April 6, 1965 F. PLASSER ETAL 3,176,625

MOBILE TRACK ALIGNING MACHINE

Filed May 11, 1962 2 Sheets-Sheet 1

FIG. 1

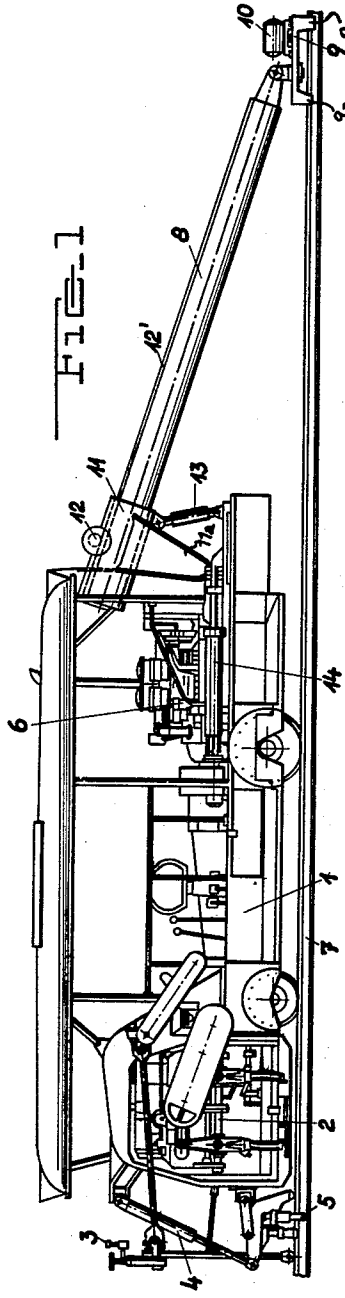
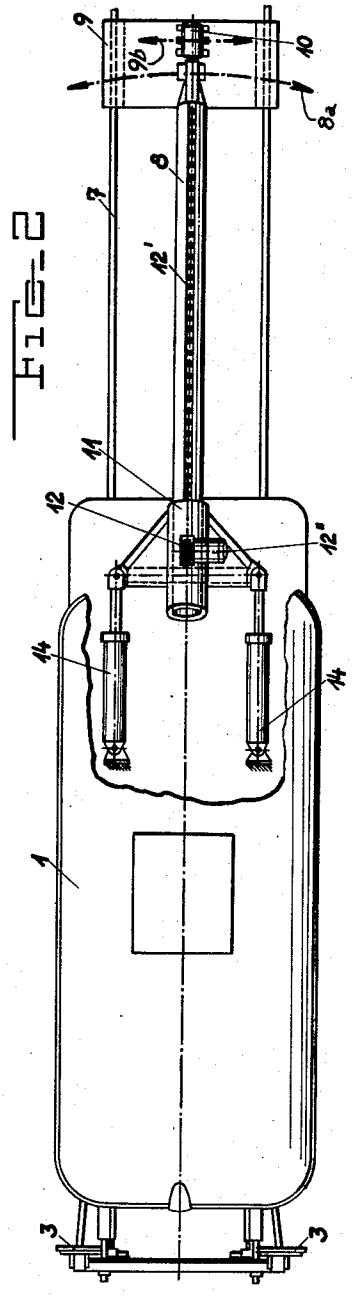


