Jan. 22, 1957 J. DROUARD ET AL 2,778,128

MACHINE FOR CLEARING AWAY THE BALLAST FROM RAILWAY TRACKS

Filed Dec. 15, 1952

2 Sheets-Sheet 1

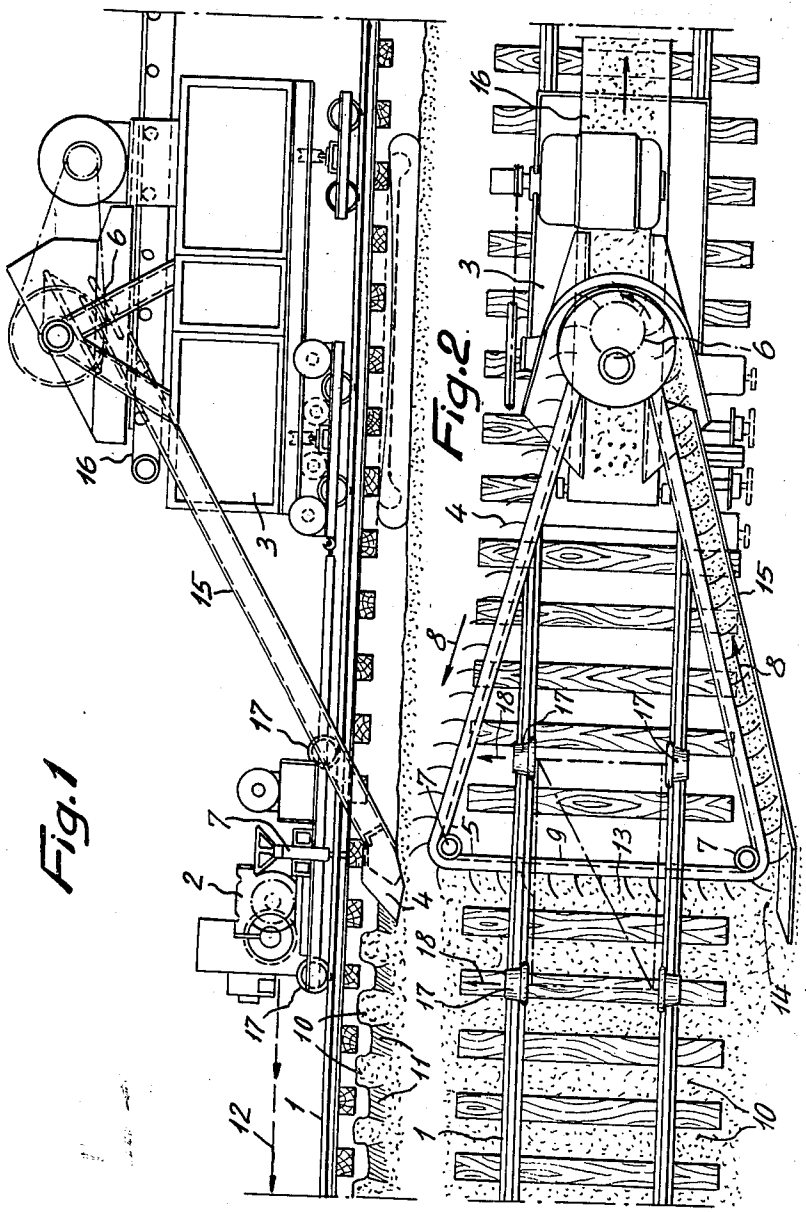


Fig. 1

Fig. 2

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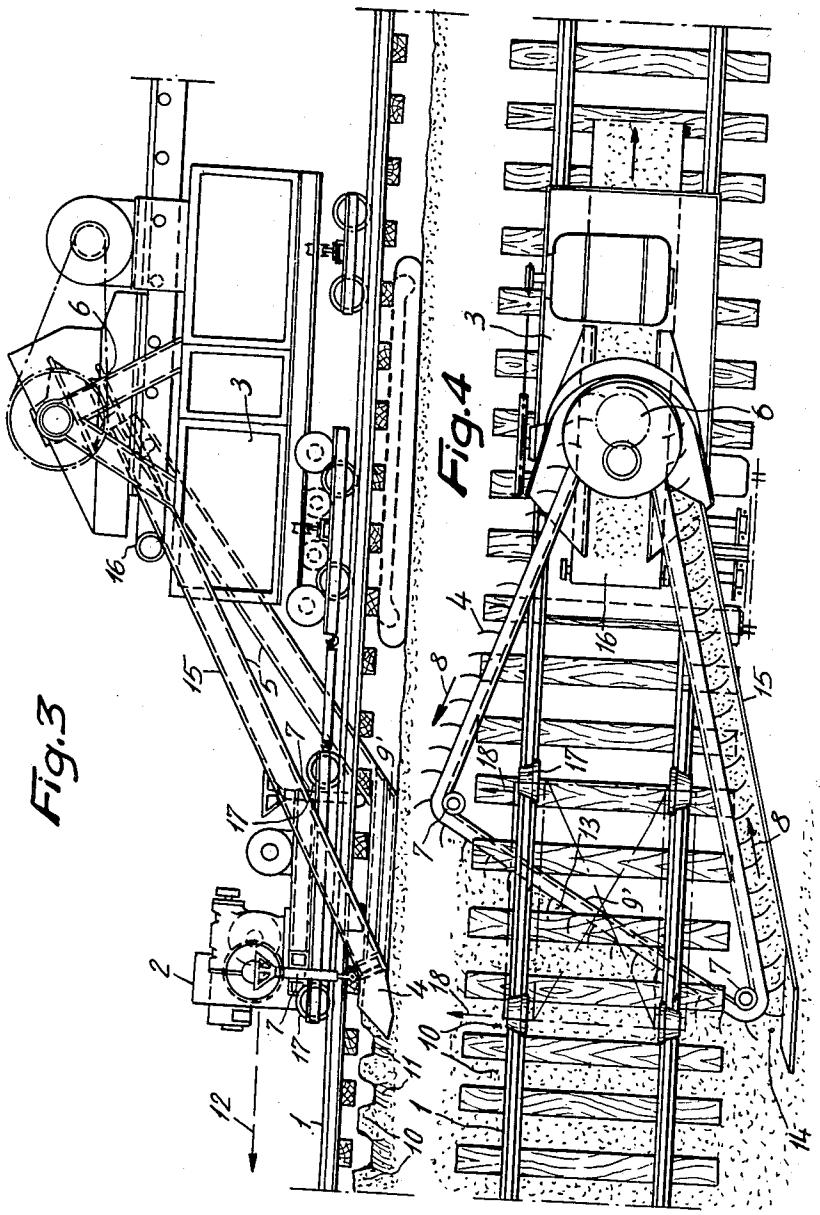


Fig.3

Fig.4

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MACHINE FOR CLEARING AWAY THE BALLAST FROM RAILWAY TRACKS

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1 Claim. (Cl. 37—104)

The present invention relates in general to machines of the kind used for clearing away the ballast from railway tracks and has particular reference to improvements in such machine with a view to providing a more even demand on its driving power and increasing its stability.

There are different types of machines for clearing away the ballast from railway tracks and more particularly machines have recently been developed which are capable of removing the whole of the ballast from a railway track, including the ballast laying beneath the ties. Machines of this last-mentioned type comprise an upper portion adapted to roll on the track to be treated and a digging portion extending beneath and across the track and designed to extract the ballast side-wise for subsequently directing it either toward a screener or toward adequate discharge means.

When it is desired to obtain high outputs from machines of this type, it is necessary to increase both the dimensions and operating speed of their digging devices engaged under the track, and also to increase the power applied thereto. However, these increases are attended by a serious inconvenience set forth hereafter.

The digging member consists as a rule of a chain the shape of which varies from one type of machine to another, but in all cases this chain is guided by an assembly of trough or channel members which during the operation of the machine are suspended through their associated suspension members from the upper portion of the machine and, therefore, from the track portion on which this machine is rolling, so that the track tends to move in the direction of operation of the transverse portion of the chain, a fact likely to have dangerous consequences.

This is particularly critical when obstacles are attacked by the chain under the track, especially when the ballast is strongly clogged up, in which case a real solid block will be found under each tie, which the clearing chain must break up as it progresses with the machine.

