Feb. 10, 1970 F. PLASSER ET AL 3,494,297

MOBILE TRACK MAINTENANCE MACHINE

Original Filed Oct. 18, 1965 6 Sheets-Sheet 1

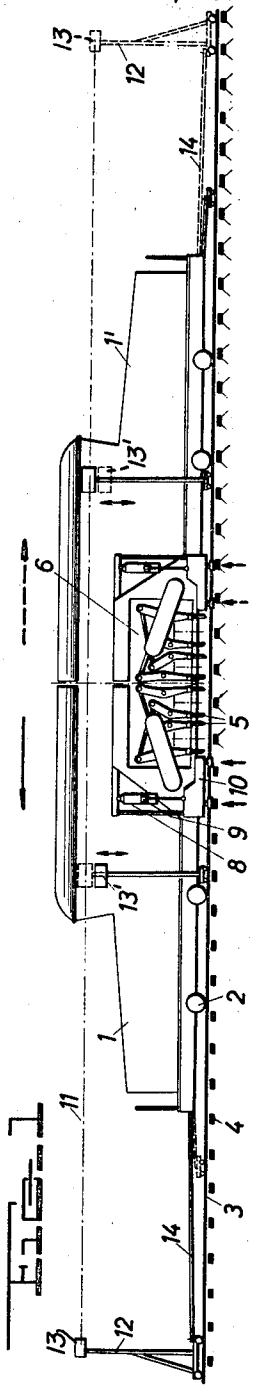

FIG. 1

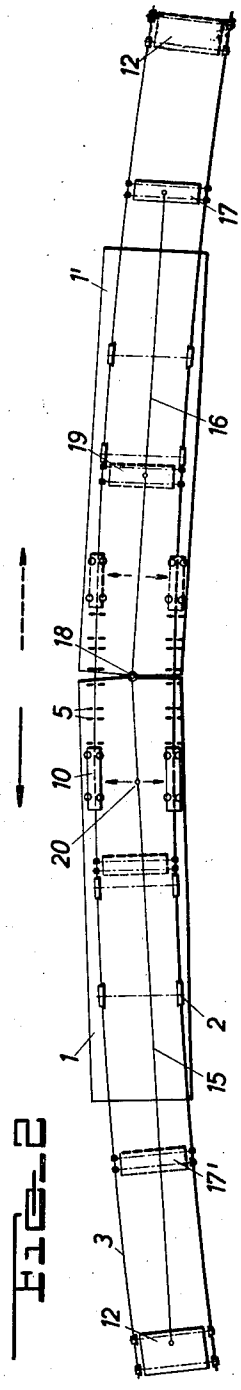

FIG. 2

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Fig. 3

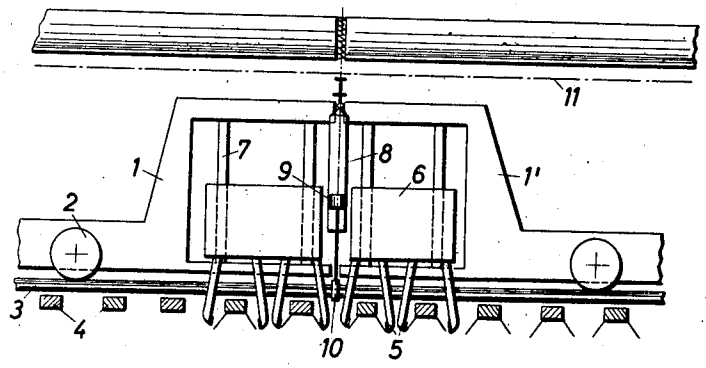

