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(54) Innovations of stone-cutter for quarry machines.

(57) 1)**The hydraulic system** , with a pump by variable capacity self-adjusting, that operate all the movements of service.

2)**The bedplate with track**, that is realized by sections of steel electric-welded and stabilized, variables on length from 6 to 12 metres (fig. N° 2 and fig. N° 2A).

3)**The machine levelling system**, that happened through 6 jacks for a bedplate with track of 6 metres c.a.(fig. N°2 part. 1 and part. 5), 8 jacks for a bedplate with track of 12 metres c.a.(fig. N° 2A part. 1 and part. 5) and a verification with levels of precision by a centralized reading.

4)**The blade carrying the chain**, that is realized with a bi-conical form (fig. N°3 part. 3), with the vertex of the truncaded cone more short always conveyed to the primitive diameter of the wheel drive (fig.N° 3 part. 1) and the vertex of the truncaded cone more long always conveyed to the primitive diameter of the wheel extreme (fig. N° 3 part. 4).

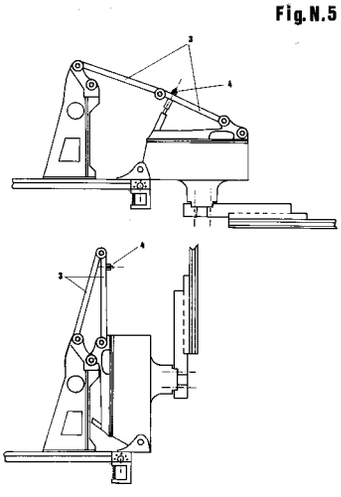
5) **The links composing the chain**, with their particular design (fig. N° 4 part.3) , that permit to utilize all thickness of blade carrying the chain usually of 30 millimetres c.a.

6)**The positionament of the blade carrying the chain in horizontal** that happened, as well as by a hydraulic jacks with run-end fixed in advance and safety-valves operated by the hydraulic system with a pump by variable capacity self-adjusting, through arms of levers by toggle or similar with run-end adjustable (fig. N° 5 part. 3).

7)**The positionament of the blade carrying the chain in vertical** that happened, as well as by a hydraulic jacks with run-end fixed in advance and safety-valves operated by the hydraulic system with a pump by variable capacity self-adjusting, through an electric-hydraulic-mechanical controls that is connected to the hydraulic system above-mentioned.

8)**The base by verifiable descent and levers by toggle with run-end fixed in advance** that is placed on the centre of the machine for his raising and for the replacement of the bedplate with track (fig. N° 1 part. 6 and part. 7).

Fig.N.5



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This industrial invention have for object remarkable innovations of the stone-cutter for quarry machines.

These machines have the advantage to cut, by means of a blade carrying the chain, blocks of marble, travertin or other types of stone of any dimension but have some disadvantages to regard to their structure and use. They have two differents hydraulics systems (primary and secondary), in which the primary transforme all the electric power in hydraulic power for the rotation with variable speed of the chain and the secondary is used for the advancement of the machine on pieces of tracks. These pieces of tracks, are assembled in quarry before to begin the cut and it is necessary levell them with bolts regulated by hand with remarkable waste of time. The blade carrying the chain is realized with a form almost parallel and does not utilize so to the better the 180 grades c.a. of the wheel drive; besides the thickness of the blade carrying the chain (usually of 30 millimetres c.a.) just on the point of support of the links composing the chain is reduced to 20 millimetres c.a. with the consequent weakening of the links that composing the chain. The positionament of the blade carrying the chain in horizontal or in vertical happened through hydraulic control and plates with bolts with remarkable waste of time; besides to replace the machine for the subsequents cuts, is necessary to replace the pieces of tracks and remake the levelling by the bolts regulated by hand with another waste of time. The innovations that are bring on to the above-mentioned stone-cutter for quarry machine have the object to improve the efficiency of machine itself assuring also a long-lasting in the time for the strength of the solution adopted, a remarkable saving of time in the use and a major security for the operator. In accordance with the innovations, this object is accomplished in the stone-cutter for quarry machine in which :

- The hydraulic system is only one and operate all the movements of service with a pump by variable capacity self-adjusting.
- In substition of the pieces of tracks there is a bedplate with track realized by sections of steel electric-welded and stabilized, variable on length from 6 to 12 metres c.a.
- The levelling of the machine happened through 6 jacks for a bedplate with track of 6 metres c.a., 8 jacks for a bedplate with track of 12 metres c.a. and a verification with levels of precison by centralized reading.
- The blade carrying the chain have a bi-conical form and have the vertex of the truncaded cone more short always conveyed to the primitive diameter of the wheel drive while the vertex of the truncaded cone more long is always conveyed to the primitive diameter of the extreme wheel.
- The particular drawing of the links composing the chain, permit to utilize all the thickness of the blade carrying the chain (usually of 30 millimetres c.a.).
- For the positionament of the blade carrying the chain in horizontal, there is a system of arms of levers by toggle or similar with run-end adjustable and besides a hydraulic jack with run-end fixed in advance and safety-valves operated by the hydraulic system with a pump by variable capacity self-adjusting.
- For the positionament of the blade carrying the chain in vertical, there is an electric-hydraulic-mechanical device that is operated by the hydraulic system with a pump by variable capacity self-adjusting and besides a hydraulic jack with run-end fixed in advance and safety-valves connected to the hydraulic system above-mentioned.
- For the raising of the machine and replacement of the bedplate with track, there is on the centre of machine a base by verifiable descent and levers by toggle with run-end fixed in advance.

The advantages of the innovations above-mentioned are a complete automation of the stone-cutter for quarry machine that besides give also the possibilty to operate itself by an electronic control.

