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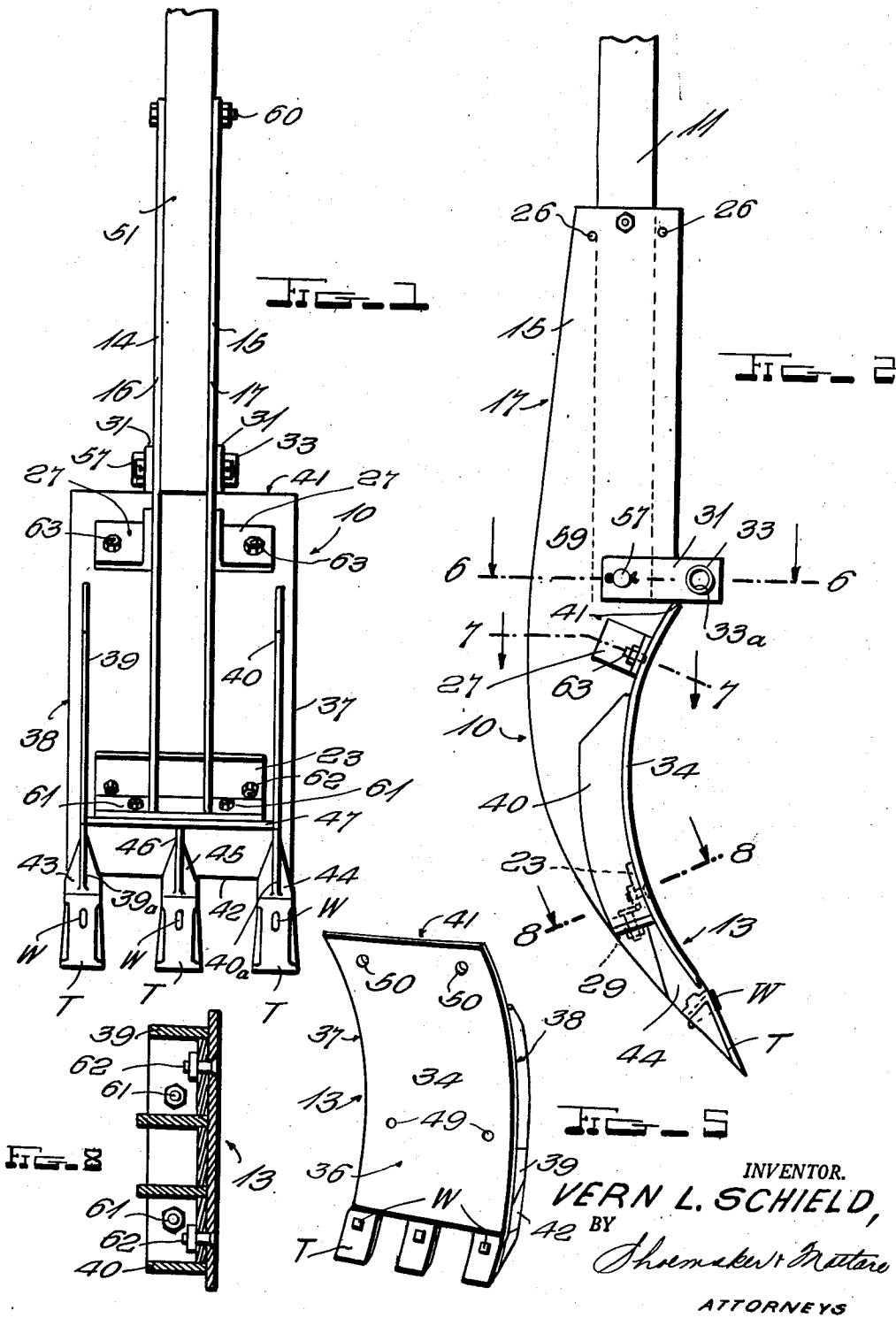
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2,652,640

