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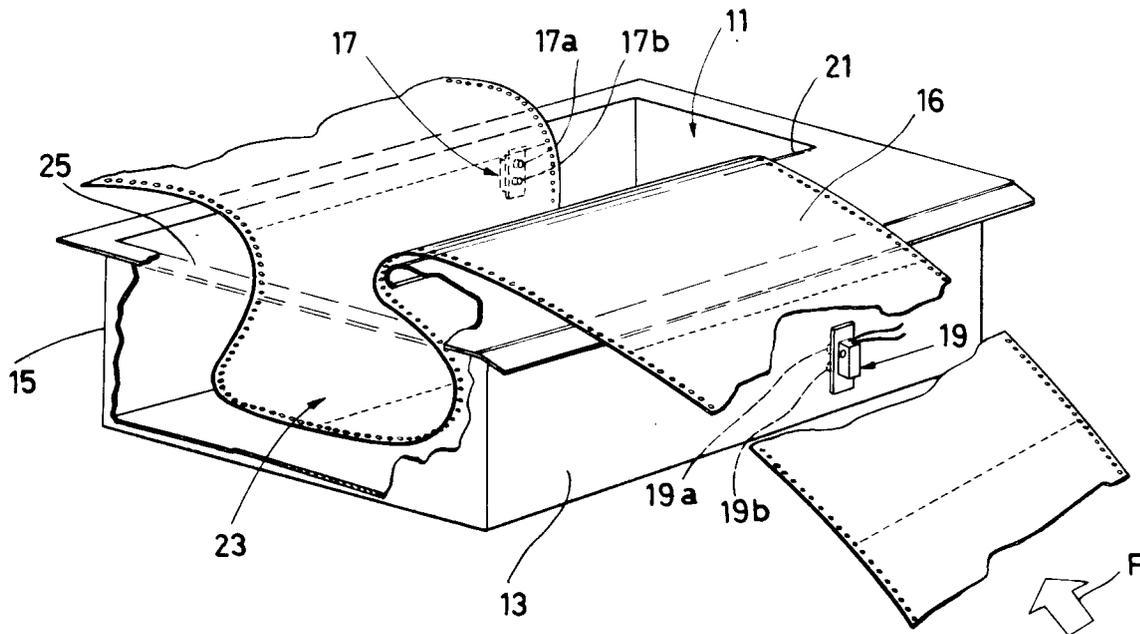
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**Loop control device for paper webs.**

For controlling the feed of a paper web (16) to a laser printer is used a loop control device comprising a container (11) in which the paper web (16)

forms by gravity a loop (23) and can interfere with control photodetectors (17, 19).



**Fig.1**

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The present invention relates to controlled feed of a continuous paper web to a using apparatus and, more specifically a loop control device.

In the following specification reference will be made to the unrolling of a paper web from a coil feeding a printer, for example a fast printer or so called LASER printer of an electronic accounting or invoicing center, being intended that that does not have any limiting meaning for the use of the present invention.

How it is well known, the printing speed of the apparatus provided in electronic accounting centers is enormously increased in the last ten years, particularly with the occurrence of the so called LASER printers, so that the feeding speed of the paper to the printer can substantially affect the productivity of the printer and thus of the whole center.

Owing to the above reason it has been moved from a feeding with packages of laterally prepunched forms also accordion folded, with respect to weakening or punching lines, having duty for the subsequent tear shearing of the single printer sheets after the print and in the envelopping and forwarding steps, to a feeding from a coil, preferably a preworked paper coil, i. e. provided with the lateral punchings and the transversal weakening lines delimitating the single sheets; the paper web is unrolled or uncoiled from a coil and fed to the printer from which comes out and is collected in an output section or device, also providing to stack the printed web in packages containing a preset sheet number (the so called "job" working with relating "job separation"), to share by means of a suitable cutting or tearing device, the last sheet of the package from the first sheet of the immediately subsequent package and, at last, to remove and recover the resulting package to be transferred to the the final working stages.

Then, it results selfevident how it is necessary to control very carefully the travelling speed of the paper in the above indicated different sections and, above all, to provide intermediate control stations fast affecting the upstream and downstream devices in case of any operational malfunction.

The control devices nowadays almost generally used, substantially provide a paper web loop: as the depth of the loop varies and particularly when are exceeded bounds preset by signalling members, as for example photodetecting means, they provide to temporarily stop the downstream paper departure and/or the upstream paper arrival in accordance with a too deep or too shallow loop.