Similar consequences would be observed with any digging systems operating transversely of the track.

Now it is one object of this invention to provide a device adapted on the one hand to reduce the stress which the digging portion of the machine, for example the chain in the case contemplated hereabove, must exert when clearing these clogged portions and on the other hand to prevent the reaction produced on the digging portion of the machine or the chain guide members from causing either the machine to run off the track or the track itself to be displaced transversely. The essential feature of the arrangement according to this invention is that the digging portion of the machine, for example the ballast-clearing portion of the chain, instead of being disposed transversely, that is at right angles to the track axis, is set at an angle thereto so that at any one moment this digging portion will engage ballast portions which are staggered longitudinally in the direction of the track. Besides, on account of the oblique direction of application of the stress produced on the ballast by this digging portion

relative to the track axis, the reaction to which this digging portion is subjected is also obliquely directed, thereby reducing the most detrimental transverse component force.

According to a complementary feature of the present invention, the direction of inclination of the digging portion of the machine relative to the track axis is such that the leading end of this portion in the direction of motion of the ballast cleared away by it is positioned ahead, on the track to be cleared, with respect to the axial direction of this track, so that the resulting reaction, which tends to swing the front portion of the machine about the rear portion thereof, will assist in further engaging the digging portion into the mass of ballast hitherto untreated and therefore likely to resist this tendency.

The affixed drawings forming part of this specification illustrate diagrammatically by way of example one form of embodiment of the improvements brought in the art by the present invention in the case of a known type of machine for clearing away the ballast from railway tracks, the machine illustrated being more particularly of the general type disclosed in the British Patent 417,745, comprising a chain acting both as an excavator and as an elevator and moving along a system of guiding troughs positioned in a plane inclined relative to the track from which it is desired to clear the ballast away. Of course, the same principle is also applicable to any other types of machines. In the drawings:

Figure 1 is a diagrammatical elevational view showing the known machine;

Figure 2 is a corresponding plan view thereof;

Figure 3 is an elevational view showing the novel arrangement of the machine according to the teaching of this invention; and

Figure 4 is a plan view of the machine shown in Figure 3.

The reference numeral 1 designates the railway track from which the ballast is to be cleared away, which consists of the conventional ties and rails on which the whole of the machine is adapted to travel. As the machine progresses along the track the latter is lifted and held in any adequate manner, for example by means of jacks or props or any other suitable devices, such as double crawler treads of any appropriate type.

The machine comprises the one hand an upper portion which may consist of a plurality of sections 2, 3 rolling on the track 1 and carrying the power unit and the main drives, and on the other hand an excavator and elevator chain 4 guided in a trough or channel system indicated generally at 5. This system is arranged in an inclined plane as shown and supported at the rear by the main section 3 of the machine at 6, and at the front by special elements 7 of section 2. The arrows 8 show the direction of motion of the chain in its guiding system. Details concerning the specific arrangement of these various parts, excepting the operative portion of the chain, will not be given here as they are fully disclosed in the aforesaid British patent.

In the known machine illustrated in Figures 1 and 2 the lower horizontal portion of chain 4 moves in the lower trough or channel element 9 passing beneath the railway track and is disposed substantially at right angles to the track axis.

As a rule, the ballast to be cleared away is rather loose between the ties, in the spotted zones 10 of Figures 1 and 2, while it forms a particularly compact and hard mass under the ties, that is in the hatched zones 11 of the same figures. When the machine is operating it progresses forward in the direction of the arrow 12 through the medium of a suitable mechanism. The chain 4, by which the ballast is cleared away at 13, see Figure 2, carries it to the

outside and then up the inclined trough **15** leading to the screener or to conveyor means **16** adapted to dump the ballast directly onto the roadbed.

When, after passing through a less compact ballast portion **10**, the chain **4** engages a more compact portion **11** the force required for removing the ballast becomes suddenly much greater. In order to exert this greater force the chain bears against its supporting elements, thereby exerting thereon a reaction which is transmitted through the suspension elements **7** to the upper portion of the machine, notably to the body **2** which, through the wheels **17**, bears in turn on the rails of track **1**. Thus, this track is strongly urged in the direction of the arrows **18** and if a sufficient stress is applied to the track the latter may be deformed. An extremely violent stress may even either displace the track sidewise to a substantial extent or cause the machine to run off the track in the direction of the arrows **18**.

