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(54) Improved work unit for platelayer waggon, and platelayer waggon which employs such work unit.

(57) The work unit (19) has the task of placing and fastening nuts (36) on bolts (44) already positioned (13) together with clips and washers on rails (12), and comprises two wrench means (20-21) positioned in series, of which the first (20) performs at least the prescrewing of the nut (36) onto the bolt (44), whereas the other (21) carries out the final tightening of the nut (36).

The invention also concerns a platelayer waggon (10) for rails which employs such improved work unit (19).

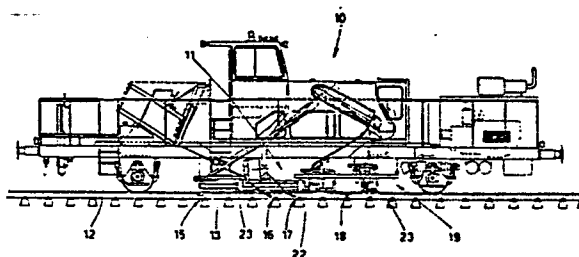


fig.1

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1 "IMPROVED WORK UNIT FOR PLATELAYER WAGGON, AND PLATELAYER
2 WAGGON WHICH EMPLOYS SUCH WORK UNIT"

3 *****

4 The present invention concerns an improved work unit for a
5 platelayer waggon, and also a platelayer waggon which employs
6 such work unit.

7 This platelayer waggon is of a type to bolt the rails of
8 railway lines onto the sleepers, as described in the copending
9 patent application No.83487 A/83 in the name of the present
10 applicants.

11 The above patent application should be consulted with re-
12 gard to the general structure and fundamental method of work-
13 ing of such platelayer waggon.

14 Some embodiments are known in the art which are concerned
15 with the depositing or fixture of components to connect rails
16 to sleepers.

17 FR-A-2.118.600 (Plasser) concerns essentially the con-
18 struction of a hydraulic screwing head which incorporates a
19 striker means and is equipped with means able to absorb
20 vibrations and to prevent them from being transmitted to the
21 motor means. Such head can be fitted to a machine performing
22 maintenance of rails and is installed on a movable trolley so
23 as to be able to carry out screwing work while the machine
24 itself is moving.

25 FR-A-2.072.850 (Plasser) discloses a self-propelled machine



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1 equipped with several wheeled devices to remove, or possibly
2 deposit, the various components such as clips, bolts, etc. The
3 devices are positioned one after another in the direction of
4 movement of the machine. The work can be controlled visually
5 by the machine driver.

6 US-A-3,628,461 (Plasser) discloses a movable trolley
7 located below a special railway waggon, such trolley bearing a
8 tool such as a screwing head. The trolley comprises wheels for
9 alignment on the rails and can be lifted besides being able to
10 move lengthwise to the machine. The work takes place under the
11 direct control of the driver, who is positioned in a cab hung
12 below the frame. This invention dwells particularly on the
13 trolley bearing the screwing head and on the relative movement
14 and alignment on the rail.

15 The improvements of the present invention concern the work
16 unit which performs the positioning, screwing and eventual
17 fastening of nuts to bolts already positioned in correspond-
18 ence with their respective plates; a clip and a washer have
19 already been placed in succession on such bolts.

20 The work unit of the invention has been developed so as to
21 perform the following purposes.

22 A first purpose consists in providing a controlled extrac-
23 tion of the nuts, one by one, from a guide for nuts which
24 delivers the nuts themselves to the position where they are
25 deposited onto the rail.

26 Another purpose of the invention is to make it possible for
27 the nuts thus extracted from their guide, one by one, to be
28 taken reliably by a first wrench head.

29 This first wrench head has the task of obtaining a speedy
30 screwing of the nut onto its bolt.

31 This speedy screwing action is made necessary by the need
32 for high processing speeds of the waggon corresponding with
33 the necessary requirements.

1 In fact, it can be observed that, to enable bolting to be
2 carried out at a high speed or hourly rate, it is necessary to
3 proceed with a quick screwing of the nut onto the bolt and
4 thereafter with a final tightening of the nut with the torque
5 pre-established.

6 The present invention envisages that the wrench heads per-
7 forming the two functions of speedy screwing and final tight-
8 ening respectively are separated.

9 In fact, the head performing the final tightening has to be
10 able to apply a high tightening torque as laid down in the re-
11 gulations.

12 This is not suited to the requirements of a high screwing
13 speed before the final tightening, and this invention there-
14 fore envisages that such two functions are separated.

15 The invention therefore visualises, below the platelayer
16 waggon and at each of its sides, a positioner device which
17 comprises two screwing units, called "wrenches" in the fol-
18 lowing text, positioned in series. Each of these wrenches has
19 a frame, which will be called a "stationary frame" hereinafter.

20 This name is justified by the fact that the "stationary"
21 frame, although attached to the platelayer waggon in an arti-
22 culated manner and although adaptable to the curvature and
23 gauge of the railway line, is solidly fixed to the waggon it-
24 self in a lengthwise direction.

25 The "stationary" frame of each wrench cooperates with a
26 trolley, hereinafter called a "movable trolley", which can run
27 lengthwise to the "stationary" frame and can be fixed moment-
28 arily to the rail.

29 The work unit, including the two wrenches, is hinged at its
30 front, with two degrees of freedom (vertical and horizontal),
31 to another trolley positioned upstream, which bears the means
32 which deposit bolts, clips and washers. These means do not
33 form part of this invention and we shall therefore not dwell

1 on them further.

2 The provision of an articulated joint between the work unit
3 which positions the nuts and comprises the wrenches of the in-
4 vention, and the front trolley which bears the other position-
5 er means, has the effect that the above unit that positions the
6 nuts is readily adapted to the curvature of the tract of rail
7 involved and also to any differences between neighbouring
8 lengths of rail.

9 Such differences may occur because the lengths of rail on
10 which the platelayer waggon moves forward have still not been
11 anchored and may therefore be at different levels.

12 The whole positioner device, including the work unit of the
13 invention and the other means located on the front trolley, can
14 be lifted by means of suitable cables or like means driven by
15 a jack or other equivalent means, as described in the cited
16 patent application.

17 This is so because the various operating means have to be
18 raised from the rails when the platelayer waggon is moving
19 from one position to another.

20 When the positioner device has been placed on the rail, the
21 unit to position the nuts according to the invention can per-
22 form its own working function.

23 The wrenches are fastened together with a hinge provided
24 between the respective stationary frames. Such fixture by a
25 hinge enables the wrenches to follow the rail in its curved
26 tracts.

27 The movable trolleys of the wrenches and therefore the sta-
28 tionary frames too are self-aligning on the rail by means of
29 wheels having the shape of truncated cones, as has already
30 been described in the cited copending patent application of
31 the present applicant.

32 The movable carriage of the first wrench can be fixed firm-
33 ly to the rail during the forward movement of the waggon so as

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1 to carry out the pre-screwing operation.

2 Such movable trolley then performs a forwards recovery
3 travel so as to reach the next station for fixture of a bolt.

4 Likewise the second movable trolley supported in the sta-
5 tionary frame of the second wrench can move in relation to
6 that frame in the same way as the first movable trolley and is
7 also fixed firmly to the rail momentarily for the definitive
8 fastening of the nut.

9 On each side of the rail the first movable trolley bears a
10 high speed wrench head which has the purpose of screwing the
11 nut quickly and partially onto the bolt.

