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(71) Applicant: **Elma - Macchine per Lamiera S.r.l.**
40037 Sasso Marconi (BO) (IT)

(72) Inventor: **Fabbri, Angelo**
40037 Sasso Marconi (BO) (IT)

(74) Representative: **Modiano, Micaela Nadia et al**
Modiano & Partners (IT)
Via Meravigli, 16
20123 Milano (IT)

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(54) **Edging assembly for tubular elements**

(57) An edging assembly (1) for tubular elements (A) comprising at least one resting surface (2) provided with at least one opening (3), such surface (2) being provided with coupling means (4) for at least one annular abutment template (5), in which at least the inner front (6) is shaped and which is arranged so as to be substantially aligned with the at least one respective opening (3), the assembly (1) further comprising at least one carousel (7), which can rotate and can slide at least partially in a radial di-

rection according to a preset stroke, with respect to a central axis of the at least one respective opening (3); the carousel (7) supporting at least one corresponding complementarily shaped roller (8), the end edge of a tubular element (A) being arranged within the opening (3), between the shaped inner front (6) of the respective annular template (5) and the corresponding complementarily shaped roller (8), for the edging, i.e., deformation thereof according to preset shape and size standards.

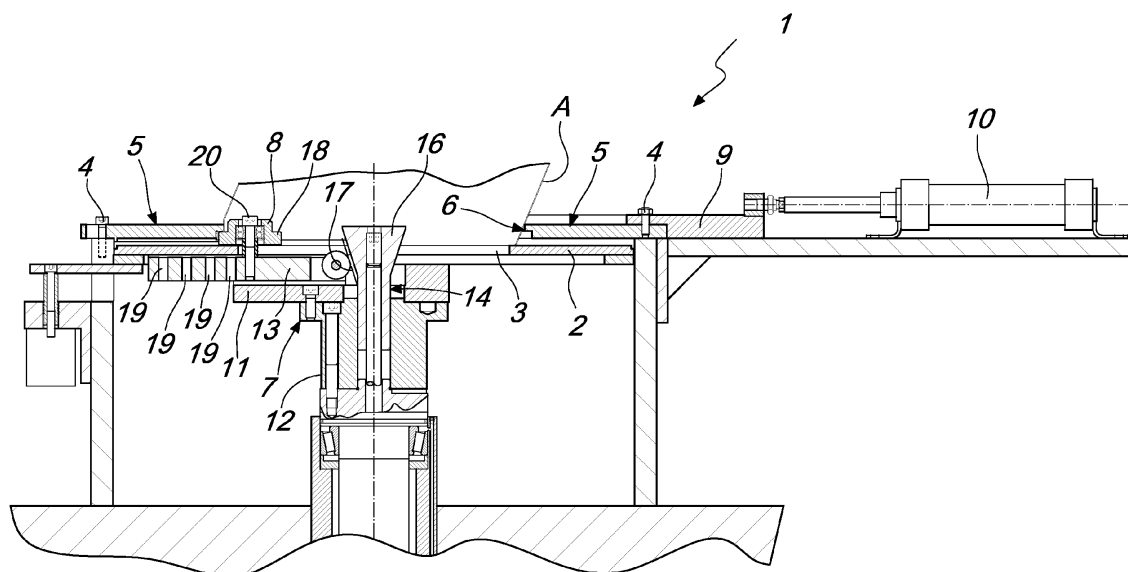


Fig. 1

Description

[0001] The present invention relates to an edging assembly for tubular elements in sheet metal and similar materials: the assembly is suitable for the formation of shaped edges (usually mutually complementary) on one or both ends of several tubular elements that need to be mutually coupled in order to constitute a predefined pipe. The coupling is usually achieved with the mutual seaming of the edges of two tubular elements which are mutually inserted in each other.

[0002] Metallic pipes are usually used for the transport of exhaust gases, in heating and air conditioning systems and, usually, in all cases in which gases need to be conveyed along a preset path.

[0003] In particular it is necessary to provide specific forms of edgings in elements that have a shape structure of the type of a section of cylindrical tubing, which are used in order to provide curves in ducts.

[0004] Such elements are made starting from a sheet (generally made of metallic material) which is cut according to a predefined shape, in which, once folded in order to make the ends thereof meet, those ends are mutually coupled (usually by means of welding processes).

[0005] The two lower and upper edges (with particular reference to a vertical orientation of the axis of the tubular element) are subjected to an edging process that facilitates their easy coupling with others (and mutually seamable) in the subsequent step of making up the duct.

[0006] The edging process consists of the mechanical machining by cold deformation of each edge using utensils of the type of contoured rollers.

[0007] In existing machines on the market for this type of machining, the piece is rotated with respect to the motorized rollers which are fixed to the footing.

[0008] The tubular element, once arranged with an edge thereof between the rollers, while it is being supported by an operator, is subjected to a rotary motion imposed by the rollers, so that the rollers impress the desired shape (in relation to a force impressed on at least one of them owing to their mutual approach) on the edge.

[0009] It is fundamentally important, in this step, that the operator facilitates the correct alignment and arrangement of the tubular element, at least in the first moments of the machining, in order to prevent the edge thereof from accidentally slipping out from the contoured rollers.

[0010] Considering that the tubular elements are hollow cylindrical sections (in practice portions of piping having at least one of the two edges cut along a plane that is inclined with respect to the central/longitudinal axis), when these machining operations are being carried out the hand of the operator (which has to hold the piece, which rotates vortically, constantly pressed against the resting surface) rises and falls to follow the inclination of the other, non-parallel, edge.

[0011] This manner of machining is dangerous for the operator who cannot handle a high rotation speed of the

pieces (otherwise he/she would be exposed to an extremely high risk of injury). The execution time, because of the piece which rotates between the hands of the operator, is very high.

[0012] The aim of the present invention is to solve the above mentioned drawbacks, by providing an edging assembly for tubular elements that is particularly safe for the operator.

[0013] Within this aim, an object of the invention is to provide an edging assembly for tubular elements that is fast and efficient.

[0014] Another object of the invention is to provide an edging assembly for tubular elements that is versatile, for performing machining operations on tubular elements of different sizes.

[0015] Another object of the present invention is to provide an edging assembly for tubular elements that is low cost, easily and practically implemented, and safe in use.

