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Firehose winding apparatus

Abstract

A portable mechanical firehose winder is described. The firehose winder comprises a foldable structure which can be stored and readily transported in a compact, stowed configuration, but can be unfolded in the field to place the firehose winder into a deployed configuration. The firehose winder has a winder mechanism having two pins for securing a firehose connector is mounted on a plate that can be rotated by hand with a crank arm. The firehose winder also has a firehose hold-down mechanism for holding down a firehose as it traverses the winder as well as an adjustable width mechanism for laterally guiding the firehose into the firehose winder mechanism.

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Background/Summary

BACKGROUND OF THE INVENTION

1. Field of the Invention

(1) The present invention relates in general to firehose winding apparatuses. More particularly, the invention is directed to portable firehose winding apparatuses capable of being folded into a compact, stowable configuration having an adjustable crank arm for reeling firehoses.

2. Description of the Related Art

(2) One of the tasks required of firefighters after a fire is extinguished is to roll up firehoses. In the past, without a hose winder, a firefighter was required to bend over and painstakingly roll up each hose while walking the roll further along. This is tiring and tough on the back. The general need for a hose winder, therefore, is to lessen the strain on a firefighter's back.

(3) There have been some hose winders to date, but the known winders break down into multiple, unwieldy parts and, therefore, are somewhat difficult to carry, deploy, and stow. A winder according to a preferred embodiment of the invention easily folds up and is carried, mounted, used, and stowed as a unit.

(4) Accordingly, a need exists for a firehose winder that easily folds up and is carried, mounted, used, and stowed as a unit.

SUMMARY OF THE INVENTION

(5) In the first aspect, a firehose winder is described. The firehose winder comprises an assembly comprising a tongue for connecting to a hitch of a vehicle, a riser hingeably connected to the tongue, a horizontal main stay tube hingeably connected to the riser, and a firehose winder mechanism attached to the horizontal main stay tube and configured to receive and wind a firehose. The tongue, the riser, and the horizontal main stay tube of the assembly are movable between a closed configuration for stowing the firehose winder and an open configuration where the horizontal main stay tube is reversibly locked and displaced vertically with respect to the tongue.

(6) In a first preferred embodiment, when the assembly is in the closed configuration, the riser is positioned immediately adjacent to and parallel with the tongue, and the horizontal main stay tube

is positioned immediately adjacent to and parallel with the riser. The firehose winder mechanism preferably further comprises a center mount plate attached to a shaft and positioned on a side of the horizontal main stay tube opposite a two-piece crank arm, two hose mount pins attached to and extending away from the center mount plate, the two hose mount pins configured to receive and wind the firehose, and an adjustable crank arm coupled to the center mount plate, wherein the handle may be moved away or towards an axis of the shaft. The firehose winder mechanism preferably comprises a shaft positioned through at least one hole formed in the horizontal main stay tube, a two-piece crank arm comprising a near portion and a far portion, near and far being used here in terms of radial distance from the shaft. The near portion is attached to the shaft where the length of the near portion is perpendicular to an axis of the shaft, the far portion is movably coupled to the near portion, and a handle is attached to a distal end of the far portion. The firehose winder mechanism preferably further comprises a center mount plate attached to the shaft and positioned on a side of the horizontal main stay tube opposite the two-piece crank arm, and two hose mount pins attached to and extending away from the center mount plate, the two hose mount pins configured to receive and wind the firehose. The firehose winder preferably further comprises a hold-down mechanism mounted on the horizontal main stay tube for applying a downward force on the firehose as the firehose is wound onto the firehose winder mechanism. The hold-down mechanism preferably comprises a lower slide hose hold-down coupled to the horizontal main stay tube, the lower slide hose down having a first length perpendicular to the horizontal main stay tube and a first curved contour formed perpendicular to the length of the lower slide hose hold-down, an arm rotatably coupled to the horizontal main stay tube, an upper slide hose hold-down rotatably coupled to the arm, the upper slide hose down having a second length perpendicular to the horizontal main stay tube and a second curved contour formed perpendicular to the length of the upper slide hose hold-down, and a spring coupling the horizontal main stay tube and the upper slide hose, the spring urging a downward force onto the firehose.

