

June 23, 1970

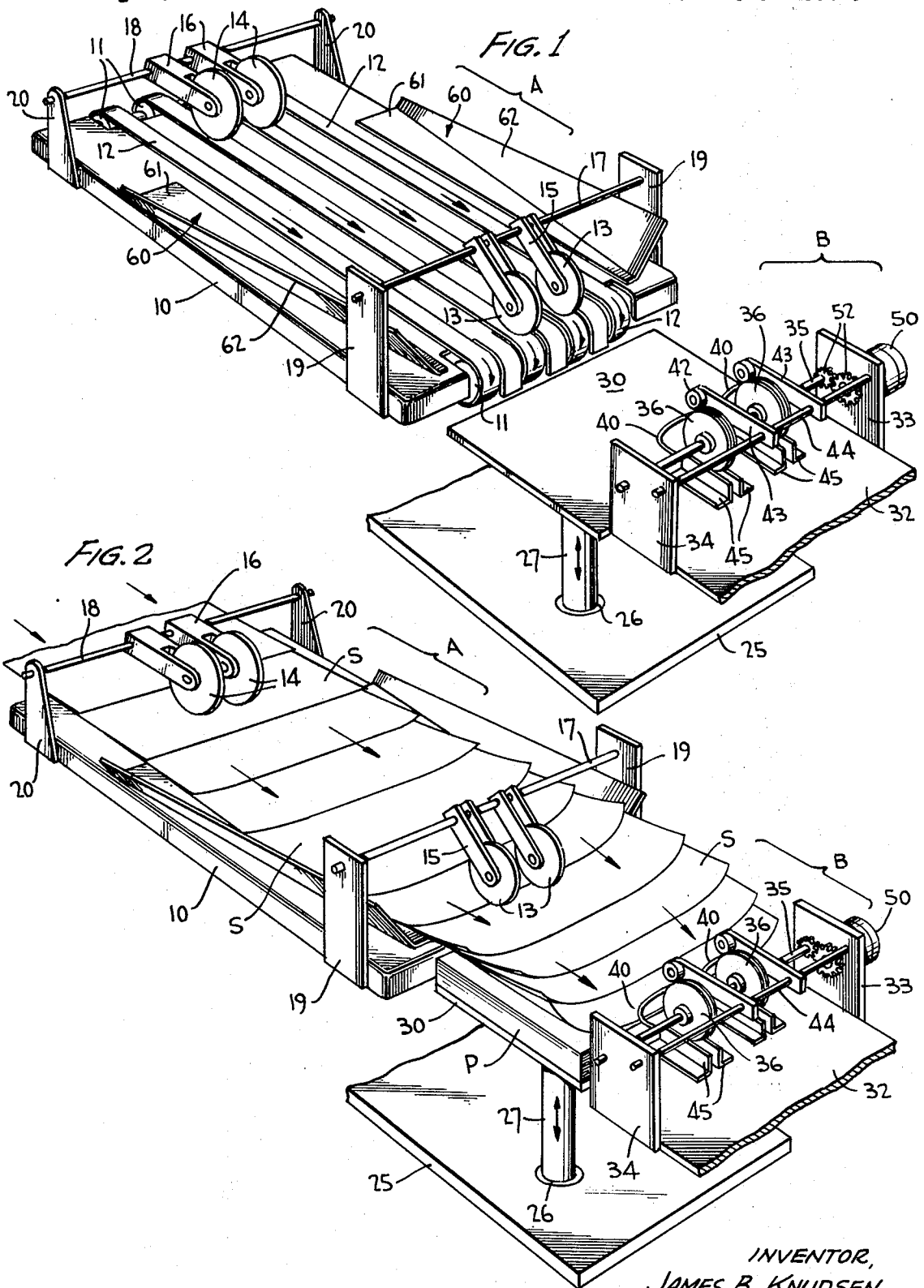
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3,516,657

