Jan. 26, 1960 J. P. LOPEZ 2,922,643

SHEET FEEDING EQUIPMENT

Filed Aug. 8, 1957 2 Sheets-Sheet 1

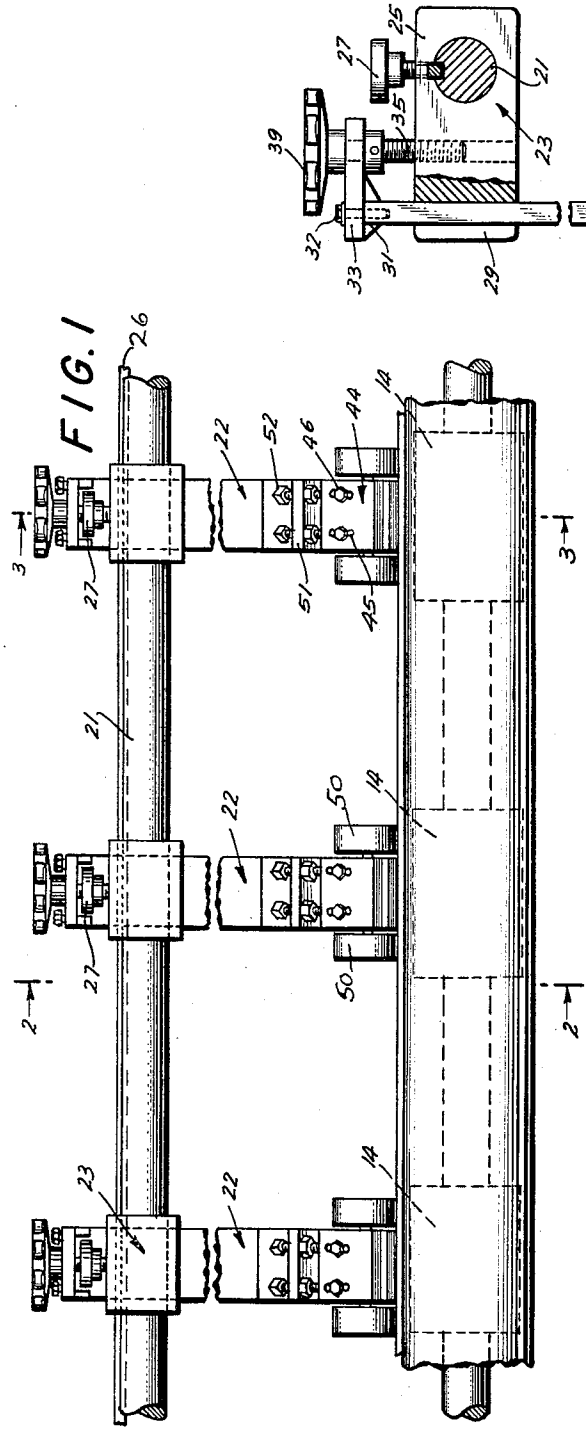


FIG. 1

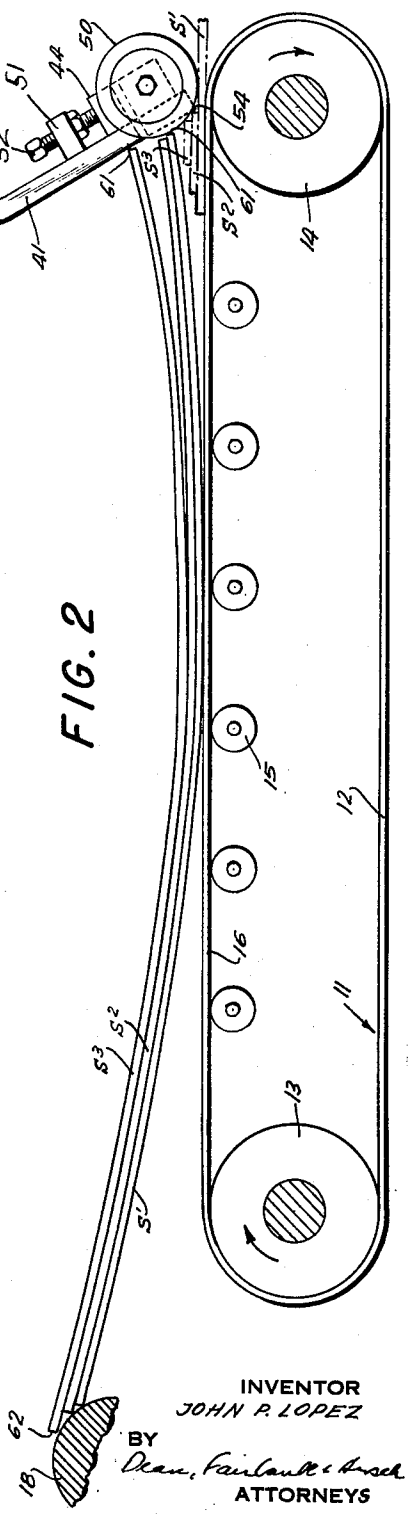


FIG. 2

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FIG. 3

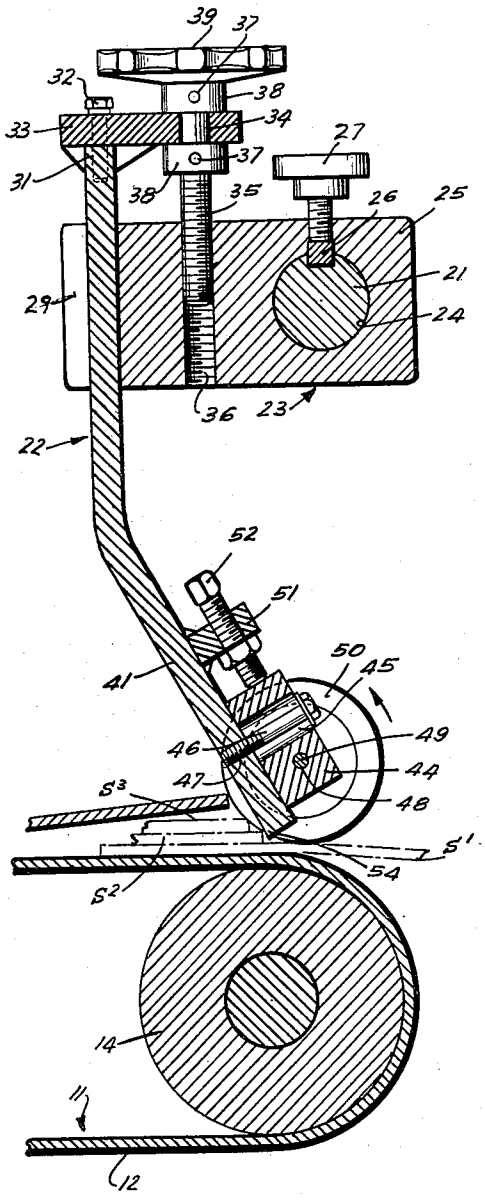
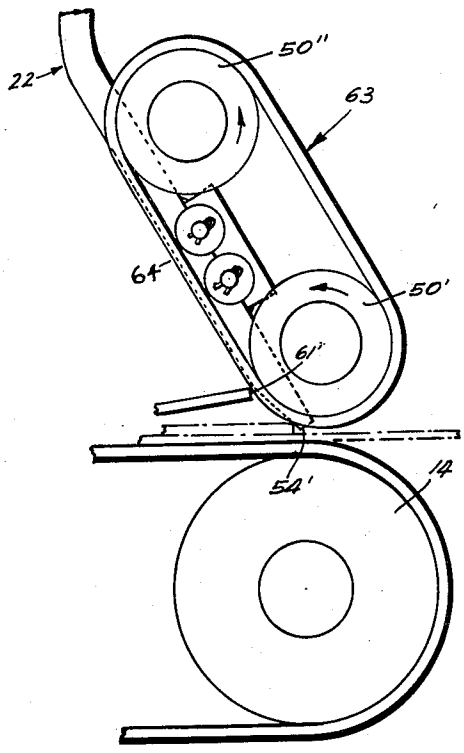


FIG. 4



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SHEET FEEDING EQUIPMENT

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1 Claim. (Cl. 271—35)

This invention relates to the art of sheet feeding equipment and more particularly to equipment for feeding one sheet at a time from the bottom of a stack.

As conducive to an understanding of the invention it is noted that where rectangular sheets of semi-rigid material such as corrugated paper, laminated paper, fiber or the like, used, for example, in the manufacture of folding boxes, are to be fed automatically one by one from the bottom of a stack, between suitable drive means which discharge individual sheets for subsequent processing where, due to unequal contraction or expansion, the sheets tend to warp, the end edge of the successive bottommost sheet in the stack may not be aligned with the drive means with the result that the continuous discharge of the sheets may be interrupted, requiring manual realignment of such an edge, thereby interrupting the subsequent processing and preventing high speed operation.

