Feb. 28, 1939. R. GEDSTAD 2,148,809

ROAD MACHINE

Filed July 18, 1936 2 Sheets-Sheet 1

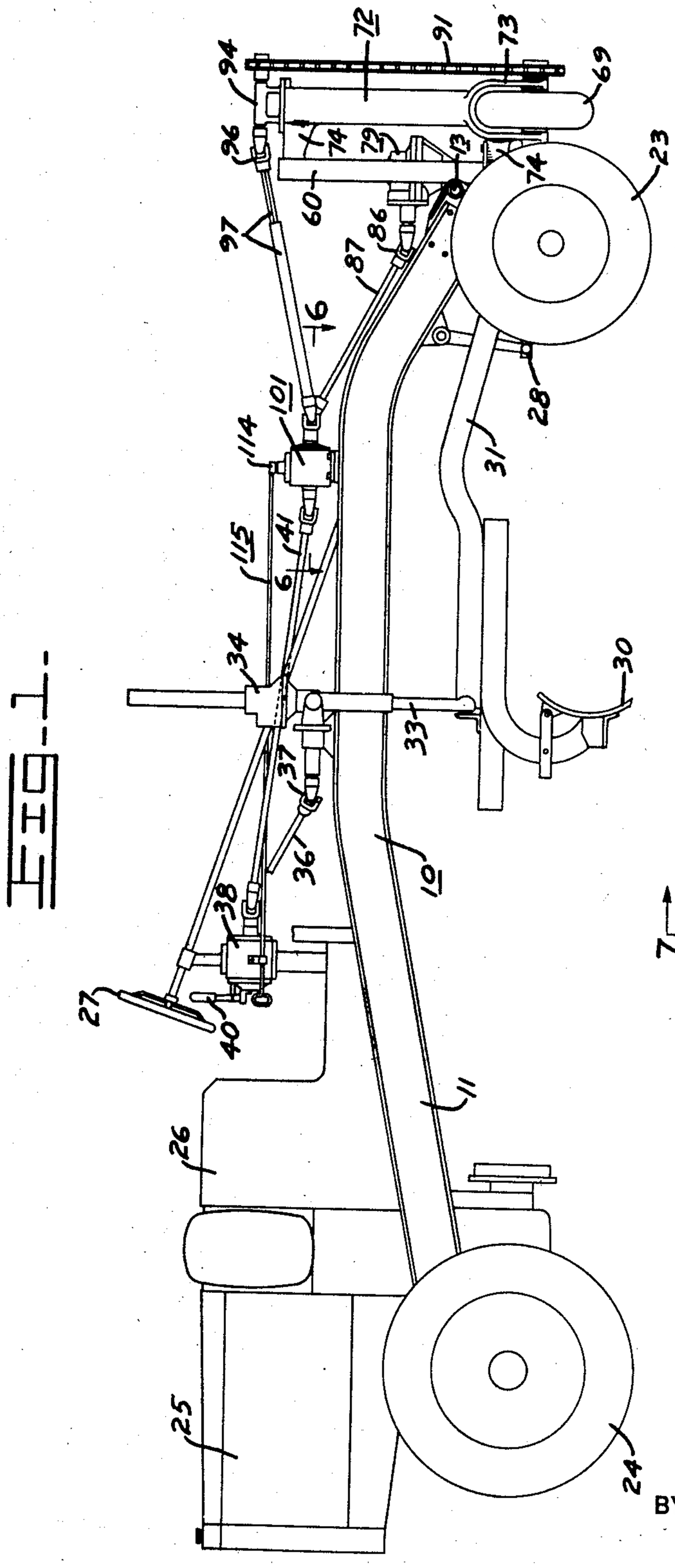

FIG. 1.

