

Nov. 21, 1939.

C. G. STRANDLUND

2,180,618

FLOW

Original Filed May 3, 1937

2 Sheets-Sheet 1

FIG-1

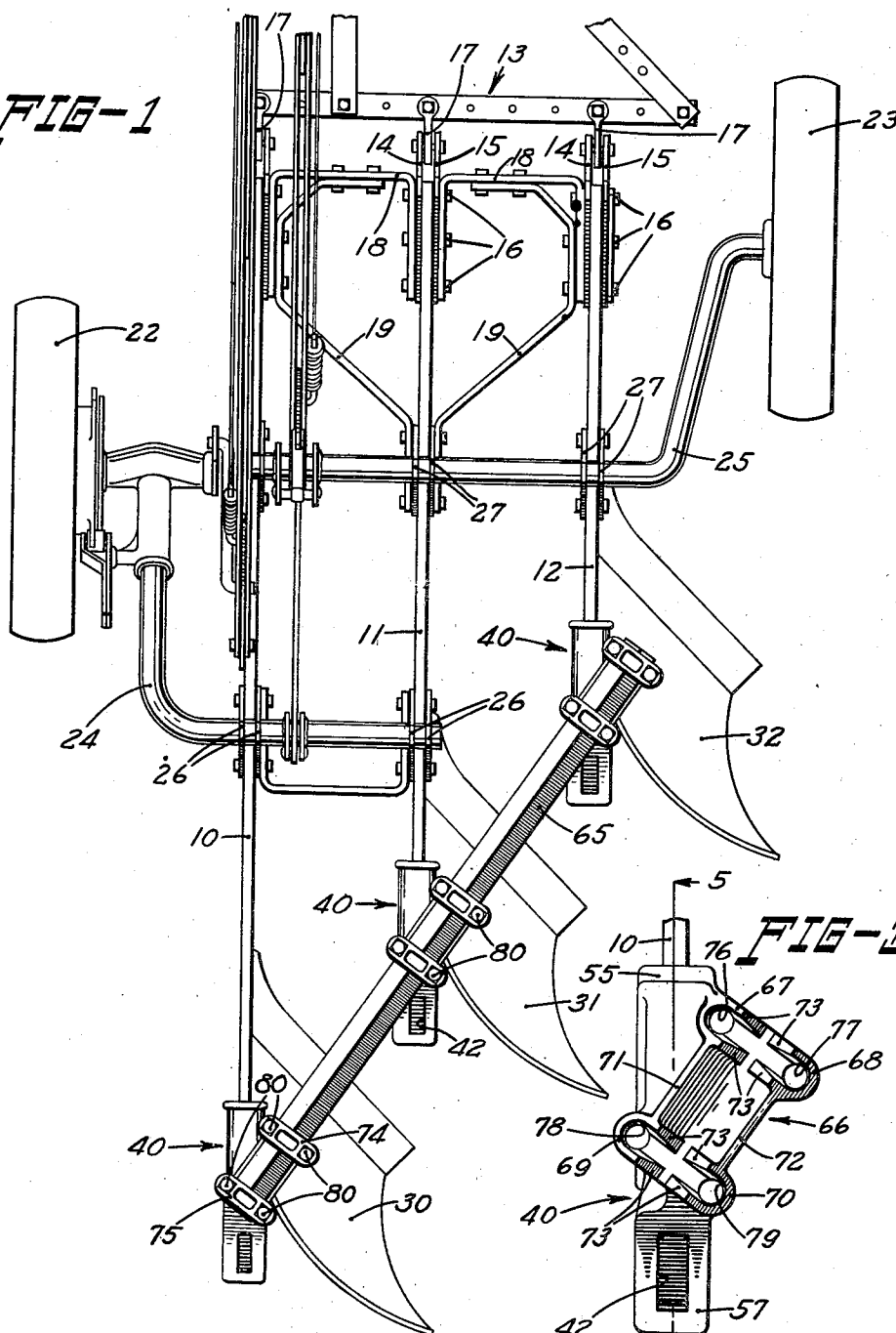
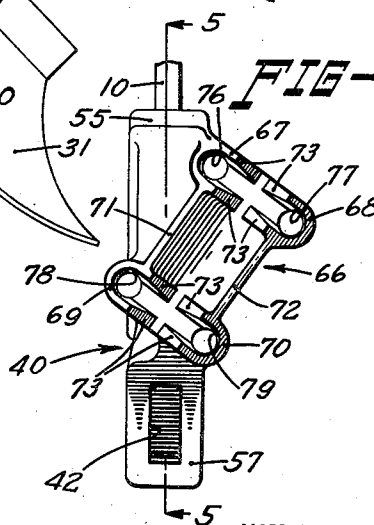


