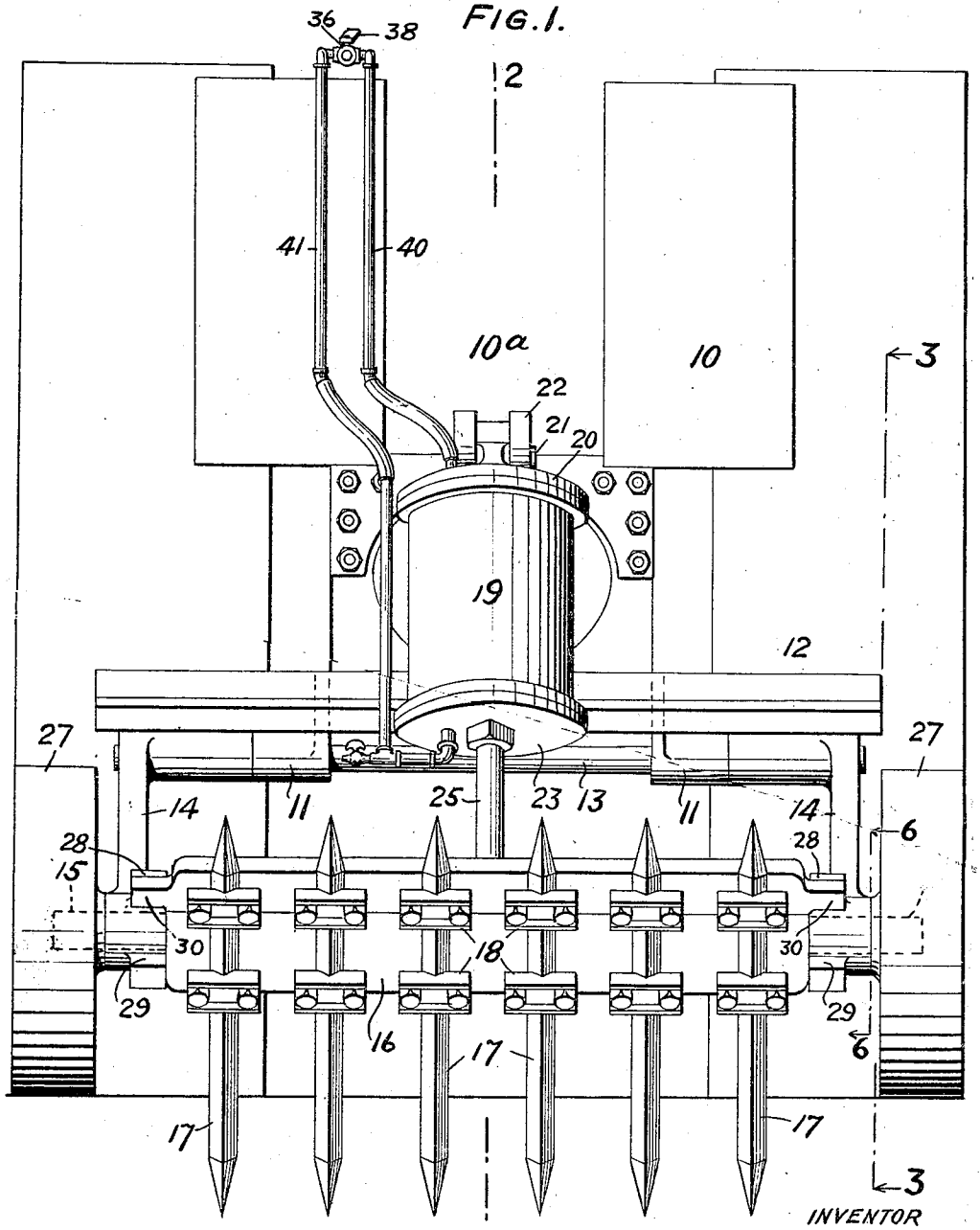
Nov. 6, 1923. 1,473,003

E. E. BERRY

SCARIFIER

Filed Dec. 1, 1920 4 Sheets-Sheet 1

FIG. 1.



WITNESS:

Robt. P. Fletcher.

INVENTOR

Earl E. Berry

BY

Frank L. Busser

ATTORNEY.

