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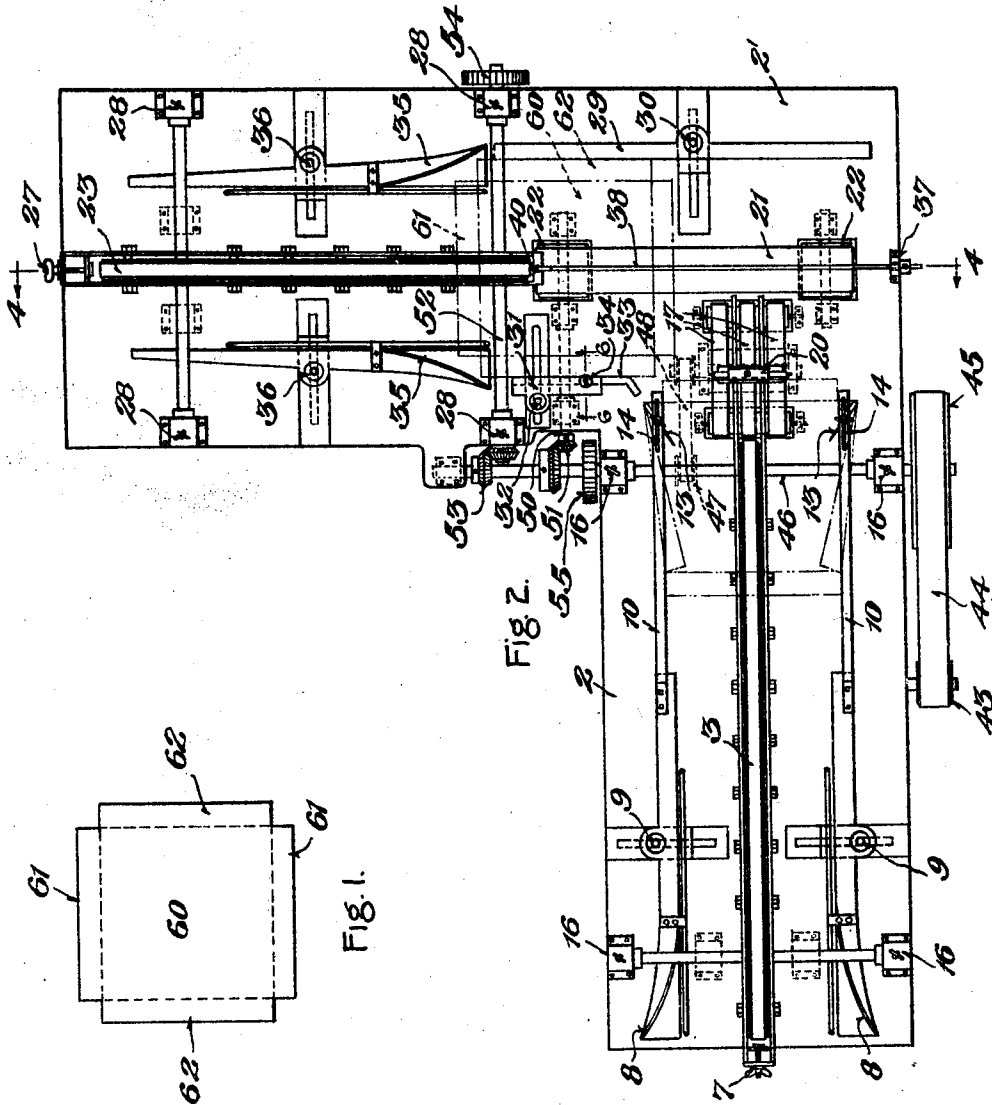
1,684,903

