HYDRAULIC TRACK ALIGNER

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This invention relates to railway track maintenance, and more particularly to a device for maintaining proper alignment of the rails of a track by means of the application of transverse bending stresses. Track aligning, as heretofore practiced, has involved the use of portable equipment which is moved from place to place on a frame or the like, unloaded, utilized, re-loaded and moved to the next car point requiring alignment. Track alignment by this method is time-consuming and costly, requiring the services of a relatively large crew for handling and operating the necessary jacks and other equipment.

The general object of the present invention is the provision of a self-contained track aligner comprising a framework, track-engageable wheels movably mounted on said framework, rail-engaging clamps or abutments at either end of the framework for engaging a rail to be bent into alignment on either side of the misaligned portion, movable clamps or abutments positioned generally centrally of the machine for engaging the misaligned rail portion, and means for moving the last-mentioned clamps or abutments to bend the rail and bring it into proper alignment. Preferably, the rail bending clamps or abutments are hydraulically actuated, and the machine is provided with a prime mover and a hydraulic apparatus for actuating the same.

For convenience in moving the machine from place to place along a section of track undergoing maintenance work, the machine is provided with travelling wheels of the usual type, flanged on one side, and a motor driven drive wheel. The flanged wheels are vertically retractable in order to permit the machine to be removed bodily from the track in order to permit the passage of regular rail traffic, or for storage when not in use. To this end, two of the flanged wheels are vertically reciprocable by hydraulic means, while two other flanged wheels, for engaging the other rail of the track, are journalled on spindles which are in turn pivoted for vertical angular movement relative to the main frame, means being provided to retain such spindles in position at either end of their pivotal travel. Preferably, the means for vertically reciprocating certain of the flanged wheels comprise hydraulic cylinders operated from the hydraulic means previously mentioned.

The clamps or rail abutment devices mounted at the respective ends of the main frame are likewise vertically retractable, through hydraulic means, so that they may be lifted above rail level while the machine is travelling from point to point, to avoid interference with rail joints, switches, etc.

The machine is provided with a hydraulic system including a group of valves for operating the several hydraulic cylinders and the aforesaid driving motor, and with an operator's seat positioned before the aforesaid group of valves, so that the machine operation may be expeditiously carried out by a single operator, thus enabling a very large saving of labor. All of the foregoing features are considered to be part of the present invention, and their provision is among the objects thereof.

Other and further objects, features and advantages will appear from the description which follows, read in connection with the accompanying drawings in which:

Figure 1 is a plan view of a device constructed in accordance with the invention;

Figure 2 is a side elevation of the device of Figure 1;

Figure 3 is a vertical section on line 3--3 of Figure 1;

Figure 4 is a vertical section on line 4--4 of Figure 3;

Figure 5 is a vertical section on line 5--5 of Figure 3;

Figure 6 is a view taken on line 6--6 of Figure 1;

Figure 7 is a view taken on line 7--7 of Figure 6;

Figure 8 is a vertical section on line 8--8 of Figure 1;

Figure 9 is a vertical section on line 9--9 of Figure 1;

Figure 10 is a section taken on line 10--10 of Figure 9;

Figure 11 is a section on line 11--11 of Figure 1; and

Figure 12 is a diagrammatic view showing the prime mover and hydraulic circuits.

In order to facilitate an understanding of the invention, reference is made to the embodiment thereof shown in the accompanying drawings and detailed descriptive language is employed. It will nevertheless be understood that no limitation of the invention is thereby intended and that various changes and alterations are contemplated such as would ordinarily occur to one skilled in the art to which the invention relates.

Referring now to Figures 1 and 2 of the drawings, the main framework of the present device is fabricated from relatively heavy and strong material, for example 5-inch channel section steel girders 15, 16, 17 and 18, welded together to form a relatively long and narrow diamond-shaped framework as shown. Suitable cross bracing may consist of angle irons arranged in X-fashion at 19, 19' centrally of the main frame, 20, 20' and 21, 21' intermediate the center of the main frame and either end, and 22, 22' and 23, 23' at the respective extremities of the frame. The transverse bracing of the frame is further strengthened by the transverse members 24, 24' and 25, 25' bordering the X-braces 20, 20' and 21, 21' respectively, as well as by the transverse members supporting the various operative features yet to be described.

