current use. Furthermore, the use of strippers entails a considerable maintenance and replacement expenditure.

The purpose of the sagging or "fluff out" described is to prevent glue from coming in contact with the areas of the lower roll not covered by paper. It must be understood that the corrugating rolls are from 60 inches to 80 inches or more in length and that in practice it is necessary to run paper of varying widths to economically meet fabrication requirements. As a consequence, the "fluff out" is a practical expedient to prevent glue contamination of any exposed portions of the lower roll. This "fluff out" feature, however, is the major cause of imperfect, defective corrugated board and board of impaired strength and rigidity for the following reasons.

While the fingers 11 on the strippers 10 permit the corrugated sheet 1 to recede less than ⅛ inch from the bottom corrugating roll during the travel from point B to point C, the corrugated sheet 1 being in a highly plastic state compressed by the corrugations to two-thirds of its original flat length, and travelling at a speed of 350 to 450 ft. per minute, there is a tendency for the crests of the corrugations to strike the sides of the bottom corrugating roll corrugations as they are forced back into the roll, and a failure to return to their original position on the corrugations of the bottom corrugating roll 5. As a consequence, the corrugations become slightly flattened and result in "low," or "leaning" flutes, or both. Since the board at this stage is compressed lengthwise to completely fill the corrugations on the bottom corrugating roll 5, when a crest of the corrugated sheet fails to return to its original position, it forces an adjacent corrugation to a "high corrugation."

This tendency results in a single face corrugated sheet of high and low or leaning corrugations, or both. When such defective single face sheet is carried to a double backer for forming double face sheets, a corresponding defective sheet results due to the fact that the low corrugations of the single faced sheet fail to make sufficient contact with the second liner to form a solid bond. Thus, a further deficiency in strength and rigidity of the double face board will be superimposed on a similar deficiency in the single face sheet.

In the travel of the corrugated sheet 1 from the point B to point C, there is a tendency of it to "fluff out" unevenly or "chatter," resulting at times in some of the corrugations receiving no glue at all from the glue roll 9. In addition, and perhaps more importantly, there is a tendency of the sheet to buckle in the transverse direction during the "fluff out." This, at times, results in a considerable transverse area of the sheet being without glue or completely "starved."

The annular grooves 12 in the top corrugating roll give rise to another more or less common defect. Since the corrugating material 1, as it enters the top corrugating roll 4, is plastic and under tension, there is a tendency for said corrugating material to be drawn into the annular grooves 12 resulting in a slight depression in said corrugating material at intervals. These depressions persist through the entire single facing operation and result in a discontinuous glue line where the second liner is attached in the double backing operation.

Most of the defects mentioned can usually be detected as the sheet comes off of the corrugating table, but the "starved" transverse areas are perhaps the most costly defects since such sheets may go through several subsequent operations, even through actual box fabrication, before the failure is apparent.

The combined effect of the deficiencies enumerated of the conventional system of manufacturing corrugated board results in a relatively high scrap loss.

New process

The system of the present invention overcomes all of the objectionable features which characterize the conventional process of corrugated paper manufacture. The two principal sources of trouble are removed; namely, the slotting of the top or receiving corrugating roll 4 and the glue roll 9 and the "fluff out" of the corrugated sheet 1 for the purpose of applying glue. In the new system, the corrugated sheet 1 is held throughout its travel through the bottom corrugating roll in undisturbed intimate contact with the corrugations thereof throughout its width, thus avoiding the primary cause of malformed corrugations.

Each corrugation is symmetrically formed and of uniform height with radial line perpendicular to the liner. This formation results in maximum strength and rigidity of the corrugated sheet.

This new process dispenses with the strippers 10, the fingers 11, the annular grooves 12 in the bottom or delivery corrugating roll 5, the annular grooves 13 in the glue roll 9, by providing a top corrugating roll 4 which may have continuous, evenly spaced, parabolic shaped corrugations throughout its length, and an etched or rotogravure type glue roll 15, which, in combination permits the application of a continuous, uniform, controlled amount of glue to the crest of each

corrugation of the corrugated sheet throughout its length.