DETACHABLE TRENCH HOE SPADE

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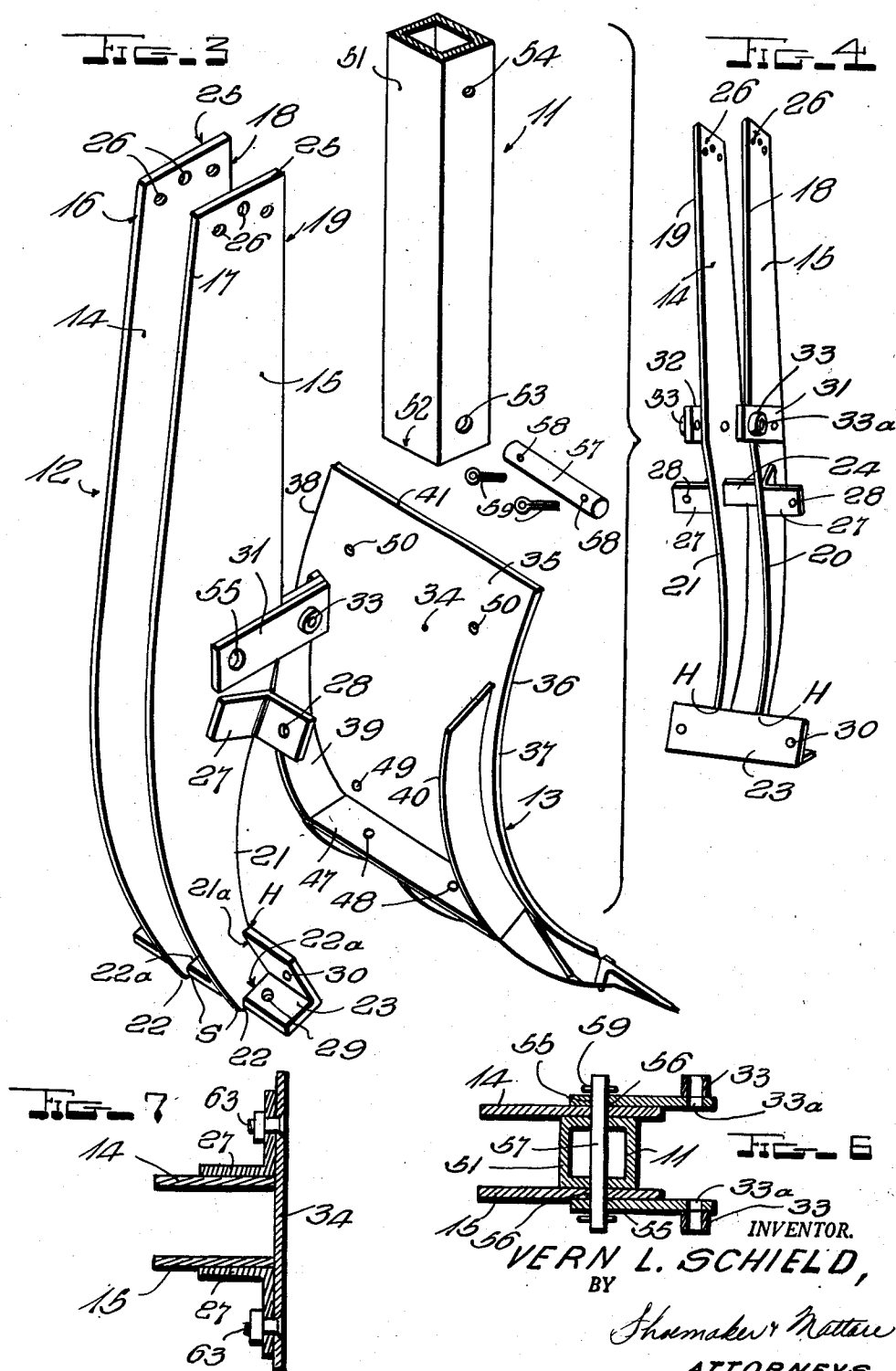
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DETACHABLE TRENCH HOE SPADE

2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

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DETACHABLE TRENCH HOE SPADE

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1

This invention relates to trench hoe spades. The invention is more particularly for detachable and interchangeable trench hoe spades.

The detachable and interchangeable trench hoe spades of the present invention are adaptable for use in connection with earth moving or handling machines of the type shown in my Patents 2,402,299, June 18, 1946, and 2,405,981, August 20, 1946, and wherein the trench hoe spade is to be attached or secured to the dipper stick referred to in my said patents. The trench hoe spades, however, may be used on or in connection with other similar types of machines.