(7) The firehose winder preferably further comprising an adjustable width mechanism for aligning and guiding the firehose laterally as the firehose is wound onto the firehose winder mechanism. The adjustable width mechanism comprises a fixed hose guide, a hose sizer tube having a plurality of index holes, the hose sizer tube attached to and extending laterally away from the horizontal main stay tube, a guide slider movable coupled to the hose sizer tube, the guide slider having a retractable pin for engaging with the index holes, and a movable hose guide coupled to the guide slider. The firehose winder preferably further comprises a stow pin mount plate attached to the riser, the stow pin mount plate having a length extending perpendicular from a length of the riser, a first retractable pin connected to the stow pin mount plate, the first retractable pin configured to secure the horizontal main stay tube adjacent to the riser and a second retractable pin connected to the stow pin mount plate, the second retractable pin configured to secure the horizontal main stay tube adjacent to the tongue. The assembly preferably further configures a toggle clamp for removably locking the horizontal main stay tube in place when the assembly is in the open configuration.

(8) In a second aspect, a firehose winder is disclosed. The fire hose winder comprises an assembly comprising a tongue for connecting to a hitch of a vehicle, a riser hingeably connected to the tongue, a horizontal main stay tube hingeably connected to the riser, and a firehose winder mechanism attached to the horizontal main stay tube configured to receive and wind a firehose, the firehose winder mechanism having an adjustable crank arm where the handle may be moved relative to an axis of the shaft.

(9) In a second preferred embodiment, the tongue, the riser, and the horizontal main stay tube of the assembly are movable between a closed configuration for stowing the firehose winder and an open configuration where the horizontal main stay tube is reversibly locked and displaced vertically with respect to the tongue. When the assembly is in the closed configuration, the riser is positioned immediately adjacent to and parallel with the tongue, and the horizontal main stay tube is

positioned immediately adjacent to and parallel with the riser. The firehose winder preferably further comprises a hold-down mechanism mounted on the horizontal main stay tube for applying a downward force on the firehose as the firehose is wound onto the firehose winder mechanism. The hold-down mechanism preferably comprises a lower slide hose hold-down coupled to the horizontal main stay tube, the lower slide hose down having a first length perpendicular to the horizontal main stay tube and a first curved contour formed perpendicular to the length of the lower slide hose hold-down, an arm rotatably coupled to the horizontal main stay tube, an upper slide hose hold-down rotatably coupled to the arm, the upper slide hose down having a second length perpendicular to the horizontal main stay tube and a second curved contour formed perpendicular to the length of the upper slide hose hold-down, and a spring coupling the horizontal main stay tube and the upper slide hose, the spring urging a downward force onto the firehose.

(10) The firehose winder preferably further comprising an adjustable width mechanism for aligning and guiding the firehose as the firehose is wound onto the firehose winder mechanism. The adjustable width mechanism preferably comprises a fixed hose guide, a hose sizer tube having a plurality of index holes, the hose sizer tube attached to and extending laterally away from the horizontal main stay tube, a guide slider movable coupled to the hose sizer tube, the guide slider having a retractable pin for engaging with the index holes, and a movable hose guide coupled to the guide slider. The firehose winder preferably further comprises a stow pin mount plate attached to the riser, the stow pin mount plate having a length extending perpendicular from a length of the riser, a first retractable pin connected to the stow pin mount plate, the first retractable pin configured to secure the horizontal main stay tube adjacent to the riser, and a second retractable pin connected to the stow pin mount plate, the second retractable pin configured to secure the horizontal main stay tube adjacent to the tongue.

(11) In a third aspect, a firehose winder is disclosed. The firehose winder comprises an assembly comprising a tongue for connecting to a hitch of a vehicle, a riser hingeably connected to the tongue, a horizontal main stay tube hingeably connected to the riser, a firehose winder mechanism attached to the horizontal main stay tube and configured to receive and wind a firehose, and a hold-down mechanism mounted on the horizontal main stay tube for applying a downward force on the firehose as the firehose is wound onto the firehose winder mechanism.