HIGH CAPACITY STACKERS

Filed Aug. 6, 1968

2 Sheets-Sheet 1



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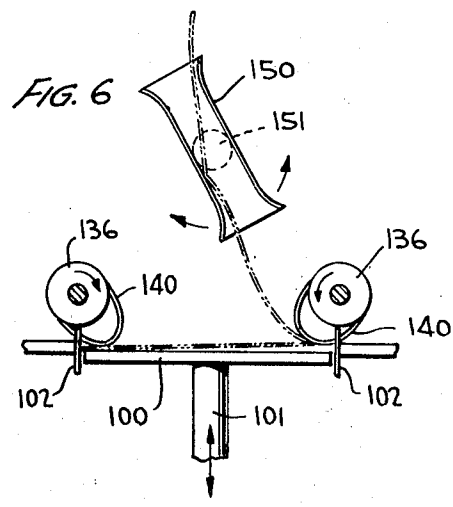
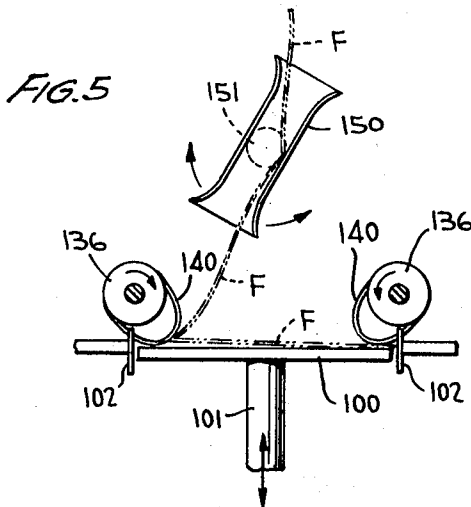
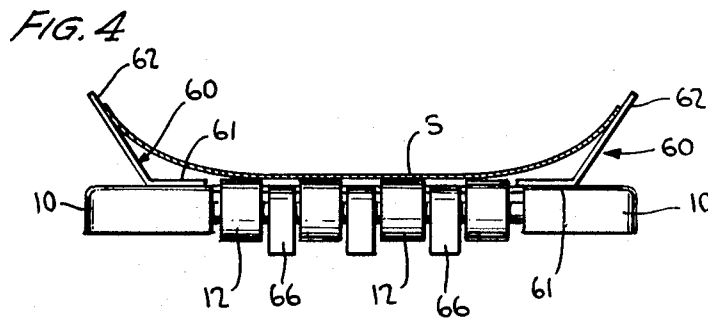
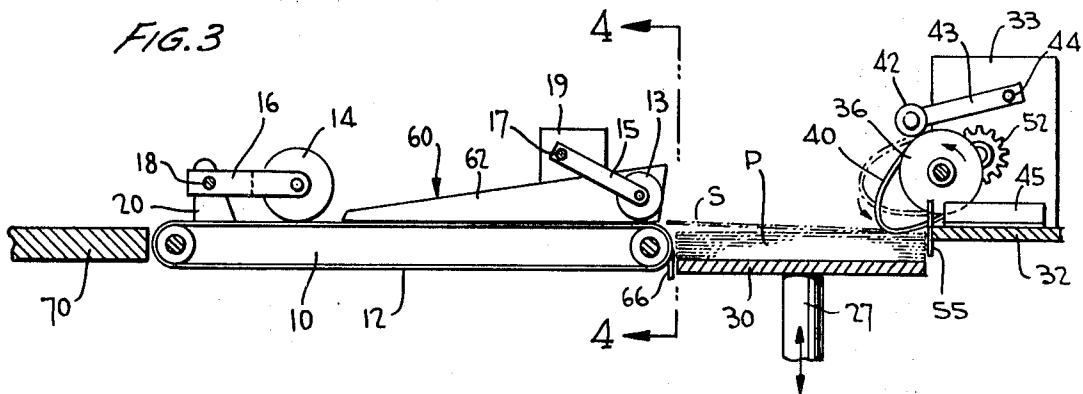
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2 Sheets-Sheet 2



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1

2

3,516,657

HIGH CAPACITY STACKERS

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10 Claims

ABSTRACT OF THE DISCLOSURE

In a variable height stacker for receiving sheets delivered thereto from a printing press or a business machine, there is provided a back-stop against which the successive sheets are moved and by which the pile is trued up. To move the successive sheets as delivered, a groove wheel or pulley is rotatably mounted above the stacker, and around an arc of the periphery of the wheel is disposed an O-ring of relatively soft rubber, plastic, or other flexible soft material, the O-ring being of considerably larger diameter than that of the wheel or pulley. A presser wheel is employed at a point generally above the center of the pulley to retain the O-ring in tracking contact with the pulley.

The excess size of the O-ring leaves a large amount of surplus ring to extend over the sheet stacking area and to gently "slap" the on-coming horizontally fed sheets in the direction toward the back-stop. The only support for the O-ring is the pulley itself, the greater portion of the O-ring being free to move gently onto the sheet to positively urge it up to the stop, and from there on slip easily on the surface of the sheet without damage or ruffling.

A desirable adjunct to the O-ring feed is a deflector chute comprising two preferably divergent substantially vertically disposed ribs or blades over which the sheets may float toward the stack or pile board, which serves to cause a slight curl or bowing of the sheets, especially in handling thin or exceptionally large sheets, to add a certain stiffening to the feed as it is gently and frictionally urged forward by the action of the "floating" O-ring, and to ensure proper separation of the sheets against possible snagging or interference by linehole apertures or hook-lock protuberances.

