United States Patent

Lukens et al.

[15] **3,648,797**

[45] **Mar. 14, 1972**

[54] CONSTRUCTION FOR A TRACTOR

[72] Inventors: **Alan F. Lukens**, Schenectady; **Everett S. Holden**; **Chester F. Jacobson**, both of Scotia, all of N.Y.

[73] Assignee: **General Electric Company**

[22] Filed: **Feb. 12, 1970**

[21] Appl. No.: **10,866**

[52] U.S. Cl. ..... **180/89**, 180/1 F, 180/54 D, 180/65, 180/79.3, 296/1 R

[51] Int. Cl. **B62d 21/10**

[58] Field of Search ..... 180/89, 79, 79.3, 1 F, 65, 180/60, 54 D; 296/1, 28

[56] **References Cited**

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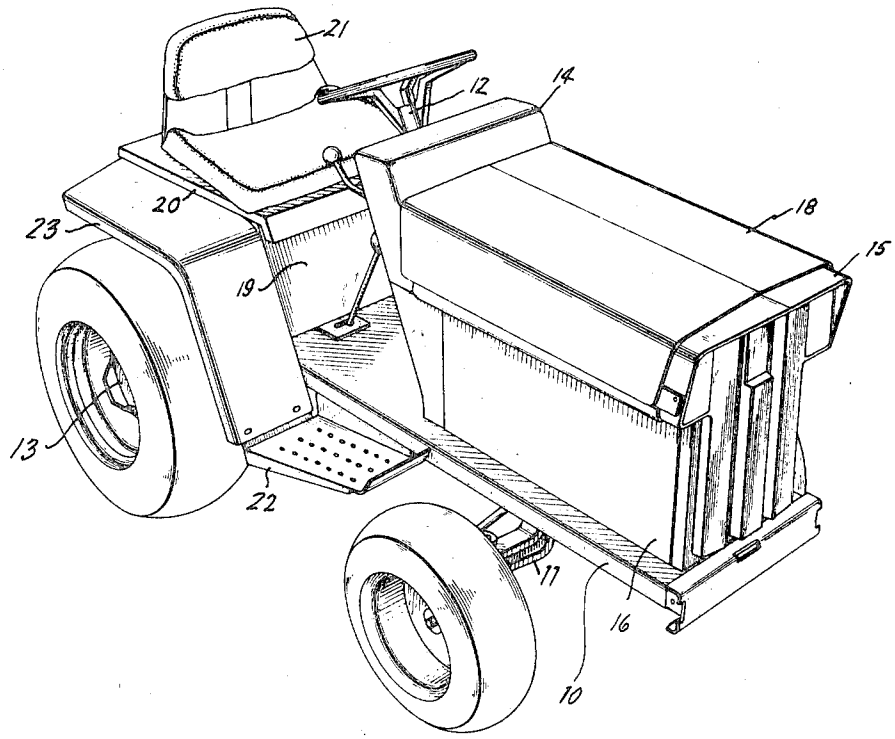
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Primary Examiner—Benjamin Hersh
Assistant Examiner—John P. Silverstrim
Attorney—John F. Ahern, Julius J. Zaskalicky, Frank L. Neuhauser, Oscar B. Waddell, Joseph B. Forman and Walter C. Bernkopf

[57] **ABSTRACT**

The chassis member is formed from a sheet of metallic material into a structure having an upper planar surface of elongated rectangular outline and a pair of downward extending planar side portions of elongated rectangular outline. The undercarriage assemblies are secured to the underside of the chassis member, that is both to the rectangular planar member and to the rectangular side portion. Front section and midsection members are secured to the top side of the chassis member to support the functional mechanical and electrical elements of the tractor as well as to provide a rugged structure.

