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(54) **FABRIC WORKING MACHINE AND SYSTEM FOR INTRODUCING FABRIC IN FABRIC WORKING MACHINES COMPRISING A FABRIC BRAKING ASSEMBLY**

(57) A braking assembly (1) is described for a fabric (3) being supplied to at least one fabric working machine, comprising at least one system of rollers through which the fabric (3) passes by sliding along a sliding direction (V), the system of rollers comprising at least one rotary roller with braked rotation (5), at least one first idle transmission roller (7) of the fabric (3) placed upstream of the rotary roller with braked rotation (5) and at least one second idle transmission roller (9) of the fabric (3) placed downstream of the rotary roller with braked rotation (5). A fabric working machine (10, 50) and a system (30) for introducing fabric in fabric working machines comprising at least one of these braking assemblies (1) are further described.

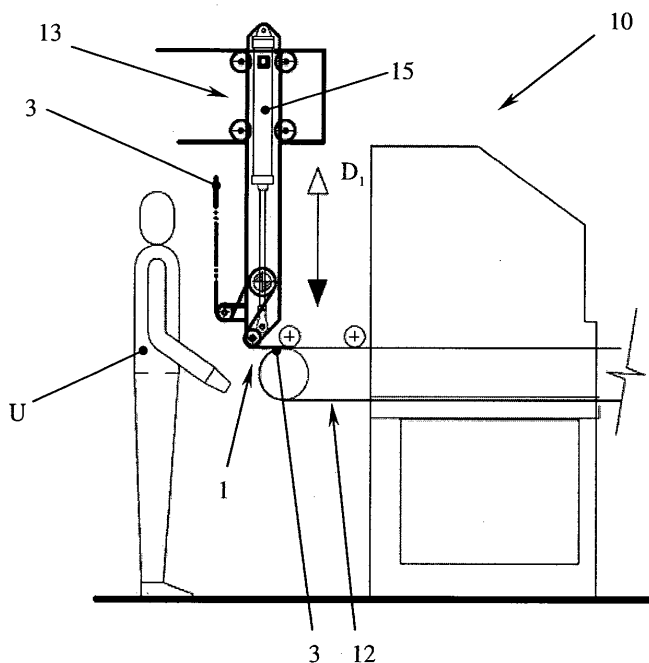


FIG. 2a

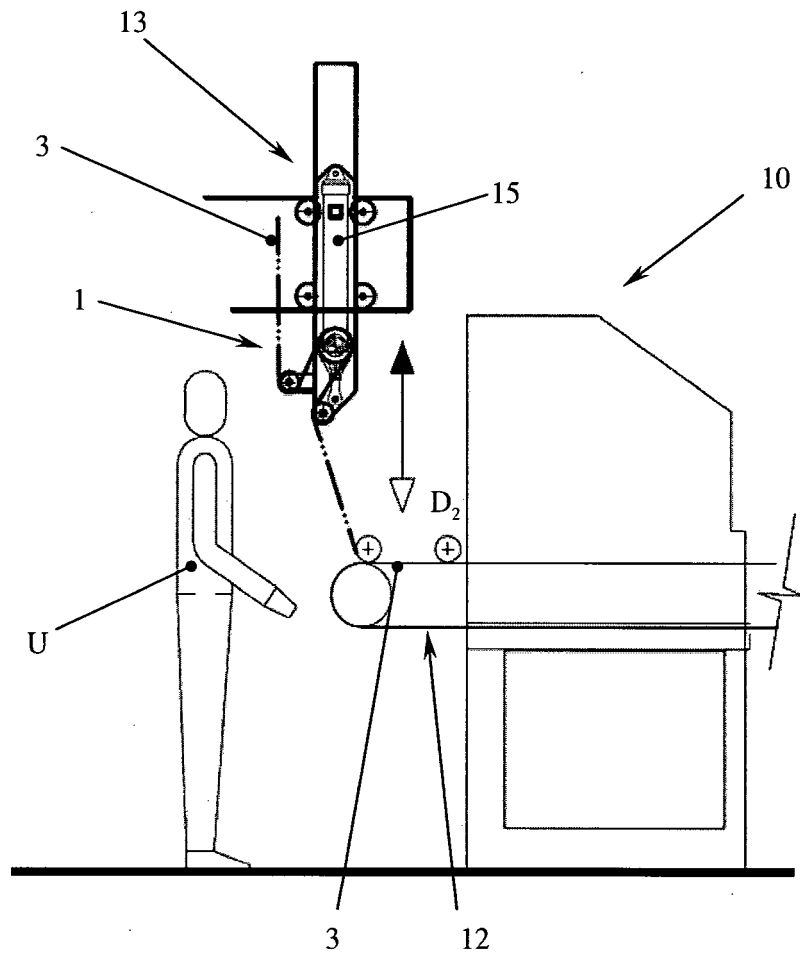


FIG. 2b

Description

[0001] The present invention refers to a machine for working fabrics and to a system for introducing fabric in fabric working machines comprising at least one fabric braking assembly supplying a fabric working machine.

[0002] Some fabric working machines are known, the as for example digital printing machines, which require that the fabric supplied thereto is suitably stretched: fabric supplying system are therefore necessary, which take into account the type of fabric to be supplied (elastic fabric which can and must be stretched, fabric not to be stretched but from which possible folds must be removed, etc.) and which take care of stretching the copings to supply to the working machines.