In the new process, as shown in Fig. 2, the corrugating material 1 is drawn over idler rolls 2 and over a steaming device 3. Ribbons, strips or coatings of a suitable glue are applied to the upper surface of the corrugating material 1 from a glue application roll 14 just before said corrugating material 1 reaches the top corrugating roll 4. The corrugating material 1 is guided over the top corrugating roll 4 and then between said top corrugating roll 4 and the bottom corrugating roll 5 for receiving corrugations thereon. The adhesive causes the corrugated sheet 1 to adhere to the surface of the bottom corrugating roll 5 thereby holding the corrugated sheet 1 in contact with said bottom corrugating roll 5 until it engages the pressure roll 8.

The liner sheet 6 comes from a suitable supply roll (not shown) and passes around preheater rolls 7 and thence around a heated pressure roll 8 which presses the liner sheet 6 against the crest of the corrugations of the corrugated sheet 1 just before said corrugated sheet 1 leaves the bottom corrugating roll 5.

The liner sheet 6 is secured to the corrugated sheet 1 by means of an adhesive or glue supplied by an etched roll or rotogravure type roll 15 located beneath the bottom corrugating roll 5 in position for applying a strip of glue to the crests of the corrugations of the corrugated sheet 1 continuously throughout the length of each corrugation.

The use of the etched or rotogravure type roll 15 eliminates the necessity for the "fluff-out" of the corrugated sheet, which is typical of the conventional process. The glue is applied to the crests of the corrugation from the etched depressions in the glue roll by contact of the roll under slight pressure with the paper while the latter is held firmly in the corrugations of the corrugating roll 4. The clearance which is regulated by the thickness of the paper between the bottom corrugating roll 5 and the glue roll 9, is ample to prevent any glue from reaching any portions of the bottom corrugating roll 5 which may be exposed. The glue is held in the etched depressions by surface tension so that there is no tendency to spray at any feasible operating speed.

In contrast to this system of glue application, the glue roll of the conventional process is a smooth cylinder carrying a film of glue of sufficient thickness to engage the crests of the corrugations as the sheet passes through the "fluff-out" cycle. In order to apply sufficient glue solids to form the necessary bond between the corrugated paper and the liner the film of glue is usually .008 to .010 of an inch in thickness with a considerable variation above and below these averages so that the thickness of the paper (usually about .009 of an inch), is insufficient to prevent contamination of exposed portions of the corrugating roll. Furthermore, there is a marked tendency for the glue to spray from the application roll at high speeds, such as 250-ft. to 300-ft. per minute, thus involving a further source of contamination to the corrugating roll. Another objectionable feature is the tendency of the film of glue on the application roll to form beads or rings at irregular intervals across the face of the roll, due to the resultant effect of the centrifugal force at high operating speeds, and the surface tension of the glue. Such beads or rings result in a non-uniform glue pattern.

This system of application results in a substantial saving of adhesive and avoids all danger of glue contamination of the lower roll. This system permits a wide choice of adhesive materials including hot melts, starch compositions, or any suitable non-abrasive composition. A hot melt, while more expensive, would have the important advantages of eliminating drying facilities and would insure a dry, non-warping flat sheet.

The glue used in this new process may be a starch glue, a pressure sensitive adhesive, or any composition having such properties that would permit the sheet to be cleanly stripped from the bottom corrugating roll 5 at the point where it makes contact with the liner sheet 6. The cohesion between the liner sheet 6 and the corrugated sheet 1 must be greater than the cohesion between the corrugated sheet 1 and the bottom corrugating roll 5. This adhesive which causes the corrugated sheet 1 to adhere to the bottom corrugating roll 5 is of a type which is operative under the temperature developed by the heated corrugating rolls 4 and 5, but which is inoperative at lower temperatures or upon elimination of its solvent content, thereby permitting the finished single faced corrugated board to be wound in a roll without adjacent convolutions adhering to one another. The adhesive must also have the property of leaving no deposit on the bottom corrugating roll 5.

