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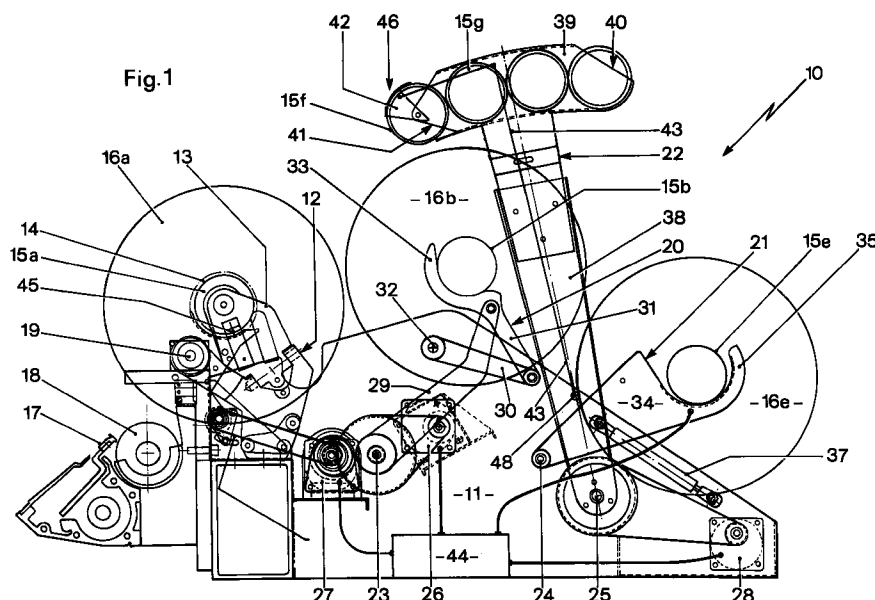
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(54) **Package transfer arrangement**

(57) A textile machine (11) has an arrangement (10) for transferring full packages (16) of processed yarn from the winding position to a store and removal position without rolling and thereby unwinding the end of the yarn from the package (16). A control arrangement (44) moves the cradle (12) from the winding position to a package brake position and then to an open position, where the package (16) is transferred to a first transfer device (20). This is then moved from its package receiving position, via a park position, to a transfer position at

which the package (16) is transferred to a second transfer device (21). The second transfer device (21) is then moved to a store position. A tube loading device (22) is then operated to supply a new tube (15) to the cradle (12), and the cradle (12), the first (20) and second (21) transfer devices and the tube loading device (22) are moved to their respective positions for winding of a new package (16) to commence.



EP 0 744 372 A2

Description

The invention relates to package transfer arrangements in textile machines, and in particular to arrangements for transferring a fully wound package of textile yarn from a position in a textile machine occupied by the package on completion of winding, to a position in which it can be stored or transported away from the machine by an automatic device.

Several such arrangements are known. However, with these known arrangements, a fully wound package held in a cradle is pivoted rearwardly, i.e. away from the yarn coming onto the package, through the textile machine for the package to be put on tracks down which it rolls to the store or removal location. During such rolling the tracks support the tube on which the package is wound, and there is a tendency for the yarn end to unwind from the surface of the package. Since the diameter of the tube is considerably less than that of the package, in rolling on the surface of the tube the package makes several revolutions as it rolls only a short distance down the tracks. Up to 3m of yarn can become unwound in this way, and this can hang down and foul the package winding mechanism of the machine. Usually a person is obliged to proceed along the machine and tie up these loose ends to prevent such fouling. This operation defeats the object of the machine being serviced by an automatic package removal device, and is costly in terms of personnel time.

It is an object of the present invention to provide a package transfer arrangement in which the above mentioned disadvantage is avoided or minimised.

The invention provides a textile machine having a package transfer arrangement comprising a first transfer device adapted to receive a package thereon and being mounted in the machine for movement between a package receiving position and a respective package transfer position, a second transfer device also adapted to receive a package thereon and mounted in the machine for movement between a respective package transfer position and a package store position, and a control arrangement operable when winding of a package on the machine is terminated, to move the first transfer device firstly to the package receiving position and then, with the package thereon, to its respective transfer position to transfer the package from the first transfer device to the second transfer device in its respective transfer position. The control arrangement may be operable then to move the second transfer device with the package thereon to the package store position.