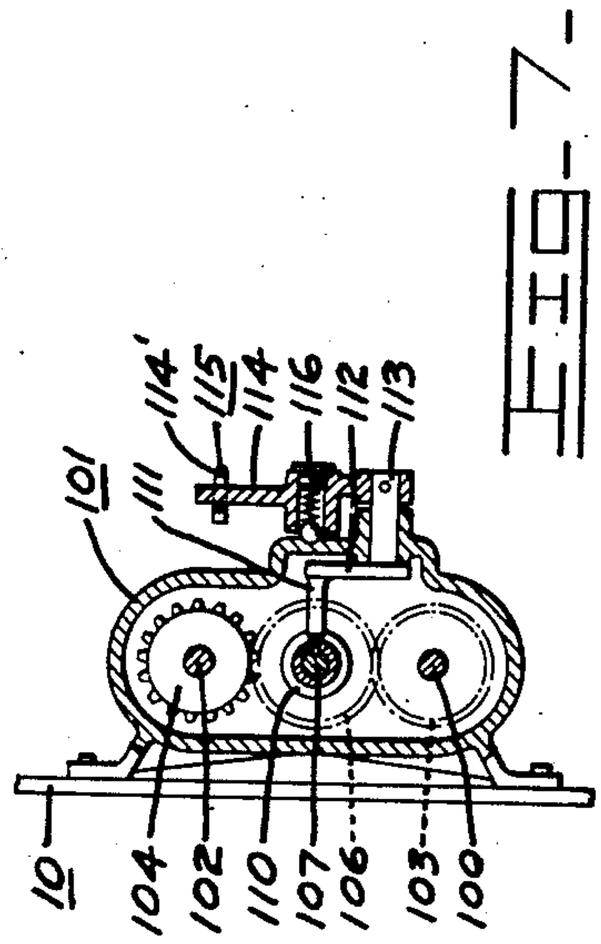

FIG. 6.

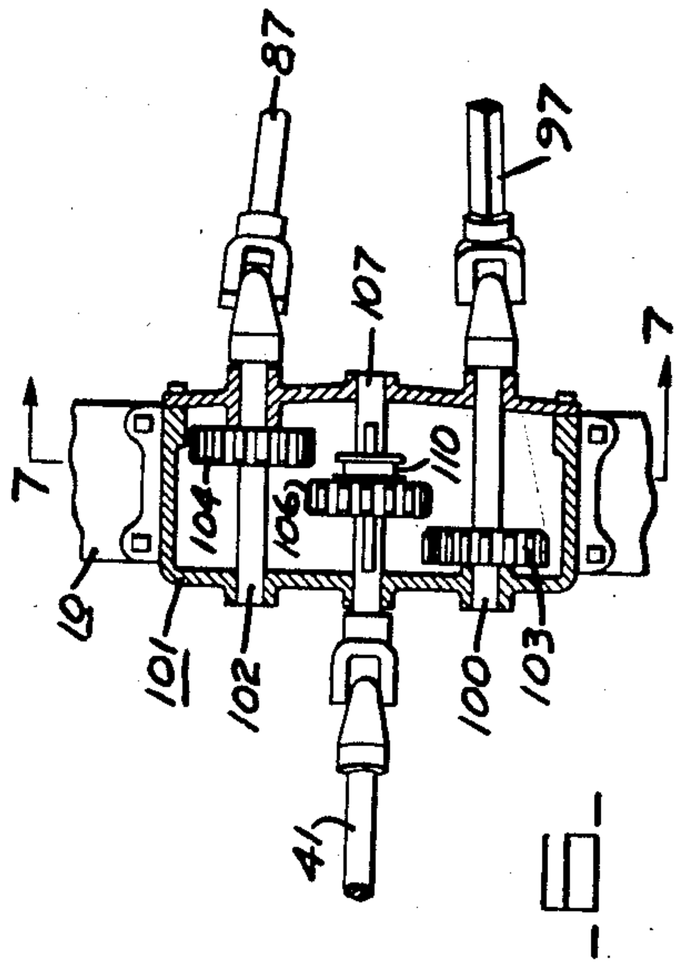

FIG. 5.

INVENTOR
Rudolph Gedstad
BY Charles M Fryer
ATTORNEY

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ROAD MACHINE

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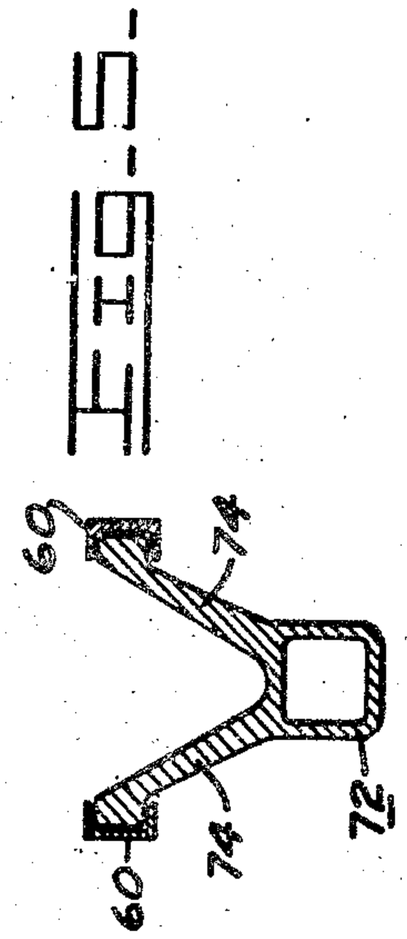


