

April 10, 1951

E. L. HEDSTROM ET AL  
BOX OR CARTON STRIPPER MACHINE

2,548,370

Filed Nov. 18, 1946

7 Sheets-Sheet 1

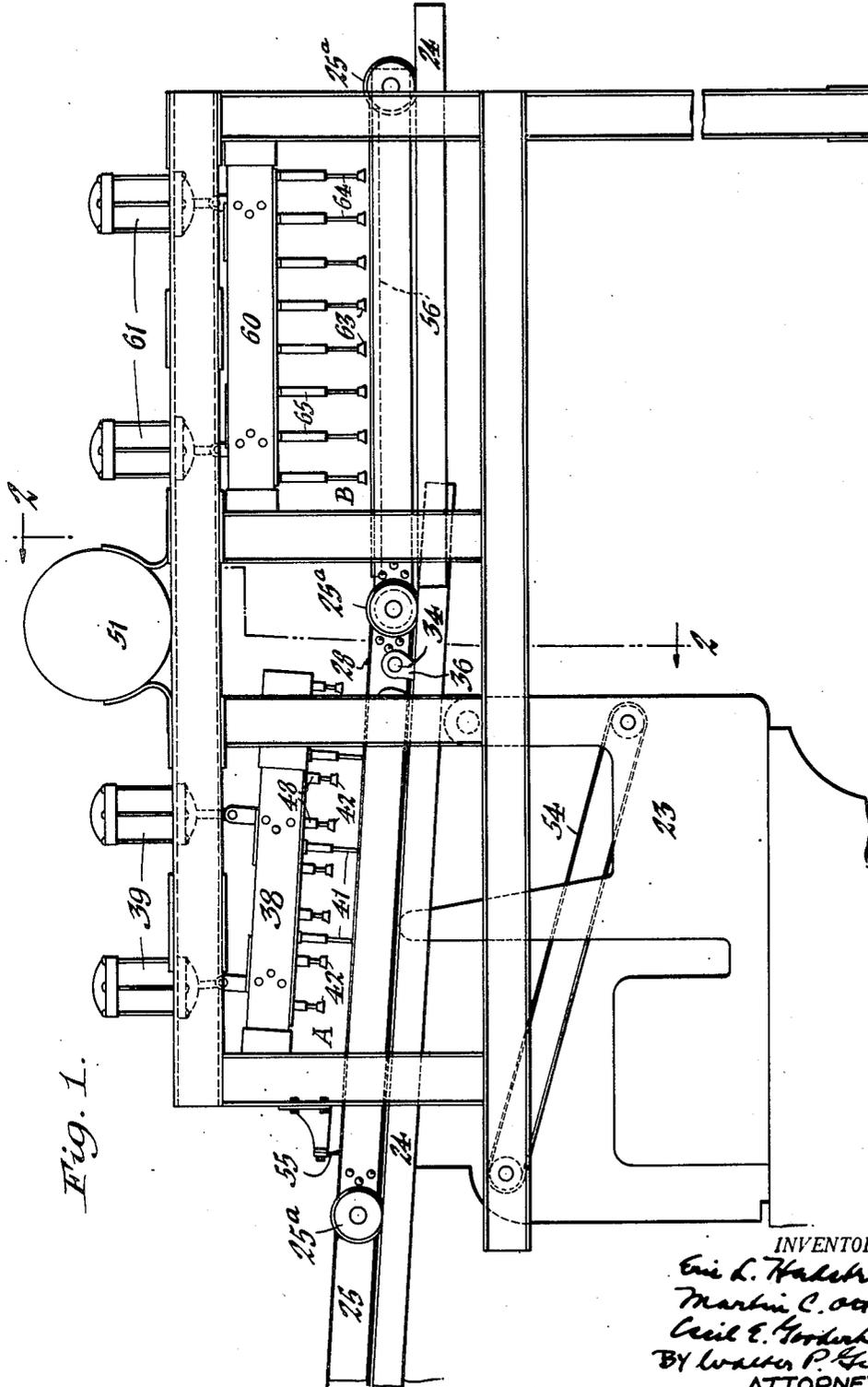


Fig. 1.

INVENTORS,  
Eric L. Hedstrom,  
Martin C. Otto,  
Ceil E. Gordonham,  
BY Walter P. Kueper  
ATTORNEY.

April 10, 1951

E. L. HEDSTROM ET AL  
BOX OR CARTON STRIPPER MACHINE

2,548,370

Filed Nov. 18, 1946

7 Sheets-Sheet 2

Fig. 2.

