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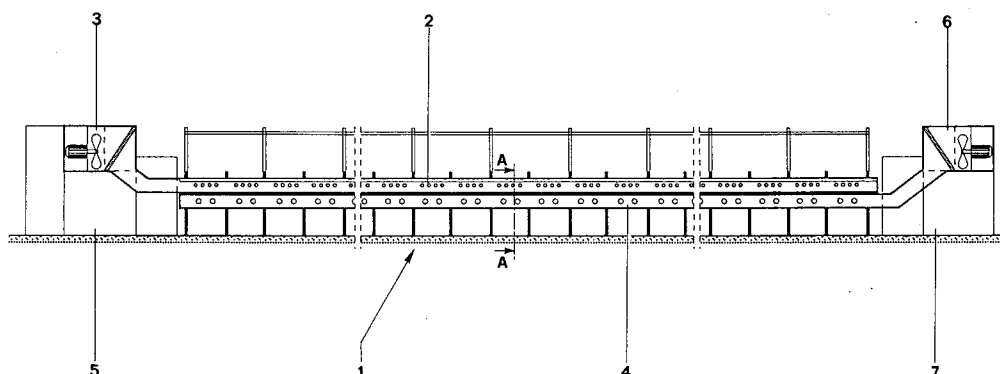
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I-20121 Milano(IT)(54) **Improvements in spinning machines with a suction system for removing dust, fibre web and broken yarns.**

(57) The invention provides improvements in spinning machines producing textile yarns and comprising a suction system for removing dust, fibre web, broken yarn ends and the like, said improvements including a suction system composed of two suction centres (3,6), one at each end of the spinning machine, each suction centre maintaining under vacu-

um a respective duct (2,4) which extends along the entire spinning face, the manifold duct (2) in the upper position being used to clean the drafting rollers (19), whereas the manifold duct in the lower position is used to clean the spinning rings (9) by means of suction tubes (14,16) which move to follow the reciprocating movement of the ring bench.

Fig.1**EP 0 482 711 A1**

This invention relates to improvements in the suction system provided for removing dust, fibre web and broken yarns in spinning machines, in particular ring spinning machines, which produce yarn for depositing on rod-shaped tubes in order to form wound yarn packages.

Said ring spinning machines comprise a plurality of working positions, normally on two opposing faces, and are therefore of considerable length.

Textile machines comprise suction ducts used for the most varying purposes, such as to clean determined parts of the machine, to remove fibre dust and to draw in excess yarn ends or cut-off yarn pieces and the like. It is well known that in drafting systems on spinning machines, a fibre sliver consisting of an assembly of fibres of a certain length is subjected to considerable traction with the result that a certain quantity of fibres, particularly the short fibres, separate to form dust. It is therefore necessary to clean the drafting components and to remove the spinning fly and dust from the various machine parts and from the yarn under formation. Any pieces of broken yarn also have to be drawn off. To achieve this, the suction action must be efficient and uniform along the entire spinning face. In addition, the spinning faces of ring spinning machines are known to extend horizontally for a considerable length, namely for several tens of metres, given that the number of spinning spindles can be of the order of one thousand, one following another.

The cross-section of the suction air duct and the power of the pneumatic system must therefore be relatively large, with a consequently high system and operating cost for this service. In addition, given the considerable length of ring spinning machines, the draw-off of dust, fibres, broken yarns etc. in known systems is insufficiently continuous in those regions furthest from the suction fan or other motorized device which provides the suction action. The air throughput in a centralized suction system in which a suction duct extending along the entire spinning face serves all the spinning spindles via suction nozzles or slots is equal to the total air quantity required to provide energetic suction action at all the spinning spindles.

To achieve proper pick-up of broken yarn and filament particles together with their effective conveying into the collection housing at the machine headstock where the suction fan and filters are located, the air velocity in the ducts and through the suction slots must be sufficiently high, and the vacuum produced must take account of the overall and localized pressure drops.

Known constructions suffer from problems such as the retention of a certain number of fibre and yarn pieces in the suction tubes acting on the spinning spindles located in the regions furthest from the fan in the machine headstock.

