Nov. 25, 1952 H. J. GOTTLIEB 2,619,175

APPARATUS FOR SEPARATING CARBON SHEETS FROM MANIFOLD PACKS

Filed March 8, 1949 2 SHEETS—SHEET 1

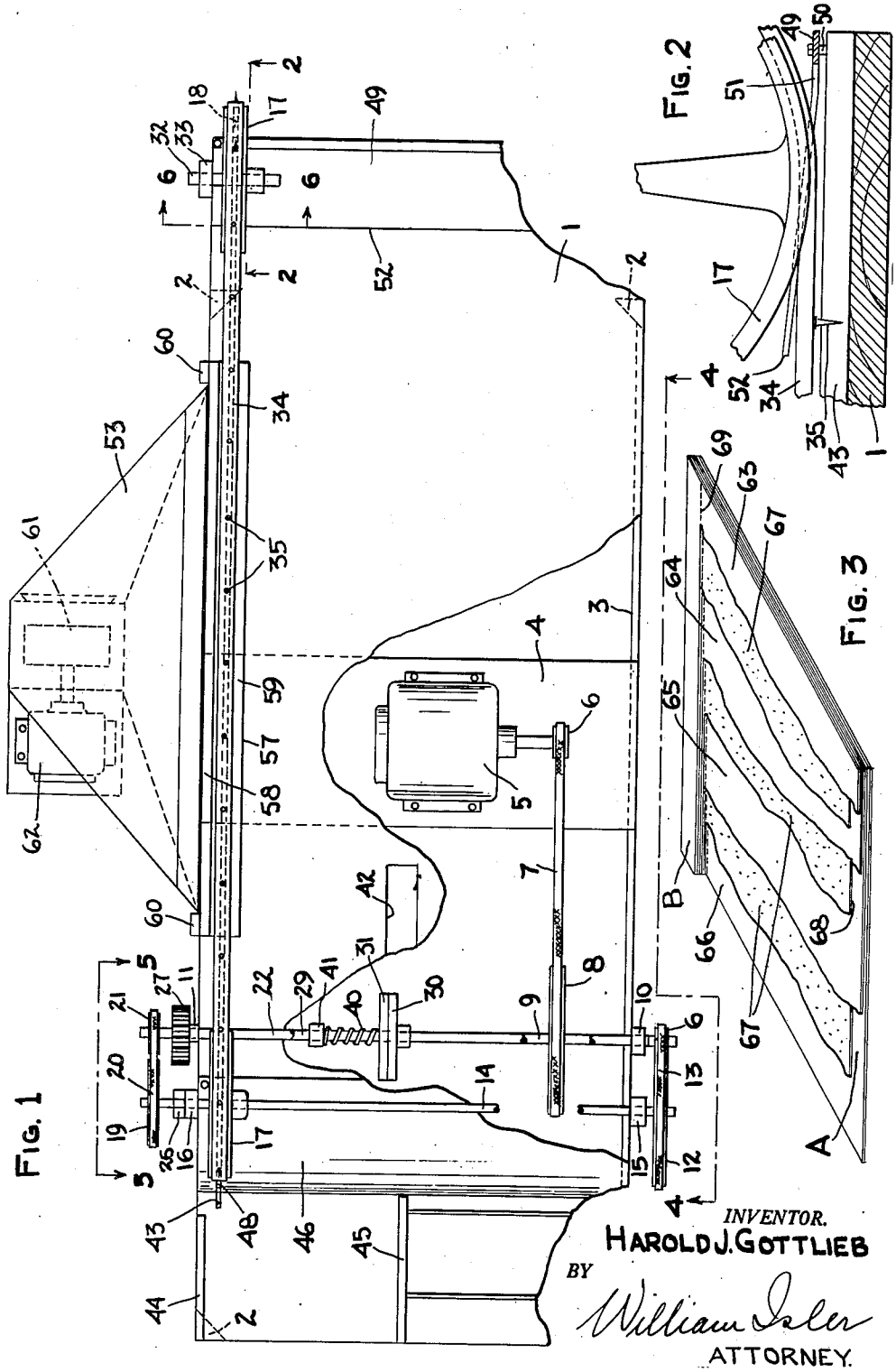


FIG. 1

FIG. 2

FIG. 3

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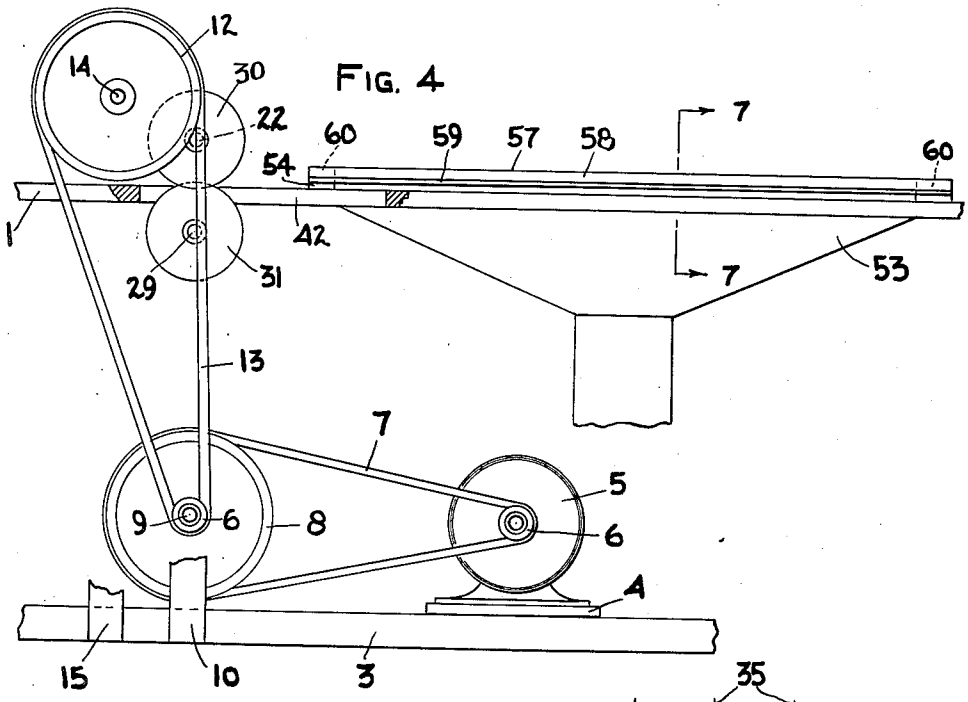


FIG. 4

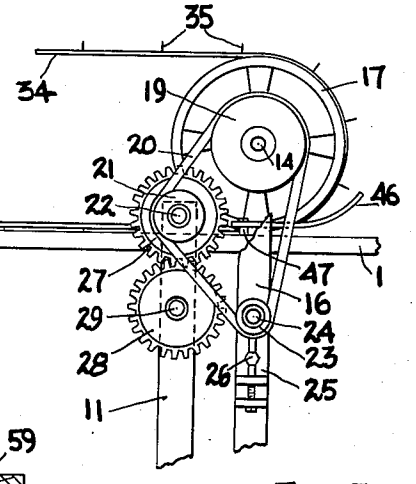


FIG. 5

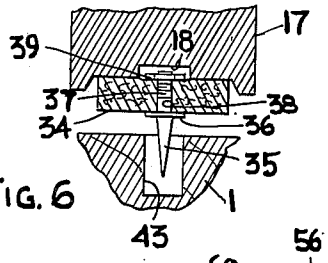


FIG. 6

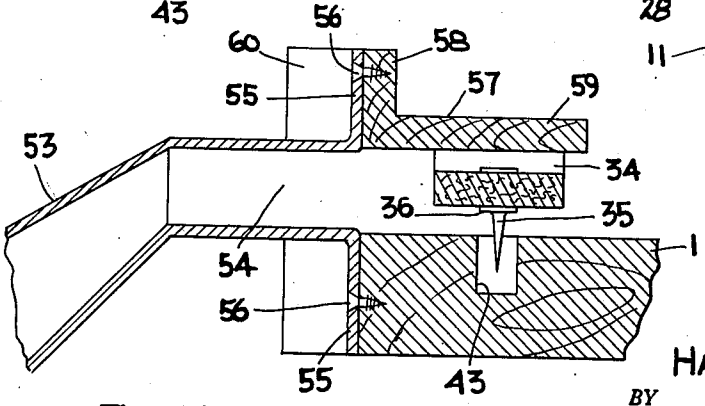


FIG. 7

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APPARATUS FOR SEPARATING CARBON SHEETS FROM MANIFOLD PACKS

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Application March 8, 1949, Serial No. 80,212

1 Claim. (Cl. 164—61)

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This invention relates to a method and apparatus for separating carbon papers or sheets from the work sheets in a manifold pack.