More specifically, these control devices normally comprise motor means providing a paper feed to a preset height from which the paper web can at last naturally form the desired loop and interact with the photodetecting control members.

It is selfevident that in such a way is asked a careful synchronization for example of the above mentioned motor means with the upstream and downstream located devices, and that raises both mechanical, structural and control (usually of electronic kind) complexity on the whole line.

It is a main object of the present invention to provide a loop control device of structurally simplified kind by maintaining unaffected the reliability by which the control function is provided.

A more specific object of the present invention is to provide a loop control device, to be located between the uncoiler of the paper web coil and the input to the laser printer, able to immediately intervene in case of printer stop and/or in case of uncoiling problems of the paper web from the coil.

These objects are embodied by a loop control device characterized by comprising an upside open container and photodetecting means arranged on two opposing vertical walls of said container, so that the paper web naturally forms by gravity a loop inside the space defined by the container in running above its upper mouth and this loop interferes with said photodetecting means.

In the preferred form of the device according to the invention the container forming the upside open space in which the paper web loop is formed, is embedded in the floor directly into the way followed by the paper web from the uncoiler to the laser printer, so that any motor or paper moving means is omitted. Even preferably, the photodetecting means are two in number, anyone comprising an emitter and a receiver, being the two means vertically aligned and located at proper heights to emit control and command signals at a maximum and a t a minimum height of the loop, going siad signal to control the paper moving motor on the side of the laser printer or the uncoiler motor.

The enclosed drawings show respectively:

in figure 1 a perspective view of the device; and in figure 2 a transversal section view thereof.

Looking at the drawings, with the reference 11 is generally indicated the container, which can be of metal, plastic material or the like. Alternatively, for example when a floor with air space is provided, the container 11 can be implemented in the form of a permanent space or pit therein.

In two opposed walls 13 and 15 of the container 11, perpendicular to the feed direction of a paper web or strip 16, indicated by the arrow F, are mounted the photodetector pairs 17 and 19, in which 17a and 19a indicate the emitters and 17b, 19b indicate the receivers.

From figure 1 is selfevident the operation of the control device according to the invention: the paper strip 16, when arrives at a fore edge 21 of the container 11, falls by gravity inside the relating space, forming a loop 23, and then comes out to a

hind edge 25.

Departure speed increases downstream the container 11 cause a height or depth reduction of the loop 23 which, when preset limits are exceeded, actuate the corresponding photodetectors 17 or 19 and a corresponding control signal, for example a slowing down signal, is forwarded to the downstream trailing means.

On the contrary, an advancing speed increase of the strip 16 upstream the container or a lessening of the downstream speed of the strip 16 lead to an increase of depth or height of the loop 23: also in this case, when a preset limit is exceeded, is actuated the corresponding photodetector 17 or 19 emitting the proper control signal.

The simplification advantages provided by the device according to the invention are increased by the extreme functionality and operation reliability having viable importance for the above mentioned reasons.

It is selfevident that the invention admit the possibility of changes and variations conceptually and mechanically equivalent: for example, the photodetectors can be replaced by other per se know sensors.

It is also possible to affect the location of the hind or output edge of the container in order to have a more reliable loop formation.

### Claims

1. Loop (23) control device for a paper web (16) characterized by comprising an upside open housing (11) and photodetecting means (17, 19) arranged along two vertical opposed walls (13, 15) of said housing (11), whereby the paper web (16) spontaneously forms, because of gravity, a loop (23) into the space defined by the housing (11) in running over the upper mouth thereof, interferring this loop (23) with said photodetecting means (17, 19).
2. Device according to claim 1, characterized in that the housing (11) forming the upside open space, in which the loop (23) of the paper web (16) is formed, is directly embedded in the floor in the path of the paper web (16) from the uncoiler to the laser printer.
3. Device according to claim 1, characterized in that said photodetecting means (17, 19) are two in number, anyone comprising an optical emitter (17a, 19a) and an optical receiver (17b, 19b), being the two photodetectors (17, 19) vertically aligned and arranged at proper heights to emit control signals at a maximum height and a a minimum height of the loop (23), controlling said signals a driving motor for

the paper (16) on the side of the laser printer, or the motor of the uncoiler.