FIG. 2

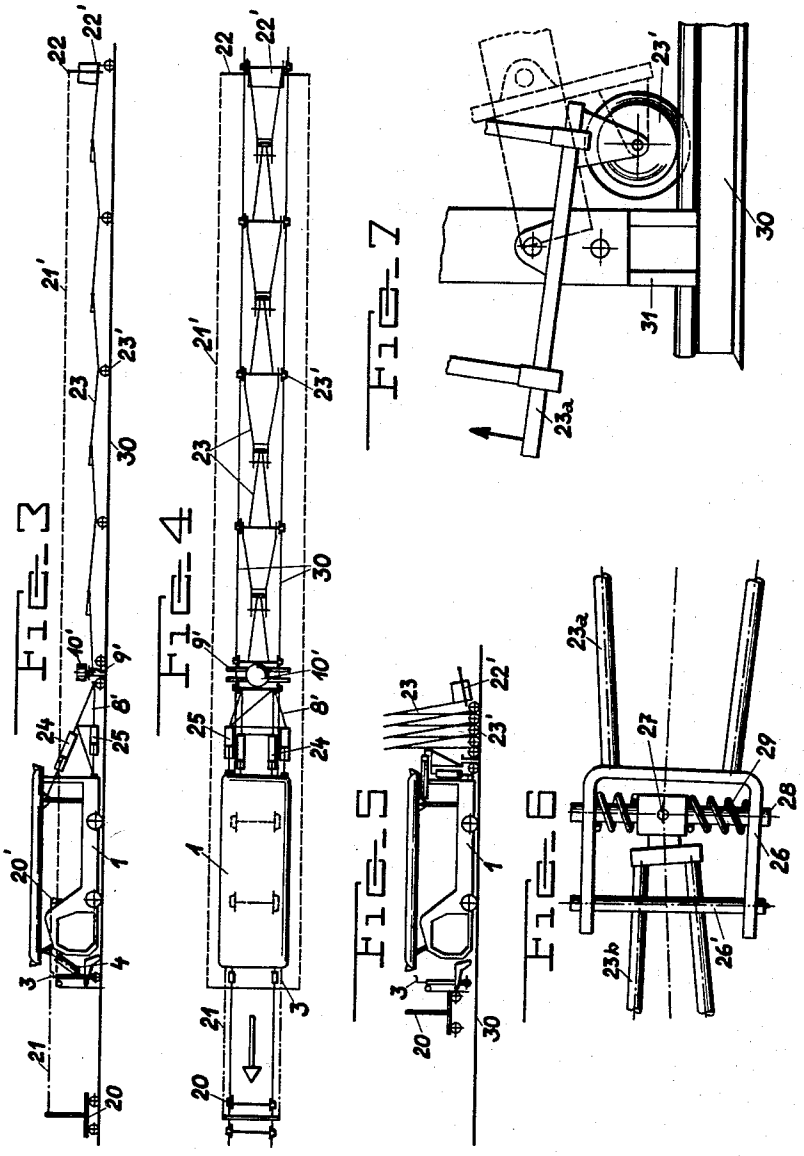


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MOBILE TRACK ALIGNING MACHINE

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7 Claims. (Cl. 104—8)

The present invention relates to improvements in track aligning machines, and more particularly to the recently introduced mobile track tampers designed for track grading, including alignment of the track in its plane.

According to this invention, the heavy chassis of a track tamping and aligning machine has mounted thereon a track aligning mechanism including a pivotal arm extending outwardly from the rear end of the machine chassis. Bearing means is provided for mounting one of the arm ends on the machine chassis while means for engaging at least one rail of the track is provided on the other arm end. There is also provided power means, for instance hydraulic motor means, for pivoting the arm and the rail engaging means is designed to transmit the pivoting power to the rail.

Since the chassis of conventional track tampers, which carries the heavy tamping tool means as well as the usually hydraulic power plant, is of sufficient weight to constitute a solid counterweight to the pivoting arm, such an arm may be used without difficulty for moving the track in relation to the chassis vertically and/or horizontally at a distance from the chassis while the track will remain stationary underneath the chassis whose weight pins the track to the ballast.

In accordance with a preferred embodiment of the invention, the friction between the track and the ballast during horizontal alignment of the track is reduced by associating vibrating means with the rail engaging means for imparting a preferably undirectional reciprocating motion to the rail engaging means. With high-frequency vibrations of this type, considerably less power is required for pushing the track horizontally in relation to the ballast. Such pushing may be further facilitated and the friction reduced to a minimum if the arm slightly lifts the track off the ballast before or during the horizontal alignment.

As indicated hereinabove, it is essential for the machine chassis to be heavy enough to serve as a fixed point for the pivoting forces of the arm extending outwardly from the chassis. This is well accomplished with a mobile track tamping and alignment machine which is not only heavy enough for this purpose but which also makes it possible to align and fix a track in an automated and continuous operation, particularly when the arm extends from the rear end of the chassis while the front end carries a suitable track grading mechanism. Thus, as such a machine proceeds continuously along the track, the track is first vertically positioned according to the desired grade, the ballast is tamped under the track ties to fix the track in the graded position and the track is finally aligned in its graded plane to assure a correctly graded and aligned track in a continuous operation with the aid of a single machine.

