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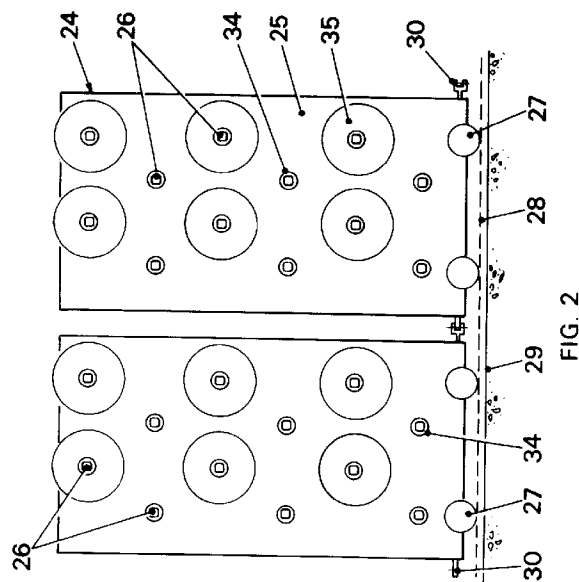
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(54) **Package removal arrangement.**

(57) In a textile machine(10) having package winding mechanisms (20) disposed in rows along each side of the machine(10) and in columns, a package removal arrangement is provided comprising cassettes(24) on which package receiving pegs(26) are also arranged in rows and columns whose spacings are less than the inter-row and inter-column spacings of the machine(10). A trolley(31) is provided on which a set of nine cassettes(24) can travel to and from the machine(10). Corresponding tracks(28, 32) on the machine(10) and the trolley(31) allow the cassettes(24) to transfer between them.



This invention relates to the removal of fully wound packages from a textile machine, and in particular from a yarn texturing machine.

Until relatively recent times, packages of yarn have been taken from the package winding mechanisms of textile machines manually, and then removed in trucks to a receiving or storage area. As packages have grown larger in order to reduce the frequency of their removal from the machine, their weight has become such that it is an arduous task to remove such packages by hand, and damage to the packages is likely to occur. As a consequence, there have been proposals to automate the package removal operation. One such proposal is described in British Patent Publication No. 2248245.

The arrangement therein described comprises a track extending around the premises in which the textile machine is situated, between the machine, a supply station of empty tubes, and a receiving station for full packages, with package carriers travelling along the track to carry empty tubes to the machine and full packages from the machine. Transfer devices located at the supply station, the machine, and the receiving station, transfer tubes or packages between a station and a carrier, or a carrier and the machine, as appropriate. The whole operation is controlled by a computer which also may control many similar machines in the same factory.

Such an arrangement as described above, whilst being ideal from the point of view of minimising the amount of manual handling of the heavy packages, involves a very large financial outlay.

A much less costly option is that of transferring the fully wound packages from the machine to a trolley or wheeled cassette, the cassette having pegs or other package receiving devices which are disposed in an array having one-to-one correspondence with the package winding mechanisms of the textile machine. Typically in a yarn texturing machine, there are 108 package winding mechanisms disposed along one side of the machine in three rows or decks, in nine bays with four mechanisms per bay in each row. Conveniently therefore, a cassette will have the pegs or other package receiving devices disposed in three rows, with the number of columns being chosen to suit the particular machine user. If there is only one column per cassette, the removal of thirty-six cassettes from each side of the machine is time consuming if not done automatically as in the costly arrangement described above. A more suitable arrangement is that of having bay-length cassettes with four columns of pegs thereon. This will result in nine cassettes being required for each side of the machine, removal of which is much less time consuming than with the single column arrangement. In either case, all of the cassettes may be moved simultaneously in a "train" by a tractor device, but the train is then so long as to create difficulty in manoeuvring it around the

factory, unless several trips are made with less than 108 packages per trip.

In order to locate any positions on the machine which are not producing textured yarn of satisfactory quality, it is important that each package, after it has been removed from the machine, can be identified with the position from which it has come. It is therefore desirable if the packages can be removed from the machine in a definite sequence and that that sequence of packages is maintained throughout the operation of transfer to the package storage station. With the first arrangement described above, such maintenance of package sequence is readily achieved, but with the manual removal of many cassettes such maintenance cannot be guaranteed.

