United States Patent [19]

Panetti

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[54] **DEVICE FOR THE IN SITU REPROFILING OF THE HEAD OF AT LEAST ONE RAIL OF A RAILROAD TRACK**

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[73] Assignee: **Speno International S.A.**, Geneva, Switzerland

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[22] Filed: **Aug. 21, 1987**

Related U.S. Patent Documents

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Filed: **Jan. 29, 1985**

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[51] **Int. Cl.**[4] **B24B 23/00**; B24B 27/08

[52] **U.S. Cl.** ..... **51/178**; 51/166 T; 51/166 MH; 51/5 B

[58] **Field of Search** ..... 51/178, 166 T, 166 MH, 51/166 TS, 5 R, 5 B, 165.9

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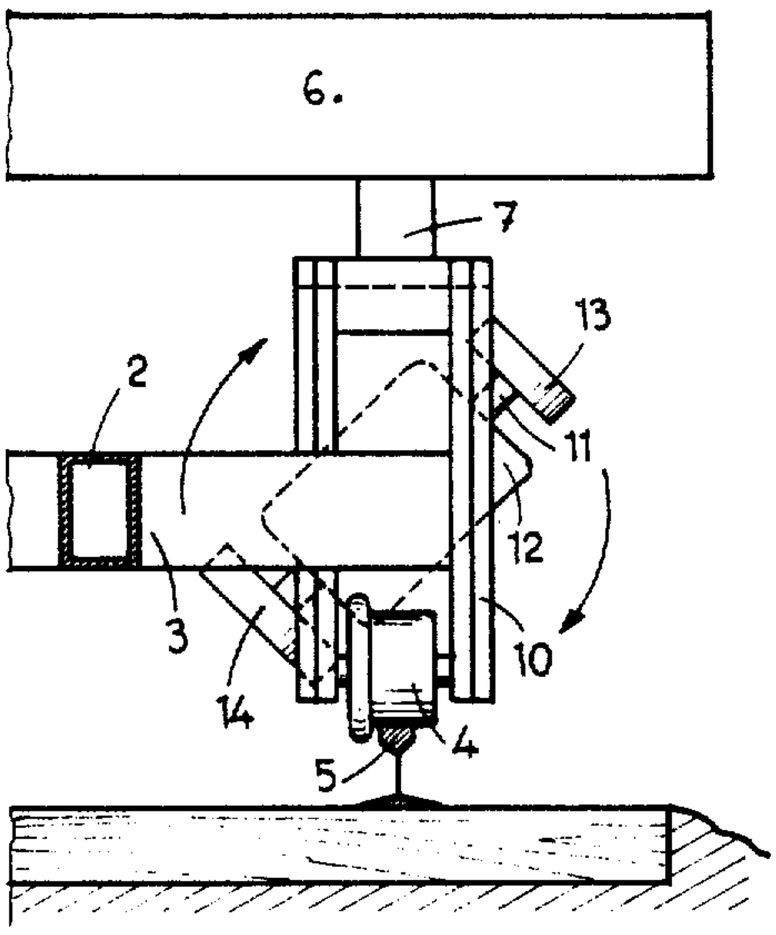
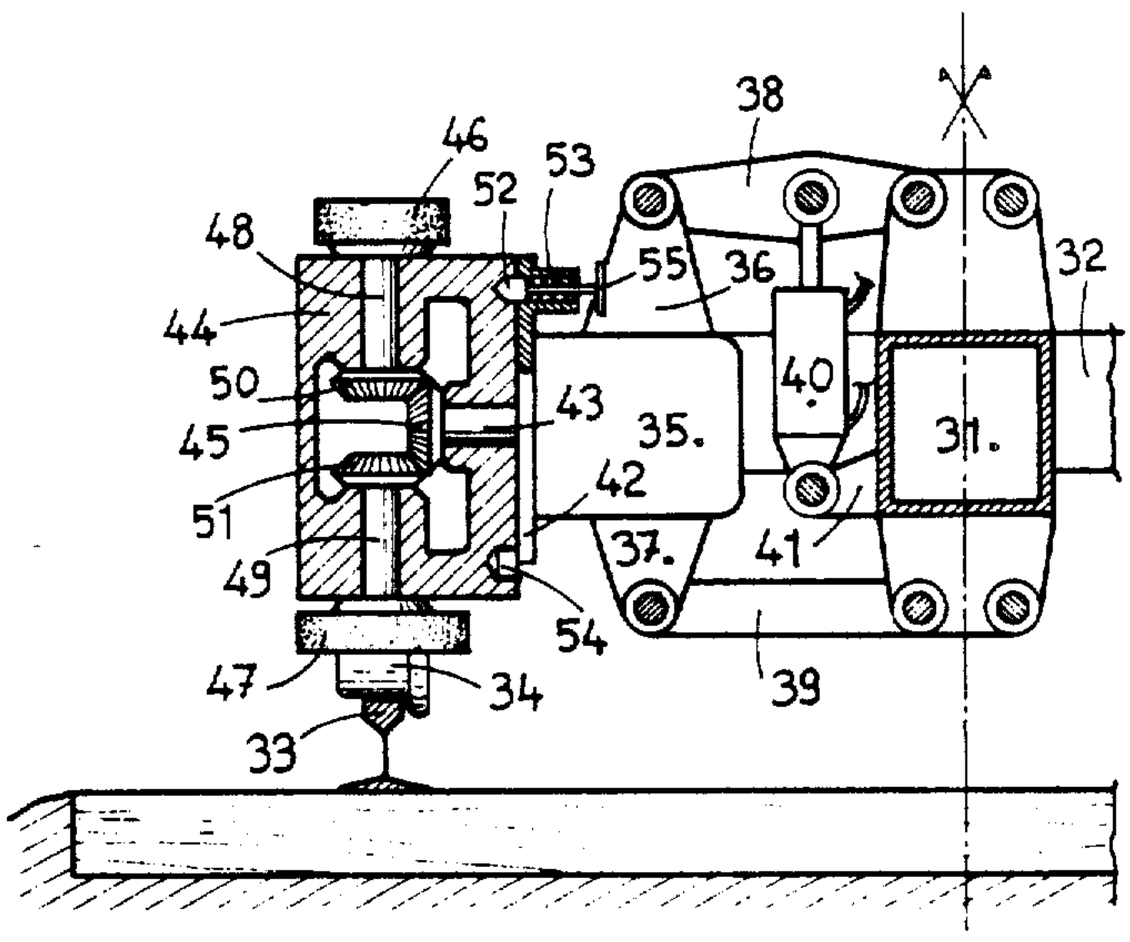
Primary Examiner—Robert P. Olszewski
Attorney, Agent, or Firm—Young & Thompson

[57] **ABSTRACT**

A rail grinding device comprising at least one reprofiling unit (**80,81**) driven along the track by a railroad vehicle (**83**); a jack (**85**) to displace in height the reprofiling unit with respect to the railroad vehicle (**83**) and to apply at least one tool of the reprofiling unit against the rail. The reprofiling unit (**80,81**) comprises at least one support (**81**) angularly displaceable with respect to the railroad vehicle (**83**) carrying several reprofiling tools (**94,95**) forming a group of tools. A positioning device (**102**), (**104**) and locking device (**106,107**) fixes the positions of the support (**81**) for which one (**95**) of the reprofiling tools (**95,96**) of the group of tools is located in working position.