(12) In a third preferred embodiment, the hold-down mechanism preferably comprises a lower slide hose hold-down coupled to the horizontal main stay tube, the lower slide hose down having a first length perpendicular to the horizontal main stay tube and a first curved contour formed perpendicular to the length of the lower slide hose hold-down, an arm rotatably coupled to the horizontal main stay tube, an upper slide hose hold-down rotatably coupled to the arm, the upper slide hose down having a second length perpendicular to the horizontal main stay tube and a second curved contour formed perpendicular to the length of the upper slide hose hold-down, and a spring coupling the horizontal main stay tube and the upper slide hose, the spring urging a downward force onto the firehose.

(13) These and other features and advantages of the invention will become more apparent with a description of preferred embodiments in reference to the associated drawings.

Description

DESCRIPTION OF THE DRAWINGS

(1) FIG. **1** is a side view of an exemplary firehose winder attached to a vehicle and prepared to roll up a firehose.

(2) FIG. **2** is a side view of an exemplary firehose winder rolling up the firehose.

(3) FIG. **3** is a side, perspective view of an exemplary firehose winder in a closed, stowable configuration in one or more embodiments.

(4) FIG. **4** is a side, perspective view of an exemplary firehose winder being placed into the open configuration, where the riser is rotated away from the tongue.
(5) FIG. **5** is a side, perspective view of an exemplary firehose winder being placed into the open configuration.
(6) FIG. **6** is a side, perspective view of the firehose winder where the adjustable crank arm is shortened or lengthened to provide greater speed or greater torque for winding the firehose.
(7) FIG. **6**A is an exploded perspective view of the near and far portions of the adjustable crank arm.
(8) FIG. **6**B is a sequence of perspective views showing how the far portion may be adjusted relative to the near portion to lengthen or shorten the crank arm as desired, and to direct the handle inward for compact storage and outward for use in winding a firehose.
(9) FIG. **7** is a side, perspective view of the firehose winder where the hold-down mechanism is positioned to accept a firehose.
(10) FIG. **8** is a side, perspective view of the firehose winder where the adjustable width mechanism is positioned to accept and guide a firehose.
(11) FIG. **9** is a closeup, side, perspective view showing details of the hold-down and the adjustable width adjustment mechanisms.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

(12) Firefighters provide crucial services to the communities in which they work. One of the many tasks required of firefighters is to roll up firehoses that were used while extinguishing a fire. Traditionally, a firefighter would lay out a firehose on the ground in a straight line, and then, starting at one end, roll the firehose by hand. This requires a firefighter to painstakingly roll up each hose while walking the roll further along. This is tiring and tough on the back. The general need for a hose winder, therefore, is to lessen strain on a firefighter's back. While there have been some mechanical hose winders to date, known winders break down into multiple, unwieldy parts and, therefore, are somewhat difficult to carry, deploy, and stow.
(13) A portable mechanical firehose winder is contemplated in one or more embodiments. The firehose winder comprises a foldable structure which can be stored and readily transported in a compact, stowed configuration that can be unfolded to place the firehose winder into a deployed configuration for use in the field. The firehose winder has a winder mechanism having two pins for securing a firehose connector. The two pins are mounted on a plate that can be rotated by hand with a crank arm. The firehose winder also has a firehose hold-down mechanism for slidably holding down a firehose as it traverses the winder toward the winder mechanism, as well as an adjustable width mechanism for accommodating firehoses of different width and for laterally guiding the firehose into the firehose winder mechanism.
(14) A firefighter may roll up a firehose by laying an end of the firehose over the hold-down mechanism through the adjustable width mechanism which can be adjusted to accommodate firehoses of varying widths. The firefighter places the firehose connector between the two pins of the winder mechanism and rotates a crank arm by hand which rotates the two pins and rolls up the firehose. In a preferred embodiment, the length of the crank arm is adjustable so that greater torque may be applied to heavier firehoses simply by extending the length of the crank arm.
(15) As used herein, the term “firehose” refers to high-pressure hoses which carry fluids such as water or other types of fire retardants which are designed to be stored flat to minimize the space required. The terms “vertical” and “horizontal” refer to the orientations of the firehose winder in the deployed configuration, where the term “vertical” refers to an upward direction away from the ground, and the term “horizontal” refers to an orientation generally parallel with the surface of the earth which is perpendicular to the vertical direction. The term “lateral” refers to a direction which is both perpendicular to the horizontal and vertical direction, such as the direction perpendicular to the length (i.e., the length of the horizontal main stay tube) in the same plane as the horizontal main stay tube. The term “substantially” may refer to imprecisions of orientation or alignment of

