A foldable trailer attachable to a vehicle, particularly an ATV, for hauling a load. The trailer includes a hitch assembly for attachment to the vehicle, a first bed rotatably attached to the hitch assembly, and a second bed rotatably attached to the first bed by a unique hinge. The trailer can be tightly folded and carried by the ATV so that the trailer can be brought through otherwise inaccessible terrain. Moreover, when in the folded position, a rear rail of the trailer can be opened to carry articles. When the trailer is deployed, the first bed is coplanar with the second bed to provide an enlarged area for holding articles. The hinge, joining the first bed to the second bed, allows the trailer to support a significant load.
ATV FOLDING MULTI-PURPOSE TRAILER

FIELD OF THE INVENTION

BACKGROUND OF THE INVENTION

SUMMARY OF THE INVENTION

The present invention provides an apparatus for a trailer towable by an ATV, riding lawn mower and/or an automobile, capable of supporting a heavy load over rough terrain, tightly foldable against an ATV, of a simplistic design and has multiple functions. The trailer includes a hitch assembly pivotally connected to a front bed which is pivotally connected to a rear bed by a novel hinge.

The present invention is directed towards a trailer having a first bed and a second bed rotatably attached to together. A hitch assembly is rotatably attached to the first bed and is provided with coupling means to attach to a vehicle. The trailer is foldable while attached to the vehicle by having the first bed rotate in a first direction and the second bed rotate in an opposing second direction such that the trailer is folded and supported above the ground by the vehicle. Rotation between the first and second beds is accomplished by a hinge. Actually, the trailer can include a first rail pivotally attached to the first bed and a second rail pivotally attached to the second bed. The second rail can be rotated generally perpendicular to the second bed while the trailer is folded and coupled to the vehicle.

In the broadest sense, the present invention is also directed towards a trailer towable by a vehicle in which the
trailer includes a first pivot means rotatably attaching a bed to a hitch assembly, and a second pivot means rotatably attaching the first bed to a second bed. The trailer is configured to be folded while attached to, and supported by, the vehicle by having the first bed rotated in a first direction and the second bed rotated in an opposed direction while the hitch assembly remains coupled to the vehicle. Optionally, the second pivoting means comprises a lateral member and a plurality of longitudinal members attached to the first bed, and a lateral beam with a plurality of longitudinal beams attached to the second bed. When the trailer is in the deployed position, the second pivoting means provides substantial load bearing capability for the trailer by having the lateral beam abut the longitudinal and lateral members. In a further option, a first rail is rotatably attached to the first bed, and a second rail is rotatably attached to a second bed. The second rail can be rotated generally perpendicular to the second bed while said trailer is folded and coupled to the vehicle.

In the broadest sense, the present invention is also directed to a hinge for supporting a heavy load comprising a lateral member, a plurality of longitudinal members attached to the lateral member and extending therefrom, a plurality of longitudinal beams pivotally connected to the plurality of longitudinal members, and a lateral beam attached to the longitudinal beams. When the hinge is in the supporting position, the lateral beam engages the lateral and longitudinal members to bear a significant load.

OBJECTS OF THE INVENTION

The principal object of the present invention is to provide a trailer coupleable to an ATV.

Another object of this invention is to provide a trailer having a substantial load capacity.

Another object of this invention is to provide a trailer that is foldable.

Another object of this invention is to provide a trailer that is carryable, when in a folded position, by an ATV.

Another object of this invention is to provide a trailer that does not need disassembly to place the trailer in the folded position.

Another object of this invention is to provide a trailer that can carry articles while folded and hitched to an ATV.

Another object of this invention is to provide a trailer that is usable as a hand truck.

Another object of this invention is to provide a trailer that can be stored in a small space.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other objects will become more readily apparent by referring to the following detailed description and the appended drawings in which:

FIG. 1 is a perspective view of the invented trailer, in the deployed position, coupled to an ATV;

FIG. 2 is a perspective view of the trailer stand;

FIG. 3 is a perspective view of the trailer in the stowed position;

FIG. 4 is a perspective view of the trailer hitch;

FIG. 5 is a perspective view of the central hinge of the trailer;

FIG. 6 is a top view of the trailer;

FIG. 7 is a bottom view of the trailer;

FIG. 8 is a front view of the trailer;

FIG. 9 is a rear view of the trailer;

FIG. 10 is a left side view of the trailer; and

FIG. 11 is a side view of the trailer in the folder position and coupled to an ATV.

