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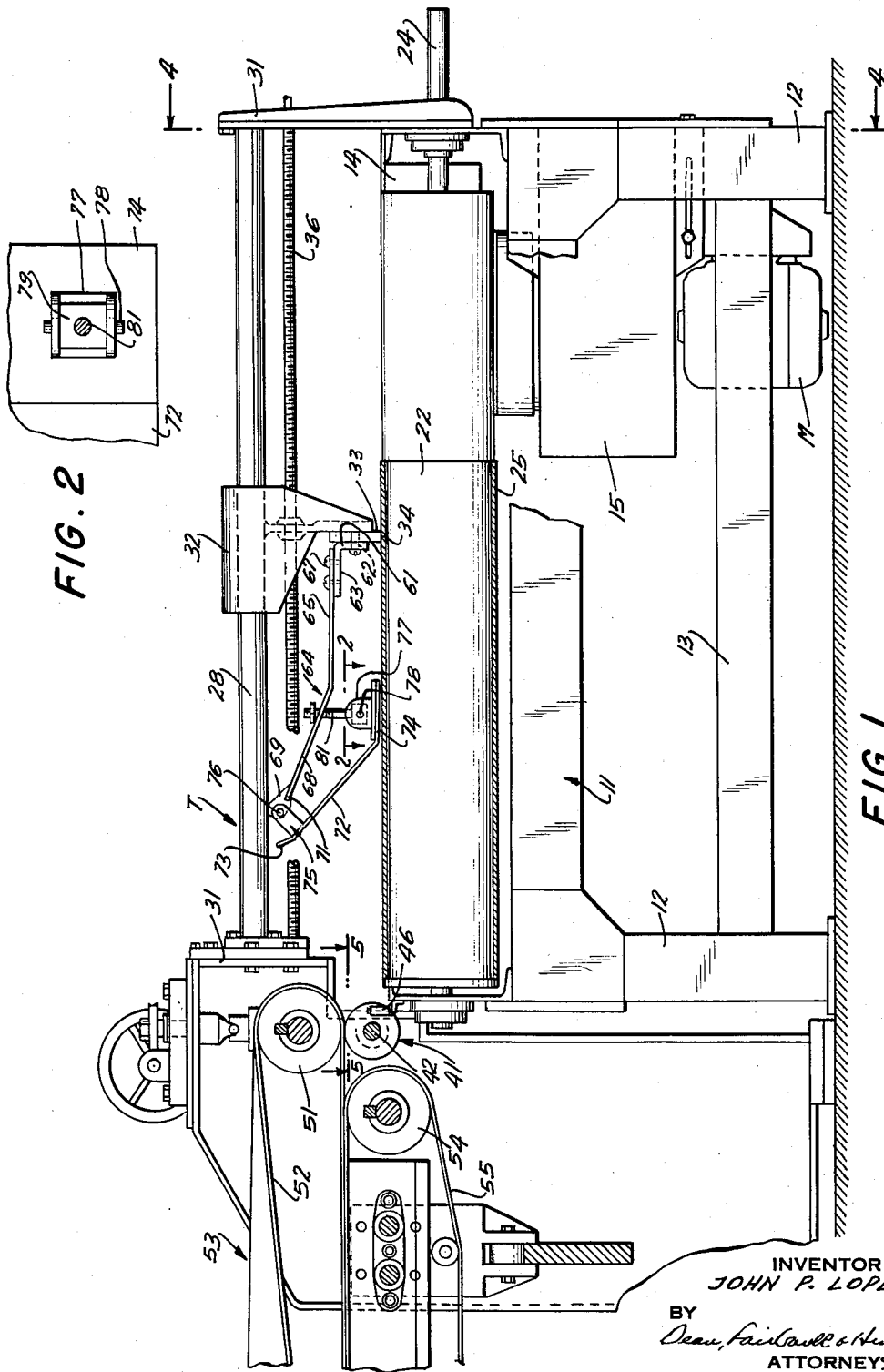
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RIGHT ANGLE CONVEYER