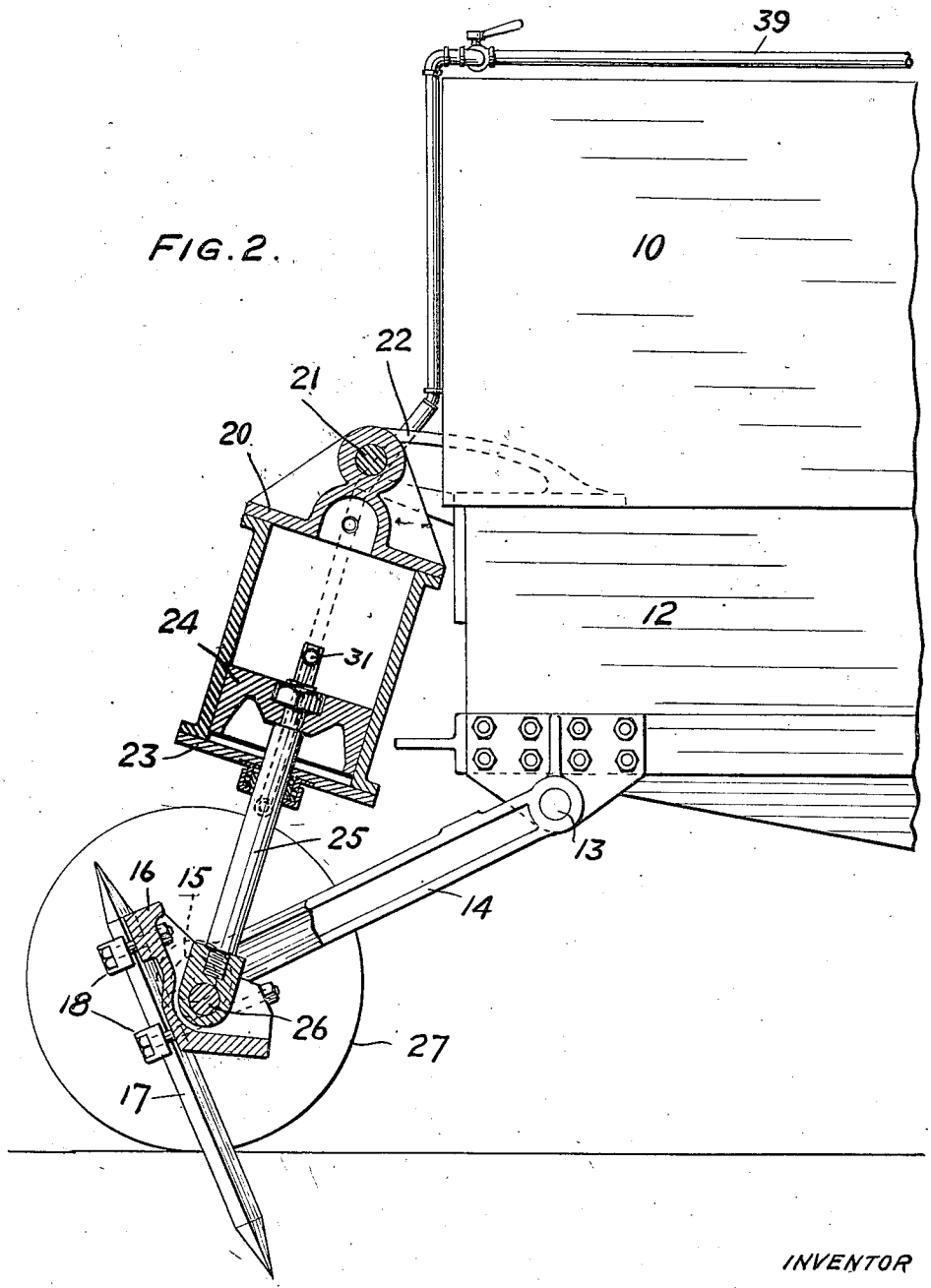
Nov. 6, 1923. 1,473,003

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Filed Dec. 1, 1920 4 Sheets-Sheet 2

FIG. 2.



