July 25, 1944. E. K. TROUP 2,354,560

SCARIFIER

Filed May 7, 1943 2 Sheets-Sheet 1

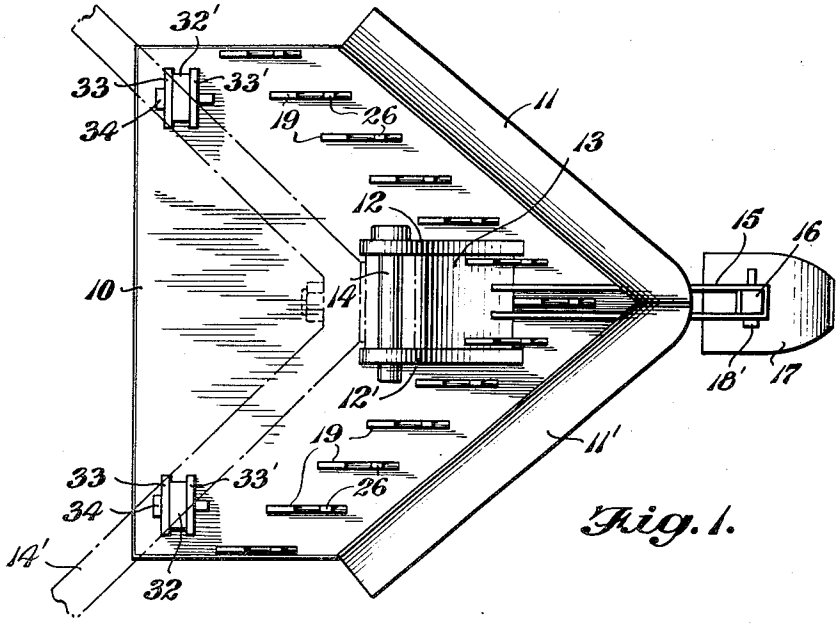


Fig. 1.

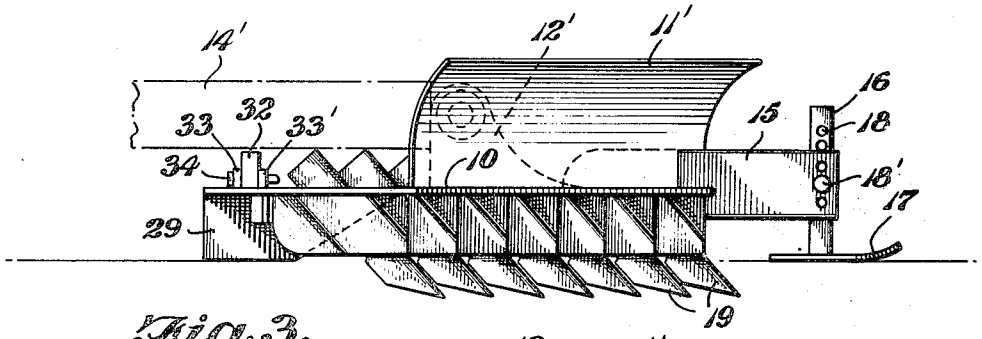


Fig. 3.

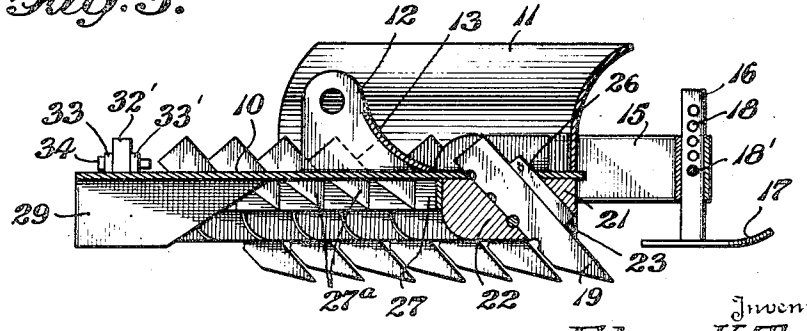


Fig. 4.

