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(54) Device to piece up threads or yarns between a beam and a winding machine.

(57) Device (10) to piece up threads or yarns between a beam (11) and a winding machine, the device comprising a first tube (20) followed by a switch (22) and by a second tube (21) connected to an aspirator assembly (17), the second tube (21) including a knife-type shears (16) in an intermediate position.

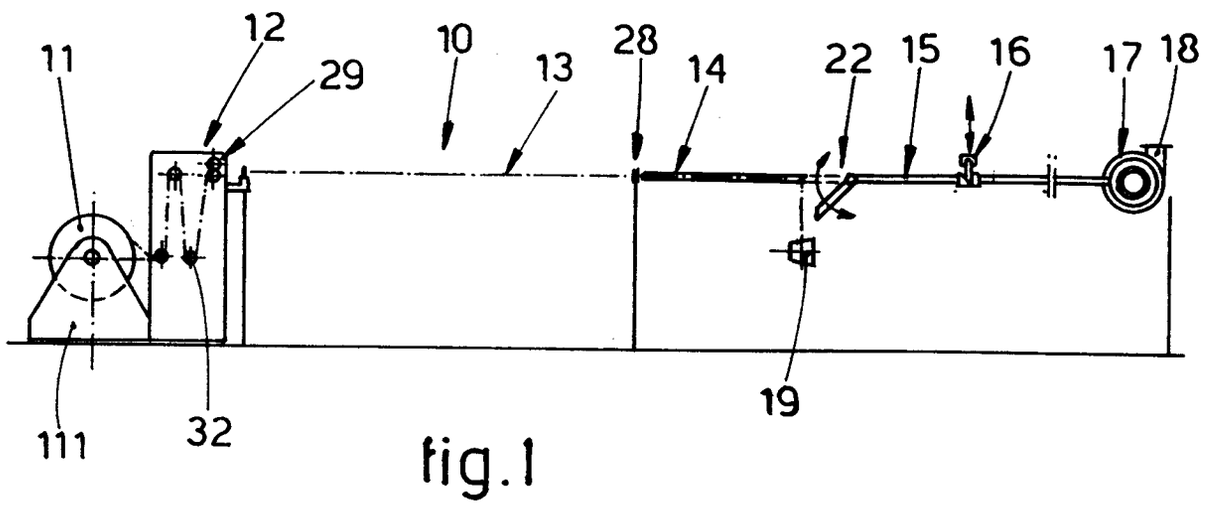

fig.1

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This invention concerns a device to piece up threads or yarns being unwound from a beam and taken up on a winding machine, as set forth in the main claim.

The invention is applied advantageously in cooperation with winding machines fed with yarn from beams and employed downstream of textile operations such as continuous mercerisation for instance.

The winding machines take up at one and the same time a plurality of threads or yarns being fed parallel to each other and coming fron one or more beams.

By textile threads or yarns are meant here materials consisting of continuous or discontinuous fibres of a natural or manmade origin normally used in processes in the textile field.

In textile processes in which it is advantageous to process continuously at one and the same time a plurality of threads or yarns, that plurality can be taken up on supports such as beams, to which we shall refer in the description that follows.

When we speak of a plurality of threads or yarns, we mean quantities which may range from some tens to thousands.

In any event, each packaged beam, whether it holds tens of threads or yarns or thousands thereof, entails the problem of having to be unwound when the threads or yarns have to be used individually thereafter.

This happens, for instance,when the purpose is to feed knitting machines or to provide weft in weaving machines or to supply the dyehouse or many other analogous applications.

In general the preferred package is a bobbin, whether cylindrical or tapered, at various spacings according to the specific usage.

There is therefore the problem of unwinding from the beam the plurality of threads or yarns wound thereon and of feeding the threads or yarns individually to their respective winding units.

It is clear that this operation involves many problems linked above all to the presence of many threads or yarns moving in close contact with each other; these problems are well known to any technician skilled in the textile field.

Moreover, the ever greater need to take up as little space as possible for obvious financial reasons conflicts with the requirements of having available in this case a very great number of take-up units which have to be positioned near each other.