Fibres, dust and broken yarns which have not been properly drawn in by the suction tubes often trigger a build-up which obstructs the suction action required for continuous cleaning of the spindles, which then suffer from a progressive deposition of fibre dust on their various parts and on the yarn under formation. The result is that irregularities and defects appear in the yarn to the detriment of quality, such irregularities leading in the limit to yarn breakage either during its formation or during the subsequent yarn working stages. The reasons for all this are the provision of only one suction duct from which all the suction tubes extend, there being more than one for each spinning spindle, and the provision of only one suction fan, located only at the headstock end of the spinning machine. The provision of only one suction duct and suction fan do not sufficiently guarantee a substantially uniform suction along the entire spinning face, with the consequence that the fibrils and dust which deposit on the various spinning machine members are not effectively removed, so compromising proper spinning.

Secondly, the slots in the suction tubes, which are of narrow cross-section, easily and frequently clog due to the fact that the suction action is weak, so that the suction efficiency is considerably reduced after a few hours of operation, making frequent maintenance and cleaning of the suction slots necessary. In addition, the said maintenance and cleaning of the suction slots requires considerable care by the service personnel, who are required to operate without any preprogrammed timing. It is a known fact that such random unprogrammed work results in low labour efficiency.

An object of the present invention is to provide a suction system for removing fibre dust and broken yarn pieces in spinning machines which is free of the aforesaid drawbacks and is able to function with greater effectiveness and for a longer time, without requiring frequent maintenance.

A further object of the present invention is to rationalize the construction of the pneumatic system of a ring spinning machine, both in terms of its capacity and in terms of its suction efficiency in effectively removing the fibrils and flying yarn pieces from the spinning spindles. A further object of the present invention is to provide a pneumatic suction system which is of new conception while at the same time being simple, and offering the facility for applying suction to further additional re-

gions which complete the entire suction requirement in terms of any further functions required by the particular application under way.

These and further objects of the invention, which will be apparent from the description, are attained by improvements in a suction system in a spinning machine of considerable length, in particular a ring spinning machine, wherein said suction system is composed of two suction centres, one at each end of the spinning machine, each suction centre maintaining under vacuum a respective manifold duct which extends along the entire spinning face.

The manifold duct in the upper position is used to clean the drafting rollers, whereas the manifold duct in the lower position is used to clean the ring bench by means of suction tubes which are flexible and extendable to follow the reciprocating movement of the ring bench. Said manifold ducts, one for each suction centre, are aligned vertically and are parallel to the machine axis, they being positioned one above the other along the entire spinning face.

According to an advantageous embodiment, the flexible extendable suction tubes are fixed at one end to a lower position on the manifold duct, and at their other end are fixed to the ring bench so that the suction slot moves to rigidly follow the continuous upward and downward reciprocating movement of the ring bench. According to a further embodiment, the suction slot of each flexible extendable tube, advantageously fixed to the ring bench, is arranged to operate in a frontal direction to clean several spinning positions.

The invention is described in greater detail hereinafter with reference to the accompanying drawings, which show one embodiment thereof given by way of non-limiting example only. Figure 1 is a schematic longitudinal frontal view of the suction system of a ring spinning machine according to the present invention, showing in particular the two motor-driven suction fans, one for each end of the spinning machine, each fan maintaining vacuum in one duct extending along the entire spinning face.

Figure 2 is a schematic frontal section of Figure 1 taken on the line A-A, said section showing the two suction ducts, of which the upper one operates in proximity to the drafting units and the lower one operates in proximity to the spinning spindles via flexible extendable suction tubes, the figure also schematically illustrating a known spindle of a ring spinning machine with the overlying drafting unit.

Figure 3 is a partial schematic plan view of the lower suction duct with its flexible extendable suction tubes arranged to operate in a frontal direction via their suction slots to clean several spinning positions or spindles of the spinning machine. In

the figures, corresponding parts or parts with identical functions are indicated for simplicity by the same reference numerals.

