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(11) **EP 0 968 946 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention
of the grant of the patent:
12.03.2003 Bulletin 2003/11

(51) Int Cl.7: **B65H 19/30**

(21) Application number: **99109429.3**

(22) Date of filing: **11.05.1999**

(54) **System for inserting cores in the winding cradle of a web material re-winding machine**

System zum Zuführen von Hülzen in einen Wickelrahmen einer Bahnmaterialwickelmaschine

Système pour insérer des noyaux dans un cadre à enrouler dans une machine à enrouler du matériau en bande

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
NL PT SE**
Designated Extension States:
RO SI

(30) Priority: **01.07.1998 IT MI981515**

(43) Date of publication of application:
05.01.2000 Bulletin 2000/01

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• **PATENT ABSTRACTS OF JAPAN vol. 017, no.**
144 (M-1386), 23 March 1993 (1993-03-23) & JP
04 317946 A (TOKUSHICHI YAMAZAKI), 9
November 1992 (1992-11-09)

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Description

[0001] The present invention relates to a system for inserting cores into the winding cradle of a re-winding machine for web material such as paper and the like.

[0002] Re-winding machines unwind large rolls of web material, to produce a plurality of logs, of a pre-set diameter, that are then cut transversally to obtain rolls of the desired length.

[0003] According to a very widespread method, the logs are formed around a tubular core.

[0004] The most widely utilized method at present is so-called free winding between three cylinders. The core is inserted, by means of inserting arms, in the cradle formed between three cylinders with parallel axes, which set it in rotational motion, causing winding thereon of the web material. Once the log has been formed it is ejected and a new core is then inserted.

[0005] The three cylinders normally turn at a constant speed during winding of the log, and at different speeds during insertion of the new core and ejection of the formed log.

[0006] The diameters of the commercial cores normally used are variable in size. The range of variation of the core diameters normally goes from 30 mm to 100 mm. Cores of small diameter are used for rolls of web material intended for domestic use, while cores of larger sizes are reserved for industrial use.

[0007] In known machines, when a change in production has to be made, the machine must be stopped for about 4-6 hours to switch from large-diameter to small-diameter cores or vice versa. In fact, besides adjustments to the various parts of the machine, the core inserting arm must be replaced with another arm of a suitable size to push the core exactly at its axis.

[0008] It is obvious that the core inserting system used in winding machines according to the prior art lacks versatility and is anti-economical. In fact, each time the core size is to be changed, production must inevitably be stopped for a long time, and it is necessary to have a wide range of inserting arms available, according to the diameters of the cores used.

[0009] EP-0853 060A, EP-0387 214A EP-0524 158A and Patent abstract of Japan, vol 17, no. 144 (M-1386), 23rd March 1993 (1993-01-20) disclose rewinding machines wherein the core inserting arm is pivoted on a fixed axis, thus showing the drawbacks mentioned above.

[0010] The object of the present invention is to eliminate these drawbacks by providing a core insertion system for winding web material into rolls on re-winding machines that is versatile, economical and simple to make.

[0011] This object is achieved, according to the invention, with the characteristics listed in appended independent claim 1.

[0012] Preferred embodiments of the invention are apparent from the dependent claims.

[0013] In the core insertion system according to the

invention, provision is made for the core inserting arms to be mounted on eccentric bodies. The arm rotating shaft is driven by means of a cam the profile of which is adapted to the work cycle of the machine. The eccentric shaft, which allows the axis of rotation of the inserting arms to be moved, consists of a torsion bar that can be operated manually, semi-automatically by means of a geared motor or automatically by means of an encoder.

[0014] Alongside the eccentric shaft, a disc with a graduated scale on which the reference diameters of the cores are engraved can be provided. In this manner, by turning the eccentric shaft, according to the diameter of the core to be inserted, it is possible to modify the path of movement of the inserting arm, which thus pushes the core to be inserted exactly at its axis and always maintains an appropriate path to avoid pushing the core beyond the line joining the axes of the winding and inserting cylinders.