Uninterruptedly the invention is explained in detail with references to the accompanying drawings in which :

1)**The hydraulic system** with a pump by variable capacity self-adjusting and valves in series by manual controls, electric or electronic, first innovation of the invention, permit to utilize for the better the power installed accordingly with the phase of work carry out because, with a single power group it's possible to do :

- The positionament of the blade carrying the chain in horizontal or vertical speedy or slow.
- The rotation of the blade carrying the chain in any direction speedy or slow.
- The advancement of the bedplate with track into the two directions.
- The raising of all the machine (included the bedplate with track) through a base by verifiable descent and levers by toggle with run-end fixed in advance that is place on the centre of the machine.
- The movement of the jacks stabilizers and of the two wheels used to move the bedplate with track ahead or back.
- The movement of the special mechanical device by electric-hydraulic-mechanical controls that is connected through particu-

lar automatisms at this system and stop the blade carrying the chain in vertical.

2) **The bedplate with track,** second innovation of the invention (fig. N° 2 part.7, fig. N° 2A part.7 and fig. N°1 part.1), is realized by sections of steel electric-welded and stabilized, united between themselves in rectangular form, milled, with rounds slides (fig. N° 1 part.2) and toothed rack (des.N° 1 part.3) applied through bolts for the movement of machine; wheels for the movement of the bedplate with track (fig. N° 2 part. 2 and fig. N° 2A part. 2), hydraulics jacks applied to the four corners outsides (fig. N° 2 part. 1 and fig. N° 2A part. 1) for the levelling and intermediates jacks foreload applied outsides to the bedplate with track to recover the flexion (fig. N° 2 part. 5 and fig. N° 2A part. 5).

The invention is exactly its structure that permit to realize bedplates with tracks of differents lenghts (fig. N° 2 part. 7 and fig. N° 2A part. 7) keeping unchanged the grade of strenght (from 6 to 12 metres c.a.).

The system of slides on which the machine rest and glide, is constituted by rounds bars of steel (fig. N° 1 part. 2) that are bolted on the bedplate with track and by bearings of wear applied (fig. N° 1 part. 4) into the base of the machine by automatic lubrication. Inside of the bedplate with track (fig. N° 1 part. 3) is assembled with bolts the toothed rack for the sliding of the machine while always inside but on the opposite side (fig. N° 1 part. 5) there is the piping for the control of the jacks and of the wheel to an extremity of the bedplate with track.

All the function above-mentioned are controlled by the hydraulic system with a pump by variable capacity self-adjusting of which to the point 1.

3) **The machine levelling system**, third innovation of the invention, is constituted by a series of jacks by centralized control connected to the hydraulic system with a pump by variable capacity self-adjusting (of which to the point 1) applied to the four corners outsides of the bedplate with track indifferently to its length (fig. N° 2 part. 1 and fig. N° 2A part. 1) and by levels of precision by centralized reading.

With the machine in quarry, in accordance with the level of precision by centralized reading place on the controls side (fig. N° 2 part. 6 and fig. N° 2A part. 6), are proceeded to a first levelling regulating the hydraulics jacks put on the corners of the controls side and then another levelling regulating the hydraulics jacks equivalents put on the opposite side to the controls maintaining unchanged the first levelling.

With the machine so level are operated the intermediates hydraulics jacks foreload (fig. N° 2 part. 5 and fig. N° 2A part. 5) to recover the flexion of the bedplate with track indipendently from the level of quarry.

Also the intermediates hydraulics jacks foreload are connected to the hydraulic system with a pump by variable capacity self-adjusting through outsides pipings to the bedplate with track.

4) **The blade carrying the chain** , of bi-conical form (fig. N° 3) fourth innovation of the invention, is so made to obtain the maximum of the strength and a better adhesion of the slow branch of the chain so that, making the various blades carrying the chain of the different length (fig. N° 3 part. 3) and changing only the breadth of the common base at the two cones (fig. N°3 part. 2) the rigidity of the blade carrying the chain remain unchanged.

The vertex of the truncaded cone more short is always conveyed to the primitive diameter of the wheel drive (fig. N° 3 part. 1) always utilizing so the 180 grades c.a. of the wheel drive; besides the vertex of the truncaded cone more long is also conveyed to the primitive diameter of the extreme wheel (fig. N° 3 part. 4). On the outside profile of the blade carrying the chain of 30 millimetres of thickness c.a., it is obtained a groove for the accomodation of the guide of the chain (fig. N° 4 part. 2) and under the same a groove more little and deep (fig. N° 4 part. 1) for the accommodation in superposition of the pipings for the lubrication of the chain and of the extreme wheel of the blade carrying the chain (fig. N° 3 part. 4). The blade carrying the chain, on the truncaded cone more short, have a particular handgrip (fig. N° 3 part. 5) that through bolts and holes permit to assemble it to a special support (fig. N° 3 part. 6) assembled on the oscillating reducer that receive the blade carrying the chain and it is provided with a longitudinal register (fig. N° 1 part. 8) for the tension of the chain. This solution permit to have the maximum of the rigidity and durability in the time.

5)**The links composing the chain**, fifth innovation of the invention, have a particular design (fig. N° 4 part. 3) that permit to make themselves of the same thickness of the blade carrying the chain (fig. N° 4 part. 4), usually of 30 millimetres c.a. and to receive internally the guide of the chain already mentioned at the point 4 (with reference to fig. N° 4 part. 2). This thickness permit to realize besides at the two laterals drain-holes (fig. N° 4 part. 6), a frontal hole (fig. N° 4 part. 7) working mostly to drain and in smallest part working to central guide of the little tooth of the tool-holder (fig. N° 4 part. 8). The tool-holder besides to have with their particular design a little tooth of assemblage and

central positionament up the links, have a frontal hole corresponding to the frontal hole of the links themselves; besides are assembled repeatedly in a series of seven pieces (of which we report to the fig. N° 4 part. 9 the first and the last) so as to distribute the load of strain for the removal of the material during the cut.

