TAMPER UNIT FOR MOBILE TRACK TAMPING MACHINE

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References Cited
UNITED STATES PATENTS
2,843,055 7/1958 Hursh et al. 104/12
3,426,697 2/1969 Stewart 104/12
2,107,639 2/1938 Madison 104/12
2,986,100 5/1961 Kershaw 104/12
3,292,558 12/1966 Ovile 104/12

FOREIGN PATENTS OR APPLICATIONS
753,833 8/1956 Great Britain 104/12

Abstract
A structural tamper unit is vertically movably mounted on a mobile track tamping machine. The tamping tool carrier is pivotal in a plane parallel to the track, and a hydraulically operated drive means for vibrating the tamping tool carrier is mounted directly on the carrier.

12 Claims, 18 Drawing Figures
TAMPER UNIT FOR MOBILE TRACK TAMPERING MACHINE

The present invention relates to a novel structural tamper unit and mobile track tamper machines incorporating such units.

In tamping machines which are mounted for mobility on a track including rails supported on ties extending transversely to the elongation of the track, it has been proposed to mount tamping tools constituting levers which may be pivoted in a plane substantially parallel to the track elongation and in the direction of an adjacent tie, and to operate not only this pivoting movement but also the vibration of the tools as well as the vertical adjustment thereof for immersion in the ballast by hydraulic power.

However, known hydraulic drives for these purposes have been found to lack maximum efficiency, to require complex and space-consuming structures for the hydraulic circuits, and thus to make the most advantageous arrangement of the tools on the machine impossible, in addition to producing insufficient vibrations.

Electrically powered drives for vibratory tamping tools have also been proposed but, in addition to electrical circuitry which is subject to operating difficulties, the vibrations obtained by these known drives were relatively weak.

In tamping apparatus wherein several tamping tools were vibrated by connecting each tool by a tubular conduit to a single hydraulic fluid supply, it has not been possible to vibrate the tools in their pivoted position.

It is a primary object of the present invention to overcome the above and other disadvantages by providing a hydraulically operated drive means for vibrating the tamping tool which is unitary with the tamping tool carrier so as to be pivotally therewith so as to form a compact structural tamping unit.

Such a unit in combination with like units forming a tamping assembly, if desired, may be arranged on a mobile track tamper machine in a greater variety of forms best suited for particular tamping conditions in association with the respective rails of the track.

According to this invention, such a structural tamping unit is vertically adjustable mounted on the machine and comprises a tamping tool and a carrier for the tool unit which includes a holder for the tamping tool. The carrier holding the tamping tool as a unit is pivotally in a plane substantially parallel to the track elongation and in the direction of an adjacent tie, and hydraulically operated drive means for vibrating the carrier holding the tamping tool is mounted directly on the tamping tool carrier.

Preferably, the pivoting means is also hydraulically operated.

In a specific embodiment, the hydraulically operated drive means comprises a drive shaft extending transversely of the track, a vibration producing structural part, such as a sliding ring, journaled on the drive shaft, and a guide member, such as a bearing for the sliding ring, engaging the structural part and mounted on the carrier holding the tamping tool for movement therewith. The structural part vibrates the guide member and the carrier in vibratory motions substantially parallel to the pivoting plane upon rotation of the drive shaft.

A structural tamper unit and a tamper assembly formed of such units in a compact and simple structure which may be assembled of standardized structural parts in manifold arrangements. Such units or assemblies may be used exclusively on a tamping machine or they may be added to such machines carrying other types of tamping tools, for instance in switch tampers.

The efficiency of the pivoting and vibratory tamping tools is at a maximum because of the minimum of transmission means for transmitting motion from one part to another. These units and assemblies also take relatively little space on the tamping machine.

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

FIG. 1 is a side view of one very simple embodiment of a track tamper according to this invention;

FIG. 2 shows a side view of a structural unit incorporating one tamping tool;

FIG. 3 is a vertical section through the structural unit of FIG. 2; and

FIGS. 4 to 17 are schematic views showing various arrangements incorporating such structural units.

