Jan. 19, 1960 H. ANDRES ET AL 2,921,636

RAILROAD BED CLEANING MACHINE

Filed Oct. 29, 1956 2 Sheets-Sheet 1

Fig. 1

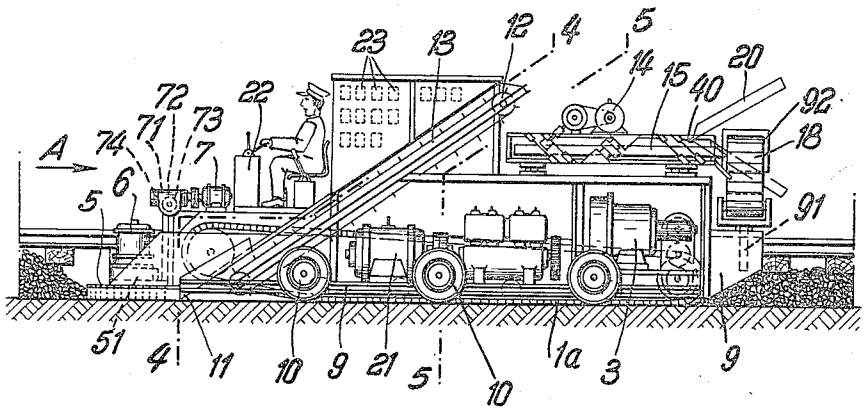
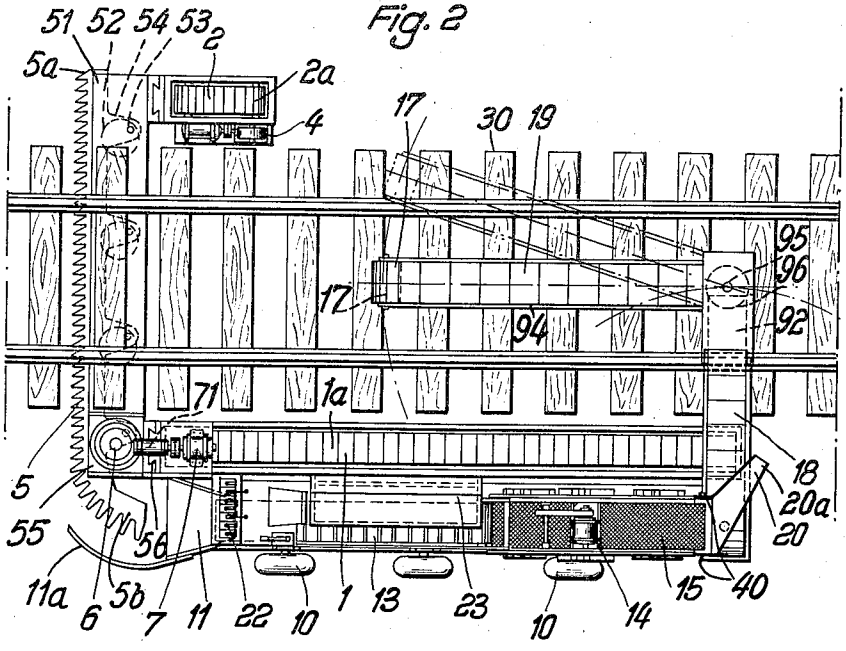


Fig. 2



Inventors

Helmut Andres,
Ernst von Hayn and
Eduard Ruemert
by: Michael S. Striker
Atty.