The various units and equipment which in combination form the yarn in the ring spinning machine, in which the improved suction system of the present invention is incorporated, are neither illustrated nor operationally described as they are already known, and are not involved in the improvement of the present invention.

In the accompanying figures:

1 schematically indicates the ring spinning machine which as a spinning machine operates on two opposing faces comprising a large plurality of working positions and is hence of considerable length; 2 is the upper suction manifold duct in which vacuum is created by the motor-driven fan 3, this latter being located and fixed at the end 5 of the spinning machine 1. Said manifold duct 2 is arranged to serve and operate in proximity to the drafting units 19 along the entire spinning face on both sides; 4 is the lower suction manifold duct in which vacuum is created by the motor-driven fan 6, this latter being located at the end 7. Said manifold duct 4 is arranged to serve and operate in proximity to the known spinning spindles 18; 14 and 16 are flexible extendable suction tubes extending from the machine 4, said tubes 14 and 16 operating on the two opposing spinning faces and being fixed, in proximity to the spindles 18, to the ring bench so that their suction slot can move to rigidly follow the upward and downward continuous reciprocating movement of the ring bench. Said suction tubes 14 and 16 enter the manifold duct 4 advantageously inclined thereto. This inclination is both to a plane perpendicular to and to a plane parallel to the axis of the manifold duct 4. The angles of inclination of the suction tubes 14 and 16 to said planes are such that the air in entering the manifold duct 4 does not undergo a sharp direction change, hence considerably reducing localized pressure drops. The entry slots in the suction tubes 14 and 16 lie in front of and in proximity to the known ring of the spinning spindle 18, where a certain quantity of especially short fibres is present, together with the formation of dust and broken yarn pieces and the like. The entry slots 8 of said suction tubes 14 and 16 can take varied geometrical forms, for instance a substantially circular or oval geometrical form, or the form of an actual thin rectangular slit extending frontally in a vertical direction, or in a horizontal direction along one or more spinning spindles, or other forms; 11 and 15 are suction tubes flowing into the manifold duct 2, said tubes 11 and 15 each operating on one spinning face opposite the other, they lying with their entry slots in a position corresponding with the region immediately below the exit rollers of the drafting unit 19 to effectively

remove those fibres which separate from the fibre web in this region, as is well known to the expert of the art.

Said suction tubes 11 and 15 enter the suction manifold duct 2 advantageously inclined thereto in virtually the same manner as described for the suction tubes 14 and 16. The entry slots in said suction tubes 11 and 15 can take varied geometrical forms, for instance a substantially circular geometrical form, or the form of a horizontally or vertically extending thin rectangular slit, or other thin forms; 12 is the element which fixes the suction port 8 to the ring bench 9.

The operation of the improved suction system of the present invention shown in the figures of the accompanying drawings is immediately apparent.

The fan housings 3 and 6 house the suction fans and the filter elements. The fibre dust and broken yarn pieces are drawn through the slots 8 in the tubes 14 and 16 and are conveyed by the suction manifold duct 4 to the housing 6 for collection, where they are retained by the filter surfaces.

Likewise, during the spinning process the fibres or flying fibrils present in proximity to the drafting unit 19 are drawn through the slots in the tubes 11 and 15 and are conveyed by the manifold duct 2 to the housing 3 for collection, where they are retained by the filter surfaces.

It is apparent that modifications can be made to the improvement in the suction system proposed in the present invention, but without leaving the scope of the inventive idea.