[0003] Various type of fabric supplying machines to fabric working machines are known in the art, which take care of centering the fabric itself. The known supplying machines are in general composed of a centering and enlarging roller of the fabric and a series of dancer rollers or load cells to keep the longitudinal tension of the entering fabric. In order to suitably stretch the fabric, means are further necessary which remove the folds from the fabric itself, tending the copings. It is however necessary that the means operate immediately adjacent to the working means of the machines, thereby resulting cumbersome and making possible intervention and/or maintenance operations on the machines difficult and scarcely practical.

[0004] Therefore, object of the present invention is solving the above prior art problems, by providing a fabric working machine and a system for introducing fabric in fabric working machines comprising at least one fabric braking assembly supplying fabric working machines, which allow stretching the fabric copings more efficiently and easier working and/or maintenance operations.

[0005] The above and other objects and advantages of the invention, as will result from the following description, are obtained with a fabric working machine as claimed in claim 1.

[0006] Moreover, the above and other objects and advantages of the invention are reached with a system for introducing fabric in fabric working machines as claimed in claim 9.

[0007] Preferred embodiments and non-trivial variations of the present invention are the subject matter of the dependent claims.

[0008] It is intended that all enclosed claims are an integral part of the present description.

[0009] It will be immediately obvious that numerous variations and modifications (for example related to shape, sizes, arrangements and parts with equivalent functionality) can be made to what is described, without departing from the scope of the invention as results from the enclosed claims.

[0010] The present invention will be better described by some preferred embodiments thereof, provided as a non-limiting example, with reference to the enclosed

drawings, in which:

- Figure 1 is a schematic side view of the fabric braking assembly according to the present invention;
- Figures 2a and 2b show schematic side views of a preferred embodiment of a machine for working a fabric comprising a braking assembly according to the present invention respectively in two operating positions thereof;
- Figures 3a and 3b show schematic side views of another preferred embodiment of a machine for working a fabric comprising a braking assembly according to the present invention respectively in two operating positions thereof;
- Figure 4 shows a schematic front view of still another preferred embodiment of a machine for working a fabric comprising a braking assembly according to the present invention respectively in two operating positions thereof; and
- Figures 5a and 5b show schematic side views of a system according to the present invention for introducing fabric in fabric working machines respectively in two operating positions thereof.

[0011] As will be described below in more detail, the braking assembly according to the present invention is adapted to suitably stretch a fabric passing therein by sliding to be supplied to at least one working machine placed downstream of the assembly itself, enough stretched and planar, namely lacking technically meaningful folds in the context of a working which must be performed by the machine, suitably slowing down its sliding speed.

[0012] Obviously, wording "upstream" and "downstream" used in the present description must be meant related to the sliding direction V of the fabric supplied to the working machine.

[0013] With particular reference to Figure 1, it is possible to note that the braking assembly 1 of a fabric 3 being supplied to at least one fabric working machine the as, for example, a printing machine, comprises at least one system of rollers through which the fabric 3 passes by sliding along a sliding direction V, the system of rollers comprising at least one rotary roller with braked rotation 5, at least one first idle transmission roller 7 of the fabric 3 placed upstream of the rotary roller with braked rotation 5 and at least one second idle transmission roller 9 of the fabric 3 placed downstream of the rotary roller with braked rotation 5, the rotation axes of the first 7 and second 9 idle transmission rollers and the rotation axis of the rotary roller with braked rotation 5 being preferably not coplanar in order to guarantee a suitable winding angle of the fabric 3 around the rotary roller with braked rotation 5.

[0014] Obviously, the rotary roller with braked rotation 5 can be equipped with any braking means 11 of its rotation without thereby exiting from the scope of the

present invention. In particular, the braking means 11 can be of the type with friction braking or electromagnetic braking, substantially known in the art.

[0015] The braking assembly 1 can obviously be an individual module to be installed on board of any fabric working machine which is already existing and operating. Alternatively, it is possible to provide any fabric working machine which operatively integrates one or more braking assemblies as described above, without thereby departing from the scope of the present invention: the present invention therefore deals also with a fabric working machine 10, such as for example a digital printing machine, equipped with at least one braking assembly 1 according to the present invention.

[0016] With reference then in particular to Figures 2a to 4, it is possible to note a machine 10 according to the present invention for working at least one fabric 3 equipped with at least one braking assembly 1 according to the present invention, through which the fabric 3 slides to be supplied to the working means of the machine 10 such as, for example, the printing heads of a digital printing machine through at least one conveyor belt 12, everything already known.

[0017] Preferably, the braking assembly 1 is connected to the machine 10 by interposing handling means 13 adapted to take the braking assembly 1 itself from a first operating position (like the one, for example, shown in Figures 2a, 3a and 4 with full lines) for supplying the fabric 3 to the working means, and in particular in an advantageous position of immediate proximity to the working means, to a second operating rest position (like the one, for example, shown in Figures 2b, 3b and 4 with dashed lines), and vice versa: advantageously, in the operating rest position, the braking assembly 1 is taken by the handling means 13 separate enough to allow at least one operator U to access the machine 10, for example to perform maintenance, working assistance operations, etc., without the obstacle of the braking assembly 1 itself. In addition, the operating rest position, can allow using the working machine 10 without the intervention and the relative obstacle of the braking assembly 1, for example where this is not required by the specific nature of the fabric 3 to be worked.

[0018] For example, as it is possible to note in particular in Figures 2a and 2b, the handling means 13 can comprise at least one linear actuator 15, for example with hydraulic, pneumatic, oil-dynamic operation, etc., having a substantially vertical movement direction and being connected to the braking assembly 1 for vertically moving this latter one from the first operating position towards the second operating rest position (for example along the direction shown by arrow D_1), and vice versa (for example along the direction shown by arrow D_2).

