June 12, 1956 L. R. RUNKLE 2,750,223

SHOVEL CONSTRUCTION

Filed March 28, 1952 2 Sheets-Sheet 1

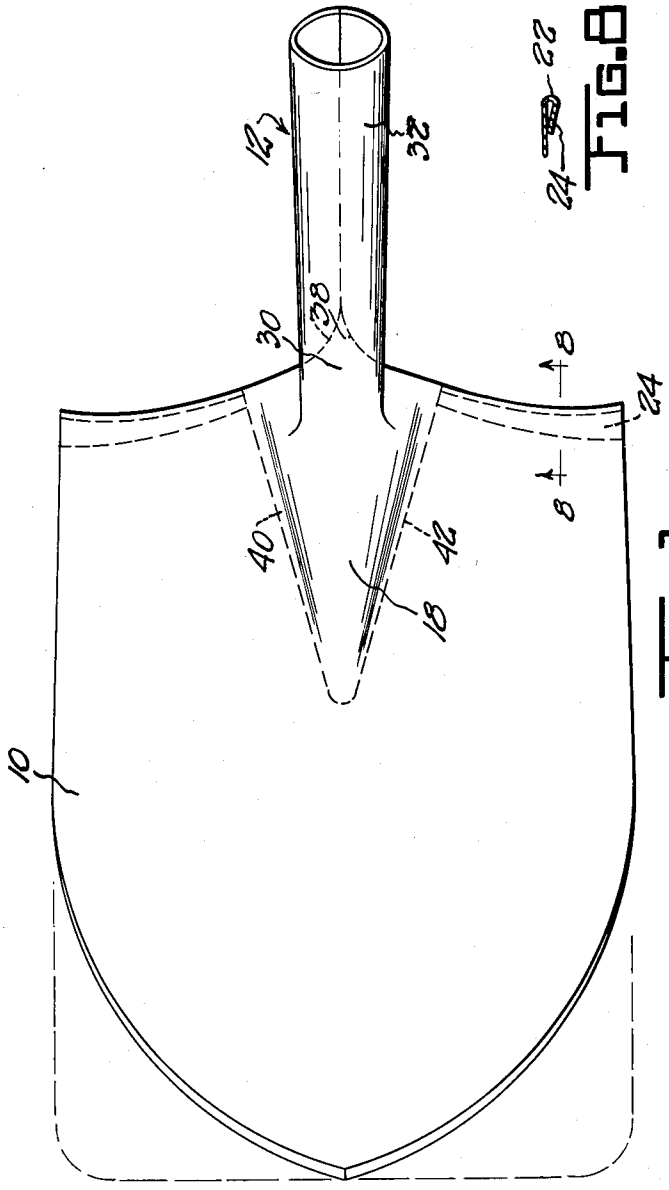


FIG. 1

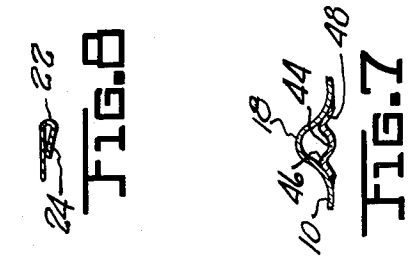


FIG. 8

FIG. 7



FIG. 6

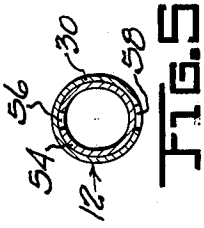


FIG. 5

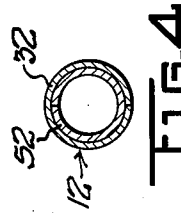


FIG. 4

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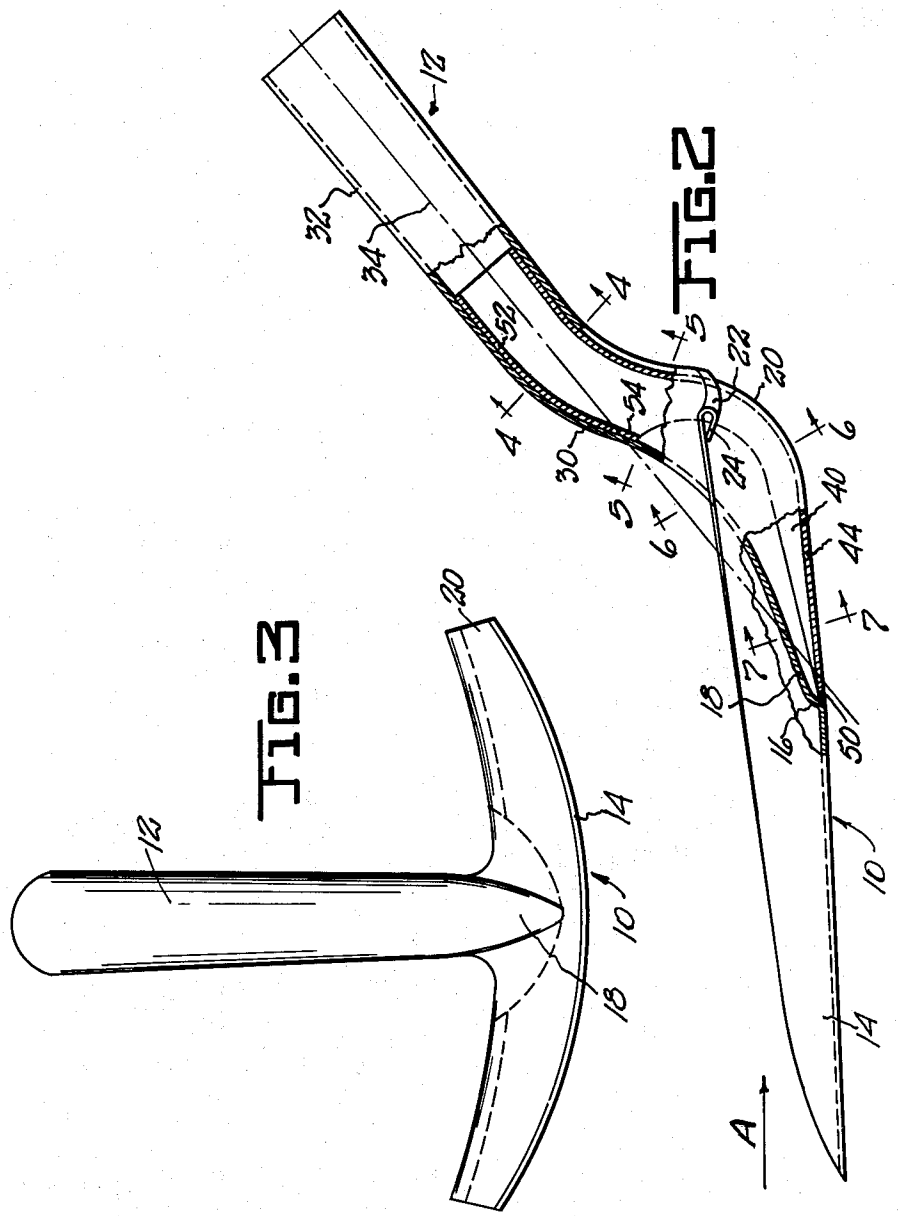


FIG. 2

FIG. 3

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2,750,223

SHOVEL CONSTRUCTION

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Application March 28, 1952, Serial No. 279,033

4 Claims. (Cl. 294—49)

This invention relates to improvements in shovels, and particularly to improvements in utility shovels or spades.

Heretofore it has been the practice in the manufacture of blades of utility shovels or spades to forge such blades from a thick blank. The forging operation is time-consuming and therefore costly. Forged shovel blades possess various properties which heretofore have been considered necessary to a successful practical utility shovel. One of the advantages is that the blade has varying thickness throughout so that strength may be provided in the blade where needed by the simple expedient of increasing the thickness of the blade at the points requiring strength. Similarly, the ability to vary the thickness of the blade has been relied upon heretofore to assist in maintaining the shape of the blade so that it will not become deformed in use. Forged shovel blades also commonly include comparatively thick rear edge portions to provide surfaces engageable by the user's foot when pressing the blade into the soil or other dense material in digging, thereby preventing a cutting action of the blade upon the shoe of the user.

The primary object of this invention is to provide a shovel blade which is constructed from metal plate or sheet steel of uniform thickness to provide requisite strength and durability, to secure the advantages of low cost and light weight, and to serve and possess various advantages which heretofore have been considered peculiar to a forged shovel blade.