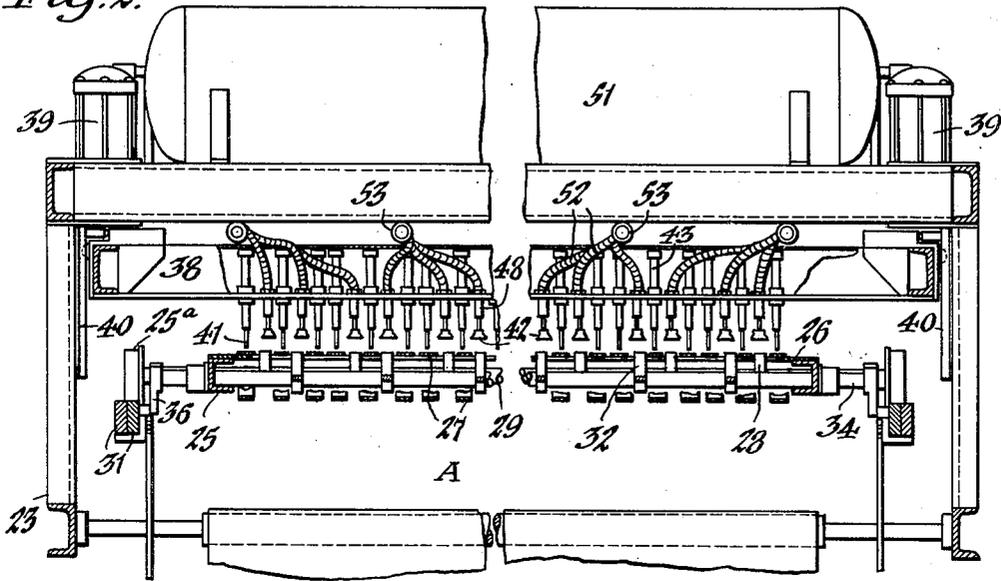
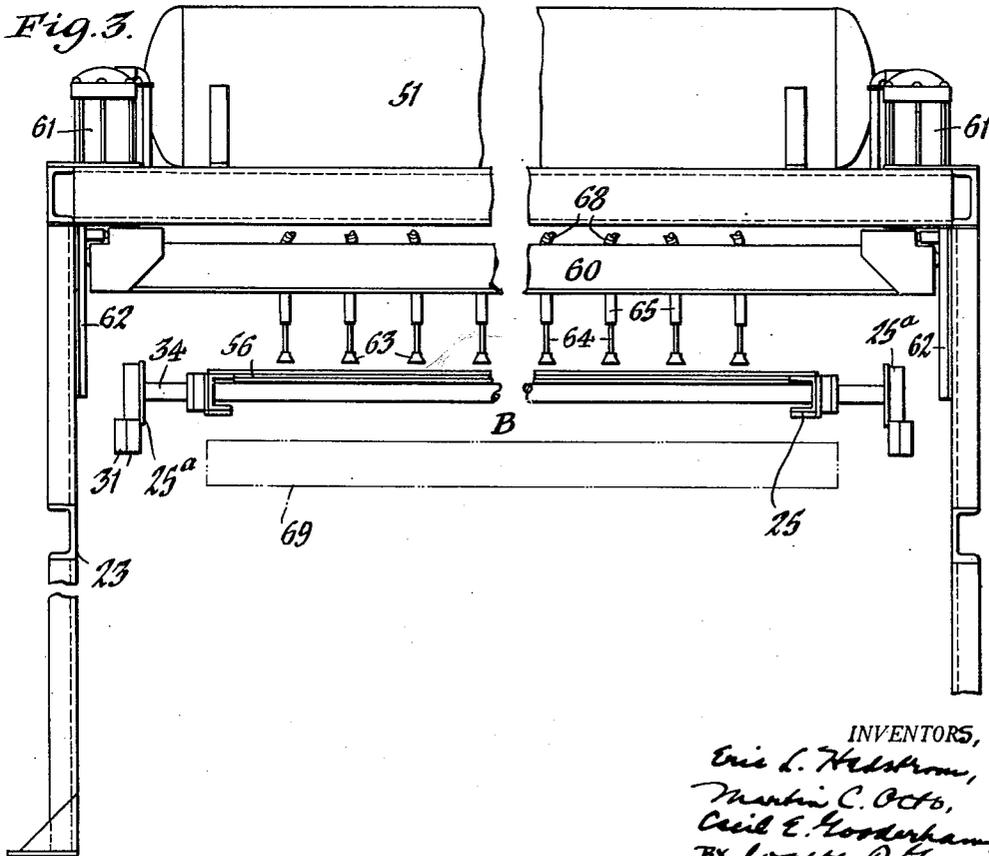


Fig. 3.



INVENTORS,  
Eric L. Hedstrom,  
Martin C. Otto,  
Ceil E. Gooderham,  
BY Walter D. Hoyer  
ATTORNEY.