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Fig. 3

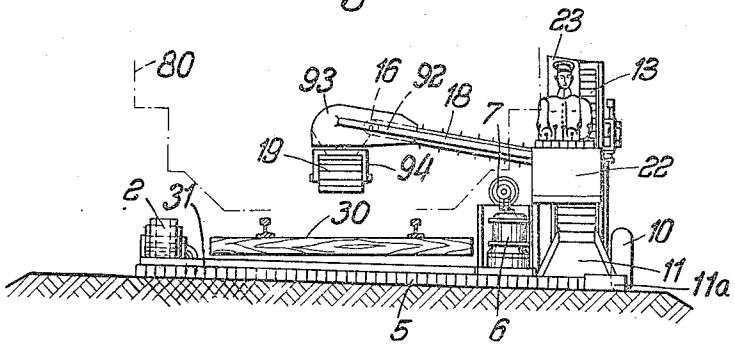


Fig. 4

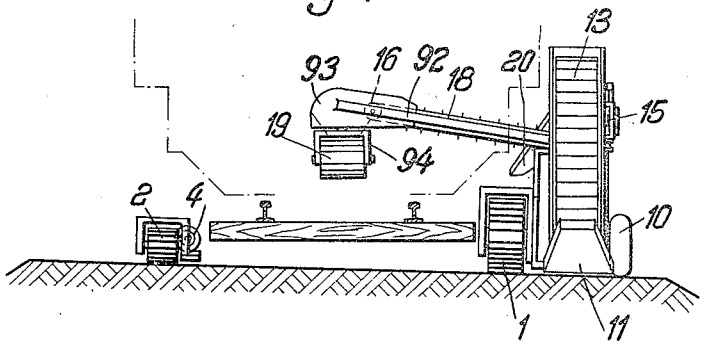
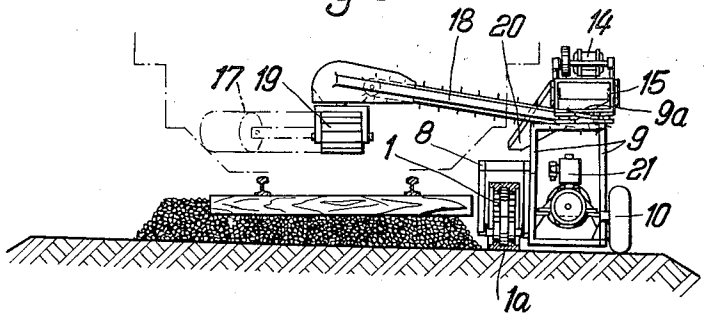


Fig. 5



Inventors

Helmut Andres
Ernst von Hayn and
Edward Roemert
by: Michael S. Striker
Atty.

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RAILROAD BED CLEANING MACHINE

Helmut Andres and Ernst von Hayn, Butzbach, and Eduard Roemert, Minden, Westphalia, Germany

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4 Claims. (Cl. 171—16)

The present invention relates to machines for cleaning railroad beds.

It is well known that from time to time the gravel and ballast or other similar material on which the ties of a railroad track are located requires cleaning. Conventional machines which do this cleaning cause delays in the travel of trains which pass over a track during the time that it is cleaned. Thus, a considerable number of the ties have the gravel or ballast removed therefrom while this material is being cleaned, and when a train has to pass over a track during cleaning thereof it is necessary to prop up temporarily a relatively large number of unsupported ties, and this operation is exceedingly time consuming. Furthermore, some of the conventional railroad bed cleaning machines require their own special tracks which run alongside of the tracks for the train. In view of the amount of traffic which is carried by railroad tracks in modern times, there is a need for a machine which is capable of quickly and efficiently cleaning a railroad bed while causing a minimum amount of delay to trains which use a track during cleaning of the bed which supports the same.

One of the objects of the present invention is to provide a machine which is capable of cleaning a railroad bed without the use of special auxiliary tracks for the machine and without the necessity of placing the machine on the main tracks of the railroad bed.

Another object of the present invention is to provide a machine which at any given time leaves only two ties unsupported, so that when a train passes over a railroad bed during cleaning thereof it is only necessary to prop up a pair of ties, and such propping of a small number of ties can be carried out in an extremely short time.

A further object of the present invention is to provide a railroad cleaning machine which is located for the most part outside of the space through which a train travels and which has only a relatively small number of movable parts which can be easily moved out of the path of the train, so that when a train travels over a railroad bed which is being cleaned, the machine can easily be positioned so that train can pass without any difficulty.

An additional object of the present invention is to provide a structure capable of accomplishing the above object and at the same time composed of simple and ruggedly constructed elements which are very reliable in operation and which have a minimum of parts.

With the above objects in view the present invention mainly consists of a railroad cleaning machine which includes a main vehicle and an auxiliary vehicle adapted to be respectively located on opposite sides of a railroad bed just beyond the ties thereof. These vehicles are interconnected at their front ends by a horizontally extending ballast removing means which is located slightly below the railroad ties in order to convey material of the railroad bed from beneath the ties to the side of the railroad bed where the main vehicle is located. The ballast removing means is the only interconnection between the two vehicles. The main vehicle is connected to a framework which carries suitable cleaning apparatus and conveyors for conveying material to the cleaning apparatus and for conveying the cleaned material from the cleaning apparatus back to the railroad bed.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

Fig. 1 is a diagrammatic side elevational view of a railroad cleaning machine according to the present invention;

Fig. 2 is a plan view of the machine of Fig. 1;

Fig. 3 is an end view of the machine of Fig. 1 as seen from the left end thereof in direction of arrow A;

Fig. 4 is a transverse sectional view of the machine of Fig. 1 taken along line 4—4 of Fig. 1; and

Fig. 5 is a transverse sectional view of the machine of Fig. 1 taken along line 5—5 of Fig. 1.