In certain types of earth moving or handling and digging operations, it is desirable to provide for flexibility of operations of various kinds and under various conditions, depending upon the particular type of operation that is desired; namely, digging trenches, ditches, etc. of different widths or handling earth or other material of different kinds and characteristics. Therefore, I have provided my detachable trench hoe spade for association with the type of machine referred to in my said patents, or similar machines, and which trench hoe spades may be readily adapted for various kinds and types of earth moving and handling or digging operations by associating therewith different kinds of blades particularly blades of various widths and shapes and contours and which blades are quickly and readily removed from and secured to the frame that carries and supports the same. Thus, provision is made for such earth working and handling operations as digging ditches of various widths and, likewise, water channels, trenches of the type that receive tile for drainage or other purposes and for back-filling earth into a previously formed ditch, trench or channel.

I have further provided such a detachable and interchangeable trench hoe spade that is of sturdy and relatively inexpensive construction and which, at the outset, is capable of being formed of individual prefabricated parts which, when assembled together, constitute frame and blade sub assemblies that are readily detachably and interchangeably connected together. Further, the disposition of the various elements or individual parts constituting the trench hoe spade in its entirety and the sizes and weights of the same are such that the entire trench hoe spade is properly balanced and equalized when in use; thus, the earth handling or digging operations are quite efficiently accomplished.

Interchangeability of the blades is accomplished in a relatively short period of time as

2

this requires simply the removal of a few bolts that secure one blade to its supporting and carrying frame and the immediate substitution and securing of a different blade to the frame by means of the same aforesaid bolts.

With the foregoing in mind, it is, therefore, an object of my invention to provide an attachment or an accessory for earth moving or handling machines in the form of a detachable and interchangeable trench hoe spade, the blade of which is readily attachable and detachable from its carrying and supporting frame and thus providing for effective digging of ditches, channels, trenches, etc. of varying widths and for earth moving and handling operations as the occasion demands.

Another object of my invention is to provide a trench hoe spade including a carrying frame for blades of different sizes and widths that may be readily attached and detached therefrom.

Another object of my invention is to provide a trench hoe spade wherein the component elements comprising the same in its entirety are prefabricated and readily assembled.

Another object of my invention is to provide a trench hoe spade including a supporting and carrying frame for detachable and interchangeable blades of varying sizes and widths and which frame, without alteration, is constructed so that the said blades are readily attached, detached and interchanged.

A further object of my invention is to provide a detachable trench hoe spade consisting of relatively few inexpensive component elements or parts, which, when assembled in their proper respective relationships, result in a device possessing unusual inherent rigid and sturdy characteristics.

Another object of my invention is to provide a sub-assembly of parts consisting of a blade carrying and supporting frame and a blade sub-assembly, the blade assembly being detachable from the frame or vice versa.

With the above and other objects in view, the invention consists in the construction and novel combination and arrangement of parts herein-after fully described, illustrated in the accompanying drawings and pointed out in the claims hereto appended, it being understood that various changes in the form, proportions, and minor details of construction, within the scope of the claims, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings:

Fig. 1 is a rear elevational view of the trench hoe spade;

Fig. 2 is a side elevational view;

Fig. 3 is an exploded perspective view showing the component prefabricated elements that are adapted to be associated with each other;

Fig. 4 is a view slightly in perspective showing the frame or carrier for the blade;

Fig. 5 is a view showing one form of blade;

Fig. 6 is a transverse sectional view on the line 6—6 of Fig. 2 looking in the direction of the arrows;

Fig. 7 is a transverse sectional view on the line 7—7 of Fig. 2 looking in the direction of the arrows; and

Fig. 8 is a transverse sectional view on the line 8—8 of Fig. 2 looking in the direction of the arrows.

The same reference numerals in the several figures of the drawings denote the same parts or elements.

The invention will be more readily understood by referring to the drawings in detail wherein the detachable trench hoe spade is denoted in its entirety by the numeral 10. Two major component elements or sub-assemblies constitute the detachable trench hoe spade in its entirety; namely, the frame assembly 12 and the blade assembly 13.

It is understood, of course, that the component elements constituting the detachable trench hoe spade are fabricated from suitable metal and may be rolled, cast, stamped or otherwise individually produced.

