May 21, 1963 G. A. MEAD ETAL 3,090,505

UNSTACKER

Filed Aug. 7, 1961 3 Sheets-Sheet 1

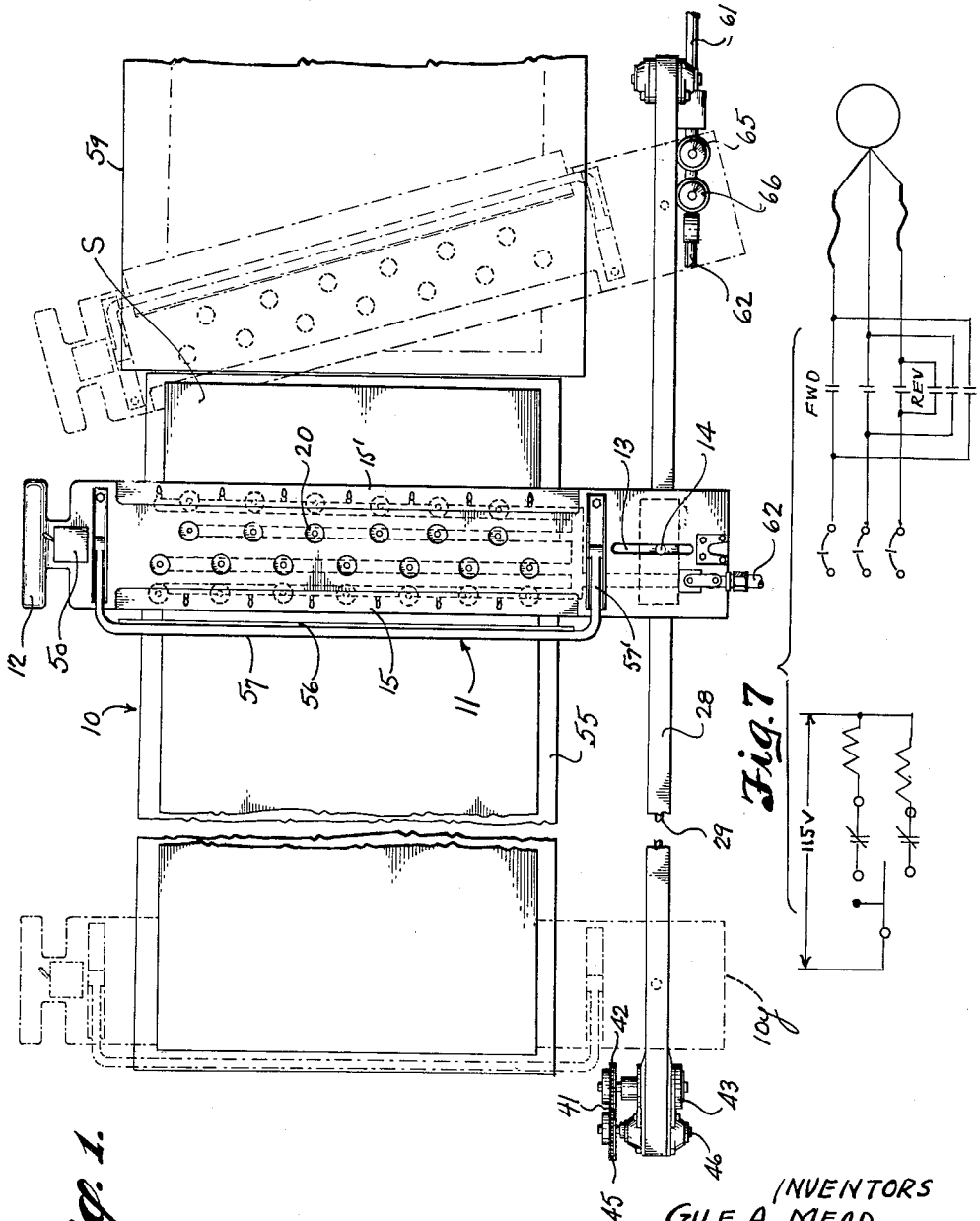


Fig. 1.

