United States Patent

[11] 3,595,170

[72] Inventors **Franz Plasser;**
Josef Theurer, both of Johannesgasse 3, Vienna, Austria

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[33] **Austria**
[31] A1/68

[54] **MOBILE TRACK TAMPER**
26 Claims, 6 Drawing Figs.

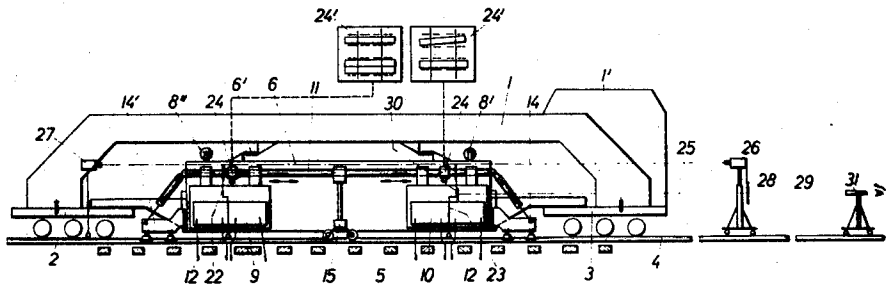
[52] **U.S. Cl.** **104/12**
[51] **Int. Cl.** **E01b 27/16**
[50] **Field of Search** ..... 104/7, 7 B, 8, 12, 14

[56] **References Cited**
UNITED STATES PATENTS

3,177,813	4/1965	Stewart	104/12
3,274,951	9/1966	Christoff	104/7
3,343,497	9/1967	Stewart	104/12
3,380,395	4/1968	Plasser et al.	104/12
3,401,642	9/1968	Fisher	104/12

Primary Examiner—Arthur L. La Point
Assistant Examiner—Richard A. Bertsch
Attorney—Kurt Kelman

ABSTRACT: A mobile track tamper with a plurality of "twin" tamping tool assemblies has means for controlling the movement of the assemblies in the track direction in response to the location of a tie to be positioned between the opposed tamping tools of each assembly.



PATENTED JUL 27 1971

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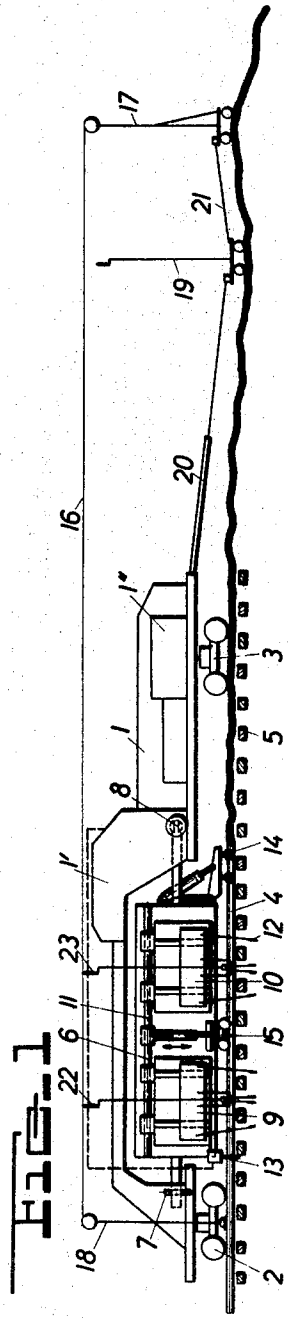