[0016] This aim and these objects are achieved by an edging assembly for tubular elements according to the present invention, characterized in that it comprises at least one resting surface provided with at least one opening, said surface being provided with coupling means for at least one annular abutment template, in which at least the inner front is shaped and which is arranged so as to be substantially aligned with the at least one respective opening, and at least one carousel, which can rotate and can slide at least partially in a radial direction according to a preset stroke, with respect to a central axis of the at least one respective opening, said carousel supporting at least one corresponding complementarily shaped roller, the end edge of a tubular element being arranged within said opening, between said shaped inner front of the respective annular template and the corresponding complementarily shaped roller, for the edging, i.e., deformation thereof according to preset shape and size standards.

[0017] Further characteristics and advantages of the invention will become better apparent from the description of a preferred, but not exclusive, embodiment of the edging assembly for tubular elements according to the invention, which is illustrated by way of non-limiting example in the accompanying drawings wherein:

Figure 1 is a sectional view, taken along a transverse plane, of a first embodiment of an edging assembly for tubular elements according to the invention; Figure 2 is a view from above of the edging assembly in Figure 1;

Figure 3 is a sectional view, taken along a transverse plane, of a second embodiment of an edging assembly for tubular elements according to the invention; Figure 4 is a view from above of a portion of the edging assembly in Figure 3;

Figure 5 is a sectional side view of an additional portion of the edging assembly in Figure 3;

Figure 6 is a sectional side view of an enlarged detail of an edging assembly for providing a "female" edge;

Figure 7 is a sectional side view of an enlarged detail of an edging assembly for providing a "male" edge".

[0018] With reference to the figures, the reference numeral 1 generally designates an edging assembly for tubular elements A.

[0019] The edge that has to be provided on the tubular elements A can be of two different types: a "male" edge constituted by a rim arranged radially with respect to the generatrices of the pipe and a "female" edge also provided with a radial rim from which a further tubular portion branches off having a larger diameter than that of the element A (and larger also than the maximum space occupation of the radial rim present in the "male" edge).

[0020] In this manner it is possible to carry out the seaming with other tubular elements A simply by inserting the "male" edge of a first element A into the "female" edge of another element A and then closing (by using specific folding devices) the tubular portion of the "female" edge onto the rim of the "male" edge.

[0021] The edging assembly 1 comprises at least one resting surface 2 provided with at least one opening 3: the surface 2 is for resting an edge of the tubular element A and thus will comprise a rim of size adapted to accommodate and support the element A, and inside such rim the central opening 3 that was defined previously will be provided.

[0022] The surface 2 is provided with coupling means 4 for at least one annular abutment template 5, in which at least the inner front 6 is shaped.

[0023] The template 6 is arranged so as to be substantially aligned with the at least one respective opening 3.

[0024] The assembly 1 comprises at least one carousel 7 which can rotate with respect to a central axis of the at least one respective opening 3 (such central axis is the center of rotation of the carousel 7).

[0025] The carousel 7 further can at least partially slide in a radial direction according to a preset stroke, which depends on the dimensions of the edges ("male" and "female") that it is necessary to provide.

[0026] The carousel 7 further acts as a support for at least one corresponding complementarily shaped roller 8.

[0027] In the formation step, the end edge of a tubular element A will thus be arranged inside the opening 3 (in substantial abutment against a limit rim of the resting surface 2), between the shaped inner front 6 of the respective annular template 5 and the corresponding complementarily shaped roller 8: the pressure of the roller 8 on the shaped inner front 6 will determine the deformation of the end edge of the interposed element A, according to preset shape and size standards.

[0028] The assembly 1 according to the invention can comprise a plurality of different openings 3, inside each of which there is a corresponding carousel 7; on each opening 3 a corresponding template 5 can be installed.

[0029] This makes it possible to simultaneously carry out multiple edging operations on different tubular ele-

ments A, considerably increasing productivity.

[0030] Of particular practical and applicative interest is the adoption of an assembly 1 provided with two openings 3, two carousels 7 and respective templates 5.

[0031] Such assembly 1, while keeping dimensions down and space occupation to a minimum, substantially makes it possible to double the speed of production of elements A provided with an edge ("male" or "female") with respect to conventional devices, while ensuring, with respect thereto, extremely high standards of safety in that the operator does not have to support the element A during the machining and the element A proper remains still during such process, thus not generating any potential danger for the operator.

[0032] It should be noted that the at least one annular abutment template 5 comprises two complementary ring portions 5a and 5b: a first ring portion 5a can be rigidly coupled to the resting surface 2, and a second ring portion 5b can be associated with a slider that can perform a translational movement 9, by way of the action of a respective actuator 10.

[0033] Such slider 9 can perform a translational movement between a first configuration of maximum distance from the central axis of the respective opening 3 and a second configuration of minimum distance from such axis, which corresponds to the mutual abutment of the two ring portions 5a and 5b so as to form the template 5.

[0034] The arrangement of the end edge of a respective tubular element A within the opening 3 and its extraction from it are possible when the second ring portion 5b is in the first configuration (the ring portion 5b is spaced from the ring portion 5a).

[0035] According to an embodiment of undoubted practical and applicative interest, the shaped inner front 6 of each template 5 comprises at least two annular frames of different diameter that define a contoured portion provided with at least one step.

[0036] It should be noted that each assembly 1 will be accompanied by a plurality of templates 5 of different inside diameters, to be used to provide edges on tubular elements A of different diameters: in this manner the assembly 1 will be particularly versatile and adapted to execute machining operations on all the commercial diameters for the pipes with which a possible element A being machined is to be used.

[0037] If the assembly has a plurality of different openings 3, each one of them will preferably be provided with a respective set of templates 5 in order to also enable the simultaneous execution of many edging operations on different tubular elements A of the same diameter.

[0038] The carousel 7, which can rotate with respect to a central axis of the opening 3, comprises a guiding block 11 coupled to a shaft 12 that is coaxial to the central axis and is functionally associated with a respective motor.

[0039] Such carousel 7 further comprises a slider 13, which can slide on the guiding block 11 in a radial direction according to a preset stroke, by way of the action of

a respective movement element 14.

[0040] The movement element 14 comprises an apparatus for linear actuation 15 that is coaxial to the central axis of the opening 3 and is provided, at its upper end, with an axially symmetrical cam 16, the outer surface of which rests on a first face 17 of the slider 13.

[0041] In order to facilitate its installation, it is preferable to arrange the movable stem of the linear actuation apparatus 15 inside an axial cavity of the shaft 12, leaving the fixed body, which is more cumbersome, confined to its exterior.