12 This movable trolley also bears a bolt-alignment device
13 which has the task of correcting any lack of vertical posit-
14 ioning of the bolts themselves by means of a feeler or aligner
15 means. An aligner means is provided on each side of the rail.

16 The movable trolley also bears a brake device, which clamps
17 the movable trolley firmly to the rail in coincidence with the
18 bolting station.

19 In this way, while the waggon is moving, the movable trol-
20 ley stays fixed to the rail at its working position and is
21 brought forward only at the end of such operation by an appro-
22 priate actuator means.

23 Likewise the second movable trolley is equipped with a fas-
24 tener head able to apply the torque laid down in the regulat-
25 ions for the final anchorage of the nut.

26 This trolley too is secured momentarily to the rail by a
27 brake device like that of the first movable trolley.

28 This second movable trolley too is brought up to its pre-
29 vious relative position by an appropriate actuator so as to be
30 repositioned at the next working station.

31 The invention envisages that the bolt-fixture sequence is
32 automated according to the positions of the various operating
33 means and, in particular, according to the extreme positions

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1 of the wrench heads and of the respective movable trolleys
2 which bear the same. Such positions are monitored by suitable
3 limit switches.

4 The invention also envisages safety switches which detect
5 anomalous working conditions such as bad positioning of some
6 parts, or working steps out of phase such as a position of a
7 movable trolley too far behind the position of the platelayer
8 waggon, for instance.

9 Such switches arrange to halt the waggon according to me-
10 thods which will be described better hereinafter.

11 The present invention is therefore embodied with an im-
12 proved work unit for a platelayer waggon for rails, such work
13 unit having the task of placing and fastening nuts on bolts
14 already positioned together with clips and washers on rails,
15 and comprising wrench means, being characterized by including
16 two wrench means positioned in series, of which the first per-
17 forms at least the pre-screwing of the nut onto the bolt, where-
18 as the other carries out the final tightening of the nut.

19 This invention is also embodied with a platelayer waggon
20 for rails which is characterized by employing such an improved
21 work unit.

22 We shall describe hereinafter, as a non-restrictive exam-
23 ple, a preferred embodiment of the invention with the help of
24 the attached figures, in which:-

25 Fig.1 shows a platelayer waggon which employs a work unit
26 according to the invention;

27 Figs.2 and 3 give a side view and plan view respectively of
28 the work unit of the invention;

29 Fig.4 gives a side view of a detail of a device that with-
30 draws nuts from their relative guide and also of the
31 engagement of a nut by a wrench head;

32 Fig.5 shows a plan view of a detail of a platform that loads
33 the nut;

1 Fig.6 shows a plan view of means that align bolts and of the
2 brake means that secure a movable trolley to the rail;
3 Fig.7 is a partly cutaway side view of the first wrench
4 head;
5 Fig.8 is also a cutaway view of the second wrench head that
6 performs the final fastening;
7 Fig.9 is a view from below of the end of the first wrench
8 head;
9 Fig.10 lastly shows the reciprocal arrangement of the various
10 limit switches which control the working of the whole
11 unit.

12 In Fig.1 a platelayer waggon 10 has a positioner device 11
13 in its lower portion. This positioner device 11 can be raised
14 in a known manner when the waggon 10 is not operating; that is
15 to say, when it 10 is moving from one work station to another.

16 When working, the positioner device 11 is lowered onto a
17 rail 12, with which it cooperates by means of wheels 23.

18 As can be seen in Fig.1, the positioner device 11 consists
19 of a first trolley 13, which is hinged at 22 to a second trol-
20 ley, or work unit, 19 having the task of positioning, screwing
21 and tightening nuts.

22 A station 15 to deposit bolts, a station 16 to deposit clips
23 and a station 17 to deposit washers can be seen in correspond-
24 ence with the first trolley 13 but do not form part of this
25 invention.

26 The trolleys 13-19 cannot be displaced lengthwise in relat-
27 ion to the waggon 10 but always keep the same position in re-
28 lation to the waggon 10.

29 Instead, the trolleys 13-19 can be adapted sideways to the
30 gauge of the railway line and to the curvature of the rails,
31 since the wheels 23 of these trolleys 13-19 are self-aligning
32 as they have the shape of a double cone.

33 To be more exact, such wheels 23 are arranged on "movable"

1 trolleys 26 and 27 (see Figs.2 and 3) as will be seen later.

2 Fig.2 shows in greater detail the work unit 19, which is
3 secured with a hinge 22 to the front trolley 13, of which the
4 rear portion can be seen.

5 The work unit 19 includes two wrench means 20-21, each of
6 which comprises a frame 126 and 127 respectively having a sub-
7 stantially quadrangular shape.

8 These frames 126-127 will be called "stationary frames"
9 hereinafter, as we said earlier in the foreword of this
10 description.

11 Such frames 126-127 are joined together with a hinge 24.
12 This connection with a hinge 24 enables the two wrench means
13 20-21 to follow the curvature of the rails easily.

14 The plan view of Fig.3 shows the stationary frames 126-127
15 and their connection 24 better.

16 Fig.2 shows a curved end portion 118 of a guide 18 for
17 nuts; this end portion 118 is pivoted at 25 so that it 118 can
18 rotate and move towards the front of the waggon 10 so as to
19 release one nut at a time from its lower end, as will become
20 clear later.

21 The frame 126 of the wrench means 20 bears a movable trol-
22 ley 26 in such a way that it 26 can run; this movable trolley
23 26 is equipped with wheels or rollers 14 that cooperate with
24 guides provided in the side structural sections of the frame
25 126. In this way the movable trolley 26 can run lengthwise
26 along the stationary frame 126.

27 Likewise the frame 127 bears a movable trolley 27 in such a
28 way that it 27 can run.

29 The trolleys 26-27 are provided with actuators 28 and 29
30 respectively, which in this example are jacks.

31 These jacks 28-29 serve only to return the trolleys 26-27
32 respectively towards the left of the figure; in fact, the jacks
33 28-29 are free of load during the travel of the trolleys 26-27

1 towards the rear of the waggon 10.

2 For the sake of convenience in explaining the various move-
3 ments, we prefer to refer to a solidly fixed relationship with
4 the platelayer waggon 10 although in actual fact the so-called
5 "movable" trolleys 26-27 are fixed solidly during working, as
6 we shall see, to the portion of rail 12 on which the waggon 10
7 is working.

8 It is only after the screwing operation has been completed
9 that the trolleys 26-27 are brought forwards again so as to
10 reach the next bolt-fixture position.

11 The plan view of Fig.3 has omitted all the devices forming
12 part of the movable trolleys 26-27 and also the two actuators
13 28-29, the purpose being to show the arrangement of the frames
14 126-127 and movable trolleys 26-27.

15 Fig.2 shows in the movable trolley 26 of the first wrench
16 means 20 a wrench head 30 which has the task of obtaining a
17 first speedy screwing of a nut.

18 The final screwing or tightening with the pre-set torque,
19 on the other hand, is obtained by a wrench head 31 located on
20 the trolley 27 of the second wrench means 21.

21 The wrench head 30 is moved vertically by an actuator 32,
22 whereas the final wrench head 31 is moved likewise by an act-
23 uator 33; these actuators 32-33 consist of hydraulic jacks in
24 the figure.

25 A device 34 to align bolts is located on the trolley 26 in
26 correspondence with the wrench head 30. This device 34 will be
27 shown better hereinafter with specific reference to Fig.6.

28 A brake device 35 is positioned immediately downstream from
29 the bolt-aligner device 34 and serves to keep the movable
30 trolley 26 momentarily firmly anchored to the rail 12.