FIG. 1

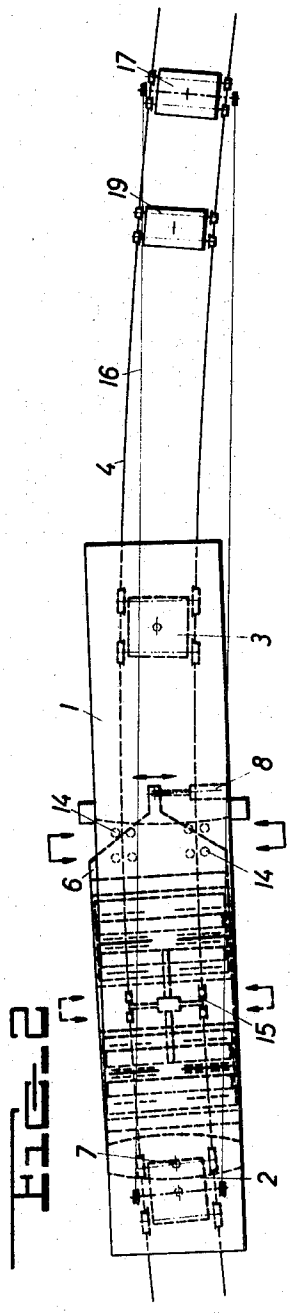

FIG. 2

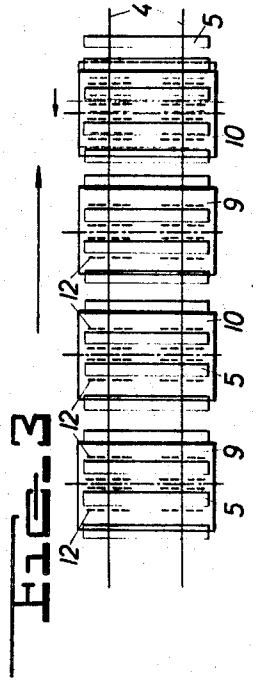

FIG. 3

INVENTORS:
FRANZ PLASSER
JOSEF THEURER
BY Kurt Kelman
AGENT

PATENTED JUL 27 1971

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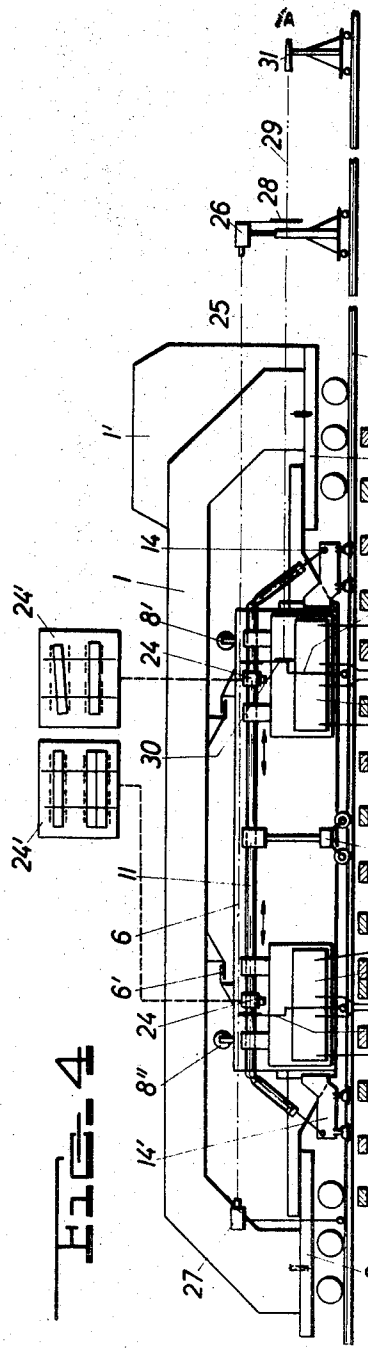

