July 10, 1951 C. W. KELSEY 2,560,352

SCARIFIER

Filed Jan. 4, 1946 3 Sheets-Sheet 1

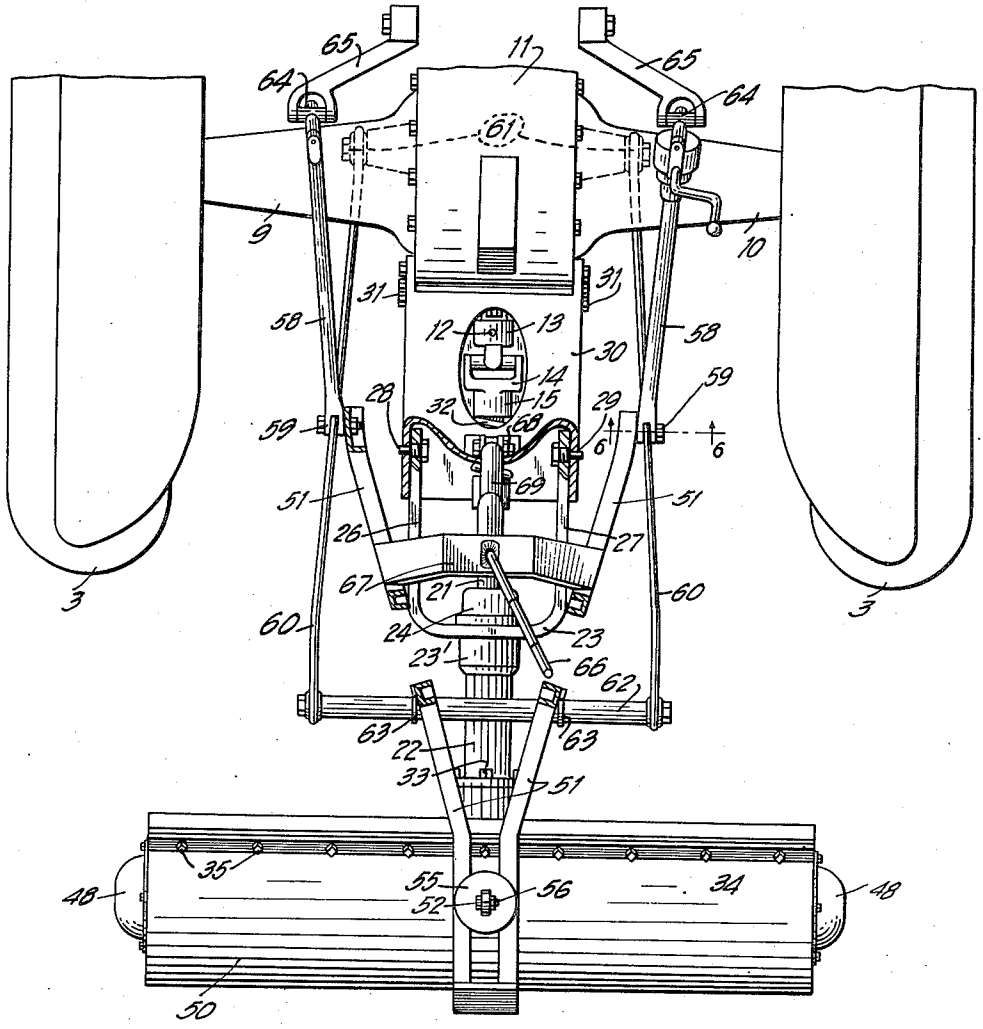


FIG. 2

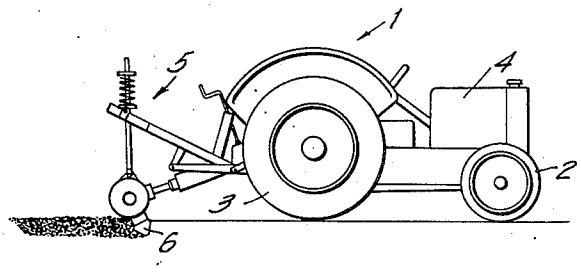


FIG. 1

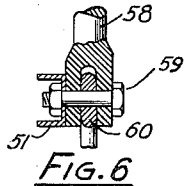


FIG. 6

INVENTOR.
Cadwallader W. Kelsey
BY
ATTORNEY

July 10, 1951 C. W. KELSEY 2,560,352

SCARIFIER

