

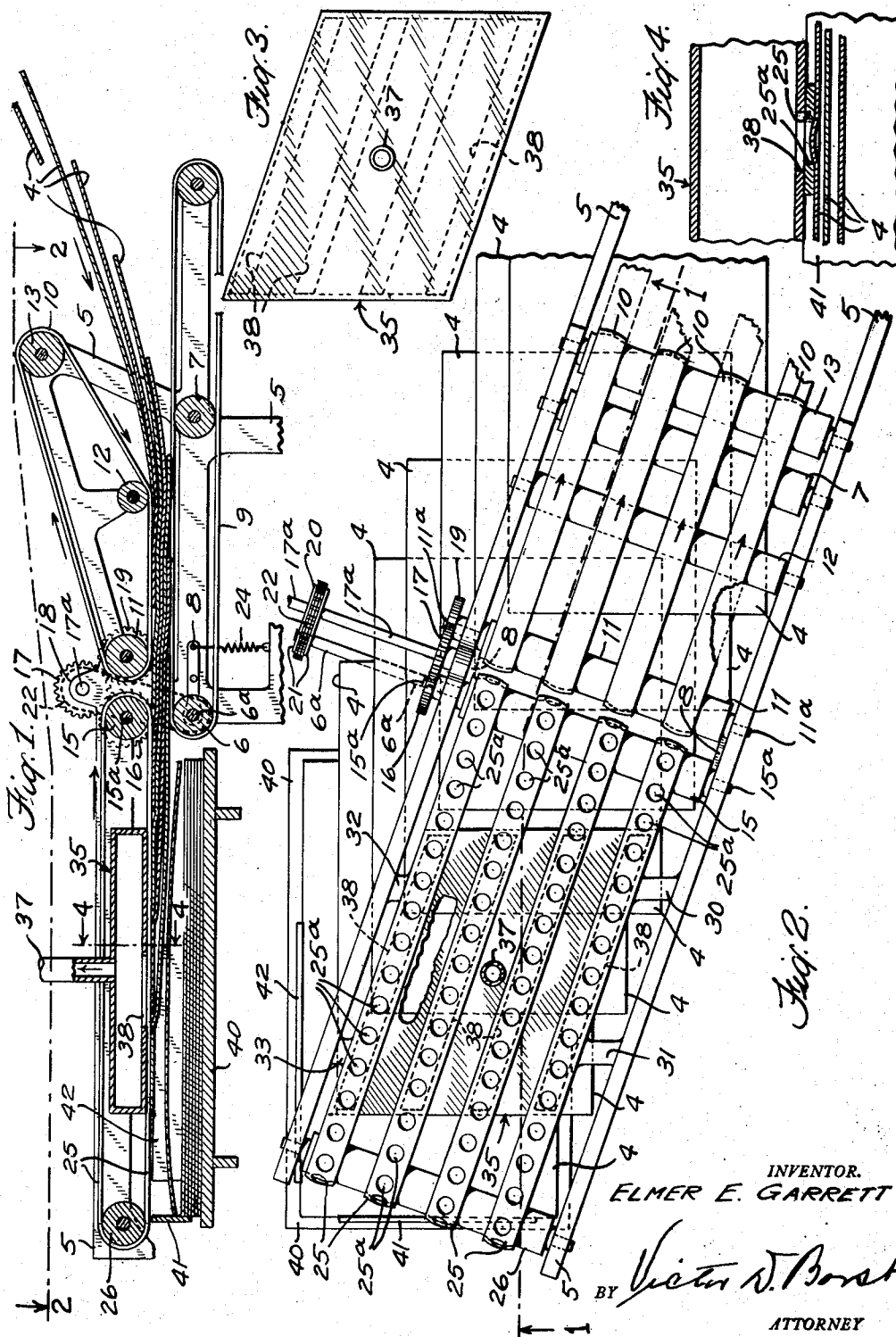
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SHEET STACKER

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SHEET STACKER

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This invention relates to a device for stacking flexible sheets which have been delivered to it in an overlapping relation.

The ultimate disposal of sheets which have been traveling at printing press speed from the cutters or other source has presented problems that have continued to beset the printing trade. Although the advantages of overlapping the sheets has lately been recognized, the difficulty remains as to how best to stack them after travelling on belts driven at only slightly reduced speeds. One solution has been to provide mechanical grippers whose jaws are tripped by cams at certain intervals in precise timing with the advance of the leading edges of the sheets. The coordination required between cooperating elements must be extremely close and accurately timed or the system breaks down and work stoppage results.

The present invention represents an improvement in sheet stacking primarily because it dispenses with this precision cooperation by a simple and novel contrivance, while retaining the advantage of positively leading the sheets individually to a point where they may be dropped to a pile.