This serious inconvenience can be avoided through the application to the above-described machine of the improvements accoding to this invention, as illustrated in Figures 3 and 4.

In this case, the general arrangement of the machine is identical and the corresponding parts are indicated with the same reference numbers in Figures 3 and 4 of the drawings. However, the lower trough or channel element is designated with the reference sign **9'** and disposed not at right angles to the track axis as in the case of the trough or channel element **9**, but at an angle relative to said axis, to such a degree that the front end of the trough in the direction of motion of the chain **4**, will be positioned ahead, on the track, in the direction of motion of this chain and in that of the arrow **12**.

With this specific arrangement it is obvious that the digging chain **4** does not engage the entire width of a hard zone **11** at one time but engages this zone firstly at its side corresponding to the foremost chain portion, for example the left-hand portion thereof, with respect to the direction of travel **12**, so as to progressively remove the ballast from left to right as the machine progresses along the track.

When a less advanced portion of chain **4** engages the opposite side of a hard zone **11**, for example the right-hand portion thereof, the foremost chain portion engages the next hard zone.

Thus, a regular continuity is obtained in the operation of this chain **4**, in contradistinction with the irregular operation observed in former machines wherein the digging member operated alternately in a zone of loose ballast and in a zone of hard or compact ballast, as will be readily understood from the drawings. Thus, instead of causing considerable variations in the stress applied to the chain in particular and in the power required for driving the machine in general, the difference in ballast density from one transverse section to another will assist not only in keeping power requirements within closer limits but also in improving the stability of the ballast clearing machine in general.

The strain on the chain may be kept within these close, substantial limits by so calculating the angle between the digging portion of the chain and the track axis that the longitudinal distance between the foremost and the backmost points of its digging portion travelling in the lower trough **9'** will correspond to at least the pitch of the ties. However, if a lesser obliquity is resorted to the chain will sometimes operate completely between two adjacent

ties but it will never operate only in a hard zone **11**, provided that the longitudinal distance between the aforesaid foremost and backmost points is greater than the width of this hard zone and even so the result will be improved considerably.

In the foregoing evidence is given of the fact that the novel arrangement steadies and reduces the component of the reactive strain in the direction of the arrows **18**. On the other hand, if the direction of inclination of the digging portion relative to the longitudinal or track axis is that shown in Figures 3 and 4 also with respect to the direction of travel **8** of the chain **4**, it will be seen that the trough or guide channel assembly is constantly urged to the right with respect to the direction of travel **12** of the machine on the track and that this assembly cannot move in this direction because it would be resisted by the still untreated ballast on its right. Thus, the front portion of the machine will no more have any appreciable tendency to swing to the right and to drag along the track laterally.

It will be readily understood that the form of embodiment exemplified in Figures 3 and 4 of the accompanying drawings is not to be construed as limiting the field of the invention as many details thereof may be varied without altering the spirit and scope of the invention. As already stated hereinabove, the invention is also applicable to a machine for clearing away the ballast from railway tracks which has a digging device of any other description.

What we claim is:

A machine for clearing away the ballast from railway tracks comprising a carriage adapted to roll on the track above the ballast to be treated, a driven endless chain having excavator portions and elevator portions supported by said carriage in a plane inclined with respect to said track and further positioned for being driven along a substantially triangular closed path, a triangularly shaped trough supported by said carriage and having said chain riding therein and said trough having two sides thereof of different lengths and extending forwardly of said carriage at an angle laterally of said carriage with each side capable of reaching outside of and below said track and with the third side thereof extending diagonally of the longitudinal direction of said track between said two sides thereof for guiding the excavator porton of said endless chain substantially horizontally in a straight line beneath the ties of said track from one side to the other side thereof and at acute angles relative to the longitudinal axis of said track whereby the foremost point of said excavator portion, with respect to the direction of travel of the ballast as it is cleared away by said excavator portion, is constantly ahead both with respect to the longitudinal direction of said track and the direction of travel of the machine.

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