United States Patent

Hawkins

[15] **3,684,032**

[45] **Aug. 15, 1972**

[54] **REPLACEABLE BLADE COMBINATION FOR CHISEL BLADE**

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[73] Assignee: **Hawkins Mfg., Inc., Pierce, Colo.**

[22] Filed: **Jan. 2, 1970**

[21] Appl. No.: **155**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 752,017, Aug. 9, 1968, Pat. No. 3,556,229.

[52] **U.S. Cl.** **172/720,** 172/733, 172/753, 30/338, 37/141, 306/1.6

[51] **Int. Cl.** **A01b 39/18**

[58] **Field of Search**.....172/556, 713, 719, 720, 733, 172/745, 749–751, 753, 762, 772; 37/141, 142; 30/260, 334, 336, 337, 338, 349; 306/1.5, 1.6; 83/698; 101/157, 169, 154; 15/265.5, 236 A; 118/DIG. 23, 261, 413

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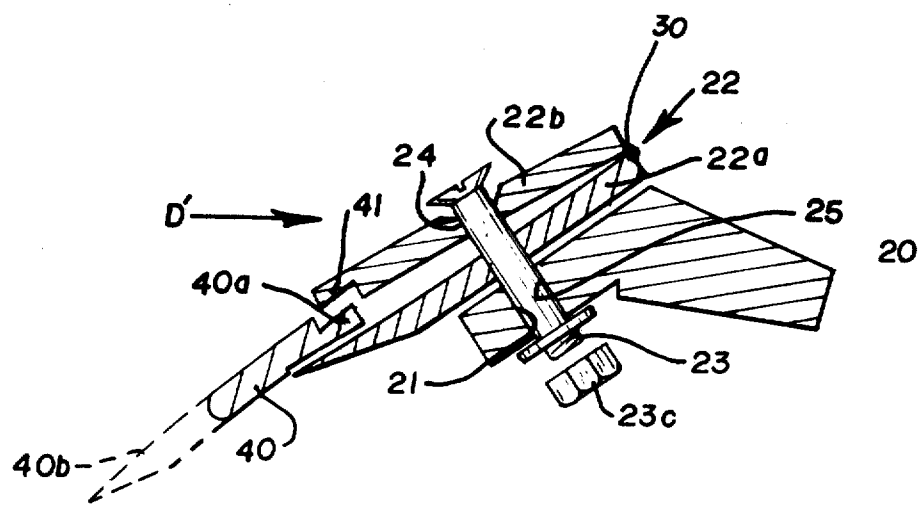
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[57] **ABSTRACT**

A replaceable blade combination for forming plows in which a matrix yoke member is utilized to secure the placeable blade.

In a first embodiment the yoke member is normally held apart by a plurality of spot-weld hinges and in a second embodiment a plurality of finger hinges on the upper member of the yoke engage the adjacent edge of the lower member of the yoke.

