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(54) A support and coupling structure for a portable drill for railway tracks.

(57) The invention relates to a support and coupling structure for a portable drill for railway tracks. It comprises two guide rails (1) provided with racks (10), a vice (3, 3'), a support (5) and manoeuvring means (6). The vice (3, 3') has a first and a second jaw (7, 8) inferiorly shaped such as to grip the upper flange of the rail (4) and superiorly equipped with a strike and a counterstrike plates (74, 84). The jaw (7) is laterally fixed between the guide bars (1) and rests on the rolling plane (40) of the rail (4). The second jaw (8) is connected to the first jaw (7) by means of a flathead pivot (9), with a counterspring (12) and a key (100). The support device (5) comprises an adjustable drill (2) support device and sliding seats (51) on the guide bars (1). The manoeuvring means (6) comprise first gears (60) enmeshing with the racks (10) and keyed on a first shaft (61), which shaft (61) is also equipped with a handle (62) and second gears (63) enmeshing with the first gears (60) and keyed on a second shaft (64) equipped with a turning handle (66).

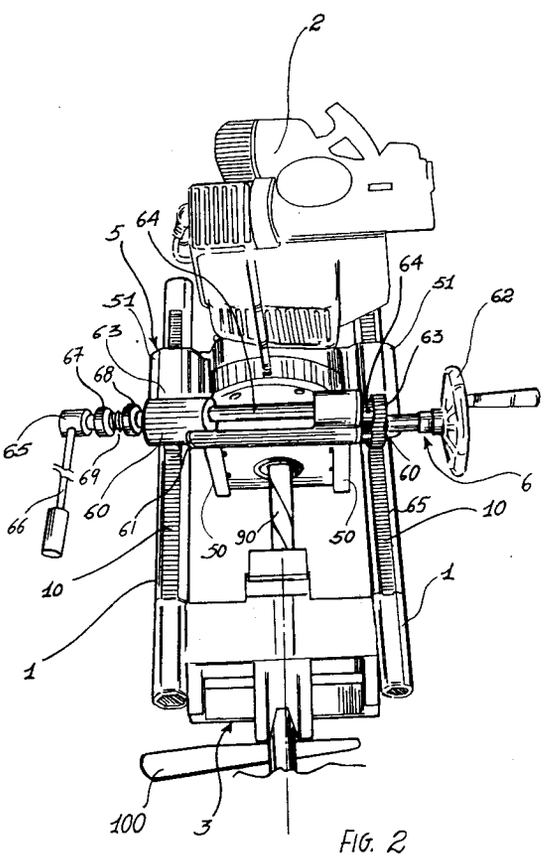

FIG. 2

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The invention relates to a support and coupling structure for a portable drill for railway tracks. The mechanisation process of maintenance work in the railway sector has advanced particularly in the field of small machines for work on tracks, such as drills, borers and saws, but there is still much room for improvement. For example, even though welding is now widely used for connecting lengths of rail, traditional-type bolting using fishplates, track bolts and holes bored in the webs of the tracks is still in widespread use. Motor-driven drills are used for this task, usually having electric, pneumatic or internal-combustion motors, with gear reducers, and support and coupling structures are necessary for coupling the assembly to the track.

Drawbacks of this kind of structure are that they are heavy and massive and therefore difficult to transport, as well as slow and laborious to install and remove on and from the track. Further, the coupling of the structure to the track is unstable, creating difficulties with regard to accuracy of desired bore height and direction.

Electric drills are usually preferable since they are lighter than internal combustion drills, but obviously where there is no available current link-up they cannot be used, and it becomes necessary to use an internal-combustion motor drill, heavier and more massive than the former type and requiring correspondingly larger and stronger support and coupling structures. The poor precision of these drills is caused by insufficiently strong and stable blocking devices, which devices are rendered even less efficient by the amount of time required to block and unblock them through the use of small handwheels manoeuvring jacks and rods on various parts of the rail, not forgetting the need to reposition and reblock the entire support structure in order to bore holes that are even very close together.

A further drawback inherent to the above drills is worthy of note: when a hole is to be drilled at crossovers in the tracks, the convergence of the rails causes such difficulty in boring the individual rails that in order to position the blocking structure the adjacent rail has to be lifted out of the way, causing enormous work hold-ups.

As mentioned above, the total weight of the drill and its support structure constitutes a considerable drawback. Since often the drill or other machine tool has to be carried by hand, if there is also a massive support structure to carry at least two operatives will be needed, causing once more considerable waste of time and manpower. Furthermore, in cases where a drill or other machine is used on working lines, it may become necessary for operatives urgently to evacuate the workplace in order to let trains or trams pass: massive and unwieldy machine tools and structures impede this urgency, with obvious risks of safety to man, machine and rolling stock.

The present invention aims to obviate the above-mentioned drawbacks by providing a support structure which is especially but not exclusively suitable for operations involving the use of a drill driven by an internal combustion motor, but extending to millers, saws and other portable machine tools, the structure being of a small weight and mass and being sufficiently rigid for carrying out its functions, easily dismountable into constituent parts and thus easily transportable, the structure also enabling holes to be drilled at various heights, both on the web of the rail and on horizontal parts of the superstructure, such as switch plates and sleepers.