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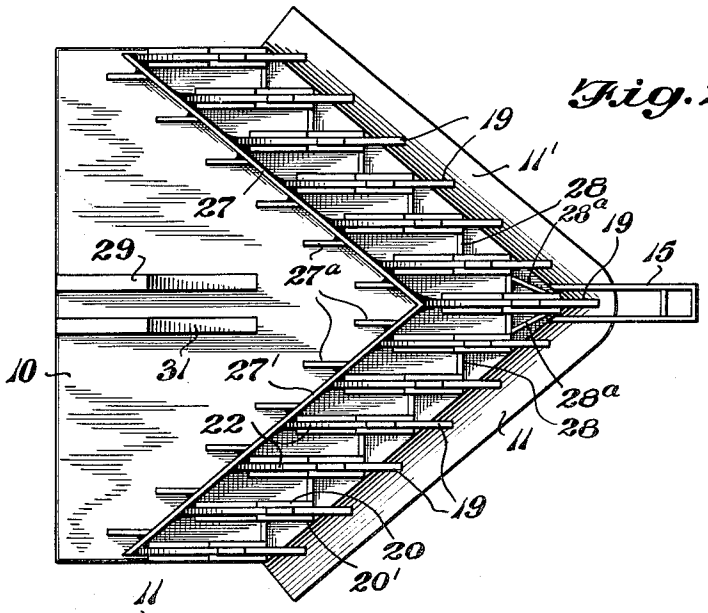


Fig. 2.

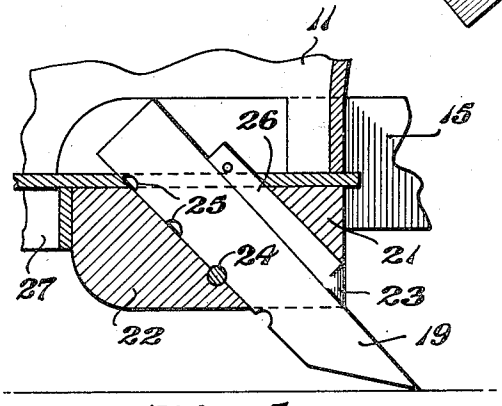


Fig. 5.

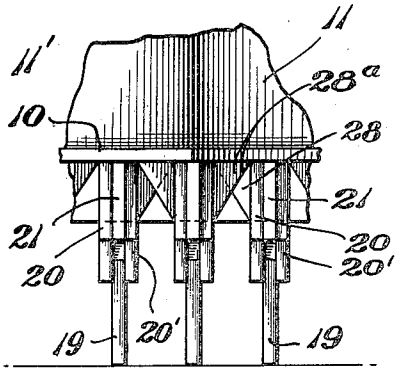


Fig. 6.

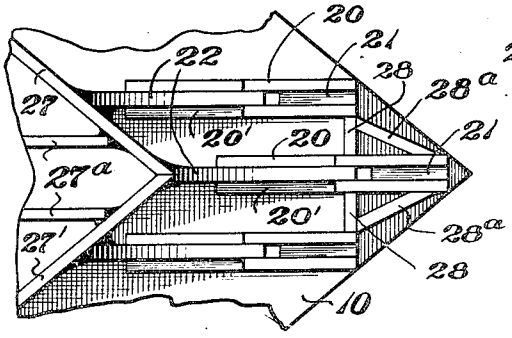


Fig. 7.

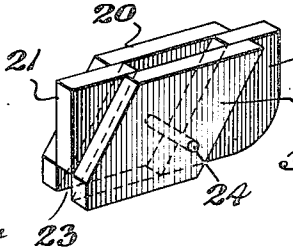


Fig. 8.

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2,354,560

SCARIFIER

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Application May 7, 1943, Serial No. 486,065

16 Claims. (Cl. 262—8)

This invention relates to scarifiers, and is particularly concerned with scarifiers adapted for heavy duty work such as surface rock removal, road bed preparation, ditching and the like, and may be considered an improvement with respect to the scarifier disclosed in my prior Patent No. 2,302,899, granted November 24, 1942.

Scarifiers as heretofore known were open to certain objections, such as the tendency of the sockets for the scarifier teeth to loosen or become displaced due to the heavy thrusts imposed on the teeth when encountering rock or like hard formations, difficulty of removal and replacement of the teeth and uniform setting of the latter, cocking or tilting of the scarifier when operating below the level of the pusher tractor as in ditching, and other objections which the present machine has been devised to overcome.