The make-up of a manifold pack is shown and fully described in another part of this specification, however, I wish to state, by way of preamble, that by the term "manifold pack" I am referring to a pack of forms such as invoices or the like, which may consist of two or more sheets interleaved with carbon paper sheets and joined together along one edge. Such packs are used for making duplicate, triplicate, quadruplicate, etc. copies at a single impression.

It is customary in making these packs that the carbon paper be somewhat shorter in length than the work sheets and that the work sheets be perforated along the margin where the sheets are joined.

In separating the carbon paper from the pack after the multiple copies have been made, the clerical worker usually grasps the pack with one hand at the joined edge, and with the other hand grasps the pack below the lower edge of the carbon sheets thereby removing the work sheets from the pack along the perforated line, leaving the carbon sheets.

Although my invention may be utilized to effect the above-described separation, it is intended that it be used primarily in separating the pack for salvage purposes rather than for clerical purposes.

Many such manifold packs are never used because they are misprinted, become obsolete or are in some other respect unusable. The carbon sheets in these packs are worthless, however, the work sheets are worth salvaging. Before the work sheets can be sold as salvage or waste paper, it is necessary that they be segregated from the carbon sheets as the carbons interfere with and are deleterious to the subsequent processing of the salvaged paper. Heretofore, such separation has been accomplished manually, in the manner above described, being a slow and relatively expensive method. In fact, under certain circumstances, the cost of separating the pack makes it uneconomical to attempt to salvage the paper.

It is the primary object of my invention to provide a method of separating the carbon sheets from manifold packs which is efficient, rapid and economical.

Another object of my invention is to provide a separating apparatus which will automatically remove and segregate the carbon sheets from the work sheets in a manifold pack.

Other objects and advantages of the invention

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will be apparent during the course of the following description.

In the accompanying drawings, forming a part of this specification, and in which like numerals are employed to designate like parts throughout the same,

Fig. 1 is a top plan view of a separator embodying my invention, portions thereof being broken away to show details of the structure;

Fig. 2 is a fragmentary sectional view taken substantially on line 2—2 of Fig. 1, showing the paper stripping arrangement;

Fig. 3 is a perspective view of a manifold pack of the type which is salvaged by the use of my invention;

Fig. 4 is a view of the power transmission train on one side of the separator, viewed as indicated by line 4—4 of Fig. 1, the belt not being shown;

Fig. 5 is a view of the power transmission train on the other side of the separator, viewed as indicated by line 5—5 of Fig. 1;

Fig. 6 is a fragmentary cross-sectional view, taken substantially on line 6—6 of Fig. 1; showing details of the belt and pulley structure, and

Fig. 7 is a fragmentary cross-sectional view, taken on line 7—7 of Fig. 4, with the belt in position, showing the blower outlet and other details of the structure.

Referring more particularly to the drawings, the separator comprises a long rectangular bed 1, which is suitably supported by a plurality of legs 2 reinforced by cross-braces such as 3. A shelf 4 is disposed across the braces 3 beneath the bed 1 on which is mounted an electric motor 5 which serves to drive various parts of the mechanism hereinafter described.

As best seen in Figs. 1, 4 and 5, a sheave 6 is secured to the motor shaft and by means of a V-belt 7 drives a large sheave 8 which is secured to a shaft 9. The shaft 9 is journalled in oppositely disposed uprights or journal bars 10, 11 which are secured to the braces 3 by welding or other suitable means.

Another sheave 6 is secured to one extremity of the shaft 9 and rotates with shaft 9 to drive sheave 12 by means of V-belt 13.

Sheave 12 is secured to one end of a shaft 14 which is journalled in oppositely disposed uprights or journal bars 15, 16. Intermediate the journal bars 15, 16 on the shaft 14 is secured a flanged pulley 17 having a circumferential centrally disposed groove 18 formed therein, the purpose of which will hereinafter become apparent.

At the other end of shaft 14 is secured a sheave 19 which by means of V-belt 20 drives sheave 21

mounted on shaft 22 which is journalled in journal bars 10 and 11. The belt 20 is kept under proper tension by means of an idler sheave 23 which is carried by stub shaft 24 on an adjustable plate 25 mounted on journal bar 16 as by cap screw 26.

