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(54) MACHINE FOR CLEANING COPS OR YARN CONES SUPPORTS FOR TEXTILE INDUSTRY

(57) Herein described is a machine (10) for cleaning cops (100) or yarn cones supports for textile industry, comprising a main structure (50) supporting an extruding group (12) which is configured for holding a single cop (100) and for removing the residual yarn (200) from the cop (100), and a collecting group (14) which is configured for collecting the clean cops (100). The extruding group (12) comprises a mechanism (16) for holding the cops (100) integral with the machine (10) and configured for holding fixed a single cop (100) loaded on the extruding group (12), and a pushing device (18) facing the holding mechanism (16) and movable along an axis substantially parallel to the rotation axis of the cop (100). In a first operative configuration of the machine (10), the cop (100) with the residual yarn (200) wound about the same is inserted and fixed on the holding mechanism (16) and, in a second operative configuration of the machine (10), the pushing device (18) is activated so as to push the cop (100) through the holding mechanism (16), whereas the residual yarn (200) is held on the holding mechanism (16) to be then removed from the machine (10) and the cleaned cop (100) is instead sent to the collecting group (14) to be used again later.

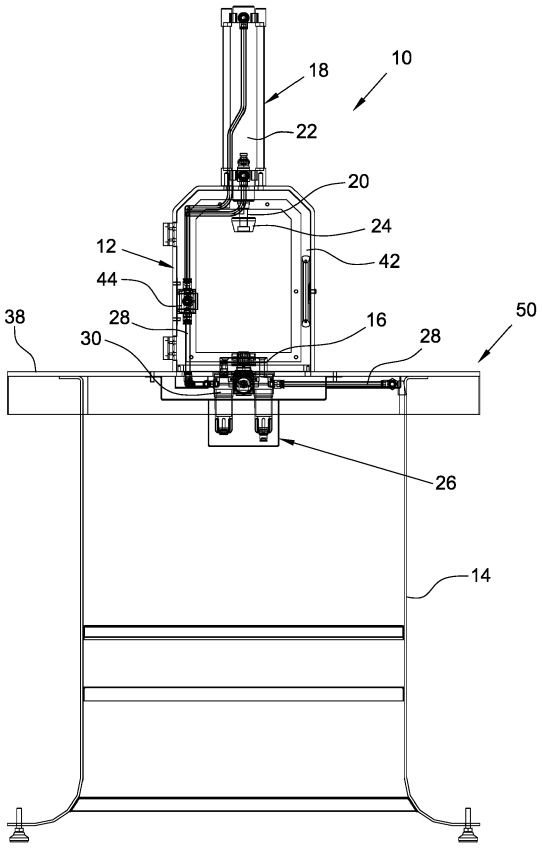


Fig. 1

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Description

[0001] The present invention refers to a machine for cleaning spinning cops or supports of yarn cones for the textile industry, in particular but not exclusively for cleaning cylindrical or frusto-conical-shaped cops.

[0002] As known, the textile machines used downstream of the spinning process are supplied with cones or spools constituted by a preset amount of yarn wound around a central support, usually referred to as "cop" due to its small cylinder or tube shape. During the subsequent operations of unwinding the yarn (winding, double-twisting, re-twisting, etc.), following the inadvertent breakage of the yarn during supply to the machine, there may occur an interruption in the supply of the yarn before the cone or spool finishes. In cases where the breakage of the yarn occurs when the cone or the spool is almost completely used, there is no longer the advantage of using the residual part of yarn, usually referred to as "tail".

[0003] Thus, in the textile industry there is the problem of cleaning the cops, eliminating the tails thereof, before proceeding to the subsequent operation, which consists in loading a new yarn on the support. The techniques currently used for performing this cleaning operation may be both of the manual and automated type.

[0004] A technical manual for the cleaning of the cops provides for cutting the residual yarns, or tails, through a special cutting tool (hook, grappling hook, knife, etc.) which is axially slid along the lateral surface of the cop. The yarns thus cut may be easily removed from the cop, which is thus ready to be reutilized.

[0005] However, this manual operation is complex, in that it should always be performed up to standard to prevent the cutting from causing alterations or damage on the surface of the cop such to jeopardize its duration over time. In addition, any alterations or damage of the surface of the cop inevitably jeopardize the wholeness of the yarn which will be subsequently wound on the cop. Moreover, this technique is difficult to apply for cleaning cops with thin walls, in that an excessive pressure exerted by the cutting tool could generate holes into which the yarn introduces, thus precluding the action of the cutting tool.

