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(54) Apparatus for cutting and placing self-adhesive tape

(57) Apparatus for cutting and for simultaneously placing two lengths of tape onto an object, like a sealing tape and a teartape on a flap of an envelope. To that end the object is guided between a transfer roll and a feed belt, with the transfer roll feeding a piece of sealing tape and a piece of teartape towards the object. The pieces of tape are cut off by two supply rolls and two knife rolls, as soon as an object approaches the transfer roll. For that purpose a sensor is mounted near the feed belt, which steers two individual servomotors for the supply rolls and two individual motors for the knife rolls.

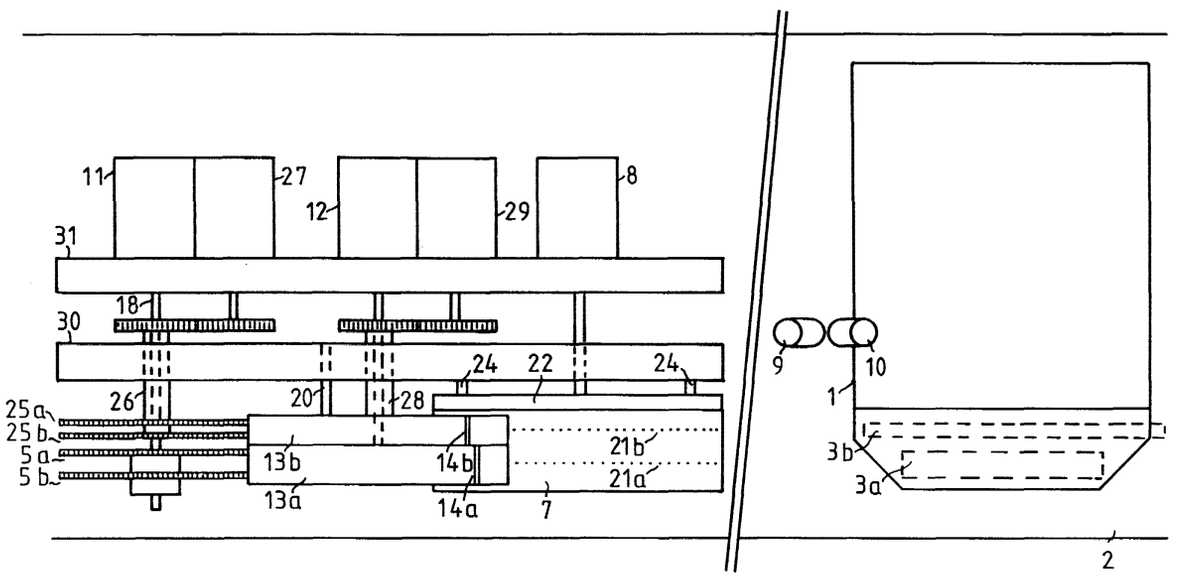

FIG. 3

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Description

[0001] The invention relates to an apparatus for cutting lengths of self-adhesive tape and for placing these lengths onto a product, provided with a supply roll, via which the tape is supplied, a knife roll, with which a piece of tape having a previously determined length is cut off, and a transfer roll, for placing the length of tape onto the product.

[0002] An apparatus of this type has been described in patent application NL 1011585. The known apparatus places lengths of tape onto a feed belt for further processing. Because the lengths of tape are taken-off continuously, the supply roll and the knife roll can be coupled to continuously operating drive means. The present invention relates to an apparatus for placing a length of self-adhesive tape onto a product on command. It is characterized in that the apparatus is provided with supply means for supplying the product, that the supply means are provided with a sensor for detecting an approaching product, that the supply roll and the knife roll each are provided with drive means and that steering means are provided for steering the drive means as soon as the sensor detects a product, such that exactly one length of tape is cut off and placed onto the product.

