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(71) Applicant

**Franz Plasser Bahnbaumaschinen  
Industriegesellschaft m.b.H.**

**(Incorporated in Austria)**

**A-1010 Wien, Johannesgasse 3, Austria**

(72) Inventor

**Pierre Mohr**

(74) Agent and/or Address for Service

**Marks & Clerk  
57-60 Lincoln's Inn Fields, London, WC2A 3LS,  
United Kingdom**

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(56) Documents cited

**GB 2036142 A GB 1267638 A EP 0164163 A2**

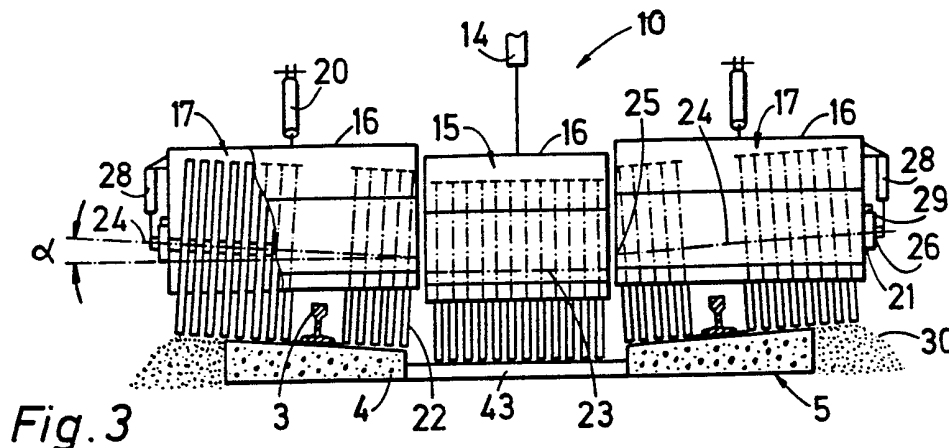
(58) Field of search

**UK CL (Edition K) E1G GGD**

**INT CL<sup>5</sup> E01B 27/02**

(54) A track maintenance machine for treating ballast beds

(57) A travelling track maintenance machine for treating the ballast bed of a railway track (5), comprising a unit for clearing or sweeping ballast and, optionally, other units intended for storing ballast and/or for delivering ballast onto the track and for profiling the ballast, the ballast sweeping unit consisting of sweeping rollers (15, 17) arranged beside one another transversely of the track which are designed for vertical displacement and rotation independently of one another under the power of drives (14, 20, 21) and which comprise elastic radially projecting clearing elements (22), their shafts of rotation extending substantially transversely of the track. A total of three sweeping rollers (15, 17) arranged in series transversely of the machine and extending over the entire width of the track are provided, the shafts of rotation (24) of the two outer sweeping rollers (17) being adjustable or arranged independently of one another at an angle to the shaft of rotation (23) of the central sweeping roller (15) or to the plane of the track.



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Fig.1

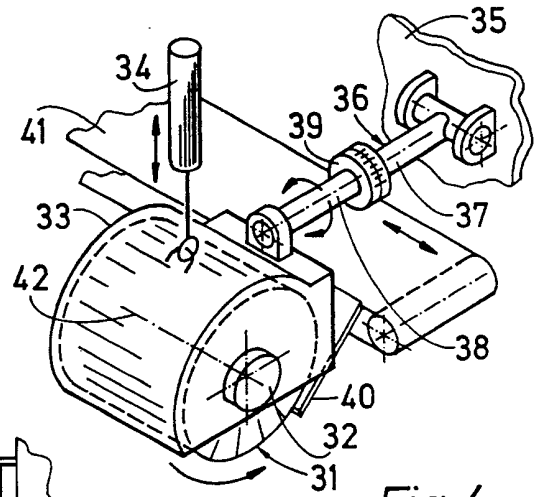
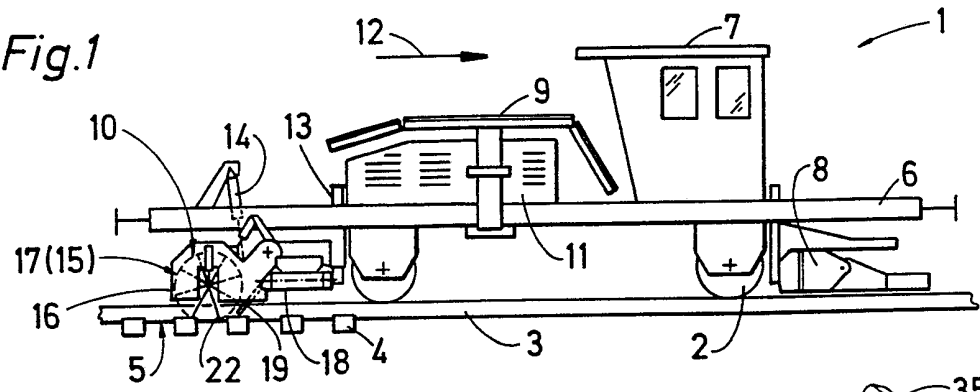
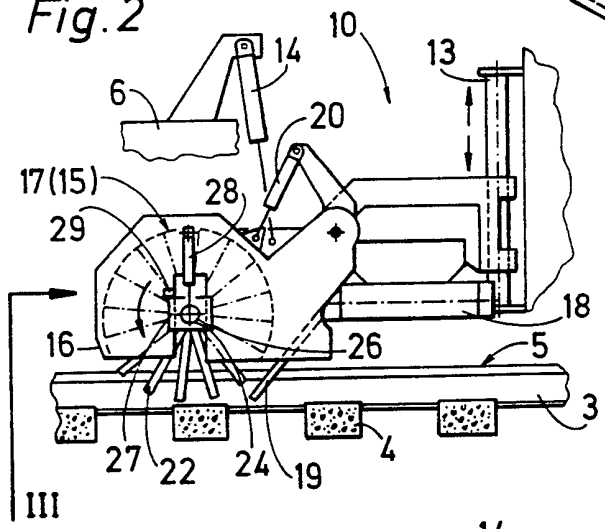


