April 27, 1965 R. L. LAUNDER ETAL 3,180,431

SOIL BREAKER FOR MOUNTING ON A RIPPER

Original Filed Sept. 22, 1961

FIG. 1.

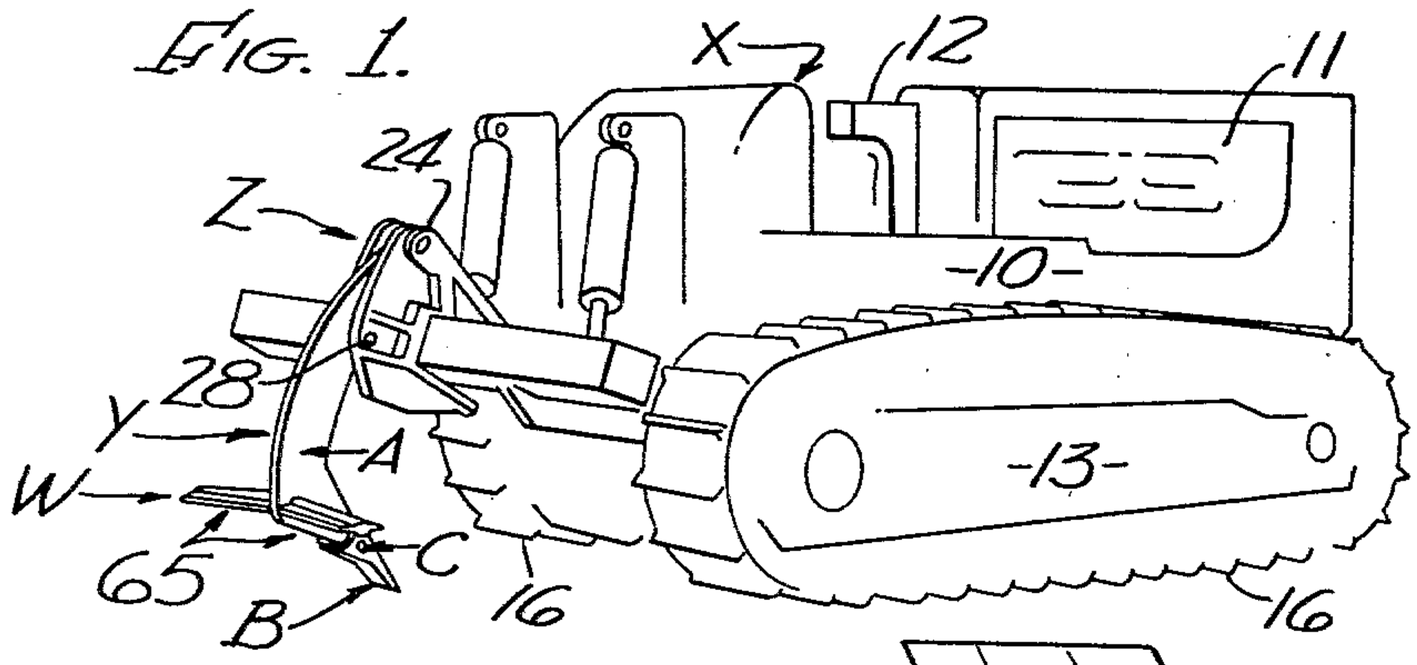


FIG. 2.

