

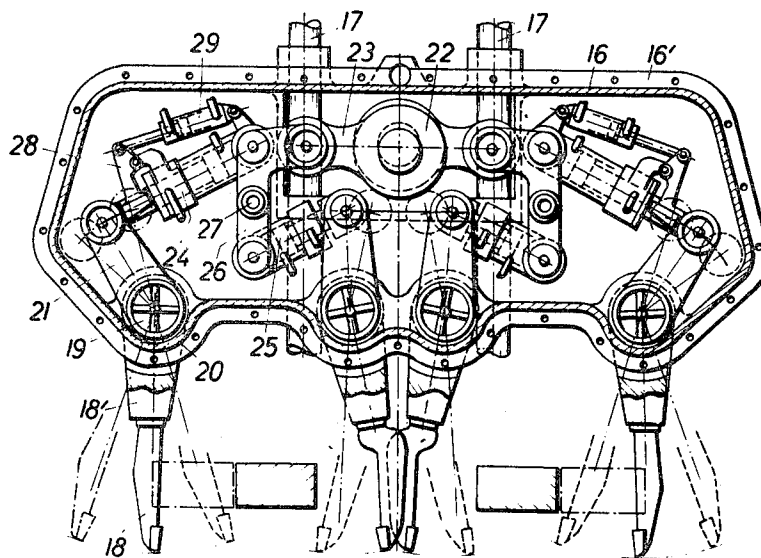
[72] Inventors **Franz Plasser;**
Josef Theurer, both of Johannesgasse 3,
1010 Vienna, Austria
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[56] **References Cited**
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Primary Examiner—Arthur L. La Point
Assistant Examiner—Richard A. Bertsch
Attorney—Kurt Kelman

[54] **TRACK-TAMPING ASSEMBLY**
13 Claims, 3 Drawing Figs.

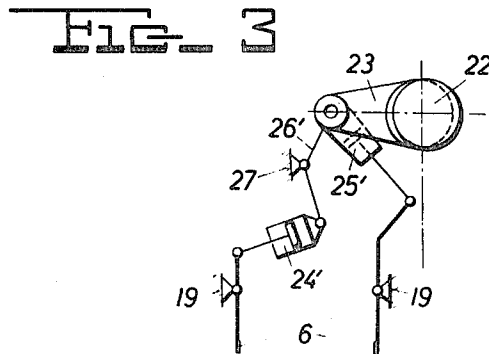
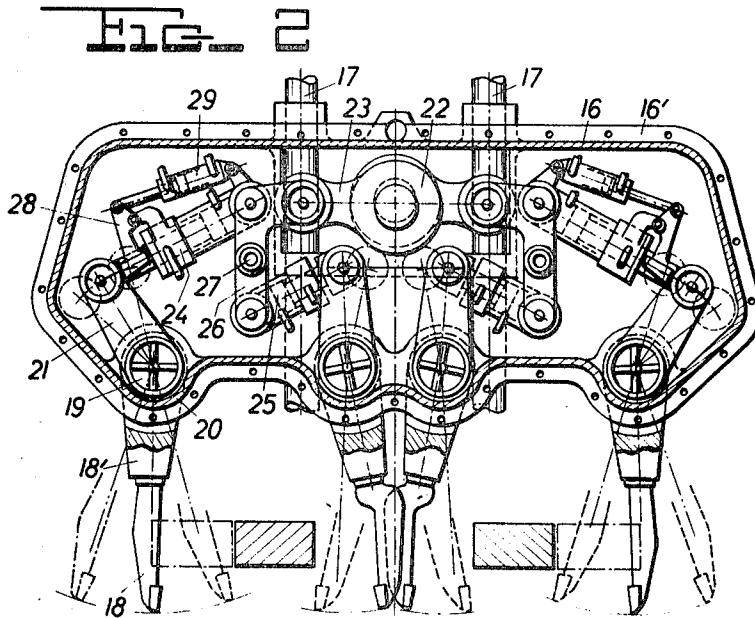
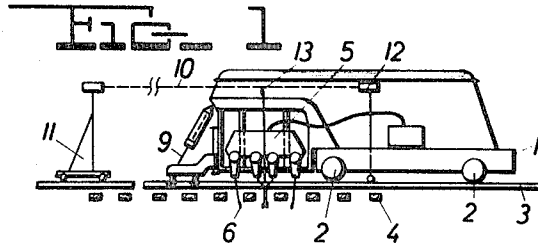
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11, 13

ABSTRACT: A track-tamping assembly including a pair of opposed, vibratory and reciprocable tamping tools is mounted on a vertically adjustable carrier, and a transmission lever is mounted on the carrier independently of the tamping-tool-vibrating means to link the upper ends of the tamping tools to the vibrating means.