Fig.4

Fig.2



III

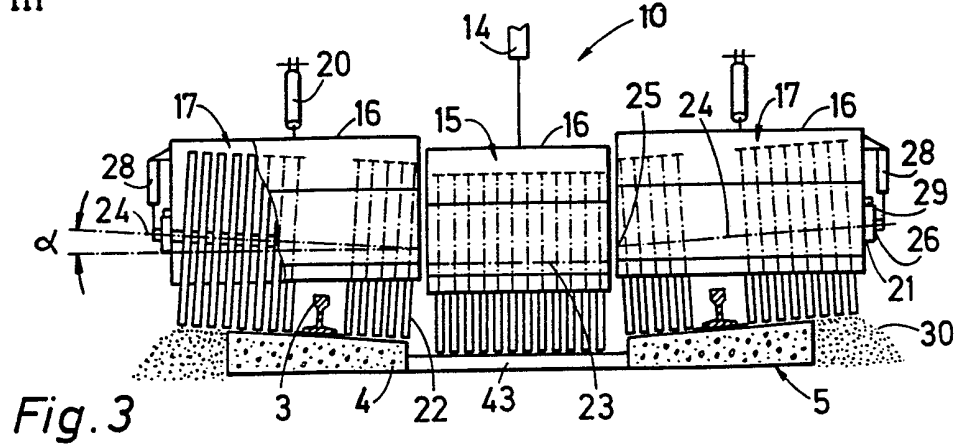


Fig.3

A TRACK MAINTENANCE MACHINE FOR TREATING BALLAST BEDS

This invention relates to a travelling track maintenance machine for treating the ballast bed of a railway track, comprising a unit for clearing or sweeping ballast and, optionally, other units intended for storing ballast and/or for delivering ballast onto the track and for profiling the ballast, the ballast sweeping unit consisting of at least two sweeping rollers arranged beside one another transversely of the track which are designed for vertical displacement and rotation independently of one another under the power of drives and which comprise elastic, radially projecting sweeping elements, their shafts of rotation extending substantially transversely of the track.

AT-PS 364 912 describes a travelling on-track machine for treating the ballast bed of railway tracks in which a ballast silo and a ballast clearing unit are fixed to a frame of the machine. The ballast clearing unit consists of two clearing roller arrangements which are each associated with a rail and each of which comprises three component rollers arranged on both sides of the rail. The component rollers are equipped with elastic radially arranged hose sections for clearing the ballast and are designed to pivot vertically independently of one another. The vertical displacement of the shafts of rotation of the sweeping rollers each comprising shafts of rotation extending transversely of the longitudinal axis of the machine is controlled either manually or by means of signals from sensors. In this way, the obstacles, for example guide rails, switch tongues, etc., encountered during the sweeping of switches and crossings in particular can be specifically avoided by raising of the particular component roller without the clearing of the other parts of the track having to be interrupted.

Now, the problem addressed by the present invention was to provide a machine of the type in question which

would provide for improved sweeping of the ballast, particularly over parts of the track situated outside the rails.

5 According to the invention, this problem has been solved by a travelling track maintenance machine of the type described at the beginning which is characterized in that a total of three sweeping rollers arranged in series transversely of the machine and extending over the entire width of the track are provided, the shafts of rotation of the two outer sweeping rollers being adjustable or arranged  
10 independently of one another at an angle to the shaft of rotation of the central sweeping roller or to the plane of the track.