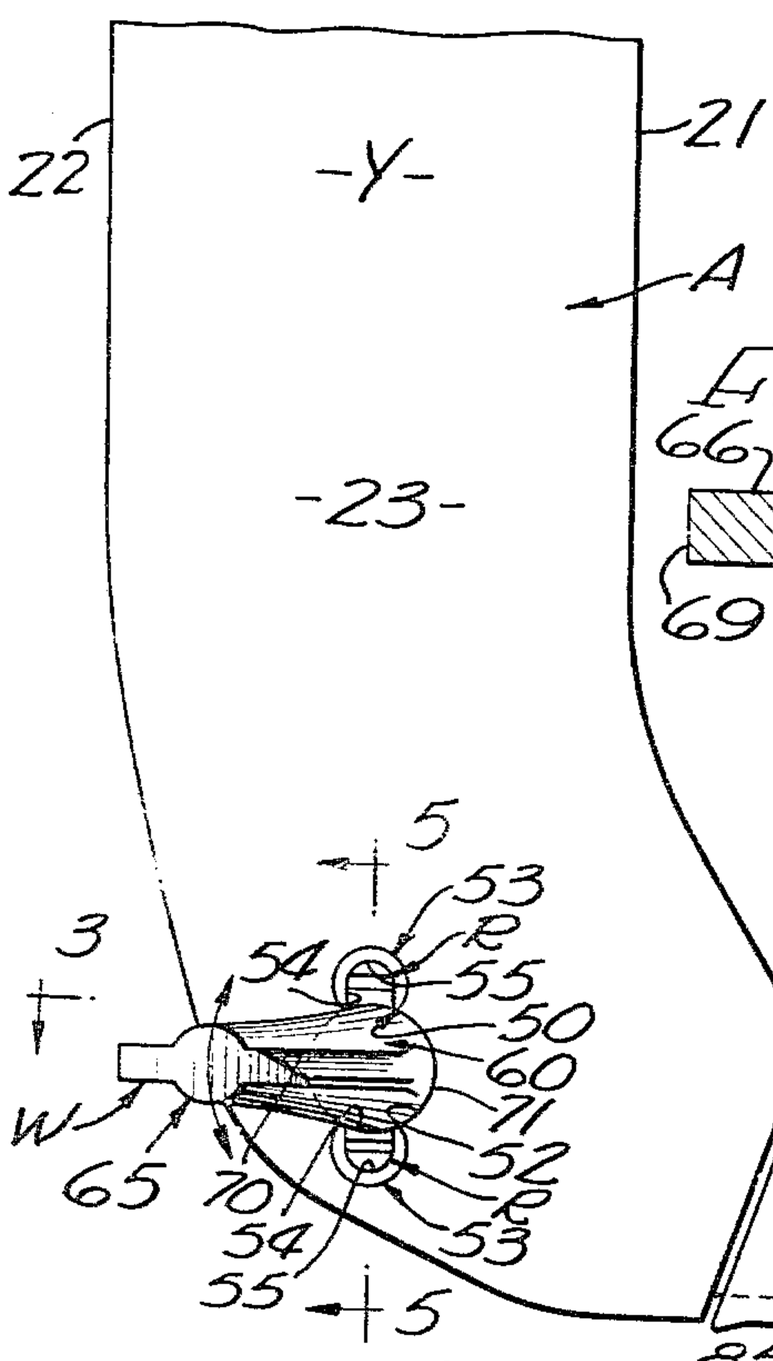


FIG. 3.