Closely adjacent sheave 21 on shaft 22 is mounted a spur gear 27 which meshes with a spur gear 28 mounted on a shaft 29 immediately below and parallel with shaft 22. Shaft 29 is also journalled in the bars 10 and 11.

A cutter wheel 30 is mounted on shaft 22 and another cutter wheel 31 is slidably mounted in slightly overlapping relationship thereto on shaft 29, the effect of the spur gears being to rotate cutter wheel 31 in a direction counter to that of wheel 30.

A compression coil spring 40 is mounted on the shaft 29 between the cutter wheel 31 and a collar 41 which is secured to the shaft. The spring maintains cutter wheel 31 in abutment with cutter wheel 30 so that proper cutting action is effected by the two wheels.

A slot 42 is provided in the bed 1 to provide clearance for the wheels 30 and 31 and it also may serve as an opening through which the bed can be cleared of cuttings, although, as will hereinafter become apparent, the cuttings can be otherwise disposed of.

Near one end of the bed 1 is mounted a stub shaft 32, as in journal bar 33, the shaft having secured thereon another grooved pulley 17 similar in all respects to the pulley hereinbefore described.

An endless flat belt 34 runs on the pulleys 17 and has secured thereto at spaced intervals a plurality of sharp-pointed pins 35 which project outwardly from the surface of the belt. The pins 35 are slightly tapered and have an annular flange 36 formed thereon which seats against the outer surface of the belt and are further provided with a threaded extension 37 which extends through openings 38 provided in the belt. A nut 39 is utilized to secure the pins 35 to the belt.

The pulleys 17 are positioned at a predetermined height above the bed 1 such that the lower reach of the belt 34 is elevated only a slight distance above the bed 1, the ends of pins 35 projecting below the top surface of the bed. To provide clearance for the movement of the pins 35, a groove 43 is formed in the bed 1 to coincide with the path of travel of the pins, as clearly shown in Figs. 6 and 7.

The left end of the device, as viewed in Fig. 1, is the loading end of the separator and the right end is the stripping end. As shown in Figs. 1 and 5, a stationary guide bar 44 is provided on the loading end of the device, and an adjustable guide bar 45 is provided in spaced parallel relationship to the bar 44, the bar 45 being movable toward or away from the bar 44.

A curved feed plate 46 extends substantially across the entire width of the loading end of the separator and is secured to the bed 1 in spaced relation thereto as defined by spacer sleeves 47. The plate 46 is suitably slotted as at 48 to allow clearance for the pins 35 and the belt 34.

As best seen in Fig. 2, the stripping end of the machine is provided with a stripper plate 49 which extends at a slight angle to the bed 1 and which is secured in spaced relationship thereto as defined by spacer sleeves 50. A portion of plate 49 underlies pulley 17 and this portion is suitably slotted as at 51 to provide clearance for the belt 34 and the pins 35. It will be noted that the end 52 of the stripper plate is elevated above the lower reach of the belt 34 and that the plate slopes gradually to a point slightly below the belt 34.

Located approximately midway and to one side of the bed 1 is an air duct 53 having a long narrow outlet opening 54. The duct 53 is flanged as at 55, the lower flange being secured as by screw 56 to the edge of the bed 1 and the upper flange being secured to one leg 58 of an L-shaped outlet extension 57, the other leg 59 of which overlies the lower reach of the belt 34, as best seen in Fig. 7.

Blocks 60 are secured to the edge of the bed 1 and to the leg 58 of the extension 57 in order to maintain the extension securely in elevated position.

The duct 53 is connected to a centrifugal blower assembly 61, which is driven by an electric motor 62.

Before proceeding to a description of the operation of the separator, I wish to refer to Fig. 3 which illustrates a paper manifold pack of the type which my invention is designed to salvage.

The pack in this instance, comprises four paper work sheets; the original 63, the duplicate 64, the triplicate 65 and the quadruplicate 66. Interleaved between these work sheets are the carbon sheets 67, the lower edges 68 of which are somewhat shorter than those of the work sheets, thereby forming a carbon free margin indicated by the letter A. Another margin B near the upper edge of the pack is defined by perforations 69 on the work sheets extending parallel to the edge, and within the margin B the sheets 63, 64, 65, 66 and the carbons 67 are integrated or joined together as by gluing.

The manifold pack is thus held together along the margin B, however, the work sheets and carbon sheets are separable below the margin B, and the work sheets are free of interleaved carbon sheets below the edge 68 of the carbon sheets as defined by margin A.