FIG. 18 is a diagram of a hydraulic operating circuit for the vibrating and reciprocating drives for the tamping tools.

The machine illustrated in FIG. 1 comprises a machine frame 1 mounted on wheels 2 for mobility on the track including rails 3 supported on ties 4 which rest on a ballast. The front end of the machine frame has a vertical trackway 5 wherein the carrier frame 7 is mounted for vertical movement under the power of hydraulic motor 6, the carrier frame projecting over a track section to be tamped. The carrier frame 7 supports the structural tamper units 8 of the invention. A suitable rail gripping element 9, such as gripping rollers, is mounted at the front end of the support shaft 13 while the other end of the hydraulic motor 10 for raising the track, if desired, for instance in relation to a reference system (not shown) which forms no part of the present invention. The track is fixed in position by tamping the ballast, as is also known.

The structural tamper units of this invention are mounted on the vertical support column 11 for pivotal movement about this column, the support column being fixedly braced on the carrier frame 7. An embodiment of a structural tamper unit is shown in the enlarged views of FIGS. 2 and 3.

The drive shaft 13 of the unit is journaled in a two-part housing 12. The output shaft of a hydraulic motor 14 is aligned with the drive shaft and one end of the drive shaft is coupled to the output shaft of the motor by clutch 16 so that the shaft may be driven by the motor. The other end of the drive shaft carries a fly weight 15. A support shaft 17, which extends parallel to drive shaft 13, is journaled in the lower portion of housing 12, the bushings 19 of the tamping tool holders 18 being journaled on the respective ends of the support shaft 17 which project from housing 12. In the illustrated embodiment, one of the tamping tool holders is fixedly held on the support shaft by bolt 20 threadedly engaging a threaded axial bore in the end of the support shaft while the other tamping tool holder is mounted on the support shaft for movement along its axis. For this purpose a fastening bolt 21 projects into an axially extending guide groove 22 on the projecting end of the support shaft, the bolt being loosened when it is desired to move the tamping tool holder and then fastened in position like a set screw. In this manner, the distance of the pair of tamping tool holders from each other and from rail 3 may be adjusted. The tamping tools 18 are removably mounted in the tamping tool holders in a manner well known per se.

The transmission of the driving force from shaft 13 to shaft 17 for vibrating the shaft and the tamping tools supported thereby may take any suitable form. The preferred transmission illustrated in the drawing includes a sliding ring 13 which is freely rotatably mounted on drive shaft 13 and moves in a guide 24 which is fixedly keyed to support shaft 17. The sliding ring 23 is eccentrically mounted so that only those vibrations caused by the sliding ring which are perpendicular to the guide 24 are transmitted to shaft 17. The vibratory motions move the guide 24 and the shaft 17, which is fixed thereto, alternately to one side and the other. This causes the tamping tools to be alternately oscillated and thus to be vibrated in a plane which is parallel to the direction of the pivotal movement of the tamping tools now to be described.

To effectuate the pivotal movement of the tamping tools towards and away from an adjacent tie in a direction parallel to the elongation of the track, a pair of bracket arms 25, 25 are fixed to the housing 12, the outer ends of the bracket arms being linked at 27 to one end of hydraulic motor 26 whose other end is linked at 28 to the support column 11 of the carrier frame.
It is advantageous for the hydraulic vibrating motor 4 to be in operative connection with at least one of the hydraulic pivoting motors 26 through a valve control, for instance, so as to form a single hydraulic drive system for the tamping tools. In such an embodiment, the hydraulic motor constitutes a common power source for the vibration and pivoting of the tamping tools. Such an arrangement provides a very compact structural tamper unit with a very simple hydraulic circuit which permits excellent control of the frequency of vibrations and the pivotal pressure of the tamping tools, which considerably reduces operating troubles under rough tamping conditions.