4 Claims, 8 Drawing Figures



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SHEET 1 OF 2

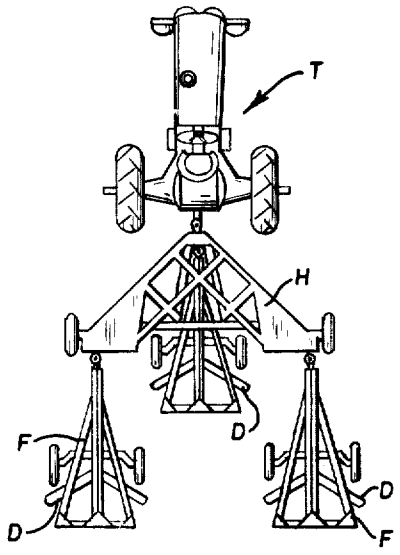


Fig. 1

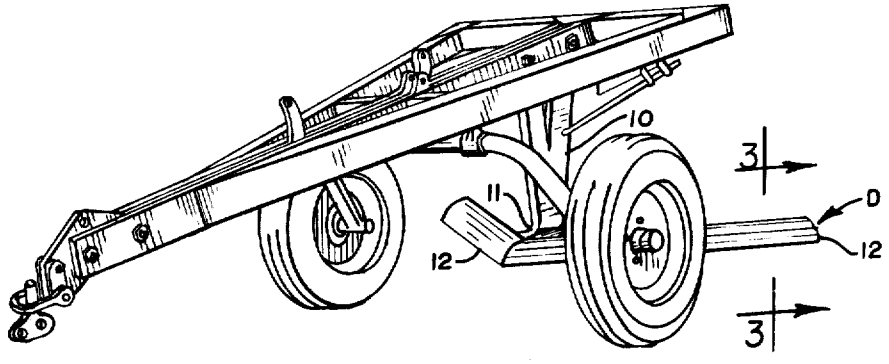


Fig. 2

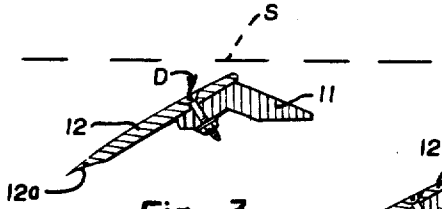


Fig. 3

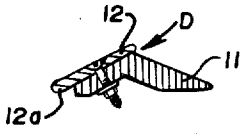


Fig. 4

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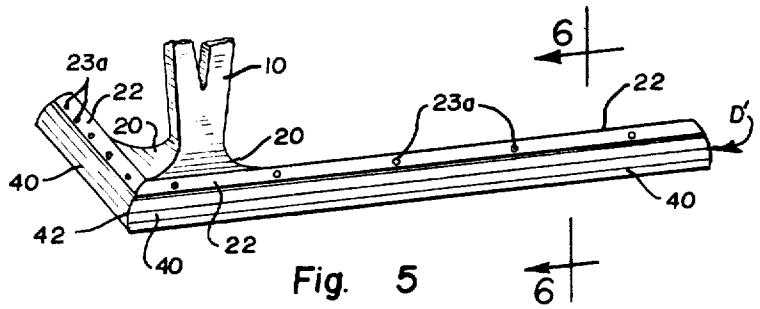