April 10, 1951

E. L. HEDSTROM ET AL

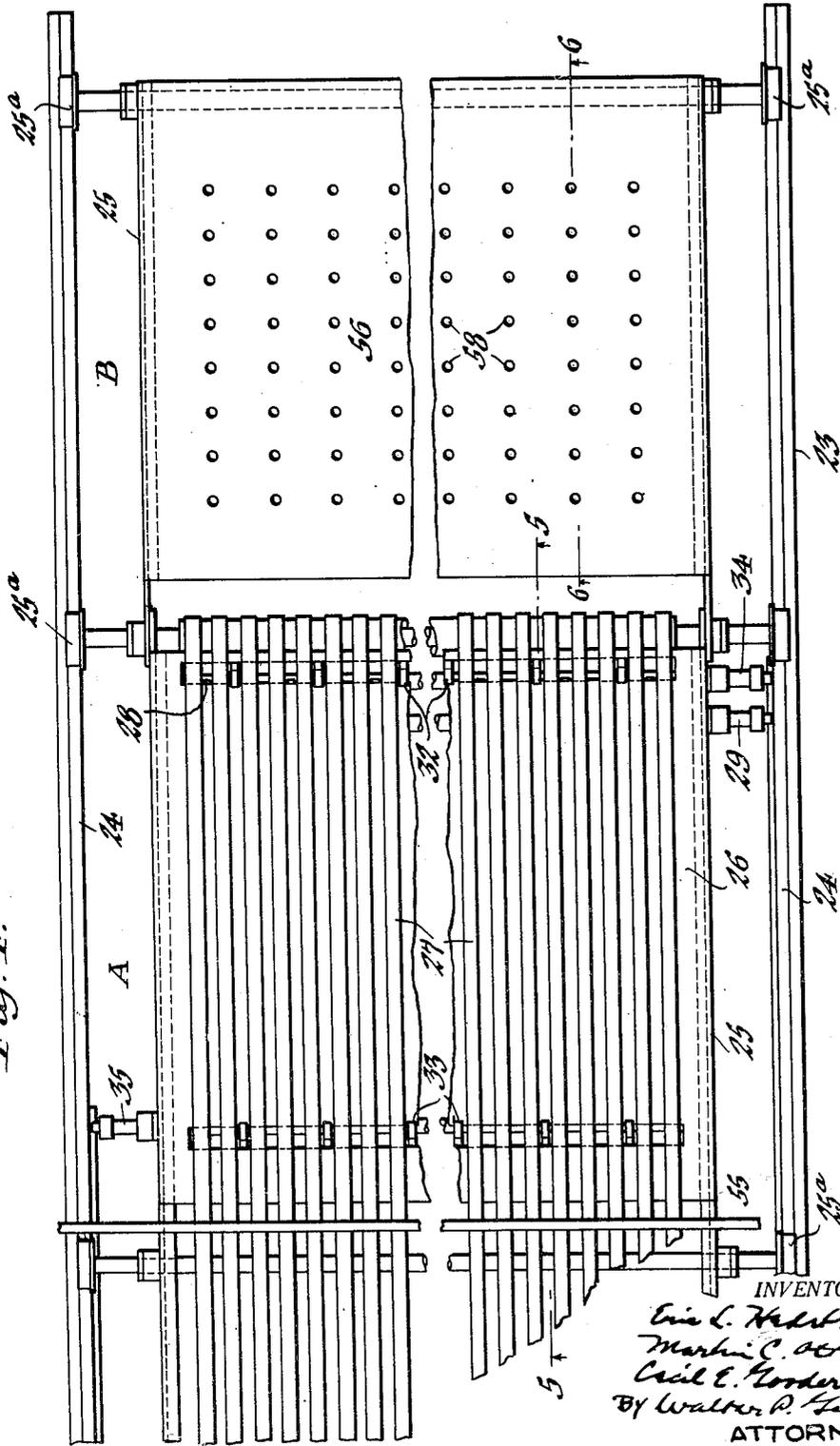
2,548,370

BOX OR CARTON STRIPPER MACHINE

Filed Nov. 18, 1946

7 Sheets-Sheet 3

Fig. 4.





April 10, 1951

E. L. HEDSTROM ET AL  
BOX OR CARTON STRIPPER MACHINE

2,548,370

Filed Nov. 18, 1946

7 Sheets-Sheet 5

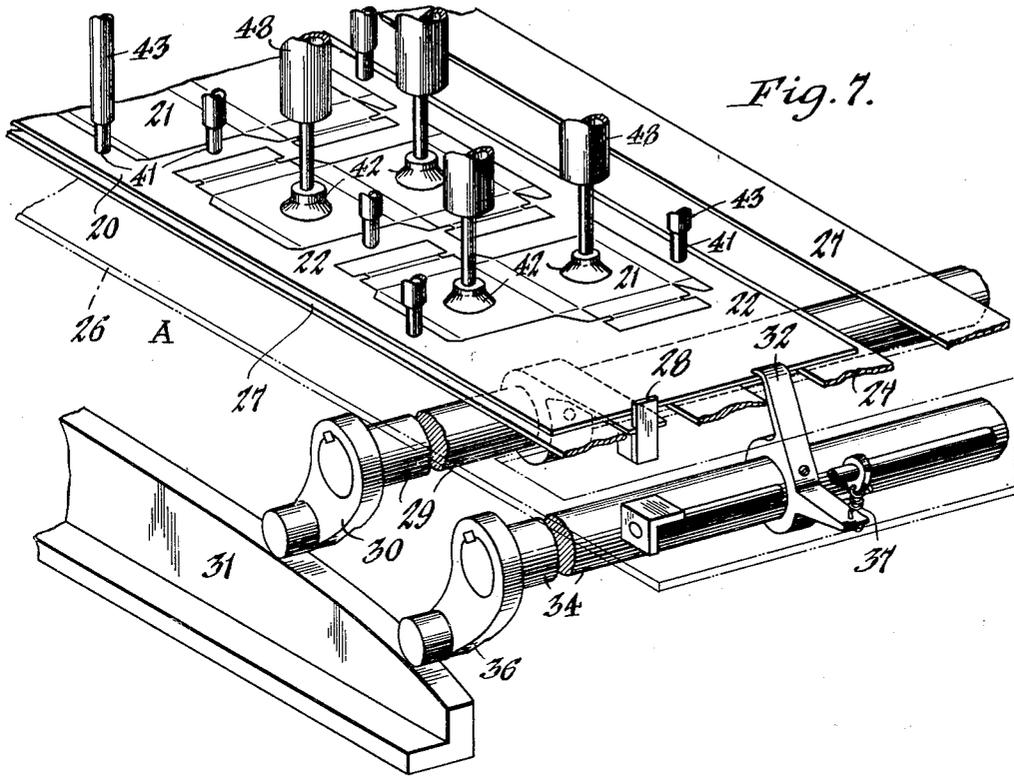


Fig. 7.

Fig. 8.

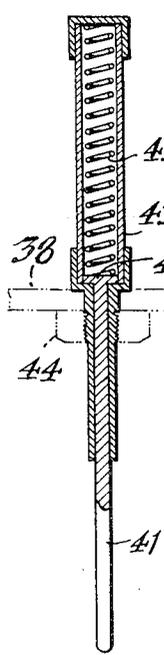


Fig. 9.

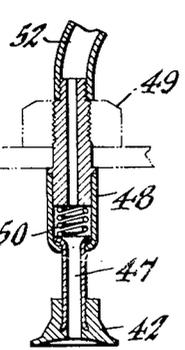
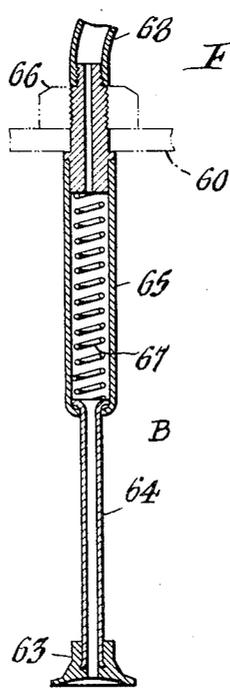


Fig. 10.



INVENTORS,  
Eric L. Hedstrom,  
Marlin C. Otto,  
Ceil E. Gooderham,  
BY Walter P. Sawyer  
ATTORNEY.

