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(54) Method and assembly for the feeding of a printing machine with single sheets obtainable from a plurality of paper web reels tearable by micropunching.

(57) A laser printer (10) is fed with single sheets (12) separated from each other and provided from a plurality of micropunched paper reels (22_1,22_2,....,22_n) through a like plurality of tearing devices (14_1,14_2,....,14_n), each having the inlet connected, through paper web diverters (20_1,20_2,...,20_n), to a respective reel (22_1,22_2,...,22_n), the tearing devices being all connected at the outlet through conveying trays (16_1,16_2,...,16_n) to the same printer.

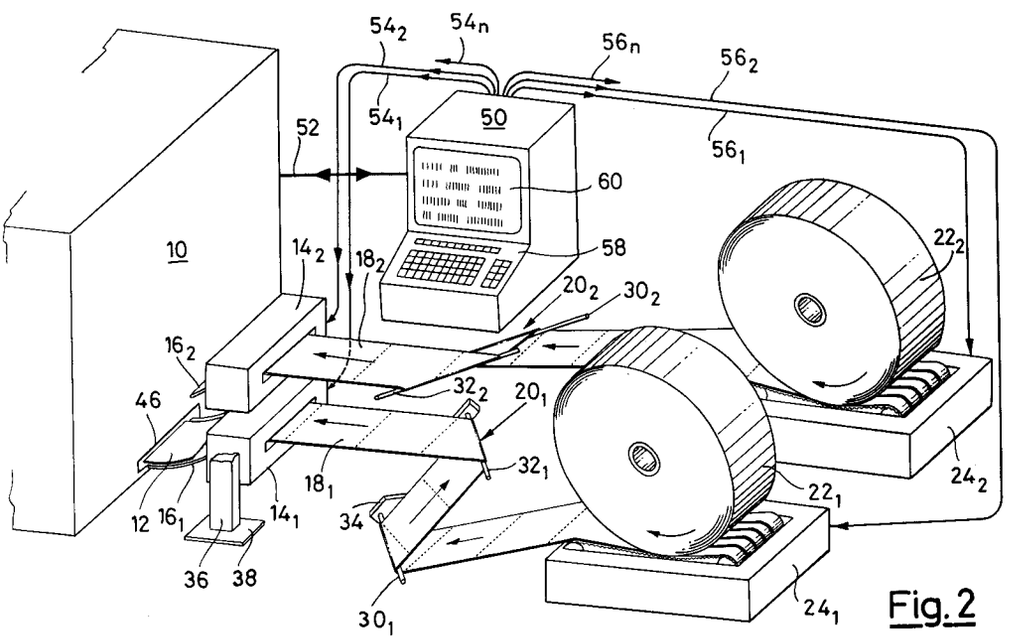

Fig. 2

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The present invention relates to a method and an assembly for the feeding of a printing machine, and particularly a laser printer, with single sheets from a plurality of separate reels of paper of the so-called micropunched tipe, namely of the type in which the paper web forming the reels is liable of a localized separation by means of weakened portions obtained by micropunching.

In a number of electronic data processing practices, especially those related to the billing, invoicing, payment of invoices, taxation and the like, often the need arises of having different parts of the documents printed onto sheets of different colors and thus the need exists of feeding the printer from time to time with paper sheets of different colors.

In order to fulfill this necessity the method and assembly of the present invention have been developed consisting in the use of a number of paper reels at least equal to the maximum number of form colors which must be used, of a number of guide members for the paper webs equal to the number of paper reels, of a number of tearing devices still equal to the numer of reels, of a like number of conveying trays and of only one laser printer using single sheets.

The aforesaid method is carried out by means of an assembly comprising a predetermined number of paper reels, each housed in a corresponding unwinding device, a like number of web diverters having the purpose of guiding each paper web from its reel to a corresponding tearing device, a like number of tearing devices each associated to a corresponding paper web, and a like number of conveying trays each connected between each tearing device and only one laser printer for the whole assembly.

More particularly the unwinding devices used in the assembly of the invention are belt unwinding devices and likewise particularly the web diverters are diverters comprising roller pairs by which the paper web is bent and passed from the laying position of the reel unwinding devices to that of the tearing devices.