FIG-4-

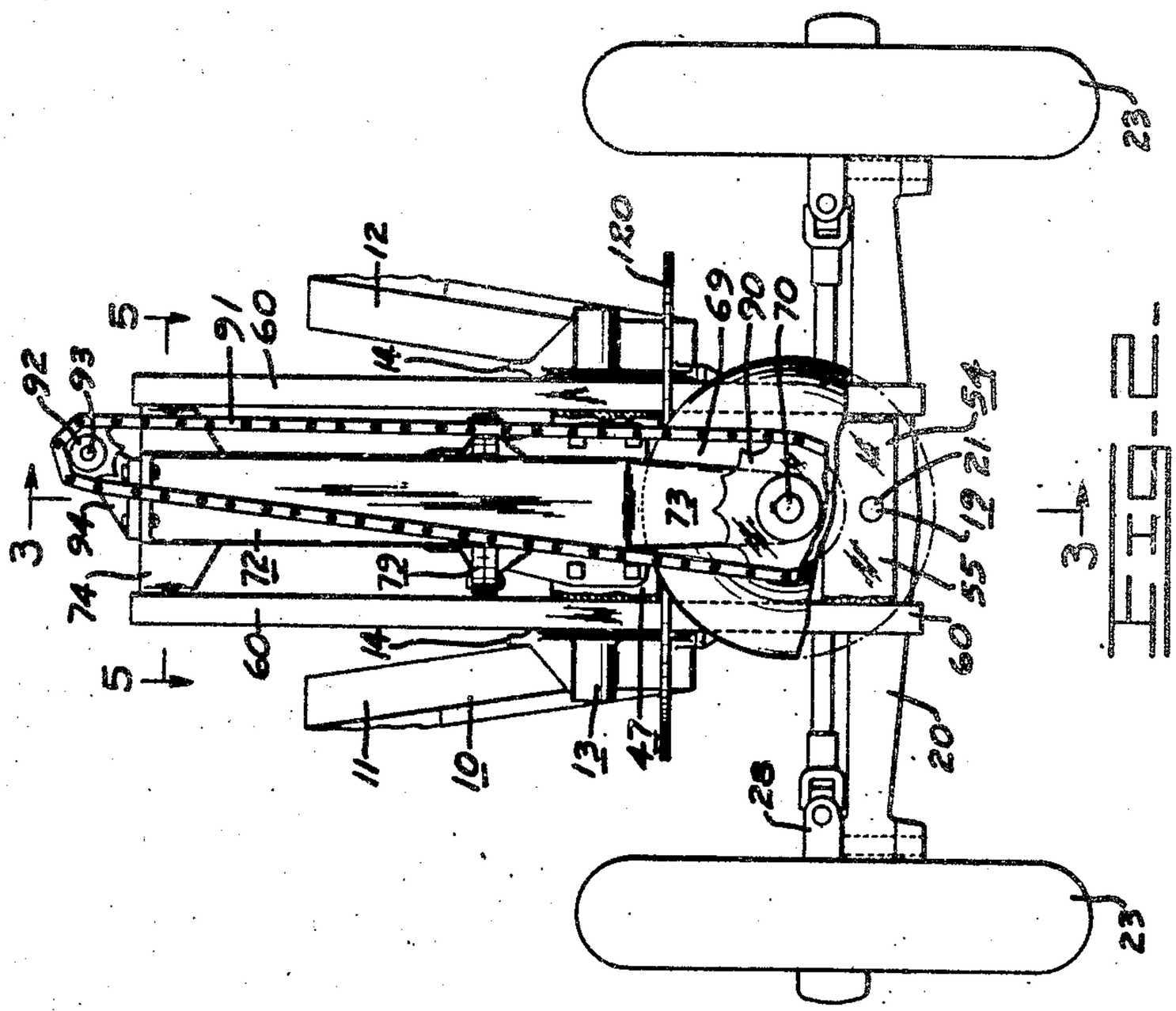