16 Claims, 7 Drawing Sheets





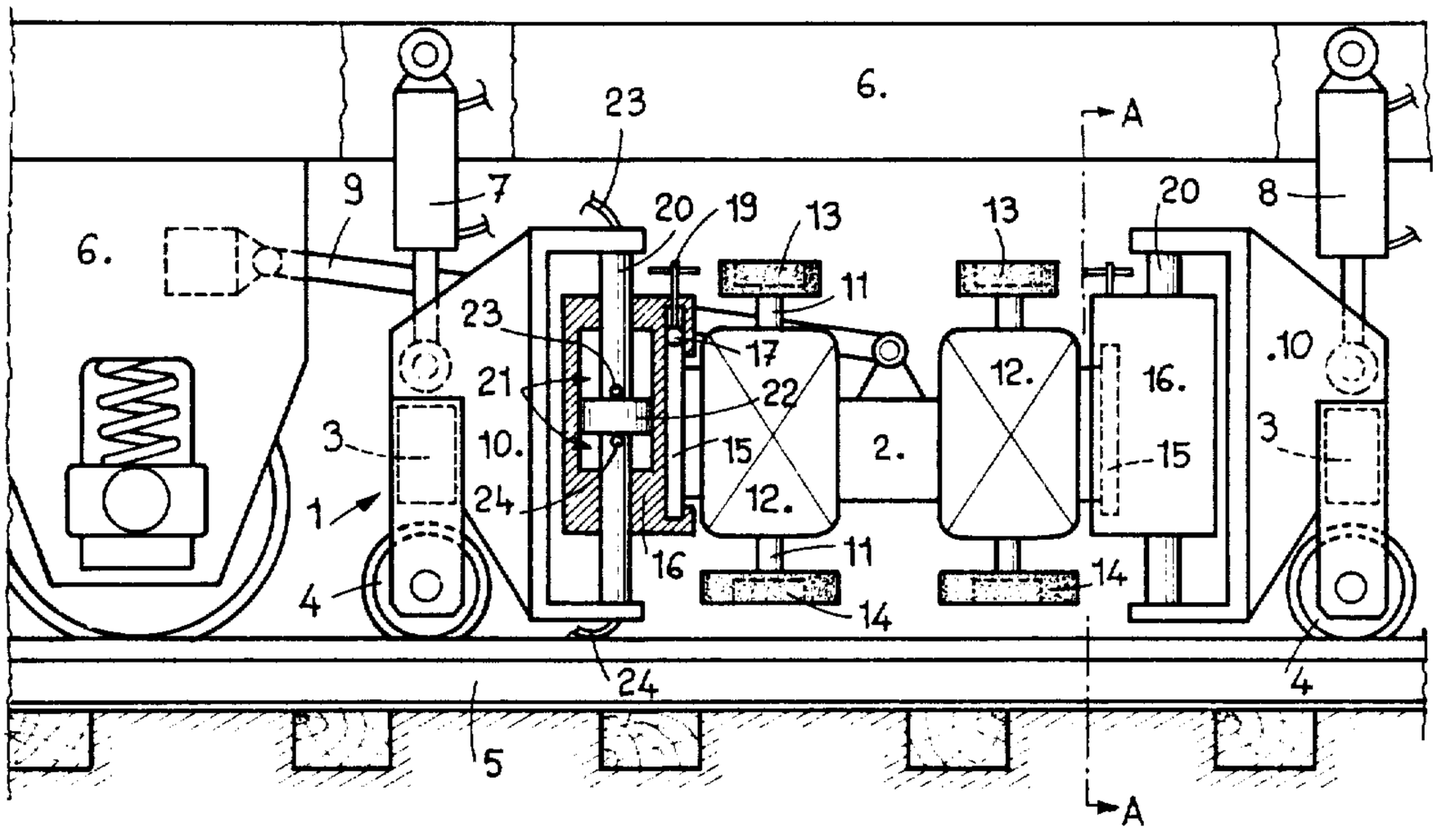

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FIG. 1

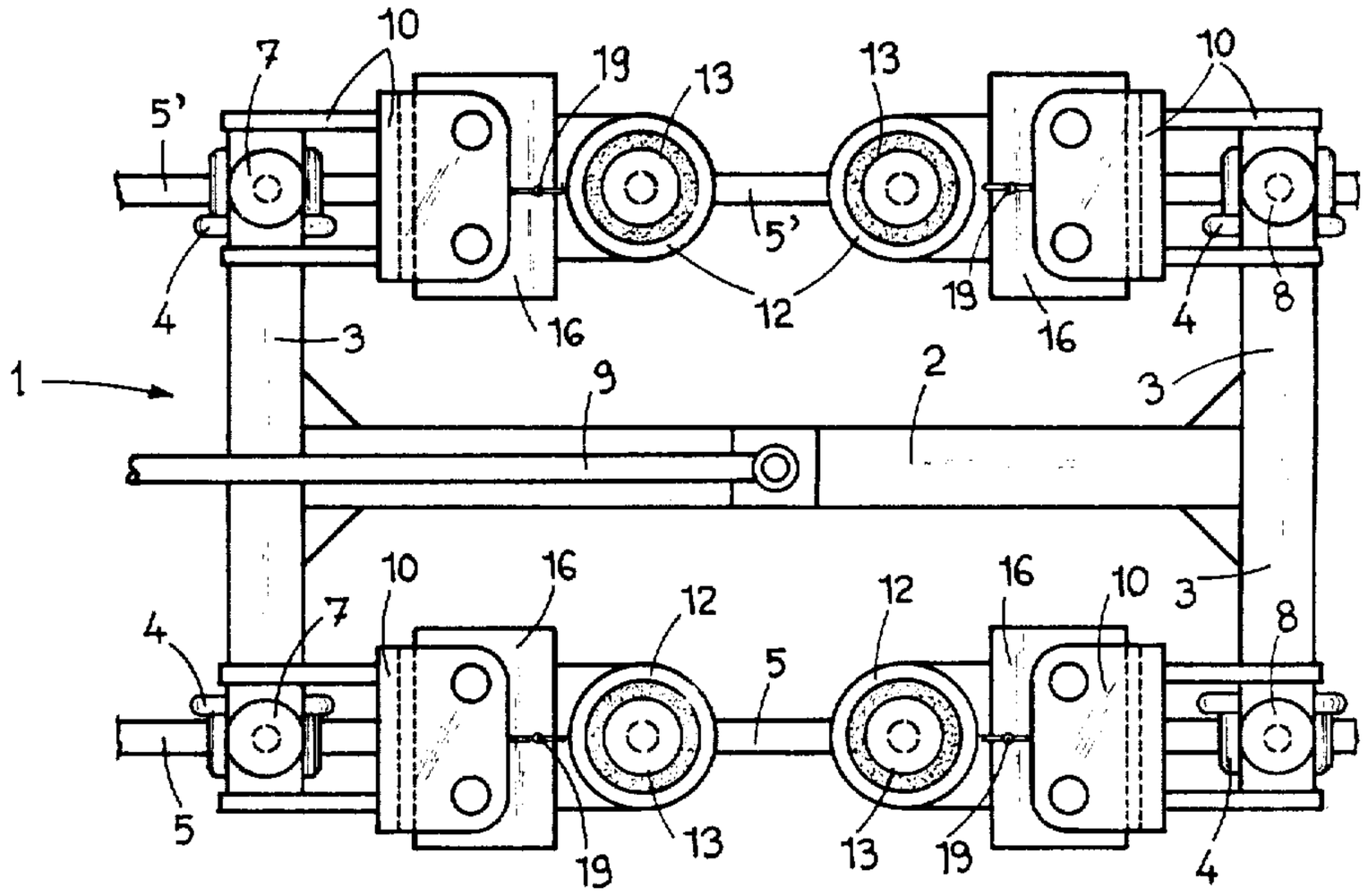
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FIG. 2

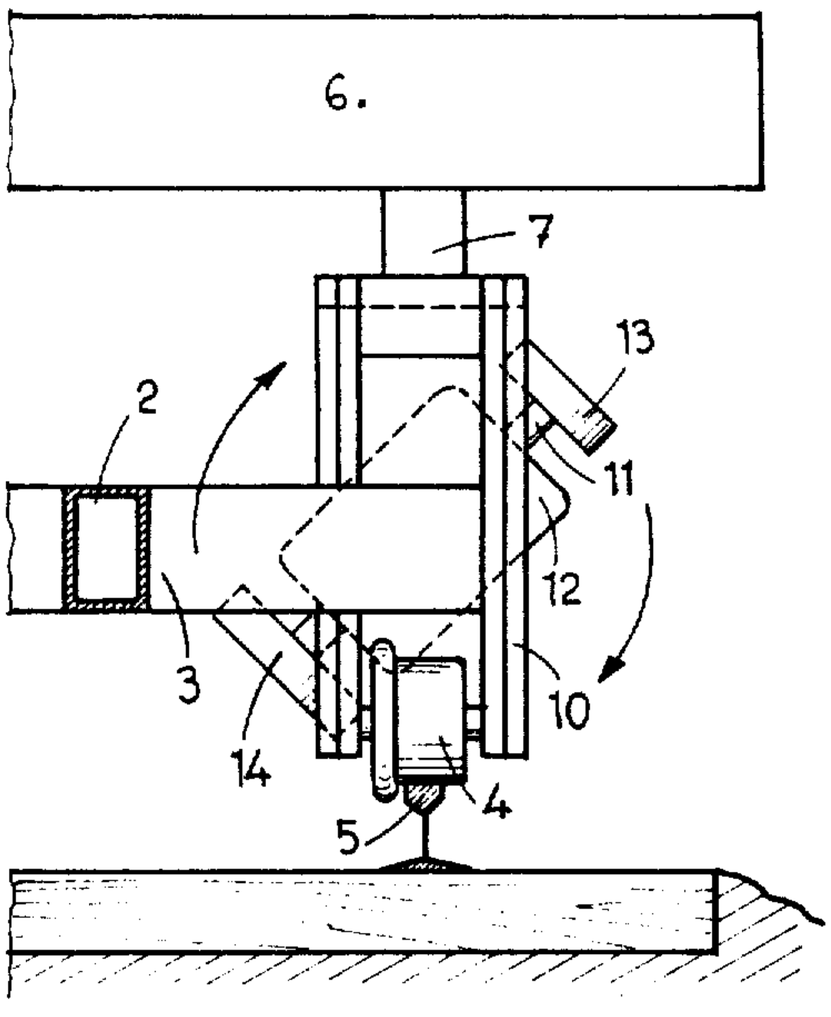


FIG. 3

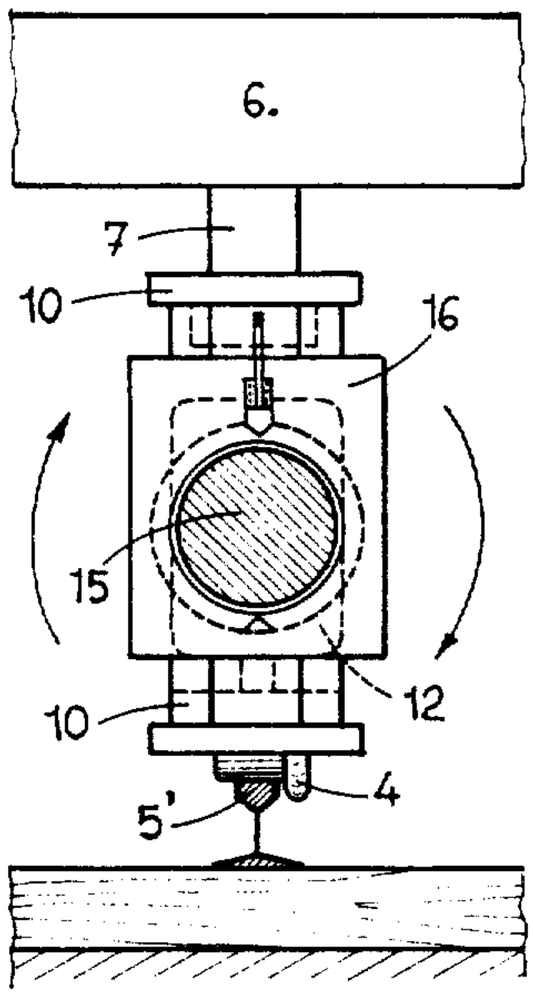


FIG. 4

FIG. 5

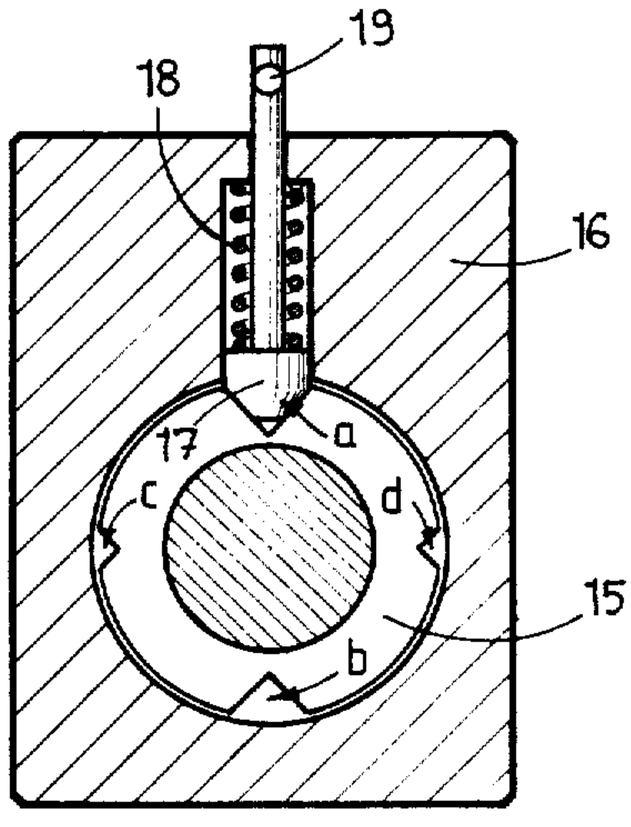
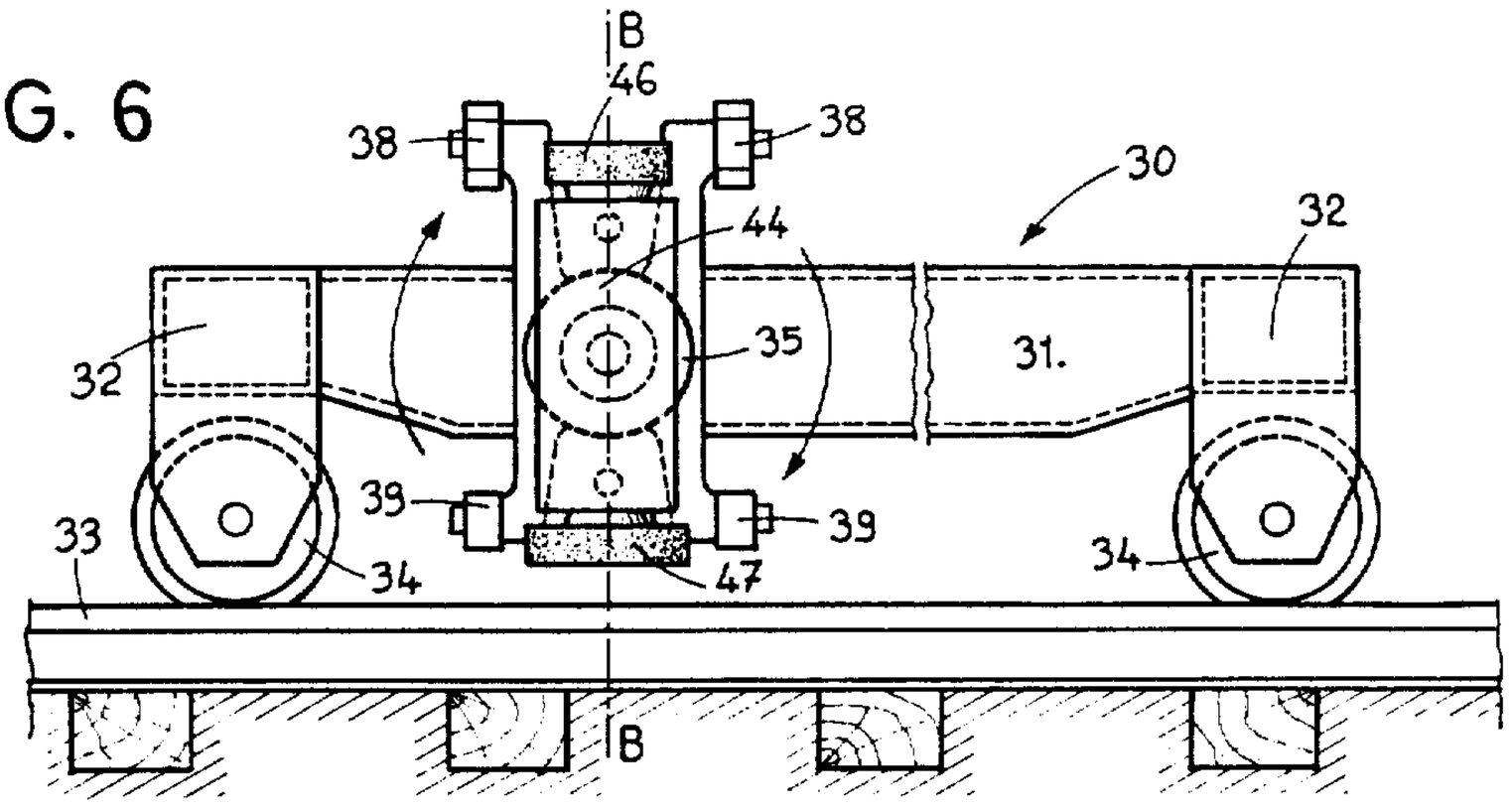


