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(54) **DEVICE FOR POSITIONING DIE-CUTTING ROLLERS IN ROTARY CUTTING MACHINES**

(57) The invention relates to a device that connects the ends of a rotation shaft (9) of a cylinder carrying a cutting die, to an eccentric cam (10) by means of bearings or bushings (11), such that the rotation of the cam, by means of an arm (12) associated with a gear arc (13), which is actuated by an endless screw (14) controlled by an impulse motor (15), causes the eccentricity between shafts during the rotation of the cam to cause a vertical micro movement of the rotation shaft of the die-carrying

cylinder, allowing the die to adjust perfectly to different paper thicknesses, so that labels are die-cut perfectly without damaging the base sheet on which they are disposed. The device can be placed interchangeably on the die-carrying cylinder (5), a base cylinder (4) or both, with the added feature of using the system to compensate for the dies, which become worn from use, by bringing them closer for optimal cutting.

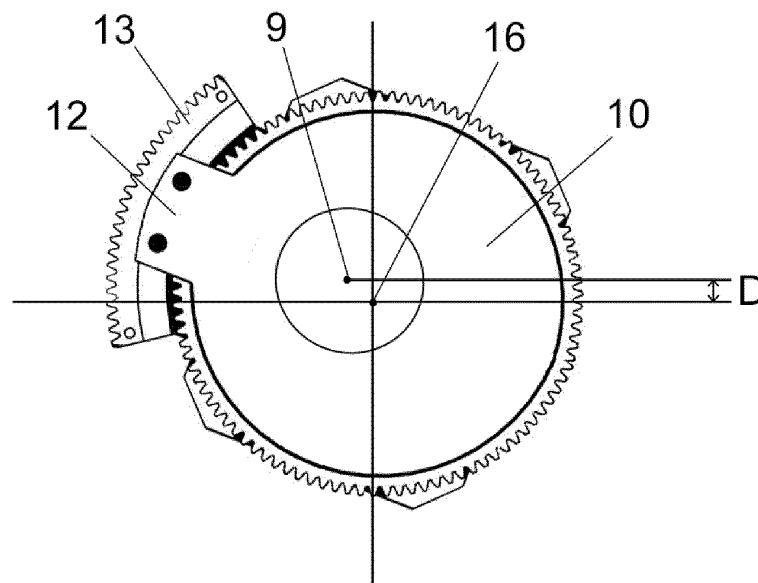


FIG. 4

Description

OBJECT OF THE INVENTION

[0001] The present invention relates to a device which has been especially conceived to allow fine adjustment of the positioning between the cutting cylinder and the base cylinder for label work and the like, when an extremely accurate precision of cutting depth is required, in machines based on rotary cylinders intended for that purpose.

[0002] The object of the invention is to provide a mechanism that allows the automatic regulation of the space that is defined between the carrier cylinder of the cutting die and the base cylinder on which the carrier sheet of the material to be die-cut slides, such as labels, so that the machine can adapt to different thicknesses, without damaging the base sheet on which they adhere.

[0003] It is therefore a micrometric movement, but it is decisive to ensure that the resulting product is of the highest quality.

BACKGROUND OF THE INVENTION

[0004] In the practical scope of the invention (that of the roller-based die-cutting machines used for the die-cutting of adhesive labels) the starting point is a sheet wherein a base layer of paraffined, siliconised or similar paper participates, on which an adhesive sheet per se is arranged, intended to be die-cut to obtain a plurality of adhesive labels of a smaller size.

[0005] These labels must be properly die-cut without the blades damaging the base sheet on which they rest, so that the sheet has a one-piece appearance when it comes out of the machine, i.e. that the labels can be separated one by one from a single common sheet.

[0006] The problem is that these sheets can have different thicknesses depending on the type of paper used, so the distance between the base cylinder and the die-carrying cylinder must be adjusted so that the die blades do not damage the base sheet, a manoeuvre that to date is carried out by hand, by means of manual micrometers associated with the shaft of the die-carrying cylinder or the shaft of the base cylinder.

DESCRIPTION OF THE INVENTION

[0007] The object of the device of the invention is to automate this process of regulating the positioning of the die-carrying cylinder, in order to avoid human errors and simplify this manoeuvre.