Fig. 5

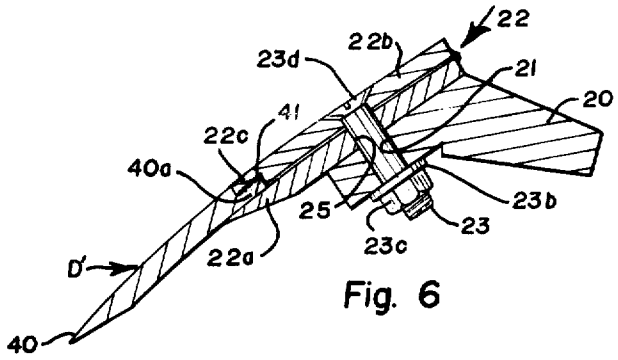


Fig. 6

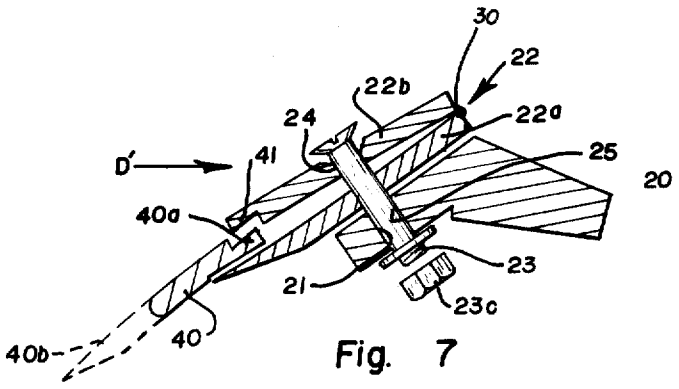


Fig. 7

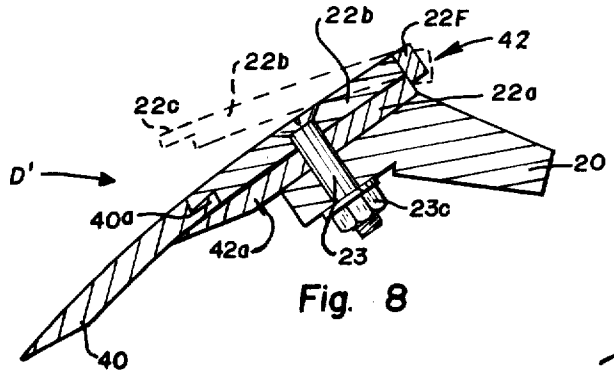


Fig. 8

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REPLACEABLE BLADE COMBINATION FOR CHISEL BLADE

My invention is a continuation-in-part of my co-pending application Ser. No. 752,017 filed Aug. 9, 1968, entitled Replaceable Blade Combination for Duck-Foot Chisel, and which co-pending application has, since filling hereof, issued under date of Jan. 10, 1971, as U.S. Pat. No. 3,556,229.

This information relates to chisel blades generally, and in this embodiment more particularly to tilling blades used as a part of a cultivator machine, such as in connection with ground stripping in dry land farming, on dry land duck-foot chisel cultivators.

In the dry land farming art, the wheat farmer divides his fields into suitable plots, and he plants every other one of said areas each year. The areas which are unplanted, in any given or every other year, he summer fallows or cultivates to keep the weeds down, to preserve the moisture during the summer, and he plants those summer-fallowed alternate areas to winter wheat in the fall of that summer-fallowed year. The alternate areas having a harvested summer wheat crop thereon are usually permitted to stand as a stubble field throughout that fall and winter, to prevent soil erosion, and then those stubble areas are chisel plowed the next spring and summer-fallowed several times throughout the summer of that following year.

Such summer fallowing is a surface tilling or cultivating of the soil to kill the weeds and to keep the soil comparatively loose, and to thereby give the sun a chance to enrich the soil with natural nitrogen during that summer's summer-fallowing cultivation. Such summer fallowing in dry land areas is usually done by what is called a duck-foot chisel blade tool means of cultivation, which is b a big V-shaped rigid horizontal chisel blade, which is carried by a heavy wheeled cart and pulled by a heavy tractor, to rip and loosen the ground in a horizontal plane at a depth of 6 to 8 inches below the surface. That process is usually done three or four times, from the start of spring stubble plowing, from approximately May 1, to the planting season on that soil in about September of that same year.

Said conventional V-shaped dry land chisel blades are usually made of one piece hard rigid heavy steel, usually 6 to 8 feet wide of 75° or 100° arc, or horizontal sweep between the V-sides, and are carried rigidly horizontally by heavy equipment to withstand the terrific force of the pressure and friction of the soil, sand and rocks through which the blade is drawn. The front cutter blade edge of that blade usually wears out in a comparatively short time, of one or two seasons of summer fallowing use at the most. That blade is mounted and drawn in conventional manner, with its front apex V-point and chisel V-blade side edges being at about a vertical cross-sectional 20° to 30° upwardly extending angle from the horizontal. Heretofore, so far as known, when the front lower edges of the cutter blade,of such a conventional duck-foot-V-chisel becomes worn, it is necessary to completely replace the entire blade cutter edge of the one-piece entire chisel, by a front 6 foot wide V-shaped cutter blade edge being welded thereon to replace the worn one, and such is at a substantial cost.

It is for the purpose of overcoming the necessity of that expensive welding replacement of the entire 6 foot wide V-shaped duck-foot chisel cutter edge, upon the front edge thereof becoming worn, that I have developed this invention.

