(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 417 849 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **90202384.5**

(51) Int. Cl.5: **B65H 54/71**

(22) Date of filing: **07.09.90**

(30) Priority: **15.09.89 IT 2173889**

(43) Date of publication of application:
20.03.91 Bulletin 91/12

(84) Designated Contracting States:
CH DE ES FR GB LI

(71) Applicant: **SAVIO S.p.A.**
Via Udine 105
I-33170 Pordenone(IT)

(72) Inventor: **Colli, Luigi**
Via Azzano X, 30
I-33170 Pordenone(IT)
Inventor: **Badiali, Roberto**
Via Carducci 1/A
I-33170 Pordenone(IT)
Inventor: **Quaia, Amedeo**
Via Ceolini 70
I-33080 Porcia(IT)

(74) Representative: **De Carli, Erberto et al**
ING. BARZANO' & ZANARDO MILANO S.p.A.
Via Borgonuovo, 10
I-20121 Milano(IT)

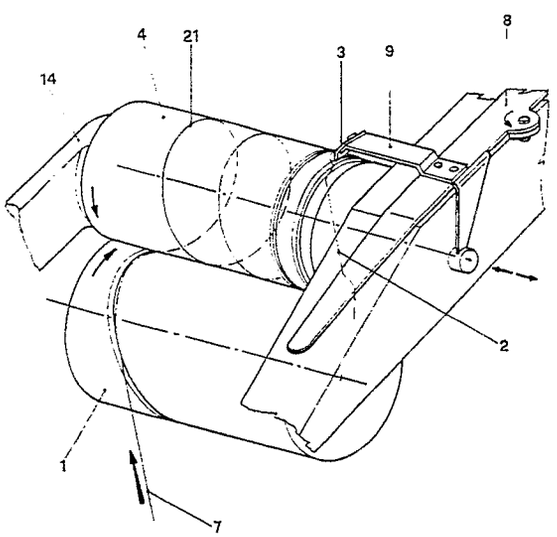
(54) Method for eliminating the yarn portion clamped and wound at the end of the winding tube, and a device for implementing the method.

(57) The present invention relates to a method for eliminating the yarn portion clamped and wound at the end of a winding tube for the purpose of forming a bobbin in a winding machine in which as the yarn portion positioned between the yarn accumulation on the tube and the region in which the tube is clamped to the holding centre of the bobbin support arm moves radially outwards by the action of centrifugal force, it undergoes a circumferential trajectory which is increasingly displaced outwards as it slackens until said portion interferes at one point with a cutting element which rapidly cuts the yarn to thus interrupt its continuity between the bobbin package and said holding centre.

The yarn portion clamped between the tube and holding centre is sucked in and removed advantageously through a suction port which is activated by the opening of the bobbin support arm.

The device for implementing the method comprises a fixed cutting blade positioned slightly above and approximately in the middle of said yarn portion when extending taut between the yarn accumulation on the tube and the point at which the tube is clamped to the holding centre of the bobbin support arm.

Fig.1



EP 0 417 849 A1

METHOD FOR ELIMINATING THE YARN PORTION CLAMPED AND WOUND AT THE END OF THE WINDING TUBE, AND A DEVICE FOR IMPLEMENTING THE METHOD

This invention relates to a method for eliminating the yarn portion clamped and wound at the end of a winding tube. More particularly, the invention relates to a method for cutting the yarn along the section between the bobbin under formation and the point at which the tube is clamped to the holding centre, said method being usable in winding machines, and particularly in automatic bobbin winding machines.

In the current state of the art automatic winding machines are available provided with bobbin support arms comprising chucks with holding centres, the purpose of which is not only to support, centre and fix the tube, but also to enable the connecting yarn reserve to be wound on the tube.

The term "connecting yarn reserve" signifies the initial yarn turns wound onto the tube, the purpose of which is to fix the yarn to the tube to facilitate proper winding from the initial turns onwards. Said connecting reserve is usually formed by clamping the yarn end at the commencement of the winding cycle between the tube end and the holding centre of the bobbin support arm. At every yarn breakage and rejoining cycle, and also on termination of each feed package and on completion of each bobbin winding operation, the bobbin rotated by the drive roller is raised and then halted to enable the known yarn rejoining cycle to proceed.