[0006] Another technique for cleaning the cops consists in blowing, on the surface of the cop, a heated high temperature air jet. The air jet is capable of causing the melting of the tails present on the cop. However, this technique may be efficiently used just for cleaning cops on which synthetic yarns are wound.

[0007] A further cleaning technique requires the use of particular cops provided, along the lateral surface thereof, with a groove which extends parallel to one of the diretrices of such lateral surface. The cutting of the residual yarns is performed through a blade which penetrates into such groove. Though allowing maintaining the wholeness of the cops without using sophisticated tools, may however be applied only to specific cops, provided with a longitudinal groove, which require to necessarily replace the cops normally utilized in textile industries.

[0008] Automated techniques for cleaning the cops provide for the use of special machines provided with mechanical scraping means, which slide axially along the lateral surface of the cop to obtain the progressive axial slipping off of the residual tails. However, similar machines, for example described in documents CH-A-372991, DE-B-1078510, EP-A-0654437, EP-A-0761588, US-A-1805452, US-A-2732609, US-A-3298078 and WO-A-88/00923, utilize complex moveable scraping mechanisms which are not always capable of maintaining the wholeness of the cops being processed.

[0009] Thus, an object of the present invention is to provide a machine for cleaning cops or supports of yarn cones for the textile industry, in particular but not exclusively for cleaning cylindrical or frusto-conical-shaped cops, capable of overcoming the aforementioned drawbacks of the prior art in an extremely simple, economic and particularly functional manner.

[0010] In detail, the present invention has the object of providing a machine for cleaning cops that is without any cleaning tool, such as for example blades and hooks.

[0011] Another object of the present invention is to provide a machine for cleaning cops that is completely safe for the operators, eliminating potential injuries caused by the cutting.

[0012] Another object of the present invention is to provide a machine for cleaning cops that is capable of maintaining the wholeness and quality of the cops, allowing a long duration of the cops over time.

[0013] Another object of the present invention is to provide a machine for cleaning cops capable of allowing an increase of productivity during the subsequent machining operations, in that the cops, not ruined by the contact with cutting tools, do not entangle and hold the yarn, thus avoiding breaking it and slowing such machining operations.

[0014] Another object of the present invention is to provide a machine for cleaning cops capable of allowing improving the quality of the yarn, given that the lesser the breakage due to the yarn being entangled on the ruined cops and lesser are the knots required to be performed on such yarn.

[0015] These objects according to the present invention are obtained by providing a machine for cleaning cops or supports of yarn cones for the textile industry, in particular but not exclusively for cleaning cylindrical or frusto-conical-shaped cops, as outlined in claim 1.

[0016] Further characteristics of the invention are outlined by the dependent claims, which are an integral part of the present description.

[0017] The characteristics and advantages of a machine for cleaning cops according to the present invention shall be more apparent from the following exemplifying and non-limiting description with reference to the attached schematic drawings, wherein:

figure 1 is a front view of a preferred embodiment of

the machine for cleaning cops according to the present invention;
figure 2 is a lateral view of the machine for cleaning cops of figure 1;
figure 3 is a side elevation view of a first component of the machine for cleaning cops of figure 1;
figure 4 is a side elevation view of a second component of the machine for cleaning cops of figure 1;
figure 5 is a perspective view of a third component of the machine for cleaning cops of figure 1;
figure 6 is a perspective view of a fourth component of the machine for cleaning cops of figure 1;
figure 7 is a schematic view showing the machine for cleaning cops of figure 1 in a first operating configuration; and
figure 8 is a schematic view showing the machine for cleaning cops of figure 1 in a second operating configuration.

[0018] With reference to the figure, a preferred embodiment of the machine for cleaning cops according to the present invention is shown, indicated in its entirety with the reference number 10. The machine 10 comprises a main structure 50 which supports a group for holding the cop 100 and removing the yarn residue 200 from such cop 100, also referred to as extruder group 12, and a collection group 14 of the clean cops 100, which in the embodiment shown in the figures is arranged beneath the extruder group 12 with reference to a support plane of the machine 10.

[0019] The extruder group 12 in turn comprises a mechanism 16 for holding the cops 100 (figure 5), integral with the machine 10 and configured for holding a single cop 100 stationary loaded on such extruder group 12. In the embodiment shown in the figures, the cop 100 is held standstill on the holding mechanism 16 in vertical position (figures 7 and 8), i.e. with the rotation axis thereof perpendicular with respect to a support plane of the machine 10.

