

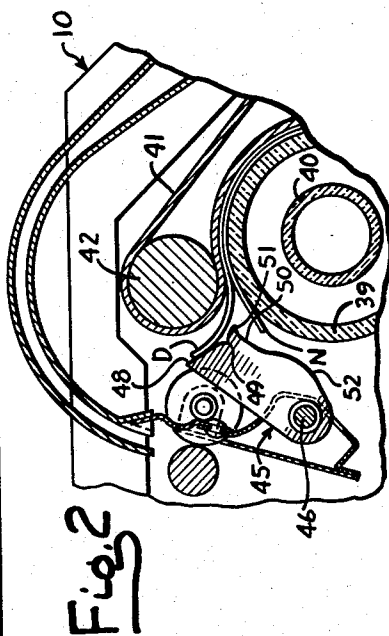
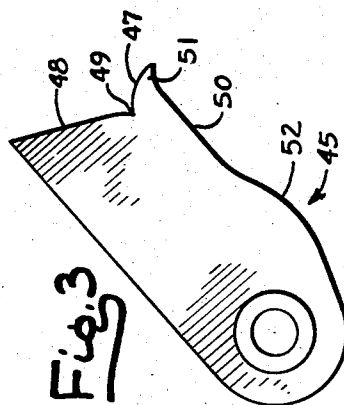
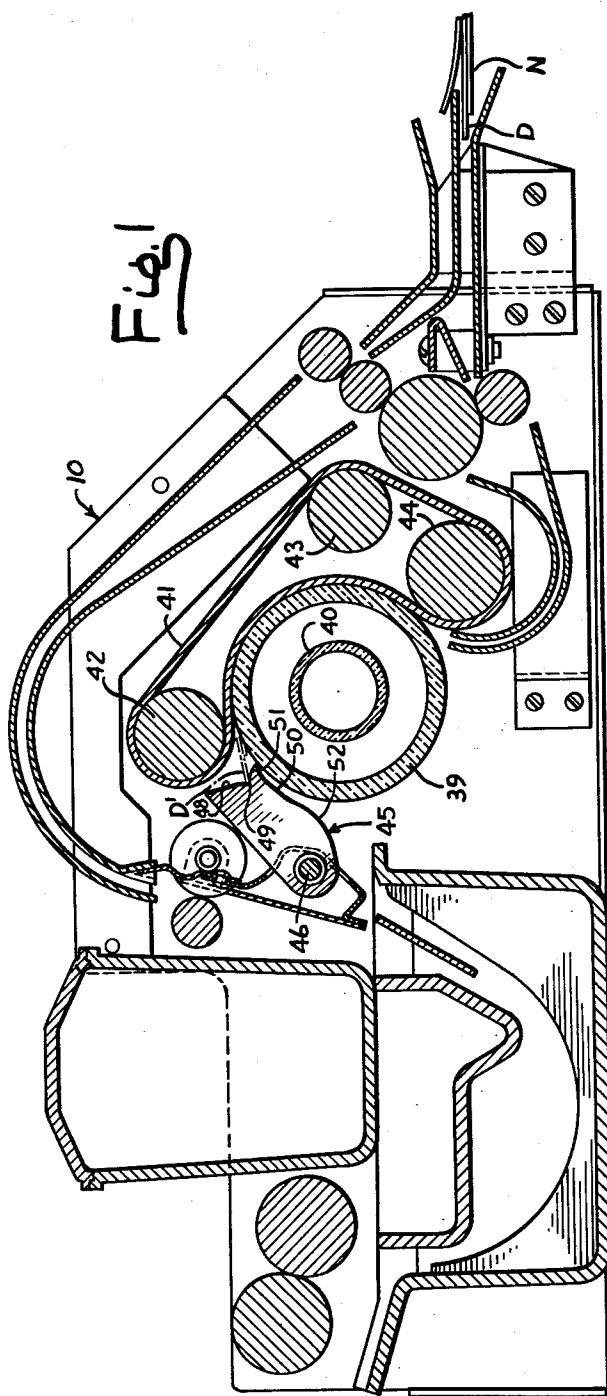
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SHEET SEPARATING DEVICE

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3,112,926

SHEET SEPARATING DEVICE

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3 Claims. (Cl. 271—64)

This is a divisional application of the co-pending U.S. application, Serial No. 705,520, filed December 27, 1957.

This invention relates generally to a sheet separating device and, more particularly, to a separating device to be employed in the production of photocopies by means of the so-called "transfer process" wherein superimposed sheets such as the document and the negative sheet used in such a process are separated after the exposure step.

