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Boschung et al.

[11] **3,724,557**

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[54] **APPARATUS ADAPTED TO BE COUPLED TO A TRACTION VEHICLE SERVING FOR THE MAINTENANCE OR CONSTRUCTION OF WATER-BOUND ROADS**

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[51] **Int. Cl.** **A01b 49/02**

[58] **Field of Search** 172/199, 200, 417, 785, 780, 172/285, 197, 288, 278

[56] **References Cited**

UNITED STATES PATENTS

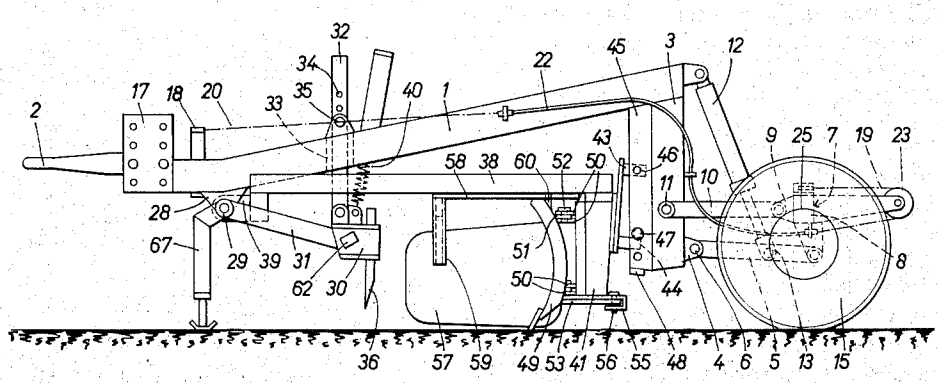
3,608,643	2/1971	Flood et al.	172/780
3,348,323	10/1967	Purdy	172/417 X
2,497,778	2/1950	Lado	172/785 X
2,662,314	12/1953	Lindeman et al.	172/285 X
2,142,985	1/1939	Arndt	172/199 X
3,043,034	7/1962	Kober	172/780 X
3,151,407	10/1964	Schmidt et al.	172/780 X
3,266,181	8/1966	Olafson	172/285 X

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[57] **ABSTRACT**

An apparatus capable of being coupled to a traction vehicle and serving for the construction or maintenance of water-bound roads, which is of the type comprising a main support bearing upon an undercarriage. This equipment also incorporates a pavement breaker beam and a levelling plate, both of which are pivotably coupled with the main support independently of one another for movement about at least one axis extending transverse to the lengthwise axis of the apparatus. According to the invention the pavement breaker beam and the levelling plate can each be arrested independently of one another at a respective predetermined spacing with respect to the main support, and further, wherein the rear end of the main support is coupled by means of a guide mechanism with the undercarriage for the purpose of regulating the height of this end above the ground.