It will be understood that the heretofore conventional V-shaped dry land duck-foot chisel, so far as known, as illustrated in cross-sectional FIG. 3, comprises a one-piece heavy frog foot or base portion **11**, to which the front one-piece V-shaped 6 foot wide chisel cutter blade portion **12** is conventionally bolted; and, that when the lower edge **12*a*** thereof becomes worn into the condition shown in FIG. 4, then the entire one-piece 6 foot wide V-shaped cutter chisel blade **12** has to be removed, and to the lower edge **12*a*** thereof a new V-shaped chisel blade lower edge portion **12*a*** has to be welded onto that small remaining substantially squared edge **12**. That is an expensive and tedious repair process.

The principle object of my invention, therefore, is to provide a novel chisel blade combination with a divisable and replaceable front lower cutter edge blade portion, so that upon a wearing thereof that a new lower cutter blade edge portion may be inserted therein, in lieu of the worn front lower cutter blade portion, by a very simple construction in co-operation with the frog foot thereof, in order to save the cost of replacing the entire cutter blade.

Another object of my invention is to provide such a V-shaped duck-foot chisel blade with individually replaceable cutter edges for dry land farming, wherein the entire V-blade is constructed in portions and with the lower cutter edge portion thereof being adapted for manual replacement in separable portions upon becoming worn, without having to weld same to the worn cutter portion and without having to replace the entire V-shaped six foot wide entire blade edge.

Another object of this invention is the provision of such a dry land chisel blade manually replaceable combination having a spring tensioned yoke portion adapted to removably hold the front cutter edge portion thereof, so that upon the blade edge portion becoming worn it may be manually seperably removed and replaced.

A further object of this invention is to provide such a novel dry land replaceable chisel blade combination which can be used for many years without having to be discarded in its entirety, upon the cutting edge portions becoming worn, and which will be economical of maintenance or replacement of the cutting edge portion thereof.

Another object of my invention is the provision in such a cutter blade of a novel spring-tensioned V-matrix or yoke adapter clamp member adapted to removably hold the front cutter blade edge portion therein and between spaced apart arms thereof.

A further object of my invention is the provision of a novel adapter yoke clamp for receiving and removably holding a replaceable chisel blade therein, and having overlapping arms in close proximity to each other and hinged at one edge hereof and with a suitable cornice groove at the other edge thereof adapted to receive a neck portion of the cutter edge portion of the chisel blade therein and for a holding thereof by said two arms when compressed together.

Other and further objects will be apparent to those skilled in the art from the following detailed explanation of the preferred embodiment of my invention herein.

While my preferred embodiment of my novel chisel blade invention herein illustrated and described shows a V-shaped duck-foot chisel unit, it is to be understood that such a chisel need not be of such a V-shaped configuration, nor do I wish to be limited in my novel replaceable blade invention to a farm tilling chisel tool.

In the drawings:

FIG. 1 is a reduced plan view of a tractor drawing a plurality of conventional dry land cultivator V-shaped duck-foot chisel cultivator Units D.

FIG. 2 is an enlarged perspective view of one of the dry land duck-foot chisel carriage units shown in FIG. 1.

FIG. 3 is an enlarged vertical cross-sectional view of the duck-foot chisel tool blade D, taken on the line 3—3 of FIG. 2 and looking in the direction of the arrows.

FIG. 4 is a similar vertical cross-sectional illustration of such a dry land conventional chisel tool of FIG. 3 after several months of use, illustrating how the front leading cutter blade edge of that chisel at **12***a* becomes so worn that its efficiency is lost and, therefore, the entire chisel **12** blade had to be repaired or replaced.

FIG. 5 is an enlarged perspective view of my novel replaceable V-shaped duck-foot chisel blade and cutter edge combination Unit D'.

FIG. 6 is an enlarged vertical cross-sectional view of my novel replaceable duck-foot V-shaped chisel blade tool combination, taken on the line 6—6 of FIG. 5 and looking in the direction of the arrows.

FIG. 7 is a similar enlarged vertical cross-sectional view of this embodiment of my replaceable chisel blade combination shown in FIG. 6, taken on the same line as that of FIG. 6, but being an exploded view thereof, and with the portion **40***b* of the blade shown as having been worn away and thus in need of replacement.

FIG. 8 is an enlarged vertical cross-sectional view of a modification of my invention.