In the sheet separating devices heretofore known in the prior art, the separation between the document sheet and the negative sheet is usually obtained by a pneumatic or suction device or by means of a deflector element which is moved to alternate positions by a cam mechanism or by electrical solenoids. These prior art separator devices have proven to be complicated, expensive and unreliable in operation.

As opposed to the expensive and complicated sheet separator arrangements heretofore employed, the sheet separator device of this invention is relatively simple and inexpensive as to its construction. Furthermore, the mode of operation is extremely reliable in that in the present device the separator is actuated by the thrust of one of the sheets to be separated.

This simple, positive mode of operation eliminates the possibility of any failure or maladjustment of an auxiliary actuating mechanism or pneumatic means which has heretofore been necessary in devices which utilized a movable deflector element or a suction arrangement for separation of the sheets.

It is, therefore, an object of this invention to provide a new and improved sheet separator mechanism for separating sheets that have been superimposed in a face to face relationship.

It is further an object of this invention to provide a sheet separator which is actuated by the thrust of one or more of the sheets to be separated.

Other objects and advantages of the present invention are inherent in the structure as disclosed in the claims or will become apparent to those skilled in the art as a detailed description proceeds in connection with the accompanying drawings wherein:

FIG. 1 is a vertical sectional view of a desk type photocopy apparatus embodying the present invention as has been illustrated and fully described in my co-pending U.S. application, Serial No. 705,520.

FIG. 2 is a sectional view similar to FIG. 1 wherein the sheet separating or kicker mechanism of the present invention showing the sheets being separated thereby.

FIG. 3 is an enlarged view of the sheet separating mechanism or kicker device.

Referring generally to the figures of the drawings, the separating device of this invention is shown in combination with a desk type photocopy device. However, this invention should not be limited to a separating device for a photocopy machine but rather it is intended that it be applied to any type of apparatus that has superimposed sheets in face to face relationship wherein separation thereof is desired.

Referring more specifically to the drawings, a separating or kicker member 45 is shown in FIGS. 1 and 2 in combination with a desk type photocopy machine 10 as shown

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and fully described in my co-pending U.S. application, Serial No. 705,520. The kicker member 45 is disposed to separate a pair of sheets D and N which have been superimposed in a face to face relationship, the sheet D being the document sheet and the sheet N being the negative. However, although only two sheets are disclosed as constituting the stack to be separated, the stack may include a larger number. It should be noticed that the sheet D is shown as having its leading edge being forwardly disposed with relation to the leading edge of the negative sheet. The relative disposition of the sheets facilitates their separation as will be explained more fully in detail later.

The sheets D and N are conveyed to the kicker mechanism 45, in a face to face relationship from an exposure means which comprises a hollow plastic or glass rotatably mounted cylinder 39 which is preferably transparent or at least translucent. A conventional flexible rubber or plastic belt 41 extends around a segment of the exterior surface of cylinder 39 and in contact therewith. Belt 41 is continuous and extends around three rollers designated 42, 43, 44 respectively, and is kept under tension.

It will be seen that as the rollers 42, 43, 44 are drivingly rotated, the belt 41 travels in contact with cylinder 39 in a counter-clockwise direction about the axis of the latter as viewed in FIG. 1.

This movement of the belt 41 will also cause corresponding rotation of cylinder 39 frictionally engaged therewith. Therefore, as the sheets D and N are directed to the initial point of tangency to the cylinder, these sheets will be gripped between cylinder 39 and belt 41 and carried therebetween in a counter-clockwise direction about the axis of cylinder 39 throughout the path of contact of the belt 41 therewith. During this interval, the light rays from a light source 40 will radiate outwardly so as to be transmitted through the transparent or translucent cylindrical wall of cylinder 39. The light rays will then pass through the negative sheet N and strike the image-bearing front face of document sheet D, from which the light rays will be reflected back to the photosensitive layer coated on the front face of negative sheet N and thereby produce a latent photographic image in negative sheet N by the so-called "reflex" method.

After this exposure step, negative sheet N and document sheet D travel to the separator device 45, now to be described in more detail. As shown in FIGURES 1 and 2, the kicker member or separator device of this invention is mounted for free rotational movement on a horizontal shaft 46. The form of this member can be clearly seen from FIG. 3 wherein it is illustrated as having an arcuate surface 47 intersecting with another surface 48 angularly inclined with respect thereto to form a recess or notch 49. The outer end of the edge 47 intersects with a lower edge 50 to form a lip 51. The lower edge 50 extends downwardly and rearwardly to a convex edge 52.

Referring again to FIG. 1, it will be seen that the center of gravity of kicker 45 will be normally urged by the force of gravity in a clockwise direction and will normally be so positioned that the lip 51 rests upon the exterior surface of cylinder 39. Therefore, as document sheet D and negative sheet N travel outwardly from between belt 41 and cylinder 39, the leading edge of document sheet D will engage and enter the recess 49 as shown by the dash-dot lines in FIG. 1 wherein the document sheet in this initial engaging position is indicated by the reference letter D'.