31 In this way, after the brake device 35 has been actuated
32 and while the waggon 10 moves forward, the trolley 26 stays
33 anchored to the rail 12 in correspondence with the screwing

1 station; thus the trolley 26 becomes displaced backwards in
2 relation to the waggon 10.

3 When the screwing operation has been completed by the
4 wrench head 30, the trolley 26 is brought forward by the act-
5 uator 28 after the brake device 35 has been released.

6 The trolley 26 can be brought thus so as to coincide with
7 the next screwing station for work on a new nut.

8 The trolley 27 in its turn is equipped with a brake device
9 135 fully analogous to the device 35 we have just described.
10 In this way the trolley 27 too is momentarily anchored firmly
11 to the rail 12.

12 In relation to the waggon 10, therefore, the trolley 27 is
13 located rearwards until the wrench head 31 has completed the
14 work of tightening the nut; then, when the head 31 has been
15 withdrawn from the nut, the trolley 27 is brought up to its
16 new position by the actuator 29.

17 While the trolleys 26-27 are left in the rear, the actu-
18 ators 28-29 are free of load and have no effect at all on the
19 positioning of the trolleys 26-27.

20 According to Fig.4 the depositing of a nut 36 in corres-
21 pondence with the outlet of the end portion 118 of the guide
22 18 takes place as follows.

23 The trolley 26 which bears the wrench head 30 moves towards
24 the front of the waggon 10 under the action of the recovery
25 actuator 28 (see Fig.2) and therefore moves towards the left
26 of Fig.4. This trolley 26 meets a roller 37 solidly fixed to
27 the end portion 118 of the guide 18.

28 The action of the trolley 26 on this roller 37 causes the
29 whole portion 118, which is pivoted at 25 (see Fig.2), to move
30 to the left in the figure (to the position shown with dots and
31 dashes in Fig.4).

32 At the same time a roller 38 located on the movable trolley
33 26 acts on a cam 139 on a positioner arm 39; this positioner

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1 arm 39 in its turn bears at its end a pin 40 to withdraw nuts
2 36.

3 The action of the roller 38 on the cam 139 takes place slightly
4 slightly before the roller 37 is engaged by the trolley 26; in
5 this way the pin 40 to withdraw nuts 36 is lowered and inserted
6 into the threaded bore of the nut 36 present at the outlet
7 of the end portion 118 of the guide 18 slightly before the
8 portion 118 itself is retracted.

9 The engaged nut 36 stays held on the pin 40 withdrawing
10 nuts and is supported by a platform 41.

11 Next, the trolley 26 leaves the position shown in the figure
12 and is brought towards the right; this takes place when
13 the trolley 26 itself is anchored firmly to the rail 12 by the
14 brake device 35.

15 In this way, when the waggon 10 moves forward, the trolley
16 26 is left behind in relation to the waggon 10 and frees the
17 guide 18 and also the positioner pin 40.

18 The positioner arm 39, being pivoted at 239, returns to its
19 position of rest through the force of gravity as it has been
20 embodied so as to be unbalanced in relation to the pivot 239.

21 The wrench head 30 carries out a downward movement first of
22 all when it corresponds with the nut 36, so as to take the nut
23 36 itself from the platform 41 which supports the nut; it is
24 then raised just enough to pass over a ridge-wise end portion
25 141 of the platform 41 (see Fig.5).

26 Fig.5 shows resilient foils 241 which withhold the nut 36
27 withdrawn from the end portion 118 of the guide 18.

28 A resilient blade 341 (Fig.4) supports these foils 241 and
29 is lowered with them under the thrust of the wrench head 30,
30 thus freeing the nut 36.

31 Fig.6 shows the brake device 35; this figure shows a portion
32 of the trolley 26 which supports an actuator 42, a jack
33 in this example.

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1 This actuator 42 acts on two arms 43, one on each side of
2 the rail 12, which in turn support two brake shoes 143 that
3 act directly on the side portion of the head of the rail 12.

4 A spring 243 can also be seen which joins together the two
5 arms 43 providing the braking action.

6 In fact, in the example shown the jack 42 acts in the direction of the opening of the arms 43, which are pivoted at 343 on the frame of the trolley 26.

9 As we said earlier, the brake device 35 serves to keep the
10 trolley 26 firmly anchored to the rail 12 at the bolt-fixture
11 station.

12 An alignment wheel 23 having the shape of a double cone can
13 be seen below.

14 As is known (see the cited patent application IT 83487
15 A/83), this wheel 23 has the task of aligning the trolley 26,
16 and therefore the stationary frame 126 solidly fixed crosswise
17 to the trolley 26, on the rail 12.

18 Fig.6 also shows the alignment device 34, which comprises
19 two movable arms 134 bearing forks 234 at their ends.

20 These forks 234 can hold bolts 44 so as to correct any inaccurate vertical positioning of such bolts 44.

22 The arms 134 are connected to each other by means of a
23 connecting rod 334. An actuator or jack 434 acts directly on
24 one of the arms 134, namely the one shown below in Fig.6 in
25 this case.

26 Motion is transmitted through the connecting rod 334 to the
27 other arm 134 too, and the two arms 134 move in this way symmetrically in relation to the axis of the rail 12.

29 Fig.7 shows, in a view lengthwise in relation to the plate-layer wagon 10, the first wrench head 30 able to slide vertically along guides 45; the end portion of the stem of the actuator 32 can be seen, the actuator 32 consisting of a jack (see Fig.2) which serves to displace the head 30 vertically.

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1 A motor, here an electric motor, 46 causes the rotation of
2 a shaft 130 of the wrench head 30 through a belt or chain re-
3 duction transmission 47.

4 A slidable rod 48 is included within the shaft 130, which
5 is envisaged as being hollow, and has the task of monitoring
6 with its lower end the level of the point of the bolt onto
7 which the nut 36 shown in the figure is screwed.

8 In this way, as the screwing proceeds, the rod 48 rises,
9 resting on the point of the bolt, until its upper end meets a
10 limit switch contact F7.

11 Resilient foils 50 to hold the nut 36 can be seen in the
12 lower part of the wrench head 30 intended to cooperate with
13 the nut 36. These resilient foils 50 are particularly evident
14 in the view of Fig.9 from below the end of the head 30 itself.

15 Within the nut 36 can be seen the end of a positioner shaft
16 49, this end being three-lobed in this figure. This shaft 49
17 has the task of engaging the inner bore of the nut 36 without
18 spoiling its screw-thread, so as to obtain proper vertical
19 alignment and support of the nut 36, which is thus held be-
20 tween the positioner shaft 49 and the resilient foils 50.

21 Fig.7 also shows a flange 51 to discharge nuts 36. This
22 flange 51 is usually kept in position by a spring 251 and ser-
23 ves to discharge nuts 36 which are faulty or which have not
24 been screwed onto a bolt for any reason (for instance, defect-
25 ive threads or other causes).

26 Discharge of a faulty nut, after the nut itself has been
27 engaged, takes place as follows; the nut 36 is held by the
28 resilient foils 50 and is raised by an extent enough to take
29 it out from the support platform 41 which can be seen in the
30 figure.

31 Such raising of the head 30, however, is not enough to
32 bring the flange 51 into contact with a stationary abutment
33 151 solidly fixed to the frame of the movable trolley 26. In

1 this way the flange 51 keeps its vertical position.

2 The figure shows a position 30B for engagement of the nut
3 36, which is thus engaged with the head 30 and is raised and
4 removed from the support platform 41 and is taken so as to
5 correspond with a bolt, which cannot be seen in this figure.