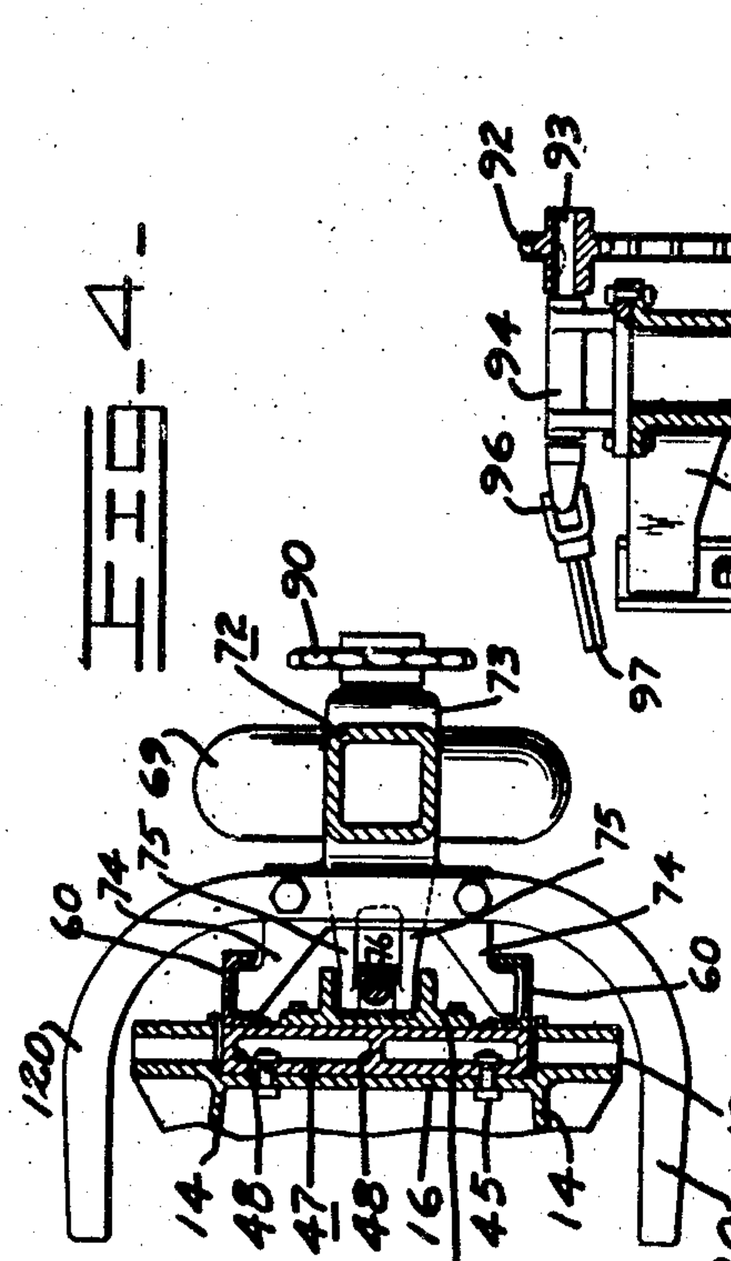