4. Device according to claim 1, characterized in that said housing (11) is made either of metal or of plastic material.

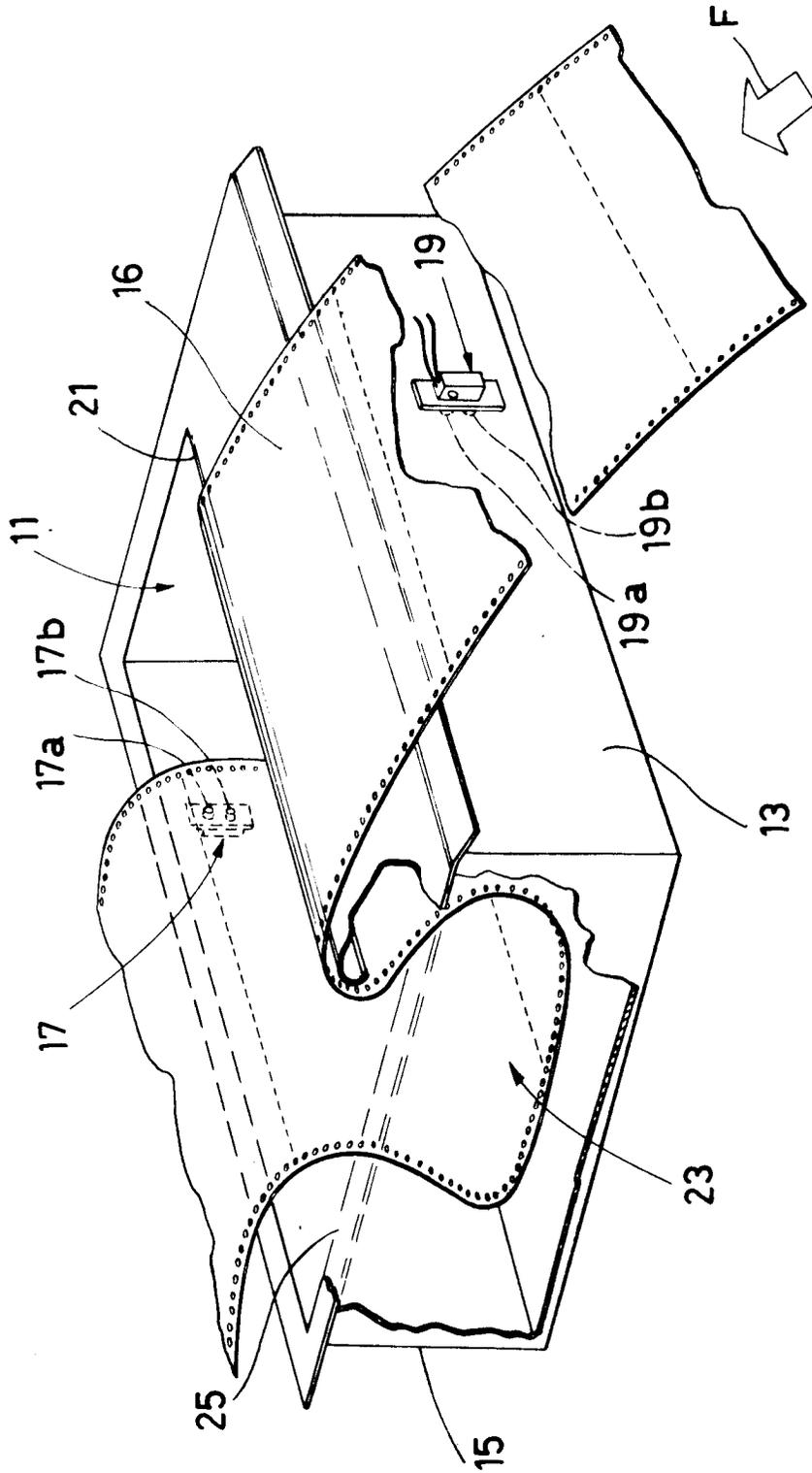


Fig.1

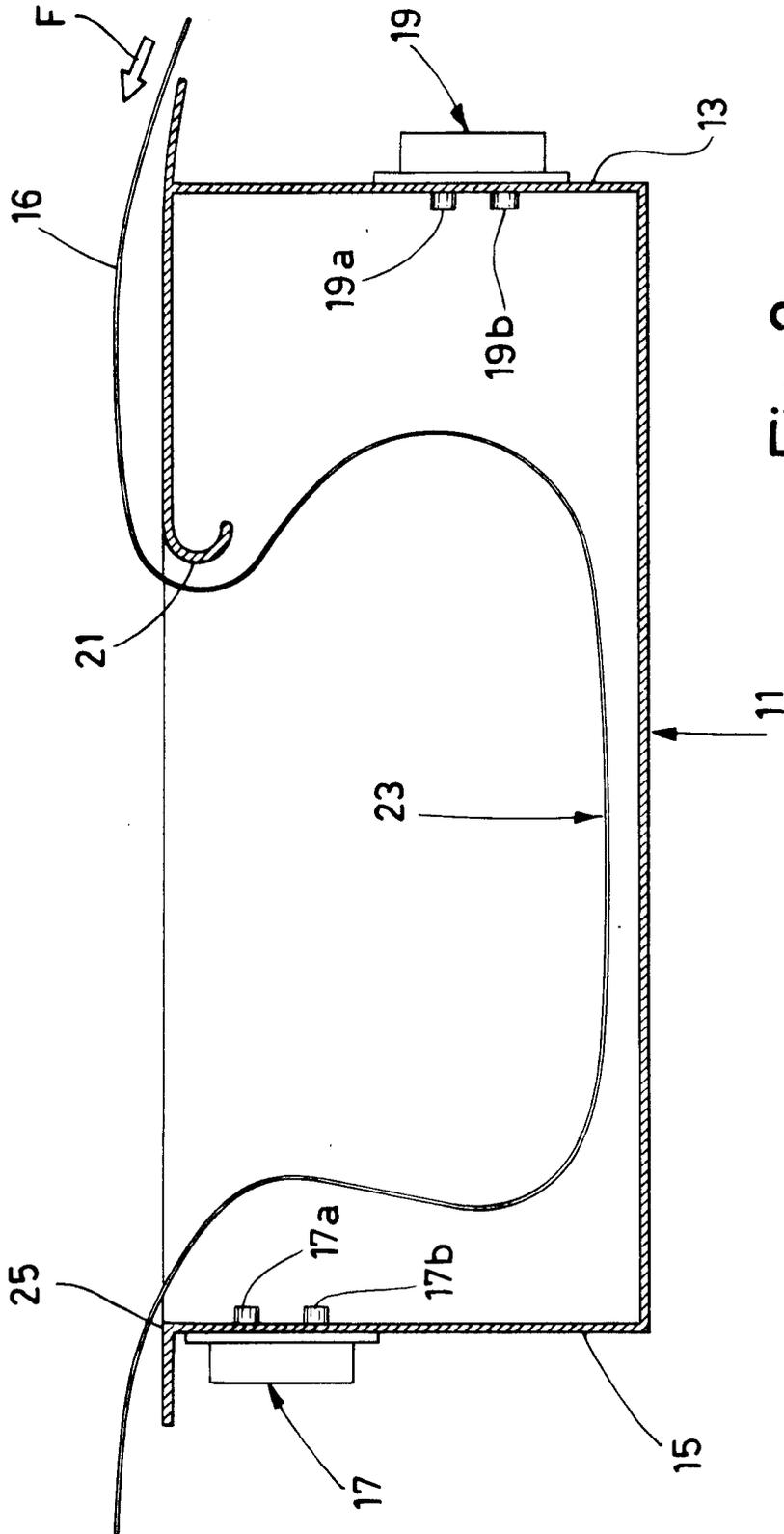


Fig. 2



**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)
X	US-A-2 487 755 (W.FEW) * column 2, line 36 - column 3, line 68; figure 1 *	1	B65H23/04
Y	---	2-4	
Y	EP-A-0 344 698 (INDUSTRIA GRAFICA MESCHI) * the whole document *	2-4	
A	GB-A-923 358 (LICENTIA PATENT-VERWALTUNGS-G.M.B.H.) * the whole document *	2	
A	FR-A-1 058 758 (WESTINGHOUSE ELECTRIC CORPORATION) * the whole document *	1-4	
A	US-A-3 464 610 (M.G. KONING) * the whole document *	1-4	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B65H
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 13 MAY 1992	Examiner MEULEMANS J. P.
<p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : particularly relevant if taken alone  Y : particularly relevant if combined with another document of the same category  A : technological background  O : non-written disclosure  P : intermediate document</p> <p>T : theory or principle underlying the invention  E : earlier patent document, but published on, or after the filing date  D : document cited in the application  L : document cited for other reasons  .....  &amp; : member of the same patent family, corresponding document</p>			