[0008] For this purpose, and more specifically, starting from the conventional structure of machines of this type, wherein a base roller is used to support the sheet to be die-cut, on which a magnetic roller rotates, to which the cutting plates or dies of the labels to be obtained are fixed perimetrically, rollers that are synchronised by means of respective end gears and solidly fixed thereto, the shaft

of the die-carrying upper roller being arranged on a vertical guide which allows a small vertical play, micrometric, and capable of being absorbed by the height/depth of the teeth participating in both synchronization gears, the invention is focussed on the fact that associated to the rotation shaft of the die-carrying cylinder, and in correspondence with both ends thereof, an eccentric cam is arranged, which is linked thereto through bearings or bushings, an eccentric cam from which a lateral arm emerges which ends in a gear arc on which acts an endless screw associated to an impulse motor, with which the movement of said endless screw and consequently the angular movement of the eccentric cam, is finely controlled, which will cause, depending on the direction of rotation applied by the motor, that the shaft of the die-carrying cylinder, and consequently the latter, to move slightly upwards or downwards, a micrometric distance, sufficient to correctly adjust the mechanism to the type of labels to be used, a movement, as previously mentioned and as is conventional, that does not affect the synchronisation in the movement between rollers, since this movement is significantly less than the height of the teeth of the gears that link both rollers.

[0009] The electric impulse motor can be manually controlled through a control interface, implemented in the machine itself or externally, or it can be regulated in a fully automated way through the data entered by the computer system associated with the machine.

[0010] In this way, a totally reliable and precise mechanism is achieved that allows the dies to be adapted to the different thicknesses of paper used in each case, without damaging the base sheet of the adhesive labels to be obtained, significantly minimising adaptation times and avoiding human errors.

DESCRIPTION OF THE DRAWINGS

[0011] As a complement to the description that will be provided herein, and for the purpose of helping to make the features of the invention more readily understandable, according to a preferred practical exemplary embodiment thereof, said description is accompanied by a set of drawings constituting an integral part thereof in which, by way of illustration and not limitation, the following is represented:

Figure 1 shows a perspective view of a label cutting machine based on rotating cylinders wherein a positioning device made in accordance with the object of the present invention is implemented.

Figure 2 shows a profile view of the assembly of the previous figure at the level of the cylinder on which the mechanism of the invention is applied.

Figures 3 and 4 show a simplified and widely exaggerated diagram of the operation of the device of the invention, since the eccentricity of the cam that participates in the invention is so small that it cannot even be appreciated in the real planes of the Figures

1 and 2, so that said operation becomes clearer in view of these two new schematic figures.

PREFERRED EMBODIMENT OF THE INVENTION

[0012] In view of the outlined figures, it can be seen how the device of the invention is intended in this case to be implemented in roller-based label cutting machines, wherein a series of guide rollers (1) are used for the sheets to be die-cut, in such way that the die-cutting process takes place when said sheets are passed through a pair of rollers synchronised with each other from respective gears (2-3), establishing a base roller (4) and an upper roller (5), die-carrying, so that in this case the upper roller (5) is vertically movable on guides (6) established on the support frame (7) of the mechanism.

[0013] As can be seen in Figures 1 and 2, the ends of the shafts of the upper roller (5) are linked to respective mechanisms (8) of vertical movement of said upper roller (5), so that said shafts (9) are linked to an eccentric cam (10) by means of bearings or gears (11), an eccentric cam from which a lateral arm (12) emerges that ends in a gear arc (13) on which acts an endless screw (14) associated with an impulse motor (15), with which the movement of said endless screw is finely controlled, said mechanism being duly protected in the corresponding casing (17).

[0014] Given that the eccentricity of the cam is minimal, as micrometric movements are required, in Figures 3 and 4 the behaviour of the cam is exaggerated so that it can be better understood, although, as has just been said, these are minimal movements that are easily absorbed by the teeth of the gears (2 and 3) that link both rollers.

[0015] Well, as can be exaggeratedly seen in figure 3, the shaft (9) of the die-carrying cylinder is offset by a small distance from the shaft (16) of the cam on which it rotates internally, so that, when the endless screw (14) is driven by means of the electric impulse motor, it causes an angular displacement of said eccentric cam (10), as shown in figure 4, which causes a vertical displacement (D), of the shaft (9) of the die-carrying upper roller (5).

[0016] This device can also be used in rotary die cutting machines, when it is necessary to bring the die closer to the sheet to be cut due to its wear.

[0017] It should be noted that the mechanism can be located as mentioned in the magnetic cylinder carrying the dies (5), or in the base cylinder (4), since it is indistinct in order to carry out the intended approach, thus, in some cases it can even be incorporated into both cylinders.

[0018] Finally, it only remains to point out that, as mentioned above, the electric impulse motor can be manually controlled through a control interface, implemented in the machine itself and/or externally, for example through an application controlled by a mobile device, tablet or similar, and/or, be regulated in a fully automated way through the data entered by the computer system associated with the machine.

