

March 15, 1966

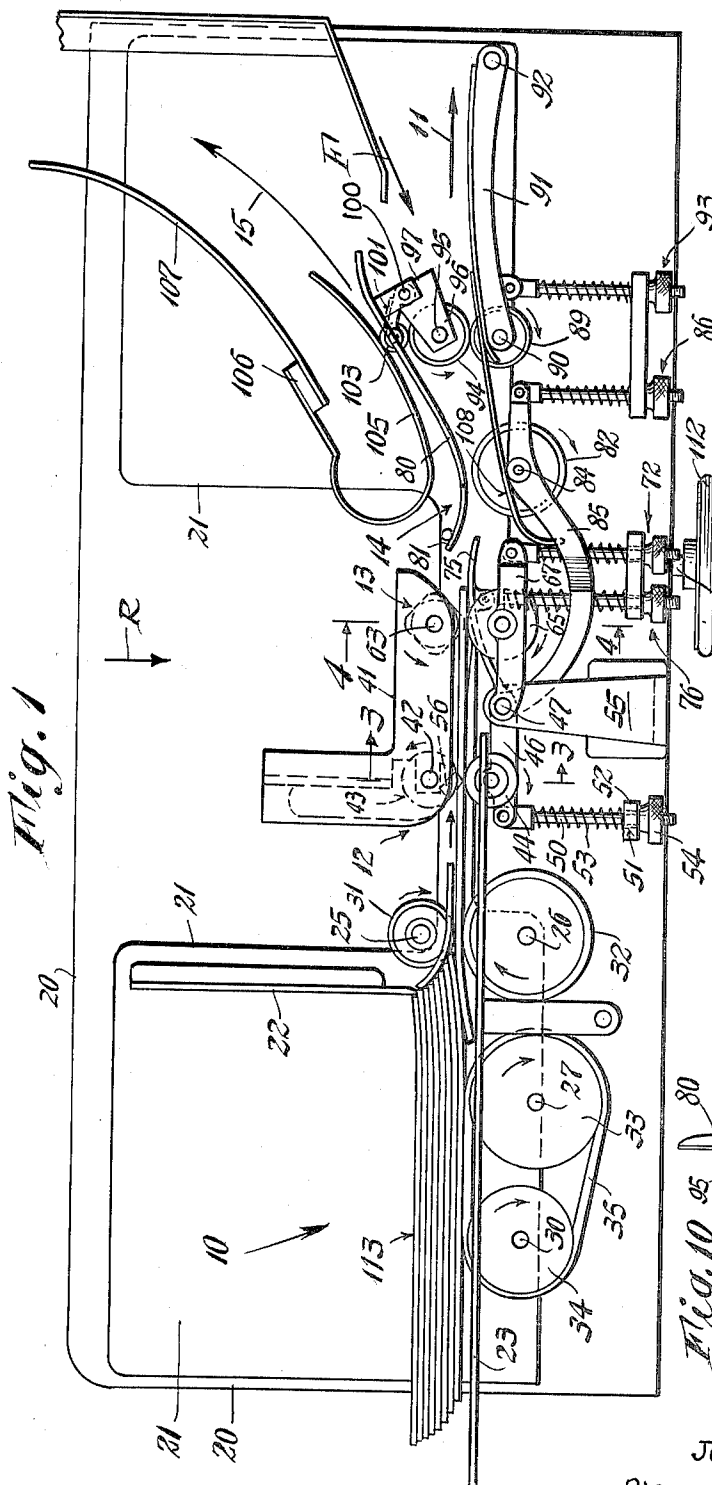
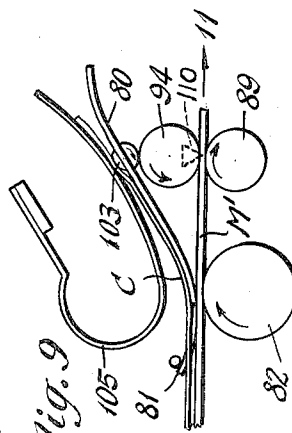
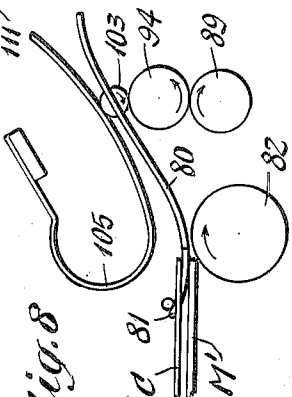
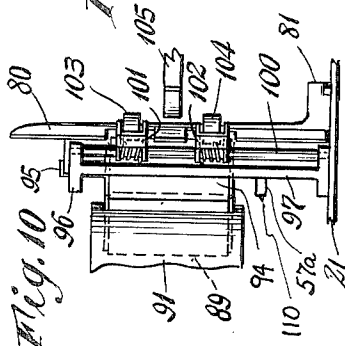
R. CHAMBERLAIN ET AL