6)**In the positionament of the blade carrying the chain in horizontal**, the innovation consist, besides than in a hydraulic jack with run-end decided in advance and safety-valves operated by the hydraulic system with a pump by variable capacity self-adjusting (of which to the point 1), in a sistem of arms of levers by toggle or similar (fig. N° 5 part. 3) with run-end adjustable (fig. N° 5 part. 4) that operate themselves for traction, contemporanously to the descent of the blade until to the attainment of the horizontal position. The advantages offered from this innovation are a remarkable saving of time in the positionament of the blade carrying the chain in horizontal because this operation is completely automatic and speedy and it is not necessary to apply manually plates, brackets, bolts or other.

7) **In the positionament of the blade carrying the chain in vertical**, the innovation consist, besides than in a hydraulic jack with run-end fixed in advance and safety-valves operated by the hydraulic system with a pump by variable capacity self-adjusting (of which to the point 1), in a special mechanical device by electric-hydraulic-mechanical control, connected with particular automatisms to the hydraulic system with a pump by variable capacity self-adjusting that operate any means able to block it whether a piston-pin or a hook or other. The advantages offered from this innovation are a remarkable saving of time in the positionament of the blade carrying the chain in vertical because this operation is completely automatic and speedy and it is not necessary to apply manually plates, brackets, bolts or other (as above to the point 6).

8) **In the base by verifiable descent and levers by toggle with run-end fixed in advance**, placed on the centre of the machine (fig. N° 1 part. 6) the innovation consist exactly, in a base by hydraulic control (look at the point 1) that lowering itself (fig. N° 1 part. 7), raise contemporanously machine and bedplate with track; at this point using one of the two wheels place in the centre of the bedplate with track (fig. N° 2 part. 2 and fig. N° 2A part. 2) that besides when is down prevent the oscillation, it is possible to replace it with a sliding ahead or back. Another operation practicable with the assistance of the base by verifiable descent and levers by toggle with run-end fixed in advance is the rotation of all machine, bedplate with track include, in any direction. For this operation is sufficent place the machine on the centre of the bedplate with track and interpose a special rotating place between the machine and the plain of the quarry lowering then the base by verifiable descent and levers by toggle with run-end fixed in advance.

Claims

1. Innovations of stone-cutter for quarry machines, characterized by the hydraulic system with a pump by variable capacity self-adjusting that put on all the movement of service slow or speedy.

2. Innovations of stone-cutter for quarry machines, according to the claim 1), characterized by a bedplate with track (fig. N° 2 part. 7, fig. N°2A part. 7 and fig. N°1 part. 1) realized with section of steel electric-welded and stabilized, united between themselves in rettangular form (variable from 6 to 12 metres c.a.) milled, with rounds slides (fig. N° 1 part. 2) applied through bolts, toothed rack (fig. N° 1 part. 3) and wheels for the moviment ahead or back of the bedplate with track (fig. N° 2 part. 2 and fig. N° 2A part.2), hydraulics jacks applied to the four corners outsides (fig. N° 2 part. 1 and fig. N° 2A part. 1) for the levelling and to the centre hydraulics jacks foreload (fig. N° 2 part. 5 and fig. N° 2A part. 5) to recover the flexion of the bedplate with track indipendetly from the level of the plain of the quarry.

3. Innovations of stone-cutter for quarry machines, according to the preceding claims, characterized by a levelling system through hydraulics jacks in measure of 6 for a bedplate with track of 6 metres c.a. (fig. N° 2 part. 1 and part. 5), in measure of 8 for a bedplate with track of 12 metres c.a. (fig. N° 2A part. 1 and part. 5) and by levels of precison by centralized reading system.

4. Innovations of stone-cutter for quarry machines, according to the preceding claims, characterized by a blade carrying the chain of bi-conical form realizable in differents lenghts (fig. N° 3 part. 3), with the vertex of the truncaded cone more short always conveyed to the primitive diameter of the wheel drive (fig. N° 3 part. 1) always utilizing so the 180 grades c.a. of the wheel drive; besides also the vertex of the truncaded cone more long is always conveyed to the primitive diameter of the extreme wheel (fig. N°3 part. 4). It is

realized by an only section of steel and on the outside profile it is obtained a groove for the accomodation of the guide of the chain (fig. N° 4 part. 2) while under the same a groove more little and deep (fig. N°4 part. 1) for the accomodation in superposition of the pipings for the lubrication of the chain and extreme wheel of the blade carrying the chain. On the truncaded cone more short there is a particular handgrip (fig. N° 3 part. 5) that through bolts and holes permit to assemble it to a special support (fig. N° 3 part. 6) that is assembled itself on the oscillating reducer that receive the blade carrying the chain and it is provided with a longitudinal register (fig. N°1 part. 8) for the tension of the chain.