[0015] As it is apparent from this brief description, with the core inserting system according to the invention, it is not necessary to interrupt production when wishing to change the diameter of the core to be inserted. In fact in this case it is sufficient to turn the eccentric shaft manually or automatically so that the inserting arm pushes the new core exactly at its axis.

[0016] Further characteristics of the invention will be made clearer by the detailed description that follows, referring to a purely exemplary and therefore non-limiting embodiment, illustrated in the appended drawings in which:

Figure 1 is a diagrammatic side elevation view of the core inserting system according to the invention, set to work with cores having a small diameter;

Figure 2 is diagrammatic view, as in Figure 1, of the core inserting system, set to work with cores having a large diameter;

Figure 3 is a further diagrammatic side view of the core inserting system according to the invention, showing an example of movement of the eccentric body.

[0017] The core inserting system according to the invention will be described with the aid of the figures.

[0018] With reference to Figure 1, a core inserting system set to work with cores 1 of small diameter, normally consisting of a cardboard or plastic tube, is considered. The cores 1 are made to slide on a conveyor belt or a loading channel having guides 2 in the form of an inclined surface. An inserting arm 3 is curved in shape and has at its free end a plurality of rollers 4 (only one of which can be seen in the figure) consisting of idle mounted cylindrical rollers. The rollers 4 push the cores 1 into a winding cradle formed between three cylinders 6, 7, 8, where the web material is wound.

[0019] The cylinder 6 is fixedly mounted. The cylinder

7 can be fixed or guided by rocker arms to adjust the distance between the skirts of cylinders 6 and 7. The cylinder 8, commonly known as the pressure cylinder, exerts pressure on the log being formed and is supported by a pair of rocker arms 20, so as to be able to follow the increase in diameter of the log.

[0020] The inserting arm 3 is pivoted at the centre of an eccentric body 9, on an axis identified by letter A in the figures. The eccentric body 9 is in turn pivoted on an axis B at a distance ϵ from the axis A. The distance ϵ between the fulcrum A of the inserting arm 3 and the fulcrum B of the eccentric body 9 gives the eccentricity of the system. Purely by way of example, in a preferred embodiment of the invention, the eccentricity ϵ can be selected as about 30 mm.

[0021] A second arm 10 is pivoted integrally to the inserting arm 3 at A. At the free end of the arm 10, a follower 11 is provided that follows the profile of a cam 12, rotation of which prevents a rocking movement of the inserting arm 3, so that the end rollers 4 follow such a path as to push the core 1 at its midline.

[0022] With reference to Figure 2, when it is necessary to change production and insert a core 1' with a larger diameter than that of the core 1, the axis of the rollers 4 must be moved correspondingly so that the rollers always act at the midline of the core. Furthermore the stroke of the inserting arm must be reduced to prevent the axis C of the core 1' from passing the line d that joins the axes Y and Z of the two cylinders 6 and 7 during pushing. This is to prevent the core 1' from falling into the winding cradle before winding of the web material thereupon begins. In the case in Figure 2, the distance of the axis of the core 1' from the axis of the cylinder 6 is greater than in the case in Figure 1. In order for the axis of the rollers 4 to be situated at the same height as the axis of the core 1', it is therefore necessary for the inserting arm 3 to be moved correspondingly. This movement and stroke adjustment of the arm 3 are obtained by turning the eccentric body 9 around its fulcrum B, so that the fulcrum A of the inserting arm 3 is moved such a distance as to allow the axis of the rollers 4 to be aligned with the midline of the core 1'.

[0023] As shown in Figure 3, the eccentric body 9 is made to turn around its fulcrum B by means of a connecting rod 14 and crank 13 system. The system illustrated is purely by way of example and any other system can be adopted. In particular the drive means can be manual, such as a handwheel for example, semi-automatic such as a geared motor or preferably automatic such as an encoder, for example, in which the measurement of the core diameter is entered and on the basis of this information the correct rotation of the eccentric body 9 is automatically set in motion.

