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(54) Device for the automatic packing of textile packages.

(57) Device for the automatic packing of textile packages and, in particular, yarn package (11), which have to be packed singly in bags of a suitable plastic material and are preferably palletised after having been discharged by discharge means (12) of their production machines (10), such as free-fibre or open-end spinning machines, winding machines or the like, the device comprising the following working units in a functional sequence:

- at least one unit (13) to engage and overturn yarn packages (11), which cooperates with the means (12) that discharge the yarn packages (11) from the production machines;
- at least one unit (20) to bag yarn packages (11) which comprises means to feed plastic materail (52) and means to prepare bags, and
- a unit (32) to orient the yarn packages (11) which comprises at least one yarn package waiting station (33) and a station (34) to engage and discharge yarn packages, the device being positioned directly in correspondence with an end portion of the production machine in cooperation with and downstream of the means (12) that discharge the yarn packages (11).

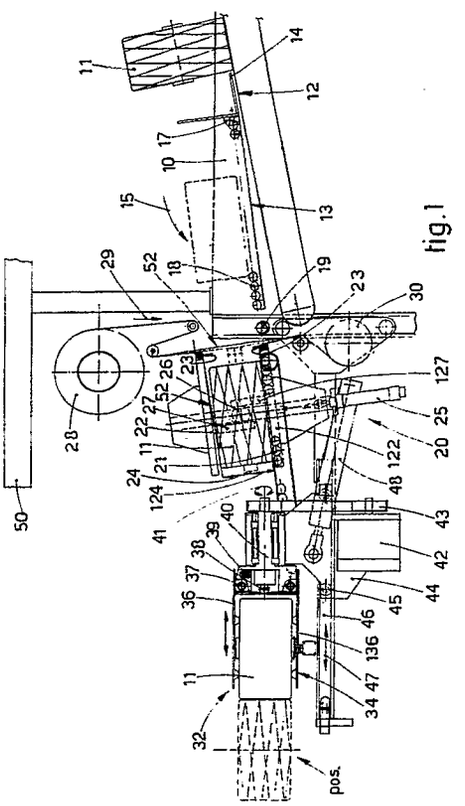

fig.1

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This invention concerns a device for the automatic packing of textile packages. To be more exact, the invention concerns a device suitable for the automatic individual bagging of textile packages and, in particular, of yarn packages, which are taken directly from the discharge means of the machines which produce such packages.

The machine can cooperate advantageously, but not only, with means that palletise the bagged yarn packages automatically and that are located preferably immediately downstream of the yarn package production machines.

The state of the art covers manifold devices able to package yarn packages and, in particular, to put each single yarn package in a plastic bag.

These bags are prepared automatically and continuously, starting with a film of a plastic material, such as polyethylene, which is sheared to size and heat-sealed.

In this way the yarn packages held in the bags are shielded from contact with each other during carriage to their final destination and risk no damage to the yarn nor any entanglement of its coils.

In fact, the carriage takes place by putting a plurality of yarn packages, in contact with each other and placed in layers on top of each other, in appropriate cases, chests, boxes or other such containers.

The bagging of the yarn packages and their successive loading into the cases, boxes or other delivery means are normally carried out in appropriate departments that perform the final packing and despatch by means of suitable complex equipment provided for this purpose.

The yarn packages are taken by hand or automatically from the discharge devices of the production machines, such as free-fibre spinning machines or winding machines, and are sent to the specific packaging departments, which are normally separated from the production shops.

The yarn packages, where they are to be placed on pallets, are not put in bags but are positioned with a space between them in each layer of the pallet and are held in that position by the perforated cardboard sheets placed between one layer and the next.

This provides a method of preventing mutual contact and therefore any damage to the yarn, but it also entails a scanty use of the space available and a low weight of yarn per unit of available surface together with the relative costs arising, in particular, from delivery operations.

Palletisation of the yarn packages may be carried out automatically or by hand either at the devices discharging the production machies or in specific packaging departments.

