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MACHINE FOR MAKING DOUBLE FACED CORRUGATED PAPER BOARD

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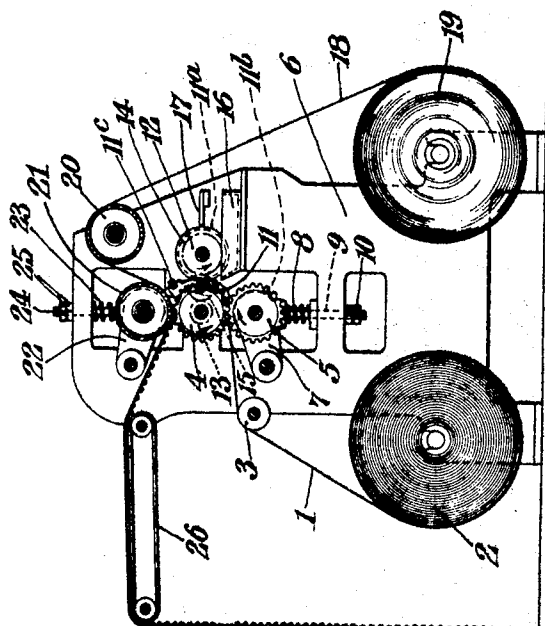


Fig. 1.

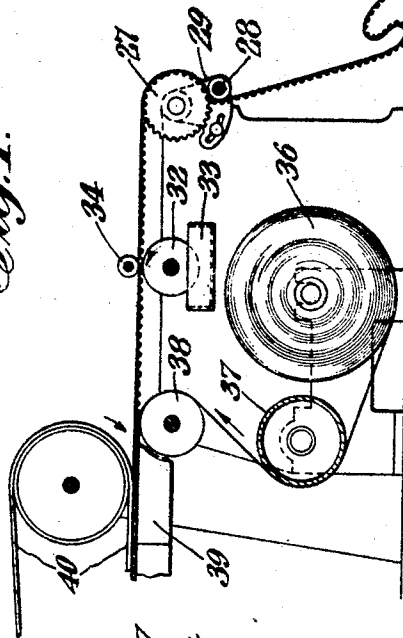


Fig. 2.

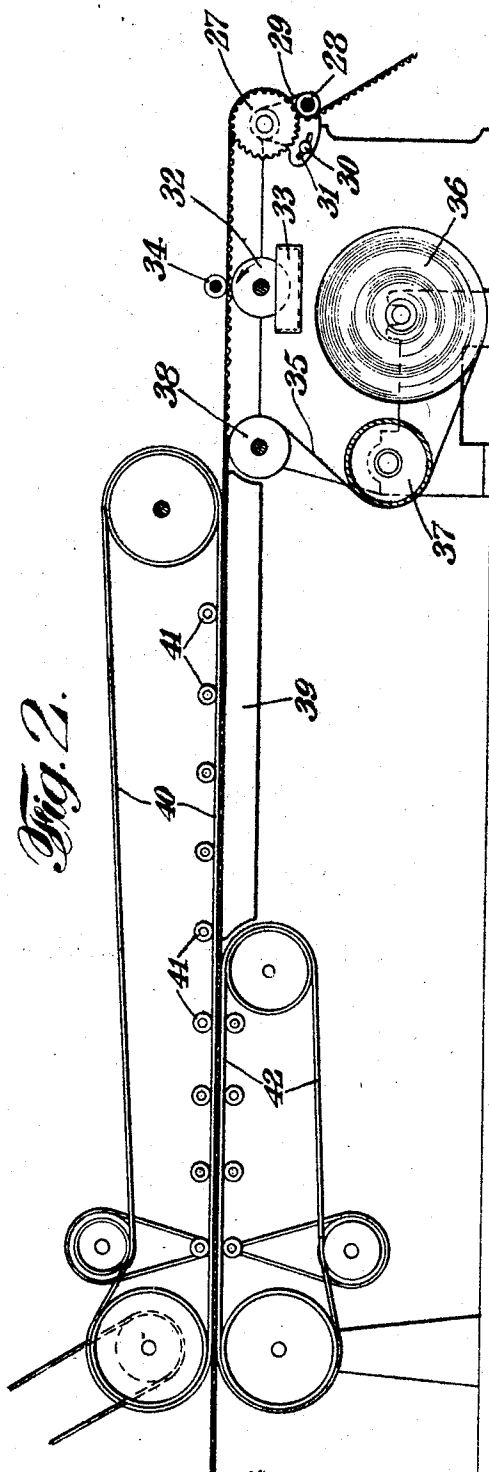


Fig. 3.