[0019] Alternatively, as it is possible to note in particular in Figures 3a and 3b, the handling means 13 can comprise at least one linear actuator 15, for example with hydraulic, pneumatic, oil-dynamic operation, etc., connected to the braking assembly 1 through at least one

eccentric kinematism adapted to transform the linear motion of the actuator 15 into a rotary motion of the assembly 1 itself to move in rotation this latter one from the first operating position towards the second operating rest position (for example along the direction shown by arrow R_1), and vice versa (for example along the direction shown by arrow R_2).

[0020] In further alternative, as it is possible to note in particular in Figure 4, the handling means 13 can comprise at least one hinge-type kinematism 17, possibly co-operating with at least one actuating motor (not shown), interposed between the machine 10 and at least one longitudinal end of the braking assembly 1, in order to move in rotation this latter one from the first, substantially horizontal operating position towards the second, substantially vertical operating rest position, and vice versa.

[0021] With reference instead in particular to Figures 5a and 5b, it is possible to note a system 30 for introducing fabric 3, for example coming from at least one supply roller 37, in at least one machine 50, such as for example a digital printing machine, for working the fabric 3. Advantageously, the system 30 according to the present invention comprises:

- at least one centering and enlarging roller 31 equipped with a plurality of longitudinal staves 32 interrupted, as known, in a central point and adapted to perform centering and enlarging of the fabric 3;
- at least one dancer roller 33, 34 for synchronizing the speed of the fabric 3 (preferably made of aluminum in order to be lightweight in contact with the fabric), wherein the dancer roller 33, 34 is operatively coupled, only with a thrust, with at least one counterweight 35 adapted to reduce the weight, and therefore the thrust, of the dancer roller 33, 34 on the fabric 3 depending whether the type of fabric requires a greater or smaller pulling force applied thereto;
- at least one braking assembly 1 of the fabric 3, as previously described, and preferably comprising at least one system of rollers through which the fabric 3 passes by sliding along a sliding direction V, the system of rollers comprising at least one rotary roller with braked rotation, at least one first idle transmission roller of the fabric 3 placed upstream of the rotary roller with braked rotation and at least one second idle transmission roller of the fabric 3 placed downstream of the rotary roller with braked rotation 5, the rotation axes of the first and second idle transmission roller and the rotation axis of the rotary roller with braked rotation 5 being preferably not coplanar in order to guarantee a suitable winding angle of the fabric 3 around the rotary roller with braked rotation itself. Advantageously, the braking assembly 1 has at least one operating supply position in immediate proximity to the working means of the machine 50.

[0022] Advantageously, the braking assembly 1 can

be connected to the system 30 by interposing handling means 36 adapted to take the braking assembly 1 itself from the operating position (like the one shown, for example, in Figure 5a) for supplying the fabric 3 to the working means of the machine 50, and in particular in an advantageous position of immediate proximity to the working means, to an operating rest position (like the one shown, for example, in Figure 5b), and vice versa: advantageously, in the operating rest position, the braking assembly 1 is taken by the handling means 36 enough separate to allow at least one operator to access the machine 50, for example to perform maintenance, working assistance operations, etc., without the obstacle of the braking assembly 1. In addition, the operating rest position can allow using the working machine 50 without the intervention and the relative obstacle of the braking assembly 1 itself, for example where this is not required by the specific nature of the fabric 3 to be worked.

[0023] For example, as it is possible to note in particular in Figures 5a and 5b, the handling means can comprise at least one linear actuator, for example with hydraulic, pneumatic, oil-dynamic operation, etc., or a rack kinematics, having a substantially vertical movement direction and being connected to the braking assembly 1 for vertically moving this latter one from the operating supply position towards the operating rest position, and vice versa.

[0024] The system 30 can further comprise means for enabling the centering of the fabric 3 with respect to the central point of the staves 32. In particular, the means for enabling the centering of the fabric are composed of at least one bar adapted to connect an handling system of the centering and enlarging roller 31 with a driven system: this bar is equipped with at least one reference sign adapted to move with respect to the central point in case of incorrect movement of the handling system, thereby signaling to the operator of the system 30 that it is necessary to intervene.

[0025] In order to further change the force applied to the fabric, the counterweight 35 can further be adapted to be operatively engaged by at least one piston with spring return, which normally is uncoupled from the counterweight 35 and engages it in a further thrust only is driven by the controlling and managing system of the machine 50, if it is necessary to modify the finale thrust of the counterweight 35 on the dancer roller 33, 34.

[0026] The system 30 according to the present invention, in a substantially known way in the art, can further comprise quick handling means of the system 30 and regulating means adapted to simultaneously allow:

- aligning the system 30 with the entry of the machine 50;
- possibly right or left moving the system 30 with respect to the entry of the machine 50 downstream; and
- rotation-preventing blocking the system 30 with respect to the entry of the machine 50 downstream.

[0027] In particular, the quick handling means are composed of at least two wheels placed on a first side of the system 30 and/or at least two feet placed on a second side of the system 30 opposite to the first side and/or a lifting/lowering device of the screw and knob type adapted to lift/lower the system 30 with respect to the ground.

[0028] Still in particular, the regulating means are composed of:

- at least one bar, preferably elongated, which extends longitudinally and in parallel with the longitudinal axis of the system 30 and is placed in a fixed and unmovable position on the ground upstream of the machine 50;
- at least one bearing element placed on a side of the system 30 and adapted to get in contact with the bar during the operating installation of the system 30; and
- at least one fastening element placed on the same side of the system 30 on which the at least one bearing element is placed.

