Oct. 4, 1966 C. J. BRUCE ET AL 3,276,771

AUTOMATIC SEPARATING DEVICE FOR PHOTOCOPYING MACHINES

Filed Jan. 12, 1965 2 Sheets-Sheet 1

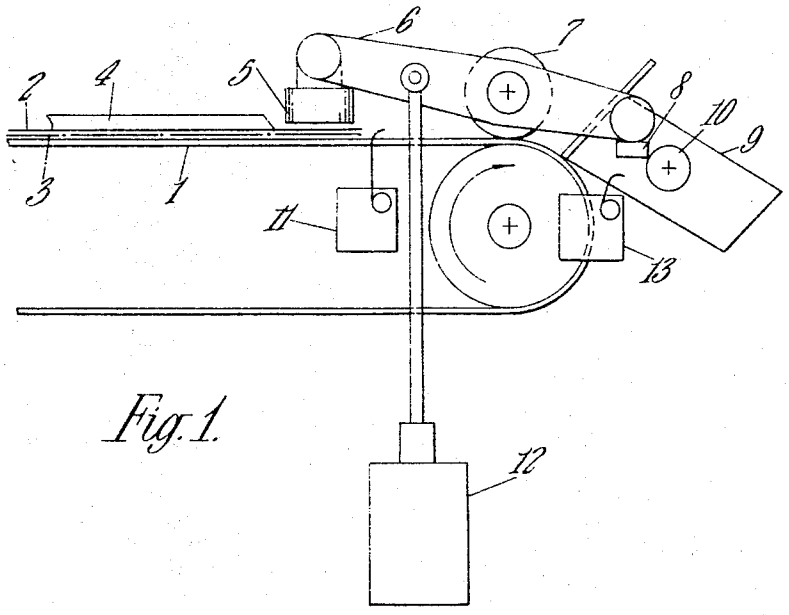


Fig. 1.

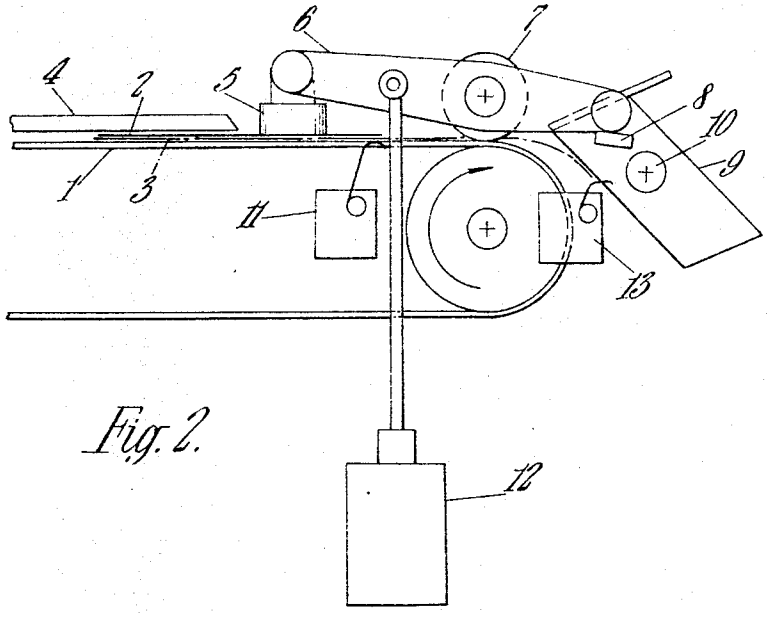


Fig. 2.