Preferably the tearing devices are mounted one above the other so as to form a sort of column supported by a supporting and fastening framework.

More particularly each tearing device is connected with the only one inlet of the single sheets of the laser printer by means of a proper conveying tray located between each tearing device and the printer.

Preferably the printer, the paper reels and the tearing devices are all under the control of a same central unit by which the paper to be sent to the printer is selected, and consequently the corresponding unwinding devices and the tearing devices are actuated.

The characteristics of the present invention which are considered as being original are particularly pointed out in the final part of the present specification; however further features and advantages shall appear from the following detailed description of an embodiment thereof, which must not be construed in a limiting sense, with reference to the accompanying drawings in which:

fig.1 is a schematic view from above of a printer feeding assembly according to the present invention;

fig.2 is a perspective schematic view of the same printer feeding assembly;

fig.3 is a partial view, in side elevation, of a series of tearing devices positioned near to a laser printer in an assembly according to the present invention.

Considering the figures and particularly fig.1, a laser printer 10 is positioned so as to receive single sheets 12 which are separated by means of tearing devices in an assembly 14 comprising separate tearing devices 14_1, 14_2....,14_n and transferred by means of conveying trays 16_1, 16_2,....,16_n, to a paper inlet of the laser printer 10, said single sheets being obtained by separation effected by means of the tearing devices 14_1, 14_2,...,14_n, from paper webs 18_1, 18_2,...18_n, each coming, through web diverters 20_1, 20_2,...,20_n,by which the webs are guided according to the respective arrows 21_1,21_2,....,21_n, from a respective paper reel 22_1,22_2,....,22_n, abutting onto a respective unwinding device 24_1, 24_2,....,24_n.

The tearing devices 14_1,14_2,....,14_n, can be either of the tearing devices disclosed and claimed in the Italian applications for utility model patent Nos.22177 B/88, 21876 B/90 and MI91000262 respectively filed on November 21, 1988, October 3, 1990 and March 27, 1991, in the name of the same Applicant as the present application. Likewise the unwinding devices 24_1, 24_2,....,24_n, can be either of the devices described and claimed in the Italian patent application No.19532 A/89 filed on February 22, 1989, and in the application for utility model patent No.MI91U000343 filed on April 30, 1991, in the name of the same applicant as the present invention.

As it is better seen in fig.2, the web diverters 20_1,20_2,....,20_n essentially consist of idle cylindrical rollers 30_1,30_2,...,30_n and 32_1,32_2,....,32_n, by which the respective paper webs 18_1,18_2,....,18_n are deviated from their positions in which are sidewise located with respect to the related reels 22_1,22_2,....,22_n to the vertically superimposed positions related to the tearing devices 14_1,14_2,....,14_n, said rollers being suitably connected to each other by some sort of proper structure such as the upright 34 shown in fig.2.

As it can be seen both in fig.2 and in fig.3, the tearing devices 14_1,14_2,....,14_n, are mounted onto a supporting member, consisting of uprights 36 in turn supported by a basement 38 which can be fastened to the floor, by which the same tearing devices are maintained in a fixed vertical alignment. The lowest tearing device 14_1 is directly connected to the laser printer 10 by means of a conveying tray 16_1 which, being provided with small rollers 40a-c and with small belts 42 movable according to the arrows 44a,44b, causes the single sheets 12 coming from the tearing device 14_1 to be directly inserted into the inlet 46 of the laser printer 10. The next tearing devices 14_2,14_3,...,14_n, are provided with simple conveying trays 16_2,16_3,....16_n of progressively reduced lengths by which the single sheets coming from the upper tearing devices are caused to fall onto lower and lower trays until the lowest tray is reached from which the same sheets are fed to the inlet 46 of the printer 10.

A central control processing unit 50 is connected through a multiple line 52 to the printer 10 for the exchange of information and control signals by which the number and type (for example the color) of the sheets to be fed as well as the time at which each single sheet must reach the printer are determined. To this end there are provided the connections 54_1,54_2,....,54_n to the related tearing devices 14_1,14_2,...,14_n and the connections 56_1,56_2,....,56_n to the related unwinding devices 24_1,24_2,....,24_n,the connections being active to fed proper control signals to the interested tearing devices and unwinding devices.

