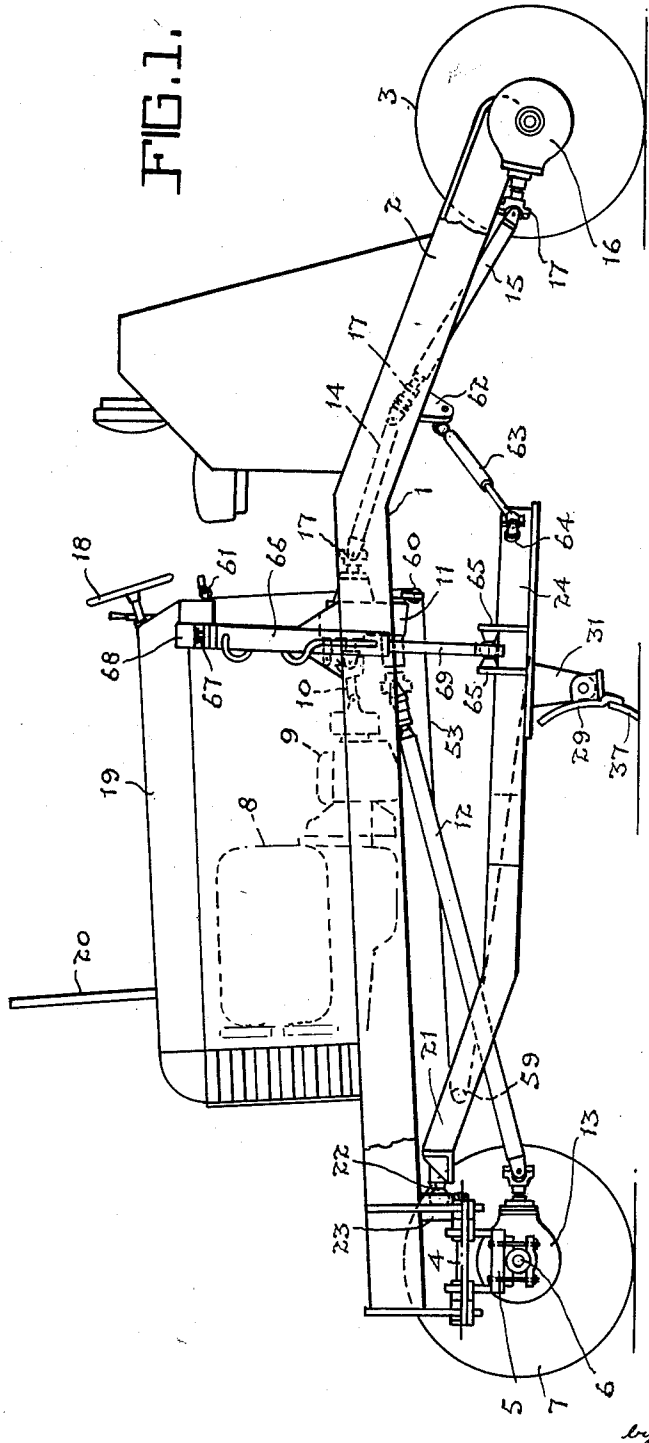
March 13, 1956 J. G. MACDONALD 2,737,736

POWER OPERATED ROAD GRADER

Filed June 27, 1950 2 Sheets-Sheet 1

FIG. 1.