The first transfer device may be movable between a park position and its package receiving and respective package transfer positions, in which case the control arrangement may be operable to move the first transfer device from the package receiving position to the park position prior to moving it to its respective package transfer position. The second transfer device may have a package detecting device thereon having differing

conditions due to the presence or absence of a package in the second transfer device, in which case the control arrangement may be operable to move the first transfer device from the park position to its respective package transfer position only if the package detecting device is in the package absence condition.

The second transfer device may be biased to move from the package store position to its respective package transfer position in the absence of a package thereon. The control arrangement may be operable to move the first transfer device from its respective package transfer position to move the second transfer device from its respective package transfer position to the package store position, after which the control arrangement may also be operable to move the first transfer device back to the park position.

The first transfer device may comprise a pair of arms having free ends adapted to support a tube therein, which arms may be pivotally mounted in the textile machine. Each arm of the first transfer device may comprise a multi-link assembly. The second transfer device also may comprise a pair of arms having free ends adapted to support a tube therein, which arms may be pivotally mounted in the textile machine.

The textile machine may comprise a cradle mounted in the machine for pivotal movement between a package winding position and an open position. The control arrangement may be operable to pivot the cradle to the open position when the first transfer device has moved to the package receiving position. The textile machine may comprise a brake operable to stop rotation of a package, in which case the cradle may be pivotal between the package winding position, a brake position and the open position. In that case, the control arrangement may be operable, when winding of a package on the machine is terminated, to pivot the cradle from the package winding position to the brake position, initiate operation of the brake, move the first transfer device to the package receiving position and, when rotation of the package has ceased, to pivot the cradle to the open position. The control arrangement may comprise a first motor operable to move the first transfer device and a second motor operable to pivot the cradle.

The machine may also comprise a tube loading device, which may have a housing adapted to hold a plurality of empty tubes for winding packages thereon. The tube loading device may be mounted in the textile machine for movement between a holding position and a loading position, in which case the control arrangement may be operable to move the tube loading device from the holding position to the loading position when the first transfer device has moved from the package receiving position to the park position. The housing may have a discharge opening through which a tube may pass, and may have a door at the discharge opening. In that case a door opening device may be provided, operable to open the door as the tube loading device moves from the holding position to the loading position to allow a tube to pass through the discharge opening, and to

close the door as the tube loading device moves from the loading position back to the holding position. The door may be adapted to restrain a second tube from passing through the discharge opening. The control arrangement may comprise a third motor operable to move the tube loading device.

The invention will now be further described with reference to the accompanying drawings in which:

- Fig. 1. is a side view of a package transfer arrangement showing a package in three positions which it occupies at different stages of the operation of the arrangement,
- Fig. 2. shows the arrangement of Fig. 1 with the package being transferred from the cradle to the first transfer device,
- Fig. 3. shows the arrangement of Fig. 1 with the package being transferred from the first transfer device to the second transfer device, and
- Fig. 4. shows the arrangement of Fig. 1 with the tube loading device in the loading position.

Referring now to the Figures, there is shown a package transfer arrangement 10 in part of a textile machine 11 in which a cradle 12 is mounted. The cradle 12 has a pair of arms 13 on the end of each of which is an end cap 14 for supporting a tube 15 on which a package 16 is wound. During the winding of the package 16, a yarn (not shown) is fed to the package 16 by a traverse guide 17, and the package 16 being wound is driven in rotation by peripheral contact with a driving bowl 18 in conventional manner. The cradle 12 is pivotal about a pivot axis 19.

