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(71) Applicant: **SAGEM S.A.**
75015 Paris (FR)

(72) Inventor: **Potakowskyj Christoph**
1100 Wien (AT)

(74) Representative: **Bloch, Gérard et al**
2, square de l'Avenue du Bois
75116 Paris (FR)

(54) Device for removing a single sheet of paper on top of a stack

(57) A device for removing a single sheet (34) of paper lying at the top of a stack (33), comprising a separation roller (27) which is driven in rotation and a sheet pressing-on lip (28), a first section (29) of this sheet pressing-on lip (28) and the separation roller (27) being held pressed against one another in a sprung fashion and the sheet pressing-on lip (28) having a second section (30) which runs approximately tangentially with respect to the outer surface of the separation roller (27) and has the purpose of supporting the end sides of the sheets of paper, the pressing-on lip (28) being secured in an immovable fashion and the separation roller (27) being held pressed against the pressing-on lip (28) in a sprung fashion.

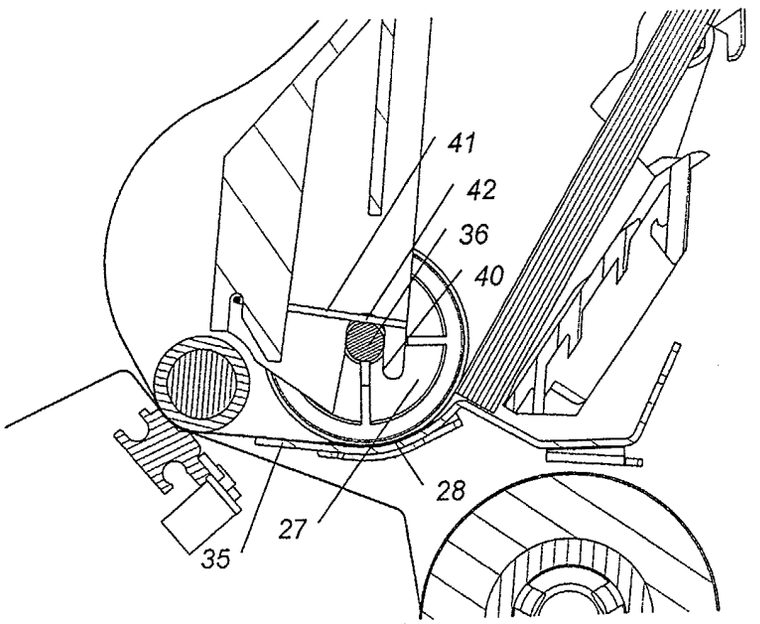

Fig. 4

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Description

[0001] The invention relates to a device for removing a single sheet of paper lying at the top of a stack, comprising a separation roller which is driven in rotation and a sheet pressing-on lip, a first section of this sheet pressing-on lip and the separation roller being held pressed against one another in a sprung fashion and the sheet pressing-on lip having a second section which runs approximately tangentially with respect to the outer surface of the separation roller and has the purpose of supporting the end sides of the sheets of paper.

[0002] Such devices are used in telefax units, copiers, computer printers, money counting machines or the like.

[0003] According to the previously known prior art, in sheet-separating devices which are constructed in such a way, the separation roller is rotatably mounted but its axis of rotation is held immovably in the housing of the unit. In order to hold the pressing-on lip and separation roller pressed against one another in a sprung fashion, the pressing-on lip is secured to a corresponding carrier, which carrier is displaceably mounted in the housing and is pressed in the direction of the separation roller by means of a spring.

[0004] The object of the present invention is to disclose a device of the type specified at the beginning, for removing a single sheet of paper lying at the top of a stack, which device is of structurally simpler design and requires fewer components. According to the invention this is achieved in that the pressing-on lip is immovably secured and the separation roller is held pressed against the pressing-on lip in a sprung fashion.