It is an object of the present invention to provide an arrangement for the removal of packages from a textile machine which is less costly than the first arrangement described above, but is more convenient and less time consuming than the second arrangement described above.

The invention provides a package removal arrangement of a textile machine having package winding mechanisms disposed in an array of rows and columns, comprising at least one cassette having package receiving devices provided thereon in an array of rows and columns in which the inter-row and inter-column spacings are less than those of the machine.

Preferably the inter-column spacing of the cassette is substantially half of that of the machine, and the package receiving devices in adjacent rows on the cassette are in adjacent columns. The inter-row spacing of the cassette may be substantially 60% of that of the machine.

The machine may have nine bays, and preferably the arrangement also comprises a set of nine cassettes. The machine may also have four package winding mechanisms per bay in each of three rows, in which case each cassette of the set may have twelve package receiving devices thereon disposed in six rows and four columns. The arrangement may also comprise a trolley adapted to receive a set of cassettes thereon, and in that case the set of cassettes when positioned on the trolley may be located with four cassettes in side-by-side disposition along each of opposed longitudinal sides of the trolley and one cassette located along a transverse side of the trolley. A machine track arrangement may be provided to extend longitudinally of the machine on which the cassettes may travel, and the trolley may have a complementary trolley track arrangement adapted to form an extension of the machine track arrangement when the trolley is moved to a cassette transfer position.

The arrangement may comprise a transfer device which is movable longitudinally of the machine and is adapted to transfer packages from each of the package winding mechanisms in one column of the machine to the package receiving devices in alternate

rows of one column of a cassette, which one cassette column is located in a predetermined longitudinal disposition relative to that one machine column. The transfer device may also be adapted to transfer empty tubes from the package receiving devices in those alternate rows of the one cassette column to the package winding mechanisms in the one machine column.

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

Fig. 1 is an end elevation of a transfer device and a cassette located adjacent a yarn texturing machine,

Figs. 2 and 3 are a front elevation and plan respectively of two cassettes loaded with packages after a first doffing of packages from the machine of Fig. 1,

Figs. 4 and 5 are views corresponding with Figs. 2 and 3 after a second doffing of packages from the machine,

Fig. 6 is a plan view of a trolley with nine cassettes thereon about to be removed from the machine, and

Fig. 7 is a schematic diagram of a factory layout.

Referring now to Fig. 1, there is shown one side of a double sided yarn texturing machine 10, comprising a creel 11 for packages 12 of supply yarn, and for each yarn, a first feed device 13, a heater 14, a cooling plate 15, a false twist unit 16, a second feed device 17 which may serve to draw the yarn between it and the first feed device 13, a second heater 18, a third feed device 19, and a winding mechanism 20. The second heater 18 and the third feed device 19 may be omitted dependent on the type of textured yarn required. The package winding mechanisms 20 are arranged in three rows or decks extending longitudinally of the machine 10, there being typically thirty-six columns of package winding mechanisms 20 in each row along each side of the machine 10 in nine bays with four columns in each bay.

In an operator's aisle 21, provided between the creel 11 and the main frame 22 of the machine 10, are a transfer device 23 and a cassette 24. In the event that the cassette 24 is of the type shown in Fig. 2, there may be eighteen such cassettes 24 in alignment longitudinally of the machine 10 so that only one such cassette 24 is visible in Fig. 1. The cassettes 24, as shown in Fig. 2, each comprise a frame 25 on which are mounted twelve package receiving devices in the form of pegs 26 arranged in six rows and four columns. The vertical spacing of the rows of pegs 26 on the cassettes 24 is substantially 60% of the vertical spacing of the rows of package winding mechanisms 20 of the machine 10, whilst the lateral spacing of the columns of pegs 26 on the cassettes 24 is substantially half of the spacing of the columns of package winding mechanisms 20 along the machine 10. Each cassette 24 is mounted on wheels 27 so that it may run on a machine track arrangement 28 provided to

be slightly elevated from the floor 29 and in parallel with the machine 10. The cassettes 24 are provided with couplings 30 by means of which two or more such cassettes 24 may be coupled to form a "train".