On this subject the present applicant has protected a winding machine to take up a plurality of textile threads or yarns being unwound parallel to each other at the same time from one or more package supports, the winding machine being located advantageously downstream of apparatuses which process this plurality of parallel threads or yarns.

The winding machine comprises a headstock to load and unwind the support or supports bearing this plurality of threads or yarns, the supports being advantageously beams; the winding machine comprises also a support structure for a plurality of winding heads in a number coordinated with the number of threads or yarns to be taken up.

This support structure includes modular assemblies of winding heads arranged in succession one after another.

Each of these modular assemblies comprises at its inlet individual treatment means for a number of threads or yarns equal to the number of winding heads on the respective modular assembly.

The plurality of threads or yarns is individually treated on leaving the headstock and at least on entering the first modular assembly of the support structure.

The state of the art sets great limits to its operation as a result of problems of engaging and delivering the leading end of each thread or yarn to its respective winding head, the problems of breakage of the thread or yarn and delivery of the broken end to the machine operator, etc.

The present applicant has designed, tested and embodied this invention so as to obviate all these drawbacks and to provide further advantages.

The device according to this invention is set forth and characterized in the main claim, while the dependent claims describe variants of the idea of the embodiment.

The invention enables the capacity of the winding heads to be fully exploited by increasing the average working speed from the present 200 metres a minute to 600 metres a minute or more. It also enables any broken thread or yarn to be intercepted and positioned automatically.

It also enables the end of the broken thread or yarn to be cut at a pre-set length.

Moreover, it enables the broken end to be delivered automatically to the machine operator at the time of knotting the end.

Lastly, it makes possible a great uniformity of the yarn packages and a hardness suitable for dyeing and lessens the dustiness and dirt.

According to the invention a plurality of first guide tubes in a number equal to that of the threads or yarns on the beam is provided between the assembly unwinding the beam and the winding machine. These tubes may consist of a glass or a plastic material or a metal.

An aspiration system associated with a shears assembly is included downstream of the plurality of first guide tubes.

Mating second tubes are located between the first tubes and the aspiration system, and each of

these second tubes bears a shears assembly.

According to a variant a shears assembly may be included for more than one second tube.

A switch is included between each first tube and each second tube.

According to a variant an assembly to accumulate a buffer quantity of thread is comprised between the first tubes and the beam and acts as a compensator.

Let us now see two embodiments of the invention with the help of the attached figures, which are given as a non-restrictive example and in which:-

Fig.1	gives a side diagrammatic view of one embodiment of the device according to the invention;
Fig.2	is a view of the embodiment of Fig.1 from above;
Fig.3	shows a variant of Fig.1;
Figs.4 and 5	gives front and plan views of a possible switch for the embodiment of Fig.1;
Figs.6 and 7	are side and front views of a possible shears for a single thread or yarn.

According to the invention a device 10 to piece up threads or yarns between a beam 11 and a winding machine lies between the beam 11 and a plurality of winding heads 19.

Fig.1 shows the beam 11 bearing a plurality of threads or yarns, which may be 50 or 100 in number or another given number; the beam 11 is positioned and driven by a drive assembly 111, which actuates the unwinding of the beam 11.

A band of threads or yarns 13 leaving the beam 11 passes through a thread buffer-holding assembly 12 which compensates any differences of speed or offtake or feed between the beam 11 and downstream units.

The buffer-holding assembly 12 comprises at least one oscillatory roll 32 and, at its exit, an assembly of drawing rolls 29.

From the buffer-holding assembly 12 the band of threads or yarns 13 spreads out apart and is arranged fan-wise until it takes up a coordinated position at an alignment zone 28.

In this alignment zone 28 each single thread or yarn meets a first tube 20, and a plurality of first tubes 20 constitutes a band 14 of first tubes.

In the example of Figs.1 and 2 second tubes 21 are included in alignment with the first tubes 20 and, being aligned, form a band 15 of second tubes 21.