6 The head 30 is then lowered and pre-screwing is carried out
7 until the rod 48, thrust by the point of the bolt, engages the
8 limit switch F7.

9 The screwing operation now ends and the head 30 can be rai-
10 sed again; if the screwing is not successful, the limit switch
11 F7 does not detect movement of the nut 36 along the bolt and a
12 timer causes the head 30 to be raised by the actuator 32 to
13 position 30A.

14 In this way, during its ascending travel, the flange 51 en-
15 gages the abutment 151, which prevents the flange 51 from be-
16 ing raised farther.

17 Instead, the head 30 is raised farther and causes the
18 spring 251 to be compressed; the flange 51 thus acts directly
19 on the nut 36, which is pushed downwards and therefore dis-
20 charged.

21 In this way a nut which is not screwed onto a bolt is re-
22 jected automatically.

23 Fig.8 gives a side view of the second wrench head, or
24 tightener head, 31. In this case the head 31 is operated by a
25 hydraulic motor 146 able to apply the fastening torque laid
26 down in the regulations.

27 The head 31 can slide in vertical guides 145 made in the
28 movable trolley 27, a part of the frame of which can be seen.

29 The wrench head 31 bears at its end an articulated hexa-
30 gonal key 131. This key 131 has an inner hole 231 to lodge the
31 point of the bolt, thus enabling the key 131 to be lowered
32 until the nut 36 has been fully tightened (position 31B of
33 Fig.8).

1 When tightening has been completed, the head 31 is then
2 raised again to its normal position 31A and is moved away
3 owing to the whole trolley 27 being moved forward by the act-
4 uator 29 (Fig.2).

5 Fig.8 does not show the actuator 33 which moves the head 31
6 vertically, such actuator 33 being shown instead in Fig.2.

7 The key 131 comprises an articulated joint 52, which gives
8 the key 131 a certain freedom on two axes.

9 In this way the nut 36 pre-positioned on the bolt by the
10 head 30 can be readily engaged by the key 131, which is adap-
11 ted thus automatically to small misalignments of the head 31
12 in relation to the nut 36.

13 The flaring of the mouth of the key 131 facilitates enga-
14 gement of the nut 36.

15 Lastly, with reference to Fig.10, we shall now describe the
16 method of working of the pre-screwing and tightening station
17 with regard to the nut 36.

18 Fig.10 shows the positioner device or unit 19, in which the
19 various limit switches with which the device 19 is equipped
20 are marked in black.

21 For greater clarity, Fig.10 gives only the references of
22 the limit switches and various actuators, the references for
23 the other means being shown in the preceding figures.

24 The method of working is as follows.

25 a) Pre-screwing step.

26 The movable trolley 26 is in its fully forward position in
27 correspondence with the position to screw the nut onto the
28 bolt.

29 The limit switches F1 and F2 are connected up by direct
30 action of the trolley 26 and cause descent of the head 30
31 (actuator 32).

32 The head 30 takes a nut 36 from the support platform 41. It
33 causes re-ascent of the actuator 32 up to F4.

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1 This re-ascent enables the head 30 to be disengaged from
2 the platform 41 vertically.

3 F4 blocks the actuator 32 at the position it 32 has reach-
4 ed, and releases the actuator 28 from load, the trolley 26
5 thus being free to move lengthwise.

6 As the waggon 10 advances, F5 detects the presence of the
7 clip (and therefore the arrival of the trolley 26 at the re-
8 quired position) and operates the actuator 42 of the brake
9 device 35.

10 The rail 12 is thus gripped (Fig.6) and the trolley 26 is
11 anchored firmly to the rail 12.

12 The trolley 26 is thus positioned to the rear in relation
13 to the waggon 10 and therefore to the device 19.

14 F5 also operates the actuator 434 of the device 34 which
15 aligns bolts. In this way the bolts 44 are aligned by means of
16 the forks 234 (Fig.6).

17 F6 indicates that the trolley 26 has reached a position
18 where the platform 41 no longer lies on the path of the head
19 30, and causes descent of the head 30 (actuator 33). It also
20 actuates a first timer.

21 The head 30 rotates first of all anticlockwise so as to
22 align the nut 36 on the bolt 44.

23 The above timer reverses the direction of rotation (which
24 now becomes clockwise) and causes the opening of the forks 234
25 by means of the actuator 434.

26 The nut 36 is screwed until the rod 48 contacts at its low-
27 er end the point of the bolt 44 and actuates F7.

28 F7 controls a second timer, which governs the re-ascent of
29 the head 30 (actuator 32). At the end of this re-ascent F2 is
30 actuated and causes the opening of the brake device 35, an-
31 other reversal of the direction of rotation of the head 30
32 (which becomes anticlockwise again) and the recovery travel of
33 the trolley 26 by means of the actuator 28 in relation to the

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1 waggon 10.

2 When the trolley 26 has recovered its position in relation
3 to the waggon 10, the positioner device 19 is ready for a new
4 cycle.

5 The stationary frame 126 comprises two limit switches F8
6 and F9 having a safety function according to the following
7 methods; if the actuator 28 is almost fully extended (with the
8 trolley 26 almost at the point of its greatest travel) but the
9 actuator 32 has still not received the command to raise the
10 head 30, F8 halts the working cycle and causes actuation of
11 the re-ascent of the head 30 by means of the actuator 32.
12 Lastly, if the actuator 28 has not been actuated or has been
13 prevented from retracting, F9, as soon as it is reached by the
14 trolley 26, causes the immediate stoppage of the waggon 10 for
15 inspection.

16 The platelayer waggon 10 can be re-actuated by the operator
17 with a manual control.

18 b) Final tightening step.

19 The movable trolley 27 bearing the head 31 is brought, during
20 movement of the waggon 10, so as to correspond with the stat-
21 ion for fixture of the bolt where the head 30 has carried out
22 earlier the pre-screwing of a nut 36.

23 F10, F11 and F12 are connected up together and actuate the
24 brake device 135 and also the descent of the head 31 (actuator
25 33). The head 31 engages the nut 36, which has already been
26 partially screwed onto the bolt 44.

27 According to a preferred cycle, when a first pre-establish-
28 ed value of torque has been reached, the speed of rotation
29 diminishes until the prescribed number of revolutions per
30 minute has been reached.

31 When the final torque laid down has been reached, the re-
32 ascent of the head 31 is caused by means of the actuator 33.

33 F11 detects the re-ascent of the head 31, causes release of

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1 the brake device 135, brings the speed of rotation of the head
2 31 back to its original value and also causes the forward re-
3 covery travel of the trolley 27 by means of the actuator 29 in
4 relation to the waggon 10.

5 The stationary frame 127 comprises two limit switches F13
6 and F14 having safety functions according to the following
7 methods; if the actuator 29 is almost fully extended (with the
8 trolley 27 near to the point of its maximum travel) but the
9 actuator 33 has still not been caused to raise the head 31,
10 F13 stops the working cycle and causes actuation of the re-
11 ascent of the head 31 by means of the actuator 33.

12 Lastly, if the actuator 29 has not been actuated or has
13 been prevented from retracting, F14, as soon as it is reached
14 by the trolley 27, causes the immediate stoppage of the waggon
15 10 for inspection.