The frame assembly includes similarly formed elongated, substantially flat, spaced, parallelly disposed sides in the form of plates 14 and 15. The rear edges 16 and 17 respectively of the said frame sides preferably have a gradual increasing curvature from their upper ends to their lower ends and which curved edges of each of the frame sides or plates are in parallel spaced relationship as are the substantially straight upper front edges thereof 18 and 19. These upper front edges 18 and 19 extend from their top ends to a point substantially midway of their lower ends and the lower front edges 20 and 21 of the plates or frame sides 14 and 15 are arcuate or curved inwardly similarly to the lower curved rear edges 16 and 17 and are tapering toward their lower ends and are of substantially less width than the upper portions of the frame sides.

The frame sides 14 and 15 are maintained in their fixed parallel relationship at their bottom or lower ends 22 by means of a transversely extending angle iron blade attaching bracket and frame connector 23, the ends of which angle iron project laterally beyond the outer faces of the frame side plates 14 and 15. The frame sides may further be maintained in their spaced parallel relationship by means of one or more connecting braces 24 that extend between, and the ends of which are welded or otherwise secured to, the inner faces or walls of the frame sides 14 and 15 at a point or points inwardly of the ends of the said frame sides.

The extreme lower ends 22 of the frame side plates are undercut at 22a and provide shoulders S and, likewise, the lower front edges 21 of the frame sides are cut back or inset, as at 21a, and provides shoulders H, which undercut and cut back portion of the lower end of the frame sides provide for the flush mounting therein respectively of the flanges of the angular

bracket 23 and which bracket is welded or otherwise secured to the lower ends and front edges of the frame sides. Adjacent the upper ends 25 of the frame sides a plurality of openings 26 are provided for a purpose later described.

Substantially intermediate the ends of the frame sides and on the outer face thereof there is inclinedly attached, as by welding or otherwise, right-angularly shaped, or substantially L-shaped, brackets 27 one web of which extends laterally from each of the outer faces of the frame sides and has an opening 28 therein. Likewise, in the bracket 23 at the bottom of the frame, in each of its flanges that project beyond the sides of the frame, openings 29 and 30 are provided, for a purpose later referred to herein.

Preferably above the brackets 27, there are secured, by welding or otherwise, sheath bridle bosses or plates 31 which are flat and substantially rectangular in outline and each having an end portion 32 that projects forwardly beyond the substantially straight side edges 18 and 19 of the frame sides and which bosses have on their outer extending portions relatively reduced and outstanding sheath bridle pin collars 33, which each have an opening therethrough in registry with openings 33a in the extended portions of each of the sheath bridle bosses.

Having described the frame assembly, I now refer specifically to the blade assembly which includes the blade per se 34, which blade is of rather substantial length from end to end and is curved, thus providing a convex rear surface 35 and a concave smooth front surface or face 36. On the convex or rear curved surface of the blade 34 there are disposed, adjacent and inwardly of the opposite side edges 37 and 38, outstanding, substantially flat, elongated reinforcing webs or ribs 39 and 40 which webs are vertically curved and assume the convex formation or curvature of the rear face of the blade and extend substantially throughout the length of the rear face thereof but terminate inwardly of the top and bottom edges 41 and 42 respectively of the blade. At the lower end, the webs 39 and 40 are in alignment with reinforcing webs 39a and 40a and which latter webs extend over or are integral with spaced tooth-receiving sockets 43 and 44, the ends of which sockets project beyond the lower end 42 of the blade adjacent either side edge thereof. Intermediate of said sockets, there is another similar tooth-receiving socket 45 provided with a reinforcing rib or web 46. Detachable teeth T are held in the respective sockets by means of removable wedges W. The tooth-receiving sockets 43, 44 and 45 are secured to the rear face of the curved blade 34 at the lower edge thereof as by welding or by any other suitable means.

A transversely extending reinforcing rib or web 47 extends between the webs 39 and 40 adjacent the bottom edge 42 of the blade and this web is secured to the rear or convex rear face of the blade by welding or otherwise in the same manner that the webs 39 and 40 are secured thereto. The transverse web 47 is provided with spaced openings 48 which register with the openings 29 in one flange of the bracket 23 that is carried by the lower ends of the frame sides plates. Spaced countersunk openings 49 are provided in the blade 34, which openings register with the openings 30 in the other flange of the bracket 23. Still further spaced countersunk openings 50 are provided in the curved blade adjacent but inwardly of its upper edge 41 and which openings

5

register with the openings 28 in the flanges of the brackets 27 that are carried by the frame side plates 14 and 15.