[0042] The translational movements along the profile of the cam 16 of the first face 17 of the slider 13 force translational movements in a radial direction of the slider 13 proper: such translational movements determine the approach of the complementarily shaped roller 8 to the shaped front 6 of the template, with consequent compression between them of the interposed portion of tubular element A and its mechanical deformation.

[0043] It should be noted that, according to an embodiment of undoubted applicative interest, the axially symmetrical cam 16 is frustum-shaped: interposed between the slider 13 and the guiding block 11 there are elastic means (usually an axially acting spring) for forcing the first face 17 of the slider 13 on the outer surface of the cam 16.

[0044] It should be noted that the slideable association between the guiding block 11 and the slider 13 can preferably be obtained by adopting a dovetail coupling.

[0045] The complementarily shaped roller 8 is pivoted freely on the slider 13 and comprises at least one protruding annular band 18.

[0046] The profile of the roller 8 is thus substantially complementary to that of the inner front 6 of the template 5.

[0047] In practice the roller 8 and the template 5 behave like the two halves of a mold between which the piece being machined (in this specific case, the end portion of a tubular element A) is interposed.

[0048] The slider 13 further comprises a plurality of accommodation holes 19, which are distributed along a pre-defined direction, for the pivot 20 for the free coupling of the roller 8, at different diameters of tubular elements A on which edging is to be performed; such accommodation can be direct or indirect, i.e. auxiliary components (such as for example in the embodiment shown in the accompanying figures) can be interposed which can be fixed to the slider 13 according to a series of different arrangements, in which case such auxiliary components will comprise a seat for the stable engagement of the pivot 20. As explained previously, different abutment templates 5 are used, the inside diameter of which is proximate to that of the corresponding tubular element A at machining operations to be executed on tubular elements A of different sizes.

[0049] According to the template 5 adopted, it should be noted that the coupling pivot 20 will be engaged in a respective corresponding accommodation hole 19.

[0050] It should be noted that the carousel 7 (and therefore the shaft 12 as well) is mounted on a supporting post provided with means for movement of a movable portion thereof which is integral with the carousel 7, with respect to a fixed portion, which is integral with the footing of the assembly 1: the stroke of such movable portion with respect to the fixed portion is of the order of magnitude of the length of the edge to be provided in the metallic element A.

[0051] Such axial movement makes it possible to vary the position of the roller 8 with respect to the template 5, making it possible to obtain the two different edges ("male" edge and "female" edge) on the tubular element A.

[0052] The lower height of the movable portion (with which the carousel 7 is associated) ensures the provision of the "female" edge in that the portion of tubular element A undergoes a deformation similar to the progression of the profile of the front 6 (or of the roller 8), while the greater height of the movable portion (with which the carousel 7 is associated) ensures the provision of the "male" edge in that the portion of tubular element A will see the creation of the radial rim only.

[0053] It should be noted that, with particular reference to an embodiment that is particularly efficient, the movement means, the actuator 10 and the linear actuation apparatus 15 are selected preferably from hydraulic cylinders, pneumatic cylinders, devices with threaded units and rack devices and the like.

[0054] If hydraulic cylinders are adopted, rapid response times and high levels of precision can be achieved which will ensure a better operation of the entire assembly 1.

[0055] During the operation the idle roller 8 presses the sheet metal of the curve section of the element A to be machined against the template 5 (which in fact behaves like the matrix die of a mold), of the appropriate diameter, in order to execute the edging machining.

[0056] The horizontal movement of the slider 13 with respect to the guiding block 11 (achieved by fixing to the respective holes 19) and the substitution of the templates 5 are the operations to be executed in order to switch from one diameter of a tubular element A to another.

[0057] The slider 13 is pushed horizontally by the frustum-shaped cam 16 which descends vertically by the action of the linear actuation apparatus 15 (which is preferably constituted by a hydraulic cylinder). The descent of the cam 16 can be interrupted and resumed, accelerated or slowed at any point of the entire work cycle (this can be useful to adapt the machining cycle to the type of material that constitutes the tubular elements A and its thicknesses).

[0058] The purpose of these variations of time and speed is to reduce the duration of the cycle where and when this is possible.

[0059] In order to be capable of executing the "male" and "female" edgings one after the other, with the same placing, without executing any assembly or disassembly

of part of the mechanism, the movable portion of the supporting post slides axially (with respect to the fixed portion).

[0060] For machining different diameters, an additional movable component is provided which makes a second roller 21 advance or retreat.

[0061] The second roller 21 is associated with the rotating carousel 7, with the interposition of a respective linear actuator for its controlled translational movement in a radial direction. Such translational movement in a radial direction occurs from a first, retracted configuration, in which the second roller 21 is spaced from the first roller 8 and is arranged inside it, to a second configuration of substantial alignment of the lateral surface of the second roller 21 with the lateral surface of the first roller 8: such configuration is adapted for the abutment, on such aligned lateral surfaces, of the end edge of the tubular element A being formed (in particular of the "female" part of the coupling that is being formed).

[0062] The linear actuator with which the second roller 21 is associated is preferably of the type of a hydraulic and/or pneumatic cylinder (although the possibility is not excluded of using other types of actuators); it will thus be driven and powered by a respective rotating distributor (connected to a hydraulic and/or pneumatic circuit) which is also substantially integral with the carousel 7.

[0063] When this second roller is set beside the first roller, mentioned above, a "broader" roller is created (in particular the overall height of their juxtaposed edges is such as to abundantly exceed the maximum length of the edges to be provided on the tubular elements A).

[0064] As previously mentioned, the "male" part of a curve section of a tubular element A is a flanging, i.e. a 90° outward fold. The female part is a "bell socket", i.e. a kind of outward step that accommodates the male part and which, in a subsequent operation carried out on another machine, is folded back toward the center, thus making the coupling of the two parts stable.

[0065] To make the "male" edge, a smaller quantity of material has to be machined than the amount necessary to make the "female" edge. The quantity of material to be machined depends, as noted, on the vertical position of the resting surface 2 (and as a consequence on the position of the movable portion of the supporting post).

[0066] The movement means (preferably hydraulic and/or pneumatic cylinders) raise or lower the edge of the tubular element A with respect to the rollers 8 (and 21) which, together with the respective template 5, execute the two machining operations. Such movement means thus have two configurations of operation, both of which are adjustable, a high configuration (for making the "male" edge) and a low configuration (for making the "female" edge).