The package transfer arrangement 10 comprises a first transfer device or handler 20, a second transfer device or catcher 21, and a tube loading device 22 (not shown in Figs. 2 and 3 for clarity), all of which are pivotally mounted in the machine 11 about respective axes 23, 24, 25. A first motor 26 is provided to move the handler 20, a second motor 27 is provided for moving the cradle 12, and a third motor 28 or cylinder (not shown) is provided for moving the tube loading device 22. The handler 20 comprises a pair of arms in the form of an assembly of three links 29, 30, 31, links 29 and 30 being mounted in the machine 11 to pivot about axes 23 and 32 respectively, and link 31 being pivotally secured to links 29 and 30. This arrangement of links 29, 30, 31 provides that the path of movement of the package 16 is relatively flat and can be accommodated within the confines of the textile machine 11. At the free end of each link 31 is a hook-shaped end 33 of an internal radius to receive a tube 15 therein. The catcher 21 has a pair of arms 34 pivoted at 24 and having at their free ends a hooked-shaped end 35 also of an internal radius to receive a tube 15 therein. A microswitch 36 is mounted on catcher 21 to detect the presence or absence of a tube 15 in the hooked end 35. Either a damper 37 biases the catcher 21 upwardly and restricts the speed

of motion of the catcher 21 in a downwardly direction under the weight of a package 16, or a cylinder 37 moves the catcher 21 upwardly and downwardly as required.

The tube loader 22 comprises an arm 38 mounted in the machine 11 to pivot about axis 25, and at its free end a housing 39 adapted to hold several, in this case four, empty tubes 15. The housing 39 has an entry aperture 40 through which empty tubes 15 may be loaded either manually or by means of an automatic device. At the other end of the housing 39 is a discharge opening 41 and a door 42. A flexible tape or cord 43 has one end attached to the door 42 and the other end attached to a fixing 44 displaced from the pivot axis 25 of the tube loader 22.

A controller 44 is connected to each motor 26, 27, 28, to microswitch 36 and to position sensors (not shown) for the cradle 13, the handler 20, the catcher 21 and the tube loader 22.

Operation of the package transfer arrangement 10 is as follows. During winding of a package 16 in the cradle 12, the periphery of the growing package 15 is in contact with the driving bowl 18. The handler 20 is in the park position shown centrally in Fig. 1 and in Fig. 4, the tube loader 22 is in its holding position as shown in Fig. 1, and the catcher 21 will be in the store position shown in Figs. 1 and 2 if a package 16e is present in the hooked end 35, or in the package transfer position shown in Fig. 3 if no such package 16e is present. The housing 39 of the tube loader 22 should have up to four empty tubes 15 in it.

On completion of the winding of the package 16, the controller 44 initiates driving of the motor 27 in a forward direction to move the cradle 12 upwardly to the brake position in which the surface of the package 16 is out of contact with the driving bowl 18. shown at the left-hand side of Fig. 1. With the cradle 12 in this position a brake (not shown) is applied to stop the rotation of the package 16a. Meanwhile motor 26 is operated to move the handler 20 to the package receiving position shown in Fig. 2. When both the package 16 has stopped and the handler 20 is in the package receiving position, the controller 44 again operates the motor 27 to move the cradle 12 to the open position as shown in Fig. 2. As this motion is performed, the arms 13 of the cradle 12 move outwardly and release the tube 15a from the end caps 14 so that the package on the tube, occupying the positions 16a, 15a respectively, which is supported by stops 45 on the cradle arms 13, can be received in the hooked ends 33 of the handler 20. The controller 44 then operates the motor 26 to move the handler 20 to the park position shown centrally in Fig. 1 with the package in position 16b. If the relevant position detector indicates that the catcher 21 is in its package transfer position as shown in Fig. 3, the motor 26 is allowed to continue to move the handler 20 to its package transfer or release position, as also shown in Fig. 3, so that the package is transferred from position 16c to the hooked end 35 of the catcher 21 and now occupies position 16d. However

if the relevant position sensor indicates that the catcher 21 is in the store position shown in Fig. 1, the handler 20 remains in the park position until package transfer can take place.

Although the weight of a fully wound package 16d would be sufficient to cause the catcher 21 to move downwardly to the store position shown in Fig. 1, if for some reason the package 16d is incomplete its weight may not be sufficient. For this reason, when the microswitch 36 indicates that the package 16d is in the hooked end 35, the controller 44 again activates the motor 26 to move the handler 20 further so that contact between the links 31 and the arms 34 causes the catcher 21 to move to the store position. When the relevant position sensor indicates that the catcher 21 has reached the store position, the controller 44 causes the motor 26 to operate in the opposite direction to move the handler 20 back to the park position.