[0024] An indicator 15 that points to a graduated scale 16 can be combined with the eccentric body 9. All the possible measurements of core diameters are indicated on the graduated scale 16. Such a measurement range normally goes from 30 mm to 100 mm.

[0025] When a core of a pre-set diameter is to be inserted, it is sufficient to control the rotation of the eccentric 9 around its fulcrum axis B, so that the indicator 15 points to the predetermined core diameter on the graduated scale 16.

[0026] It is therefore evident that the invention enables the core inserting arms 3 to be set extremely easily and rapidly to any core diameter.

Claims

1. A system for inserting cores (1, 1') in the winding cradle formed by a set of three cylinders (6, 7, 8) of a web material re-winding machine, comprising at least one inserting arm (3), provided with a plurality of terminal idle rollers (4), driven with a rocking movement, so that said rollers (4) sequentially push the cores (1, 1') into said winding cradle, **characterized in that** said inserting arm (3) is pivoted on a fulcrum axis (A) on an eccentric body (9), having an eccentric axis (B), a rotation of which causes a movement of said fulcrum axis (A) of the inserting arm (3).
2. A system according to claim 1, **characterized in that** the fulcrum axis (A) of said inserting arm (3) is situated substantially at the centre of said eccentric body (9), and the fulcrum axis (B) of said eccentric body is at a distance (ϵ) from said fulcrum (A) of the inserting arm (3), the distance (ϵ) defining the eccentricity of said eccentric body (9).
3. A system according to claim 2, **characterized in that** said eccentricity (ϵ) ranges from 5 mm to 100 mm.
4. A system according to claim 1, **characterized in that** said eccentric body (9) is made to rotate around its own fulcrum (B) by means of a connecting rod (14) and crank (13) system.
5. A system according to any one of the preceding claims, **characterized in that** said eccentric body (9) can be operated manually.
6. A system according to any one of claims 1-4, **characterized in that** said eccentric body (9) can be operated semi-automatically, by means of a geared motor.
7. A system according to any one of claims 1-4, **characterized in that** said eccentric body (9) is operated by means of an automatic encoder interfaced with a computer in which the core diameters (1, 1') are pre-set.
8. A system according to claim 1, **characterized in**

that combined with said eccentric body (9) is a graduated scale (16) in which the various possible core diameters (1, 1') are indicated, in order to facilitate adjustment of the rotation of the eccentric body (9).

9. A re-winding machine for web material, **characterized in that** it comprises a system for inserting cores into the winding cradle according to any one of the preceding claims.

Patentansprüche

1. System zum Einführen von Kernen (1,1') in den Wicklungsschlitten, bestehend aus einem Satz von drei Zylindern (6, 7, 8) einer Folien-Aufwickelmaschine, das mindestens einen Einführarm (3) aufweist, der mit einer Mehrzahl von Leerlaufrollen (4) ausgerüstet ist, die durch eine Schwingbewegung so angetrieben werden, dass genannter die Rollen (4) die Kerne (1, 1') fortlaufend in den Wicklungsschlitten drücken, **dadurch gekennzeichnet, dass** der Einführarm (3) an eine auf einem exzentrischen Körper (9) befindlichen Drehachse (A) angelenkt ist, und der Körper (9) eine exzentrische Achse (B) aufweist, deren Rotation eine Bewegung der Drehachse (A) des Einführarms (3) verursacht.
2. System nach Anspruch 1, **dadurch gekennzeichnet, dass** sich die Drehachse (A) des Einführarms (3) grundsätzlich in der Mitte des exzentrischen Körpers (9) befindet und die Drehachse (B) dieses exzentrischen Körpers (9) sich in einer Entfernung (ϵ) von diesem Drehpunkt (A) des Einführarms (3) befindet, wobei die Entfernung (ϵ) die Exzentrizität dieses exzentrischen Körpers (9) bestimmt.
3. System nach Anspruch 2, **dadurch gekennzeichnet, dass** die Exzentrizität (ϵ) in einem Bereich von 5 mm bis 100 mm liegt.
4. System nach Anspruch 1, **dadurch gekennzeichnet, dass** genannter exzentrischer Körper (9) um seinen eigenen Drehpunkt (B) durch ein Schubkurvensystem (14, 13) gedreht wird.
5. System nach einem der vorausgegangenen Ansprüche, **dadurch gekennzeichnet, dass** der exzentrische Körper (9) von Hand betätigt werden kann.
6. System nach einem der Ansprüche von 1 - 4, **dadurch gekennzeichnet, dass** der exzentrische Körper (9) halbautomatisch mittels eines Getriebemotors betätigt werden kann.
7. System nach einem der Ansprüche von 1 - 4, **da-**