[0029] The fastening element is adapted to fasten the bar after the corresponding bearing element has been placed in contact with the bar, in order to unmovably fasten the system 30 to the bar, aligned and possibly right or left moved with respect to the entry of the machine 50 downstream.

[0030] Preferably, the bearing element is composed of at least one plate and the fastening element is composed of hook adapted to be completely hooked around the bar.

[0031] The preferred use configuration of the system 30 according to the present invention can provide that the bearing elements and the fastening elements are two, placed next to the first side and the second side of the system 30, namely respectively next to the wheels and the feet.

[0032] As regards the operation of the thereby structured system 30, upon maintenance or replacement, it is easily removed from the working line by lifting it through the lifting/lowering device and moving it through the wheels. After having performed the necessary operations, the system 30 is put again in its original position, perfectly aligned with the machine 50, moving it till the bearing elements are in contact with the bar placed on the ground in front of the machine 50. Once having reached the contact with the bar on the whole length of the system 30, the fastening elements are lowered to fasten the bar itself; then the system 30 is lowered through the lifting/lowering device till the feet come again in contact with the ground. The system 30 is thereby aligned with the machine 50 (in any entry position, even displaced laterally on the right or left with respect to the centerline of the machine) and the connection of the fastening elements to the bar, with the support of the bearing elements, further prevents the rotation and/or the overturning of the system 30 in its operating position.

[0033] The system 30 of the invention can further be

equipped with a regulating device with bubble and steering wheel adapted to verify and make, through lateral lifting/lowering movements, the planarity and the parallel position of the system 30 with respect to the downstream machine 50.

Claims

1. Machine (10, 50) for working a fabric (3) equipped with at least one braking assembly (1) of a fabric (3) being supplied to at least one fabric working machine, comprising at least one system of rollers through which the fabric (3) passes by sliding along a sliding direction (V), the system of rollers comprising at least one rotary roller with braked rotation (5), at least one first idle transmission roller (7) of the fabric (3) placed upstream of the rotary roller with braked rotation (5) and at least one second idle transmission roller (9) of the fabric (3) placed downstream of the rotary roller with braked rotation (5), **characterized in that** the braking assembly (1) is connected to the machine (10, 50) by interposing handling means (13) adapted to take the braking assembly (1) from a first operating supply position of the fabric (3) to the working means to a second operating rest position, and vice versa.
2. Machine (10, 50) according to the previous claim, **characterized in that** the rotation axes of the first (7) and second (9) idle transmission rollers and a rotation axis of the rotary roller with braked rotation (5) are not coplanar.
3. Machine (10, 50) according to any one of the previous claims, **characterized in that** the rotary roller with braked rotation (5) is equipped with at least one braking means (11) of its rotation.
4. Machine (10, 50) according to the previous claim, **characterized in that** the braking means (11) is of the type with friction braking or electromagnetic braking.
5. Machine (10, 50) according to the previous claim, **characterized in that** the first operating position is a position of immediate proximity to the working means.
6. Machine (10, 50) according to claim 4, **characterized in that** the handling means (13) comprise at least one linear actuator (15) having substantially vertical movement direction and being connected to the braking assembly (1) for vertically moving the braking assembly (1) from the first operating position towards the second operating rest position, and vice versa.
7. Machine (10, 50) according to claim 4, **characterized in that** the handling means (13) comprise at least one linear actuator (15) connected to the braking assembly (1) through at least one eccentric kinematism adapted to transform a linear motion of the actuator (15) into a rotary motion of the assembly (1) to move in rotation the braking assembly (1) from the first operating position towards the second operating rest position, and vice versa.
8. Machine (10, 50) according to claim 4, **characterized in that** the handling means (13) comprise at least one hinge-type kinematism (17) interposed between the machine (10, 50) and at least one longitudinal end of the braking assembly (1) to move in rotation the braking assembly (1) from the first, substantially horizontal operating position towards the second, substantially vertical operating rest position, and vice versa.
9. System (30) for introducing fabric (3) in at least one machine (10, 50) for working the fabric (3) according to any one of the previous claims, **characterized in that** it comprises:
 - at least one centering and enlarging roller (31) equipped with a plurality of longitudinal staves (32) adapted to perform centering and enlarging of the fabric (3);
 - at least one dancer roller (33, 34) for synchronizing a speed of the fabric (3);
 - at least one of the braking assemblies (1) of the fabric (3) having at least one operating supply position in immediate proximity with working means of the machine (50).
10. System (30) according to claim 9, **characterized in that** the braking assembly (1) is connected to the system (30) by interposing handling means (36) adapted to take the braking assembly (1) from the operating supply position of the fabric (3) to the working means of the machine (50) to an operating rest position, and vice versa.
11. System (30) according to the previous claim, **characterized in that** the handling means (36) comprise at least one linear actuator or a rack mechanism having a substantially vertical movement direction and being connected to the braking assembly (1) for vertically moving the braking assembly (1) from the operating supply position towards the operating rest position, and vice versa.