When the handler 20 has moved with package 16b from the park position to the release position and the package is in position 16c or 16e, the controller 44 causes the motor 28 to operate to rotate the tube loader 22 about the axis 25 from the holding position shown in Fig. 1 to the loading position shown in Fig. 4. Alternatively a cylinder (not shown) operates on an extension of arm 38 to cause such movement. As this movement takes place, the tape or cord 43, being attached to a fixing 48 displaced from the pivot 25, pulls the door 42 open. This allows the first tube 15f to fall onto stops 45 on the arms 13 of the cradle 12. The door 42 has a curved surface 46 of similar curvature to the tubes 15 and is pivoted on the housing 39 about the discharge opening 41 so that the curved surface 46 moves around the surface of the first tube 15f and prevents the next or subsequent tubes 15g from passing out of the discharge opening 41. The controller 44 then causes the motor 27 to move the cradle 12 from the open position, thereby closing the arms 13 so that the end caps 14 engage the tube 15. The cradle 12 is moved back to the package winding position with the tube 15 now in contact with the driving bowl 18. At the same time springs 47 (Fig. 4) move the tube loader 22 back to the holding position. This latter movement allows the door 42 to close as the cord or tape 43 slackens, and the tubes 15g to move towards the discharge opening 41. A new empty tube 15 can then be placed in the housing 39 through the entry aperture 40.

A new package 16 can be wound on the empty tube 15 in the cradle 12, and when such winding is completed the above procedure can be repeated. It will be noted that with the package transfer arrangement of the present invention, as the package transfers firstly from position 16a in the cradle 12 to the handler 20, and then from position 16c in the handler 20 to position 16d in the catcher 21, there is in each case only a very short distance involved over which rolling of the package 16 whilst supported by the surface of the tube 15 on the arms 13, 31, or 34 can occur. By this means unwrapping of any significant quantity of yarn from the surface

of the package 16 is avoided, thereby avoiding or minimising the risk of the yarn end fouling the textile machine 11 and avoiding the need for manual tying up of such yarn ends.