The invention, as it is characterised in the claims that follow, solves the problem of providing a support and coupling structure for a portable drill for railway tracks, of the type comprising a pair of parallel cylindrical guide bars for the forwards and backwards movement of the drill, and consequently of the bit and chuck of the drill, which are parallel to the guide bars, a blocking device for blocking the parallel guide bars to a rail, a drill support device and manoeuvring means for the movement of the bar pair guide, which is characterised in that:

- the blocking device, associated to an end of the parallel guide bar pair is in fact a vice, comprising a first and a second jaw, inferiorly shaped according to a shape of an end and a fishing surface of the rail, and superiorly provided with a strike and a counterstrike surfaces to signal that the blocking procedure has been carried out; the first jaw having a horizontal centrally developing body which is rigidly fixed laterally between the guide bars and which leans on the rolling plane of the rail head; the second jaw having a vertically developing body connected to the first jaw by means of a flathead pivot provided with a coaxial counterspring and a feather key, the pivot being received in a central through-hole in the second jaw and, coaxially, in a tubular element, in contrast with the spring which projects centrally from the first jaw perpendicularly to the rail on an opposite side to the bars; the feather key being moveably insertable in a groove made in proximity of the pivot end projecting from the tubular element and having one of its ends inclined and striking against a free end of the tubular element, with a consequent blocking of the vice on the top section of the rail by pressure exerted on the pivot:
- the drill support device on the guide bars comprises an adjustable drill suspension frame and associated parallel cylindrical

seats which slide on the guide bars, the frame-seats assembly being dismountable from the guide bars;

- the drill manoeuvring means on the guide bar pair comprise two parallel racks superiorly solid to the guide bars, a first gear pair meshing with the racks through vertical apertures made in the cylindrical sliding seats and keyed on a first transversal rod mounted on the support frame and rotatable by means of a handle at one of the rod ends, a second gear pair engaged with the first gear pair and keyed on a second transversal rod, also mounted on the support frame and rotatable to it, and which bears a perpendicular turning head rotatable through the use of a turning rod of adequate length.

Further characteristics and advantages of the present invention will better emerge from the detailed description that follows of an embodiment of the invention, illustrated in the form of a non-limiting example in the accompanying drawings, in which:

- figure 1 shows, in lateral perspective view, a support and coupling structure for a portable rail-boring drill according to the present invention;
- figure 2 shows, in frontal perspective view, a support and coupling structure for a portable rail-boring drill according to the present invention;
- figure 3 shows, in lateral and in large scale, a blocking device, namely a vice, of the structure of figures 1 and 2;
- figure 4 shows, in enlarged-scale perspective view, a support and manoeuvring means of the structure of figures 1 and 2;
- figure 5 shows, in enalarged-scale perspective view, a further embodiment of the vice blocking device and relative guide bars according to the invention
- figure 6 shows, in enlarged-scale transversal section, a detail of the manoeuvring means of the structure according to the invention.

With reference to the figures, 1 indicates a pair of parallel cylindrical guide bars of a drill 2, shown only in outline. 3 and 3' denote a vice for blocking the parallel guide bars 1 to a flanged rail 4 for railways or tramways, while 5 denotes a drill support device and 6 manoeuvring means of the drill support device 5 on the guide bars 1.

The vice 3, 3' is associated to the guide bars 1 in proximity of their ends in two different variations, as will be more fully described hereinafter. The vice 3, 3' comprises a pair of jaws 7, 8 which couple to the rail 4.

The jaw 7 of the vice 3 has a horizontally-developing central body 70 fixed laterally between the guide bars 1 and resting on the rolling plane 40 of the head of the rail 4.

A central tubular element 75 projects horizontally and centrally from the central body 70 of the jaw 7 and is parallel to and on the opposite side of the guide bars 1, as can be seen in figures 1 and 2, or perpendicular as shown in figure 5 in an alternative embodiment, as will be described hereinafter.

An inferior portion projects from the central body 70 of the jaw 7, which inferior portion exhibits lateral vertical portions 71 which engage with the edge 41 of the rail head. A flat inclined plate 72 is solid to the vertical portions 71 and projects towards the guide bars 1 in order to engage at its end portions with the fishplate surfaces 42 of the rail 4.

A portion of support 73 for an inclined plate 74 extends centrally upwards from the central body 70 of the jaw 7 and parallel to the flat plate 72. Figures 1, 3 and 5 show how the upper inclined plate 74 functions as a strike plate.

The jaw 8 of the vice 3' develops vertically (see figure 5) and exhibits a vertical face 80 turned towards the jaw 7 and centrally holed, and lateral walls 81 destined to engage with the edge 71 of the rail 4 head.

The vertical lateral walls 81 of the jaw 8 are solid to the flat plate 72 of the jaw 7 and to an inclined upper end plate 84 which, like inclined plate 74, functions as a striker.

As previously mentioned, the jaw 7 is solid between the ends of the guide bars 1 and is fixed with respect to them. The jaw 8, which is mobile, is fixed to the jaw 7 through a connection with a flathead pivot 9 and a key 100. The pivot 9 passes through the central hole of the jaw 8, striking with its flat head against the jaw 8 vertical face 80: it also passes through the tubular element 75 of the jaw 7, from which element 75 a grooved portion 9a of it projects (see figure 2) having a diametral hole destined to receive a pin 11. The key 100 has inclined sides which are removably insertable in the pivot 9 groove 9a: its function is to near jaw 8 to jaw 7.