Referring to the drawings, it will be seen that the machine of the invention includes a main vehicle **1** and an auxiliary vehicle **2** which, as indicated in Fig. 2, are respectively located at opposite sides of the railroad bed just beyond some of the ties **30** thereof. As is evident from Figs. 3–5, the vehicles **1** and **2** are so positioned that they are located out of the path of a moving train which moves through the space indicated in dot-dash lines in Figs. 3–5. The vehicles **1** and **2** each have propelling means in the form of an endless track means **1***a* and **2***a*, respectively engaging the railroad bed. The track means of vehicles **1** and **2** are independently driven by motors **3** and **4**, respectively, the motor **3** being shown in Fig. 1 and the motor **4** being shown in Fig. 2. By regulation of the speed of the drive means **3** and **4**, the vehicles **1** and **2** are controlled so as to travel at the same speed. However, because of the endless tracks of these vehicles, they adapt themselves to whatever curvature the ground takes.

The vehicles **1** and **2** are interconnected at their front ends by a horizontally extending ballast removing means **5**. As is apparent from Fig. 2, ballast removing means **5** is the sole interconenction of the vehicles **1** and **2**. Furthermore, as is evident from Fig. 2, the support **55** of ballast removing means **5** is interconnected with the front ends of the vehicles **1** and **2** through a pair of dovetail projections and slots **56**, so that the ballast removing means **5** is capable of being moved up and down with respect to the vehicles **1** and **2**, and thus it is possible to adjust the elevation of the conveyor **5**. Ballast removing means **5** includes a reciprocating rake **5***a*. As is apparent from Fig. 2, the teeth of the rake **5***a* are so shaped that the gravel, ballast, or the like of the railroad bed will be shifted toward the side of the bed where the main vehicle **1** is located when the rake **5***a* reciprocates toward the side of the bed where the vehicle **1** is located, while the inclination of the teeth permits rake **5***a* to move with respect to the gravel, ballast or the like, without substantially shifting the latter when rake **5***a* is shifted toward the side of the railroad bed where the auxiliary vehicle **2** is located. The rake **5***a* is carried by the support plate **51** which rotatably supports discs **52** having excentric pins **53** respectively fixed to extensions **54** of the toothed part of the rake **5***a*, so that during rotation of discs **32** rake **5***a* is reciprocated back and forth while still moving slightly to the right and left, as viewed in Fig. 2. The support plate **51** of rake **5***a* carries a motor **6** which serves to drive the conveyors. The end portion **5***b* of rake **5** is located forwardly of propelling track means **1***a* which thus moves on a smooth surface.

The adjustment of the elevation of the ballast removing means 5 is provided by a separate drive which includes the motor 7 shown in Figs. 1–3. This motor 7 may drive a suitable worm 71 which in turn rotates a wormwheel 72 having connected thereto a disc 73 with an eccentric pin 74 which serving as a crank arrangement elevates or lowers a linkage, not shown, connected at its lower end to support plate 51 of ballast removing means 5, so that in this way the motor 7 may be used to form a drive for adjusting the elevation of ballast removing means 5.

As is particularly evident from Figs. 3–5, the vehicle 1 is surrounded in part by a framework 8 which is connected at its side directed away from the vehicle 2 to an additional framework 9, so that this framework 9 is supported in part by the vehicle 1. The side of the framework 9 which is distant from the vehicle 1 is turnably connected to a plurality of wheels 10 which directly engage the ground and thus serve together with the vehicle 1 as a support for the framework 8, 9.

The framework 9 carries just behind the discharge end of the conveyor means 5 a chute 11 which receives material from rake 5*a* and guides this material upwardly and rearwardly. A suitable guide plate 11*a* is fixed to the chute 11 extending therefrom part way around the discharge end 5*b* of rake 5*a*, as indicated in Fig. 2, so as to guide material onto the chute 11.

The framework 9 additionally carries an inclined conveyor band 13 which is driven by a pair of pulleys 12, and one of these pulleys 12 is in the form of a rotatable housing of a motor, or the pulley may have its own independent driving motor, so that the conveyor 13 is independently driven. The band conveyor 13 is carried by the framework 9 in a position which enables it to receive material from the chute 11 and to convey this material upwardly and toward the rear of the framework 9, the upper run of the band conveyor 13 moving upwardly and to the right as viewed in Fig. 1.