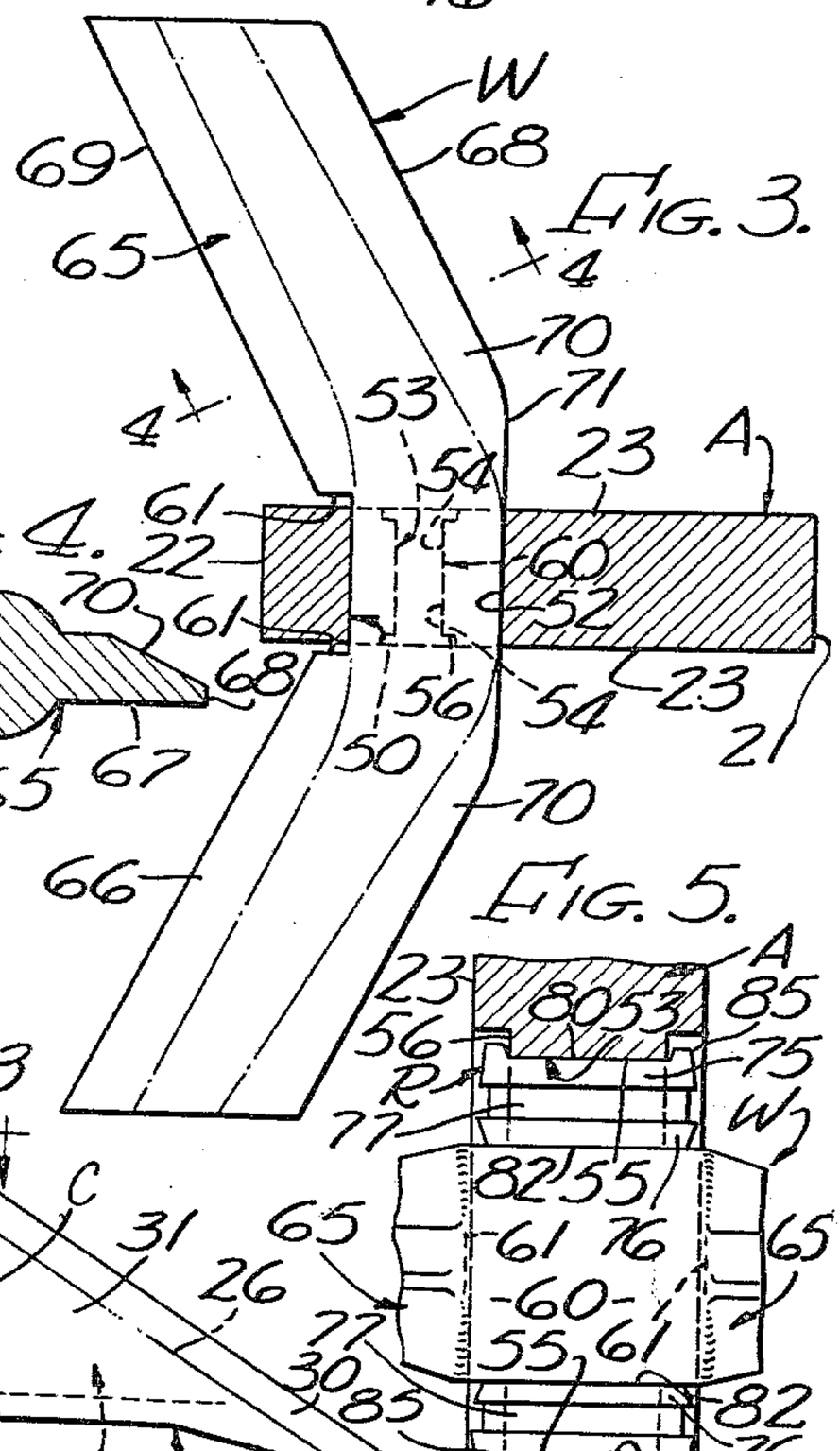
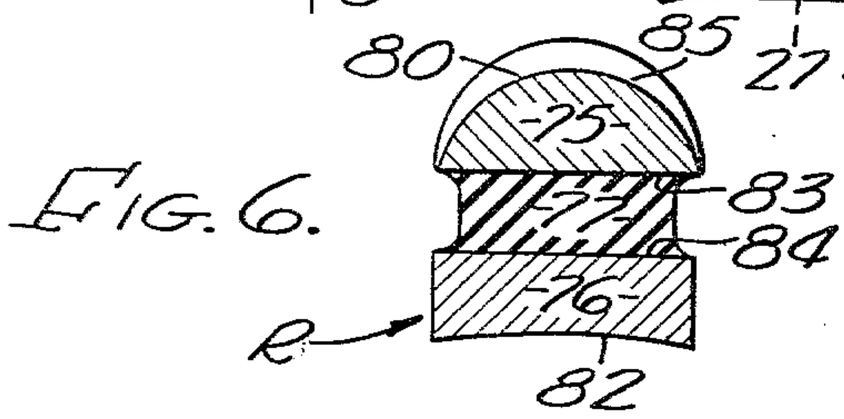


FIG. 4.

FIG. 5.

FIG. 6.



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1

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SOIL BREAKER FOR MOUNTING ON A RIPPER

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Continuation of application Ser. No. 140,009, Sept. 22, 1961. This application Feb. 18, 1963, Ser. No. 259,186

2 Claims. (Cl. 172—720)

This invention relates to earth handling and excavating equipment and particularly to a vehicle mounted "ripper," it being a general object of this invention to provide a simple and practical soil breaking device for use on ripper bars or shanks and the like equipment.

This application is filed as a continuation of my application entitled Ripper and Cutter Wing for Soil Breaking, Serial No. 140,009, filed September 22, 1961.

Earth handling and treating equipment is rugged in construction because of the severe strains imposed upon the same. Rippers, for example, are very rugged implements that are forced to penetrate earth formations, and in splite of their ruggedness and in spite of structural deflections they are accurately set in order to achieve best results. When it is desired to lift a maximum amount of earth with a ripper, that is to loosen the same, "breakers" are added and these breakers are in the nature of wedges that trail behind the penetrating point of the ripper. Various types of breakers have been improvised and added to rippers but, for the most part, these breakers are ungainly and cumbersome. Not only are they characterized by complexity but they are inherently fragile and subject to being damaged. For instance, backing up of the tractors cannot be tolerated by the usual breaker structure without serious consequence. Further, the usual breaker is in the nature of an attachment and is not fully integrated with the ripper with which it is cooperatively related.