A trolley 31 is provided with a complementary trolley track arrangement 32 at substantially the same height above the floor 29, which enables the cassettes 24 to be wheeled from the machine track arrangement 28 onto the trolley 31. It will be seen from Fig. 6 that the trolley track arrangement 32 is formed in a "U" shape so that nine cassettes 24 can be accommodated on the trolley 31 with four cassettes 24 located in side-by-side disposition along each longitudinal side of the trolley and one cassette 24 located along the "front" transverse side of the trolley 31. By this means a set of nine cassettes 24 can be accommodated on a single trolley 31 which is relatively short to facilitate its movement around the factory in which the textile machine 10 is housed.

As can be seen from Fig. 7, a factory layout may comprise a supply station 33 of empty tubes 34 to which, under a first possible mode of operation, two trolleys 31 are taken either manually, or, especially if coupled together, by means of a tractor vehicle (not shown). Each trolley 31 has nine empty cassettes 24 mounted thereon and 216 empty tubes 34 can be loaded on to the pegs 26 of those cassettes 24 either manually or by a mechanised transfer device (not shown). When the packages being wound on at least one side of the textile machine 10 are substantially fully wound, the trolleys 31 are taken to that side of the machine 10 and the cassettes 24 are transferred to the machine track arrangement 28. The eighteen cassettes 24 will extend along the full length of the machine 10, with the pegs 26 in alternate columns at a predetermined location relative to the package winding mechanisms 20 of the machine 10.

The transfer device 23 then exchanges 108 fully wound packages 35 from the machine 10 with empty tubes 34 from the cassettes 24, starting with the packages 35 from the three winding mechanisms 20 in the first column on that side of the machine 10 with three empty tubes 34 from three rows in the corresponding column of pegs 26 on the cassettes 24, for example the pegs 26 in the top row and in the same column but the alternate rows, as shown in Fig. 2. To achieve this operation, the transfer device 23 travels from one end of the machine 10 towards the other on rails 36 provided along the machine 10, to stop adjacent the first column of fully wound packages 35, for example by sensing a magnetic marker provided on the machine 10. The transfer device 23 has an arm (not shown) which extends out of the transfer device 23 to engage the three yarns as they travel upward to the packages 35 and then retracts to draw those yarns into the path of a cutter (not shown) in the transfer device 23. The cutter is then activated and cuts the yarns, allowing the issuing yarn ends to be taken into

a suction device (not shown) adjacent the cutter. Three transfer cradles 37 extend remove the packages 35 from the winding mechanisms 20, and take them into the transfer device 23. At the same time three transfer pegs of a transfer mechanism (not shown) of the transfer device 23 extend from the transfer device 23 to grip the empty tubes 34, which are removed from the pegs 26 in the column of the cassette 24 and held on the transfer pegs. The transfer mechanism then rotates through 90° so that the transfer pegs with the empty tubes 34 thereon are aligned with but vertically displaced from the wound packages 35. The packages 35 are then transferred to a duplicate set of transfer pegs of the transfer mechanism, which then moves vertically so that the empty tubes 34 are placed in the transfer cradles 37, which extend and place them into the now vacated machine winding mechanisms 20. The transfer mechanism again moves vertically and rotates through 90°, and the packages 35 are transferred to the now empty pegs 26. The transfer device 23 then moves along the machine 10 to the next column of wound packages 35 on the machine 10. The exchange between wound packages 35 and empty tubes 34 by the transfer device 23 as described above is repeated, and this exchange operation continues until all of the wound packages 35 have been removed from that side of the machine 10 and empty tubes 34 have been placed in all of the vacated winding mechanisms 20 at that side. As each column of wound packages 35 is replaced by empty tubes 34 in the winding mechanisms 20, the ends of the yarns are taken by a threading device (not shown) of the transfer device 23 from the suction device referred to above, and the threading device extends towards the machine 10 so as to introduce the yarns to the empty tubes 34. The processing of the yarn, including the winding of new packages 35 is recommenced. The cassettes 24 will then appear as shown in Figs. 2 and 3. The cassettes 24 can be removed if desired, but this mode of operation allows the cassettes 24 to remain in position alongside the machine 10 until the packages 35 now being wound are completed. The exchange of wound packages 35 from the machine 10, and empty tubes 34 from the cassettes 24, by the transfer device 23 is then repeated as described above, with the transfer mechanism being displaced from its previous location relative to the cassettes 24 by the cassette inter-row and inter-column spacing. When this second package doffing operation has been completed the cassettes 24 will then appear as shown in Figs. 4 and 5. Only then need the cassettes 24 be removed, by being transferred to the trolley track arrangements 32 of two trolleys 31 on which the cassettes 24 are taken to a packing station 38. The packages 35 may be removed from the cassettes 24 either manually or by means of another mechanised transfer device (not shown). This mode of operation allows two doffs of

packages 35 from the machine 10 without the need for manual intervention, thereby enabling the machine 10 to run throughout the night without a night-shift in attendance. This will reduce the running costs of the machine 10 by a considerable amount.