In FIGS. 1, 2, 3 and 4, I have illustrated the conventional one-piece 6 foot wide rigid V-shaped duck-foot dry land farming tool chisel blade D. Such a blade D is mounted by a fixed vertical carrying rigid frame **10** to a V-shaped rigid duck-foot horizontal base portion **11**, and which latter is carried by a conventionally elevatable wheels, and is adapted to be towed by a tractor. I have shown, by a reduced diagramatic plan view in FIG. 1, how a conventional Tractor T, in the large dry land wheat farming areas, by means of a conventional tree hitch H, usually pulls three of those dry land chisel carriages at a time. Each of those V-shaped duck-foot chisel blade units D are usually of an overall horizontal span of about 6 feet. In FIG. 3, I illustrated the heretofore conventional method of having the front entire V-shaped 6 foot face cutter blade **12**, of configuration illustrated, bolted to the horizontal frog foot base **11**. I further illustrated the use of that type of a conventional blade in FIG. 4, namely, there I show how, after several weeks or months of usage, the lower edge of that entire front 6 foot wide V-cutter blade **12** becomes greatly worn until there is practically none of it left below the plane of the frog foot **11**. Thus it is necessary to completely overhaul that V-shaped front cutter blade **12** by a complete and tedious remodeling welding of a new cutter 6 foot wide V-edge cutter piece **12** onto what is left of that old cutter piece, as shown in FIG. 4. The worn conventional blade **12** after such usage and before its repair before my invention is illustrated in FIG. 4.

To overcome that disadvantageous expensive repair result just explained, I have designed my novel composite and separable replaceable V-shaped duck-foot dry land cutter blade unit combination, indicated in its entirety as D', as illustrated in FIGS. **5**, **6**, **7** and **8**.

In my novel combination, I secure the conventional horizontal V-shaped rigid frog foot base **20** to the lower edge of the conventional vertical rigid carriage support arm **10**, as before, and I provide spaced apart bolt openings **21** in the front annular portion of that base, as illustrated.

I provide a novel V-shaped matrix yoke adapter member **22**, having a leg portion **22***a* adapted to rest on the outer downwardly and forwardly extending surface of the frog **20**, having spaced openings **25** therethrough for a bolt in each opening. The yoke member has an upper and slightly shorter upper leg portion **22***b* overlapping **22***a*, as shown in FIGS. **7** and **8**. Leg **22***b* has companion aligned openings **24** therethrough. Upper leg **22***b* is cross-sectionally formed as illustrated for reason to be explained. In FIG. **7** it will be noted that I suitably weld the upper abutting edges of the upper and lower adapted clamps **22***a* and **22***b*, at various spaced points **30** at approximately 5 inch intervals along the length of that juncture edge; and effecting that welding when the opposite edges of those leg clamps are temporarily held in spaced apart condition for the purpose, as shown in FIG. **7**. Thus those weld hinge spots act as spring-tensioned hinges for normally holding the upper leg **22***b* or lower leg **22***a* and in the open position, as shown in FIG. **7**, before the bolt **23** is inserted in place for compressing that yoke member, to permit insert of blade portion **40**, and as will be explained.

