Separating device for sideways removing a publication from the lower side of a pile of publications.

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Description

The invention relates to a separating device for sideways removing a publication from the lower side of a pile of publications such as magazines, paper and the like, comprising a means for moving the lowest publication in the direction of removal and comprising a suction table that, as seen in the direction of removal is positioned behind said means for moving the lowest publication, said means and suction table being controlled in such a way that the publication to be removed at first will be moved by the suction table in the direction opposite to the direction of removal prior to its motion in the direction of removal.

A known separating device of this type is illustrated in US-A-3.570.842 which device is primarily meant for use with articles such as cardboard blanks, that often are not perfectly flat, as for instance when they are slightly twisted. The successive sheets of the pile are delivered by means of reciprocating fingers which advance at each forward stroke the lowermost sheet of the pile. To ensure a correct operation of said reciprocating fingers the lowermost article, after being moved in the direction opposite to the direction of removal, is lowered for disengaging it from the remaining articles of the pile. This disengagement is necessary to prevent a negative influence of the articles not being perfectly flat. Lowering said lowermost article is obtained in that the suction table, that firstly moves the article in the direction opposite to the direction of removal, is lowered during its stroke in the direction of removal.

This known separating device, however, is not meant to separate publications with their open sides ahead, and especially such publications that are rather thin.

It is not possible to remove such publications from the lower side of a pile directly in the direction of their open sides, for this could lead to damaging or crumpling up said publications, especially near to the open sides thereof. Further, removing said thin publication by means of reciprocating fingers according to US-A-3.570.842 is impossible because the publication lacks any strength for withstanding the pushing force exerted by the fingers.

It is an object of the present invention to provide a separating device of the type mentioned before offering the possibility of separating such publications with their open sides ahead.

Therefore, the separating device according to the invention is characterized in that the means for moving the lowest publication in the direction of removal comprises a first suction table gripping the frontal portion of said publication, as seen in the direction of removal, whereas the second suction table is movable to and fro in a horizontal plane only.

The second suction table that, as seen in the direction of removal, is positioned behind the first suction table can grip the rear portion of the publication as seen in the direction of removal. In case the publication has to be removed with its open side ahead the back of the publication is positioned at said rear portion. As a result this rear portion of the publication that is gripped by the second suction table has such a rigidity that the publication can be moved without any restriction over some distance in the direction opposite to the direction of removal without the need of lowering this rear portion, whereafter it will be possible to remove the publication in the direction of removal without damaging or crumpling up this publication.

Hereafter, the invention will be further explained with reference to the drawing in which is shown an embodiment of the separating device according to the invention.

Fig. 1 shows schematically a side-elevational view of an embodiment of the separating device according to the invention;

Fig. 2 shows a plan view of the separating device of Fig. 1; and

Fig. 3 illustrates schematically the method of operation of a separating device according to the invention.

The separating device schematically shown in Fig. 1 comprises a holder 1 for a pile of publications 2, a first suction table 3 and a second suction table 4. The holder 1 can be filled from its top with publications, such as magazines, papers or the like forming a pile 2.

Movable to and fro below the pile 2 the two suction tables 3, 4 both are supported by a guidance 5; therefore, the suction tables 3, 4 are provided with a recess receiving said guidance 5. The first suction table 3 can grip the frontal portion of the publication to be removed as seen in the direction of removal (indicated by arrow A), while the second suction table 4, as seen in the direction of removal, is positioned behind the first suction table 3 and can grip the rear portion of said publication 6. The pile of publications 2 is placed in the holder 1 in such a way that the backside of each publication 6 is positioned above the second suction table 4.

The holder 1 is provided with a stationary support surface 7 for supporting the frontal portion of the publication lying thereabove during removing the lowest publication 6 under this support surface 7. As will be further explained later on, the second suction table 4 is provided with a drive for moving the publication 6 in the direction opposite to the direction of motion prior to the motion in the direction of removal. The distance over which the second suction table 4 first moves the publication 6 in this direction at least is that large that the frontal portion of this publication 6 disengages said support surface 7.

In the position of the separating device shown in Fig. 1 the frontal edge of the lowest publication 6, where the open side of this publication 6 is positioned, has disengaged the support surface 7 and under influence of the gravity force as well as the forces exercised on the central portion of the publication 6 by the weight of the pile 2, has
reached the first suction table 3. After said publication 6 in this way at its open side being loosened from the pile 2 the first suction table 3 can remove it under the support surface in the direction of removal. The gap between the lower side of the support surface 7 and the upper side of the first suction table 3 is big enough to ensure an unrestricted passage in this publication 6.