16 The platelayer waggon 10 can be re-started by the operator
17 with a manual control.

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INDEX

1	
2	10 - platelayer waggon
3	11 - positioner device
4	12 - rail
5	13 - front trolley
6	14 - wheels or rollers
7	15 - station to deposit bolts
8	16 - station to deposit clips
9	17 - station to deposit washers
10	18 - guide for nuts
11	118 - end portion
12	19 - unit to position and screw nuts
13	20 - first wrench means
14	21 - second wrench means
15	22 - hinge
16	23 - wheels
17	24 - hinge
18	25 - pivot
19	26 - movable trolley
20	126 - stationary frame
21	27 - movable trolley
22	127 - stationary frame
23	28 - actuator
24	29 - actuator
25	30 - wrench head
26	30A - raised position
27	30B - lowered position
28	130 - shaft
29	31 - tightener wrench head
30	131 - hexagonal key
31	231 - inner hole
32	32 - actuator
33	33 - actuator

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- 1 34 - device to align bolts
- 2 134 - arms
- 3 234 - forks
- 4 334 - connecting rod
- 5 434 - actuator or jack
- 6 35 - brake device
- 7 135 - brake device
- 8 36 - nut
- 9 37 - roller
- 10 38 - roller
- 11 39 - arm to engage nuts
- 12 139 - cam
- 13 239 - pivot
- 14 40 - pin to withdraw nuts
- 15 41 - support platform for nuts
- 16 141 - ridge portion
- 17 241 - foils
- 18 341 - resilient blade
- 19 42 - actuator or jack
- 20 43 - brake arms
- 21 143 - brake shoes
- 22 243 - spring
- 23 343 - pivot
- 24 44 - bolts
- 25 45 - guides
- 26 145 - guides
- 27 46 - motor
- 28 146 - motor
- 29 47 - transmission
- 30 48 - rod
- 31 49 - positioner shaft
- 32 50 - resilient foils
- 33 51 - flange to discharge nuts

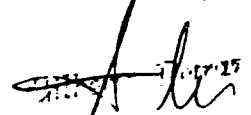
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- 1 151 - abutment
- 2 251 - spring
- 3 52 - articulated joint
- 4 F1-F14 - limit switches.

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CLAIMS

- 1 - Improved work unit (19) for a platelayer waggon (10) for rails, such work unit (19) having the task of placing and fastening nuts (36) on bolts (44) already positioned (13) together with clips and washers on rails (12), and comprising wrench means (20-21), being characterized by including two wrench means (20-21) positioned in series, of which the first (20) performs at least the pre-screwing of the nut (36) onto the bolt (44), whereas the other (21) carries out the final tightening of the nut (36).
- 2 - Improved work unit (19) for a platelayer waggon (10) for rails as claimed in Claim 1, in which the first wrench means (20) performs also the placement of the nut (36) on the bolt (44).
- 3 - Improved work unit (19) for a platelayer waggon (10) for rails as claimed in Claim 1 or 2, in which the wrench means (20-21) are connected together with a hinge (24).
- 4 - Improved work unit (19) for a platelayer waggon (10) for rails as claimed in any claim hereinbefore, which is connected with a hinge (22) to a front trolley (13) of the platelayer waggon (10), the hinge (22) permitting two degrees of freedom, namely horizontal and vertical respectively.
- 5 - Improved work unit (19) for a platelayer waggon (10) for rails as claimed in any claim hereinbefore, in which the first wrench means (20) comprises:
- stationary frame means (126),
 - movable trolley means (26) cooperating in a movable manner (14) with the stationary frame means (126) and bearing a pre-screwing head (30) on each side of the rail (12),
 - means (118-39-41) to deposit nuts (36),
 - means (34) to align bolts (44), and
 - brake means (35) which anchor the movable trolley means (26)



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1 to the rail (12) momentarily.

2 6 - Improved work unit (19) for a platelayer waggon (10) for
3 rails as claimed in Claims 1 and 5, in which the pre-screwing
4 head (30) is able to slide vertically on guide means (45) of
5 the movable trolley means (26) and comprises at least one of
6 the following means:

- 7 - foil means (50) to hold a nut (36),
- 8 - positioner shaft means (49) cooperating with the inside bore
9 of the nut (36),
- 10 - a flange means (51) which discharges faulty nuts and coop-
11 erates with stationary abutment means (151), and
- 12 - a rod means (48) which monitors the end of the bolt (44) and
13 cooperates with limit switch means (F7) (Fig.7).

14 7 - Improved work unit (19) for a platelayer waggon (10) for
15 rails as claimed in Claim 1 and in Claim 5 or 6, in which the
16 means (118-39-41) to deposit nuts (36) include in cooperation:

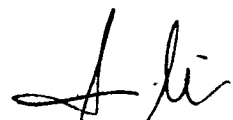
- 17 - a movable end portion (118) of the guide (18) for nuts (36),
- 18 - arm means (39) to engage nuts (36) with pivot means (40) to
19 withdraw nuts (36), and
- 20 - platform means (41) to support nuts (36) momentarily,
21 such movable portion (118) and such arm means (39) to engage
22 nuts (36) cooperating momentarily, even indirectly, with the
23 movable trolley means (26).

24 8 - Improved work unit (19) for a platelayer waggon (10) for
25 rails as claimed in Claim 1 and in Claim 5, 6 or 7, in which
26 the means (34) to align bolts (44) comprise:

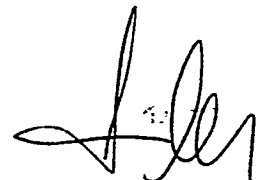
- 27 - movable arm means (134) with fork means (234), and
- 28 - actuator means (434).

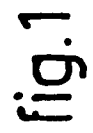
29 9 - Improved work unit (19) for a platelayer waggon (10) for
30 rails as claimed in any claim hereinbefore, in which the
31 second wrench means (21) includes:

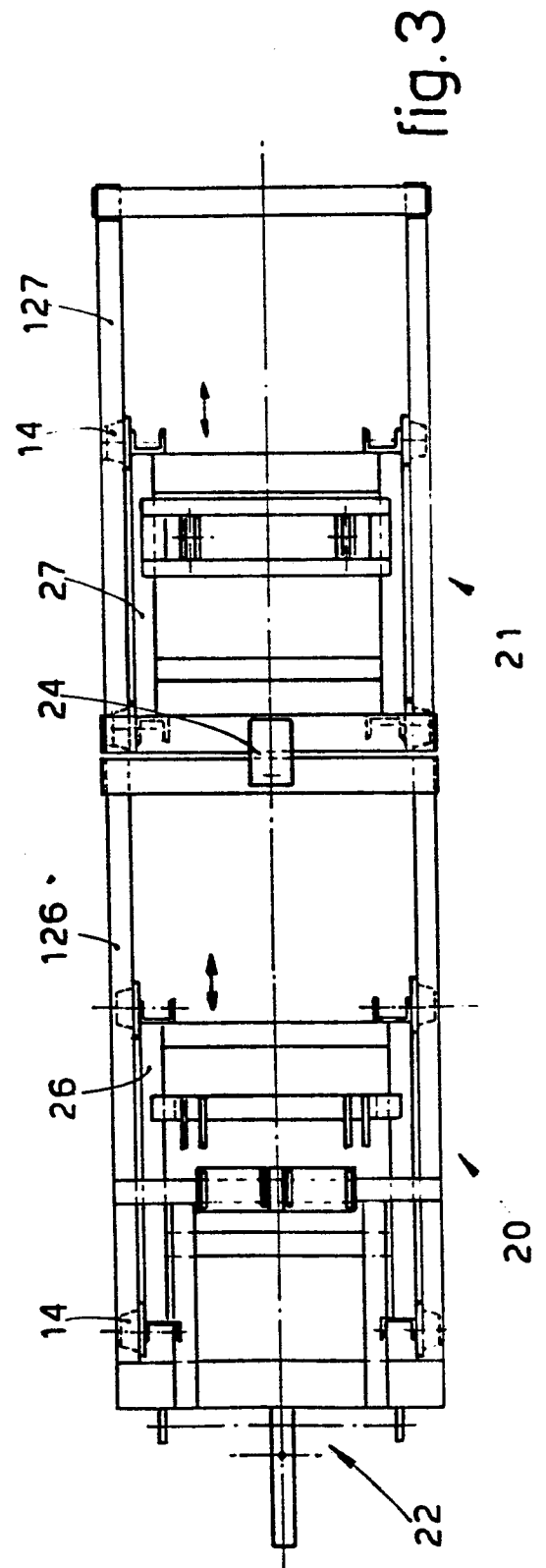
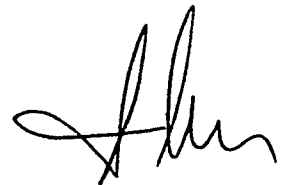
- 32 - stationary frame means (127),
- 33 - movable trolley means (27) cooperating movably (14) with the