Fig. 4

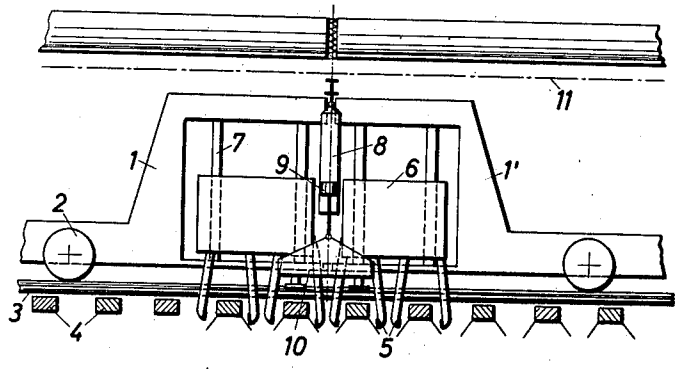

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Fig. 5

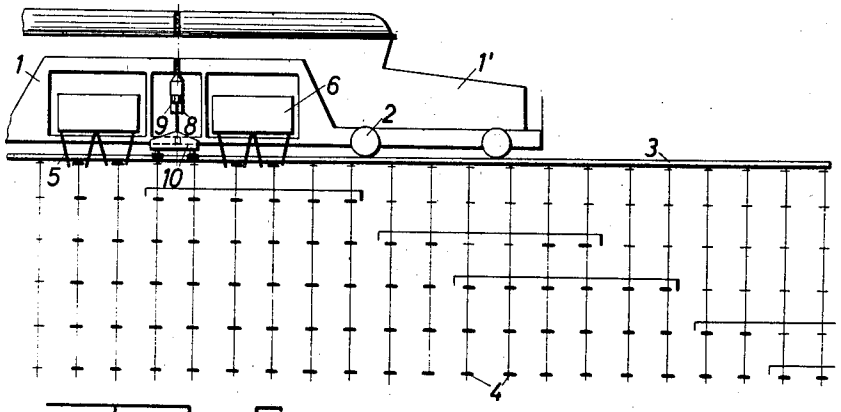
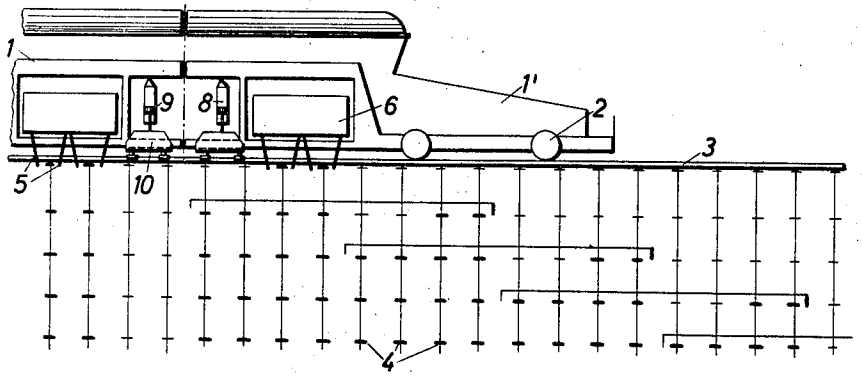


Fig. 6



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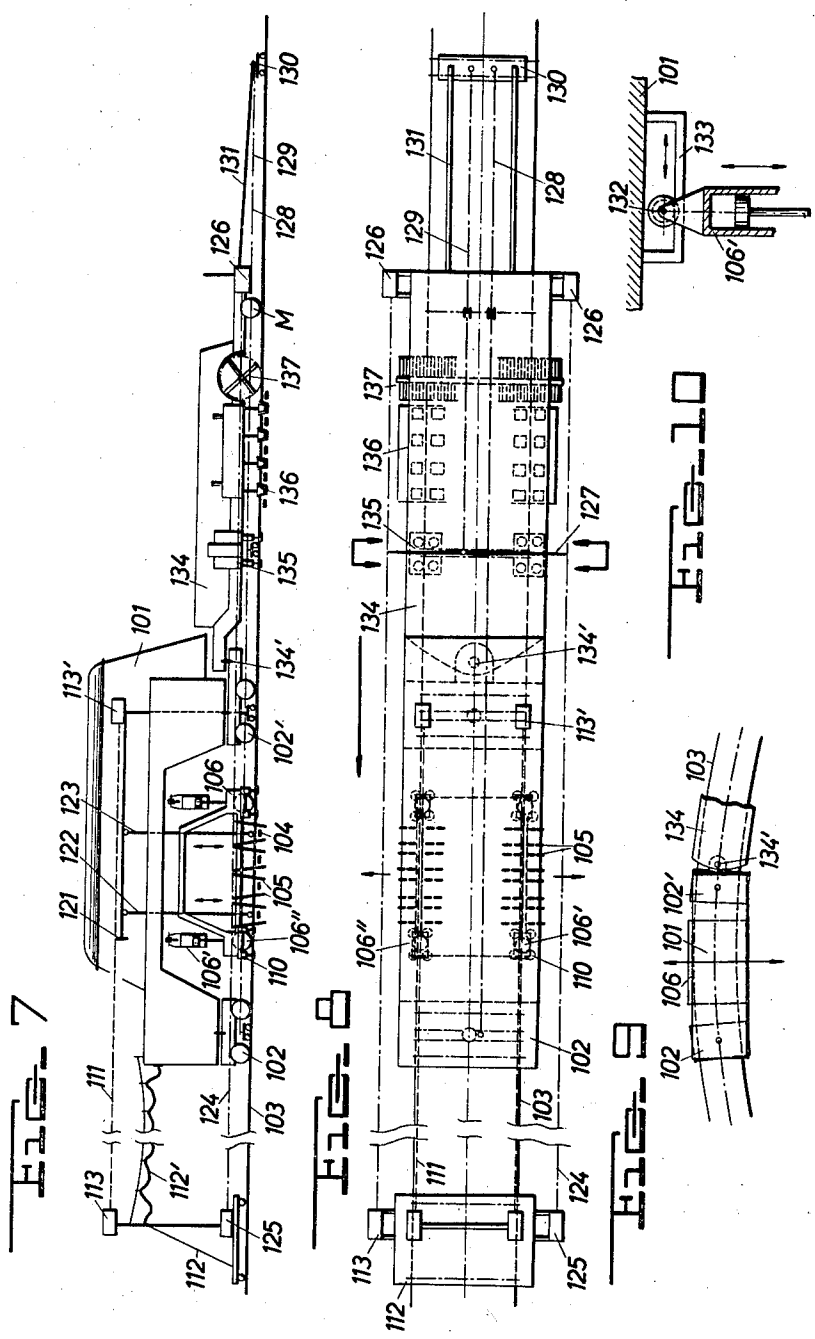