This invention relates to sheet delivery devices for stacking sheets in an orderly pile as they come from a printing press or a business machine.

The principal object of the invention is to provide a novel and improved stacker which is of relatively simple construction and operation, but is of great flexibility and operable at maximum efficiency regardless of inaccuracies or the absence of finely regulated adjustment of the pile lowering mechanism.

Throughout the history of printing, there has been the problem of re-piling the printed sheets into a neat stack. Most generally the sheets are fed either individually or in stream-feed fashion in a substantially horizontal direction onto a pile board which is gradually lowered as the sheets accumulate on the pile.

In order to move the sheets up against a common back stop for the pile, there have been employed numerous expedients, including pushers, joggers, air jets turning wheels, suction devices, fingers, and other means. In most cases, the main fault of such devices is their inability to properly meet or adapt to the changing height of the pile. Factors which govern the rate of pile lowering are, of course, the thickness of the sheets being delivered and the rate of feed of the sheets, and there is need for constant adjustment of the stacking devices, or the pile mechanism, or both.

The present invention, in its preferred embodiments, contemplates the provision of a novel means for urging the sheets, of whatever gauge, into position against a stop and with a great range of heights. This means involves the use of one or more "floating" O-rings of rubber or other soft and only slightly frictional material, which O-rings are trained about a grooved wheel or pulley of much smaller diameter than that of the O-ring whereby a large surplus portion of the O-ring extends freely over, and is adapted to come into gentle rubbing contact with, the sheet being fed to the stacker and urge it toward the stop, and also to ensure proper separation against any tendency to snag or adhere due to interference by hook-lock or linehole aperture protuberances. Since the force of contact with the sheet is substantially only that of the weight of the O-ring itself and the rate of speed at which it is revolving, the frictional "slap" or contact with the sheet is very gentle and positive, and when the sheet has abutted the back stop, the O-ring for the rest of its contact can readily slip on the surface of the paper without damaging or ruffling of the sheet which might occur if it were propelled by a rigid or weighted pusher instrumentality.

Another object of the invention is the provision of a novel deflector chute for warping or curling the sheets slightly out of a flat planar condition in order to stiffen them for better forward feeding, especially if they are of thin gauge or of extraordinarily large area.

Other objects and features of novelty will be apparent from the following specification when read in connection with the accompanying drawings in which certain embodiments are illustrated by way of example.

In the drawings:

FIG. 1 is a fragmentary view in perspective of the delivery and stacking portions of a machine embodying the principles of the invention, with the devices empty;

FIG. 2 is a similar view suggestive of the movement of the sheets during delivery and stacking;

FIG. 3 is a fragmentary view in longitudinal section through the devices shown in FIGS. 1 and 2;

FIG. 4 is a vertical transverse sectional view taken on line 4-4 of FIG. 3; and

FIGS. 5 and 6 are somewhat diagrammatic views of a modified form of the invention adapted for the piling of a zig-zag continuous form.

In FIGS. 1 and 2 the delivery section of the apparatus for receiving sheets from a printing press or business machine is given the general designation A and the piling or stacking section is designated B.

The delivery section A comprises essentially a base-board 10 carrying at its forward and rearward ends a series of rollers or pulleys 11 about which may be trained the conveying belts 12. Forwardly disposed presser rollers or discs 13 and similar rearwardly disposed rollers 14 are carried by brackets 15 and 16 pivotally supported by the cross bars or shafts 17 and 18 mounted on the posts 19 and 20.

The piling or stacking section B is shown as comprising essentially the frame section 25 having an opening 26 through which the pile elevator posts 27 may move. The pile board or elevator platform is designated 30 and is designed to receive the sheets successively from the delivery section. Suitable well known mechanism is, of course, provided for raising and lowering the elevator pile board or platform 30, adjustments being made for the speed of lowering during operation.

The principal novel features of the stacking mechanism will now be described. A platform 32 forming a part of the framework of the machine is provided with vertical plates 33 and 34 upon each side thereof which plates are provided with bearing openings for the reception of the shaft 35 upon which are mounted the grooved pulleys 36,

two of which are shown in the drawings; but, of course, any number can be employed as deemed necessary. Trained about the grooves of the pulleys or wheels 36 are the O-rings 40 which may be made of soft flexible rubber or a similar elastomeric plastic material, the surface of the material being of intermediate frictional properties as will be described presently. In order to retain the O-rings 40 in guided tracking relationship around the grooves of the pulleys 36 the small bearing rollers 42 are employed, these rollers being carried by the arms 43 pivotally supported by the cross shaft 44 supported upon the end brackets 33 and 34.

Optionally, further positioning of the guide means for the pulleys 36 and the O-rings 40 may be used, and these take the form in the illustrated embodiment of the spaced angle pieces 45.