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Nov. 6, 1923. 1,473,003

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SCARIFIER

Filed Dec. 1, 1920 4 Sheets-Sheet 3

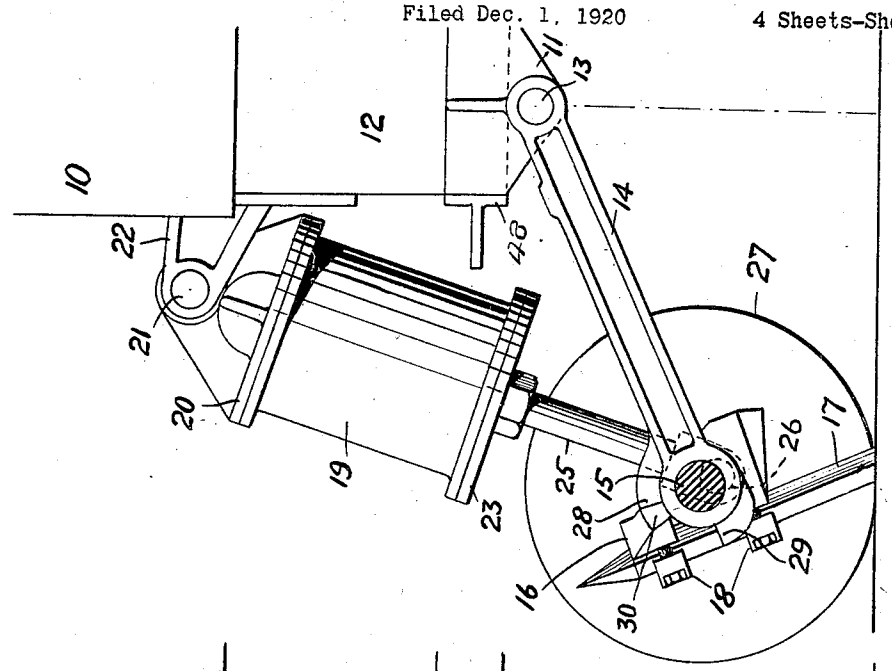


FIG. 3.

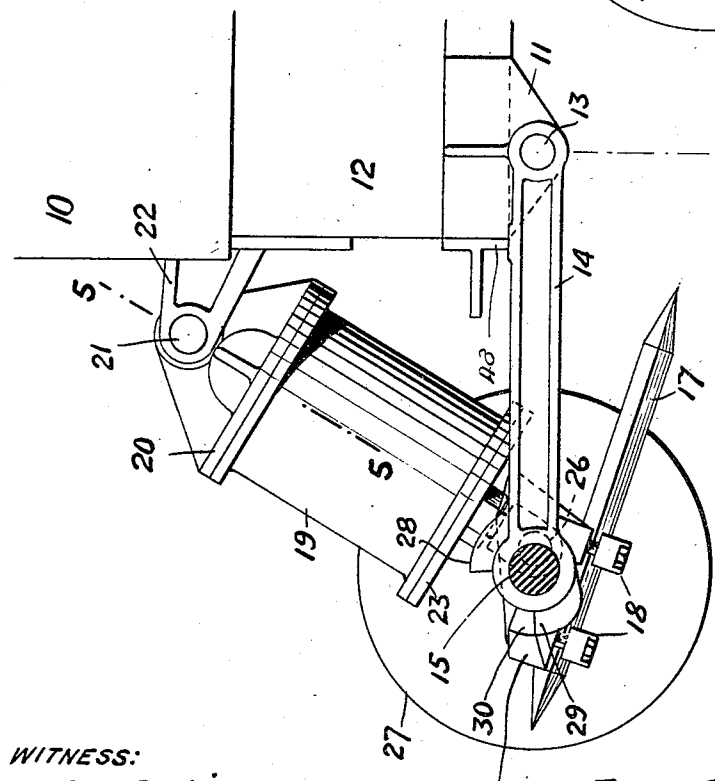


FIG. 4.

WITNESS:

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Nov. 6, 1923.

E. E. BERRY

1,473,003

SCARIFIER

Filed Dec. 1, 1920

4 Sheets-Sheet 4

FIG. 5.

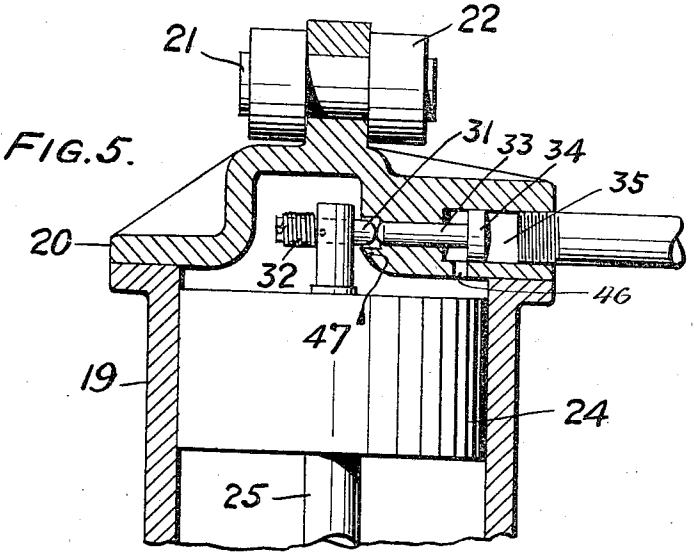


FIG. 6.