Filed Jan. 4, 1946 3 Sheets-Sheet 2

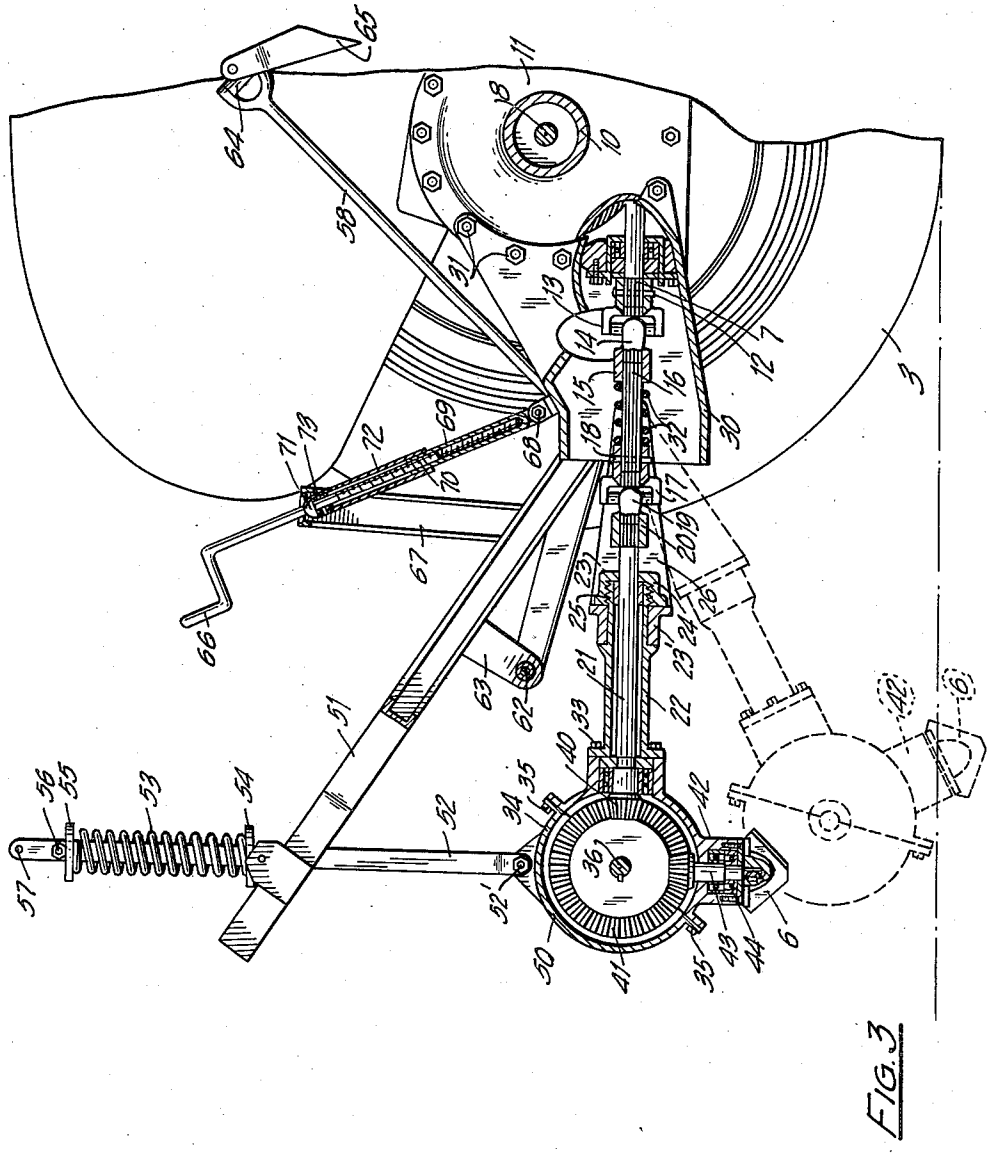


FIG. 3

INVENTOR.
Cadwallader W. Kelsey
BY
ATTORNEY

July 10, 1951 C. W. KELSEY 2,560,352

SCARIFIER

Filed Jan. 4, 1946 3 Sheets-Sheet 3

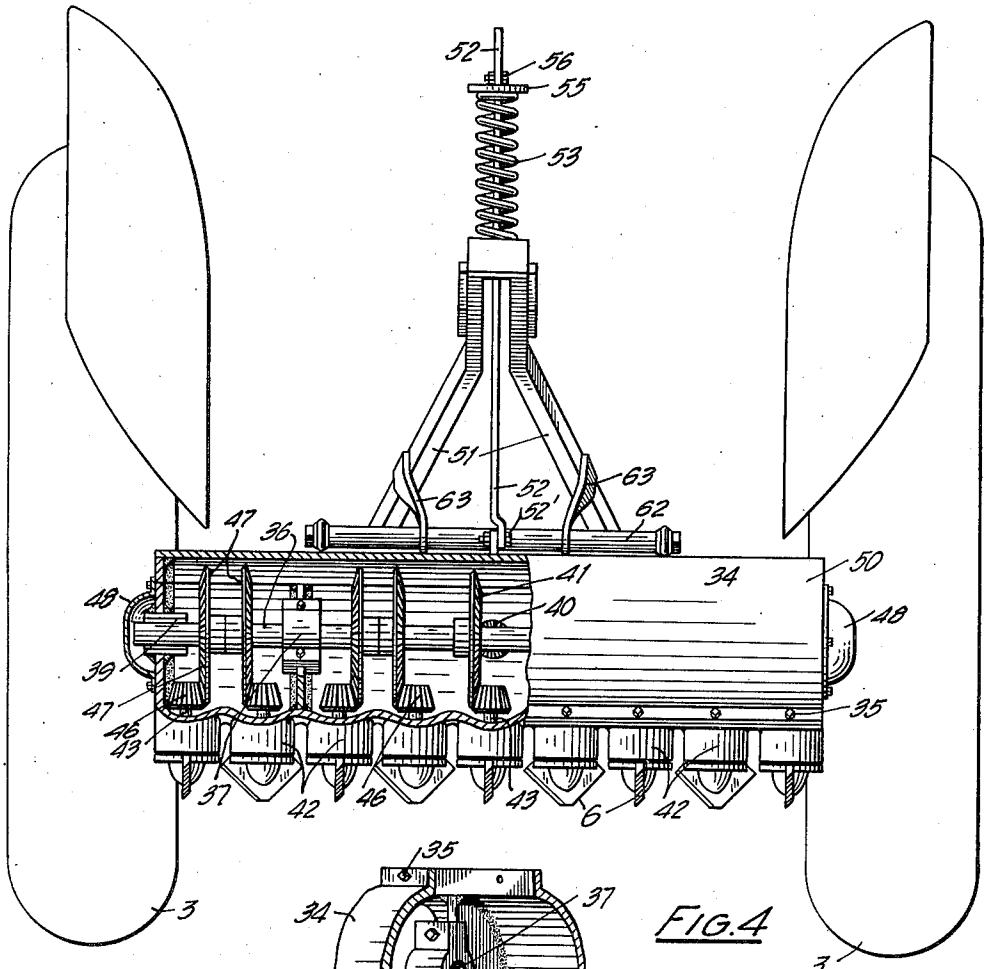


FIG. 4

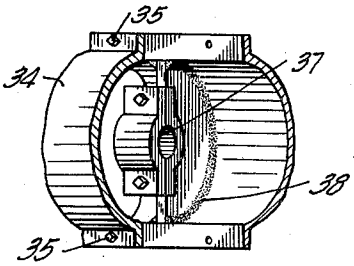


FIG. 5

INVENTOR.
Cadwallader W. Kelsey
BY
ATTORNEY

Patented July 10, 1951

2,560,352

UNITED STATES PATENT OFFICE

2,560,352

SCARIFIER

Cadwallader W. Kelsey, Troy, N. Y.

Application January 4, 1946, Serial No. 638,963

3 Claims. (Cl. 262—19)

1

My invention relates to scarifiers or devices for breaking up the surface of the ground, roads, pavements and the like.