The operation of the assemply of the invention is as follows:
The sequence of sheets to be printed by the printer 10 is set at the control central unit 50, for example by means of the keyboard 58, it being possible to display said sequence onto the display 60. Then the central control unit 50 decides, on the basis of the information coming from the printer 10, what sheets are to be selected and thus the single tearing devices 16_1,16_2,....,16_n as well as the unwinding devices 24_1,24_2,....,24_n, are actuated, whereby the forming of any desired file is permitted. Of course the instructions, instead of being entered through the keyboard 58, might be fed through devices for the reading of magnetic tapes, magnetic or optical disks or the like.

The above description relates to a preferred embodiment of the invention, having non limiting purpose, and from the reading thereof a skilled in this art shall be able to find out logically equivalent solutions which are hereby covered.

For example the tearing devices might be positioned sidewise to each other, whereby the conveying members from the tearing devices to the printer would be modified and the web diverters would be no longer necessary.

Claims

1. Single sheet feeding method for a printing machine from a plurality of reels of micropunched paper web characterized by the provision of a number of paper reels equal to at least the maximun number of form colors to be used, of a number of paper diverters equal at least the number of paper reels, of a number of tearing devices equal to the reel number, of an equal number of conveying trays and a single sheet laser printer.

2. Assembly for embodying the method in claim 1 characterized by a preset number of paper web reels (22_1, 22_2, ..., 22_n), each housed on a corresponding unwinding device (24_1, 24_2 ..., 24_n), an equal number of web diverters (20_1, 20_2, ..., 20_n) having the purpose of guiding each paper web (18_1, 18_2, ..., 18_n) from its reel (22_1, 22_2, ..., 22_n) to a corresponding tearing device (14_1, 14_2, ..., 14_n) of an equal numbr of tearing devices, each associated to a corresponding paper web (18_1, 18_2, ..., 18_n), en equal number of conveying trays (16_1, 16_2, ..., 16_n) each connected between each tearing device (14_1, 14_2, ..., 14_n) and a single laser printer (10) in common with the whole assembly.

3. Assembly as in claim 2, characterized in that the here used unwinding devices are belt unwinding devices.

4. Assembly as in claim 2, characterized in that the web diverters (20_1, 20_2, ..., 20_n) are roller pair diverters by which the paper web (18_1, 18_2, ..., 18_n) is bent so as to pass from the laying position of the unwinding devices (24_1, 24_2, ..., 24_n) to the laying position of the tearing devices (14_1, 14_2, ..., 14_n).

5. Assembly, as in claims 2 to 4, charcterized in that the tearing devices (14_1, 14_2, ..., 14_n) are superimposed to each other to form a structure like a stack by means of a supporting and fastening frame (36) therefor.

6. Assembly, as in claim 5, characterized in that each tearing device (14_1, 14_2, ..., 14_n) is connected to only one single sheet inlet (46) in a laser printer through a suitable conveying tray (16_1, 16_2, ..., 16_n) positioned between each tearing device (14_1, 14_2, ..., 14_n) and the printer (10).

7. Assembly, as in claims 2 to 6, characterized in that the printer (10), the paper reels (22_1, 22_2, ..., 22_n) and the tearing and the tearing devices (14_1, 14_2, ..., 14_n) are controlled by a same control center (50) by which the paper to be sent to the printer is selected and consequantely the corresponding unwinding devices (24_1, 24_2, ..., 24_n) and the corresponding tearing devices (14_1, 14_2, ..., 14_n) are actuated.