[0003] A favourable embodiment of the invention, in which the transfer roll can place the length of tape directly onto a passing product, is characterized in that the supply means comprise a feed belt, that the transfer roll is mounted above the feed belt and that the transfer roll and the feed belt operationally have the same peripheral velocity, such that the product is clamped for a moment between the feed belt and the transfer roll.

[0004] After a length of tape has been placed onto an object, the supply roll and the knife roll are halted in at least substantially previously determined positions. A favourable embodiment which prevents tolerances in these positions to influence the accuracy of the apparatus, is characterized in that supply roll and the knife roll are provided with angular encoders, connected to the steering means, in such a manner that when steering the drive means, the actual position of the supply roll and the knife roll can be taken into account.

[0005] A favourable embodiment according to another aspect of the invention is characterized in that the sensor is moreover arranged for discriminating between different types of products. It is possible then to cut off the desired length of tape at the right moment, in dependence of the type of product and the position of the supply roll and the knife roll.

[0006] The relatively abrupt halting of the supply roll, in combination with the elasticity of the tape may result in the tape being torn off the transfer roll. A favourable embodiment, which prevents this tearing off, is characterized in that an intermediate roll is provided, mounted between the supply roll and the transfer roll, which intermediate roll is provided with a freewheeling bearing.

[0007] A problem with the supply roll and the transfer roll is that they contact the adhesive layer of the tape and thus may stick to the tape. A further favourable embodiment of the inventive apparatus which prevents sticking, while still providing a sufficient support for the tape, is characterized in that the supply roll and the intermediate roll both consist of two mutually coupled disks and that a distance between the disks is adjustable. It is possible then to support any type of tape only at the edges. Preferably, the peripheries of the disks of the supply roll and the transfer roll are moreover provided with ribs or protrusions, in order to further reduce the mutual contact area.

[0008] As placing a length of tape on an object can be done in an entirely controlled manner, it becomes possible now to place a number of tapes simultaneously on an object, with a predetermined mutual relationship. This may be used advantageously for example on a flap of an envelope, on which a sealing tape and a teartape must be placed side by side, with the sealing tape for example being a finger lift tape with both sides provided with an adhesive layer and with the teartape being positioned such that it sticks out at least on one side of the flap. A favourable embodiment according to another aspect of the invention is therefore characterized in that the apparatus comprises two supply rolls, two intermediate rolls and two knife rolls, for placing at least substantially simultaneously two lengths of tape to a product, and that the supply rolls and the knife rolls are each provided with drive means, connected to the steering means. Use may be made of a common transfer roll, as this rotates with a constant peripheral speed.

[0009] The invention also relates to a method for placing a first tape and a second tape onto a flap of a covering, like an envelope, in the process of which the first tape and the second tape are each guided from a tape reel, via a supply roll and an intermediate roll, between a knife roll and a transfer roll, while the covering is supplied via a feed belt alongside a sensor and next underneath the transfer roll, with the sensor steering the supply rolls and the knife rolls via their individual drive means such that, every time a covering is detected, previously determined lengths of first tape and second tape are placed onto the flap with previously determined mutual orientations in a longitudinal direction.

[0010] The invention also relates to a covering, like an envelope, provided with a sealing tape and a teartape, placed according the above method.

[0011] The invention will now be further explained with a reference to the following figures, in which:

Fig. 1 schematically represents a possible embodiment of an apparatus according to the invention in side view;

Fig. 2 schematically represents a first possible embodiment of an apparatus according to the invention in top view;

Fig. 3 schematically represents a second possible

embodiment of an apparatus according to the invention in top view.