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3,608,498



INVENTORS
FRANZ PLASSER
JOSEF THEURER
BY *Yusufetman*
AGENT

TRACK-TAMPING ASSEMBLY

BACKGROUND AND SUMMARY OF THE INVENTION

The present invention relates to a machine for tamping ballast underneath a track including rails supported on a plurality of ties resting on the ballast and spaced in the direction of track elongation, and more particularly to improvements in track-tamping assemblies mounted on such machines in a vertically adjustable carrier for vertical movement therewith.

Known track-tamping assemblies include a pair of opposed tamping tools and means mounted on the carrier for vibrating and reciprocating the opposed tamping tools in the direction of track elongation. Each tool has two ends, and the lower end is arranged for immersion in the ballast adjacent one of the ties, with the one tie positioned between the opposed tools of the pair. It is also known to provide a twin assembly which includes two such pairs of opposed tamping tools, the pairs of tools being so spaced from each other in the direction of track elongation 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 ties whereby the adjacent tools of the two pairs of tools may be immersed in the ballast between two adjacent ties. With either type of track tamping assembly, a common vibrating means may be provided for all tamping tools, as shown, for instance, in our U.S. Pat. Nos. 3,357,366 and 3,429,276.

It is the primary object of the present invention to connect the tamping tools operatively with the common vibrating means in a most economical and room-saving manner enabling all drives for the vibratory and/or reciprocating movement of the tamping tools to be mounted compactly in a minimum of space.

It is a more specific object of this invention to provide a single transmission element at least indirectly connected to the vibrating means for driving a plurality of tamping tools with a minimum of moving parts.

In accordance with the invention, such a transmission element is linked to the upper ends of the opposed tamping tools of each pair of tools, the transmission element being mounted on the track tamping tool assembly carrier independently of the vibrating means.

Any suitable means may be used for reciprocating the tamping tools of each pair, including hydraulic, hydromechanical or mechanical means. A preferred reciprocating means is a hydraulic or pneumatic motor, i.e. a cylinder-and-piston device operated by a pressure fluid. The vibrating means may also take any suitable form, a common cam shaft which vibrates two arms extending therefrom in opposite directions being preferred, the two vibrating means being linked to the upper ends of the tamping tools.

Particular advantages will be obtained by the present invention in connection with the above-described twin-track-tamping assemblies. In this case, the tamping-tool-reciprocating means preferably includes a separate drive, such as a hydraulic motor, connected to the upper ends of each tamping tool, and one transmission element for each pair of opposed tools is linked to the respective drives of said pairs of tools.

DETAILED DESCRIPTION OF DRAWING

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

FIG. 1 is a schematic side view of a generally conventional ballast-tamping machine wherein this invention may be used;

FIG. 2 is a vertical section showing the mounting of a twin tamping tool assembly according to one embodiment of the invention; and

FIG. 3 is a schematic view showing another embodiment of a tamping tool mounting in accordance with the invention.

DETAILED DESCRIPTION

Track tamping machines of the general type shown in FIG. 1 are known, for instance, from our U.S. Pat. Nos. 3,357,366, 3,372,651 and 3,429,276. They include a carriage frame 1 having front and rear wheels 2, 2 mounted for movement on track 3 whose rails are supported on a plurality of ties 4 resting on the ballast (not shown) and spaced in the direction of track elongation. A carrier 5 is vertically adjustably mounted on the carriage frame and a twin-track-tamping assembly is mounted on the carrier for vertical movement therewith.