[0067] In the high configuration, the second roller 21, which is arranged lower down, must be withdrawn toward the center of rotation (central axis) in order to not interfere with the resting surface 2. According to this arrangement, with the resting surface 2 high and the second roller 21

withdrawn, only the roller 8, the one which is fixed rigidly to the slider 13, is operating.

[0068] When a "female" edge is to be executed, the resting surface is in the low configuration. The second roller 21 is advanced and set vertically beside the roller 8 so as to form an axially symmetrical component provided with a wider lateral surface.

[0069] The descent movement of the resting surface 2 and the advancement of the second roller 21 with respect to the roller 8 are connected so that no conditions of interference ever occur.

[0070] The work cycle is as follows:

- the operator, by means of a button or by activating a sensor, selects whether to execute a "male" edge or a "female" edge on the portion of tubular element A to be machined;
- the resting surface 2 is automatically positioned in the high configuration or in the low configuration, as a consequence, and the second roller 21 advances or remains withdrawn (again as a function of the type of machining selected). The mobile ring portion 5b of the template 5 remains spaced from the fixed ring portion 5a;
- the operator places a tubular element A inside the template 5, on the resting surface 2;
- the operator activates the automatic sequence of the work cycle;
- the mobile template 5b touches the fixed template 5a. The shaft 12 is made to rotate; the slider 13 advances radially, pushed by the frustum-shaped cam 16 which descends vertically, pushing the roller 8 or, if execution of a "female" edge was selected, the two rollers 8 and 21, outward;
- a processor (for example a PLC) governs the rotation speed of the shaft 12, the position and the descent speed of the cam 16 and thus of the approach of the slider 13 to the template 5.

[0071] After a set time everything returns to the rest position.

[0072] The processor (for example a PLC) that governs the assembly 1 is provided with memory units in which machining cycle data can be stored for different tubular elements A (different in terms of thicknesses, dimensions and types of material) and which, by simply calling up a code associated with a specific item to be produced, provides the elements of the assembly 1 with the speed, the times and any other information relating to the different laws of motion.

[0073] The size and shape of the rollers 8 and 21 and the diameter of the templates 5 are devised so that the machining is executed by the assembly 1 without any form of intervention by the operator.

[0074] Advantageously the present invention solves the above mentioned problems, by providing an edging assembly 1 for tubular elements A which is particularly

safe for the operator: the tubular element A in fact does not rotate about itself, but is substantially stationary during the machining.

[0075] The only movements performed by the tubular element A are limited to small adjustments of position which are caused by the minimum size tolerance that exists between each template 5 and the respective tubular element A.

[0076] In any case it is not necessary for the operator to support the element A during the machining (on the contrary, the assembly 1 can operate only when the operator is outside a predefined perimeter around the element A).

[0077] Conveniently the edging assembly 1 according to the invention is particularly fast and efficient, in that the operator can prepare the piece to be machined after the piece that is already positioned on the assembly 1, since the assembly 1 does not require direct intervention from the operator. This means that the preventive activity of the operator makes it possible to reduce the dead times in operation.

[0078] Furthermore, for assemblies 1 provided with multiple openings 3 and carousels 7, it will be possible to considerably increase the speed of production given the possibility of executing multiple machining operations simultaneously.

[0079] If there are two openings 3 and carousels 7 in a single assembly 1, its dimensions will still be very contained and thus its installation will be possible even in the space usually occupied in conventional machines (in which however only one edging operation is executed at a time, with the direct and continuous assistance of the operator).

[0080] Conveniently, the assembly 1 is particularly versatile in that it can execute machining operations on tubular elements A of different sizes simply by mounting the corresponding template 5 and arranging the roller 8 in the corresponding position (using the adjustable mounting made possible by the holes 19).

[0081] According to the type of practical implementation of the assembly 1, there can be a roller 8 which is mounted directly onto respective holes 19 of the slider 13 or, more conveniently, there can be interposed components onto which the roller 8 will be fixed, again in a predefined position, and which can in turn be coupled to the slider 13 according to a plurality of different arrangements thanks to the holes 19.

[0082] Conveniently the edging assembly 1 for tubular elements A is low cost, easily and practically implemented and is safe in use.

[0083] The invention, thus conceived, is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims. Moreover, all the details may be substituted by other, technically equivalent elements.

[0084] In the embodiments illustrated, individual characteristics shown in relation to specific examples may in reality be interchanged with other, different characteris-

tics, existing in other embodiments.

[0085] In practice, the materials employed, as well as the dimensions, may be any according to requirements and to the state of the art.

[0086] The disclosures in Italian Patent Application No. BO2012A00063 from which this application claims priority are incorporated herein by reference.

[0087] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. An edging assembly for tubular elements (A), **characterized in that** it comprises at least one resting surface (2) provided with at least one opening (3), said surface (2) being provided with coupling means (4) for at least one annular abutment template (5), in which at least the inner front (6) is shaped and which is arranged so as to be substantially aligned with the at least one respective opening (3), and at least one carousel (7), which can rotate and can slide at least partially in a radial direction according to a preset stroke, with respect to a central axis of the at least one respective opening (3), said carousel (7) supporting at least one corresponding complementarily shaped roller (8), the end edge of a tubular element (A) being arranged within said opening (3), between said shaped inner front (6) of the respective annular template (5) and the corresponding complementarily shaped roller (8), for the edging, i.e., deformation thereof according to preset shape and size standards.
2. The edging assembly according to claim 1, **characterized in that** said at least one annular abutment template (5) comprises two complementary ring portions (5a, 5b), a first ring portion (5a) being rigidly associable with said resting surface (2), a second ring portion (5b) being associable with a slider (9) that can perform a translational movement, by way of the action of a respective actuator (10), between a first configuration of maximum distance from the central axis of the respective opening (3) and a second configuration of minimum distance from said axis, which corresponds to the mutual abutment of the two ring portions (5a, 5b) so as to form said template (5), the arrangement of the end edge of a respective tubular element (A) within a said opening (3) and its extraction from it being possible when said second ring portion (5b) is in said first configuration.
3. The edging assembly according to claim 1, **characterized in that**

terized in that said shaped inner front (6) of said at least one template (5) comprises at least two annular frames of different diameter that define a contoured portion provided with at least one step.