FIG. 6



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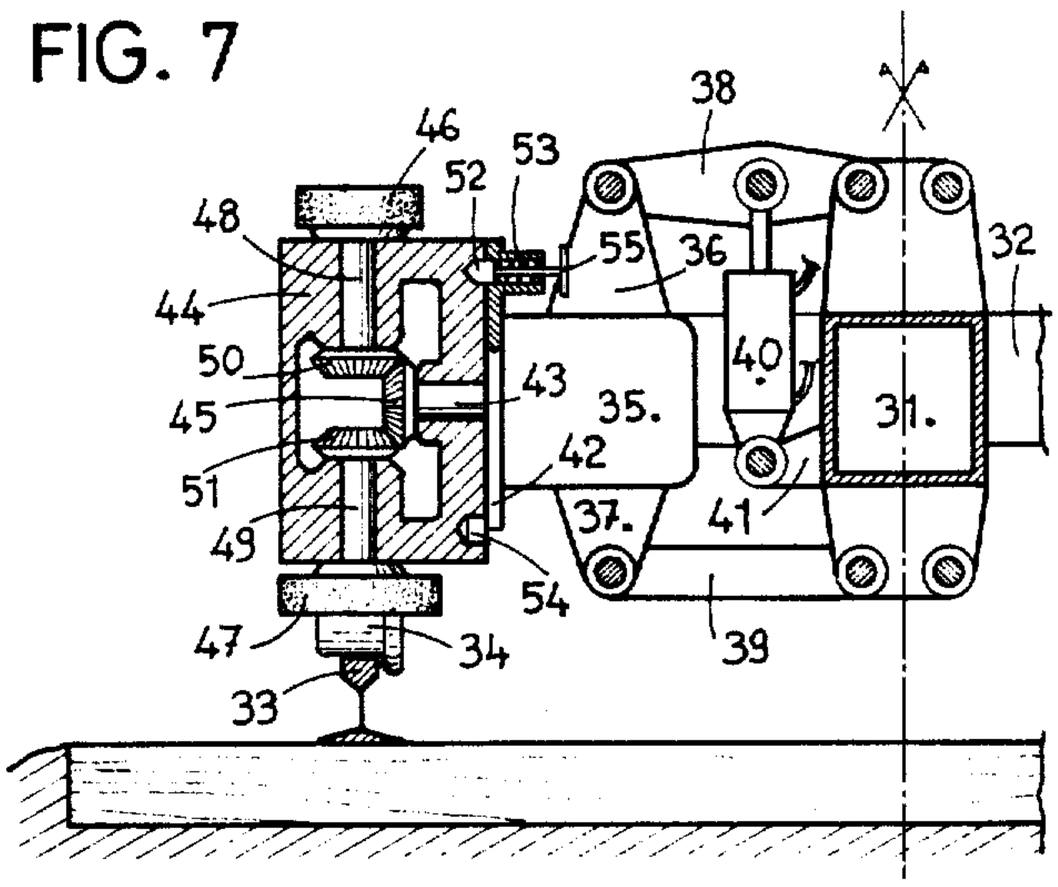

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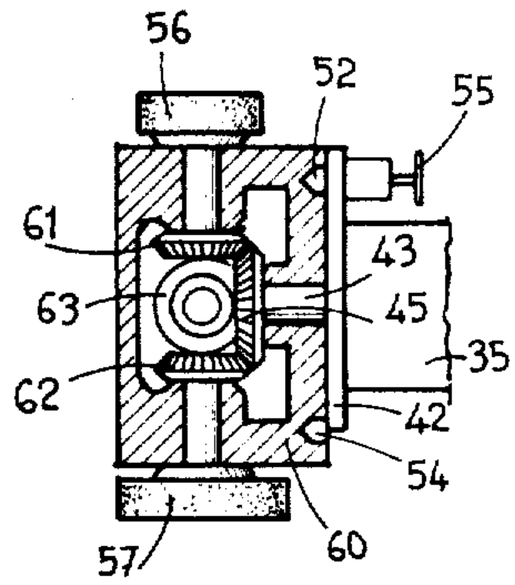


FIG. 8

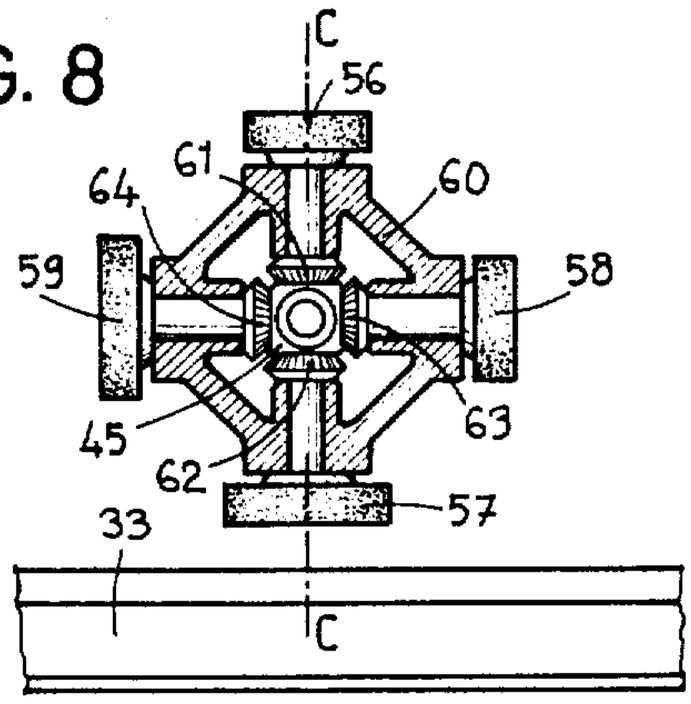
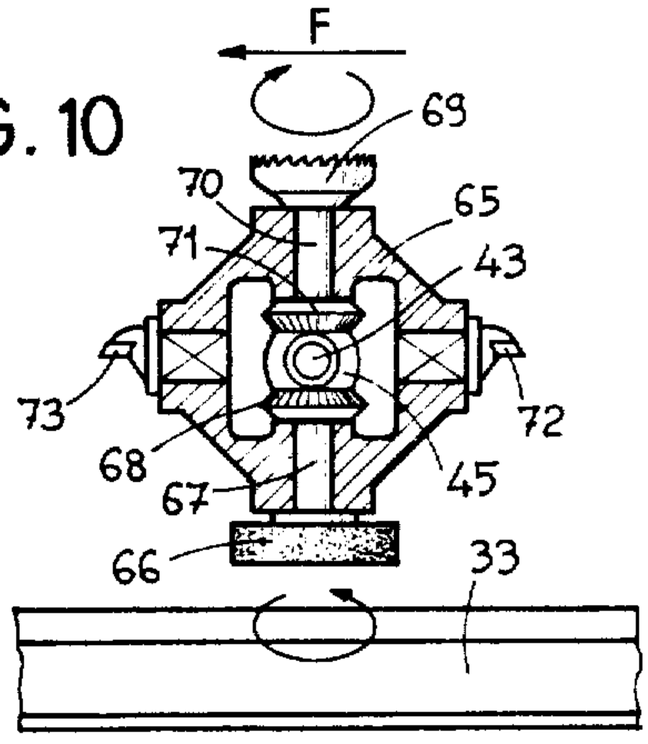