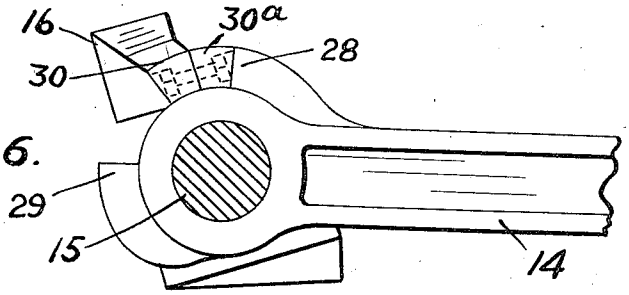
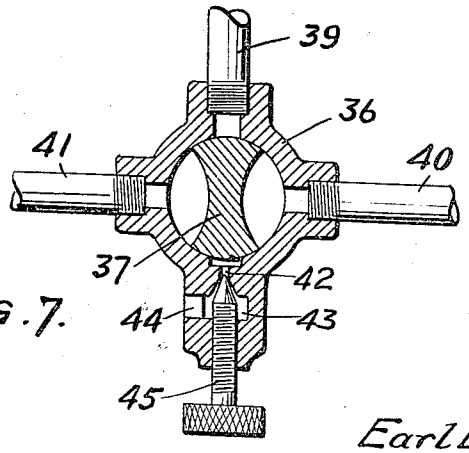


FIG. 7.



WITNESS:

Robt. R. Mitchell.

INVENTOR

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BY

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Patented Nov. 6, 1923. 1,473,003

UNITED STATES PATENT OFFICE.

EARL E. BERRY, OF KENNETT SQUARE, PENNSYLVANIA, ASSIGNOR TO AMERICAN ROAD MACHINERY COMPANY, INC., OF KENNETT SQUARE, PENNSYLVANIA, A CORPORATION OF DELAWARE.

SCARIFIER.

Application filed December 1, 1920. Serial No. 427,494.

To all whom it may concern:

Be it known that I, EARL E. BERRY, a citizen of the United States, residing at Kennett Square, county of Chester, and State of Pennsylvania, have invented a new and useful Improvement in Scarifiers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to an improvement in fluid pressure actuating scarifiers, and more particularly to devices of this type which are attached to road machinery or steam rollers for tearing up the surface of roads prior to paving.

The object of my invention is to provide a simple and efficient device of this character in which the teeth of the scarifier are rotated about the axis of their support to raise the points of the teeth above the plane of the supporting wheels of the scarifier, when out of operation, and thereby reduce the required movement of the scarifier when shifting it from its operative position to its inoperative position, and at the same time provide sufficient clearance between the points of the teeth and the road when the scarifier is in its raised or inoperative position.

Another object of my invention is to so mount the cylinder for raising and lowering the scarifier, from its operative to its inoperative position or vice versa, that I am enabled to form a direct connection between the operating piston in the cylinder and the scarifier by means of the piston rod, and to so mount the scarifier that the teeth will be automatically positioned by the direct action of the piston rod when raising the scarifier.

A further object of my invention is to provide means whereby the angle of the teeth can readily be changed to vary the pitch of the teeth in accordance with the surface to be scarified.

The precise nature of my invention will be best understood by reference to the accompanying drawings, which will now be described, it being premised, however, that various changes may be made in the details of construction without departing from the spirit and scope of my invention as defined in the appended claims.

Fig. 1 of the drawings is a rear view of a portion of a road roller with one form of scarifier made in accordance with my invention attached thereto.

Fig. 2 is a sectional view on the line 2—2 of Fig. 1.

Fig. 3 is a detail sectional view on the line 3—3 of Fig. 1.

Fig. 4 is a similar view with the scarifier in its inoperative position.