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BLANK BENDING MACHINE

Filed June 1, 1927

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

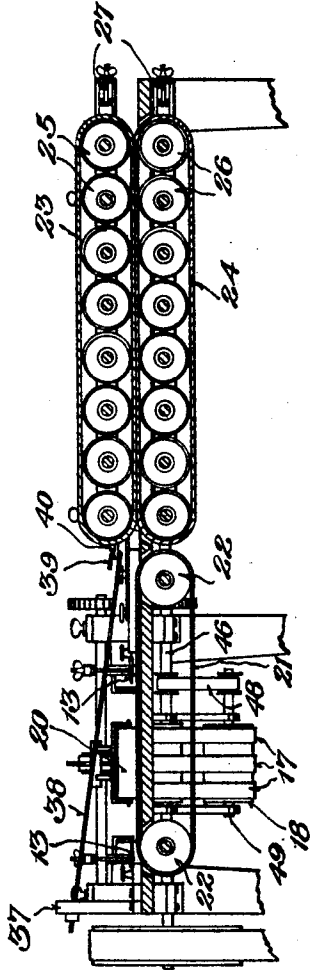


Fig. 4

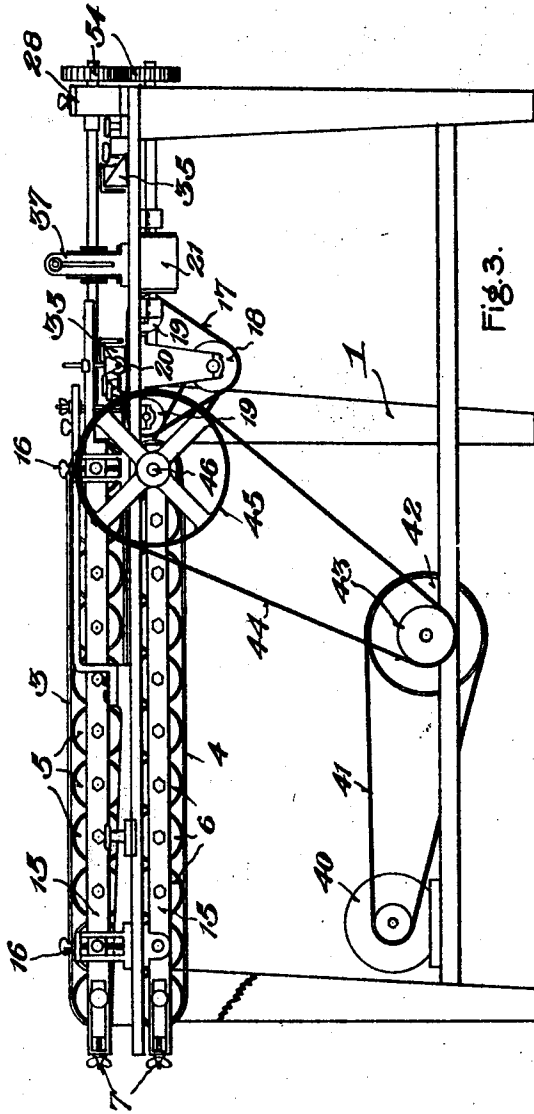


Fig. 3.

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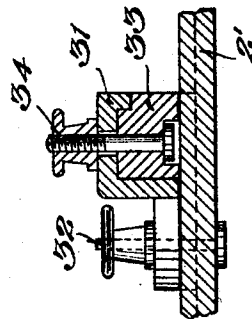
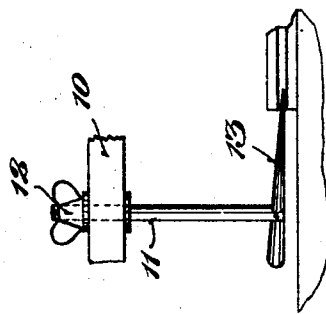
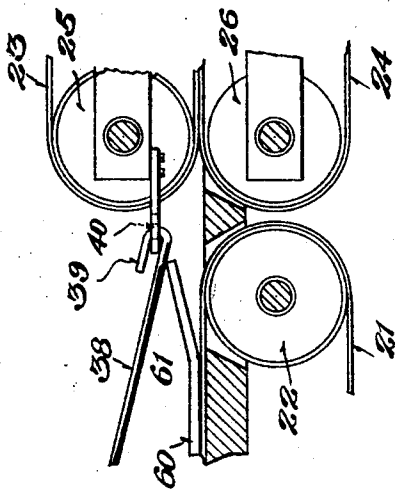
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE.