FIG. 10



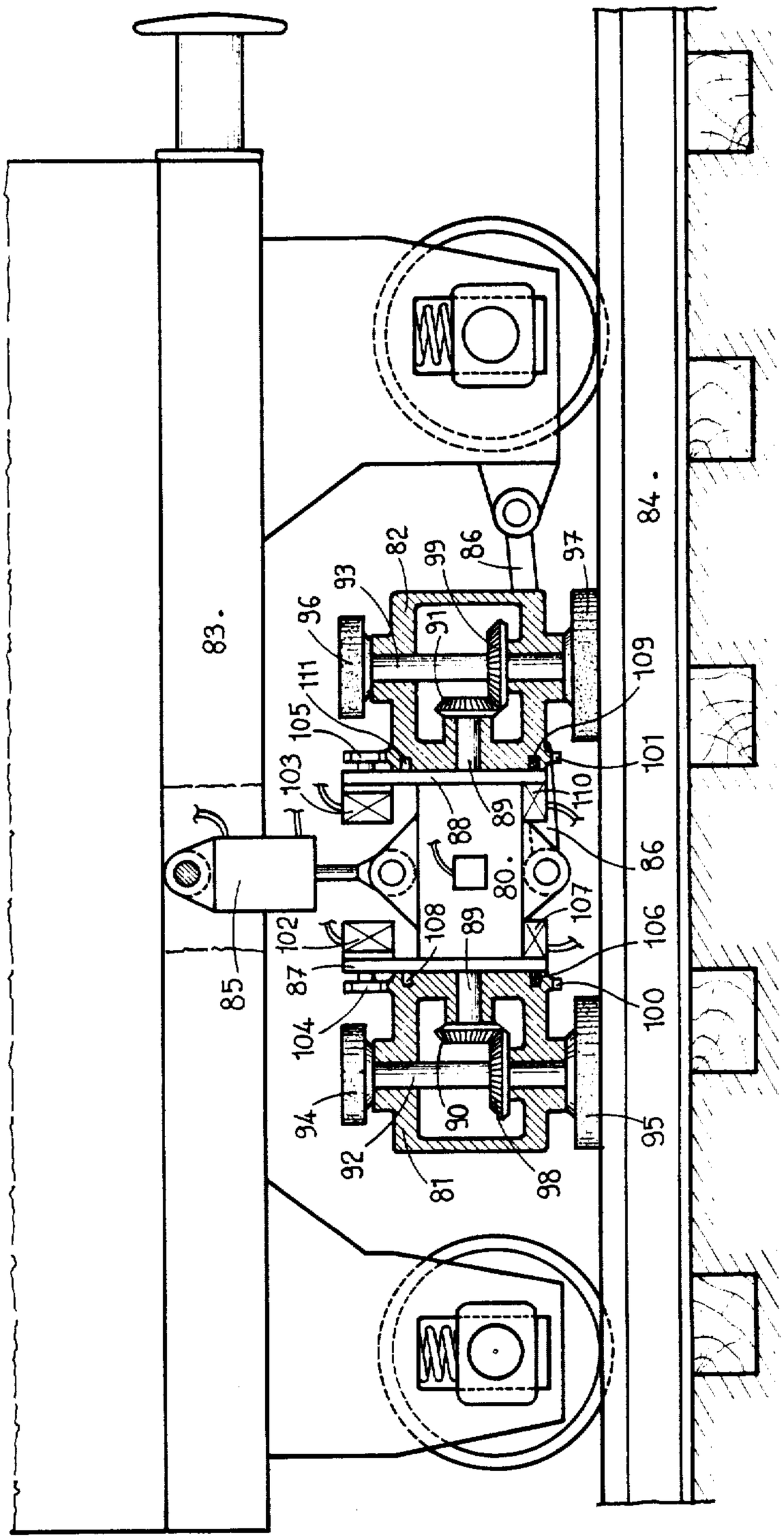

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FIG. 11

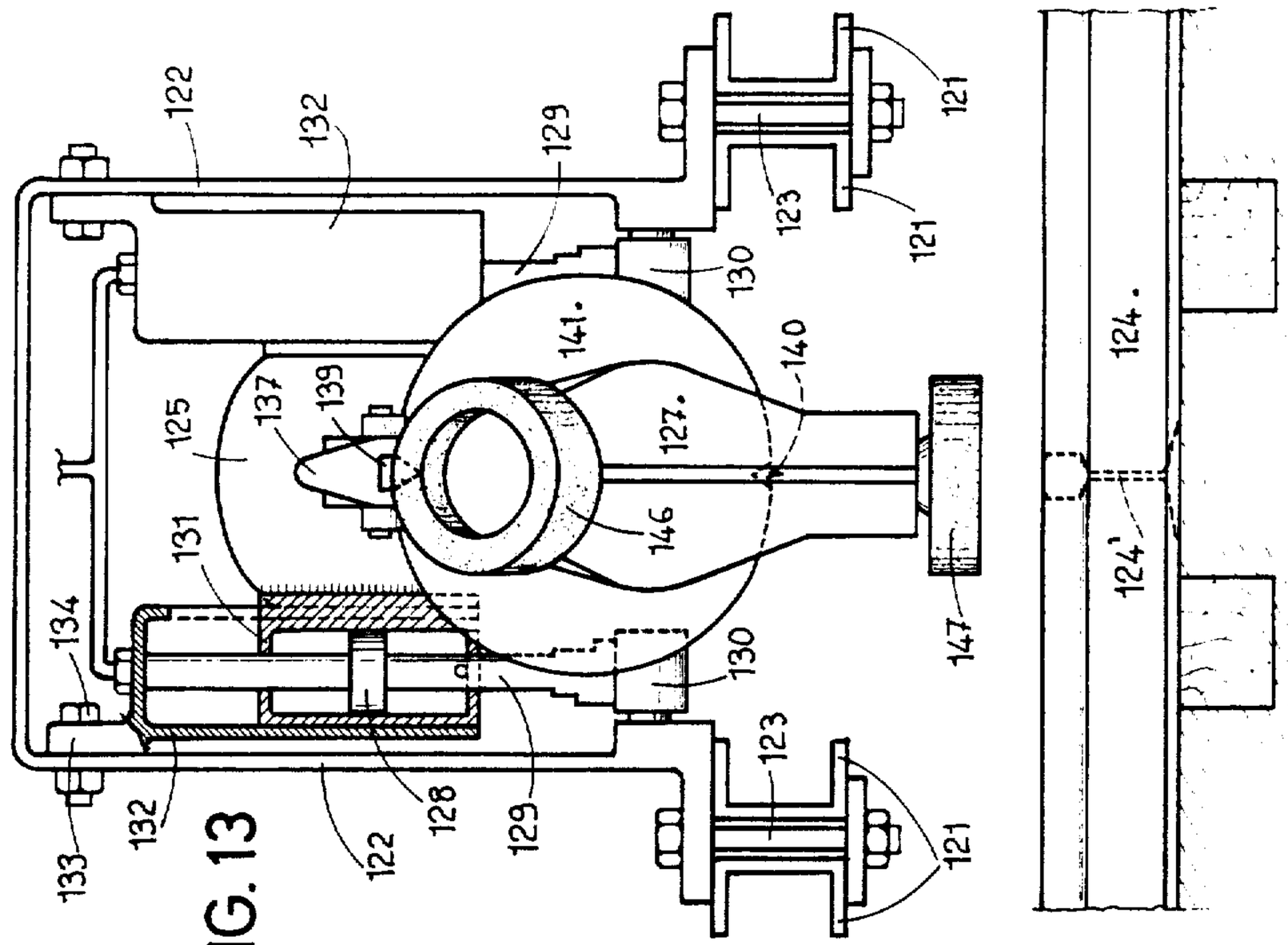
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FIG. 13

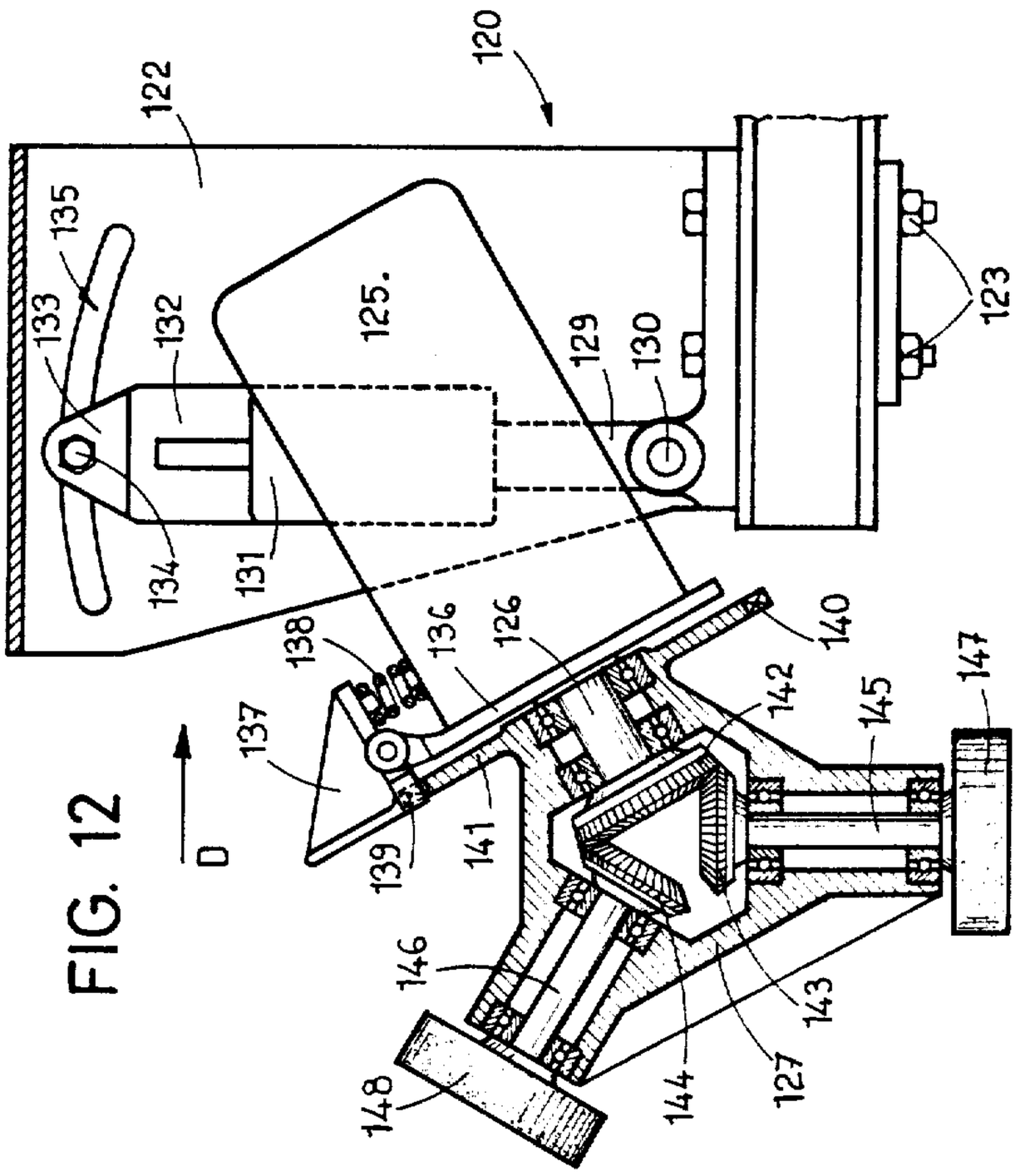
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FIG. 12

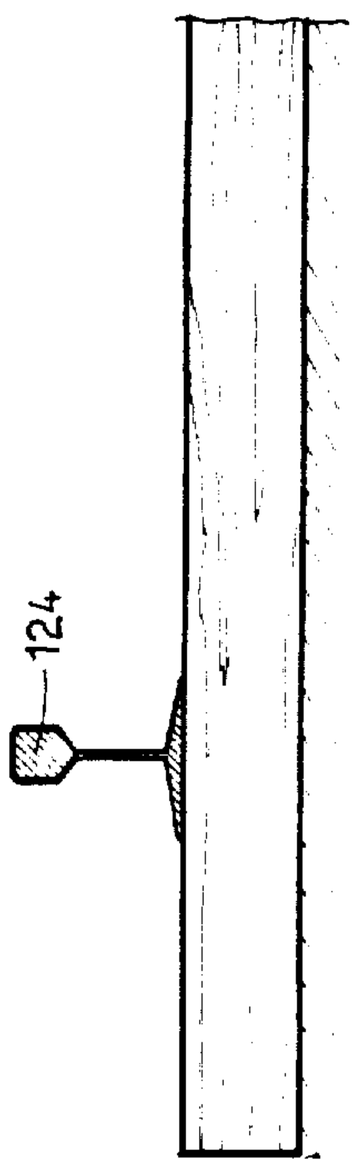
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FIG 14