A spring 12 is positioned between jaw 7 and jaw 8, which spring 12 is coaxial to the pivot 9 and has the function of keeping the two jaws 7 and 8 apart up to the limit of the pin 11, which last acts as an endrun striker if the key 100 is not inserted in 05 the groove 9a of the pivot 9.

When the key 100 is inserted in the groove 9a and one of its sides strikes against the free end 75a of the tubular element 75, its complete insertion causes jaw 8 to near jaw 7 superiorly up until the relative upper plates 84 and 74 strike together and inferiorly up until the relative portions 71, 74 and 81 strike against the edges 41 and the fish-

plates 44 of the rail 4 head.

The tubular element 75 exhibits an end diametral recess 75b, which the key 100 can enter when the flathead pivot 9 is turned: when this operation is performed, the jaws 7 and 8 are distanced and the vice can run along the rail 4.

The support device 5 of the drill 2 on the guide bars 1 comprises an adjustable support frame 50 and associated parallel sliding cylindrical seats 51 on the guide bars 1. The frame-seats assembly 5 are removable from the guide bars 1.

The adjustable drill support frame 50 comprises lateral C-brackets 52 perpendicular to the guide bars 1 for the housing of the drill 2 and preferably also its gear reducer 2a. There is a slot 53 on each of the C-brackets 52 for the passage on each side of adjustment bolts 54 which, cooperating with the gear reducer 2a (not shown), adjust the drill 2 position.

To enable fine adjustment of the gear reducer 2a assembly movement along the C-brackets 52 before applying the bolts, a rack (not illustrated) can be present on the gear reducer box at and parallel to one of the two C-brackets 52, which rack meshes with a rotatably and preferably friction-mounted command pinion 57 present on one of the C-brackets 52 and connected to a manoeuvring organ 58.

The adjustable drill suspension frame 50 further comprises, at the free ends of the C-brackets 52, a solid connecting element 55 having a function of stiffening the frame and also functioning as a gripping organ for the transport of the whole assembly 5 when it is removed from the guide bars 1.

The manoeuvring means 6 of the drill 2 on the guide bars 1 comprise two parallel racks 10 superiorly solid to the guide bars 1. The racks 10 extend considerably over the length of the guide bars 1, but not up to their end zones. The means 6 further comprise a first gear couple 60 meshing with the racks 10 through vertical openings 56 made in the cylindrical seats 51 and keyed on a first transversal shaft 61 which, thanks to the presence of slide bearings 61a (see figure 6) is rotatable on the adjustable drill support frame 50 by means of an end handle 62. The means 6 also comprise a second gear couple 63 meshing with the first gear couple 60 keyed on a second transversal shaft 64 and, thanks to slide bearings 64d, rotatable on the adjustable drill support frame 50 and bearing a perpendicular turning head 65 rotatable by use of a turning rod 66 of adequate length.

The manoeuvring means 6 function as follows. When the assembly 5 is mounted on the guide bars 1 through the cylindrical seats 51, the first gear couple 60 meshes with the racks 10. Then by rotating the handle 62 the adjustable drill support frame 50 is made to move, and with it the drill 2, either forwards or backwards. As can be seen in figure 1, the drill 2 and thus its chuck and bit 90, (see also figure 2) are brought up to contact the web 45 of the rail 4. The further advancement bringing about the boring of the hole in the rail 4 is performed by turning the rod 66, which provides the correct pressure of the bit 90 on the web 45.

Figures 1 to 3 show an arrangement of the structure wherein the guide bars 1 are arranged horizontally, and wherein the jaw 7 of the vice 3 is fixed between the two guide bars 1, with the bars 1 axes and the pivot 9 axis all parallel, so that the drill bit 90 is perpendicular to the web 45 of the rail 4.

Figure 5 shows an arrangement of the structure wherein the guide bars 1 are arranged vertically and wherein the jaw 7 of the vice 3' is fixed between the bars 1 in such a way as to create a perpendicular relation between the guide bar 1 axes and the axis of the pivot 9. Thus the bit 90 axis is perpendicular to the flange 46 of the rail 4.

There is the possibility, with the invention as hereto described, that the operator would tend to lean too heavily on the manoeuvring rod and cause a non-gradual advancement of the drill during the drilling operation, with negative effects on the hole quality as well as possible damage to the bit. If the advancement were too rapid, the bit might stick in the hole, leading to further defective results. Furthermore, during the vertical positioning phase, or when the drill is at rest, the weight of the drill itself might set the gear pair in rotation along the racks, leading to a slow but progressive sliding of the entire group downwards, obstructing the fixing and positioning operations.

During horizontal use of the structure, it is possible that once the hole has been drilled, the drill bit will screw into the hole so violently that the chuck impacts against the metal of the rail.

In order to encounter successfully the above-mentioned problems, the invention permits of manually adjusting the drill 2 resistance to advancement on the racks 10 along the parallel guide bars 1.