[0005] The pressing-on lip can thus be secured to the housing wall which is present in any case in the region of the separation roller and has the purpose of guiding the stack of sheets of paper, and a component which is constructed separately therefrom for displaceably bearing the pressing-on lip can be dispensed with.

[0006] In a device as described above, in which the separation roller has, for bearing it rotatably and driving it, two axle stubs which are mounted in bearing blocks, the first bearing block of the first axle stub being arranged directly next to the separation roller, and the second bearing block of the second axle stub being arranged at a distance from the separation roller which is large in relation to its width, it is possible, according to a preferred embodiment of the invention, to provide that the first axle stub is mounted in a slot-like recess in the first bearing block and is loaded by a spring which presses it in the direction of the pressing-on lip.

[0007] It is thus possible to continue largely to use the way of implementing the bearing system for separation rollers which has already been known in the prior art. All that is necessary is to change the bearing seat of the first axle stub into a slot-like recess and to provide suitable means for fastening the spring. The expenditure which is necessary for this (for example redesigning plans for the casting moulds) is however relatively low.

[0008] In a further refinement of the invention it is possible to provide for the spring to be formed by a spring wire which has at least two bends and comprises a first lever which bears against the first axle stub, as well as a second lever which bears against a counterbearing.

[0009] Such a spring can be manufactured with particularly low expenditure, and can be held in the region of the separation roller using very simple means.

[0010] The invention is described in more detail with reference to the appended drawings in which particularly preferred exemplary embodiments are illustrated. In said drawings:

Fig. 1 shows a vertical section through a sheet-separating device which is designed according to the prior art;

Fig. 2 shows a perspective plan view of the pressing-on lip 28 of this known sheet-separating device;

Fig. 3 shows a vertical section through a first embodiment of a device according to the invention;

Fig. 4 shows an enlarged view of the region around the separation roller of the device according to Fig. 3, the separation roller and a bearing block being shown in non-sectional views;

Fig. 5 shows a vertical section through a second embodiment of a device according to the invention;

Fig. 6 shows an enlarged view of the region around the separation roller of the device according to Fig. 5, the separation roller and the bearing block not being shown in sectional views;

Fig. 7 shows a perspective plan view of the separation roller of the device according to Figs 5 and 6.

[0011] The present invention relates to the structural measures with which the top sheet 34 of paper can be removed from a stack 33 of a plurality of sheets of paper. Such a sheet-separating device may be provided, for example twice in a telefax unit, namely at the blank-sheet infeed device on the one hand, and at the original-sheet infeed device on the other. These two sheet-separating devices are of structurally identical design and can also be used in other devices in which sheets of paper have to be removed individually from a stack, for example in copiers, computer printers, money counting machines or the like.

[0012] According to the known prior art illustrated in Figs 1 and 2, a sheet-separating device has two functionally essential components, namely a separation roller 27 which can be driven in rotation and a sheet pressing-on lip 28. Both the outer surface of the separation roller 27 and the pressing-on lip 28 have surfaces which form a higher coefficient of friction with paper than that

between paper and paper. For this purpose, the outer surface of the separation roller 27 and the entire pressing-on lip 28 are preferably formed from rubber.

[0013] A first section 29 of the pressing-on lip 28 and the separation roller 27 are held pressed against one another in a sprung fashion. If there is no sheet of paper arranged between these two parts, they bear one against the other with little pressure. According to the previously known prior art, this is achieved in that this section 29 is provided on a displaceably mounted carrier 31, and this carrier 31 is pressed in the direction of the separation roller 27 by a spring 32 (only illustrated symbolically).