A further object is to provide a shovel blade formed from two pieces of sheet steel so shaped, constructed and assembled as to provide a tubular portion in the blade projecting from the outline of the blade at one end to define a handle-receiving ferrule or socket and located in part within the overall outline of the blade to form a rigidifying portion strengthening the blade and accommodating transfer of the load from the blade to the handle ferrule progressively along at least a part of the length of said blade.

A further object is to provide a shovel blade formed of sheet steel or plate stock of uniform thickness whose thickness is less than that usually required in such material to withstand the stresses acting upon a shovel blade in use, wherein the blade is bent to a shape curved in in every direction to impart rigidity thereto, and wherein the blade is provided with a substantially tubular longitudinal part extending for a portion only of its length and merging with a handle-receiving ferrule at its rear end and being of a cross-sectional dimension reducing progressively from the rear margin of the blade to a point intermediate the length of the blade.

A further object is to provide a shovel blade which is stamped from sheet steel and characterized by a substantially continuous transverse curvature and by downwardly and forwardly return bent flanges at the rear transverse margin of the blade interrupted by a central longitudinal rearwardly projecting handle-receiving ferrule and cooperating with said ferrule to rigidify said blade in both longitudinal and transverse directions.

A further object is to provide a shovel blade stamped from sheet steel which is characterized by an upwardly offset longitudinal rib at its rear central portion merging with an integral handle-receiving ferrule which is bent adjacent said blade, wherein said blade is reinforced at said rib by a member disposed in face engagement with said blade at the margins of the rib-forming offset and positioned completely at or above the lowermost level of said blade throughout, said reinforcing member including a tubular portion projecting into and fitting snugly in the bent portion of said ferrule to increase the thickness of said ferrule at the bent portion thereof.

Other objects will be apparent from the following specification.

In the drawing:

Fig. 1 is a plan view of a shovel blade constituting one embodiment of my invention and illustrating in dotted lines the outline of a shovel blade of different shape utilizing my invention.

Fig. 2 is a side view of the shovel blade with parts shown in section.

Fig. 3 is a front edge view of the shovel blade as viewed in the direction of arrow A in Fig. 2.

Fig. 4 is a transverse sectional view taken on line **4—4** of Fig. 2.

Fig. 5 is a transverse sectional view taken on line **5—5** of Fig. 2.

Fig. 6 is a fragmentary transverse sectional view taken on line **6—6** of Fig. 2.

Fig. 7 is a fragmentary transverse sectional view taken on line **7—7** of Fig. 2.

Fig. 8 is a fragmentary detail sectional view taken on line **8—8** of Fig. 1.

Referring to the drawing which illustrates the preferred embodiment of the invention, the numeral **10** designates a shovel blade. This shovel blade may be either of the "round nose" type shown in full lines in Fig. 1, or may be of the "square point" type shown in dotted lines in Fig. 1. The blade **10** has a ferrule **12** projecting from the center of its rear edge and adapted to receive a handle (not shown) in the manner well understood in the art.

The blade **10** and ferrule **12** are formed integrally and are formed from sheet steel. I prefer to form the blade from hot rolled steel, 40–60 carbon, of 14 gauge having a thickness in the range between .071 inch to .082 inch. It will be understood, however, that the shovel blades may be formed from other materials and that the material as described above is illustrative and its definition is not intended to be limiting either with respect to its carbon content or its gauge. Any sheet steel of requisite strength, capable of forming by stamping or pressing by the use of dies, may be employed.

The blade is configured or bent along all dimensions thereof, that is, it is bent both longitudinally and transversely. The transverse configuration of the blade at its tip or front edge is illustrated in Fig. 3 at **14** as being curved. The curvature preferably is arcuate or uniform, but a true arcuate curvature is not essential.

At the rear portion of the blade, commencing at a point **16** approximately mid-length of the blade **10**, the transverse curvature of the blade is altered to a compound curvature by the formation therein of an upwardly offset longitudinal ridge portion **18**. This ridge portion is narrow at its front end, being substantially pointed at **16** and being of progressively increasing lateral and vertical dimension from point **16** rearwardly. Thus it will be observed by comparison of Figs. 6 and 7 that both the lateral and the vertical dimensions of the longitudinal central rib **18** increase substantially between section lines **7** and **6**, respectively. At the part **16** of the shovel which

defines the front of the rib 18, the construction provides a somewhat abrupt but nevertheless rounded forward portion of the offset or rib so as to reduce to a minimum the interference of said rib with the operation of inserting the shovel blade edgewise into the soil or other compact material in which it may be used. It will likewise be observed that the progressive increase of both the lateral dimension and the vertical dimension of the rib from front to rear affords a wedging action facilitating insertion of the shovel blade into the soil.