mechanical parts which would be expected as a result of typical mechanical and machining tolerances as well as the orientation affected by the slope and orientation of a vehicle to which mechanical parts are attached. Although embodiments described herein refer to firehoses, it shall be understood that firehose winder described herein may be used by other types of hoses.

(16) FIG. **1** is a side view of an exemplary firehose winder **101** attached to a vehicle **10** and prepared to roll up a firehose **50** in an open, deployed configuration. The firehose winder **101** comprises an assembly **105** comprising a tongue **110** for connecting to a hitch **20** of a vehicle **10**. One or more retractable spring-loaded pins **114** on the tongue **110** engage with holes formed on the trailer hitch **20**. The assembly **105** further comprises a riser **130** hingeably connected to the tongue **110** which elevates the firehose winding mechanism **153** to a convenient height for the user. The assembly **105** further comprises a horizontal main stay tube **150** hingeably connected to the riser **130**. In an embodiment, the tongue **110** is coupled to the riser **130** via a lower guard **120** which has a lower pivot **122** which allows the tongue **110** to rotate away from the riser **130**. Likewise, the horizontal main stay tube **150** is coupled to the riser **130** via an upper guard **140** which has an upper pivot **144** which allows the horizontal main stay tube **150** to rotate away from the riser **130**. A toggle clamp **142** releasably locks the horizontal main stay tube **150** in place when the firehose winder **101** is in an open, deployed configuration. A carrying handle **210** is provided for conveniently carrying the firehose winder **101** while in the closed, stowed configuration.

(17) A firehose winder mechanism **153** is attached to the horizontal main stay tube **150** and is configured to receive and wind a firehose **50**. The firehose winder mechanism **153** comprises a shaft **158** positioned through and movably affixed to at least one hole formed in the horizontal main stay tube **150**, a two-piece crank arm **159** attached to the shaft **158** where the length of the two-piece crank arm **159** is perpendicular to the axis of the shaft **158**, and a handle **168** attached to a distal end of the two-piece crank arm **159**. A center mount plate **154** is attached to the shaft **158** and is positioned on a side of the horizontal main stay tube **150** opposite that of the two-piece crank arm **159**. Two hose mount pins **156** are attached to and extends away from the center mount plate **154** where the two hose mount pins **156** are configured to receive and wind the firehose **50**.

(18) The hose mounts pins **156** are preferably eccentrically offset from the shaft **158**, as shown in FIG. **1**, to provide a central location for receiving the connector **60** at the end of the firehose **50**. In use, the firefighter typically winds up the male connector **60** in order to protect its external threads on the inside of the roll, the internal threads on the offsite-end female connector (not shown) being inherently protected by their internal location.

(19) A hold-down mechanism **180** is mounted on the horizontal main stay tube **150** for applying a downward force on the firehose **50** as the firehose **50** is wound onto the firehose winder mechanism **153**. An adjustable width mechanism **190** is also attached to the horizontal main stay tube **150** and is employed for aligning and guiding the firehose **50** laterally as the firehose **50** is wound onto the firehose winder mechanism **153**.