Mereby by maintaining the common hydraulic circuit which supplies the present machine to this particular embodiment, a useful hydraulic control circuit for vibrating and reciprocating the tamping tools is shown in Fig. 18.

As shown in this Fig., a constant speed pump 32 delivers hydraulic fluid from hydraulic fluid supply sump 31 to the control or programming unit 33, a pressure relief valve 34 being mounted in the circuit. The output of the unit 33 is connected through a control valve 35, 36 to direct hydraulic fluid selectively to one or the other chamber of hydraulic pivoting motors 26 for reciprocation of the tamping tools. Simultaneously, the output of unit 33 is connected to the hydraulic vibrating motors 14 mounted on housings 12. Thus, a single hydraulic operating circuit is provided for the operation of the vibrating and reciprocating drives of the tamping tools.

Tamper units of this type may be arranged in a great variety of arrangements in track tampers and related track working machines. In such arrangements, a hydromechanically operable tamping assembly may be formed of several such units and the tamping tool holders of the tamping tools may be so interconnected that the hydraulic vibration of one tool is mechanically transmitted to the other tool whereby all the tamping tools vibrate in unison while they may be pivoted in respect of each other, the tamping tools being vertically movable together.

In such a tampering assembly, a single hydraulic drive for a pair or group of tamping tools will suffice while the tamping tools may be individually moved and adjusted within the assembly. This makes for great compactness and a very space-saving structure. The control valves 35, 36 to direct hydraulic fluid selectively to one or the other chamber of hydraulic pivoting motors 26 for reciprocation of the tamping tools simultaneously. The output of unit 33 is connected to the hydraulic vibrating motors 14 mounted on housings 12. Thus, a single hydraulic operating circuit is provided for the operation of the vibrating and reciprocating drives of the tamping tools.

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mounted over the respective rails and are each pivotal about a vertical axis of symmetry 30 passing through the associated rail. The pivotal adjustment of such tamping assemblies is shown on an enlarged scale in FIG. 12 where the tamping assemblies are over a switch point.

FIG. 15 shows an arrangement wherein a series of tamping assemblies are spaced in the direction of track elongation for tamping in adjacent cribs, each assembly consisting of two tamper units 8 mounted on a common carrier pivotal about a vertical axis 30, and having a single motor 14 with a suitable power transmission to the other unit of the assembly. Three such spaced assemblies are shown so that three adjacent ties may be tamped simultaneously.

In FIG. 16, on the other hand, two tamping assemblies are provided for simultaneously tamping two adjacent ties, each such assembly consisting of two pairs of tamper units 8' each pair being mounted on a carrier 29 pivotal about a vertical axis 30. A respective pair of units is mounted on each side of the rail 3 and the units of each pair are mounted on respective sides of each tie 4. A single hydraulic motor 14 is used for the two adjacent assemblies on each side of the rail, suitable power transmission means being indicated in broken lines.

FIG. 17 is a top view of a mobile track tamper similar to that shown in FIG. 1 and carrying tamping assemblies similar to those shown in FIGS. 14 and 12, the adjustment of the tamping assemblies being at an oblique tie being clearly shown in this FIG. A further adjustment of the tamping assemblies is also indicated in FIG. 17. As indicated by the double-headed, horizontally extending arrows in this FIG., the tamping assemblies may also be mounted for movement in the direction of track elongation on carrier frame 7, thus making very fine adjustments possible in all directions. As the double-headed arrows show, universal adjustment of the tamping assembly positions in adaptation to all track conditions is thus made possible.

In mobile track tampers of the type illustrated in FIG. 17, which may be used as a track leveling machine when provided with a reference system of any suitable or conventional kind and with hydraulically operated track raising and/or shifting units, the hydraulically operated structural tamper units of this invention are particularly useful because all the track raising and tamper units may then be operated through a single hydraulic fluid supply circuit wherein the flow of hydraulic fluid to the individual units and/or assemblies of tamper units may be programmed with the highest efficiency.