April 10, 1951

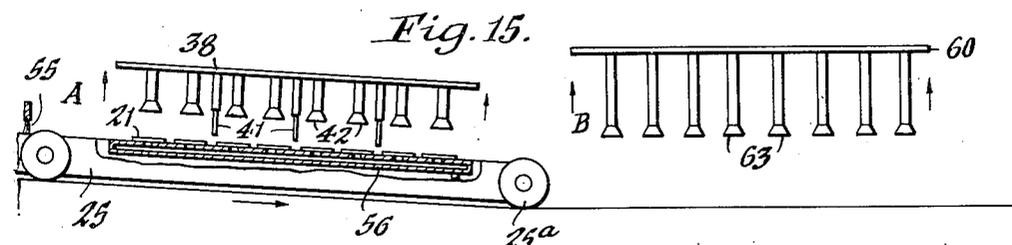
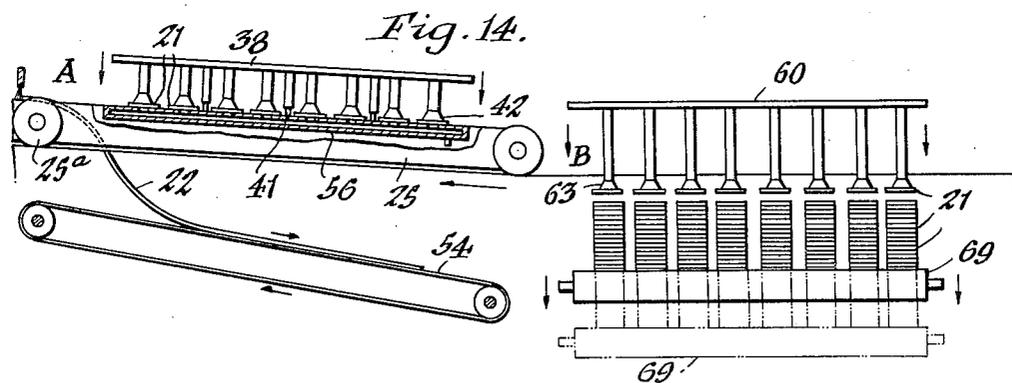
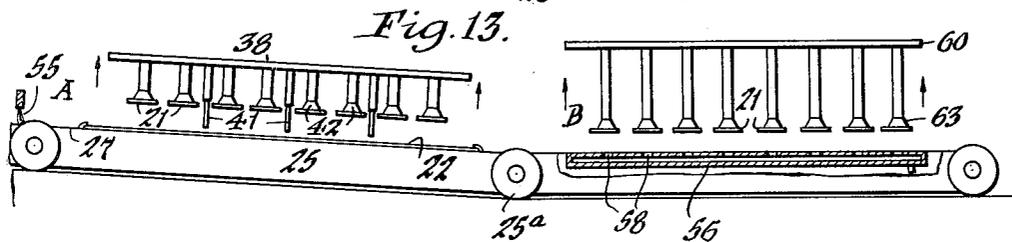
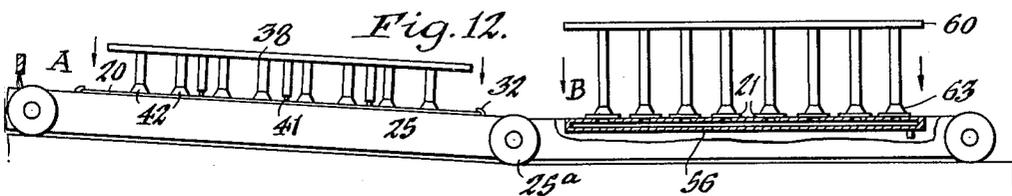
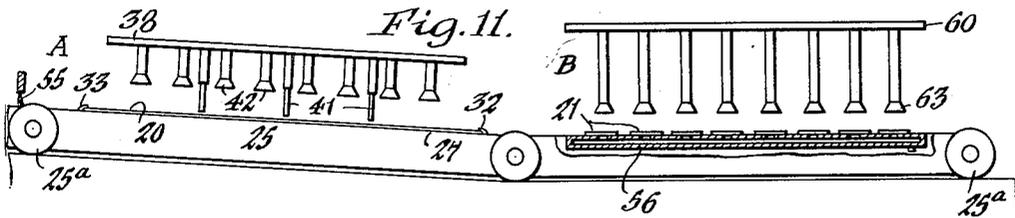
E. L. HEDSTROM ET AL

2,548,370

BOX OR CARTON STRIPPER MACHINE

Filed Nov. 18, 1946

7 Sheets-Sheet 6



INVENTORS,  
Eric L. Hedstrom,  
Martin C. Otto,  
Cecil E. Gooderham,  
BY Walker P. Sawyer  
ATTORNEY.

