# United States Patent

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[54] **MOBILE TRACK-WORKING MACHINE**
**4 Claims, 2 Drawing Figs.**


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[50] Field of Search ..... 94/48—50; 104/7, 12, 10—13



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**ABSTRACT:** A mobile track-working machine, such as a track liner, carries a surface ballast compactor whose downward pressure is periodically relieved while the machine moves along the track to facilitate the forward movement.


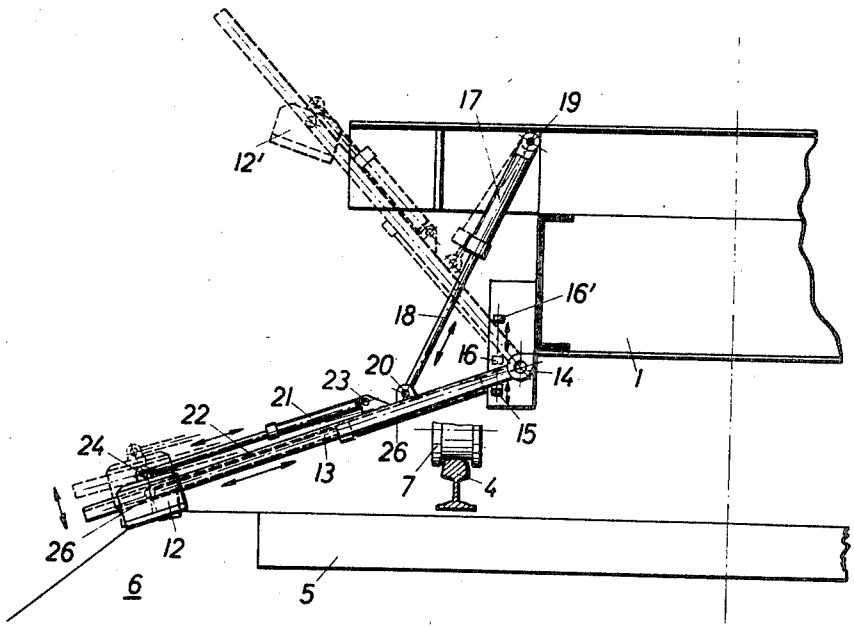

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Fig. 1

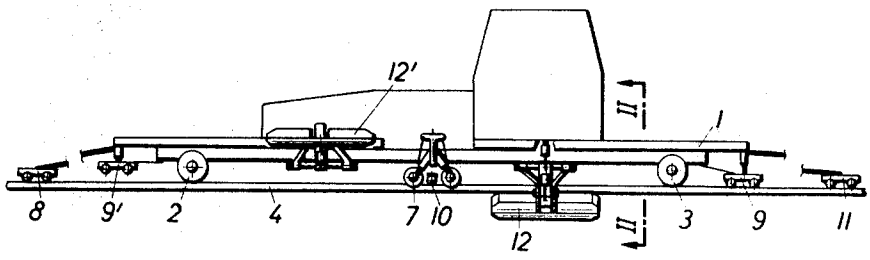
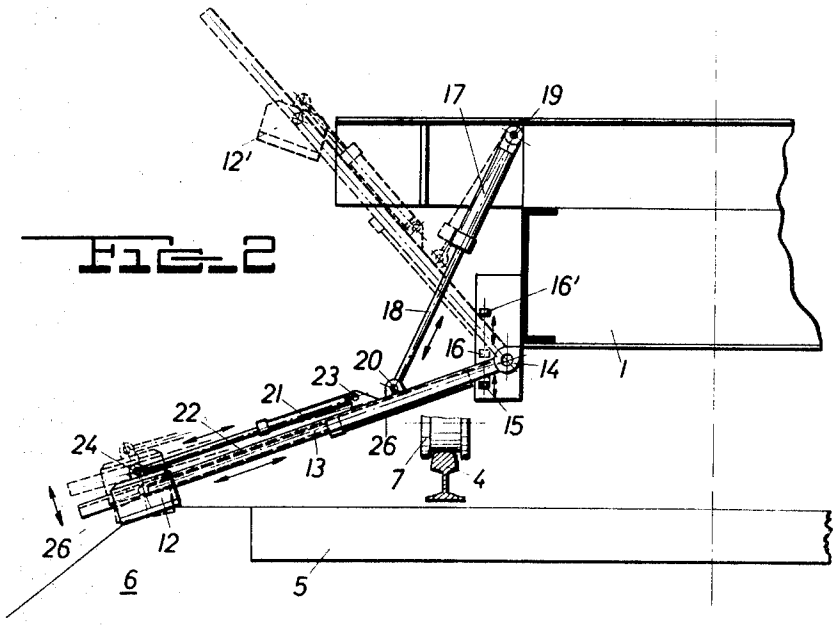



Fig. 2

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# MOBILE TRACK-WORKING MACHINE

Background and Summary of the Invention

The present invention relates to a mobile track-working machine, and more particularly to a nonstop track liner which lines the track while the machine continuously moves therealong, and which has a ballast compactor mounted on the machine for movement therewith in the direction of track elongation.