The drive of the second suction table 4 exists of an operator rod 8 being connected to said second suction table 4 and further comprising a follower member 10 cooperating with a curved track 9. In the represented embodiment of the separating device the following member 10 exists of a follower roll, but other follower members can also be applied.

The operator rod 8 only can make a to and fro motion that is parallel to the guidance 5 and that is caused by the shape of the curved track 9. The curved track 9 is provided on a disk 11 that, as appears clearly from Fig. 2, is mounted on a drive shaft 12 of the first suction table 3. This drive shaft 12 is driven by a motor 13 that is connected with the drive shaft 12 through a coupling 14. The rotation of the drive shaft 12 causes a rotation of the disk 11 so that the intersection between operator rod 8 and curved track 9, at which intersection the follower roll 10 is positioned, moves to and fro. Forced by the follower roll 10 the operator rod 8 and therefore also the second suction table 4 will move to and fro wherein the second suction table 4 will always assume the same position after each complete revolution of the disk 11.

Moreover, the drive shaft 12 comprises a crank shaft 15 driving a drive rod 16 that is connected to the first suction table 3. Because the crank shaft 15 is part of the drive shaft 12 carrying the disk 11 with the curved track 9 the motions of the first suction table 3 and the second suction table 4 are mutually coupled, however it not being necessary that the relative distance between both suction tables is constant. In the represented embodiment of the separating device it indeed is not.

Finally two pairs of cooperating transfer means are positioned next to the first suction table 3 for transferring the publication 6. These transfer means comprise an upper pair of pressure rolls 17 and a lower pair of transport disks 18. Each transport disk 18 comprises a recess 19 extending over 90° of its circumference. The publication 6 is inserted into this recess 19 and then is transferred by the remaining section of the circumference of the transport disks 18. Instead of the represented arrangement in which said transfer means 17, 18 are positioned between the holder 1 and the drive shaft 12 it is possible that the transport disk 18 is also mounted on the drive shaft 12. The advantage of this is that in this way a correct synchronisation is achieved between the disk 11 and the crank shaft 15 on one side and the transport disk 18 on the other.

The operation of the separating device according to the invention will be elucidated referring to Fig. 3. For the sake of clarity in Fig. 3 the disk 11 and the crank shaft 15 respectively, are illustrated at both sides of the suction tables; the coupling between the disk 11 and the crank shaft 15 as described above, however, remains unchanged.

The angle references of the disk 11 containing the curved track 9 as illustrated in Fig. 3 represent the angular displacement of the disk 11 relative to a chosen starting position that is represented by 0°. This starting position is represented in Fig. 3e and will be further explained hereafter. The curved track 9 is shaped in such a way that the second suction table 4 stands still for a short while in its two extreme positions. Therefore, the two acute-angled circle segments that are enclosed by two dotted lines limit curved track sections with a constant distance towards the centre of the disk. As a result the second suction table 4 will stand still when the follower roll 10 is in one of these two curved track sections.

In the position shown in Fig. 3a a recently separated publication 6' has just reached the transfer means 17, 18. At this instant the first suction table 3 is deactivated and starts loosing its suction capacity. For, the reaction of the suction capacity takes some time so that the deactivation has to start before the first suction table 3 reaches its extreme left position as represented in Fig. 3b. After the first suction table 3 has disengaged the publication 6' said publication 6' is removed by the transfer means 17, 18 and, if necessary, is supplied to a next operation step.

The publication 6 being lowest now and in the file 2 being stacked above the publication 6' has engaged the second suction table 4 with its rear side where the back of the publication 6 is positioned, said second suction table 4 standing still in its extreme left position. In the time period that precedes the beginning of a right-handed motion of the second suction table 4, the second suction table 4 is activated and its suction capacity is increased. Therefore, the publication 6 will be sucked firmly to the second suction table 4 so that this can move the publication 6 at first in the direction opposite to the direction of removal.

Fig. 3 shows the moment on which the first suction table 3 starts to move to the right and where the transfer means 17, 18 remove the publication 6' to the left. The second suction table 4 is still in its extreme left position.

When the disk 11 has reached the position shown in Fig. 3c, the first suction table 3 that is deactivated moves to the right. The second suction table is just before moving to the right for moving the publication to the right that at this instant is firmly sucked to the suction table. Forced by the curved track 9 the second suction table 4 moves towards its extreme right position as shown in Fig. 3d. After reaching this position the second suction table 4 will stand still for a while during which stand still the suction capacity of the second suction table 4 will be reduced. During the motion of the second suction table 4 from the position according to Fig. 3c towards the position according to Fig. 3d the frontal side of the publication 6, corresponding with the open side.
of the publication 6, will disengage the support surface 7 so that this frontal side falls upon the first suction table 3. As a result the frontal side of the publication 6 is effectively separated from the frontal side of the next publication in the pile 2 lying thereabove.