FIG. 7

FIG. 8

FIG. 9

FIG. 10

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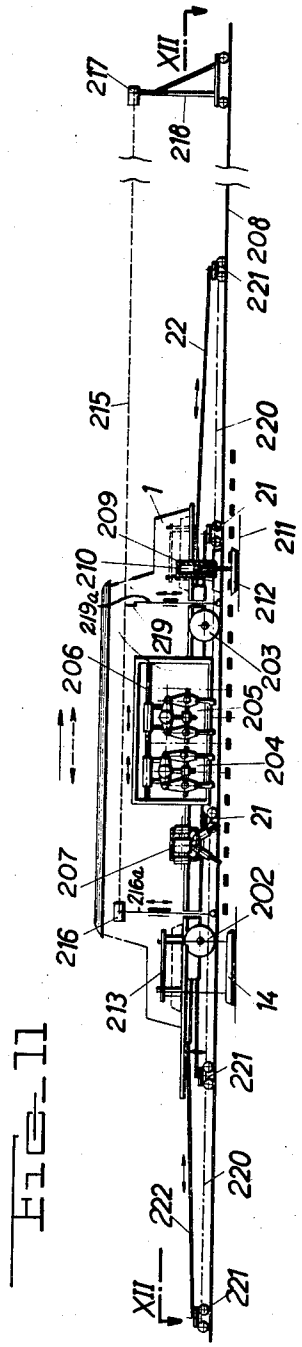

Fig. 11

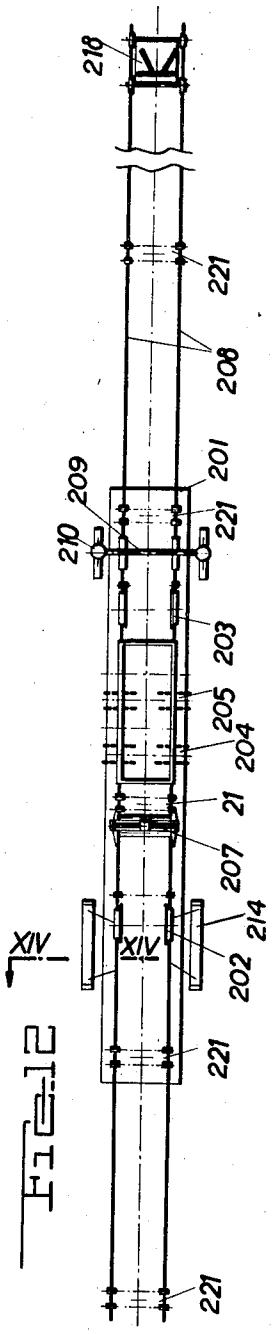

Fig. 12

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Fig. 13

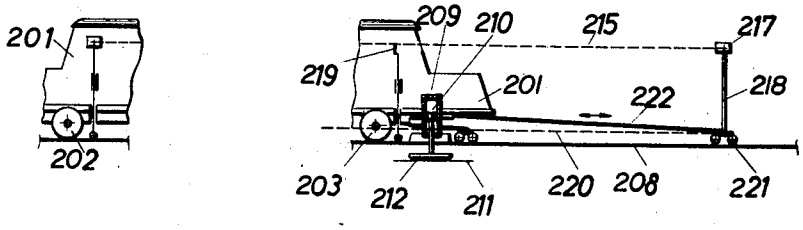


Fig. 14a

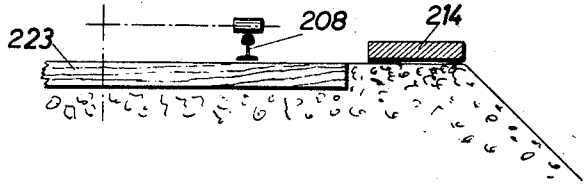


Fig. 14b

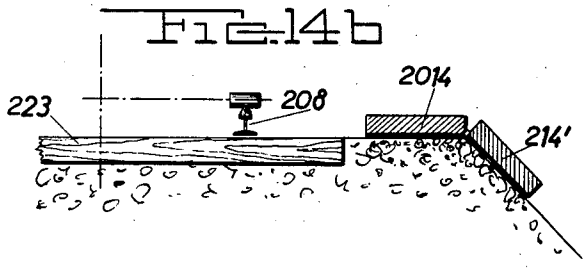
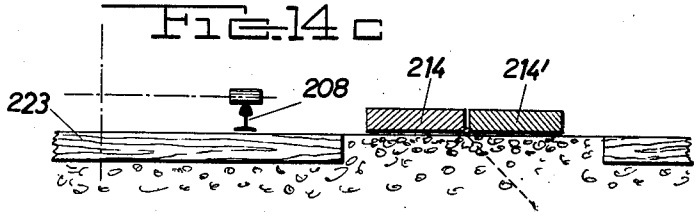


Fig. 14c



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3,494,297

MOBILE TRACK MAINTENANCE MACHINE

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Continuation of applications Ser. No. 497,288, Oct. 18, 1965, and Ser. No. 599,077, Dec. 5, 1966. This application July 25, 1967, Ser. No. 668,266

Claims priority, application Austria, Dec. 31, 1964, A 11,099/64; Dec. 6, 1965, A 10,915/65; Sept. 26, 1966, A 8,972/66

Int. Cl. E01b *33/00, 27/00*

U.S. Cl. 104—7 19 Claims

ABSTRACT OF THE DISCLOSURE

A mobile track grading and lining machine with a bridge-like carriage frame whose two ends are supported on trucks. Tampers and preferably track linings devices are mounted on the carriage frame between the tracks. The tampers can be centered in relation to the track axis.