(20) A user in the field would open the assembly **105** by rotating the tongue **110** away from the riser **130**, and then by rotating the horizontal main stay tube **150** away from the riser **130**. The toggle clamp **142** is engaged to lock the horizontal main stay tube **150** in place. The tongue **110** is placed into and secured by a trailer hitch **20** attached to a vehicle **10** in an embodiment. The user would then retract the locking pin **114** of the tongue **110** and attached the assembly **105** into the trailer hitch **20** of the vehicle **10**. During attachment, the firefighter would retract the locking pin **114** of the tongue **110** with an internal spring-loaded rocker mechanism (not shown), insert the tongue **110** into the hitch **20** (aka “receiver”), and securely attach the assembly **105** to the trailer hitch **20** of the vehicle **10** when the spring-loaded locking pin **114** is aligned with and automatically presses outward into a corresponding hole (not shown) in the hitch **20**.

(21) A user would them place the connector **60** between the hose mount pins **156** and drape the firehose **50** alongside the length of the horizontal main stay tube **150** and through the hold-down mechanism **180** and the adjustable width mechanism **190**.

(22) As shown in FIG. **2**, the hold-down mechanism **180** is set to apply a downward force to the firehose **50** and the adjustable width mechanism **190** is adjusted to laterally guide the firehose **50** into the firehose winder mechanism **153**. The user then grabs onto the handle **168** and rotates the crank arm **159**, which, in turn rotates the shaft **158**, the hose center mount plate **154**, and the hose mount pins **156**, which rolls the firehose **50**. In an embodiment, the crank arm **159** is a two-piece crank arm **159** that is adjustable in length so that the distance between the handle **160** and the shaft **158** can be decreased to wind more rapidly when rolling lighter firehoses or increased to apply greater torque when rolling heavier firehoses. When the firehose **50** is fully wound, the user simply slips the firehose **50** off the hose mount pins **156** of the hose center mount plate **154**.
(23) FIGS. **3-5** are side, perspective views of the firehose winder **101** illustrating the firehose winder in a closed, stowable configuration **220** opening up to be placed in an open, deployable configuration **222** as shown in FIG. **5**. Specifically, the tongue **110**, the riser **130**, and the horizontal main stay tube **150** of the assembly **105** are movable between a closed configuration **220** for stowing the firehose winder **101** and an open configuration **222** where the horizontal main stay tube **150** is reversibly locked and displaced relative to the riser **130** so at to be substantially parallel with respect to the tongue **110**.
(24) FIG. **3** is a side, perspective view of an exemplary firehose winder **101** in a closed, stowable configuration **220** in one or more embodiments. When the assembly **105** is in the closed configuration **220**, the riser **130** is positioned immediately adjacent to and parallel with the tongue **110**, and the horizontal main stay tube **150** is positioned immediately adjacent to and parallel with the riser **130**. In an embodiment, a stow pin mount plate **134** having two retractable stow pins **136** are attached to the riser **130**. In the closed configuration **220**, the two retractable stow pins **136** engage with holes formed in the tongue **110** and the horizontal main stay tube **150** and releasably lock the assembly **105** in the closed configuration **220**. The user may open the assembly **105** by retracting the stow retractable pins **136** to release the tongue **110** and the horizontal main stay tube **150** from the riser **130**.
(25) FIG. **4** is a side, perspective view of an exemplary firehose winder **101** illustrating the first step in placing the assembly **105** into the open configuration, where the riser **130** is rotated away from the tongue **110**. As noted above, the user retracts the retractable stow pins **136**, and then rotates the tongue **110** away from the riser **130**.
(26) As shown in FIG. **5**, the user rotates the horizontal main stay tube **150** away from the riser **130**, and then releasably locks the horizontal main stay tube **150** in place by engaging the toggle clamp **142** to place the assembly **105** into the open, deployed configuration **222**. Attached to the horizontal main stay tube **150** are the firehose winder mechanism **153**, the hold-down mechanism **180**, and the adjustable width mechanism **190**.
(27) The firehose winder mechanism **153** is illustrated in FIGS. **5** and **6**. In an embodiment, the firehose winder mechanism **153** comprises a shaft **158** positioned through at least one hole formed in the horizontal main stay tube **150**. A two-piece crank arm **159** having a handle **168** is attached to the end of the two-piece crank arm **159** opposite from the axis **157** of the shaft **158**. The firehose winder mechanism **153** further comprises a center mount plate **154** attached to the shaft **158** and positioned on a side of the horizontal main stay tube **150** opposite that of the two-piece crank arm **159**. Two hose mount pins **156** are attached to and extend away from the center mount plate **154** where the two hose mount pins **156** are configured to receive and releasably secure the firehose **50**. The two hose mount pins **156** are positioned away from the axis **157** of the shaft **158**.
(28) As shown in FIG. **6**, the two-piece crank arm **159** comprises a near portion **160** and a far portion **162** where the near portion **160** is attached to the shaft **158** where the length of the near portion **160** is perpendicular to the axis **157** of the shaft **158**. The far portion **162** is movably coupled to the near portion **160** and has a handle **168**.
(29) In an embodiment, the near portion **160** is formed as a hollow rectangular tube which is dimensioned to receive the far portion **162** which also may be formed from a hollow rectangular