The above and other objects, advantages and features of the present invention will be more fully understood by reference to 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 embodiment of a track tamping and aligning machine according to the invention;

FIG. 2 is a top view of FIG. 1, with the roof of the machine chassis partly broken away to show the bearing and power pivoting means for the pivotal arm;

FIG. 3 is a schematic side view of another machine embodiment;

FIG. 4 is a top view of FIG. 3;

FIG. 5 is a view similar to that of FIG. 3 but with outwardly extending parts of the machine folded together;

FIG. 6 is a top view showing one detail of the machine of FIGS. 3–5; and

FIG. 7 is a side view showing another detail of this machine.

Referring now to the drawing and first to the embodiment of FIGS. 1 and 2, there is shown a chassis 1 of a generally conventional track tamping and aligning machine. Since such machines and their various structural features form no part of the present invention, except inasmuch as they are combined with the characteristic parts claimed herein, no detailed description or drawing of such features is presented. A track tamping and aligning machine useful in the present invention has been described and claimed, for instance, in our copending application Serial No. 27,578, filed May 9, 1960, or in our copending application Serial No. 93,123, filed March 3, 1961.

As described in these copending applications, a conventional track tamping machine carrying ballast tamping means 2 has mounted at the front end of machine chassis 1 a suitable means for lifting the track 7 on which the machine chassis moves. As fully described in application Serial No. 93,123, for instance, the track grading mechanism at the front end of the tamper may include a measuring scale 3 cooperating with a suitable reference line, such as a tensioned wire (not shown), to determine the desired grade and hydraulic track jack means 4, 5 for gripping and lifting the track to the grade determined by the reference line. The machine chassis 1 also carries a suitable power plant 6 for driving the various movable parts of the machine, including the hydraulic motor means and the wheels on which the chassis moves on the track. Neither the tamping, grading or driving means schematically described and shown herein form part of the present invention, except as far as they constitute a new combination with the other parts of the track aligning machine.

According to this invention, a pivotal arm 8 extends outwardly from one of the ends of machine chassis 1, which is the rear end of the chassis in the illustrated preferred embodiments. One end of the arm 8 is mounted in bearing means constituted by bearing sleeve 11 on the rear end of the chassis. Means is provided at the other arm end for engaging at least one rail of the track, the illustrated engaging means being a plate-shaped rail gripping member 9 extending transversely of the track and having pairs of prongs 9*a*, 9*a* at each end for power-transmitting engagement with each track rail.

The plate-shaped portion of the rail gripping member 9 carries a suitable vibrating means 10, such as a conventional eccentric motor disclosed, for instance, in German Patent No. 1,084,288, for imparting vibrations to the rail engaging means, preferably unidirectional vibrations, such as indicated by the arrows 9*b*.

To enable the machine to be readily moved over long distances without impediment by the outwardly extending arm 8, means is provided for moving the arm in the bearing means 11 inwardly into the machine chassis 1. For this purpose, the inner arm end is slidably mounted in bearing sleeve 11 and a rack 12' on the arm meshingly engages a pinion 12 mounted on the bearing sleeve. The bearing sleeve 11 is mounted on the chassis on pivotal bracket 11*a* which is supported on the chassis on a universal mounting. This enables the bracket and, therefore, the bearing sleeve and the arm 8 to be pivoted in a vertical

plane extending in the direction of the track about a fulcrum extending transversely of the track as well as to be pivoted in a horizontal plane parallel to the track and about a fulcrum extending perpendicularly to the track so that the outer end of the arm swings in the direction of arrows 8*a*. A hydraulic motor means 13 is linked to the chassis and the bearing sleeve, respectively, to effectuate the pivotal movement in the vertical plane and thus to enable the outer arm end to be lifted slightly off the ballast during the aligning operation to be described hereinafter. It also enables a more drastic pivotal movement of the bearing sleeve 11 and arm 8 to bring it into a horizontal position wherein the arm may be withdrawn through the sleeve into the chassis, the pinion 12 being driven by motor 12''. In this non-operational position of pivotal arm 8, the machine may be readily moved for long-distance hauling.