CROSS REFERENCES

This is a continuation of our copending applications Ser. No. 497,288, filed Oct. 18, 1965, and Ser. No. 599,077, filed Dec. 5, 1966, both abandoned.

BACKGROUND AND SUMMARY OF THE INVENTION

The present invention relates to a mobile track grading, lining and tamping machine used in the maintenance of railroad tracks.

Machines of this general type have become well known and widely used, and more recently, we have developed such machines with a plurality of tamping tool assemblies spaced along the direction of track elongation for simultaneously tamping a succession of similarly spaced ties in a single operational stage. While such machines greatly increase tamping efficiency, problems have arisen in avoiding excessive weight and commensurate pressure on the machine axles, as well as in the mounting of the heavy, vertically adjustable tamping tool carriers.

In one aspect of this invention, we provide a track liner wherein means for laterally aligning the track is mounted on the machine intermediate its front and rear trucks. According to another aspect of the invention, a variety of track surfacing and maintenance tools are mounted on a bridge-like carriage frame whose two ends are supported on trucks for movement on the track, including a preferably vertically adjustable carrier for a plurality of tamping tool assemblies spaced along the track elongation for simultaneously and efficiently tamping a succession of similarly spaced ties.

In one embodiment of the invention, two like machine frames are turned towards each other with their open front ends and are pivotally coupled together to form the bridge-like carriage frame on which the track maintenance tools are mounted centrally of the swivel trucks which support the machine on the track. In this embodiment, the two forwardly extending machine frame portions bridge over the track section on which work is done and this construction makes it possible to extend this section over many ties to be covered in a single operational stage, i.e. to level and/or line a comparatively long track section and simultaneously to tamp the leveled and/or lined ties in this one operation.

In another embodiment, the tamping tool carrier is centrally mounted on a bridge-like carriage frame whose two ends are supported on the track on swivel trucks. Such a frame may be sturdy enough for the tamping tool carrier to be suspended thereon, for instance by hydraulic motors which also serve to adjust the carrier vertically in relation to the track and which may be independently supported on trucks running on the track. In this manner, the track section between the frame ends remains free of interfering support element and may be taken up entirely by track maintenance tools.

With the track aligning means located intermediate the front and rear trucks, the entire heavy weight of the tamping and lining machine, which rests on the trucks, is transmitted to the track below the machine so that the previously graded and tamped track is held down firmly and prevented from assuming a wrong grade again during lateral alignment. Also, this location of the track aligning means makes it possible most fully and efficiently to use the entire length of the machine for the mounting of various operating devices so that the machine can be used for grading, aligning and tamping, such devices including a plurality of tamping tool assemblies, means for compacting ballast in the strips extending laterally of the track, and reference lines in relation to which the track is leveled and/or laterally aligned.

It is a primary object of this invention to resurface, i.e. laterally align and/or grade, tracks speedily and efficiently by so arranging the track aligning, grading and tamping means as to correct the track position and fix the track in the corrected position in a minimum of time.

BRIEF DESCRIPTION OF DRAWING

The above and other objects, advantages and features of the present invention will become more apparent from the following detailed description of certain illustrative embodiments thereof, taken in conjunction with the accompanying drawing wherein

FIG. 1 is a schematic side view of one embodiment of a mobile track tamping, grading and lining machine according to the invention;

FIG. 2 is a top view of FIG. 1;

FIG. 3 is a schematic side view of a modified machine;

FIG. 4 is a schematic side view of yet another modification;

FIGS. 5 and 6 illustrate two further modifications of the machine, together with the sequence of tamping operations indicated in the schemes below the tracks;

FIG. 7 schematically shows still another embodiment of a machine according to this invention in side view;

FIG. 8 is a top view of FIG. 9;

FIG. 9 is a partial top view showing this machine in a track curve;

FIG. 10 shows a detail of the machine of FIGS. 7 and 8;

FIG. 11 is a schematic side view of another mobile track tamping and lining machine according to the invention;

FIG. 12 is a top view, taken along line XII—XII, of FIG. 11;

FIG. 13 is a fragmentary side view showing a modification of the track leveling or grading means in more detail; and

FIGS. 14*a*, 14*b* and 14*c* are sections along line XIV—XIV of FIG. 12 and show various modifications of means for tamping the ballast laterally outside the track.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring now to the drawing and first to FIGS. 1–6, the mobile track grading and lining machines illustrated therein comprise two like machine frames **1**, **1'** which are coupled together. The coupled portions of the machine frames constitute a bridge-like carriage frame extending

between respective ends of the machine frames. Each end of the carriage frame is supported on the rails 3, 3 of the track for mobility thereon on at least one carriage axle or truck. Each carriage axle or truck includes rail-engaging wheels 2 and 2', respectively, and the track rails rest on ties 4 which are tamped by the machine to fix the track in its corrected position.

