Sept. 18, 1962 A. SCHEUCHZER 3,054,459

APPARATUS FOR CLEANING THE BALLAST OF A RAILWAY TRACK

Filed March 25, 1960

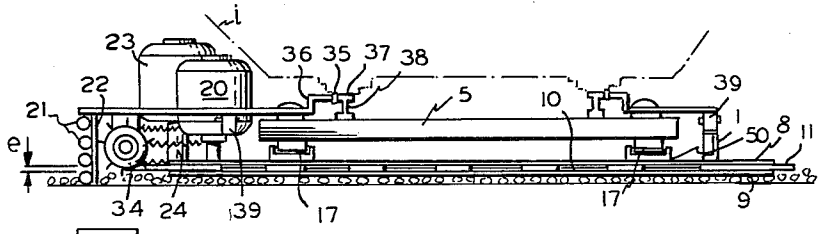


FIG.2

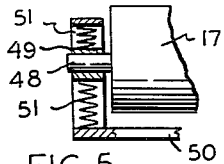


FIG.5

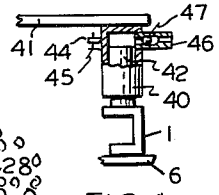


FIG.4

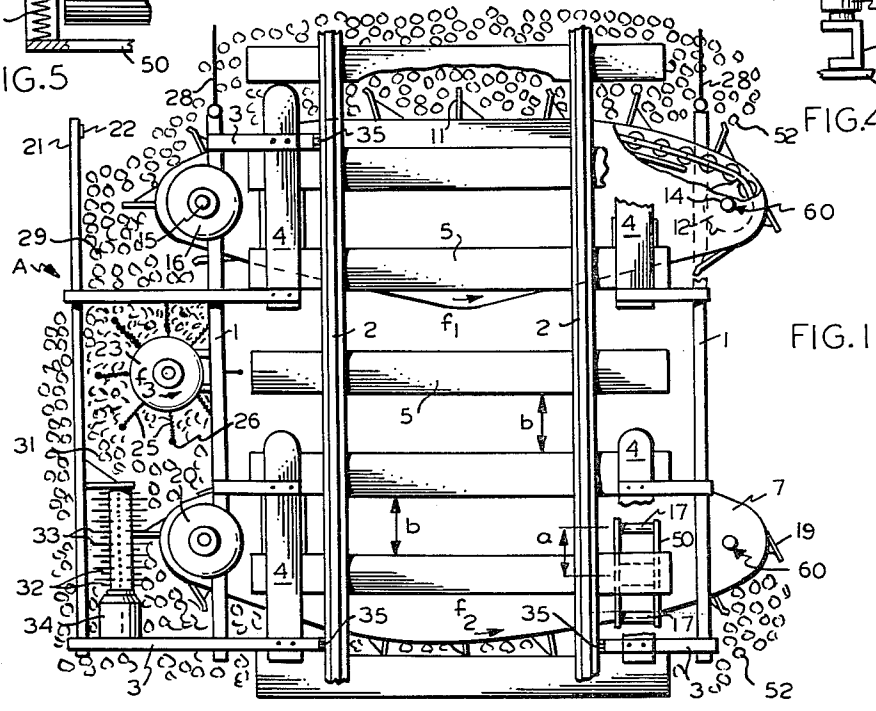


FIG.1

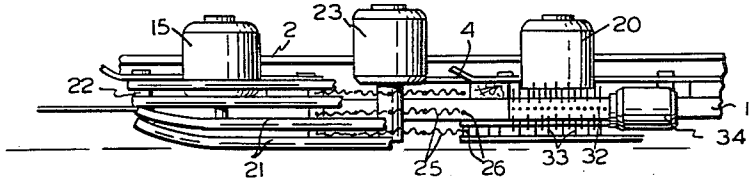


FIG.3

INVENTOR

ALFRED SCHEUCHZER

BY Irwin S. Thompson

ATTORNEY

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APPARATUS FOR CLEANING THE BALLAST OF A RAILWAY TRACK

Alfred Scheuchzer, 25 Ave. de l'Esplanade, Lausanne, Switzerland

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There are presently various types of plants permitting in the first place the removal of the ballast from underneath a railway track, then to clean the components of said ballast. Said known plants have in common this, that after the removal of the ballast components of the track, they proceed to the cleaning of said components by means of screens of conventional type, all of which require the lifting of the material up to a level well above that of the track. It follows that said plants have such overall dimensions and a weight that they must be mounted on a carriage rolling on the track in order to ensure their progression along the railway track as the repairing work proceeds.