3,240,089

DOCUMENT HANDLING APPARATUS

Filed Aug. 27, 1963

2 Sheets-Sheet 1



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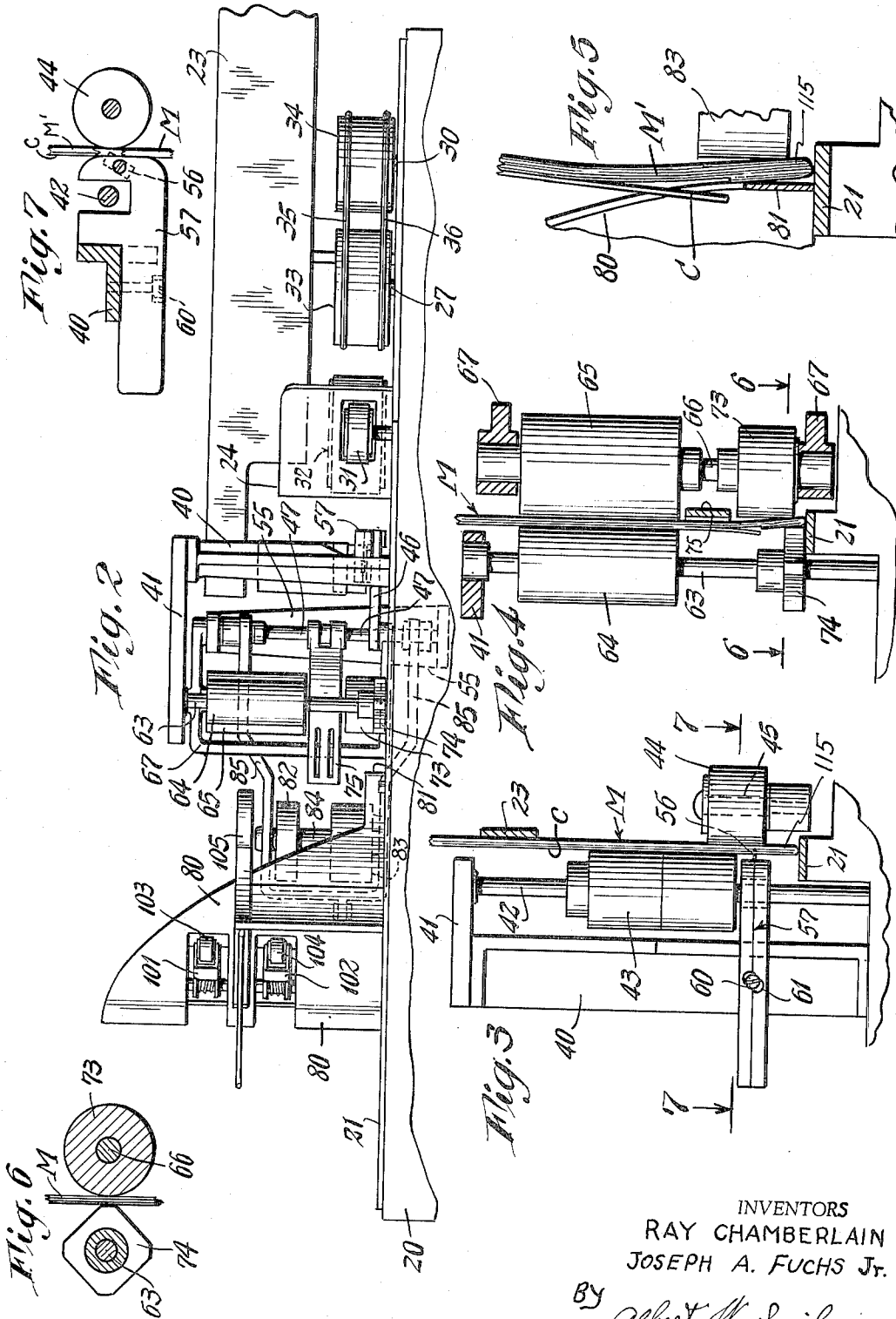
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1