An object of this invention is to provide a soil breaking implement for use with rippers and the like and wherein a fewest number of parts are employed. In practicing this invention there is a single wing part held in place by a single releasable fastener or a single pair of releasable fastener units that frictionally hold the wing in position.

Another object of this invention is to provide an implement of the character referred to that requires but a minimum of modification to the ripper, or like implement, to which it is related. Either the ripper is provided with a special opening therethrough, a single opening, or an adapter block with said opening therein is attached to the ripper. In either case, the single opening accommodates the "wing" and the fastener unit or units for securing said wing in position.

It is still another object of this invention to provide a "wing" for soil breaking and which can be inserted in or through and retained in an opening in or through a supporting implement, whereby the wings present lateral projections in the form of wedges that lift soil at the sides of the supporting implements when said implements and wings are advanced to penetrate the soil. The retaining units, when installed, occupy the portions of the opening that pass the wedge portions of the wing and which would otherwise be void when the wing is in working position.

The various objects and features of this invention will be fully understood from the following detailed description of the typical preferred form and application thereof, through which description reference is made to the accompanying drawings, in which:

FIG. 1 is a perspective view illustrating a typical use and installation of the breaker wing of the present invention.

2

FIG. 2 is an enlarged side view of the wing installation shown in FIG. 1.

FIG. 3 is an enlarged detailed view taken as indicated by line 3—3 on FIG. 2.

FIG. 4 is a cross-section taken as indicated by line 4—4 on FIG. 3.

FIG. 5 is an enlarged fragmentary sectional view taken as indicated by line 5—5 on FIG. 2.

FIG. 6 is an enlarged transverse section taken through one of the retainer units.

Tractors and rippers therefor, and all machinery of the type under consideration, are heavily constructed and appurtenances thereto must also be heavily constructed. Obviously, dependability will follow from ruggedness, but it is also necessary to provide equipment that is free from unnecessary and extended complexity. For example, it is common for an attachment, especially soil breakers, to be awkward in that they involve a multiplicity of projected parts designed to trail behind the supporting implement. More specifically, the usual soil breaker for use with a ripper involves a triangular wedge pinned to and trailing from the rear of the ripper shank, and further guide shoes are provided to properly elevate the wedge.

The present invention contemplates the use of a tractor-type vehicle X or the like, an implement Y preferably in the form of a ripper, and a ripper mounting attachment Z adapting said ripper Y to the vehicle X. The said vehicle X is preferably a continuous tread-type vehicle having a body 10 carrying a power plant 11, driving facilities 12, and a chassis 13 with wheels supported by tracks 16. The vehicle X is a traction vehicle adapted to pull implements and appurtenances thereto located at the rear of the vehicle, as shown.

The ripper Y is adapted to be used as a heavy and rugged earth handling apparatus known generally as a "scarifier" or a "grubber," and it is common to rotatably mount such a ripper. Said rotation is effective in raising and lowering the ripper and its appurtenances, for clearance and for adjusting the depth of penetration into the earth formation. The rotative position can, of course, be controlled and set, as circumstances require.

The ripper Y involves generally, an arm-like shank A, a tooth point B carried at the terminal end of the shank A, and retainer means C to secure the point B in working position. The shank A is an arm-like element that is provided to carry a tooth point B and is adapted to be adjustably supported by the mounting attachment Z. The shank A is elongate having a flat front 21, a flat back 22, and flat sides 23. The front and back and the sides are parallel with each other respectively, the shank A being rectangular in cross-section with the sides 23 substantially closer together than the front and back 21 and 22. The shank A is preferably uniform in cross-section throughout its length with a mounting opening intermediate the ends thereof and with a laterally and forwardly projecting adapter 25 at its active lower and terminal end. The adapter 25 comprises upper and lower faces 26 and 27 converging to a vertex, there being an opening transversely through the adapter to receive a retainer pin.