[0014] The pressing-on lip 28 has a second section 30 which directly adjoins the first section 29 and which runs approximately tangentially with respect to the outer surface of the separation roller 27. The end sides of the sheets of paper of the stack 33 which is to be separated rest on this section 30 or, owing to the oblique position of this second section 30, they slip in the direction of the separation roller 27. The sheet 34 of paper which is at the top in the stack 33 comes to rest here on the edge of the first section 29 which bears against the separation roller 27. When the separation roller 27 rotates, the friction between the outer surface of this roller and the upper side of the uppermost sheet 34 of paper is then greater than the friction between the underside of the uppermost sheet of paper and the upper side of the second uppermost sheet of paper, which results in the separation roller 27 drawing only the uppermost sheet 34 of paper between itself and the first section 29 of the pressing-on lip 28. Thus, only the uppermost sheet 34 of paper is conveyed as the operation proceeds.

[0015] As is apparent in particular from Fig. 2, the separation roller 27 and the pressing-on lip 28 do not extend over the entire width of the paper but are rather arranged at the half of this width and are narrow in comparison with it.

[0016] A sheet-separating device according to the invention is designed according to the same principle and functions according to the principle just explained.

[0017] Figs 3 and 4 on the one hand and 5 and 6 on the other show two exemplary embodiments of the device according to the invention. The first embodiment shown in Figs 3 and 4 can be used in a device in particular for separating blank sheets, and the second embodiment shown in Figs 5 and 6 can be used in a device in particular for separating original sheets.

[0018] The pressing-on lip 28 is secured in an immovable fashion here and the separation roller 27 is held pressed against the pressing-on lip 28 in a sprung fashion. This is achieved in structural terms by virtue of the fact that the pressing-on lip 28 is simply bonded onto the housing wall 35 which is located in the region of the separation roller 27 (cf. Figs 4 and 6), and the axle stubs 36, 37 of the separation roller 27 are not fixedly mounted but rather mounted so as to be displaceable in the direction of the pressing-on lip 28, which is clear from Fig. 7:

[0019] In order to be able to bear the separation roller 27 in a rotatable fashion and drive it in rotation, it has two axle stubs 36, 37 which project beyond both its end sides. The first axle stub 36 is kept relatively short here and mounted rotatably in a first bearing block 38 which is arranged directly next to the separation roller 27. The second axle stub 37 is relatively long in comparison with the width b of the separation roller 27 and is mounted in a second bearing block 39 which is arranged spaced relatively far apart from the separation roller 27.

[0020] This method of bearing the separation roller 27 is known prior art, i.e. is also used in sheet-separating devices according to Figs 1 and 2. In order to be able to press the separation roller 27 against the pressing-on lip 28 in a way according to the invention, a slot-like recess 40, in which the first axle stub 36 is mounted, is provided in the first bearing block 38. This recess 40 can be embodied as an oblong hole or, as provided in Fig. 7, as a slot which is open at the edges.

[0021] Furthermore, the first axle stub 36 is loaded by a spring 41 which attempts to displace it in the direction of the pressing-on lip 28 in the required fashion.

[0022] This spring 41 can be of basically any desired design. The design illustrated in Fig. 7 has proven particularly favourable. The spring 41 is composed here of a spring wire which has two bends. It thus comprises a first lever 42 whose free end bears against the first axle stub 36, a centre piece 43 which is attached to the housing of the device, and a second lever 44 which bears against a counterbearing 45.

[0023] The profile of the spring wire in the relaxed state is selected here to be such that, in the state in which it is installed in the housing as in Fig. 7, it exerts on the axle stub 36 the spring force which is necessary according to the invention.

[0024] The separation roller 27 is driven by means of the second axle stub 37 and/or the gearwheel 46 which is located next to the second bearing block 39 and is connected to the axle stub 37. The large overall length of the axle stub 37 ensures that slight swivelling of this axle stub 37, such as occurs when the first axle stub 36 is displaced along the slot-like recess 40, leads to only extremely slight swivelling of this gearwheel 46. This swivelling is so slight that the gearwheel 46 does not become skewed with its drive wheel (not shown in Fig. 7).