The present applicant has designed, tested and embodied a device for the automatic bagging of textile packages which is to be installed directly at the means which discharge such packages from their production machines.

The invention is set forth in the main claim, while the dependent claims describe various features of the invention.

The device according to the invention comprises at least one unit to engage and overturn the textile packages, which we shall call "yarn packages" hereinafter; this unit is arranged at the terminal part of the means that discharge the yarn packages from each production machine.

At least one actual bagging unit is positioned downstream of that yarn package engagement and overturning unit and has the task of preparing a bag with the yarn package inside it. The bagging unit cooperates with means suitable to feed a plastic film continuously.

A unit to engage, orient and remove the yarn packages thus bagged is located downstream of the bagging unit and cooperates advantageously with means that palletise the bagged yarn packages automatically.

In this way the yarn packages in each layer on the pallet can be placed in contact with each other without any risk of damage, and a great increase of weight is thus achieved as compared to the traditional systems, given an equal amount of space available, as described in a specific palletisation method which is the subject of a parallel patent application in the name of the present applicant.

Moreover, tapered yarn packages, where involved, can be positioned in the layers on the pallet alternately right side up and upside down with the point of the package facing upwards and downwards alternately.

For this reason the unit to engage, orient and remove the yarn packages comprises a means to overturn the yarn packages by 180° according to a desired sequence or sequences.

The device according to the invention can be arranged to be retractable, that is to say, it can cooperate only momentarily in position with the means that discharge yarn packages from their production machines. This is necessary where, as in the case of open-end spinning machines, the space around the zone of discharge of yarn packages from the production machines has to be left free to allow the passage of automatic means that piece up broken yarns or clean spinning units and the like. When the spinning machine is working normally, these automatic means run continuously along the sides of the machine but are halted temporarily during the removal of completed yarn packages from the machine.

These and other special features of the invention will be made clearer in the description that follows.

The attached figures, which are given as a non-restrictive example, show the following:-

Fig.1 is a diagram of a side view of a device according to the invention;

Fig.2 is a plan view of the device of Fig.1.

In the attached figures a device according to the invention is shown as being fitted to the end portion of a textile machine, which in this example is an open-end spinning machine 10, at a zone of discharge of yarn packages 11.

In the example shown the spinning machine 10 has two discharge conveyor belts 12 for the yarn packages 11 produced on the two working sides of the machine 10.

On each discharge conveyor belt 12 the device of the invention includes a first unit 13 to engage and overturn yarn packages, the unit 13 being positioned in correspondence with and above the discharge belt 12 and cooperating therewith.

The unit 13 to engage and overturn yarn packages 11 consists of a fork element 14, which receives the yarn packages 11 from the belt 12 and overturns them according to the arrow 15 so as to bring them to the position shown with lines of dashes in Fig.1.

The overturning of the fork 14 may be carried out by the action of a suitable means such as a jack 16 connected to the fork 14 at 17.

The yarn package 11, which now has its axis vertical, is transferred to a second removal unit, which in this example consists of a first roller conveyor 18 but could also be a conveyor belt or another analogous means.

In this way the yarn package 11 leaves the spinning machine 10 and is sent, with the help of further support rollers 19, to a third bagging unit 20.

In the example shown there are two bagging units 20 to cooperate in a coordinated and simultaneous manner with the two discharge belts 12 of the spinning machine 10.

In Fig.2 the bagging unit 20 shown in the upper part of the drawing is drawn partially with lines of dashes and is exactly the same as, and a counterpart of, the analogous bagging unit located in the lower part of the same drawing.

The bagging unit 20 consists of a working surface, here also a second roller conveyor 21, on which a yarn package 11 to be bagged is fed.

Two welding elements, 22 and 122 respectively, are included below and above the yarn package 11 in an inactive position on the second roller conveyor 21 and are conformed in the shape of a "C" so as to surround the yarn package 11 peripherally.

The welding elements 22-122 bear along the whole length of their reciprocally facing surfaces heating means, such as electrical resistors, referenced with 23 in Fig.1 as an example.