April 10, 1951

E. L. HEDSTROM ET AL  
BOX OR CARTON STRIPPER MACHINE

2,548,370

Filed Nov. 18, 1946

7 Sheets-Sheet 7

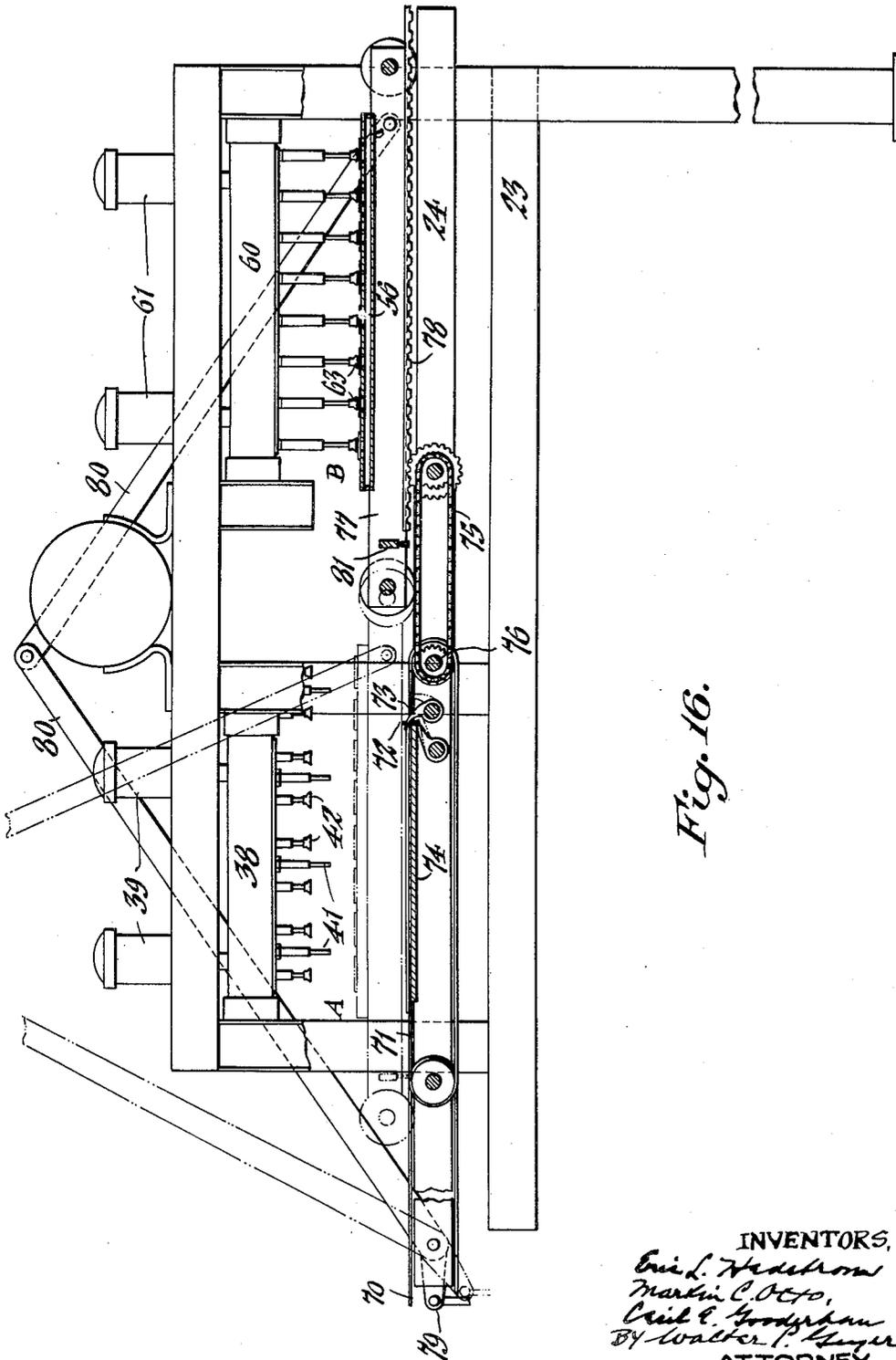


Fig. 16.

INVENTORS,  
*Eric L. Hedstrom*  
*Marlin C. Otto,*  
*Carl E. Grodysman*  
BY *Walter P. Meyer*  
ATTORNEY.

# UNITED STATES PATENT OFFICE

2,548,370

## BOX OR CARTON STRIPPER MACHINE

Eric L. Hedstrom, Martin C. Otto, and Cecil E.  
Goederham, Buffalo, N. Y.

Application November 18, 1946, Serial No. 710,614

8 Claims. (Cl. 93—58)

1

2

This invention relates generally to the art of paper boxes and other die-cut articles, but more particularly to a novel apparatus and method for expediting the removal of the waste usually present after passing the sheet of stock through the cutting and creasing machine.

It has for one of its objects to provide an efficient apparatus and method for removing such waste which is so designed as to automatically strip from the die-cut portions of the sheet any waste both about or between such portions, whereby the boxes or other articles are discharged from the machine stripped of the customary waste and stacked ready for shipment.

Another object of the invention is the provision of reliable and efficient means for gripping the respective portions of the sheet and for stripping one portion from the other and in conjunction therewith to provide novel means for disposing of the waste portions and delivering the article-bodies in a stacked fashion as they are discharged from the machine.

Other features of the invention reside in the construction and arrangement of parts hereinafter described and particularly pointed out in the appended claims.

In the accompanying drawings:

Figure 1 is a side elevation of the apparatus embodying our invention. Figure 2 is a fragmentary cross-section taken substantially in the plane of line 2—2, Figure 1. Figure 3 is a fragmentary end view thereof, viewed from the right end of Figure 1. Figure 4 is a fragmentary top plan view of the reciprocating carriage and conveyor belt assembly of the apparatus. Figure 5 is an enlarged fragmentary longitudinal section taken substantially in the plane of line 5—5, Figure 4, showing a sheet of paper in position to strip the waste portion from the die-cut or article portion thereof. Figure 6 is a similar view taken substantially in the plane of line 6—6, Figure 4, showing the vacuum chamber and associated parts at the delivery end of the machine. Figure 7 is a fragmentary perspective view showing the manner of gripping the body and waste portions of the die-cut and creased sheet preparatory to effecting the stripping of such portions from each other. Figure 8 is an enlarged vertical section of one of the waste-engaging plungers. Figure 9 is a similar view of one of the vacuum cups employed for engaging or gripping the body portion of the die-cut article. Figure 10 is a like section of one of the vacuum cups employed for handling the removal of the body portion of the die article

from the carriage and delivering it to the pile or stack at the discharge end of the machine. Figures 11—15 inclusive are diagrammatic, side elevations, partly in section, showing the steps and cycle of operations in stripping the waste from the die-cut articles and depositing the waste-removed articles in a pile or stack at the discharge end of the machine. Figure 16 is a fragmentary side elevation, partly in section, showing a modified form of the invention.

Similar characters of reference indicate the corresponding parts throughout the several views.

Referring first to Figure 7 showing the method and a part of the apparatus employed for expediting the removal or stripping of the waste about the box-containing portions of a sheet, the numeral 20 indicates a sheet which has been previously printed, creased and cut to form a multiple of boxes or other articles therefrom, 21 indicates the box-containing portions or bodies thereof, and 22 indicates the waste portion which, it will be noted, extends about the margin of the sheet as well as between the respective box-ports.

In the preferred embodiment of the invention shown in the drawings, 23 indicates a suitable frame which supports the working parts thereof and includes a pair of longitudinal tracks 24 on which a reciprocating, sheet-conveying carriage 25 is guided for presenting the die-cut sheet 20 to the waste-removing or stripping station A of the machine, and the box portions, from which the waste has been removed, to the box-discharge, or delivery station B, as shown in Figures 1 and 11—15 inclusive. This carriage may be actuated in any suitable manner and has rollers 25<sup>a</sup> thereon engaging the tracks, and a plate 26 underlying spaced belts 27 for supporting and conveying the sheet. It will be noted that the leading or front ends of this plate and belts terminate some distance rearwardly from the front end of the carriage. As the sheet is delivered to the waste-removing station by the conveyor belts and carriage, its leading edge encounters a series of stop fingers 28 disposed in a transverse row in the spaces between the belts and mounted on a rock shaft 29 supported at its ends on the carriage. A follower arm 30 fixed on this shaft and engaging a cam track 31 applied to the frame serves to govern the movement of the stop fingers at proper times to and from their sheet-arresting position. Two sets of gripper fingers 32, 33 are disposed in transverse rows on the carriage for gripping the leading and trailing edges of the sheet 20 while being operated upon

3

at the waste-removing station. These fingers are mounted on companion rock shafts 34 and 35, respectively, supported at their ends on the carriage and each of the fingers has a follower arm 36 thereon engageable with the cam track 31 for governing the movements of the fingers at predetermined times to and from gripping engagement with the sheet. A spring 37 connected to each finger normally urges it to its sheet-gripping position. While the sheet is thus held at its ends, which ends constitute a part of the waste portion 22 to be removed or stripped from the box-forming body of the sheet, means are provided at this station of the machine and in correlation to the sheet for effecting a separation of the box-bodies from the waste portion thereof.