Objects of the herein disclosed scarifier include, therefore, means whereby the scarifier teeth may be readily adjusted in their sockets to any desired working level and thereafter securely fixed in adjusted position; means for maintaining the sockets for the teeth and consequently the teeth themselves in proper alignment throughout the life of the machine; a simple yet highly effective means for maintaining the scarifier at the proper angle with respect to the surface being operated on, particularly when the scarifier is operating below the level of the tractor which propels the scarifier and which brings the main frame or bed plate of the scarifier considerably below the operating level of the tractor; means functioning to reinforce the scarifier bed plate in cooperative relation with the socket reinforcing means and at the same time facilitating tilting of the scarifier to gain access to the teeth for cleaning or removal and replacement; and to improve scarifiers generally.

The foregoing and other objects and advantages will become apparent in view of the following description taken in conjunction with the drawings, wherein:

Figure 1 is a plan view of a scarifier in accordance with the invention;

Fig. 2, a bottom plan view thereof;

Fig. 3, a side elevation;

Fig. 4, a substantially central longitudinal section;

Fig. 5, an enlarged section of one of the tooth sockets with a tooth mounted therein;

Fig. 6, an enlarged fragmentary view in front elevation of the front portion of the scarifier;

Fig. 7, an enlarged fragmentary bottom plan view of said front portion; and

Fig. 8, a perspective of one of the sockets for the scarifier teeth.

Referring to the drawings in detail, the machine comprises a bed plate 10 having the front side edges thereof shaped at a divergent angle, and connected to these edges are mold boards or deflector plates 11 and 11'. The bed plate should be of such strength and rigidity as to properly support the scarifier teeth and coacting parts hereinafter described.

The machine is of the pusher type, or is adapted to be pushed instead of pulled by a tractor or the like; and accordingly on top of the bed plate there is secured a coupling or hitch consisting of side plates 12 and 12' reinforced by a stiffening plate 13, the side plates having projected therethrough a coupling pin 14. The tractor is usually connected to the hitch by means of A-frames indicated at 14'.

Projecting forwardly from the front of the bed plate or the apex of the angle defined thereby, is a pilot bar 15 adapted to adjustably receive an upright bracket or post 16 carrying on the lower end thereof a shoe or skid 17 which is adapted to contact the surface of the ground being worked and determine the depth of penetration of the scarifier teeth. In order to render the shoe adjustable, the post 16 is provided with a plurality of holes 18 through which a pin 18' is projected, said pin being also projected through matching holes in the end of the bar 15.

One of the features of improvement of the present invention consists in the mounting of the teeth 19. It is highly desirable that these teeth be firmly held against displacement, since when they strike a rock or other hard formation, there is a heavy thrust imposed thereon which has a tendency to move them upwardly in their sockets. Accordingly, each tooth is mounted in a housing or socket comprising side plates 20 and 20', a front plate 21 and a rear plate 22. These plates are secured, preferably by welding at their top edges, to the bottom surface of the bed plate, and the side plates are also welded against the adjacent surfaces of the front and rear plates, the plates thus arranged providing a socket opening 23 for the tooth 19. The back wall of each socket is provided with a locking member in the form of a boss 24, which may be made by projecting a hardened bolt or dowel pin through the side plates and securing said bolt to the adjacent edge of the back plate by welding. The boss 24 is adapted to engage in any one of a plurality of notches or recesses 25 formed in the rear edge of each tooth 19.

A wedge 26 is inserted in the socket opening 23 at the front of the tooth, note particularly Fig. 5, the wedge preferably being inserted from beneath the bed plate or from the lower end of the socket, in order that any thrust on the tooth will have a tendency to tighten the wedge. However, with the construction herein disclosed it is possible to use a wedge which is insertible from either below or above the bed plate. An advantage in having the wedge inserted from below is that any rock or soil which is displaced by the teeth has a tendency to lodge itself in the lower part of the socket opening beneath the wedge, thereby holding the wedge more firmly in position.

There are a number of advantages resulting from the particular locking arrangement of the teeth just described. In the first place, the teeth cannot possibly become displaced without breaking the boss 24, and since this is made sufficiently rugged to stand practically any strain imposed thereon, no trouble has been experienced in this regard. The teeth may be readily mounted in and removed from their socket openings, which has heretofore required considerable time and labor, since the teeth would become lodged so firmly in their sockets as to cause considerable trouble to effect removal. The recesses 25 are all preferably spaced the same distance on each tooth, so that the working level of the entire group of teeth is always constant.