The blade 10 is substantially straight on all longitudinal lines at its front portion, but is bent upwardly at 20 at its rear portion. The bend at 20 is preferably substantially arcuate but not necessarily truly arcuate. The rearmost edge of the blank at the portion thereof projecting laterally from the ferrule 12 is downwardly return bent about a comparatively short radius at 22 to provide a reinforcing flange 24. The bend 22 has a radius greater than the thickness of the sheet material and preferably extends for more than 180 degrees so that the free front edge of each flange extends into engagement with the adjacent part of the shovel blade.

The manner in which the front edge of the flange 24 contacts the bottom surface of the portion 20 of the shovel blade forwardly of the bend 22 is illustrated clearly in Figs. 2 and 8. The two flanges 24 extend from the outer side edges of the blade for approximately one-third of the width of the blade, as well illustrated in Figs. 1 and 3. It will be understood that this proportion is approximate and illustrative and is not intended to be limiting. Also, it will be understood that the length of each flange will be determined in part by the lateral width of the offset or rib 18 at its rearmost portion. As illustrated, the inner edges of the flanges 24 terminate approximately at the point at which the general transverse curvature of the blade increases abruptly to start the definition of the rib 18 rather than being defined by the width of the crown portion only of said rib 18.

The ferrule 12 is formed integrally with the blade 10 as an extension of the longitudinal rib offset 18 thereof. The ferrule includes a curved upwardly projecting gooseneck portion 30 and a rear straight upwardly inclined socket portion 32. As best seen in Fig. 2, the parts are so arranged that the axis 34 of the socket portion 32 is inclined to the blade portion 10 and intersects that blade portion slightly rearwardly of the front tip 16 of the offset rib 18. Likewise, it will be seen that a part of the axis line 34 passes forwardly of the gooseneck or bent portion 30 so that a substantial part of the axis line 34 is entirely outside of the confines of the ferrule 12 and the rib 18. The ferrule preferably tapers longitudinally with its large dimension being located at its open end. The free edges of the sheet metal at 38 at the portions which merge between the blank and the ferrule are illustrated in dotted lines in Fig. 8, it being observed in Fig. 2 that said edges are spaced throughout the major portion of the bent part 30 of the ferrule and are in contact throughout the major portion of the straight part 34 of the ferrule.

The shovel is provided with a sheet metal reinforcement member 40. This reinforcement member is preferably formed of metal of the same character and the same gauge as that which forms the blade and the ferrule, although the use of similar or identical material is not essential and the reinforcement member may be formed of other plate steel stock of either lighter or heavier gauge than the blade itself. The inner end portion of the reinforcement member is of generally triangular shape or a shape simulating an arrowhead as is outlined by dotted lines 42 in Fig. 1.

The reinforcement member is characterized by a longitudinally extending central bend 44 and a pair of laterally spaced similarly reverse bends 46, as best illustrated in Figs. 6 and 7. A pair of flanges 48 are located at the opposite sides of the reinforcement member 40.

The flanges will preferably be slightly curved and are adapted to bear in face engagement with the bottom surface of the blade 10 in symmetrically spaced relation at opposite sides of the central rib 18 of the blade. This rib 18 cooperates with the central longitudinal bend 44 of the reinforcement member 40 to define a substantially tubular portion which extends full length of the rib 18, being of tapered character so as to increase in dimension from the front end 16 of said rib in a rearwardly direction. The reinforcement member 40 is welded at 50 to the blade. The arrangement is preferably such that substantially all parts of the reinforcement member 40 will lie at or above the level of the lowermost portions of the blade 10. Thus, as seen in Figs. 6 and 7, it will be apparent that no part of the reinforcement member 40 depends or projects downwardly to any substantial extent below the bottom surface of the shovel blade 10. The weld 50 is continuous along both sides and at the front of the rib 18.

The manner in which the central portion 44 of the reinforcement forms a substantial continuation of the front part of the blade 10 is well illustrated in Fig. 2. Observe in this connection that there may be a very slight inclination of the part 44 relative to the plane of the blade 10, but where this occurs it occurs to conform to the similar angle of the rear part of the blade 10 compared to its front part due to the drawing of the metal to form the rib 18.