We claim:
1. A structural tamper unit for a mobile track tamping machine mounted for mobility on a track including rails supported on ties extending transversely to the elongation of the track, means being provided for vertically adjustably mounting the tamper unit on the tamping machine, and the tamper unit comprising
   1. a tamping tool;
   2. a carrier for the tamping tool,
      a. the tamping tool carrier including a holder for the tamping tool;
      3. means independent of said vertical adjusting means for pivoting the carrier holding the tamping tool as a unit in a vertical plane substantially parallel to the track elongation and in the direction of the track elongation towards and away from an adjacent one of said ties; and
      4. hydraulically operated drive means for, the carrier holding the tamping tool,
      a. the hydraulically operated drive means being mounted directly on the tamping tool carrier.
   2. The structural tamper unit of claim 1, wherein the pivoting means is hydraulically operated.
   3. The structural tamper unit of claim 1, wherein the hydraulically operated drive means comprises a drive shaft extending transversely of the track, a vibration producing structural part journaled on the drive shaft, and a guide member engaging the structural part and mounted on the carrier holding the tamping tool for movement therewith, the structural part vibrating the guide member and the carrier in vibratory motions substantially parallel to the pivoting plane upon rotation of the drive shaft.
   4. The structural tamper unit of claim 3, wherein the structural part is a slide ring and the guide member is an annular bearing for the slide ring.
   5. A mobile track tamping machine mounted for mobility on a track including rails supported on ties extending transversely to the elongation of the track, comprising a hydraulically operable tamping assembly verticallyadjustably mounted on the machine, the assembly comprising two structural tamper units, each unit including
   1. a tamping tool;
   2. a carrier for the tamping tool, (a) the tamping tool carrier including a holder for the tamping tool;
   3. means for pivoting the carrier holding the tamping tool as a unit in a vertical plane substantially parallel to the track elongation and in the track elongation direction towards an adjacent one of said ties, b. the tamping tool of said tamper units being pivotal towards each other; 4. hydraulically operated drive means for, the carrier holding the tamping tool of one of said tamper units, c. the hydraulically operated drive means being mounted directly on the tamping tool carrier;
   5. drive means for vibrating the carrier holding the tamping tool of the other one of said tamper units; and
   6. transmission means interconnecting the drive means of said tamper units for transmitting power from the hydraulically operated drive means to the other drive means.
   6. The mobile track tamping machine of claim 5, further comprising means for pivoting the tamping assembly, associated with a respective one of the rails independently of the tamping assembly associated with another rail about an axis perpendicular to the plane of the track.
   7. The mobile track tamping machine of claim 6, wherein two of said tamping assemblies are associated with a respective one of said rails, the tamping assemblies being arranged on respective sides of the rails and one of the tamping assemblies associated with each rail being pivotal about said axis.
   8. The mobile track tamping machine of claim 6, wherein the structural tamper units are symmetrically arranged in said assembly and said axis extends in a vertical plane of symmetry of the assembly.
   9. The mobile track tamping machine of claim 5, further comprising a substantially fixed axle supporting the carrier holding the tamping tool for pivoting about said axle, and the hydraulically operated drive means has an output shaft substantially coaxial with said axle.
   10. The mobile track tamping machine of claim 5, further comprising means for moving the tamping assembly transversely of the track.
   11. The mobile track tamping machine of claim 10, wherein two of said tamping assemblies are associated with each of said rails, the tamping assemblies being arranged on respective sides of each rail and one of said assemblies associated with each rail being transversely movable.
   12. The mobile track tamping machine of claim 5, wherein the pivoting means is hydraulically operated, and the hydraulically operated drive means and the hydraulically operated pivoting means are connected to a single hydraulic fluid supply circuit.