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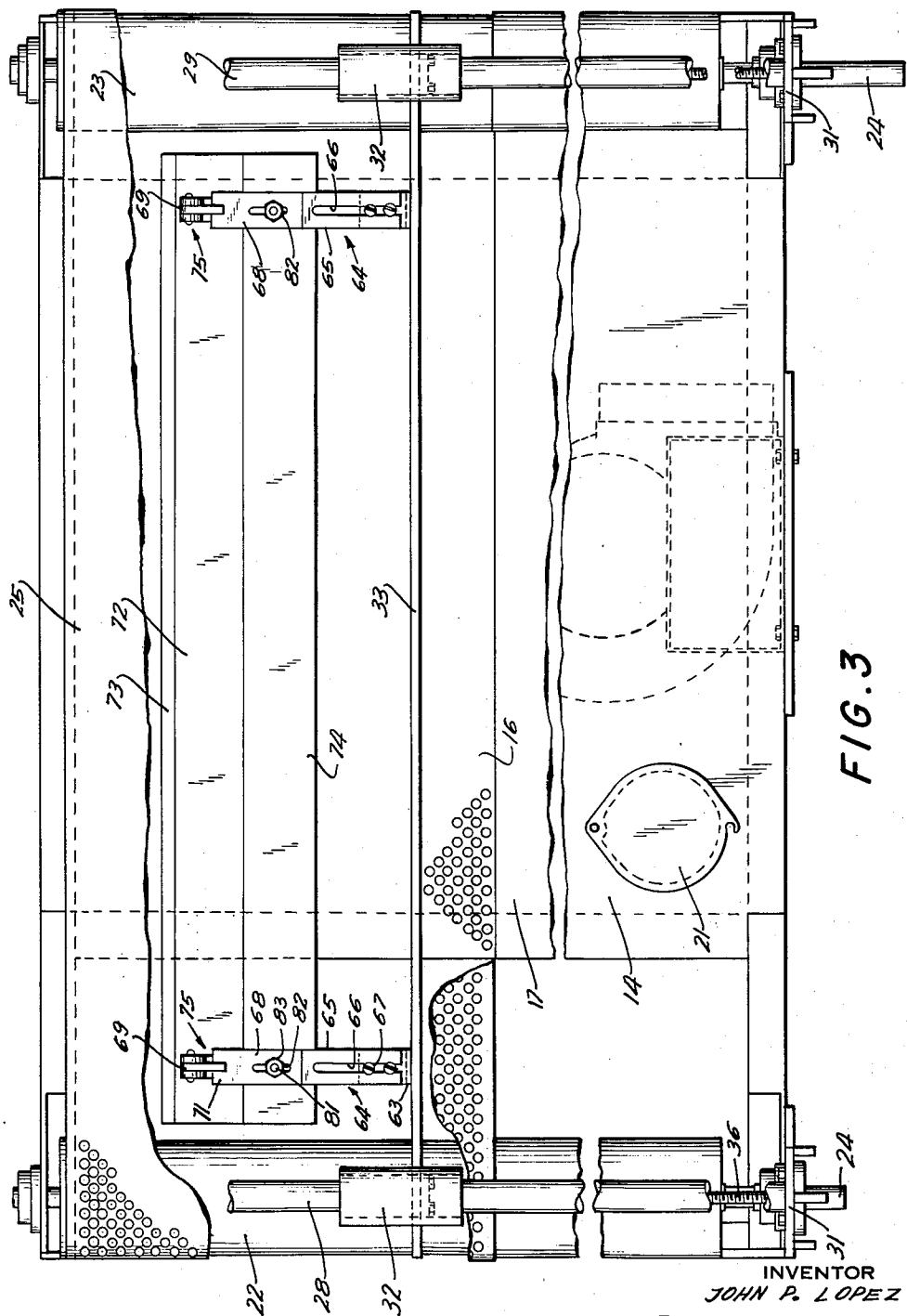