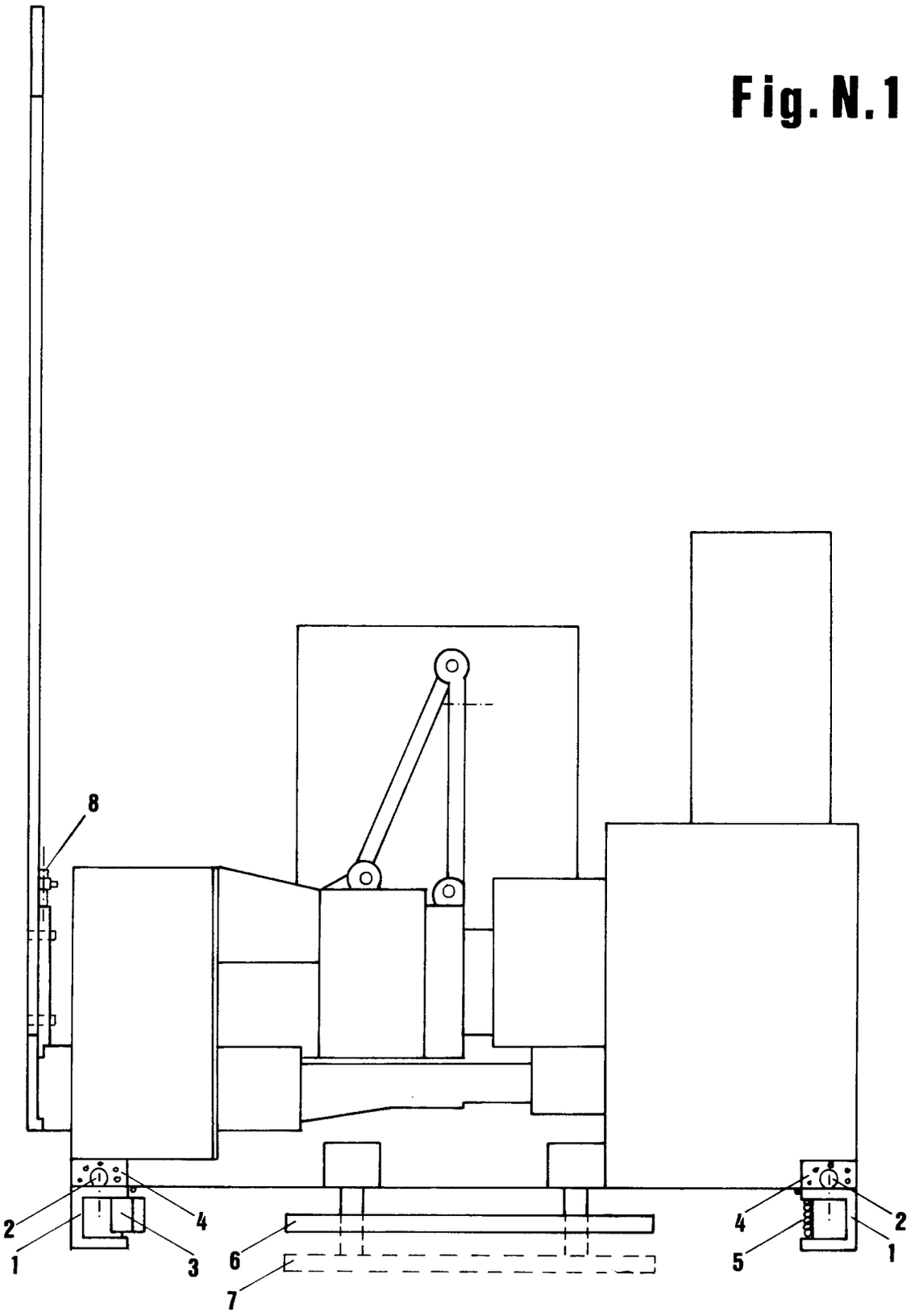
5. Innovations of stone-cutter for quarry machines, according to the preceding claims, characterized by links composing the chain with a particular design (fig. N° 4 part. 3) that permit to utilize to the maximum the thickness of the blade carrying the chain (fig. N° 4 part. 4) about 30 millimetres c.a. and to receive internally the guide of the chain. This thickness permit to realize besides at the two laterals drain-holes (fig. N° 4 part. 6), a frontal hole (fig. N° 4 part. 7) working mostly by drain and in smallest part working by central guide of the little tooth of the tool-holder (fig. N° 4 part.8). The tool-holder, characterized by a particular design with a little tooth of assemblage and central positionament up the links, a frontal hole corresponding to the frontal hole of the links for the drain, assembled repeatedly in a series of seven pieces (of which to fig. N° 4 part. 9 are drawn the first and the last) to distribute the load of strain during the cut.

6. Innovations of stone-cutter for quarry machines, according to the preceding claims, characterized by the positionament of the blade carrying the chain in horizontal through hydraulic jack with run-end fixed in advance and safety-valves operated by the hydraulic system with a pump by variable capacity self-adjusting and arms of levers by toggle system or similar (fig. N° 5 part. 3) with run-end adjustable (fig. N° 5 part. 4) that operated themselves for traction contemporanously to the descent of the blade carrying the chain until to the attainment of the horizontal position. There is saving of time because the movement is completely automatic.

7. Innovations of stone-cutter for quarry machines, according to the preceding claims, characterized by the positionament of the blade carrying the chain in vertical through hydraulic jack with run-end fixed in advance and safety-valves operated by the hydraulic system with a pump by variable capacity self-adjusting and by a special mechanical device by electric-hydraulic-mechanical control connected with particular automatisms to the hydraulic system with a pump by variable capacity self-adjusting and operate any means able to block it whether a piston-pin or a hook or other. There is saving of time because the movement is completely automatic.

8. Innovations of stone-cutter for quarry machines, according to the preceding claims, characterized by a base by verifiable descent and levers by toggle with run-end fixed in advance, applied in the centre of the machine (fig. N° 1 part. 6 and part. 7), operated through the hydraulics system with a pump by variable capacity self-adjusting, for the lowering of the machine and of the bedplate with track, it replacement or rotation.