The tooth point B is a removable element adapted to be secured to the adapter 25 above referred to, and involves a point 30 and a housing 31. The point 30 is a flat plate-like part sharpened at its forward end and having a bottom face that has seating engagement with the top 26 of the adapter. The housing 31 is a U-shaped part with side sections spaced to receive the adapter 25 and with a lower wall that converges forwardly where it joins the point 30. Aligned openings are provided in the opposite side sections to receive a retainer pin.

The retainer means C engages through the openings

in the adapter and tooth point respectively and it is in the form of a yieldingly expansible elongate pin. When in place or in operating position, the pin extends through both the housing and the adapter 25 that occupies the housing. The pin is a sectional structure involving like metal sections and coupled together by a separating spreader section. The spreader section is resilient and is squeezed when the pin is in place, to the end that the tooth point B is urged tightly onto the adapter 25, the said openings being initially offset so as to gain this effect.

The shank A is connected to the attachment Z by means of a coupling pin 28 that engages through the opening in the shank, and by means of an adjustment device 24 included in the attachment Z. In any case, the shank A normally depends with the tooth point B disposed at an inclined angle facing forwardly, as shown in FIG. 2.

In accordance with the invention we provide the soil breaking wing W that is secured in working position on the shank A by means of the retainer unit or units R. The wing W is the active element of the structure in that it acts to break soil as it progresses therethrough behind the tooth point B. It is to be understood, however, that the wing W herein disclosed can be installed on any implement of the type under consideration and is not limited to installation on a ripper shank. In any case, the supporting implement is to be provided with an opening 50 therein or therethrough and which characterizes the present invention.

As above set forth, the ripper shank is flat-sided, having opposite sides 23, and in accordance with the invention the opening 50 extends transversely into or through the shank A on a horizontal axis normal to the sides of the shank. If circumstances require, an adapter block (not shown) is utilized in order to avoid enlarging of the shank, but it will be readily apparent that such a block can be dispensed with by simply machining the opening 50 directly through a shank of enlarged proportions. A block, if employed, is welded to the back wall 22 of the shank and with its opposite sides coincidental with the sides 23 of the shank.

The opening 50 is of peculiar and distinct shape, being composed of a round bore 52 and diametrically opposite radially disposed recesses 53. However, there will be circumstances when a single recess is provided for the accommodation of a single retainer unit. The two recesses are alike and they are in a common plane extending through the center of the opening 50 and in a plane substantially vertical when the ripper shank A is in a normal working position. Each recess 53 has opposed parallel walls 54 joined by a semi-circular wall 55 located at the vertical extremes of said recesses, and each recess opens into the round bore 52. In order to maintain flush fastener units the recesses are counterbored at 56 with flat bottoms of the counterbores parallel with the sides 23.

The wing W characterizes the present invention and it is a very rugged element of construction, preferably a forging of steel alloy and especially formed and shaped for facility of attachment to an implement by insertion into the opening 50 hereinabove described. Essentially, the wing W is an elongate element of wedged cross-section adapted to be mounted transversely of the shank A. Firstly, the wing W is adapted to pass into place, and secondly it is adapted to be turned into an operative position. As will be later described, the retainer unit or units R serve to maintain the wing W in place allowing it to rotate at will and without danger of becoming displaced.

In the preferred form, the wing W involves a bearing portion 60 and a pair of oppositely projecting wedge portions 65. In carrying out the form of invention illustrated, the bearing portion 60 is round and cylindrical and such as to rotatably engage in the bore 52. Also,

the portion 60 is of an axial extent equal to or slightly greater than the thickness of the implement body to which it is attached. Thus, the bearing portion 60 occupies the bore 52 between the opposite sides 23.

The wedge portions 65 are flattened in a horizontal working plane and they have top and bottom faces 66 and 67 and they have front and back edges 68 and 69. In carrying out the invention, it is necessary to insert the wing W firstly into place and then to secondly rotate the same. Therefore, the wedges 65 are formed so that the faces 66 and 67 are spaced so as to fit between the opposed side walls 53 of the aligned recesses and the edges 68 and 69 are spaced so as to fit between the diametrically opposite bottom walls 55 thereof or between bottom 55 of a single recess and the opposite periphery of the bore 52. In any case, the clearances are such as to readily fit or pass the wedges through the bore 52 and recesses 53.