Fig. 5 is a detail sectional view on the line 5—5 of Fig. 4, illustrating the locking device.

Fig. 6 is a detail sectional view on the line 6—6 of Fig. 1, showing a filler block in position to vary the angle of the teeth.

Fig. 7 is a sectional view through one form of valve for controlling the admission of pressure fluid to the cylinder and the exhaust therefrom.

In the drawings, the reference character 10 designates the rear of a steam roller or road machine, which is supported in the usual manner on wheels which are driven by power to move the machine over the road, and 10^a the driver's entrance at the rear, as shown in Fig. 1. 11 are brackets secured to the frame 12 of the roller. 13 is a shaft mounted therein and which extends beyond the brackets as shown in Fig. 1.

Mounted on the ends of the shaft 13 are draw or drag bars 14, the outer ends of which are bored out to receive trunnions 15 on the ends of a tool bar 16, and 17 are scarifying teeth or tools secured to the tool bar, by means of screw clamps 18. These teeth or tools are square in cross-section and are pointed at both ends so as to permit reversing when one of the points is broken off or blunted. The tool bar 16 and the clamps are provided with V-shaped recesses which together form sockets for the teeth. As the depth of these V-shaped recesses is less than one-half the greatest diameter of the teeth, the teeth can be securely clamped in their adjusted positions by the clamps 18.

19 is a fluid pressure cylinder, having an upper cylinder head 20 provided with a bearing for a shaft 21, which is mounted in brackets 22 secured to the frame of the roller, the arrangement being such that the cylinder 19 is suspended from the roller in such a manner that it can freely oscillate with relation thereto.

The lower end of the cylinder is also provided with a head 23, and 24 is a piston

within the cylinder, which is arranged to reciprocate therein for the purpose hereinafter described. 25 is a piston rod secured to the piston 24 which extends through a stuffing box on the cylinder head 23, and which rod is pivotally connected at its lower end to the tool bar 16 by a pin 26. The axis of the pin 26 is eccentric to the trunnions 15 to permit the tool bar to be swung about the axis of the trunnions 15 by the movement of the piston 24, as hereinafter set forth.

Pivotally mounted on the trunnions 15 are wheels 27 which support the tool bar 16 when in operative position, and gage the depth to which the teeth enter the ground when the scarifier is moved ahead by the roller.

28 and 29 are stops on the drag bars 14, which are engaged by stops 30 on the tool bar 16, the stops 28 being arranged to limit the movement of the tool bar 16 about the axis of the trunnions 15 to determine the angle of the teeth 17 as shown in Fig. 3, while the stops 29 are arranged to limit the movement of the tool bar in the other direction or folding movement as shown in Fig. 4.

If it is desired to increase the pitch of the teeth 17 from that shown in Figs. 2 and 3, a liner or filler block such as shown at 30^a, in Fig. 6, may be secured to each of the stops 30 to reduce their movement toward stops 28.

Slidably mounted in the piston rod 25 is a locking pin 31 which is retained in its locking position by means of a spring 32, and is arranged to retain the scarifier in its inoperative position, as shown in Figs. 4 and 5. 33 is a releasing plunger for the locking pin, having a piston 34 in a cylinder 35, in the upper cylinder head 20.

36 is the casing for the controlling valve 37 for controlling the admission and exhaust of actuating fluid to and from the cylinder 19, and 38 is an actuating lever connected to the valve 37.

39 is a pipe leading from any suitable source of fluid pressure to the valve casing 36, and 40 and 41 are pipes leading from the valve casing to the top and bottom, respectively, of the cylinder 19. 42 is an exhaust port in the valve casing 35 which communicates with a chamber 43 in the valve casing and which is open to atmosphere by means of a port 44. 45 is a needle valve for adjusting the size of the outlet from exhaust port 42 to the chamber 43 to control the speed of the piston in either direction when pressure is admitted thereto.

The pipe 40 is not connected directly with the cylinder 19, but is in direct connection with the small cylinder 35 of the piston 34 on the locking pin releasing plunger 33, and when plunger 33 is advanced to release the locking pin 31, as hereinafter set forth, the piston 34 will uncover a port 46 and admit pressure to the cylinder 19 above the piston 24.

47 is a cam surface in the cylinder head 20 which is engaged by the locking pin 31 during the upward movement of the piston 24 to shift the pin against the action of its spring 32, and 48 are stops on the frame of the roller 10 engaged by the drag bars 14 to limit the upward movement of piston 24.