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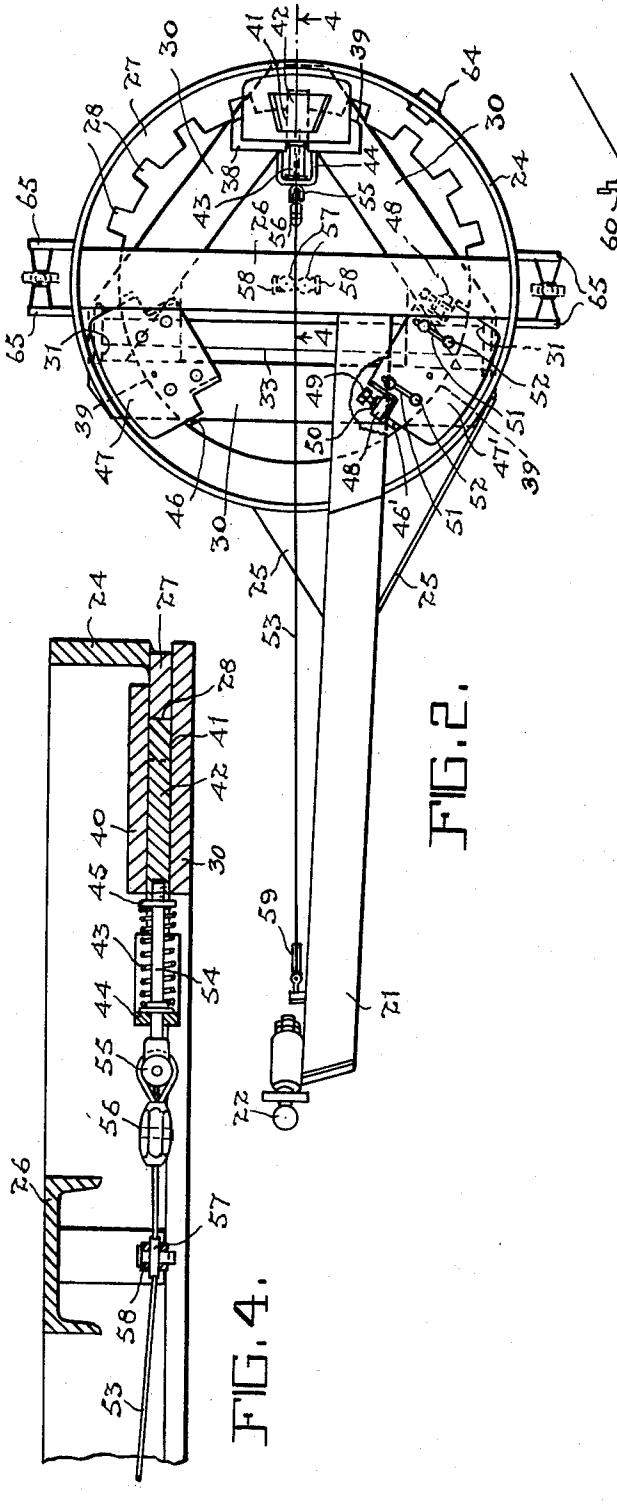


FIG. 2.

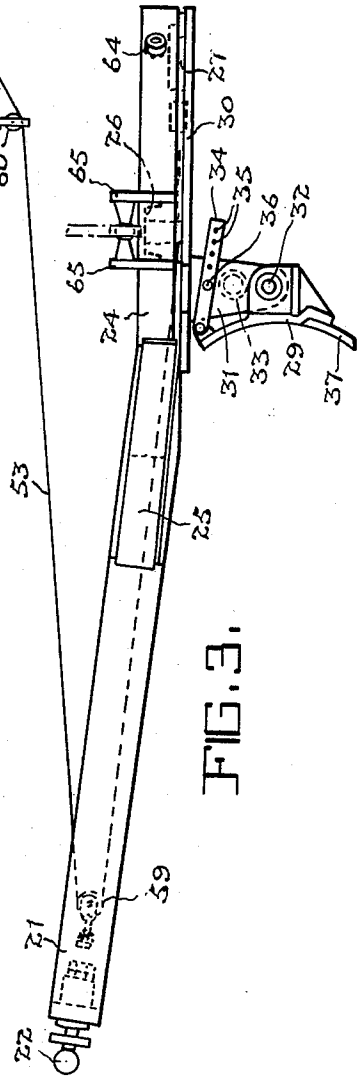


FIG. 3.

FIG. 4.

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POWER OPERATED ROAD GRADER

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Application June 27, 1950, Serial No. 170,555

2 Claims. (Cl. 37—156)

This invention relates to improvements in road maintaining equipment and more particularly to improvements in small type power maintainers or graders for scraping, grading and the like.

One important object of the invention is to provide a power maintainer which will afford maximum traction for given horsepower and weight and will afford greatly increased maneuverability and ease of operation than possible with previous machines, enabling grading, scraping and the like to be carried out more effectively and efficiently in a minimum of time.

Another important object is to provide in a traction device of the type referred to a novel and simplified drawbar, circle and mould board assembly of exceedingly rugged and compact construction which will permit maximum clearance under the blade of the mould board when raised.

A further important object is to provide a power maintainer construction which will enable the size of the maneuverable working tool or scraper blade to be increased to a maximum for a given wheel base to increase the area of surface that can be graded by a given size of maintainer.

A still further object is to provide a maintainer that can be used to scrape or grade with equal facility when in reverse and when in forward motion.

A further object of importance is to provide a device of the type referred to which will be economical, both to manufacture and to maintain, placing the initial cost as well as the cost of replacements and repairs within the budget of small communities or contractors.