FIG-2



WITNESS
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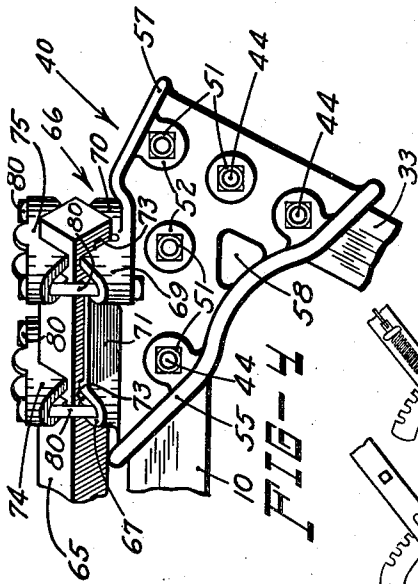
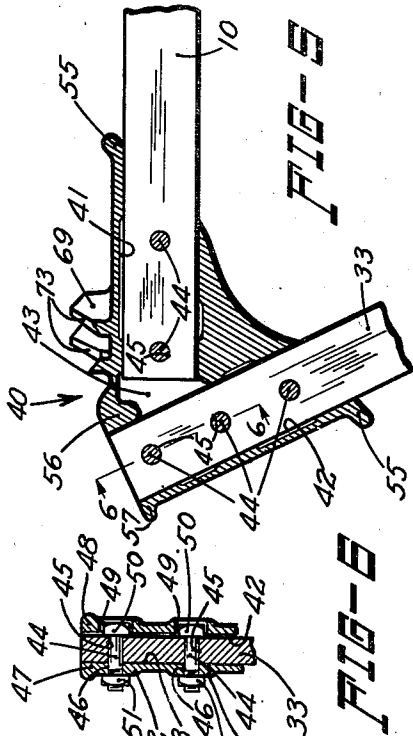
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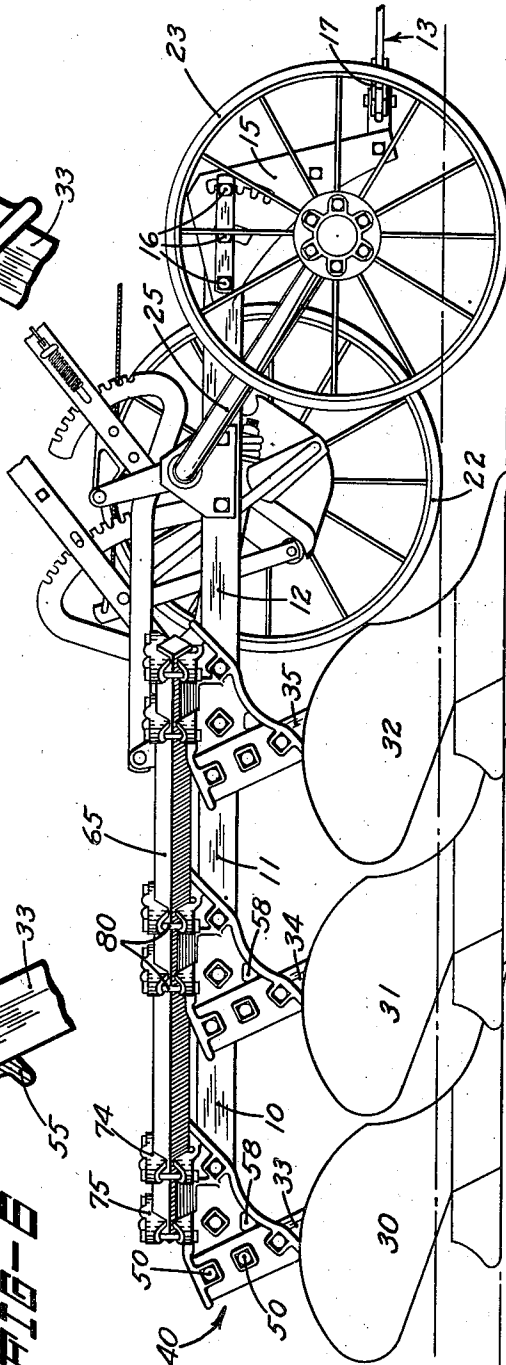
PLOW