[0012] Fig. 1 schematically represents a possible embodiment of an apparatus according to the invention in side view, in which a product 1, in this case an envelope, is supplied by a feed belt 2 in order to be provided with a length of self adhesive tape 3, which is supplied from a reel, not shown in the figure, via an auxiliary roll 4, which contacts the non-adhesive side of tape 3, a supply roll 5, which contacts the adhesive side, an intermediate roll 6, provided with a freewheeling bearing, which also contacts the adhesive side, and a transfer roll 7. Transfer roll 7 is driven by a motor 8, such that its peripheral speed corresponds with the peripheral speed of feed belt 2, as a result of which a product 1 can pass without any difficulty between transfer roll 7 en feed belt 2. During this passage, a length of tape must be placed onto product 1. In order to detect an approaching product 1, an optical detector is provided, as such well known in the art, comprising a light source 9 and a light sensitive cell 10, which can detect a difference in reflectivity between the feed belt 2 and product 1. As soon as product 1 is detected, supply roll 5 starts rotating for a short time with the aid of a motor 11, therewith enabling transfer roll 7 to take along a short length of tape 3. Substantially simultaneously with motor 11 a motor 12, coupled to a knife roll 13 starts rotating, as a result of which a knife 14 cuts off tape 3, after which supply roll 5 stops. Transfer roll 7 picks up the length of tape and places it onto product 1. In order to simplify the transfer, the outside surface of transfer roll 7 is provided with small holes, which are connected to a non-moving suction port 15. This provision is known in the art and has been described for example in EP 0 773 165. When tape 3 has been cut-off, it is sucked onto the surface of transfer roll 7 by the underpressure applied to the small holes and transported towards product 1. In the mean time, transfer roll 7 rotates underneath the free end of tape 3. The freewheeling bearing of inter-mediate roll 6 prevents the free end of tape 3 from being pulled off the surface of transfer roll 7 when supply roll 5 abruptly stops, due to the elasticity of tape 3.

[0013] For the steering of motor 11 and motor 12 by optical detectors 9,10, steering means 16 are provided, which switch on motor 11 and motor 12 with an adjustable delay and during an adjustable length of time, such that a piece of tape with a previously determined length is placed on product 1 at a previously determined location. For pushing the length of tape firmly onto product 1, a press-on roll 17 may be provided, located underneath feed belt 2, which is mounted eccentric here on a shaft and can be rotated manually to a position in which product 1 and feed belt 2 may just pass between transfer roll 7 and press-on roll 17.

[0014] Fig. 2 schematically represents a first possible embodiment of an apparatus according to the invention in top view, with a product 1 which is supplied with the aid of feed belt 2 in order to be provided with a length of self-adhesive tape 3, in this case a piece of fingerlift tape of which a protection layer can be removed, after which product 1 can be sealed. Tape 3, which is for reasons of clarity not shown in the figure, is supplied via supply roll 5, which contacts the adhesive layer and which consists for that reason of two narrow disks 5a, 5b, which are mounted adjustable on a shaft 18 of motor 11. Because the disks are adjustable, different types of tape may be used. Care must be taken then to adjust the disks 5a,5b such that they contact only the edges of tape 3. In order to minimise the contact surface between disks 5a,5b and the adhesive surface of tape 3 even further, disks 5a,5b are provided with protrusions 19, on which tape 3 rests. Tape 3 then continues its way via intermediate roll 6, of which only a shaft 20 is visible here, and transfer roll 7.

[0015] Transfer roll 7 is provided with holes 21 on its outside surface, with which tape 3 is kept in place during the actual transfer. The holes are connected to a side of transfer roll 7, against which a non-moving flange 22 rests, in which a cavity is made which forms the non-moving suction port 15 which is connected to a vacuum pump not shown here. Motors 8,11,12 and shaft 20 are mounted on a mounting plate 23, which is mounted above feed belt 2. Flange 22 is mounted on mounting plate 23 with the aid of spacers 24. Intermediate roll 6, visible in Fig. 1, also contacts the adhesive side of tape 3 and is for that reason also made of two narrow, adjustable disks, provided with protrusions, just like supply roll 5.

