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

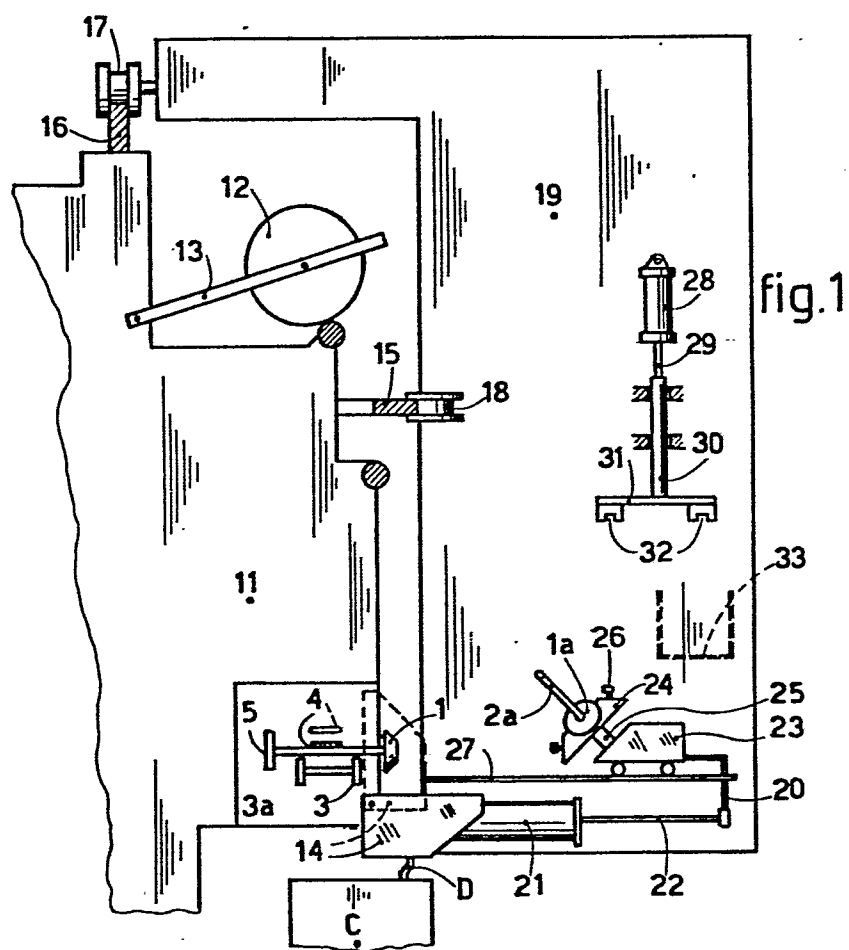
(72) Inventor: **Spano, Raffaello**
Via Divisione Acqui 100/18
Genova(IT)

(72) Inventor: **Zanello, Aldo**
Via Sella 240
Pray (Vercelli)(IT)

(74) Representative: **Petraz, Gilberto**
G.L.P. S.a.s. di Gilberto Petraz P.le Cavedalis 6/2
I-33100 Udine(IT)

(54) **Method and device for cleaning rotors in spinning machines of the open-end type.**

(57) Any dirty rotor (1) which is a part of an open-end spinning machine in a first phase is automatically localized, withdrawn and replaced with a clean rotor (1a) taken from a storage point for clean rotors, the purpose being to reduce to a minimum the time needed for the re-starting of spinning on the unit in question, while at the same time another phase is carried out in which the rotor or rotors withdrawn and replaced are thoroughly cleaned and, after being cleaned, are stored.



1. Description of the patent for an industrial invention entitled:
· "Method and device for cleaning rotors in spinning machines
· of the open-end type".
· In the name of the Company OFFICINE SAVIO S.p.A.
5. at Pordenone.
· Submitted on
· Under No.

10. : It is known that with spinning machines of the open-end
· type, whenever the yarn breaks, all the impurities and fibres
· present in the rotor have to be removed before carrying out
· "re-attachment" of the broken yarn.

· By "re-attachment" we mean the several operations, which
15. may be carried out by hand or automatically, necessary for
· the spinning process to be re-started. Briefly, the operat-
· ions to be carried out are the following: recovery of the
· yarn on the bobbin onto which it is being wound: introduct-
· ion of the yarn into the spinning chamber: activation of the
20. feed of the fibres: rapid extraction of the yarn which has
· by now been connected.

· It may also be necessary to cause a preventive break in
· the yarn so as to clean the rotor when it is wished that the
· quality of the yarn should remain better than the specified
-25. limits laid down. In fact it is known that, as time goes by;

1 the quantity of impurities which build up in the rotor increases and causes a more and more noticeable decline in the quality of the yarn produced.

In the present state of the art the residual impurities and fibres are removed by means of various manual or automatic systems. When the rotor is cleaned by hand, the operator in charge opens the spinning unit and thereby causes the rotor to stop; he then cleans the inside of the rotor with a brush and/or spatula without removing it from its seating.