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DOCUMENT HANDLING APPARATUS

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This invention relates to an apparatus for separating various portions of bound multileaf documents. More particularly the invention relates to a novel apparatus for feeding, slitting and separating sheets from bound multileaf documents such as magazines.

In the retailing of magazines a vendor usually has one or more unsold copies of any particular magazine issue left over and these are usually returned to a distributor. After accumulating a quantity of old issues the distributor in many cases strips the covers from such issues and returns the same to a wholesaler for credit. The task of stripping the covers from the magazines has heretofore constituted a tedious and time consuming task and for the most part has been carried out by hand which gives rise to relatively high labor costs.

The prime object of the instant invention is to provide a machine which is capable of efficiently stripping the first sheet from multileafed documents such as magazines and delivering these first sheets and the remaining portions of the documents to separate collecting stations respectively.

Another object of the invention is to provide a novel magazine cover removing apparatus wherein after being moved past a slitting blade a magazine is flexed so as to urge the cover in the region of the slit to move away from the remaining portion of the magazine thereby facilitating separation of the cut parts of the magazine.

Another object of the invention is to provide a novel impact producing mechanism for rapidly oscillating a portion of a slit magazine so that the slit cover thereof is shaken loose from the remaining portion of the magazine.

Another object of the invention is to provide a magazine separating apparatus having novel means for insuring the severance of at least the cover from the remaining portions of the magazine and for reliably guiding the separated portions of the magazine along two distinct feed paths respectively.

Other objects of the invention will become apparent as the disclosure progresses.

FIG. 1 is a plan view illustrating one embodiment of the instant invention.

FIG. 2 is a rear elevational view as seen from the direction indicated by arrow R of FIG. 1.

FIG. 3 is an elevational view in partial section taken along section line 3—3 of FIG. 1.

FIG. 4 is an elevational view in partial section taken along section line 4—4 of FIG. 1.

FIG. 5 is an elevational view taken transversely of the magazine feed path and shows the separating of the cover from the remaining portion of the magazine.

FIG. 6 is a sectional plan view taken along section line 6—6 of FIG. 4.

FIG. 7 is a sectional plan view taken along section line 7—7 of FIG. 3.

FIGS. 8 and 9 are diagrammatic sketches illustrating the cover separating action in the instant machine; and

FIG. 10 is an elevational view of a portion of the magazine cover transport means as seen from a direction indicated by arrow F of FIG. 1.

A very general description of the instant apparatus will be made with reference to FIG. 1. The machine comprises a document retaining means 10 which is adapted to receive and support a stack of magazines that are to have their covers removed. Belt and pulley means are provided for serially transporting magazines from the retaining

2

means 10 along a predetermined feed path 11 through the machine. As each magazine moves along said feed path it successively passes a cutting station 12; a magazine flexing station 13 and a cover intercepting station 14. From station 14 the severed magazine cover is guided along a divergent feed path 15 to a suitable collecting or stacking station while the remaining portion of the magazine continues its movement along the feed path 11 to another suitable collecting or stacking station.