FIG. 4

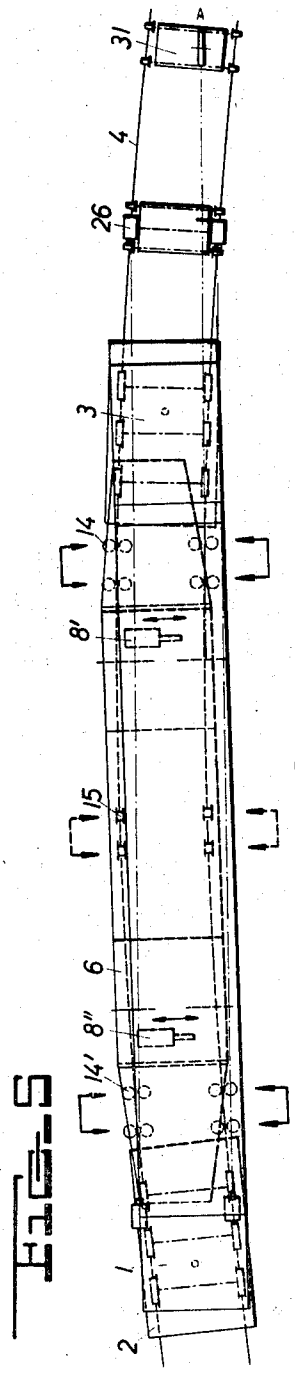

FIG. 5

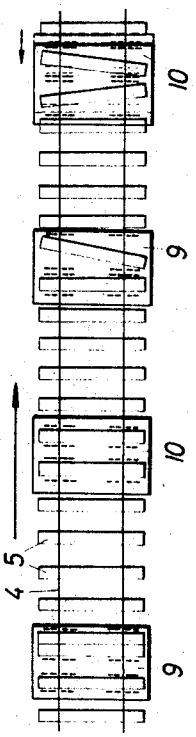

FIG. 6

INVENTORS:
FRANZ PLASSER
JOSEF THEURER
BY
Kurt Kelman
AGENT

MOBILE TRACK TAMPER

BACKGROUND AND SUMMARY OF THE INVENTION

The present invention relates to mobile track tampers wherein a plurality of "twin" tamping tool assemblies are mounted on an elongated frame for tamping ballast underneath a track including rails supported on a plurality of spaced ties resting on the ballast.

"Twin" tamping tool assemblies have recently become known and are described and claimed in out U.S. Pat. Nos. 3,372,651 and 3,357,366. Each such assembly includes two pairs of opposed tamping tools. The pairs of tools are so spaced from each other in the direction of elongation of the track that the tools of each pair which are adjacent to each other are at a smaller distance from each other than the distance between adjacent ones of the ties. The opposed tools of each pair are arranged for immersion in the ballast adjacent one of the ties and for reciprocation in this direction, with the one tie positioned between the opposed tools of each pair.

Difficulties have been encountered when a plurality of tamping tool assemblies are to be mounted on a common elongated frame in spaced relation in the direction of elongation of the track. These difficulties are due primarily to the fact that the track ties frequently are not evenly spaced from each other and/or do not extend exactly perpendicularly to the track rails. In such cases of irregular tie position, it is important to avoid hitting the ties with the tamping tools when the tamping tool assemblies are lowered into the ballast for tamping. Such an impact of the tamping tools on the ties damages the same.

Other problems arise in connection with the mounting and positioning of track position correcting means, i.e. track lifting and/or shifting means, on the tamper and their proper association with suitable components of reference systems for indicating and controlling the track position, i.e. the track grand and/or lateral alignment. Also, a tamper frame carrying a plurality of "twin" tamping tool assemblies must have a substantial length. When a tamper with such a long frame is used in track curves, the tamping tools must maintain their proper position in respect of the ties to be tamped when the tools are immersed in the ballast.

It is the primary object of this invention to meet and overcome the above difficulties and problems.

This and other objects are accomplished according to the invention by mounting the tamping tool assemblies on the elongated frame for movement in the direction of track elongation and controlling the movement of at least one of the tamping tool assemblies in response to the location of the one tie which is to be positioned between the opposed tools. Means for correcting the position of the track and a reference system for indicating the correct track position form part of the tamper of the present invention.

The means for controlling the movement of the tamping tool assemblies may include a tactile element in contact with the track, preferably a selected tie, or a visible control arranged to view the location of the one tie, such as a television screen.