Some manufacturers have however tried to resolve the problem of the non-use of the railway track during the repairing work, so as to leave said track free for normal railway traffic. Said plants comprise cleaning devices of the old ballast, which, like the previously described plants, have screens of conventional type which require a lifting of all the ballast components up to a level substantially above that of the track. However, all said devices, conveyor, elevator and screen, are located outside the gauge of the vehicles rolling on the track, so that the repairing of the track can be effected without too much breakdown in the railway traffic.

Nevertheless, said plants take up a large space on and above the counter-banquette beside the railway track and its ballast. Now, as a matter of fact these counter-banquettes are very seldom entirely unobstructed, as would be required by such plants. Quite on the contrary, on said counter-banquettes are generally disposed the switch signals, the control devices of said signals, the electric feeding channels, the socles of the poles, etc. As a matter of fact, for this reason said plants can only seldom be utilized.

The present invention has for its object a method of repairing a railway track comprising the steps of taking out the ballast with the aid of a digging endless chain carrying tools, disposed transversely under the track and driven into a translation movement along the track and, as the progression thereof moves on, screening the ballast piled up on the side of the track by projecting its components horizontally against a screen disposed on a level with the ballast, and piling up the still utilizable components on one of the banquettes along the track in the rear of the screening apparatus advancing at the same speed as that of the digging endless chain.

Thus, the screening operation is carried out in the very banquette of the railway track and without lifting of the material, so that the counter-banquette remains entirely free.

The invention has also for its object a plant for carrying out said method, which comprises a frame formed of two portions disposed on either side of the track and which carries a digging device disposed transversely under the track and constituted by a casing connecting rigidly the two portions of said frame and shielding an endless chain equipped with tools. One of the portions of said frame carries, further, a screening device of the components of the ballast removed by the digging device. Said screening device comprises beating members projecting the components of the ballast horizontally against

a screen disposed on a level with the ballast and which piles up the components of the ballast still utilizable on one of the lateral banquettes along the track to the rear of the screening device.

Said plant thus does not require any conveying or elevating device for the material, which permits reducing in a very large measure its dimensions and thus its weight, so that it is, consequently, possible to clear entirely the track under repair and to keep said track, during all the working time, open for normal railway traffic.

The accompanying drawings show schematically and by way of example an embodiment of the plant for carrying out the method.

FIG. 1 is a plan view, certain parts being broken away for more clearness.

FIG. 2 is a rear view.

FIG. 3 is a side view in direction of the arrow A.

FIG. 4 is a detail view illustrating depth-adjusting means of the plant.

FIG. 5 is a detail view illustrating suspension means.

According to the accompanying drawing, the plant for carrying out the method comprises a frame formed of girders 1 parallel to the rails 2 and of supports 3 which carry guide shoes 4 bearing on the portions of the sleepers 5 located on either side outside the rails. Said frame comprises thus two portions disposed on either side of the track and which are connected by two casings 6 and 7 located under the sleepers 5.

The casing 6 comprises two parallel plates 8, 9 shielding an endless chain 10 provided with tools 11. Said casing and said endless chain constitute a digging device of known type and described e.g. in the Swiss Patents Nos. 126,750 and 154,984. The endless chain passes over two sprocket wheels 12 (of which one only is shown) integral each with a shaft 14 rotating freely in bearings 60 provided in the casing 6. One of said shafts is connected to the shaft 15 of a driving motor 16 carried by the frame 1, 3.

The casing 7, which comprises likewise two parallel plates, shields an endless chain provided with tools 19. Said casing and said endless chain constitute a device for replacing under the track the still utilizable ballast components.

The design of the latter device is very similar to that of the digging device, so that there is no need to describe it here more in detail. The endless chain carrying the tools 19 is driven by a motor 20 carried by the frame 1, 3. The upper plates of each casing 6, 7 are further provided with bearing devices constituted by sets of rollers 17 rolling on the lower surfaces of the sleepers 5. The rollers 17 of one and the same set of rollers are located behind one another at a distance a smaller than the distance b separating two sleepers 5.

The plant is further provided with a screening device located between the digging device and the device for replacing the components of the ballast. Said screening device is located on one of the sides of the track and carried by the frame. Said screening device comprises a screen constituted by rods 21 disposed parallelly one to another and held in position with respect one to another by posts 22 rigidly fixed to the frame. A vertical shaft 24 driven by a motor 23 is secured to the frame. Chains 25 are attached to said shaft 24 and disposed in three parallel rows. Each chain 25 carries at its free end a mass 26. The screen is located on a level with the ballast and each rod 21 is disposed in a plane perpendicular to the shaft 24.