The welding elements 22-122 can be displaced in the direction of the arrows 24 and 124 by a jack 25, which, when actuated in the direction of the arrows 24-124, causes rotation of a wheel and displacement of racks 27-127, which cooperate with the wheel 26 and are firmly fixed to the welding elements 22 and 122 respectively.

Displacement of the racks 27-127 according to the arrows 24-124 brings the welding elements 22-122 substantially into contact with each other, as shown with lines of dashes in Fig.1.

A film 52 of plastic material, such as polyethylene, which is suitable to form bags to hold the yarn packages 11, is positioned frontally to the second roller conveyor 21. This film 52, which has a suitable width greater than the maximum width of the yarn package 11, is wound on a spool, from which it is unwound in the direction of the arrow 29.

The film 52, being suitably tensioned, covers the inlet of the bagging unit 20 and is wound below onto a take-up roller 30 connected to a motor (not shown here).

At this inlet the film 52 may be guided advantageously so as to enable it to be correctly positioned for the next bagging step; frontal guides 31 shown in Fig.2 are included for this purpose.

The yarn package 11 arriving on the first roller conveyor 18 and possibly assisted by a thrust means (not shown here) contacts the film 52 and draws it with itself to a working position on the second roller conveyor 21.

The welding elements 22-122 are now actuated and heat-seal the film 52 on its three open sides so as to form a bag to hold the yarn package 11.

The welding elements 22-122 may comprise in their frontal portion some means to shear the bag made of the film 52. In fact, the film 52 is still a continuous element owing to the action of the electrical resistors 23 and contains a transverse welded tract in the zone where the frontal closure of the bag has been made.

This transverse welded line can be eliminated by actuating the take-up roller 30 and by winding thereon a portion of film 52 which can be discarded thereafter.

When the bag has been closed, the yarn package 11 inside is fed along the same second roller conveyor 21, which extends as far as a fourth unit 32 to orient the yarn package 11.

The orientation unit 32 consists of a waiting station 33, two stations in this example, positioned sideways to a station 34 which engages and discharges the yarn packages and which advantageously services the two lateral waiting stations 33.

The yarn package 11 is moved now from one and now from the other of the waiting stations 33 to the engagement and discharge station 34 by a

thrust means such as a jack 35.

In this example the engagement and discharge station 34 consists of an upper jaw 36 and lower jaw 136, both of which can be oscillated on pivots 37 by an opening means such as a small piston/cylinder actuator 38.

When the piston/cylinder actuator 38 is actuated, the jaws 36-136 separate to accommodate the yarn package 11 fed from the waiting station 33; resilient return means such as springs 39 are included to return the jaws 36-136 when the action of the piston/cylinder actuator 38 has ended.

The jaws 36-136 are fitted to a rotary support 40, which can be actuated to rotate about its own axis according to the arrow 41 by a suitable motor 42 and relative transmission 43.

When the motor 42 is actuated with required sequences, the yarn package 11 is rotated alternately clockwise and anticlockwise by 180°. This is particularly advantageous with yarn packages of a truncated cone type which are to be palletised, as described in a parallel patent application in the name of the present applicant.

For this purpose the yarn package 11 is oriented in the desired manner and fed from the engagement and discharge station 34 to a discharge position referenced with "A" in the figures, where it is freed of constraints by the opening of the jaws 36-136 and can therefore cooperate advantageously with automatic palletisation means located downstream of the device according to the invention.

The movement of the yarn package 11 to the discharge position A can be brought about owing to the fact that the engagement and discharge station 34 is installed on a trolley 44 comprising wheels 45 able to run in guides 46.

The alternating movement of the trolley 44 according to the arrows 47 is achieved by means of a suitable jack 48.