Referring now to the structural details of the machine as shown in FIGS. 1 and 2 the instant apparatus comprises a main supporting frame 20, FIG. 2 having a horizontal upper deck plate 21 secured thereto. The deck plate 21 is contoured so as to essentially define the floor area of the stack retaining station 10, the relatively narrow longitudinal feed path 11, and the feed path 15, all as is generally illustrated in FIG. 1. Fixedly mounted on one end of the deck plate is a first vertically disposed edge guide plate 22 that is disposed substantially normal to said feed path 11, and a second vertically disposed and slightly elevated (FIG. 2) face guide plate 23 that is disposed parallel to and along the initial portion of said feed path; said guide plates being mounted on the machine frame by any suitable fastening means. A fillet type arcuate guide plate 24, FIG. 2, is fixedly mounted on the deck plate 21, the guide surfaces at the opposite ends thereof being respectively coextensive with and parallel to the operative guide surfaces of said guide plates 22 and 23. Four vertically disposed shafts 25, 26, 27 and 30 are rotatably mounted on the machine frame and extend through the deck plate 21, these shafts having feed rolls 31 and 32 and pulleys 33 and 34 secured to their respective upper ends. Looped around pulleys 33 and 34 is a pair of belts 35 and 36, FIG. 2, the inner lengths or runs of which are disposed generally between the lower edge of guide plate 23 and the deck plate 21 and extend slightly beyond the plane of the guide plate 23 as is best seen in FIG. 1. The periphery of roll 31 is disposed adjacent the feed path 11 and extends through a suitable aperture formed in the arcuate guide plate 24 while the opposed and cooperating roll 32 extends beneath the lower edge of plate 23 and into said feed path. The lower ends of shafts 25, 26, 27 and 30 are rotatably supported and driven by any suitable drive means mounted in the machine frame beneath the deck plate 21 so as to rotatably drive the various associated rolls and pulleys in the directions noted by the arrows in FIG. 1.

The roll 31 and its supporting shaft may be adjustably mounted for movement toward and away from the roll 32, the adjusting means here being the same as that for certain other positionally adjustable rolls to be subsequently described. This adjusting feature is provided for the various rolls so that the machine may accommodate magazines having various thicknesses.

A vertical pillar post 40 is fixed to the machine frame and supports a horizontally disposed L-shaped outboard support bracket 41 that is secured thereto by any suitable fastening means. A vertical shaft 42 extends through a suitable opening in the deck plate 21 and is rotatably supported at its upper outboard end by said L-shaped bracket 41 as is best seen in FIG. 3. Rotatably fixed to the intermediate exposed portion of shaft 42 is a feed roll 43 having a peripheral portion which is disposed along said feed path and which cooperates at its lower end with an opposed roll 44 disposed on the other side of the feed path as is best seen in FIG. 3. Roll 44 is rotatably mounted on an upstanding shaft 45 that extends through a suitable opening in the deck plate 21; shaft 45 being rotatably mounted in the free end of an adjusting lever 46 that in turn is pivotally mounted on an upstand-

3

ing pivot shaft 47. The free end of lever 46 is articulately connected to a threaded link 50 that extends horizontally through a suitable aperture 51 formed in an upstanding lug 52 fixed to the machine frame 20. A spring 53 operatively disposed between link 50 and lug 52 effectively serves to yieldably bias the roll 44 toward roll 43 to an extent determined by the setting of a nut 54 that is threadedly engaged with the outer end of link 50 and abuts the outer face of said lug 52. The pivot shaft 47 is fixedly mounted on the horizontally extending legs of a U-shaped bracket 55, FIG. 1, that is fixed to the machine frame.

A cutting blade 56, FIGS. 3 and 7, extends into the feed path 11 at a point below the roll 43 and opposite a lower portion of roll 44; the cutting blade being fixedly supported by means of a two piece laminated clamping bracket unit 57 that is secured to said pillar post 40 by means of a suitable screw 60, FIGS. 3 and 7. The aperture 61 in unit 57 through which screw 60 extends is elongated as shown in FIG. 3 so as to permit the adjustable positionment of the cutting edge of blade 56 with respect to the document feed path 11 thereby affording a control over the depth of cut produced by blade 56.