The adhesive may be of the pressure-sensitive type with sufficient adhesion to the metal roll at temperatures of 300° to 350° for the purpose intended, and which will become non-tacky upon reduction in temperature. It may also be of the water soluble type, such as a starch base glue which will have sufficient adhesion for holding the corrugated sheet during its travel over the lower roll and which upon evaporation of its water content will disintegrate into a non-tacky powder.

An adhesive which will meet these several critical requirements is an aqueous dispersion of gelatinized borated starch. For example, such an adhesive may be prepared by dispersing borated starch in water at room temperature, raising the temperature of the dispersion to a temperature of about 170° F., under agitation and treating at such temperature for fifteen minutes or more. The resulting adhesive should have a solids content of not less than 20% and preferably up to the maximum which can be obtained, namely, of about 24%. The temperature of the adhesive is then reduced to 90° to 100° F. The adhesive is then ready for use.

The adhesive has a very high initial tack and when applied to the upper side of the corrugating medium 1, as shown in the drawing, immediately forms a very strong bond with the paper and a somewhat lesser bond with the bottom corrugating roll 5 immediately upon being drawn into contact therewith. Upon coming into contact with the bottom corrugating roll 5, which is held to a temperature of 300° to 350° F., the water content of the adhesive begins to vaporize and by the time the corrugated sheet 1 has travelled to the point E where the liner is attached through the medium of the pressure roll 8 shown in the drawing, the aqueuos content is substantially eliminated and the adhesive distintegrates into a fine, white, tack-free powder. Thus the single faced board may be stripped cleanly and readily from the corrugating roll and wound into the

usual roll form for shipment without danger of the layers thereof sticking to one another.

Thus, the borated starch base adhesive gives an extremely high tackiness when applied to the corrugated sheet 4 and the bottom corrugating roll 5, maintains this bond until the liner sheet 6 is attached, and immediately thereafter becomes inoperative as bonding medium thereby allowing the finished corrugated board to be wound in a roll without adjacent convolutions adhering to one another.

Single faced corrugated paper produced by this system in turn permits the manufacture of double faced paper of corresponding perfect formation and maximum strength. There is no opportunity for the "starved" areas or other defective glue applications to occur. Losses are reduced to an absolute minimum and the board is of an entirely new order or quality and uniformity.

Obviously, the hereinbefore described apparatus for and process of forming single faced corrugated board admits of considerable modification without departing from the invention. Therefore, I do not wish to be limited to the precise arrangements shown and described.

What I claim is:

1. The process of manufacturing corrugated board which comprises continuously feeding a pliable substantially flat sheet of paperboard to the bite portion of intermeshed heated rotating corrugating rolls, effecting successive corrugations of the moving sheet passing between the enmeshed roll and simultaneously causing an adhesive to be applied for adhesively securing the corrugated paperboard to one of the rotating rolls, continuing the rotary movement of the roll to which the corrugated paperboard is adhesively secured and while enmeshed with the other rotating roll thus moving the adhesively secured paperboard beyond the corrugating stage, coating a liner securing adhesive to the successive crests of the adhesively secured and moving paperboard while still enmeshed with the roll, continuing rotary movement of the roll with the thus adhesively secured paperboard enmeshed in this roll beyond the liner adhesive applying stage, applying and bonding a liner to the coated crests of the corrugations and simultaneously with such bonding of the liner and corrugated sheet applying sufficient heat to the adhesive which secures the paperboard on the roll while the same is rotating to destroy the adhesive characteristics thereof thereby causing release of the substantially dry and set lined corrugated paperboard from the roll.

2. The process as defined in and by claim 1 wherein the substantially flat sheet of paperboard is heated and moistened before entrance of the same to the bite portion of the intermeshed heated rotating corrugating rolls.