In known devices for clamping the tube to the holding centre of the bobbin support arm, when the holding centre is braked said tube moves, sometimes by just a little but a certain movement always takes place under the effect of its inertia, about the surface at which it is clamped to the holding centre.

This movement becomes gradually accentuated as wound yarn accumulates on the tube, because the moment of inertia increases continuously until the bobbin is complete, as is easily apparent. The yarn which is inserted between the holding centre and tube for forming the connecting turns slackens as the tube rotates relative to the holding centre, and because of the considerable rotational winding speed it moves radially outwards under the effect of centrifugal force.

In current winding machines such as automatic bobbin winding machines there is no automatic cutting of the yarn between the bobbin and the point at which the yarn is clamped to the holding centre during the actual winding of the bobbin under formation. This means that on removing the completely wound bobbin to replace it with an empty tube and conveying it via chutes or conveyor belts, the length of yarn which was previously clamped between the tube and the holding centre is now free and hanging, often resulting in the unwinding of said reserve turns. This produces a free yarn end of a certain length which during the conveying and handling of the bobbin becomes randomly joined to the free yarn ends of other bobbins. The consequence of this is that the free yarn ends become tangled together, resulting in considerable difficulty in separating the bobbins from each other.

In such a case as this an operator has to be used to cut these various connections so as to obviate the danger of hold-ups in the conveying and transporting of the bobbins towards the subsequent processing stages.

Manual intervention by a service operator is certainly not the best system for obtaining totally reliable bobbin conveying. Moreover, manual interventions which are required on a random rather than a planned regular basis result in low labour efficiency. Another aspect certainly not of lesser importance is that any yarn ends hanging from bobbins being fed to two-for-one twisting spindles interfere with the unwinding yarns which are being brought adjacent in order to be twisted together. This interference is often the source of breakage of one of the two yarns, leading to interruption of the two-for-one twisting process. Because of the high production rate of current machines, production hold-ups such as these, even if reduced to only a small percentage of the total time, assume considerable importance because of the delay which arises in restarting the production cycle.

To obviate the aforesaid drawbacks the applicant has tested a method for eliminating the yarn portion clamped at the end of the winding tube and has constructed the device for implementing the method. The object of the present invention is therefore not only to free service personnel from the task of watching out for any tangling of the free yarns from the bobbins, but also to ensure that the twisting operation runs correctly.

In accordance therewith, the present invention provides a method for eliminating the yarn portion clamped and wound at the end of a winding tube for the purpose of forming a bobbin in a winding machine in which as the yarn portion positioned between the yarn turns wound on the tube and the region in which the tube is clamped to the holding centre of the bobbin support arm moves radially outwards by the action of centrifugal force, it undergoes a circumferential trajectory which is increasingly displaced outwards as it slackens, and

thus becomes continuously wider until said portion interferes at one point with a cutting element which is located in a radially fixed position above it and rapidly cuts the yarn to thus interrupt its continuity between the bobbin package and said holding centre. The method of the present invention also includes sucking and removing, through a suction port which is activated when the bobbin support arm opens, that yarn portion which is clamped between the tube and holding centre but which has been previously cut and separated from the yarn wound on the tube.

The method of the present invention is implemented by a device comprising a fixed cutting blade supported by a bracket rigidly fixed to the bobbin support arm, said blade being positioned slightly above and approximately in the middle of said yarn portion when extending taut between the yarn turns wound on the tube and the point at which the tube is clamped to the holding centre of the bobbin support arm.