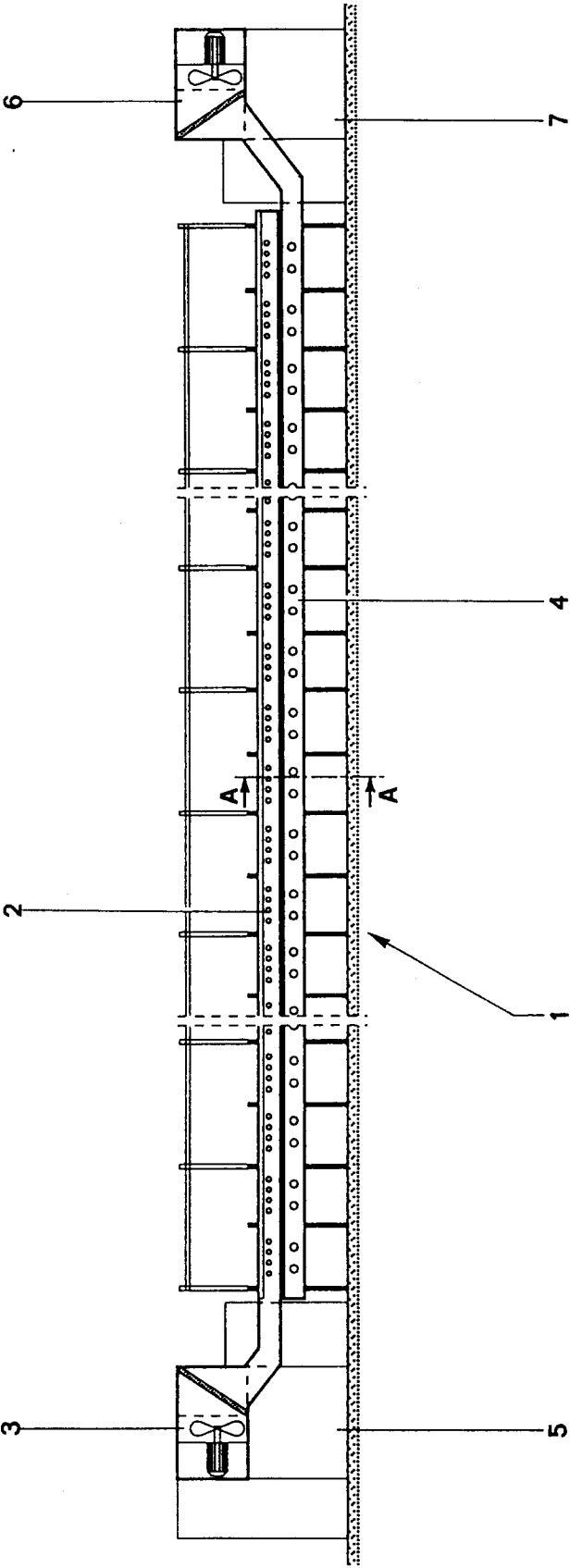
Claims

1. Improvements in spinning machines producing textile yarns to be deposited on tubes in order to form wound yarn packages and which comprise a suction system for removing dust, fibre web, broken yarn ends and the like, characterised in that said suction system is composed of two suction centres, one at each end of the spinning machine, each suction centre maintaining under vacuum a respective manifold duct which extends along the entire spinning face, the manifold duct in the upper position being used to clean the drafting rollers, whereas the manifold duct in the lower position is used to clean the ring bench by means of suction tubes which are flexible and extendable to follow the reciprocating movement of the ring bench.
2. Improvements in spinning machines producing textile yarns as claimed in claim 1, characterised in that the two manifold ducts, one for each suction centre, are aligned vertically and

are parallel to the machine axis, they being position one above the other along the entire spinning face.

3. Improvements in spinning machines producing textile yarns as claimed in claim 1, characterised in that the flexible extendable suction tubes are fixed at one end to a lower position on the manifold duct, and at their other end are fixed to the ring bench so that the suction slot moves to rigidly follow the continuous upward and downward reciprocating movement of the ring bench.
4. Improvements in spinning machines producing textile yarns as claimed in claims 1 and 3, characterised in that the suction slot of each flexible extendable tube, advantageously fixed to the ring bench, is arranged to operate in a frontal direction to clean several spinning positions.