Fig. 7

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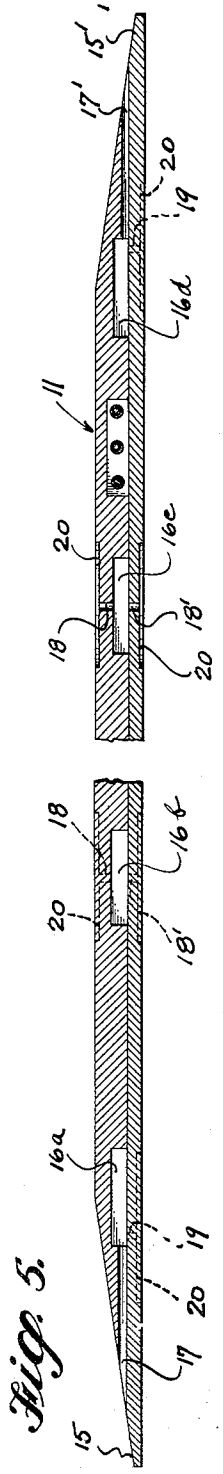


Fig. 5.

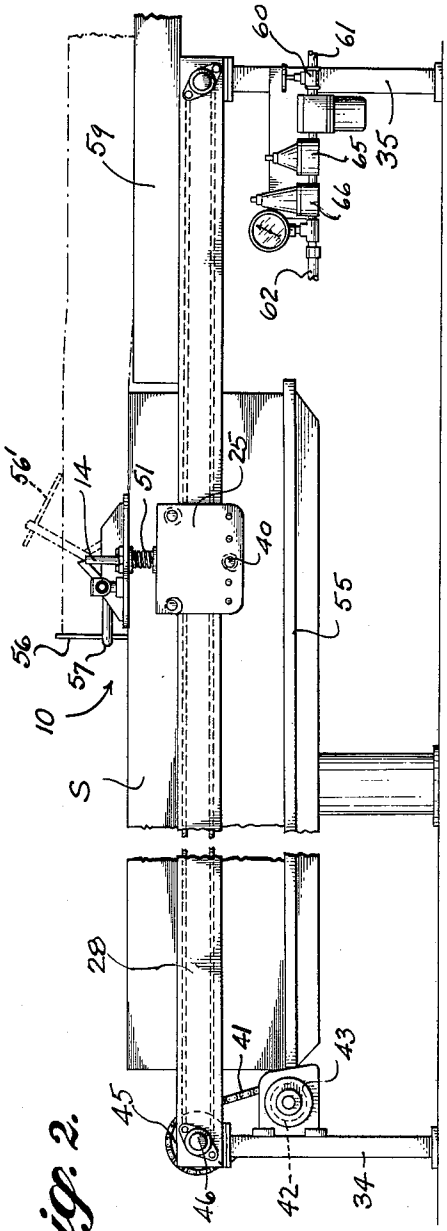


Fig. 2.

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Fig. 3.

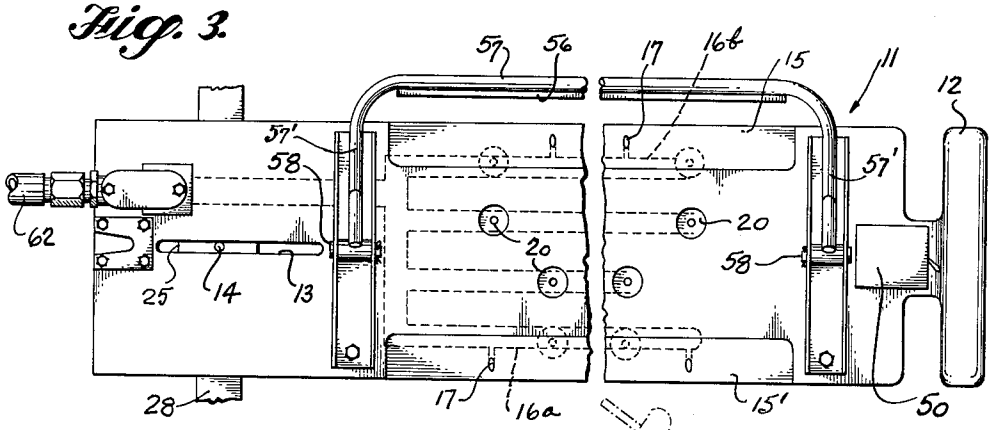


Fig. 4.

