Feb. 26, 1952 J. AQUILLA 2,587,273

MACHINE FOR MAKING CORRUGATED PAPERBOARD

Filed Aug. 4, 1948 2 SHEETS—SHEET 1

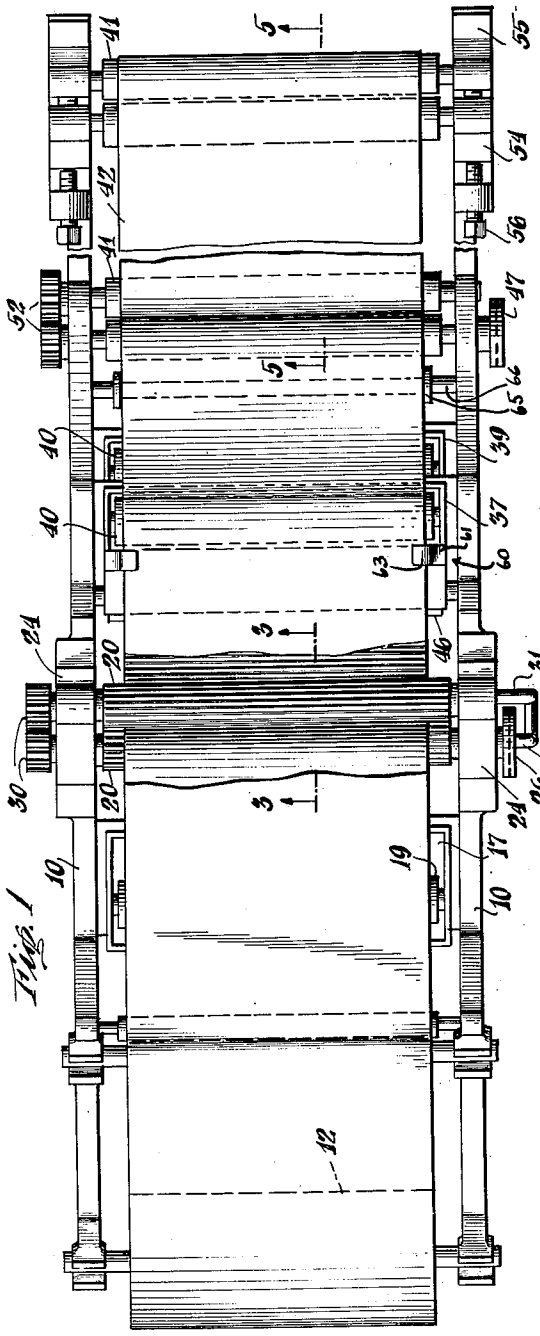


Fig. 1

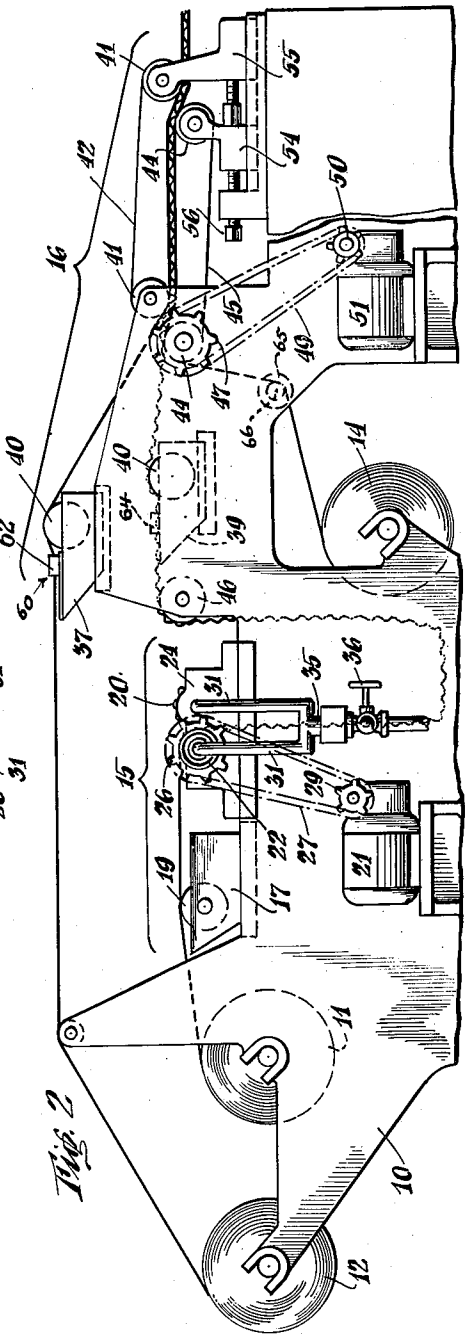


Fig. 2

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Fig. 4

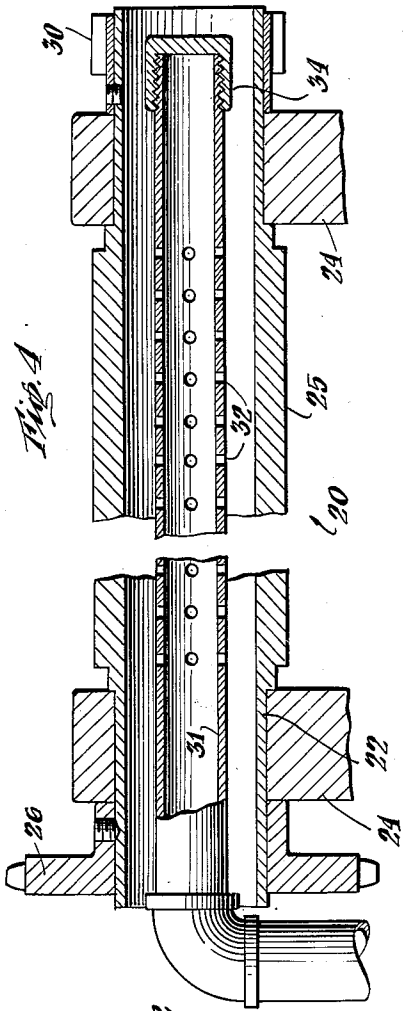


Fig. 3

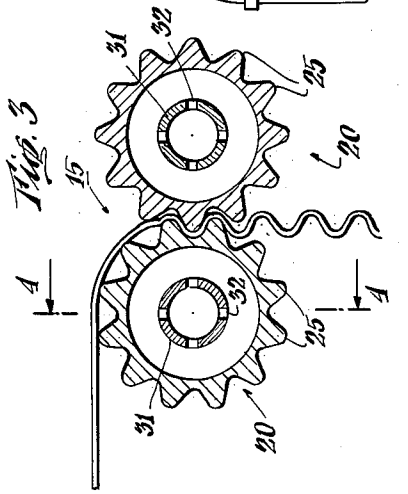
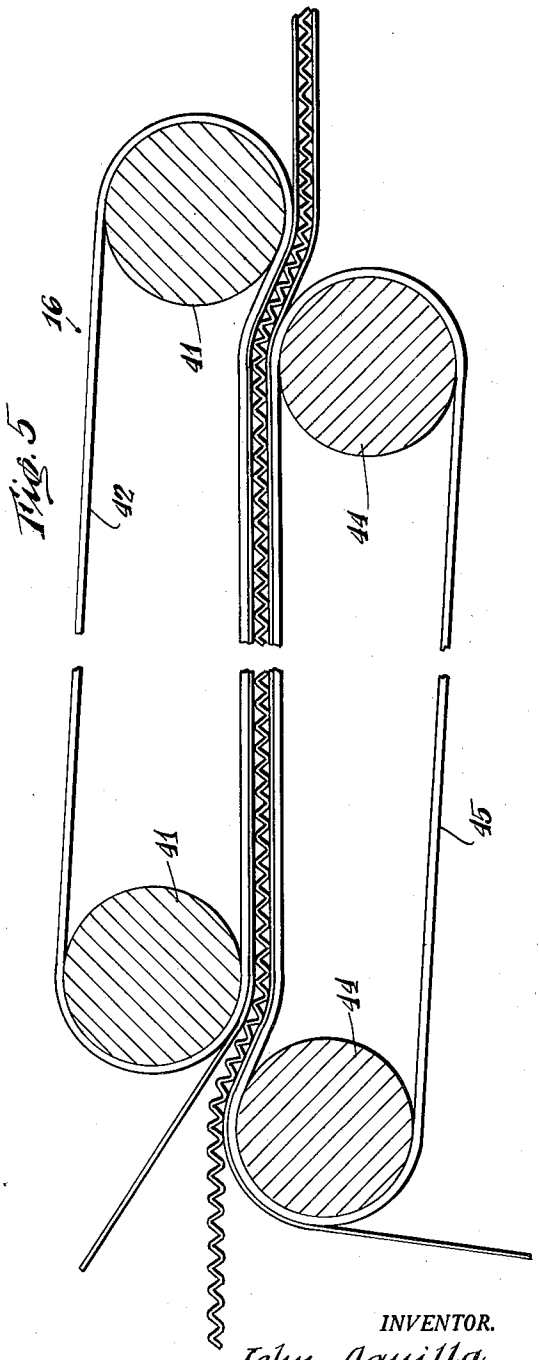


Fig. 5



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MACHINE FOR MAKING CORRUGATED PAPERBOARD

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3 Claims. (Cl. 154—31)

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The present invention relates to machines for producing laminated products and refers particularly to machines for corrugating paper and applying facings thereto to produce corrugated paper board and the like.