[0020] The extruder group 12 further comprises a thrust device 18 (figure 3), faced on the holding mechanism 16 and moveable along an axis substantially parallel to the rotation axis of the cop 100. In the embodiment shown in the figures, the thrust device 18 is placed above the holding mechanism 16 and it is moveable along a vertical direction with reference to a support plane of the machine 10.

[0021] With reference to figures 7 and 8, the operation of the machine 10 for cleaning cops according to the present invention occurs as follows. In a first operating configuration, shown in figure 7, the cop 100 with the yarn residue 200 wound around it is inserted and fixed on the holding mechanism 16. In a second operating configuration, shown in figure 8, the thrust device 18 is actuated so as to push the cop 100 through the holding mechanism 16, while the yarn residue 200 is held on the holding mechanism 16 and it can be subsequently removed from the machine 10. The cleaned cop 100 is instead sent to the collection group 14 so as to be reutilized subsequently.

[0022] In detail, the thrust device 18 is of the pneumatic type and comprises a piston 20 moveable by a reciprocating motion within a respective cylinder 22. The pneumatic piston 20 is provided, at the free terminal end thereof, with a bushing 24 capable of being engaged with a corresponding terminal end of the cop 100 to push it through the holding mechanism 16. The bushing 24 may conveniently be of the removable type, so as to allow the use of a plurality of different bushings 24 capable of adapting to corresponding cops 100 of different shape and dimensions.

[0023] The pneumatic piston 20 is actuated by the compressed air supplied by a special group 26 for treating the air (figure 6), which in the embodiment shown in the figures is installed in the collection group 14, beneath the extruder group 12. The air treatment group 26 is provided with a compressor (not shown), as well as with one or more channels 28 capable of conveying the compressed air from and towards the thrust device 18. The air treatment group 26 may also comprise a filtering device 30 with airflow regulation and lubricating functions, as well as one or more control manometers 32.

[0024] As shown in figure 5 and in figures 7 and 8, the holding mechanism 16 is constituted by an extruder plate 34 provided with a through hole having an internal diameter such to allow the sliding of the cop 100 through the extruder plate 34 when such cop 100 is pushed by the thrust device 18. An elastic membrane 36, also provided with a respective through hole aligned with the through hole of such extruder plate 34 is operatively coupled to the extruder plate 34. The through hole of the elastic membrane 36 in any case has an internal diameter smaller than the internal diameter of the through hole of the extruder plate 34. The assembly constituted by the extruder plate 34 and by the elastic membrane 36 is thus made integral with a wall 38 for connection between the extruder group 12 and the collection group 14 of the clean cops 100 through a spacer element 40.

[0025] Both the extruder plate 34, and the elastic membrane 36 may be of the removable type and they may be substituted with extruder plates and/or with elastic membranes having respective through holes of different dimensions. This allows the use of a plurality of combinations of extruder plates and of elastic membranes capable of adapting to cops 100 of different shape and dimensions.

[0026] When the machine 10 is in its first operating configuration, shown in figure 7, one of the terminal ends of the cop 100 is inserted into the through hole of the extruder plate 34 and it lies on the elastic membrane 36. When instead the thrust device 18 is actuated, in the second operating configuration of the machine 10, the cop 100 is forced to pass through the through hole of the elastic membrane 36, so that it also traverses the wall 38 to reach the collection group 14, while the yarn residue 200 is held by the extruder plate 34 and by the elastic

membrane 36, so as not to traverse such wall 38 and thus be easily removed. This allows efficiently removing the yarn residues 200 from cops 100 of various shapes, such as for example cylindrical-shaped, frusto-conical-shaped, spindle-shaped, etc.

[0027] As shown in figures 1 and 2, the extruder group 12 may be obtained in form of a closed chamber provided with a port 42 which can be opened for the introduction of the cop 100 to be cleaned and for the subsequent extraction of such cop 100 once cleaned. During the steps of operating the machine 10, the port 42, moved manually, actuates a safety device 44 (figure 4) which allows the air treatment group 26 activating the pneumatic piston 20 (figure 8) only when such port 42 is completely closed.

[0028] Regardless of the type of actuation, the safety device 44 comprises a locking bolt 46 which, when activated exclusively following the complete closure and providing safety conditions for the port 42, allows the actuation of the pneumatic piston 20 of the thrust device 18, thus guaranteeing complete safety for the operators.