Claims

1. A device for removing a single sheet (34) of paper lying at the top of a stack (33), comprising a separation roller (27) which is driven in rotation and a sheet pressing-on lip (28), a first section (29) of this sheet pressing-on lip (28) and the separation roller (27) being held pressed against one another in a sprung fashion and the sheet pressing-on lip (28)

having a second section (30) which runs approximately tangentially with respect to the outer surface of the separation roller (27) and has the purpose of supporting the end sides of the sheets of paper, **characterized in that** the pressing-on lip (28) is secured in an immovable fashion and the separation roller (27) is held pressed against the pressing-on lip (28) in a sprung fashion.

2. Device according to Claim 1, the separation roller (27) having, for bearing rotatably and driving it, two axle stubs (36, 37) which are mounted in bearing blocks (38, 39), the first bearing block (38) of the first axle stub (36) being arranged directly next to the separation roller (27), and second bearing block (39) of the second axle stub (37) being arranged at a distance from the separation roller (27) which is large in relation to its width (b), **characterized in that** the first axle stub (36) is mounted in a slot-like recess (40) in the first bearing block (38) and is loaded by a spring (41) which presses it in the direction of the pressing-on lip (28).

3. Device according to Claim 2, **characterized in that** the spring (41) is formed by a spring wire which has at least two bends, and comprises a first lever (42) which bears against the first axle stub (36), and a second lever (44) which bears against a counterbearing (45).

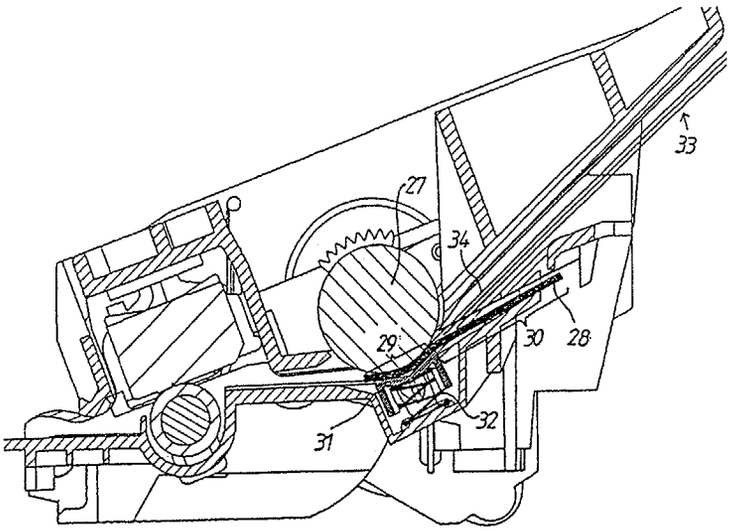

Fig. 1 (Prior art)

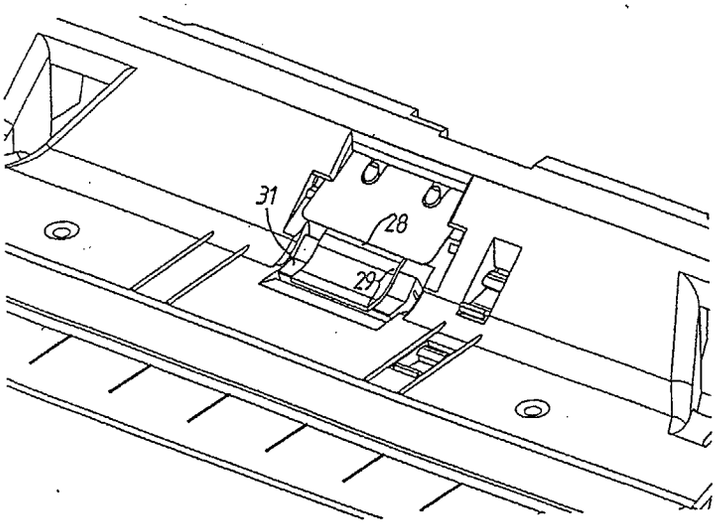

Fig. 2 (Prior art)