5 Claims, 5 Drawing Figures



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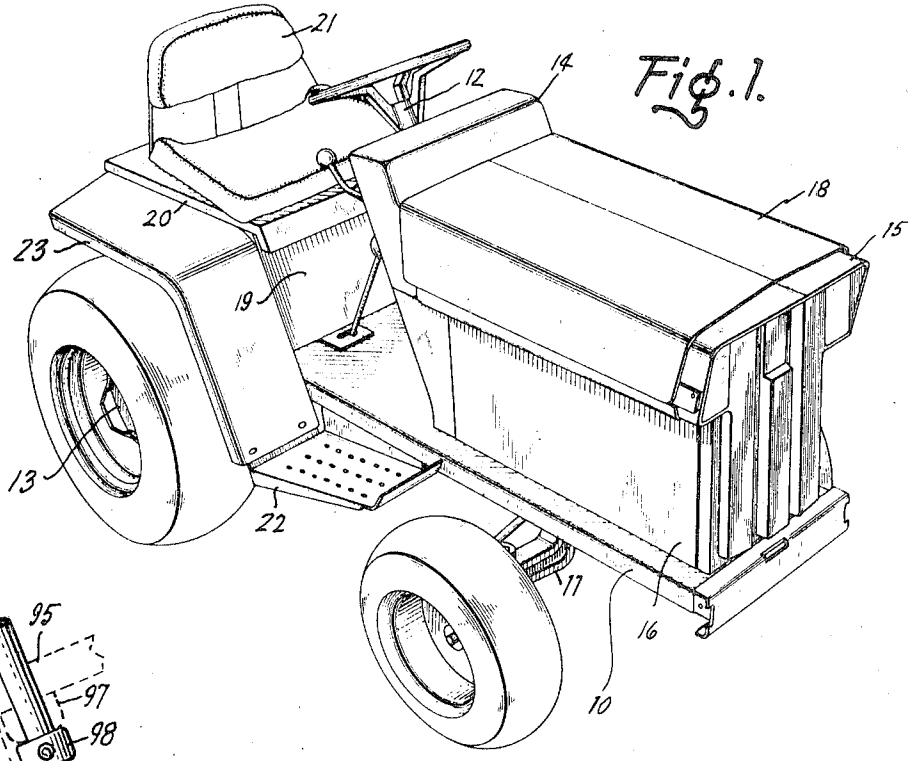


Fig. 1.