[0029] It has thus been observed that the machine for cleaning cops according to the present invention attains the previously set objects, thus becoming a practical and safe alternative to the current techniques, whether manual or automated, for cleaning the cops.

[0030] The machine for cleaning cops of the present invention thus conceived is susceptible to numerous modifications and variants, all falling within the same inventive concept; in addition, the details can be replaced with technically equivalent elements. In practice the materials used, as well as the shapes and dimensions, may vary according to the technical needs.

[0031] Thus, the scope of protection of the invention is defined by the attached claims.

Claims

1. Machine (10) for cleaning cops (100) or yarn cones supports for textile industry, comprising a main structure (50) supporting an extruding group (12) which is configured for holding a single cop (100) and for removing the residual yarn (200) from said cop (100), and a collecting group (14) which is configured for collecting the clean cops (100), the extruding group (12) comprising:

    - a mechanism (16) for holding the cops (100) integral with the machine (10) and configured for holding fixed a single cop (100) loaded on said extruding group (12); and
    - a pushing device (18) facing the holding mechanism (16) and movable along an axis substantially parallel to the rotation axis of the cop (100), said pushing device (18) being of the pneumatic type and comprising a piston (20) which is movable according to a reciprocating motion inside a respective cylinder (22),

    so that, in a first operative configuration of the machine (10), the cop (100) with the residual yarn (200) wound about the same is inserted and fixed on the holding mechanism (16) and, in a second operative configuration of the machine (10), the pushing device (18) is activated so as to push the cop (100) through the holding mechanism (16), whereas the residual yarn (200) is held on the holding mechanism (16) to be then removed from the machine (10) and the cleaned cop (100) is instead sent to the collecting group (14) to be used again later, the machine (10) being **characterized in that** the holding mechanism (16) consists of:

    - an extruding cap (34), provided with a through-hole having an inner diameter such as to allow the sliding of the cop (100) through said extruding cap (34) when said cop (100) is pushed by the pushing device (18); and
    - an elastic membrane (36) operatively coupled to said extruding cap (34), said elastic membrane (36) being provided with a respective through-hole aligned with the through-hole of said extruding cap (34),

    wherein the through-hole of said elastic membrane (36) has an inner diameter smaller than the inner diameter of the through-hole of said extruding cap (34).

2. Machine (10) according to claim 1, **characterized in that** the pushing device (18) is placed above the holding mechanism (16) and is movable along a vertical direction with respect to a bearing plane of the machine (10), so that the cop (100) is held fixed on the holding mechanism (16) in vertical position, i.e. with its rotation axis perpendicular with respect to said bearing plane of the machine (10), and that the collecting group (14) of the clean cops (100) is placed below the extruding group (12) with respect to said bearing plane of the machine (10).

3. Machine (10) according to claim 1 or 2, **characterized in that** the piston (20) is provided, at the free end thereof, with a bushing (24) capable of engaging with a corresponding terminal end of the cop (100) for pushing the same through the holding mechanism (16).

4. Machine (10) according to claim 3, **characterized in that** the bushing (24) is of the removable type, so that it is possible to use a plurality of different bushings (24) capable of adjusting on corresponding cops (100) having different shape and dimensions.

5. Machine (10) according to any claim 1 to 4, **charac-**

terized in that the assembly consisting of the extruding cap (34) and of the elastic membrane (36) is made integral with a wall (38) for the connection between the extruding group (12) and the collecting group (14) of clean cops (100) by means of a distal element (40).

6. Machine (10) according to any claim 1 to 5, **characterized in that** both the extruding cap (34) and the elastic membrane (36) are of the removable type to be replaced by extruding caps and/or by elastic membranes having respective through-holes of different dimensions, so as to adjust on cops (100) having different shape and dimensions.

7. Machine (10) according to any claim 1 to 6, **characterized in that** the extruding group (12) is made in the form of a closed chamber provided with an openable port (42) for the introduction of the cop (100) to be cleaned and for the following extraction of said cop (100) once cleaned.

8. Machine (10) according to claim 7, **characterized in that** the port (42) is provided with a safety device (44) comprising a locking bolt (46) capable of allowing the activation of the piston (20) only upon completely closing and safety arrangement of said port (42).