BRIEF DESCRIPTION OF DRAWING

The above and other objects, advantages and features of this invention will become more apparent from the following description of two preferred embodiments thereof, taken in conjunction with the accompanying drawing wherein

FIG. 1 is a schematic side view of one embodiment of a mobile tamper according to the invention;

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

FIG. 3 schematically illustrates the controlled movement of one of the tamping tool assemblies;

FIG. 4 is a side view similar to that of FIG. 1 of another embodiment of the tamper;

FIG. 5 is a top view of FIG. 4; and

FIG. 6 is a schematic illustration similar to FIG. 3 of the operation of the second embodiment.

DETAILED DESCRIPTION

The illustrated tampers may be used for grading and/or lining a track and for fixing the graded track in the corrected position by tamping. In all the figures of the drawing, the mobile tamper comprises an elongated frame 1 which is mounted for mobility on the track on two swivel running gears 2, 3. The tamper moves on a track including rails 4 supported on a plurality of spaced ties 5 resting on a ballast underneath the ties. As appears clearly in FIG. 1, the rear running gear 2 of the tamper moves on a previously corrected track section; the track section being corrected is fixed in position by tamping, and a track section to be corrected extends forwardly, as indicated by the heavy line indicating the irregular grade of this track section.

The frame 1 has the form of a bridge extending over the track section being tamped, and a carrier 6 for the tamping tool assemblies 9 and 10 is supported on the frame. The operator's stand 1' is also mounted on the frame, as are the motor means 1'' for operating all moving parts of the tamper in a conventional manner.

As more fully described and illustrated in U.S. Pat Nos. 3,372,651 and 3,357,366, the "twin" tamping tool assemblies are mounted on the carrier for vertical movement so that the tamping tools 12 may be immersed in the ballast so that the opposed tools of each assembly will simultaneously tamp two adjacent ties. The tamping tool assemblies are mounted on a support beam 11 of frame 1 for movement in the direction of elongation of the track.

Referring now to the embodiment shown in FIGS. 1 and 2, the carrier 6 may be pivoted about a fulcrum extending perpendicularly to the track plane and parallel thereto. This fulcrum is constituted by pivot pin 7 connecting the carrier 6 to frame 1 above running gear 2. At the opposite end, the carrier is connected to a hydraulic motor 8 arranged to move the carrier transversely of the track about pin 7.

In view of the mounting of the tamping tool assemblies 9 and 10 for movement on support beam 11 and the ability of the carrier 6 to be swung laterally, the position of the tamping tools in respect of the ties to be tamped is adjustable in the direction of track elongation as well as transversely thereto. Thus, as indicated in FIG. 3, the tamping tool position may be adjusted to the tie position, two successive operating stages of the two tamping tool assemblies being shown in FIG. 3. The long arrow in FIG. 3 indicates the working direction of the tamper. In the first stage, the relative spacing of tamping tool assemblies 9 and 10 places the opposed tools of each assembly alongside the ties 5 to be tamped. However, as the tamper advances, the spacing of the ties changes. If tamping tool assembly 10 were maintained in the same position as in the first stage, its tamping tools would hit and damage the ties 5 upon immersion in the ballast, as indicated in broken lines at the right in FIG. 3. However, if the tamping tool assembly is moved slightly backwards, as indicated in the full-line position and by the short arrow, the opposed tools of the assembly will be positioned properly alongside the ties to be tamped.

In accordance with the present invention, the tamper includes a tactile element 13 associated with tamping tool assembly 9 and in contact with the track to prove the position of a tie 5 or another track component. As shown by a broken line, the tactile element 13 is connected to the operator's stand 1' so that the tamping tool assembly may be moved in the direction of elongation of the track in response to the probing of the tactile element. Systems for controlling the movement of tamper parts in response to the probing of tactile elements in contact with the track are well known, as exemplified, for instance, in our U.S. Pat. Nos. 2,976,816 and 3,127,848.