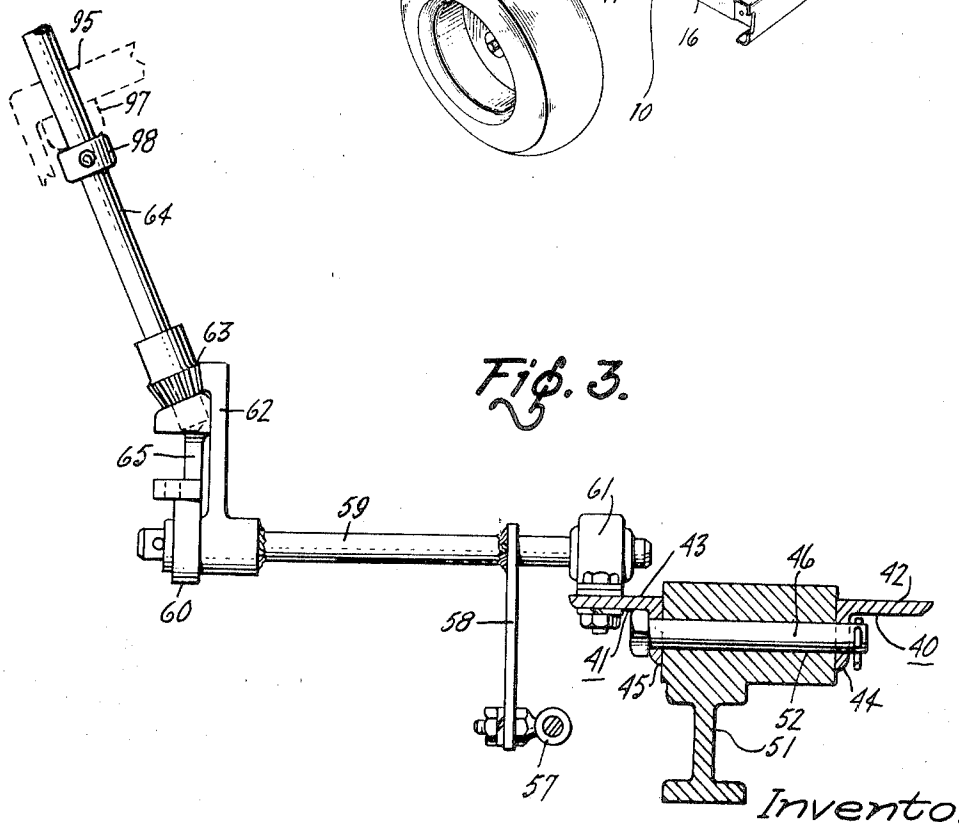


Fig. 3.

Inventors
Alan F. Lukens
Everett S. Holden
Chester F. Jacobson
by
Their Attorney

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Fig. 2.

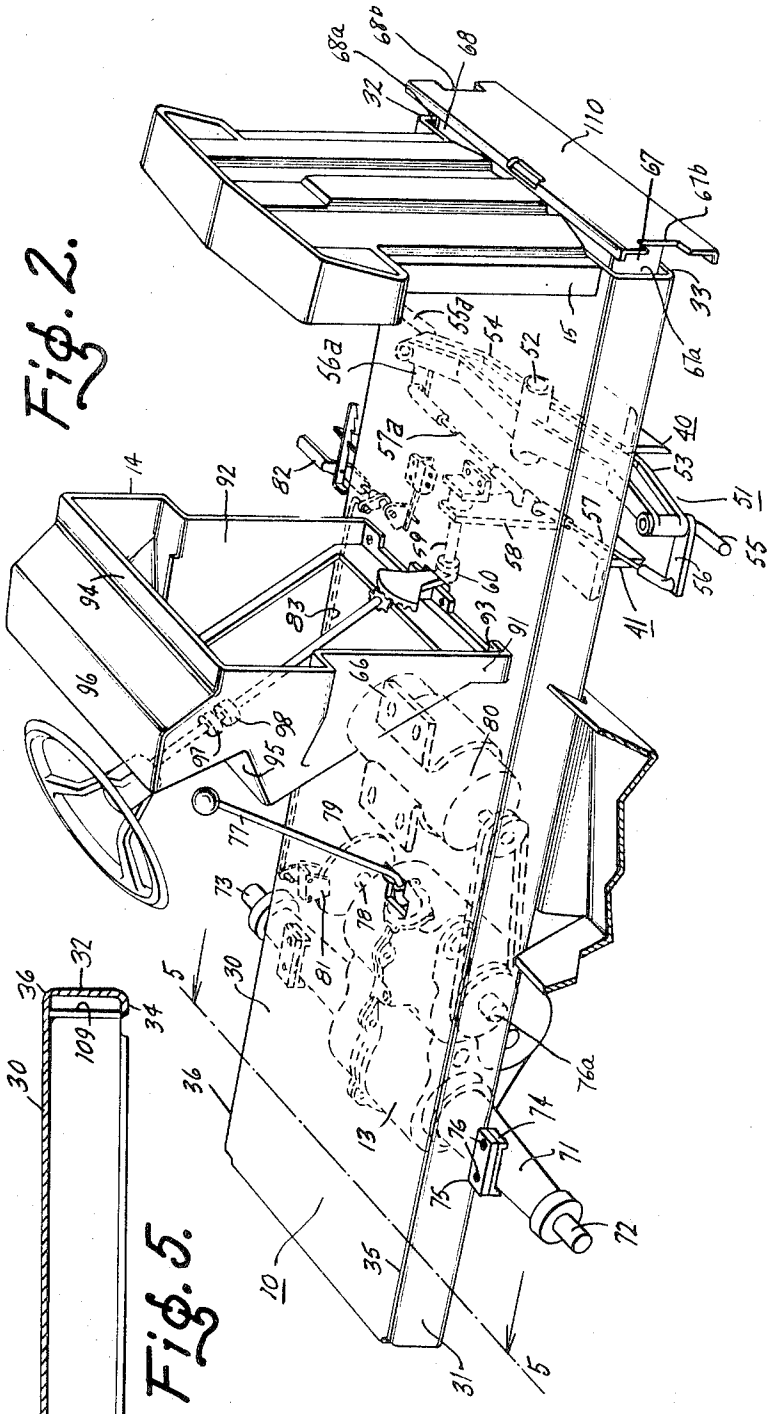


Fig. 4.