An aspiration assembly 17 connected to an aspirator 18 is comprised at the downstream end of the band 15 of second tubes 21.

In this example one knife-type shears 16 for each second tube 21 is included in an intermediate position at a required distance from the downstream end of the first tube 20.

As we said earlier, one knife-type shears 16 can also work on a plurality of second tubes 21.

We also said above that the distance between the shears 16 and the downstream end of the band 14 of first tubes is determined in relation to the distance between the downstream end of the first tube 20 and the winding head 19.

A switch 22 is positioned between the second tubes 21 and the first tubes 20 and can be displaced, thus enabling the machine operator to have access to a single thread or yarn diverted by the switch 22.

Figs.4 and 5 show the switch 22 as being of a rotary type able to be moved by a motor 23 which causes angular rotation, so that during the switching step the switch 22 interrupts the alignment of the first tube 20 with the second tube 21 and is positioned at an angle to the first and second tubes 20-21, thus assisting the operator to engage the thread or yarn passing through.

Figs.6 and 7 shows a shears assembly 16 with a single knife suitable to operate on each single thread or yarn present in the relative second tube 21.

In this example the shears assembly 16 comprises a cylinder/piston actuator 24 connected to a knife 27 which contains a movable blade 25 and possibly a shock absorber 26.

When actuated by the cylinder/piston actuator 24, the movable blade 25 is raised and the thread or yarn is sheared.

When the cylinder/piston actuator 24 is freed of pressure, the movable blade 25 descends onto the shock absorber 26 without causing vibrations, damage or other results.

Fig.3 shows a variant of the embodiment of Fig.1; this variant provides the advantage of taking up much less space since the band 15 of second tubes is positioned substantially parallel to and above (or below) the band 14 of first tubes, thus lessening considerably the lengthwise extent of the space occupied by the device.

Let us now describe the method of working summarily.

Whenever the beam 11 is changed, the ends of the threads or yarns wound on that beam are passed through the buffer-holding assembly 12 and drawing rolls 29.

The machine operator then arranges to place the single threads or yarns in front of each specific first tube 20 put under negative pressure by the aspiration assembly 17.

When all the threads or yarns have been aspirated, that is to say, when all the threads or yarns are positioned in their own individual first tubes 20 and have been tensioned by the negative pressure created in the first tubes 20, the beam 11 is rotated

slowly until the threads or yarns have reached the aspiration assembly 17.

The warping machine thus embodied is now halted and all the shears, each one of which is located in correspondence with a second tube 21 in this example, shear their respective threads or yarns at the usable length pre-set for their attachment to their respective winding heads 19.

Substantially at the same time as the performance of the shearing, the switch 22 to enable the operator to engage the threads or yarns is opened in each single tract connecting the first tubes 20 to the second tubes 21.

When all the winding heads 19 have been connected to their respective threads or yarns, the drawing rolls 29 and the drive assembly 111 are set in rotation with a pre-set, differentiated step of acceleration.

The increase in speed of the drive assembly 111 increases the speed of the threads or yarns and cuases displacement of the oscillatory roll 32 of the thread buffer-holding assembly 12.

The oscillatory roll 32 is associated with a position control station, and the system to control the speeds tends to keep the oscillatory roll 32 in that station.

The oscillatory roll 32 and the station are connected in turn to a system that regulates the speed of rotation of the drive assembly 111 and the drawing rolls 29.

Likewise, the specific oscillatory roll 32 of each winding head 19 will regulate the take-up speed and adjust it to the speed of the thread or yarn leaving the drawing rolls 29.

In this way the whole system will be regulated according to the speed set for the actuation of the drawing rolls 29 and/or drive assembly 111.

If a thread or yarn is broken during the processing, the aspiration ensures the engagement of the end of the broken thread or yarn with a speed equal to the winding speed, so as to keep the thread or yarn always under a slight tension to prevent that thread or yarn becoming entangled with the other threads or yarns.