Claims

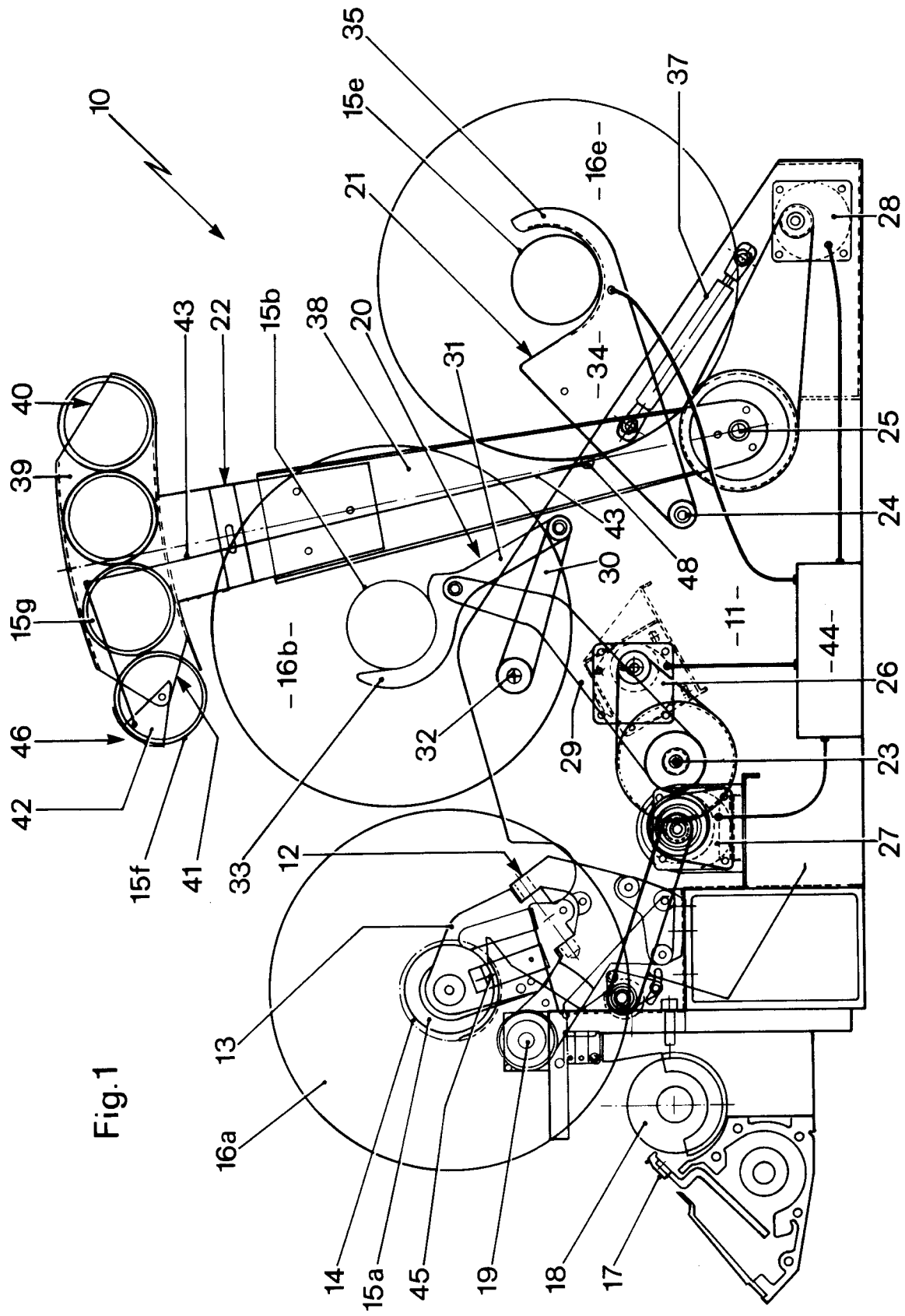
1. A textile machine (11) having a package transfer arrangement (10) characterised by a first transfer device (20) adapted to receive a package (16) thereon and being mounted in the machine (11) for movement between a package receiving position and a respective package transfer position, a second transfer device (21) also adapted to receive a package (16) thereon and mounted in the machine (11) for movement between a respective package transfer position and a package store position, and a control arrangement (44) operable when winding of a package (16) on the machine (11) is terminated, to move the first transfer device (20) firstly to the package receiving position and then, with the package (16) thereon, to its respective transfer position to transfer the package (16) from the first transfer device (20) to the second transfer device (21) in its respective transfer position.
2. A textile machine according to claim 1, characterised in that the control arrangement (44) is operable to move the first transfer device (20) from the package receiving position to a park position prior to moving it to its respective package transfer position.
3. A textile machine according to claim 2, characterised in that the control arrangement (44) is operable then to move the second transfer device (21) with the package (16) thereon to the package store position and to move the first transfer device (20) back to the park position.
4. A textile machine according to claim 2 or claim 3, characterised in that the second transfer device (21) has a package detecting device (36) thereon having differing conditions due to the presence or absence of a package (16) in the second transfer device, and the control arrangement (44) is operable to move the first transfer device (20) from the park position to its respective package transfer position only if the package detecting device (36) is in the package absence condition.
5. A textile machine according to any one of claims 1 to 4, characterised by a cradle (12) mounted in the machine (11) for pivotal movement between a package winding position and an open position, and in that the control arrangement (44) is operable to pivot the cradle (12) to the open position when the first transfer device (20) has moved to the package receiving position.

6. A textile machine according to any one of claims 1 to 5, characterised by a brake operable to stop rotation of a package (16) and in that the control arrangement (44) is operable, when winding of a package (16) on the machine (11) is terminated, to pivot the cradle (12) from the package winding position to a brake position, initiate operation of the brake, move the first transfer device (20) to the package receiving position and, when rotation of the package (16) has ceased, to pivot the cradle (12) to the open position. 5 10
7. A textile machine according to any one of claims 1 to 6, characterised by a tube loading device (22) which has a housing (39) adapted to hold a plurality of empty tubes (15) for winding packages (16) thereon, and in that the tube loading device (22) is mounted in the machine (11) for movement between a holding position and a loading position. 15 20
8. A textile machine according to claim 7, characterised in that the control arrangement (44) is operable to move the tube loading device (22) from the holding position to the loading position when the first transfer device (20) has moved from the package receiving position to the park position. 25
9. A textile machine according to claim 7 or claim 8, characterised in that the housing (39) has a discharge opening (41) through which a tube (15) may pass and a door (42) at the discharge opening (41). 30
10. A textile machine according to claim 23, characterised in that a door opening device (43) is operable to open the door (42) as the tube loading device (22) moves from the holding position to the loading position to allow a tube (15) to pass through the discharge opening (41), and to close the door (42) as the tube loading device (22) moves from the loading position back to the holding position. 35 40