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MACHINE FOR MAKING DOUBLE-FACED CORRUGATED PAPER BOARD

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The manufacture of double-faced corrugated paper board by machinery of the type now commercially employed, involves the use of corrugating and pressure rolls for forming the central corrugated web and applying one facing thereto, together with a mechanism for applying the second facing to the single-faced corrugated paper formed by the rolls above mentioned. For practical reasons it is desirable or essential that the single-faced paper be fed to the above mechanism with the facing uppermost, in such manner that the second facing is applied to the underside of the single-faced paper. Heretofore it has been deemed necessary to reverse the direction of feed of either the single-faced paper or one of the webs making up the same, in order to present the single-faced paper to the second facing applying mechanism with the first facing uppermost. Such reversal has been disadvantageous from the practical standpoint, in that a web of paper had to pass from one side of the corrugating and pressure rolls, above and around to the other side of said rolls, thus requiring additional parts, taking up additional space, and forming a barrier to access to the machine by the operative, without performing any useful operations on the paper other than to present it properly to the second facing mechanism. The reversal of the single-faced paper furthermore since it involved bending the paper around a roll shortly after the first facing was applied thereto, tended to weaken and disturb the bond between the corrugated web and the facing.

The primary object of the present invention is to provide a method of making double-faced corrugated paper board which will eliminate the above step of reversing the paper webs or single-faced paper prior to the application of the second facing thereto, thus enabling the paper webs to be fed directly to the corrugating rolls, and from said rolls directly to the second facing-applying mechanism without involving any bending or reversing of the single-faced corrugated paper, which would weaken the same; the invention also involves machinery whereby the

above method of making paper board may be mechanically carried out.

Further objects and advantages of the invention will be in part obvious and in part specifically pointed out in the description hereinafter contained which taken in conjunction with the accompanying drawings discloses the preferred embodiment of a machine adapted to carry out the invention; such machine however is to be considered merely as illustrative of the principles of the invention. In the drawings—

Fig. 1 is a side view largely diagrammatic of the first section of a machine adapted to operate in accordance with the invention.

Fig. 2 is a view similar to Fig. 1 but showing the final section of the machine.

Fig. 3 is an enlarged fragmentary diagrammatic view of the corrugating rolls and associated parts.

In the machine chosen to illustrate the invention, the web 1 to be corrugated is first fed from a roll 2 over a preheating roller 3 and then between a pair of heated corrugating rolls 4 and 5 of usual character. As shown, the upper corrugating roller 4 is carried by fixed bearings in the framework 6 and the lower corrugating roll 5 is movably supported by bearing arms 7 which are pivoted to the frame of the machine, the roll 5 being constantly urged upwardly toward roll 4 by spring members 8 acting between the bearing arms 7 and the frame of the machine. Suitable stop members shown as consisting of rods 9 projecting downwardly from the bearing arms 7 and having adjustable heads 10 cooperating with the frame of the machine, are, however, provided to prevent the roll 5 from meshing too tightly with the roll 4 when the web 1 is not being fed between such rollers.

After being corrugated, by passing between rolls 4 and 5, the web 1 is carried around on to the upper side of roll 4, a suitable number of fingers 11 being provided to guide the corrugated web 1 around roll 4. The backs of fingers 11 run in grooves 11^a in the adhesive roll 12 hereinafter described, while the ends of the fingers engage in similar annular grooves 11^b in the corrugating roll 5,

the fingers being shown as supported by a transverse bar 11°.

As the corrugated web 1 passes around roll 4, adhesive is applied to the outer or exposed peaks of the corrugations, by means of an adhesive roll 12 or other suitable device; however, as an improvement in the mechanical application of adhesive to the corrugated web we prefer to rotate the roll 12 so that the points on its surface which engage the corrugations move in the opposite direction to the corrugations, thereby applying the adhesive more firmly, thoroughly and uniformly. In the drawings the mechanism for rotating the rolls 4 and 5 is not illustrated, but the roller 12 may be driven in the reverse direction, for example, by a gear 13 running with roll 4 and driving a gear 14 fixed to roller 12, through an intermediate idler gear 15. As illustrated the ratio of the gears 13, 14 and 15, furthermore, preferably is such that the roller 12 moves at much slower speed than roll 4 or the paper traveling therewith, whereby a fresh adhesive coated portion of adhesive roll 12 is moved to the point of contact with the corrugated web, during the same time that the web advances a distance equal to the pitch of the corrugations. This will avoid a too great or too small application of adhesive to the corrugations. It will be understood that the adhesive roll 12 operates in conjunction with an adhesive containing tray 16 and scraper 17 of the usual character.

A facing sheet 18 is next applied to the upper side of the corrugated web 1, and pressed into engagement with the sticky peaks of the corrugations. As shown, the first facing sheet is fed from a roll 19 at the front of the machine, over a preheating roll 20 which warms the inner surface of the sheet, and then between the upper corrugating roll 4 and a heated pressure roll 21 which is urged toward roll 4. This pressure roll may be provided with pivoted bearing arms 22, springs 23 and stop members 24 having adjustable heads 25, similar respectively to the members 7, 8, 9 and 10 previously described in connection with lower corrugating roll 5.