FIG. 3

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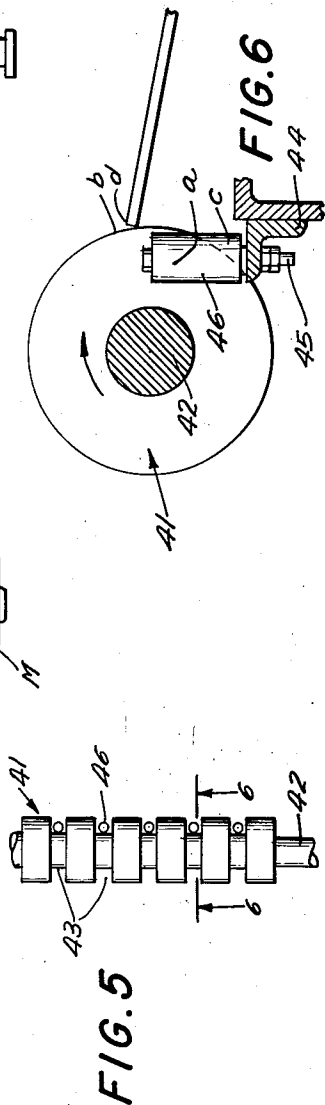
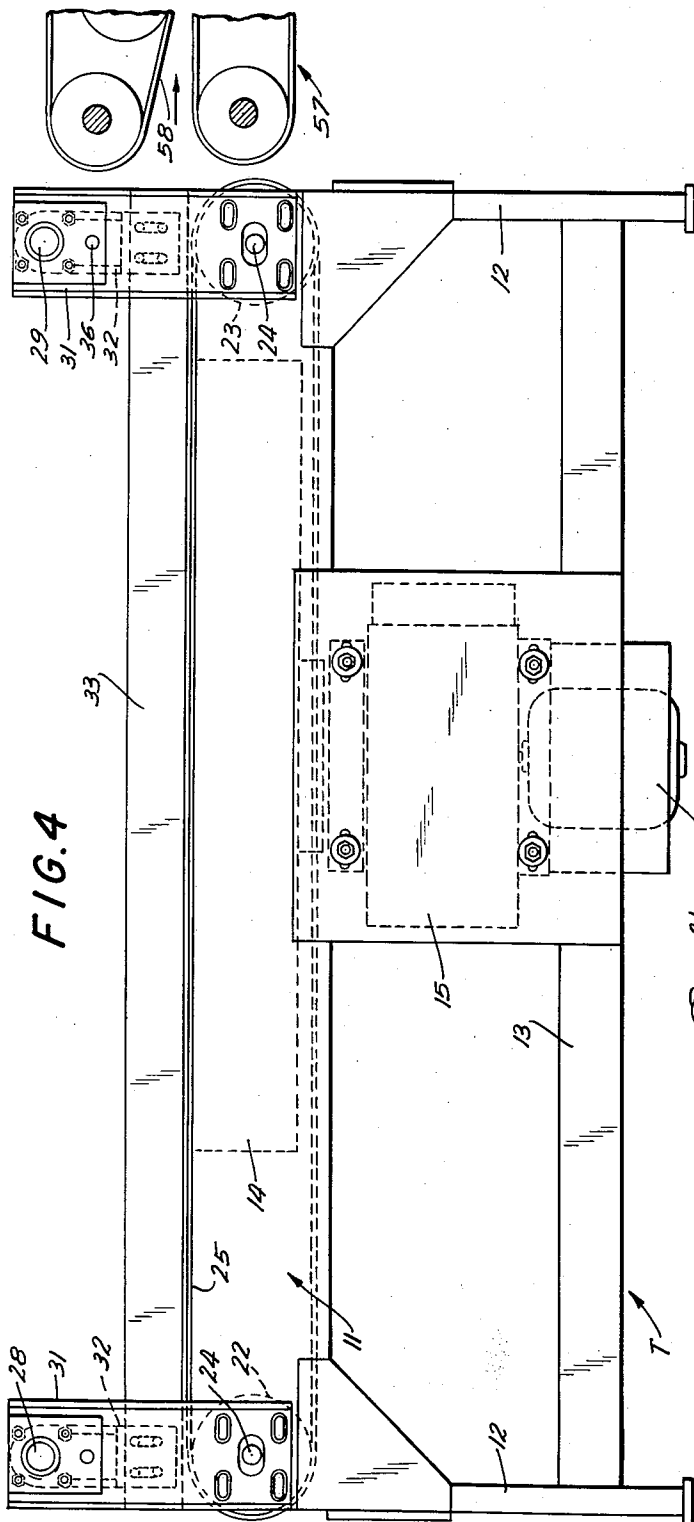
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RIGHT ANGLE CONVEYER

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7 Claims. (Cl. 198—28)

This invention relates to the art of conveying equipment and more particularly to a conveyer adapted to receive relatively flat articles and to advance such articles at a high rate of speed in direction at right angles to the direction of discharge thereon.