4 Claims, 3 Drawing Figures



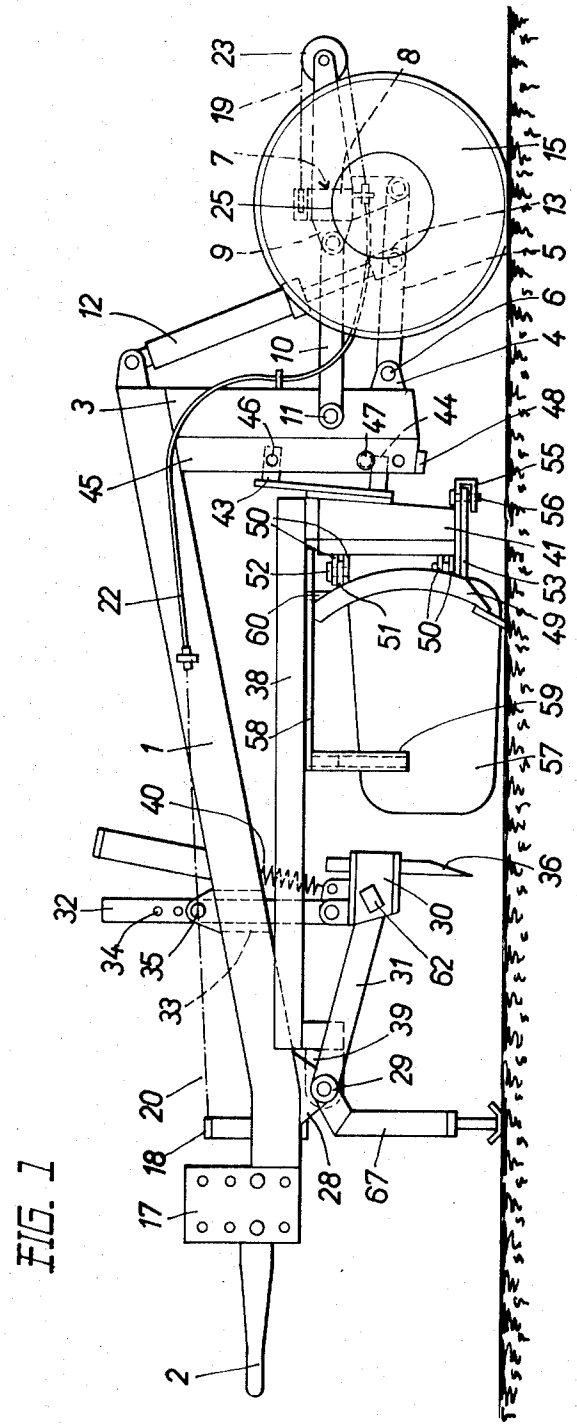

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FIG. 1

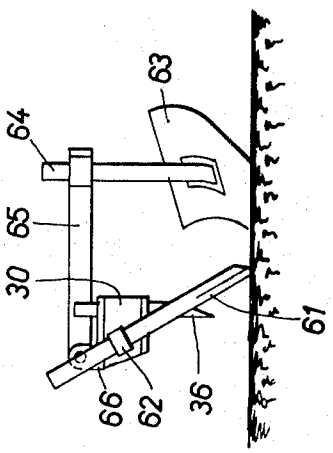

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FIG. 3

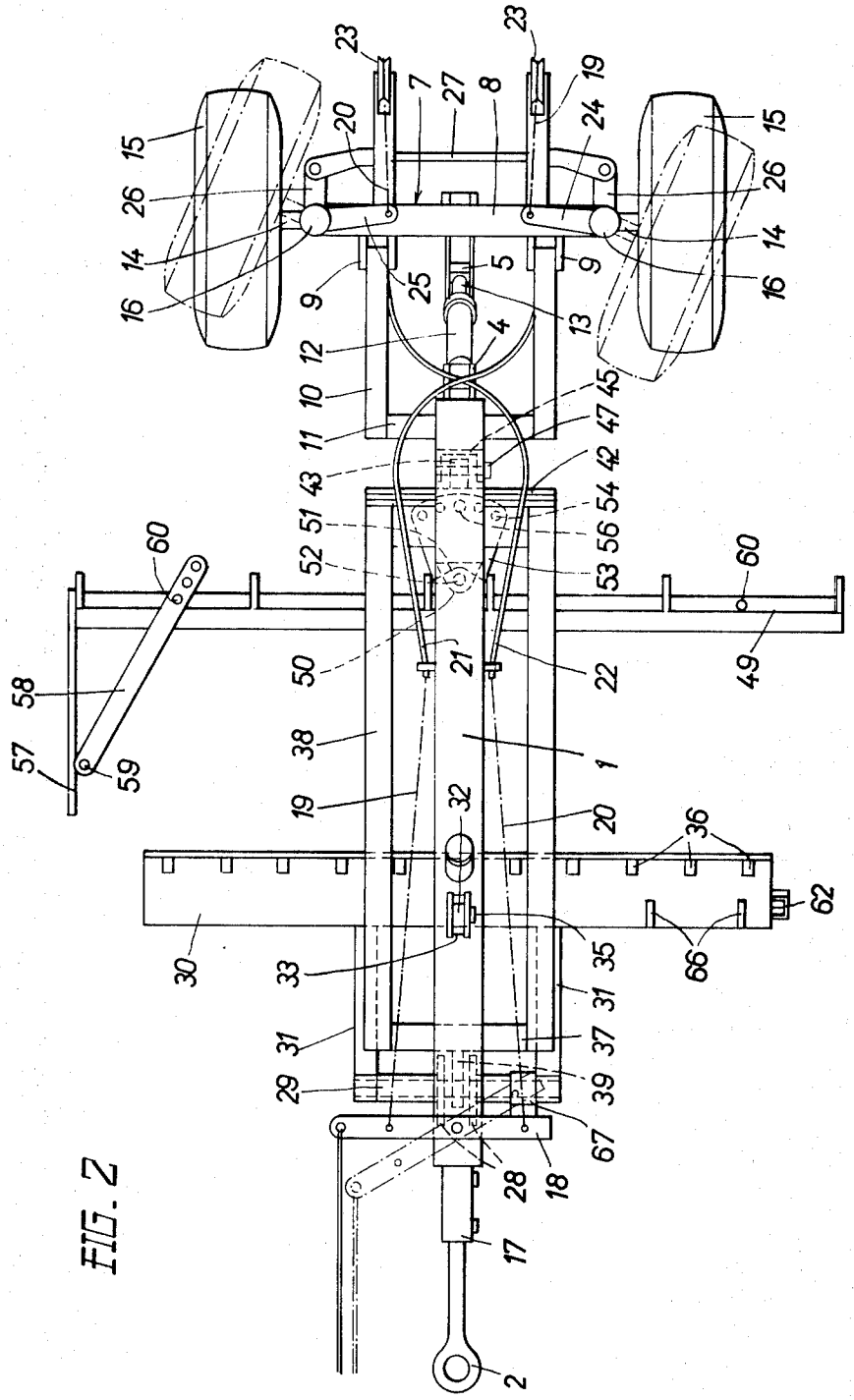

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FIG. 2

APPARATUS ADAPTED TO BE COUPLED TO A TRACTION VEHICLE SERVING FOR THE MAINTENANCE OR CONSTRUCTION OF WATER-BOUND ROADS

BACKGROUND OF THE INVENTION

The present invention relates to a new and improved apparatus which can be coupled to a traction vehicle and serving for the construction or maintenance of water-bound roads, the apparatus being of the type incorporating a main support bearing upon an undercarriage, a pavement breaker beam and a grading or levelling plate, both of which are pivotably coupled with the main support independently of one another about at least one axis extending transverse to the lengthwise axis of the apparatus.

Apparatuses are already known to the art for the maintenance or construction of water-bound roads which can be coupled to a traction vehicle or the like and possess a pavement or road breaker beam and/or a grading or levelling plate. The breaker beam or the levelling plate can be elevationally positioned and, if desired, rocked into the correct location with respect to the lengthwise axis of the apparatus, by utilizing a number of mechanical, hydraulic or pneumatic lifting mechanisms. In order to control the breaker beam and the levelling plate as well as the travelling wheels of the apparatus there is also provided a platform for an operator who correctly controls the apparatus during operation. To this end, it is necessary that the operator actuate a number of levers controlling the individual lifting mechanisms. Yet, particularly in the case of performing maintenance operations upon small roads the utilization of such known apparatuses is much too expensive because of the necessity of providing an operator.

SUMMARY OF THE INVENTION

Hence, there is a real need in the art for an apparatus of the aforementioned type which is not associated with the drawbacks of the prior art constructions. Accordingly, it is a primary objective of this invention to provide just such an apparatus which capably fulfils this need.