It will be noted that the single-faced corrugated paper thus formed, leaves the rolls 4 and 21 with the facing uppermost and in accordance with the present invention the single-faced paper is then lead directly to the second facing-applying mechanism without reversing it or turning it upside down. As shown, a carrier belt 26 assists in moving the single-faced paper away from the pressure and corrugating rolls and out of the way of the operative, and the web then travels to the second facing-applying mechanism. We prefer, however, to place the single-faced paper under adjustable tension prior to applying the second facing thereto, this being accomplished in the present instance by feeding

the single board partially around a corrugated or plain roller 27 having an adjustable press roll 28 associated therewith. As shown, the roll 28 is supported in arms 29 which are pivoted to swing about the axis of roll 27, and are adjustable as by means of a bolt 30 contained in a sector slot 31 in arm 29. Thus more or less tension will be placed upon the single-faced paper by the second facing-applying mechanism, depending upon how much the same is caused to bend by roll 28, in passing partially around roll 27. The tension therefore may be adjusted to the proper amounts required for the different tensile strengths of various grades of paper employed. The passage of the single-faced paper partially around roll 28 also will break up any curl which may tend to form therein.

We also prefer to leave a certain amount of slack, as indicated in the drawings, between the initial single-faced paper forming part of the machine and the tension and curl-breaking device. This gives the single-faced paper time to dry and harden before being subjected to tension. As is also indicated in the drawings, the slack parts of the single-faced paper may be more or less folded in such manner that at certain points the corrugations are above the facing, and references herein to maintaining the facing of the single-faced paper uppermost in passing the same from the single-faced paper forming part of the machine to the second facing-applying mechanism, accordingly are not to be constructed as excluding such casual slack bends or folds as may or may not occur, which have no effect upon the steps involved in making the paper board, and do not injure the single-faced paper since it already has had time to dry and harden before bending.

From the tension device above described, the single-faced paper then passes to the mechanism which applies the second facing thereto, the downwardly projecting corrugations first having adhesive applied thereto, as by an adhesive roll 32 running in an adhesive containing tray 33, and against which the corrugations are pressed by a roll 34.

The second facing 35 is fed from a roll 36 partially around a preheating roll 37 which warms the inside surface of the facing and then over an idler roll 38 where the second facing comes into contact with the under side of the single-faced paper. The double-faced board then is conducted over a stationary heater 39 and under an endless conveyor 40, rollers 41 associated with the endless conveyor supplying sufficient pressure to hold the second facing and the single-faced paper in firm contact while the adhesive is becoming set. The double-faced corrugated board then travels over an endless conveyor 42 where it seasons until permanently set in flat and smooth condition, and then usually

passes through suitable cut-off knives and cut to desired lengths.

The conveyors 40 and 42 will both travel at exactly the same speed as the corrugated board and also at the same speed as the rolls which form the single-faced paper; the slack ahead of the tension device being provided at the beginning of the operation of the machine. Generally speaking the various rolls of the machine are positively driven to feed the paper ahead at the same speed.

It will thus be seen that the manufacture of double-faced corrugated board, as above described, permits the webs making up the single-faced paper to be fed directly into the corrugating rolls without first passing either of them over or around the rolls, also that the single-faced paper is delivered from the rolls with its facing uppermost and is so maintained as it moves along to have the second facing applied thereto, thereby eliminating any step of reversing or turning the single-faced paper upside down in order to present it properly to the second facing-applying mechanism, and avoiding injury to the single-faced corrugated paper due to bending the same sharply immediately after forming it.

While the invention has been described as performed by specific machinery, it will be understood that many changes may be made therein without departing from its principles as defined in the appended claims.

We claim:

1. A machine for making double-faced corrugated paper board comprising means for continuously making and feeding a long single-faced corrugated paper, a mechanism adapted to continuously apply a facing sheet to the unfaced side of said single-faced corrugated paper and feed along the double-faced board thus formed, and an adjustable tension device located between said means and said mechanism for acting upon the single-faced paper as it is fed to said mechanism, said device acting as a brake on the single-faced corrugated paper in opposition to the feeding action of the mechanism aforesaid.

2. A machine for making double-faced corrugated paper board comprising means for continuously forming and feeding along single faced corrugated paper, mechanism for continuously applying a facing to the unfaced side of said single-faced paper and feeding the same along, said mechanism including an adhesive applying device acting upon the exposed corrugations of said single faced corrugated paper, and an adjustable tension device located in advance of said adhesive applying device for acting upon the single-faced corrugated paper as it passes to said mechanism, said device acting as a brake on the single-faced corrugated paper in op-

position to the feeding action of the mechanism aforesaid.

3. A machine for making double-faced corrugated paper board comprising means for continuously making and feeding along single-faced corrugated paper, a mechanism adapted to continuously apply a facing sheet to the unfaced side of said single-faced corrugated paper and feed along the double-faced board thus formed, and an adjustable tension device located between said means and said mechanism, said tension device comprising a corrugated roll adapted to engage the corrugations of the single-faced paper and a roll adapted to engage the facing of the single corrugated paper to hold the latter in arcuate contact with the corrugated roll.

4. In a machine for making faced corrugated paper, a corrugating roll, an adhesive applying roll adjacent thereto, and means for turning said adhesive applying roll in the same direction as said corrugating roll and at a rate of rotation substantially lower than that of the corrugating roll.

In witness whereof, we have hereunto set our hands this 29th day of March, 1926.

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JOSHUA WAGNER.