At least one tamping tool carrier 6 is vertically adjustably mounted on the bridge-like carriage frame, each carrier being vertically movable along posts 7 which support the carrier in the carriage frame, and each carrier holding a plurality of tamping tool assemblies 5. Track lining and/or grading means is also mounted on the bridge-like carriage frame, the schematically illustrated track position correcting means including a hydraulic jack with a cylinder 8, a vertically movable piston 9 and a track gripping means 10 connected to the piston for movement thereby. The track correcting means may be entirely conventional, as may be the track grading and/or lining system including reference line 11, in relation to which the track is graded or leveled. One of the ends 13, 13 of the reference line may consist of a sender and receiver, respectively, of suitable electromagnetic radiation, if the reference line is a beam, such sender or receiver being mounted on a bogie 12, 12 arranged on the track in advance of the machine and coupled to the machine by spacing rods 14, 14 or the like. The other reference line end 13', 13' extends to a sending or receiving station on the machine.

Referring more particularly to the embodiment of FIGS. 1 and 2, the lateral lining of the track is controlled by reference lines 15, 16. Bogies 17, 17' are moved into position at a desired distance from the machine to hold one of the ends of the reference lines. In the illustrated lining system, the two reference lines 15, 16 extend from the ends of a track section to be lined to a point of intersection 18 which also is a fulcrum for the pivotal coupling of the two machine frames 1, 1'. As appears from FIG. 2, the reference line 16 extends from bogie 17 to the pivot. Each of the reference lines runs through a respective reference point 19, 20 intermediate the ends of the track section to be lined, reference point 19 lying in a previously corrected portion of the track section while reference 20 lies in a track section portion to be lined. At this point, the track is laterally moved until the ratio of the distance of the point of intersection 18 of the two reference lines from the starting point 17 of the track section to the distance of point 18 to reference point 20 is the same as that of the distance between point 18 and point 12 to the distance between point 18 and reference point 19. This curve lining method is more fully described and claimed in U.S. Patent No. 3,292,557, dated Dec. 20, 1966.

A machine of this type may be constructed symmetrically in relation to the center or coupling point of the bridge-like carriage frame so that it may be operated along the track in either direction, as indicated by the arrows.

The tamping tool assemblies are so arranged on this machine that four immediately adjacent ties may be tamped simultaneously, each of the machine frames 1, 1' holding a pair of tamping tool assemblies in a manner more fully described and claimed in our copending Patents Nos. 3,357,366 and 3,372,651. Track tramping methods which may be practiced with such a tamping tool assembly arrangement are more fully described and claimed in our copending application Ser. No. 536,380, filed Mar. 22, 1966 and abandoned in favor of continuation application Ser. No. 678,158, filed Oct. 23, 1967. The track position correcting means are mounted on each machine frame 1, 1' between the tamping tool assemblies and the carriage axle.

The general operation of the track tamping assemblies may be entirely conventional, as disclosed, for instance, in our U.S. Patents Nos. 3,357,366 and 3,372,651, and the track grading and lining means may also take any suitable form, including such lining means as disclosed in U.S. Patents Nos. 2,966,123 and 3,000,099, and track grading or leveling means as shown in U.S. Patents Nos. 2,847,943, 2,869,476, 2,962,979, 3,041,982 or 3,119,346. Those skilled in the art of track tamping, lining and leveling will readily select any suitable tamping, lining and grading means and systems useful for their purpose, and the present invention is not concerned with the specific structure of such means, except as combined with the positioning of such means as herein disclosed.

The modified machine of FIG. 3 differs from the previously described embodiment in that it comprises a sole track lifting means 8, 9, 10.

The modified machine of FIG. 4 differs from that of FIG. 3 only in that the track gripping means 10 includes two track clamping devices which are spaced from each other along the longitudinal extension of the track and which, in a known manner, include rollers glidingly engaging the rails so that the clamping devices may remain engaged with the track rails while the machine moves therealong. Those skilled in this art will select that construction of the track gripping means, which is most useful in the particular machine and meets its space requirements.

In the embodiments of the machine shown in FIGS. 5 and 6, each tamping tool carrier 6 holds two tamping tool assemblies for simultaneously tamping a total of four ties. However, the distance between the tamping tool carriers is such that a pair of ties intermediate the pairs of ties being tamped remains untamped (see FIG. 5). As schematically shown in FIG. 5, the machine is alternately advanced by a distance of six and two ties so that the two ties, which remain untamped in each tamping stage, are subsequently tamped.

In the modification of FIG. 6, the distance between the tamping tool carriers is increased so that four ties intermediate the pairs of ties being tamped remain untamped, two track lifting means being mounted in the space between the tamping tool carriers. With this machine, a first pair of ties, which remained untamped in the preceding tamping operation stage, is tamped in an immediately succeeding stage during which a further pair of ties in advance of the previously tamped ties is also tamped. In a third tamping operation stage, the other pair of previously untamped ties is tamped simultaneously with an additional pair of ties in advance of the last-named pair of ties. As indicated in the scheme accompanying FIG. 6, the machine is advanced by a distance of four ties from one tamping stage to the next.

Another embodiment of a mobile track maintenance machine according to the present invention is shown in FIGS. 7–10. In this machine, the ends of the bridge-like carriage frame 101 are supported on swivel trucks 102, 102'. A tamping tool carrier 106 is mounted on the carriage frame substantially centrally of the swivel trucks, and holds the schematically shown plurality of tamping tool assemblies 105 designed simultaneously to tamp a like plurality of ties 104 whereon the track rails 103, 103 rest. A pair of hydraulic motors 106' vertically adjustably mount the tamping tool carrier on the bridge-like carriage frame, each hydraulic motor being independently supported on the track by auxiliary trucks 106'' which run on the track. The carrier 106 has track gripping means 110 within the range of the auxiliary trucks to enable the track to be lifted with the carrier.