[0016] Fig. 3 schematically represents a second possible embodiment of an apparatus according to the invention in top view, with a product 1 which is supplied with the aid of feed belt 2 in order to be provided with a first length of self-adhesive tape 3a, again a piece of fingerlift tape of which a protection layer can be removed, after which product 1 can be sealed and a piece of teartape 3b, with which a product 1, once it has been sealed, can be opened again. Tape 3a is supplied via supply roll 5, which consists again of two disks 5a,5b, which are mounted adjustable on shaft 18 of motor 11. Tape 3b is supplied via a second supply roll, consisting of two disks 25a,25b, which are driven by a motor 27, via a tubular shaft 26 and two gear wheels. The lengths of tape are transported towards product 1 via two intermediate rolls 6a,6b, of which only a mutual shaft 20 is visible here, and transfer roll 7, which is provided with two rows of small holes 21a,21b for keeping the tapes 3a,3b in place. As the pieces of tape may have different lengths, and as they must be positioned individually, also two knife rolls 13a,13b and knifes 14a,14b are provided, driven by a motor 12 and via a tubular shaft 28 and two gear wheels by a motor 29. Hollow shafts 26,28 and the shaft of transfer roll 7 are provided with bearings, mounted in a mounting plate 30 and shaft 20 and plate 22 are also mounted onto it, plate 22 with the aid of spacers 24, while the motors 11,27,12,29 and 8 are

mounted onto a second mounting plate 31.

[0017] For the steering of motors 11,27,12,29 by optical detectors 9,10, steering means 16 must switch on the motors with an adjustable delay and during an adjustable time span, in such a way that two pieces of tape, each with a predetermined length are placed at predetermined locations on product 1. The motors may be stepping motors or motors provided with an angular encoder, such that their angular positions can be determined continuously.

Claims

1. Apparatus for cutting lengths of self-adhesive tape and for placing these lengths onto a product, provided with a supply roll, via which the tape is supplied, a knife roll, with which a piece of tape having a previously determined length is cut off, and a transfer roll, for placing the length of tape onto the product, characterized in that the apparatus is provided with supply means for supplying the product, that the supply means are provided with a sensor for detecting an approaching product, that the supply roll and the knife roll each are provided with drive means and that steering means are provided for steering the drive means as soon as the sensor detects a product, such that exactly one length of tape is cut off and placed onto the product.

2. Apparatus according to claim 1, characterized in that the supply means comprise a feed belt, that the transfer roll is mounted above the feed belt and that the transfer roll and the feed belt operationally have the same peripheral velocity.

3. Apparatus according to claim 2, characterized in that supply roll and the knife roll are provided with angular encoders, connected to the steering means.

4. Apparatus according to claim 3, characterized in that the sensor is moreover arranged for discriminating between different types of products.

5. Apparatus according to claim 3 or 4, characterized in that an intermediate roll is provided, mounted between the supply roll and the transfer roll, which intermediate roll is provided with a freewheeling bearing.

6. Apparatus according to claim 5, characterized in that the supply roll and the intermediate roll both consist of two mutually coupled disks and that a distance between the disks is adjustable.

7. Apparatus according to claim 6, characterized in that the peripheries of the disks are provided with ribs or protrusions.

8. Apparatus according to claim 4, characterized in that tha apparatus comprises two supply rolls, two intermediate rolls and two knife rolls, for placing at least substantially simultaneously two lengths of tape to a product, and that the supply rolls and the knife rolls are each provided with drive means, connected to the steering means.

9. Method for placing a first tape and a second tape onto a flap of a covering, like an envelope, in the process of which the first tape and the second tape are each guided from a tape reel, via a supply roll and an intermediate roll, between a knife roll and a transfer roll, while the covering is supplied via a feed belt alongside a sensor and next underneath the transfer roll, with the sensor steering the supply rolls and the knife rolls via their individual drive means such that, every time a covering is detected, previously determined lengths of first tape and second tape are placed onto the flap with previously determined mutual orientations in a longitudinal direction.

10. Covering, like an envelope, provided with a sealing tape and a teartape, placed according the method as claimed in claim 9.