Another, more specific object of the present invention relates to an improved apparatus capable of being coupled with a traction vehicle and serving for the maintenance or construction of water-bound roads, which further enables dispensing with the use of an additional operator and provides a rational and economical utilization of the equipment.

Still a further significant object of the present invention relates to an improved apparatus for performing maintenance and construction work at roads or other surfaces which is relatively simple in construction, reasonably economical to manufacture, and requires a minimum of operating personnel to carry out the requisite work.

Now, in order to implement these and still further objects of the invention, which will become more readily apparent as the description proceeds, the inventive apparatus is manifested by the features that the breaker beam and the levelling plate can be arrested independently of one another at a respective predetermined distance with respect to the main support, and wherein the rear end of the main support is coupled by a guide

mechanism with the undercarriage for the purpose of regulating the height of this end of the equipment above the ground.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be better understood and objects other than those set forth above, will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings wherein:

FIG. 1 is a schematic side view of a preferred embodiment of inventive apparatus which can be coupled to a traction vehicle and serving for the maintenance or construction of water-bound roads;

FIG. 2 is a top plan view of the apparatus structure depicted in FIG. 1; and

FIG. 3 is a schematic illustration of a supplementary or auxillary mechanism which can be laterally secured to the breaker beam of the apparatus shown in FIGS. 1 and 2.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Describing now the drawings, the exemplary embodiment of road maintenance or construction equipment depicted in FIGS. 1 and 2 will be seen to comprise a main support 1, at the front end of which there is provided a suspension eyelet 2 for coupling the apparatus or equipment to the non-illustrated traction hook or equivalent structure of a traction vehicle.