The aspiration assembly 17 is formed in such a way as to enable the negative pressure to be kept at about a desired value, which corresponds substantially to the aspiration of a determined number of broken threads or yarns at a determined speed for a determined period of time. The purpose of this is that the working of the aspirator should not be required continuously but should be required only when needed and that such working should take place when requested and therefore with a given delay but not with a regular or continuous actuation.

Any reduction of pressure within the aspiration assembly 17 can be compensated by means of a small vacuum pump or another analogous system.

It should be borne in mind that the shears 16 will keep its respective movable blade 25 raised so as to interrupt the aspiration arriving from the aspiration assembly 17 while the respective single thread or yarn is being taken up on the winding head and so long as this thread or yarn is not broken, the purpose being to economise negative pressure.

By means of the invention the threads or yarns which break during the working of the plant are intercepted at once, and the unwinding of such threads or yarns is ensured by the winding heads working in coordination with the drawing rolls 29 and drive assembly 111.

If the breakage takes place in the take-up head, the lack of the thread or yarn will be notified at once by the single oscillatory roll 32 of the relative winding head 19, for this oscillatory roll 32 will fall and close a contact for instantaneous actuation of the relative shears 16 and thereafter of the relative switch 22, thus assisting aspiration of the broken thread or yarn and enabling the sheared thread or yarn to be arranged and positioned for the successive operations to be carried out by the machine operator.

To prevent any problems being caused by any threads or yarns which break between the beam 11 and buffer-holding assembly 12, an auxiliary aspirator assembly 30 may be included and be associated with an auxiliary aspirator 31 which aspirates the single threads or yarns immediately downstream of the beam 11 and upstream of the buffer-holding assembly 12.

According to another variant a further second auxiliary aspirator assembly 130 may be included and be connected to a second auxiliary aspirator 131 positioned between the drawing rolls 29 and the upstream end of the individual first tubes 20, the purpose being to be able to collect any threads or yarns which break between the drawing rolls 29 and the first tubes 20.

The spirit of the invention covers the possibility that the band 14 of first tubes 20 should also be positioned at an angle to the band 15 of second tubes 21.

Claims

1. Device (10) to piece up threads or yarns between a beam (11) and a winding machine, the device being characterized in that it comprises a first tube (20) followed by a switch (22) and by a second tube (21) connected to an aspirator assembly (17), the second tube (21) including a knife-type shears (16) in an intermediate position.

2. Device (10) as claimed in Claim 1, one device being included for each thread or yarn.

3. Device (10) as claimed in Claim 1 or 2, in which an assembly (12) to hold a buffer quantity of thread or yarn with at least one oscillatory roll (32) is included between the beam (11) and the first tube (20).

4. Device (10) as claimed in any claim hereinbefore, in which an assembly of drawing rolls (29) is included at the outlet of the thread buffer-holding assembly (12).

5. Device (10) as claimed in any claim hereinbefore, in which the aspirator assembly (17) is of a type to maintain a negative pressure.

6. Device (10) as claimed in any claim hereinbefore, in which a first auxiliary aspirator assembly (30) is included in the tract between the beam (11) and thread buffer-holding assembly (12).

7. Device (10) as claimed in any claim hereinbefore, in which a second auxiliary aspirator assembly (130) is included in the tract between the drawing rolls assembly (29) and the upstream end of the first tube (20).

8. Device (10) as claimed in any claim hereinbefore, in which the first tube (20) and second tube (21) are substantially coaxial and follow one another.

9. Device (10) as claimed in any of Claims 1 to 7 inclusive, in which the first tube (20) and second tube (21) are substantially parallel.

10. Device (10) as claimed in any of Claims 1 to 7 inclusive, in which the first tube (20) and second tube (21) are positioned substantially at an angle to each other.

11. Device (10) as claimed in any claim hereinbefore, in which the instantaneous vertical position of the oscillatory roll (32) determines the speed of at least a drive assembly (111).

12. Device (10) as claimed in any claim hereinbefore, in which the instantaneous vertical position of the oscillatory roll (32) determines the speed of at least the drawing rolls assembly (29).