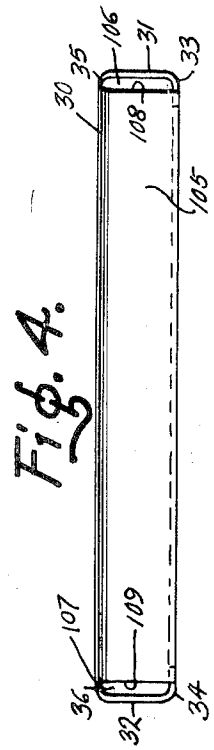


Fig. 5.

Inventors
Alan F. Lukens
Everett S. Holden
Chester F. Jacobson
by [illegible]
Their Attorney

CONSTRUCTION FOR A TRACTOR

The present invention relates to the construction of a tractor and relates in particular to the structure of the chassis member and the other functional members of the tractor and the cooperative combination thereof.

An object of the present invention is to provide an improved chassis construction for a tractor.

Another object of the present invention is to provide a simple structure to which the undercarriage members and the body members are easily and ruggedly secured.

Another object of the present invention is to provide a tractor of low center of gravity.

Another object of the present invention is to provide a tractor of a mechanical configuration which is easily mounted and dismounted by an operator.

Another object of the present invention is to provide a tractor which provides a high degree of operator safety.

Another object of the present invention is to provide a chassis construction for a tractor to which implements and auxiliary apparatus and assemblies may be easily and securely attached.

In carrying out the present invention as applied to an illustrative embodiment thereof, there is provided an integral chassis member including an upper planar portion of elongated rectangular outline, a pair of side planar portions of elongated rectangular outline each extending orthogonally downward from respective long edge of the upper planar portion and a pair of lower planar portions of elongated rectangular outline each side of which extends orthogonally inward from a respective lower edge of a respective side portion. A support member is provided extending substantially in a direction parallel to a short edge of the upper planar portion and secured at each end to a respective lower planar portion near a short edge of the upper planar portion. A front wheel assembly is pivotally mounted to the support member. A rear wheel assembly having a housing element and a pair of aligned axial elements rotatably mounted therein is secured at each side thereof to respective lower planar portions.

The features of our invention which we desire to protect herein are pointed out with particularity in the appended claims. The invention itself, however, both as to its organization and method of operation together with further objects and advantages thereof may best be understood by reference to the following description taken in connection with the accompanying drawings wherein:

FIG. 1 is a perspective view of an electrically powered tractor in accordance with the present invention taken at an elevated point from the front and the right side thereof.

FIG. 2 is a perspective view of the chassis member of the vehicle of FIG. 1 showing the manner of attachment of the undercarriage elements and some of the body elements thereof.

FIG. 3 is a sectional view taken along the axis of the lower drive shaft of the steering assembly showing the manner of suspension of the front wheel assembly to the cross bars on the chassis member and the pivotal mounting of the lower drive shaft.

FIG. 4 is an end view of the rear of the chassis member of the vehicle of FIG. 1.

FIG. 5 is a sectional view of the chassis member taken along section line 5—5 of FIG. 2.

Referring now to FIG. 1, there is shown an electrically driven tractor including a chassis or platform member 10 to the underside of which is secured a front wheel assembly 11, a steering assembly 12, and a rear wheel assembly 13. Shown attached to the upper side of the chassis member are a pair of rigid members 14 and 15 of generally rectangular outline. Member 14 is attached to a central region on the chassis member 10 and member 15 is attached adjacent the front end of the chassis member. Side panels 16 are provided connected between the rigid members 14 and 15 and a hood member 18 pivotally mounted about the front rigid member 15 to provide a compartment for the inclusion of storage batteries and electrical components of the tractor. Spaced from the centrally

located rigid member 14 is a rear compartment member 19 in which batteries are located. The member 19 is provided with a lid member 20 hinged on the rear side thereof. A seat 21 is secured to the lid member 20. Foot rests 22 are attached to each side of the chassis member 10 adjacent the open space between the forward and rear compartment of the tractor. A fender member 23 is attached on each side to the rear compartment member 19 and an adjacent foot rest member 22.