FIG-2-



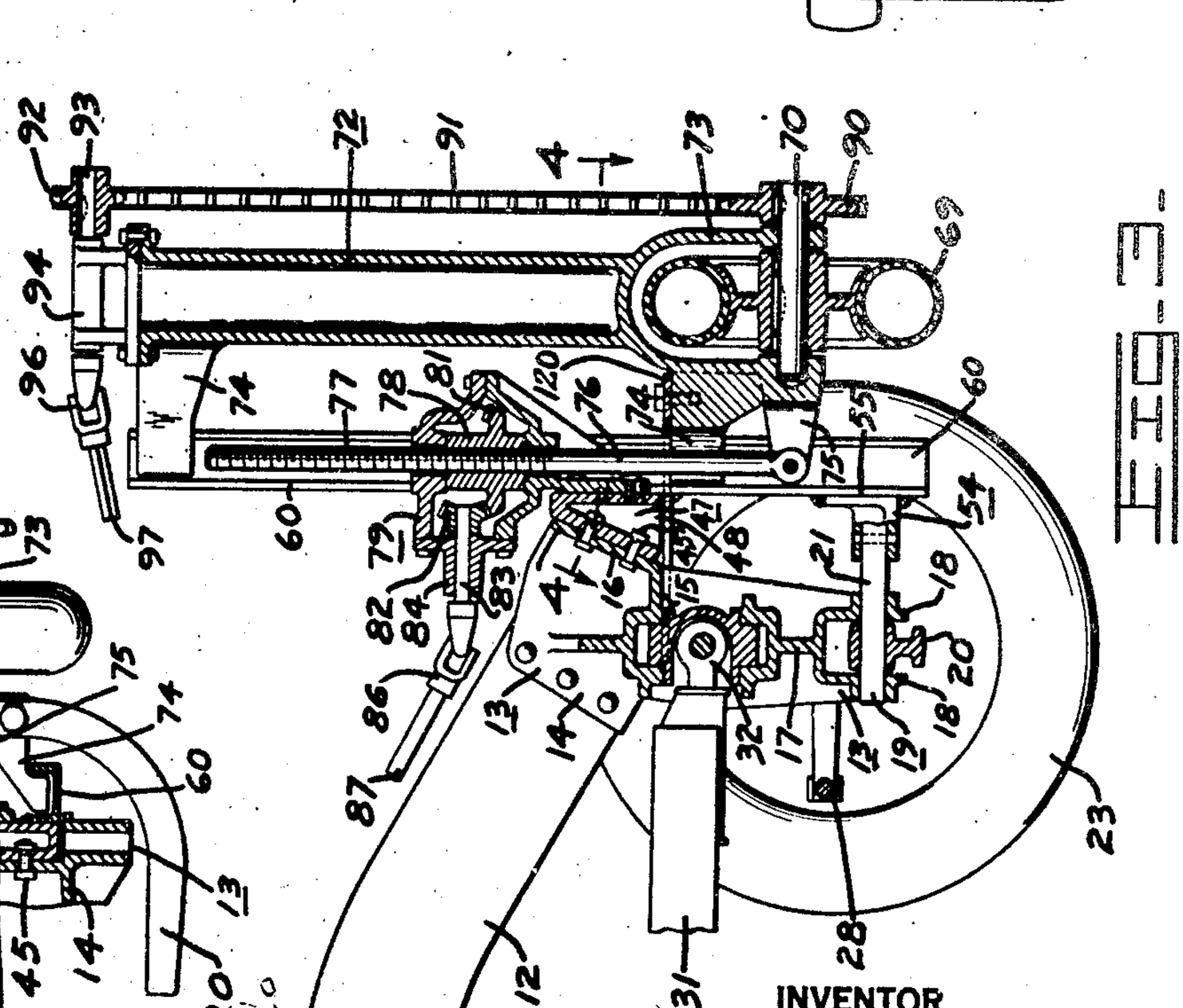


FIG-3-

INVENTOR
Rudolph Gedstad
BY Charles M Fryer
ATTORNEY

Patented Feb. 28, 1939

2,148,809

UNITED STATES PATENT OFFICE

2,148,809

ROAD MACHINE

Rudolph Gedstad, Peoria, Ill., assignor to Caterpillar Tractor Co., San Leandro, Calif., a corporation of California

Application July 18, 1936, Serial No. 91,359

2 Claims. (Cl. 180—1)

My invention relates to automotive road machines of the type adapted for road maintenance work, and more particularly to means for turning such type of machine in a minimum space.

When a road machine is operated upon narrow roads that offer limited turning facilities, such as in mountainous regions where there are few crossroads, and where short back and forth runs are necessary such as on re-working small sections of roadway or on oil mix work, it is desirable to be able to turn the machine around quickly and easily at each end of the run. Such machine is generally constructed with a very long wheel base to provide ample room for the earth working means and to minimize vibration of the machine which would affect the working of the earth working means and, therefore, requires a large area in which to turn. Hence, when it is desired to turn the machine at the end of a run, it is necessary to continue on until a suitable crossroad or correspondingly large area is located, unless suitable mechanism is provided to enable the turning in a short space.

Road machines have been provided with means, in the form of a turntable device, for turning around in a limited space. Such device is generally centrally located beneath the frame of the machine, and is adapted when functioning to support the entire machine for pivotal movement at one point, thus, requiring an accurate balance of the machine on the device before turning of the machine can be accomplished. Furthermore, after obtaining the proper balance, the machine must be manually rotated on the turntable. Obviously, the use of such type of turning device, where a proper balance must first be obtained and then a manual turning operation performed, necessitates costly delays.

My invention is designed to overcome the above described difficulties and has as its objects, among others, the provision of improved:

(1) Means for turning a road machine in a limited space;

(2) Turning mechanism that is readily controlled from the operator's station;

(3) Turning mechanism which is of economical and simple construction;

(4) Turning mechanism that is so positioned as not to interfere with the operation of the earth working means or ground engaging tools of the road machine.

Other objects of the invention will become apparent from a perusal of the following description thereof.

In general, the turning device or mechanism of my invention comprises an adjustably supported ground engageable member, preferably in the form of a drivable wheel, mounted beyond or outside of the usual front and the rear ground engaging members or wheels of the road machine; so as not to interfere with the earth working means which would otherwise occur if the turning device were located between the ground engaging members. The drivable or turning wheel is adjustably mounted upon the machine adjacent an end portion thereof in such manner that its axis extends substantially in the same direction as the longitudinal axis or line of draft of the machine, and is normally positioned a sufficient distance above the ground so as not to interfere with the normal travel of the machine.