The suspension eyelet 2 is operatively coupled by an elevation adjustment mechanism 17 with the main support 1 in order to accomodate the height of the suspension eyelet 2 to the height of the traction hook above the ground.

The rear end 3 of the main support 1 is downwardly flexed. Now, it will be observed that at the rear face of this bent or flexed end 3 there are secured two bearing flanges 4, between which there is pivotably mounted a first connecting element 5 which can rock about a bolt member 6. The other end of this connecting element 5 is located beneath the center of the undercarriage 7 at the central plane thereof and is pivotably coupled therewith.

The undercarriage 7 itself generally essentially embodies a carrier or support 8, substantially rectangular in cross-section, carrrier 8 extending transversely with respect to the lengthwise or longitudinal axis of the apparatus. Furthermore, carrier 8 is equipped at its front face with two pairs of flanges 9 for retaining two further connecting elements 10. The other ends of these connecting elements 10 are pivotably coupled with the ends of a rod 11 piercingly extending through the bent or flexed end 3 of the main support 1. The connecting line between the bolt 6 and the rod 11 as well as the connecting line between the pivot axes about which pivot the connecting elements 5 and 10 with respect to the undercarriage 7, collectively form with these connecting elements 5 and 10, a parallelogram guide arrangement between the main support 1 and the undercarriage 7.

A single-acting hydraulic pressure cylinder 12 is pivotably arranged at the rear upper side protion or end of the main support 1. The piston rod 13 of this pressure cylinder 12 is articulated with the first connecting

element 5 so that the angular position thereof can be adjusted with respect to the flexed end 3 of the main support 1.

Continuing, it will be observed that at each end of the carrier 8 there is provided a respective axle or shaft 14 for the travelling wheels 15. These shafts 14 together with the travelling wheels 15 are pivotable in a horizontal plane about a respective vertically arranged pin member 16 anchored to the ends of the carrier 8. A double-arm lever 18 is pivotably mounted at the main support 1 directly behind the elevation adjustment mechanism 17. Traction cables 19 and 20 are secured to this lever 18, these traction cables being guided at the rear portion of the apparatus within flexible tubes 21 and 22, respectively, and over the deflecting rollers 23. The ends of these traction cables 19 and 20 are coupled with the single-arm levers 24 and 25, respectively, which, in turn, are rigidly secured to the axles or shafts 14 for rocking or pivoting of the travelling wheels 15. One end of the double-arm lever 18 is destined to be connected with a point or location at the traction vehicle through the agency of a non-illustrated guide, this location possessing a lateral spacing from the traction hook.

As long as the traction vehicle together with the apparatus of the invention travels in a straight line, then, the double-arm lever member 18 is disposed perpendicular, to the lengthwise axis of the apparatus and the travelling wheels 15 are situated parallel to such lengthwise axis. As soon as the traction vehicle travels, for instance, towards the left in a curve then the double-arm lever member 18 is rotated in counterclockwise direction by means of the non-illustrated guide for the apparatus depicted in FIG. 2, as such has been indicated in phantom lines. This pivotal movement is transmitted by the traction cables 19 and 20 in the opposite direction to both of the travelling wheels 15, and specifically in such a way that the apparatus trails and follows the traction vehicle approximately along the same tracks.

Further, a second respective single-arm lever member 26, which projects rearwardly is secured to the associated shafts or axles 14 of the wheels 15. The respective ends of the two single-arm lever members 26 are coupled with one another via a connection rod 27 or equivalent structure for the purpose of synchronizing the pivotal movements of both travelling wheels 15.

By virtue of the parallel connection between the main support 1 and the undercarriage 7 the pin members 16, which define the pivot axes about which the wheels 15 are rocked, extend practically always vertically above the ground independently of the height of the rear portion of the main support 1, so that guiding of the apparatus is not influenced by the elevational adjustment of the flexed end 3 of the main support 1.