A preferred embodiment of the invention is described hereinafter by way of non-limiting example with reference to the accompagnying drawings in which:

Figure 1 is an overall schematic axonometric perspective view of the device for implementing the method of the present invention, said view representing the moment of commencing winding;

Figure 2 is a schematic front view showing the commencement of winding corresponding to Figure 1, said view comprising an enlargement of an area showing the position of the cutting blade slightly above the yarn portion extending tautly from the point in which it is clamped between the tube and the holding centre of the bobbin support arm;

Figure 3 is a schematic front view showing winding underway, with the bobbin already with a certain formed diameter, said view comprising an enlargement of said area which now shows the commencement of interference between the cutting blade and the yarn, which has now undergone slackening and has consequently moved outwards by centrifugal force;

Figure 4 is a schematic front view showing the completion of winding, with the holding centre of the bobbin support arm moved into its open position to allow doffing of the bobbin, said view representing the moment of activation of the suction port which sucks in and removes the yarn portion which has been freed by the cutting blade cutting the yarn wound on the bobbin;

Figure 5 is a schematic side view of Figure 4 with the yarn portion subjected to suction.

In the figures, corresponding parts are given the same reference numerals for simplicity. Those devices and mechanisms which operate in mutual cooperation with the device for implementing the method of the present invention are not shown and neither is their operation described, as they are already known and also because they are not involved in the implementation of the invention. On the accompanying drawings: 1 is the grooved feed roller or motorized drive roller for the bobbin under formation (and in the present case shown only schematically as it is unimportant for the purposes of the present invention); 2 is the yarn portion which at the commencement of winding is clamped between the tube and holding centre of the bobbin support arm; 3 is the cutting element or cutting blade fixed rigidly to the flat element 9, this latter element being fixed to the control lever 8 for opening the holding centre of the bobbin support arm. Said cutting blade 3 is fixed such that it can position itself slightly above the yarn when this is taut between the point at which it is clamped between the tube and holding centre and the first yarn turn on the tube 4; 4 is the tube which supports the crossed yarn winding for forming the bobbin 5 of any shape and size; 6 is the suction port which is activated each time the bobbin support arm 14 is opened by the lever 8, which by known means drags the rotatable holding centre 10 of the bobbin support arm 14 into the open position with transverse movement; 7 is the yarn, which rises as it winds; 21 is a yarn turn, which is deposited as a continuous spiral on the tube 4; 8a is the position assumed by the lever 8 on opening the bobbin support arm to allow doffing of the full bobbin 5 and insertion of the tube 4 for forming a new bobbin; 11 is the lever of the microswitch 15; 18 is the solenoid valve which when energized by the microswitch 15 opens the pneumatic circuit 18 to activate the actuator 19; 20 is the stem of the actuator 19, said stem extending at its end in the form of a flat element for opening and closing the suction duct 12. The device for implementing the method of the present invention and shown on the figures of the accompanying drawing is of easily understandable operation. On commencement of winding the yarn 7 is clamped by known methods and means between the tube 4 and the mobile holding centre 10. Said holding centre supports the tube and fixes it onto the bobbin support arm 14.

As is well known to the expert of the art, this is to make it possible to commence the winding of the yarn 7 onto the tube 4 to form the bobbin 5.

During yarn winding, that yarn portion extending from its clamping point between the tube and holding centre to the first yarn turn wound on the tube 4 slackens for the aforesaid reasons.

As said yarn portion slackens it expands by moving radially under the effect of the centrifugal force generated by the high rotational winding

speed, until it comes into contact with the blade 3 (see Figure 3) by which it is cut and thus interrupted. The yarn portion 2 restrained and clamped between the mobile holding centre 10 and the tube 4 therefore becomes a free piece of floating yarn on opening the arm 14 for doffing the bobbin 5. As the lever 8 which opens the mobile holding centre 10 moves into the position 8a it presses the central pivot of the mobile holding centre 10 against the lever 11, so closing the contact of the microswitch 15, to pass an electrical signal which energizes the solenoid valve 18.

This latter opens the pneumatic circuit 10 to operate the actuator 19, which moves the flat element at the end of its rod 20, so opening the suction duct 12 (Figure 4). The suction port 6 sucks the yarn portion 6 in (see Figure 5) and conveys it to any scrap yarn accumulation region, so that it is not given freedom as a piece of floating yarn which could prejudice the quality of the next bobbin or of that under formation on one of the adjacent headstocks, as is well known to textile service personnel. After the full bobbin of wound yarn 5 has been doffed, the new tube is inserted to restart winding in order to form a new bobbin, as is well known in the art.