Suitable means are provided for lowering or raising the drivable wheel with relation to the frame of the machine to thereby place the wheel either in ground engaging or operative position on the ground, or in elevated or inoperative position with respect to the ground. By lowering the drivable wheel to operative position or in engagement with the ground, the portion or end of the road machine upon which the mechanism is mounted can be raised from the ground, thereby causing the ground engaging or wheel supporting members at such end to be raised from contact with the ground. In this position, the machine is carried upon the drivable wheel and on the ground engaging members or wheels at the opposite end of the machine. Driving means are provided for rotating the drivable or turning wheel in either direction, so that, after the wheel has been lowered into driving engagement with the ground and a portion or end of the machine raised, in the manner previously explained, the wheel can be rotated to thereby cause the machine to be turned. When the machine has been turned, the rotation of the drivable wheel can be stopped, the lifted ground engaging members lowered to the ground and the drivable wheel then raised to inoperative position.

Reference will now be made to the drawings for a more detailed description of the invention. In the drawings:

Fig. 1 is a schematic side elevation of a type of automotive road machine with a preferred form of my turning mechanism applied thereto.

Fig. 2 is an enlarged front elevational view of the road machine illustrated in Fig. 1, parts being broken away to illustrate more clearly the mechanism of my invention.

Fig. 3 is a longitudinal vertical section of the front portion of the road machine taken substan-

tially in a plane indicated by the line 3—3 in Fig. 2.

Fig. 4 is a horizontal section taken in a plane indicated by the line 4—4 in Fig. 3.

Fig. 5 is a horizontal section taken in a plane indicated by the line 5—5 in Fig. 2,

Fig. 6 is a horizontal section of a gear box which comprises a portion of the adjusting mechanism for the drivable turning wheel, taken in a plane indicated by the line 6—6 in Fig. 1.

Fig. 7 is a transverse vertical section of the gear box illustrated in Fig. 6, taken in a plane indicated by the line 7—7 in Fig. 6.

A type of automotive road machine disclosed herein for purposes of illustration, to which the turning device of my invention is secured, will now be briefly described. The road machine comprises a main frame 10 including symmetrically disposed side members 11 and 12 connected by suitable cross members including front bolster 13. Front bolster 13 is formed as an integral casting and comprises spaced side members 14, held apart by transversely arranged horizontal flange 15 and transverse inclined flange 16. Bolster 13 serves a multiplicity purpose, flanges 14 and 16 thereof serving as a closing member for the ends of frame members 11 and 12 of the vehicle frame 10, to which they are attached, while flange member 16 serves the additional purpose as an attaching means for securing any turning attachments thereto; flange member 15 besides serving as a spacer for members 14—14, also constitutes an integral anchor means for depending member 17, on which axle 20 is pivoted. Below horizontal flange 15 and integral with the other bolster parts, is a transverse vertical flange 17 which is forked adjacent its lower end and has longitudinally aligned bosses 18 formed upon the forked ends thereof. Rigidly secured in bosses 18 is a shaft 19 upon which is pivotally mounted front axle 20. Shaft 19 has a portion 21 projecting forwardly in front of axle 20 for a purpose to be hereinafter explained.

Frame 10 is provided with the usual ground engaging means or members at each end portion thereof to support the machine on the ground, such as front steerable wheels 23 secured to the ends of front axle 20 to pivot about upright axes, and rear traction wheels 24. Traction wheels 24 are driven by an engine 25 located at the rear of the machine above the wheels 24; and the drive to the traction wheels is controlled from an operator's station 26 mounted on frame 10 immediately forward of engine 25. A steering wheel 27, positioned adjacent the operator's station, is connected to the front wheels 23 through the usual steering devices 28 to effect turning of the wheels.

Mounted beneath frame 10 is an adjustably mounted earth working tool or blade 30. Although I have illustrated only one earth working tool mounted beneath the frame 10, it is not uncommon to have at the same time, other earth working means, such as a scarifier mounted therebeneath immediately behind front wheels 23. Blade 30 is secured to the usual blade circle assembly which is held in any desired operating position by the conventional forwardly extending drawbar 31 universally secured at 32 to front bolster 13, and by lift links 33 which are preferably adjustable as to length and are adjustably supported in suitable housings 34 universally mounted on frame side members 11 and 12. Raising and lowering of either end of blade 30 to adjust the angular position thereof in an upright plane is controlled by means of suitable self-locking nut and screw adjusting devices mounted in housings 34, only one of which is shown in Fig. 1; the usual means (not shown) being provided to adjust the circle for adjusting the angle of the blade with reference to the line of draft of the machine.