For this purpose the manoeuvring means 6 comprise a clutch device, mounted coaxially to the second transversal shaft 64 and interacting between the head 65 and the drill support device 5. To this end, the shaft 64 has a threaded end portion 64a and a socket 64b for a key. The clutch device includes an adjustment collar 67, internally threaded and screwable on a counterthread realised in the end portion 64a of the shaft 64, a pressure collar 68, slidable along the shaft 64 and engaged on it by means of a key coupling 64c, and an elastic element 69, preferably constituted by a plurality of belleville washers interpositioned be-

tween the adjustment collar 67 and the pressure collar 68. The belleville washers 69 are compressible by manually screwing the adjustment collar 67 so that it exerts on the pressure collar 68 first a rightwards movement (see figure 6) in the direction of the arrows F-F, and, at the endrun stop, adequate pressure on relative contact surfaces 68a, 5a, predisposed for exactly this purpose, between the slidable collar and the drill support device.

Contrarily, in order to eliminate the effect of the clutch device, the adjustment collar 67 is unscrewed on the threaded portion 64a of the shaft 64 in a leftwards direction (arrow F, figure 6), returning into the shown position. The adjustment collar 67 enables different elastic element 69 pressure levels to be achieved on the pressure collar 68, ranging from limited clutch for a greater resistance to drill advancement up to a complete blocking of the drill movement.

Where vertical boring is to be carried out, there may be the problem of difficulty in extracting the bit 90 from the hole after the operation: for this reason means are provided for retracting the whole drill 2 and the support frame. These means can be in the form of a cross-bar 91 removably connected to the guide bars 1 at their opposite end to the vice 3, a spring 92 fixed to the support frame 50 and resisting its advancement movement, and a threaded rod 93 passing through the cross-bar 91 and connected to a handle 94, for manual adjustment of the spring tension. The spring 92 is connected at one end to the support frame 50 and at the other end to the bottom end of the rod 93. Thus the spring 92 is tensed by the handle 94 n an operative position starting at the point where the drill bit 90 is touching the surface to be bored, and it acts in contrast with the movement of the bit 90 into the hole so that the same can be withdrawn easily on completion of the boring operation.

To summarize, the various positions of the vice 3 are as follows. When the key 100 is inserted into the slot 9a of the pivot 9 and one of its sides strikes against the end of the tubular element 75, the vice is in a blocking position on the rail 4. When the key 100 is inserted into the slot 9a of the pivot 9 and one of its sides strikes against the diametral recess of the tubular element 75, the vice 3 is in a non-operative position with regard to the flange of the rail 4, and thus the structure cannot slide along the rail.

When the key 100 is removed from the slot 9a of the pivot and the pin 11 strikes against the free end 75a of the tubular element, the vice is in a loose non-operative position between the first and second jaws 7 and 8, and the structure can be dismounted and moved to another workplace.

When the key 100 is removed from the slot 9a of the pivot 9 and the pin 11 strikes against the diametral recess 75b of the tubular element 75, the jaws of the vice 3 are in a non-operative position (even looser than the previous) and the structure can be removed more easily from the rail 4 and moved to another workplace.

The above demonstrates how the conformation of the invention is advantageous.

Since only the upper flange of the rail 4 is blocked by the vice 3, the support and coupling structure with its associated drill can be used in situations where, with the known art, it was impossible to reach, eg. at junction zones. Thanks to the fact that almost all of the mass of the coupling structure and its relative motor group is situated above the rolling plane of the rail 4, with only the gear reducer and the drill bit (in all, about 30-40 cm) being below the rolling plane, the drill can be operated in very restricted areas.

Another advantage is that the drill can be separated from its support, and the support itself can be separated into many parts, rendering the whole assembly easy to transport, even by a single person.

The ease of blocking and unblocking afforded by the vice, more specifically the fact that the key 100 can be applied or removed by a simple single hammer-stroke, considerably accelerates the speed of the single operations, enhancing the safety of the operatives and the machinery, as well as speeding up the entire removal operation.

Obviously modifications and/or improvements can be made to the invention, all entering within the field of the following claims.

Claims

1. A support and coupling structure for a portable drill for railway tracks comprising two parallel cylindrical guide bars (1) for forwards and backwards movement of a drill (2) and of a chuck and bit (90) of the drill (2), which chuck and bit (90) are parallel to the guide bars (1); a vice (3, 3') for blocking the parallel guide bars (1) to a railway (4); a support (5) of the drill (2) and manoeuvring means (6) for moving the support (5) on the guide bars (1),
characterised in that:

- the vice (3, 3') associated to an end of the parallel guide bar pair comprises a first (7) and a second jaw (8), inferiorly shaped according to a shape of a rail end (41) and a rail fishing surface (42), and superiorly provided with a strike surface (74) and a counterstrike surface (84) to signal that a blocking procedure has been carried out; the first jaw (7) having a horizontal centrally developing body (70) which is rigidly fixed laterally be-

tween the guide bars (1) and which leans on a rolling plane of a head of the rail (4); the second jaw (4) having a vertically developing body connected to the first jaw (7) by means of a flathead pivot (9) provided with a coaxial spring (12) and a feather key (100), the pivot (9) being received in a central through-hole in the second jaw (8) and, coaxially, in a tubular element (75), and being opposed by the spring (12) which projects centrally from the first jaw (7) perpendicularly to the rail (4) on an opposite side to the guide bars (1); the feather key (100) being movably insertable in a slot made in proximity of the pivot (9) end projecting from the tubular element (75) and having one of its ends inclined and striking against a free end of the tubular element (75), with a consequent blocking of the vice (3, 3') on the top flange of the rail (4) by pressure exerted on the pivot (9);