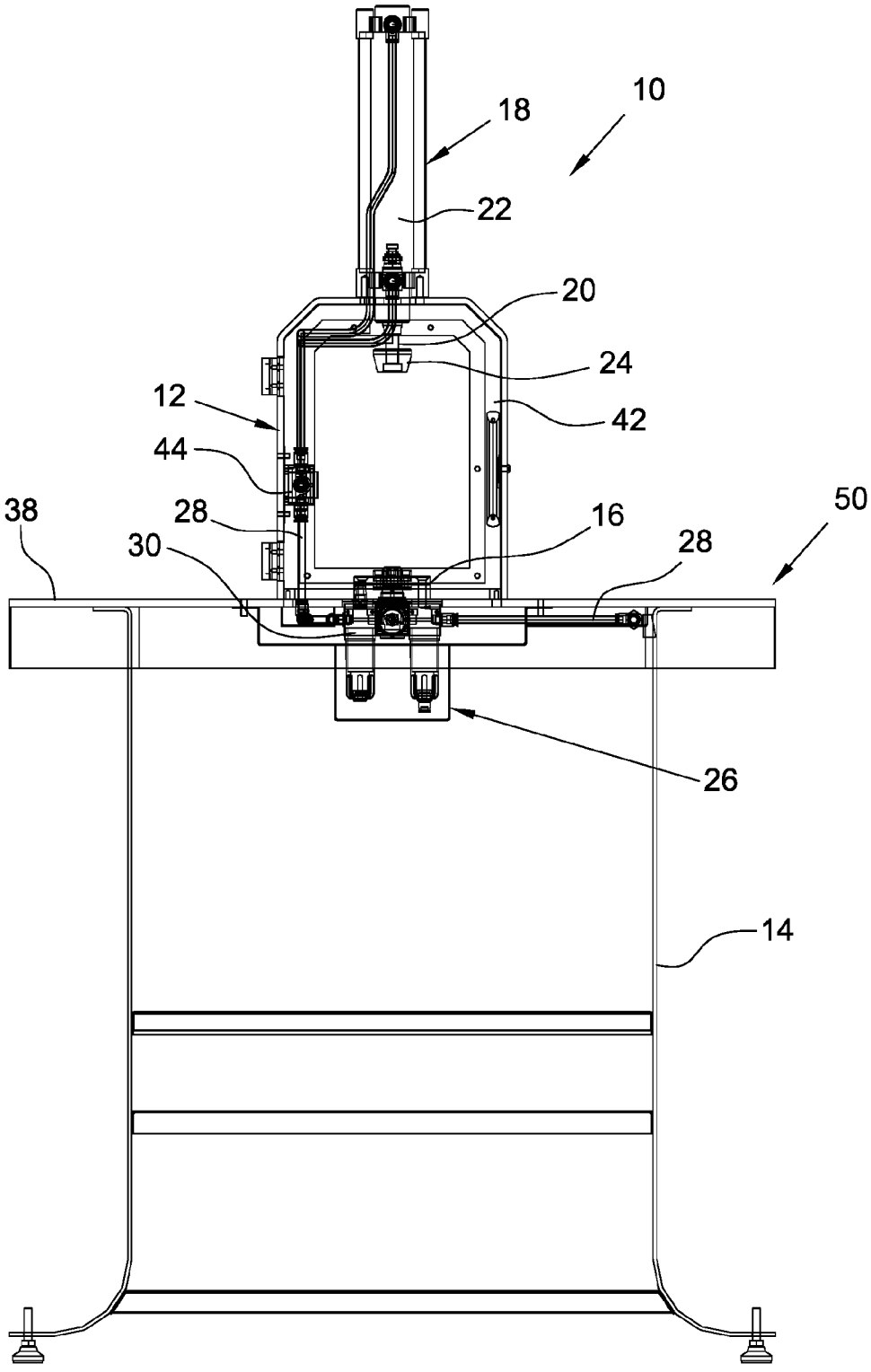


Fig. 1

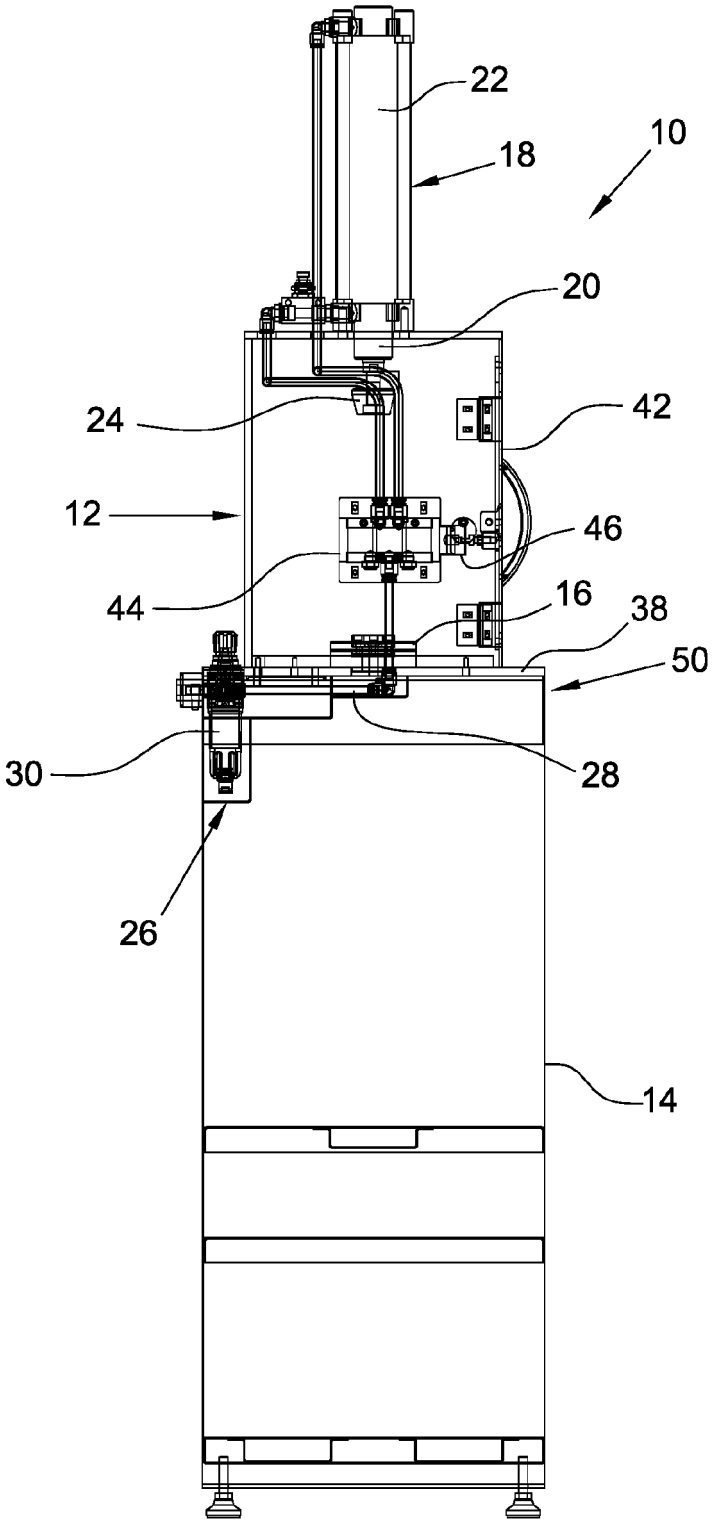


Fig. 2

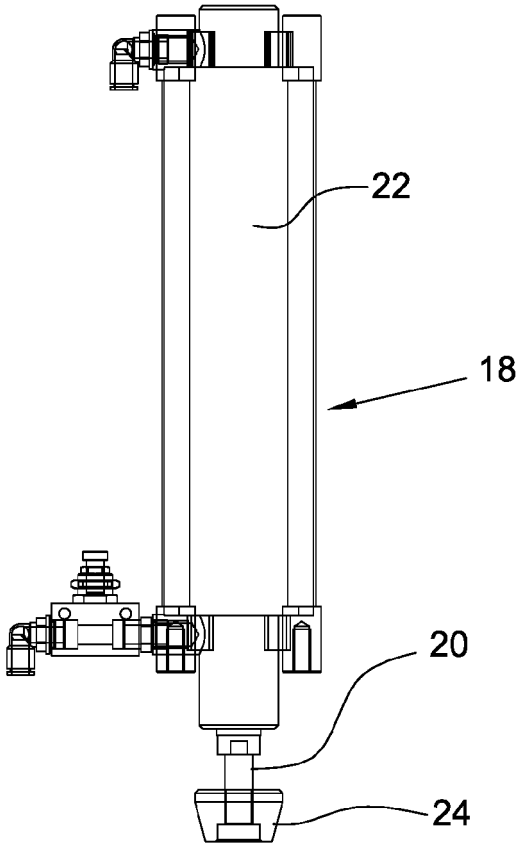


Fig. 3