It is accordingly among the objects of the invention to provide an equipment which is relatively simple in construction and has but few parts which are not likely to become deranged even with long use, and which may operate at a high rate of speed dependably to discharge successive sheets from the bottom of a stack without likelihood of stoppage of the discharge operation even if the sheets are warped and do not initially have their end edge aligned with the discharge drive means.

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

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 a fragmentary front view of the equipment,

Fig. 2 is a sectional view taken along line 2—2 of Fig. 1 with parts broken away,

Fig. 3 is a sectional view similar to Fig. 2 and on a larger scale taken along line 3—3 of Fig. 1, and

Fig. 4 is a detail view of another embodiment of the invention.

Referring now to the drawings, the equipment desirably comprises a conveyor 11, illustratively an endless belt 12, riding around parallel rollers 13, 14, the latter preferably being driven, a plurality of parallel idler rollers 15 supporting the top run 16 of belt 12. In addition, an idler roller 18 is provided extending parallel to and longitudinally spaced from roller 13 being positioned above the horizontal plane thereof.

Extending transversely across the belt 16 and positioned above the latter adjacent the roller 14, is a hanger rod 21 from which depends a plurality of guide arms 22 each in the form of an elongated substantially rectangular bar.

To mount each of the guide arms 22, a substantially rectangular block 23 is provided, which has a transverse bore 24 near one end 25 through which rod 21 extends, a key 26 secured to rod 21 permitting movement of the block along the rod, but preventing rotation thereon.

Desirably a set screw 27 is provided to retain the block 23 in desired position along the rod.

The other end of the block 23 desirably is bifurcated, defining a pair of spaced parallel legs 29 between which the guide arm 22 is positioned. Secured to the upper end 31 of the arm 22 as by screws 32 and extending at right angles thereto, is a bracket 33 which has an opening 34 near its free end through which extends a screw 35 threaded into a correspondingly threaded opening 36 in block 23.

Affixed to the screw 35 as by set screws 37 and straddling the bracket 33 is a pair of collars 38. Thus, upon rotation of the screw 35 by its knob 39, the guide arm may be raised or lowered as desired.

The lower end of the guide arm is inclined outwardly as shown, to define a deflector portion 41. Secured to the deflector portion 41 adjacent its lower end is a roller block 44 which, as shown in Figs. 1 and 3, has a pair of parallel slots 45 through each of which extends a screw 46 threaded into a correspondingly threaded opening 47 in arm portion 41. The block 44 also has a transverse bore 48 through which extends a shaft 49 on each of the ends of which is mounted a deflector roller 50, which desirably has a knurled periphery, the rollers 50 straddling arm 22 as shown in Fig. 1.

Associated with the block 44 is a cross bar 51 affixed to arm 22 and having a pair of adjustment screws 52 extending therethrough and adapted to abut against the upper end of said block 44 as shown in Fig. 3.

It is to be noted that the rollers 50 are of such diameter and are so mounted that the extreme lower rear edge 54 of the guide arm 22 will extend slightly beyond the periphery of the roller to define a stop which functions in the manner hereinafter described.

To set the equipment for operation, the block 44 is adjusted by loosening screws 46 and turning screws 52 until the edge 54 of the lower portion of the guide arm 22 protrudes slightly beyond the periphery of the rollers. The screws 46 are then tightened.

The blocks 23 are positioned along the rod 21 so that they will be located between the side edges of the sheets to be fed and are locked in position by turning screws 27.

The guide arms 22 are then lowered by turning screws 35 so that the rollers 50 are spaced from the portion of run 16 of belt 12 riding around rollers 14 by a distance just slightly less than the thickness of the sheets to be fed so that the sheet may securely be gripped between rollers 50 and such portion of the belt for advance of the sheet. With the rollers so positioned it is apparent, as shown in Figs. 2 and 3, that the stop edge 54 will be spaced from the belt 12 by a distance slightly greater than the thickness of a sheet so that it may pass thereunder in the manner described.

To use the equipment, a stack of sheets S which may be corrugated sheets, for example, is placed on the conveyer belt 12 as shown in Fig. 2. The roller 18 is adjusted so that its distance from the inclined portion 41 of the guide arms 22 is less than the length of the sheets. Thus, when the leading edges 61 of the sheets are abutting against inclined portions 41 of the guide arms 22, the other ends 62 of at least the sheets above the lowermost sheet S' will be supported by the roller 18.