Fig. N.1



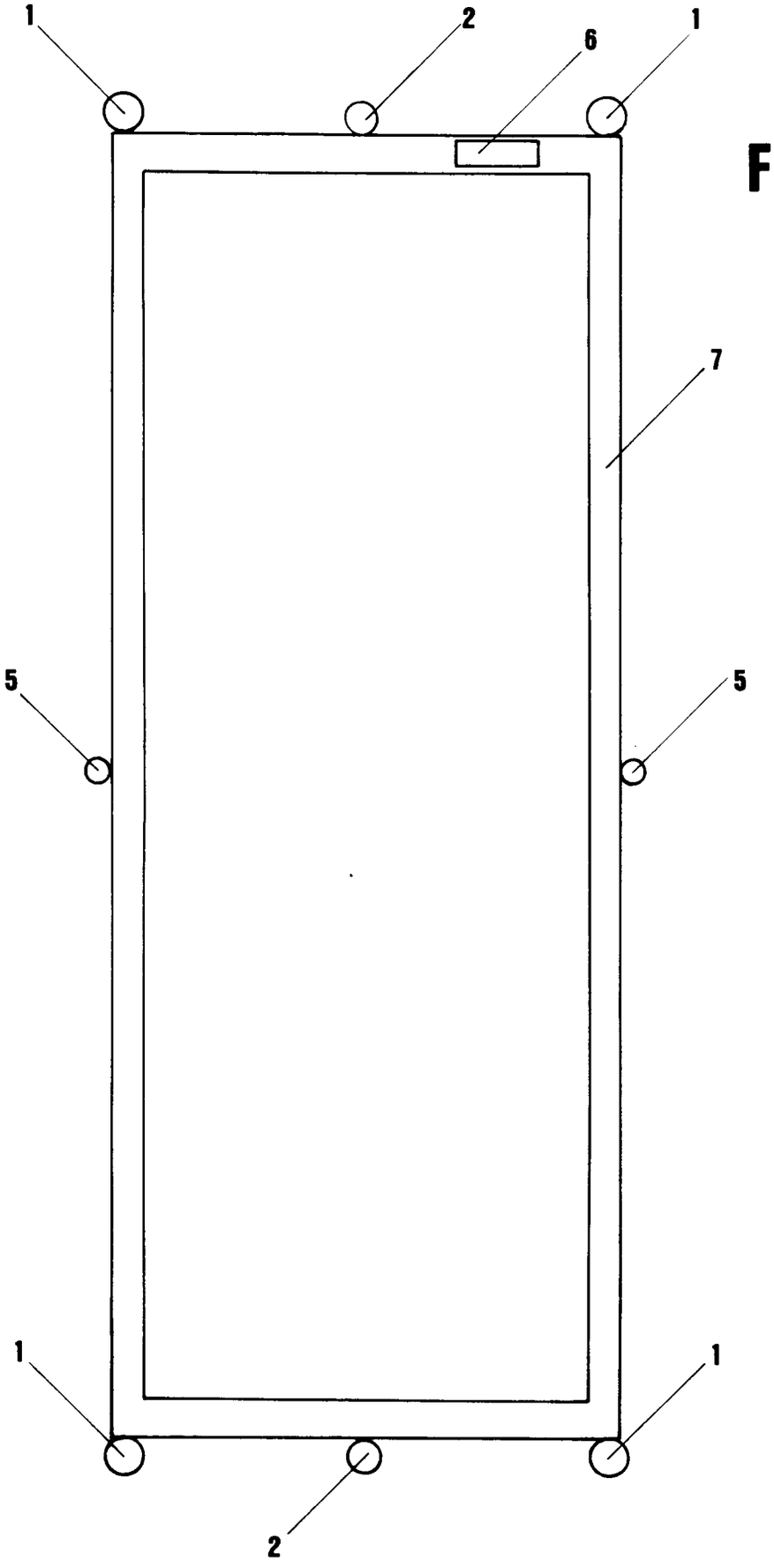


Fig. N. 2

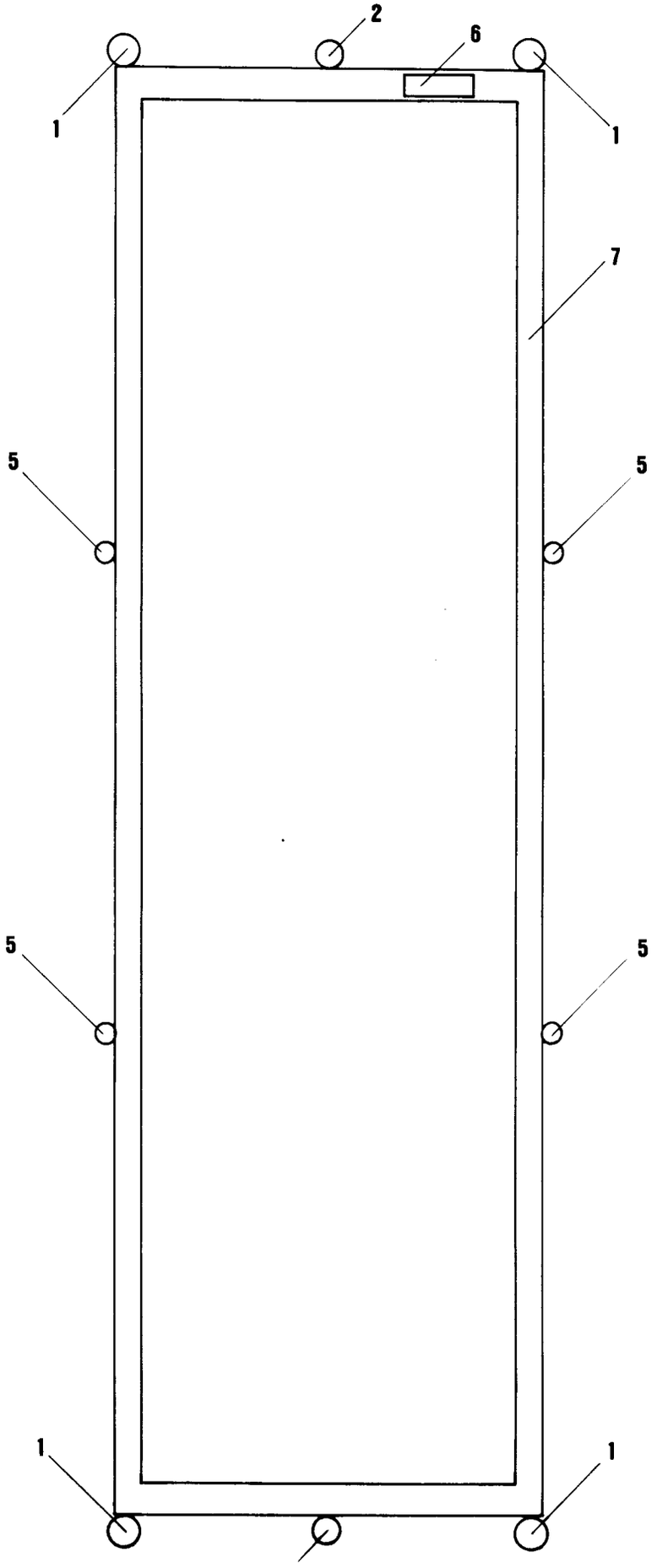


