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NOBUYUKI YANAGAWA
AUTOMATIC SEPARATION MECHANISM FOR THE
USE OF A COPYING MACHINE
Filed Aug. 28, 1967

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Fig. 1.

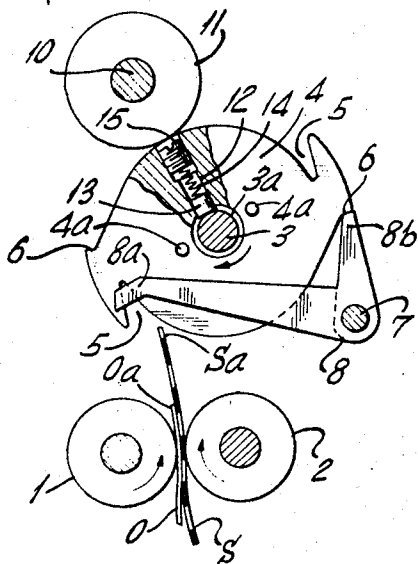


Fig. 3.

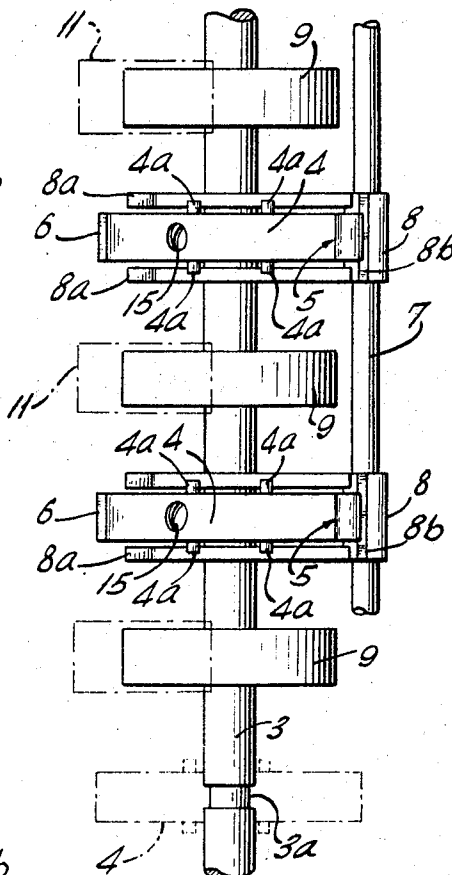
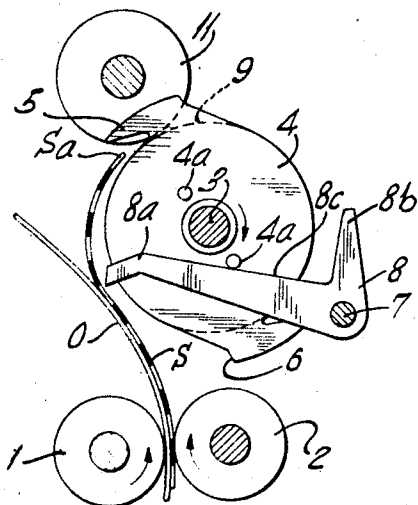


Fig. 2.



INVENTOR
NOBUYUKI YANAGAWA

BY
Burgess, Ryan & Hicks
ATTORNEYS

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AUTOMATIC SEPARATION MECHANISM FOR THE USE OF A COPYING MACHINE

Nobuyuki Yanagawa, Yokohama-shi, Japan, assignor to Kabushiki Kaisha Ricoh, a corporation of Japan

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U.S. Cl. 271—64

3 Claims

ABSTRACT OF THE DISCLOSURE

A sheet separating device for a copying machine including a rotatable separating member having peripheral tangentially addressed notches, the open face of said notches looking backward in relation to the direction of rotation of the separating member, a bell crank stopper member pivoted adjacent to said separating member and adapted to be tripped by an edge of a sheet passing through the copy machine to permit limited rotation of said separating member, pins on said separating member for restoring said stopper member to a position where it arrests the rotation of said separating member.

Brief description of the accompanying drawings:

FIG. 1 is a side view of one embodiment of this utility model.

FIG. 2 is a side view of the above embodiment illustrating a mode of separating a sensitized copy sheet from an overlaid original sheet.

FIG. 3 is a plan view of the above embodiment.

Detailed description of this utility model.—This utility model relates to an automatic separation mechanism for the use of separating sensitized copy sheet from an overlaid original sheet in a copying machine. The primary object of this utility model is to provide an automatic separation mechanism of a simple structure that ensures ease of assembly.

Other objects and advantages will become apparent upon reading the claims in conjunction with the following detailed description and the attached drawings, in which 1 and 2 represent a pair of feeding rollers axially provided in the proximity of an outlet of an exposure mechanism (not shown) in a copying machine.

The peripheral velocity of the roller 1 revolving in the direction of arrow is determined same as that of a transparent revoluble cylinder in said exposure mechanism but slightly smaller than that of the roller 2, so that, when the sensitized copy sheet S and the original sheet O superposed therewith are clamped between said pair of rollers 1 and 2, the leading edge Sa of the sensitized copy sheet S is adapted to precede the leading edge Oa of the original sheet. Over said roller 2 is rotatably provided in the same direction therewith (in the direction of arrow) a shaft 3 carrying a rotatable separation plate 4 which is frictionally connected with said roller 2 as hereinafter described. On the periphery of the rotatable separation plate 4 are formed notches 5 and stop portions 6 which are positioned diametrically opposite to each other.