DETAILED DESCRIPTION

The present invention is a trailer coupleable to a vehicle such as an ATV, riding law mower and automobile. When deployed, the invented trailer is capable of supporting a heavy load by use of a novel hinge. The trailer can also be folded, while remaining hitched to the vehicle, to facilitate egress through rough terrain.

Referring to FIG. 1, the trailer 10 is shown in deployed position coupled to an ATV 12. The trailer 10 generally includes a front bed 14, a hitch assembly 16 pivotally connected to the front bed 14 and extending forward for attachment to the ATV 12, and a rear bed 18 pivotally attached to the rear of the front bed 14.

The front bed 14 is comprised of a substantially rectangular frame and a floor 20 affixed to the frame. Preferably the frame is made of tubular, square-shaped steel members, although other materials and configurations can be used. Referring to the bottom view of FIG. 7, the frame perimeter is formed of a laterally oriented fore and rear members 22, 24 which are joined by a pair of parallel longitudinal side members 26. A pair of parallel center members 28, laterally spaced apart from the longitudinal center-line of the front bed 14, also join the fore and rear members 22, 24.

The frame members are interconnected in an overlapping manner which allows the trailer 10 to fold while providing a durable and strong structure. Specifically, the fore and rear members 22, 24 are secured to the top surface of the side and center members 26, 28. The terminal ends 30 of the fore member 22 extend a sufficient distance beyond the side members 26, such as one to three inches, to serve as an abutment surface against which a rotatable front rail 32 (see also FIG. 1) is stopped when placed in the upright position. The terminal ends 34 of the rear member 24 extend a sufficient distance beyond the side members 26, such as one to three inches, to serve as part of a central hinge 40, described in detail below.

The proximal ends 42 of the center members 28 extend forwardly several inches past the fore member 22 to which the hitch assembly 16 attaches. The distal ends 44 of the center members 28, along with distal ends 46 of the side members 26, extend equidistantly rearward a sufficient distance, such as one to three inches, past the rear member 24 to form a front part of the center hinge 40.
The front floor 20, positioned between the fore and rear members 22, 24, is affixed to the top surface of the side and center members 26, 28 to provide a surface for supporting items being hauled. The floor 20 can be of a meshed or solid configuration, and constructed from a variety of materials such as, for example, wire, nylon, polyester, plastic and sheet metal. Preferably, the floor 20 will be metal with small openings 50 formed therein. The rigid metal floor 20 can support heavy loads without substantial deflection, which could otherwise reduce ground clearance and result in damage. The openings 50 reduce overall trailer 10 weight, and are sized to avoid carried items from falling therethrough while allowing water or other fluids to drain.

Referring to FIGS. 1 and 10, the front rail 32 is pivotally attached to the side members 26 for selective rotation between a closed position against the front floor 20 and an upright position used when hauling items. The front rail 32 includes a laterally oriented cross member 52 to which is affixed, at opposed ends, a pair of parallel side-rail members 54. The lower ends of the side-rail members 54 are rotatably attached to the outer surface of the respective side members 26 by any standard pivot 56. The pivot 56 is positioned slightly rearward of the fore member 22 so that when the front rail 32 is rotated ninety degrees upright, the side-rail members 54 engage the fore member 22 to hold the front rail 32 in the upright position.

Furthermore, the side-rail members 54 are attached to the rear surface of the cross member 52 to offset the cross member 52 so that when in the closed position, the side-rail members 54 and side members 26 are coplanar so that front rail 32 rest flat against the trailer front floor 20 (see FIG. 3).