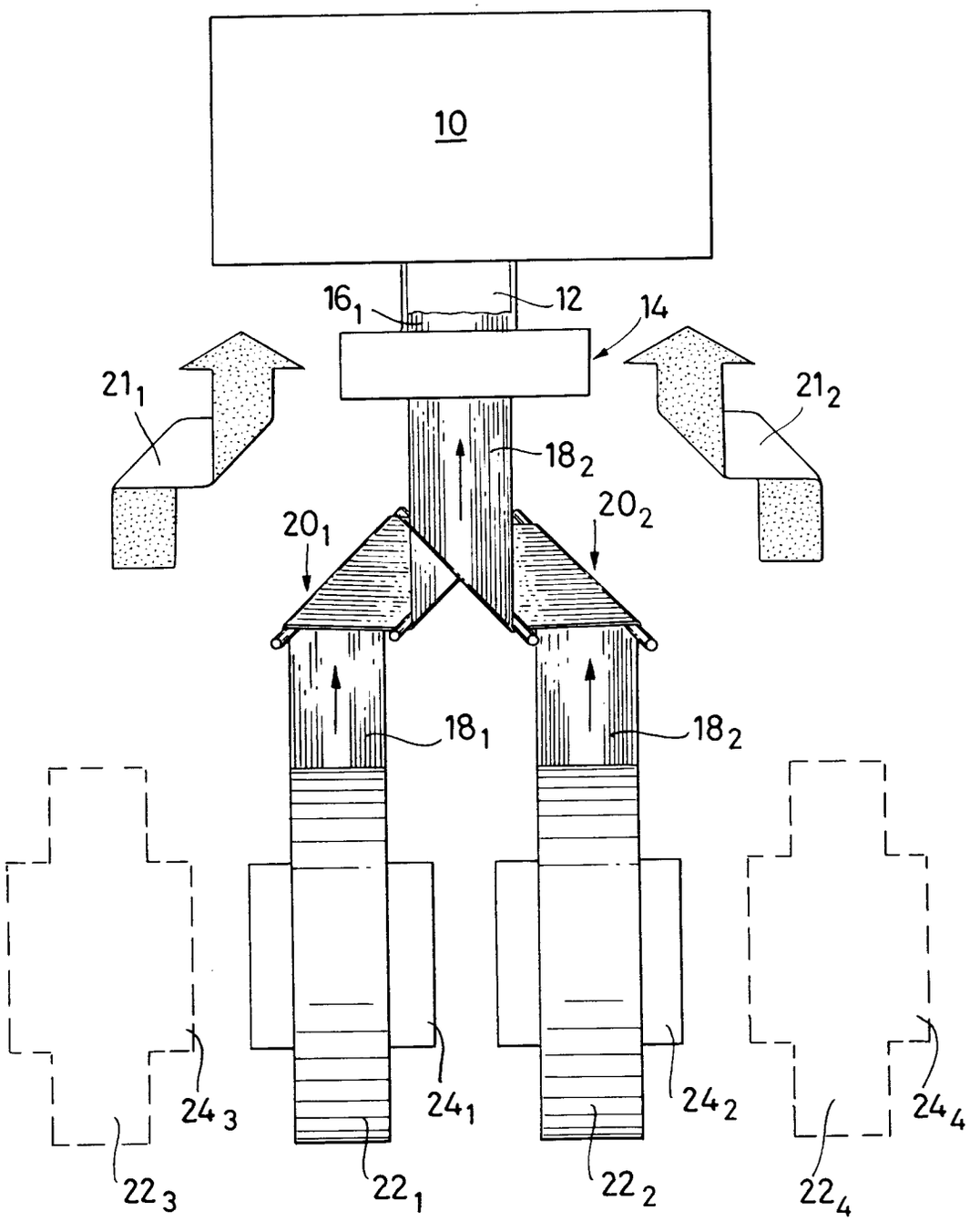