tube. In an embodiment, the far portion **162** has a plurality of indexing holes **164** along its length. The near portion **160** has a retractable pin **166** which is configured to engage with the indexing holes **164** formed in the outer portion **162**. As such, the user may adjust the length of the two-piece crank arm **159** by pulling on the retractable pin **166** on the near portion **160**, sliding the far portion **162** into a desired position relative to the near portion **160**, and then releasing the retractable pin **166** into one of the indexing holes **164** in the far portion **162** to secure the far portion **162** relative to the near portion **160**.

(30) Moreover, the far portion **162** is configured to be axially rotatable within the near portion **160** when the far portion **162** is fully extended from the near portion **160**. In an embodiment, as best shown in FIGS. **6**A and **6**B, the far portion **162** may have a circular tubular section **163** at the end of the rectangular tubular section (not separately numbered) which allows the user to rotate the far portion **162** relative to the near portion **160**.

(31) The two-piece crank arm **159** may be set up as follows. First, as shown in FIG. **5**, the user finds the handle **168** secured to the horizontal main stay tube **150** with a storage clip **170**. Second, the user disengages the two-piece crank arm **159** from the storage clip **170** by pulling out the retractable pin **166** and then extending the far portion **162** relative to the near portion **160** until the handle **168** is no longer retained by the storage clip **170**. Third, the user continues to pull the far portion **162** outward until its square profile is no longer inside of the near portion **160** and it can be rotated relative thereto. Fourth, the user then rotates the far portion **162** by 180 degrees so that the handle **160** is extending away from the assembly **105**, rather than toward the assembly **105**, as shown by the arcuate arrows in FIG. **6**. Fifth, the user then adjusts the length of the two-piece crank arm **159** by pulling the retractable pin **166**, adjusting the position of the far portion **162** relative to the near portion **160** by sliding the far portion **162** back into the near portion **160** to set the length of the crank arm **159** to the desired length, and then releasing the retractable pin **166** so that it engages with one of the indexing holes **164** of the far portion **162**, thereby locking the near portion **160** and far portion **162** to one another at that desired length.

(32) Returning to FIGS. **6**A and **6**B, the preferred far portion **162** is formed from a rectangular tubular section which has a square profile and a circular tubular section **163** at the end thereof which has a circular profile. In the preferred embodiment, a length of all-thread rod is used to allow the far portion **162** to be almost, but not completely pulled out of the near portion **162**, thereby exposing part of the circular tubular section **163** and allowing the user to rotate the far portion **162**, and its handle **168**, as desired. This unique configuration allows the crank arm **159** to be lengthened or shortened, as desired, and to have the handle **168** extending in one direction for compact storage and extending in the opposite direction for use in winding up a firehose.