- 1 stationary frame means (127) and bearing a final wrench head
2 (31) on each side of the rail (12), and
3 - brake means (135) anchoring the movable trolley means (27)
4 momentarily to the rail (12).
- 5 10 - Improved work unit (19) for a platelayer waggon (10) for
6 rails as claimed in Claims 1 and 9, in which the final wrench
7 head (31) can slide vertically on guide means (145) of the
8 movable trolley means (27) and comprises an articulated key
9 (131) to tighten the nuts (36).
- 10 11 - Improved work unit (19) for a platelayer waggon (10) for
11 rails as claimed in Claim 1 and in Claim 9 or 10, in which the
12 wrench head (31) works with a variable number of revolutions
13 per minute.
- 14 12 - Improved work unit (19) for a platelayer waggon (10) for
15 rails as claimed in Claim 1 and Claim 9, 10 or 11, in which
16 the wrench head (31) can apply a variable torque.
- 17 13 - Improved work unit (19) for a platelayer waggon (10) for
18 rails as claimed in any claim hereinbefore, in which the
19 movable trolleys (26-27) comprise actuator means (28-29) which
20 are active only in the phase of recovery of travel by the
21 trolleys (26-27).
- 22 14 - Improved work unit (19) for a platelayer waggon (10) for
23 rails as claimed in any claim hereinbefore, which comprises
24 limit switch means (F8-F13) to raise the wrench heads (30-31).
- 25 15 - Improved work unit (19) for a platelayer waggon (10) for
26 rails as claimed in any claim hereinbefore, which comprises
27 safety limit switch means (F4-F14) to halt the platelayer
28 waggon (10).
- 29 16 - Platelayer waggon (10) for rails, which employs an im-
30 proved work unit (19) according to any of the claims herein-
31 before.