4. The edging assembly according to claim 1, **characterized in that** said carousel (7) that can rotate with respect to a central axis of said opening (3) comprises a guiding block (11), which is coupled to a shaft (12) that is coaxial to said central axis, is functionally associated with a respective motor, and a slider (13), which can slide on said guiding block (11) in a radial direction according to a preset stroke by way of the action of a respective movement element (14).
5. The edging assembly according to claim 4, **characterized in that** said movement element (14) comprises an apparatus for linear actuation (15) that is coaxial to said central axis of said opening (3) and is provided, at its upper end, with an axially symmetrical cam (16), the outer surface of which rests on a first face (17) of said slider (13), the translational movements of said first face (17) along the profile of said cam (16) forcing translational movements in a radial direction of said slider (13).
6. The edging assembly according to claim 5, **characterized in that** said axially symmetrical cam (16) is frustum-shaped, between said slider (13) and said guiding block (11) there being interposed elastic means for forcing said first face (17) of said slider (13) on the outer surface of said cam (16).
7. The edging assembly according to claim 1, **characterized in that** said complementarily shaped roller (8) is pivoted freely on said slider (13) and comprises at least one protruding annular band (18), the profile of said roller (8) being substantially complementary to the profile of the inner front (6) of said template (5).
8. The edging assembly according to claim 1, **characterized in that** it comprises a second roller (21) that is associated with said rotating carousel (7), with the interposition of a respective linear actuator for its controlled translational movement in a radial direction from a first retracted configuration, in which it is spaced from said first roller (8) and is arranged inside it, to a second configuration of substantial alignment of the lateral surface of said second roller (21) with the lateral surface of said first roller (8) for the abutment on said aligned lateral surfaces of the end edge of a tubular element (A) being formed.
9. The edging assembly according to one or more of the preceding claims, **characterized in that** said slider (13) comprises a plurality of holes (19) for direct or indirect accommodation, which are distributed along a predefined direction, for the pivot (20) for

the free coupling of said roller (8), at different diameters of tubular elements (A) on which edging is to be performed, different abutment templates (5) being used the inside diameter of which is proximate to that of the corresponding tubular element (A), and said coupling pivot (20) being engaged directly or indirectly in a respective accommodation hole (19).

10. The edging assembly according to one or more of the preceding claims, **characterized in that** said carousel (7) is mounted on a supporting post provided with means for movement of a movable portion thereof which is integral with said carousel (7), with respect to a fixed portion, which is integral with the footing of the assembly (1), the stroke of said movable portion with respect to said fixed portion being of the order of magnitude of the length of the edge to be provided in said tubular element (A).
11. The edging assembly according to one or more of the preceding claims, **characterized in that** said movement means, said actuator (10) and said linear actuation apparatus (15) are selected preferably from hydraulic cylinders, pneumatic cylinders, devices with threaded units and rack devices and the like.