The longitudinal shape of the reinforcement member 40 is curved to conform to the curvature of the rear bend 20 of the blade 10, as best seen in Fig. 2. This affords a substantially continuous welded reinforcmeent of the central portion of the blade 10 from the front part 16 of the rib 18 of the blade to the rear edge or bend 22 of the blade. The reinforcement continues upwardly past the rear edge of the blade entering the ferrule 12 at the bent portion 30 thereof and is formed in a tube 52 at its end. The tube 52 includes a curved neck portion 54 and a rear straight portion. This tube fits snugly within and is in substantially continuous surface contact with the inner walls of the ferrule 12. The snug fit of the tube portions 52 and 54 within the ferrule parts 32 and 30, respectively, is illustrated in Figs. 4 and 5, respectively. In this connection observe in Fig. 5 the gap at 56 occurring by reason of the location at which the section line is taken slightly beyond the forward end of the complete tubular formation of the reinforcement part 54. It will also be observed at this same point that the gap 58 in the outer ferrule 30 occurs as a result of the fact that its edges 38 do not contact at the point at which the section is taken. It will be observed, however, that the two gaps or interruptions of the ferrule occur at diametrically opposite parts of the tubular formation so that the tube itself is continuous even though it is not of double wall thickness throughout. The formation of a continuous walled tube, with strength which is inherent and characteristic in a tube, at the bent portion 30 of the ferrule is of great importance as a compensation for the light gauge uniform sheet steel of which the shovel is formed. It will be observed that the ferrule reinforcing tube extends for only a part of the length of the ferrule 32 so that it may define a stop to limit the extent of the insertion of the handle within said ferrule.

A shovel constructed as described herein is characterized by light weight and a strength adequate for its intended usage. The reinforcement 40 is located at points of greatest weakness of a shovel, namely, at the gooseneck or bent portion of the ferrule and the portion at which the ferrule and the shovel blade join. The reinforcement extends for a substantial part of the length of the blade so that the marginal welding thereof to the blade tends to distribute, for a substantial part of the length of the shovel, the stresses which are imparted to the reinforcing member by or through the ferrule. The continuous cross-sectional tubular shape of the ferrule

and of the rear central portion of the blade imparts to the structure a strength comparable to that of a tubular member, thus resisting effectively any tendency of the shovel to bend in a direction transverse of the center line of said tubular part. This center line curves to conform to the upward curvature of the rear edge of the blade at 20, thence continues upwardly and rearwardly until it merges with the inclined center line of the ferrule shown at 34. The extension of the reinforcement member 40 and of the blade 16 to a point at least as far forward as the point of intersection of the center line 34 with the blade also assists in producing requisite strength of the structure. It will also be noticed that these reinforcement factors are supplemented by the strength imparted to the structure by the manner in which the blade is bent both transversely and longitudinally.

While the preferred embodiment of the invention has been illustrated and described, it will be understood that changes in the construction may be made within the scope of the appended claims without departing from the spirit of the invention; one such change being an inversion of the location of the reinforcing member to the top surface of the shovel with the ferrule being formed as a continuation of a longitudinal upwardly concave portion of the blade located comparably to the concave portion 40 of the reinforcement as shown herein.

I claim:

1. In a shovel, a blade and ferrule formed integrally from sheet metal, said blade being bent to define an upwardly offset longitudinal rib extending for a portion of its length and merging with said ferrule, said ferrule being

substantially straight and joined to said blade by a bent portion so shaped that the axis of said ferrule intersects said blade adjacent to the front of said rib, and a reinforcing member marginally secured to the surface of said blade around said rib and interfitting and cooperating with said bent portion and ferrule to define a continuous tubular portion from the open end of said ferrule to the front end of said rib, said tubular portion being of multiple thickness for at least part of its cross-sectional extent throughout the length of said bent portion and a part of said straight ferrule portion.

2. The construction defined in claim 1, wherein said reinforcing member is located at and above the level of the adjacent portions of the bottom surface of said blade.

3. The construction defined in claim 1, wherein said reinforcing member includes a tubular end portion having a snug contacting fit in said ferrule for a portion of the length of said straight ferrule portion.

4. The construction defined in claim 1, wherein said reinforcing member is reversely bent crosswise thereof to define marginal flanges bearing in face engagement against the bottom surface of said blade at the margins of said rib and also to define a concave surface confronting the concave bottom surface of said rib.

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