The pivot 56 can be any suitable pivot. For example, but not to be construed as limiting, an opening can be provided through the lower end of each side-rail member 54 which coaxially aligns with an opening in each side member 26. Each pair of coaxially aligned openings is configured to receive a pivot shaft therethrough. The pivot shaft can be held in place by any known means such as retaining rings, or a complementary threaded nut. A nylon washer is disposed between the side-rail members 54 and the side members 26 to allow the side-rail members 54 to be manually rotated. Moreover, friction between the side-rail members 54 and respective washer maintain the front rail 32 in position, upright or closed, until overcome by manual force from an operator. The pivot shaft can additionally be provided with suitable bearings, such as a flange sleeve bearing.

As shown in FIG. 8, the front rail 32 is provided with a covering surface 60. Any of the alternatives described for the front floor 20 are applicable to the front rail surface 60. However, a netted configuration (see FIG. 1) of nylon is preferred for weight considerations.

Referring to FIG. 4, the hitch assembly 16 is pivotally attached to the proximal ends 42 of the center members 28. The hitch assembly 16 includes a longitudinally oriented tow bar 62 to which is attached a handle 64 and a coupling mechanism 66. The tow bar 62 can be made of one, or a plurality of members as shown, with its distal end rotatable attached between the center members proximal ends 42.

To pivotally attach the tow bar 62 to the center members 28, first and second openings are provided through the center members proximal ends 42 which coaxially align with first and second openings provided through the tow bar 62. First and second pins 70, 72 or other suitable means, are received therein a set of first and second openings, respectively. The pins 70, 72 are preferably held in position by a retaining ring, bolt or spring loaded detent. When both pins 70, 72 are positioned in the respective openings, the hitch assembly 16 is in fixed relationship with the front bed 14. When only the second pin 72 is positioned, the pin 72 acts as a pivot and provides a rotatable joint between the hitch assembly 16 and the front bed 14. If desired, the hitch assembly 16 can be removed from the front bed 14 by removing both pins 70, 72.

The handle 64 is laterally oriented across the tow bar 62 and suitably extends to allow an operator to grasp. The handle 64 facilitates the use of the trailer 10 as a hand truck.

The coupling mechanism 66 is removably secured to the proximal end of the tow bar 62 by a plurality of bolts or other suitable means. The coupling mechanism 66 has a standard configuration which includes a socket 76 for receiving a ball from a vehicle's, riding lawn mower's or ATV's hitch and a latch 78 for securely coupling the ball and socket 76. A vertical opening 84 is also provided through the proximal end of the tow bar 62 for receiving a pin for attachment to riding lawn mowers which utilizes a pin and hole type hitch instead of a ball and socket assembly.

As illustrated in FIG. 7, the rear bed 18 has a generally rectangular frame and includes a laterally oriented fore member 90 to which is affixed a pair of parallel, rearward extending side members 92 and a pair of parallel, rearward extending center members 96. The side members 92 are affixed at opposed ends of the fore member 90 and the center members 96 are preferably juxtaposed and adjacent to a midpoint of the fore member 90. Each of the side and center members 92, 96 are attached to the bottom surface of the fore member 90. A rear member 98 laterally extends across, and is attached to the top surfaces, of the side and center members 92, 96. Preferably the frame members are tubular, square-shaped steel, although other materials and configurations can be used.

The rear bed 18 is provided with a floor 100. The rear floor 100 is positioned between the fore and rear members 90, 98, and is affixed to the top surface of the side and center members 92, 96, to provide a surface for supporting items being hauled. As illustrated in FIG. 6, two sections 102 of the rear bed floor 100 is cut-away to allow a rear rail 104 to close. Another pair of cutouts 106 is provided in the rear floor 100 to correspond with the distal ends 46 of the front side members 26 so that the side members 26 do not interfere with the rear floor 100 when folding the trailer 10. The rear floor 100 is made of the same materials as described for the front floor 20.