In this modification I provide a novel replaceable elongated cutter blade portion **40**, of the cross-sectional configuration shown in FIGS. **6** and **7**. The blade **40** has a conventional transverse lower cutting edge portion and its opposite or other edge is formed as a reduced neck **40***a* of wedge or cross-sectional configuration as shown, having the extremity thereof formed thicker than the neck as a wedge head, for reason to be explained. The transverse edge **22***c* of the upper adapter leg **22***b*, opposite the welded hinge spots **30**, of the composite clamp **22**, is formed as a cornice projection and with its outermost cornice edge thicker than its inner edge, as illustrated, so as to snugly abut and hold the wedge neck edge portion of the chisel blade **40**, when my novel replaceable blade unit is fully assembled by its bolt **23**, as shown in FIG. **6**. The relative parts of my adapter clamp **22** and its upper and lower legs **22***b* and **22***a*, respectively cross-sectionally formed as illustrated by the FIGS. **6** and **7**, are for the reasons just explained. I provide suitable spaced bevel-headed plow bolts **23**, each in a recessed opening **24**, in the upper leg **22***b*, to extend therethrough and through the opening **25** of the lower leg **22***a*. Each bolt is inserted through one of speced aligned openings **21** of the frog foot **20**. A suitable lock washer **23***b* and nut **23***c* are used to hold the head **23***d* of the bolt **23** against the spring tension of hinges **30** of upper leg **22***b* on tightening seating of that nut to hold the adapter hinged unit **22**, as shown in FIG. **6**, and thus hold the cornice portion **22***c* of upper leg **22***b* firmly thereby onto the wedge neck **40***a* of the chisel blade **40**. My said novel hinge clamp combination is tightly bolt held onto the frog foot **20**. It is to be noted that the upper surface of the

blade portion **40** is slightly curved as is the outer periphery of the upper leg **22***b* and that the two are formed and held,by my structure,together in a common curve arc alignment when assembled as illustrated. That outer or ground contact curvature just explained, of my chisel **40** so held, are very important, as the ground dug by the chisel blade slides there against and upwardly thereover and by that curve there is less frictional obstruction to that earth digging movement as the blade is pushed forwardly through the ground or to the left as illustrated.

My novel replaceable blade unit D', just described, is to be noted to have certain characteristics, namely: the vertical thickness of the outer portion of upper leg **22***b* at its wedge **22***c* edge is greater than the neck portion thereof, so that thereby a downward pulling of **22***b* by the bolt **23** thus assures effecting a tight holding clamp of that wedge portion **22***c* against the wedge neck **40***a* portion of the blade **40**. Further, the base leg **22***a*, of the adapter clamp **22**, projects outwardly beyond the cornice **22***c* portion of the upper leg **22***b* for the reason of thereby providing an adequate fulcrum holding point for blade **40** so held as explained, to assure a tight holding of blade **40** during operation of the chisel blade unit in the ground, so that pressure to the right, as illustrated in FIG. **6**, on ground chiseling use of the unit, will not cause a twisting or other movement of the neck **40***a* under the cornice **22***c* of the upper leg **22***b*, as will be understood. That vertical cross-sectional formation of the upper leg **22***b* and lower leg **22***a*, as illustrated, are for the co-action purposes on use as just explained.

When it is time to replace my novel replaceable blade **40**, as when it becomes worn on use, as diagramatically illustrated by the dotted reference numeral **40***b* in FIG. **7**, it will be observed that a loosening of nut **23***c*, and thereby loosening of the bolt **23**, as shown in FIG. **7**, will then permit the spring tension of the plurality of the spaced welded "hinge" spots **30** to then thereby cause a hinge raising of the entire leg **22***b* into the position of **22***b*–**22***a* as shown in that FIG. **7**, and then a new blade **40** can be inserted and the bolt **23** then tightened to the position as shown in FIG. **6**.

As viewed in FIG. **5**, I form the members **22** and **40**, as just explained, horizontally elongated to span each side of the front V-face of the V-frog foot **20**, and to abut the adjacent edges thereof, centrally at the front of the V, as the apex line **42** of that V-duck-foot, with the front edge abutment as a press fit abutment without any welding at that front apex edge, for thus permitting a removal and replacement of either of the members **40** on either side of that apex independently of the other.