Fig.1



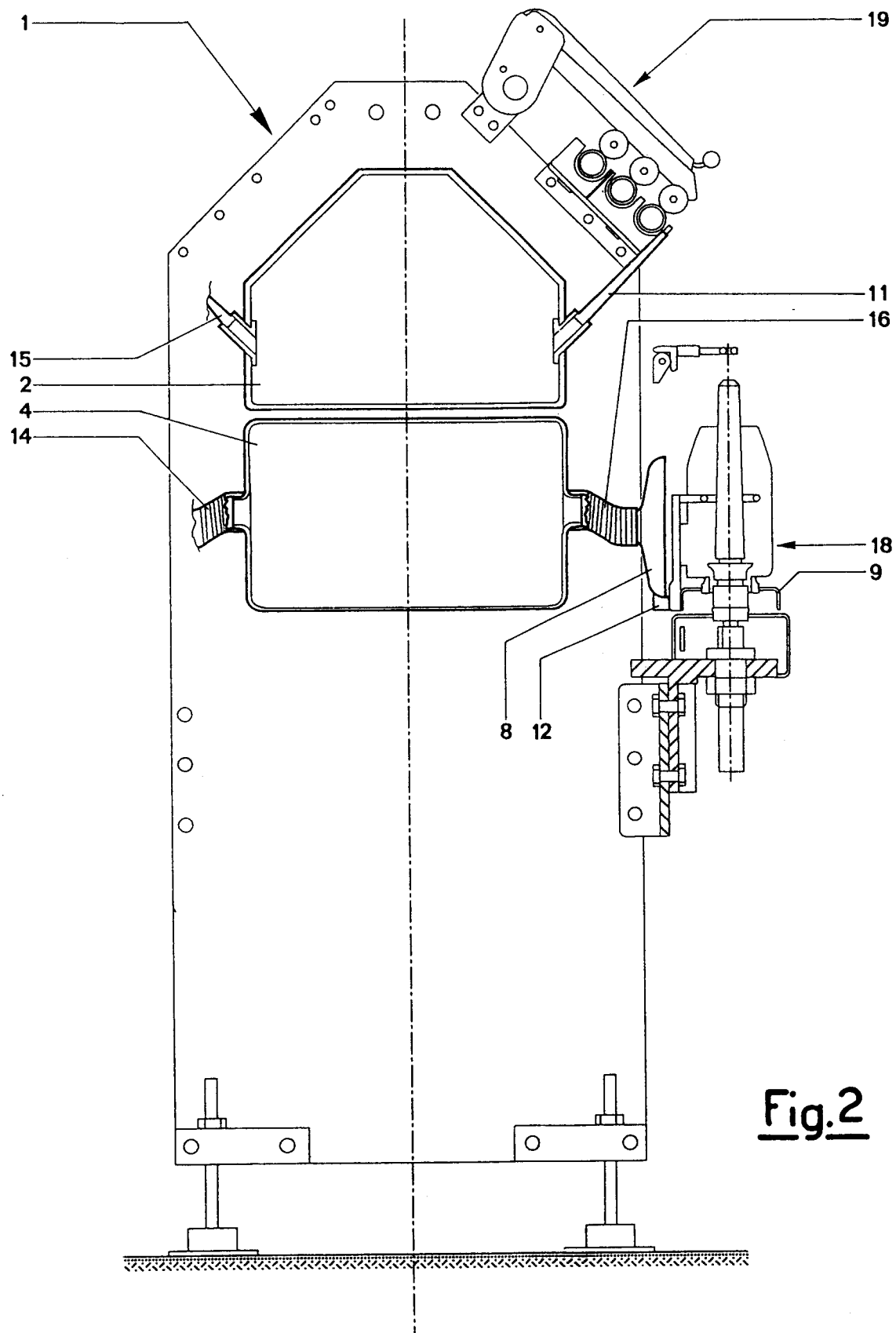
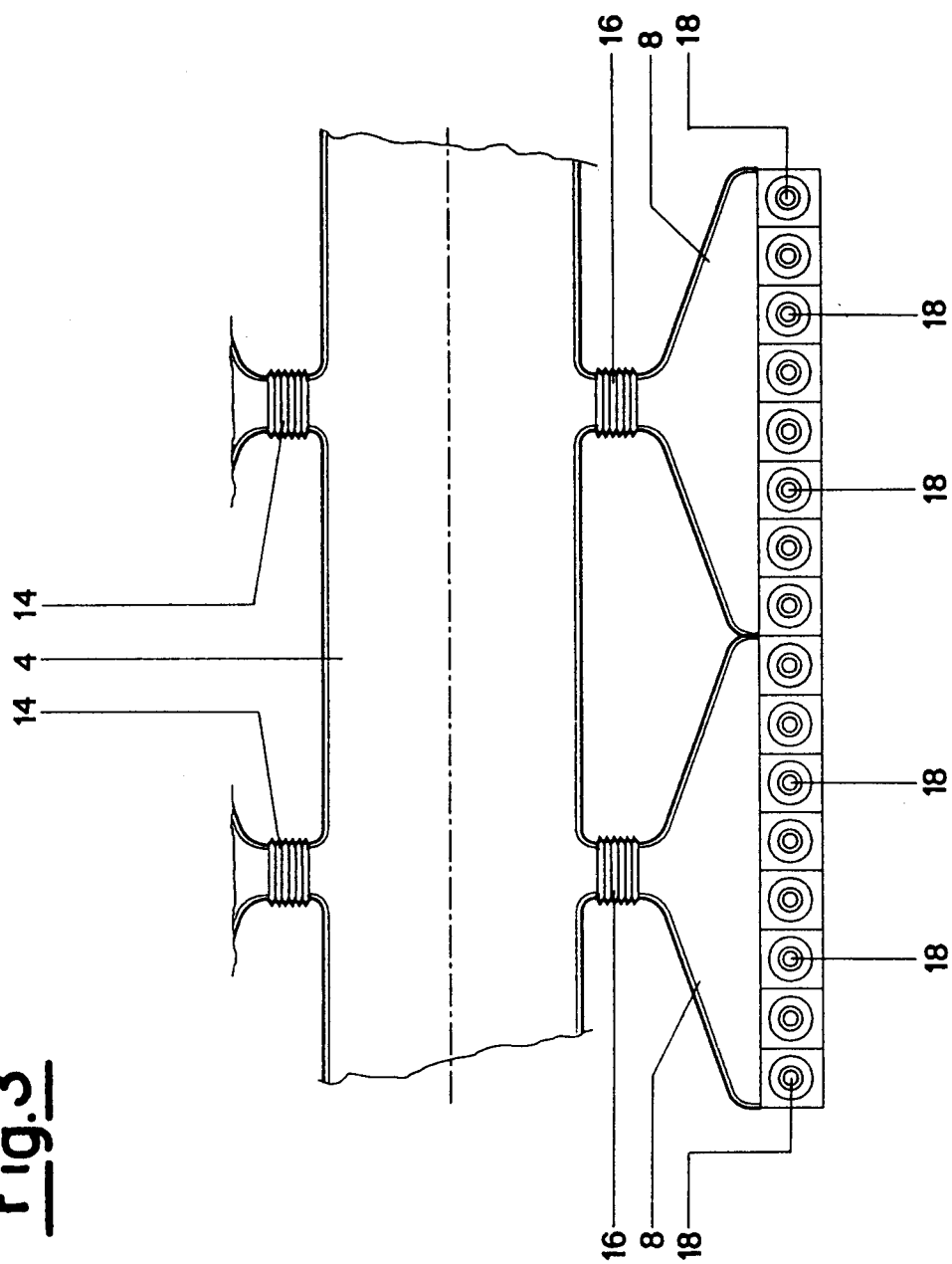


Fig.2

Fig.3





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EUROPEAN SEARCH REPORT

Application Number

EP 91 20 2716

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)
Y	US-A-3 412 545 (E. LIPPUNER) * column 4, line 47 - column 5, line 2; figures * ---	1-4	D01H11/00 B65H54/70 D01H5/66
Y	GB-A-959 969 (HALL & KAY) * page 2, line 17 - line 34; figures * ---	1-4	
A	US-A-3 990 219 (SCHEWE) * column 2, line 28 - line 46 * -----	1,2	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			D01H B65H
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 05 FEBRUARY 1992	Examiner HAGBERG A.M.E.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category 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 I : document cited for other reasons & : member of the same patent family, corresponding document			