The bagging unit 20 and orientation unit 32 are fitted to a frame 49, which is connected to the spinning machine 10 and, according to a variant of the invention, can be retracted, for instance by sliding vertically or by being overturned or in another suitable way. This is necessary during normal spinning steps of the spinning machine 10, during which a yarn piecing-up trolley may be present to inspect the two sides of the machine and will be moved on a support structure 50 including curved portions 51 at the end parts of the machine 10, as shown with lines of dashes in Fig.2; this trolley might normally interfere with the working position of the device according to the invention.

We have described here a preferred embodiment of the invention, but it is clear that many variants can be applied by a person skilled in this field without departing thereby from the scope of the invention according to the following claims.

Claims

1. Device for the automatic packing of textile packages and, in particular, yarn package (11), which have to be packed singly in bags of a suitable plastic material and are preferably palletised after having been discharged by discharge means (12) of their production machines (10), such as free-fibre or open-end spinning machines, winding machines or the like, the device being characterized in that it comprises the following working units in a functional sequence:
   - at least one unit (13) to engage and overturn yarn packages (11), which cooperates with the means (12) that discharge the yarn packages (11) from the production machines;
   - at least one unit (20) to bag yarn packages (11) which comprises means to feed plastic materail (52) and means to prepare bags, and
   - a unit (32) to orient the yarn packages (11) which comprises at least one yarn package waiting station (33) and a station (34) to engage and discharge yarn packages, the device being positioned directly in correspondence with an end portion of the production machine in cooperation with and downstream of the means (12) that discharge the yarn packages (11).

2. Device as claimed in Claim 1, in which the unit (13) to engage and overturn yarn packages (11) consists of an oscillatory element (14) having its own actuation means (16) and of means (18) to remove the yarn packages.

3. Device as claimed in Claim 1 or 2, in which the unit (13) to engage and overturn yarn packages (11) is arranged above the end portion of the yarn package discharge means (12).

4. Device as claimed in any claim hereinbefore, in which the means that feed the plastic material (52) in the yarn package bagging unit (20) consist of a spool (28) to feed the plastic material (52) and a suitably actuated take-up roller (30).

5. Device as claimed in any claim hereinbefore, in which the bag preparing means of the yarn package bagging unit (20) consist of a working surface (21) and a pair of suitably actuated (25-26-27-127) movable welding elements (22-122).

6. Device as claimed in any claim hereinbefore, in which the welding elements (22-122) are conformed in the shape of a "C".

7. Device as claimed in any claim hereinbefore, in which the welding elements (22-122) are arranged as mutual counterparts, when in their inactive position, above and below the yarn package (11) to be bagged.

8. Device as claimed in any claim hereinbefore, which comprises means (31) to guide the plastic material (52).

9. Device as claimed in any claim hereinbefore, in which the working surface (21) of the bagging unit (20) is a means to remove yarn packages (11).

10. Device as claimed in any claim hereinbefore, in which the yarn package waiting station (33) comprises a yarn package displacement means (35).

11. Device as claimed in any claim hereinbefore, in which the yarn package waiting station (33) is located at the side of a yarn package engagement and discharge station (34).

12. Device as claimed in any claim hereinbefore, in which the yarn package engagement and discharge station (34) comprises yarn package engagement means (36-136) which can oscillate (37-38) and rotate (40) about their own axis.

13. Device as claimed in any claim hereinbefore, in which the .yarn package engagement and discharge station (34) is equipped with means (44-46-48) capable of carrying out straight alternating movement.

14. Device as claimed in any claim hereinbefore, in which the yarn package engagement and discharge station (34) cooperates with means which palletise the yarn packages (11) automatically.