10 If an automatic device is envisaged for the cleaning of the rotors, the operation is carried out in this case with means pre-arranged either in each unit or on a movable trolley which can work along the whole machine. The means known so far are brushes, spatulas, air blowers, jets of liquid and suction elements, and said means can be used individually or jointly.

Basically, with the present known state of the art, the cleaning is done with means which depend on the system employed, with the unit open or closed, but in all cases without the rotor being removed.

The foregoing cleaning method involves a series of shortcomings, amongst which is the long time needed to re-start production of the spinning unit when the yarn breaks, for it is hard (especially with waxy or very "dirty" materials) to eliminate readily and wholly all the impurities which have been deposited in and are adhering to the inside of the rotor; furthermore, periodical maintenance of the unit is required, and the rotor has to be disassembled and cleaned thoroughly.

The main purpose of this invention is to eliminate or reduce as much as possible all the drawbacks arising from the known cleaning systems.

In accordance with said purpose the invention has as its objects a method and the relative device to carry out that

1 method; according to said method, only a dirty rotor or a
rotor complete with a relative support is replaced automat-
ically by a clean rotor, and thereafter the dirty rotor is
cleaned and made available as a replacement for another rotor.

5 The replacing operation is particularly easy in spinning
units suitably pre-arranged or provided with removable rotors,
such as is the case, for instance, in units equipped with
the so-called "indirect support".

The invention also comprises a device with a movable
10 trolley to carry out the aforesaid method, whereby said de-
vice is characterized by including means suitable for keep-
ing in a continuous traversing movement along the working
face or faces of one or more machines a trolley and some means
fitted to halt the movement thereof in front of the unit
15 where the yarn is broken or in front of a unit which it is
wished to clean; furthermore, said trolley is characterized
by the fact that it is provided with grasping means able to
take and remove the rotor from the machine, following on the
opening of the corresponding unit, so as to transfer said
20 rotor to a cleaning group and to replace it quickly with a
clean rotor, whilst the cleaning group takes steps to clean
the dirty rotor thoroughly with suitable means which are not
restricted by the structural geometry of the machine; the
trolley carries out said operations in the time required for
25 them but not limited by the production requirements.

Another feature of the device which carries out the
method that is our object lies in the fact that the trolley
forming a part of the device, besides being equipped with
cleaning organs, is also provided with means able to hold or
30 store temporarily one or more rotors, after the latter have
been removed and cleaned, so as to make the replacement of
dirty rotors a quicker operation.

The more evident characteristics of the invention are

1. described hereinafter with reference to the attached drawings,
which are given for demonstration purposes only and wherein:

- Fig. I is a diagrammatic view of a device with a trolley
according to the method which is our object as applied to an
5 open-end spinning machine;
- Figs. 2 & 3 give a diagrammatic representation of two
successive phases of the working cycle of the cleaning unit
linked to the trolley;
- Fig. 4 is a side view of a rotating turret means provided
10 with means for grasping a rotor of an open-end unit;
- Fig. 5 is a front view of the turret means of Fig. 4;
- Figs. 6 to 9 show in a diagrammatic manner the main phases
of the working cycle by the activation of which the turret
means shown in Figs. 4 & 5 replaces a dirty rotor with a clean
15 rotor in an open-end spinning unit;
- Fig. 10 gives a perspective of a detail linked to the
cleaning trolley fitted on an open-end spinning machine;
- Figs. 11, 12 & 13 show in a diagrammatic manner the main
phases of the working cycle set in operation by the detail
20 represented in Fig. 10, following on which a dirty rotor re-
moved on the turret means is replaced with a clean rotor;
- Fig. 14 is a perspective and diagrammatic view of one
type of indirect support;
- Fig. 15 gives a diagrammatic representation of another
25 known kind of gas-type support;
- Fig. 16 gives a diagrammatic representation of a known
type of active magnetic support;
- Fig. 17 is a diagrammatic perspective of a non-restrict-
ive example of the means that permit a rotor to be withdrawn
30 jointly with the corresponding support;
- Fig. 18 shows diagrammatically a plan view on a small
scale of the positions which can be taken up by the cleaning
device in respect of a spinning machine.

1. We must begin by saying that Fig.I4 shows diagrammatic-
ally a known indirect support, wherein I. indicates the spin-
ning rotor solidly fixed to the shaft 2 set in rotation and
kept in position by the wheels 3 & 3a and belt 4, whilst the
5 wheel 5, which acts as a thrust bearing, determines the axial
position of the shaft 2 and rotor I; Fig.I5 gives a diagram
of another known type of indirect support working by means
of a cushion of gas introduced into the chambers 6 & 6a which
support the shaft 2 solidly fixed to the rotor I; likewise
10 Fig.I6 is a diagram of a known indirect support working by
means of an active magnetic field generated by the stators
7 & 7a.

In all the examples shown in Figs.I4, I5 & I6 and in
other known cases which we have not shown, provided that the
15 rotor I can be withdrawn from its indirect support together
with the shaft 2, it can be subjected to the method and the
cleaning device which are our subject.