This means for removing or stripping the respective portions of the sheet from each other is preferably constructed as follows:

Mounted in the upper portion of the frame 23 at the station A and disposed above the path of travel of the reciprocating carriage 25 is a sheet gripping and stripping mechanism movable vertically or toward and from the sheet and having hold-down and lifting elements located in predetermined relation thereon for engagement with the body and waste portions of the sheet, respectively, and in a manner as to cause the waste portion 22 to be held down on the plate and belts 26, 27 and the die-cut bodies 21 to be drawn upwardly or lifted therefrom when such mechanism is elevated, whereby such bodies are severed or torn loose from the waste portion of the sheet with the waste portion brushed or swept from the belts on a subsequent stroke of the carriage to a discharge point and the box-bodies being conveyed to the station B and subsequently discharged and stacked in a neat pile for ready handling. This mechanism consists of a body or carrier 38 suspended from pneumatic or like actuated units 39 mounted on the top of the frame and guided at its ends in suitable upright guide-ways 40 applied to the upright portions of such frame, as shown in Figure 2. Any suitable means may be employed for actuating the pneumatic units to in turn cause the carrier to be lowered or elevated to the positions depicted in Figures 11-15 inclusive. Applied to and depending from the carrier 38 are two sets of sheet gripper elements 41 and 42 adjustably mounted thereon to accommodate various shapes and sizes of boxes and other die-cut articles, the grippers 41 being in the form of plungers or hold down pins or posts which are so positioned and spaced as to be engageable with the waste portion 22 of the die-cut sheet being run through the machine, and which serve to effectually and uniformly retain the waste portion in flatwise adhering relation to the conveyor belts 27 on which the sheet is supported. These plungers are supported for vertical displacement in companion individual guides or tubes 43 which are adjustably mounted on the carrier in any suitable fashion, lock nuts 44 being used for retaining them in a set position of adjustment. Each plunger is normally urged to its lowered or clamping position by a spring 45 housed within the companion guide tube and bearing at one end against the plunger-head 46 and at its other end against the top of such tube, as shown in Figure 8. In the elevated position of the carrier shown in Figure 11, the lower ends of these plungers clear the sheet, but as the carrier is lowered they contact the surface of the sheet as shown in Figure 12, with the springs 45 gradually exerting

4

more and more pressure on the plungers to retain the waste portions against the conveyor belts and maintain such gripping action for a portion of the up-stroke of the carriage during which time the box-bodies are gripped by the companion grippers 42 and separated from the waste portion of the sheet.

The lifter grippers 42 are preferably in the form of vacuum cups so positioned and spaced as to be engageable with the box or body portions 21 of the die-cut sheet being run through the machine and which serve to effectually grip and retain such portions of the sheet thereto during the elevating or stripping stroke of the carrier 38 as shown in Figure 13 and until such time as they are to be transferred to the belt-carriage 25 for subsequent delivery to station B of the machine. Each of these cups is applied to the lower end of a vertically-displaceable tubular stem 47 guided in a tubular fitting 48 adjustably mounted on the carrier, a lock nut 49 serving to retain it in a set position of adjustment. A spring 50 is provided for normally urging the cup to its lowered position. Each cup 42 communicates with a source of vacuum, such as a vacuum tank 51 mounted on the top of the machine frame, through the medium of a flexible tube 52 and one or another of a plurality of interposed manifold pipes 53, as shown in Figure 2. It will be noted that the gripper plungers 41 are normally extended below the gripper cups 42 so that the former contact and grip the waste portion of the sheet before the latter on the down or gripping stroke of the carrier. Any suitable means may be employed for establishing and cutting off the vacuum to the vacuum cups.

Disposed at the waste-removing station A and below the carriage 25 is a conveyor belt 54 onto which the removed waste is adapted to be directed for discharge. The manner of directing the waste from the conveyor belts 27 is shown in Figure 14, this cycle of operation taking place during the travel of the carriage 25 from the position shown in Figures 5 and 13 to that shown in Figure 14, but with the carrier 38 in its elevated position before being actuated to its lowered position shown in such last-named figures, so as to leave the waste portion of the sheet free to be discharged or swept from the conveyor belts. At this time the leading and trailing gripper fingers 32, 33 as well as the stop fingers 28 are also in their released positions. A deflector 55 in the form of a brush or the like is mounted on the frame immediately above the belts 27 and adjacent the entrance to the station A, and is adapted during the rearward stroke of the carriage, to engage the rear edge of the sheet 20 and cause the waste portion 22 thereof to be relatively shifted in the opposite or forward direction, its front or leading edge dropping off the ends of the conveyor belts 27 and thence directed by gravity onto the conveyor 54 as seen in Figure 14, from which the waste portions are discharged.

After the waste has been stripped from the box-bodies 21 of the sheet, such bodies are retained to the vacuum cups 42 during the sweeping of the waste onto the discharge conveyor 54, after which the carrier 38 is again lowered to present the box-bodies to the plane of the carriage 25 and at which time the vacuum is broken and the box-bodies released from the respective cups, ready to be conveyed to the delivery station B. The means for thus handling the box-bodies and suitably stacking them is preferably constructed as follows:

5

At its front end and forwardly of the conveyor belts 27 for operative registration at one time with station A and at another time with the station B, the carriage is provided with a box-receiving platform 56 which is substantially rectangular in form and hollow to provide a vacuum chamber 57 having apertures 58 in its top or box-body supporting wall, the box-bodies being each adapted to cover or span one or another of these apertures and thereby be exposed to the vacuum in such chamber to retain the box-bodies in clinging relation to this platform. A flexible pipe 59 connects the vacuum chamber with the tank 51 and any suitable means may be employed for establishing and cutting off the vacuum to this chamber, suffice it to say that the vacuum is on during that cycle of operations in conveying the box-bodies from the stripping station A to the delivery station B (see Figures 11 and 15) and is off during the remaining cycles of operation (see Figures 12, 13 and 14).