The machine station 13 for flexing the magazine after its cover has been slit comprises a second vertical shaft 63 that extends through a suitable aperture in the deck plate 21 and is rotatably supported at its outboard end in said L-shaped bracket 41. To the intermediate portion of shaft 63 is fixed a roll 64 whose peripheral portion is disposed along the feed path and is adapted to cooperate with an opposed roll 65 that is fixed to a vertical shaft 66. The shaft 66, FIG. 4, extends through a suitable aperture in the deck plate and is rotatably mounted in the horizontally disposed leg portions of a U-shaped yoke 67, the horizontal lower leg of which is disposed in a suitable opening formed in the frame and deck plate. The yoke 67 is pivotally supported on said shaft 47 so as to permit roll 65 to be adjustably positioned relative to its cooperating roll 64; this positional adjustment being controlled by an adjusting device 72, FIG. 1, that is similar to that shown at 50-54 for the lever 46. Fixed to the lower part of shaft 66 is a second roll 73, FIG. 4, that is disposed in opposed cooperating relation with respect to a four lobe cam 74, FIGS. 4 and 6, fixed to said shaft 63. Rotation of cam 74 causes the cam lobes to strike and intermittently flex the lower edge of the magazine as the latter progresses along feed path 11 as will be described. The magazine camming station 13 of the machine also includes a curved cam arm 75, FIGS. 1, 2 and 4, that is pivotally mounted on said shaft 47 and extends generally downstream along said feed path as best shown in FIG. 1. The cam arm 75 is pivotally adjustably positioned with respect to the feed path by means of an adjusting device 76, FIG. 1, that is also similar to that shown at 50-54 for said lever 46.

After leaving camming station 13 the magazine enters the cover separating station 14 which includes a generally vertically tapered separator blade 80 that is fixedly attached to the machine frame by any suitable means. The upstream nose portion 81 of the horizontally curved blade 80 is vertically shortened as is best seen in FIG. 2 and extends into the center of the feed path at a point just downstream from the end of the curved cam arm 75 so as to be in a position to intercept, as illustrated in FIG. 5, the severed cover of the slightly flexed magazine that is moving out of the camming station 13. Disposed in opposed cooperating relation to the upstream portion of the separator blade 80 is a pair of axially spaced rolls 82 and 83, FIG. 2, that are fixed to a shaft 84 that extends through a suitable aperture in the deck plate and is rotatably mounted in the horizontally disposed legs of a U-shaped bracket 85. Bracket 85 is pivotally mounted on said shaft 47 and is pivotally adjusted by means of an adjusting device 86 that is also similar to that shown at 50-54 for said lever 46.

4

When the severed cover and the remaining portion of the magazine are separated by the intercepting blade 80 they proceed along their respective divergent feed paths 15 and 11, FIG. 1, under the action of separate feed drive means; such feed drive means including a roll 89, FIG. 1, fixed to a shaft 90 that extends through a suitable aperture in the deck plate and is rotatably mounted on the horizontally extending arms of a U-type bracket 91 that is pivotally mounted on an upstanding stud 92 fixed to the deck plate 21. The pivotal position of bracket 91 may be adjusted by means of an adjusting device 93 that is also similar to that shown at 50-54 for said lever 46. Roll 89 is disposed in opposed cooperating relation with respect to a roll 94 that is rotatably fixed to a vertical shaft 95. Shaft 95 extends through a suitable aperture in the deck plate 21 and has its upper outboard end rotatably supported by a horizontal projection 96, FIGS. 1 and 10, formed on an upstanding bracket 97 that is secured to the deck plate. Fixed to bracket 97 is a vertically disposed shaft 100 that rotatably supports a first and a second pair of similar arms 101 and 102 that respectively rotatably mount at the free ends thereof rolls 103 and 104. The arms 101 and 102 are suitably biased as by means of springs so as to yieldably swing the rolls 103 and 104 into peripheral engagement with the said roll 94. As will be apparent shaft 95 and roll 94 when driven will frictionally rotate the rolls 103 and 104. Rolls 103 and 104 extend a short distance through suitable slots formed in the adjacent portion of the separator blade 80 and thus are capable of frictionally engaging and driving magazine covers that are moving along the said divergent path 15.