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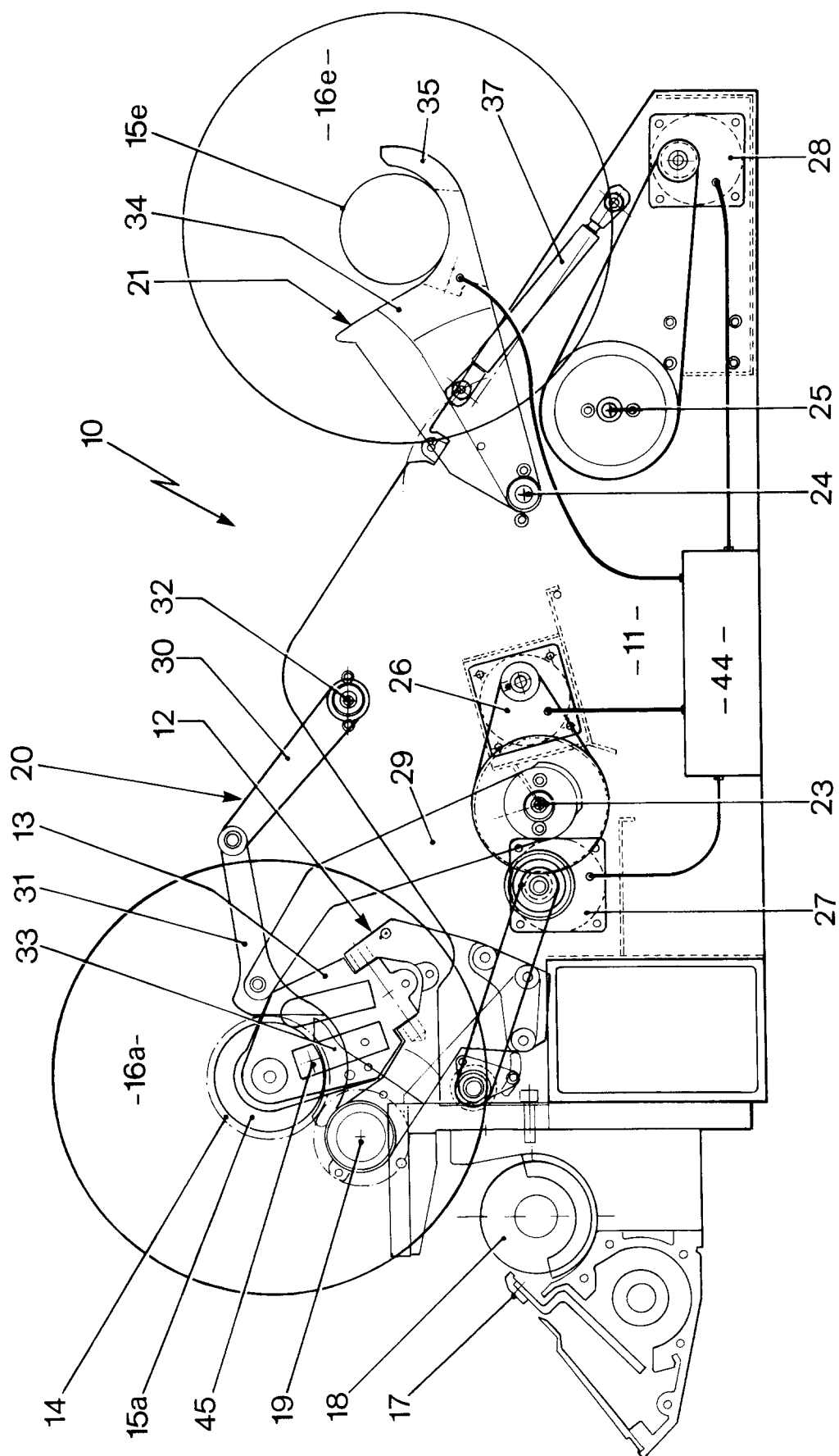