With reference to Fig.I, II is an open-end spinning mach-
ine provided with spools I2, of which each is installed on a
20 swinging arm I3. From the container C the sliver D is fed to
the corresponding spinning unit consisting of the rotor I
mounted on its indirect support and of the spinning chamber
group and organs to open the fibres, the whole being protect-
ed by the cover I4 represented with continuous lines in its
25 open position and with lines of dashes in the position it
takes up when the rotor is active.

The spinning machine II is provided, for instance, with
immovable lengthwise rails I5 & I6 engaged with sliding means
I7 & I8 solidly fixed to the trolley I9, which thus runs
30 along the front of the spinning machine II and, therefore,
along a plurality of spinning stations I to I4 aligned along
said spinning machine.

The trolley I9 is driven along the rails I5 & I6 by mot-

1. or organs governed by automatic devices controlled by suitable sensors linked to a programmer means and comprises a two-way hydraulic or pneumatic cylinder 21 mounted immovably on the trolley 19, whereby the piston rod 22 of the cylinder has its end 20 solidly fixed to a small trolley 23 equipped with turret means 24 that can turn around the axis of its sloping shaft 25; said turret means 24, which in the instance shown has a quadrangular plan and trapezoidal crosswise sections but which could have any other shape such as that of a truncated cone, bears on each of its sloped side faces 24a (Figs. 4 & 5) a grasping organ 26, such as an expansion-type mandrel for example, which is able to hold temporarily a rotor I from any spinning station forming part of a spinning machine II.

15. Each trolley 19 is also equipped with a two-way cylinder 28 having a vertical axis and a piston, of which the rod 29 is mounted so as to be able to revolve and run within a sleeve 30 and is solidly fixed to a horizontal arm 31 provided with grasping organs 32 situated symmetrically opposite to each other in respect of the axis of said cylinder 28 and at such a distance from each other that in the position shown in Figs. I & 3 one of the organs 32 is vertically aligned with the grasping organ 26 borne on the upwards-facing side 24a of the turret means 24 when the small trolley 23 is in its position furthest away from the spinning station, whereas the other opposed organ 32 is vertically aligned with the cavity of a washing vessel 33 located at a height convenient for the purposes described hereinafter.

The small shaft 25 of the turret means 24 receives from 30 the small trolley 23 rotational impulses for arcs of 90°; the small shaft 30 solidly fixed to the arm 32, besides carrying out an alternating movement in a vertical direction, receives impulses of rotational movement in one single direction cover-

1. ing arcs of 180° ; all the movements are automatic and take place at programmed times.

The working of the device described so far is as follows: the trolley 19 moves along the rails 15 & 16 (Fig.1) and is able to reach and stop in front of any of the spinning stations I to 14 of the spinning machine 11; having reached the unit where it is desired or is necessary to replace the rotor because the latter is dirty, it halts; thereafter, by means of devices not shown here, it opens the cover 14 automatically and brings it from the position shown with lines of dashes to that shown with continuous lines; it arranges to stop the rotor I and to raise the tangential belt 4. Thereafter the cylinder 21 brings back its own piston and takes the rod 22 from the position of Fig.1 to that of Fig.2 together with the small trolley 23 and turret means 24; the latter has a grasping organ 26 which is free and has its own horizontal axis in a position coaxial with the small shaft 2 of the rotor I which has to be cleaned, whilst at least one of its other grasping organs 26 bears a clean rotor Ia - 2a (Figs.6 to 9 inclusive).

At the moment when the small trolley 23 and turret means 24 move forwards, the latter is in its position of Fig.6 in relation to the unit concerned and indicated with 33 in Figs. 6 to 9 inclusive.

25. The free grasping organ 26 is aligned with the rotor I - 2 and moves forward with the small trolley 23 until it seizes the rotor; in programmed sequence thereafter the cylinder 21 arranges to bring back the whole group comprising the small trolley 23 together with the turret means 24 to the starting position as shown in Fig.3. In this latter position the rotor I - 2 is wholly withdrawn from the corresponding spinning unit. Thereafter the turret means 24 rotates in an anti-clockwise direction, as regards Fig.3 and Figs.6 to 9

1. inclusive, through an arc of 90° and thereby brings the clean
rotor Ia - 2a, with which it was provided, to the position
of the dirty rotor I - 2. Thereafter the cylinder 2I brings
the small trolley 23, turret means 24 and rotor Ia - 2a back
5. again to the position of Fig. 2 or else to a position advanced
towards the unit previously deprived of the rotor I - 2. The
clean rotor is thus positioned on the support 3, 3a, 4 and 5,
and the small trolley 23 returns to its initial backward po-
sition, while the cover 14 is closed. The trolley 19 is thus
10. free to restart its traversing movement along the front of
the spinning machine II. When the small trolley 23 has taken
up again its backward position in relation to the front of
the spinning machine II (Figs. I & 3), the turret means 24
completes a further angular movement of 90° in an anti-clock-
15. wise direction and brings a previously removed dirty rotor
I-2 into vertical alignment with one of the seizing organs
32 solidly fixed to the arm 3I, which is associated with the
rod 29 of the cylinder 28; the second seizing organ 32 of
said arm 3I is vertically aligned with the bath or cleaning
20. unit 33. At that moment the cylinder 28 is activated and
thrusts the rod 29 and arm 3I downwards until they bring the
seizing organ 32, which is aligned with the small shaft 2
of the rotor I-2, into contact with the end thereof; said
seizing organ grips the end of said small shaft 2, whilst
25. thereafter the seizing organ 26 of the turret means 24, which
was gripping the rotor I, frees the latter.