In an alternative mode of operation, one trolley 31 with nine cassettes 24 located thereon as shown in Fig. 6 may be taken to the machine 10 either manually or by means of a tractor vehicle. The nine cassettes 24 are then transferred to the machine track arrangement 28 to extend along substantially half of the length of the machine 10. The removal of the empty tubes 34 from the first column of pegs 26 of the first cassette 24, and their replacement by fully wound packages 35 from the first column of winding mechanisms 20 is then carried out as described above. When this has been completed, the cassettes 24 are moved along the machine 10 by approximately the cassette inter-column spacing and the empty tubes 34 from the second column of pegs 26 are removed and replaced by packages 35 from the second column of winding mechanisms 20. This operation is repeated as the cassettes 24 are moved down the machine 10 at approximately half of the speed at which the transfer device 23 is moved. With this mode of operation, all of the packages 35 from one side of the machine 10 can be accommodated on nine cassettes 24 and on one trolley 31. This can make manoeuvring a trolley 31, with all 108 packages 35 from one side of a machine 10 thereon, around the factory much simpler than was previously the case, especially if space for doing so is limited.

In some cases two yarns being processed on the machine 10 at adjacent positions are plied together to form a single yarn. In that case, with the first mode of operation described above, four full doffs of packages 35 can be made from the machine 10 before the cassettes 24 need to be moved on two trolleys 31 to the packing station 38. With the second mode of operation described above, when two-ply yarns are produced, the packages 35 from two doffs can be accommodated on one trolley 31 before the trolley 31 needs to be removed to the packing station 38.

By means of the invention, less manual intervention is required than was the case heretofore, so that the running costs of the machine 10 are thereby reduced. Also there is more flexibility of operation than was available with known arrangements. In addition, with any of the above described modes of operation, the sequence of removal of full packages from the machine is maintained on the cassettes and on the trolleys, so that such sequence can be maintained up to the storage station. This will enable the machine position from which any sub-standard packages have been produced to be readily identified.

Claims

1. A package removal arrangement of a textile machine(10) having package winding mechanisms(20) in an array of rows and columns, comprising at least one cassette(24) having package receiving devices(26) provided thereon in an array of rows and columns, characterised in that the inter-row and inter-column spacings of the cassette(24) are less than those of the machine(10). 5 10
2. A package removal arrangement according to claim 1, characterised in that the inter-column spacing of the cassette(24) is substantially half of that of the machine(10), and the package receiving devices(26) in adjacent rows on the cassette(24) are in adjacent columns. 15
3. A package removal arrangement according to claim 2, characterised in that the inter-row spacing of the cassette(24) is substantially 60% of that of the machine(10). 20
4. A package removal arrangement according to any one of claims 1 to 3, wherein the machine(10) has nine bays and has four package winding mechanisms(20) per bay in each of three rows, characterised in that the arrangement comprises a set of nine cassettes(24) and each cassette(24) of the set has twelve package receiving devices(26) thereon disposed in six rows and four columns. 25 30
5. A package removal arrangement according to claim 4, characterised by also comprising a trolley(31) adapted to receive a set of cassettes(24) thereon. 35
6. A package removal arrangement according to claim 5, characterised in that the set of cassettes(24) when positioned on the trolley(31) are located with four cassettes(24) in side-by-side disposition along each of opposed longitudinal sides of the trolley(31). 40 45
7. A package removal arrangement according to claim 6, characterised by also comprising a machine track arrangement(28), provided to extend longitudinally of the machine(10), on which the cassettes(24) may travel. 50
8. A package removal arrangement according to claim 7, characterised in that the trolley(31) has a complementary trolley track arrangement(32) adapted to form an extension of the machine track arrangement(28) when the trolley(31) is moved to a cassette transfer position. 55
9. A package removal arrangement according to claim 7 or claim 8, comprising a transfer device(23) which is movable along the machine(10) and is characterised by being adapted to transfer packages(35) from each of the package winding mechanisms(20) in one column of the machine(10) to the package receiving devices(26) in alternate rows of one column of a cassette(24), which one cassette column is located in a predetermined longitudinal position relative to that one machine column.
10. A package removal arrangement according to claim 9, wherein the transfer device(23) is adapted to transfer empty tubes(34) from the package receiving devices(26) in those alternate rows of the one cassette column to the package winding mechanisms(20) in the one machine column.