durch gekennzeichnet, dass der exzentrische Körper (9) durch einen automatischen Encoder betätigt werden kann, der an einen Rechner angeschlossen ist, in dem die Durchmesser der Kerne (1, 1') vorgegeben sind.

8. System nach Anspruch 1, **dadurch gekennzeichnet, dass** dem exzentrischen Körper (9) eine Maßskala (16) zugeordnet ist, in der die verschiedenen möglichen Kerndurchmesser (1, 1') angegeben sind, um die Einstellung der Drehung des exzentrischen Körpers (9) zu erleichtern.

9. Folien-Aufwickelmaschine, **dadurch gekennzeichnet, dass** sie ein System zum Einführen von Kernen in den Wicklungsschlitten nach einem der vorausgegangenen Ansprüche aufweist.

Revendications

1. Système d'introduction de noyaux (1, 1') dans le berceau d'enroulement composé d'un ensemble de trois rouleaux (6, 7, 8) d'une machine à rebobiner du matériau en feuille, comprenant au minimum un bras d'introduction (3), pourvu d'une pluralité de palets terminaux folles (4), actionnés par un mouvement oscillatoire, de manière à ce que lesdits palets (4) poussent les noyaux (1, 1') en séquence dans ledit berceau d'enroulement, **caractérisé en ce que** ledit bras d'introduction (3) est pivoté sur un axe d'appui (A) sur un corps excentrique (9) présentant un axe excentrique (B) dont une rotation provoque un mouvement dudit axe d'appui (A) dudit bras d'introduction (3).
2. Système selon la revendication 1, **caractérisé en ce que** l'axe d'appui (A) dudit bras d'introduction (3) est substantiellement placé au centre dudit corps excentrique (9), et que l'axe d'appui (B) dudit corps excentrique se trouve à une distance (ϵ) dudit appui (A) du bras d'introduction (3), la distance (ϵ) définissant l'excentricité dudit corps excentrique (9).
3. Système selon la revendication 2, **caractérisé en ce que** ladite excentricité (ϵ) varie entre 5 mm et 100 mm.
4. Système selon la revendication 1, **caractérisé en ce que** ledit corps excentrique (9) est réalisé pour pivoter autour de son propre appui (B) au moyen d'un système de bielle (14) et de manivelle (13).
5. Système selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le corps excentrique (9) peut être actionné manuellement.
6. Système selon l'une quelconque des revendica-

tions 1 à 4, **caractérisé en ce que** ledit corps excentrique (9) peut être actionné de manière semi-automatique, à l'aide d'un moto-réducteur.

7. Système selon l'une quelconque des revendications 1 à 4, **caractérisé en ce que** ledit corps excentrique (9) est actionné au moyen d'un encodeur automatique ayant une interface avec un ordinateur où les diamètres des noyaux (1, 1') sont préétablis. 5
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8. Système selon la revendication 1, **caractérisé en ce qu'**une échelle graduée (16) où sont indiquées les différentes valeurs possibles du diamètre des noyaux (1, 1') est associée audit corps excentrique (9), de façon à faciliter le réglage de la rotation du corps excentrique (9). 15
9. Machine à rebobiner du matériau en feuille, **caractérisée en ce qu'**elle comprend un système d'introduction des noyaux dans le berceau d'enroulement selon l'une quelconque des revendications précédentes. 20