To prevent the tooth sockets or housing from becoming displaced or misaligned, I provide a pair of reinforcing bars 27, note particularly Fig. 2 in conjunction with Fig. 7, said bars being securely welded to the under side of the bed plate 10 and also to the adjacent rear edges of the rear socket plates 22. A series of rearwardly projecting members 27ª are welded to each bar 27 and also to the under side of the bed plate 10, said projections reinforcing the bars 27 and preventing the latter from bending rearwardly due to the tremendous thrusts which are sometimes imposed on the teeth 19. These rearward projections 27ª also distribute the thrust over a greater area of the bed plate.

At the front of the sockets 23, each of the latter is reinforced by a plate 28. By referring to Fig. 6 it will be noted that these plates are of triangular formation, or the free edge is cut away, providing a clearance space between each socket. This clearance space is such as to permit stones and other particles of a size such as do not require crushing to pass on through beneath the bed plate, while at the same time the strength of the reinforcing plate 28 is not impaired. Each plate 28 is welded at its top edge to the bottom surface of the bed plate, at its adjacent side edge to the front socket plate 21, and at its lowest pointed extremity to the adjacent side plate 20'. The result is a rigid bracing structure for the socket plates.

It will be seen that the combined reinforcing action of the bars 27 with their projections 27ª at the rear of the sockets and the plates 28 at the front thereof insure against bending and/or displacement of the sockets in any direction.

The socket reinforcement at the front end of machine is additionally reinforced by plates 28ª, note particularly Fig. 6, said plates being welded to the bottom surface of the bed frame and at their front edges to the adjacent side plates of the socket members and at their rear edges to the adjacent triangular reinforcing plates 28, there being a pair of the latter plates extending in substantial transversal alignment at this point.

As is well known in the operation of scarifiers of the pusher type, a convenient method of gaining access to the under side of the scarifier for the purpose of removing the teeth or other operations is to back the tractor and cause the scarifier to tilt upwardly at an incline. To facilitate this operation, I provide a combined tilting and reinforcing means 29 at the central rear extremity of the bed plate 10, note Fig. 2 in conjunction with Fig. 4. In the form shown, such means consists of spaced plates or beams each a vertical rear edge defining a corner or projection which digs into the ground and forms an anchor or pivot about which the machine turns when the tractor is backed. The front edge of the plates are preferably beveled upwardly at an incline as indicated at 31, to interpose a minimum of resistance to forward motion of the scarifier. This unit 29 also stiffens the back portion of the bed plate.

In certain types of work, as in ditching, the scarifier drops lower with each swath until it reaches a point where it has a tendency to tilt downwardly at the front section where the teeth encounter unusual opposition to forward motion, as for example rocks or the like, thereby causing the rear section to move upwardly clear of the ground surface. To overcome this objection, I provide abutments 32 and 32' at the rear of the bed plate 10, each of said abutments being mounted between opposed plates 33 and 33' and maintained in place by means of a pin 34 projecting through holes or openings formed in the plates and the abutment respectively.

The improved scarifier operates in a highly effective manner, the material dislodged by the teeth gathering beneath the bed plate around the teeth and sockets therefor and then piling up to a point where it reaches the mold boards, which take the material and spread it laterally on opposite sides of the machine. In certain instances it may be found desirable to adjust the teeth to different positions, depending upon the type of material being worked on. The adjustment can easily be made by backing the tractor to cause the scarifier to cock upwardly at an angle or incline, rendering the teeth and the sockets therefor accessible. It is then only necessary to remove the wedges, which can easily be done since the wedges need not be driven home with such force as is required where no locking means are present in the socket.

The machine is adapted for different types of work, such as road building, rock removal, ditching and the like. In ditching, the abutment members at the rear of the bed plate are of exceptional advantage in that the machine does not cock irrespective of the hardness of the formations encountered by the teeth. I have found it convenient to carry abutments of different lengths with the tractor and simply substitute the latter in order to provide the proper action or clearance with respect to the A-frame of the tractor.

The machine may be manufactured in an economical manner and is rugged and capable of long life, particularly due to the reinforcement of the tooth sockets. The bed plate or frame together with the sockets or portions thereof may be cast as an integral unit, or they may be made by a combined casing and welding operation. However, I have found that welding the socket plate and the various coacting parts results in great strength as well as convenience in replacing parts which may become broken.

It will be understood that certain modifications in structure and design of my improved scarifier may be adopted without departing from the spirit or scope of the invention as defined by the appended claims.