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BLANK-BENDING MACHINE.

Application filed June 1, 1927. Serial No. 195,680.

This invention relates to certain new and useful blank bending machines and relates more particularly to blanks employed in the formation of paper boxes and the like.

The primary object of the invention is to provide improved means for bending first one set of side portions and secondly the opposite set of side portions of the blank thereby to break or weaken the material and thus enable the blank to be subsequently folded manually, or otherwise, thereby to expedite the formation of the box.

More specifically, the invention aims to provide a machine of this kind which is not only of simple construction, but which enables the blanks to be more expeditiously bent as stated in the foregoing.

The invention has further and other objects which will be later set forth and manifested in the course of the following description.

In the drawings:—

Figure 1 is a plan view of the box blank, which latter is of common form;

Figure 2 is a top plan view of the machine;

Figure 3 is a side elevation;

Figure 4 is a section on line 4—4 of Fig. 2;

Figure 5 is a detail view partly in section of the mechanism for guiding the blanks to the final conveying belts;

Figure 6 is a section on line 6—6 of Figure 2 showing the side guide for the blanks;

Figure 7 is a detail view of one of the devices for restoring the bent edge of the blank to flat position, and

Figure 8 is a fragmentary rear end elevation of Figure 7.

In proceeding in accordance with the present invention, a frame 1 is employed which has a table 2 thereon of substantially L-shape. At the front end of the machine superposed endless belts 3 and 4 are mounted upon series of rollers 5 and 6, the end rollers being adjustable by means of any form of belt tensioning devices such as illustrated at 7 in order to take up the slack in the belts. The upper belt 3 is flanked by bending devices 8, the bending devices being adjustable laterally by means of screw and slot connections 9. Projecting rearwardly from each of the bending devices are arms 10, which latter act as supports for studs 11, the studs being secured to the arms by means of wing nuts 12. A finger 13 is secured to the lower end of each of the studs and is adjustable with the latter longitudinally of the arms 10 by means of slots 14

formed in the arms. It will be understood that the belts 3 and 4 have their confronting flights arranged to grip the top and bottom faces of the blank and to move the latter by frictional contact therewith, and in order to regulate the degree of such contact and to also enable the belts to be used with blanks of varying thicknesses, the rollers 5 are preferably journaled on carriers 15, and the latter are capable of being adjusted so as to regulate the space between the confronting ends of the belts by any suitable means, such as the screw devices 16.

At the rear end of the conveyor, comprised of the belts 3 and 4, endless belts 17 are trained over series of pulleys 18 and 19 so as to receive the blanks from the belts 3 and 4. A compressor roller 20 overlies the horizontal flights of the belts 17 and engages the blank, pressing same against the belt 17. An endless transfer belt 21 is mounted on rollers 22 and is disposed at substantially right angles to the conveyor 3—4 and the belts 17, and acts to transfer the blanks from the first conveyor to a second conveyor which latter is composed of superposed endless belts 23 and 24. The belts 23 and 24 are mounted on pulleys 25 and 26 respectively, the endmost pulleys being provided with belt slack adjusting devices 27 which may be of any suitable form. The spaces between the confronting flights of the endless belts 23 and 24 may be regulated as described in connection with the belts 3 and 4 by means of screw control devices 28 as shown in Figure 2.