It will be understood that if the leading edge of the document sheet droops slightly so as to first make contact with the arcuate edge 47, or is slightly elevated so as to first strike the edge 48, these edges will guide the leading edge of the document sheet toward and into the

recess 49. Due to the fact that the sheets were initially put into the apparatus with the leading edge of the document sheet D projecting forwardly of the leading edge of negative sheet N, the latter does not make contact with kicker element 45 until after the following operation has occurred.

That is, continued movement of document sheet D will cause its leading edge to exert a thrust upon the separator or kicker 45. The line of this thrust extends rearwardly above shaft 46 so as to exert a torque upon kicker 45 to rotate the latter upwardly in a counter-clockwise direction about shaft 46.

As kicker 45 rotates upwardly in response to the thrust exerted by document sheet D the arcuate contour of edge 47 engages the lower surface of document sheet D to cause its leading edge 43 to be raised outwardly of recess 49 and upwardly along the edge 48, as best shown in FIG. 2. Kicker 45 will have been rotated to its upward position before the leading edge of negative sheet N advances sufficiently to contact kicker 45. The leading edge of negative sheet N then contacts kicker 45 along the edge 50 thereof and slides downwardly along edge 50 and then along the convex edge 52.

It will thus be seen that document sheet D and negative sheet N are thereby separated by kicker 45 which directs the sheets into different directions. The edge 43 of kicker 45 remains in contact with document sheet D so as to hold kicker 45 in its uppermost position while negative sheet N is passing beneath kicker 45 in contact with the convex edge 52 thereof, as seen in FIG. 2. After the trailing edge of document sheet D has passed the outer extremity of edge 48, kicker 45 will be free to rotate in a clockwise direction down to its original normal position with its lip 51 resting upon cylinder 39.

After leaving the kicker or separator 45, the leading edge of document sheet D travels upwardly while the negative sheet goes downwardly and continues the process through the machine, this having been fully illustrated and described in my co-pending application.

It is to be understood that the specific embodiment of the invention shown in the drawings and described in detail above is merely illustrative of one of the many forms which the invention may take in practice, and numerous changes and modifications thereof will readily occur to those skilled in the art without departing from the scope of the invention delineated in the appended claims which are to be construed as broadly as possible in view of the prior art.

I claim:

1. An apparatus for separating superimposed original and copy sheets passing in face to face relation from a place of exposure, comprising means for conveying said sheets endwise into a separation station with at least the leading edge of one sheet disposed on and behind the leading edge of another sheet, a two-legged tumbling element mounted rockably at said station, the end of one leg of said element normally lying across the path of the

forward one of said leading edges, said element having between the ends of said legs a surface normally in a position to be engaged by said forward edge and movable thereby to rock said element and thus move said one leg out of said path and move the end of the other leg of said element across the path of approach of the backward one of said edges, whereby said edges and the sheets are diverted into separate paths.

2. An apparatus for separating superimposed original and copy sheets passing in face to face relation from a place of exposure, comprising means for conveying said sheets endwise into a separation station with at least the leading edge of one sheet disposed on and behind the leading edge of another sheet, a two-legged tumbling element mounted at said station for rocking movement on an axis parallel to the plane, but transverse to the direction, of the approach of said sheets, both legs of said element extending away from said axis to one side thereof and toward said conveying means, the end of one leg of said element normally lying across the path of the forward one of said leading edges, said element having between the ends of said legs a surface normally in a position to be engaged by said forward edge and movable thereby to rock said element and thus move said one leg out of said path and move the end of the other leg of said element across the path of approach of the backward one of said edges, whereby said edges and the sheets are diverted into separate paths.

3. An apparatus for separating superimposed original and copy sheets passing in face to face relation from a place of exposure, comprising means for conveying said sheets endwise into a separation station with at least the leading edge of one sheet disposed on and behind the leading edge of another sheet, a two-legged tumbling element mounted rockable at said station on a fixed axis, both legs of said element extending to one side of said axis and toward said conveying means, the end of one leg of said element normally lying across the path of the forward one of said leading edges, said element having between the ends of said legs a surface normally in a position to be engaged by said forward edge and movable thereby to rock said element and thus move said one leg out of said path and move the end of the other leg of said element across the path of approach of the backward one of said edges, whereby said edges and the sheets are diverted into separate paths, said surface being a concave surface extending between the ends of said legs and operative to guide and deflect said forward edge through a curved path leading upwards and away from the path of said backward edge.

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