Claims

1. A device for positioning die-cutting rollers in rotary cutting machines, wherein the carrier sheet for the labels to be obtained is passed through a pair of rollers synchronized with each other from respective gears (2-3), establishing a base roller (4) and an upper roller (5), die-carrying, the upper roller (5) being vertically movable on guides (6) established on the support frame (7) of the mechanism, **characterised in that** respective eccentric cams (10) are linked to the ends of the shafts (9) of the upper roller (5) by means of bearings or gears (11), eccentric cams (10) from which a lateral arm (12) emerges that ends in a gear arc (13) on which an endless screw (14) acts associated with an impulse motor (15), associated with an internal and/or external control interface, manually operated and/or computerised.
2. The device for positioning die-cutting rollers in rotary cutting machines, according to the preceding claim, **characterised in that** the movement mechanism of the roller is on the base roller (4).
3. The device for positioning die-cutting rollers in rotary cutting machines, according to the first claim, **characterised in that** the movement mechanism is incorporated in the upper roller (5) and in the base roller (4).
4. The device for positioning die-cutting rollers in rotary cutting machines, according to preceding claims, **characterised in that** it allows the approach of the upper roller (5) and the base roller (4), to compensate for the wear of the die.

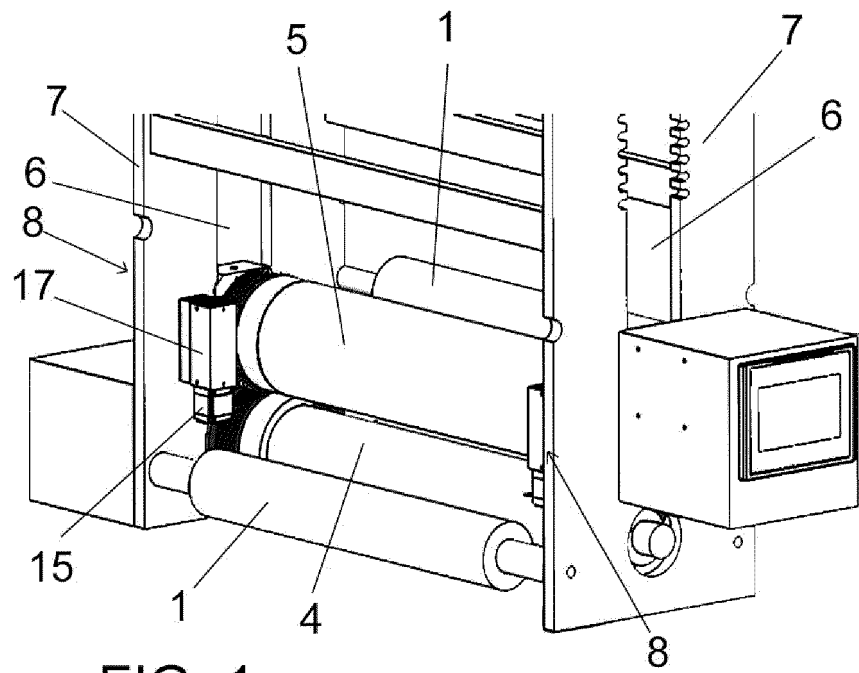


FIG. 1

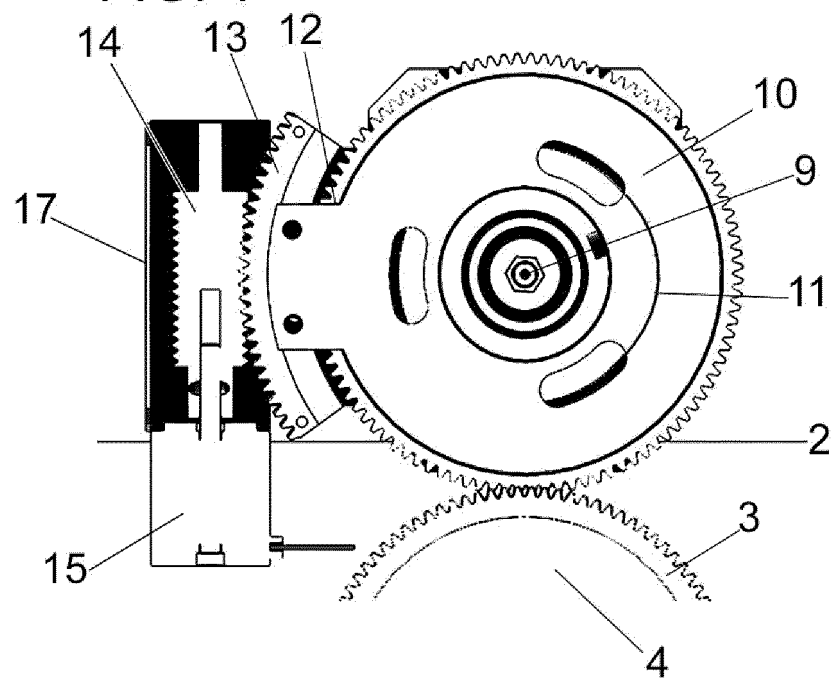


FIG. 2

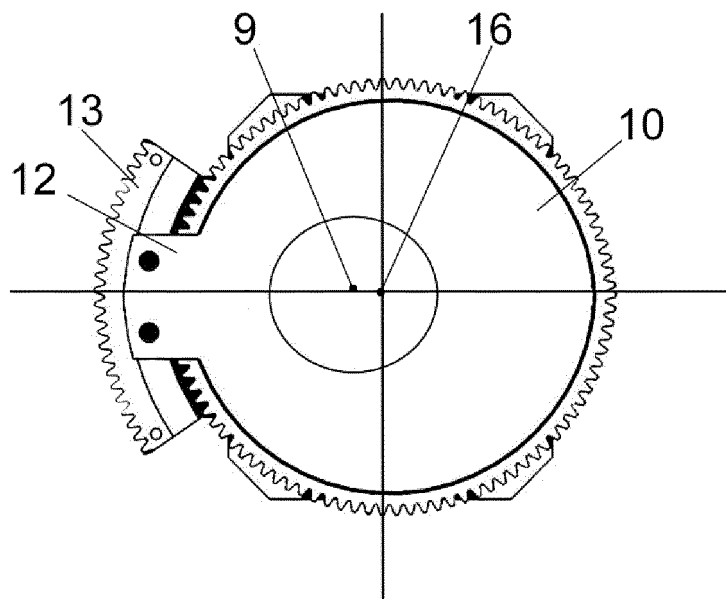


FIG. 3

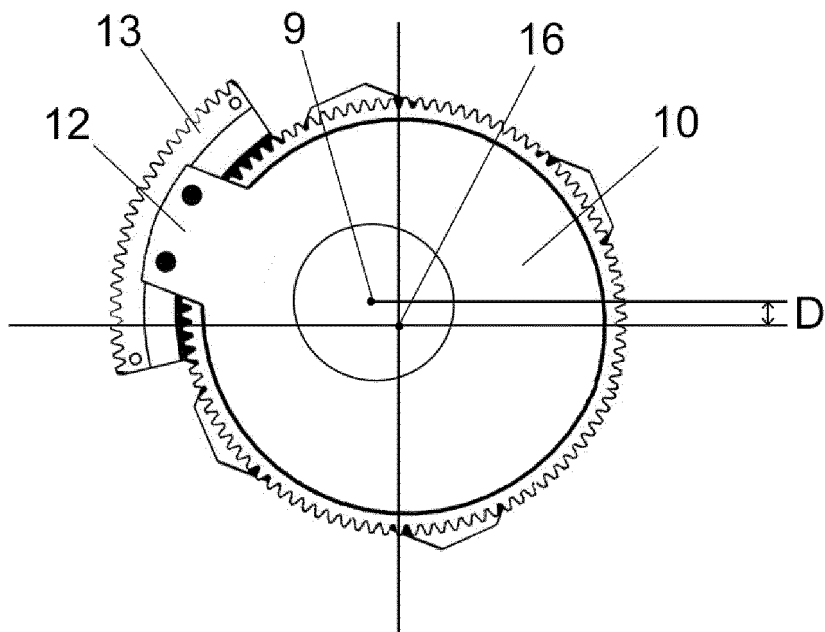


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2019/070055

A. CLASSIFICATION OF SUBJECT MATTER

B31D1/02 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B31D, B65C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, INVENES, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2014083778 A (TOPPAN TDK LABEL CO LTD) 12/05/2014, paragraph 17, figures 3- 5 & Abstract from DataBase EPODOC. Retrieved from EPOQUE; AN - JP-2012235015-A & Abstract from DataBase WPI. Retrieved from EPOQUE; AN - 2014-J03361.	1-4
A	US 1785250 A (HENRY EBERHARDT STANLEY LEOPOL) 16/12/1930, page 3, line 90 - page 4, line 5; figures 12,13.	1-4
A	GB 532018 A (MAURICE BEZENCENET) 15/01/1941, page 9, lines 39-79; figures.	1-4
A	JP S5964295 A (ISOWA INDUSTRY CO) 12/04/1984, figures.	1-4

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Information on patent family members

Patent document cited in the search report	Publication date	Patent family member(s)	Publication date
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