A long guide 29 is mounted on the frame of the machine and is adjustable toward and from the belt 21 by means of a screw and slot connection 30. The guide 29 is disposed on the outer side of the belt 21, and a shorter guide 31 is mounted on the opposite side of the belt 21 and to the rear of the belts 17, the guide 31 being disposed opposite to the inner sides of the belts 17. The guide 31 is capable of lateral adjustments by means of a screw and slot connection 32 and carries a substantially J-shape arm 33 which is adjustable toward and from the belts 17 by means of a screw and slot connection 34. It will be obvious from the foregoing that the guides 29, 31 and 33 can be adjusted to accommodate blanks of varying sizes. Opposed blank edge bending devices 35 are arranged on opposite sides of the second conveyor composed of the endless belts 23 and 24 and are laterally adjustable by means of

screw and slot connections 36 so as to accommodate blanks of varying sizes. A standard 37 is carried by the side 2' of the frame of the machine and has one end of a bar or rod 38 secured thereto. The bar 38 overlies the belt 21 and extends downwardly at an angle toward the conveyor 23—24. The opposite end of the rod or bar 38 is provided with a hook 39 engaged in an eye 40 provided therefor, so as to thus support the rod in position. The rod or bar 38 constitutes a guide which acts to engage and unfold the bent edges of the blanks so as to direct the latter into engagement between the belts 23 and 24, as shown more clearly in Figure 5.

As shown in Figure 3, the machine may be driven by a motor 40 which through means of a belt 41 drives a pulley 42, the latter in turn being connected to a smaller pulley 43. A belt 44 is trained over the pulley 43 and drives a larger pulley 45 mounted on a shaft 46. The shaft 46 has a pulley 47 mounted thereon which by means of a belt 48 drives the shaft 49 on which the rollers 18 of the belts 17 are mounted, as shown in Figure 4. The rear roller 22 of the belt 21 is mounted on a shaft 50 which latter is driven by miter gearing 51 from the shaft 46. The belt 23 is driven by a shaft 52 through miter gearing 53 which latter is operated by the shaft 46. The shafts of the belts 23 and 24 are operated in unison by means of gears 54 as shown in Figure 3 and similar gearing 55 effects movement of the shafts of the belts 3 and 4 in unison.

In operation, a blank 60 is engaged with the first conveyor 3—4 and has its opposed side edges 61 bent downwardly. The blank is then caused to move by the conveyor into engagement with the fingers 13 which latter enter under the bent edges of the blank and restore the latter to their original flat position as shown in Figure 1. The blank edges are thus first moved downwardly and then upwardly, weakening same at the line of bend or fold. The blank is then engaged by the belts 17 and passes under the compressor roller 20, the belts 17 being driven at a high rate of speed sufficient to move the blank onto the transfer belt 21 before the edges of the blank can be turned upwardly. The blank is then engaged with the guide 38 as shown in Figure 5, and due to the downward inclination of the guide, the latter will engage and move the edges 61 into engagement with the endless belts 23 and 24. The guides 29 and 34 act to engage and straighten the blank as shown in dotted lines in Figure 2, so that the blank is then moved by the second conveyor 23 and 24 into engagement with the bending devices 35.

From the foregoing, it will be noted that the blanks initially have their opposite side edges bent and subsequently have their remaining side edges bent, the fingers 13 and

the wire 38, as well as the conveyor 23—24 acting to give the bent edges of the blanks a series of bending movements to thus weaken the line of fold or bend, thereby facilitating or expediting the bending of the blank edges when the blank is being formed into a box.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:—

1. In a blank bending machine, opposed bending members for bending the opposite side edges of a blank, a blank conveyor disposed between the members, arms carried by the members, longitudinally adjustable studs carried by the members, substantially horizontal fingers carried by the studs for restoring the bent edges into the plane of the blank body, a second blank conveyor arranged at substantially right angles to the first conveyor, a transfer conveyor, an endless belt between the first and transfer conveyors, a compressor roller associated with the belt, said transfer conveyor transferring the blanks from the belt to the second conveyor, opposed bending means for bending the other side edges of the blank arranged on opposite sides of the second conveyor, blank guides associated with the transfer conveyor for guiding the blanks to the second conveyor, a member having an inclined end disposed between the guides for engaging and moving the first named bent side edges of the blank so as to be engaged by the second conveyor, and means to operate the conveyors.