Several light cantilevered type leaf spring elements are provided for guiding the documents through the separating station 14; such elements including a horizontally bowed leaf spring guide 105, FIG. 1, that is secured at one end to an upstanding post 106 fixed to the deck plate; the other free end thereof serving to yieldably bias the magazine covers into engagement with the said driven feed rolls 103 and 104. Post 106 also supports a similar leaf spring guide 107 that extends downstream of feed path 15 so as to guide covers C along said path 15. A third leaf spring guide 108, FIG. 1, is secured to the lever 91 and extends upstream of feed path 11 so as to guide a magazine portion M' between the rolls 89, 94. Any suitable hoppers, stackers or other receptacles may be provided for separately receiving the covers C and the remaining portions M' of the magazines that move along the respective feed paths. A multilator cutting blade 110, FIGS. 9 and 10, is fixedly supported on the machine frame below roll 94 by means 57a, FIG. 10, that are similar to that for blade 56, said blade 110 operatively extending into the path 11 of movement of the magazine portion M' so as to further slice or otherwise destroy the remaining portion of each magazine body.

It will be understood that the periphery of the various feed rolls are coated with a friction material such as rubber, and that the lower ends of the shafts 42, 45, 63, 66, 84, 90 and 95 are rotatably supported and driven by any suitable means mounted on the machine frame 20 beneath the deck plate 21. These shafts may be driven from a main input shaft 111, FIG. 1, having a pulley 112 secured to the outer end thereof.

In the operation of the instant machine a stack 113 of magazines is placed on edge on the deck plate 21 so as to be received by the document retaining means defined essentially by guide plates 22-24. As the leading magazine is engaged by the adjacent run of the driven belts 35 and 36 it will be driven longitudinally along the feed path 11 and between the rolls 31 and 32 to the cutting station 12. The reversely rotating roll 31 permits only a single magazine to be fed at a time into said cutting station. As the magazine passes between the feed rolls 43 and 44 of station 12 the cutting blade 56 slits the front cover C along a line parallel and adjacent to the lower bound

5

edge 115, FIG. 3 of the magazine. The rolls 43 and 44 progressively feed the slit magazine along the feed path 11 and into the nip of rolls 64 and 65, FIG. 4, of the magazine flexing station 13. Here the camming blade 75 progressively flexes or bends the lower portion of the magazine and cover to the left as seen in FIG. 4 while the rotating four lobe cam 74 simultaneously intermittently strikes and displaces the lowermost bound portion 115 of the magazine thereby insuring that the actual severance of the slit cover from the rest of the magazine is complete. This camming and flexing of the lower portion of the magazine produces a bowing of the magazine such that the convex outer side of the latter faces the upper side of the feed path 11 as seen in FIG. 1. This bowing tends to separate the lower part of the cover C from the rest of the magazine M as illustrated best in FIG. 5 and the continued movement of the magazine into the cover separating station 14 will thus permit the leading edge 81 of the separator blade 80 to initially intercept the lower portion of the slit cover and thereafter cam the entire cover into the diverging feed path 15 as is sequentially illustrated by the diagrammatic sketches of FIGS. 8 and 9. The severed cover C is fed along path 15 by the drive action of the feed rolls 103 and 104 while the remaining portion M' of the magazine continues its movement along the path 11 under the driving action of the roll 94. Each successive magazine as it passes through the machine thus has its cover cut off and transported to a separate receptacle while remaining portion of each magazine is further cut up by blade 110 while being transported to another receptacle. The collected remaining portions of the magazines are usually removed and disposed of while the magazine covers are returned to wholesalers as evidence of the amount of credit due.

As will be seen the instant machine can accommodate a wide variety of magazine sizes and once adjusted for a particular magazine thickness needs only to be supplied with stacks of that magazine whereafter the transport, cutting, flexing, and separating functions are automatically and rapidly carried out. One prototype of the instant machine has been constructed so as to efficiently process magazines at a rate in excess of 50 per minute.

The instant apparatus may be provided with any suitable base and power drive means such as that illustrated by U.S. Patents 753,207 and 1,377,853, or by the well known Model AV machine produced by Pitney-Bowes, Inc.

Since many changes could be made in the embodiment of the invention as particularly described and shown herein without departing from the scope of the invention, it is intended that this embodiment be considered as exemplary and that the invention not be limited except as warranted by the following claims.