The movement of the other tamping tool assembly may then be controlled in response to the movement of the one as-

sembly. However, if desired, a tactile element or other control element may be associated with each tamping tool assembly for control of its movement in the direction of track elongation.

While grading, i.e. lifting, of the track may be accomplished at least partially by intensive tamping, wherein sufficient ballast is tamped underneath the track ties to lift the track, the tamper illustrated in the drawing, comprises a means **14** for lifting the track, which is mounted forwardly of the foremost tamping tool assembly in the working direction of the tamper. The illustrated track lifting means comprises pairs of flanged rollers which glidingly grip the track rails and which may be lifted by a hydraulic motor, such as fully described and claimed in out U.S. Pat. No. 3,381,615. Any other suitable track lifting means may be used, however, including such means associated with each tamping tool assembly. It is, of course, possible to effect lifting of the track by vertically movable track grippers and then to grade finely by additionally moving the track up to the desired grade by tamping.

It is useful to limit the upward movement of the track to a predetermined distance by mounting a track shoe **15** on frame **1**. This track shoe is arranged for contact with, and to exert a downward pressure on, the track. The illustrated track shoe is arranged adjacent each tamping tool assembly, i.e. therebetween, and consists of pairs of flanged rollers engaging the track rails and being pressed down on the rails by a hydraulic motor mounted on the support beam **11**. In this way, the distance of the track shoe from the frame is adjustable and the distance of any upward movement of the track is determined by the adjusted distance of the track show from the support beam.

Track position correcting means on the tamper may also include lateral track shifting means so that the tamper may operate not only for grading but also for lining the track. This may be accomplished very simply by making the track lifting means also laterally movable. Thus, the track rail gripping rollers will move the track laterally when they are so moved. Furthermore, the track shoe **15** may also be laterally movable to constitute additional lateral track shifting means, coarse lining being effected by means **14**, for instance, while fine lining is effected by track shoe **15**. These track shifting positions are indicated in FIG. **2** by pairs of double arrows.

It may be desirable to limit the extend of track movement during grading and/or lining to a predetermined section of the track while a previously corrected track section is held fixed against correcting movement. For this purpose, the gripping rollers of track shoe **15**, for instance, may be used as means movable in relation to, but engaging, the track to hold the track in a fixed position between the running gears **2** and **3**. When the hydraulic motor presses the rollers against the track rails, the rollers will hold the track in position against vertical and/or lateral movement.

It will also be noted that, while the lateral track shifting means may be individually operated, a lateral movement of the carrier **6**, on which the track engaging means are mounted, will laterally move these means in respect of frame **1** to effect lining, as proposed in the embodiment of FIGS. **1** and **2**.

In this embodiment, the reference system includes a reference wire **16** extending from a front bogie **17** on the ungraded track section to a rear station **18** supported on the corrected track section in the range of the rear running gear **2** of the tamper. The height of the wire and anchor at station **18** may be adjusted. An intermediate bogie **19** is coupled respectively to the tamper and to the front bogie **17** by rods **20**, **21**, being positioned closer to the tamping station than the front bogie. The intermediate bogie serves to control the position of reference line **16** if and when the front bogie **17** happens to be located at a "false" high point, i.e. if it rests on a track point which is lower than the track point on which the intermediate bogie rests. In this case, the intermediate bogie will support the reference line and will become the front station of the reference system. The spacing between the intermediate and front bogies **17** and **19** is preferably the same as that between the tamping tool assemblies **9** and **10**.

The reference system also includes a track position indicating element **22** and **23** associated with each tamping tool assembly for cooperation with the reference wire **16**. Each indicating element has a spotboard whose edge is arranged to contact the reference wire, the spotboard being supported on the track rail and being raised therewith.

In the embodiment of FIGS. **4** and **5**, wherein like parts functioning in a like manner have been designated by like reference numerals, the carrier **6** has been mounted on frame **1** by means of transverse beams **6'**, hydraulic motors **8'** and **8''** enabling the carrier to be shifted laterally in respect of the track.