In the operational position when the arm is used to move the track in its horizontal plane in the direction of arrows 8*a* and thus to align the track, it may be preferred, as mentioned hereinabove, to lift the track slightly off the ballast to reduce friction. This horizontal movement is further facilitated by the transverse vibrating motion imparted to the rail gripping member 9 by operation of vibrator 10. In a manner well known and, therefore, not shown, the rail gripping prongs 9*a* may be operated to clamp the rails so that the rails may be lifted when the arm 8 is lifted, as well as being laterally moved by the transverse pivoting of the arm. This transverse pivoting movement is effected by another hydraulic motor means illustrated to consist of a pair of hydraulic motors 14, 14 linked, respectively, to the chassis 1 and to the support bracket 11*a* of bearing sleeve 11. When transverse pivoting of arm 8 is to be effected, the hydraulic motors 14 are so operated that the piston of one motor is pushed outwardly while the piston of the other motor is pushed inwardly by the same stroke, until the track rails have been laterally moved into the desired position.

While hydraulic pivoting means have been shown and found to be most useful, it will be obvious to those skilled in the art that they could be replaced by any suitable power means effective to pivot arm 8 and that any suitable rail engaging means may be mounted on the outer end of the pivotal arm for transmitting the mounting power to the track rails.

The conventional parts of the track tamping and aligning machine of the embodiment of FIGS. 3 to 7 being generally the same as those of FIGS. 1 and 2, they have been designated by the same reference numerals to avoid redundancy in the description.

In FIGS. 3 and 4, the track grading mechanism at the front end of the chassis is shown to include the tensioned wire 21 which cooperates with the measuring scale 3 to guide the operation of the track lifting means 3, 4. As is fully described in our above-mentioned copending applications, the tensioned wire 21 extends from a front bogie 20 to a wind-up roll 20' mounted on the chassis vertically above a point of the track section which has previously been graded, i.e. above the front axle of the chassis. In this manner, the heavy track tamper itself may be used as a reference point for grading track 30 in a manner fully described in our copending applications. Thus, as the track tamping and aligning machine advances along track 30 toward the left, as seen in FIG. 3, the track is first graded and then fixed in the graded position by tamping the ballast under the graded track ties. The transverse alignment of the previously graded track is effected on the tamped ballast with the mechanism mounted at the rear end of the machine chassis.

This transverse alignment is guided by another tensioned wire 21' associated with a track rail and extending in the general direction of the track from the front end of chassis 1 to an anchor means 22 spaced rearwardly from the rear end of the chassis and mounted on an end bogie 22'. The tensioned wire 21' serves as a reference

line for the transverse alignment of the track rails in a manner well known in the art.

The end bogie is spaced from the chassis 1 by means of a plurality of trucks 23 which travel on the track on wheels or rollers 23' so that the entire assembly advances on the track 30 in unison.

In this embodiment, the vertical pivoting means for pivotal arm 8' comprises two drive means, each consisting of a pair of hydraulic motors. When it is desired to lift the track 30 off the ballast, the pair of hydraulic motors 25 is operated so that their pistons push the outer arm end upwardly while the other pair of hydraulic motors 24 simultaneously pulls this arm end upwardly. With this pivoting arrangement, slight lifting of the track 30 causes the track in the range of the rear axle of the chassis to be subjected to such heavy downward pressure that its resultant friction with the ballast is sufficient to absorb the horizontal pressure forces caused by the lateral movement of the track so that the track moves only in the range of the rail engaging means 9' but remains stationary at the point of the rear axle. In this pivoting operation, the heavy track tamper itself serves as a fixed counter-weight to the pivoting arm 8'. The horizontal pressure forces are further reduced by vibrating the rail engaging means 9' transversely, i.e. by reciprocating the rail engaging means in the general direction of its lateral swinging motion.

While FIGS. 3 and 4 show the track tamping and aligning machine in operating position, FIG. 5 schematically illustrates the machine with its front and rear bogies 20 and 22' moved into a compact unit with the machine chassis. To make a folding of the rear aligning assembly possible, the pivotal arm 8' itself may be constituted by a plurality of hinged lengths whereby the arm may be folded or collapsed during non-use. Also, the spacing trucks 23 may be pivotally coupled together whereby the trucks may be folded or collapsed about their pivotal couplings, like scissors.