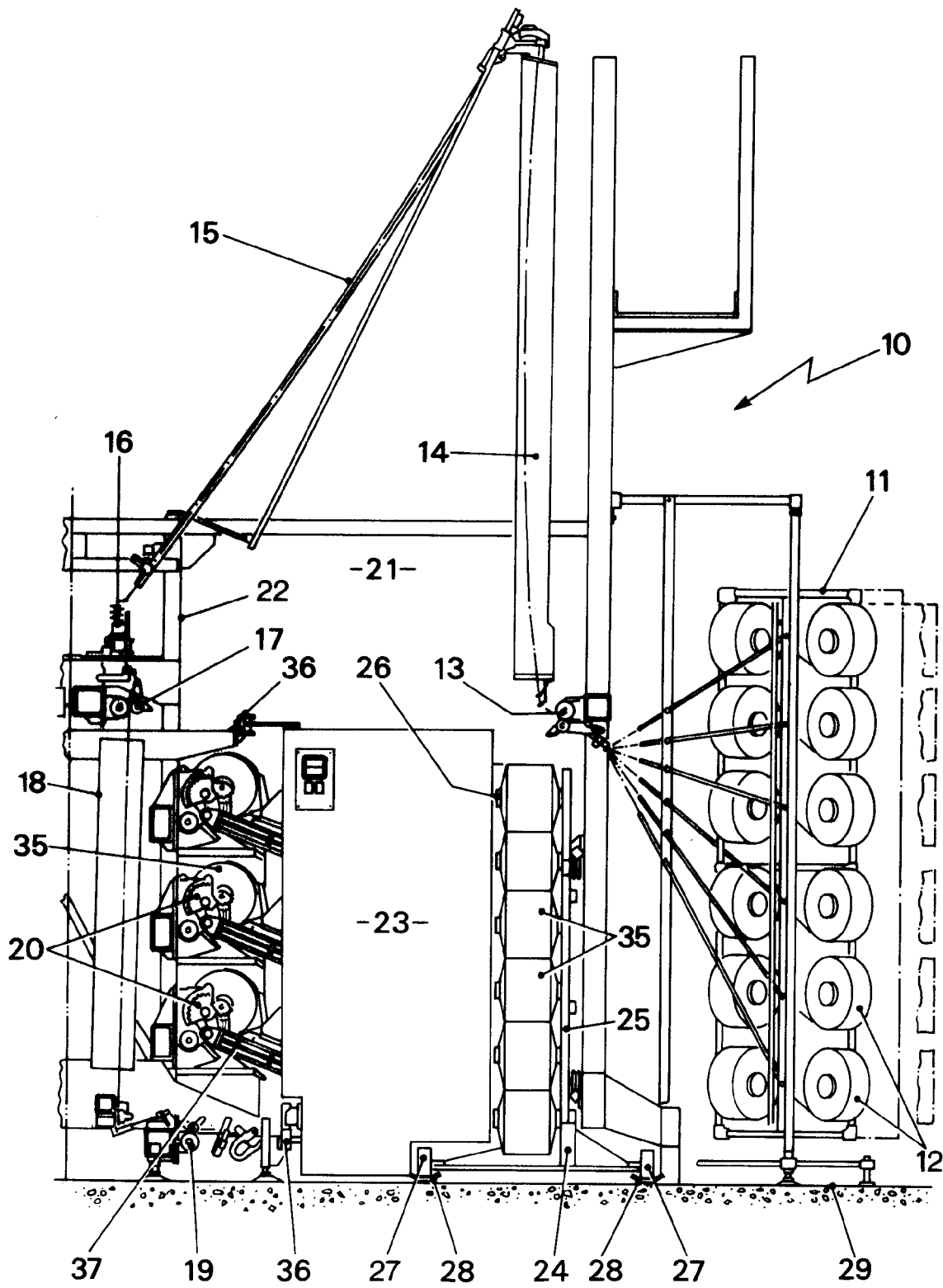
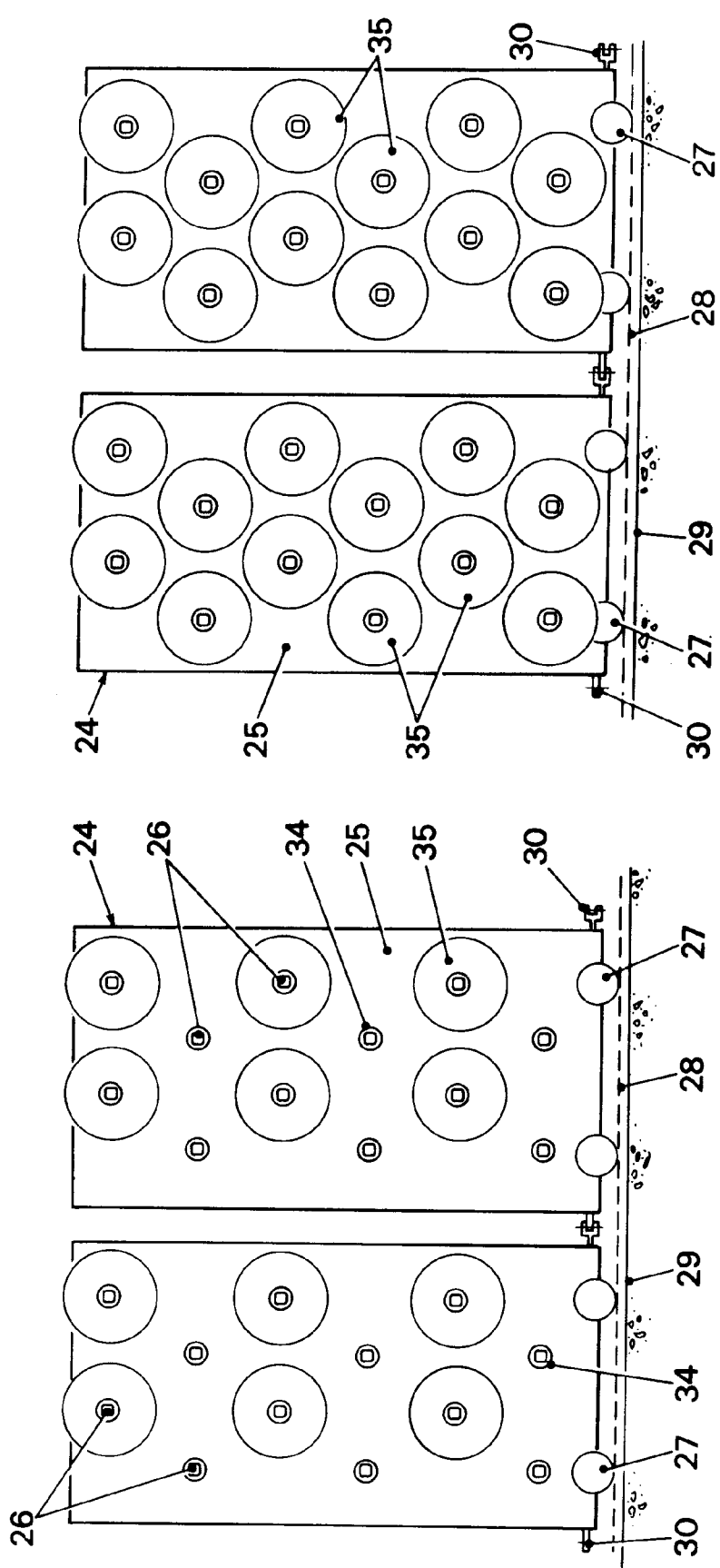