The frame work 9 also carries a cleaning means in the form of a vibrating sieve 15 which is driven by its own independent motor 14 through suitable pulleys and linkages. It will be noted from Fig. 1 that the receiving end of the sieve 15 is located beneath the discharge end of conveyor 13, so that the material falls from the conveyor 13 onto the sieve, and the vibrations of the latter serve not only to clean the material but also to transport the material toward the discharge end of the sieve 15 which is located at the right end thereof, as viewed in Fig. 1.

The right end of the framework 9, as viewed in Figs. 1 and 2, carries on a pivot means 91 the frame 92 of a third conveyor band 18 which is driven by one or more rollers 16 which may be driven by their own separate motors so as to drive the conveyor band 18 independently of all of the other devices which make up the cleaning machine of the invention. The outer end of frame 92 of the conveyor band 18 is connected to a support structure 93 which carries a framework 94 of another conveyor band 19 positioned to receive material from the conveyor band 18, and is evident from Figs. 2–5, frame 94 of conveyor means 19 is pivotally connected to the free end of the frame 92 of conveyor means 18 for turning movement with respect thereto about a vertical pivot 95, so that the conveyor means 19 is capable of distributing the cleaned material over the railroad bed. The framework 93 located at the left end of the conveyor means 18, as viewed in Figs. 3–5, carries a suitable motor driven structure 96 which is capable of automatically reciprocating the conveyor 19 angularly back and forth in a substantially horizontal plane so as to continuously distribute the cleaned gravel, ballast, or the like over the conveyor bed. The conveyor band 19 is turnable on rollers 17 one of which is independently driven by a suitable motor connected thereto (not shown). The conveyors 18 and 19 are capable of being turned about the pivot 91 of the conveyor 18 on the framework 9 through an angle which locates both of these conveyors 18 and 19 out of the path through which a train moves, and it will be noted that it is only the pair of conveyor means 18 and 19 which are located in this path during the operation of the machine. Thus, it is a very simple matter to turn the conveyor means 18 with respect to the framework 9 through a suitable drive or by hand through an angle in a clockwise direction, as viewed in Fig. 2, which is sufficient to locate the conveyors 18 and 19 out of the path of a moving train indicated at 80 in dash and dot lines, and after the conveyors 18 and 19 are thus retracted and after the unsupported ties 30 are properly propped up, the train can pass. Thus, a minimum amount of delay is caused by a cleaning of the railroad bed with the structure of the invention. As is particularly apparent from Fig. 2, it is possible to so arrange the parts that at any given time it is only necessary to prop up a pair of ties of the railroad bed in order to permit a train to pass over the bed during cleaning thereof.

The framework 9 also carries a chute 20, shown in Figs. 1 and 2, and this chute 20 is pivotally supported for movement about a pivot 40 at its left end, as viewed in Figs. 1 and 2, so that the elevation of the chute 20 may be adjusted, this chute 20 receiving some of the cleaned material from the sieve 15 and delivering this material to the part of the railroad bed which is located behind the main vehicle 1. The conveyor means 18 and 19 distribute the cleaned material over the remainder of the bed, and the angular swing of the conveyor means 19 is sufficient to locate the cleaned material behind the vehicle 2 as well as on the rest of the bed all the way up to the main vehicle 1.

As was mentioned above, one of the pulleys for each of the conveyor bands 13, 18 and 19, may be in the form of an electric motor, and all of these motors as well as the motors 3, 4, 6, 7, and 14 independently receive their current from a motor-generator assembly 21 which is also carried by the framework 9 and which is controlled from the operating station 22 over suitable relays 23 diagrammatically indicated in Fig. 1. Of course, the drive of the machine and its several components can be carried out in any other suitable manner, although it is an important feature of the invention that each of the mechanisms has its own independent drive.