In Fig. 3 the first suction table 3 has reached its extreme right position and will be activated. The moment of activation can, if necessary, be a short while before the moment of reaching the represented position.

Finally Fig. 3F represents the situation in which the first suction table 3 has sucked the publication 6 and is removing it under the support surface 7 to the left. The second suction table 4 is deactivated and is just before moving to the left. After a short while the two suction tables 3, 4 again will reach the positions shown in Fig. 3A, wherein the publication 6 engages the transfer means 17, 18 and wherein a next publication rests with its rear side on the second suction table 4.

Claims

1. Separating device for sideways removing a publication (6) from the lower side of a pile (2) of publications (8) such as magazines, papers and the like, comprising a means (3) for moving the lowest publication (6) in the direction of removal and comprising a suction table (4) that, as seen in the direction of removal is positioned behind said means (3) for moving the lowest publication (6), said means (3) and suction table (4) being controlled in such a way that the publication (6) to be removed at first will be moved by the suction table (4) in the direction opposite to the direction of removal prior to its motion in the direction of removal, characterized in that the means (3) for moving the lowest publication (6) in the direction of removal comprises a first suction table (3) gripping the frontal portion of said publication, as seen in the direction of removal, whereas the second suction table (4) is movable to and fro in a horizontal plane only.

2. Separating device according to claim 1, characterized in that moving the publication (6) at first in the direction opposite to the direction of removal occurs under influence of the second suction table (4).

3. Separating device according to claim 1 or 2, characterized in that it comprises a stationary support surface (7) being constructed in such a way that the publication (6) to be removed can move under said support surface (7) while the frontal portion of the publication thereaboe as seen in the direction of removal will be supported by this support surface (7).

4. Separating device according to claim 3, characterized in that the distance over which the second suction table (4) at first moves the lowest publication (6) in the direction opposite to the direction of removal being at least that large that the frontal portion of this publication (6) as seen in the direction of removal disengages said support surface (7).

5. Separating device according to one of the preceding claims, characterized in that the second suction table (4) is drivable by an operator rod (8) being connected to said second suction table (4) and further comprising a follower member (10) such as a follower roll cooperating with a curved track (9).

6. Separating device according to claim 5, characterized in that the curved track (9) is provided on a disk (4) that is mounted on a drive shaft (12) taking care of the two and fro motion of the first suction table (3).

7. Separating device according to claim 6, characterized in that the drive shaft (12) of the first suction table (3) comprises a crank shaft (15) driving as drive rod (6) that is connected to the first suction table (3).

8. Separating device according to one of the claims 5—7, characterized in that the curved track (9) for the second suction table (4) is shaped in such a way that the second suction table (4) stands still for a short while in its two extreme positions.

Patentansprüche

1. Trennvorrichtung für die seitliche Entnahme einer Druckschrift (6) von der Unterseite eines Stapels (2) von Druckschriften (6), wie Zeitschriften, Zeitungen und dergleichen, mit einer Vorschubeinrichtung (3) für den Vorschub der untersten Druckschrift (6) in der Entnahmerrichtung und mit einer Saugeplatte (4), welche, in der Entnahmerrichtung gesehen, hinter der Vorschubeinrichtung (3) angeordnet ist, wobei die Vorschubeinrichtung (3) und die Saugeplatte (4) so gesteuert sind, dass die zu entnehmende Druckschrift (6) vor ihrer Bewegung in der Entnahmerrichtung zuerst durch die Saugeplatte (4) in der die Entnahmerrichtung entgegengesetzte Richtung bewegt wird, dadurch gekennzeichnet, dass die Vorschubeinrichtung (3) eine erste Saugeplatte (3) aufweist, welche, in der Entnahmerrichtung gesehen, vorderen Teil dieser Druckschrift erfasst, und dass die zweite Saugeplatte (4) nur in einer Horizontalebene hin- und herbeweglich ist.

2. Trennvorrichtung nach Anspruch 1, dadurch gekennzeichnet, dass die Bewegung der Druckschrift (6) zuerst in die der Entnahmerrichtung entgegengesetzte Richtung unter der Einwirkung der zweiten Saugeplatte (4) erfolgt.

3. Trennvorrichtung nach Anspruch 1 oder 2, dadurch gekennzeichnet, dass sie eine feststehende Stützfläche (7) aufweist, die so ausgebildet ist, dass sich die zu entnehmende Druckschrift (6) unter dieser Stützfläche (7) fortbewegen kann, während der, in der Entnahmerrichtung gesehen, vordere Teile der darüber befindlichen Druckschrift durch diese Stützfläche (7) getragen wird.