Accordingly, an object of the present invention is to provide an improved machine of the foregoing type which is relatively simple in construction and which is economical to manufacture.

Another object is to provide such a machine having improved means for applying the corrugations.

Still another object is to provide such corrugating means which are readily heated at a low cost.

Yet another object is to provide improved means for applying the facings to the corrugated paper without crushing the same.

A further object is to provide an improved arrangement for centering the corrugated paper and facings in order to avoid a slitting operation.

Still a further object is to provide a drive for the facing applying means and an independent drive for the corrugating means whereby paper is continuously passed through the heated corrugating means, independently of the operation of the facing applying means and overheating of the corrugated paper is prevented.

Other and further objects will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawing, forming a part of the specification, wherein:

Figure 1 is a plan view of a machine for making corrugated paper board in accordance with the present invention, a portion of the material fed through the machine being broken away to illustrate details thereof.

Figure 2 is a side elevational view of the machine shown in Figure 1.

Figure 3 is an enlarged sectional view taken along the line 3—3 on Figure 1, illustrating details of the corrugating means.

Figure 4 is a sectional view taken along the line 4—4 on Figure 3, illustrating the heating means for one of the rolls of the corrugating means.

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Figure 5 is an enlarged sectional view taken along the line 5—5 on Figure 1, illustrating details of the facing applying means.

Referring to the drawings in detail, and more particularly to Figures 1 and 2 thereof, there is shown a machine comprising a frame 10 for rotatably supporting a supply roll 11 of paper to be corrugated, a supply roll 12 of paper adapted to provide the upper facing of the finished product and a supply roll 14 of paper adapted to provide the lower facing of the finished product; corrugating means generally indicated by the reference numeral 15; and facing applying means generally indicated by the reference numeral 16.

The corrugating means 15 comprises a receptacle 17 for containing liquid, such as water or a suitable wetting agent, a transfer roll 19 having its lower side submerged in the liquid and supporting the paper to be corrugated to thereby apply liquid to the paper and moisten the same, a pair of heated corrugating rolls 20 about to be described in detail, and drive means including a motor 21 for effecting rotation of the corrugating rolls 20.

As illustrated in Figures 3 and 4, the corrugating rolls 20 each comprise a hollow tubular member 22 journalled for rotation in bearings 24, a serrated exterior 25 between the bearings 24, and a cylindrical interior open at its ends. A sprocket 26 is secured to one end of one of the rolls 20 for receiving a chain 27 driven by a sprocket 29 rotated by the motor 21, and a gear 30 is secured to the other end of the roll 20 which meshes with a similar gear 30 on the other roll 20 to effect rotation thereof.

The serrations 25 of the rolls 20 are constructed and arranged to mesh and serve as feed rolls for unrolling the paper from the supply roll 11 while forming the corrugations therein.

Preferably, the rolls 20 are heated to provide for better setting of the corrugations formed in the paper, the formation of which is facilitated by moistening the same. This is conveniently accomplished by a gas burner comprising a tube 31 in coaxial relation with the roll 20 and having perforations 32 therein between the bearings 24 for directing flame jets against the interior of the roll adjacent the corrugating serrations. One end of each of the tubes 31 is capped at 34 and the other end is connected to a gas supply line 35 having a control valve 36 therein (Figure 2). The open ends of the rolls 20 provide for the supply of air to attain proper combustion of gaseous fuel.

The facing applying means 16 comprises a pair

of receptacles 37 and 39 for containing an adhesive substance in liquid form each having a transfer roll 40 partially submerged therein for respectively applying the adhesive to the underside of the upper facing and to the underside of the corrugated paper; and means for passing the facings and corrugated paper therebetween to cause the facings to be adhered to the intermediate corrugated paper as about to be described.

These last mentioned means are illustrated in Figure 5 and comprise a pair of spaced apart upper rollers 41, an endless belt or apron 42 extending about the rollers 41, a pair of spaced apart lower rollers 44, and an endless belt or apron 45 extending about the rollers 44, which are adapted to cooperate with an adjacent strand of the belt 42 to feed the corrugated paper board therebetween. Each of the rollers 41 is adjacent one of the rollers 44 but is offset in the direction of travel of the belts 42 and 45, for example, the rollers 41 may be somewhat in advance of the rollers 44. The rollers 41 and 44 are further spaced to provide a greater distance between the belts at adjacent rollers than at portions intermediate the rollers to thereby eliminate nips between rollers 41 and 44 tending to crush or otherwise deform the corrugations. As will be noted, the belts 42 and 45 serve to unroll the facings from the supply rolls 12 and 14 while the corrugated paper is drawn over an idler 46 (Figure 2), and fed between the facings. While so drawn between the belts, light, but sufficient pressure is applied by the adjacent belt strands at portions intermediate their rollers to cause the facings to be adhered to the intermediate corrugated paper without crushing of the latter.