The means for controlling the movement of the tamping tool assemblies **9**, **10** includes a visible control. The illustrated control consists of a television camera **24** associated with each tamping tool assembly to view the ties to be positioned between the opposed tools of the adjacent pairs of tools, and television screens **24'**, **24'** at the operator's stand **1'** to enable the operator to view the tie positions and to move the tamping tool assemblies accordingly to center the assemblies properly in relation to the ties, as illustrated in FIG. **6**, which shows the particularly usefulness of the invention with obliquely positioned ties.

The reference system illustrated in conjunction with this embodiment is that more fully described and claimed in our U.S. Pat. No. 3,334,593. In this reference system, two overlapping reference lines **25** and **29** are constituted by sight lines or bundles of radiation, such as light rays. The light beam **25** is projected from sender **26** to receiver **27** at the rear station of the system. The end point **26** of beam **25** is adjusted in relation to the reference beam **29** which is a sight line extending from a sighting instrument **31**, such as a telescope, to the spotboard **30** of the track position indicating element **23** and passing through a transparent marker on spotboard **28** attached to sender **26**. Since the reference line **29** is very long, advance of the tamper over four track ties will produce no substantial changes in the vertical position of sender **26** so that accurate grading will be assured.

The tamper of this embodiment may be operated selectively in either direction along the direction of track elongation without being turned around, having a track position correcting means **14'** mounted on the other side of the center point of the tamper. As shown, in fact, each essential operating component of the tamper is duplicated on each side of the center point.

If the tamper is to be used for lining, any suitable reference system for lining purposes may be installed. Since such systems are well known and a showing thereof would have made the drawing too crowded, it has been omitted.

While the invention has been described and illustrated with certain now preferred embodiments, it will be clearly understood that many variations and modifications may occur to those skilled in the art without departing from the spirit and scope thereof.

We claim:

1. A mobile track tamper for tamping ballast underneath a track including rails supported on a plurality of spaced ties resting on the ballast, said tamper comprising

1. a plurality of tamping tool assemblies mounted in spaced relation in the direction of elongation of the track,
   a. at least one of the tamping tool assemblies being movable in said direction in relation to the tamper whereon it is mounted for tamping a selected one of said ties by the movable tamping tool assembly;
2. means for controlling the movement of the movable tamping tool assembly in response to the location of the selected tie;
3. means for correcting the position of the track; and
4. a reference system for indicating the correct track position.

2. The mobile track tamper of claim **1**, wherein the means for controlling the tamping tool assembly movement includes a tactile element associated with the movable tamping tool assembly and in contact with the track.

3. The mobile track tamper of claim 2, wherein the tactile element is arranged for contact with a tie.

4. The mobile track tamper of claim 1, wherein the means for controlling the tamping tool assembly movement includes a visible control arranged to view the location of the one tie.

5. The mobile track tamper of claim 1, wherein the track position correcting means includes a means for lifting the track, said track lifting means being mounted on the tamper forwardly of the foremost tamping tool assembly.

6. The mobile track tamper of claim 1, wherein the track position correcting means includes a means for laterally shifting the track.

7. The mobile track tamper of claim 6, wherein said lateral track shifting means is vertically movable whereby it may be operated for track lifting and shifting, said track lifting and shifting means being mounted on the tamper forwardly of the foremost tamping tool assembly.

8. The mobile track tamper of claim 6, wherein the lateral track shifting means comprises a carrier, track engaging means mounted on the carrier, and means for mounting the carrier on the frame for lateral movement in respect of the frame.

9. The mobile track tamper of claim 1, further comprising a common elongated frame for mounting the tamping tool assemblies.

10. The mobile track tamper of claim 1, wherein each assembly includes two pairs of opposed tamping tools, said pairs of tools being so spaced from each other in said direction that the tools of each pair which are adjacent to each other are at a smaller distance from each other than the distance between adjacent ones of said ties, the opposed tools of each pair being arranged for immersion in the ballast adjacent one of said ties and for reciprocation in said direction, with the one tie positioned between the opposed tools of each pair.