Compactors having a downwardly facing surface arranged for contact with a corresponding ballast area and actuated by means for exerting a downward pressure on the compactor surface to tamp the ballast area have been used in all types of mobile track-working machines, such as track tampers, ballast-cleaning machines and track liners. Such compactors serve to tamp the ballast in areas where track work has loosened the ballast and where ballast compaction is needed to assure maintenance of a selected track position.

More particularly, in track liners which have track-shifting means mounted on the machine for movement therewith in the direction of track elongation for laterally shifting the track in a selected transverse direction, ballast compactors are preferably mounted on the machine for contact of the compactor surface with a ballast area laterally adjacent the track in a direction opposite to the selected direction of the track shifting. Ballast tamping at this area adjacent the ends of the track ties assures that the repositioned track remains in the lined position and prevents or at least reduces spring-back of the track after the machine has advanced from the correction point and the track shifting means has released the track at this point.

Difficulties have been encountered when such compactors are mounted on machines which advance along the track because the downward pressure of the compactor on the ballast creates friction sufficient to impede the forward movement of the machine.

It is the primary object of the present invention to overcome this and other disadvantages and to assure substantially unimpeded forward movement of the machine while maintaining the tamping efficiency and without prolonging the track working time.

This and other objects are accomplished in accordance with this invention by means for preferably periodically relieving the downward pressure on the compactor surface while the machine moves in the direction of track elongation.

This may be accomplished by means for lifting the compactor out of contact with the ballast for short periods of time sufficient to reduce or remove the friction between the contacting compactor surface and the ballast. It may be sufficient for this purpose merely to relieve the downward pressure on the compactor, which may be exerted only by its own weight or by positive pressure means, so that the machine may move forwardly while the friction is momentarily at a minimum.

## BRIEF DESCRIPTION OF DRAWING

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

FIG. 1 is a schematic side view of a track liner embodying this invention; and

FIG. 2 is an enlarged side view, taken in the direction of arrows II–II, of the ballast compactor and its mounting on the track liner frame.

## DETAILED DESCRIPTION

The invention is illustrated in conjunction with the recently developed nonstop track liner developed by the inventors and capable of continuously lining a track as the apparatus advances along the track without stopping, the working direction being indicated by an arrow in FIG. 1. Such a liner comprises a frame 1 mounted on running gears 2, 3 which moves on track rails 4. The rails are fixed to ties 5 which rest on ballast 6.



Suitable and generally conventional track-shifting means 7 are mounted on the liner frame 1 for lateral movement thereof. The track shifting means includes pairs of double-flanged rollers, each pair of rollers gripping a respective rail and being operatively connected with a motor for pressing the gripped rail in the desired lateral direction for lining the track to a desired position determined by a reference system indicated only by front and rear bogies 8, 11, and intermediate bogies 9 (or 9', depending on the working direction) and 10. The reference system is well known per se and forms no part of the present invention, wherefore it is not further illustrated or described.

According to the invention and as shown in detail in FIG. 2, the track liner frame 1 carries two vibratory surface tampers or compactors 12, 12' which are spaced in the working direction and from the track-shifting means laterally adjacent a rail. As shown in FIG. 1, only the compactor mounted immediately behind the track-shifting means need be lowered into operating position, the other compactor being carried in its upper or inoperative position when the liner works in the direction of the arrow but being lowered to tamp the ballast when the lining direction is reversed. However, if found desirable, both compactors could be operated simultaneously or, if desired, a single compactor may be mounted laterally adjacent the track-shifting means. To make the apparatus useful for lining in either lateral direction, the compactor or compactors are mounted adjacent each rail, the mounting being illustrated in FIG. 2.

As shown, an otherwise conventional vibratory surface tamper is constituted by a compactor 12 having a large working surface for engagement with the ballast to be tamped. The compactor is mounted on carrier arm 13 which is pivotally movable in a vertical plane extending transversely of the track about pivot 14 on frame 1. Two preferably adjustable stops 15, 16 delimit the pivoting range of arm 13, stop 15 limiting the downward movement of the arm and stop 16 limiting its upward movement. As indicated in broken lines in FIG. 2, stop 16, in particular, is adjustable to delimit a relatively short upward movement of the arm designed to lift the compactor off the ballast, preferably periodically, during the operation while the track is being lined, as well as a relatively extended upward movement of the arm, when the stop is in posi tion 16' and the compactor is in rest position 12'.

Obviously, the illustrated mechanical stops may be replaced by suitable switches operable by the pivoting carrier arm 13 when it reached selected limits.

Carrier arm 13 is pivoted by a pneumatic or hydraulic motor including a cylinder 17 pivoted to frame 1 at 19 and a piston rod 18 pivoted to carrier arm 13 at 20. The motor 17, 18 moves the compactor 12 upwardly at selected periods.