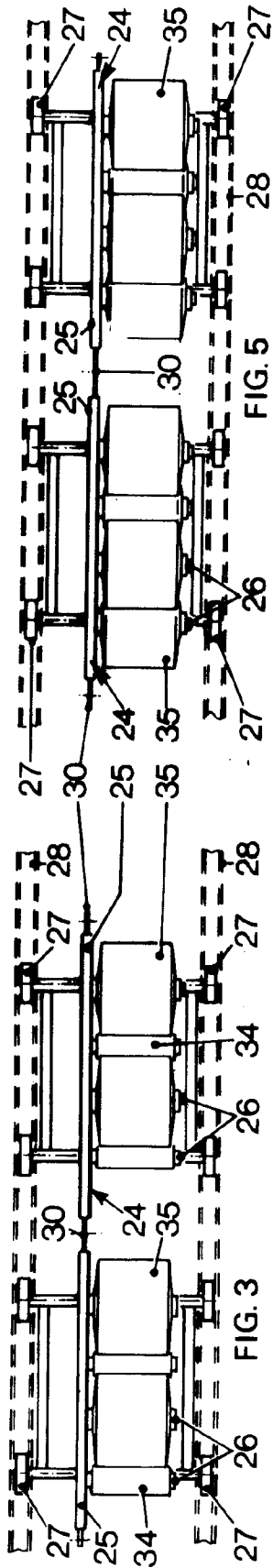