Each nut and screw device is actuated by a shaft 36 which has one end connected thereto by suitable universal coupling 37. The opposite ends (not shown) of shafts 36 are connected to control mechanism in power control box 38 which is conveniently positioned at operator's station 26. By such mechanism, either of shafts 36 or both can be driven from the engine in either direction, to thereby adjust the nut and screw devices in housings 34 in either direction and consequently adjust the blade. Reference is made to the United States patent to Carl A. Gustafson No. 2,034,141 for a more detailed description of the power control box mechanism which generally includes a plurality of reversible clutching means operable in either direction by control levers 40, only one of which is shown in Fig. 1, to operate the various adjusting mechanisms on the machine. The control lever 40 shown in Fig. 1 is adapted to effect driving of shaft 41 in either direction to provide the means for transmitting power to operate the turning device of my invention, in a manner to be explained hereinafter.

Supporting means for the turning device is provided adjacent the front end portion of the machine, on front bolster 13 and on shaft 19. Secured to transverse flange 16 (Fig. 3) of front bolster 13, by suitable bolts 45, is an inverted V-shaped bracket 47 reinforced by ribs 48 (Fig. 4) formed between the flanges thereof. Fixedly secured to the forwardly extending portion 21 of shaft 19, is a bracket 54 having a transversely extending face 55 vertically aligned with the front face or flange of bracket 47; a pair of parallel upright guides 60 being secured to such faces of the brackets 47 and 54. Each guide 60 is in the form of a U-channel to provide a track or guideway wherein runners secured to the turning device are slidably arranged. Inasmuch as bracket 47 and bracket 54 are securely fastened to front bolster 13, which is secured to frame 10, and because vertical guides 60 are securely mounted on brackets 47 and 54, a rigid unitary supporting structure is provided.

The turning device includes drivable ground engageable member or wheel 69 secured to shaft 70 journalled for rotation, about an axis extending in the direction of the line of draft of the machine, in the lower end of tubular supporting member 72 therefor. Such member 72 has forked portion 73 at its lower end to accommodate the wheel, and has a pair of rearwardly extending runner arms 74 adjacent its upper and lower ends, slidably engaged in the guides 60. Thus, support 72 is movably mounted to allow wheel 69 to be raised or lowered with reference to the ground.

Means are provided for effecting movement of the support 72 and hence wheel 69 relative to the ground, and at the same time to provide for holding the wheel 69 and the support 72 in a fixed position when in elevated position out of contact with the ground. For this purpose, forked portion 73 of support 72 is provided at its rear with ears 75 between which is pivotally mounted upwardly extending rod 76 having threads 77 adjacent its upper end. Threads 77 are engaged with nut 78 held against axial movement in gear housing 79 secured to the front face of bracket 47. Nut 78

has beveled gear 81 in driving engagement with beveled pinion 82 secured to shaft 83 journalled in boss 84 on housing 79. Shaft 83 has a universal coupling connection 86 with shaft 87 which is driven from previously referred to shaft 41 in a manner to be subsequently explained.

From the preceding description, it is apparent that rotation of shaft 87 in either direction will effect raising or lowering of the drivable wheel 69 into or out of engagement with the ground. Upon lowering thereof from the position shown in Fig. 3, the wheel 69 can be moved into contact with the ground, and after this occurs, further driving of shaft 87 in the same direction results in the front end portion of the machine including the front supporting wheels 23, being lifted off of the ground. When the front end portion of the machine is lifted off of the ground, means is provided for driving wheel 69 in either direction to effect turning of the machine about the rear supporting means 24 as an approximate pivot. A sprocket 90 is secured to a forwardly projecting portion of shaft 70, and is adapted to be driven through chain 91 engaging sprocket 92 secured to shaft 93 journalled in bracket 94 secured to the top of tubular support 72. The rear end of shaft 93 has a universal coupling connection 96 with telescopic shafting 97 which is also driven from shaft 41 (Fig. 1).

Both shaft 87 and telescopic shafting 97 are connected with selective clutching mechanism or drive establishing means to enable connection of either of such shafts with shaft 41 to cause either movement of turning wheel 69 with respect to the ground or driving of such wheel when desired. With reference to Figs. 1 and 6, telescopic shafting 97 is connected to shaft 100 journalled in selective clutch casing 101, and shaft 87 is connected to shaft 102 also journalled in casing 101 and spaced from shaft 100. Gear 103 is secured to shaft 100, and a gear 104 is secured to shaft 102 but longitudinally displaced from gear 103. This enables either one of gears 103 or 104 to be selectively engaged by hand controlled clutch gear or element 106 slidably splined on shaft 107 journalled in casing 101 between shafts 100 and 102, and connected with the previously described shaft 41 which can be caused to be driven in either direction through manipulation of control lever 40. For effecting clutching of slidable gear 106 with either of gears 103 or 104, gear 106 is provided with annular groove 110 in which is engaged pin 111 mounted on arm 112 secured to pin 113 pivotally mounted in the top of casing 101. Pin 113 is adapted to be oscillated by means of arm 114 fixed to the pin and loosely engaged in eye 114' formed in axially movable hand controlled link 115 extending to a position adjacent the control box 38; suitable spring pressed latching means 116 being provided between arm 114 and casing 101 to hold the clutching gear 106 in neutral position or in either of its engaged positions with gears 103 or 104.