Parallel with said rotatable shaft 3 is a shaft 7, which is axially provided with a bell crank type engagement and disengagement member 8. One arm end 8a of said engagement and disengagement member 8 extends to the position of one of said notches 5 while the other arm end 8b thereof is engaged with one of said stage portions 6 so that when the arm end 8a is pushed upwards by the leading edge of the sensitized copy sheet S, the engagement and disengagement member 8 is adapted to rotate in a clockwise direction around its axis 7, thereby

releasing the arm end 8b from engagement with the stop portion 6 of the rotatable separation plate 4.

The shaft 3 is further provided, alternately with the aforesaid rotatable separation plate 4, as shown in FIG. 3, with rollers 9 which are fixed thereon, the circumference of which are pressed with rollers 11 transfixed by an axis 10 (see FIG. 1).

The rotatable separation plate 4 carries, in its radial direction, a hole 12 in which is provided a pressure member 13 fitted in a circumferential groove 3a of the shaft 3, an extensible spiral spring 14 and a pressure screw 15. The rotatable separation plate 4 and the shaft 3 are frictionally connected to each other as the pressure member 13 is pressed on the latter by the force of said spring 14, while free movement of the rotatable separation plate 4 in an axial direction of the shaft 3 is prevented as the pressure member 13 is fitted in the circumferential groove of the shaft 3.

Supposing the leading edges of a sensitized copy sheet and an original which are transported from the exposure mechanism were caught between the pair of rollers 1 and 2, the leading edge 3a of the sensitized copy sheet S which precedes that of the original, is fed into the notch 5 of the rotatable separation plate 4, whereupon the engagement and disengagement member 7 is rotated in a clockwise direction around its axis 7, thereby releasing its arm end 8b from engagement with the stage portion 6.

Thus, the rotatable separation plate 4 which is frictionally associated with the shaft 3 revolving in the direction of the arrow rotates, holding the leading edge of the sensitized paper, simultaneously with the rotary movement of the shaft 3, thereby feeding the sensitized copy sheet S between the rollers 11 and 9 while the original sheet O thus separated from the sensitized copy sheet S is delivered out towards the front of the copying machine.

A number of rotatable separation plates 4 are provided on the rotatable shaft 3 and the friction force between each of the separation plate 4 and the shaft 3 must be suitably and evenly determined so as to ensure maximum effect of the separation mechanism.

On the other hand, the engagement and disengagement member 8, which is adapted to be freely rotatable relative to axis 7, is urged to press, by its weight, its arm end 8b onto the circumference of the rotatable separation member 4, said arm end 8b being adapted to engage, as shown in FIG. 1, with a stage portion 6 after a light sensitive copy sheet is separated from the superposed original form.

However, despite the fact that the engagement and disengagement member 8 is urged to freely rotate, by its weight, around its axis 7, if the friction force between the axis 7 and the engagement and disengagement member 8 is, for example, increased due to thermal bulge of either, or both, of the respective parts, or varied due to distortion of the engagement and disengagement member 8 in the course of time, or if the other end 8a of said engagement and disengagement member 8 hits against the light sensitive copy sheet, rotary return movement of the engagement and disengagement member 8 in a counter-clockwise direction is prevented, whereby the rotatable separation member 4 is likely to be prevented from taking the next separation position. In order to eliminate this drawback, an abutment 4a is provided on the lateral surface of said rotatable separation member 4.

FIG. 2 illustrates one mode of the engagement and disengagement member 8 which is rotated in a counter-clockwise direction, disengaging from the rotatable separation member 4 which is shown in the figure as rotated to a certain degree. If the rotatable separation member 4 makes further revolution from a position shown in this figure, the aforesaid abutment 4a presses down the upper edge 8c of the engagement and disengagement member 8,

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causing said member 8 to rotate in a counterclockwise direction, placing an end 8b of said member 8 in the rotary path of the stage portion 6 of the rotatable separation member 8.

The present invention therefore ensures accurate engagement and disengagement between the rotatable separation member and the engagement and disengagement member, enabling to provide an automatic separation device free from erroneous operations.

I claim:

1. An automatic separation device to be used in a copying machine for separating an original form and a light sensitive copy sheet, characterized in that it comprises a pair of guide rollers into which an original form and a light sensitive copy sheet are transported from a printing section, a rotatable separation member frictionally mounted on a rotatable axis which is provided parallel to said guide rollers, said rotatable separation member carrying notches which are adapted to face, at its open end, against delivery side of said guide rollers, a pivotally mounted bell crank stopper member, one end of the said stopper member being adapted to extend across one of the said notches while the other end of the said stopper is engageable with the said rotatable separation member, so that, when the leading edge of a light

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sensitive copy sheet enters into said notch, the said end of the stopper extending across the notch is forced to move clockwise whereby causing the other end of the stopper to be disengaged from the separation member, enabling thereby integral rotation of said rotatable separation member and its rotatable axis, said rotatable separation member carrying, at its lateral surface, an abutment which returns said stopper member, after rotation of said rotatable separation member is started, to a position to stop said rotatable separation member.

2. An automatic separation device according to claim 1 having means on said separation member adapted upon rotation of said member to return said stopper member to a position to engage said separation member to arrest rotation thereof.

3. An automatic separation device according to claim 1 having a pair of take-off rollers adjacent said separation member for removing one of a sheet from said separation member.

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RICHARD E. AEGERTER, *Primary Examiner.*