The operation of the described plant is as follows:

The chains for digging and for replacing the ballast components being driven in the direction of the arrows f_1 and f_2 by their respective motors 16 and 20 and the

driving shaft 24 of the chains 25 of the screening device being driven in the direction of the arrow f_3 by the motor 23, the whole plant is drawn along the track by means of cables 28 winding round winches (not shown) located on either side of the track. As the plant moves forward, the digging device digs the ballast of said track and deposits the components of the ballast on the side of the track. Said components pile up into a pile 29 along the track.

The masses 26 of the screening device hit the ballast components thus deposited along the track and project said components horizontally against the screen, in which the width *e* of the free space between the adjacent rods 21 corresponds to the dimension of the largest components to eliminate. Thus, all the fine and small components go through the screen and scatter beyond the screen, while the largest components of ballast which are still utilizable pile up in the free space between the screen and the railway track and form a pile 31 which advances along the track as the progression of the plant moves along.

Said large components are pushed in the direction of the track by a rotary rake which comprises a shaft 32 parallel to the screen, equipped with radial teeth 33 and driven into rotation by a motor 34 carried by the frame. Said large ballast components pushed back in the direction of the track are then drawn along by the tools 19 and deposited by said tools under the sleepers 5. Due to the continuous progression of the plant, said large ballast components are deposited by the tools 19 so as to be evenly distributed over the whole width of the ballast 52.

It is to be noted that in the described plant, the screening operation is carried out on site, i.e. on the lateral banquette of the railway track and that all lifting and conveying devices of the ballast components to be sorted out, as well as the containers of accumulation and sorting drum of prior plants in use, are entirely eliminated.

Thus, in the described plant, the ballast components resting in a pile along the track are projected horizontally against the screen and the large components still utilizable pile up at the rear of the screening device on the lateral banquette along the railway track.

As shown in the drawing all the members and elements of the described plant are located entirely outside the gauge defined by the dash and dot line *i* and required for the passage of the trains. Thus, the track remains entirely clear, so that the railway traffic can be maintained on the track during the entire repairing time, which constitutes a very important advantage of the described plant with respect to all the plants known up to now.

Furthermore, as can easily be realized, the three main operations are:

(*a*) Removal of the old ballast.

(*b*) Elimination of the fine and small components.

(*c*) Replacing the components of the ballast still utilizable.

These operations are carried out simultaneously, on a very short track length, e.g. smaller than 10 metres, so that only a few blocks or wedges must be put under the sleepers 5 to wedge up said sleepers and to permit the passage of a train on the track under repair.

All the operations of removing the ballast, of sorting out said components, and of replacing the utilizable components being carried out during the progression of the plant along the track with the aid of devices located behind one another and on a level with the ballast, and especially due to the fact that the screening device is entirely free from sorting out apparatuses, always very heavy and cumbersome; any useless conveying and lifting of the ballast components are eliminated, which permits not only reducing the bulkiness of the plant and simplifying its design with respect to the known plants, but, further, carrying out all the sorting out work on the lateral banquette of the track while leaving the track itself entirely clear for normal railway traffic.

As shown in the drawing, the frame 1, 3 which carries all the member and elements of the plant is carried by the guide shoes 4 which slide on the sleepers 5 outside the rails 2. During the digging operation of the ballast and the replacing of the ballast components, forces are generated which tend to lift the frame. Sets of rollers 17 bearing on the lower surfaces of the sleepers 5 oppose such a lifting of the frame and maintain said frame in position with respect to the track.

The digging operation of the ballast and the replacing of the ballast components generate of necessity lateral forces which tend to displace the frame laterally with respect to the railway track. To avoid such inopportune lateral displacements, the frame is further provided with guiding members 35 constituted by shoes or rollers carried by supports 36 and which bear on the lateral surfaces of the rails 2, as shown on the lateral surface of the head 37 of each rail 2.

The ballasts of the railway tracks having possibly various thicknesses, the plant is further provided with devices 39 for adjusting the digging depth constituted each by a cylinder 40 (FIG. 4) fixed to the girders 1 and in which slides a piston 42 fixed respectively on the casing 6 or on the casing 7. The cylinder is provided, on the one hand, with an exhaust duct 44 equipped with a valve 45 and, on the other hand, with a filling duct 46 comprising a non-return valve 47.