Two bearing blocks 28 are welded or otherwise affixed beneath the forward portion of the main carrier 1. A shaft 29 is piercingly extended through appropriate bores provided at the bearing blocks 28, shaft 29 being mounted to be rotatable but not axially displaceable. A surface or pavement breaker beam 30 is pivotably mounted about the axis of the shaft 29 through the agency of two pivot arms 31 rigidly connected with the breaker beam 30 and rigidly connected with the ends of the shaft 29. An adjustment rail 32 which is pivotably coupled at the center or central region of the breaker beam 30 extends through an opening or recess 33 provided at the main support 1. Adjustment rail 32 possesses in its lengthwise direction at a uniform spacing from one another appropriate apertures or bores 34 through which there can be extended a bolt member 35, in order to regulate the spacing or distance between the breaker beam 30 and the main support 1. Additionally, a plurality of breaker or tear-up teeth 36 uniformly spaced from one another, are arranged at the rear face of the breaker beam 30 in suitable cutouts or openings provided thereat. A traction spring 40 is effectively arranged between the breaker beam 30 and the main support 1, so that the weight of the breaker beam 30 is partially compensated in order to facilitate the adjustment of the spacing between it and the support frame or carrier 1.

Apart from the foregoing structure, the apparatus also incorporates a frame 38 having a front narrow side 37 which is mounted between the bearing blocks 28 at the shaft 29 through the agency of connection element 39, so that this frame 38 is pivotable about such shaft 29 and limitedly rotatable about its lengthwise axis. The latter feature can be achieved in that a ball-and-socket joint can be provided at the connection piece 39 and through which extends the shaft 29.

At the rear end face of the frame 38 there is secured a downwardly protruding or directed shoulder or extension 41. Projection 41 has a somewhat inclined rear face at which there is mounted a plate member 42 possessing two pins 43 and 44 projecting therefrom at substantially right angles. These pins 43 and 44 partially extend into a guide block 45, which in cross section is substantially of U-shaped configuration, and which is secured to the inside region of the flexed end of the main carrier 1. Further, within the guide block 45 there are provided three or more transverse bores 46 for selectively receiving a blocking bolt member 47 or equivalent structure. The lower region of the guide block 45 is closed off by a transversely extending web 48.

A grading or levelling plate 49 arranged at the front face of the projection or shoulder 41 is pivotably coupled with this shoulder 41 for movement about an axis disposed perpendicular to its lengthwise axis. This coupling or connection occurs through the agency of two pairs of bearing flanges 50 secured to the shoulder 41, two flaps 51 connected to the grading or levelling plate 49 and two screws 52 which extend through bores in the bearing flanges 50 and the flaps 51. A locking plate 53 possessing the configuration of a sector of a circle is arranged beneath the lower flap member 51 and parallel thereto. Locking plate 53 is equipped with bores 54 arranged concentrically about the pivot axis of the levelling plate 49 and partially enclosed by a bracket 55 secured to the underside of the shoulder 41, so that it is possible to regulate the angle between the lengthwise axis of the apparatus and the levelling plate 49 and to block such in selected position by means of a insertable pin 56.

At one or both ends of the levelling plate 49 there is provided a respective pivotable external plate 57. A brace or support 58 which, on the one hand, is mounted in a sleeve member 59 secured to the external plate 57 and, on the other hand, is mounted at one pin

60 connected to the upper edge of the levelling plate 49 ensures that the selected angle between the external plate 57 and the levelling plate 59 is maintained, so that the external plate 57 travels approximately parallel to the lengthwise axis of the apparatus.

FIG. 3 illustrates an auxillary device which can be connected to one end of the breaker beam 30. This auxillary device serves the purpose of cutting the marginal edges of the roadway. It encompasses a knife or cutter 61 which is maintained in the illustrated inclined position by a retaining bracket 62 connected to the end face of the breaker beam 30. Any suitable expedient, such as for instance a non-illustrated conventional positioning screw can be utilized to arrest this cutter 61 in the desired elevational position. Behind the cutter or knife 61 there is located a plowshare 63 for displacing the cut marginal edges towards the center of the apparatus or towards the outside. Plowshare 63 is rotatably connected with the upper end of the breaker beam 30 through the agency of a handle 64 connected with the plowshare 63 and a substantially V-shaped connection member 65 coupled with projections or upstanding portion 66 provided at the upper end of such breaker beam 30, so that the edge cutting mechanism just described can be moved independently of the breaker beam 30 about its pivot or rotational points provided at the projections 66.