15 With the sweeping roller arrangement according to the invention, it is now possible to adapt the ballast sweeping unit to different sleeper shapes and hence to ensure uniform filling of the sleeper cribs, even where the sleeper heads have an inclined surface. Whereas wooden sleepers normally have a flat surface, the surface of  
20 concrete sleepers and also steel sleepers, particularly two-block sleepers, often slopes towards the sleeper heads at an angle corresponding to the inclination of the rails towards the middle of the track (normally 1:20 or even 1:40). The surface of the ballast bed adjoining the  
25 sleeper head also has an inclination (differing according to the rail authority) which can readily be established and treated by the displacement of the outer sweeping rollers in accordance with the invention at an angle to the plane of the track. By virtue of the construction of the ballast  
30 sweeping unit in the form of three separate sweeping rollers each with its own housing, the advantage of being able selectively to avoid any obstacles on the track is maintained.

35 In one preferred embodiment of the invention, each outer sweeping roller is designed to sweep one block of a

two-block sleeper situated on the inside or outside of a rail. In this way, the sleeper cribs of the two-block sleepers can be uniformly ballasted over the entire extent of the individual blocks associated with each rail with due  
5 allowance for their inclination. The middle sweeping roller can be independently lowered to the upper edge of the block connection for correspondingly lowering the level of the ballast bed.

In another embodiment of the invention, each outer  
10 sweeping roller is extended beyond the particular sleeper end. In this way, the sleeper ends can be ballasted with the same inclination as the adjoining sleeper cribs.

One advantageous embodiment of the invention is distinguished by the fact that a separate shaft displacement drive is provided for displacing the shafts of rotation of the sweeping rollers situated outside the rails at  
15 an angle to the plane of the track. This considerably simplifies the operation of the machine and thus provides for rapid establishment of the desired angle of inclination of the outer sweeping rollers from the operator's cabin.  
20

According to another aspect of the invention, each of the shafts of rotation of the sweeping rollers situated outside the rails is fixedly connected at one end to the housing of the sweeping roller by a pivot bearing while a  
25 pivot bearing situated at the other end is mounted for vertical displacement in a guide in the housing and is connected to the particular shaft displacement drive. In this way, the position of the shafts of rotation can readily be adapted to the particular longitudinal profile  
30 of the sleepers independently of the vertical displacement by the vertical displacement drives.

In another embodiment of the invention, the guide provided laterally on the housing comprises a stop above the pivot bearing with which the pivot bearing comes into  
35 contact. This very simple solution provides for rapid

change-over of the shaft of rotation to a certain angle of inclination defined by the stop.

Finally, in another embodiment of the invention, the housing of each sweeping roller situated outside the rails is connected to a guide which is fixed to the machine frame, extending longitudinally of the machine, and which is formed by two guide parts arranged in tandem which are designed to turn relative to one another about the longitudinal axis of the guide and to be joined to one another by means of a flange connection. This very simple and robust connection provides for the accurate adjustment of any angle, for example by means of a scale on the flange connection, before use.

Examples of embodiment of the invention are described in detail in the following with reference to the accompanying drawings, wherein:

Figure 1 is a side elevation of a track maintenance machine according to the invention in the form of a ballast plough comprising a sweeping roller arrangement.

Figure 2 is a side elevation of the sweeping roller arrangement shown in Fig. 1 on a larger scale.

Figure 3 is an elevation of the sweeping rollers in the direction of arrow III in Fig. 2.

Figure 4 is an oblique elevation of part of another embodiment of the invention.

The track maintenance machine 1 in the form of a ballast plough shown in Fig. 1 comprises a machine frame 6 which is designed to travel along a track 5 consisting of rails 3 and two-block sleepers 4 on undercarriages 2. A driver's and operator's cabin 7, a vertically displaceable centre plough 8, shoulder ploughs 9 and a sweeping roller arrangement 10 are arranged on the machine frame 6. A central power plant 11 provides both for the advance of the machine 1 in the working direction indicated by an arrow 12 and for activation of the various drive units. The sweep-

ing roller arrangement 10, which is shown in more detail in Figs. 2 and 3, is designed for vertical displacement along a guide 13 under the power of a vertical displacement drive 14 pivotally connected to the machine frame 6 and consists essentially of a middle sweeping roller 15 and two outer (relative to the transverse axis of the machine) sweeping rollers 17 with their own housings 16 and of transverse conveyor belts 18 with associated ballast guide plates 19. The two outer sweeping rollers 17 are designed for vertical displacement independently of one another and of the middle sweeping roller 15 under the power of their own vertical displacement drives 20. In addition, all the sweeping rollers 15, 17 have their own rotation drives 21 and elastic clearing elements 22 arranged radially on a shaft of rotation 23 of the central sweeping roller 15 and on shafts of rotation 24 of the outer sweeping rollers 17. At one end, the shafts 24 are fixedly connected to the housing 16 by a pivot bearing 25 while the pivot bearing 26 situated at the other end is mounted for vertical displacement in a guide 27 in the housing 16 and is connected to a shaft displacement drive 28 pivotally connected to the housing. A stop 29 is also arranged on the housing 16 and is associated with a pivot bearing 26.