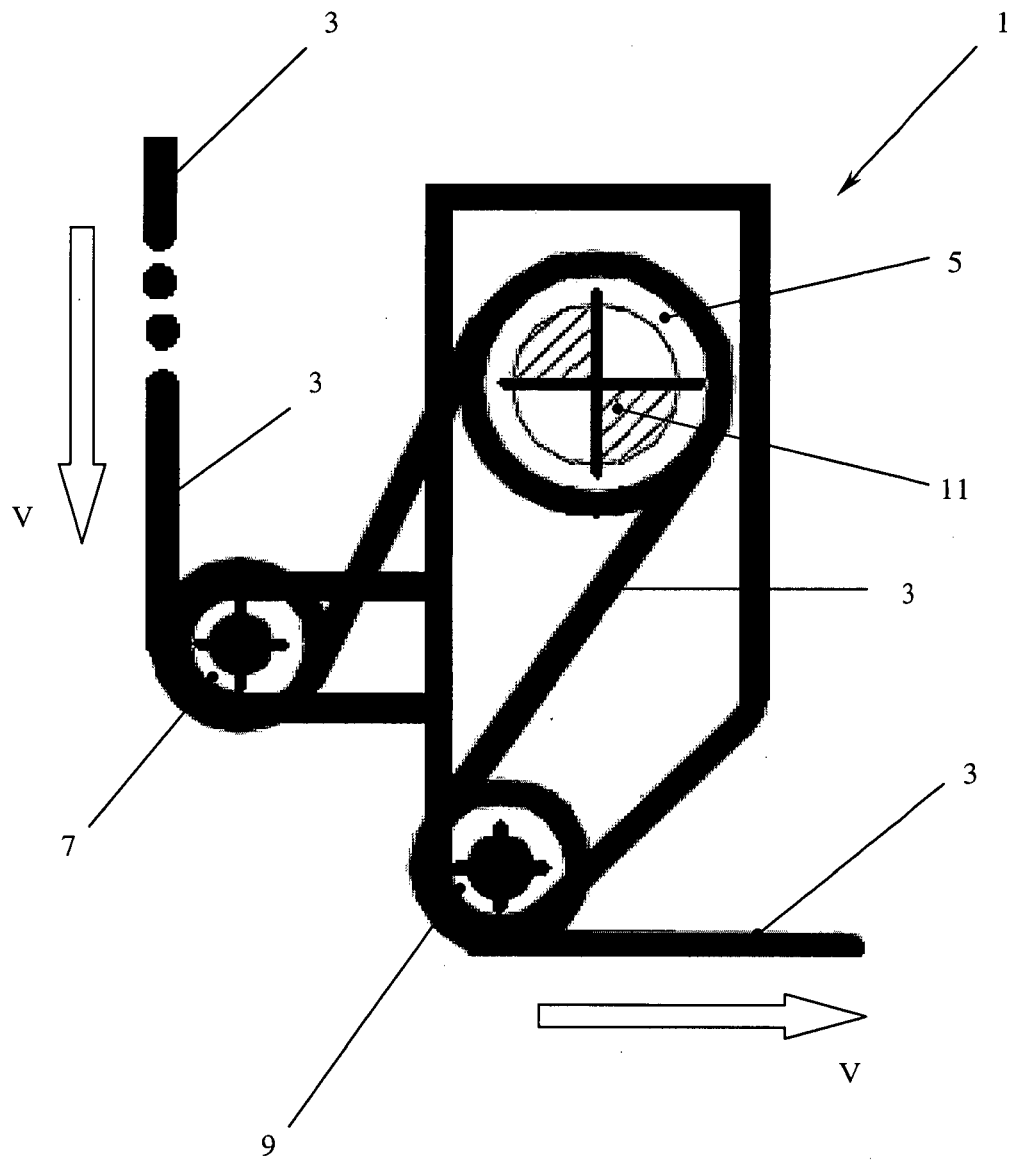


FIG. 1

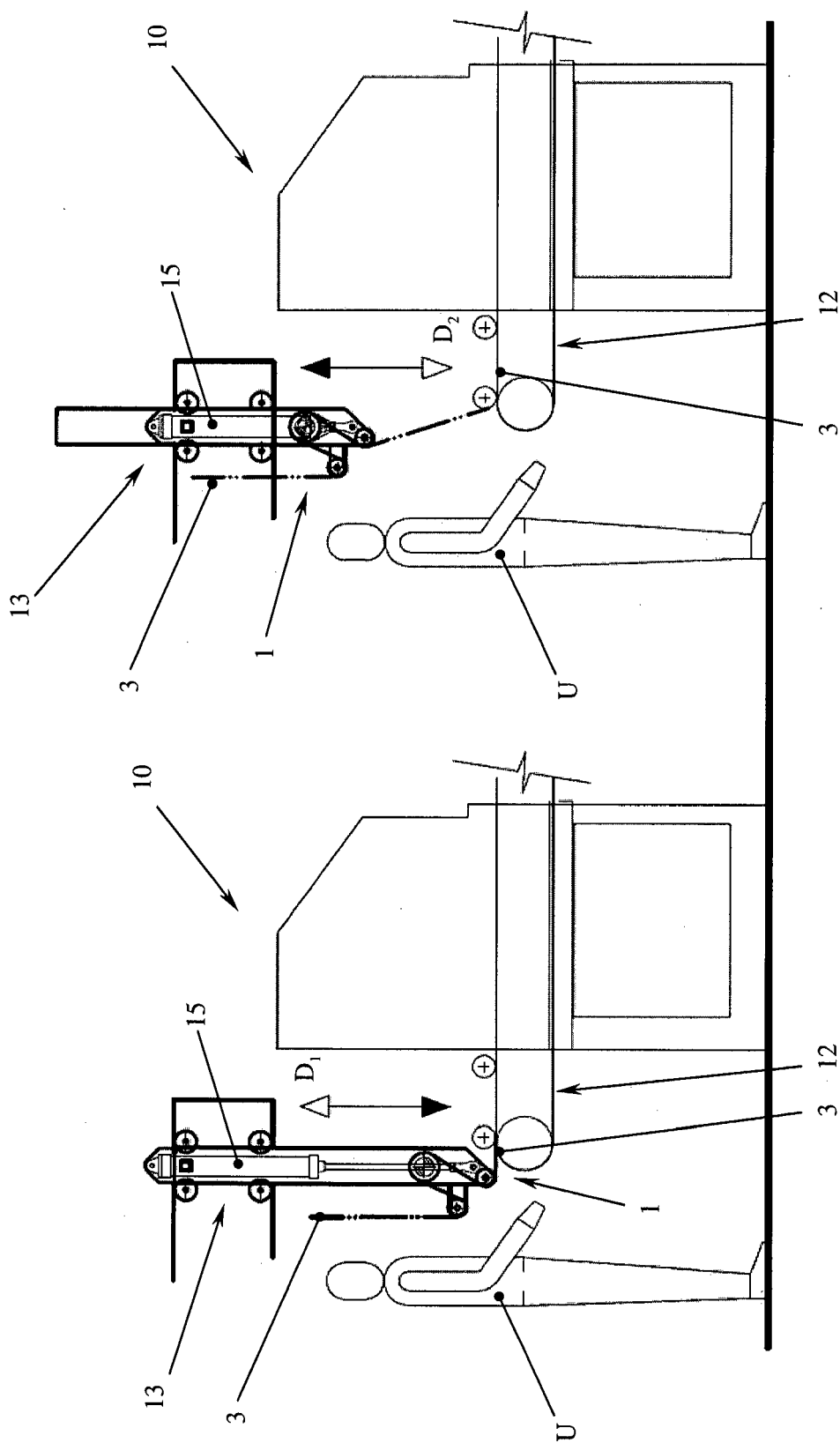


FIG. 2b

FIG. 2a

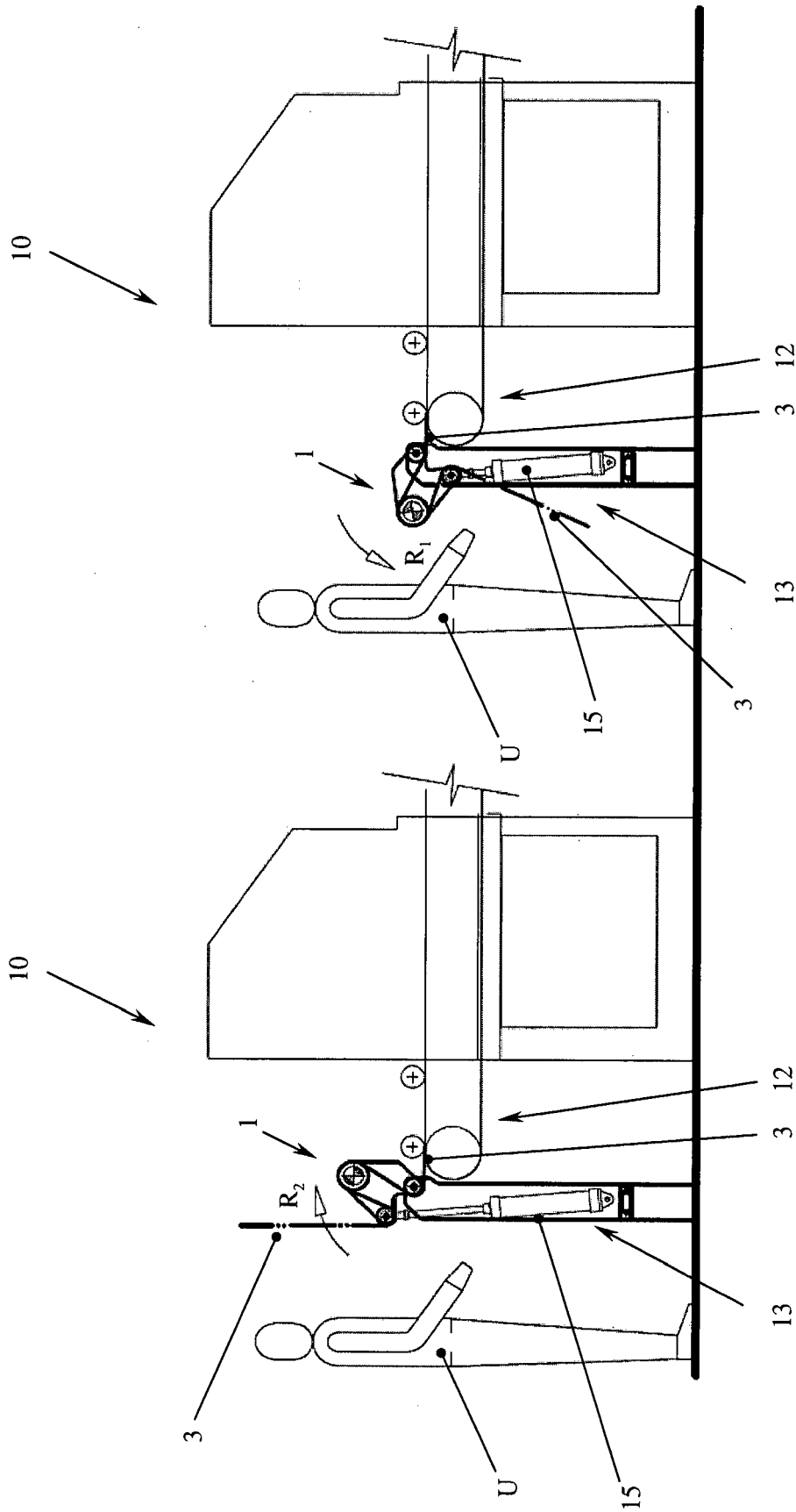


FIG. 3b

FIG. 3a

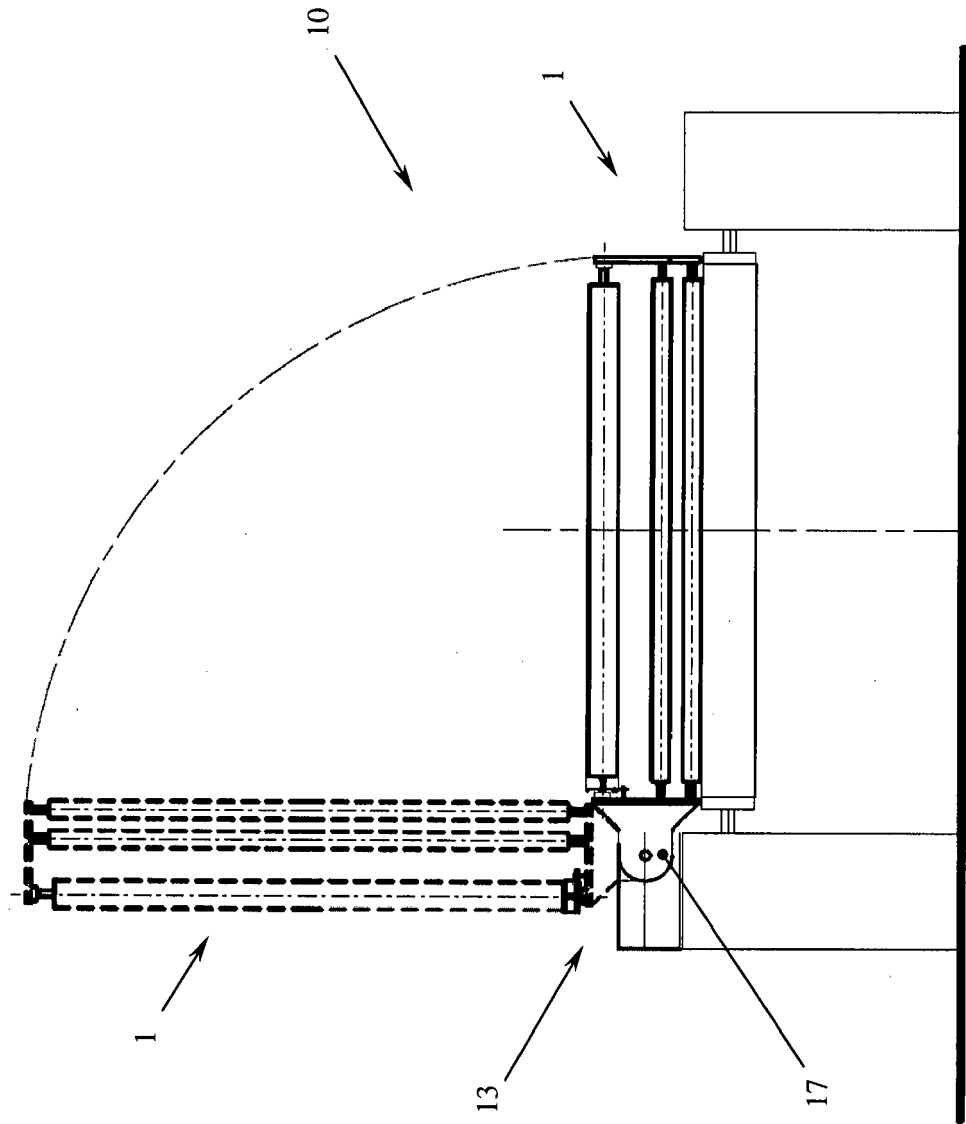
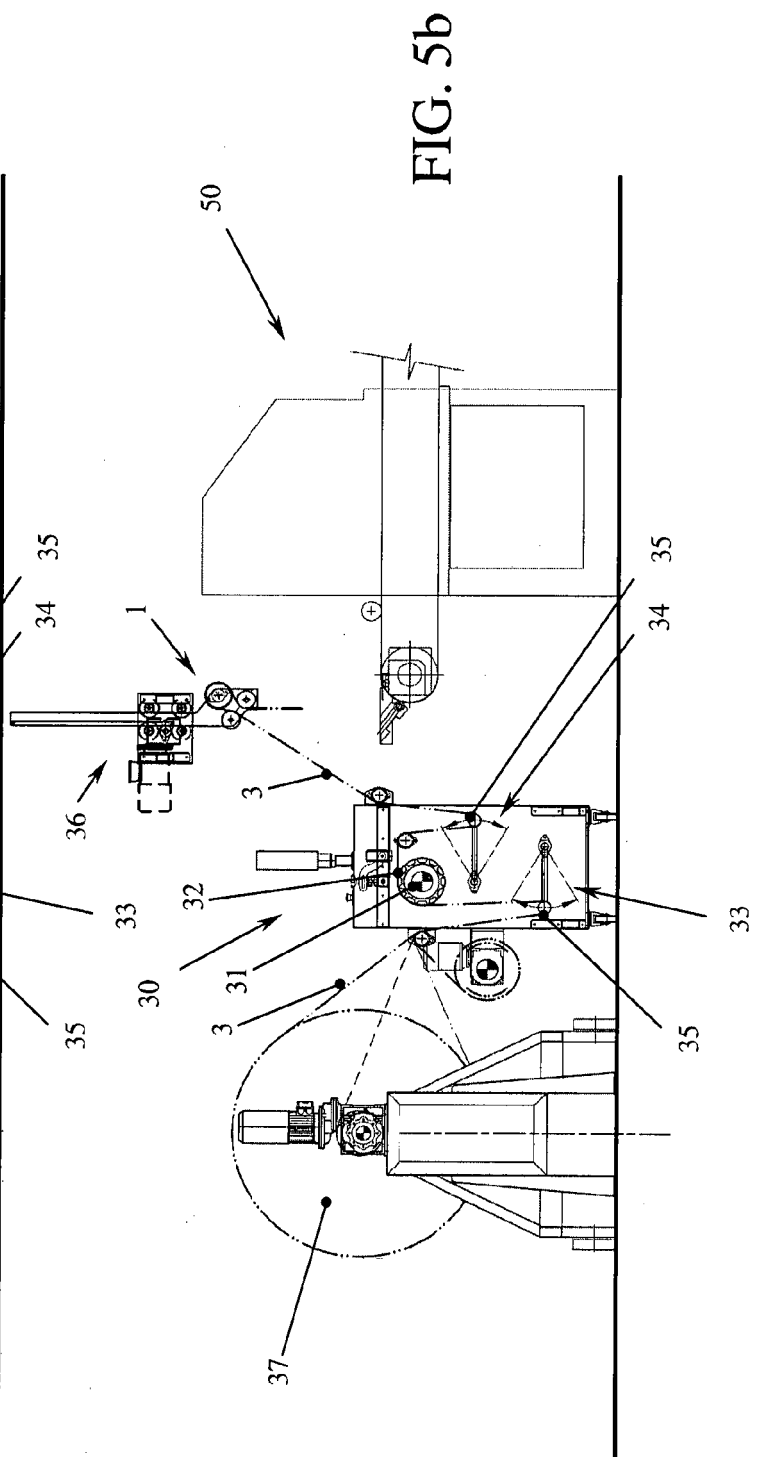
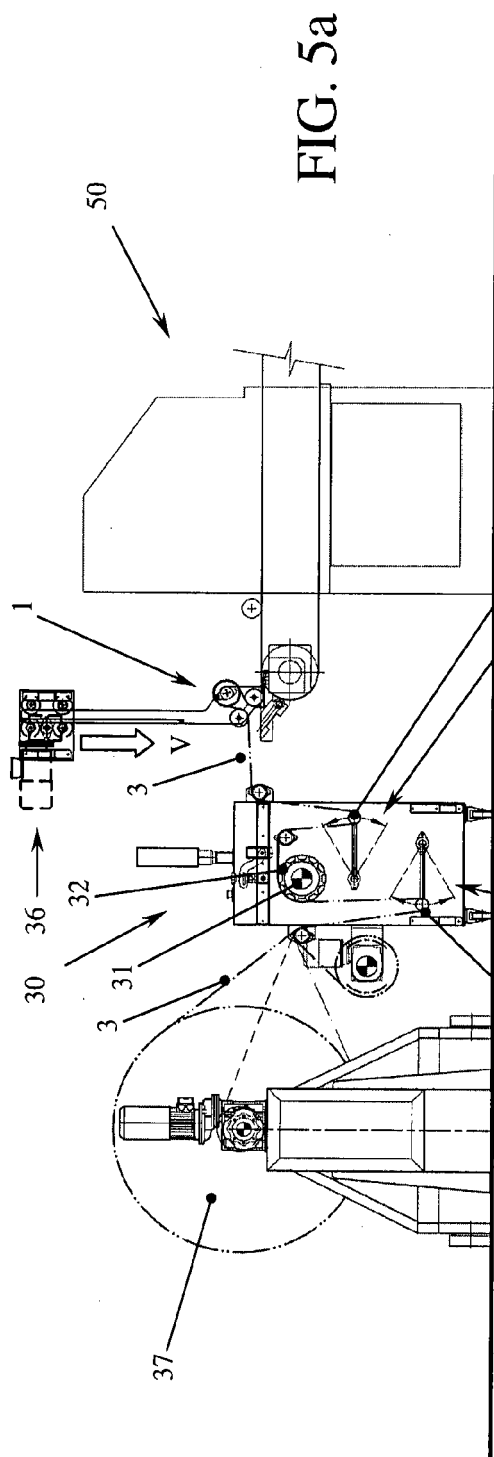


FIG. 4





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Application Number
EP 17 00 1078

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X A	WO 2004/072360 A2 (ROBUSTELLI S R L FLLI [IT]; ROBUSTELLI RICCARDO [IT]; ROBUSTELLI SANDR) 26 August 2004 (2004-08-26) * the whole document *	9 1-8,10,11	INV. B65H23/025 B65H23/14
X A	EP 1 541 737 A1 (CORINO MACCHINE S R L [IT]) 15 June 2005 (2005-06-15) * paragraphs [0011] - [0014]; figure 3 * EP 2 985 250 A1 (KORNIT DIGITAL TECHNOLOGIES LTD [IL]) 17 February 2016 (2016-02-17) * paragraphs [0020], [0022], [0023], [0036]; figures 1,9 * -----	9 1-8	TECHNICAL FIELDS SEARCHED (IPC) B65H
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 18 October 2017	Examiner Pussemier, Bart
CATEGORY OF CITED DOCUMENTS 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 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 & : member of the same patent family, corresponding document			

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 17 00 1078

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