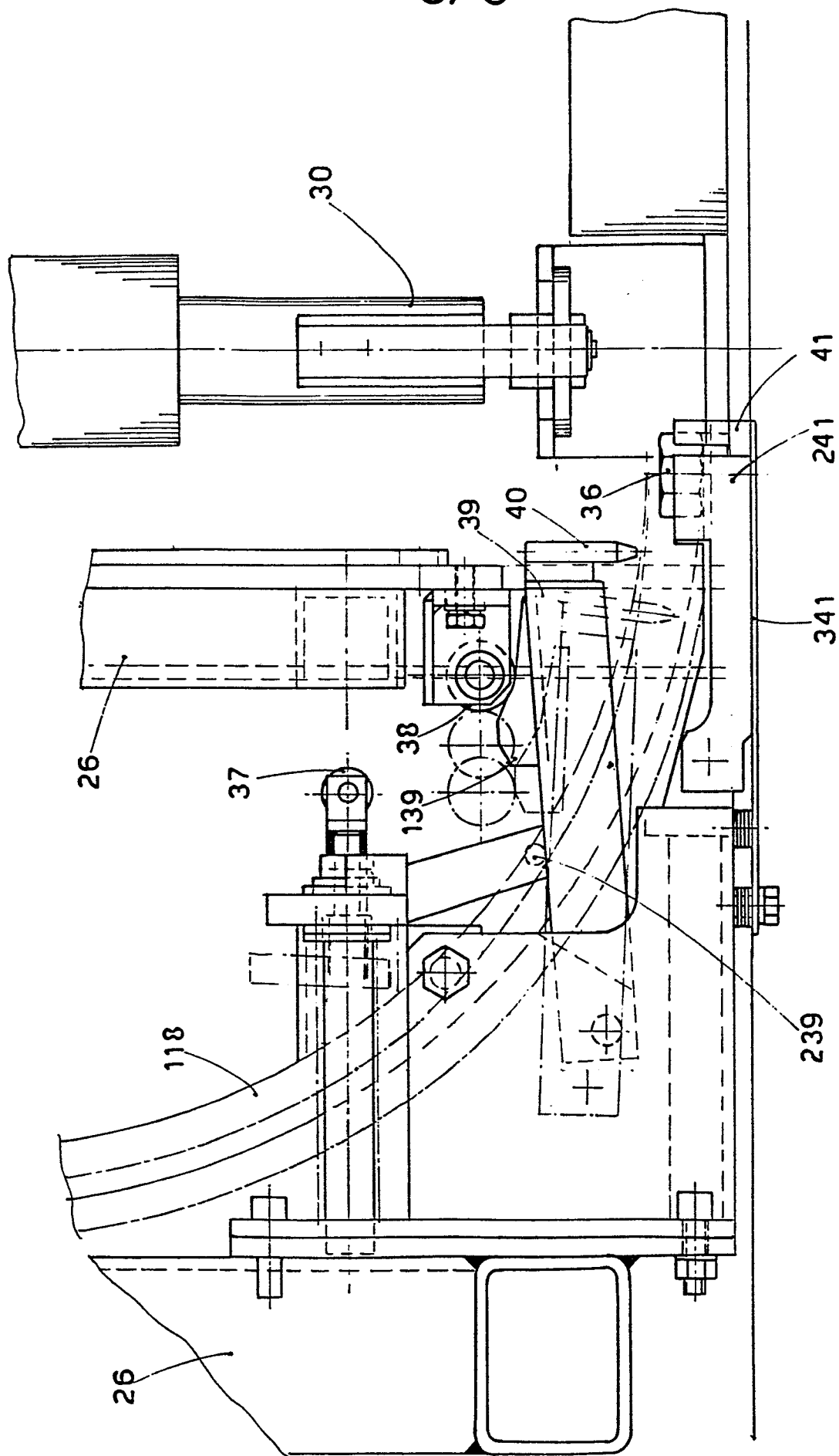


fig. 4

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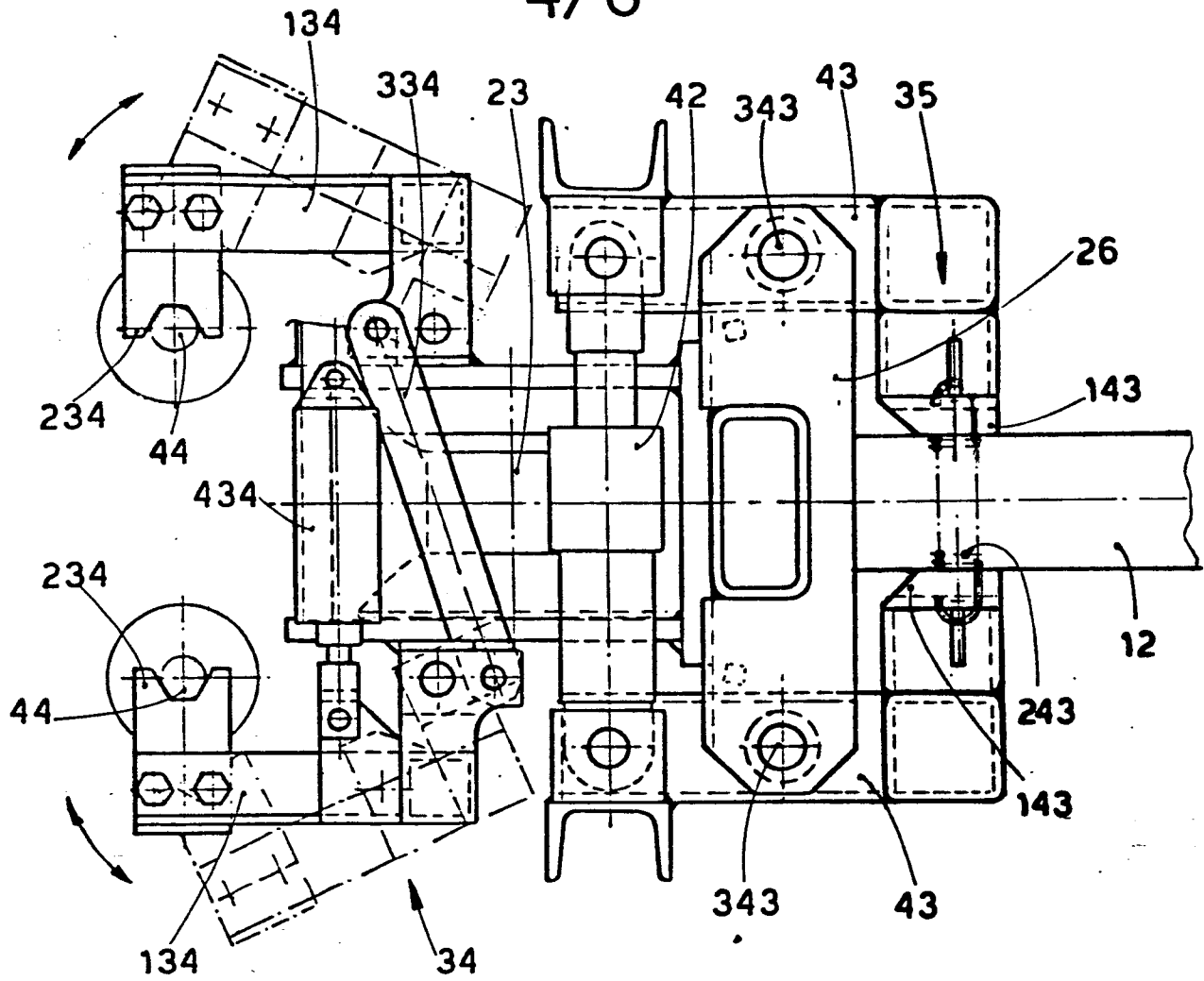


fig.6

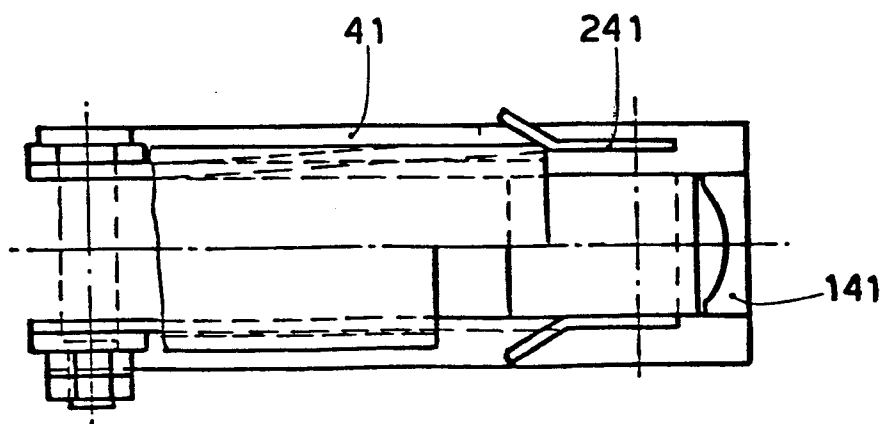


fig.5

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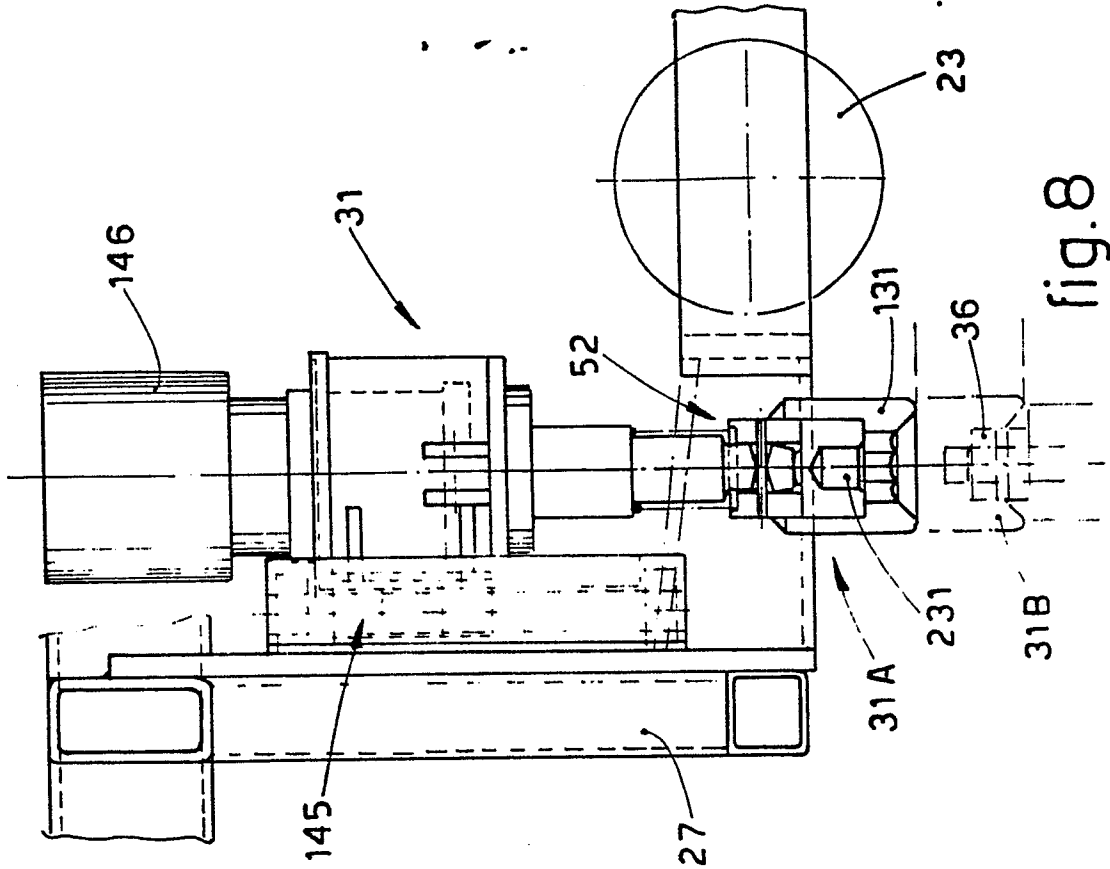