It will be seen that the main frame is of a breadth approximating the spacing between the rails 10 and 11 of a standard railway track, but is mounted so as to be centered, longitudinally, over one of said rails. To this end, a pair of a support the frame in proper horizontal alignment and on both rails, two axles 26 and 27 are journalled transversely of the main frame, each carrying a flanged roller 28 and a cylindrical rolling support 29. The supports 29 are fixed in position longitudinally of the axles 26, 27, but are of much greater breadth than the head portion of the rail 10, while the rollers 28 float on the axles 26, 27 so as to accommodate transverse movement of the frame relative to the rail 11. The axles 26 and 27 are permanently positioned with respect to the main frame, and serve to support the same during track aligning operations.

Additional flanged rollers 28' at either end of the machine float on shafts 28'' mounted between brackets 15', 16' and 17', 18', respectively, secured to the corresponding main frame members.

For traveling from point to point along the track, the track aligning machine is provided with conventional rail engaging wheels 30, 30' and 31, 31'. The wheels 30 and 31 are journalled on short shafts 32 (Figure 6) secured between parallel horizontal members 33 which are vertically movable in slideways 34-34. Each spindle 32 likewise extends through the respective arms of a yoke 35 which is connected, at its upper end, to the piston rod 36 of a hydraulic cylinder 37. In this manner,
it is apparent that the wheels 30 and 31 may be hydraulically raised and lowered relative to the main frame, for the purpose of raising and lowering the latter relative to the rail 11.

The wheels 30' and 31' are journaled, respectively, at the outer ends of spindles 38, which are pivoted at their inner ends on longitudinal pivots 39 so that the spindles 38 may be swung in vertical planes between the positions illustrated in solid and in dotted lines in Figure 8. In the solid line position of Figure 8, the spindles 38 rest in guides formed of angle irons 48 welded to the main frame and braced by diagonal braces 41, and are retained in this position by metal straps 42. In their raised positions, the spindles 38 are retained by hook members 43 carried on the vertical diagonal braces 44 which support the hydraulic cylinders 37.

When the track aligning machine arrives at a point where it is to be used for bending a rail 11, the wheels 30 and 31 are raised relative to the main frame, by means of the hydraulic cylinders 37, and the wheels 30' and 31' are swung upwardly on their spindles 38. This has the effect of lowering the main frame relative to the rails, the machine now being supported by engagement of the flanged rollers 28 with the rail 11 and the rolling supports 29 engaging the rail 10. The machine is now free to move transversely, to some extent, relative to the respective rails.

At either end of the main frame there is provided a generally U-shaped clamp or abutment member 50 best seen in Figures 3, 4 and 5. Each clamp 50 comprises a pair of spaced parallel members mounted for sliding movement on either side of a fixed guide member 51 secured on the main frame members 15, 16 or 17, 18 as the case may be, which guide member 51 also serves to support brackets 52 which in turn support hydraulic cylinders 53 for producing vertical movements of the clamps 50. The guide member 51 is secured to the main frame and the brackets 52 are welded to the lateral extremities of the guide member 51. When the machine is to be operated for bending a rail 11, the clamps 50 at either end of the machine are placed in their lower positions as illustrated in Figure 3.

Near the longitudinal center of the main frame there are provided two transverse supports 59 (Figures 1, 9) each comprising parallel angle irons 60 welded across the main frame and connected adjacent their ends by plates 61. To the latter are secured the respective piston rods 62 of a two-way hydraulic cylinder 63 one of which is located in each support 59. Each cylinder 63 is mounted on pedestals 64 carried on a plate 65 which is slidably on the angle irons 60. A movable plate 65 is secured to the underside of the plate 65 between the parallel angle irons 60 and thus moves transversely with the cylinder 63 as hydraulic fluid is admitted to one end or another of the latter and exhausted from the opposite end thereof. The abutment member 66 is generally of inverted U-shape, the respective legs being undercut, as shown, to accommodate the head portion 11* of the rail 11 when the abutment member engages the latter to produce the required movement or bending thereof. When the wheels 30, 30' and 31, 31' are in lowered position, the main frame of the machine is raised relatively to the rails so that the abutment member 66 lies above the level of the rail head portion 11*. When said wheels are raised relatively to the main frame, the latter is supported on the rails by the flanged rollers 28 and rolling supports 29, and the movab}
5 frame in substantial mutual alignment for rolling engagement with a rail of said track, support means carried by said frame for rolling engagement with the other rail of said track, abutment means mounted on said frame adjacent the respective ends thereof and movable to positions closely adjacent either side of said first rail for engaging said first rail upon transverse movement of said frame in either direction, abutment means movable transversely of said frame to engage and press against either side of said first rail, and means for actuating said transversely movable abutment means to exert transverse pressure on said first rail.