Referring to FIG. 6 in conjunction with FIG. 9, the rear rail 104 is pivotally attached to the side members 92 for selective rotation between a closed position against rear floor 100 and an upright position used when hauling items. The rear rail 104 includes a laterally oriented cross member 106 to which is affixed, at opposed ends, a pair of parallel side-rail members 108. The proximal ends of the side-rail members 108 are rotatably attached to the inner surface of the respective side members by a standard pivot 110, con-
The side-rail members 108 are attached to the front surface of the cross member 106, offsetting the cross member 106 so that when the rear rail 104 is in the closed position, the side-rail and side members 108, 92 are in a common plane and the rail surface 112 rests against the trailer floor 100. When closing the rear rail 104, the side-rail members 108 pass into the cutaway sections 102 to facilitate the generally flat positioning of the rear rail 104.

When the rear rail 104 is in the ninety-degree upright position, the side-rails 108 about the rear member 98, restricting the rear rail 104 from extending past the upright position.

Referred to FIGS. 7 and 9, an axle assembly is secured to the underside, distal end, of the rear bed 18. Any suitable axle assembly may be used, such as the illustrated assembly 120 which includes at least one transverse member 122 affixed to the rear center and side members 96, 92 and extends outwardly beyond the rear side members 92. A plurality of transverse members can be used to provide additional strength as necessary. Axles 124 extends from the transverse member 122 to which wheels 126 are attached.

Optionally, side rails 130 can be provided, as shown in FIG. 10. A variety of side rails are suitable for use with the trailer 10. The illustrated embodiment shows each side rail 130 formed of a first member 132 removably attached to the front rail 32 and a second member 134 removably attached to the rear rail 104. The two members 132, 134 are joined together by any suitable means 140, such as a pair of bolts secured by screws, rods held by pins, or rods with spring loaded detents.

As another example, the side rails could each be a single member removably joined to the front and rear rails. As a further example, the side rails could include a cross member to which is affixed at opposed ends downward extending side-rails which terminate as prongs. Openings provided through the front and rear side members receive the prongs for removably holding the side-rails in place. These further alternatives are not illustrated in the drawings.

Each of the alternative side rails may be provided covering side wall. Preferably, for weight considerations, the side wall is a nylon netting which ties to the side-rails and the corresponding side members.

The hinge 40, detailed in FIG. 5, rotatably joins the first and second beds 14, 18. Although several known configurations of hinges may be used to allow the trailer 10 to fold, the preferred hinge 40 provides simplistic folding and significant load bearing capability. The front portion 150 of the hinge 40 is formed of the front member 24 and the distal ends 46, 44 of the side and center members 26, 28 of the front bed 14. The rear hinge portion 152 comprises the fore member 90 and the proximal ends of the side and center members 92, 96 of the rear bed 18.

Referring to FIG. 7, the front and rear hinge portions 150, 152 are rotatably attached together by having the front hinge side members 26 disposed adjacent to the respective rear hinge side members 92 and joined by a pivot 160. Likewise, the front hinge center members 28 are disposed adjacent to the front hinge center members 96 and joined by a pivot 162. Each pivot 160, 162 can be any suitable pivot, but preferably includes coaxial openings formed through the adjacent members for receiving a pivot shaft. The pivot shafts can be held in place by any known means, such as retaining rings or a complementary threaded nut.

When the trailer 10 is fully deployed for carrying a load, opposing faces of the front hinge rear member 24 and the rear hinge fore member 90 engage in compression. Additionally, the bottom surface of the rear hinge fore member 90 engages in compression with the upper surface of the front hinge side and center members 26, 28. This configuration provides the hinge 40 with excellent load bearing capability. For example, when the members are 1 square, grade thirty-six, tubular steel, the hinge 40 supports a load of at least 800 lbs. When made of grade forty-six tubular steel, the hinge 40 supports a load of at least 1000 lbs. To keep the hinge 40 locked in the deployed position, a removable pin 166 is inserted through coaxial openings in the front bed rear member 24 and the rear bed fore member 90.

As shown in FIG. 2, the trailer 10 can optionally be provided with a stand 170 to hold the front end of the trailer 10 above the ground when detached from the ATV 12. As detailed in FIG. 2, the stand 170 includes a cross member 172 and a pair of legs 174 extending from opposed ends of the cross member 172. The stand 170 is rotatably attached to the front bed center members 28 by a suitable pivot 176 to allow selective positioning between a closed position (shown in stipple) and an open position to support the trailer 10. To open, the legs 174 are rotated ninety degrees downwards until the cross member 172 abuts the front bed 14 center members 28. A pin or other suitable member can be used to lock the stand 170 in the closed or open position.