During the operation of the railroad bed cleaning machine of the invention, the gravel, ballast, or the like is removed from beneath a few ties by hand so that the horizontally extending ballast removing means 5 can then be placed beneath these times and connected to the front ends of the vehicles 1 and 2. After the elevation of the horizontal ballast removing means 5 is adjusted, the motors 3, 4, 6, 12, 14, 16 and 17 are operated. The machine now moves along the railroad bed and the rake 5*a* moves the unclean material from beneath the ties and delivers this material by end portion 5*b* to the chute 11. The material moves up the chute 11 to be received by the conveyor band 13 which delivers the material to the vibrating sieve 15. The greatest part of the material which is cleaned by the sieve 15 is redistributed by way of the conveyor means 18 and 19 back to the railroad bed in the manner described above, while the chute 20 receives a relatively small fraction of the clean material. The chute 20 has a free end 20*a* projecting rearwardly beyond conveyor means 18 in order to deliver this small fraction of material to the part of the bed which is located behind the main vehicle 1. The foreign matter and other impurities which are separated from the gravel, ballast or the like by the sieve 15 fall through the same onto a slightly inclined plate 9*a* and are laterally dropped at the side of the railroad bed laterally of the gravel thereof.

As was pointed out above, when a train passes over a part of the railroad bed which is being cleaned by the machine of the invention, it is only necessary to move the conveyor means 18 and 19 out of the space through which the train travels and it is only necessary to prop up the two ties which are unsupported at any given time as by

placing suitable blocks beneath these ties. Also, a device may be included with the machine of the invention in order to temporarily prop up any ties which do not have gravel, ballast, or the like located therebeneath during cleaning of the bed and while a train is passing thereover.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of railroad bed cleaning machines differing from the types described above.

While the invention has been illustrated and described as embodied in a substantially automatic railroad bed cleaning machine, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

What is claimed as new and desired to be secured by Letters Patent is:

1. In a machine for removing the ballast of a railroad bed from underneath the ties and rails, in combination, a pair of vehicles spaced from each other a distance equal to at least the length of a railroad tie, each of said vehicles including movable propelling means adapted to rest on the base of the railroad bed outside of the ties on opposite sides of the ties for propelling the respective vehicle in direction of the rails, each of said vehicles including a drive means connected to the propelling means of the respective vehicle for driving the respective propelling means; an elongated horizontal ballast removing means for removing the ballast underneath the railroad ties, said ballast removing means having end portions located forwardly of said propelling means of said vehicles, respectively, for smoothing the base of the railroad bed for the passage of said propelling means; said end portions of said ballast removing means being respectively supported on said vehicles substantially in the horizontal plane of said propelling means, said ballast removing means being the only connection between said vehicles so that the machine can remain in operative position while traffic is going over the rails.

2. In a machine for removing the ballast of a railroad bed from underneath the ties and rails, in combination, a pair of vehicles spaced from each other a distance equal to at least the length of a railroad tie, each of said vehicles including endless movable propelling track means adapted to rest on the base of the railroad bed outside of the ties on opposite sides of the ties for propelling the respective vehicle in direction of the rails, each of said vehicles including a drive means connected to the propelling track means of the respective vehicle for driving the respective propelling means; an elongated horizontal ballast removing means for removing the ballast underneath the railroad ties, said ballast removing means having end portions located forwardly of said propelling track means of said vehicles, respectively, for smoothing the base of the railroad bed for the passage of said propelling track means; said end portions of said ballast removing means being, respectively, adjustably supported on said vehicles substantially in the horizontal plane of said propelling means, and being adjustable for adjusting the elevation of said ballast removing means, said ballast removing means being the only connection between said vehicles so that the machine can remain in operative position while traffic is going over the rails.

3. In a machine for removing the ballast of a railroad bed from underneath the ties and rails, in combination, a pair of vehicles spaced from each other a distance equal to at least the length of a railroad tie, each of said vehicles including endless movable propelling track means adapted to rest on the base of the railroad bed outside of the ties on opposite sides of the ties for propelling the respective vehicle in direction of the rails, each of said vehicles including a drive means connected to the propelling track means of the respective vehicle for driving the respective propelling means; an elongated horizontal ballast removing means for removing the ballast underneath the railroad ties, said ballast removing means having end portions located forwardly of said propelling track means of said vehicles, respectively, for smoothing the base of the railroad bed for the passage of said propelling means; said end portions of said ballast removing means being respectively supported on said vehicles substantially in the horizontal plane of said propelling track means for operational movement and being adjustably supported on said vehicles for adjusting the elevation of said ballast removing means, said ballast removing means being the only connection between said vehicles so that the machine can remain in operative position while traffic is going over the rails; means on said vehicles connected to said end portions of said ballast removing means for adjusting the elevation of said ballast removing means; and moving means connected to said ballast removing means for operating said ballast removing means.

4. A machine as set forth in claim 3 wherein said ballast removing means is rceiprocable in longitudinal direction thereof and transverse to the rails.

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