15. Device as claimed in any claim hereinbefore, which is fitted to retractable means.

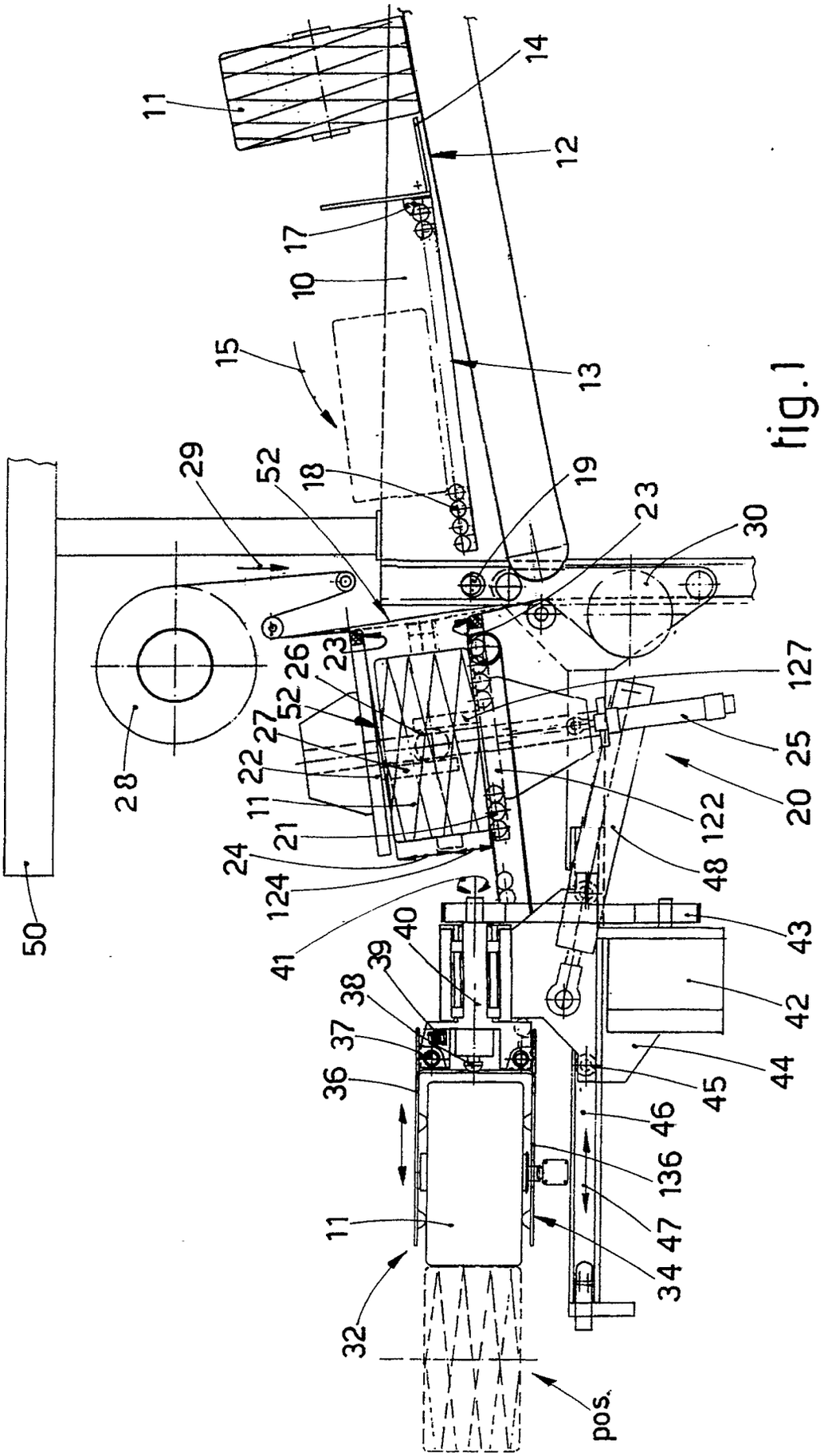
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fig.1