Fig. N.2A

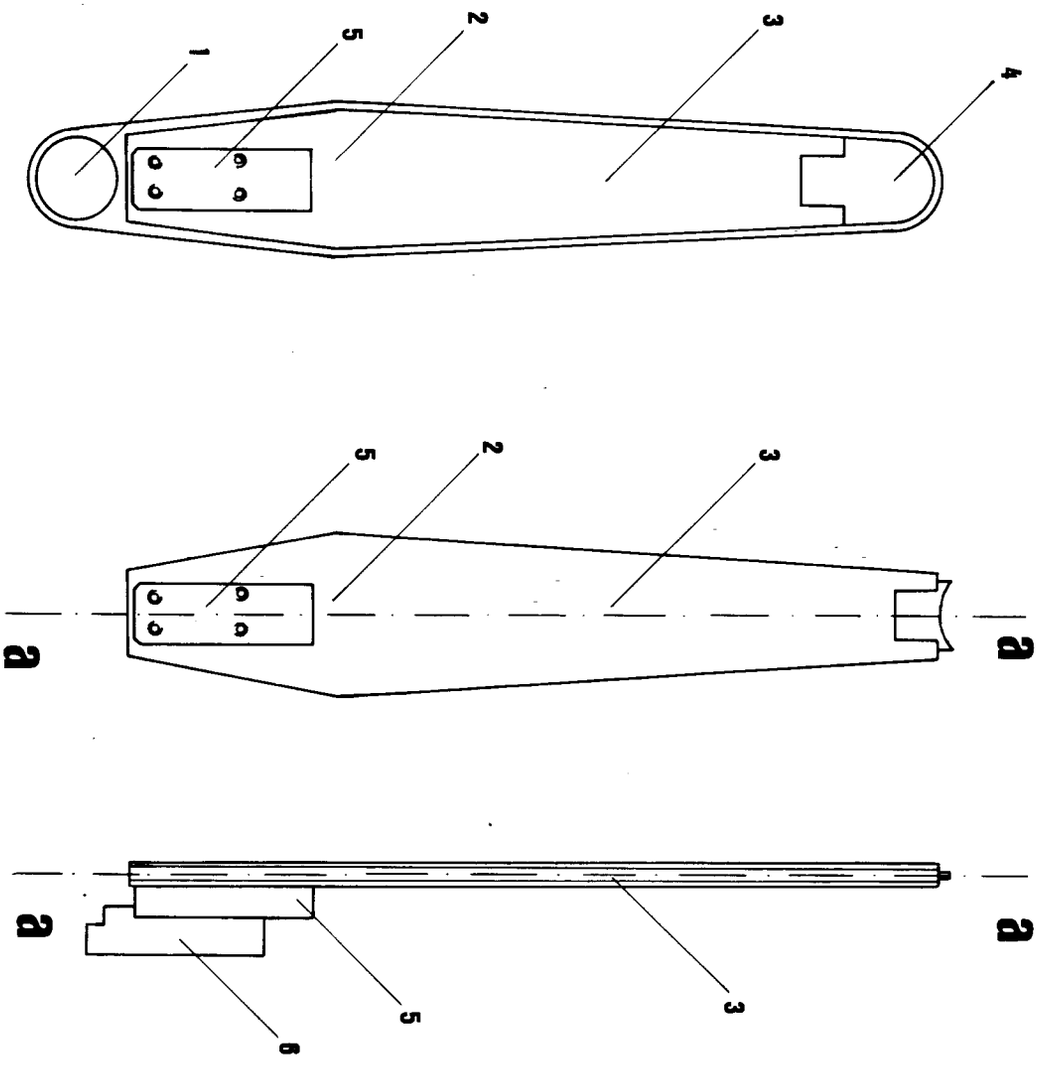
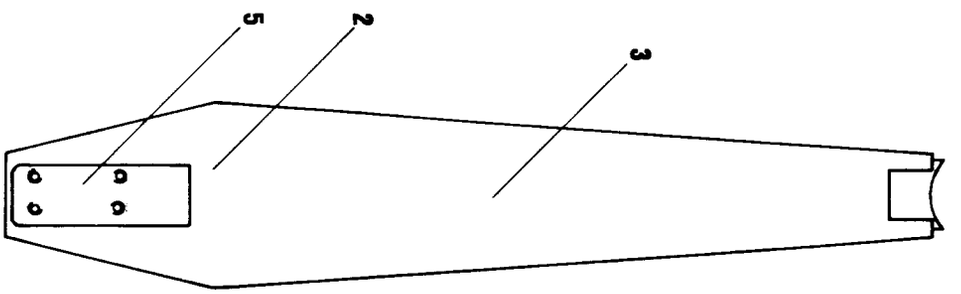