Similar to a trailer, the frame 134 of a track liner is pivotally coupled to the rear truck 102' with a king pin or like pivot joint 134'. The frame 134 carries not only track lining tools 135 but also surface tampers 136 and ballast cleaning devices 137 which may consist of rotary brooms.

Grading or leveling of the track is controlled by reference line 111 extending from a front bogie 112 carrying sender 113 to a receiver 113' positioned in the carriage frame 101 rearwardly of the tamping tool assemblies and

supported directly on one of the track rails. Such a grading control system is well known and includes a stop **121** carried by two spaced rods **122, 123** which rest directly on the track so that the stop moves upwardly together with the track when the later is raised. The two stop support rods **122, 123** are arranged adjacent the respective ends of tamping tool carrier **106**.

A remote control cable **112'** connects the front bogie **112** to the operating console of the machine. Furthermore, the front bogie also carries additional senders **125** emitting beams constituting additional reference lines **124** extending to receivers **126** mounted on the track liner. The reference lines **124** serve primarily for lining the track in straight track sections, these reference lines cooperating with laterally movable stops **127** mounted in the range of track lining tools **135** on frame **134**.

In curved track sections, lining is controlled by reference lines **128** and **129** constituting, respectively, a long and short chord. The long chord **128** extends from the front truck **102** of the bridge-like carriage frame **101** through the lining point R, at which the lining tools **135** operate, and the measuring point M, at which the ordinates of the long and short chords are compared, to the rear bogie **130** which follows the track liner on the track section to be lined. This rear bogie is coupled to the track liner frame **134** by means of rods **131**. The short chord **129** extends only from the lining point R through the measuring point M to bogie **130**. The track **103** is laterally moved by the track lining tools **135** until the ordinates of the chords **128** and **129** at point M have relative lengths determined by the ratio of the chord lengths.

The schematic showing of FIG. 9 illustrates clearly to what extent the tamping tool carrier **106** must be moved laterally in curved track sections to assure that the tamping tool assemblies are properly associated with the respective track rails. This figure also shows the advantage of using swivel trucks for supporting the ends of bridge-like carriage frame **101** on the track.

Various means may be used to make the tamping tool carrier laterally adjustable in relation to the carriage frame. In the structure illustrated in FIG. 10, the cylinder of one of the hydraulic motors **106'** is linked to a roller **132** which runs on a guide rail **133** extending transversely of the track and mounted on carriage frame **101**.

When the machine travels to and from an operating station, the tamping tool carrier may be lifted out of contact with the track and the front bogie may be stored readily on the carriage frame **101**. Furthermore, the two independent hydraulic motors **106', 106'** have the advantage that the track may be lifted to different levels at spaced points. Such an arrangement makes it possible to level a relatively long track section accurately, particularly when the control stop **121** is carried by two similarly spaced support rods **122, 123**.

In FIGS. 11–14, like reference numerals designate like parts in all figures, all means and mechanisms which are conventional being schematically shown only sufficiently to illustrate their mutual cooperation and/or positioning on the machine.

Machine frame **201** is shown to be supported by front and rear axles or trucks **202** and **203** for movement on the track in the direction of the track elongation indicated by the arrows in full and broken lines. The arrow in full lines indicates the working direction of the illustrated machine. If, as will be more fully described hereinafter, the operating means of the machine are arranged thereon, in pairs symmetrically in respect of the machine midpoint in a manner, for instance, more fully disclosed and claimed in our copending application Ser. No. 438,907, filed Mar. 11, 1965, and abandoned in favor of continuation application Ser. No. 733,206, filed May 6, 1968, the machine may be operated in either direction, as indicated by the two-headed arrow in broken lines.

While single front and rear axles are illustrated herein for sake of simplicity, it will be understood that such axles may form parts of trucks supporting the machine frame.

The machine carries two tamping tool assemblies **204** and **205** of generally conventional structure and mounted on the machine frame forwardly (in respect of the indicated operating direction of the machine) of the aligning means between front axle **203** and track aligning means **207**. The illustrated tamping means is movable in unison along guide bar **206** extending in the direction of the track elongation, the schematically illustrated arrangement of the two tamping tool assemblies being more fully disclosed and claimed in our Patent No. 3,380,395.
3,380,395.

The schematically shown means **207** for laterally aligning the track may take any suitable or conventional form, the illustrated embodiment including a pair of pressure elements engaging each of the rails **208** and being affixed to hydraulically operable arms operable to exert a lateral pressure on either of the rails to move the track laterally in response to the exerted pressure. As clearly shown, the track aligning means **207** is mounted on the machine intermediate the front and rear axles, with the tamping means being arranged forwardly thereof. If the machine were to be operable in both directions, a track aligning means would be mounted symmetrically on either side of the tamping means, axle **202** becoming the front axle and axle **203** the rear axle.

A track lifting means **209** is also schematically shown and may take any suitabe or conventional form, this means being positioned in accordance with the invention forwardly of the front axle **203**. The illustrated embodiment is a hydraulic jack including cylinder **210** vertically movably supporting a shoe **212** engaging the surface **211** of the ballast or road bed, magnetic or mechanical rail clamping means cooperating with the shoe to lift the track.