It is advantageous for the ballast-contacting surface of the compactor 12 to be obliquely inclined towards the end of the ties 5, i.e. towards the track so that its compacting action will press the ballast in the direction of the lateral track movement during lining, the compactor always being operated on that side of the track whence it has been moved by track-shifting means 7. In this manner, the compacted ballast will help to hold the lined track in the desired lateral position, and to prevent spring-back of the track.

Preferably, the inclination of the ballast-contacting surface of the compactor is adjustable. In the illustrated embodiment, the compactor body is pivotally mounted on the carrier arm 13 at 25 for swinging motion about an axis extending in the direction of the track. A pneumatic or hydraulic motor including a cylinder 21 connected to bracket 23 on arm 13 and a piston rod 22 pivoted to the compactor body at 24 serves to swing the compactor body to adjust the inclination of its ballast contacting surface in respect of the ballast.

Furthermore, in the illustrated embodiment, the distance of the compactor from the track is also adjustable. For this purpose, another pneumatic or hydraulic motor is mounted on the carrier arm, only cylinder 26 being shown, to move the compactor body along the arm towards and away from the track.

If desired, the ballast-contacting surface of the compactor may also extend obliquely in respect of the track elongation, such oblique position being adjustable, if desired. In other words, the ballast contacting surface may be oblique not only in respect of the track plane but also in respect of a plane perpendicular thereto and extending in the direction of the track. In this case, the compacting area, i.e. the area of contact between the compactor surface and the ballast, will be widened.

Vibration of the compactor is conventionally effected by a driven eccentric mounted in the compactor body and at least the forward edge of its ballast contacting surface may be concave to facilitate movement along the track in the working direction of the liner.

To overcome possible resistance to the forward movement of the tamper in the direction of the track and also to protect parts of the machine from intermittent shocks, the carrier arm, which supports the compactor, may be resiliently yieldingly mounted, the amount of yield being controlled by suitable stops. A pressure gage may be associated with the resiliently yielding mounting of the arm to lift the same slightly off the ballast when a resistance or friction beyond a set limit is encountered. The lifting motion may be initiated by a limit switch.

In a nonstop track liner which lines the track while the liner continuously advances along the track, the intermittent lifting of the compactor from contact with the ballast is of very short duration, the time of the compactor out of contact with the ballast being only a fraction of the tamping time during which the compactor operates on the ballast. In this manner, the tamped ballast sections overlap in the direction of the track elongation while the track liner continuously advances therealong.

The lifting stroke itself may be minimal and, under certain circumstances, may amount to no more than a reduction of the downward pressure of the compactor. At any rate, the lifting stroke may be limited, for instance by adjustable stops, to interrupt only momentarily the area contact of the contacting surface of the compactor with the underlying ballast or to reduce the contact force.

The periodic or intermittent lifting of the compactor may be effected not only by the illustrated hydraulic drive but also by any suitable mechanical or electrical motor means, as will be obvious to those skilled in the art, which may be mounted outside the ballast compacting area, as shown, or in the compacting area, in which case such motor means will impart to the compactor a skipping motion.

The contact pressure of the compactor need not be reduced or eliminated periodically by may be controlled in response to a set limit of resistance encountered by the compactor during its forward movement. Such resistance or friction may be readily measured by conventional simple instrument, such as hydraulic pressure gages, and signals from such an instrument may then be used to control the lifting or downward pressure reduction of the compactor. In this case, the compactor pressure is lifted only when the measured pressure exceeds a set limit.

We claim:

1. In a mobile track-working machine, which comprises a vibratory ballast compactor mounted on the machine for movement therewith in the direction of track elongation, the compactor having a downwardly facing surface arranged for contact with a corresponding ballast area, and means for exerting a downward pressure on the compactor surface to tamp the ballast area, the improvement of means for relieving the downward pressure on the compactor surface while the machine moves in the direction of track elongation for very short time periods constituting a fraction of the time periods during which the downward pressure is exerted on the ballast whereby overlapping ones of said ballast areas are tamped in succession by the compactor as the machine continuously moves in the direction of track elongation, said downward pressure-relieving means being constituted by means for lifting the compactor out of contact with the ballast, and limit means being arranged in association with the lifting means and adjustable to two positions to limit the lifting of the compactor to a very short stroke in a first position of said limit means so as to hold the lifted compactor in a relieved position closely adjacent said ballast, said limit means in a second position thereof permitting movement of the compactor to a rest position in a direction away from said ballast.

2. In the mobile track working machine of claim 1; track-shifting means mounted on the machine for movement therewith in the direction of track elongation for laterally shifting the track in a selected transverse direction, and said ballast compactor being mounted on the machine for contact of the compactor surface with a ballast area laterally adjacent the track in a direction opposite to the selected direction of the track shifting.

3. In the mobile track-working machine of claim 2, the compactor surface being obliquely inclined toward the track.

4. In the mobile track-working machine of claim 1, wherein said lifting means includes a pivotal arm carrying the compactor for movement in a plane transverse and perpendicular to the track elongation, and motor means for pivoting the arm.