To this end there is provided a perforated endless belt disposed over a platform on which the sheets are stacked which is driven in seal making contact with an air evacuated housing. The under side of the belt carries by air suction the exposed leading portions of the overlapped flexible sheets until the valving action of the next succeeding sheet allows the leading ends to fall. The trailing ends of the sheet are simultaneously drawn off their support and the sheets are successively deposited on the platform.

The accompanying drawings illustrate a practical embodiment of the invention the novelty of which has been described in principle, the details of construction being more fully expounded and defined in the following specification and claims.

Fig. 1 is a sectional elevation of the sheet stacker taken on the line 1—1 of Fig. 2;

Fig. 2 is a plan view of the stacker taken on the line 2—2 of Fig. 1;

Fig. 3 is a top plan of the evacuating chamber; and

Fig. 4 is an enlarged end elevation of the chamber taken on the line 4—4 of Fig. 1.

Referring now particularly to the accompanying drawings, the numerals 5 refer generally to the side frame members of the sheet stacker. As shown in Fig. 2 the sheet stacker mechanism is angularly displaced from the original line of travel of sheets 4. The advantage of altering the direction of travel resides in a fact that has been experimentally found, namely, that the final stacking in orderly piles is facilitated. An angle of approximately 30° between the disposition of the sheets and their line of advance has been found satisfactory.

It will also be apparent that stacking will be expedited by bringing the sheets to the stacking pile in an overlapped or shingled arrangement. The sheets are brought to the stacker from the press in an end to end relation

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on delivery belts (not shown) which are driven at a greater speed than the stacker and deposited on the stacker conveyors. Their relative arrangement is accordingly converted from an end to end to a shingled or overlapped one.

Roll 7 is rotatably mounted in the frame members 5 and roll 6 is rotatably mounted in arms 8 pivoted on the outside of frame members 5; both rolls extend across the machine. Trained over the rolls 6 and 7 are belts 9 which are driven at less than printing press speed to effect the overlapped relation of the sheets referred to above. In order to maintain a constant and predetermined distance between the leading edges of the sheets, top conveyor belts 10 are provided. These belts are similarly trained over rolls 11, 12 and 13 and are driven by roll 11. The rolls are also mounted in and between frame members 5.

Roll 15 is mounted immediately above roll 6 and is rotated in bearings in the side frame members 5. Mounted outside of one frame member 5 on shaft 15a of roll 15 is gear 16 which is in driven engagement with gear 17. Gear 17 is fixed to shaft 17a which is rotatably mounted in bracket 18 affixed to the frame member 5. The shaft 17a is driven by a power source not shown. Gear 17 also engages gear 19 which is fixed on shaft 11a of tape roll 11. The belts 10 are accordingly driven in the direction indicated by the arrow in Fig. 1.

Also mounted on shaft 17a is sprocket wheel 20 and mounted on shaft 6a carried by arms 8 outside gear 16 is sprocket wheel 21. A sprocket chain 22 connects the two wheels. The roll 6 is thereby driven from the same source as the upper rolls and the belts 9 travel in the direction indicated by the arrow in Fig. 1.

The sheets 4 are pressed firmly against the driven roll 15 by the action of cooperating roll 6 which is biased upwardly by springs 24 connected to the frame 5 and the opposite end of the arms 8 to that of the roll 6. Springs 24 are adjustable for varying amounts and sizes of sheets traveling between rolls 6 and 15 at any one time.

Stacker belts 25 having air holes 25a are carried by the driven roll 15 and roll 26 which are rotatably mounted in frame members 5. Brackets 30, 31, 32 and 33 are mounted on the inner sides of frame members 5. Secured to these brackets in any suitable manner is vacuum chamber housing 35 which is an enclosed air tight housing with the exception of exhaust outlet 37, connected to air evacuating means not shown, and longitudinal air slots 38 in the bottom plate of the chamber housing 35. Rolls 26 and 15 are so located that the belts pass in close fitting contact with the bottom plate of the housing 35 in the immediate region of the longitudinal slots 38. When the chamber is evacuated, air is sucked through the holes 25a as they pass over the slots.

Directly under the housing 35 there is provided a platform 40 for receiving the deposited sheets 4. The sides of the platform 40 are parallel with the corresponding sides of the sheets. Stop guides 41 and 42 are supported by means not shown. These guides are approximately parallel with the two sides of the sheets which lead their advancing progression. The advantage of conveying the sheets on the stacker at an angle to their own alignment becomes apparent as it is seen that they are all jogged by one guide or the other into substantially the same position before being dropped.