The essential phases of the working cycle of the mov-
able group comprising the cylinder 28, arm 3I and seizing
organs 32 are shown in Figs. II, I2 & I3. As can be seen in
30. Fig. II, it is preferable that the seizing organ 32 aligned
vertically with the cleaning bath 33 should always carry a
rotor Ia - 2a which has already been cleaned, the object
being to carry out a quick replacement of the dirty rotor

1. I - 2 already removed, which, as is shown in Fig. I2, is withdrawn by the arm 3I and replaced (Fig. I3) at once by a rotation of 180° and a successive lowering of the arm itself. By an operation of this kind the twofold purpose is fulfilled
5. of supplying the turret means 24 again at once with a clean rotor and of subjecting the dirty rotor at the same time to cleaning operations in the cleaning bath 33. Clearly, the cylinder 28 can raise the arm 3I moderately so as to disengage the end of the small shaft 2a of the rotor Ia which has
10. been cleaned and taken by one of the organs 26 of the turret means 24, whilst the dirty rotor I - 2 is allowed to remain under the action of the cleaning unit 33. It is also clear that both the seizing organs 26 of the turret means 24 and the seizing organs 32 of the arm 3I can be activated and dis-
15. activated independently, while all their diverse movements are automatic and are coordinated owing to the employment of known devices.

According to an evident variant the cleaning operation can be carried out at one or more unmovable stations located
20. along the path of the trolley I9 (Fig. I8) at one or more of the points indicated with numbers from I to VI inclusive and provided with cleaning means and with means to collect and discharge rotors onto and from the trolley I9, which in such a case is equipped with means 21, 22, 23 & 24 to remove dirty
25. rotors and install clean rotors but lacks the cleaning unit 28 - 3I.

Depending on the number of operations which the trolley I9 can be foreseen to have to carry out during its run in relation to the structure and lay-out of the spinning machines
30. (Fig. I8) and also in relation to the capacity of the storage means, the cleaning unit, I to VI inclusive, is positioned suitably.

In particular, if the capacity of the trolley is enough

1 to serve two or more machines, the cleaning unit may be positioned at any of the stations indicated with numbers from I to VI inclusive in Fig.18; if the capacity of the trolley is enough for only one machine, the unit can be at I and IV or II and V or III and VI, whereas if the capacity of the trolley is enough for only one face of a machine, then the unit will have to be at I and III for the first machine and at IV and VI for the second machine. The determination of the capacity of the tanks needed to serve a certain number of spinning units without stopping at the cleaning station can be calculated with the following formula:

$$C = S + \frac{N}{1000} \times n \times \frac{t}{60 \times 1000}$$

wherein:

C = capacity of the tank

15 S = stock of rotors

N = number of operations to be carried out per 1000 spindles per hour

n = number of units to be served

t = average time in minutes needed by the trolley to keep

20 1000 spinning units in production (including supervision and machine operations).

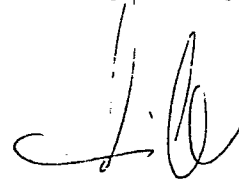
With reference to Fig.17, which shows a rotor I with a conventional support 8, 9 is a part of the spinning unit solidly fixed to the spinning machine frame II, whilst IO is a pair of removable pivots on which the bosses 8a of the support 8 can be hinged at IOa.

By realizing a solution of this kind or any other solution able to permit the rotor to be withdrawn together with its corresponding support and by equipping the trolley 19 adequately, the method and the device which are our subject can also be used advantageously with spinning units having rotors with a direct, rigid support.

Clearly, the invention is not limited by what has been

1. described and shown for demonstration purposes alone but can
be applied to all practical realizations that are comprised
within the scope of the method which is the subject of the
invention.

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1.

C L A I M S

I) Method for cleaning rotors in spinning machines of the open-end type, characterized by the fact that any dirty rotor (I) which is a part of an open-end spinning machine is, during a first phase, localized, removed and replaced with a clean rotor taken from a storage point for clean rotors, so as to reduce to a minimum the time needed for re-starting the spinning on the unit concerned, being also characterized by the fact that at the same time another phase is carried on in accordance with which a thorough cleaning is performed of the rotor or rotors removed and replaced, which latter are stored after being cleaned.

2) Method and device for cleaning rotors in spinning machines of the open-end type, as in Claim I and according to a variant, characterized by comprising two successive phases, during the course of the first of which the localization, removal and replacement of a dirty rotor with a clean rotor takes place automatically, whereas during the course of the second thereof the thorough cleaning of the rotor removed from the spinning unit is performed, the clean rotor being drawn from a storage point for clean rotors.