Mounted in the upper portion of the frame 23 at the station B and disposed above the path of travel of the reciprocating carriage 25 is a box-body gripping mechanism movable vertically toward and from the plane of the carriage and having pick-up elements located in predetermined relation thereon for engaging the box-bodies on the platform 56 to first lift or remove such bodies from the platform and then release them for stacking in a neat pile or piles. This mechanism is similar to that located at the stripping station A and consists of a head or carrier 60 suspended from pneumatic or like actuated units 61 and guided at its ends in suitable guideways 62 applied to the upright portions of the frame, as shown in Figure 3. Any suitable means may be employed for actuating the pneumatic units in turn raise the carrier to the position shown in Figure 11 or to either of the lower positions shown in Figures 12 and 14, respectively. Applied to and depending from this carrier are a plurality of pick-up elements 63 which are preferably in the form of vacuum cups and positioned and spaced thereon to correspond with the vacuum cups 42 on the companion carrier 38 so as to register with and engage the box-bodies 21. Each of these cups is applied to the lower end of a vertically-displaceable tubular stem 64 guided in a tubular fitting 65 adjustably mounted on the carrier 60 and retained in a set position by a lock nut 66. A spring 67 is provided for normally urging the cup to its lowered position. Each cup 63 communicates with the vacuum tank 51 through companion flexible tubes 68 and any suitable means may be employed for establishing and cutting off the vacuum to these cups.

By this construction, as the waste portion 22 of the sheet is being discharged onto the conveyor 54, the chambered platform 56 is presented to the station A and momentarily arrested while the then elevated carrier 38 with its cup-charged box-bodies 21 is lowered from the position shown at the left in Figure 13 to that shown at the left in Figure 14 to place such bodies on the platform. Immediately thereafter the carrier 38 is elevated to the position shown at the left in Figure 15, the vacuum is established in the platform to positively retain the box-bodies in place thereon, and the carriage 25 is shifted in the opposite direction to present the box-bodies to the delivery station and simultaneously therewith present another die-cut sheet to the stripping station, as seen at the left in Figure 11. At this stage both carriers 38 and 60 are lowered to their

6

gripping positions shown in Figure 12, the vacuum is broken in the platform 56 and the carriers then elevated to the positions shown in Figure 13, wherein at the station A the box-bodies have been separated from the waste portion of the sheet and at the station B the previously separated box-bodies have been lifted by the vacuum cups 63 clear of the platform. After the next or waste-discharging stroke of the carriage, wherein the platform 56 is removed from beneath the carrier 60, the latter is lowered to the position shown at the right in Figure 14 and the vacuum is broken in the companion cups with the result that the box-bodies are released therefrom and drop by gravity onto a stacking platform 69 of any suitable construction but which is gradually lowered as the box-bodies are piled thereon so that such bodies fall but a short distance. The carrier 60 is then elevated to its initial position shown at the right in Figure 15 to make clearance for the forward stroke of the carriage 25 to bring the next lot of box-bodies, from which the waste has been removed, to the delivery station.

In Figure 16 we show a modified form of our apparatus designed for handling the die-cut sheets in a more efficient manner for disposing of the stripped waste portions of the sheets as well as for piling or stacking the box or body portions of such sheets. The frame, the sheet gripping and stripping mechanism at station A, and the box-body gripping mechanism at station B are substantially the same as heretofore described and bear the corresponding reference characters. In this form of our apparatus, the die-cut sheets are delivered to the station A from a continuously moving belt 70 onto spaced, intermittent belt 71 and are arrested at this station by stop fingers 72 and held in place by gripper fingers 73. Beneath the intermittent belt is a stationary plate 74. Motion is transmitted to the intermittent belt 71 in any appropriate manner, as by a ratcheting chain and sprocket drive 75 connected to the belt-shaft 76. The chain and sprocket drive is driven from a reciprocating carriage 77 guided on the tracks 24 and having a gear rack 78 thereon in operative geared relation to the sprocket drive, the carriage being reciprocated from a crank 79 and connecting arms 80. Applied to the top side of this carriage is the chambered platform 56. During the travel of the carriage from station A to station B, a die-cut sheet is deposited on the reciprocating belt 71 and arrested in position beneath the carrier 38, at which time the latter is lowered to bring its grippers 41 and 42 into contact with the waste and body portions of the sheet, whereupon the carrier is elevated to cause the body portion of the sheet to be stripped upwardly from the waste portion thereof. Upon the completion of this stripping operation, the carriage 77 is returned to station A, at which time the carrier 38 is lowered with its retained body portions of the sheets to transfer such sheets onto the chambered platform 56 in the manner previously described. The carrier is then elevated and the carriage moved again to station B to transfer the body portions of the sheets beneath the carrier 60. During this transfer operation, the waste portions of the sheet are swept from the belt 71 in any suitable manner as by the brush 81, and another die-cut sheet is deposited onto this belt for stripping the waste therefrom. When the body portions of the sheet reach station B, the carrier 60 is lowered and then raised to pick up those portions from the platform 56 in the manner

heretofore, described, and during the next cycle of travel of the carriage 77 said carrier 60 is lowered and the body portions of the sheet released therefrom for piling or stacking.

We claim as our invention:

1. In a machine for stripping the waste from a die-cut sheet, comprising a frame, conveyor means movable relatively to said frame for presenting the sheet to and supporting it at a predetermined station for stripping the body portions of the sheet from the waste portion thereof and for presenting such body portions to a predetermined station for discharging the body portions therefrom, sheet-gripping and stripping mechanism disposed above the path of travel of the conveyor for movement vertically toward and from the same and having hold-down elements thereon engageable with the waste portions of the sheet and lifting elements for releasable gripping engagement with the body portions of the sheet for causing the stripping of the body portions from the waste portion during a given movement of such stripping mechanism and for returning the stripped body portions to the conveyor means during another movement of said stripping mechanism, and means at the discharge station for removing the stripped body portions of the sheet from said conveyor means and depositing them in stack-like fashion at such station.