Reference is now made particularly to FIG. 2 which shows the tractor of FIG. 1 with the wheels, fenders and rear compartment assembly removed and also shows the side panel members 16 and the hood 18 of the front compartment member removed along with all of the electrical circuit elements of the tractor. The chassis member is shown in solid outline and portions of members secured to the underside thereof are indicated in dotted outline. The chassis member 10 is formed from a sheet of material, such as steel, of the desired thickness and includes an upper planar portion 30 of rectangular outline, a pair of side planar portions 31 and 32 of elongated rectangular outline and a pair of lower planar portions 33 and 34 of elongated rectangular outline. See FIG. 5 for a cross-sectional view of the chassis member 10. The long sides or edges of all of the portions 30–34 are parallel. The side planar portion 31 extends orthogonally downward from one long side 35 of the upper planar portion 30 and the other side planar portion 32 extends orthogonally downward from the other long side 36 of the other planar portion 30. The lower planar portion 33 extends orthogonally inward from the lower side of the side portion 31 and the lower planar portion 34 extends orthogonally inward from the other lower side portion 32. As shown, the short sides of the planar portions 31 and 32 and the short side of the lower planar portions 33 and 34 are substantially smaller in width than the short side of the upper planar portion 30 as can be clearly seen from the end views of FIG. 4 and FIG. 5. As shown, the width of each of the side portions 31 and 32 are equal and also larger than the width of the lower planar portions 33 and 34, although it does not necessarily have to be so. However, such proportioning is advantageous for reasons such as undercarriage member attachment and accessory attachment. Such a chassis member is easy to fabricate from an integral sheet of material, has a high load carrying capacity and is rugged. The chassis member configuration enables easy, flexible and secure attachment of undercarriage elements as well as upper body elements thereto. Such structure has additional advantages which will be pointed out below.

A front wheel assembly support is provided near the front end of the chassis member. The support is in the form of a pair of identical cross bars 40 and 41 as can be seen in FIG. 3. In cross section the cross bars 40 and 41 have respective flat sections 42 and 43 which are secured to the lower planar portions 33 and 34 at the ends thereof and have respective flat portions 44 and 45 extending orthogonally to the first mentioned portions thereof. The orthogonal downward extending portions 44 and 45 are closely spaced as can be seen in the sectional view of FIG. 3. Each of the cross bars 40 and 41 has an aperture located therein for retention of a shaft 46 secured thereto for the support of the front wheel assembly member 11. The front wheel assembly comprises a cast support 51 member having a centrally located bearing surface 52 which is supported on the aforementioned shaft 46 and has a pair of arms 53 and 54 at the end of each of which is located respective knuckle shaped pins 55 and 55*a*, each having a vertically extending shaft and a horizontally extending shaft, the vertically extending shaft being supported in the arm and the horizontal extending shaft adapted to receive the bearing surface of a wheel. A tab 56 is secured to knuckle 55 and one end of a tie rod 57 is connected to the tab 56 through a ball or rotatable joint. Similarly, tab 56*a* is secured to knuckle 55*a* and one end of the tie rod 57*a* is connected to the tab 56*a* through a ball or rotatable joint. Plate 58 is secured to the lower steering shaft 59 and also to the rods 57 and 57*a* so as to move the tie rods in one direction and the other in response to rotation of the

lower steering shaft **59** in one rotational direction or the other. Steering shaft **59** is mounted with its axis horizontal and centrally located underneath the upper planar portion **30** and pivotally supported at each end by a bearing. The bearing **60** at one end is mounted to the upper planar portion and the bearing **61** at the other end is mounted to cross bar **41** as shown in FIG. **3**. Mounted and rigidly secured on the lower steering shaft **59** at the end opposite from the end to which the plate member is secured is secured a sector gear **62** which meshes with a beveled gear **63** secured to one end of an upper steering shaft **64**. The lower end of the steering shaft **64** is supported in a bearing **65** surface mounted to the upper planar portion **30**.