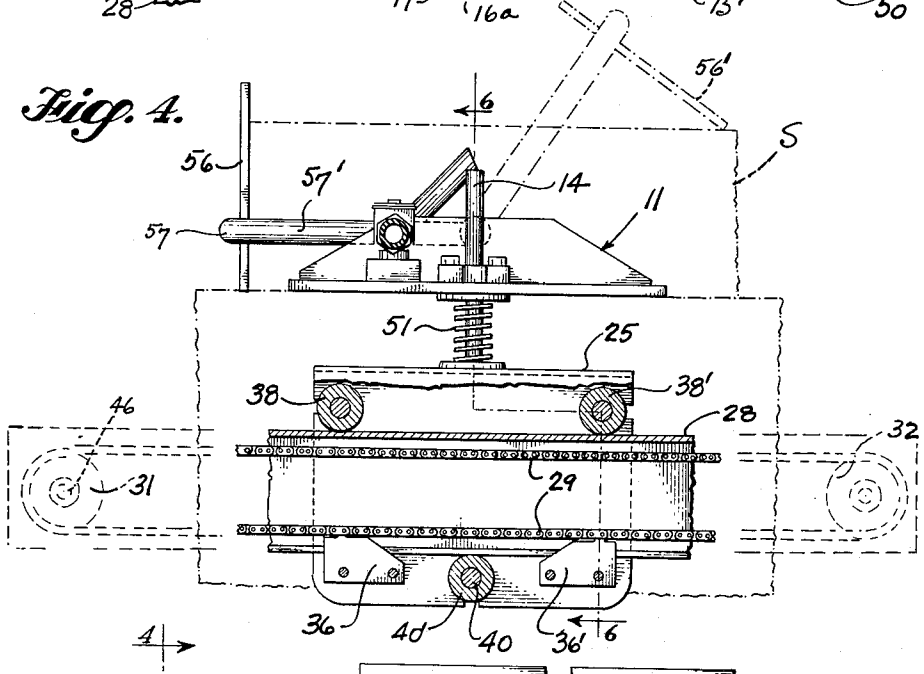
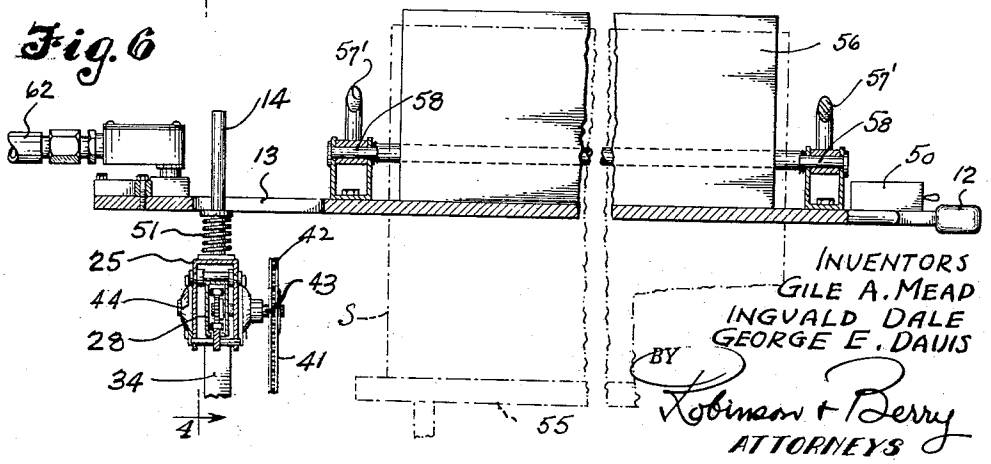


Fig. 6



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UNSTACKER
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9 Claims. (Cl. 214—8.5)

This invention relates to what herein, and in the industry to which it applies, has been designated as an "unstacker." More particularly, the invention relates to the provision of an unstacker characterized by the construction and use therein of a special form of blade for the expeditious dividing and separation of adjacent portions of a stack of paper sheets for the ready removal of the upper divisional portion or section from the stack.

It is the principal object of this invention to provide an unstacker employing a blade of the above character that is of substantial length and width; that may be applied to a stack of paper sheets at a selected level for stack division and which blade is powered by novel means for mechanically facilitating its entry into the stack at the selected level and which blade is channel for the reception therein of air under pressure and is ported for its discharge therefrom into the stack at the division line as an aid for both the separation and in the removal of that section of the stack that is above the blade from the remaining portion of the stack below it.