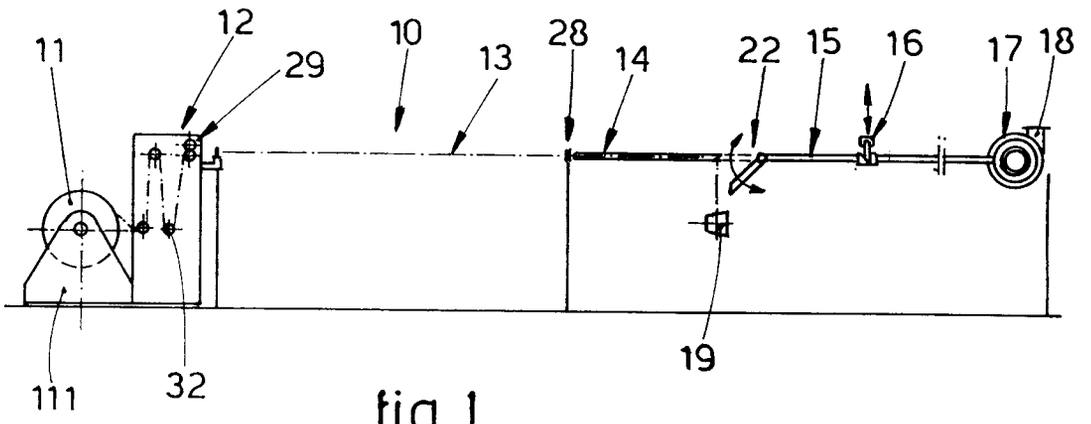

fig.1

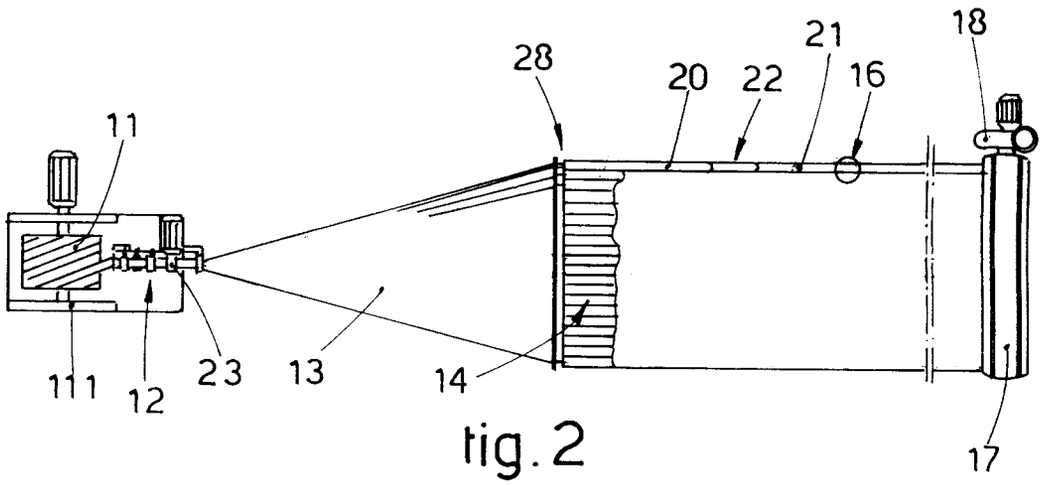

fig.2

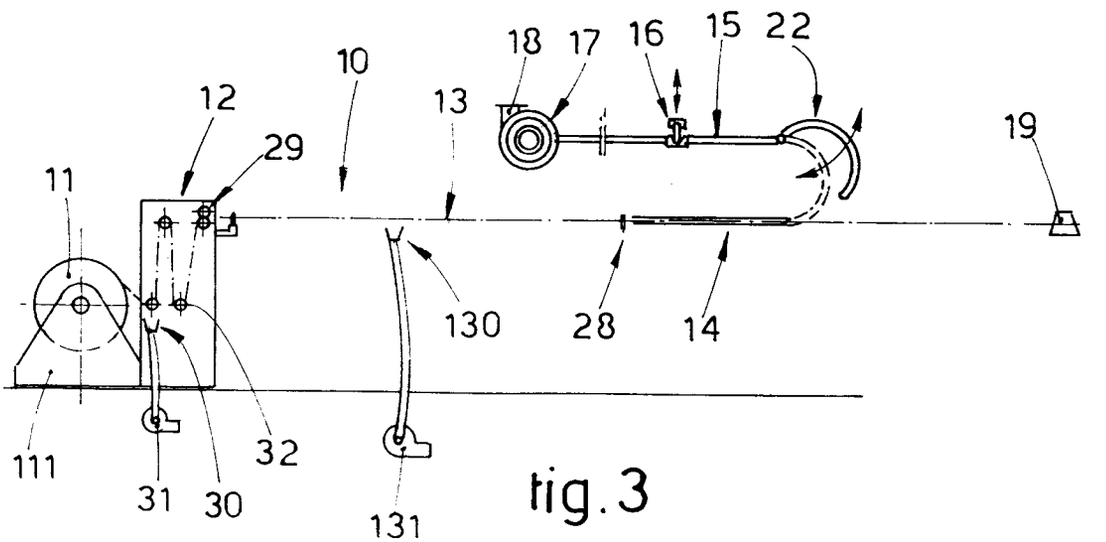

fig.3

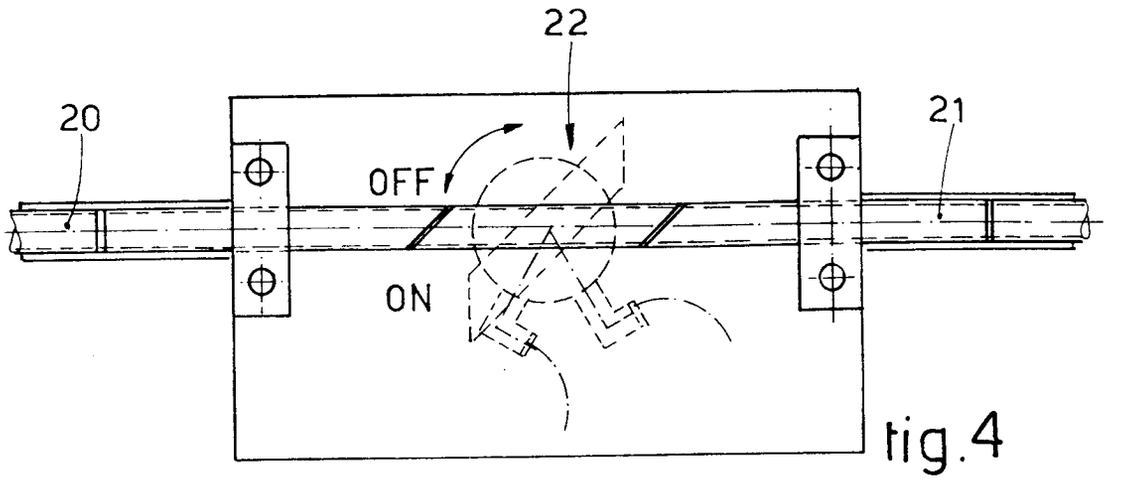

fig.4

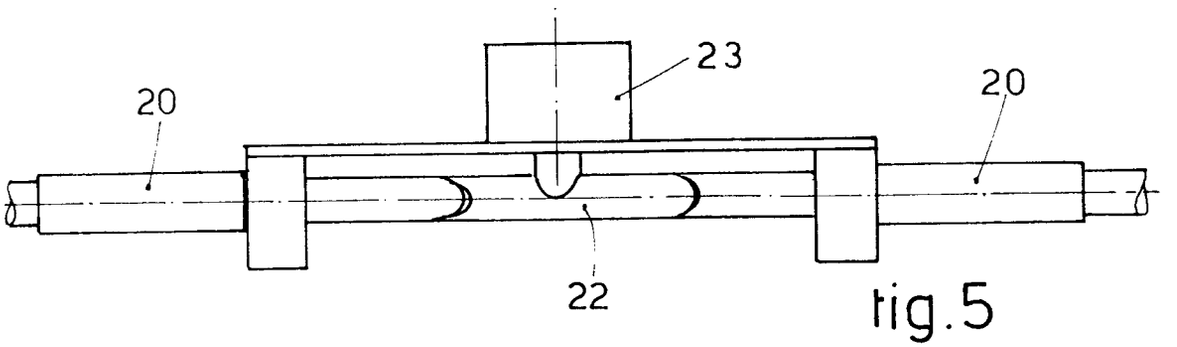

fig.5

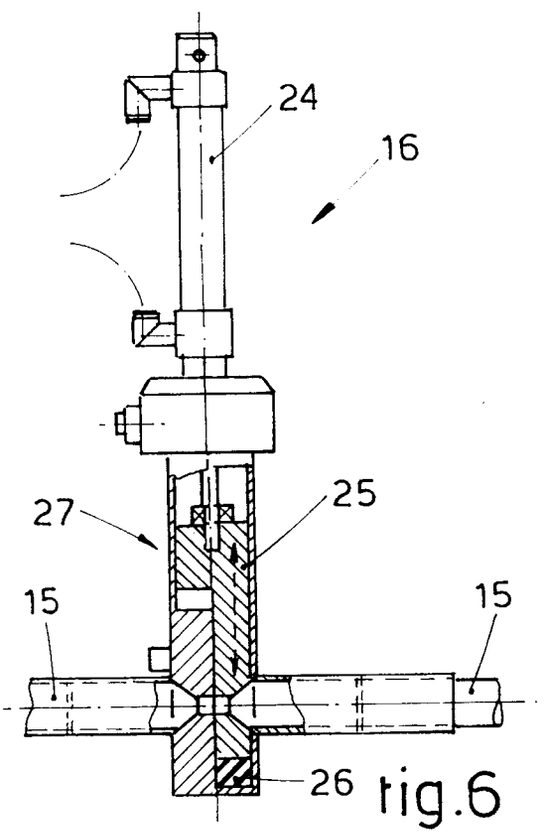

fig.6

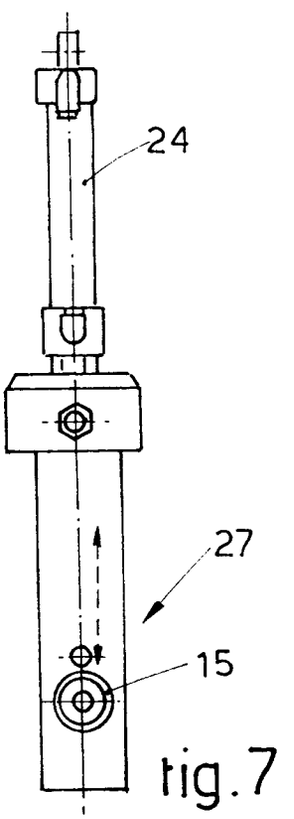

fig.7

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 12 1949

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	FR-A-2 260 650 (BARMAG BARMER MASCHINENFABRIK AG) * page 12, line 35 - page 14, line 9; figure 10AB *	1,5	B65H51/16
A	FR-A-2 297 937 (HEBERLEIN MASCHINENFABRIK AG.) * page 1, line 16 - line 19 * * page 3, line 10 - line 32 *	1,2,5	
A	US-A-3 942 312 (J. VENOT) * the whole document *	1,2,4,5	
A	EP-A-0 234 336 (BAYER AG) * figure 1 *	1	
A	US-A-3 946 546 (J. VENOT)		
A	GB-A-1 306 808 (TURNER BROTHERS ASBESTOS COMPANY LIMITED)		
A	DE-A-2 952 400 (BARMAG BARMER MASCHINENFABRIK AG)		TECHNICAL FIELDS SEARCHED (Int. Cl.5) B65H D04B D03J D02G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	13 MARCH 1992	D HULSTER E.W.F.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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