As shown in Fig. 3 in particular, the outer sweeping rollers 17 extend over the entire block of the two-block sleeper 4 and a region of ballast adjoining the sleeper end which is intended for ballasting the sleeper. The middle sweeping roller 15 corresponds in length to the block connection 43 and has a lower operating position than the two outer sweeping rollers 17.

In the practical application of the track maintenance machine 1 according to the invention, the sweeping roller arrangement 10 - in addition to the centre and shoulder ploughs 8,9 which are used as required - is lowered into the operating position by means of the vertical displace-

ment drive 14. At the same time, the shaft of rotation 24 of each outer sweeping roller 17, by actuation of the shaft displacement drive 28, is displaced at an angle of inclination  $\alpha$  to the shaft of rotation 23 of the middle sweeping roller 15 until the position of the sweeping rollers 17 is adapted to the inclination of the sleeper block so that uniform filling of the sleeper cribs is guaranteed. In addition, the ballast surface 30 adjoining the sleeper blocks to increase the resistance to transverse shifting is levelled in the same plane by the sweeping rollers 17, surplus ballast being ejected onto one or the other shoulder of the ballast bed via the ballast guide plate 19 and the transverse conveyor belt 18. The stop 29 stops the displacement of the shaft 24 when the desired angle of inclination  $\alpha$  is reached.

Figure 4 shows another embodiment of the invention in which an outer sweeping roller 31 is designed for actuation by a rotation drive 32 and is arranged in a housing 33 which can be raised by means of a vertical displacement drive 34. In addition, the housing 33 is connected to a guide 36 which extends substantially longitudinally of the machine, being fixed to a machine frame 35, and which consists of two guide members 37 and 38. The guide members 37 and 38 are joined together by a flange connection 39 of which the flanges are designed to turn relative to one another about the longitudinal axis of the guide 36 and to be fixed in various positions. The shaft of rotation 42 of the outer sweeping rollers 31 is thus adjustable at an angle to the plane of the track. A scale on the flange connection 39 shows the extent of the angular movement which takes place manually in accordance with the particular longitudinal profile of the sleepers. In practical operation, the ballast taken up by the sweeping roller 31 via a ballast guide plate 40 is transported by a transverse conveyor belt 41 to one side of the track or the other.



CLAIMS

1. A travelling track maintenance machine for treating the ballast bed of a railway track, comprising a unit for clearing or sweeping ballast and, optionally, other units intended for storing ballast and/or for delivering ballast onto the track and for profiling the ballast, the ballast sweeping unit consisting of at least two sweeping rollers arranged beside one another transversely of the track which are designed for vertical displacement and rotation independently of one another under the power of drives and which comprise elastic, radially projecting clearing elements, their shafts of rotation extending substantially transversely of the track, characterized in that a total of three sweeping rollers arranged in series transversely of the machine and extending over the entire width of the track are provided, the shafts of rotation of the two outer sweeping rollers being adjustable or arranged independently of one another at an angle to the shaft of rotation of the central sweeping roller or to the plane of the track.
2. A machine as claimed in claim 1, characterized in that each outer sweeping roller is designed to sweep one block of a two-block sleeper situated on the inside or outside of a rail.
3. A machine as claimed in claim 2, characterized in that each outer sweeping roller is extended beyond the particular sleeper end.
4. A machine as claimed in any of claims 1 to 3, characterized in that a separate shaft displacement drive is provided for displacing the shafts of rotation of the sweeping rollers situated outside the rails at an angle to the plane of the track.
5. A machine as claimed in any of claims 1 to 4, characterized in that each of the shafts of rotation of the sweeping rollers situated outside the rails is fixedly

connected at one end to the housing of the sweeping roller by a pivot bearing while a pivot bearing situated at the other end is mounted for vertical displacement in a guide in the housing and is connected to the particular shaft displacement drive .

5 6. A machine as claimed in claim 5, characterized in that the guide provided laterally on the housing comprises a stop above the pivot bearing with which the pivot bearing comes into contact.

10 7. A machine as claimed in claim 1, characterized in that the housing of each sweeping roller situated outside the rails is connected to a guide which is fixed to the machine frame, extending longitudinally of the machine, and which is formed by two guide parts  
15 arranged in tandem which are designed to turn relative to one another about the longitudinal axis of the guide and to be joined to one another by means of a flange connection . .

20 8. A railway track maintenance machine, substantially as herein described with reference to Figures 1 to 3 or Figure 4 of the accompanying drawings.