Thus, by connecting the duct 46 with a fluid feeding pump (not shown), the user has the possibility of increasing the distance between the girders 1 and the casings 6 and 7 and thus of increasing the digging depth.

On the other hand, by opening the valve 45 he has the possibility of letting liquid go out through the exhaust duct 44 and thus of reducing the distance between the girders 1 and the casings 6 and 7 and thus of reducing the digging depth.

Each roller 17 carries two pivots 48 (FIG. 5 showing only one pivot) rotating each in a bearing 49 connected to a frame 50 by the intermediary of elastic devices 51. Thus, the rollers 17 may adapt themselves to the various thicknesses of the sleepers 5 and remain in contact with the lower surface of said sleepers whatever the digging depth may be within the adjusting limits (6 to 10 cm.) allowed by the adjusting devices.

An embodiment of a plant for carrying out the method has been described here by way of example and with reference to the accompanying drawing, but it goes without saying that multiple variations could be foreseen without departing from the scope of the claimed protection.

I claim:

1. A plant for repairing a railway track having rails mounted upon sleepers which project on both sides of the track beyond said rails, said plant comprising: a frame having two separate portions, said portions disposed on opposite sides of said track outside of said rails and level with said track; ballast digging means located under said track including a rotating endless chain, digging tools carried by said chain which dig the ballast and transport its components to one side of said track, and a casing means for shielding said endless chain, said casing means connecting together said frame portions; and horizontal screening means mounted upon one of said frame portions and laterally juxtaposed with respect to said track for retaining only the ultilizable components of the ballast, said screening means comprising a screen positioned level with said transported ballast components and extending parallel with said track and beating means located on the same level with said screen for horizontally projecting said transported ballast components against said screen, said beating means including a vertical driving axle, a motor for rotating said axle, a plurality of chains mounted in parallel rows with one end of each chain rigidly fixed to said axle, and a mass attached to the other

end of each chain; so that said plant leaves said track open for normal traffic during the repair thereof.

2. A plant as claimed in claim 1 wherein said frame contains carrying means for contacting the upper surfaces of the projecting portions of said sleepers and bearing means bearing upon the lower surfaces of said sleepers for preventing any lifting of said frame.

3. A plant as claimed in claim 1 further comprising adjusting means mounted between said frame and said ballast digging means for controlling the digging depth of the latter.

4. A plant as claimed in claim 1 wherein said frame includes guiding means abutting against portions of the lateral external surfaces of said rails for preventing any lateral displacement of said plant.

5. A plant for repairing a railway track comprising a frame disposed on and movable along said track, means mounted on said frame for enabling said frame to move along said track, digging means mounted on said frame and disposed underneath said track and perpendicular thereto for removing the ballast therefrom, means mounted on said frame extending parallel with said frame for screening the ultilizable portions of said ballast from the non-utilizable portions, said screening means positioned at the level of the ballast under the railway track, said screening means including beating means having a plurality of chains each terminated by a mass, said chains mounted on a vertical driving shaft, and means mounted upon said frame for replacing the utilizable portions of said ballast underneath said railway track.

6. A plant as claimed in claim 5, wherein said ballast replacing means comprises a rotatable endless chain, driving means for rotating said chain, tools mounted on said chain, and casing means disposed transversely under said track for shielding said chain, said frame comprises two

portions, one on each side of said track, said casing means being carried by the two frame portions.

7. A plant as claimed in claim 6, further comprising feeding means for feeding the utilizable portions of said ballast separated by said screening means to said ballast replacing means.

8. A plant according to claim 6 further comprising adjustable means for varying the digging depth of said ballast digging means.

9. A plant as claimed in claim 7, wherein said feeding means comprises a rotary rake having a rotatable shaft mounted on said frame parallel to said track and radial members rigidly connected to said rake shaft.

10. A plant according to claim 9 in which said ballast replacing means has an adjusting means mounted between said frame and said replacing means for adjusting the depth at which said replacing means operates.

11. A plant according to claim 5 in which said frame has mounted thereon guide shoes to ride on the top surfaces of the sleepers of said track, and bearing means consisting of a plurality of rollers resiliently mounted in a further frame beneath said guide shoes to bear against the lower surfaces of the sleepers of said track and resiliently contact sleepers of various thicknesses.

12. A plant according to claim 5 in which said frame further comprises guiding members bearing on a lateral portion of the lateral external rails of said track for opposing lateral displacement of said plant.

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