The dipper stick assembly, which is conventional in most earth handling machines, consists of a hollow or solid column 51 and is provided, adjacent its lower end 52, with a transverse opening 53 which extends clear through the same, and spaced from the said opening upwardly on the stick 51, there is another opening 54 which extends clear through the same. With the dipper stick 51 positioned between and preferably in contact with the inner faces of the frame side plates 14 and 15, the opening 53 is in register with openings 55 in the sheath bridle bosses 31 which is, likewise, in registry with registered openings 56 in the frame side plates 14 and 15, and through which openings, a cylindrical pin 57, having cotter pin openings 58 therein adjacent its opposite ends, is positioned thus allowing for intentional movement of the hoe with respect to the dipper stick for disposing the hoe at different angular adjusted positions. The cylindrical pin 57 is maintained in position by means of removable cotter keys or pins 59.

When it is desired to adjust the angular disposition of the blade with respect to the dipper stick, it is simply necessary to move or pivot the frame or dipper stick on the cylindrical pin 57, after having first, of course, removed the bolt 60, and then, by selecting any one of the plurality of openings 26 adjacent the top of the frame sides and inserting the bolt 60 in any of the selected registered openings and through the opening 54 in the dipper stick, the angular adjustment or positioning of the blade is effected.

The transversely extending blade attaching bracket 23 at the bottom of the frame side plates rests on and is supported by the transversely extending reinforcing web 47 and, thus, the openings 29 and 30 in the flange of the bracket 23 are automatically properly aligned respectively with openings 48 and 49 in the transverse web and the blade, and likewise, the openings 28 in the brackets 27 are aligned with openings 50 in the upper portion of the blade 34. Suitable removable bolts or other securing means 61 secure the frame and its bracket 23 to the transverse web 47 as, likewise, do the removable bolts 62 which extend through the registered openings 30 and 49 in the bracket 23 and blade respectively. Further, securing of the frame to the blade or vice versa is effected by means of removable bolts 63 which are in the registered openings 28 and 50 in the bracket 27 and blade respectively.

The degree of curvature of the lower end portions of the frame sides 14 and 15 is such that it conforms with the curvature or convex rear face portion of the blade 34, and, when the frame assembly and the blade assembly are connected and associated together by means of the aforesaid bolts, etc., there results a rather effectively reinforced and rigid trench hoe spade. The reinforcing webs or ribs 39 and 40, along with the reinforcing rib 47, it will be seen, greatly strengthens and rigidifies the blade structure per se.

It is obvious that, with the removal of the aforementioned bolts, which detachably secure the blade assembly to the frame assembly, blade assemblies of different widths, depending upon the character of work that is to be performed, can, therefore, be readily interchanged with the frame assembly.

6

It is understood, of course, that, regardless of the size or width of the blade used, the reinforcing ribs or webs on the blades and the blade attaching bracket 23 will all be uniform as regards spacing and size, thus standardizing the two assemblies and providing for ready attachment, detachment and interchanging of many different blades.

What is claimed is:

1. An earth handling or digging hoe adapted to be detachably connected with a conventional dipper stick of an earth handling machine wherein the hoe consists of a blade supporting and carrying frame assembly and a separate blade assembly, the frame consisting of two substantially flat, spaced, elongated plates, the blade being curved and having a convex rear surface on which is secured a transversely extending reinforcing rib adjacent its lower edge and a vertically extending reinforcing rib adjacent each side thereof and terminating short of the top edge of the blade, the frame having a transversely extending blade attaching bracket and frame connector adjacent its lower end, the said bracket and the frame to which it is attached resting on the transversely extending rib on the rear convex surface of the blade, and means for detachably securing the said bracket and the transversely extending rib together.

2. An earth handling or digging implement of the type adapted to be detachably secured to the dipper stick of an earth handling machine wherein the implement consists of a blade supporting frame and a blade, the frame including spaced, elongated, substantially flat plates, the extreme lower edges and a portion of the inner side edges of the spaced frame plates being cut out to form shoulders respectively at the bottom of the plates and the inner lower edges thereof, a right-angularly shaped transversely extending blade attaching bracket with the flanges thereof seated and secured in the cut out lower portion of the plates and with the edges of the flanges of the bracket abutting the shoulders, the inner lower edges of the frame being curved, the rear surface of the blade being curved to conform with the curvature of the inner edges of the frame, a transversely extending reinforcing rib on the curved rear surface of the blade adjacent the lower edge thereof, and means for detachably securing the bracket fixed to the frame to the transversely extending rib on the rear curved surface of the blade.