It is among the objects of the invention to provide a conveyer equipment of the above type that has relatively few parts and is not likely to become deranged with long continued use, which equipment will dependably receive relatively flat, rectangular articles such as folded box blanks, in rapid succession and without likelihood of jamming due to opening of such box blanks, from suitable discharge means which successively ejects such articles onto the conveyor, and which will align such articles and retain them in aligned relation on the conveyor while advancing the same at a high rate of speed in direction at right angles to the direction of discharge thereon without dislodgment of such articles on the conveyor.

According to the invention these objects are accomplished by the arrangement and combination of elements hereinafter described and particularly recited in the claims.

In the accompanying drawings in which are shown one or more of various possible embodiments of the several features of the invention,

Fig. 1 is an end view of the equipment,

Fig. 2 is a sectional view taken along line 2—2 of Fig. 1,

Fig. 3 is a top plan view of the equipment with parts broken away,

Fig. 4 is a side elevational view taken along line 4—4 of Fig. 1,

Fig. 5 is a detail view taken along line 5—5 of Fig. 1, and

Fig. 6 is a sectional view on an enlarged scale taken along line 6—6 of Fig. 4.

Referring now to the drawings, the right angle take off T comprises a frame 11 supported from the floor by upright legs or standards 12, elongated beams 13 affixed to the associated legs 12 serving to strengthen the frame.

Rigidly mounted on the upstanding legs 12 and extending parallel to the floor is a substantially rectangular tank 14. Referring to Fig. 1, for example, suitably mounted on beams 13 is a motor M that drives a suction fan 15, which may be of any conventional type, the suction fan having an outlet connected to the bottom of the tank 14. Thus, upon energization of the motor M, suction will be created in the tank 14.

The upper surface of the suction tank 14 desirably is formed from a perforated steel sheet 16, illustratively rectangular as shown and which extends transversely of the frame from the left hand side toward the right hand side, a portion of the top surface adjacent the right hand side of the top surface of the tank being imperforate as shown at 17.

Desirably, a pivoted cover plate 21 is provided over an opening in the imperforate portion of the top surface

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of the tank which may be opened as desired to regulate the degree of suction created in the tank and reacting through the perforations in the perforated sheet 16.

Extending transversely across the frame and straddling the suction tank 14 are a pair of rollers 22 and 23 respectively. The rollers are suitably mounted on shafts 24 extending transversely across the frame and the rollers are encompassed by a perforated endless belt 25, the diameter of the rollers being such that the opposed runs of the belt will straddle the suction tank 14 with the upper run of the belt resting on the perforated steel sheet 16 which comprises the top surface of the suction tank.

As shown in Figs. 1 and 2, the rollers 22, 23 desirably are of reduced diameter at the portion thereof adjacent the left hand side of the frame, which portion is aligned with the perforated steel sheet 16. The belt 25 is of width to cover only the reduced diameter portion of the rollers so that the imperforate portion of the suction tank 14 will not be covered, thus providing access to the cover plate 21 and providing clearance for the suction fan and inlet port to the suction tank.

Extending transversely across the frame and positioned above the top surface of the suction tank 14 are longitudinally spaced supporting rods 28 and 29, the ends of which are carried by upstanding supports 31. Slidably mounted on each of the rods is a bracket 32 which depends from the rod and a cross bar or back stop 33 is affixed at its respective ends to each of the brackets, with the lower edge 34 of said cross bar 33 being positioned closely adjacent the surface of belt 25 as is clearly shown in Fig. 1. The brackets have a threaded opening through which extends a screw 36, one end of which is rotatably mounted in the upright support 31 on the left side of the machine and the other end of which extends through and is rotatably mounted in the upright support on the right hand side of the machine. Thus, when the screws 36 are rotated, the position of the back stop 33 may be adjusted to accommodate different widths of box blanks in the manner to be described.

Affixed to the front surface of back stop 33 adjacent each of its ends between the brackets 32 is an angle member 61, the vertical leg of which is secured to back stop 33 as by screws 62. The horizontal leg 63 of each of the angle members 61 extends toward the left side of the conveyer belt 25 and mounts one end 65 of a support bar 64. As shown in Fig. 3, the end 65 is bifurcated to define a slot 66 and a pair of screws 67 extend through the slot 66 into corresponding threaded openings in leg 63 adjustably to mount bar 64.

Referring to Fig. 1, each of the bars 64 is upwardly inclined as at 68 and an upstanding mounting finger 69 is affixed to the end 71 of each of the bars and extends outwardly therefrom.

The bars 64 support a deflector plate 72 which, as shown in Figs. 1 and 3, is substantially rectangular and has its side edges upwardly inclined as at 73 and 74.

