June 8, 1937. M. H. SIDEBOTHAM 2,083,351

MANUFACTURE OF CORRUGATED PAPER CARTONS

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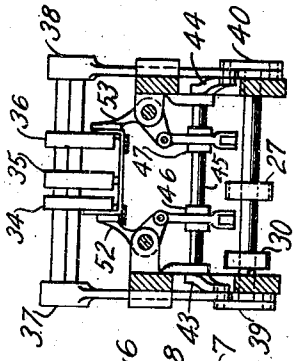

Fig. 4

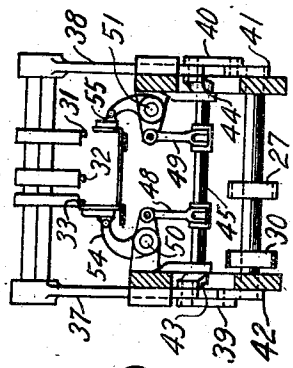

Fig. 3

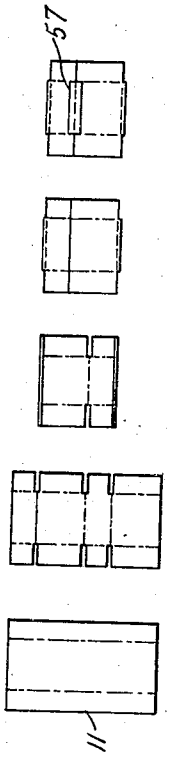

Fig. 5 Fig. 6 Fig. 7 Fig. 8 Fig. 9

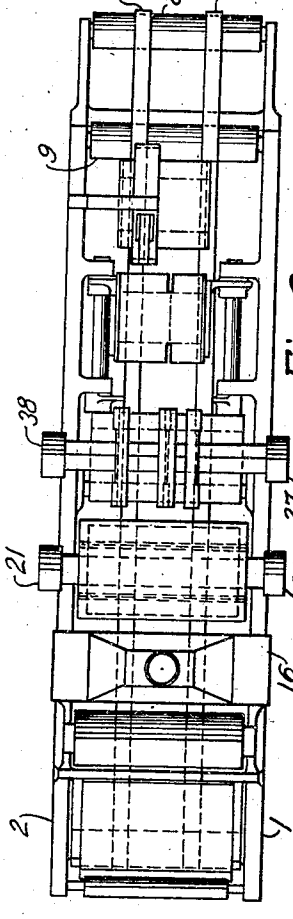

Fig. 2

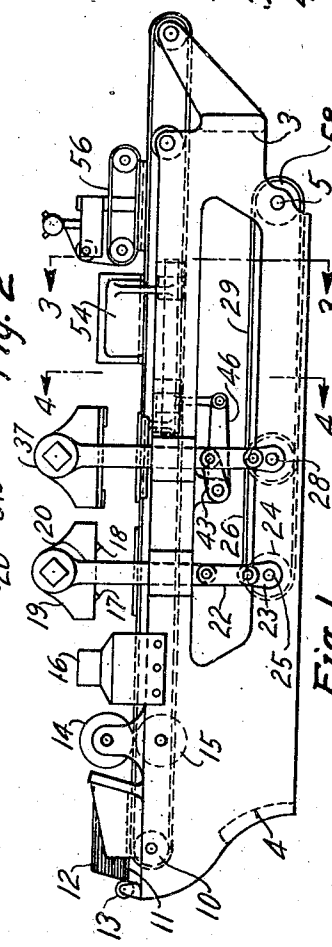

Fig. 1

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MANUFACTURE OF CORRUGATED PAPER CARTONS

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Application July 29, 1935, Serial No. 33,624

16 Claims. (Cl. 93—49)

This invention relates to the manufacture of paper or paste-board boxes, and has particular reference to the production of corrugated paper cartons in flat condition with the opposite edges of the blanks in abutting relationship, and with the said edges held together by adhesively secured tape, or wire stitching or other known methods.

Heretofore, so far as I am aware, the common practice in effecting the production of such cartons has been to cut blanks to the required size, then put said blanks through a slotting and scoring machine, after that, the slotted and scored blanks are folded by hand or, in rare instances, folded and taped by a machine.

Machines of a prior type which fold on scored blanks have not been a commercial success because of the difficulty in registering the folding mechanism to the previously made scores in the blanks. The stiff nature of the blanks and in the case of corrugated blanks their structural formation opposes bending which results in the edges of the blanks, when folded, being out of straight lines.

One of the objects of my present invention is to effect rapid production of paper cartons by a sequence of operations, comprising the feeding of a paper blank to a carrier, printing the blank, slotting, scoring, folding and then taping the abutting edges of the folded blank.

Another object of my invention is to produce a machine that will effect rapid production of paper cartons by a sequence of operations, in which the folding is effected by starting the folding operation while the mechanism for longitudinal scoring is in contact with the blank, thus assuring proper alignment of the abutting edges of the folded blank.

Another object of my invention is to provide a machine of the above type in which fiber blanks may be fed in rapid succession and which will perform automatically all operations necessary to produce a complete carton in flat condition.