Oct. 4, 1966 C. J. BRUCE ET AL 3,276,771

AUTOMATIC SEPARATING DEVICE FOR PHOTOCOPYING MACHINES

Filed Jan. 12, 1965 2 Sheets-Sheet 2

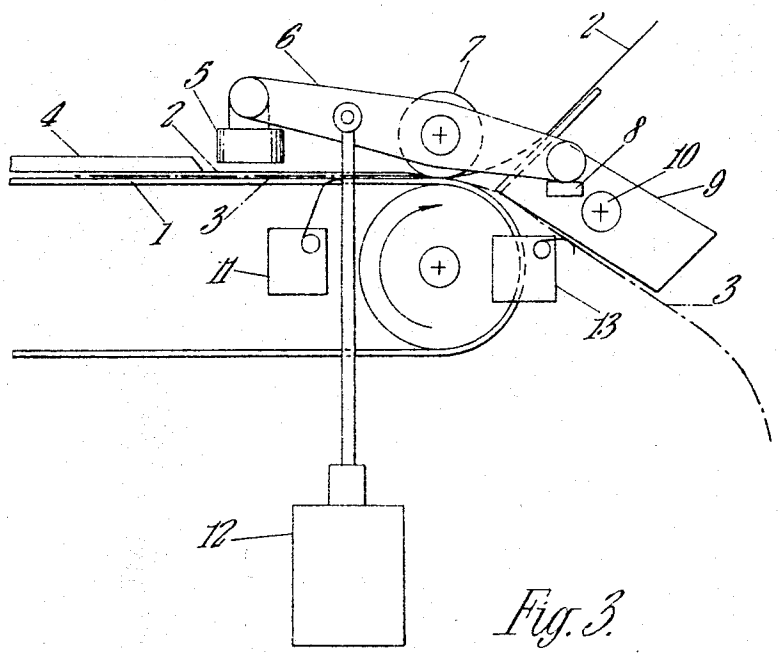


Fig. 3.

United States Patent Office

3,276,771
Patented Oct. 4, 1966

3,276,771

AUTOMATIC SEPARATING DEVICE FOR PHOTOCOPYING MACHINES

Colin James Bruce and Miklos Geza Fekete, London, England, assignors to Devodias (Photocopying) Limited, London, England, a British company

Filed Jan. 12, 1965, Ser. No. 424,930
Claims priority, application Great Britain, Jan. 13, 1964, 1,390/64
4 Claims. (Cl. 271—18)

This invention relates to an automatic device adapted to be used with a conveying means for separating two superposed sheets of material. More particularly but not exclusively the invention is concerned with the separation of a master and a copy issuing from a photocopying machine.

The invention consists in an automatic separating device adapted to be used with a conveying means for two superposed sheets, comprising at least one gripping means adapted to be moved to engage the upper of the two superposed sheets in response to the operation of a first sensing means adapted to be actuated by one or both sheets so that the friction between the lower of the superposed sheets and the conveying means moves the lower sheet relative to the upper sheet which is held by the gripping means and a deflector movable between two extreme positions for guiding the two sheets along two separate paths, a second sensing means being arranged in one of the paths which when engaged by the lower sheet is adapted to operate the gripping means to release the upper sheet and move the deflector to guide the upper sheet along the other path.

Thus when the separating device is used to separate a master and copy issuing from a photocopying machine, the master is held by the gripping means until the second sensing means is actuated which automatically operates the deflector to guide the master sheet along a different path preventing it from reaching the developer and becoming soiled.

Conveniently the deflector is pivotably mounted and is adapted to be moved to at least one of its extreme positions by a solenoid operated linkage which also operates the gripping means.

The invention will be further described, by way of example, with reference to the accompanying diagrammatic drawings in which:

FIGURES 1 to 3 show in side elevation three separate stages in the operation of a device according to the invention.

Referring to the drawings there is illustrated a conveyor belt **1** for conveying two sheets of paper, for example, a master sheet **2** shown in full line and a copy sheet **3** shown in chain-dotted line, issuing from a photocopying machine (not shown). Near the delivery end of the conveyor belt **1** there is arranged a pressure plate **4** for applying pressure to the two sheets **2** and **3** and guiding them below the gripping means of the separating device comprising two sponge rubber pads **5**. These sponge rubber pads **5** are pivotally mounted on one end of a linkage **6** supported at its middle a series of pressure rollers **7**, the other end of the linkage **6** bearing against an abutment **8** of a deflector **9** pivotally mounted at **10**.

Arranged in the path of the two sheets **2** and **3** between the pads **5** and the rollers **7** is a first sensing switch **11** electrically connected to a solenoid **12** or similar energising device for actuating the linkage **6**, while a second sensing switch **13** is located in the path of the conveyor belt **1** below the deflector **9**. This second sensing switch **13** is also electrically connected to the solenoid **12**, so that operation of the second sensing switch **13** causes the solenoid **12** to become de-energised.