According to one feature of the invention, the machine also carries means **213** for compacting the ballast laterally adjacent the track, more particularly in the two ballast strips alongside the track beyond the ends of the track ties **223**. As more clearly but schematically shown in FIGS. 14*a*, 14*b* and 14*c*, such ballast compacting means preferably include vibrating tampers **214, 214'** engaging respective surfaces of the ballast, along the horiontal strip adjacent the tie ends (FIG. 14*a*), along the horizontal strip as well as the inclined shoulder of the ballast bed (FIG. 14*b*) or along the horizontal strips of the ballast bed extending between two adjacent tracks (FIG. 14*c*).

As is conventional in track lining and leveling machines, the track position is corrected, i.e. the lateral alignment and the grade of the track is determined, in relation to reference or datum lines constituted by a light, radar, infrared or ultraviolet ray, for instance, any suitable beam of electromagnetic radiation being useful, a sighting line or a tension wire, the invention not being concerned with the specific nature of the reference line.

The reference line **215** in relation to which the track is graded or leveled has its rear end carried on a vertically adjustable support **216***a* while its front end is carried on front bogie **218** movable on the track ahead of the machine in a manner well known per se. The rear support includes a vertically adjustable rod journaled in the machine frame and running on rail **208** on a roller. The illustrated reference line is a beam of electromagnetic energy emanating from a sender (**216** or **217**) at one end and going to a receiver (**216** or **217**) at the other end, it being immaterial at what end the sender and receiver are positioned. As will be seen, the rear end of the reference line is located close to, and forwardly of, the rear axle (in the operating direction of the machine). A sighting board or stop **219** establishes the desired grade of the track when it contacts the reference line and thus causes an interruption of the beam or otherwise energizes or de-energizes an electric circuit causing the track

lifting to cease. Similarly to the mounting of the rear end of the reference line, the sighting board or stop is independently mounted on the machine frame by means of rod 219*a* running on the rail on a roller. Rod 219*a* is journaled in the machine frame for vertical movement in response to the track grade. Pairs of symmetrically arranged track grading means may be provided if the machine is to operate in either direction.

Another reference line 220 in relation to which the track is laterally aligned is constituted in the illustrated embodiment by a tension wire forming a chord of a circular arc to serve in any suitable or conventional lining system, the specific structure of such systems forming no part of the present invention. The ends of the reference wire are supported on front and rear carriages 221, 221 running on the track in unison with the machine and being coupled thereto by spacing rods 222. Preferably and as schematicallyy indicated by the double-headed arrows, the coupling rods 222 may be longitudinally adjusted so that the spacing between the carriages 222 and the machine frame 201 may be suitably changed. In the illustrated arrangement, lateral alignment is effected in a known manner with the aid of several chordal reference lines, requiring the provision of several pairs of wire end support carriages 21.

As shown in the modification of FIG. 13, the front bogie 218 may be combined with one of the carriages 221 into a single front support for the respective ends of grading reference line 215 and aligning reference line 222, this front carriage being coupled to the machine frame by a longitudinally adjustable spacing rod 22 to change the distance between the front carriage and the machine in any desired manner.

The illustrated arrangement of two or more tamping tool assemblies on the machine frame does not only have the advantage of permitting the simultaneous tamping of groups of two or more ties, as fully described and claimed in our above-mentioned Patent No. 3,380,395, but the increased length of the machine entailed by this arrangement is also advantageous because aligning reference lines 220 of sufficient length may be accommodated in such a system with the end supports of the reference lines still coupled to the machine frame.

The illustrated tamping means arrangement greatly increases the efficiency of the machine since, in each successive operation, the track is leveled and/or aligned and the corrected track is fixed in position by tamping groups of ties.

More than two tamping tool assemblies may be mounted on the machine frame, the number of assemblies being limited only by the acceptable length of the machine. If three tamping tool assemblies are used, a group of three ties may be tamped simultaneously in each operation, two of the three ties enclosing three other ties, and in each successive operation two ties are skipped whereby one of the other ties is enclosed by the two first ones of the previously tamped group of three ties, and a second one of the other ties is enclosed by the two last ones of the previously tamped group of three ties.

The operation of the machine will partly be obvious from the above description and will be summarized hereinafter:

When the machine of FIG. 11 reaches a track section to be resurfaced, it is stopped and the track lifting means 209 forwardly of the front axle is operated to level the track to the desired extent. The positioning of the track lifting means in relation to the front axle causes the latter to be lifted slightly with the track whereon it rests adjacent the lifting means. The leveled track section between the axles of the machine is now fixed at the desired grade by tamping and any necessary latreal alignment is effectuated by aligning means 107 positioned behind the tamping means. The lateral alignment proceeds at a point where the track remains substantially in contact with the ballast so that no errors in the previously fixed grade are caused by the alignment, the full weight of the heavy machine resting on axles 202 and 203 to aid in downward pressure of the track against the tamped ballast. As the track is thus intermittently and progressively resurfaced section by section, the laterally operating ballast compacting means is operated to compact the ballast on each side of the track.

While the invention has been described and illustrated in connection with certain embodiments, it will be clearly understood that many modifications and variations may occur to those skilled in the art, particularly after benefiting from the present teaching, without departing from the spirit and scope of this invention.