Referring to FIG. 1, in operation, the deployed trailer 10 can be hitched to a vehicle, such as an automobile, ATV or lawn mower. When attached to a automobile, the trailer 10 would be adapted to comply with state and federal regulations pertaining to high speed tires, break lights, and the like, and could be sized to carry an ATV. When used off-road, the unique hinge 40 allows the deployed trailer 10 to carry a significant load over rough terrain.

In regards to FIG. 11, the trailer 10 in folded position remains coupled to the ATV 12 by the hitch assembly 16. In this position, the trailer 10 is suspended above the ground, tightly folded near or against the ATV 12. When folded, the trailer 10 has a width less than the diameter of the tires 126, and does not impede the ATV 12 from advancing through difficult terrain.

Referring to FIG. 10, to fold the trailer 10, the side rails 130 are disconnected and the front and rear rails 32, 104 are rotated to a closed position. Then the first pin 70 is removed from the tow bar 62 and the pin 166 securing the hinge 40 is removed. As shown in FIG. 11, the front bed 14 is rotated about the second hitch assembly pin 72 to an upward, generally vertical orientation. Optionally, the front bed 14 can be rotated until the bed 14 abuts a rack attached to the ATV 12, and in particular, the rear rail 24 rests upon a rack (this position is not illustrated). In this position, the rack serves to provide lateral support and impedes further forward rotation of the front bed 14.
Simultaneously, the rear bed 18 will rotate about the hinge 40 to a downward, generally vertical orientation. The trailer 10, now folded and carried by the ATV 12, is tethed by a bungee cord 180, or the like, to keep the trailer 10 for inadvertently unfolding, as illustrated in FIG. 11. Optionally, an apparatus such as a holding latch (not shown) can be provided on the ATV 12 to hold the trailer 10 to the ATV or ATV rack.

When the trailer 10 is in the folded position, attached to the ATV 12, the rear rail 104 can be rotated ninety degrees open to a generally horizontal position to carry supplies. This feature allows gear to be easily carried to a destination site while the trailer 10 remains folded for egress through difficult terrain.

The trailer 10 can also be coupled to a riding lawn mower which uses a pin and hole type hitch. First, the coupling mechanism 66 (FIG. 4) is removed to expose the vertical opening 84 formed through the tow bar 62. Thereafter, the opening 84 is aligned with holes in a lawn mower hitch and a pin is inserted therein.

The trailer 10 can also be used as a hand cart, as shown in FIG. 3. The deployed trailer 10 is detached from the ATV. The trailer 10 is placed into an upright position with the hitch assembly 16 at the top and the rear rail 104 at the bottom. The operator loads articles onto the rear rail 104, then grasps the handle 64 to tilt and maneuver the trailer 10.

Furthermore, the trailer 10 is easily stored in the retracted or deployed position. When in the deployed position, the trailer 10 is self-standing by having three points of contact with the ground in triangular relationship: the tires 126 and the rear member 98 of the rear bed 18.

Preferably the members are tubular, elongate and constructed of metal. However, other materials can be used such as plastic or PVC. Additionally, the members are not limited as tubular and may be solid or U-shaped, for example. Moreover, the members can be secured together by any known manner such as, for example, welding, rivets, bolts and adhesive. Bolting the various components together is found to be advantageous in the trailer can be fully disassembled for shipping and that damaged parts are easily replaced.

Furthermore, the number of members may be changed. For example, where a single member is illustrated in the drawings, a plurality of members can be used. Conversely, where a plurality of adjacent members are shown, a single member can be used.

SUMMARY OF THE ACHIEVEMENT OF THE OBJECTS OF THE INVENTION

From the foregoing, it is readily apparent that I have invented an improved trailer for attachment to a vehicle and for hauling articles.

It is also apparent that the trailer tightly folds to the vehicle when closed and has a simplistic design.