Scarifiers of the present type used in breaking up macadam pavements, dirt roads and the like prior to resurfacing comprise a heavy wheeled vehicle provided with projecting spikes or teeth, and which is usually drawn behind a road roller or the like so that the teeth or jaws are forced under the surface of the road or ground and pry it upwardly. Sometimes a roller with long spikes in the rear wheels thereof is used as a scarifier. In any event, the scarified material is usually broken into large, irregular shaped chunks which either must be removed and replaced with new material or which must be broken up by hand or otherwise if the material is to be used in whole or in part in the resurfacing.

The principal object of my invention is to provide an improved means not only for breaking up the top surface of the ground but which will also at the same time pulverize or break up the scarified material into comparatively small pieces or particles. Another object is to provide a device of this character, adapted for use in soil stabilization and the improvement of dirt roads or the like, in which the surface of the ground or road is first broken up and hydraulic or other cement is thereafter mixed with the broken material to form a hard, concrete-like surface when wet and rolled. Another object is to provide a device which may be used, not only to break up the surface of the road, but also thoroughly to mix the cement or other binding material with the broken up material. A further object is to provide a device of this character which is adapted for use anywhere it is desired, not only to break up the surface of the ground, but also thoroughly to pulverize or break up the loosened material such, for example, as in the preparation of a seed bed or in the building of a lawn.

With these objects in view, my invention includes the novel elements and the combinations and arrangements thereof described below and illustrated in the accompanying drawing in which—

Fig. 1 is a small scale, more or less diagrammatic side elevation view of a tractor showing my scarifier attached thereto;

Fig. 2 is a fragmentary top plan view of the rear end of a tractor, with portions thereof broken away and showing my scarifier attached thereto;

Fig. 3 is a fragmentary side elevation view of the rear portion of a tractor with portions broken

2

away and showing a longitudinal, vertical section of one of my scarifiers secured thereto;

Fig. 4 is a rear elevation view of my scarifier with portions thereof broken away to show details of construction;

Fig. 5 is a fragmentary perspective view of the driven shaft housing with portions broken away to show one of the bearings for the driven shaft secured in the housing; and

Fig. 6 is an enlarged section of Fig. 2 in the plane 6—6.

Referring to the drawings—

1 is a tractor having front wheels 2 and rear wheels 3, and which is understood to be provided with a motor beneath the hood 4 which is operatively connected to the wheels 3 for propelling the device over the ground. 5 generally represents my scarifier which will be described below in detail, and which is attached to and drawn by the tractor; the scarifying elements 6 being rotated by means of mechanism operatively connecting them to the power take-off 7 of the tractor (see Fig. 3).

Referring now to Figs. 2, 3 and 4, 3—3 are the rear wheels of the tractor which are understood to be mounted on axles 8 within housings 9 and 10 on either side of the differential housing 11. Connected to the power take-off 7 of the tractor by means of a pin 12 or other suitable means is a half 13 of a universal joint. The other half 14 of this joint is provided with an internally splined collar 15 in which the forward end of the splined shaft 16 is received. The other end of the splined shaft 16 is connected to a half 17 of a second universal joint by means of a pin 18, and the other half 19 of the second universal joint is provided with an internally splined collar 20 within which the forward end of the drive shaft 21 is received. The drive shaft 21 is provided with a housing 22 which is rotatably connected to a yoke 23 by means of the yoke collar 23' and the cap 24 which engages the threaded forward end 25 of the shaft housing 22. The forwardly extending branches 26 and 27 of the yoke 23 are pivotally connected at 28 and 29 (see Fig. 2) to a frame or housing 30 which, in turn, is bolted to the differential housing as shown at 31 (see Figs. 2 and 3). A helical spring 32 surrounds the splined shaft 16 and is compressed between the half universals 15 and 17.