The operation of the device will now be described with

reference to the three stages illustrated in the accompanying drawings.

In the first stage of the operation (FIGURE 1) both the sheets **2** and **3** have passed through the exposure section of the photocopying machine and are carried from this section by the conveyor belt **1** to the separating device. The length and width of the conveyor or belt **1** depends on the size and the design of the particular photocopying machine to which it is fitted. The pressure plate **4** presses down upon the belt to ensure that the two superposed sheets are kept flat on the belt surface. In the first stage of the operation the gripping sponge rubber pads **5** are in the raised position and the deflector **9** in the lowered position under the action of the linkage **6** bearing on the abutment **8**. The leading edge of the sheets pass under the sponge rubber pads **5** and operate the first sensing switch **11** which energises the solenoid **12**.

The second stage of the operation is shown by FIGURE 2 where the energised solenoid **12** operates the linkage **6** pulling down the gripping pads **5** onto the sheets holding back the master sheet **2**. The copy sheet **3** which is in direct contact with the conveyor belt **1** is carried by the conveyor belt and continues to move below the pressure plate **4** and under the deflector **9** which has been released by the linkage **6** and has automatically moved to its raised position. The copy sheet **3** operates the second sensing switch **13** which de-energises the solenoid **12**.

The third stage of the operation is illustrated in FIGURE 3 where the de-energised solenoid has returned the sponge rubber pads **5** to their raised position and the deflector **9** moves down. The master sheet **2** having been released by the sponge rubber pads **5** is conveyed by the belt **1** from below the pressure plate **4** between the bite of the pressure rollers **7** and the conveyor roller where it is deflected by the deflector **9** and thus separated from the copy sheet **3** completing the whole operation and leaving the device ready for the next cycle.

Although in the example illustrated the leading edges of both the sheets **2** and **3** are aligned and operate the first sensing switch **11**, the separation device will work just as efficiently if one of the leading edges of the master or copy sheet is advanced with respect to the other and operate the first sensing switch. The distance between the leading edges of the sheets will however be limited to the distance between the trip lever of the first sensing switch **11** and the sponge rubber pads **5** for a satisfactory separation.

The deflector **9** may be formed as an integral part of a developing unit to which the copy sheet passes directly from the separating device. Alternatively the deflector can be positioned remote from the developing unit in which case the copy sheet, after separation, can pass through a conveyor system before it reaches the developing unit.

It is to be understood that the gripping means may be made from any suitable resilient or yieldable material i.e. an expanded elastomeric material, rubber or a synthetic plastics material such as neoprene. It is also possible to make the gripping surface of which may be sharply knurled, reeded or covered with a plurality of sharp needle points. Instead of being formed in the shape of a pad the grippers may be formed as rollers.

We claim:

1. An automatic separating device adapted to be used with a conveying means for two superposed sheets, comprising at least one gripping means capable of being moved to engage the upper of said two superposed sheets, a first sensing means adapted to be actuated by one or both said sheets to initiate operation of said gripping means such that the friction between the lower of said superposed sheets and the conveying means moves said lower sheet

relative to said upper sheet, a deflector movable between two extreme positions for guiding said two sheets along two separate paths and a second sensing means arranged in one of said paths, which sensing means is adapted to be actuated by said lower sheet to release said gripping means and move said deflector to guide said upper sheet along the other path.

2. A device as claimed in claim 1, in which said gripping means comprise two sponge rubber pads.

3. A device as claimed in claim 2, in which a linkage is attached to said gripping means, a solenoid being capable of being energised by said first sensing means and de-energised by said second sensing means.

4. A device as claimed in claim 3, in which said deflector is pivotably mounted and is adapted to be moved to at least one of its extreme positions by said solenoid operated linkage.

References Cited by the Examiner

UNITED STATES PATENTS

3,130,394	4/1964	Hinz et al.	271—57 X
3,159,397	12/1964	Zyber	271—57 X

ROBERT B. REEVES, *Primary Examiner.*

H. S. LANE, *Assistant Examiner.*