It is further apparent the trailer has an improved hinge capable of supporting great weight when the trailer is in the deployed position.

It is to be understood that the foregoing description and specific embodiments are merely illustrative of the best mode of the invention and the principles thereof, and that various modifications and additions may be made to the apparatus by those skilled in the art, without departing from the spirit and scope of this invention, which is therefore understood to be limited only by the scope of the appended claims.

What is claimed is:

1. A trailer for towing behind a vehicle, said trailer comprising:
   a first bed;
   a hitch assembly rotatably attached to said first bed, wherein said hitch assembly is provided with means for coupling to the vehicle;
   a second bed rotatably attached to said first bed; and
   wherein said first bed is adapted to rotate in a first direction and said second bed is adapted to rotate in a second direction, such that said trailer can be folded and supported above the ground by the vehicle while said hitch assembly remains coupled to the vehicle.

2. The trailer according to claim 1 further including a first hinge rotatably attaching said hitch assembly to said first bed, and a second hinge rotatably attaching said first bed to said second bed.

3. The trailer according to claim 2 further including a first rail pivotally connected to said first bed.

4. The trailer according to claim 3 further including a second rail pivotally connected to said second bed, wherein said second rail can be rotated generally perpendicular to said second bed while said trailer is folded and coupled to the vehicle.

5. The trailer according to claim 2 wherein said first bed comprises:
   a fore member;
   a pair of spaced apart side members attached to said fore member;
   a center member disposed between said side members and attached to said fore member; and
   a rear member attached to said side members and to said center member.

6. The trailer according to claim 5 wherein said rear member comprises:
   a fore beam;
   a pair of spaced apart side beams;
   a center beam disposed between said side beams and attached to said fore beam; and
   a rear bar attached to said side beams and to said center beam.

7. The trailer according to claim 6 wherein said side members are pivotally attached to said side beams.

8. The trailer according to claim 7 wherein said center member is pivotally attached to said center beam.

9. The trailer according to claim 8 wherein said fore beam abuts said side members when said trailer is in a deployed position.

10. The trailer according to claim 9 wherein said fore beam abuts said center member when said trailer is in the deployed position.
11. The trailer according to claim 10 wherein said fore beam abuts said rear member when said trailer is in the deployed position.

12. The trailer according to claim 2 further including a first floor attached to said first bed and a second floor attached to said second floor.

13. The trailer according to claim 12 wherein said first and second floors are rigid.

14. A trailer for towing behind a vehicle, said trailer comprising:

   a hitch assembly;
   a first means for attaching said hitch assembly to a vehicle;
   a first bed;
   a second means for pivotally attaching said first bed to said hitch assembly;
   a second bed;
   a third means for pivotally attaching said second bed to said first bed; and

wherein said first bed is adapted to rotate in a first direction and said second bed is adapted to rotate in a second direction, such that said trailer can be folded and supported above the ground by the vehicle while said hitch assembly remains coupled to the vehicle.

15. The trailer according to claim 14 further including a first rail rotatably attached to said first bed and a second rail rotatably attached to said second bed, wherein said second rail can be rotated generally perpendicular to said second bed while said trailer is folded and coupled to the vehicle.

16. The trailer according to claim 15 wherein said third pivoting means comprises a lateral member and a plurality of longitudinal members attached to said first bed; and a lateral beam and a plurality of longitudinal beams attached to said second bed.

17. The trailer according to claim 16 wherein said lateral beam abuts said longitudinal members when said trailer is in a deployed position to provide load bearing for said trailer.

18. The trailer according to claim 17 wherein said lateral beam abuts said lateral member when said trailer is in a deployed position to provide load bearing for said trailer.

19. The trailer according to claim 18 further including pivoting means for rotateably connecting said longitudinal members to said longitudinal beams.

20. A hinge for supporting a heavy load, said hinge comprising:

   a lateral member;
   a plurality of longitudinal members attached to said lateral member and extending therefrom;
   a plurality of longitudinal beams pivotally connected to said plurality of longitudinal members; and
   a lateral beam attached to said longitudinal beams and capable of engaging said lateral and longitudinal members when said hinge is in a supporting position.

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