After continued operative use of my novel duck-foot chisel tool combination Unit D', just explained, there comes a time when there is a wearing away of the front cutter edges, of the lower front edge of the chisel blades **40**, and which worn away portion I have indicated by dotted lines **40***b* in FIG. **7**. With my novel combination unit D', shown in FIGS. **5**, **6**, **7**, and **8**, the farmer does not have to throw away the entire chisel blade unit **40**–**22**, when it gets in the worn condition illustrated in FIG. **7**, but, as a result of my invention, instead he simply loosens the nut **23***c*, of each bolt **23**, on the side of the V-duck-foot, and the spring tension of hat elongated yoke **22** will then spread the legs **22***a* and **22***b* thereof, as illustrated in FIG. **7**. Then the old worn blade **40** can be removed therefrom, by a slipping thereof from therebetween, and a new blade **40** can then be inserted and the nut re-tightened to hold the new blade thereby in place as in FIG. **6**. The cost of my new blade is comparatively small, in comparison to the overall cost of the heretofore required conventional overall welding repair job, heretofore explained, in affixing a new cutter edge portion to the V-blade as shown in FIG. **4**.

Replacement of either front cutter blade **40**, on either side of my novel V-shaped 6 foot wide duck-foot composite blade D' of FIGS. **5**, **6** and **7**, for example, can be accomplished, upon release of the bolt **23**, holding the respective yoke **22** on that side of the V-blade, without having to loosen those on the other side of the apex **42** of the V-blade, and thus providing a simple and comparatively inexpensive replacement job for the farmer when it is time to replace the cutting blade of either side of the V-blade.

In FIG. **8** I have shown a modification of my novel hinge construction of my novel matrix hoke member **22** of my composite unit D'. In that modification I spot weld a plurality of spaced rigid steel projections **22F**, at approximately 5 inch intervals, only to the edge of the upper leg portion **22***b* as shown, and so those said spot-welded pieces **22***b* act as downwardly extending fingers therefrom and so as to extend beyond the plane and edge of that upper leg, and so that those finger projections, upon a placing of the upper leg **22***b* onto the lower leg **22***a*, extend over the upper vertical edge of the lower leg **22***a*, and without being secured to the lower leg. Thus downwardly extending fingers **22** substantially accomplish a gravity hinging combination of upper and lower legs **22***b* and **22***a* of my novel adapter, though without any spring tension being accomplished to cause a raising of the upper leg upon release of the bolt, due to the angular positioning of this composite adapter **42** as illustrated in FIG. **8**, on the frog foot **20**. In this modification, which has all other parts otherwise constructed as before, when the operator wishes to replace a worn out blade **40**, since the frog blade **20** is normally rigidly held horizontally substantially as illustrated in FIGS. **6** and **7**, it will thus be seen that when the bolt is loosened, nevertheless the parts will remain substantially in their relative arrangement, by **22***b* being held on **22***a* by a gravity holding by finger hinges **22F**, on the upper edge of **22***a*. In that loose bolt condition, the operator may take a suitable lever, as a crowbar, and lift the cornice edge **22***c* side of the upper leg **22***b* slightly into the dotted line position shown in FIG. **8**, and then he holds that upper leg so elevated sufficiently until he removes the worn blade **40** and a new blade **40** is therein inserted, and then the weight of the upper leg **22***b* will set itself into place when the lever is withdrawn,, and the bolt and nut can then be replaced, as will be understood.

It will be obvious to those skilled in the art that many changes and modifications may be made in the preferred embodiments of my invention herein illustrated, taught and described in detail; therefore, I wish to be bound in the teaching, spirit, scope and extent of my invention only by the hereunto appended claims.

What I claim and desire to secure by Letters Patent is:

1. In a horizontal land chisel tool, in combination, a rigid frog foot secured to and carried by an arm of a tool carrier frame, the foot having a bolt opening herein, and a replaceable chisel blade unit adapted to be removably secured to and carried by said frog foot and comprising: matrix yoke adapter clamp unit having upper and lower overlapping substantially parallel legs each having two parallel edges and with the edges of each leg being parallel with the edges of the other leg and with each leg having a companion aligned opening adapted to receive a bolt extending therethrough both legs, one of said pair of adjacent parallel edges of the upper and lower legs of the adapter clamp being spring-hinge-spot-welded together at a plurality of spaced spots, a bolt securing means extending through said bolt openings and adapted to removably secure the adapter clamp to the frog foot, and a removable cutter blade having a reduced wedge neck portion removably positioned between and clampingly held by the other parallel pair of edges of the legs of the yoke adapter clamp opposite from said spring-hinge-spots upon securement of the adapter legs to the frog foot by the bolt securing means, and said spring tension hinges normally holding said legs with said other parallel pair of edges spaced apart.