The mobile holding centre 10 moves into its closed position to thus clamp the new tube 4, said movement deactivating the elements 15 and 18, to shut off suction in the duct 12 by means of the actuator 19 and thus nullify the suction action of the port 2. The described embodiment has been presented as a non-limiting example of the invention.

It is apparent that modifications and additions can be made to the details of the device by experts of the art, but without leaving the general idea of the present invention. For example, the mobile port can be positioned on the doffing carriage so as to be brought up to the mobile holding centre 10 only when doffing is to take place, to perform a function analogous to that heretofore described.

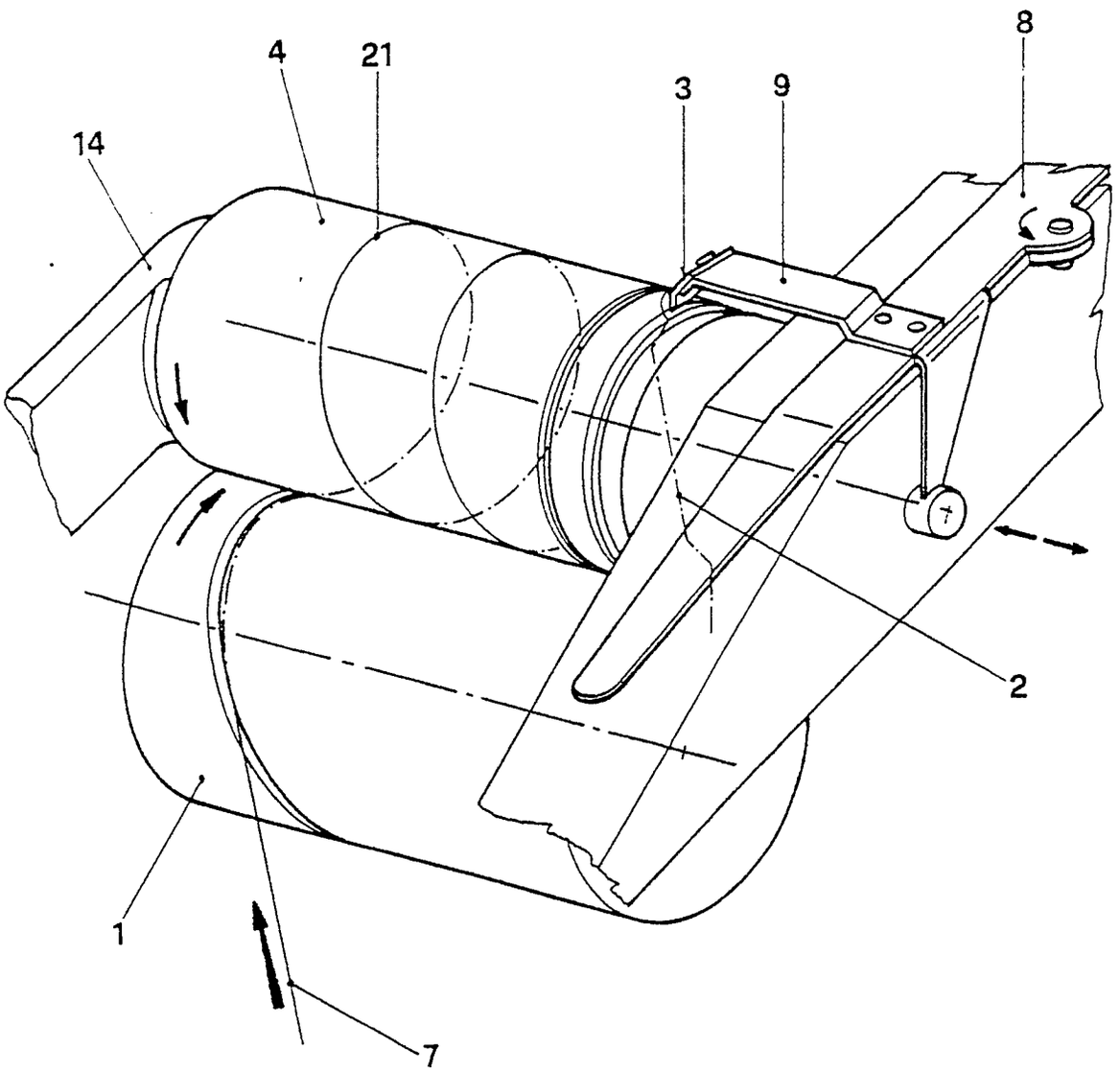
Claims

1. A method for eliminating the yarn portion clamped and wound at the end of a winding tube for the purpose of forming a bobbin in a winding machine, characterised in that as the yarn portion positioned between the yarn turns wound on the tube and the region in which the tube is clamped to the holding centre of the bobbin support arm moves radially outwards by the action of centrifugal force, it undergoes a circumferential trajectory which is increasingly displaced outwards as it slackens and thus becomes continuously wider until said portion interferes at one point with a cutting element which is located in a radially fixed position above it and rapidly cuts the yarn to thus interrupt its continuity between the bobbin package and said holding centre.

2. A method for eliminating the yarn portion clamped and wound at the end of a winding tube as claimed in claim 1, characterised in that the yarn portion clamped between the tube and holding centre is sucked in and removed through a suction port which is activated by the opening of the bobbin support arm.

3. A device for implementing the method claimed in claim 1, characterised by comprising a fixed cutting blade supported by a bracket rigidly fixed to the bobbin support arm, said cutting blade being positioned slightly above and approximately in the middle of said yarn portion when extending taut between the yarn turns wound on the tube and the point at which the tube is clamped to the holding centre of the bobbin support arm.