FIG.1



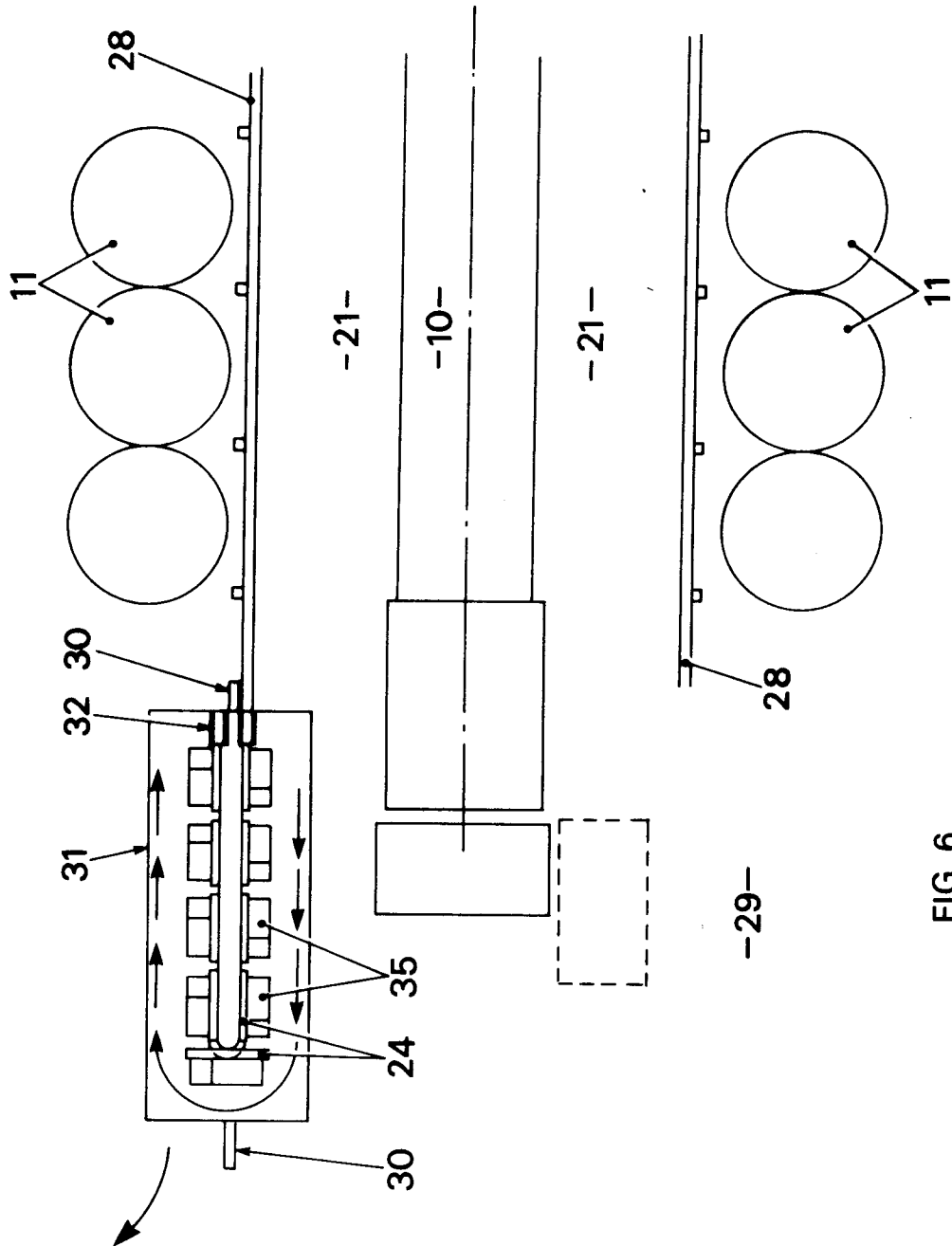