Original Filed May 3, 1937

2 Sheets-Sheet 2



WITNESS
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UNITED STATES PATENT OFFICE

2,180,618

PLOW

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Application May 3, 1937, Serial No. 140,332
Renewed May 12, 1939

22 Claims. (Cl. 97—100)

The present invention relates generally to plows and other implements comprising a plurality of laterally spaced, parallel draft beams and a downwardly extending shank or standard disposed at the rear end of each beam, to which is attached a ground-working tool.

The conventional method of constructing such plows consists in forming a single beam to include both draft beam and tool standard portions by bending the rear end of the beam to the proper angle while hot. Then, in the assembly operation, the several beams are again heated and clamped to a standard jig or face plate, whereby the points of connection to the draft frame and implement tool at opposite ends of the beam are set in proper alignment. During this operation, however, the intermediate portion of the beam is thrown slightly out of alignment, which is negligible as far as the operation of the beam itself is concerned, but which is appreciable from the standpoint of assembling several beams into a multi-bottomed implement, for it prevents the use of cross braces of standard dimensions, but rather requires individual hand-fitted braces between the beams. These braces are usually fitted to the beams while the latter are held in proper position on the face plate. Obviously, therefore, the braces are not interchangeable, hence a plow user cannot obtain a stock replacement from the factory in case of breakage of a brace, but must fit one by hand. Furthermore, if it should be necessary to replace a plow beam, the braces must be reshaped.

In my copending application, Serial No. 41,508, filed September 21, 1935, I have disclosed one method of constructing plows which obviates some of these difficulties. In this method, after the beams are bent and aligned, a bracket is fixed on the rear end of the beam. This bracket has a thickened portion defining brace-receiving V-shaped notches. The beams are fixed to a face plate, as before, and the faces of these notches are milled whereby they are accurately positioned with respect to the two ends of the plow beam. Hence, a straight bar of rectangular cross section serves as a transverse brace and is rigidly secured within the notches of the several brackets.

The present invention is in the nature of an improvement in the structure disclosed in my aforesaid copending application and has for its general object the provision of a plow structure, the manufacture of which is further simplified and its cost reduced, and of which the parts can be standardized to make them interchangeable.

More specifically, the object of the present invention is concerned with the provision of a plow structure comprising an assembly of straight structural members.

A further object of my invention relates to the provision of brackets for joining the several members of the structure of a plow or other implement, rigidly and in proper alignment.

I am aware that it is old to construct a plow with tool shanks separate from the draft members, but as far as I know, the tool shanks have always been fixed thereto by bolting them directly to the draft frame, in which case the entire draft load is imposed upon the fastening bolts which is unsatisfactory because of the high concentration of stresses. By this invention, however, I have provided a unitary bracket member having sockets for receiving the draft beam, the tool carrying standard and the transverse brace, and which transmit loads between members without concentration of stresses. Since each of these members is a straight bar of standard structural form, all hand fitting and bending operations are eliminated and the cost of production is accordingly decreased with respect to previous designs. Furthermore, all parts being standard, they are interchangeable, therefore repair parts can be ordered from the factory with confidence that they will fit and maintain perfect alignment.

These and other objects and advantages of my invention will be apparent after a consideration of the following detailed description of a specific embodiment of my invention, in which reference is made to the drawings appended hereto, in which

Figure 1 is a plan view of a three-bottomed plow embodying the principles of the present invention.

Figure 2 is a side elevation of the plow shown in Figure 1, as viewed from the furrowward side of the plow.

Figure 3 is a plan view of one of the brackets for securing one of the draft beams to its associated plow standard and to the transverse bracing member, the latter being removed to show the details of construction of the bracket.