3) Device as in Claim I, characterized by comprising a trolley (I9) which can move along the whole face of a spinning machine (II) and can halt automatically so as to coincide with each spinning stations (I to I4), whereby said trolley is provided with means to brake any rotor (I) and to open the corresponding cover (I4), and also with means to remove the halted rotor of the open unit, and also with means to take a clean rotor from a storage point associated with the trolley (I9), and also with means to put said rotor thus taken onto its working position.

4) Device as in Claims I and 2, characterized by the fact

1. that the trolley (19) is equipped with a two-way hydraulic
or pneumatic cylinder (21) which is able to make a small
trolley (23) carry out alternate approaching and/or depart-
ing movements in relation to each spinning unit (1 to 14),
5 whereby said small trolley (23) is provided with means (24-
26) able to withdraw a dirty rotor (1) from the unit and re-
place it with a clean rotor (1a) and whereby said small trol-
ley (23) can also pre-arrange the rotor thus withdrawn (1) in
such a position that the latter can be taken by a seizing
10 organ (32) so as to be brought to the cleaning phase.

5) Device as in Claims 1 and 4, characterized by the
fact that the small trolley (23) is equipped with a turret
means (24), which can revolve and is provided with seizing
organs (26) able to engage and hold temporarily a rotor (1-2)
15 withdrawn from a spinning unit, whilst the two-way cylinder
(28) is associated with an arm (31) equipped with at least
two seizing organs (32), each of which is able to grip the
end of the shaft (2) of a rotor (1), whereby one of said sei-
zing organs (32) is aligned vertically with a cleaning unit
20 (33) lying beneath it, whereas the other seizing organ (32)
is vertically aligned with the shaft (2) of the rotor with-
drawn and displaced at an angle by the turret means (24) of
the small trolley (23).

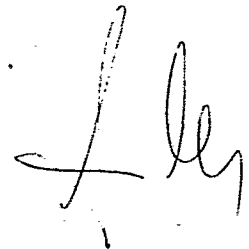
6) Device as in Claim 1, wherein the removal and replace-
25 ment of the rotors in relation to a spinning unit are per-
formed by seizing organs (26-32) driven by mechanical, pneum-
atic or hydraulic means.

7) Device as in Claim 1, according to a variant (Fig. 17),
characterized by the fact that each rotor to be cleaned to-
30 gether with its support (8) is hinged, in relation to the re-
maining part of the spinning unit, and solidly fixed to the
spinning machine by means of pivots (10) which can be axially
moved, whereas the small trolley (23) is equipped with means

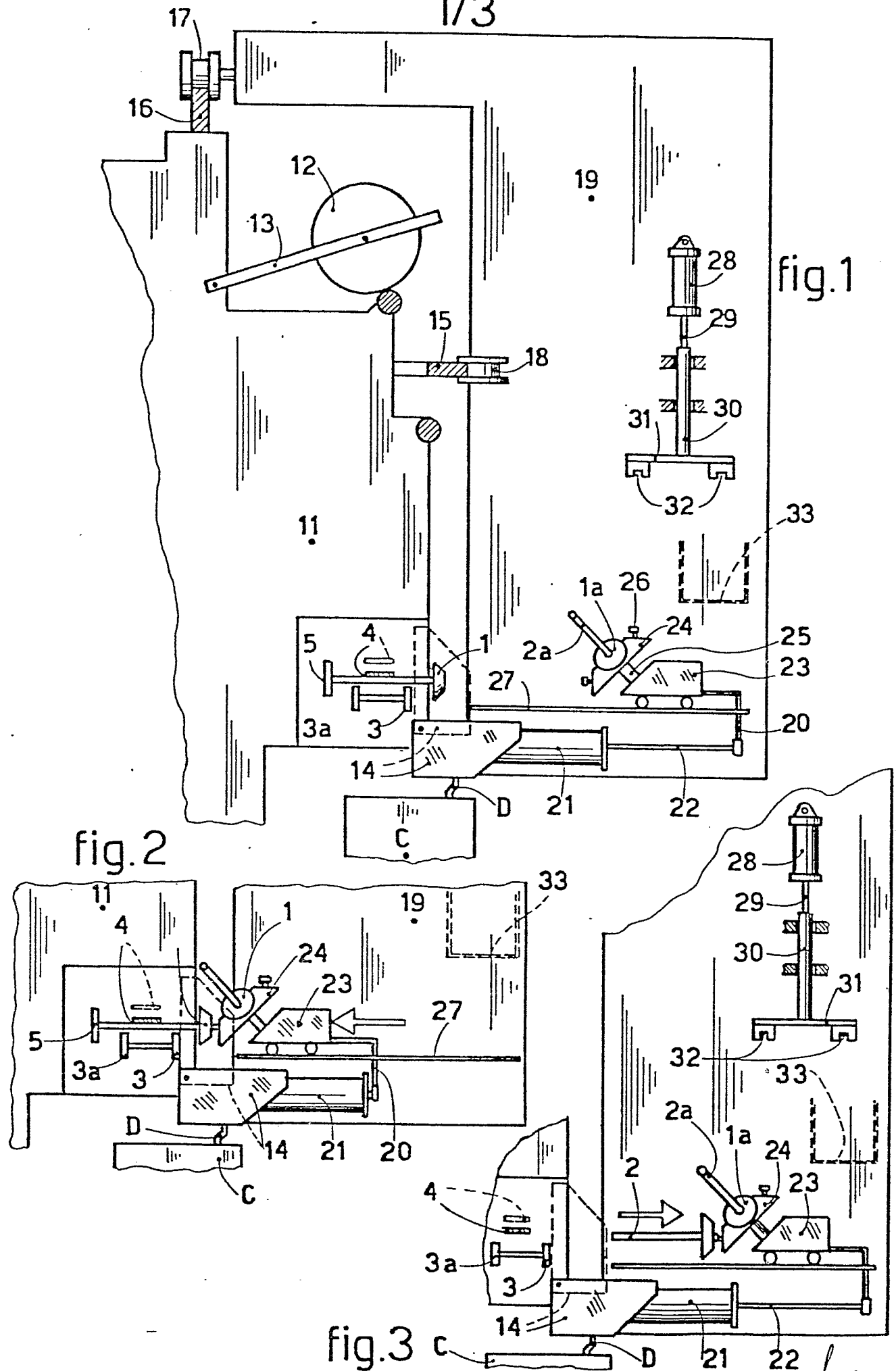
1 able to perform the opening of the hinge composed of said
pivots and is also equipped with means to seize, remove and
clean the rotor (I) together with its corresponding support
(8), whilst a cleaned rotor and its corresponding support,
5 by an inverse movement of said means, are installed automat-
ically once again on their seating, the organs removed being
taken and subjected to cleaning.