Fig. 2

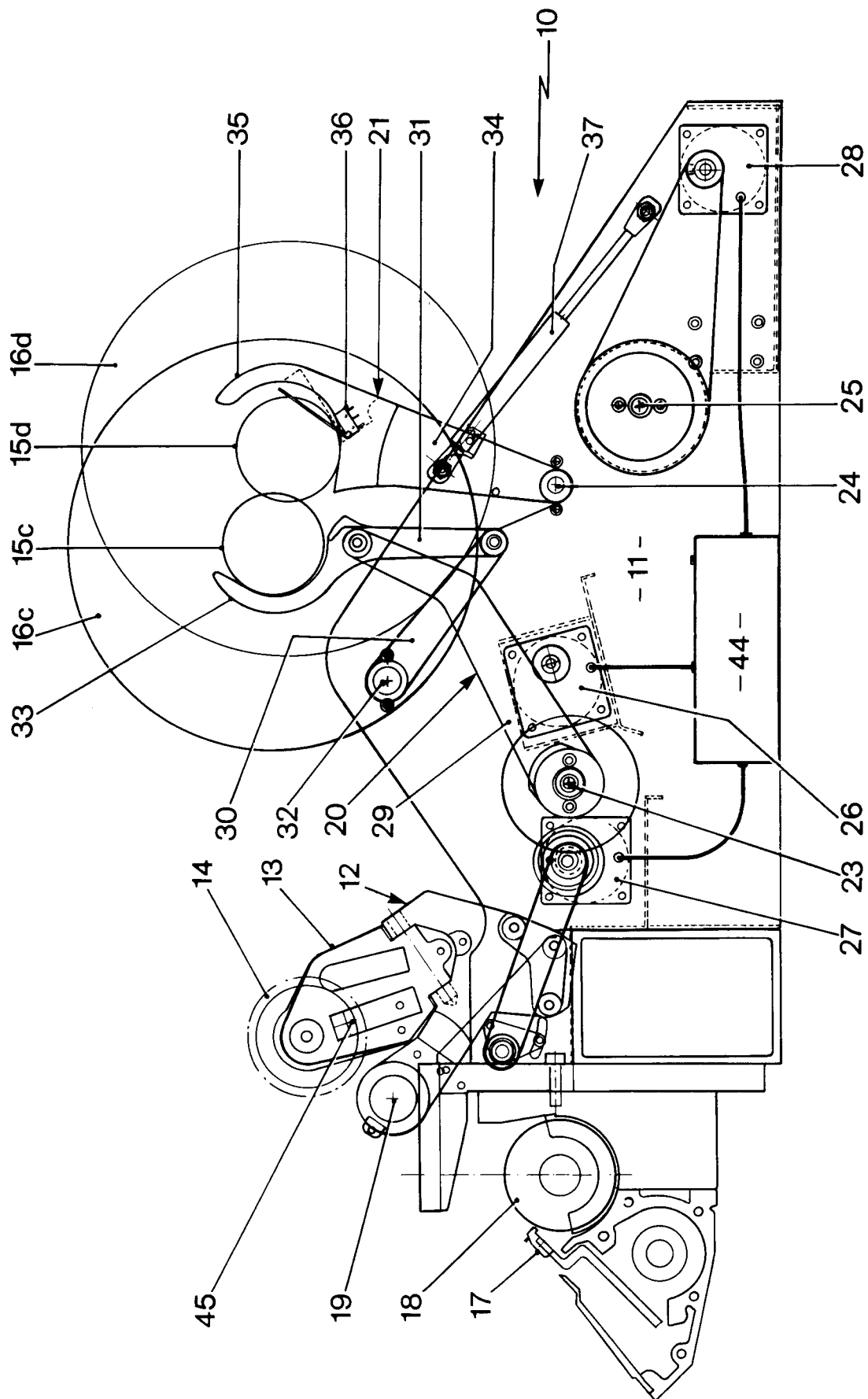