- the drill support device on the guide bars (1) comprises an adjustable drill suspension frame (50) and associated parallel cylindrical seats (51) which slide on the guide bars (1), the frame-seats assembly being dismountable from the guide bars (1);
- the drill manoeuvring means on the guide bars (1) comprise two parallel racks (51) superiorly solid to the guide bars (1), a first gear pair (10) meshing with the racks (10) through vertical apertures (56) made in the cylindrical sliding seats (51) and keyed on a first transversal rod (61) mounted on the support frame (5) and rotatable by means of a handle (62) at one of the rod ends (62).

2. A structure as in claim 1, characterised in that the first jaw (7) of the vice (3) is fixed between the guide bars (1) in such a way that an axis of the pivot (9) connecting jaw (7) and jaw (8) and axes of the guide bars (1) are parallel; an axis of the bit (90) of the drill (2) being perpendicular to the web (45) of the rail (4).

3. A structure as in claim 1, characterised in that the first jaw (7) of the vice (3') is fixed between the guide bars (1) in such a way that there is a perpendicular relation between axes of the bars (1) and an axis of the pivot (9) connecting the first and second jaws (7 and 8); an axis of the bit (90) of the drill (2) being perpendicular to the lower surface of the lower flange (46) of the rail (4).

4. A structure as in claim 1, characterised in that the tubular element (75) of the first jaw (7) exhibits, at free end, a diametral recess (75b) to receive a key (100) passing into the connecting pivot (9).

5. A structure as in claims 1 and 4, characterised in that the second jaw (8) is connected to the first jaw (7) by means of the flathead pivot (9) and a spring (12) and the key (100), which key (100) is insertable in the slot in the tubular element (75) in the diametral recess (75b), placing the vice (3, 3') in a non-operative loosely-coupled position with the upper flange of the rail (4), whereby it can slide along the rail (4).

6. A structure as in claim 1, characterised in that endrun means are present and comprise a pin (11) inserted in a diametral through-hole nearer to an end of the pivot (9) than the insertion slot for the key (100).

7. A structure as in claims 1 and 5, characterised in that the second jaw (8) is connected to the first jaw (7) by means of the flathead pivot (9) and the endrun pin (11) but not by means of the key (100), so that the vice (3, 3') is in a non-operative position, with the jaws (7 and 8) loosely connected; whereas the vice (3, 3') is in closer position with respect to the previous position when the pin (11) is striking against the free end (75a) of the tubular element (75).

8. A structure as in claim 1, characterised in that the manoeuvring means (6) of the drill (2) on the guide bars (1) further comprise a second gear pair (63, 63), enmeshed with the first gear pair (60) and keyed on a second transversal shaft (64), rotatable on the support frame (50) and bearing a perpendicular turning head (65) turnable by means of a turning rod (66) of adequate length.

9. A structure as in claims 1 and 8, characterised in that the manoeuvring means (6) further comprise: a clutch device mounted coaxially to the second transversal shaft (64) and interacting between the head (65) and the support (5); the clutch device including an adjustment collar (67), internally threaded and screwable on a counterthread made at an end portion (64a) of the second shaft (64); a pressure collar (68), engaged on and slidable along the second shaft (64); and an elastic element (69), interpositioned between the adjustment collar (67) and the pressure collar (68), and compressible by screwing the adjustment collar (67) to exert

an adequate pressure on relative contact surfaces (68a, 5a) between the said pressure collar (68) and the support (5).

10. A structure as in claim 1, characterised in that it comprises elastic means for a backwards return movement of the support frame (50) and drill (2), including a crossbar (91) removably connected to the guide bars (1) at an end of the guide bars (1) which is opposite to the end bearing the vice (3, 3'), a spring (92) countering the advancement movement of the support frame (50) and connected to same, and a threaded rod (93), passing through the crossbar (91), for manually adjusting the spring tension by means of a handle (94).

11. A structure as in claim 1, characterised in that the adjustable support frame (50) of the drill (2) comprises lateral C-brackets (52) perpendicular to the guide bars (1) for the housing of a gear reducer group (2a) of the drill (2) projecting with respect to the motor of the drill (2): on each C-bracket (52) there is a vertical slot (53) for the passage of a plurality of bolts (54), the function of the C-brackets (52) being to adjust the height of the drill (2) and therefore its chuck and bit (90) with respect to the guide bars (1).

12. A structure as in claim 11, characterised in that a rack is provided on the gear reducer (2a) group which rack is parallel to one of the C-brackets (52) and enmeshes with a command pinion (57) supported rotatably on the C-bracket (52) and connected to a manoeuvring organ (58).

13. A structure as in claim 11, characterised in that the adjustable support frame (50) of the drill (2) further comprises, at the free ends of the C-brackets (52), a solid connecting and frame stiffening element (55) and sliding seats, when the whole assembly is removed from the guide bars (1).