It is also an object of this invention to provide an unstacker of the above stated kind wherein the stack dividing blade is of substantial length and is pivotally attached at its outer end to a powered belt, or the like, and which blade has a hand hold member at its opposite or inner end whereby the blade user may adjust and maintain a desired angularity of the stack dividing blade as it is advanced edgewise by the powered belt and user into and through the stack for its division.

Yet another object of the invention is to equip the blade with swingingly mounted "pusher plate" that may be adjusted from and into a position whereby the upper portion of a stack, as separated from the lower portion by entry of the blade into and through the stack, may be employed in conjunction with the blade and its powering belt for the displacement of that divisional portion of the stack that is above the blade, from that portion remaining below it.

Yet another object of the invention is to equip the blade, at the hand supported end thereof, with a power controlling switch whereby direction of travel of the blade under influence of the powering motor for division of the stack and for subsequent removal of the top section from the lower portion of the stack may be conveniently controlled by the blade user while holding the blade handle.

Still further objects and advantages of the invention reside in the details of construction and combination of its parts and in the mode of use of the device, as will hereinafter be fully described.

In accomplishing these and other objects, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein:

FIG. 1 is a top or plan view of an "unstacker" embodied by the present invention with parts broken away to shorten the length of the view, and illustrating its mode of use.

FIG. 2 is a front elevation of the unstacker as shown in FIG. 1.

FIG. 3 is a top view showing, in larger scale, the stack dividing blade of this invention.

FIG. 4 is an end view of the blade showing the connection at that end with the blade powering chain belt, this view being taken on line 4—4 in FIG. 6.

FIG. 5 is an enlarged, cross-sectional view of the blade.

FIG. 6 is a vertical section taken on line 6—6 in FIG. 4.

FIG. 7 is a schematic showing of the electrical system of the device.

Referring more in detail to the drawings:

In its present preferred form of construction, the stack dividing member of this unstacker, designated in its entirety in FIGS. 1 and 2 by reference numeral **10**, comprises a substantially flat blade having a length of approximately six feet and a width of approximately one foot as designed for its present use. At its inner end this blade, designated in its entirety by reference numeral **11**, is equipped with a hand hold member or handle **12** and along its outer end portion is formed with a centrally located and longitudinally extending slot **13** through which a vertical pivot shaft **14** extends, as will presently be more fully explained.

Between its outer and inner end portions, the blade, as shown best in cross-section in FIG. 5, has opposite longitudinal edge portions downwardly beveled to thin edges, as designated at **15** and **15'** respectively. Also, as has been shown in FIG. 5, the blade body which as presently made has a thickness of about 3/8 of an inch, is formed with four laterally spaced, longitudinal air channels designated at **16***a*, **16***b*, **16***c* and **16***d*. Leading from the channels **16***a* and **16***d*, respectively, to the top sides of the longitudinal beveled edge portions **15—15'** of the blade are air discharge passages **17—17'** and likewise opening both upwardly and downwardly from the channels **16***b* and **16***c* to the top and bottom surfaces of the blade are air ports **18—18'**. Likewise, air ports **19** open downwardly from channels **16***a* and **16***d* to the bottom surface only of blade. The ports **18—18'** and **19**, as formed along the blade, are spaced at approximately six inches and open into very shallow, circular depressions **20** formed in the flat top and bottom surfaces of the blade.

The blade **10** is normally disposed flatly for use in a horizontal position and is supported at its forward or outer end on a housing **25**, to which it is pivoted by the previously mentioned pivot shaft **14**. This housing is of rectangular formation, open at its ends and is mounted for travel in opposite direction on a horizontal beam **28**, now to be described more in detail.

In FIG. 6, it has been shown that the beam **28** is of tubular formation and of rectangular cross-section, and it contains therein a continuous chain belt **29** that extends the length of the beam **28** and operates about sprocket wheels **31** and **32** mounted in the opposite end portions of the beam as best shown in FIG. 4.