In order to support the apparatus when it is not coupled to a traction vehicle there can be provided an auxillary support or leg brace 67 pivotable about the shaft member 29.

Now, in order to break up or tear up the pavement or surface of a water-bound road the breaker beam 30 is lowered against the force of the traction spring 40, by regulating the position of the adjustable rail 32 until the bolt 35 can be piercingly inserted into the uppermost bore 34. This position which the breaker beam 30 has assumed in relation to the main carrier or support 1 then remains continuously stable during tearing up of the road surface. By appropriately raising or lowering the main support 1 through the action of the pressure cylinder arrangement 12 it is possible to adjust the depth of penetration of the breaker beam 30 during its operation. The arresting or blocking bolt 47 is removed from the guide block 45, so that the levelling plate 49 only bears upon the surface of the road with its own weight and can freely move up and down more or less independently of the position of the main support 1. Hence, the grading or levelling plate 49, depending upon its position, distributes the road material loosened by the tear-up teeth 36 or the breaker beam 30, so that preferably a portion of this road material is displaced towards the center of the roadway. If the levelling plate 49 is briefly raised by the torn-up road material, the force with which the tear-up teeth 36 are pressed down is in no way influenced.

When the apparatus travels in curves or rearwards then, the levelling plate 49 bearing upon the support surface would get in the way or be disturbing. Yet, by raising the main carrier 1 into its higher position, not only is the breaker beam 30 raised away from the support or road surface, but by virtue of the provision of the transverse extending web 48 at the lower end of the guide block 45 the levelling plate 49 is likewise raised, because the transverse web 48 and the lower pin 44 transmit the upward movement of the main support 1 to the levelling plate 49.

Now for grading or levelling the freedom of movement of the levelling plate 49 with respect to the main support 1 is removed by inserting the blocking bolt 47 into the guide block 45, so that the elevational position of the levelling plate 49 is directly dependent upon the height of the main support 1 from the ground. Thus, the levelling plate 49 no longer bears by means of its own weight upon the road surface, rather there additionally is exerted the entire weight of the apparatus with the exception of the undercarriage 7 through the agency of this levelling plate 49 upon the road surface.

Since the levelling or grading plate 49 is located closer to the wheels 15 of the apparatus of the invention than the non-illustrated axle of the traction vehicle, any irregularities of the road which may be present are smoothed out extremely well since the wheels 15 roll upon the previously levelled or graded portion of the road and the rear axle of the traction vehicle is located much further forward. Hence, up and down movements of the rear axle of the traction vehicle are only transmitted to a rather slight extent to the levelling or grading plate 49.

The above described apparatus for the construction or maintenance of water-bound roads possesses, in relation to the known devices of this type, the advantage that only a single pressure cylinder 12 is required for adjusting the elevational position of the breaker beam 30 or the levelling plate 49. Moreover, by virtue of the provided guiding of the wheels 15 it is no longer necessary for the driver of the traction vehicle to exercise particular care in order that the apparatus, for instance, is guided exactly along the edge of the road. Hence, he can concentrate fully upon steering the vehicle, counting upon the fact that the apparatus will truly follow the tracks thereof. Simple manipulation of the single pressure cylinder 12 can easily be carried out by the driver. Hence, it is possible to dispense with any additional operator for the apparatus and the operation thereof is accordingly rationalized.

Only when there is a conversion of the operation of the apparatus from breaking up the roadway to levelling or grading thereof, or vica-versa, is it necessary that the driver step out of the traction vehicle and initiate blocking or release of the levelling plate 49 by inserting or removing, respectively, as the case may be, the blocking bolt 47 or the like.

Additionally, it would be possible to provide for the change of the spacing between the main carrier 1 and the breaker beam 30, for instance, a non-illustrated lifting cylinder and for the blocking and release of the levelling or grading plate 49 a likewise non-illustrated mechanism, which lifting cylinder and which mechanism can be operated from the drivers cabin of the traction vehicle.

In the event that only the breaker beam 30 should be rendered operable for the purpose of processing or working the street or road surface, then, the levelling or grading plate 49 can be raised so high by means of the blocking bolt 47 that such levelling plate is retained at a spacing above the surface of the road without it contacting the torn up road material. By virtue of raising the levelling plate 49 the force acting upon the breaker

beam **30** is increased by the amount of the weight of the levelling plate **49**.