As heretofore mentioned, it is desired to salvage the work sheets by segregating them from the carbon sheets. In utilizing my invention to accomplish the foregoing, the manifold pack is fed into the separator at the loading end, the guides 44 and 45 serving to maintain the pack properly aligned.

With the motor 5 in operation, shafts 9, 14 and 22, and the sheaves and pulleys mounted thereon, all rotate in a direction which is counter-clockwise as viewed in Fig. 4, or clockwise as viewed in Fig. 5, so that the lower reach of belt 34 moves in a direction toward the stripping end of the apparatus. The cutter wheel 30 rotates counter-clockwise and cutter wheel 31 rotates clockwise, as viewed in Fig. 4, so that their horizontal resultant is also in the direction of the stripper end of the separator.

The manifold pack is fed in under the feed plate 46 with the margin A disposed adjacent guide bar 44 and the margin B disposed adjacent guide bar 45. When the pack has been fed in far enough the pins 35 on the moving belt 34 pierce the margin A and carry the pack forward. It is to be noted that the carbon sheets 67 are not pierced or held by the pins 35.

As the pack passes through the rotating cutter wheels 30 and 31, the margin B is severed, thus removing any connection or joinder between the sheets 63, 64, 65, 66 and the carbons 67 and

putting the pack in condition to be completely separable.

The blower assembly **61** now being in operation, the pack is drawn by the belt across the outlet opening **54** of the duct **53** and a strong stream of air hits the edge of the pack riffling the sheets and blowing the interleaved carbon sheets out of the pack and across the bed **1** where they drop into a suitably placed receiver.

The sheets **63**, **64**, **65** and **66** are held by the pins **35** against lateral displacement and continue to move forward with the belt.

As the sheets pass under the elevated end **52** of the stripper plate **49**, the sheets are caused to be removed from the pins **35** as the direction of travel of the belt **34** commences to change. This stripping action is facilitated by the taper form of the pins which permit quick disengagement of the paper from the pins as the sheets are drawn downwardly.

The sheets, now free of carbon paper, are dropped into a suitable receiver placed at the end of the bed **1**.

Although I have referred to the slot **42** in the bed **1** as an opening through which the cuttings may drop, it will be apparent that the stream of air is directed laterally across the bed **1** and will suffice to sweep the bed clear of cuttings by blowing them into the same receiver into which the carbon sheets are deposited.

The cutters **30** and **31** may be adjusted on their respective shafts to accommodate any size of manifold pack within practical limits so that the separator may be used for a variety of sizes of packs.

The packs may be fed into the apparatus manually or by suitable feeding means forming no part of this invention.

The various sheaves heretofore described, are of such relative diameters as to step down the rotation of the pulleys **17** to practical operating speeds. I have successfully operated a separator constructed as described above at a belt speed of approximately 150 feet per minute, however, this rate of speed is not to be considered as necessary maximum.

Using manual feeding of the packs, the separator has segregated work sheets at the rate of approximately 200 pounds of paper per hour. This poundage may be contrasted to that obtained by skilled workers in performing separations manually, in which the output is about 25 pounds per hour.

It will thus be apparent that I have devised a method and an apparatus for effecting separation of manifold packs which quickly and

economically removes the undesired carbon paper from the salvagable work sheets so that valuable waste paper which has heretofore, in many instances, not been recovered at all due to its prohibitive cost of separation, can now be efficiently processed.

It is to be understood that the form of my invention, herewith shown and described, is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of my invention, or the scope of the subjoined claim.

Having thus described my invention, I claim:

A separator for separating the work sheets from the carbon sheets in a manifold pack wherein the pack has a margin not interleaved by carbon sheets, comprising a movable endless belt, a plurality of piercing elements secured to said belt and projecting outwardly therefrom, a bed for supporting said manifold pack, said bed being provided with a clearanceway for said piercing elements, said piercing elements being adapted to impale the aforesaid margin of said manifold pack, means for continuously driving said belt, a rotating cutter disposed in the path of movement of the manifold pack and adapted to sever the margin of said pack opposite said first-named margin, a high velocity blower associated with said bed, said blower having a narrow outlet parallel to the direction of travel of said belt and coplanar therewith, whereby to displace the severed interleaved carbon sheets of said pack, and a bifurcated sheet secured to said bed and having portions thereof extending athwart said belt whereby to strip the piercing elements of the manifold sheets adhering thereto after said carbon sheets have been removed.

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