Secured to the plate 72 near each end thereof adjacent the inclined edge 73 is a U-shaped bracket 75, the legs of which straddle an associated finger 69 and are pivotally connected thereto as at 76. The inclined edge 74 of the plate near each end thereof also has secured thereto a U-shaped bracket 77 between the legs of which is pivotally mounted as at 78 a block 79 from which rises a screw 81 which extends through an elongated slot 82 in the inclined portion 68 of each of the bars, a nut 83 on each of the screws 81 permitting adjustment of the angle of inclination of the plate 72 which is positioned so that its lower inclined edge 74 is spaced from the belt 25 and is inclined toward the left side of the machine as shown in Fig. 1.

Means are provided to eject rectangular box blanks

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onto the perforated belt 25 to be advanced thereby in direction at right angles to the direction of ejection thereon.

To this end, as shown in Fig. 1, a roller 41 is provided mounted on a horizontal shaft 42 extending at right angles to the rollers 22 and 23.

The roller 41 is positioned slightly to the left of the top surface or upper run of the perforated conveyer belt and rises above the latter. The roller 41 has a plurality of annular grooves 43 in its periphery as shown in Fig. 5. Affixed to the frame of the machine and extending parallel to roller 41 is an L-shaped bar 44 clearly shown in Fig. 6. Rising from the bar are a plurality of stud shafts 45 aligned respectively with the annular grooves 43 in the roller 41. Rotatably mounted on each of the stud shafts is a roller 46 positioned in each of the annular grooves and having the upper portion *a* of its outer periphery on the right hand side thereof positioned so that it does not extend beyond the outer periphery *b* of the roller 41 with the lower portion *c* of said roller 46 extending beyond the periphery *b* of said roller 41 as is clearly shown in Fig. 6.

Associated with the roller 41 is a roller 51 positioned above the latter, said roller 51 illustratively carrying one end of an endless conveyer belt 52 which may form part of a box blank folding machine 53, the latter as it per se forms no part of this invention, not being described in detail. The endless belt 52 rides between the rollers 41 and 51 and an additional roller 54 also forms part of the folding machine 53, so that when a box blank is advanced it will be moved by the belt 52 and a belt 55 encompassing the roller 54, between the rollers 41 and 51 to be ejected outwardly onto the perforated belt 25 of the right angle take off T.

Also associated with the right angle take off in the illustrative embodiment shown is a box blank squaring machine 57 which may be of the type shown in patent application Serial No. 620,841, filed November 7, 1956. This squaring machine has an inlet throat 58 into which the box blanks are successively advanced by the perforated endless belt 25 of the right angle take off T.

In the operation of the equipment, the motor M driving the suction fan 15 is energized to create a suction in the suction tank 14 and the cover plate 21 is adjusted for the desired amount of suction which will securely retain a box blank against the perforated endless belt 25 yet prevent excessive suction which might draw portions of the box blank material into the openings in the perforated belt 25 with resultant deformation of such box blank. The back stop 33 is adjusted by rotation of screws 36 so that the distance of the back stop 33 from the vertical rollers 46 is substantially equal to the width of the box blank to be accommodated, with a slight additional tolerance.

The rollers 22 and 23 carrying the perforated endless belt 25 are driven in any suitable manner so that the belt will be advanced at a rate of speed slightly less than the speed at which the box blanks are ejected thereon so that box blanks may be successively advanced in shingled relation by the perforated belt 25.

As the folded box blanks are ejected by the driven roller 51 of the folding machine 53, in association with the roller 41, the box blanks will strike the pivoted deflector plate 72 and be cammed downwardly, the speed of ejection of the box blanks causing the plate 72 to pivot upwardly so that the box blanks will pass therebeneath and strike the stop member 33. Inasmuch as there is suction provided through the perforations in the endless belt 25, such box blank will be drawn downwardly and securely retained against such endless belt 25.

With the use of the deflector plate 72, the box blanks will be retained in closed condition and hence subsequent box blanks will not jam which might occur if preceding blanks opened an dthe subsequent blanks abutted thereagainst.

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If the box blank when it strike the back stop 33 should bounce back slightly, as the rear edge *d* (Fig. 6) thereof will still be against the periphery *b* of roller 41 which is rotating in a clockwise direction, such rear edge will be forced downwardly. Thus the other edge of the box blank will be moved toward the back stop until, by reason of the spacing between the back stop 33 and rollers 46, the box blank will fall therebetween to be retained on the belt 25 by suction.