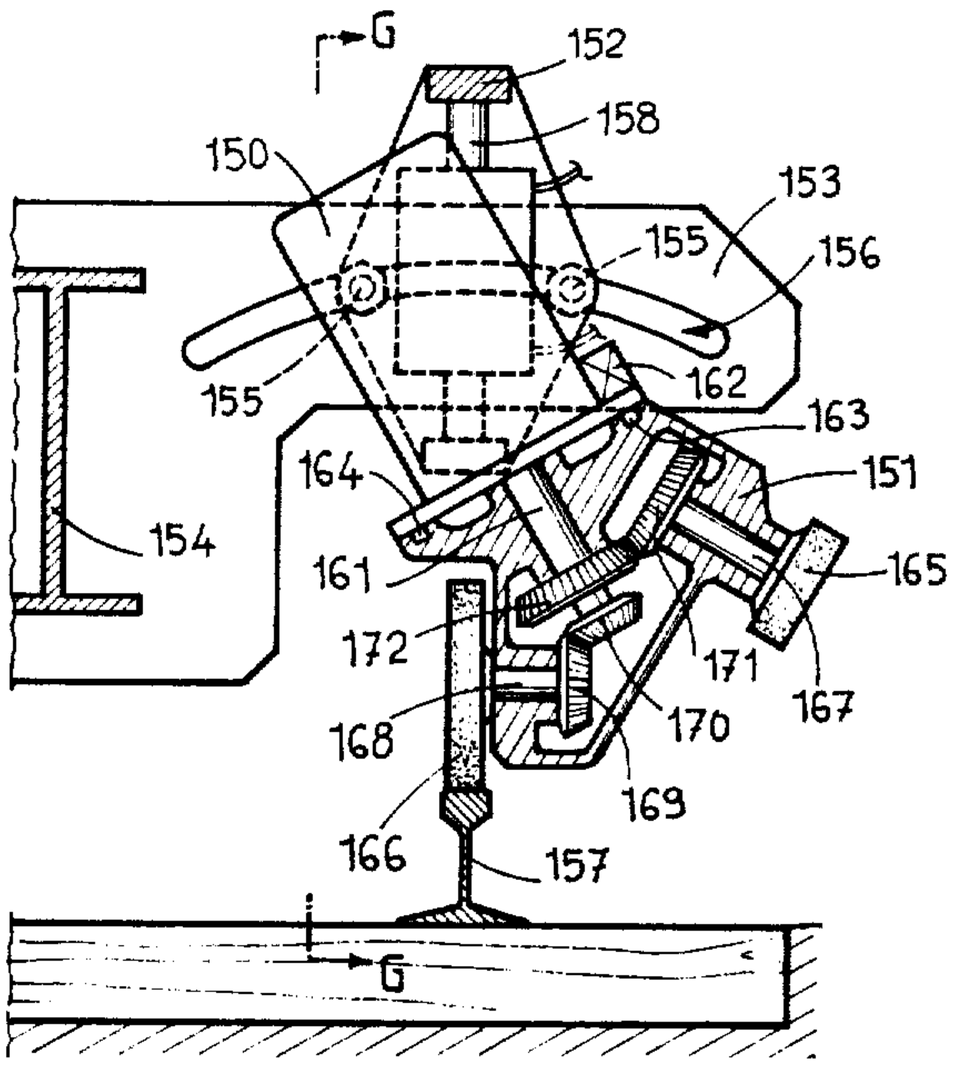


FIG. 15

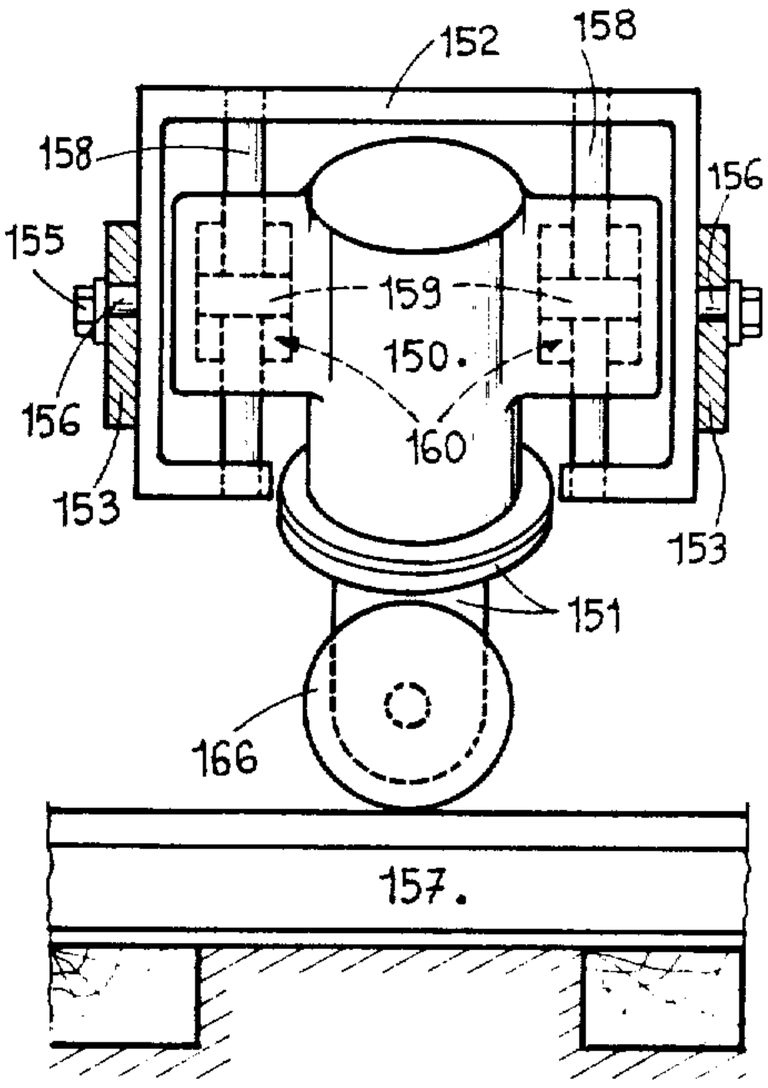
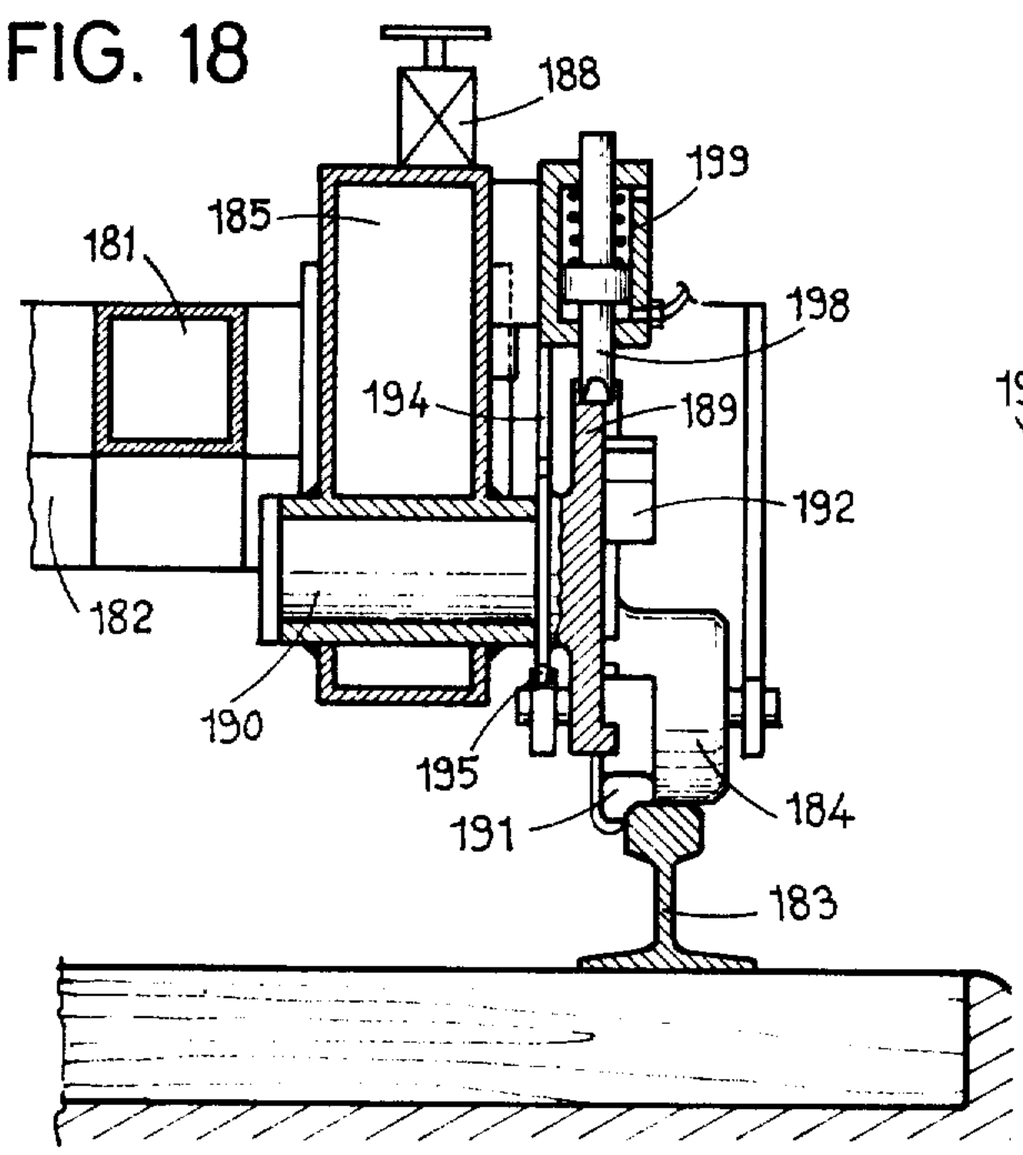


FIG. 18



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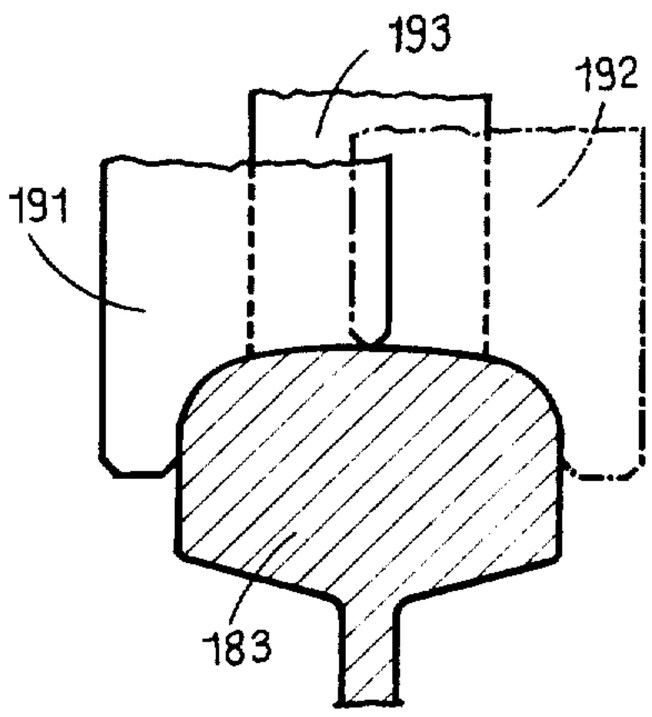