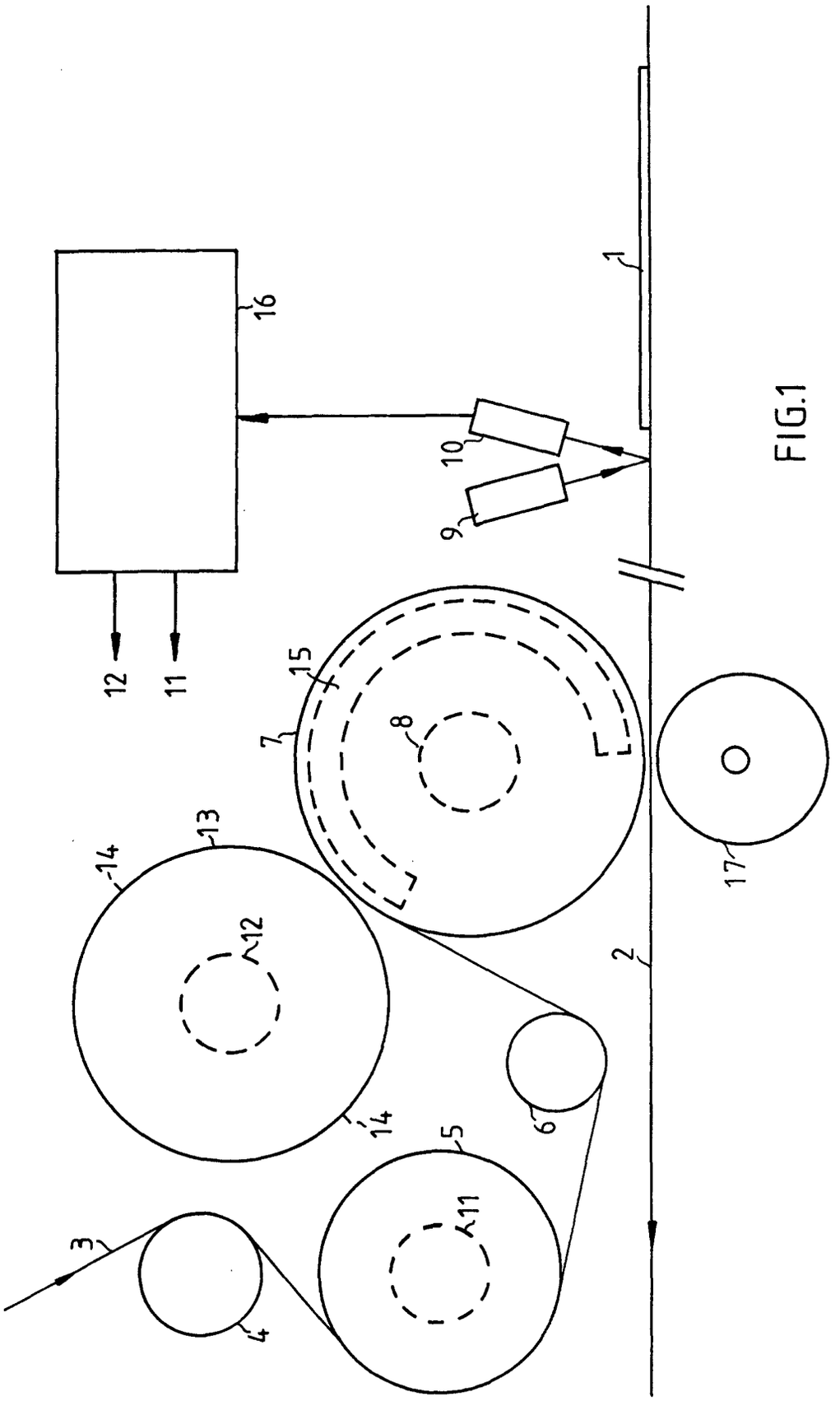


FIG.1