Figure 4 is a side elevation of the bracket shown in Figure 3, as viewed from the landward side of the plow.

Figure 5 is a sectional elevation taken along a line 5—5 in Figure 3.

Figure 6 is a section taken along a line 6—6 in Figure 5, showing the manner in which the

securing bolts engage the bracket and the plow standard.

Referring now to the drawings and more particularly to Figures 1 and 2, the plow comprises a plurality of longitudinally extending laterally spaced parallel beams 10, 11, 12, each of the beams comprising simply a straight steel bar of rectangular cross section. The forward end of each of the draft beams is connected to a tractor hitch member 13 by means of a pair of downwardly and forwardly extending plates 14, 15 secured to the end of the beam by bolts 16 and to the hitch member 13 by a clevis 17. The forward ends of the beams are connected together and braced by means of U-shaped braces 18 which extend between adjacent beams and are fastened to the beams by means of the above-mentioned bolts 16. Other diagonally and rearwardly extending brace members 19 serve also to maintain the forward ends of the beams in proper relative position.

The beams are supported on a land wheel 22 and a furrow wheel 23, mounted on the ends of crank axles 24 and 25, respectively, which are journaled on the beams in suitable bearing plates 26 and 27, respectively, in a well-known manner which need not be described here in detail. As is also well-known, the plow can be raised and lowered by rotating the crank axles, and can be leveled by rotating one of the crank axles relative to the other.

At the rear end of each of the beams 10, 11 and 12 is disposed a ground-working tool 30, 31, 32, respectively, and connected to the beams by means to be described later. In the embodiment shown herein, these tools comprise mold-board plow bottoms of a conventional form. These plow bottoms are spaced laterally with respect to each other by the spacing between the draft beams and are spaced longitudinally with respect to each other to secure proper earth turning operation, by reason of the fact that the draft beams 10, 11 and 12 are of relatively different lengths, as shown. Each of the plow bottoms 30, 31 and 32 is mounted on a plow standard or tool shank 33, 34, and 35, respectively, which comprise simply straight steel bars of rectangular cross section similar to the draft beams 10, 11, and 12, but of greater lateral thickness to withstand the bending stresses imposed upon them during plowing.

A rigid connection between each of the tool shanks and its respective draft beam is accomplished by means of a bracket member indicated in its entirety by the reference numeral 40. This bracket, as is evident in Figures 2, 4 and 5, comprises a heavy hollow casting of generally triangular shape, the interior of which is formed during the casting operation by means of a single core to provide two intersecting passages 41, 42 constituting receptacles or sockets to receive adjacent ends of the associated draft beam 10 and tool standard 33, respectively. These passages are disposed on axes which diverge at a pre-determined angle for the purpose of holding the tool shank 33 in proper position relative to the draft beam 10. In the preferred embodiment, the left or landward interior wall 43 of each of the sockets 41, 42 of the casting lie in a common plane, and is carefully formed to provide a vertical aligning surface for the draft beam 10 and the tool shank 33. The beam and the shank are drawn up tightly against this surface by means of bolts 44 which pass through aligned openings 45 and 46 in the bars and the

landward wall 47 of the bracket casting, respectively. The bolts 44 fit snugly within these openings to act as dowels to assist in aligning the bars 10, 33. In the furrowward wall 48 of the bracket member are provided square enlarged apertures 49 which are slightly larger than heads 50 of the bolts 44, whereby the bolt heads 50 are received within the apertures 49 and are permitted to seat against the sides of the draft beam 10 and tool standard 33. The bolts are secured by nuts 51 which are drawn up tightly against the faces of bosses 52 provided around the bolt openings 45 in the casting. While the nuts are being tightened, the heads 50 of the bolts are prevented from turning by the sides of the square apertures 49.