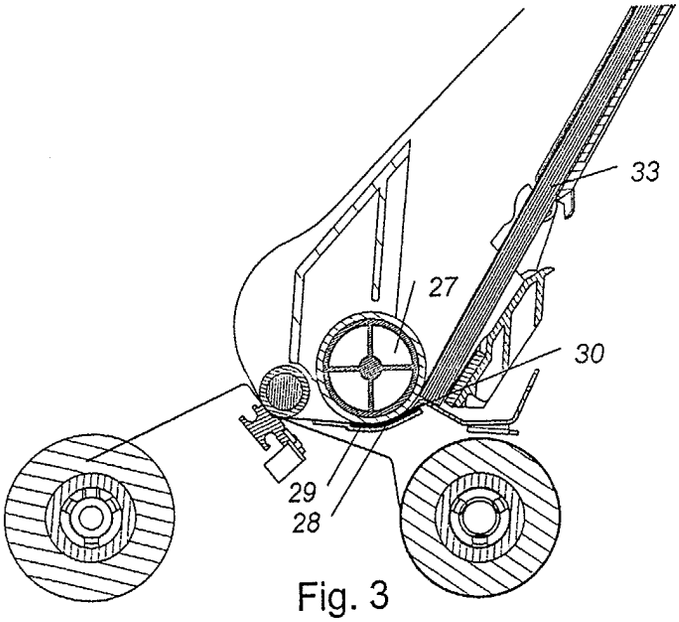

Fig. 3

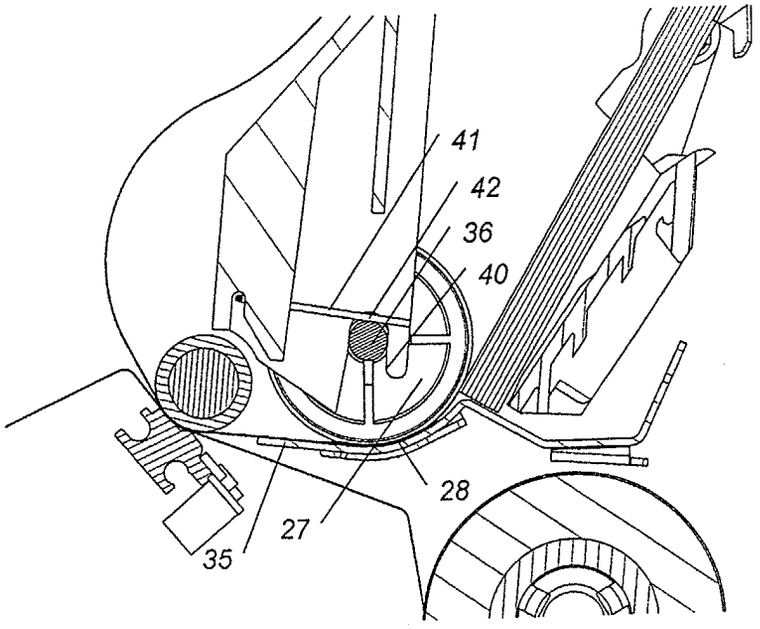

Fig. 4

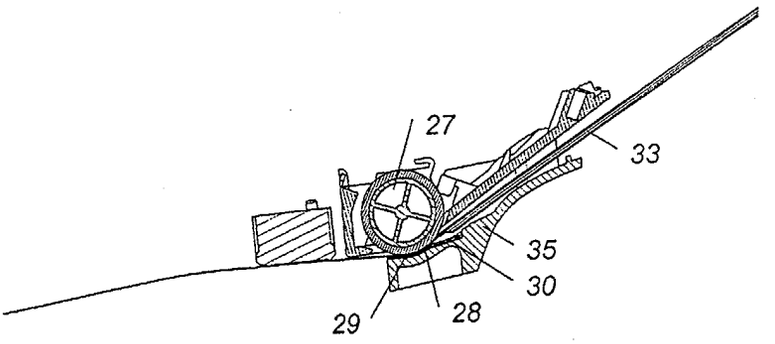

Fig. 5

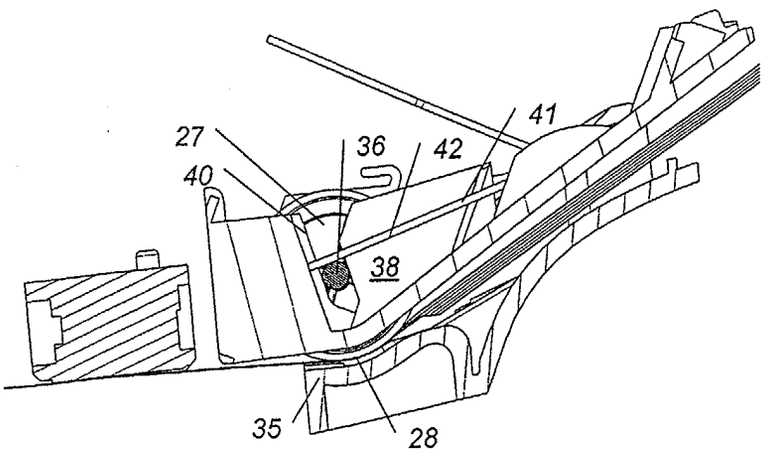

Fig. 6

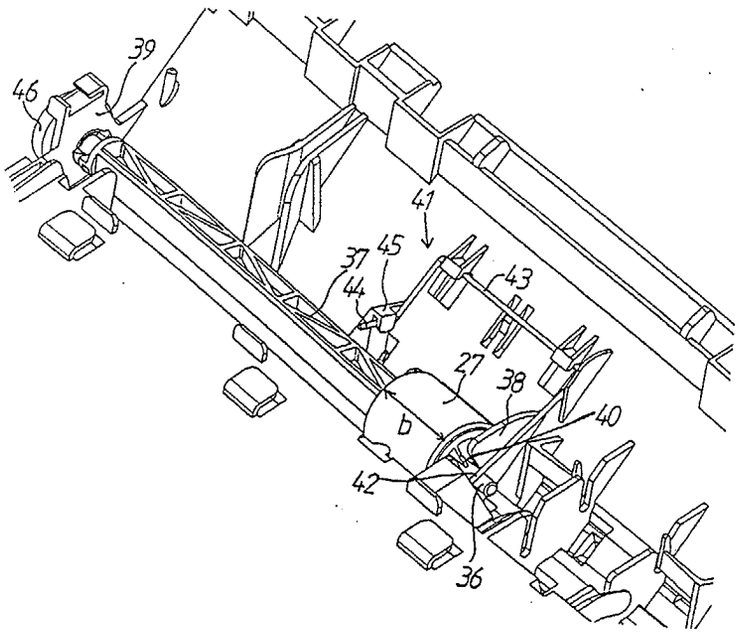

Fig. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 03 29 0576

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X A	EP 0 452 961 A (CANON KK) 23 October 1991 (1991-10-23) * column 4, line 40 - column 5, line 28; figures 3-5 *	1 2	B65H3/06 B65H3/52
X A	PATENT ABSTRACTS OF JAPAN vol. 2000, no. 20, 10 July 2001 (2001-07-10) -& JP 2001 080771 A (FUNAI ELECTRIC CO LTD), 27 March 2001 (2001-03-27) * abstract; figures 6,10,11 *	1 2	
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A	PATENT ABSTRACTS OF JAPAN vol. 010, no. 315 (M-529), 25 October 1986 (1986-10-25) & JP 61 124450 A (RICOH CO LTD), 12 June 1986 (1986-06-12) * abstract *	1	TECHNICAL FIELDS SEARCHED (Int.Cl.7) B65H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	7 August 2003	Lemmen, R

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