While the invention includes the combined instrumentalities above mentioned, I wish it to be understood that I consider the aforesaid means not only combinatively novel, but insofar as I am aware, certain of the devices going to make up such means are new in less combinations than the whole and some capable of individual use, as will more clearly appear hereinafter.

Other more specific objects and advantages of the invention will be apparent to persons skilled in the art as the same becomes better understood by reference to the following description, taken in connection with the accompanying drawing, in which I have illustrated one practical embodiment of the invention, and wherein:—

Figures 1 is a right-hand side elevation of the machine.

Figure 2 is a plan view of the machine.

Figure 3 represents a section on line 3—3 of Figure 1 showing the starting position of mechanism which completes the folding of the blank.

Figure 4 represents a section on line 4—4 of Figure 1 showing the longitudinal scoring and slotting knives in contact with the paper blank and, also, showing the completion of the first folding operation.

Figures 5, 6, 7, 8, and 9 show the condition of the blank as successive operations are performed to complete the box in flat condition.

Figure 5 shows the blank after the transverse scoring operation.

Figure 6 shows the blank after the longitudinal scoring and slotting operation.

Figure 7 shows the blank after the first folding operation is completed, said folding operation being performed while the longitudinal scoring means is in contact with the blank.

Figure 8 shows the blank after the completion of the second folding operation.

Figure 9 shows the completed box after the taping operation.

Similar numerals refer to the similar parts throughout the several views.

Referring first to Figures 1 and 2, the different parts or members of the machine are mounted on suitable sideframes 1 and 2 connected by crossbars 3 and 4, which constitute the framework of the machine.

Mounted in sideframes 1 and 2 is a power shaft 5 which is caused to rotate by any suitable power means not necessary to describe.

The conveyor belts 6 and 7 are driven by the action of rolls 8, 9 and 10 which are driven at practically uniform peripheral speed, from power shaft 5, by gearing not necessary to illustrate.

In the operation of the machine a paper blank 11 is fed from supply stack 12 to the conveyor belts 6 and 7 by means of feeding roll 13 which is driven from power shaft 5 by gearing not necessary to illustrate. The paper blank 11 is carried by conveyor belts 6 and 7 which pass between rolls 14 and 15 supported by sideframes 1 and 2, the lower loll 15 being of any known type to effect printing, usually at predetermined intervals, on the lower surface of the blank 11.

The next unit comprises an oven 16 supported by sideframes 1 and 2, said oven when in use

for the purpose of drying the printed surface, being kept at a suitably high temperature by electricity or gas flames as may be preferred. Such heating power may be stopped when no ink-printing is being effected.

The next unit comprises means for transversely scoring the blank 11 as shown in Figure 5. The transverse scoring knives 17 and 18 are fastened to scoring head 19 which is caused to move up and down by arms 20 and 21 which are supported by sideframes 1 and 2. The lower ends of arms 20 and 21 are connected by link 22 with crank 23 on shaft 25 which is caused to operate by means of pulley or sprocket 24 which is mounted on shaft 25, said pulley or sprocket 24 is connected by a belt or chain 26 with pulley or sprocket 27 which is mounted on shaft 28. Fixed on shaft 28 is a pulley or sprocket 30 which is caused to rotate by means of belt or chain 29 which is driven by pulley or sprocket 58 mounted on power shaft 5.

The next unit comprises means for slotting, scoring and folding. The slotting and scoring knives 31, 32 and 33 are fastened to heads 34, 35 and 36 which are caused to move up and down by arms 37 and 38 which are supported by sideframes 1 and 2. The lower ends of arms 37 and 38 are connected by links 39 and 40 to cranks 41 and 42 which are caused to operate by rotation of shaft 28. The lower end of arms 37 and 38 are connected by the ends of levers 43 and 44 mounted on shaft 45 which supports levers 46 and 47 which act through links 48 and 49 to produce a rocking action to shafts 50 and 51. Folder arms 52 and 53 mounted at the ends of shafts 50 and 51 are so mounted and shaped as to bend the two edge sections of blank 11 upwardly to about 90 degrees from the horizontal plane. This folding operation is done while the heads 34 and 35 and 36 are in their lowest position and while the scoring knives are in contact with the blank 11.

The partly folded blank 11 is carried by conveyor belts 6 and 7 to a position between folding arms 54 and 55 which act on the partly folded blank to complete the folds by bending the two edges of the blank towards each other so that when this operation is completed the edges of blank 11 are in abutted condition.

The blank 11 is carried from the slotting, scoring and folding unit, by conveyor belts 6 and 7 to a taping unit 56 which applies a strip of tape 57 to the abutting edges of folded blank 11.

Having now described my invention, I claim:

1. The method of making paper cartons by a sequence of operations consisting of feeding a paper blank to a carrier, printing the blank, rapidly drying the printing, transversally scoring the blank, longitudinally slotting and scoring the blank in one operation, partly folding the side portions of the blank while the longitudinally scoring means is in contact with the blank, folding the said side portions of the blank towards each other until the edges of said side portions are in abutting position, applying a section of adhesively treated tape to the abutted edges of the blank.