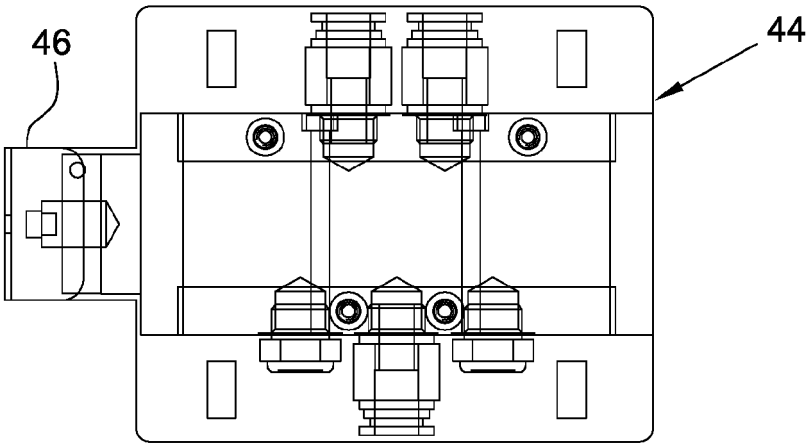


Fig. 4

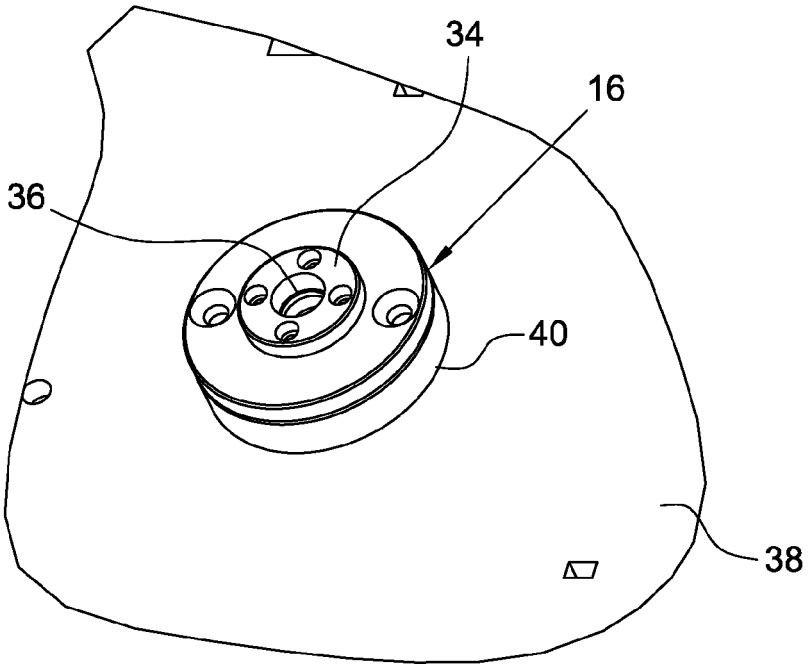


Fig. 5

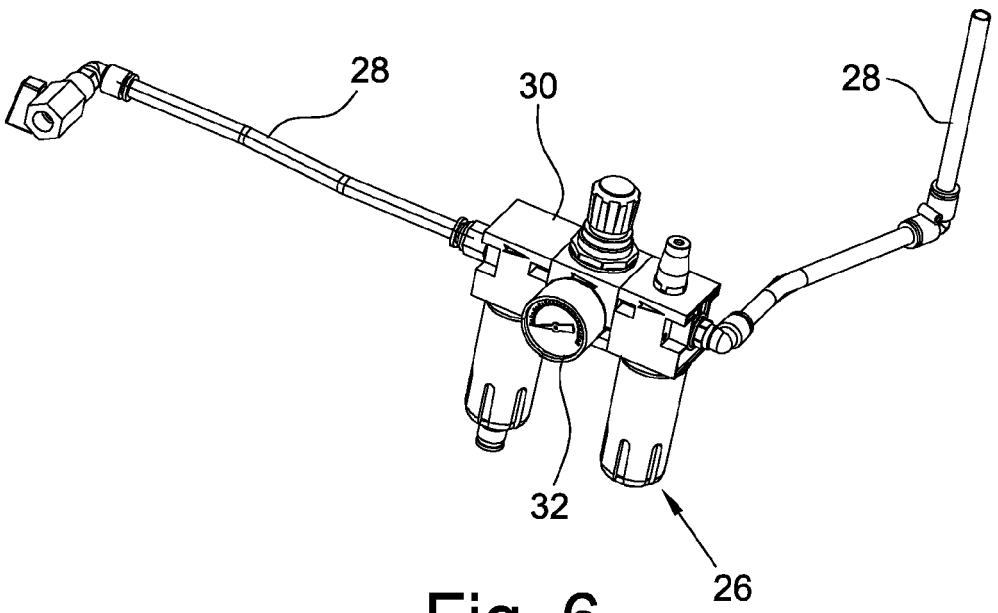


Fig. 6

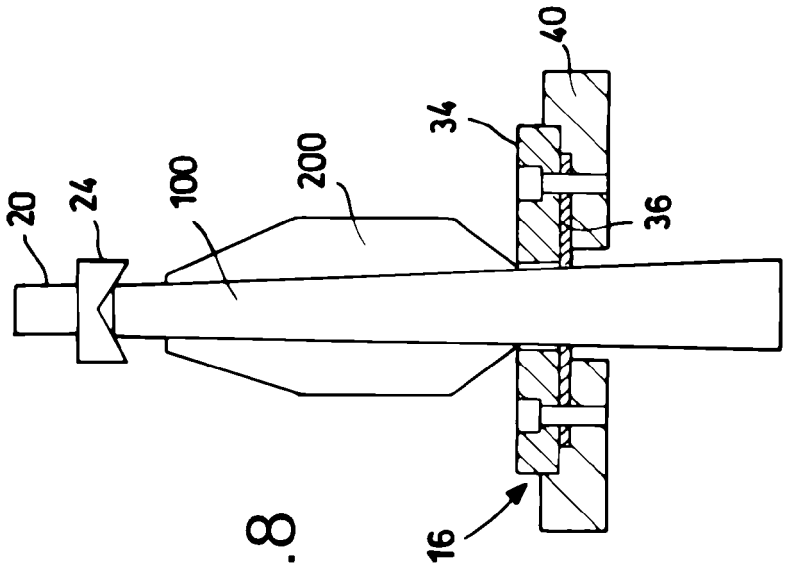