The beam **28** is supported at its opposite ends by legs or standards **34—35**. The lower run of the chain belt **29** is shown in FIG. 4 to be pinned or otherwise joined to triangularly shaped blocks **36—36'** fixed in the housing **25** between the lower edges of its opposite side walls, as shown in FIGS. 4 and 6, surrounds beam **28**. This housing **25** is equipped within its opposite end portions and near the top wall thereof with a pair of transversely directed horizontal rollers **38—38'** which have rolling support on the top wall of the beam **28** as well shown in FIG. 4. Across their lower edges the opposite sidewalls of the housing **25** are joined in rigid spacing by a transverse bolt **40** that passes beneath the beam **28** and carries a roller **40'** in rolling contact with the lower wall portions of beam **28** which is longitudinally slotted to receive and for travel of the lugs **36—36'** therein along the beam.

Travel of the chain belt **29** is effected by a driving belt **41** applied about a belt wheel **42** on the drive shaft **43**

of an electric motor 44 and about a belt wheel 45 fixed on the mounting and driving shaft 46 of the sprocket wheel 31 as shown in FIG. 4 to be mounted in that end of beam 28. The electric motor 44 is shown in FIG. 2 to be mounted on the beam supporting leg or standard 34, and it is supplied with electric current through suitable circuit lines, not shown, and a controlling toggle switch 50 that is mounted on the blade 11 closely adjacent the handle 12 thereof, as shown in FIGS. 1 and 3. Reversal of the switch reverses the motor and this causes reversal in direction of travel of the chain belt 29 thus to move the blade 10 either into or from the paper stack accordingly. The toggle switch 50 automatically centers itself in its "off" position when released.

It is further to be explained that to employ the blade 11 for use it is laid across the paper stack as in FIG. 6, with its slotted outer end portion applied over the housing 25 with the vertical pivot pin 14 on the top of housing 25 projecting upwardly through the blade slot 13. This end of the blade is yieldably supported by a spiral cushioning spring 51 applied about the pivot member 14 between the top wall of the housing 25 and lower face of the blade, as shown in FIGS. 4 and 6. The unstacker mechanism 10 as disposed for unstacking, is placed with the horizontal beam 28 extending along the forward side of the stack of paper to be divided; such a stack being designated in FIGS. 1, 2 and 4 by reference character S where it is shown to be placed on a hydraulic or air lift 55. Then a control valve 60 in an air supply line 61 leading to the outer end of the blade, as indicated in FIG. 2, is opened to admit air under the desired or a suitable pressure through a flexible pipe line 62 into the four air channels of the blade. Then, with the operator supporting the blade beyond one end of the stack, by means of the handle member 12, he lifts a corner portion of the stack at the desired plane of stack division, and swings the blade edge 15 into the separation, as has been indicated by the dash line showing of the blade in FIG. 1. He then closes toggle switch 50 to energize the motor 44 to cause chain belt 29 to advance the outer end of the blade toward the left, in FIG. 1, and into the stack while the operator supports and advances its other end, thus the blade is advanced through the stack to near the opposite side edge thereof and is there adjusted to the position designated in dash lines at 10y in FIG. 1. The switch 50 is then released and its automatic opening stops the motor.

With the stopping of the electric motor 44 and with the blade in position of 10y in FIG. 1, the operator then swings the pusher plate with which the blade is equipped, to its functional position. This will now be described.

The pusher plate, as designated best in FIGS. 3 and 4 by reference numeral 56, is flat and of substantial length and is shown to be fixed rigidly to and to extend along a handle bar 57 that is mounted on and extends lengthwise of the blade. The handle bar 57 as therein shown has leg portions 57'—57' at its opposite ends which are pivotally mounted on the top wall of the blade, as at 58—58 and by reason of its swinging mounting the pusher plate 56 can be swung from its inactive position shown in dash lines in FIG. 4 at 56' to its pushing position of FIGS. 2 and 3 and thus located to flatly engage that side edge wall portion of that section of the paper stack to be removed. With the pusher plate 56 disposed in its functional position as shown in dash lines at the lefthand end in FIG. 1, the reverse travel of the blade is then effected by closing the toggle switch 50 toward the right. This reverse travel will cause the plate 56 to push that part of the stack above the blade from the lower or body portion of the stack in accordance with the showing in FIG. 2. With this reverse travel of the blade, as effected at one end by the chain belt 29, the operator, holding the handle end maintains a like travel of that end of the blade thus to effect the pushing of the upper divisional position of the stack onto a receiving table or belt such as that indicated at 59 in FIG. 2.