4. Trennvorrichtung nach Anspruch 3, dadurch gekennzeichnet, dass die Distanz, über welche die zweite Saugeplatte (4) die unterste Druckschrift (6) zuerst in die der Entnahmerrichtung entgegengesetzte Richtung bewegt, mindestens so gross ist, dass sich der, in der Entnahmerrichtung gesehen,
vordere Teil dieser Druckschrift (6) von der Stützfläche (7) löst.
5. Trennvorrichtung nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass die zweite Saugplatte (4) durch eine mit dieser verbundenen Schubstange (8) betätigbar ist, und dass ein Mitnehmer (10), z.B. eine Mitnehmerrolle vorgesehen ist, der mit einer Kurvenbahn (9) zusammenarbeitet.
6. Trennvorrichtung nach Anspruch 5, dadurch gekennzeichnet, dass die Kurvenbahn (9) an einer Schelbe (11) vorgesehen ist, die auf einer Antriebswelle (12) sitzt, welche die Hin- und Herbewegung der ersten Saugplatte (3) bewirkt.
7. Trennvorrichtung nach Anspruch 6, dadurch gekennzeichnet, dass die Antriebswelle (12) der ersten Saugplatte (3) eine Kurbel (15) aufweist, die eine mit der ersten Saugplatte (3) verbundene Schubstange (16) antriebt.
8. Trennvorrichtung nach einem der Ansprüche 5 bis 7, dadurch gekennzeichnet, dass die Kurvenbahn (9) für die zweite Saugplatte (4) einen derartigen Verlauf nimmt, dass die zweite Saugplatte (4) in ihren beiden Extremlagen kurzzeitig stillsteht.

Revendications

1. Dispositif de séparation pour extraire latéralement une publication (6) de la base d’une pile (2) de publications (6), telles que des magazines, des journaux et analogues, comprenant un organe (3) de déplacement de la publication la plus basse (6) dans le sens d’extraction et comprenant une table d’aspiration (4) qui, vue dans le sens d’extraction, est placée à l’arrière dudit organe (3) de déplacement de la publication la plus basse (6), ledit organe (3) et ladite table d’aspiration (4) étant commandés d’une manière telle que la publication (6) à extraire est d’abord déplacée par la table d’aspiration (4) en sens inverse du sens d’extraction avant son déplacement dans le sens d’extraction, caractérisé en ce que l’organe (3) de déplacement de la publication la plus basse (6) dans le sens d’extraction comprend une première table d’aspiration (3) qui saisit la partie frontale de ladite publication, vue dans le sens d’extraction, tandis que la deuxième table d’aspiration (4) est mobile en va-et-vient dans un plan horizontal seulement.

2. Dispositif de séparation suivant la revendication 1, caractérisé en ce que le déplacement de la publication (6) d’abord en sens inverse du sens d’extraction se produit sous l’influence de la deuxième table d’aspiration (4).

3. Dispositif de séparation suivant la revendication 1 ou 2 caractérisé en ce qu’il comprend une surface d’appui fixe (7) construite d’un manière telle que la publication (6) à extraire peut se déplacer sous ladite surface d’appui (7) tandis que la partie frontale de la publication placée au-dessus vue dans le sens d’extraction, est supportée par cette surface d’appui (7).

4. Dispositif de séparation suivant la revendication 3, caractérisé en ce que la distance dont la deuxième table d’aspiration (4) déplace d’abord la publication la plus basse (6) en sens inverse du sens d’extraction est au moins assez grande pour que la partie frontale de cette publication (6), vue dans le sens d’extraction, se dégage de ladite surface d’appui (7).

5. Dispositif de séparation suivant l’une des revendications précédentes, caractérisé en ce que la deuxième table d’aspiration (4) est déplacée par une tige de manœuvre (8) reliée à ladite deuxième table d’aspiration (4) et comportant en outre un élément suiveur (10), tel qu’un galet palpeur coopérant avec une piste courbe (9).

6. Dispositif de séparation suivant la revendication 5, caractérisé en ce que la piste courbe (9) est prévue sur un disque (11) qui est monté sur un arbre d’entraînement (12) qui entraîne le mouvement de va-et-vient de la première table d’aspiration (3).

7. Dispositif de séparation suivant la revendication 6, caractérisé en ce que l’arbre d’entraînement (12) de la première table d’aspiration (3) comporte une manivelle (15) entraînant une bielle (6) qui est reliée à la première table d’aspiration (3).

8. Dispositif de séparation suivant l’une des revendications 5 à 7, caractérisé en ce que la piste courbe (9) pour la deuxième table d’aspiration (4) présente une configuration telle que la deuxième table d’aspiration (4) reste immobile pendant un court instant dans ses deux positions extrêmes.
fig. 3