Moreover, in a manner not shown in the arrangement of FIGS. **1** and **2**, it still would be possible for the breaker beam to be constructed to be pivotable about its lengthwise axis in order to adjust the angle of attack of the breaker beam teeth **36** with respect to the surface of the road.

Furthermore, instead of the single pressure cylinder which is to be actuated during the tearing up or grading of the surface of the road, which cylinder is coupled via a non-illustrated pressurized conduit with the traction vehicle, it would also be possible to utilize a threaded spindle arrangement for regulating the height of the rear end **3** of the main carrier or support **1**. It is not absolutely necessary that the breaker beam **30** and the levelling plate **49** are arranged to be pivotable about the same pivot axis defined by the shaft **29**. What is important is that the breaker beam and the levelling plate are pivotably mounted independently of one another with respect to the main support **1**.

By virtue of the parallel guide arrangement between the rear end **3** of the main support **1** and the undercarriage **7** as well as the use of the simple acting pressure cylinder **12** the travelling wheels **15** remain along the proper track in each operational position, so that the guiding of the apparatus is insured for in each instance.

Even though it is possible to save on the use of one operator with the above described apparatus, the construction thereof in comparison to the previously known devices or equipment of this type is much simpler and it provides for the rational use thereof and also the advantage that it is cheaper in its fabrication or manufacture and the aquisition thereof.

While there is shown and described present preferred embodiments of the invention, it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied and practiced within the scope of the following claims.

Accordingly, what is claimed is:

1. An apparatus capable of being coupled to a traction vehicle and used for the construction or maintenance of water-bound roads or the like, comprising an undercarriage, a main support unit bearing upon said undercarriage, a road surface-breaker beam member and a levelling member, means pivotably connecting both said breaker beam member and said levelling member with said main support unit independently of one another for movement about at least one axis extending transverse with respect to the lengthwise axis of the apparatus, means selectively positioning said breaker-beam member and said levelling member independently from another at a respective predetermined spacing with respect to said main support unit, guide means displaceably connecting the rear end of said main support unit with said undercarriage, means connected with said guide means in order to control the height of said rear end of said main support unit above the ground, said undercarriage being provided with a pair of travelling wheel members and means including steering means controlling both wheel members of said undercarriage for the purpose of synchronously controlling said wheel members as a function of the angle between the lengthwise axis of the apparatus and that of the traction vehicle, and wherein said steering means comprises a double-arm lever member mounted at said main support unit and capable of being connected with said traction vehicle, and further incorporates two single arm lever members each coupled with a respective vertically arranged pivot means provided for each travelling wheel member of said undercarriage, a respective end of the double-arm lever member being coupled via an associated traction cable with a free end of an associated one of said single lever arm member.

2. An apparatus capable of being coupled to a traction vehicle and used for the construction or maintenance of water-bound roads or the like, comprising an undercarriage, travelling wheel means provided for said undercarriage, a main support unit bearing upon said undercarriage and its wheel means, a road surface-breaker beam member and a levelling member, means pivotably connecting both said breaker beam member and said levelling member with said main support unit independently of one another for movement about at least one axis extending transverse with respect to the lengthwise axis of the apparatus, means selectively positioning said breaker-beam member and said levelling member independently from another at a respective predetermined spacing with respect to said main support unit, and guide means displaceably connecting the rear end of said main support unit with said undercarriage, means connected with said guide means in order to control the height of said rear end of said main support unit above the ground, and wherein said means for positioning said levelling member incorporates a vertically extending guide block deposed at said rear end of said main support unit, pin members provided at the rear face of said levelling member extending into said guide block, and a blocking belt member insertable into a transverse bore of said guide block serving as a stop means for limiting the upward and/or downward movement of the levelling member.

3. The apparatus as defined in claim **2**, further including means pivotably mounting said levelling member for movement about a substantially vertical axis, and mechanism operatively connected with said levelling member and incorporating a locking plate and an insertable pin member engageable with said locking plate for arresting said levelling member in its assumed pivotable position.

4. The apparatus as defined in claim **3**, wherein said locking plate is carried by said levelling member.

* * * * *