Fig. 3

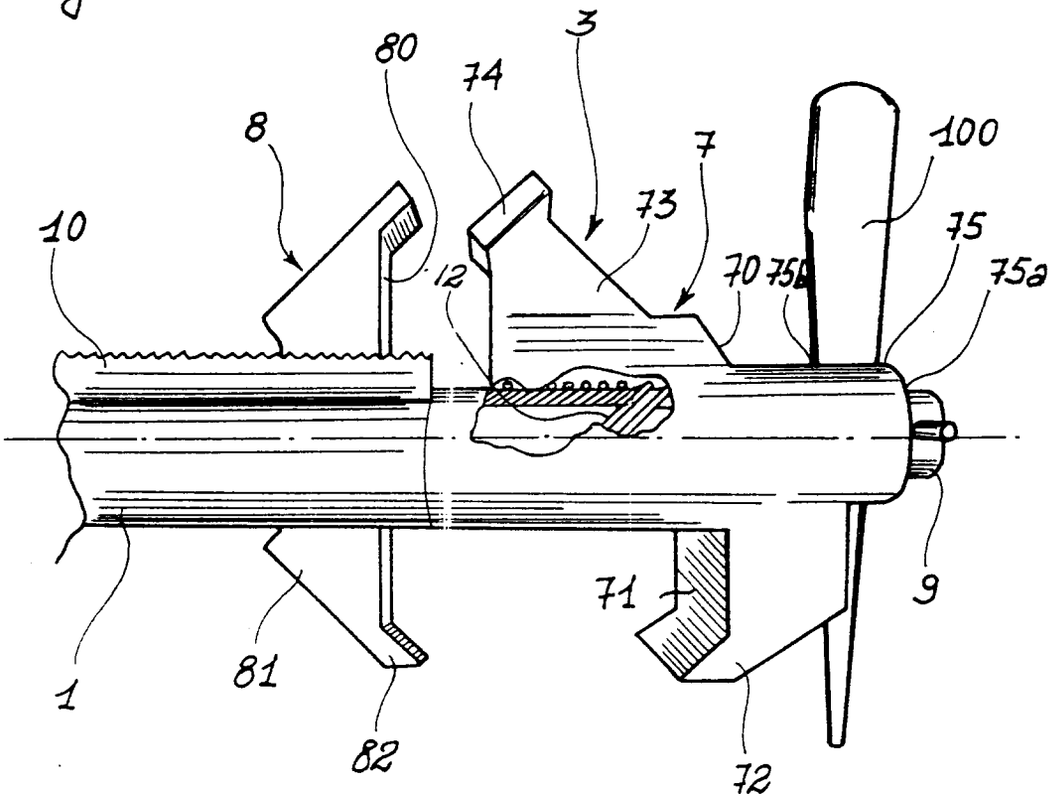
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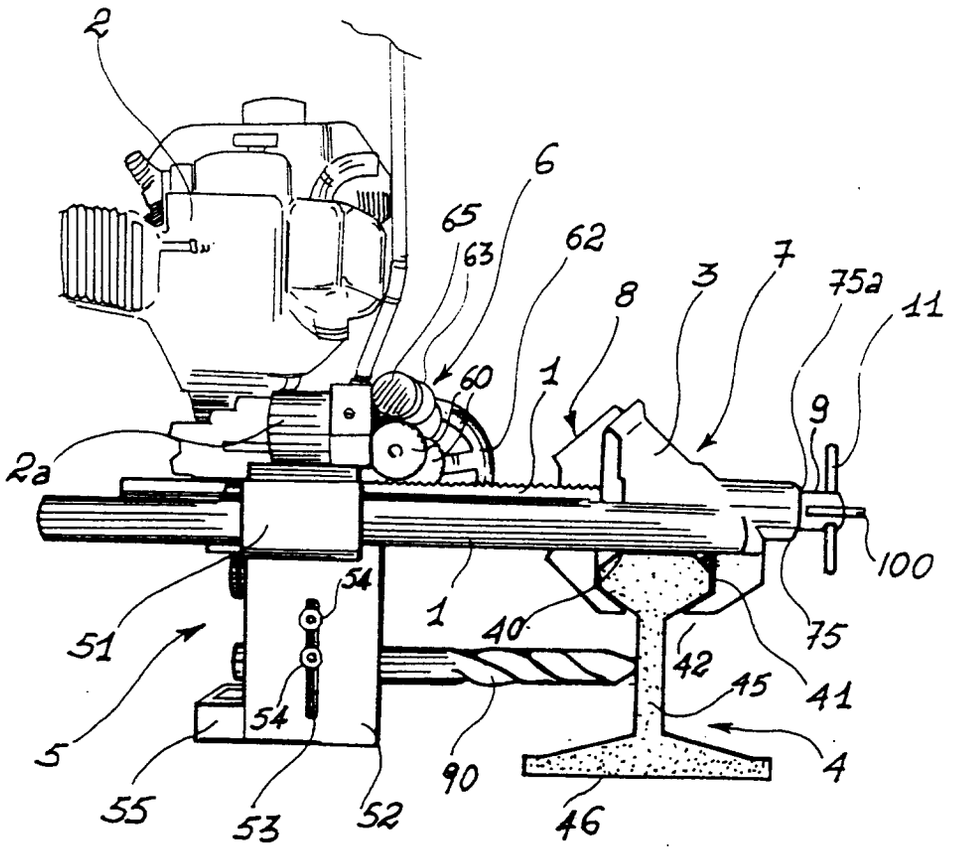