It should be clearly understood that the invention is also applicable to the type of track-tamping assembly including a single pair of opposed tamping tools wherein each tool has two ends and one of the ends of the pair of tamping tools is arranged for immersion in the ballast adjacent one of the ties, with the one tie being positioned between the tools.

The tamping tools are vibratory and reciprocable in the direction of track elongation.

In the illustrated embodiment, the tamping tool assembly includes two pairs of opposed tamping tools, and the pairs of tools are spaced from each other in the direction of track elongation so 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 ties whereby the adjacent tools of the two pairs may be immersed in the ballast between the adjacent ties.

As indicated in FIG. 1, present day track tampers also include means for grading or leveling the track, including track-lifting means 9 at the front end of the carriage frame, and a reference system in respect of which the track is leveled, such system including a reference line 10 extending from a front bogie 11 in the uncorrected track section to a rear station 12 resting on the corrected track section. The reference system also includes a stop 13 cooperating with the reference line and resting on the track section being tamped and raised. All of this structure and its function are well known.

In the embodiment of the invention illustrated in FIG. 2, the tamping tool assembly carrier is constituted by a common housing 16 defining a sump for a lubricating medium, such as oil. The housing 16 is vertically adjustably mounted on columns 17, 17 in the carriage frame for moving the lower ends of the tamping tools into and out of immersion in the ballast.

Each tamping tool of the twin tamping tool assembly is shown to include a pivot 19 intermediate its ends about which the tool is reciprocated, the tool being a lever swinging about this pivot. An upper portion 21 of the tamping tools extends from pivot 19 into housing 16 and a lower portion 18' extends downwardly from the pivot and outwardly of the housing. The lower portion 18' of the tamping tools constitutes a mount for tamping tool jaw 18.

The housing 16 has a bottom formed with concave portions 20 accommodating respective pivots 19 of the tamping tools which are flooded with the lubricating oil in the housing. Suitable sealing means or gaskets are provided around the tamping tool pivots for preventing leakage of the oil through the housing bottom. The upper and lower tamping tool portions are detachably connected, for instance by means of a bolt fastening together a forked upper end of the lower tamping tool portion grasping a lower end of the upper tamping tool portion. If the two tamping tool portions are clamped together in this manner, their relative angle in respect of each other may be adjusted so that the distance between the lower ends of the tools of each pair may be changed, for instance to tamp double ties.

The housing 16 consists of detachably connected wall portions which may be bolted together along their mating flanges 16' so that the housing may be opened for access to the parts mounted therein, the various shafts or pivots for the moving parts in the housing being supported by the housing wall.

The illustrated common tamping-tool-vibrating means includes a common camshaft 22 mounted in the housing wall

and extending in a plane which is transverse and vertical to the track and runs centrally between the columns 17, 17. A pair of arms 23 extend oppositely from the camshaft in the direction of track elongation, and the arms are vibrated by the shaft upon rotation thereof. The upper ends of the tamping tools of each pair are linked to a respective camshaft arm in the manner now to be described.

In the illustrated embodiment, separate drives 24 and 25 are connected to the upper ends of each tamping tool for reciprocating the opposed tamping tools in the direction of track elongation, the illustrated drives being hydraulic motors. A transmission element 26 is mounted in the housing 16, its fulcrum 27 being mounted on the housing wall independently of the camshaft. The upper ends of the tamping tools of each pair are linked to a respective transmission element 26 by means of the interposed drives 24, 25, and each transmission element is at least indirectly connected to the vibrating means, being linked to the outer ends of the camshaft arms in the illustrated embodiment.

As shown, the transmission element is advantageously a lever having two arms, a bellcrank lever being illustrated in FIG. 2. The upper end of one of the tamping tools is linked to one lever arm via hydraulic motor 24, and the upper end of the other tamping tool of each pair is linked to the lever arm via hydraulic motor 25. In this manner, each pair of opposed tamping tools is associated with one common transmission element, the structure being identically duplicated for each pair of the twin tamping tool assembly.