Thus it is evident that the beam and shank members 10, 33 are supported on one wall 47 of the casting 40 and aligned by the inner surface 43 of the cored space within the casting, while the furrowward wall 48 of the casting serves as a reinforcement against twisting and bending strains. The advantage of forming the interior of the casting by a single core will now be apparent, for if the core should become slightly displaced in the mold during the casting operation, the alignment of the beam and shank will not be affected. Since the most severe forces which are imposed upon the casting are those tending to increase the angle included between the beam 10 and shank 33, a heavy bead 55 extends around the lower forward edge of the triangular casting as a means of reinforcement. Furthermore, a thickened portion 56 is provided in the casting immediately forward of the upper end of the tool shank 33, which serves as a reinforcement against compressive stresses at this point caused by the tendency of the shank to rotate in a clockwise direction, as viewed in Figure 5. A bead 57 extends around the upper end of the tool shank socket 42 to provide additional reinforcement at this point. A depression 58 is formed on each side of the casting in the space between the sockets 41, 42, reducing the thickness of the metal at this point to a mere web, to eliminate excess weight and also to provide for uniform cooling of the casting to prevent warping thereof.

The lateral spacing of the several plow bottoms 30, 31, 32, as well as the fore and aft alignment of each plow bottom is maintained by means of a diagonally disposed bracing member 65 extending transversely of the implement frame and rigidly secured to each of the brackets 40 in proper alignment by means which will be described. The bracing member 65 comprises a straight steel bar, preferably of square cross section, and disposed with its sides lying in planes at 45 degrees to the vertical. Figures 3 and 4 show the means for securing this bar to each of the brackets 40, comprising a raised portion 66 formed integrally with the casting 40. This raised portion comprises a pair of U-shaped vertically extending flanges 67, 68 disposed in diagonal alignment with open ends in opposition to each other near the forward end of the casting 40, and offset in a furrowward direction therefrom; and a similar pair of opposed U-shaped flanges 69, 70 disposed parallel to the first mentioned pair 67, 68 but positioned near the rear of, and centrally located with respect to the casting 40. The diagonally aligned flanges 67 and 69 are interconnected by a reinforcing web 71 while the other pair of flanges 68 and 70 are interconnected by a reinforcing web 72. The

adjacent edges of each pair of opposed U-shaped flanges are beveled to provide two pairs of downwardly converging V-shaped notches 73 which are thus disposed in spaced apart vertical planes which lie diagonally with respect to the longitudinal draft beams 10, 11 and 12. These V-shaped notches are all disposed in alignment in a diagonal direction relative to the beams, and the notches on each of the several brackets 40 are also in alignment with each other, whereby the transverse bracing member 65 is received in seating engagement with each of the notches 73 on each of the brackets 40.

In order to insure perfect alignment and interchangeability between the brackets, the faces of the notches of each of the bracket castings is accurately machined to a given relation with respect to the aligning surface 43 within the sockets 41 and 42. This is accomplished by setting up each bracket in a jig, which includes a pair of bars corresponding to the draft beam 10 and the standard 33, which are drawn up firmly against the aligned surface 43. These bars are attached to a suitable face plate in a fixed relation to the milling cutter which is then manipulated to machine the surfaces of the notches.

Each opposed pair of notched flanges 67, 68, and 69, 70 is provided with a complementary securing cap 74, 75. Each of these caps is provided with U-shaped flanges which are notched to fit over the upper sides of the bracing bar 65 directly above the notched portions in the bracket casting 40. Apertures 76 and 77 are provided within the curved ends of each of the U-shaped flanges 67, 68 and apertures 78, 79 are similarly provided within the flanges 69 and 70, respectively, to receive fastening bolts 80 which extend vertically through these apertures 76, 77, 78, and 79 in the casting 40, and through similar aligned apertures in the securing caps 74 and 75, thus clamping the bracing bar 65 firmly between the V-shaped portions of the castings 40 and the caps 74, 75.

Thus it is clear that since each bracket member has a number of comparatively widely spaced notches, the brackets when secured to the aligning bar 65, will each be maintained in proper fore and aft and also the proper vertical position with respect to the longitudinal axis of the implement. Furthermore, since the draft beams 10, 11 and 12, and the tool standards 33, 34 and 35 are firmly secured against the aligning surface 43 in their sockets, the entire plow structure is maintained at all times in accurate alignment. Since none of the bars need be heated or bent to shape, there is no danger of mis-alignment due to warping or springing.

I do not intend my invention to be limited to the precise details shown and described in the embodiment disclosed herein, except as limited by the claims which follow.