According to the invention a maintainer has the working tool or scraper blade located midway between the front and rear wheels for maximum maneuverability, enabling the tool to be turned through a complete 360° without fouling the wheels for a minimum wheel base, and has the engine located between the front and rear wheels in a manner to locate the centre of gravity directly over the working tool to place maximum weight on the blade.

An important feature of the invention consists in providing drive to both the front and rear wheels whereby, with the four-wheel drive and equal weight on each wheel by virtue of the location of the centre of gravity midway therebetween, maximum traction is afforded.

Another important feature resides in forming the circle used to hold the mould board integral and coplanar with the drawbar and supporting the mould board from a rigid assembly rotatably supported from and substantially coplanar with the circle to afford a compact rugged construction providing for maximum clearance beneath the maintainer.

A further feature consists in locating the operator's position so that the working tool will be in full view when operating the maintainer either forwardly or in reverse.

A further and very important feature consists in providing a maintainer construction which will enable standard automotive parts to be used to a large extent to greatly

facilitate and decrease the cost of manufacture and maintenance.

Referring to the accompanying drawings, Figure 1 is an elevational view of a maintainer according to the invention with parts broken away for clarity.

Figure 2 is a plan view of the drawbar circle and mouldboard assembly.

Figure 3 is a side elevational view of the assembly of Figure 2.

Figure 4 is an enlarged fragmentary vertical sectional view on the line 4—4 of Figure 2.

As illustrated, the maintainer or grader comprises a main frame 1 having a rearward sloping portion 2 supported by the rear wheels 3, and pivoted at the front by a stud bolt 4 extending centrally and longitudinally thereof to a transverse frame 5 bolted to the front axle 6 carrying the front wheels 7.

Mounted on the frame 1 intermediate the wheels is an engine 8 which is preferably a standard truck engine which drives through a transmission 9 and drive coupling 10 to the transfer case 11.

A drive shaft 12 connects the drive from the transfer case or power take-off 11 to the front differential 13, and drive shafts 14 and 15 connect the transfer case or power take-off 11 to the differential 16 of the rear wheels, the drives connecting through suitable universal joints 17.

I have found in practice that standard automotive drive shafts, universal joints, transmission and differentials are ideal for transferring the motive power from the engine 8 to the front and rear wheels, and as these parts are of standard design and in themselves do not form part of the invention no further details are deemed required.

The steering mechanism operated from the control 18 is omitted for the sake of clarity.

The engine transmission and associated parts are enclosed under the hood or cowl 19 and exhaust from the engine is discharged through the vent pipe 20.

Mounted beneath the main frame is a drawbar 21 swiveled at its forward end by means of its ball stud 22 engaging in the ball jaw 23 carried by the frame. Formed integral with the rear of the drawbar is the circle 24 which is shown offset from the axis of the drawbar to eliminate interference with the drive shaft 12 and which is braced by the angled struts 25 and transverse channel 26.

The circle 24 includes an internal flange 27 having notches 28 in its inner periphery.

A mould board or scraper blade 29, Figure 3, is supported on a rigid mount comprising the welded bars 30 arranged in triangular formation from which depend hangers 31 to which the mould board is pivoted as at 32. A tubular cross bar 33 forms a support and spacer for the hangers 31, and the inclination of the mould board is adjusted by means of the strap 34 having selected orifices 35 through which locking pin 36 engaging the hangers extends.

The actual blade or cutting element of the mould board is shown at 37 and may be replaceably mounted. At one apex the mould board mounting 30 has welded thereto wear plates 38 having an arcuate edge 39 contacting and fitting the inner perimeter of the circle flange 27.

Superimposed on the wear plates 38 is a bearing plate 40 secured thereto and overlying the circle flange. Defined between the mounting 30 and bearing plate 40 is a slot 41 receiving a locking bar 42, Figure 4 urged by spring 43, compressed between yoke 44 and locking bar bearing head 45 into a registering notch 28.

At another apex the mould board mounting 30 is provided with a wear plate 46 and a bearing plate 47 bolted thereto in superimposed relation, the wear plate abutting

the inner perimeter of the circle flange 27 and the bearing plate overlying the flange.

At the remaining apex wear and bearing plates 46' and 47' corresponding to plates 46 and 47 are provided but are mounted for adjustment to compensate for wear. In this case the mounting 30 is provided with bosses 48 through which set screws 49 locked by nuts 50 operate to move the wear plate 46' relative to the mounting and into contact with the circle flange.

To accommodate this adjustment of the wear plate and also to permit adjustment of the bearing plate if desired these plates 46' and 47' are provided with slots 51, Figure 2, through which bolts 52 securing the plates to the mounting extend.