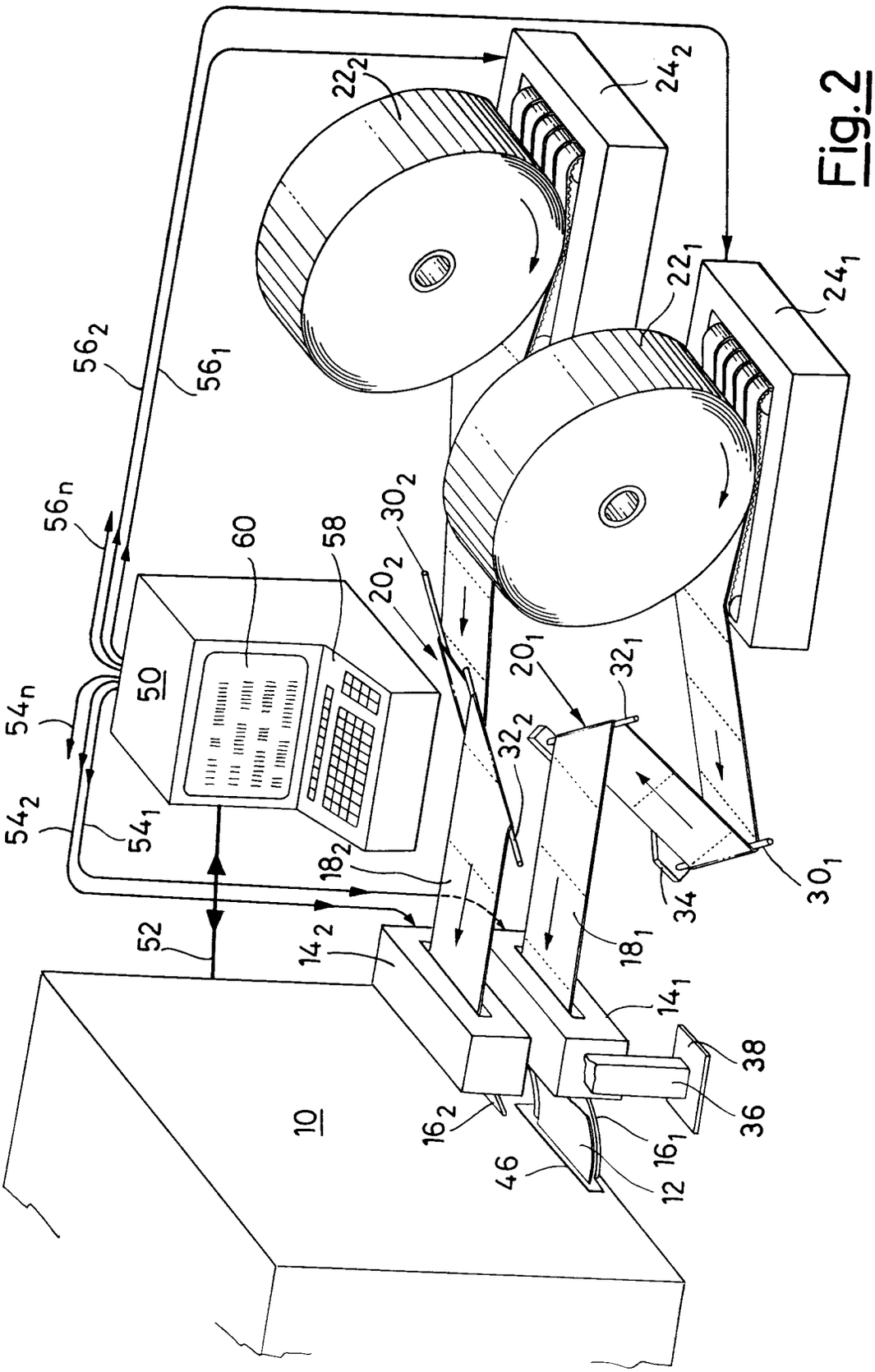