3. The process as defined in and by claim 1 wherein the adhesive that is applied to the sheet for securing the same to the roll is dispersed in a volatile solvent, the amount of which solvent is regulated to volatilize completely and thus effecting a disintegration of the adhesive into a dry tack-free powder upon volatilization of the solvent and causing the release of the substantially dry and set lined corrugated paperboard from the roll.

4. The process as defined in and by claim 1 wherein the sheet prior to corrugation is heated, the intermeshed corrugating rolls being heated at a temperature in excess of 300° F., and the sheet is continuously passed through the said intermeshing rolls at the rate of at least 250 feet per minute and the said adhesive that is applied to the sheet for securing the same to the roll is completely volatilized in less than one-half second thereby causing release of the substantially dry and set lined corrugated paperboard from the roll.

5. The process as defined in and by claim 1 wherein the adhesive that is applied to the sheet for securing the same to the roll consists of a solution of borated starch having a solids content of not less than twenty percent.

6. The process as defined in and by claim 1 wherein the adhesive which secures the corrugated paperboard to the roll comprises an aqueous dispersion of gelatinized borated starch of not less than twenty percent solids content.

7. The process as defined in and by claim 1 wherein the adhesive for securing the sheet to the roll comprises gelatinized borated starch dispersed in a volatile solvent, the said dispersion having not less than twenty percent solids content and the said adhesive rapidly disintegrating to a tack-free powder due to the heat from the roll, thereby causing a release of the substantially dry and set lined corrugated paperboard from the roll.

8. Apparatus for making single faced corrugated board from a pliable strip comprised only of a pair of elongated intermeshed rotatable corrugating rolls, the entire peripheral portions of the said rolls being free and unobstructed as such and also as regards the strip that is partially disposed about each of these rolls, and which strip is moved by the said rolls, the crests and valleys constituting the corrugations on the receiving roll all being of the same cross sectional dimensions throughout their lengths and likewise the crests and valleys constituting the corrugations on the delivery roll all being of the same cross sectional dimensions throughout their lengths and the two being adaptable for intermeshing, one of which rolls is adapted to receive the strip to be corrugated partially thereabout and the other of which rolls is a delivery roll for the corrugated strip, an adhesive applying roll substantially coextensive in length with the said delivery roll and in close proximity therewith at one point of its periphery, a pressure roll also substantially coextensive in length with the said delivery roll and in close proximity therewith at a point of the periphery thereof spaced from the adhesive applying roll, means for supplying heat interiorly to the enmeshed receiving and delivery rolls and the pressure roll for heating the exterior portions thereof, the said receiving corrugated roll and the enmeshed delivery roll serving to receive the pliable strip to be corrugated at the enmeshed portions of the receiving and delivery rolls, means for applying an adhesive to the surface of the strip facing the delivery roll, the rotation of the said receiving and delivery rolls effecting successive corrugations in the said strip while it is moving between these enmeshed rolls and a simultaneous adhesive securement and retention of the successively formed corrugations in the delivery roll thus adhesively securing and retaining the corrugated strip in the corresponding valleys and crests of the delivery roll while the latter is rotating, the said adhesive applying roll contacting and applying a uniform continuous

coating of adhesive to the successive crests of the formed corrugations of the strip while the latter is adhesively retained in the corrugations of the delivery roll at a peripheral point spaced from the enmeshed corrugations of the receiving and delivery rolls, the pressure roll serving to apply a liner at a peripheral point of the delivery roll spaced from the application of the adhesive on the adhesively coated crests of the corrugated strip while still enmeshed with the corrugations of the delivery roll, whereby the heat from the delivery roll serves to destroy the adhesive characteristics of the adhesive which retains the corrugated strip enmeshed with the delivery roll thus releasing the substantially dry and set lined paperboard from the delivery roll.

WALTER C. GEORGE.

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