11. The mobile track tamper of claim 1, wherein each of the tamping tool assemblies is independently movable in said direction, and the means for controlling the movement of the movable tamping tool assembly in response to the location of the selected tie controls the movement of a first one of the assemblies, the movement of successive ones of said assemblies being controlled in response to the movement of the first assembly.

12. The mobile track tamper of claim 11, wherein each of the tamping tool assemblies is independently movable in said direction, and the means for controlling the tamping tool assembly movement includes a tactile element associated with each assembly and in contact with the track.

13. A mobile track tamper for tamping ballast underneath a track including rails supported on a plurality of spaced ties resting on the ballast, said tamper comprising

2. an elongated frame;

2. a plurality of tamping tool assemblies mounted on the frame in spaced relation in the direction of elongation of the track for movement in said direction in relation to the tamper whereon they are mounted,

a. each tamping tool assembly being movable independently in said direction for tamping a selected one of said ties;

3. a track shoe mounted on said frame and arranged for contact with, and to exert a downward pressure on, the track, the track shoe being arranged adjacent each tamping tool assembly for limiting any upward movement of the track to a predetermined distance;

4. means for controlling the movement of at least one of the tamping tool assemblies in response to the location of the selected tie;

5. means for correcting the position of the track; and

6. a reference system for indicating the correct track position.

14. The mobile track tamper of claim 13, wherein the vertical distance of the track shoe from the frame is adjustable, said distance of the upward movement of the track being determined by the adjusted distance of the track shoe from the frame.

15. The mobile track tamper of claim 13, wherein the track shoe is mounted between two adjacent ones of said tamping tool assemblies.

16. A mobile track tamper for tamping ballast underneath a track including rails supported on a plurality of spaced ties resting on the ballast, said tamper comprising

1. an elongated frame;

2. a plurality of tamping tool assemblies mounted on the frame in spaced relation in the direction of elongation of the track for movement in said direction, each assembly including

a. two pairs of opposed tamping tools, said pairs of tools being so spaced from each other in said direction that the tools of each pair which are adjacent to each other are at a smaller distance from each other than the distance between adjacent ones of said ties, the opposed tools of each pair being arranged for immersion in the ballast adjacent one of said ties and for reciprocation in said direction, with the one tie positioned between the opposed tools of each pair;

3. means for controlling the movement of at least one of said tamping tool assemblies in response to the location of the one tie which is to be positioned between the opposed tools thereof;

4. means for correcting the position of the track,

b. the track position correcting means including a means for laterally shifting the track;

5. two running gears mounting the frame for mobility on the track,

c. the tamping tool assemblies and the lateral track shifting means being mounted on the frame between the running gears; and

6. a reference system for indicating the correct track position.

17. The mobile track tamper of claim 16, wherein the lateral track shifting means is mounted between two adjacent tamping tool assemblies.

18. A movable track tamper for tamping ballast underneath a track including rails supported on a plurality of spaced ties resting on the ballast, said tamper comprising

1. an elongated frame;

19. The mobile track tamper of claim 18, wherein the reference system comprises a succession of references lines overlapping each other in the direction of elongation of the track.

20. The mobile track tamper of claim 19, wherein one of said reference lines is associated with each of said correcting stations.

21. The mobile track tamper of claim 19, wherein at least one of said reference lines has an end point adjustable in relation to the reference line which it overlaps, and an element indicating the position of the track associated with said reference line.

22. The mobile track tamper of claim 18, wherein the reference system comprises a reference line, the reference line cooperating with the track position indicating element which indicates the highest position of the track in respect to the uncorrected track position for controlling the correction of the track.