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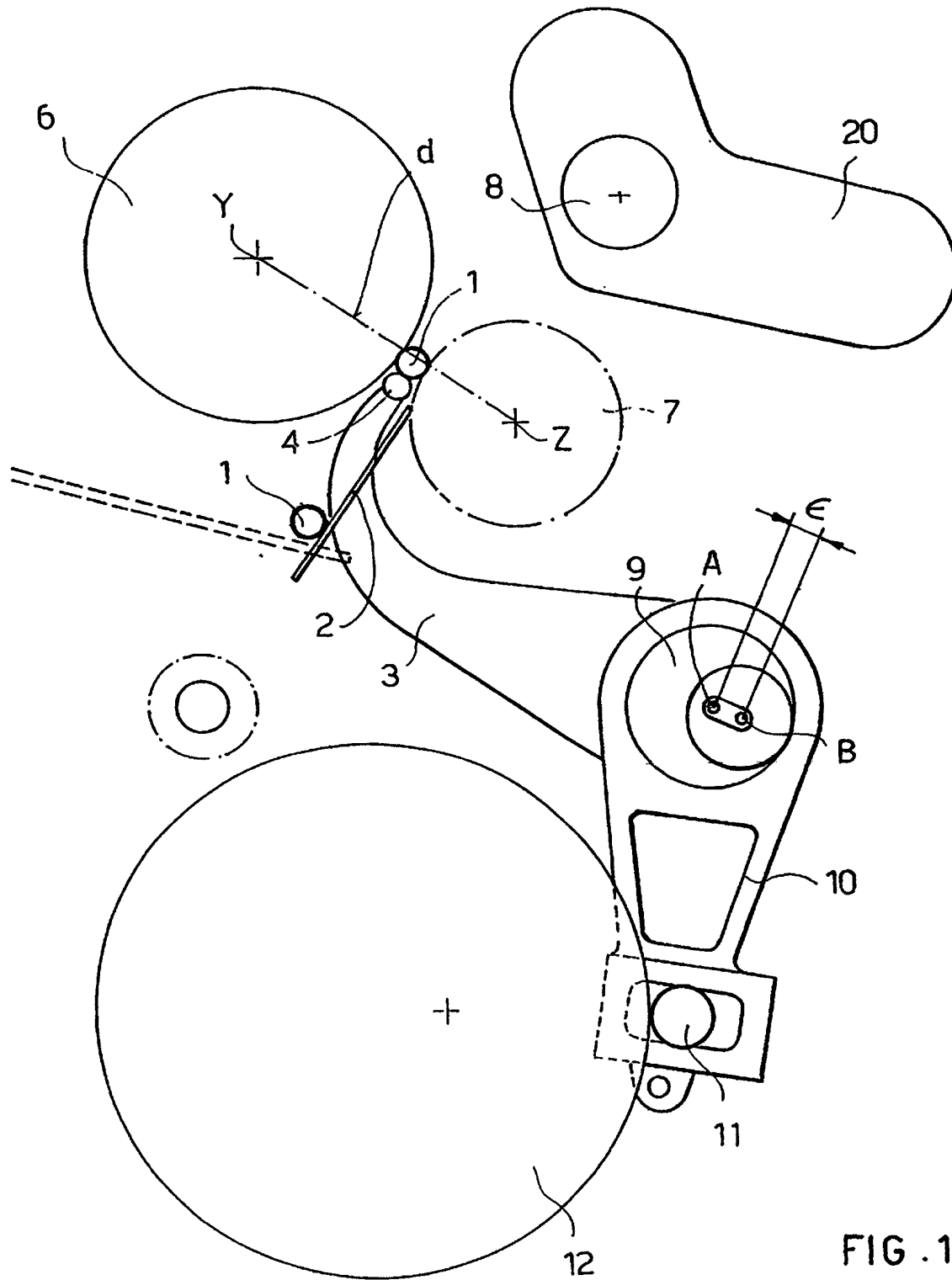