FIG. 6

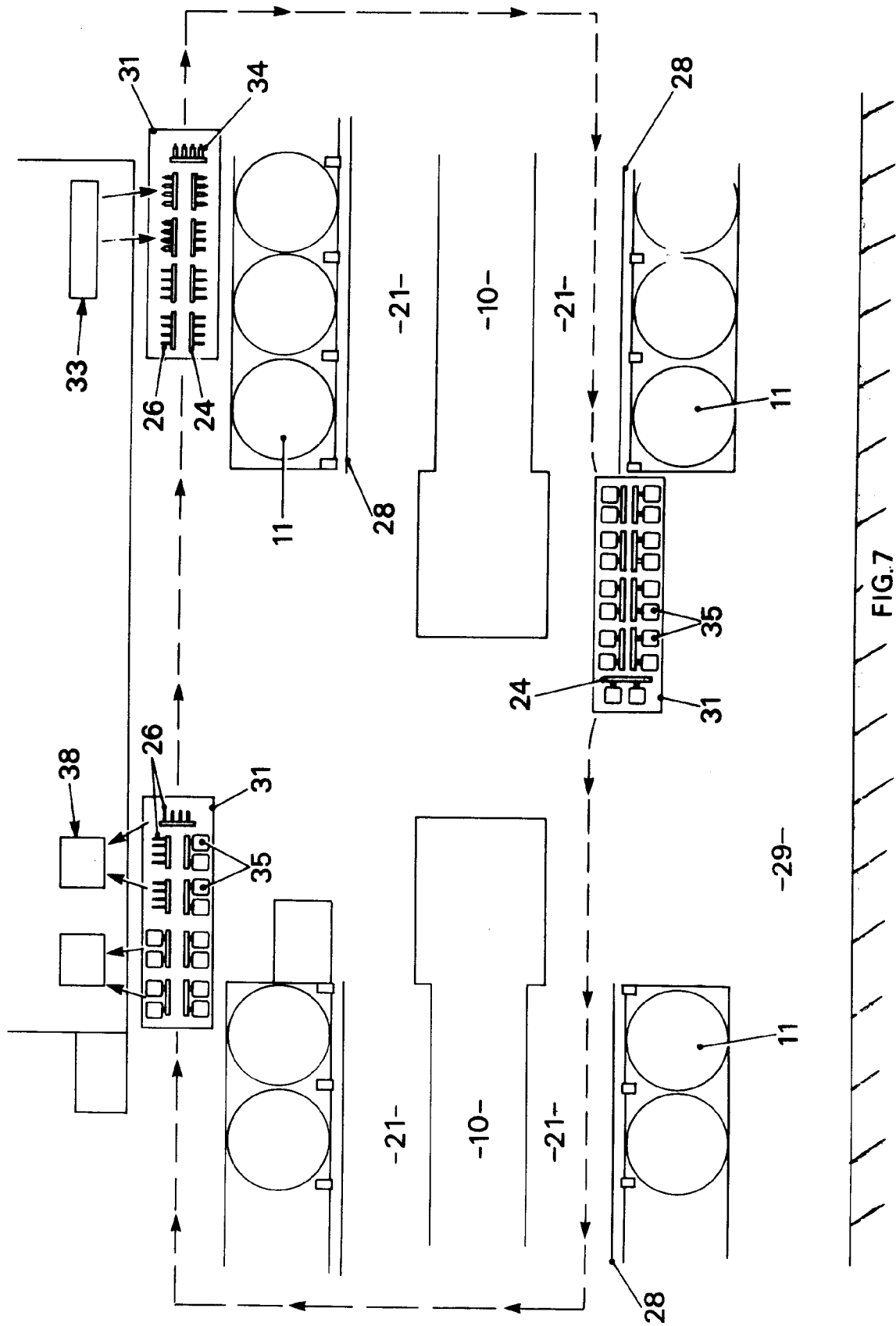


FIG.7