23. A mobile track tamper for tamping ballast underneath a track including rails supported on a plurality of spaced ties resting on the ballast, said tamper comprising

1. an elongated frame;

2. a plurality of tamping tool assemblies mounted on the frame in spaced relation in the direction of elongation of the track for movement in said direction, each assembly including

a. two pairs of opposed tamping tools, said pairs of tools being so spaced from each other in said direction that the tools of each pair which are adjacent to each other are at a smaller distance from each other than the distance between adjacent ones of said ties, the opposed tools of each pair being arranged for immersion in the ballast adjacent one of said ties and for recipro-

cation in said direction, with the one tie positioned between the opposed tools of each pair;

3. means for controlling the movement of at least one of said tamping tool assemblies in response to the location of the one tie which is to be positioned between the opposed tools thereof;

4. means for correcting the position of the track,

b. the track position correcting means including a track shoe for laterally shifting the track, the track shoe being mounted on said frame and arranged for contact with, and to exert a downward pressure on, the track, the track shoe being laterally movable and arranged adjacent a tamping tool assembly for limiting any upward movement of the track to a predetermined distance; and

5. reference system for indicating the correct track position.

24. A mobile track tamper for tamping ballast underneath a track including rails supported on a plurality of spaced ties resting on the ballast, said tamper comprising

1. an elongated frame;

2. a plurality of tamping tool assemblies mounted on the frame in spaced relation in the direction of elongation of the track for movement in said direction, each assembly including

a. two pairs of opposed tamping tools, said pairs of tools being so spaced from each other in said direction that the tools of each pair which are adjacent to each other are at a smaller distance from each other than the distance between adjacent ones of said ties, the opposed tools of each pair being arranged for immersion in the ballast adjacent one of said ties and for reciprocation in said direction, with the one tie positioned between the opposed tools of each pair;

3. means for controlling the movement of at least one of said tamping tool assemblies in response to the location of the one tie which is to be positioned between the opposed tools thereof;

4. means for correcting the position of the track;

5. two running gears mounting the frame for mobility on the track;

6. means movable in relation to, but engaging, the track to hold the track in a fixed position,

b. said track engaging means being mounted between the running gears at a point it is desired to hold the track fixed against any correcting movement; and

7. a reference system for indicating the correct track position.

25. A mobile track tamper for tamping ballast underneath a track including rails supported on a plurality of spaced ties resting on the ballast, said tamper comprising

1. an elongated frame;

2. a plurality of tamping tool assemblies mounted on the frame in spaced relation in the direction of elongation of the track for movement in said direction, each assembly including

a. two pairs of opposed tamping tools, said pairs of tools being so spaced from each other in said direction that the tools of each pair which are adjacent to each other are at a smaller distance from each other than the distance between adjacent ones of said ties, the opposed tools of each pair being arranged for immersion in the ballast adjacent one of said ties and for reciprocation in said direction, with the one tie positioned between the opposed tools of each pair;

3. means for controlling the movement of at least one of said tamping tool assemblies in response to the location of the one tie which is to be positioned between the opposed tools thereof;

4. means for correcting the position of the track mounted at each side of the center point of the tamper; and

5. a reference system for indicating the correct track position,

b. the reference system including track position indicating elements associated with each of the track position correcting means whereby the track position may be corrected by the tamper operating in either direction along the direction of elongation of the track.

26. A mobile track tamper for tamping ballast underneath a track including rails supported on a plurality of spaced ties resting on the ballast, said tamper comprising

1. a plurality of tamping tool assemblies mounted in spaced relation in the direction of elongation of the track for movement in said direction in relation to the tamper whereon they are mounted,

a. each tamping tool assembly being movable independently in said direction for tamping a selected one of said ties;

2. means for controlling the movement of at least one of the tamping tool assemblies in response to the location of the selected tie;

3. means for correcting the position of the track, said track position correcting means including

b. a plurality of means for lifting the track, each track lifting means being mounted on the tamper forwardly of an associated one of said tamping tool assemblies; and

4. a reference system for indicating the correct track position.