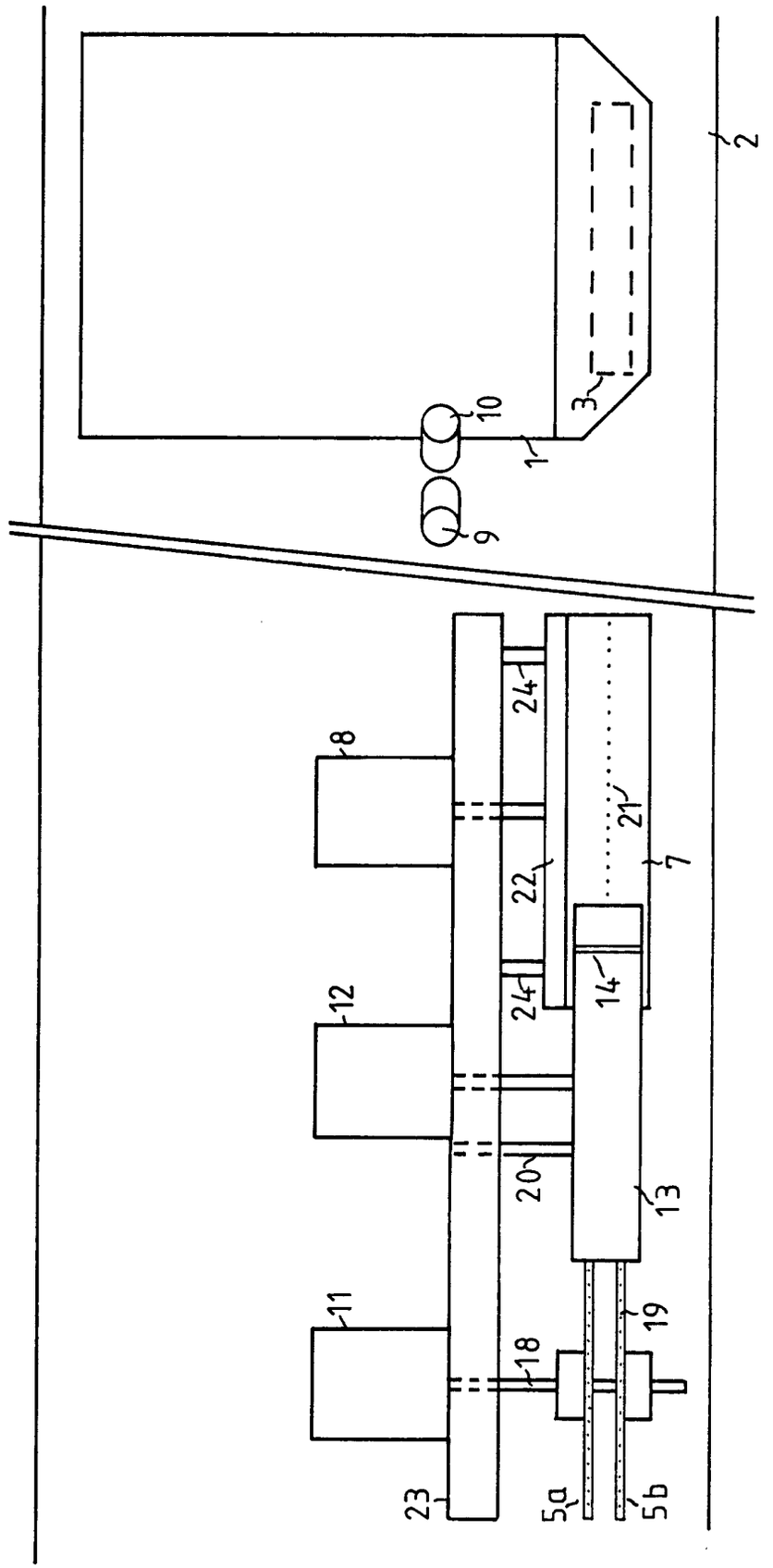
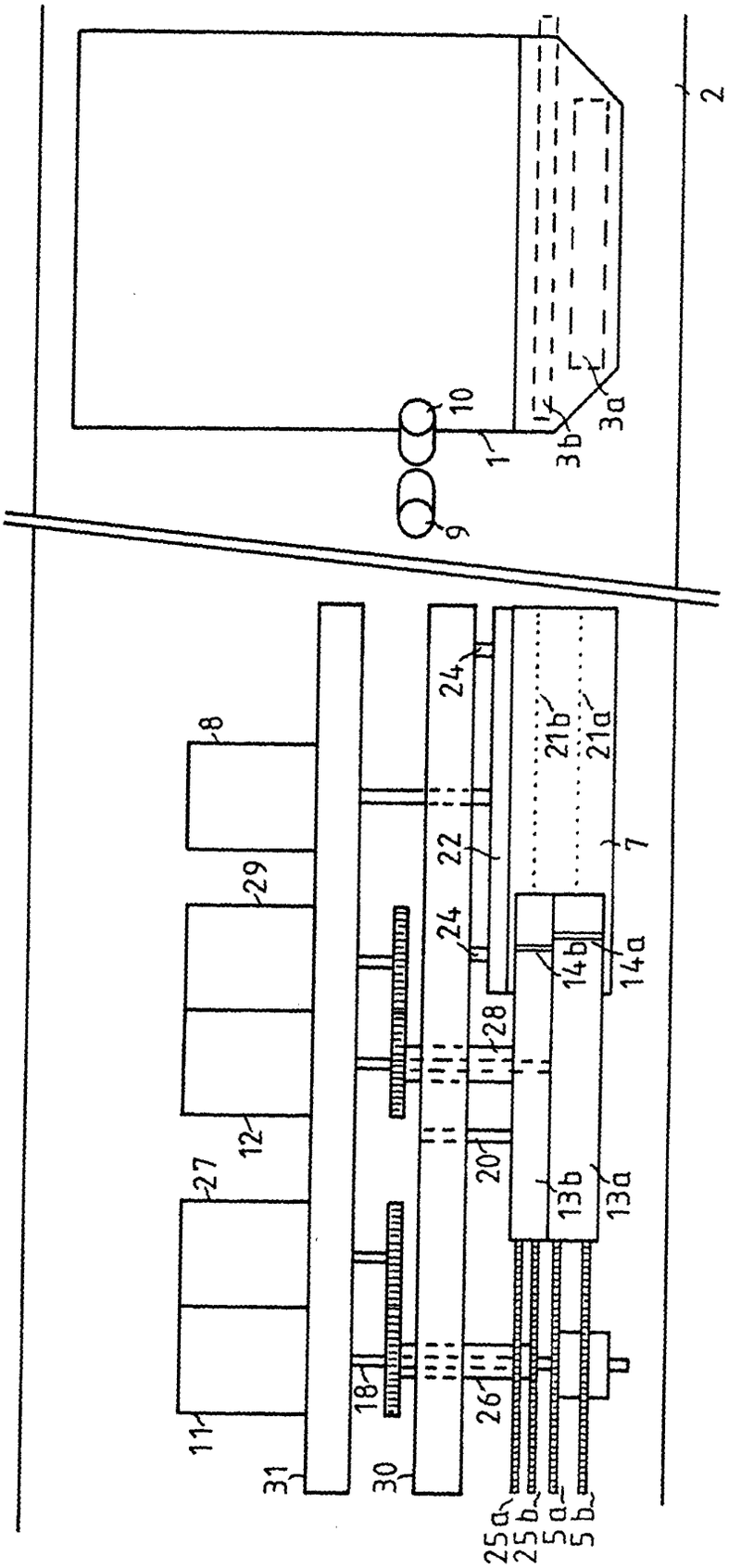


FIG. 2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5b

FIG. 3