3. An earth handling or digging implement consisting of a frame for carrying and supporting a blade, and the blade, the frame comprising spaced, elongated, substantially flat plates, a transversely extending blade attaching bracket and frame carrier at the lower ends of the plates, right-angularly shaped brackets, one web of which extends laterally from the outer face of each of the plates of the frame and which brackets are spaced from the transversely extending bracket, sheath bridle bosses consisting of rectangularly shaped plates secured to the opposite faces of the frame plates above the right-angularly shaped brackets and having a portion of each thereof extending beyond the front edge of the frame plate, the blade being curved and presenting a convex rear surface, a transversely extending reinforcing rib on the blade adjacent its lower edge and reinforcing ribs adjacent each side edge of the curved blade on the rear surface thereof, the bracket on the frame plates being provided with openings that register with open-

ings in the transversely extending reinforcing rib and openings in the blade and the laterally extending portions of the right-angularly shaped brackets being likewise provided with openings which register with openings in the blade adjacent the top edge thereof, and removable fasteners for insertion in all of the aforementioned openings, whereby the blade or different blades are detachably secured to the frame.

4. An earth handling or digging implement consisting of a blade carrying and supporting frame, two similarly formed elongated, substantially flat, spaced plates, an angle shaped metal blade attaching bracket and frame connector fixedly secured to the lower ends of said plates, the inner lower edges of said plates being curved, a blade having a curved rear surface, a transversely extending reinforcing web on the blade adjacent its lower edge, the bracket of the frame resting on said web, means for detachably securing the bracket and the web together, and the curved inner lower edges of the frame plates conforming with the curvature of the rear surface of the blade.

5. An earth handling or digging implement as described in claim 4 wherein the lower bottom and inner edges of the frame plates are cut out and provide shoulders, and the angle shaped metal bracket positioned in the cut out portion, and with the edges of its flanges abutting the said shoulders, and the angle shaped metal bracket extending laterally beyond the outer side faces of the frame plates.

6. An earth handling or digging implement as described in and by claim 4 wherein right-angularly shaped brackets are provided on the opposite outer faces of the frame plates above the bracket at the end thereof, and these brackets and the blade attaching bracket and frame connector each having openings therein which register with openings in the blade, and detachable securing means positioned in the registered openings so that blades of different sizes and widths can be associated with the blade carrier frame.

7. An earth handling or digging hoe consisting of prefabricated frame and blade assemblies, the frame assembly including upright side plates spaced transversely from each other and adapted to be secured to opposite sides of a dipper stick, a member fixedly secured to lower ends of said plates transversely thereof and having end portions projecting laterally therefrom, the blade having a transversely extending rib rigid with and projecting rearwardly from its rear surface,

and fasteners detachably securing the projecting end portions of said member to said rib and to the rear surface of the blade.

8. An earth handling or digging hoe consisting of frame and blade assemblies, a reinforcing rib extending across the rear surface of the blade in spaced relation to the lower end thereof, vertical reinforcing ribs rigid with and extending upwardly from opposite ends of said transverse rib adjacent side edges of the blade, the frame being disposed vertically in close fitting engagement with the rear surface of the blade midway the width thereof above the transverse rib, a bar mounted across the lower end of said frame and having end portions projecting laterally therefrom, and fasteners detachably securing said bar upon the transverse rib and to the rear face of the blade between the vertical ribs.

9. An earth handling or digging implement including transversely spaced, elongated, substantially flat side plates, a transversely extending blade attaching bracket mounted across the lower ends of said plates and projecting from outer sides thereof, the lower portions of front edges of the said spaced frame plates being vertically curved, a detachable earth handling or digging blade having a curved rear surface contacting the curved portion of the front edges of said plates, a transversely extending reinforcing rib adjacent the lower edge of said blade, and removable fasteners detachably securing the bracket on the frame to the transversely extending reinforcing rib on the rear curved surface of the blade.

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