This pivotal coupling is clearly shown in FIG. 6. Each truck 23 comprises two frame parts of about equal length. The forwardly extending frame part 23*a* of each truck 23 has a yoke 26 with a transversely extending axle 28. The freely pivotal coupling 27 is slidably mounted on axle 28 and centered thereon by a pair of springs 29 bearing against the yoke and the coupling, respectively. A transverse brace 26' connects the ends of the yoke and rests on the rearwardly extending frame part 23*b* of the next adjacent truck 23.

The forwardly and rearwardly extending truck parts are hingedly connected so that the trucks may be folded about their center at which point they are supported on wheels or rollers 23' for mobility on the track. Thus, the entire assembly of spacing trucks may be folded together like an accordion while the truck wheels remain on the track (see FIG. 5).

As seen in FIG. 7, the last truck 23 carries a member 31 which is arranged to glide along the track rail and is resiliently pressed thereagainst so that the anchor means 22, 22' of the tensioned wire 21' provides a proper reference line for the track aligning operation. When the rear assembly is collapsed, as shown in FIG. 5, and the truck part 23*a* is folded uywardly (see arrow and broken lines in FIG. 7), the member 31 will also move upwardly out of contact with the rail.

Since the present invention is not concerned with the control of the grading or aligning operation by means of reference lines 21 and 21', this has not been further described herein, any suitable control being useful with the machine of this invention. The essential element in the claimed combination is the rearwardly extending pivotal arm mounted on a heavy chassis and pivotal by power means effective to transmit the pivoting power to the track. The pivoting movement of the arm in a horizontal direction may be effected by rail engaging means which engage the rail only laterally. For pivotal movement of the track in a vertical direction, the rail engaging

means must be capable of clamping or gripping the rail so as to keep it engaged when the rail is lifted off the ballast.

While the invention has thus been described in connection with certain now preferred embodiments, it will be clearly understood that many variations and modifications 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 as defined in the appended claims.

What we claim is:

1. A track tamping and aligning machine comprising a machine chassis with mobility on the track and having a front end and a rear end, track tamping means mounted on said chassis, means for lifting the track mounted at the front end of the machine chassis, a pivotal arm extending outwardly from the rear end of said machine chassis and said arm having two ends, bearing means for mounting one of the arm ends on the machine chassis, power means mounted on the machine chassis and operatively connected to the pivotal arm for pivoting said arm, and means on the other end of the arm for engaging at least one rail of the track and for transmitting the pivoting movement of said arm to said rail.

2. The track tamping and aligning machine of claim 1, further comprising means for moving the pivotal arm in said bearing means inwardly into the machine chassis.

3. The track tamping and aligning machine of claim 1, wherein said power means comprises drive means mounted on the chassis and arranged to move said one arm end laterally in respect of the track axis.

4. The track tamping and aligning machine of claim 3, wherein said drive means comprises hydraulic motor means.

5. The track tamping and aligning machine of claim 1, further comprising a reference line associated with a track rail for aligning the rail therewith, an anchor means spaced from the rear end of the chassis and holding an end of the reference line, and a plurality of trucks with mobility on the track, said trucks being arranged adjacent each other between the other arm end and the anchor means for spacing the anchor means from the other arm end.

6. The track tamping and aligning machine of claim 5, comprising means for pivotally coupling the trucks to each other whereby said trucks may be folded together about their pivotal couplings.

7. The track tamping and aligning machine of claim 5, wherein each truck is mounted on wheel means arranged in the center of the truck, each truck having two parts hingedly connected at said center and upwardly foldable about said center, a rearwardly extending one of the parts of each of said trucks being pivotally coupled to a forwardly extending one of said parts of an adjacent one of said trucks whereby the wheel means of the adjacent trucks may be rolled closely together on the track with the truck parts extending upwardly therefrom in folded condition.

References Cited by the Examiner

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OTHER REFERENCES

Ripper: German application, 1,084,288, printed June 30, 1960.

EUGENE G. BOTZ, *Primary Examiner.*

LEO QUACKENBUSH, *Examiner.*