8) Method and device as in Claim I, characterized by the
fact that the trolley (I9) is provided with a storage point
10 (24) for cleaned rotors, and with means to re-supply it from
one of the stationary stations, and with means to replace
dirty rotors (I) with regenerated rotors, whereby said trol-
ley (I9) is also equipped with means to collect and discharge
dirty replaced rotors in front of the stationary cleaning
15 stations (I - VI).

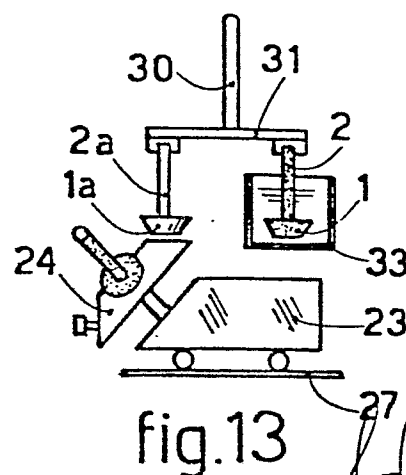
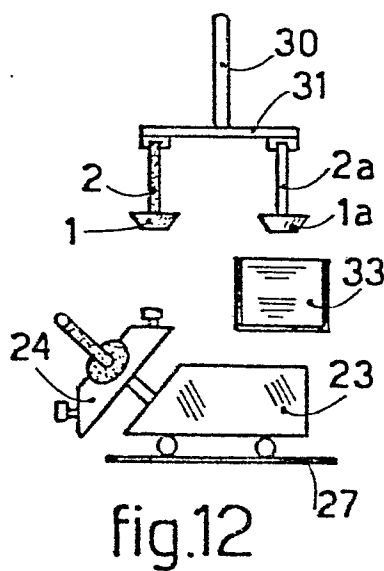