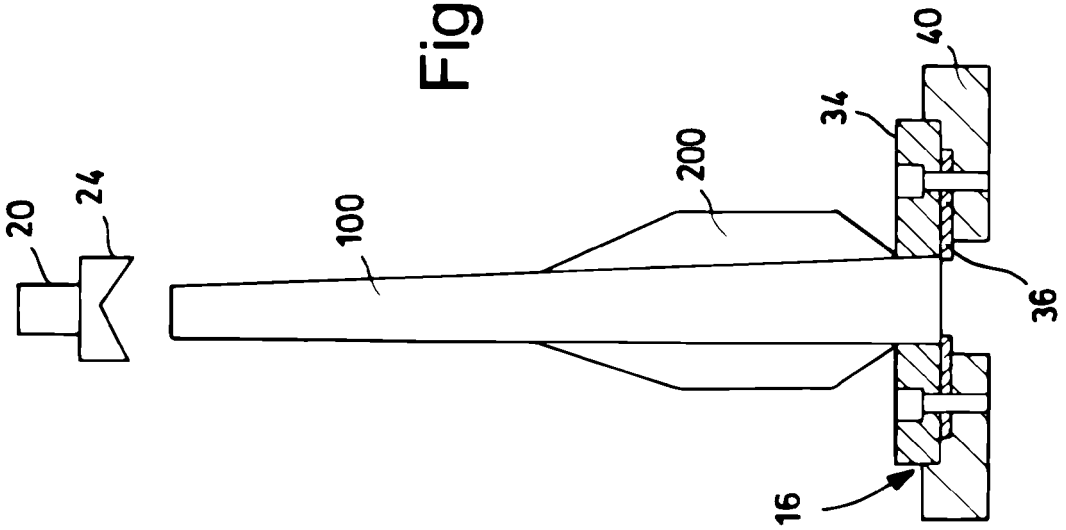


Fig.8

Fig.7



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EUROPEAN SEARCH REPORT

Application Number
EP 15 17 0894

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	29 September 2015	Pussemier, Bart

CATEGORY OF CITED DOCUMENTS

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