2. In a machine for stripping the waste from a die-cut sheet, comprising a frame, conveyor means movable relatively to said frame for presenting the sheet to and supporting it at a predetermined station for stripping the body portions of the sheet from the waste portion thereof and for presenting such body portions to a predetermined station for discharging the body portions therefrom, sheet-gripping and stripping mechanism disposed above the path of travel of the conveyor for movement vertically toward and from the same and having hold-down elements thereon engageable with the waste portions of the sheet and lifting elements for releasable gripping engagement with the body portions of the sheet for causing the stripping of the body portions from the waste portion during a given movement of such stripping mechanism and for returning the stripped body portions to the conveyor means during another movement of said stripping mechanism, and elevating means at the discharge station having pick-up elements thereon releasably engageable with the stripped body portions of the sheet for removing the same from said conveyor and subsequently releasing and depositing them in a stack-like fashion at such station.

3. In a machine for stripping the waste from a die-cut sheet, comprising a frame, a pair of elevating means mounted on said frame, one of said means including hold-down elements for engagement with the waste portion of the sheet and lifting elements for releasable gripping engagement with the body portions of the sheet for causing the stripping of the body portions of the sheet from the waste portion thereof upon the upstroke of such means and the companion means including lifting elements releasably engageable with the stripped body portions of the sheet, and a horizontally reciprocating carriage guided on the frame for movement below said elevating means and including a sheet-engaging support for presenting the die-cut sheet to the first-named elevating means and a support for receiving the stripped body portions released from the latter and presenting them to the second-named elevating means.

4. In a machine for stripping the waste from a die-cut sheet, comprising a frame defining a stripping station and a discharge station for the stripped body portions of the sheet, a reciprocating carriage guided on said frame between the stations and including a sheet-engaging support for presenting the die-cut sheet to the stripping station and a second support for receiving the stripped body portions of the sheet from the stripping station and presenting them to the discharge station, a stripper mechanism at the stripping station including lifting elements for releasable gripping engagement with the body portions of the sheet for stripping them from the waste portion thereof on the upstroke of said mechanism and for transferring such stripped body portions onto the second carriage-support on the downstroke of said mechanism, and a receiving and delivery mechanism at the discharge station including lifting elements for releasable gripping engagement with and for removing said body portions from said second carriage-support and depositing them in stack-like fashion at such station.

5. In a machine for stripping the waste from a die-cut sheet, comprising a frame defining a stripping station and a discharge station for the stripped body portions of the sheet, a reciprocating carriage guided on said frame between the stations and including a sheet-engaging support for presenting the die-cut sheet to the stripping station and a second support for receiving the stripped body portions of the sheet from the stripping station and presenting them to the discharge station, stripping means disposed at the stripping station for movement toward and from the sheet and including hold-down elements engageable with the waste portion of the sheet during the movements of such stripping means and lifting elements for releasable gripping engagement with the body portions of the sheet for causing the separation of such portions from the waste portion upon a relative movement of the stripping means, said lifting elements being adapted to transfer the separated body portions onto the second carriage-support, and pick-up means at the discharge station including an elevating head having elements thereon for releasable gripping engagement with and for removing said body portions from said second carriage-support on the upstroke of said head and depositing them in stack-like fashion at such station on the downstroke of said head.

6. In a machine for stripping the waste from the die-cut sheet, comprising a frame defining a stripping station and a discharge station for the stripped body portions of the sheet, a reciprocating carriage guided on said frame between the stations and including a sheet-engaging support for presenting the die-cut sheet to the stripping station and a second support for receiving the stripped body portions of the sheet from the stripping station and presenting them to the discharge station, stripping means disposed at the stripping station for movement toward and from the sheet and including hold-down elements engageable with the waste portion of the sheet during the movements of such stripping means and lifting elements for releasable gripping engagement with the body portions of the sheet for causing the separation of such portions from the waste portion upon a relative movement of the stripping means and to elevate such portions above the plane of the carriage, means in operative relation to the sheet-engaging support and engageable

9

with the waste portion of the sheet for directing it from such support during the travel of the carriage in a given direction to a point of discharge, said lifting elements being adapted to thereafter transfer the separated body portions onto the second carriage-support, and vertically-displaceable pick-up means at the discharge station including elements adapted for releasable gripping engagement with and for removing said body portions from said second carriage-support and depositing them in a stack-like fashion at such station.

7. In a machine for stripping the waste from a die-cut sheet, comprising a frame, a reciprocating carriage including a support for presenting a sheet to a given operating station for stripping the body portions from the waste portion of the sheet and a second support for receiving the body portions at such stripping station and transferring them to a second operating station for discharging such portions from the machine, and means in operative relation to said first-named support and operatively engageable with the waste portion of the sheet at a predetermined time in the movement of the carriage to discharge such waste portion from the machine.

8. In a machine for stripping the waste from a die-cut sheet, comprising a frame, a reciprocating carriage including a support for presenting a sheet to a given operating station for stripping the body portions from the waste portion of the sheet and a second support for receiving the body portions at such stripping station and transferring them to a second operating station for dis-

10

charging such portions from the machine, combined pressure and vacuum-operated means at the first-operating station and releasably engageable with the body and waste portions of the sheet to strip them one from the other with the waste portion retained on the first-named support and the body portions retained by said vacuum-operated means, means in correlation to said first-named support and operatively engageable with the waste portion of the sheet at a predetermined time in the movement of the carriage to discharge such waste portion from the machine, and vacuum-operated, pick-up means at the second-operating station for removing said body portions from said second-carriage-support and for depositing them at such station.

ERIC L. HEDSTROM.  
MARTIN C. OTTO.  
CECIL E. GOODERHAM.

#### REFERENCES CITED

The following references are of record in the file of this patent:

#### UNITED STATES PATENTS

Number	Name	Date
1,981,974	Vernimb -----	Nov. 27, 1934
2,255,522	Wilcox et al. -----	Sept. 9, 1941
2,444,544	Thomas -----	July 6, 1948

#### FOREIGN PATENTS

Number	Country	Date
766,164	France -----	Apr. 9, 1934