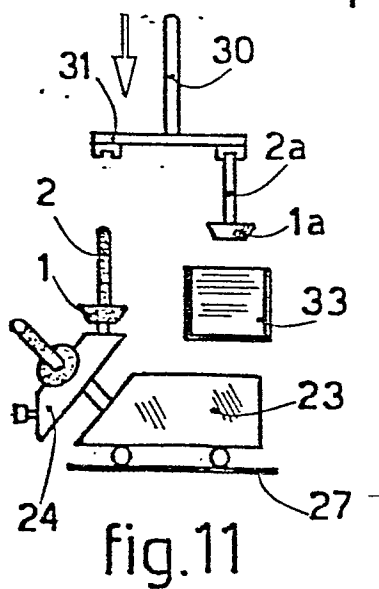
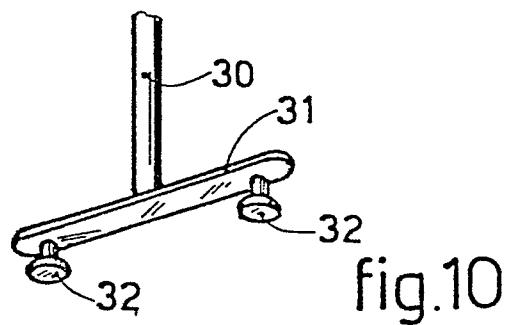
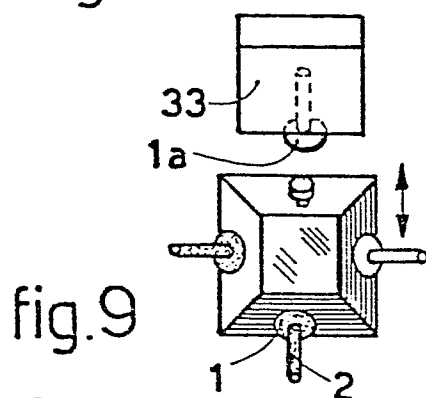
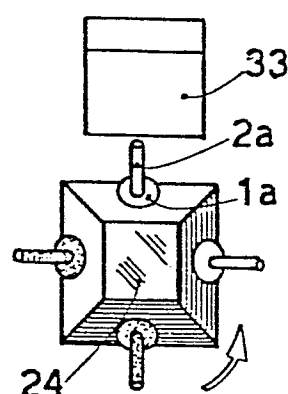
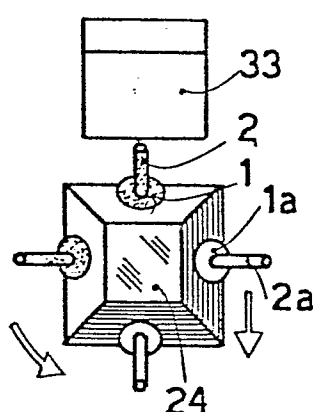
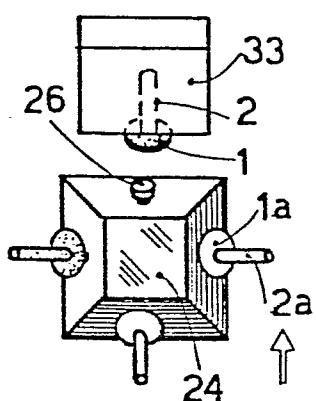
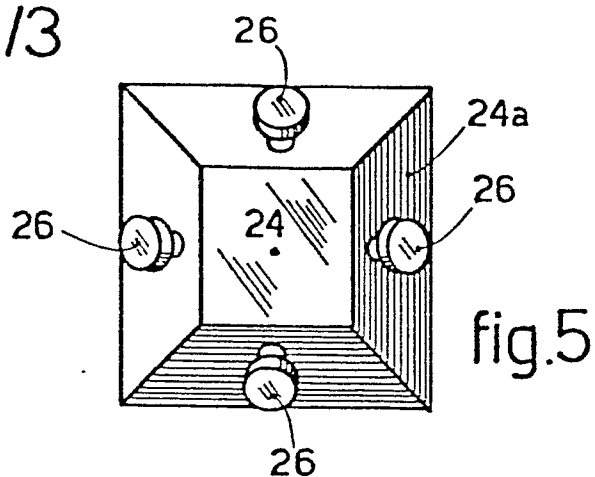
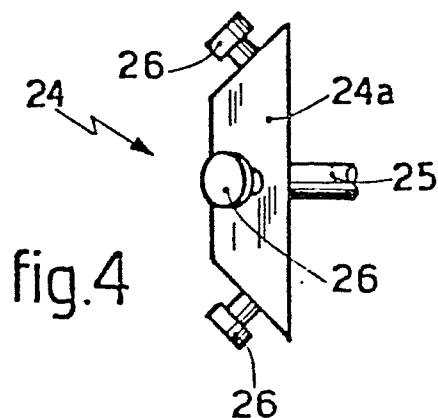
9) Method and device as in Claims I and 6, characterized
by the fact that the trolley (I9) that runs along the working
face of the spinning machine cooperates with stationary clean-
ing stations.