Assuming the parts to be in the position shown in Figs. 4 and 5, and it is desired to lower the scarifiers into operative position as shown in Figs. 1, 2 and 3, the valve 37 is shifted to admit pressure to pipe 40 and place pipe 41 in communication with exhaust port 42.

The pressure in pipe 40 will first advance the lock releasing plunger 33 and release locking pin 31, which will unlock the piston 24. In this releasing movement of the plunger 33, the piston 34 thereon will uncover port 46, admit pressure to the top of the cylinder 19, and as the lower end of the cylinder is open to exhaust, the piston 24 will move downward. As the exhaust is throttled by means of the needle valve 45, the movement of the piston will be resisted by the back pressure of the fluid in the cylinder 19 below the piston 24 to prevent shock to the various parts when the limit of the movement of the piston 24 is reached.

The piston 24 is moved downwardly until the wheels 27 contact with the surface of the road, and the teeth 17 will enter the ground and be moved downwardly about the axis of the trunnions 15 by the forward movement of the roller 10, until the stops 30 on the tool bar engage the stops 28 on the drag bars 14, and the scarifier will be held in its operative position by the pressure of the fluid on the top of piston 24.

When it is desired to raise the scarifier from its operative position, the valve 37 is reversed to admit pressure to the bottom of the cylinder 19 through pipe 41 and open the top of the cylinder to exhaust through pipe 40. During the first part of the upward movement of the piston 24, the teeth 17 will be withdrawn from the ground and the tool bar 16 will be rocked about the axis of the trunnions 15 until the stops 30 engage the stops 29, and during the further movement of the piston 24, the scarifier will be raised to the position shown in Figs. 4 and 5. Just before the piston 24 reaches the limit of its upward movement, the locking pin 31 will engage the cam surface 47 which will move said pin against the action of its spring 32, and as soon as this pin passes the cam surface, the spring 32 will shoot the locking pin 31 into a locking recess above the cam surface 47, as shown in Fig. 5, to retain the scarifier in its inoperative position.

This shooting of the locking pin 31 into

its locking recess will also shift the releasing plunger 33, so that its piston 34 will cover port 46.

The advantages of my invention result from the provision of a scarifier having its teeth so mounted that they can be rotated about the axis of their support so as to be moved away from the road when the scarifier is raised to its inoperative position, which enables me to reduce the height of the lift of the scarifier, and at the same time provide sufficient space or clearance between the teeth and the road bed when the scarifier is raised to its inoperative position. This reduction in the height of the lift enables me to use a single actuating cylinder at the center of the structure which can be mounted in a vertical position so that the piston rod can be connected directly to the scarifier, and at the same time retain the top of the cylinder low enough to permit the driver to enter the cab or driver's platform of the roller through the rear entrance over the cylinder.

This arrangement also permits the placing of the parts, so that the upward movement of the scarifier when in operation about the axis of the supporting or gage wheels and the axis of the drag bars is transmitted directly to the piston in the cylinder through the medium of the piston rod, without the interposition of actuating devices between the connecting rod and scarifier, which are liable to become bent and jam, which would destroy the resilient or cushioning action of the piston, when the scarifier engages obstructions. In other words, the cylinder is so positioned that the line of movement of the piston is coincident with the line of movement of the scarifier, and the teeth can be raised by an obstruction without raising the gage wheels, and as the cylinder is short I am also enabled to directly mount it in a vertical position on the supporting frame of the roller, which is sufficiently rigid to resist the strains caused by the scarifier.

The teeth are also so disposed with relation to the surface of the ground to be torn up when the scarifier is lowered into operative position, that they will readily enter the ground by the movement of roller and readily assume their working positions, as the movement of the roller will tend to force them into the ground.

A still further advantage results from the provision of means whereby the angle or pitch of the teeth can readily be varied to meet the requirements of different surfaces to be scarified.

Having now fully described my invention, what I claim and desire to protect by Letters Patent is:—

1. A device of the character described having drag bars, both pivoted at one end to permit the outer ends to be raised and lowered, gage wheels connected to the drag bars beyond the pivotal connections of said bars, a scarifying tool pivoted to the drag bars beyond their pivotal connections, a power cylinder, a piston in said cylinder, a piston rod connected to the piston and the tool, the arrangement being such that when the piston is actuated the drag bars are swung about their pivotal connections and the tool is moved about its pivotal connections to the drag bars, and stops for limiting the movement of the tool on the drag bars.