2. The combination defined in claim 1, said actuating means comprising a double-acting hydraulic cylinder and means for supplying fluid under pressure to said cylinder.

3. The combination defined in claim 1, said actuating means comprising a pair of double-acting hydraulic cylinders, the cylinders of said pair being equally spaced from the respective ends of said frame, and means for supplying fluid under pressure to said cylinders.

4. The combination defined in claim 1, including means to raise and lower said wheels relative to said frame.

5. The combination defined in claim 4, said last means comprising a hydraulic cylinder associated with each said wheel and means for supplying fluid under pressure to said cylinders.

6. The combination defined in claim 1, including a further plurality of wheels for rolling engagement with said other rail, a handle for each of said further wheels, and a pivotally mounted handle for swinging movement in a plane transverse to said track to cause its associated further wheel to engage and disengage said other rail, and means for retaining said handle in fixed position relative to said frame at either end of its pivotal travel.

7. In a railway track aligner, in combination, a frame, a plurality of wheels journaled in association with said frame in substantial mutual alignment for rolling engagement with said other rail, a handle for each of said further wheels means pivotally mounting each said spindle for swinging movement in a plane transverse to said track to cause its associated further wheel to engage and disengage said other rail, and means for retaining said handle in fixed position relative to said frame at either end of its pivotal travel.

8. The combination defined in claim 7, said rollers being movable transversely of said frame and said support means being wider than the wheel-engaging surface of the engaged rail, whereby said frame may move transversely while supported on said rails.

9. The combination of claim 7, including means to raise said wheels relative to said frame and said rollers whereby said frame is supported on said first rail only through said rollers.

10. The combination defined in claim 1, including a drive wheel journaled in association with said frame, means for moving said drive wheel into and out of engagement with said first rail, and means for rotating said drive wheel.

11. The combination of claim 10, said last means comprising a rotary hydraulic motor, means for supplying fluid under pressure to said motor, and transmission means connecting said motor and said drive wheel.

12. The combination of claim 11, said motor and said drive wheel being mounted on a common support, means securing said support to said frame for pivotal movement, and means for controlling the pivotal position of said support relative to said frame.

13. The combination of claim 1, including means mounting each said first-mentioned abutment means for vertical movements relative to said frame, and means for producing said last-mentioned movements.

14. The combination of claim 13, said last means comprising a hydraulic cylinder associated with each said first-mentioned abutment means, and means for supplying fluid under pressure to said cylinders.

15. In a railway track aligner, in combination, a frame, a plurality of wheels journaled in association with said frame in substantial mutual alignment for rolling engagement with a rail of said track, means mounting said wheels for vertical movements relative to said frame, support means carried by said frame for rolling engagement with the other rail of said track, abutment means mounted on said frame adjacent the respective ends thereof and movable to positions closely adjacent either side of said first rail for engaging said first rail upon transverse movement of said frame in either direction, abutment means movable transversely of said frame to engage and press against either side of said first rail, and means for actuating said last-mentioned abutment means to exert transverse pressure on said first rail, and means for selectively producing all of said movements, comprising a prime mover mounted on said frame, a hydraulic pump operatively connected to said prime mover, a fluid reservoir, hydraulic cylinders associated with said wheels, said first-mentioned abutment means, and said last-mentioned abutment means, valve-controlled conduits connecting said cylinders with said pump and said reservoir, and conduit means connecting said reservoir and said pump.

16. The combination of claim 15, including a drive wheel mounted in association with said frame, a hydraulic motor operatively connected to said drive wheel, and valve-controlled conduits connecting said hydraulic motor with said pump and said reservoir.

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