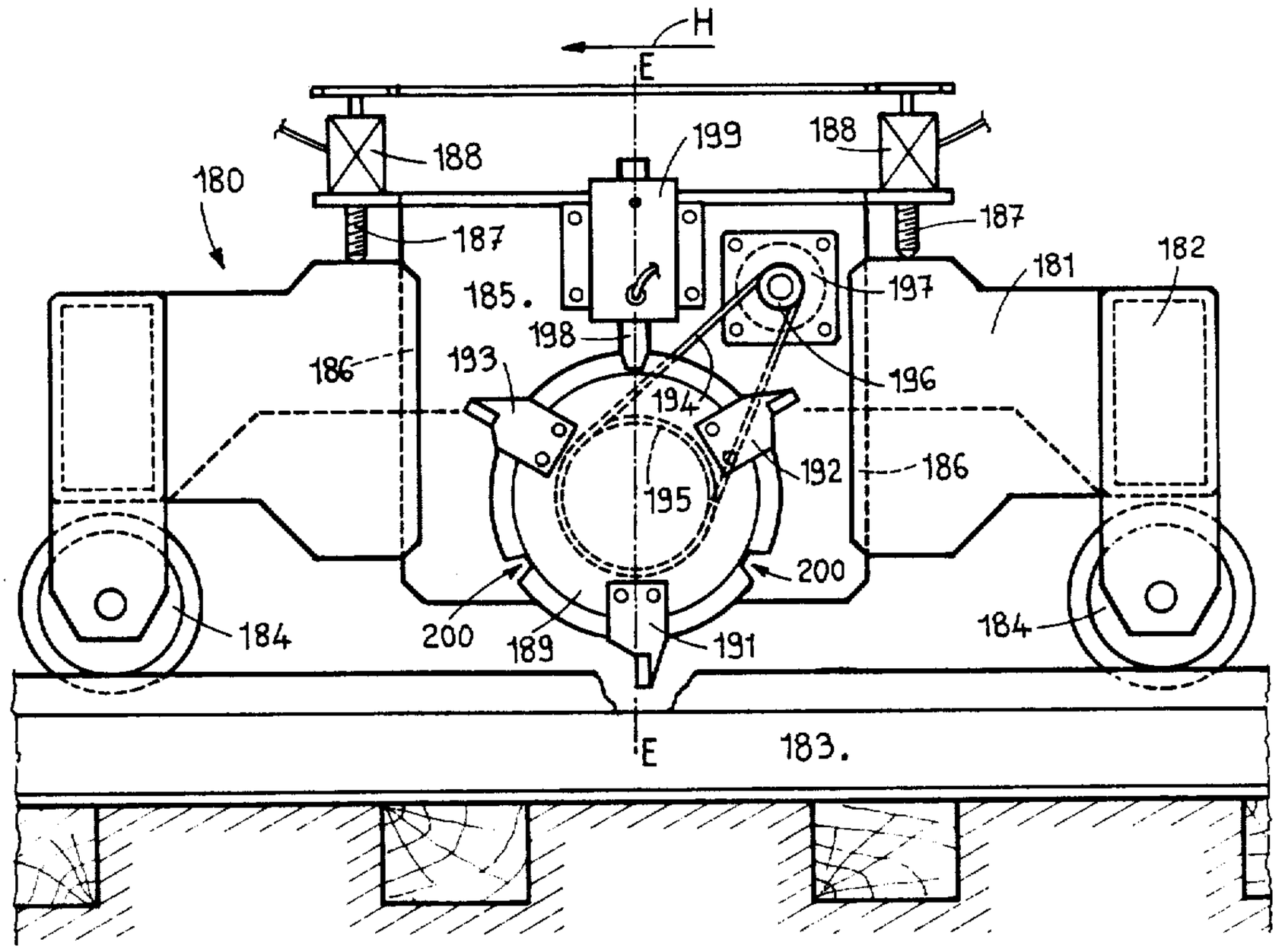
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FIG. 16

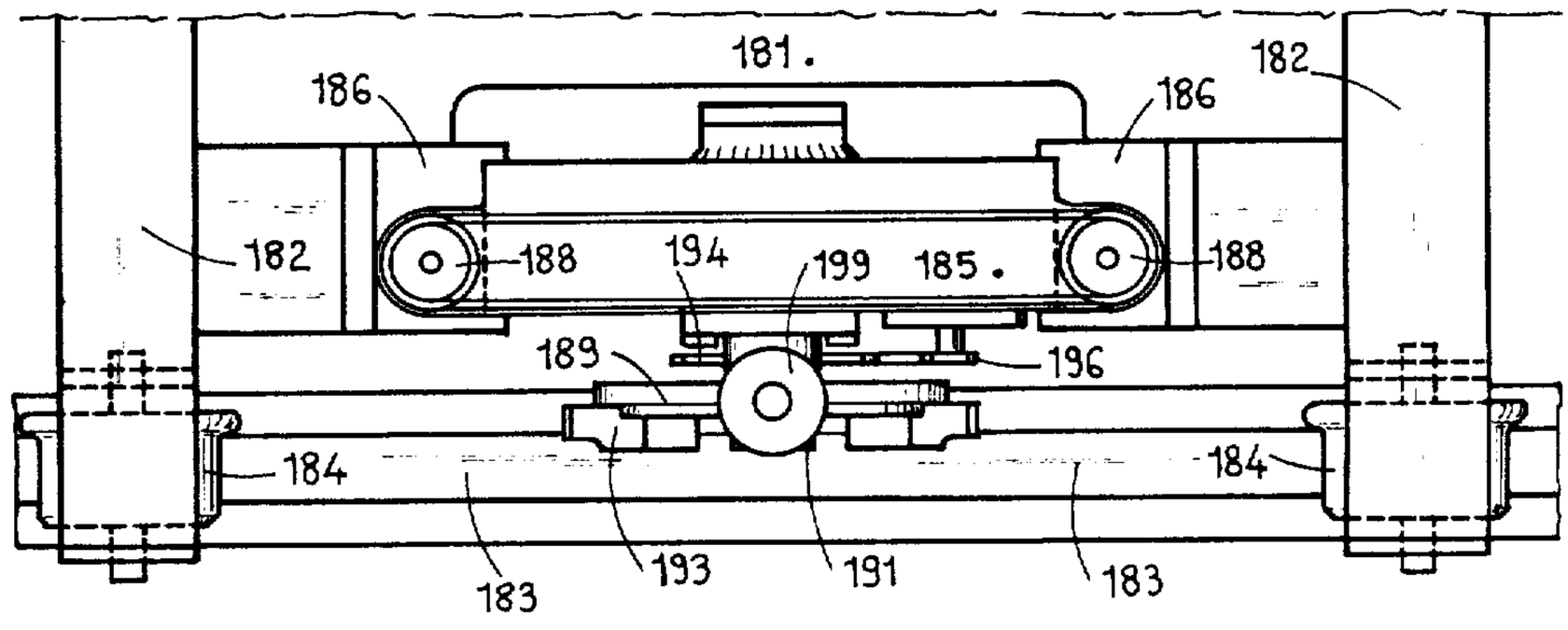
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FIG. 17

DEVICE FOR THE IN SITU REPROFILING OF THE HEAD OF AT LEAST ONE RAIL OF A RAILROAD TRACK

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

The present invention has for its object a device for reprofiling and/or rectifying in situ the surface of the head of at least one rail of a railroad track.

Under the effect of heavy loads and above all of the dynamic overloads, an undulatory wearing off is formed progressively on the surface of the head of the rail as well as an important alteration of the profile of this head, burrs of more or less importance can be formed.

To permit longer use of the rails one proceeds to a reprofiling of the rails particularly to their rectification, an operation which has the aim of giving to the rail desired transverse and longitudinal profiles.

The reprofiling and the rectification of the rails of a railroad track need frequent changes of the working tools whatever their nature. The tools having the form of milling cutters, or of scrapers, knives, cutters are submitted to forces and wear which are very high. They break frequently. The tools having the shape of abrasive blocks are applied to the rails with very high pressure, they are also subjected to forces which can cause them to break. On the other hand they deform by adapting themselves rapidly to the profile of the surface to be reprofiled to the detriment of the desired profile.

Finally the rotative grinding wheels are often driven in an intensive manner due to the power needed to make them rotate and due to their high contact pressure in order to obtain a maximum efficiency. On the other hand they wear very rapidly. Therefore in all these cases, there is a necessity of relatively frequently changing the reprofiling tools.

It is further to be noted the necessity of replacing during the work one tool having a given shape by another tool having another particular shape or of another type as a function of the nature of the work to be effected.

This is particularly the case with the tools having a cutter shape, knife shape or with the milling cutters which cannot work simultaneously the whole profile of the head of the rail and which it is necessary to replace by knives or milling cutters provided with a different cutting edge.

These same tools can permit only a coarse work of reprofiling and have to be replaced by tools of another type, abrasive blocks or rotative grinding wheels for the finishing work.

For the rotative grinding wheels there is an interest to be able to use wheels having a relatively high hardness for which the wear is relatively slow. But they perform only coarse work and it is desirable to replace them by smoother grinding wheels for the finishing work. These rotative grinding wheels are of a diameter such that they can hardly be used to work in the track switches or the level crossings. It is then necessary to replace them by wheels of a small diameter or by peripheral grinding wheels.

For all these reasons, it is necessary to frequently change the working tools. But such changes are practically impossible on track, even if it were authorized disregarding the security prescriptions. The different rapid fixing systems of the reprofiling tools which have already been proposed do not ameliorate this situation and it is frequently decided to forego a finishing work which would however desirable would interrupt the work without using totally the intervals which are already too short occurring between the train arrivals to come back to a station to change the reprofiling tools or finally to change prematurely the reprofiling tools presenting a certain wear in order not to be obliged to interrupt the work during the intervals.

The present invention has the aim to remedy these drawbacks. It permits replacing rapidly or even automatically a reprofiling tool by another one which is identical or has another shape or is of a different type. It permits always using the tool which is the best adapted to the work to be done, this to the profit to the quality of the work. It permits using it without loss of time and at the best time moment, thereby exploiting at the best the available intervals with improvement in the efficiency.

The attached drawings show schematically and by way of examples several embodiments and variants of a reprofiling device of the head of at least one rail of a railroad track according to the invention.

FIG. **1** is a side elevation of a first embodiment of the reprofiling device mounted on a carriage connected to a railway vehicle.

FIG. **2** is a top view of the reprofiling device of the carriage shown in FIG. **1**.

FIG. **3** is a partial front elevation of the device shown in FIG. **1**.

FIG. **4** is a partial crosssection along line A—A of FIG. **1**.

FIG. **5** shows on a greater scale a locking device of the angular position of the reprofiling units shown in FIGS. **1** to **4**.

FIG. **6** shows in elevation from the side a second embodiment of the reprofiling device mounted on a carriage to be connected to a railroad vehicle.

FIG. **7** is a partial crosssection along line B—B of FIG. **6**.

FIG. **8** shows in partial crosssection, perpendicular to the driving shaft, a variant having four reprofiling tools of the same type.

FIG. **9** is a partial crosssection of the variant shown in FIG. **8** along line C—C of this Figure.

FIG. **10** shows a partial crosssection of another variant of the reprofiling device comprising four tools of different types.

FIG. **11** is a side elevation of a third embodiment of the reprofiling device directly connected to a railroad vehicle.

FIG. **12** is a partial crosssection of a fourth embodiment of the reprofiling device.

FIG. **13** is a view from D of the reprofiling device shown in FIG. **12**.

FIG. **14** is a partial crosssection of a fifth embodiment of the reprofiling device comprising a peripheral grinding wheel as well as a radial grinding wheel.

FIG. **15** is a crosssection along line G—G of FIG. **14**.