2. The method of making paper cartons by a sequence of operations consisting of printing a blank, rapidly drying the printing, longitudinally slotting and scoring the blank in one operation, partly folding the side portions of the blank while the longitudinally scoring means is in contact with the blank, folding the said side portions of the blank towards each other until the edges of said side portions are in abutting position, applying a section of adhesively treated tape to the abutted edges of the blank.

3. The method of making paper cartons by a sequence of operations consisting of feeding a paper blank to a carrier, longitudinally slotting and scoring the blank in one operation, partly folding the side portions of the blank while the said scoring means is in contact with the blank, folding said side portions of the blank towards each other until the edges are in abutting position, applying a section of adhesively treated tape to the abutted edges of the blank.

4. The method of making paper cartons by a sequence of operations consisting of longitudinally slotting and scoring a paper blank in one operation, partly folding the blank while the scoring means is in contact with the blank, folding the side portions of the blank towards each other until the edges of said side portions are in abutting position, applying a section of adhesively treated tape to the abutted edges of the blank.

5. The method of making paper cartons by a sequence of operations consisting of feeding a paper blank to a carrier, printing the blank, simultaneously scoring and slotting the blank, partly folding the side portions of the blank while the scoring means is in contact with the blank, folding the said side portions of the blank towards each other until the edges of said blank are in abutting position, applying a section of adhesively treated tape to the abutted edges of the blank.

6. The method of making paper cartons by a sequence of operations consisting of printing a paper blank, simultaneously scoring and slotting and partly folding the side portions of the blank while the scoring means is in contact with the blank, folding the side portions of the blank towards each other until the edges of said blank are in abutting position, applying a section of adhesively treated tape to the abutted edges of the blank.

7. The method of making paper cartons by a sequence of operations consisting in feeding a paper blank to a carrier, printing the blank, scoring and slotting the blank while partly folding the side portions thereof, folding said side portions of the blank to abutting position, applying a section of adhesively treated tape to the abutted edges of the blank.

8. Apparatus of the class described comprising means for causing blanks to travel, means for printing the blanks, heating means to dry the printing, means to transversally score each blank, reciprocally acting blank scoring and slotting means, blank folding arms co-acting with the scoring means to partly perform the folding operation while the scoring knives are in contact with the blank, mechanism to fold the side portions of the blank towards each other until the edges of the blank are in abutting position, means to apply a section of adhesively treated tape to the abutted edges of the blank.

9. A machine for making paper cartons from blanks comprising means for printing the blanks and heating means to dry the printing, means to transversally score each blank, blank scoring and slotting knives mounted in a reciprocally acting platen, blank folding arms co-acting with the scoring means to partly perform the folding operation while the scoring knives are in contact with the blank, mechanism to fold the side portions of the blank towards each other until the

edges of the blank are in abutting position, means to apply a section of adhesively treated tape to the abutted edges of the blank.

10. A machine for making paper cartons from blanks comprising means to cause the blanks to travel, means for printing the blanks, means for longitudinally scoring and slotting the blanks in one operation, blank folding arms co-acting with the scoring means to partly perform the folding operation while the scoring knives are in contact with each blank, mechanism to fold the side portions of the blank towards each other until the edges of the blank are in abutting position, means to apply a section of adhesively treated tape to the abutted edges of the blank.

11. A machine for making paper cartons from blanks comprising means for printing each blank, means for simultaneously scoring and slotting the blank, folding means co-acting with the scoring means to partly perform the folding operation while the scoring knives are in contact with the blank, mechanism to fold the side portions of the blank towards each other until the edges of the blanks are in abutting position, means to apply a section of adhesively treated tape to the abutted edges of the blank.

12. A machine for making paper cartons from blanks comprising means for causing blanks to travel, blank scoring and slotting knives mounted in a reciprocally acting platen, blank folding arms co-acting with the scoring means to partly perform the folding operation while the scoring knives are in contact with each blank, mechanism to fold the side portions of the blank towards each other until the edges of the blank are in abutting position, means to apply a section of adhesively treated tape to the abutted edges of the blank.

13. Apparatus of the class described comprising means for simultaneously slotting and scoring each blank, blank folding arms co-acting with the scoring means to partly perform the folding operation while the scoring knives are in contact with the blank, mechanism to fold the side portions of the blank towards each other until the edges of the blank are in abutting position, means to apply a section of adhesively treated tape to the abutted edges of the blank.

14. Apparatus of the class described comprising reciprocally acting means for scoring blanks, means co-acting with said scoring means to begin folding operations on the blanks while the scoring means is in contact with the blanks, folding arms to bend the side portions of the blanks towards each other until the side portions of the blanks are in abutted position.

15. Apparatus of the class described comprising reciprocating scoring knives acting in lines perpendicular to the material to be folded, means co-acting with said scoring means to fold the blank while the scoring means is in contact with the material.

16. Apparatus of the class described comprising reciprocally acting slotting and scoring knives, means co-acting with said scoring knives to begin folding operations on the material while the scoring knives are in contact with the material.

MELVIN H. SIDEBOTHAM.