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3/3

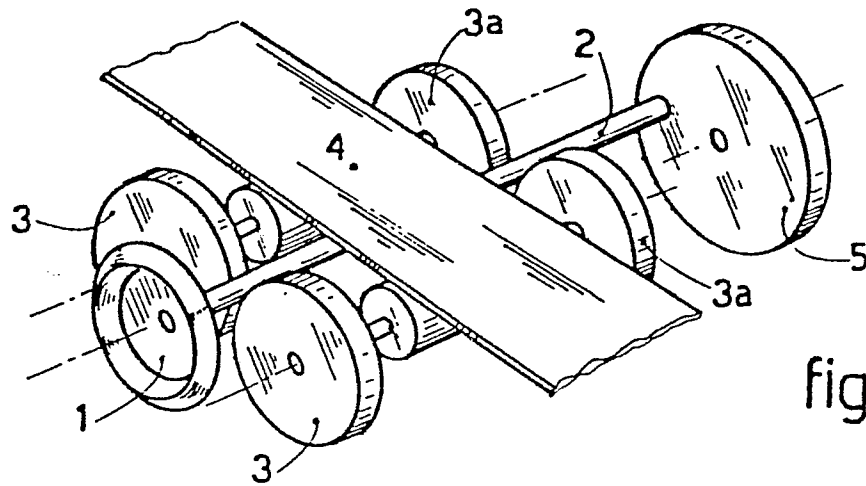


fig.14

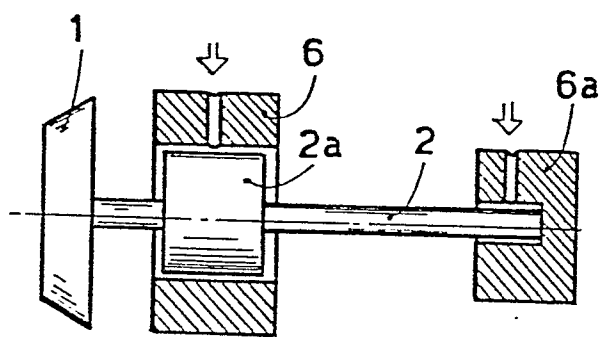


fig.15

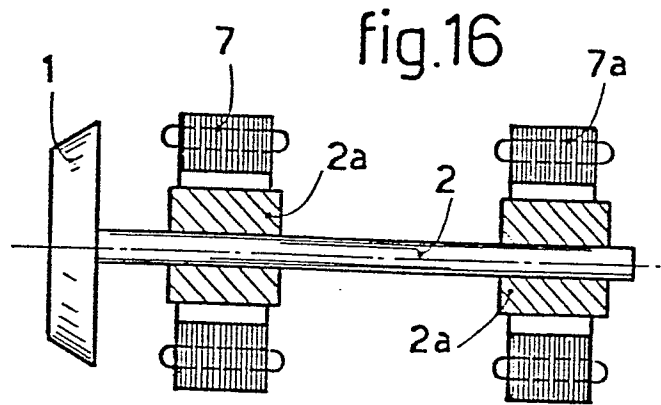


fig.16

fig.17

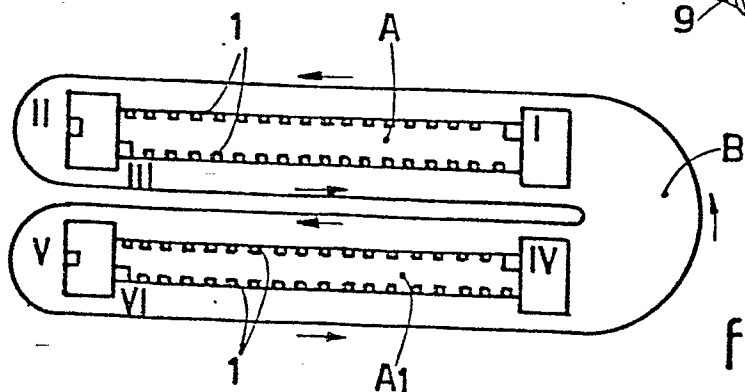
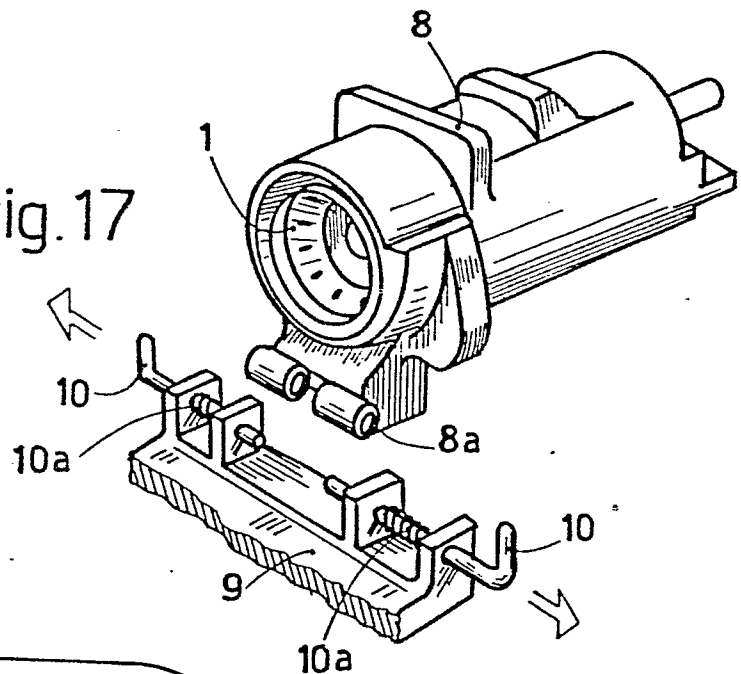


fig.18

Gilberto Pelraz



European Patent
Office

EUROPEAN SEARCH REPORT

0019595
Application number
EP 80 83 0025

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	<u>FR - A - 2 384 044 (STAHLECKER)</u> * Whole document * -----		D 01 H 7/885
			TECHNICAL FIELDS SEARCHED (Int.Cl. ³)
			D 01 H
			CATEGORY OF CITED DOCUMENTS
			X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
			&: member of the same patent family, corresponding document
☒ The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 30-07-1980	Examiner DEPRUN