The leading or exposed portion of each sheet is not picked up by the belts 25 until it has been advanced as far as the under plate of the housing by the rolls 6 and 16. Suction then takes over and the exposed area of each sheet is led by the belts until it strikes the guides 41 and 42 at which time the exposed area has advanced beyond the housing 35 thus shutting off the suction to it and the

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trailing end has been drawn clear of roll 6 allowing the sheet to drop to the platform 40 beneath. The distance between the end of the housing 35 and the guide 41 should be adjusted to approximate the distance between the leading edges of the sheets.

The platform 40 may be stationary as shown or made to automatically descend as the sheets are deposited. Means for accomplishing this automatic descent are well known in the art.

While an embodiment of the improvements has been shown and described for illustrative purposes, variations in the particular structure illustrated may be utilized without departing from the spirit of the invention.

What is claimed is:

1. A sheet stacker comprising a housing having a slot in its bottom side extending longitudinally of the housing, means for evacuating the housing, an endless perforated stacking belt, means for driving the belt longitudinally under and in close proximity to the said slot, conveyor means for delivering flexible sheets in overlapped relation to the underside of the receiving end of said belt whereby the leading exposed portion of each sheet is successively held against the belt by suction as it passes underneath the slot and is released from the belt as it leaves the slot, and stop guides for the sheets disposed angularly with respect to the path of said belt and sheets, one of said stop guides being parallel to the leading edge of the sheets and located in advance of the slot a distance substantially equal to the length of the leading exposed portions of the sheets.

2. A stacker for flexible sheets moving rapidly in end to end relation from a production machine, said stacker comprising an endless perforated stacking belt, conveyor means aligned longitudinally with said stacking belt and disposed angularly to the original path of travel of said sheets to deliver the sheets overlapped laterally and longitudinally along a line substantially diagonal to the sheets to the underside of the receiving end of said stacking belt, a suction housing disposed over and in close proximity to said perforated stacking belt, means for evacuating said housing, at least one slot in the bottom of said housing extending longitudinally of the housing and parallel to the perforations in said stacking belt, said slot being distended longitudinally, in the general form of a parallelogram, in the direction of travel of said flexible sheets whereby the end of said slot is substantially parallel to the leading edges of the advancing sheets, means for driving the perforated stacking belt longitudinally under and in close proximity to said slot and stop guides for the sheets disposed angularly with respect to the path of travel of the stacking belt and sheets, one of said stop guides being substantially parallel to the leading edges of the sheets.

3. The stacker according to claim 2 further characterized in that said parallel stop guide is positioned forward of the forward end of the slot in the bottom of the suction housing, and said conveyor means for feeding the sheets comprises a pair of endless belts between which

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the sheets are conveyed, the delivery end of the conveyor means being disposed rearwardly from the suction housing to release the trailing edge of each sheet substantially simultaneously with the release of that sheet's leading exposed portion by the stacking belt as the sheet advances beyond said slot and drops against the stop guides, the forward supporting roll for the lower conveyor belt being disposed substantially directly below the rearward supporting roll of the stacking belt.

4. A stacker for flexible sheets moving rapidly in end to end relation from a production machine, said stacker comprising a plurality of parallel endless perforated stacking belts, conveyor means aligned longitudinally with said stacking belts and disposed angularly to the original path of travel of said sheets to deliver the sheets in laterally and longitudinally overlapped relation along a line substantially diagonal to the sheets to the underside of the receiving end of said stacking belts, a suction housing disposed over and in close proximity to said perforated stacking belts, means for evacuating said housing, a plurality of parallel slots in the bottom of said housing extending longitudinally of the housing and parallel to said stacking belts; said slots being displaced longitudinally, in the general form of a parallelogram, in the direction of travel of said flexible sheets whereby the ends of said slots are substantially parallel to the leading edges of the advancing sheets, means for driving the perforated stacking belts longitudinally under and in close proximity to said slot and stop guides for the sheets disposed angularly with respect to the path of travel of the stacking belts and sheets, one of said stop guides being substantially parallel to the leading edge of said sheets.

5. The stacker according to claim 4 further characterized in that said parallel stop guide is positioned forward of the forward ends of the slots in the bottom of the suction housing, and said conveyor means for feeding the sheets comprises a plurality of pairs of parallel endless belts between which the sheets are conveyed, the delivery end of the conveyor means being disposed rearwardly from the suction housing to release the trailing edge of each sheet substantially simultaneously with the release of that sheet's leading exposed portion by the stacking belts as the sheet advances beyond said slots and drops against the stop guides, the forward supporting roll for the lower conveyor belts being disposed substantially directly below the rearward supporting roll of the stacking belt.

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