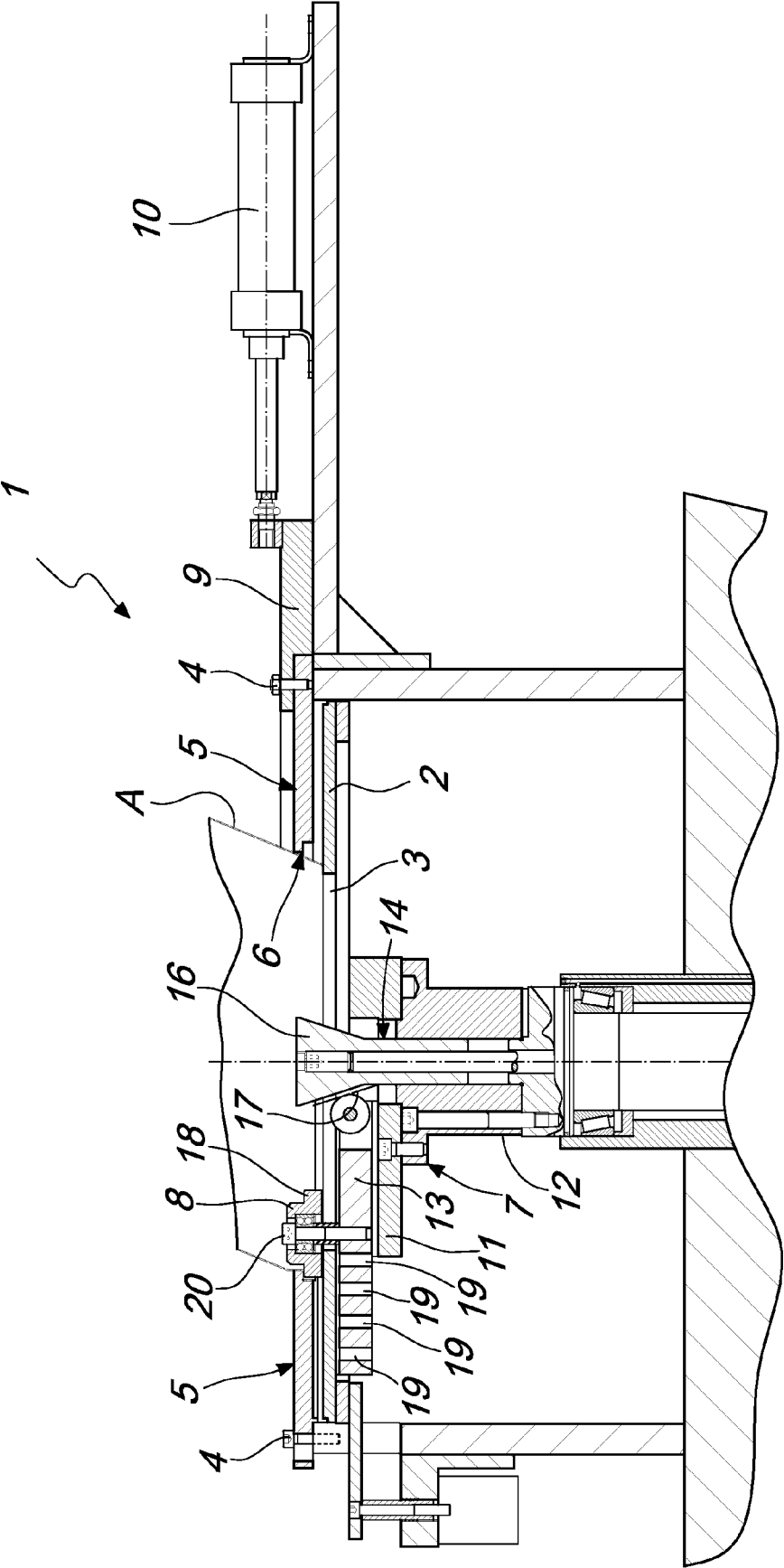
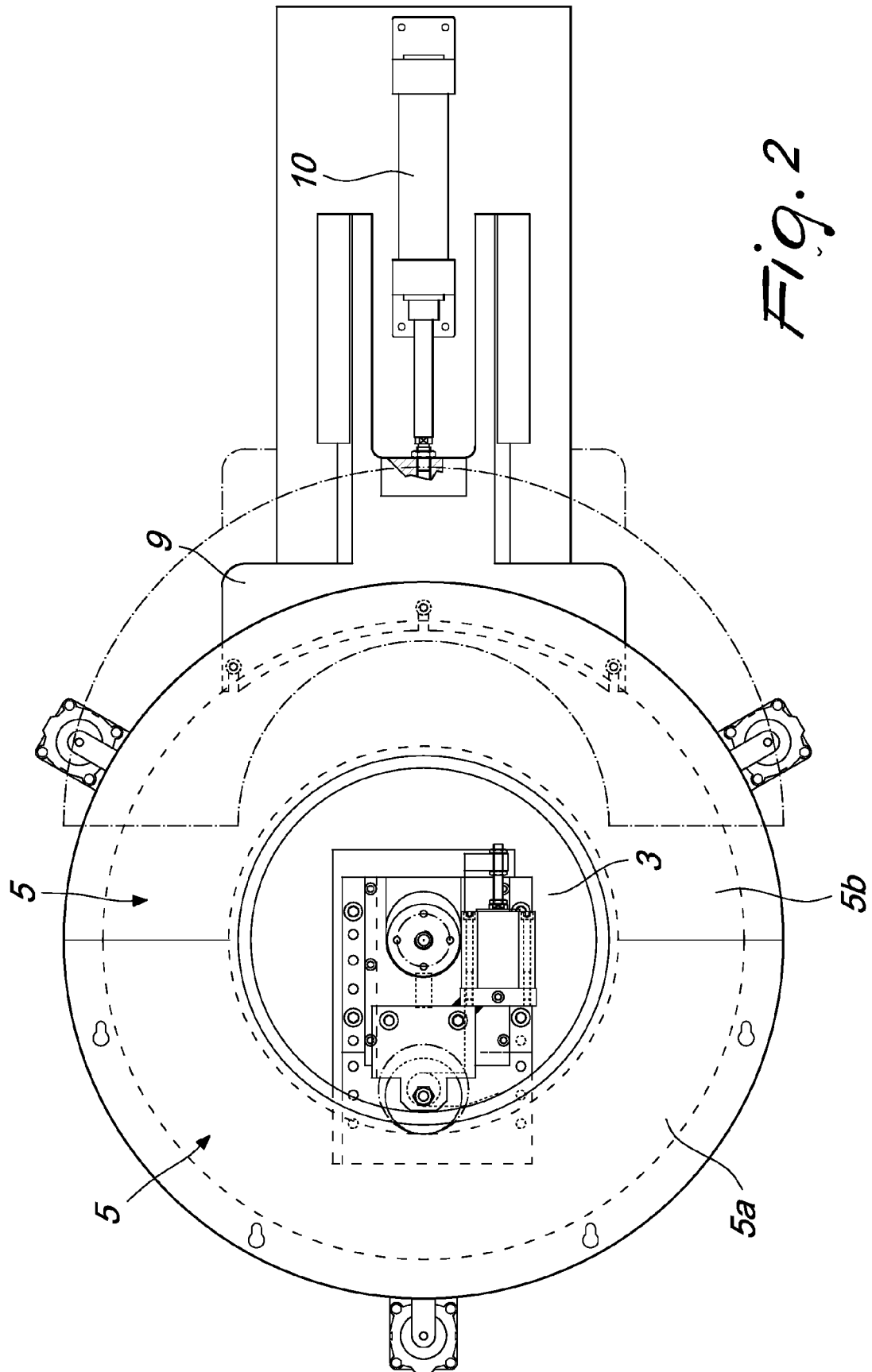