FIG. 1

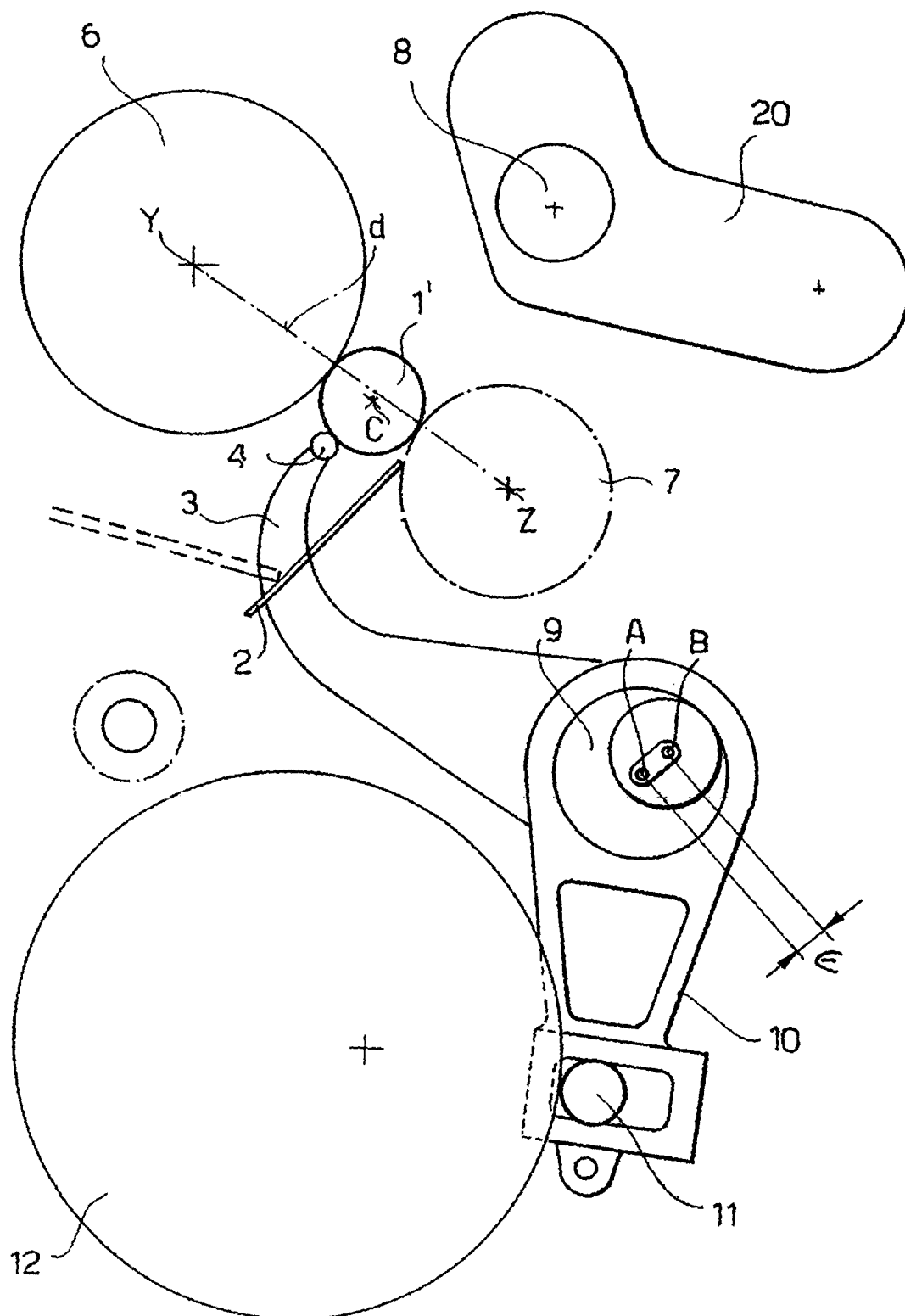


FIG. 2

FIG .3