Fig.1



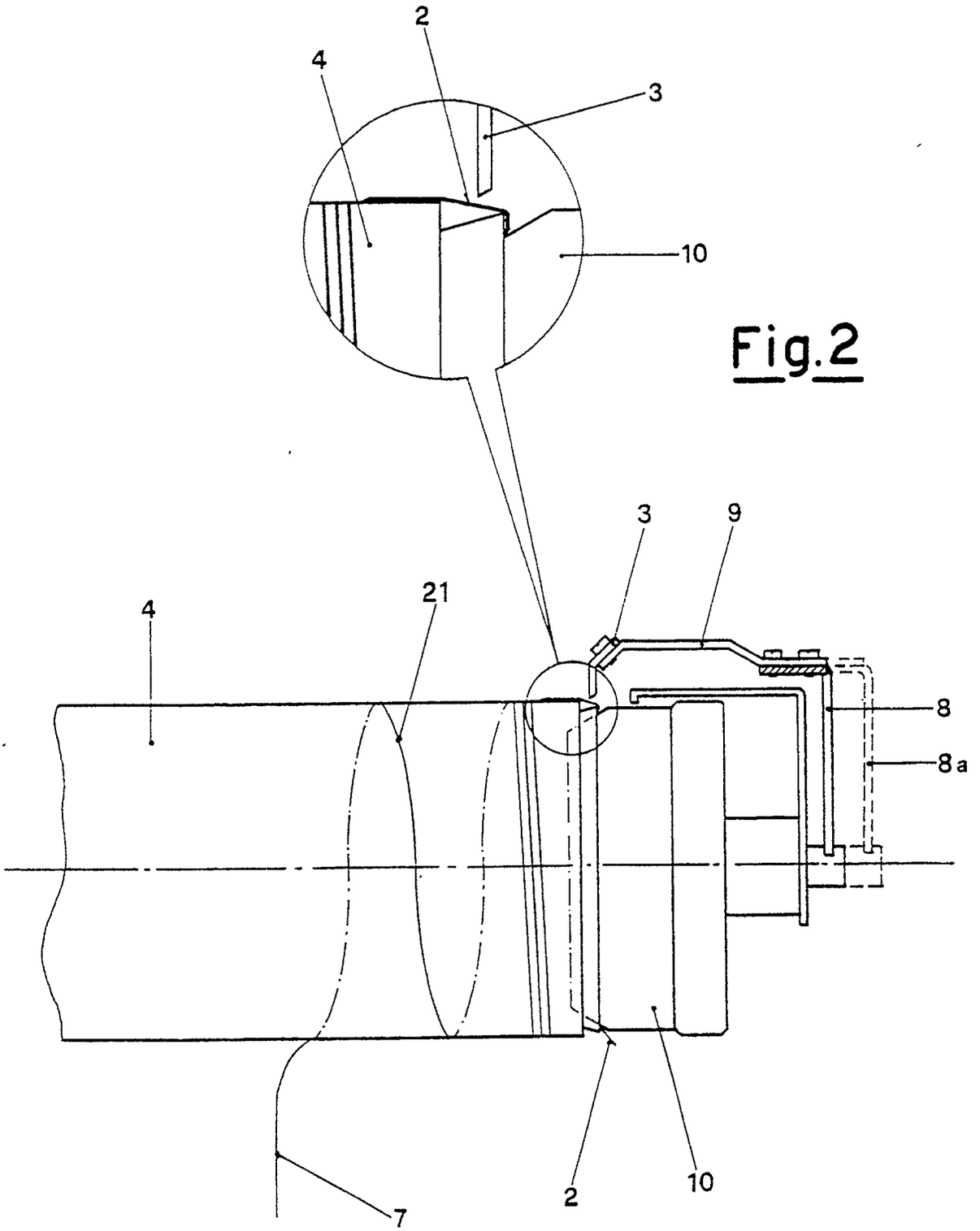


Fig.2

Fig.3

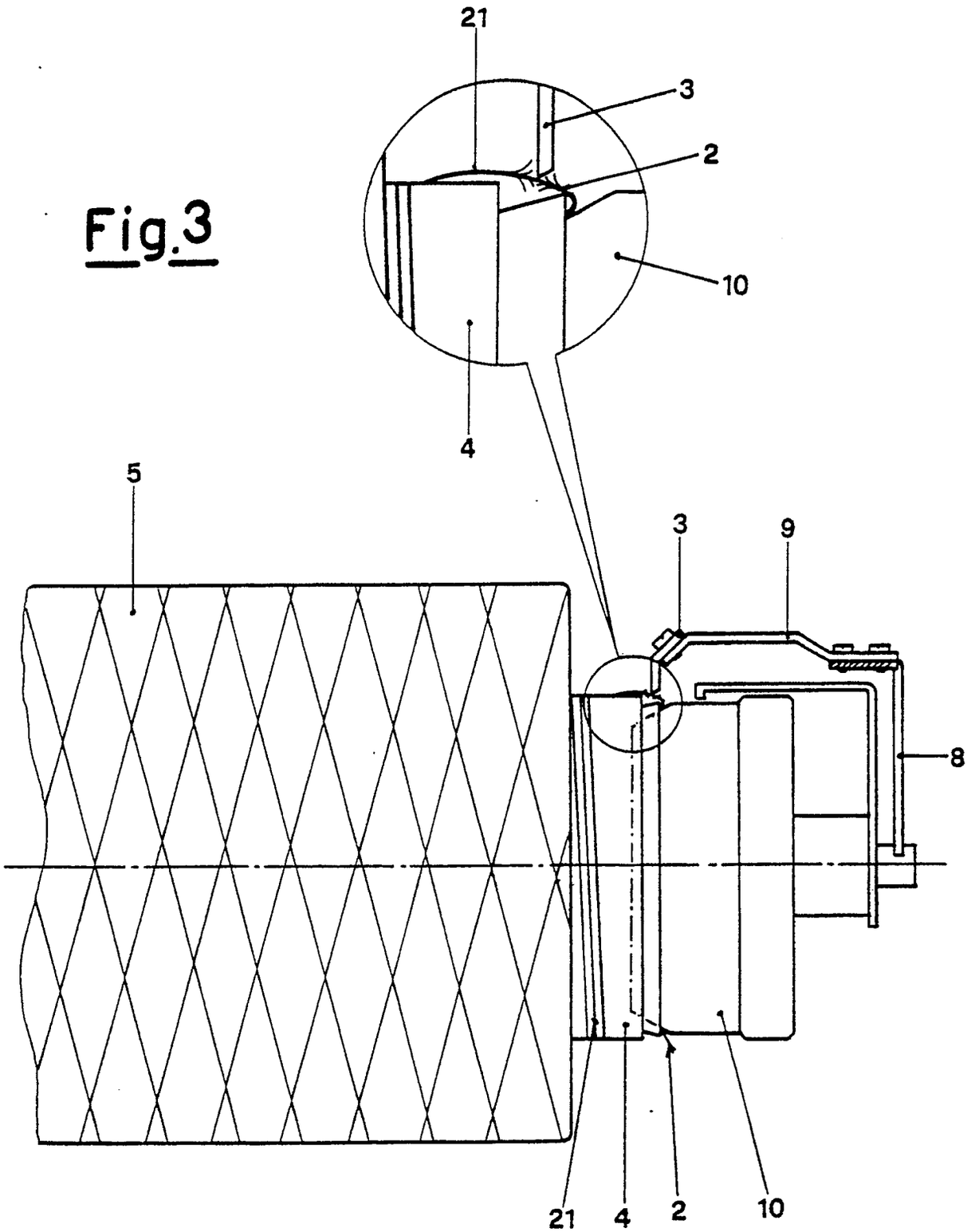


Fig.5

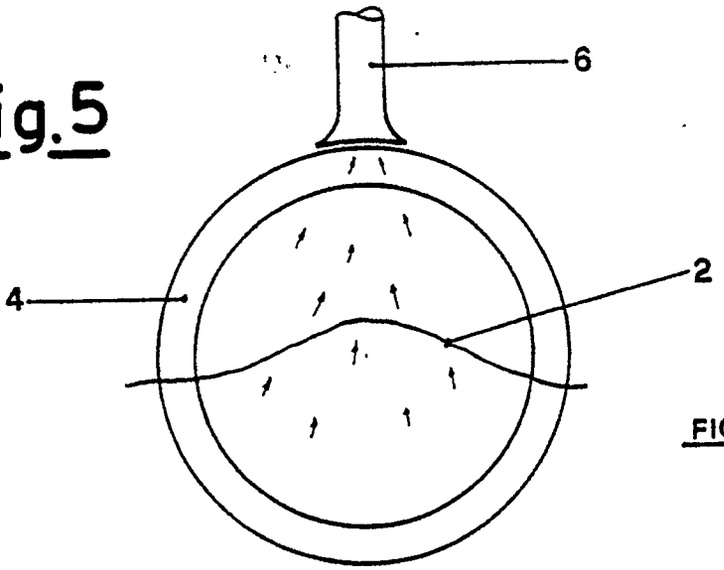
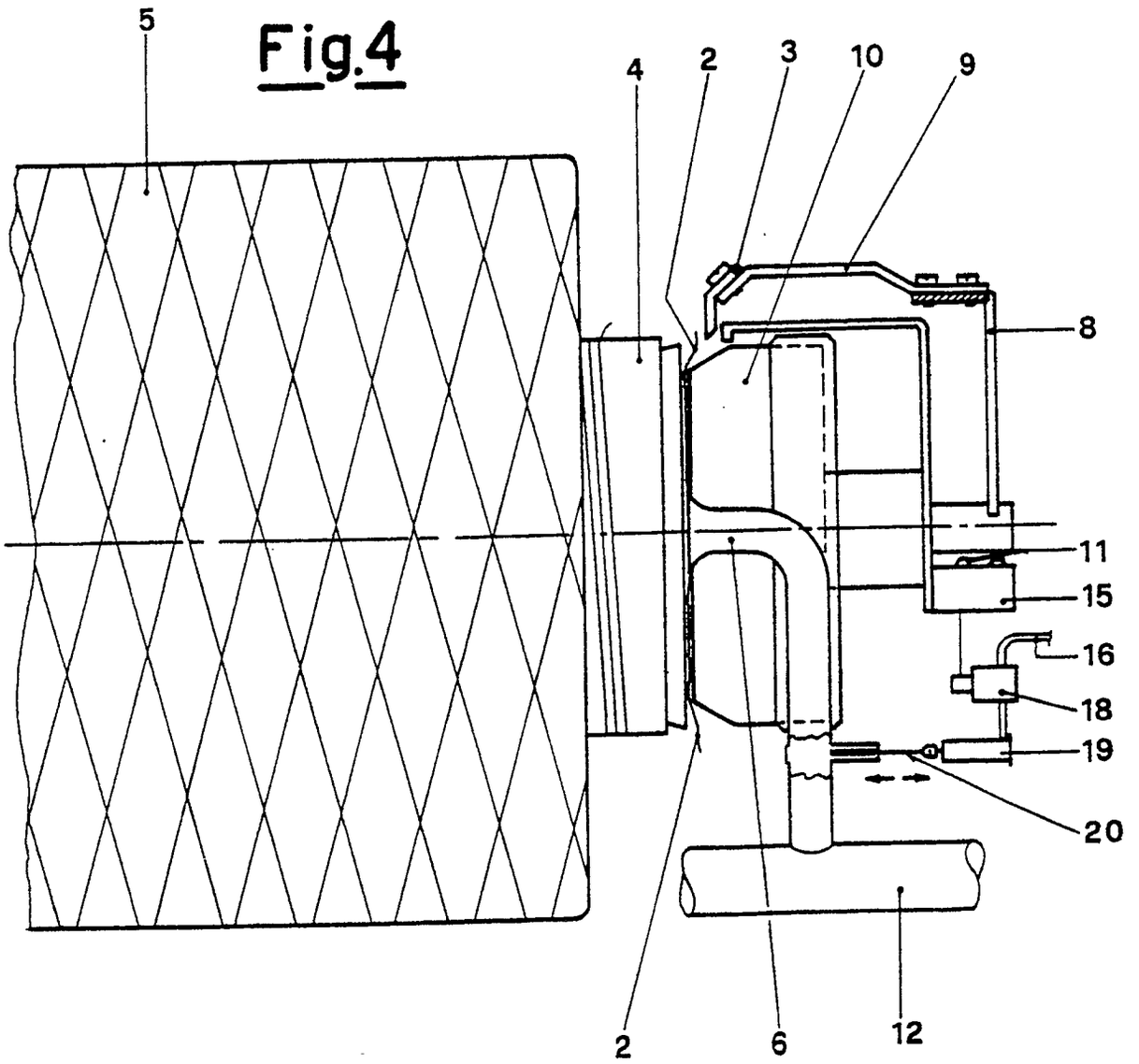


FIG. 5

Fig.4



European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 20 2384

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	DE-B-1 214 583 (DR.-ING. WALTER REINERS) * claims 1, 2; figures 1-9 *	1,3	B 65 H 54/71
A	GB-A-5 433 73 (MASCHINENFABRIK SCHWEITER A.G.) * page 2, lines 81 - 117 *	1-3	
A	GB-A-1 069 612 (EIZABURO NEGISHI) * page 2, lines 50 - 56 *	2	
A	US-A-2 575 015 (W. E. HENDRICKS)		
A	US-A-2 578 755 (R. O. SMITHSON; C. F. FITZGERALD)		
A	US-A-2 646 936 (H. T. O'NEILL, JR.)		
A	US-A-2 634 917 (J. W. MAY)		
A	FR-A-2 307 746 (MASCHINENFABRIK RIETER AG.)		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)
B 65 H D 01 H

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	06 December 90	D HULSTER E.W.F.

CATEGORY OF CITED DOCUMENTS

X: particularly relevant if taken alone
Y: particularly relevant if combined with another document of the same catagory
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention

E: earlier patent document, but published on, or after the filing date
D: document cited in the application
L: document cited for other reasons

&: member of the same patent family, corresponding document