A rear wheel assembly member **13** having a housing element and a pair of aligned axial elements **72** and **73** rotatably mounted in the housing is provided. The axial elements **72** and **73** are adapted to receive and have secured thereto rear drive wheels. On each side of a housing element **71** adjacent a respective axial element is located a pad or flange **74**. A mating pad or flange **75** is provided on the side and lower planar portions of the chassis member **10** and holes are provided therein for receiving bolts **76** to connect the flanges **74** and **75** together and hence connect the rear wheel assembly **71** to the chassis member **10**. Additionally, flange members may be provided for securing the rear wheel assembly **13** to the upper planar portion **30**. Securing the front wheel assembly **11** and the rear wheel assembly **13** crosswise as indicated provides a particularly rugged, bend and twist resisting structure for the support of the undercarriage and the upper body elements of the tractor. The rear wheel assembly member **13** shown may be a transaxle member such as are commercially available, for example Model 2300 transaxle from Peerless Machine and Gear Company, a division of Tecumseh Products Company of Clinton, Michigan. Such transaxle member provides not only the drive gearing from a driven shaft **76***a* to the rear axle but also provides differential gearing as well as different gear ratios, that is, shift capability as indicated by the gear shift lever **77**. Also attached to the underside of the chassis member **10** by means of clamp **66** is an electric motor **80**. Belting from a pulley on the drive motor **80** to a pulley on the drive shaft **76***a* of the assembly **13** provides power coupling from the motor **80** to the assembly **13**. The assembly **13** is provided with another shaft **78** coupled to the power transmission gear chain thereof for the attachment of a disk **79** upon which clamping action may be provided by the brake member **81** in response to the actuation of the brake pedal or lever **82** which is connected thereto by the rod **83**. Actuation of the brake pedal **82** effects a clamping action of a pair of friction surfaces on the disk **79** to effect braking action. As shown, the brake assembly may be conveniently attached to the side planar portion **32** of the chassis member **10**.

A rigid member **14** preferably of cast construction, for example aluminum, of generally rectangular outline is secured to a central region of the top side of the upper plane portion **30** of the chassis member. The width of the rigid member **14** is comparable to but less than the width of the chassis member **10** and each of the sides **91** and **92** have appreciable widths in the general direction of the long side of the upper planar portion **30**, that is extending from the forward to the rearward direction. As shown, the lower side portion **93** is secured to the upper planar portion **30** by means of bolts. The side portions **91** and **92** are contoured to have increasing width along the upper portion thereof. The upper side portion provides a dashboard **95** and a hood portion **96** on which switches, levers, meters and other control elements may be located. Also provided in the upper complex side portion **94** is a bearing element **97** for securing the upper portion of the upper steering shaft **64**. A collar **98** fastened to the shaft **64** secures the shaft from upward axial movement.

Located near the front of the upper planar portion **30** on the chassis member is a second rigid member **15** which forms the front end of the tractor as well as the front end of the front battery compartment. The rigid member **15** is of generally rectangular outline and is secured to the top side of the upper planar portion **30** by means of bolts (not shown). The width of the rigid member **15** is made comparable but less than the width of the aforementioned rigid member **14**. As shown and indicated in FIG. **1**, side plates **16** are secured to the rigid members **14** and **15** on each side thereof and a hood member **18** is provided to form a compartment for the inclusion of batteries and other electrical components used in the tractor. The rigid members **14** and **15** which are preferably of cast metallic material such as aluminum provide additional structural ruggedness to the tractor as well as providing useful structure for support of electrical and mechanical components of the tractor.