Fig. 1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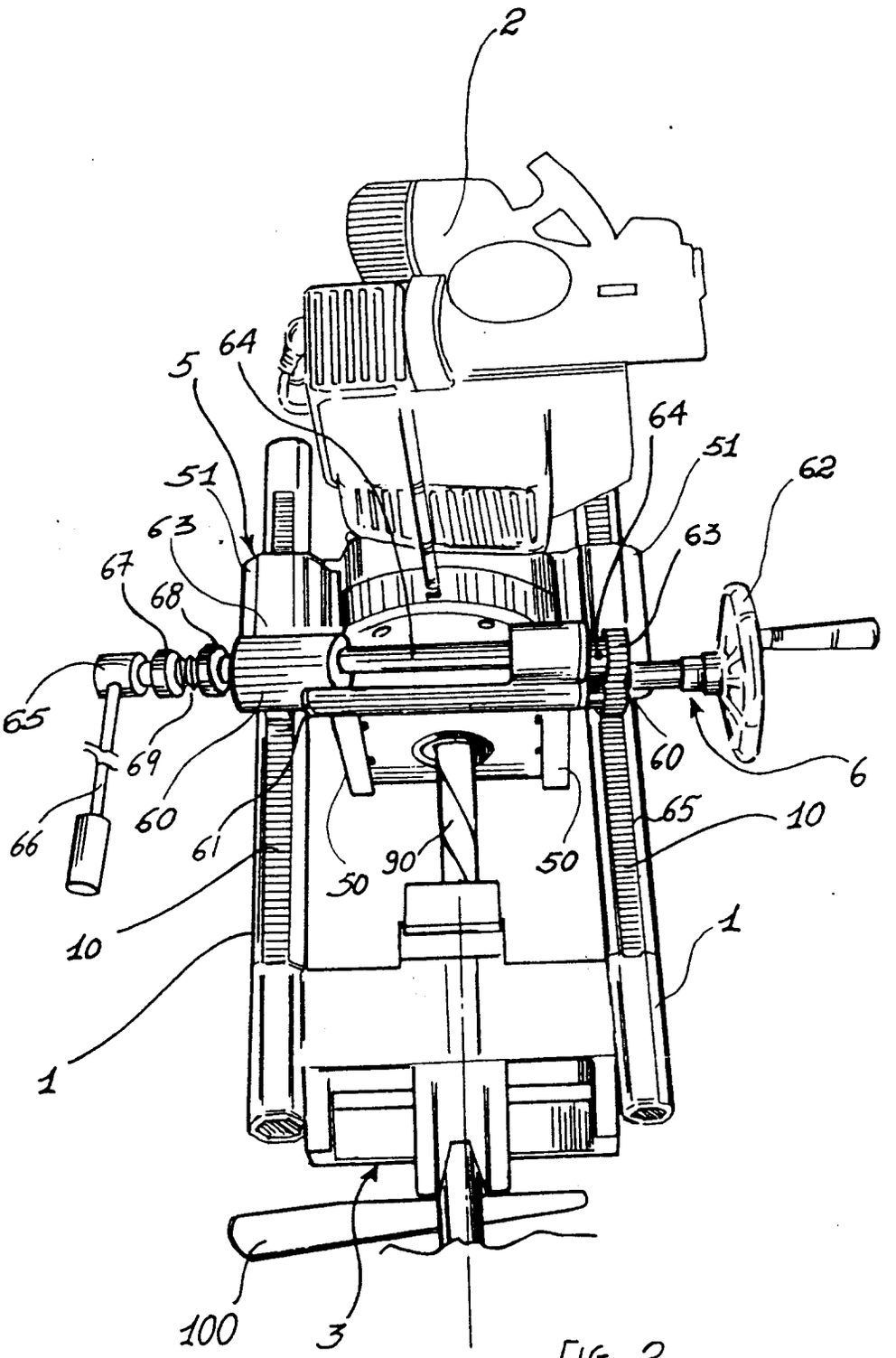
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FIG. 2