As a result, the weight of the entire stack of sheets will not be supported by the conveyer so that the pressure on the lowermost sheet S' will not be so great as to prevent ready movement thereof by the belt 12 and the rollers 50, between which the lowermost sheet will be clamped.

As the upper run 16 of the conveyer belt 12 moves to the right, the leading edges 61 of the sheets will abut against the rollers 50 or the inclined portion 41 as shown in Fig. 2.

The forward movement imparted to the stack of sheets will cause the leading edges **61** thereof against the inclined portions **41** of the guide arms **22** to slide down the latter and the pressure of the leading edges of the sheets against the rollers **50** will cause the latter to rotate in a counterclockwise direction. Such rotation of rollers **50** will cause the edges of the sheet in contact therewith to be deflected downwardly and when the leading edge **61** of the lowermost sheet S' reaches the stop **54** it will be moved below the latter by the downward movement of the sheet immediately thereabove.

As a result, the leading edge of the lowermost sheet S' will pass beneath the stop **54** and as such lowermost sheet is free to be advanced by the conveyor **11**, its leading edge **61** will pass between the rollers **50** and the adjacent portion of belt **12** riding around rollers **14**. As a result, such lowermost sheet will be positively clamped and discharged from the bottom of the stack.

While such lowermost sheet S' is being discharged as shown in bottom lines in Fig. 2, the leading edge of the sheet S^2 immediately thereabove will be restrained by the stop **54** which is spaced from the belt by a distance sufficient to permit only one sheet to pass thereunder at a time. When such lowermost sheet has been completely discharged and hence is clear of the stop **54**, the second sheet S^2 will then be the lowermost sheet and its leading edge **61** will be forced downwardly beneath stop **54** by the force exerted by the leading edge **61** of sheet S^3 immediately thereabove which will be deflected downwardly by the counterclockwise rotation of rollers **50** and the operation previously described will be repeated.

The embodiment shown in Fig. 4 is especially desigend for use with sheets having considerable warpage. In this embodiment the rollers **50** are replaced by two pairs of rollers **50'** and **50''**, each pair **50'**, **50''** carrying an endless belt **63** against the rear runs **64** of which the leading edges **61'** of the sheets abut. Thus, when such sheets are advanced and their leading edges exert pressure against the runs **64** of belts **63**, the belts will rotate in a counterclockwise direction deflecting the leading edges downwardly. In the manner previously described with respect to the embodiment of Figs. 1 to 3, the leading edge **61'** of the lowermost sheet will be moved beneath the stop **54'** by the downward pressure exerted by the leading edge of the sheet immediately thereabove under the drive imparted by the rotating belts **63**. The discharge action is thus identical to that previously described.

With the relatively simple equipment above described, it is apparent that sheets may be dependably fed from a stack at a high rate of speed regardless of the warpage of such sheets.

As it is only necessary that a single guide arm and its associated rollers coact with the sheets, it is apparent that the stack may contain sheets varying in width.

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 claim, 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:

Equipment for successively discharging the bottommost sheet from a stack, said equipment comprising a conveyor to carry such stack, said conveyor having an inlet and outlet and comprising a pair of spaced parallel rollers, an endless belt encompassing said rollers, one of said rollers being at the inlet end and the other at the outlet end of said conveyor, a depending elongated bar, means to support said bar over the portion of the belt riding around one of said rollers, the lower portion of said bar being inclined downwardly and outwardly toward the outlet end of said conveyor, means to effect continuous advance of said conveyor to urge the leading edges of said stack of sheets against said inclined portion, a deflector roller mounted at the lower end of said inclined portion on an axis parallel to that of said spaced parallel rollers and adapted to have the lowermost portion of its periphery spaced from the belt by a distance slightly less than the thickness of a sheet, a portion of the periphery of said deflector roller extending laterally beyond the plane of said inclined portion, the lower end of said inclined portion being disposed eccentrically with respect to, and inwardly of the axis of said deflector roller and extending slightly beyond the periphery of said deflector roller to define a stop, said stop being adapted to be positioned from the belt by a distance slightly greater than the thickness of a sheet to permit a single sheet to pass thereunder and to restrain movement thereunder of the sheets above such bottommost sheet.

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