Referring now to FIGS. **4** and **5**, the chassis member is shown with upper planar portion **30**, the side planar portions **31** and **32** and the lower planar portions **33** and **34**. Integral with the upper planar portion **30** is a portion **105** which is folded back to form an end seal and is further folded to provide a pair of channel openings **106** and **107**, one on each side. Tabs **108** and **109** integral with portion **105** are folded upward parallel to portions **31** and **32**, respectively, and each are welded to adjacent lower planar portions and to upper planar portion. A mating prong member may be inserted into each of the openings **106** and **107** formed. Such prong members may be connected by a cross bar to which in turn may be attached accessory apparatus. Thus, the structure provides a means for facilitating attachment of accessories either on a permanent attached basis or on a removable basis thereto.

In FIG. **2** there is shown a pair of prong members **67** and **68** each in elongated form welded to the chassis member **10**. Prong **67** element is spaced from an adjacent side planar portion **31** of the chassis member to form a channel **67***a* therewith and is welded to upper planar portion **30** and lower planar portion **33**. Similarly, prong element **68** is spaced from an adjacent side planar portion **32** of the chassis member to form a channel **68***a* therewith and is welded to upper planar portion **30** and lower planar portion **34**. Slots **67***b* and **68***b* are provided in the ends of the base member **110**. Slot **67***b* registers with channel **67***a* and slot **68***b* registers with channel **68***a*. Accordingly, other attachments including appropriate prong elements may be detachably mated with the chassis member.

While the invention has been described in a specific embodiment, it will be appreciated that many modifications may be made by those skilled in the art and we intend by the appended claims to cover all such modifications and changes as fall within the true spirit and scope of the invention.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. In a powered traction vehicle wherein a front wheel assembly is pivotally mounted to a support member which is secured to a chassis, and the housing of a rear wheel assembly is secured to said chassis, said chassis comprising:

a. an upper planar portion of elongated rectangular outline;

b. a pair of side planar portions of elongated rectangular outline, each of said side planar portions extending orthogonally downward from a respective long side of said upper planar portion;

c. a pair of lower planar portions of elongated rectangular outline, each of said lower planar portions extending orthogonally inward from the lower side of a respective side portion, the short sides of said side planar portions and said lower planar portions being substantially smaller than the short side of said upper planar portion;

d. each of said portions being integral with one another, and the long sides of said portions being parallel to one another;

e. a pair of elongated planar elements extending inwardly into said chassis from at least one end thereof parallel to said side planar portions, each of said elements being rigidly secured to said upper planar portion and one of said lower planar portions and spaced from said side planar portion to provide a channel adapted to receive a mating prong member, the pair of channels thus formed

at the end of said chassis providing means for facilitating attachment of accessories apparatus comprising a pair of mating prongs;

f. an end seal member comprising a planar portion of substantially elongated rectangular outline secured to said planar elements and extending orthogonally downward from a short side of said upper planar portion, said end member exhibiting a pair of channel openings, each of said openings registering with one of said pair of channels;

g. said support member extending substantially in a direction parallel to a short side of said upper planar portion and secured at each end thereof to said chassis near a short side of said upper planar portion, and

h. said housing element being secured at each side thereof to said chassis.

2. The combination of claim 1 wherein said end seal member and said elongated planar elements are constituted of folded portions integral with said upper planar portion.

3. An electrically propelled tractor comprising the combination of claim 1 wherein a first rigid member of generally rectangular outline is transversely secured to the top side of said upper planar portion in a central region thereof, the width of said first rigid member being less than the width of said upper portion, and bearing means in the side of said first rigid member opposite the side secured to said upper planar portion for supporting the upper portion of a steering shaft, a second rigid member of generally rectangular outline transversely secured to the top side of said upper planar portion adjacent the short side thereof near the said support member, the width of said second rigid member being comparable to the width of said first rigid member, means including said upper planar portion and said rigid members for providing a battery compartment for said vehicle.

4. The combination of claim 3 in which an electric drive motor is provided mounted to the under side of said upper portion and mechanically coupled to the axles of said rear wheel assembly.

5. The combination of claim 3 in which said rigid members are castings.

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