Secured to the rear end of the drive shaft housing 22 by means of cap screws 33 is a transversely extending cylindrical housing 34 formed in two halves which are bolted together as shown at 35. A transversely extending driven shaft 36 is

mounted in bearings 37 which are welded to the interior of one of the half housings as shown at 38 in Fig. 5, and end bearings 39 therefor are also provided at each end of the housing. The shaft 36 is driven by the shaft 21 through the pinion 40 on the end of the drive shaft which cooperates with the bevel gear 41 keyed or otherwise secured to the driven shaft 36. The half housing in which the bearings 37 are secured has formed integral with the lower exterior portion thereof a plurality of comparatively closely spaced cylindrical bosses 42 which are provided with axial bores for the passage of the stub shafts 43 and are counterbored to receive the stub shaft bearings 44. Secured to the outer ends of each of the stub shafts is a scarifying element 6 here illustrated as comprising a flat, approximately triangular drill or cutter. Within the housing, each stub shaft is provided with a pinion 46 which cooperates with a bevel gear 47 keyed or otherwise secured to the shaft 36. It will be noted from Fig. 4 that adjacent scarifying elements are arranged with their planes substantially at right angles to each other, and it will also be apparent that the alternate scarifying elements at either side of the center element rotate in opposite directions. It will also be apparent that, by removing the caps 48 at the ends of the housing 34 and thereafter removing the bolts or cap screws 35 which hold the halves of the housings 34 together, the half housing 50 may be lifted off to provide access to the bearings for the shaft 46 and the gears which drive the scarifying elements.

In order to raise and lower the scarifier and to support it in proper operating relation to the ground, I provide the V-shaped channel frame 51 from which the housing 34 is resiliently supported by means of the link 52, which is pivotally connected to the housing by a bolt 52', and the helical compression spring 53; the spring 53 being compressed between a member 54 secured to the frame 51 and a washer-like element 55 which is secured to the link 52 by means of a bolt 56. The link 52 may have spaced holes such as 57 therein (see Fig. 3) for the reception of the bolt 56. The channels forming the V-shaped frame 51 are pivotally connected at their lower extremities to the lifting members 58 and also to the members 60 by bolts 59, and the members 60 are pivotally connected to the sides of the differential housing, as shown at 61. The free ends of the members 60 are connected together by the transverse member 62, and braces 63 (see Figs. 3 and 4) are welded or otherwise secured to the sides of the V frame 51 and connect them with the member 62. The lifting members 58 are pivotally connected through universal joints 64 to the cranks 65 which are understood to be parts of the hydraulic lifting mechanism with which all present day tractors are equipped for lifting plows and other attachments drawn by the tractor. Thus, the scarifier may be raised and lowered, as shown in Fig. 3, by means of the hydraulic lifting mechanism of the tractor.

In addition to the hydraulic lifting means just described, I provide a manually actuated lifting means which is operable by turning the crank 66 (see Figs. 2 and 3). An inverted U-shaped frame element 67 has its branches welded or otherwise secured to the channel members forming the V-shaped frame 51, as shown in Figs. 2 and 3. Pivotally secured to the top of the frame or housing 30, as shown at 68 in Figs. 2 and 3, is an internally threaded tubular member 69

which cooperates with the threaded end 70 of the crank 66 and, just beneath the center portion of the U-shaped member 67, the crank 66 is provided with a semi-spherical element 71 which bears against the bottom of the U-shaped member 67. 72 is a sleeve which is secured to the crank 66 by means of a pin 73 and which serves merely as a protecting cover for the threaded portion of the crank. Thus, by turning the crank 66 the scarifier not only may be raised and lowered but the arrangement provides a positive stop limiting the extent to which the scarifier may be lowered; it being understood that while the cranks 65 are swung clockwise, as viewed in Fig. 3, by hydraulic pressure, they are always free to swing clockwise, and thus do not interfere with the manual lifting of the scarifier by crank 66. This is of particular advantage in maintaining a uniform depth of cut because, in turning the tractor around, it is usually necessary to raise the scarifier out of contact with the ground and, after the turn has been made and the scarifier lowered, it will automatically stop at the same elevation above the ground as before making the turn.

While I have described my invention in its preferred embodiment and, as an attachment for a tractor, it will be apparent that the function of the tractor per se is merely to draw the scarifier over the ground. A motor, of course, is necessary to operate the scarifying elements, and it is also desirable that a motor actuate the hydraulic lift, but a separate motor-equipped vehicle may be employed to pull the scarifier over the ground. Therefore, it is to be understood that the words which I have used are words of description rather than of limitation and that changes within the purview of the appended claims may be made without departing from the true scope and spirit of my invention in its broader aspects.