For driving the pulleys 36 and thus operating the O-ring feed, an electric motor 50 is suggested which is carried upon the end plate 33 and geared to the shaft 35 by the gear train 52.

As indicated in FIG. 2 of the drawings, the sheets S are being moved in a stream-feed formation through the delivery device A and successively onto the pile P resting upon the pile board 30. A back stop plate 55 may be carried preferably by the board or frame portion 32 against which the sheets are moved to gauge the stacking and provide a smooth edge for the pile P. As most clearly shown in FIGS. 2 and 3 of the drawings, as the sheets move toward the back stop the O-rings 40, assuming that the pulleys 36 are rotating in the direction of the arrow, will gently move upon the top surface of the uppermost sheet and frictionally urge it toward the back stop 55, and once the sheet has reached this position the loose free portion of the periphery of the O-ring will slide harmlessly over the surface of the sheet until the next sheet is brought into its field of action.

For feeding unusually thin sheets or sheets of unusually large area, the side plates or blades 60 are provided, one flange 61 being suitably secured to the board 10 and the other flanges 62 of the blades being bent in an upward but divergent direction as clearly shown in FIG. 4 of the drawings. Thus, as the sheets proceed along the delivery mechanism, they are bent or curled slightly thus adding a certain amount of stiffness which facilitates the feed. This feature also ensures separation of the individual sheets for proper stacking, whenever there is a tendency for them to snag or adhere together due to hook-lock or linehole aperture protuberances.

It may also be found desirable to provide the vertical plates or tabs 66 to possibly better confine the pile at the forward edge of the elevator 30. In FIG. 3 of the drawings, a ledge belonging to the printing or other device from which the sheets are delivered is suggested at 70.

Another embodiment of the invention is suggested in FIGS. 5 and 6 of the drawings, and this is for the efficient stacking of a zig-zag folded continuous form upon a pile board 100 supported by the post 101. Stops 102 are provided at both sides of the arrangement and the O-rings and pulleys 140 and 136 are duplicated at each edge of the pile board. Swing chutes 150 mounted upon oscillating shafts 151 are provided for alternately laying the successive zig-zag connected forms F on the pile board 100 and the operation of the device will be readily understood. As the successive forms are laid, the O-rings 140 gently serve to completely flatten out the successive form units and lay them in proper alignment on the board 100.

It is understood that various changes and alterations may be made in the embodiments of the invention illustrated and described herein without departing from the scope of the invention as determined by the following claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A sheet device comprising, in combination, a supporting means for receiving successive sheets fed thereto, and means for moving said sheets to evenly aligned positions upon said supporting means, said sheet moving means comprising a pulley disposed on a horizontal axis above the path of the sheets in their movement on the pile supporting means, a flexible O-ring of soft, mildly frictional surface texture but of much greater diameter than that of said pulley, said O-ring trained about said pulley along a small arc of its circumference with the greater portion of the O-ring floating free, means for rotating the pulley to cause the free portion of the O-ring to rub gently but positively upon the upper surface of the sheet to feed it toward the pile supporting means.

2. The sheet stacking device as set forth in claim 1, in which there is provided means for retaining a portion of said O-ring in driven contact with the pulley at said small arc of contact, said arc of contact being the sole supporting means for the O-ring.

3. The sheet stacking device as set forth in claim 2, in which slotted supplemental guide means are provided for the O-ring near the point where it resumes driving contact with its pulley.

4. The sheet stacking device as set forth in claim 1, in which there is provided a stop means at the far side of the supporting means against which the sheets are moved by the frictional contact of the O-ring, the surface of the O-ring being of such intermediate frictional qualities as to feed the sheet against the stop but thereafter slide smoothly over the sheet without damage or ruffling.

5. The sheet stacking device as set forth in claim 4 in which said O-ring is made of soft flexible elastomeric material.

6. The sheet stacking device as set forth in claim 4 in which the O-ring is made of rubber.

7. The sheet stacking device as set forth in claim 1 in which means are provided for feeding said sheets to said supporting means, said feeding means including a chute comprising at least two generally vertically extending ridges spaced apart laterally along which the sheet will move to slightly bowed condition.

8. The sheet stacking device as set forth in claim 7 in which said ridges comprise two slats of forwardly divergent relationship and of slightly rising inclination.

9. The sheet stacking device as set forth in claim 1 in which the sheets to be stacked are in the form of a continuous zig-zag fold web, and two sets of O-ring sheet moving means are employed, one at each end of the supporting means to alternately lay successive sheet units in opposite directions.

10. The sheet stacking device as set forth in claim 9 in which an oscillating chute is employed to start the successive sheets in their alternate movements toward aligned position.

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