fig.8

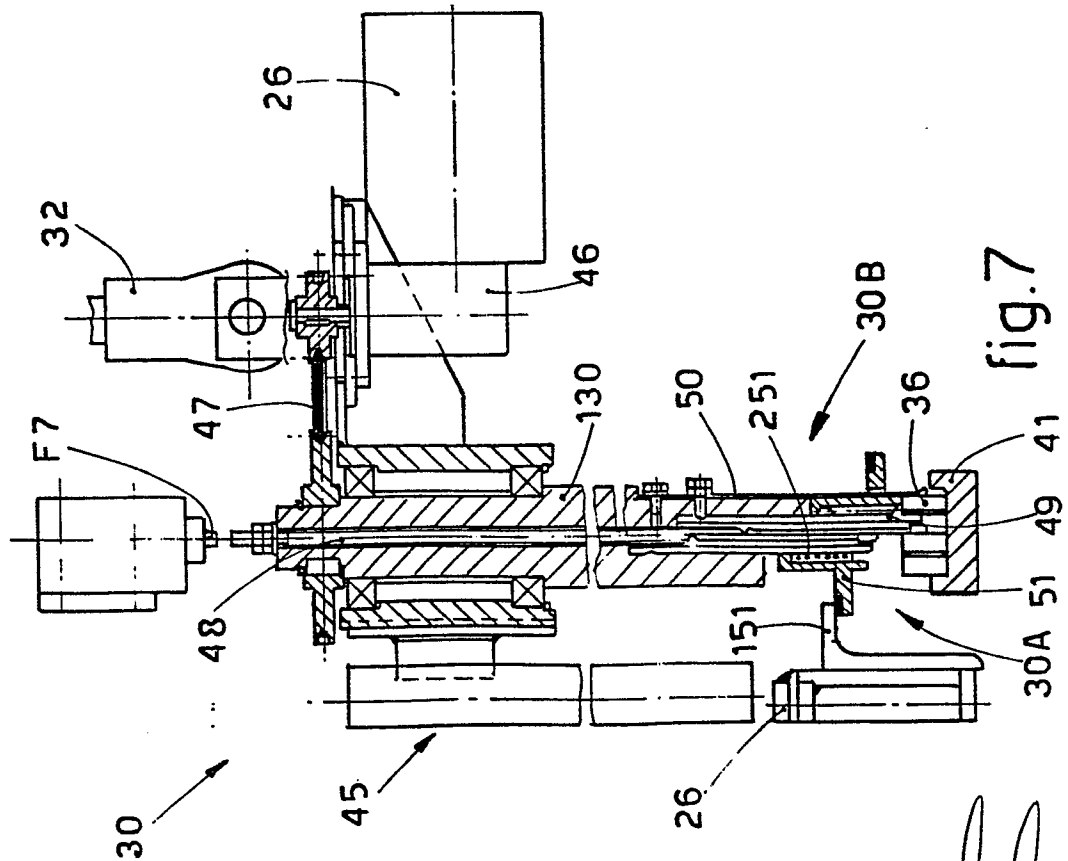


fig.7

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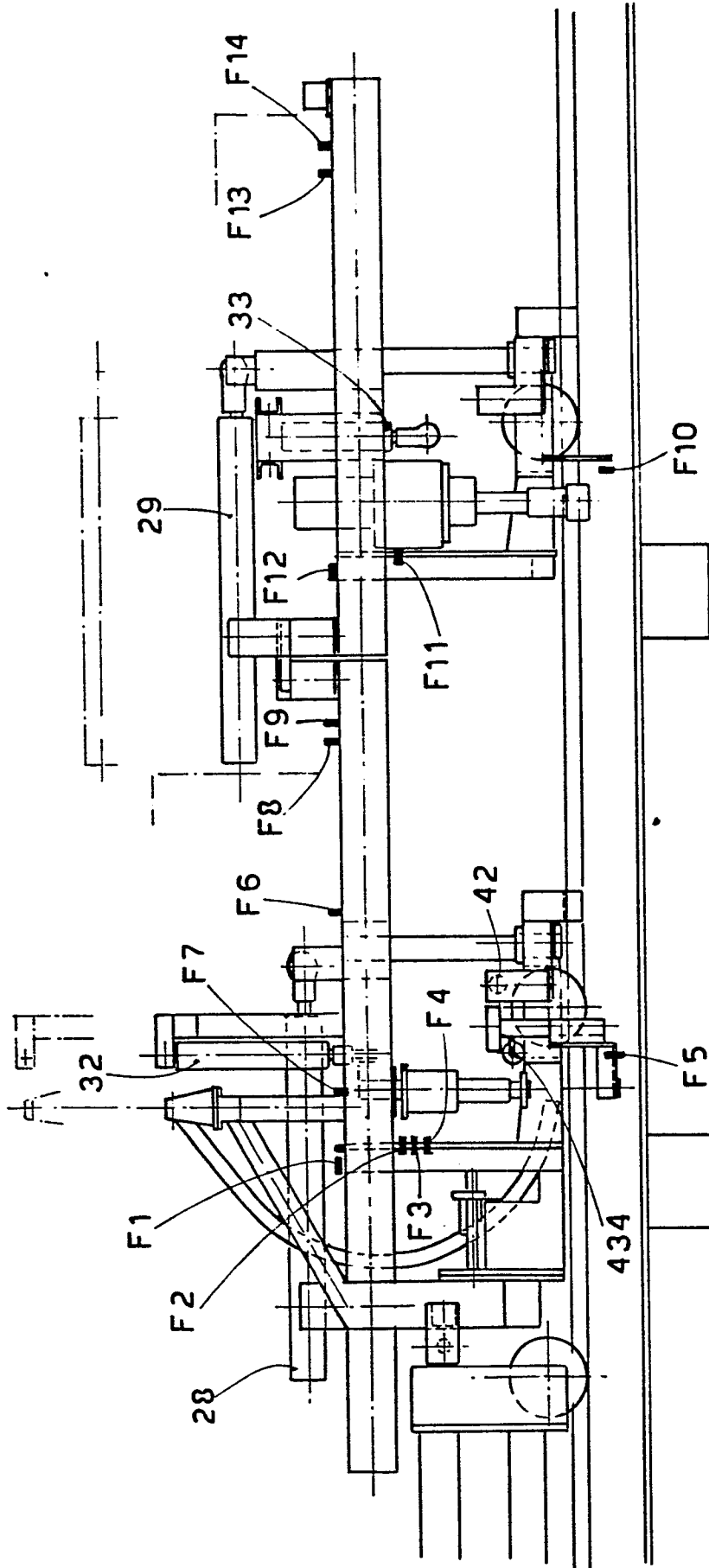


fig.10

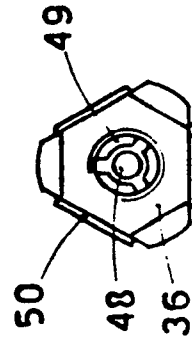


fig.9

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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.4)
A,D	FR-A-2 118 600 (PLASSER)		E 01 B 29/28
A,D	FR-A-2 072 850 (PLASSER)		
A,D	US-A-3 628 461 (PLASSER)		
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			E 01 B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 15-04-1985	Examiner RUYMBEKE L.G.M.
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