What I claim is—

1. A scarifier adapted to break up the surface of a road and for attachment to a tractor having a power take-off at the rear thereof; said scarifier comprising a transversely-extending driven shaft; a driving shaft cooperating therewith and provided with means adapting it to be connected to said power take-off; a housing entirely enclosing said driven shaft comprising two, approximately semi-cylindrical sections extending lengthwise of said driven shaft and substantially from end-to-end thereof; means detachably securing said sections together; bearings for said driven shaft fixed in one of said sections; a plurality of scarifying elements; a plurality of bearings on said one section of said housing, positioned below said driven shaft bearings and having their axes disposed at right angles to the axes of said driven shaft bearings, in which said scarifying elements are rotatably mounted; and gears in said housing drivingly connecting said scarifying elements with said driven shaft; said gears and said bearings being accessible upon the separation of said housing sections by the removal of said means detachably securing said sections together.

2. A scarifier adapted to break up the surface of a road and to be operatively connected to a tractor having a power take-off at the rear thereof and hydraulic means for raising and lowering apparatus drawn by said tractor; said scarifier comprising a longitudinally-extending driving shaft provided with means adapting it to be operatively connected to said power take-off,

a transversely-extending, driven shaft, means drivingly connecting said shafts, a housing enclosing said driven shaft comprising two, approximately semi-cylindrical sections extending lengthwise of said driven shaft and substantially from end-to-end thereof; means detachably securing said sections together; bearings for said driven shaft fixed in one of said sections; a plurality of scarifying elements; bearings depending from said one of said sections having parallel-disposed axes disposed at right angles to the axes of said driven shaft bearings and in which said scarifying elements are rotatably mounted; gears in said housing drivingly connecting said driven shaft and said scarifying elements; a frame provided with means adapting it to be pivotally connected to said tractor and also with means adapting it to be connected to said hydraulic means for swinging said frame about the axis of said pivotal connecting means; and means resiliently suspending said housing from said frame; whereby up and down movements of said housing may take place independently of said frame and said hydraulic means; said gears and said bearings being accessible upon the separation of said housing sections by the removal of said means detachably securing said sections together.

3. A scarifier adapted to break up the surface of a road and to be operatively connected to a tractor having a power take-off at the rear thereof and hydraulic means for raising and lowering apparatus drawn by said tractor; said scarifier comprising a longitudinally-extending driving shaft provided with means adapting it to be operatively connected to said power take-off, a transversely-extending, driven shaft, means drivingly connecting said shafts, a housing enclosing said driven shaft comprising two, approximately semi-cylindrical sections extending lengthwise of said driven shaft and substantially

from end-to-end thereof; means detachably securing said sections together; bearings for said driven shaft fixed in one of said sections; a plurality of scarifying elements; bearings depending from said one of said sections having parallel-disposed axes disposed at right angles to the axes of said driven shaft bearings and in which said scarifying elements are rotatably mounted; gears in said housing drivingly connecting said driven shaft and said scarifying elements; a frame provided with means adapting it to be pivotally connected to said tractor and also with means adapting it to be connected to said hydraulic means for swinging said frame about the axis of said pivotal connecting means; means resiliently suspending said housing from said frame; and manually adjustable means cooperating with said frame for positively limiting the extent to which said frame may be lowered by said hydraulic means; whereby automatically to maintain a substantially uniform depth of cut when said scarifier is lowered after the raising thereof.

CADWALLADER W. KELSEY.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
510,738	Voysey et al.	Dec. 12, 1893
513,708	Henderson	Jan. 30, 1894
1,696,576	Jones	Dec. 25, 1928
2,214,702	Seaman	Sept. 10, 1940
2,287,479	Kelsey	June 23, 1942
2,345,741	Foulke, Jr.	Apr. 4, 1944
2,366,626	Kelsey	Jan. 2, 1945
2,383,386	Hipple	Aug. 21, 1945
2,462,641	Hyland	Feb. 22, 1949