FIG. 4

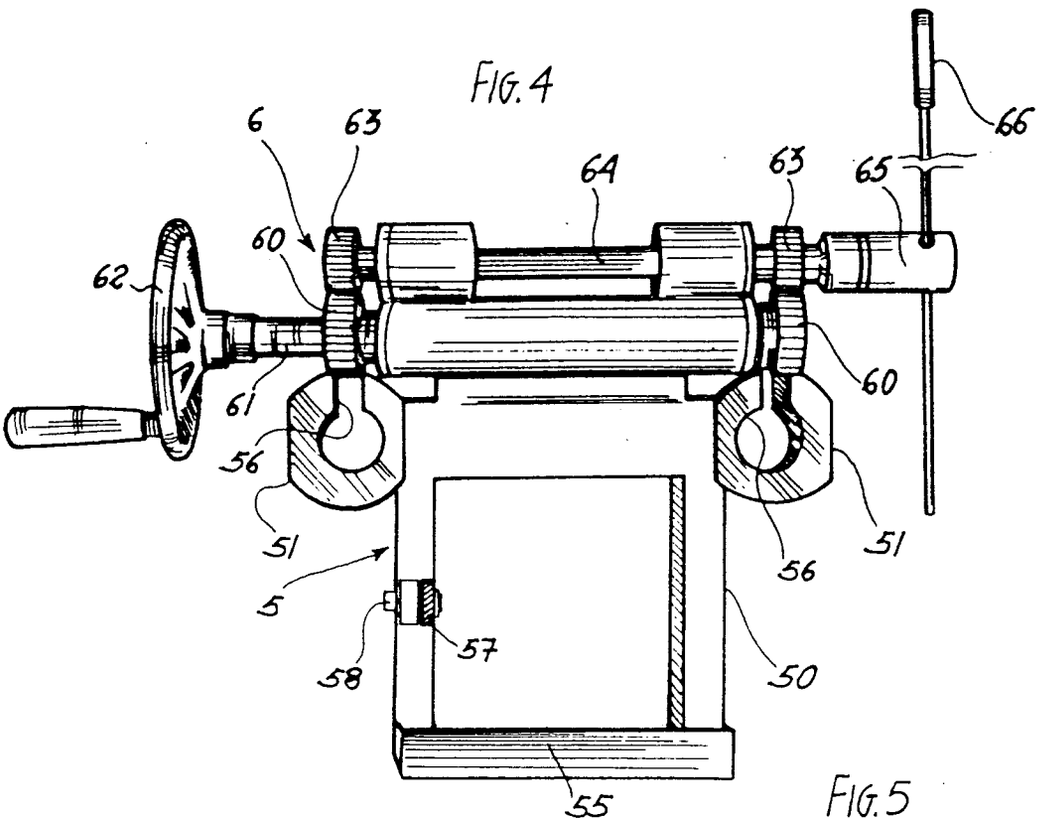
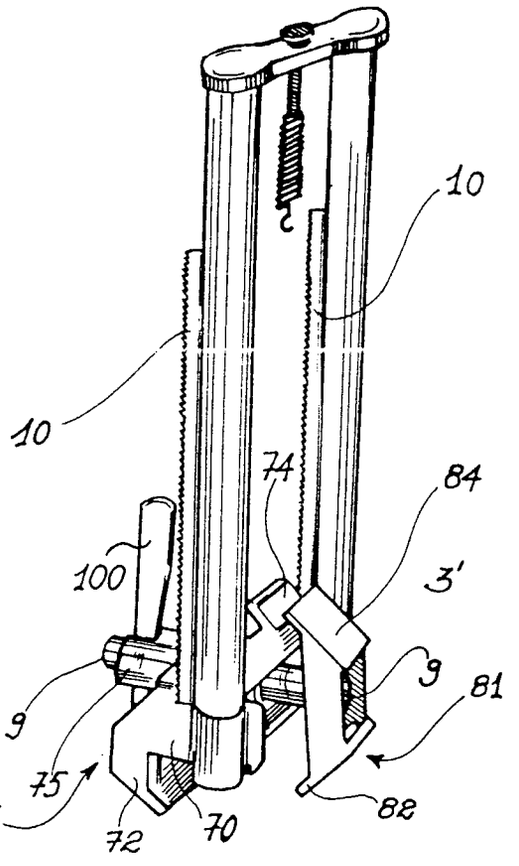


FIG. 5



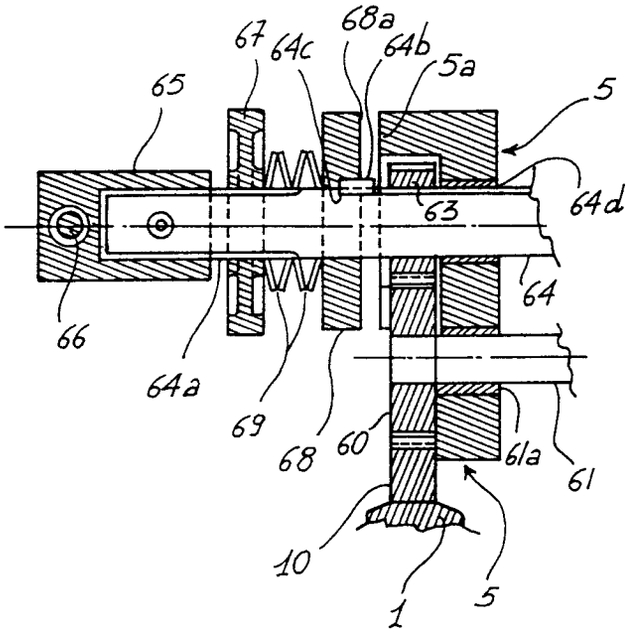


FIG. 6

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 83 0078

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
A	US-A-3 945 749 (MCILRATH) * the whole document * ---	1,2	E01B31/06
A	RAIL INTERNATIONAL, vol.21, no.12, December 1990, BRUXELLES BE page 33, XP000170607 'Great Britain: New rail drill' ---	1,2	
A	US-A-1 502 339 (JIMERSON) * figures * ---	1,2	
A	BE-A-468 806 (SOCIÉTÉ ALSACIENNE DE CONSTRUCTIONS MÉCANIQUES) * figures * -----	1,2	

TECHNICAL FIELDS SEARCHED (Int.Cl.5)

E01B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	16 September 1994	Blommaert, S

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
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