It is to be understood that, as the blade 11 enters the stack for stack division and during its movement the discharge of air into the stack from the blade channels and ports will cause the formation of an air pocket or space, at the line of separation, within the stack to practically support the upper section and to permit it to be floated on the entrapped air from the lower portion of the stack with little effort. This air under pressure makes for easy application of the blade to the stack with a minimum of stack distortion. Air pressure employed is adjusted to requirements and is controlled through suitable reducing and relief valves 65—66 located in the air supply system as has been shown best in FIG. 2.

What we claim as new is.

1. An unstacker comprising a stack separation blade adapted to be advanced edgewise into a stack of paper sheets for the removal of that portion of the stack which is above the blade from that portion which is below it, a pusher plate movable with the blade and engageable with an edge portion of the stack above the blade, said pusher plate being pivotably supported for adjustment from a horizontal position substantially above the plane of the blade to a vertical position to serve as a pusher plate for the removal of the upper portion of the stack from the lower portion incident to the return of the blade to that side of the stack from which it entered.

2. An unstacker according to claim 1 wherein said stack separation blade is downwardly beveled along its forward and rearward edge portions and is formed with channels for air under pressure and with air discharge perforations leading from the channels to its top and under surface of the blade to provide an air cushion between those portions of the stack at the plane of their separation by the blade, and means for applying air under pressure to said air channels of the blade.

3. An unstacker according to claim 1 wherein said blade is of such length as to extend at its opposite ends beyond the ends of the stack of paper sheets in its application thereto for an unstacking operation, a blade supporting rail extending horizontally along one end of the upper stack for the support of the corresponding end of the blade thereon during its entrance into the stack and its reverse travel therefrom and a handle at the opposite end of the blade for its manual support and manipulation during its advancement into and retraction from the stack and powered means for movement of the rail supported end of the blade.

4. An unstacker according to claim 3 including a housing mounted for guided travel along said rail and for support of that end of the blade thereon, a driven belt operable along the rail and connected to said housing for effecting its movement, means on the housing securing that end portion of the blade thereon and a reversible driving means for said belt.

5. An unstacker according to claim 4 wherein said reversible driving means for said belt comprises supporting wheels for said belt at opposite end of said rail, a reversible electric motor for driving said belt in the advancement of the blade into a stack and for its retraction, an electric circuit for the motor including a motor direction control switch mounted on the blade adjacent the handle portion thereof.

6. An unstacker according to claim 4 wherein said housing has a pivot pin extending upwardly therefrom and said blade is formed in its rail supported end with a longitudinal slot receiving said pin pivotally therethrough and yieldable supporting means for that end of said blade is applied about the pin between housing and blade end.

7. An unstacker comprising in combination, a vertically adjustable platform supporting a stack of paper sheets thereon, a fixed rail supported horizontally across one end of said stack, a housing supported for travel in

opposite directions along said rail, belt mounting wheels at opposite ends of the rail, a belt extended about said wheels and joined to said housing, means for driving said belt to selectively move the housing in opposite directions, a blade pivotally supported at one end on said housing and having a handle for its manual support at its opposite end and whereby the blade may be positioned for entering the stack for separation and removal of that part above the blade from the part below it, means for driving the belt for the entry and movement of the blade into the stack, a pusher plate mounted by and movable with the blade, across the top of the stack, as the blade moves within the stack, and then adjustable into a pushing position for the removal of that portion of the stack which is above the blade with the return travel of the blade to the entering side of the stack, and a table positioned at blade level to receive the removed portion of the stack thereon.

8. An unstacker according to claim 7 wherein the blade is of such length as to extend beyond the ends of the stack and wherein said pusher plate is mounted by a

support at its opposite ends pivoted to said blade ends and of such length as to support the plate horizontally above the stack during the entering of the blade thereinto, and to swing it to a vertical pushing position to engage the stack edge after the blade has been fully advanced for stack separation.

9. The unstacker of claim 8 wherein the blade is channeled for reception of air under pressure therein and has air outlet ports opening to its top and under surfaces, and means is provided for application of air under pressure to said channels.

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