What is claimed is:

1. A scarifier comprising a bed frame of substantially V-shape at its front extremity, a series of tooth sockets on the underside of said bed frame, said sockets each comprising a pair of oppositely disposed side plates and front and rear plates welded to one another and spaced to define a socket opening, scarifier teeth removably disposed in said openings, said plates being welded at their upper edges to the under surface of the bed frame, the rear plate of the socket assembly having a locking boss projecting upwardly therefrom and said teeth each being formed with a series of notches adapted to engage said boss, a wedge inserted in the socket opening adjacent to said tooth for holding the tooth in locked position in the opening, a pair of reinforcing bars arranged in V-shaped formation and welded to the rear socket plates and also to the adjacent under surface of the bed plate, said bars being formed with rearwardly extending projections also welded to the bed frame to distribute the thrust over a greater area with respect to the bed plate, triangular-shaped reinforcing plates connected between sockets at the front extremities of the latter, and also to the under side of the bed plate, said triangular plates coacting with said reinforcing bars to brace the sockets against displacement, and mold boards secured to the V-shaped portion of the bed frame and projecting upwardly from the latter.

2. In a scarifier, a horizontally disposed bed frame, a series of socket members secured in the under side of said bed frame, and means for reinforcing said socket members comprising an elongated bar secured to the under side of the bed frame and to the adjacent portions of the socket members, said bar having a series of rearwardly projecting members secured to the bar and also the under side of the bed frame to reinforce the bar against displacement and to distribute the thrust throughout a greater area of the bed frame.

3. In a scarifier, a main bed plate having a plurality of socket members secured to the under side thereof, teeth carried by the socket members, means for reinforcing the socket members, said means including elongated bars arranged in V-shaped formation and secured to the rear portions of the socket members and also to the bed frame and a series of blocks secured to the under side of the bed frame transversely between the front extremities of said socket members, said blocks being formed in a manner such as to provide spaces permitting the passage of dislodged material therebetween.

4. In a scarifier, a main horizontally disposed bed plate, a series of socket members secured to the under side of said plate and projecting downwardly therefrom, said socket members being arranged to define a plurality of openings for removably receiving scarifier teeth, and means for reinforcing said socket members including a pair of bars arranged in triangular formation and welded to the rear portions of the socket members and also to the under side of the bed plate, and a plurality of rearwardly projecting members welded to said bars and also to the under side of said bed frame to hold the bars against displacement and to more equally distribute the thrust with respect to the bed plate.

5. In a scarifier, a main horizontally disposed bed plate, a plurality of socket members secured to the under side of said bed plate and projecting downwardly therefrom, said socket members being arranged to provide a series of openings for removably receiving scarifier teeth, and means for reinforcing said socket members including a series of substantially triangular-shaped blocks secured transversely between the socket members, said blocks providing spaces for the passage of dislodged material rearwardly between the socket members.

6. In combination with a pusher tractor having a coupling frame for connection with an object to be pushed, a scarifier including a substantially horizontally disposed bed plate having a series of socket members on the under side thereof carrying scarifier teeth, and means for preventing tilting of the bed plate when the scarifier is working below the level of the tractor, said means including one or more abutments mounted on the bed frame and adapted to engage said coupling frame.

7. In combination with a pusher tractor having a frame adapted to be coupled to an object to be pushed, a scarifier including a substantially horizontally disposed bed plate having a series of socket members on the under side thereof carrying scarifier teeth, and means for preventing tilting of the bed plate when the scarifier is working below the level of the tractor, said means including an abutment secured to the bed plate and projecting upwardly therefrom, said abutment being adapted to abut said coupling frame and being removable and replaceable for substitution of abutments of different lengths.

8. In combination with a pusher tractor having an A-frame for connection with an object to be pushed, a scarifier including a substantially horizontally disposed bed plate having a coupling member thereon providing a hitch for the said A-frame, and means for preventing tilting of the bed plate when the scarifier is working below the level of the tractor, said means including one or more abutments and means removably mounting said abutments on the bed plate beneath said A-frame.

9. In combination with a pusher tractor having an A-frame for connection with an object to be pushed, a scarifier including a substantially horizontally disposed bed plate having a series of socket members on the under side thereof carrying scarifier teeth, a hitch unit mounted on the bed plate for connection with the A-frame, the rear opposite sides of the bed plate being provided with abutments adapted to engage said A-frame and prevent tilting of the bed plate when the scarifier is working below the level of the tractor, and means removably mounting said abutments.