2. In a blank bending machine, a conveyor, blank bending means associated with the conveyor for bending opposed side edges of a blank, a second conveyor arranged at substantially right angles to the first conveyor, bending means for bending the other side edges of the blank associated with the second conveyor, means to transfer the blanks from the first to the second conveyor, means to unfold the first bent edges disposed adjacent to the transfer means, blank guides between the transfer and second conveyors, and means between the guides to engage the blanks and to unfold the first bent edges so as to guide same to the second conveyor.

3. In a blank bending machine, a pair of conveyors having a substantially right angular relation, bending means associated with each conveyor whereby to initially bend two opposed side edges of the blank and subsequently the remaining side edges, fingers arranged to turn the initially bent edges about their lines of bend, a transfer conveyor between the pair of conveyors, and a horizontal guide element overlying the transfer conveyor and inclined toward the second conveyor of the pair of conveyors to bend the said initially bent side edges so as to engage same with the said second conveyor to be moved thereby.

4. In a blank bending machine, a blank

conveyor, means associated with the conveyor for bending opposed side edges of a blank, a second blank conveyor arranged at an angle to the first conveyor, a transfer conveyor adjacent to the second conveyor, means to move the blanks from the first conveyor onto the transfer conveyor, means to unfold the initially bent edges of the blank and to direct the blank onto the second conveyor, means associated with the second conveyor for bending the other side edges of the blank, and means to operate the conveyors.

5. In a blank bending machine, a blank conveyor, means associated with the conveyor for bending opposed side edges of a blank, a second blank conveyor arranged at an angle to the first conveyor, a transfer conveyor adjacent to the second conveyor, an endless belt conveyor to move the blanks from the first conveyor onto the transfer conveyor, a roller above said belt conveyor to press the blanks against the belt conveyor, means associated with the second conveyor for bending the other side edges of the blanks, and means to operate the conveyors.

6. In a blank bending machine, a blank conveyor, means associated with the conveyor for bending opposed side edges of a blank, a second conveyor disposed at an angle to the first conveyor, means associated with the second conveyor to bend the other side edges of the blank, an endless belt for receiving the blanks from the first conveyor, means engaging on top of the blanks to hold same on said belt, a second endless belt at an angle to and for receiving the blanks from the first belt and for transferring same to the second conveyor, and a member overlying the second belt and extending downwardly at an incline toward the second conveyor to unfold the initially bent edges of the blank and to direct the blanks onto the second conveyor.

7. In a blank bending machine, a pair of angularly related conveyors each including a pair of superposed endless belts, means associated with the conveyors for initially bending two opposed side edges of the blank and

subsequently for bending the two remaining side edges, an endless belt for receiving the blanks from one of the conveyors, means overlying the belt for holding the blanks on the latter, a second endless belt at an angle to the first belt for receiving the blanks from the first belt and for transferring same to the other conveyor, and a member overlying the second belt and having a part extending downwardly at an incline toward the second conveyor to unfold the initially bent side edges of the blank and to direct the blank between the endless belts of the said second conveyor.

8. In a blank bending machine, a pair of conveyors having a substantially right angular relation, bending means associated with each conveyor whereby to initially bend two opposed side edges of the blank and subsequently the remaining side edges, means arranged to turn the initially bent edges about their lines of bend, a transfer conveyor between the pair of conveyors, and a horizontal guide element overlying the transfer conveyor and inclined toward the second conveyor of the pair of conveyors to bend the said initially bent side edges so as to engage same with the said second conveyor to be moved thereby.

9. In a blank bending machine, a blank conveyor, means associated with the conveyor for bending opposed side edges of a blank, a second conveyor disposed at an angle to the first conveyor, means associated with the second conveyor to bend the other side edges of the blank, a third conveyor to receive the blanks from the first conveyor, a transfer conveyor to receive the blanks from the third conveyor and to move same onto the second conveyor, and means associated with the transfer conveyor to unfold the initially bent edges of the blank and to direct the latter onto the second conveyor.

In testimony whereof I have signed my name to this specification.

ARTHUR L. YOUNG.