In order to effect rotation of the belts 42 and 45, a sprocket 47 is secured to one end of one of the rollers 44 for receiving a chain 49 driven by a sprocket 50 rotated by a motor 51, and a gear 52 is secured to the other end of the aforementioned roller which meshes with a similar gear 52 on the roller 41 adjacent this roller 44.

If desired, the other rollers 41 and 44 may be mounted on the frame for lengthwise movement by slidable supports 54 secured in predetermined positions on a slide 55 by bolts 56 to thereby adjust the tension of the belts 42 and 45.

From the foregoing description it will be noted that the corrugating and facing applying means are operated by independent drive means, whereby the facing applying means may be shut down temporarily without stopping the corrugating means. Should such condition be established, the corrugating means continues to operate and the paper will not be overheated or scorched due to stoppage between the heated rolls 20. The paper which has been corrugated is merely permitted to be deposited at a point between the rolls 20 and the idler 46 and such accumulation of excess corrugated paper is used up at the end of a run when the supply on the roll 11 is exhausted.

Heretofore, it has been found necessary, insofar as applicant is aware, to slit the side edges of the facings after the assembly of the facings and corrugation into a composite or laminated form in order to provide a balanced arrangement. This slitting operation is required in the prior art arrangement in view of the fact that the supply rollers thereof are provided with a braking or resistive effort, thereby pretensioning the papers. In applicant's arrangement, as explained hereinbefore, the corrugation and facings, as well as the supply rollers 11, 12, and 14, are in a loose state, so that the papers can be readily guided laterally and, accordingly centered.

Referring again to Figs. 1 and 2, there are shown lateral guides 60 of any suitable configuration, such as "Z" shaped brackets each having a base 61, a vertical upright 62 and a bent-over portion 63, which guides are adapted to be secured to the receptacle 37 in any well known manner for the upper facing. A similar guide 64, mounted on the receptacle 39, is provided for the corrugation while guides or flanges 65, provided on a freely rotatable shaft 66, guide the lower facing. With the three guides 60, 64, and 65 disposed in predetermined alignment it will be readily understood that the corrugation will be guided substantially midway between the edges of the facings, thereby eliminating the slitting operation.

It will be seen that the present invention provides an improved machine for making corrugated paper board which embodies novel features of construction resulting in improved operation and the production of a better product.

As various changes may be made in the form, construction and arrangement of the parts herein, without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matters herein are to be interpreted as illustrative and not in any limiting sense.

I claim:

1. In a machine for making corrugated paper board, the combination of a pair of rollers, an endless belt extending about said rollers, a second pair of rollers, and an endless belt extending about said second pair of rollers constructed and arranged to cooperate with said first belt to feed corrugated paper board therebetween, said belts being supported only by their respective rollers, both of said rollers of said first pair being respectively adjacent both of said rollers of said second pair and being offset in the direction of travel of said belts to provide a greater distance between said belts at adjacent rollers than between said belts at portions intermediate their respective rollers to thereby eliminate nips at adjacent rollers tending to crush the corrugated paper board, the axes of said rollers being so disposed that the bottom peripheral surfaces of said first pair of rollers fall below the top peripheral surfaces of said second pair of rollers and thereby impart a predetermined pressure to said paper board.

2. In a machine for making corrugated paper board, the combination of a pair of lower rollers, an endless belt extending about said rollers, a pair of upper rollers, and an endless belt extending about said rollers constructed and arranged to cooperate with said first belt to join at an entrance between said belts a pair of facings to a cardboard sheet to form a corrugated paper board and to feed the corrugated paper board therebetween, said belts being supported only by their respective rollers, said upper rollers being each adjacent one of said lower rollers and being spaced forwardly with respect thereto to eliminate nips at adjacent rollers tending to crush the corrugated paper board, the axes of said rollers being so disposed that the bottom peripheral surfaces of said upper rollers fall below the top peripheral surfaces of said lower rollers and thereby impart a predetermined pressure to said paper board.

3. In a machine for making laminated products, the combination of a pair of endwise offset

endless belts each having a strand thereof adjacent the other and adapted to contact same, means including a pair of rollers for each endless belt for moving said belts to cause said adjacent strands to move in the same direction, means for feeding a pair of separated sheets between said strands, means for feeding a third sheet between said pair of sheets, means including a Z-shaped bracket at each side of said sheets for guiding said three sheets in balanced, lateral alignment with respect to each other, means for applying adhesive to said third sheet and one of said pair of sheets prior to feeding said sheets to said belts, whereby said belts cause said sheets to be adhered while passing therethrough, the axes of each pair of said rollers being so disposed that the bottom peripheral surfaces of one of said pairs of rollers fall below the top peripheral surfaces of the other pair of rollers and thereby impart a predetermined pressure to said sheets and means for adjusting the contact pressure of said belts.

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