FIG. **16** is a side elevation of a sixth embodiment of the reprofiling device mounted on a carriage intended to be connected to a railroad vehicle, comprising tools constituted by cutters.

FIG. **17** is a partial top view of the device shown in FIG. **16**.

FIG. 18 is a crosssection along line E—E of FIG. 16.

FIG. 19 is a view on a greater scale of a crosssection of the rail showing the service position of three cutters or scrapers with respect to this rail.

To be able to obviate the draw-backs cited in the introduction and to realize the objects of this invention, the reprofiling device according to the present invention comprises at least one reprofiling unit driven along the track by a railroad vehicle. Means are provided to displace this reprofiling unit in height with respect to the vehicle as well to apply at least one tool of the unit against the rail with a determined pressure or against abutment members which can be fixed or adjustable.

Each reprofiling unit comprises an angularly displaceable support comprising a plurality of reprofiling tools, forming a group of tools, the working faces or edges of which are located in different planes. Through an angular displacement of the support with respect to the railway vehicle, each tool of the same group of tools can be brought into its working position, enabling it to enter in contact with the rail to reprofile it, the other tools of the same group being then in waiting position, wherein they cannot cooperate with the rail. Finally, the reprofiling device according to the invention comprises a positionning device permitting positioning the support in such a manner as to bring into working position the desired tool, as well as a locking device permitting fixing the support in the desired position.

Thus, each reprofiling unit comprises several tools forming one group and which can be brought through an angular displacement of the support successively into working position, the displacement of the support can be motorised, and above all there is no need to stop and change the tool. The tools of the same group can all be similar if it is needed to perform the same work for a long period of time. These tools can also be different, each adapted to a specific work operation. Therefore in a same group of tools one can have radial grinding wheels of different diameters, different granulometry and different hardness, radial grinding wheels and peripheral grinding wheels, scrapers or abrasive blocks, as desired.

By angularly displacing the support of the group of tools of one reprofiling unit of one or several steps, one replaces one tool by another, achieving the objects of the invention.

The first embodiment of the reprofiling device shown in FIGS. 1 to 5 comprise a guiding carriage 1, formed by a beam 2 and crossbeams 3, presenting flanged wheels 4 rolling on the rails 5, 5' of a railroad track. This guiding carriage 1 is connected to a railroad vehicle 6 on the one hand by jacks 7, 8 to enable its lifting for the running at high speed and on the other hand by a rod 9 for its driving along the track.

In the example shown, this carriage 1 has frames 10 carried by each of the ends of the crossbeams 3, that is a total of four frames on each of which is mounted one reprofiling unit through the intermediary of means which permit applying one tool of the unit against the rail with a determined force.

Each reprofiling unit comprises an electric motor the two ends of the motor shaft 11 of which emerge from its housing 12 and are adapted to receive the reprofiling tools, here grinding wheels. In the example shown one of the radial grinding wheels 13 has a smaller diameter than the other 14 to enable the reprofiling of the track switches and of the level crossing, the grinding wheel 14 being used for the reprofiling of the surface of the

head of the rail 5. In this embodiment, the housing 12 of the motor constitutes a support which is angularly displaceable and which carries a group of two tools 13, 14. This support provided by the housing 12 of the driving motor of the grinding wheel 13, 14 in rotation comprises a flange 15 having a disc shape located in a plane parallel to the shaft 11 of the motor, rotatable in a body 16 mounted on the frame 10.

As seen in FIG. 5, the flange 15 comprises on its periphery four notches, a,b,c,d cooperating successively with a locking finger 17 subjected to the action of a spring 18 and which can be actuated manually by means of a control member 19.

The body 16 is slidably mounted on two columns 20 fast with the frame 10. The body 16 comprises chambers 21 surrounding the columns 20 which comprise a portion of greater diameter constituting a piston 22. Ducts 23, 24 provided in the columns 20 permit feeding a fluid under pressure into the chambers 21 either on the one side, or the other side of the piston 22 to cause a displacement of the body 16 along these columns. This system permits applying one of the tools 13, 14 of the reprofiling unit against the rail with a determined force.

Thus, with such a reprofiling device when the conditions necessitate the replacement of the tool 14 by the tool 13, one proceeds to the following operations.

a. one lifts the reprofilng unit by means of the jacks constituted by the chambers 21 of the body 16 and the piston 22 and the columns 20 of the frame 10 so that the tool 14 is no longer in contact with the rail.
b. one unlocks by means of the control member 19 the flange 15.
c. one pivots the support, here constituted by the flange 15 and the housing 12 of the motor, about 180°, FIG. 3 shows the motor and the grinding wheels during their pivoting.
d. one locks the support in this new position by means of the locking finger 17 entering into the notch b of the flange 15.
e. one applies the grinding wheel 13 against the rail with a desired force by means of the jacks constituted by the chambers 21 and the columns 20, 22.

It is evident that in variants, the pivoting of the support 12, 15 and thus of the motor and of the grinding wheels around an axis which is parallel to the longitudinal axis of the rail 5, can be motorised and controlled from the inside of the railroad vehicle as well as the locking and unlocking of the angular position of the support. Thus, the replacement of the working tool is performed rapidly and completely from without the inside of the driving vehicle.

When the railroad vehicle is in a station at rest, it is possible to fix the support 12, 15 in intermediate angular positions thanks to the notches c,d of the flange 15.

In these intermediate positions, the axes of the grinding wheel 13 and 14 are located horizontally in a position which is easily accessible facilitating their replacement.

In a variant of this embodiment, the motors 12 associated with a same rail 5 or 5' could be rigidly connected to each other, the two motors forming then only one support and only one reprofiling unit comprising two groups of two tools. This solution has the advantage of not having tool groups supported in cantilever relation.

The second embodiment of the reprofiling device is shown in FIGS. 6 and 7. Here also the reprofiling unit is carried by a carriage 30, formed by a beam 31 and crossbeams 32, rolling on the rails 33 of the track by

means of flanged wheels **34**. As in the first embodiment described, and without this being again represented in this figure, this carriage **30** is connected to a railroad vehicle to be driven by it along the track as well as by means permitting a displacement in height of this carriage with respect to the vehicle to put out of service the reprofiling device during the displacement at high speed of the railway vehicle.

Here the reprofiling unit comprises also a motor **35** the housing of which has two lugs **36, 37** each connected to the beam **31** through a hinged lever **38,39** forming thus a deformable parallelogram. A jack **40** is located between a lug **41** fast with the beam **31** and an intermediate point of the lever **38** and enables thus causing displacements in height parallel to itself of the motor **35**, which is needed, as will be seen, to apply the tool against the rail with a determined force or to lift it off the rail.

The housing of this motor **35** has a flange **42** on the side where the motor shaft **43** emerges. This motor shaft **43** is rotatable in the wall of the housing **44**, the flat face of which is applied against the free face of the flange **42**, and terminates in a conical pinion **45**.

The angular position of the housing **44** with respect to the motor is fixed by means of a locking finger **52**, subjected to the action of its spring **53** cooperating with blind holes **54** in the housing **44**. A control member **55** permits retracting the locking finger to modify the angular position of the housing **44** with respect to the motor. In this embodiment the housing **44** constitutes the angularly displaceable support on which the group of reprofiling tools is mounted.

Here also the group of reprofiling tools comprises two radial grinding wheels of different diameters **46, 47** carried by the shafts **48, 49** pivoted in the housing **44**. The shafts **48, 49** and the motor shaft **43** are coplanar. Each of the shafts **48** and **49** comprises a conical pinion **50, 51** meshing with the conical pinion **45** of the motor shaft **43** for driving in rotation the grinding wheels **46, 47**.

In this embodiment also only one of the tools of a group of reprofiling tools is in working position at a given moment and the movement of one tool from its waiting position to its working position is effected by a rotation of the housing **44** around the motor shaft **43**. Intermediate positions of the support **44** may also be provided for the replacement of a grinding wheel. In this intermediate position the axis of a tool is then located approximately horizontally and in an accessible and handy position for its replacement.

This embodiment has the advantage that the motor **35** driving in rotation one group of grinding wheels **46, 47** undergoes only, with respect to the carriage **30**, translation displacements of low amplitude facilitating its electrical connection. Another advantage resides in the fact that the gears **45, 50, 51** may constitute if desired a reducer, the speed of rotation of the grinding wheels **46, 47** being then different from that of the driving shaft **43**, or even different from each other.

In this embodiment also one can motorise the locking and unlocking of the angular position of the housing **44** as well as its driving in rotation around the motor shaft **43**. Another advantage of this embodiment resides in the fact that the support is lighter and thus easier to drive in rotation.

FIGS. **8** and **9** show a variant of this embodiment in which the group of reprofiling tools comprises four griding wheels **56, 57, 58, 59**, each carried by a shaft rotatable in one wall of a housing **60** and meshing through pinions **61, 62, 63, 64** with the pinion **45** of the driving shaft **43**. The same locking system **52, 53, 54, 55** is used to fix the respective positions of the housing **60**.

In such an embodiment, one can have two radial grinding wheels of **57, 59** greater diameter, for the reprofiling of the head of the rail, having different granulometries or hardnesses, the harder one being used for the coarse work and the less hard for the finishing. The same can apply to the radial grinding wheels **56, 58** of smaller diameter which are used for rectifying the track switches.

In the variant shown in FIG. **10** the housing **65** constituting the angularly displaceable support around the motor shaft **43** carries two rotative tools, one grinding wheel **66** driven in rotation by a shaft **67** and a pinion **68** meshing with the motor pinion **45**; and a milling cutter **69** driven in rotation through a shaft **70** and a pinion **71** meshing also with the motor pinion **45**. This housing carries further two fixed tools such as the scrapers **72, 73** or abrasive blocks. In this variant, one of the static tools **72** is adapted to be in contact with the rail **33** during a displacement of this housing **65** with respect to the rail in the direction of the arrow F whereas the other static tool **73** is adapted for a relative displacement in a reverse direction.

It is to be seen therefore that the reprofiling tools of a same group can be very different from the others and each adapted to a particular work operation having to be performed on the rail.

It is evident that the number of reprofiling tools carried by a same support is not limited to four but could be higher. Thanks to gears or pinions driving the rotative tools, the reduction ratio between the shaft of each tool and the motor shaft can be adapted to the type of tools used so that each has an optimal rotational speed.

Furthermore, each of the driving shafts of the rotative tools can comprise a clutch or a claw coupling permitting to driving selectively one or more tools only.

In a third embodiment of the reprofiling device shown in FIG. **11**, the reprofiling unit comprises a motor **80** and two angularly displaceable supports **81, 82** each carrying a group of reprofiling tools. This reprofiling unit is directly connected to a railroad vehicle **83** which ensures its guiding along the rail **84**.

In this embodiment, the housing of the motor **80** is connected to the railroad vehicle **83** on the one hand by a jack **85** permitting lifting the reprofiling units and subsequently to applying a different tool of each group against the rail **84** with a determined force for the work. The housing of this motor **80** is on the other side connected to the railroad vehicle **83** through a lever **86** for traction along the track.

The motor **80** comprises flanges **87, 88** located at its ends, traversed by the motor shaft **89**. The ends of this motor shaft **89** are rotatable in the wall of the housings **81, 82** and terminate in pinions **90** and **91**.

Shafts **92, 93** perpendicular to the motor shaft **89** are pivoted in the housings **81** and **82** and carry at their ends merging out from the said housings two radial grinding wheels **94, 95** and **96, 97** of different diameters. Each shaft **92, 93** carries a conical pinion **98, 99** meshing with motor pinions **90, 91** respectively.