Inasmuch as a portion of the periphery *b* of roller 41 extends beyond the outer peripheries of the vertical rollers 46, at their upper edges it is apparent that the edge of the box blank adjacent said vertical rollers cannot hang up on the tops of said rollers 46, but will fall between the rollers 46 and the back stop 33 and thereupon the vertical rollers 46 will act as guides for the adjacent edge of the box blank as it is advanced by the perforated suction belt 25.

As the box blanks retained against the suction belt 25 are advanced in shingle relation, when the leading edge moves past the end of the belt 25 over the roller 23, it will be inserted into the mouth 58 of the squaring machine 57 which will thereupon grip the leading edge of such box blank and advance the latter for subsequent processing.

With the equipment above described, the box blanks may be processed in one line and then moved at right angles into another line. As a result of such right angle turn there is no need for an extremely long production line and furthermore, certain operations require that after the box blank has been folded it be turned at a ninety degree angle for subsequent processing.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope of the claims, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. Equipment for advancing substantially flat, rectangular articles such as folded box blanks, said equipment comprising a conveyer movable in a horizontal plane, means to provide suction through said conveyer to retain an article thereon, said means comprising a suction tank having a perforated top wall, means to create a suction in said tank, said conveyer comprising an endless perforated belt having its upper run riding on the perforated top wall of said tank, said conveyer having a continuous surface for discharge of articles thereon, means positively to eject articles initially in substantially a horizontal plane above that of said conveyer belt, onto said conveyer belt in direction at right angles to the direction of movement thereof, stop means opposed to the means to discharge articles onto the conveyer and transversely spaced therefrom, and a downwardly inclined deflector member positioned between the ejection means and the stop means and in the path of movement of the articles ejected onto the conveyer.

2. The combination set forth in claim 1 in which said stop means comprises an elongated member, a pair of spaced support bars are affixed to said elongated member and extend toward said discharge means, a portion of each of said bars at the free ends thereof being inclined upwardly, said deflector member comprises a substantially rectangular plate, pivotally mounted adjacent one of its longitudinal edges to the free ends of said support bars and inclined downwardly therefrom, a pair of support rods are pivotally mounted at one end to the plate near the ends thereof adjacent its other longitudinal edge, said rods extending through said support bars and means to limit the downward movement of said rods through said support bars.

3. The combination set forth in claim 1 in which a portion of the top wall of said tank is imperforate and said upper run of the endless perforated belt rides on the perforated portion of said top wall, means being provided in said imperforate portion of said top wall to regulate the suction.

4. Equipment for advancing substantially flat, rectangular articles such as folded box blanks, said equipment comprising a conveyer movable in a horizontal plane, means to provide suction through said conveyer to retain an article thereon, means to discharge articles onto said conveyer in direction at right angles to the direction of movement thereof, stop means opposed to the means to discharge articles onto the conveyer and transversely spaced therefrom, said discharge means being positioned adjacent an edge of the conveyer and comprising a roller mounted on an axis extending parallel to the adjacent edge of said conveyer and positioned outwardly therefrom, said roller having a portion thereof extending above said conveyer, means associated with said roller to grip an article therebetween to eject the latter onto said conveyer, said stop means limiting the transverse movement of said article by said discharge means, said roller having a plurality of annular grooves therein, and a plurality of upstanding means positioned respectively in said annular grooves, said upstanding means being positioned between the axis of said roller and the adjacent edge of said conveyer, the lower portion of said upstanding means being clear of said roller to define a guide for such article.

5. The combination set forth in claim 4 in which each of said upstanding means comprises a roller, the upper portion of the periphery of which adjacent said conveyer is positioned inwardly of the periphery of said first named roller.

6. The combination set forth in claim 4 in which the position of said stop means is adjustable whereby the distance between the stop means and the lower portion of said upstanding means may be set to an amount slightly greater than the width of the articles to be discharged onto the conveyer.

7. The combination set forth in claim 6 in which said stop means comprises an elongated bar extending parallel to said roller having its lower edge lying in substantially the same horizontal plane as that of said conveyer, a pair of brackets mount said bar, a pair of support rods extending transversely across the conveyer slidably mount said brackets, and screw means associated with said brackets to adjust the position thereof on said support rods to adjust the position of said stop means.

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