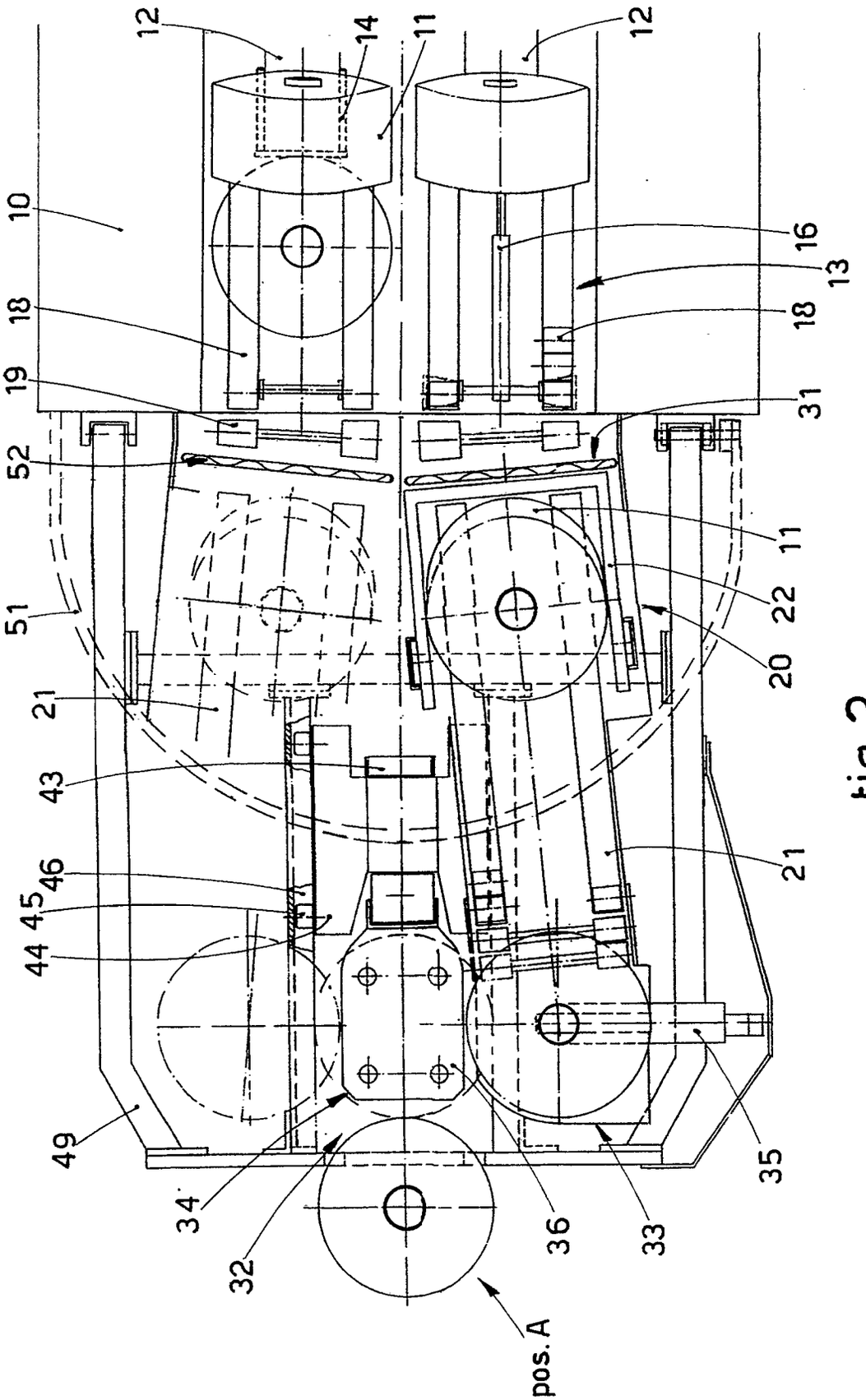
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fig.2

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EUROPEAN SEARCH REPORT

Application Number

EP 91 10 8650

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	US-A-3 436 895 (PEARNE) * column 14, line 25 - column 17, line 3; figures *	1	B 65 B 35/58 B 65 H 67/06
A	US-A-4 002 005 (MUELLER) * column 3, line 34 - column 5, line 46; figures *	1	
A	GB-A-2 092 984 (F. ELSNER ET AL)	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B 65 B
B 65 H

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	17 September 91	NGO SI XUYEN G.

CATEGORY OF CITED DOCUMENTS

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