10
16 1
12
14
21 1
21 2
18 2
20 1
20 2
18 1
18 2
24 3
24 1
24 2
24 4
22 3
22 1
22 2
22 4

Fig.1


22_2
24_2
22_1
24_1
56_2
56_1
56_n
60
58
30_2
20_2
20_1
32_1
32_2
50
54_n
54_2
54_1
18_2
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14_2
18_1
14_1
38
36
16_2
16_1
46
12
10

Fig.2

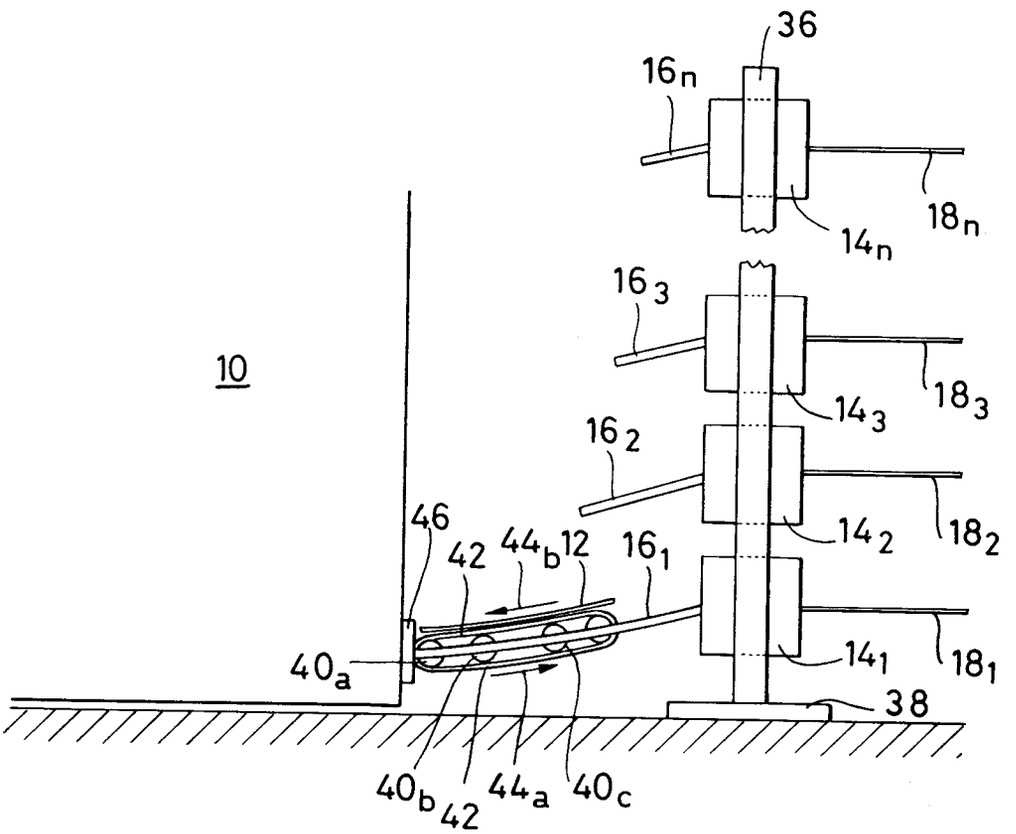
36
16n
18n
14n
16 3
18 3
14 3
10
16 2
18 2
14 2
46
42
44b
12
16 1
40a
14 1
18 1
38
40b
42
44a
40c

Fig.3

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EUROPEAN SEARCH REPORT

Application Number
EP 92 20 2334

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.5)
A	FR-A-2 587 014 (ELEQTRONIQUE SERGE DASSAULT) * the whole document *	1,2	B65H35/00 B65H35/10 B65H16/02
A	PATENT ABSTRACTS OF JAPAN vol. 7, no. 228 (P-228)(1373) 8 October 1983 & JP-A-58 117 565 (RICOH) 13 July 1983 * abstract *	1,2,7	
A	DE-A-3 101 522 (WESCHO-LADENBAU) * abstract; figure 1 *	1,2	
A	EP-A-0 088 314 (OCE-NEDERLAND) * page 1, line 1 - page 3, column 37; figure 1 *	1,2	
A	EP-A-0 309 659 (AUTELCA) * the whole document *	1,2,4	
A	EP-A-0 218 197 (YOSHIDA KOGYO) * abstract * * column 5, line 9 - line 25; figures 1,2 *	1,2	TECHNICAL FIELDS SEARCHED (Int. Cl.5) B65H G03G B26D B26F
A	US-A-3 182 539 (WILLIAMS JR.) * the whole document *	1,2	
A	DE-A-3 030 845 (TREOM I FALKENBERG AB) * the whole document *	3	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	29 DECEMBER 1992	HAGBERG A.M.E.

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