Fig. 1



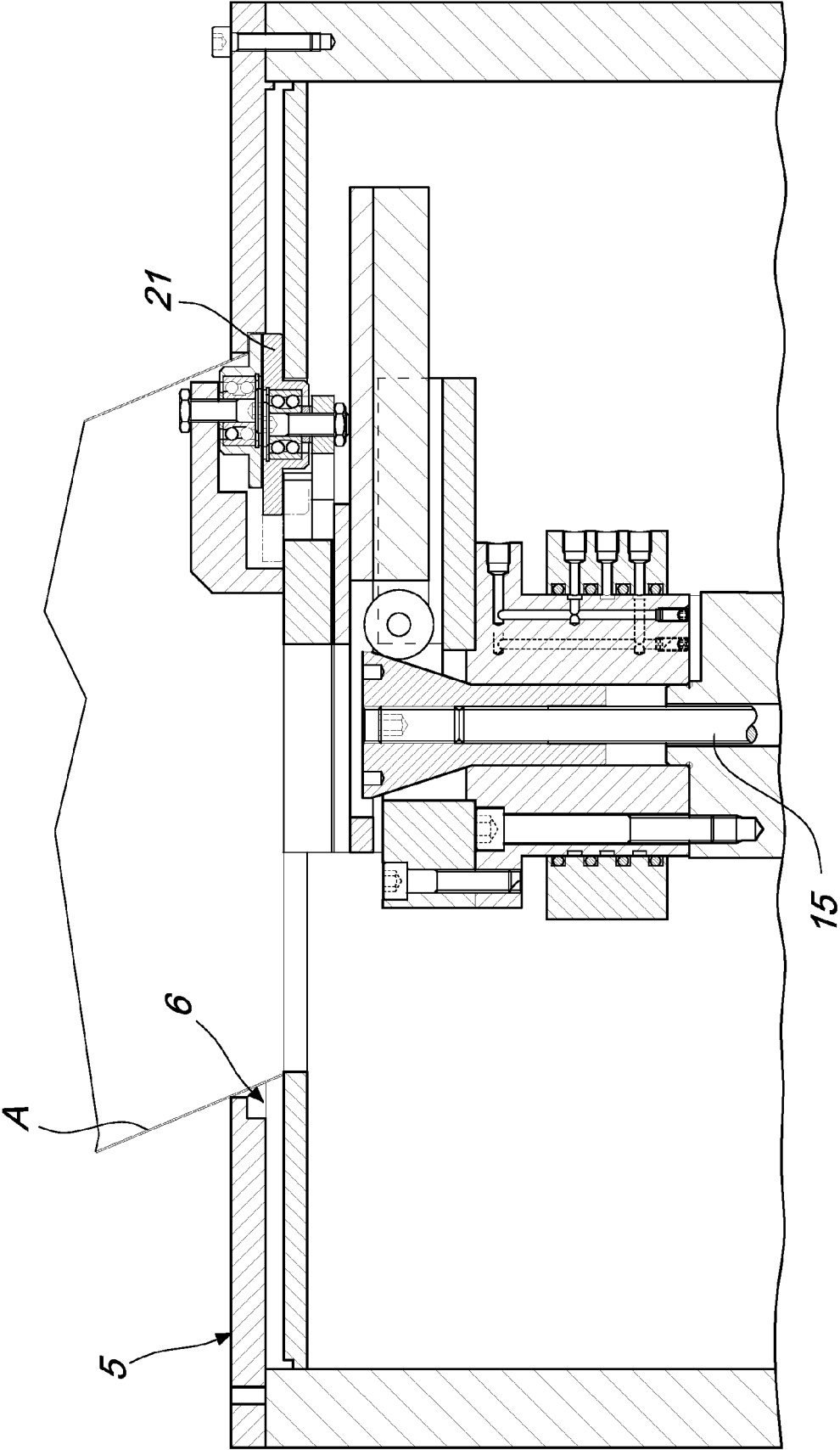


Fig. 3

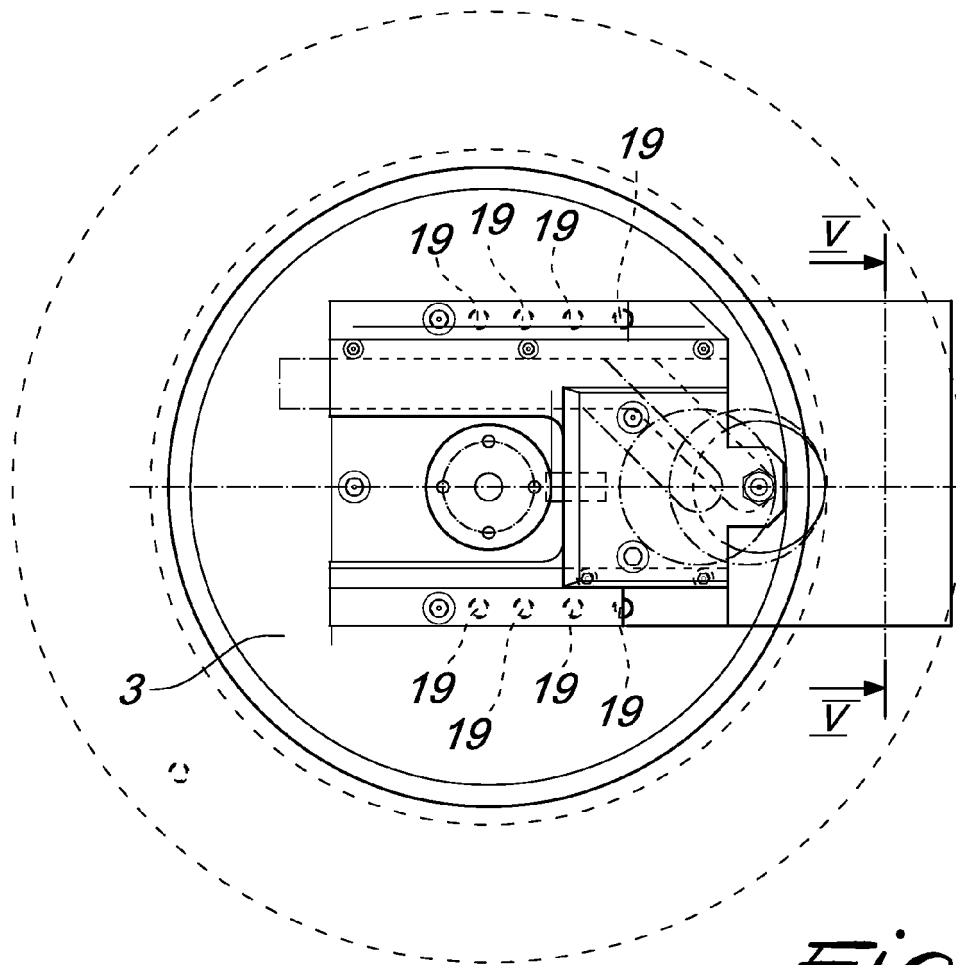


Fig. 4

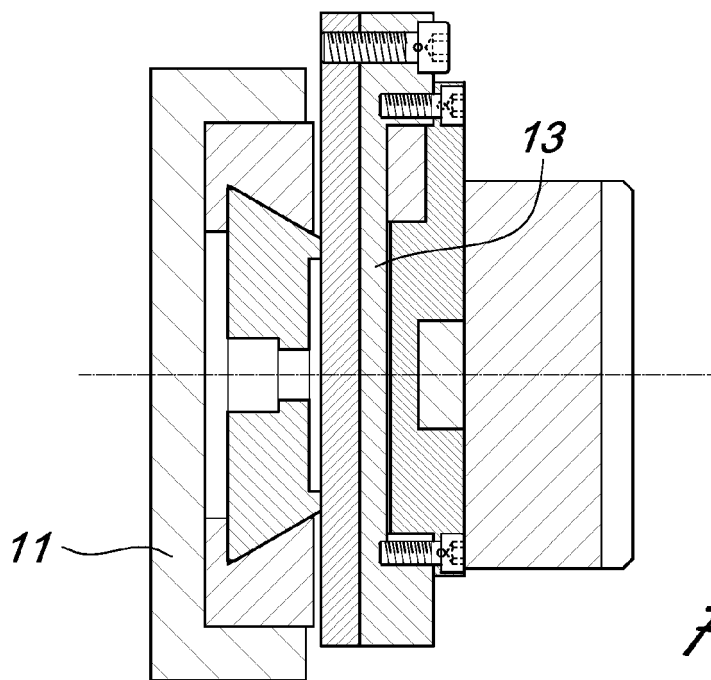
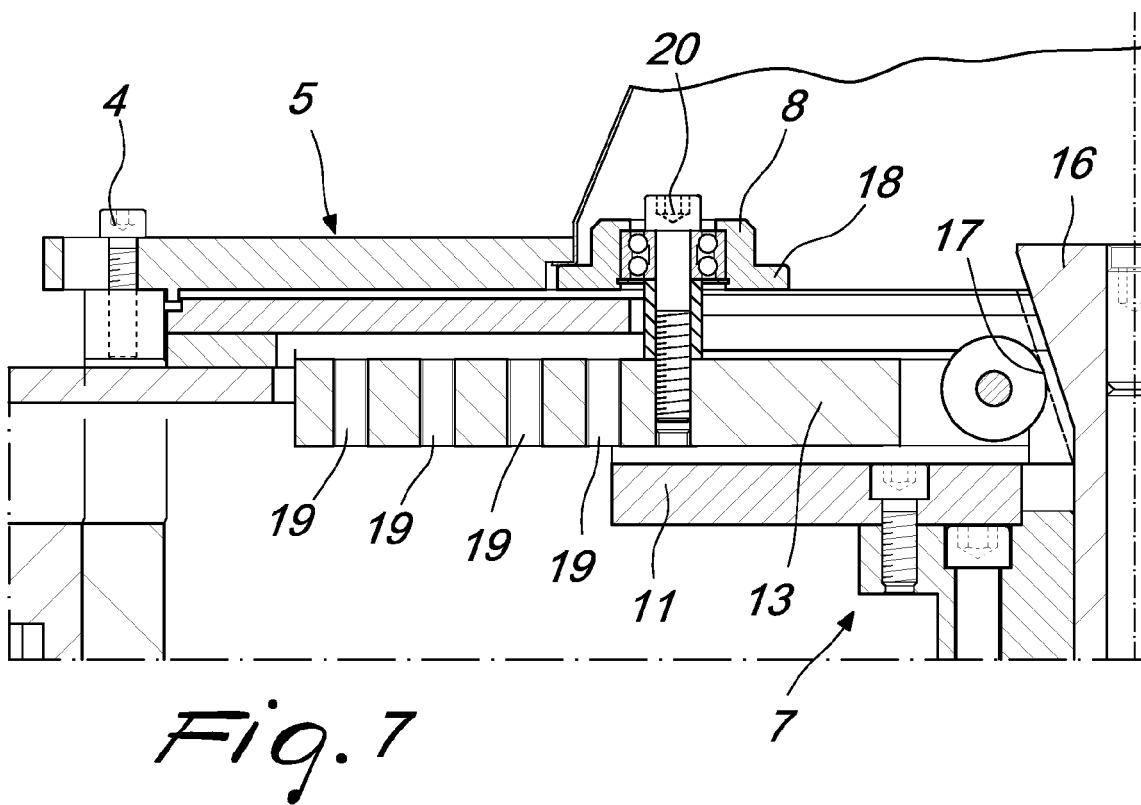
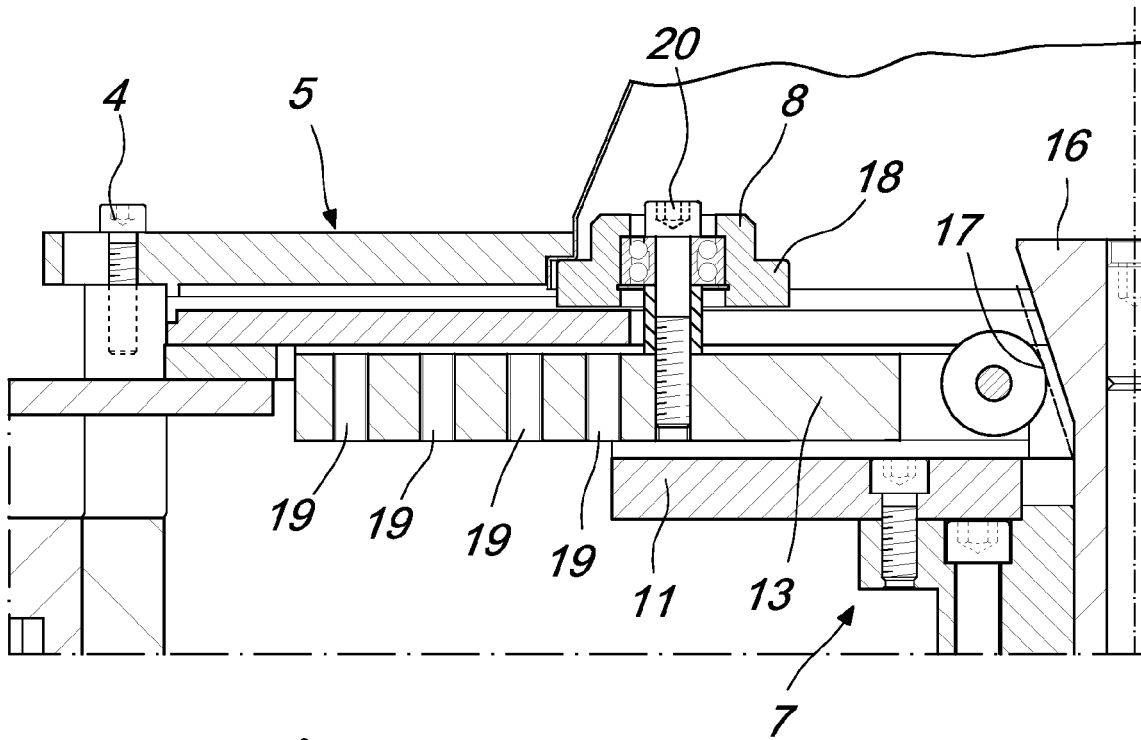


Fig. 5





EUROPEAN SEARCH REPORT

Application Number
EP 13 19 1450

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	WO 02/47838 A1 (SPIRO S A [CH]; BINGGELI RUDOLF [CH]) 20 June 2002 (2002-06-20) * page 9, line 13 - page 10, line 28; figures 3-8 *	1	INV. B21D19/04
A	DE 296 18 108 U1 (ALSTHOM CGE ALCATEL [FR]) 28 November 1996 (1996-11-28) * page 5, paragraph 3; figures *	1	
A	US 7 257 975 B1 (STAUFFACHER GLENN [US] ET AL) 21 August 2007 (2007-08-21) * the whole document *	1	
A	US 1 543 895 A (WINKLEY ERASTUS E) 30 June 1925 (1925-06-30) * the whole document *	1	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			B21D
Place of search		Date of completion of the search	Examiner
Munich		11 December 2013	Pieracci, Andrea
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 L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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