Fig. 3

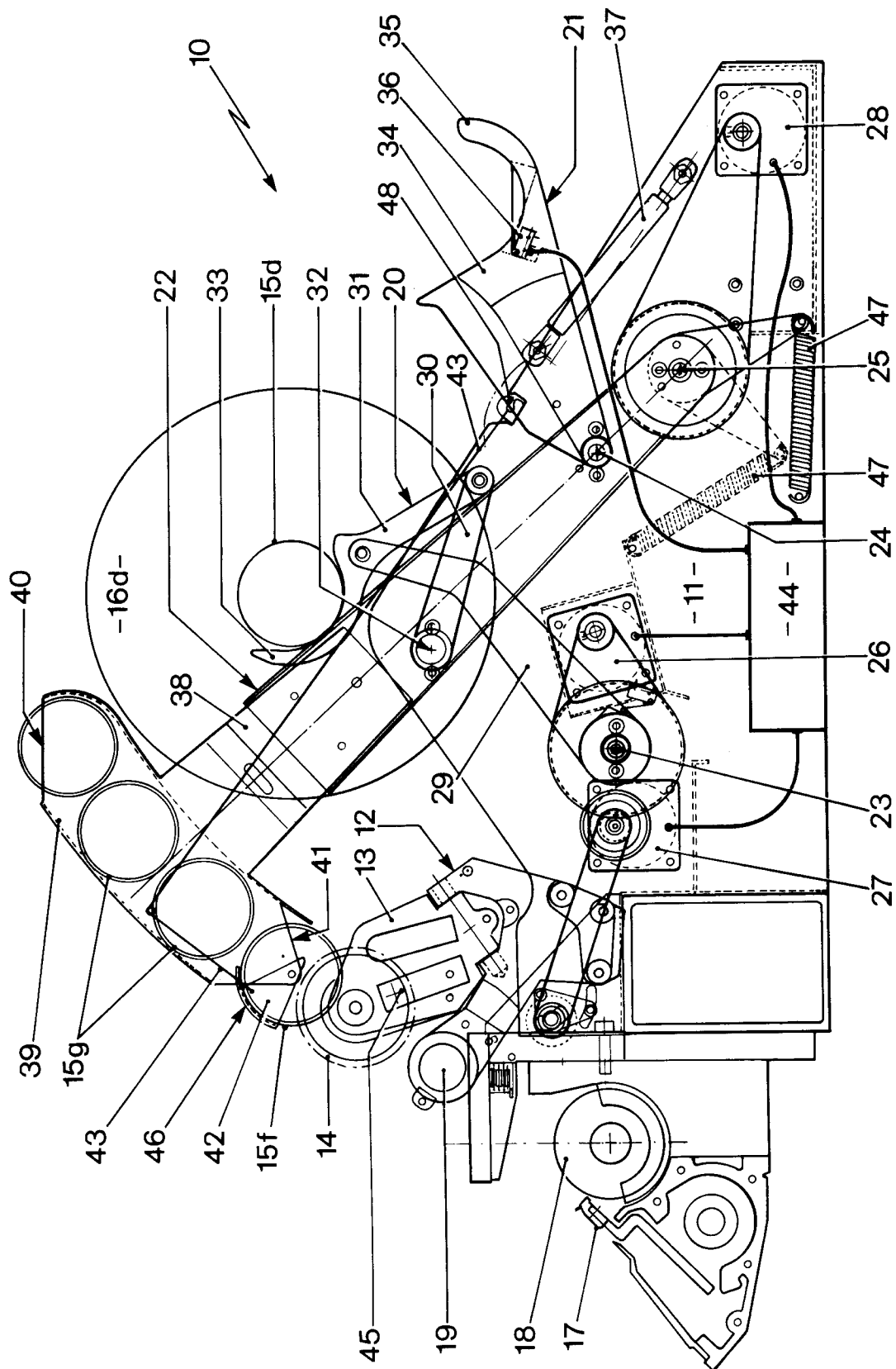


Fig. 4