What is claimed is:

1. In an apparatus for removing a cover sheet from a multileafed document;
 - a frame;
 - document retaining means mounted on said frame;
 - document feed means for serially transporting a document along a first predetermined feed path extending away from said retaining means;
 - cutting means mounted on said frame for severing the cover sheet from the document as the latter moves along said feed path;
 - impact means for applying a rapid series of blows to the side of each slit document to insure the separation of each cover sheet from the remainder of the associated document; and
 - separating means for intercepting and guiding the severed cover sheet along a second feed path extending away from said first feed path.
2. Apparatus as defined by claim 1: additionally comprising
 - document flexing means mounted on said frame and extending into said feed path for engaging and bow-

6

ing an entire documents as a unit along a longitudinally extending portion thereof, the convex side of a bowed document being on the same side of the said feed path as said cutting means;

said separating means including a stationary blade having a leading end that is disposed adjacent the junction of said first and second feed paths.

3. Apparatus as defined by claim 2 wherein said document feed means includes a plurality of cooperating feed rolls disposed along said first feed path, and wherein said cutting means includes a fixedly disposed cutting blade that extends into said first feed path.

4. In an apparatus for removing the cover sheets from multileafed documents;

- a frame;
 - a document retaining means mounted on said frame and adapted to receive a stack of said documents;
 - document transport means for separating successive documents from said stack and serially transporting the same along a first predetermined feed path;
 - a cutting knife mounted on said frame and formed with a cutting edge that is operatively disposed in said feed path so as to slit the cover sheet of each document that is transported past said knife;
 - flexing means mounted on said frame and disposed along said feed path and including an camming arm member for engaging and flexing an entire closed document as a unit along a longitudinally extending portion thereof, the convex side of a bowed document being on the same side of said feed path as said cutting knife; and
 - a separator blade mounted on said frame and having a nose portion that extends into said path so as to intercept the displaced portion of the severed cover sheet and to guide the latter along a second feed path that diverges from said first feed path.
5. Apparatus as defined by claim 4: additionally comprising feed means for transporting document covers along said diverging second feed path and for continuing the transporting of the remaining portions of the documents along said first feed path.

6. In an apparatus for removing covers from magazines;

- a frame;
- transport means on said frame for serially transporting magazines along a first feed path;
- cutting means mounted on said frame for slitting a magazine cover along a line adjacent and substantially parallel to the bound edge thereof;
- flexing means for bowing a portion of a slit magazine whereby a portion of the incised cover being on the convex side of the flexed magazine tends to move away from the remaining portion of the magazine, said flexing means including a device for repetitively striking the bound edge portion of said magazine so as to insure the complete severance of a slit cover; and

separating means for separating the cover from the remaining portion of each magazine.

7. Apparatus as defined by claim 6 wherein said flexing means also includes a camming member which extends into said feed path so as to cause each magazine to be bowed such that the convex side portion of the flexed magazine faces said striking device.

8. Apparatus as defined by claim 7 wherein said separating means includes a blade having a nose portion that extends from the striking means side of said feed path into said path so as to be in a position to intercept the severed covers of magazines fed past said flexing means.

9. In an apparatus for removing covers from magazines;

- a frame;
- supporting means mounted on said frame and adapted to receive a plurality of magazines to be processed;
- magazine transport means mounted on said frame and

7

adapted to serially transport magazines away from said supporting means and along a first predetermined feed path;

a cutting blade mounted on said frame and disposed adjacent said feed path so as to be capable of slitting the covers of magazines that are transported past the cutting edge thereof;

flexing means mounted on said frame for flexing a slit magazine, said flexing means including a magazine bowing arm that extends from one side of said feed path into said feed path and a cooperating device for repetitively striking the magazine to insure that the slit portion of said cover is completely severed and displaced from the rest of the magazine; and

separating means mounted on said frame for physically separating the cut portions of a flexed magazine, said separating means including a blade having a nose portion that extends into said feed path so as to intercept each severed magazine cover and conduct the latter along a divergent second feed path while the remaining portion of the magazine continues movement along said first feed path.

8

10. Apparatus as defined by claim 9 wherein the striking device comprises a multi-lobed cam that is rotatably mounted on said frame and on the other side of said first feed path.

11. Apparatus as defined by claim 10: additionally comprising

mutilator blade means mounted on said frame and disposed along said first feed path downstream from said separating means and adapted to cut a magazine portion that is transported past said mutilator blade means; and

means for transporting severed magazine covers along said second feed path.

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