The wing W with its characteristics, above described, also involves a practical combination of the same. The wedges 65 are wider than the diameter of the bore 52 and therefore terminate at opposed inwardly faced shoulders 61 that act to engage the sides 23 when the wing W is rotated into working position. Thus, there is a positive mechanical lock so that the wing element cannot become displaced. Further, the relatively heavy cross-section of the central bearing portion 60 is carried or continued laterally and outwardly along the wedges in order to strengthen the same. Although this is not shown, the wing wedges can have upward or downward dihedral in order to work best in certain earth formations. Still further, the wedges 65 are swept backward so as to have a deflective function and so as to direct the wing W to have a trailing action, and the front edge 69 is bevelled at 70 in order to have an upward breaking action. In this preferred form, when the wedges 65 are swept backward and the bevelled portions 70 adjacent to the central portion 60 are removed along a straight line 71 continuing from the periphery of said bearing. Thus, it is possible to insert the wing W of bent configuration through an opening 50, with relatively close clearances, said clearance along line 71 permitting angular turning of the wing from the bearing 60 to the wedge 65 and vice versa.

The retainer unit or units occupy the recess or recesses 53 whereby the wing W cannot escape from working position even when rotated so that the wedges 65 align said recess or recesses. Only when the retainer unit or units are deliberately removed can the wing W be manipulated into and out of said working position. The retainer unit R is a fabricated or sectional pin structure, following the teaching of Patent No. 2,699,153, wherein a body of rubber is arranged between two semi-circular sections to urge them apart. However, the pin configuration required in the instant invention is decidedly different and the said pin is put to a different use than heretofore. More specifically, the instant retainer R has a two-fold purpose, one to occupy the opening 50 by being locked therein, and two to press against the bearing portion 60 to frictionally hold the wing W in position. As shown, the retainer unit R involves two metal sections 75 and 76 and a spreader section 77 therebetween. The section 75 has a convex exterior 80 to seat on the bottom wall 55 of the recess 53, while the section 76 has a flat or concave exterior 82 to seat and press against the periphery of the bearing portion 60. The two pin sections 75 and 76 are spaced and parallel with opposed inner faces 83 and 84 to which and between which the spreader section 77 is vulcanized, said section 77 being of rubber or the like resilient material or member. The width of the retainer unit R is such as to fully occupy the recess 53 and its length is substantially the same as the distance between opposite sides 23. Shoulders 85 project radially from the top 80 of the section 75 at opposite ends of said section, in order to straddle

the shank body and engage with opposite counterbore bottoms at 56.

From the foregoing, it will be apparent that the wing W is easily inserted through the key-shaped opening 50 provided therefore; that a single or pair of retainer units R are readily installed; that the said wing W is thereby retained in a transverse working position wherein it is free to revolve as circumstances require according to soil conditions. The said retainer units R can be driven into place whereupon the tapered configurations of the ends thereof cause the spreader sections to squeeze, thereby permitting the opposite metal sections to move temporarily toward each other. This permits entry of the said units R into a central position where they are locked by the lugs or shoulders 85, and in which position they yieldingly urge the concaved sections against the bearing portion 60 to frictionally hold the wing W in rotative position. With the opening 50 fully occupied and with the units R locked in position it is virtually impossible to have a displacement of the wing W. However, it is a simple matter to over-compress the pins by suitable manipulation and thereby deliberately dismantle the combination of elements. When in the working position, the wing is free to seek a proper trailing position regardless of the digging angle of the ripper, and during backing up and on turning maneuvers.

Having described only a typical preferred form and application of our invention, we do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to ourselves any modifications or variations that may appear to those skilled in the art and fall within the scope of the following claims:

Having described our invention, we claim:

1. A soil breaker of the character described and including, a circular cylindrical bearing portion for rotatable mounting support on a central axis extending centrally through a circular cylindrical bearing opening, and a pair of wings integral with the said bearing portion and projecting oppositely along said axis, said wings being of wedge-shaped cross section, and each disposed angularly and in a common plane extending radially from said central axis.

2. A soil breaker of the character described and including a circular cylindrical bearing portion for rotatable mounting support on a central axis extending centrally through a circular cylindrical bearing opening, and a pair of wings integral with the said bearing portion and projecting oppositely along said axis, said wings being of wedge-shaped cross section with one side thereof extending radially from the outer diameter of said bearing portion to form opposed locating shoulders, and with the other side thereof terminating at said bearing portion, and each wing being disposed angularly and in a common plane extending radially from said central axis.

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