I claim:

1. In a plow, a draft beam, a plow standard separate from said beam, and means for rigidly joining said beam and said standard in a predetermined angular relation to one another, comprising a unitary casting having divergently disposed tubular passages formed therein and adapted to receive the ends of said beam and said standard, respectively, there being aligned apertures in the walls of said casting and in said beam and said standard, and bolts disposed therewithin for securing the beam and standard rigidly to said casting, the heads of said bolts being smaller than the apertures associated

therewith to permit said heads to seat against the side of said beam and the side of said standard.

2. In an agricultural implement, a plurality of laterally spaced, longitudinally extending draft members, a vertically disposed ground-working tool carrying member associated with each of said draft members, a transversely disposed brace, a bracket associated with each pair of said associated members for joining said members together and for attaching them to said brace, means for rigidly securing each of said members to their respective brackets, and means for rigidly attaching each of said brackets to said transverse brace.

3. In an agricultural implement, a plurality of laterally spaced, longitudinally extending draft beams, a plurality of tool-carrying standards separate from said beams, means for rigidly joining one of said standards to each of said beams, respectively, comprising a plurality of brackets, means for fixing one of said standards and one of said beams to each of said brackets in a predetermined angular relation, a bracing bar disposed transversely of said draft beams, and means for fixing each of said brackets to said bracing bar.

4. In an agricultural implement, a plurality of draft beams, a plurality of tool-carrying standards separate from said beams, a transversely extending bracing bar, and means for joining said beams, said standards, and said bar to form a rigid structure, said means comprising a plurality of bracket members, each of said members having a receptacle for one of said beams, a receptacle for one of said standards, a receptacle for said bracing bar, and means for securing each of said beams and standards and said bar within their respective receptacles.

5. In an agricultural implement, a plurality of draft beams, a plurality of tool-carrying standards separate from said beams, a transversely extending bracing bar, and means for joining said beams, said standards, and said bar to form a rigid structure, said means comprising a plurality of bracket members, each of said members comprising a pair of tubular sections disposed in angular relation to each other and adapted to receive one of said beams and one of said standards, respectively, there being recessed aligning and attaching means on said bracket members for receiving said bracing bar.

6. In an agricultural implement, a plurality of draft beams, a plurality of tool-carrying standards separate from said beams, a transversely extending bracing bar, and means for joining said beams, said standards, and said bar to form a rigid structure, said means comprising a plurality of bracket members, each of said members having a socket for receiving one end of one of said beams, a socket for receiving one end of one of said standards in predetermined angular relation to said beam, and a portion establishing a brace bar receiving surface, disposed in the proper relative position with respect to the other ends of said beam and said standard to maintain said plow structure in proper alignment.

7. In a plow, a plurality of laterally spaced, parallel draft beams comprising straight bars of rectangular cross section, a tool-carrying standard for each of said beams, a bracket disposed at the rear end of each of said bars, each of said brackets having a tubular socket for receiving said rear end of said bar, means for rigidly securing said bar within said socket, there being a second tubular socket provided in each

of said brackets for receiving one of said standards, means for securing said standards within said second sockets, respectively, and means defining V-shaped notches on each of said brackets, said brackets being positioned with said notches in alignment diagonally relative to said parallel draft beams, a common bracing bar extending through said aligned notches and adapted to seat therein, and means for fixing said bracing bar to each of said brackets.

8. In a plow, a substantially straight bar serving as a draft beam and a second substantially straight bar serving as a plow bottom carrying standard, means for joining said bars in a predetermined relative position comprising a generally triangular hollow unitary bracket member including a pair of divergingly disposed tubular sections adapted to receive said bars, one of the inner side walls of each of said sections establishing aligning surfaces for said bars, and means for clamping said bars firmly against said aligning surfaces.

9. In a plow, a structure comprising a plurality of laterally spaced bars serving as draft beams and a plurality of other bars serving as plow bottom carrying standards, means for joining each of said standards to one of said beams, respectively, in a predetermined relative position comprising unitary bracket members, each of said members including a pair of tubular sections adapted to receive one of said beams and one of said standards, respectively, one of the inner walls of each of said sections being disposed in a common plane for establishing an aligning surface for said bars, means for clamping said bars firmly against said aligning surface, a transversely disposed brace bar, and means on each of said bracket members defining a brace bar receiving surface disposed in the proper relative position with respect to said aligning surface to maintain said plow structure in proper alignment.