10. In a scarifier, a bed plate having a series of socket members on the under side thereof carrying scarifier teeth, means for reinforcing said socket members including a substantially V-shaped member secured to the rear extremities of said socket members and also to the under side of the bed plate, and reinforcing means beneath the bed plate in rear of said V-shaped reinforcing members, said means including a beam having a rear substantially vertical projecting portion adapted to dig into the ground when the scarifier is pulled rearwardly and facilitate tilting of the scarifier, the front extremity of said

beam being tapered upwardly to reduce resistance to forward motion of the scarifier.

11. In a scarifier, a substantially horizontally disposed bed plate having a series of socket members secured to the under side thereof carrying scarifier teeth, means for reinforcing said socket members, and means for reinforcing said bed plate in rear of said socket members, said bed plate reinforcing means including a pair of spaced plates secured to the under side of the bed plate, the rear edges of said plates projecting downwardly and providing relatively sharp corners adapted to dig in the ground when the scarifier is pulled rearwardly to facilitate tilting of the scarifier, the front extremities of said plates being beveled upwardly to avoid resistance to forward movement of the scarifier.

12. In a scarifier, a horizontally disposed bed plate, a plurality of tooth sockets secured to the under side of said bed plate and providing a series of socket openings, scarifier teeth disposed in said openings, reinforcing members disposed laterally between said sockets and secured to the under side of said bed plate and said sockets respectively to brace the sockets against lateral bending stresses, and additional reinforcing members disposed in rear of said sockets and also secured to the latter and said bed plate to brace the sockets against stresses applied longitudinally of the socket members.

13. A scarifier comprising a horizontally disposed body, a plurality of tooth sockets secured to the under side of said body and providing a series of socket openings, scarifier teeth disposed in said openings, reinforcing members disposed laterally between said sockets and secured to the under side of said body and to said sockets respectively and bracing the sockets against lateral stresses, additional reinforcing members disposed rearwardly of said sockets and also secured to the latter and said bed plate and bracing the sockets against stresses longitudinally of said sockets, and skid means disposed longitudinally of said body adjacent the front and rear of the same for maintaining said body substantially parallel to and above the surface treated and for limiting the penetration of the teeth into said surface.

14. In a scarifier, a substantially horizontally disposed bed plate having a series of socket members secured to the under side thereof carrying scarifier teeth, means for reinforcing said socket members, and means for supporting said bed plate in rear of said socket members, said bed plate supporting means including skid means secured to the under side of the bed plate, the rear edges of said skid means projecting downwardly and providing relatively sharp means at its rear adapted to dig in the ground when the scarifier is pulled rearwardly to facilitate tilting of the scarifier, the front extremities of said plates being beveled upwardly to avoid resistance to forward movement of the scarifier.

15. In a scarifier, a substantially horizontally disposed bed plate having a series of socket members secured to the under side thereof carrying scarifier teeth, means for reinforcing said socket members, and means for supporting said bed plate in rear of said socket members, said bed plate supporting means including skid means secured to the under side of the bed plate, the rear edges of said skid means projecting downwardly and providing relatively sharp means at its rear adapted to dig in the ground when the scarifier is pulled rearwardly to facilitate tilting of the scarifier, the front extremities of said plates being beveled upwardly to avoid resistance to forward movement of the scarifier, and skid means disposed adjacent the front of said body adapted to cooperate with said first-mentioned skid means for maintaining the body above the surface treated and for limiting the penetration of the teeth thereinto.

16. A scarifier comprising a body adapted to be disposed in a substantially horizontal position, sockets secured to the under side of said body and having a series of socket openings, said socket openings being disposed in substantially V-shape formation, scarifier teeth disposed in said openings, means rearwardly of said sockets for supporting said body and including skid means on the under side of said body, the rear portion of said skid means having relatively sharp means adapted to dig into the ground when the scarifier is moved rearwardly to facilitate tilting of the scarifier, the front of said skid means being beveled to reduce resistance to forward movement to the scarifier, and skid means adjacent the front of the scarifier for cooperating with the first-mentioned skid means for maintaining the body substantially parallel to and above the ground and for limiting the penetration of the teeth into the ground.

ELMO K. TROUP.