In operation, when the road machine has been stopped and it is desired to operate the turning device, the device can be lowered from the position shown in Fig. 1 to effect lifting of the front end portion of the machine off of the ground, by first engaging clutching gear 106 with gear 104 to establish connection between shaft 41 and shaft 87. Next, control lever 40 is moved in the proper direction to effect driving of shaft 41 in the direction for lowering of the drivable turning wheel 69. When the front end of the machine has been lifted off of the ground the desired distance, control lever 40 can be moved to neutral position to interrupt the drive to shaft 87. Then, clutching gear 106 can be moved into engagement with gear 103 to establish connection between shaft 41 and telescopic shafting 97 which, because of its telescopic nature, is adjustable as to length upon lowering or raising of the turning device. After engagement of gear 106 with gear 103 and while the front end of the machine is still off the ground, control lever 40 can be moved to either one of its positions to rotate shaft 41 in the desired direction for driving wheel 69 and thereby effect turning of the machine. During such turning, it will be apparent that drivable wheel 69 will move the machine laterally about the rear ground engaging wheels 24 as an approximate pivot, thus enabling the machine to be turned within a comparatively short turning radius.

After the machine has been turned, the turning device is restored to its original position in a manner which will be obvious from the foregoing explanation. It is to be noted that irrespective of the adjusted position of the turning wheel 69 with reference to the frame of the machine when it is lifted off the ground, it can always be driven in view of the fact that the distance between the axes of shaft 70 and shaft 93 is fixed, and because of the telescopic shafting 97 adjustable as to length to compensate for change in distance between the top of the support 72 and gear box 101 upon movement of the support. Thus, wheel 69 can be driven irrespective of the height to which the front end of the machine may be raised above the ground. This is important in rough terrain where it is sometimes necessary to lift the machine higher than on perfectly flat ground.

Furthermore, it will be noted that the turning device is located beyond or outside the ground engaging supporting wheels 23 or 24 of the machine that is, it is not located between such wheels 23 and 24 which would result in interference with the ground engaging tools. Although in the preferred construction, the drivable ground engageable wheel 69 is mounted adjacent the front end of the machine in front of the axis of rotation of the front ground engaging wheels 23, it is apparent that it may be mounted adjacent the rear of the machine or rear wheels if so desired.

To prevent either of front wheels 23 from dragging while turning the road machine, which might be caused because of the usual pivotal mounting of front axle 20 on shaft 19, means is preferably provided to maintain the front axle 20 in a substantially horizontal position when the front of the machine is lifted off of the ground. This means may comprise a U-shaped bumper 120, in the form of a single leaf spring, which is secured to lower arms 74 and has its ends extending rearwardy to a point above the axle 20. Thus, when the turning device is lowered to elevate the machine and consequently raise wheels 23 above the ground, axle 20 will come in close proximity to the outer ends of the bumper, which will limit or prevent undue oscillation of the axle about its pivot, to preclude either of wheels 23 from contacting the ground and dragging.

I, therefore, claim as my invention:

1. A vehicle having a main frame structure supported at one end thereof upon wheels and at the other end upon wheels mounted on an axle pivoted to said frame to permit oscillatory

movement of said axle in a plane transverse to the longitudinal axis of said vehicle, a device for enabling turning of said vehicle comprising a wheel normally carried out of contact with the ground, means for lowering said wheel into contact with the ground to raise said pivoted axle above its normal height from the ground, and resilient means supported on said lowering means and actuable upon operation thereof to engage said pivoted axle at either side of its pivot point to preclude unbalancing of said axle and consequent dragging of one of the wheels mounted thereon during subsequent operation of said turning device.

2. A vehicle having a main frame structure supported at one end thereof upon wheels and at the other end upon wheels mounted on an axle pivoted to said frame to permit oscillatory movement of said axle in a plane transverse to the longitudinal axis of said vehicle, a device for enabling turning of said vehicle comprising a wheel normally carried out of contact with the ground, means for lowering said wheel into contact with the ground to raise said pivoted axle above its normal height from the ground, and resilient means in the form of a leaf spring actuable into pressure engagement with said pivoted axle to either side of its pivot point upon operation of said lowering means to preclude unbalancing of said pivoted axle when lifted above its normal height above ground, whereby dragging of one of the wheels mounted on said pivoted axle during subsequent operation of said turning device is precluded.

RUDOLPH GEDSTAD.