2. The combination with a road machine and scarifier drag bars pivotally connected thereto and extending longitudinally with reference to the line of travel of the machine, of a transversely extending scarifying tool holding bar pivotally connected to the drag bars, gage wheels mounted on the tool bar, a fluid pressure cylinder mounted on the road machine, a piston in said cylinder, and a piston rod connected to the piston and the tool bar, the pivotal connection between the tool bar and the connecting rod being eccentric to the pivotal connection between the drag bars and the tool-holding bar.

3. The combination with a road machine and scarifier drag bars pivotally connected thereto and extending longitudinally with reference to the line of travel of the machine, of a transversely extending scarifying tool holding bar pivotally connected to the drag bars, stops for limiting the rotary movement of the tool bar with relation to the drag bars, gage wheels mounted on the tool bar, a fluid pressure cylinder mounted on the road machine, a piston in said cylinder, and a piston rod connected to the piston and the tool bar, the pivotal connection between the tool bar and the connecting rod being eccentric to the pivotal connection between the drag bars and the tool holding bar.

4. The combination with a road machine and scarifier drag bars pivotally connected thereto and extending longitudinally with reference to the line of travel of the machine, of a transversely extending scarifying tool holding bar pivotally connected to the drag bars, stops on the drag bars and the tool bar for limiting the rotary movement of the tool bar with relation to the drag bars, means for securing liners to one set of stops to vary the limit of such movement, gage wheels mounted on the tool bar, a fluid pressure cylinder mounted on the road machine, a piston in said cylinder, and a piston rod connected to the piston and the tool bar, the pivotal connection between the tool bar and the connecting rod being eccentric to the pivoted connection between the drag bars and the tool holding bar.

5. The combination with a road machine and scarifier drag bars pivotally connected thereto and extending longitudinally with

reference to the line of travel of the machine, of a transversely extending scarifying tool holding bar pivotally connected to the drag bars, gage wheels mounted on the tool bar, the axis of said wheels being in line with the axis of the pivotal connection between the drag bars and the tool bar, a fluid pressure cylinder mounted on the road machine, a piston in said cylinder, and a piston rod connected to the piston and the tool bar, the pivotal connection between the tool bar and the connecting rod being eccentric to the pivotal connection between the drag bars and the tool holding bar.

6. A scarifier having longitudinally extending drag bars pivotally connected to a road roller, a transversely extending scarifying tool holder pivotally connected to the drag bars, gage wheels pivotally mounted on the pivotal connections between the drag bars and the tool holder, a fluid pressure cylinder, a piston in said cylinder, a piston rod connected to the piston, and a connection between the piston rod and the tool holder eccentric to the pivotal connection between the drag bars and the tool holder, whereby the tool holder can be rocked with relation to the drag bars and raised and lowered therewith.

7. A scarifier having longitudinally extending drag bars pivotally connected to a road roller, a transversely extending scarifying tool holder pivotally connected to the drag bars, gage wheels pivotally mounted on the pivotal connections between the drag bars and the tool holding bar, a fluid pressure cylinder, a piston in said cylinder, and a piston rod connected to the piston at one end and pivotally connected at its other end to the tool bar eccentric to the pivotal connection between the drag bars and the tool holder.

8. A scarifier having longitudinally extending drag bars pivotally connected at their front ends to the rear of a road roller, a transversely extending tool holding bar pivotally connected to the rear ends of the drag bars, gage wheels for the tool holding bar, and fluid pressure means for raising and lowering the tool holding bar pivotally connected to the tool holding bar between the ends of the drag bars and arranged to oscillate the tool holding bar with relation to the drag bars when raising and lowering the tool holding bar.

9. A machine of the type described, having pivoted drag bars extending longitudinally with relation to the machine, a scarifying tool bar extending transversely and pivotally connected to the free ends of the drag bars, scarifying tools on the bar, gage wheels for regulating the depth the tools enter the ground, and means for raising the tool bar, said raising means being connected to the tool bar eccentric to the pivotal connections between the tool bar and the drag bars to permit the tools to swing about the axis of the tool bar during the raising and lowering of the tool bar.

In testimony of which invention, I have hereunto set my hand, at Kennett Square, Pa., on this 22nd day of November, 1920.

EARL E. BERRY.