As in the preceeding embodiment, each support **81, 82** is angularly displaceable with respect to the motor **80** and thus with respect to the railroad vehicle **83** around the motor shaft **89**, a plane force of each housing **81, 82**

being applied agains the flange **87, 88** of the said motor **80**.

In this embodiment each housing **81, 82** comprises a **100, 101** located in a plane parallel to the flange **87, 88**. A motor **102, 103** fixed on the flange **87, 88** drives a pinion **104, 105** meshing with the gear **100, 101** for driving in rotation and positioning the housings **81, 82**.

A locking finger **106, 109** actuated by an electro-magnet **107, 110** cooperating with blind holes **108, 111** enables the locking of the angular position of the housings **81, 82** with respect to the motor **80**.

In the fourth embodiment of the reprofiling device (FIGS. **12** and **13**) the reprofiling unit is mounted on a carriage **120** similar to the carriage **30** of the second embodiment, rolling along the track by means of flanged wheels and driven by a railroad vehicle. Means are also provided to permit displacements in height of this carriage with respect to the vehicle. These means are of very well-known types and will not be shown in this embodiment.

The frame of this carriage **120** comprises two transverse slides **121** formed by U shaped beams the dorsal portions of which are located one in front of the other. A yoke **122** is fixed by means of bolts **123** on these slides **121** in a position such that a tool of the reprofiling unit will be located, when it is in working position, above the rail **124**.

The reprofiling unit comprises an electric motor **125** the driving shaft **126** which is rotatable in the wall of the housing **127** serving as support for a group of reprofiling tools.

This reprofiling unit is connected to a yoke **122** by a jack, the piston **128** of which is fast with a rod **129** hinged at flange **130** on the yoke and the cylinder **131** of which is fast with a housing of the motor **125**. The cylinder **131** slides in a slotted sleeve **132** presenting a fixing lug **133** fastened by means of a bolt **134** to the upper part of the yoke **122**. A slot **135** of arcuate shape permits modifying the inclination of the motor **125** and therefore of the grinding wheel with respect to the rail **124**.

The frontal portion of the motor **125** which the motor shaft **126** emerges has a flange **136** carrying indexing ratchet **135, 137** subjected to the action of a spring **138** the finger **139** of which cooperates with notches **140** provided in the periphery of a disc **141** which is parallel to the flange **136** of the support or housing **127**.

The end of the motor shaft **126** carries a driving pinion **142** meshing with two other pinions **143, 144** carried by driving shafts **145, 146** rotatable in the housing **127** forming between them and with the driving shaft angles of 120°. Each driving shaft **145, 146** carries at its free end emerging from the housing a rotative tool, here radial grinding wheels **147, 148**.

In a position shown, the axis of the grinding wheel **147** in working position is located in a longitudinal, vertical plane of the rail **124** but thanks to the slot **135** the grinding wheel **147** may be inclined around the longitudinal axis of the rail to grind different side lines of the surface of the head of the rail.

In this embodiment when a grinding wheel **147** is in working position, the other grinding wheel **148** is in a waiting, inactive position which is simultaneously a position in which its replacement can be easily effected.

In this example, the axis of the motor **125** is disposed in a plane perpendicular to the longitudinal axis of the rail but in a variant it would be located in the vertical plane containing the longitudinal axis of the rail **124**. In this variant the slides **121** would be longitudinal and the position of the rail would be that shown at **124'**.

It is evident that the driving in rotation of the support **127** to place the grinding wheel **148** in working position, and to withdraw the grinding wheel **147** as well as the actuation of the indexing device **137, 138, 139** to lock the successive working positions of the housing can be motorised and controlled from the inside of the railroad vehicle driving the carriage **120**.

In a fifth embodiment of the reprofiling device shown in FIGS. **14** and **15** the reprofiling unit comprises a motor **150** and a displaceable support **151** carrying a group of reprofiling tools on two plates **153** which are fast with a carriage **154** guided and driven along the track by a railroad vehicle.

The frame **152** is fixed by bolts **155** passing through a slot **156** of the plates **153** and can be inclined in order to modify the orientation of the tool which is in working position with respect to the rail **157**.

The frame **152** comprises two columns **158** presenting each a piston **159** located in cylinders **160** forming part of the housing of the motor **150**. Thanks to the pneumatic or hydraulic jacks thus constituted, one realizes means permitting to applying a tool against the rail with a determined force; these means permit also lifting the reprofiling unit to enable an angular positioning of the support **151**.

Here also the support **151** can be angularly displaced around the shaft **161** of the motor **150**. An electro-magnet **162**, or a jack, actuating a lock **163** cooperating with blind holes **164** of the support **151** permits the locking in successive working positions of the housing **151**.

In this embodiment, the group of tools comprises a radial grinding wheel **165** and a peripheral grinding wheel **166** mounted on shafts **167, 168** pivoted in the housing **151** and driven by the motor shaft **161** through the intermediary of gears **169, 170, 171** and **172**.

In all the embodiments described up to now all the rotative tools carried by a support are preferably all simultaneously in rotation. The driven rotative tools which are in waiting position constitute then an important fly wheel permitting absorbing the abrupt load variations of the working tool.

The sixth embodiment of the reprofiling device shown in FIGS. **16** to **19** comprises a carriage **180** formed by a beam **181** and crossbeams **182** and rolling on the rails **183** of the track by flanged wheels **184**. This carriage **180** is connected in a known manner as in the first embodiment described for example to a railroad vehicle by means ensuring its traction along the track and means permitting displacing it in height and if desired transversely with respect to the railroad vehicle.

This carriage **180** comprises for each line of rails a sliding block **185**, slidably mounted in slides **186** fast with the carriage, which can displace substantially perpendicularly to the longitudinal axis of the rail. Adjustable abutments **187** motorised by electrical motor **188** adjust the height of the sliding block **185**.

This sliding block **185** carries an angularly displaceable support formed by a plate **189** located in a vertical plane parallel to the longitudinal axis of the rail **183** comprising a shaft **190** rotatable about a horizontal axis in the sliding block **185**.

This rotative support **189, 190** carries a group of reprofiling tools constituted by shaped cutters **191, 192** and **193** rigidly fixed to the periphery of the plate **189**. The working face or cutting edge of these scrapers has a shape corresponding to a portion of the desired profile

for the head of the rail. The cutters **191** and **192** are orientated in such a manner as to cooperate with the rail to reprofile it by scraping when the carriage is displaced in the direction of the arrow H whereas the cutter **193** is orientated to work on the rail when the carriage displaces in the reverse direction.

The setting in place of the working tools is effected by means of a positioning device of the support **189** comprising a chain **194** meshing with a toothed ring **195** fast with the shaft **190** and driven by a pinion **196** fast with a shaft of the motor **197** flanged to the support **185**.

A lock **198** actuated by a jack **199** cooperates with notches **200** in the periphery of the plate **189** to fix its successive working positions.

In such an embodiment the cutting depth of the cutters **191, 192, 193** is determined by the motorised abutments **188** defining the position of the sliding block **185** and the bearing force of the cutters on the rail is given by the weight of this sliding block and of the members which it carries.

All these described embodiments using rotative or non rotative reprofiling tools, enable replacing rapidly and easily one working tool with a tool which is in waiting position to take account of its wear or to use a tool particularly adapted to a kind of desired work. Thus, the intervals between two trains can be used optimally for the reprofiling of the rail of the track.

Thanks to the reprofiling device according to the invention it is not necessary during the working on the track to skip the track switches or the level crossings, the grinding can continue, and all the track can be reprofiled.

I claim:

1. In a reprofiling device of the surface of the head of at least one rail of a railroad track comprising at least one reprofiling unit driven along the track by means of a railroad vehicle; means to displace in height the reprofiling unit with respect to the said railroad vehicle and means to apply at least one tool of the reprofiling unit against the rail; the improvement in which the reprofiling unit comprises at least one angularly displaceable support carried by said unit; there being a plurality of said reprofiling tools forming one group of tools mounted on this support in such a way that their faces or working edges are located in different planes; and means to position the support and to lock the support in any of a plurality of positions relative to said unit in each of which a different one of the said reprofiling tools of the group of tools is located in the same working position, cooperating with the rail, the other tools of the same group of tools being therefore in a waiting position, out of contact with the rail, at least one of said tools being a rotary tool, a motor for rotating said at least one rotary tool, a drive shaft extending from said motor, the support being pivotally mounted on said drive shaft for rotation between said plurality of positions, and means drivingly interconnecting said drive shaft and said at least one tool.

2. Device according to claim **1**, characterized by the fact that each group of tools comprises at least two different types of tools.

3. Device according to claim **1**, characterized by the fact that the tools of a same group of tools are all rotative tools.

4. Device according to claim **3**, characterized by the fact that the tools of a same group of tools are all grinding wheels.

5. Device according to claim **4**, characterized by the fact that each group of tools comprises grinding wheels of different diameters and of different hardnesses.

6. Device according to claim **4**, characterized by the fact that each group of tools comprises at least one radial grinding wheel and at least one peripheral grinding wheel.

7. Device according to claim **1**, characterized by the fact that each group of tools comprises at least one rotative tool and at least one fixed tool.

8. Device according to claim **3**, characterized by the fact that all tools of a grinding unit are simultaneously driven in rotation.

9. Device according to claim **3**, characterized by the fact that reduction ratios of driving linkages of the rotative tools of a same group are different.

10. Device according to claim **1**, characterized by the fact that the unit comprises a frame mounted for rolling movement on flanged wheels along the rail to be reprofiled, the support being mounted for rotation on and relative to the frame.

11. Device according to claim **1**, said drive shaft having a bevel gear thereon, and a bevel gear on said at least one rotary tool in mesh with said bevel gear on said drive shaft to drive said at least one rotary tool.

12. Device according to claim **11**, said at least one rotary tool comprising a pair of rotary tools mounted for rotation in the support on a common shaft.

13. Device according to claim **11**, said at least one rotary tool comprising two rotary tools on two different shafts, each of said two different shafts having a bevel gear thereon in mesh with said bevel gear on said drive shaft.

14. Device according to claim **11**, there being four said rotary tools each having a bevel gear thereon in mesh with said bevel gear of said driving shaft.

15. In a reprofiling device of the surface of the head of both rails of a railroad track comprising a pair of reprofiling units driven along the track by means of a railroad vehicle; means to displace in height the reprofiling units with respect to said railroad vehicle and means to apply at least one tool of each reprofiling unit against the rail; the improvement in which each reprofiling unit comprises at least one support carried by each said unit; a shaft extending through and beyond opposite ends of each said support and carrying at each of its ends a rotary grinding tool, means for rotating each shaft, means mounting said supports on their respective said units for rotation about axes perpendicular to and intersecting said shafts intermediate the ends of said shafts, an elongated beam disposed lengthwise in the direction of movement of the reprofiling device along the track, cross beams at the ends of said beam extending perpendicular to said beam on opposite sides of said beam, said means to displace in height the reprofiling unit including jacks at the ends of said cross beams by which said cross beams are interconnected to said railroad vehicle, and a rod intersecting said railroad vehicle with a point intermediate the length of said beam for pulling said units along the track, said units being disposed on opposite sides of said beam between a respective pair of said ends of said cross beams.

16. Device according to claim 15, said means to displace in height the reprofiling units including also further jacks disposed between the ends of said cross beams and said supports.

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