Fig. N. 3



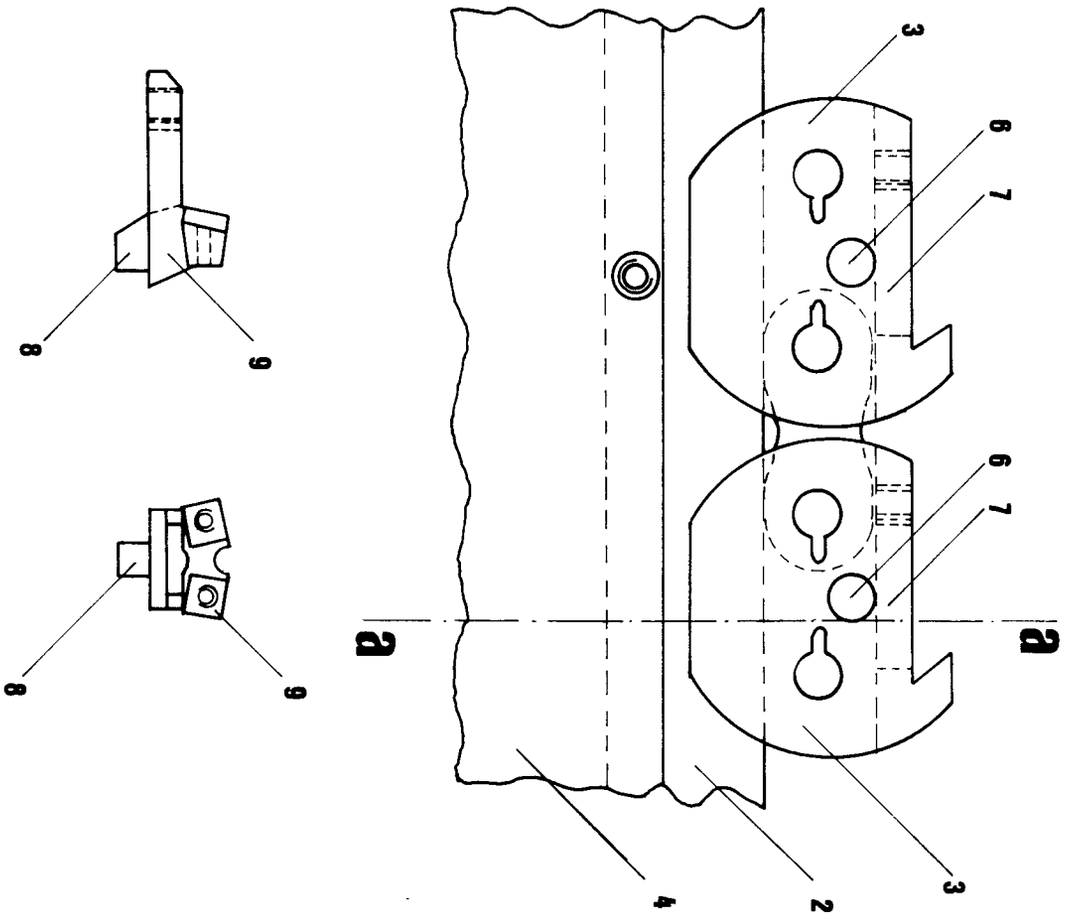


Fig. N. 4

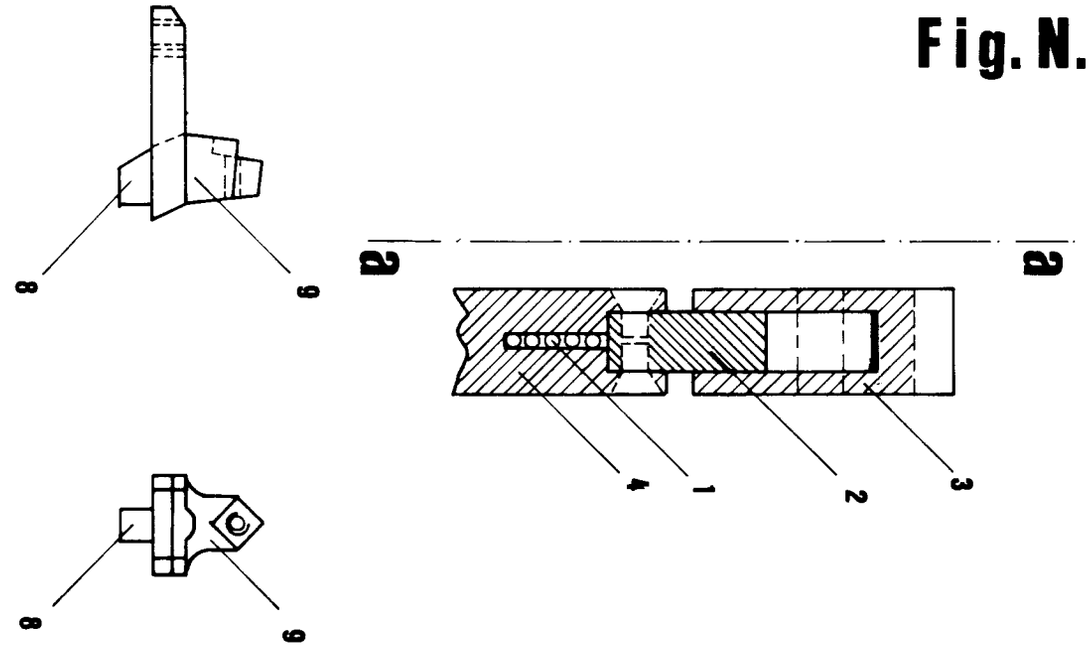
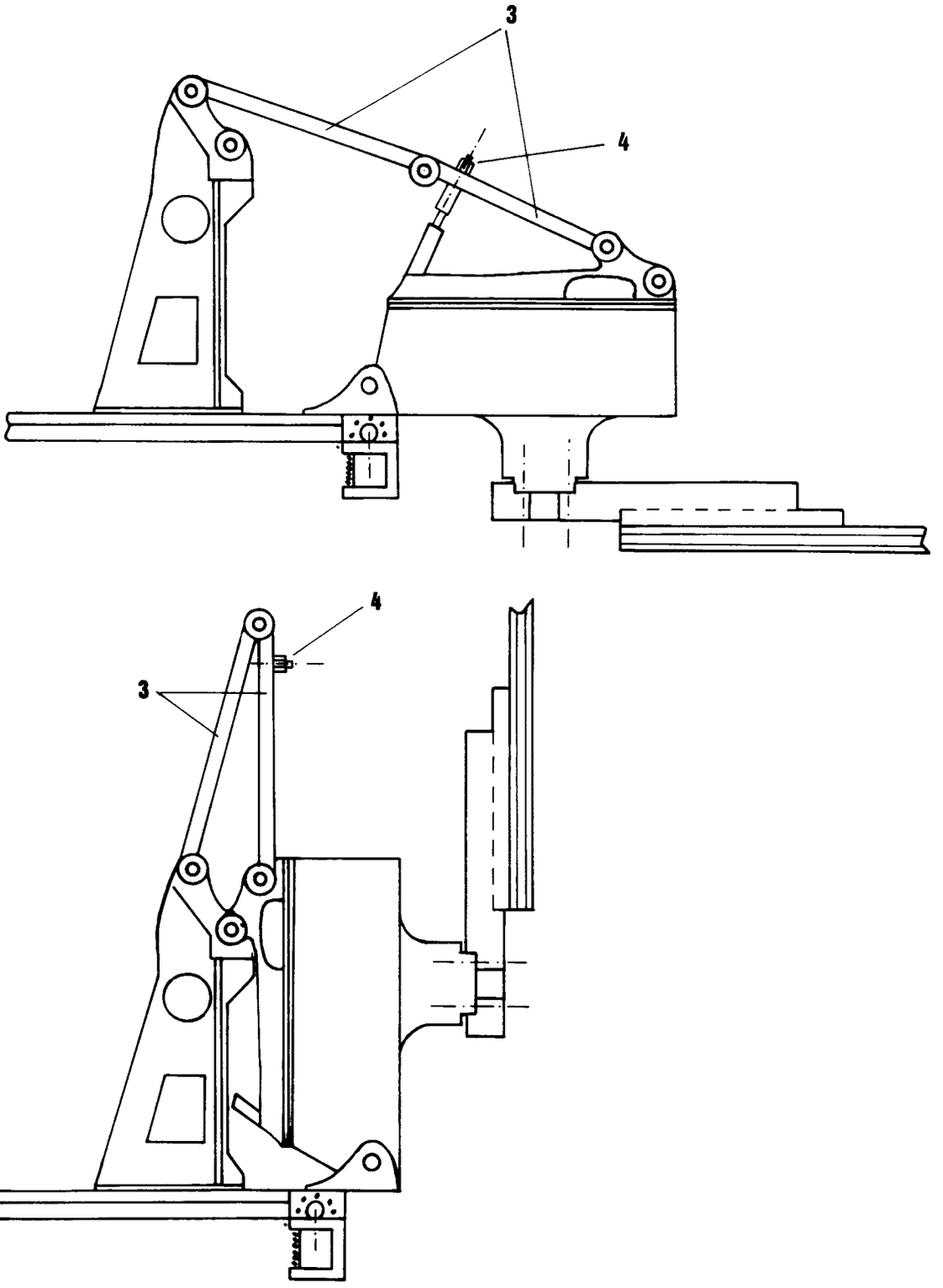


Fig.N.5



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EUROPEAN SEARCH REPORT

Application Number
EP 93 83 0490

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.6)
X A	EP-A-0 269 172 (H.B.ZACHRY COMPANY) * abstract * * column 13, line 55 - column 14, line 1 *	1 6-8	B28D1/08 B28D7/00 B28D1/12 B27B17/12
A	US-A-5 215 071 (MERTES ET AL.) * column 2, line 34-51 *	1	B27B33/14
A	FR-A-2 382 577 (MASCHINENFABRIK KORFMANN G.M.B.H.) * page 6, line 19 - page 7, line 21; figures 1-3 *	2,5	
A	EP-A-0 241 422 (GAMMA STAWAG AG) * column 3, line 6-52; figures 1,2 *	2	
A	US-A-3 384 417 (MYLEWSKI) * column 3, line 19-33; figure 1 *	4	
A	EP-A-0 453 322 (BLOUNT,INC.) * column 2, line 51 - column 3, line 55; figures 1-4 *	5	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
A	US-A-4 464 964 (ALEXANDER) * column 10, line 53-60; figure 10 *	5	B28D B27B
A	FR-A-2 496 544 (FANTINI)		
A	DE-A-32 31 351 (HÜTTINGER)		
A	DE-A-40 19 300 (PÖLLMAN KONSTRUKTION, ENTWICKLUNG GMBH)		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	17 May 1994	Petersson, B

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