We claim:

1. An improved mobile track maintenance machine arranged for movement on the track in the direction of track elongation and comprising a carriage frame having two ends, a front truck and a rear truck respectively supporting each carriage frame end for movement on the track, track tamping means and track grading means mounted on the carriage frame, the track grading means being constructed to lift the track and the tamping means being arranged to fix the track in the lifted position by tamping ballast under spaced ties supporting the track, and means for laterally aligning the track mounted on the carriage frame intermediate the trucks.

2. The mobile track maintenance machine of claim 1, further comprising a reference line for laterally aligning the track in relation thereto, another reference line for grading the track in relation thereto, and a front bogie movable on the track and supporting one of the ends of both reference lines.

3. The mobile track maintenance machine of claim 1, comprising pairs of said track aligning means, and further comprising pairs of said tamping means mounted on the frame forwardly of respective ones of said track aligning means in the direction of said trucks, and pairs of track lifting means mounted on the machine forwardly of the trucks, each of said pairs of means being symmetrically arranged on the machine in respect of a midpoint of the machine in the direction of the track elongation.

4. The mobile track maintenance machine of claim 1, further comprising means for compacting ballast laterally adjacent the track.

5. The mobile track maintenance machine of claim 1, wherein the tamping means is mounted on the carriage frame forwardly of the aligning means in the direction of the front truck, and the track grading means is mounted on the carriage frame forwardly of the front truck.

6. The mobile track maintenance machine of claim 1, further comprising a reference line forming a chord of a circular arc for laterally aligning the track in relation thereto, another reference line for grading the track in relation thereto, said other reference line having a forward and a rear end, a front bogie movable on the track and carrying the forward end of the reference line, and a vertically adjustable support mounted on the carriage frame carrying the rear end of the reference line, said vertically adjustable support being mounted forwardly of the rear truck.

7. A mobile track maintenance machine arranged for movement on a track in the direction of track elongation, the track including two rails mounted on ties, comprising a bridge-like carriage frame having two ends, a truck supporting each carriage frame end for movement on the track rails, a plurality of tamping tool assemblies spaced along the track elongation, each of said assemblies including a pair of vibratory tamping tools for tamping one of said ties and at least two of said assemblies being sufficiently closely spaced for simultaneous tamping of a succession of similarly spaced ties, at least one common carrier for at least two of said spaced tamping tool assemblies, means for vertically adjustably mounting the carrier or carriers on the carriage frame intermediate said ends, and means for vertically aligning the tamping tool

assemblies with respective ones of the track rails in curved track sections.

8. The mobile track maintenance machine of claim 7, wherein the trucks are swivel trucks pivotal in respect of the carriage frame about an axis extending perpendicularly to the track.

9. The mobile track maintenance machine of claim 7, wherein a single one of said carriers supports the tamping tool assemblies, and further comprising hydraulic motor means vertically adjustably mounting the carrier on the carriage frame, and track gripping means mounted at each end of the carrier for lifting the track with the carrier.

10. The mobile track maintenance machine of claim 9, further comprising independent trucks arranged to support the carrier for movement on the track rails.

11. The mobile track maintenance machine of claim 7, wherein the means for vertically aligning the tamping tool assemblies includes means extending transversely of the track for mounting the carrier or carrier laterally adjustably on the carriage frame.

12. The mobile track maintenance machine of claim 11, wherein the means for vertically adjustably mounting the carrier or carriers on the carriage frame is laterally adjustably mounted thereon.

13. The mobile track maintenance machine of claim 7, wherein the bridge-like carriage frame consists of two like machine frames each having a frame portion extending from a respective one of said ends and overhanging a tie to be tamped, coupling means for coupling the two frame portions together for pivotal movement about a vertical axis, one of said carriers being mounted on each of said frame portions, the pivotal movement of said frame portions about said vertical axis vertically aligning the tamping tool assemblies with respective ones of track rails in curved track sections.

14. The mobile track maintenance machine of claim 13, further comprising track position correcting means mounted on the bride-like carriage frame between one of said trucks and an adjacent one of said tamping tool assemblies.

15. The mobile track maintenance machine of claim 14, wherein the track position correcting means is arranged between adjacent ones of said carriers centrally of the ends of the carriage frame.

16. The mobile track maintenance machine of claim 15, wherein said track position correcting means is a single means arranged at the point wherein the two like machine frames are coupled together.

17. The mobile track maintenance machine of claim 15, wherein said track position correcting means includes two of said means arranged adjacently on each of said like machine frames.

18. The mobile track maintenance machine of claim 14, wherein the track position correcting means comprises a pair of spaced track rail gripping means adapted glidingly to engage the rail at points spaced in the direction of track elongation.

19. The mobile track maintenance machine of claim 13, further comprising two reference lines for lining the track in relation thereto, said reference lines adjoining each other in the direction of track elongation, and the reference lines having one common end at the point where the two like machine frames are pivotally coupled together.

References Cited

UNITED STATES PATENTS

1,043,245	11/1912	Ohman	104—12
1,468,528	9/1923	Vena	104—7
2,497,682	2/1950	Mertz	104—12
2,734,463	2/1956	Hursh et al.	104—7
3,165,838	1/1965	Plasser et al.	104—7
3,371,619	3/1968	Stewart	104—8

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