The locking bar 42 serves to maintain the mould board mounting fixed to the circle until release by operation of the cable 53 connected to the locking bar pull rod 54 at its clevis head 55 by means of the cable clamp 56.

The cable is led between sheaves 57 supported beneath the channel 26 by bracket 58 around the sheaves 59 at the front of the drawbar, rearwardly around sheave 60 to the operator's control position 61 located to the rear of the mould board. When released the mould board and its mounting 30 can be manually adjusted to the desired angle and the mould board can be set at the desired inclination by adjustment of the strap 34 as described.

Connected between the circle 24 and a depending bracket 62 carried by the main frame is an extensible side shift device 63 in the form of a telescopic rod universally connected at its ends to the respective bracket 62 and circle boss 64.

Outwardly of the circle brackets 65 are secured to which are connected the drawbar operating hydraulic cylinders 66 which are supported outwardly of the main frame as at 67 to the transverse struts 68 for universal movement. The piston rods 69 of these cylinders are operated from any suitable source of hydraulic pressure, not shown, which may preferably derive directly from the engine 8.

The disposition of the engine 8 intermediate the front and rear wheels enables the centre of gravity to be located substantially centrally between the wheels so that each is equally weighted. By providing for the equal weighting of the wheels the provision of a four-wheel drive through the drives described enables a maximum tractive effort to be obtained and it is this feature which enables a standard truck engine to provide the tractive power required for grading and scraping and other road-maintaining operations.

Also, as illustrated in Figure 1, the arrangement of the mould board 29 is such that it is located equally between the wheels and can be rotated through a full 360° upon release of the locking bar 42 without fouling the wheels for a minimum length of wheel base corresponding to the length of the scraper blade required.

Further, by locating the scraper blade centrally between the wheels and also arranging that the centre of gravity is centrally located, a relationship is provided which enables the maximum weight possible in accordance with the size of the maintainer to be applied to the blade, enabling more efficient grading or scraping.

It will be noted that the operator's position is displaced rearwardly from the centre of gravity of the machine and hence rearwardly from the working tool or cutting blade 37, giving the operator a full, clear view of the tool at all times whether operating forwardly or in reverse.

It is particularly pointed out with reference to Figures 1 and 3 that the drawbar circle and mould board mounting form an extremely compact structure, being substantially co-planar, affording maximum clearance beneath the grader for a given height of grader frame upon elevation of the drawbar by the cylinders 66. At the same time adjustment for the angle and inclination of the mould board is readily carried out, and adjustment can be readily made to compensate for wear between the relative movable parts under extensive service permitted by the adjustable wear plate 46'.

From the foregoing it will be appreciated that a maintainer or grader according to the invention will be an extremely practical and economical and efficient road-maintaining apparatus, and the increased convenience and saving in cost afforded both in manufacture and maintenance will enable the wider use of road apparatus to improve road maintenance.

It is to be understood herein that according to the invention a maintainer includes any form of road maintenance equipment wherein a working tool or mould board is utilized and constructed in accordance with the concepts of this invention and as set forth in the appended claims.

What I claim as my invention is:

1. In a self-powered road maintainer, a longitudinal main frame, front and rear wheels arranged at the terminals of and supporting said main frame, an engine and a control station therefor located between said front and rear wheels to locate the centre of gravity of the maintainer substantially mid-way between said wheels, a drawbar swivelled at the front of said main frame and extending rearwardly, a circle secured integrally with said drawbar with centre substantially in vertical alignment with the centre of gravity of said maintainer, and vertically reciprocal means supporting said circle at opposite sides thereof substantially mid-way between said wheels, said circle having an internal flange formed with notches in the inner periphery thereof, a mouldboard mounting frame abutting the underside of said flange and having a centre on the axis of said circle, guide means secured to said mounting frame abutting the inner notched periphery of said flange to locate said mounting frame centered on the circle axis, said guide means being relatively separable to move into contact with said flange periphery, bearing plates secured to said mounting frame and bearing on the upper surface of said flange to support said mounting frame for rotation on said circle, releasable flange-engaging plunger means carried by said guide means and operable upon separation of said guide means to maintain flange contact and adapted to selectively engage in said notches to lock said mounting frame in adjusted position of rotation, and a mouldboard supported from said mounting frame and substantially coinciding with a diameter of said circle.

2. A device as claimed in claim 1 in which said mouldboard mounting frame is triangular and said guide means comprises three guide plates located at the apices of said mounting frame, two of said guide plates being stationary and the third being movable radially of the centre of said circle, said guide plates having convexed outer edges having a curvature inverse to the curvature of said inner flange periphery and bearing thereagainst, and means for operating said adjustable guide plate.

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