10. An article of manufacture comprising a bracket for joining separate beam and shank members of an implement, said bracket comprising a unitary casting having a single cored space provided therein forming a pair of intersecting passages for receiving said members, there being aligned perforations in the walls of said casting on opposite sides of said passages, and bolt means adapted to be inserted through said aligned perforations, one of each pair of aligned perforations being polygonal in shape to receive and hold complementary portions of said bolt means.

11. An article of manufacture comprising a bracket for joining separate beam, shank, and bracing members of an implement, said bracket comprising a unitary casting having a single cored space provided therein forming a pair of intersecting passages for receiving said beam and shank members, means on the outer surface of said casting defining V-shaped notches for receiving said bracing member, there being excess material provided on the surfaces of said notches adapted to be removed to establish receiving surfaces for said bracing member in the proper position relative to said beam and shank receiving passages, whereby a plurality of such brackets connected to a common bracing member will be maintained in properly aligned relation.

12. In a plow, a substantially straight bar serving as a draft beam and a second substantially straight bar serving as a plow bottom carrying

standard, means for joining said bars in a predetermined relative position comprising a generally triangular hollow unitary bracket member including a pair of divergingly disposed tubular sections adapted to receive said bars, one of the inner side walls of each of said sections establishing aligning surfaces for said bars, there being aligned apertures in the walls of said bracket member and in said bars, and bolt means disposed in said aligned apertures adapted to bear upon said bars for clamping the latter firmly against said aligning surfaces.

13. An article of manufacture comprising a bracket for joining separate beam and shank members of an implement, said bracket comprising a unitary casting having a single cored space provided therein forming a pair of intersecting passages for receiving said members, one of the walls of each of said passages serving as an aligning surface for said implement members, there being aligned perforations in the walls of said casting on opposite sides of said passages to receive clamping means for securing said implement members firmly against said aligning surfaces, the perforations in the walls opposite to said aligning surfaces being enlarged to permit the clamping means to bear upon the implement members.

14. An article of manufacture comprising a bracket for joining separate beam and shank members of an implement, said bracket comprising a unitary casting having a single cored space provided therein forming a pair of intersecting passages for receiving said members, one of the walls of each of said passages serving as an aligning surface for said implement members, there being aligned perforations in the walls of said casting on opposite sides of said passages to receive bolts for securing said implement members firmly against said aligning surfaces, the perforations in the walls opposite to said aligning surfaces being polygonal in shape and adapted to admit the heads of the securing bolts to bear upon the implement members and to hold the heads against turning.

15. An article of manufacture comprising a bracket for joining separate beam, shank, and bracing members of an implement, said bracket comprising a unitary casting having a single cored space provided therein forming a pair of intersecting passages for receiving said beam and shank members, means on the outer surface of said casting for attaching said bracing member thereto, there being excess material provided on said attaching means adapted to be removed to establish receiving and aligning surfaces adapted to interfit with said bracing member in the proper position relative to said beam and shank receiving passages, whereby a plurality of such brackets connected to a common bracing member will be maintained in properly aligned relation.

16. A plow comprising a plurality of laterally spaced longitudinally extending draft beams of relatively different lengths, a hitch device therefor, said beams having their forward ends disposed in alignment along a line perpendicular to the travel of the plow and connected to said hitch device, the rear ends of said beams terminating on a line disposed oblique to the line of advance, a plow shank for each of said beams and separate therefrom, a bracket rigidly fixed to each associated beam and shank for joining the latter together, a bracing bar for joining the several beams together in a rigid structure, said bar being disposed obliquely to the line of ad-

vance adjacent the rear ends of said beams, and means for rigidly securing each of said brackets to said bracing bar.