2. A land chisel tool combination as defined in claim 1, and further characterized by the cutter blade wedge-neck portion being cross-sectionally wedge shaped with its thicker cross-sectional wedge dimension being outermost, and with the upper leg of the adapter clamp having one edge formed as a protruding cornice adapted cross-sectionally to receive said wedge shape neck portion of the cutter blade for snug abuttment holding of that leg wedge neck portion thereby and against the other leg on that wedge shape portion of the blade being inserted between said legs and on securement of the bolt securement means.

3. A land chisel tool combination comprising: a rigid frog foot secured to and carried by an arm of a tool carrier frame, said frog foot having a forwardly downwardly acute angle surface with relation to the ground surface and having a bolt opening therein, and a replaceable chisel blade unit adapted to be removably secured to and carried by said frog foot and comprising: a matrix yoke adapter clamp unit having upper and lower overlapping substantially parallel legs each having two parallel edges and with the edges of each leg being parallel with corresponding edges of the other leg and with each leg having a companion aligned bolt opening extending therethrough, one edge of the upper leg being disposed in a substantially common plane with the corresponding edge of the lower leg, the upper leg having a plurality of spaced fingers each secured to the one edge thereof so as to extend at substantially a right angle thereto, said fingers extending downwardly over said corresponding edge of the lower leg so as to act as gravity finger hinges for hingedly holding the upper leg on the lower leg when the legs are overlapped loosely on the frog foot with said fingers uppermost, a bolt securing means extending through said bolt openings and adapted to removably secure the adapter clamp to the frog foot, and a cutter blade having a wedge neck portion edge removably held by the parallel edges of the legs opposite from said gravity finger hinges.

4. In a horizontal dirt chisel tool, in combination, a rigid carrier arm secured to and carried by the underside of a tool carrier frame, a rigid frog foot base member having a bolt opening therethrough and secured to and carried by said arm, and a horizontal replaceable chisel blade unit removably secured to and carried by said frog foot base and comprising: a matrix yoke member having overlapping arms joined at one end by a plurality of spaced spot welds which serve as spring-tensioned hinges for normally urging said arms into spaced apart relation, each of said arms having an aligned bolt opening, a bolt-securing means extending through said arm openings and through the openings of the frog foot base for thereby removably securing the yoke to the frog base by thereby compressing the arms together against the spring tension of the yoke member, and a removable earth cutter blade having a portion thereof inserted between and clampingly held by the arms of the spot-welded-tensioned yoke member before and upon securement, respectively, of the yoke to the frog base member by the bolt-securing means, whereby upon release of the holt-securing means the spring tension of the spot-welded yoke member causes its arms to become spaced apart for thereby automatically releasing the cutter blade portion from between the yoke arms.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,684,032 Dated August 15, 1972

Inventor(s) Roy I. Hawkins

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the cover sheet, in the ABSTRACT line 1, "forming" should read -- farming -- . Column 1, line 36, "b" should read -- by -- . Column 2, line 59, "hereof" should read -- thereof --. Column 3, line 51, "illustrated" should read -- illustrate -- ; line 55, "illustrated" should read -- illustrate -- . Column 4, line 3, "separable" should read -- separably -- ; line 10, "annular" should read -- angular -- ; line 23, "adapted" should read -- adapter -- ; line 38, "cutting" should read -- cutter -- . Column 5, line 50, "the" should read -- that -- ; line 66, "hat" should read -- that -- . Column 6, line 33, "22" should read -- 22F -- ; line 57, after "place", insert a comma -- , -- ; line 58, "withdrawn,," should read -- withdrawn, -- . Column 7, line 4, "herein," should read -- therein, -- ; line 6, after "comprising:", insert -- a -- .

Signed and sealed this 19th day of December 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

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