The two arms of the transmission lever 26 extend at an angle to each other, which angle faces the vertical plane wherein the cam shaft axis extends, and the upper transmission lever arm is connected to the associated vibrating arm 23. The fulcrum 27 of the transmission lever is positioned below a horizontal plane defined by the camshaft axis. The upper end of the tamping tool farther removed from the camshaft is linked to the arm of the transmission lever extending upwardly from fulcrum 27, and the upper end of the tamping tool closer to cam shaft 22 is linked to the arm of the transmission lever extending downwardly from fulcrum 27. In this manner, the tamping tools of each pair are vibrated in opposite directions.

The length of the reciprocating stroke of the opposed tamping tools of each pair may be further varied by providing adjustable stops for the reciprocating movement of the outer tool of each pair. For this purpose, a fixed stop may be mounted on the cylinder of hydraulic motor 24 and a movable stop 28 for selective engagement therewith may be mounted so as to be movable into the path of the cylinder movement by a hydraulic motor or like drive 29. The movable stop 28 will engage the fixed stop and thus limit further movement when the stop 28 is swung into the path of the cylinder movement of hydraulic motor 24 by drive 29.

In the schematically illustrated embodiment of FIG. 3, like parts functioning in a like manner are designated by like reference numerals. The fulcrum 27 of the two-armed transmission lever 26' is also mounted below the horizontal plane wherein the axis of camshaft 22 lies. Also, the upper end of one of the tamping tools 6 of the tamping assembly is linked to one of the transmission lever arms via the reciprocating hydraulic motor 24' for this tool. In this case, however, the tamping tool farther removed from the camshaft is linked to the transmission lever arm extending downwardly from fulcrum 27. On the other hand, the upper end of the tamping tool 6 closer to the camshaft 22 is linked to the transmission lever arm extending upwardly from fulcrum 27, the tamping tool reciprocating motor 25' being interposed. This upwardly extending transmission lever arm and the hydraulic motor 25' are linked to the camshaft 23 at the same pivot, in the illustrated embodiment, although the hydraulic motor may be linked directly to the transmission lever arm or to arm 23 at another pivot.

It is also possible to construct the transmission element as a lever having more than two arms, for instance three, one of the transmission lever arms serving for connection to the

vibrating means while the two other arms are linked to the upper ends of the tamping tools of each pair. Furthermore, other tamping-tool-vibrating means may be used, instead of a camshaft, as is well within the skill of the art without departing from the spirit and scope of the present invention which encompasses all structural and functional equivalents of the disclosed apparatus.

We claim:

1. A machine for tamping ballast underneath a track including rails supported on a plurality of ties resting on the ballast and spaced in the direction of track elongation, said machine comprising

1. a track-tamping assembly including a pair of opposed tamping tools, each tool having two ends and one of the ends of the tamping tools being arranged for immersion in the ballast adjacent one of the ties, with said one tie being positioned between the tools;
2. a vertically adjustable carrier whereon the track-tamping assembly is directly mounted for vertical movement therewith;
3. means mounted on the carrier for reciprocating the tamping tools of said pair in the direction of track elongation;
4. means mounted on the carrier for vibrating the tamping tools of said pair; and
5. a transmission element interconnecting the tools and mounted on the carrier independently of the vibrating means,
 - a. the other ends of said tamping tools being linked to the transmission element and the transmission element being at least indirectly connected to the vibrating means.

2. A machine for tamping ballast underneath a track including rails supported on a plurality of ties resting on the ballast and spaced in the direction of track elongation, said machine comprising

1. a track-tamping assembly including two pairs of opposed tamping tools, each tool having two ends and one of the ends of each of the tools being arranged for immersion in the ballast adjacent one of the ties, with said one tie being positioned between the tools of each of said pairs, said pairs of tools being spaced from each other in the direction of track elongation so 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 whereby said adjacent tools of the two pairs may be immersed in the ballast between said adjacent ties;
2. a vertically adjustable carrier whereon the track-tamping assembly is directly mounted for vertical movement therewith;
3. means mounted on the carrier for reciprocating the tamping tools of each of said pairs in the direction of track elongation, the tamping-tool-reciprocating means including a separate drive connected to each one of the other ends of the tamping tools of said pairs;
4. means mounted on the carrier for vibrating the tamping tools of said pair; and
5. a pair of transmission elements mounted on the carrier independently of the vibrating means,
 - a. each of the transmission elements being linked between the separate drives of the tamping tools of each of said pairs.