17. A plow comprising a plurality of laterally spaced longitudinally extending draft beams of relatively different lengths, a hitch device therefor, said beams having their forward ends disposed in alignment along a line perpendicular to the travel of the plow and connected to said hitch device, the rear ends of said beams terminating on a line disposed oblique to the line of advance, a plow shank for each of said beams and separate therefrom, a bracket rigidly fixed to each associated beam and shank for joining the latter together, a bracing bar for joining the several beams together in a rigid structure, said bar being disposed obliquely to the line of advance adjacent the rear ends of said beams, and means for rigidly clamping said bar to each of said brackets at a pair of obliquely aligned points on each bracket.

18. In a plow, a structure comprising a plurality of laterally spaced bars serving as draft beams and a plurality of other bars serving as plow bottom carrying standards, means for joining each of said standards to one of said beams, respectively, in a predetermined relative position comprising unitary bracket members, each of said members including a pair of divergently disposed tubular sections adapted to receive one of said beams and one of said standards, respectively, one of the inner walls of each of said sections establishing aligning surfaces for said bars, means for clamping said bars firmly against said aligning surfaces, a transversely disposed brace bar, and means on each of said bracket members defining a brace bar receiving surface disposed in the proper relative position with respect to said aligning surfaces to maintain said plow structure in proper alignment.

19. In a plow, a structure comprising a plurality of laterally spaced bars serving as draft beams and a plurality of other bars serving as plow bottom carrying standards, means for joining each of said standards to one of said beams, respectively, in a predetermined relative position comprising unitary bracket members, each of said members including a pair of divergently disposed tubular sections adapted to receive one of said beams and one of said standards, respectively, one of the inner walls of each of said sections establishing aligning surfaces for said bars, means for clamping said bars firmly against said aligning surfaces, a transversely disposed brace bar, and means on each of said bracket members for attaching said brace bar thereto, there being excess material provided on said attaching means adapted to be removed to establish receiving and aligning surfaces adapted to interfit with said brace bar in the proper position relative to said beam and shank aligning surfaces, whereby a plurality of such brackets connected to a common bracing bar will be maintained in properly aligned relation to maintain said plow structure in proper alignment.

20. In a plow, a structure comprising a plu-

ality of laterally spaced bars serving as draft beams and a plurality of other bars serving as plow bottom carrying standards, means for joining each of said standards to one of said beams, respectively, in a predetermined relative position comprising unitary bracket members, each of said members including recesses adapted to receive one of said beams and one of said standards, respectively, one wall of each of said recesses establishing aligning surfaces for said bars, means for clamping said beams and standards firmly against said aligning surfaces, a transversely disposed brace bar, and means on each of said bracket members for attaching said brace bar thereto, there being excess material provided on said attaching means adapted to be removed to establish receiving and aligning surfaces adapted to interfit with said brace bar in the proper position relative to said beam and shank aligning surfaces, whereby a plurality of such brackets connected to a common bracing bar will be maintained in properly aligned relation to maintain said plow structure in proper alignment.

21. An implement comprising a plurality of laterally spaced bars serving as draft beams and a plurality of other bars serving as ground working tool carrying shanks, means for joining each of said shanks to one of said beams, respectively, in a predetermined relative position comprising unitary bracket castings, each of said castings having a single cored space provided therein forming a pair of intersecting passages for receiving said bars, one of the walls of each of said passages serving as aligning surfaces for said beam and shank bars, means for clamping said beams and shanks firmly against said aligning surfaces, a transversely disposed brace bar, and means on each of said bracket members for attaching said brace bar thereto.

22. An implement comprising a plurality of laterally spaced bars serving as draft beams and a plurality of other bars serving as ground working tool carrying shanks, means for joining each of said shanks to one of said beams, respectively, in a predetermined relative position comprising unitary bracket castings, each of said castings having a single cored space provided therein forming a pair of intersecting passages for receiving said bars, one of the walls of each of said passages serving as aligning surfaces for said beam and shank bars, means for clamping said beams and shanks firmly against said aligning surfaces, a transversely disposed brace bar, and means on each of said bracket members for attaching said brace bar thereto, there being excess material provided on said attaching means adapted to be removed to establish receiving and aligning surfaces adapted to interfit with said brace bar in the proper position relative to said beam and shank aligning surfaces, whereby a plurality of such brackets connected to a common bracing bar will be maintained in properly aligned relation to maintain said plow structure in proper alignment.

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