3. The ballast-tamping machine of claim 2, wherein said separate drives are hydraulic motors.

4. A machine for tamping ballast underneath a track including rails supported on a plurality of ties resting on the ballast and spaced in the direction of track elongation, said machine comprising

1. a track-tamping assembly including a pair of opposed tamping tools, each tool having two ends and one of the ends of the tamping tools being arranged for immersion in the ballast adjacent one of the ties, with said one tie being positioned between the tools;

2. a vertically adjustable carrier whereon the track-tamping assembly is mounted for vertical movement therewith;
3. means mounted on the carrier for reciprocating the tamping tools of said pair in the direction of track elongation;
4. means mounted on the carrier for vibrating the tamping tools of said pair; and
5. a transmission lever having two arms mounted on the carrier independently of the vibrating means,
 - a. the other end of one of said tamping tools being linked to one lever arm and the other end of the other tamping tool being linked to the other one of the lever arms, and the lever being connected to the vibrating means for vibrating the tamping tools in opposite directions.
5. The ballast-tamping machine of claim 4, wherein the tamping-tool-reciprocating means includes a separate drive connected to each other end of the tamping tools, respective ones of said drives being linked to each of said lever arms.
6. The ballast-tamping machine of claim 4, wherein the tamping-tool-vibrating means includes a camshaft rotatable about an axis extending in a plane which is transverse and vertical to the track, and an arm extending from the camshaft in the direction of track elongation and being vibrated by the shaft upon rotation thereof, the two arms of the transmission lever extending at an angle to each other, which angle faces said plane, and one of the lever arms being connected to the vibrating arm extending from the camshaft.
7. The ballast-tamping machine of claim 6, wherein the fulcrum of the transmission lever is positioned below a horizontal plane defined by the axis of the camshaft.
8. The ballast-tamping machine of claim 7, wherein the other end of the tamping tool farther removed from the vibrating means is linked to the arm extending upwardly from the fulcrum, and the other end of the tamping tool closer to the vibrating means is linked to the arm extending downwardly from the fulcrum.
9. A machine for tamping ballast underneath a track including rails supported on a plurality of ties resting on the ballast and spaced in the direction of track elongation, said machine comprising
 1. a track-tamping assembly including a pair of opposed tamping tools, each tool having two ends and one of the ends of the tamping tools being arranged for immersion in the ballast adjacent one of the ties, with said one tie being

- positioned between the tools;
2. a common housing for the tamping tools, each tamping tool including a pivot intermediate its ends about which the tool is reciprocated, and the housing enclosing the pivots and defining a sump for lubricating medium for said tamping tool pivots;
2. a vertically adjustable carrier whereon the track-tamping assembly is directly mounted for vertical movement therewith;
4. means mounted on the carrier for reciprocating the tamping tools of said pair in the direction of track elongation;
5. means mounted on the carrier for vibrating the tamping tools of said pair; and
6. a transmission element mounted on the carrier independently of the vibrating means,
 - a. the other ends of said tamping tools being linked to the transmission element and the transmission element being at least indirectly connected to the vibrating means.
10. The ballast tamping machine of claim 9, wherein said housing encloses the means for reciprocating the tamping tools and the mounting of the transmission element, the housing constituting the vertically adjustable carrier for the tamping tool assembly.
11. The ballast-tamping machine of claim 9, wherein the housing includes a bottom, the tamping tool pivots are mounted in the housing bottom, and sealing means is provided around the pivots for preventing leakage of the lubricating medium through the bottom.
12. The ballast-tamping machine of claim 11, wherein each tamping tool comprises an upper portion extending from the pivot into the housing and a lower portion extending downwardly from the pivot and outwardly of the housing, the lower portion constituting a mount for a tamping tool jaw, and means for detachably connecting the upper and lower tamping tool portions, the sealing means surrounding the tamping tool portion connecting means.
13. The ballast-tamping machine of claim 12, wherein the lower portion of the tamping tool has a forked upper end grasping a lower end of the upper tamping tool portion, and the connecting means is a bolt fastening the last-named ends together.

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