(33) The hold-down mechanism **180** is illustrated in FIGS. **6**, **7**, and **9**. FIG. **7** is a side, perspective view of the firehose winder **101** where the hold-down mechanism **180** is positioned to accept a firehose **50**. FIG. **9** is a side, perspective view showing details of the hold-down mechanism **180** and adjustable width mechanism **190**. The hold-down mechanism **180** is mounted on the horizontal main stay tube **150**. The hold-down mechanism **180** comprises a lower slide hold-down **182** attached to the horizontal main stay tube **150**, and an upper slide hose-down **186**. The hold-down mechanism **180** applies a downward force on the firehose **50** as the firehose **50** is wound onto the firehose winder mechanism **153**. The hold-down mechanism **180** retrains the firehose **50** from moving in a vertical direction, and may tend to squeeze the firehose **50** to remove excess water remaining in the firehose **50**. The hold-down mechanism **180** comprises a lower slide hose hold down **188** coupled to the horizontal main stay tube **150** and an upper slide hose down **186** for applying a force to the firehose **50** as it traverses the firehose winder **101**.

(34) The hold-down mechanism **180** further comprises a hold-down vertical extension **182**, which is pivotably coupled to a hold-down arm **184**, which, in turn, is coupled to the upper slide hose down **186**. A spring **174** is positioned between the spring hose down **172** and the upper hose down **186** applies a downward force onto the firehose **50** as it traverses the firehose winder **101**. The

lower slide hose down **188** has a first length perpendicular to the horizontal main stay tube **150** and a first curved contour formed perpendicular to the length of the lower slide hose hold down **188**. The hold-down mechanism **180** has an arm rotatably coupled to the horizontal main stay tube **150**, an upper slide hose hold **186** down rotatably coupled to the arm **182**, the upper slide hose down **186** having a second length perpendicular to the horizontal main stay tube **150** and a second curved contour formed perpendicular to the length of the upper slide hose hold down, and a spring **174** coupling the horizontal main stay tube **150** and the upper slide hose, the spring **174** urging a downward force onto the firehose **50**. FIG. **7** shows the hold-down mechanism **180** open and ready to accept a firehose **50**, and FIG. **6** shows the hold-down mechanism **180** engaging with and applying a downward force to the firehose **50**.

(35) The adjustable width mechanism **190** is illustrated in FIGS. **7**, **8**, and **9**. FIG. **8** is a side, perspective view of the firehose winder where the adjustable width mechanism is positioned to accept and guide a firehose. The adjustable width mechanism **190** aligns and guides the firehose **60** laterally as the firehose **50** is wound onto the firehose winder mechanism **153**. In an embodiment, the adjustable width mechanism **190** comprises a fixed hose guide **191** and a hose sizer tube **194** having a plurality of index holes **200**. The hose sizer tube **194** is attached to and extends laterally away from the horizontal main stay tube **150**. A guide slider **196** is movable coupled to the hose sizer tube **194**, where the guide slider **196** has a retractable pin **198** for engaging with the index holes **200**. A movable hose **192** guide is coupled to the guide slider **196**. As shown in FIG. **6**, the adjustable width mechanism **190** is placed to accept a narrow firehose **50**, and as shown in FIG. **8**, the adjustable width mechanism **190** is placed to accept a wider firehose **50**

(36) Although the invention has been discussed with reference to specific embodiments, it is apparent and should be understood that the concept can be otherwise embodied to achieve the advantages discussed. The preferred embodiments above have been described primarily as portable firehose winders. In this regard, the foregoing description of the firehose winders is presented for purposes of illustration and description.

(37) Furthermore, the description is not intended to limit the invention to the form disclosed herein. Accordingly, variants and modifications consistent with the following teachings, skill, and knowledge of the relevant art, are within the scope of the present invention. The embodiments described herein are further intended to explain modes known for practicing the invention disclosed herewith and to enable others skilled in the art to utilize the invention in equivalent, or alternative embodiments and with various modifications considered necessary by the particular application(s) or use(s) of the present invention.

Claims

1. A firehose winder comprising: an assembly comprising a tongue for connecting to a hitch of a vehicle; a riser hingeably connected to the tongue; a horizontal main stay tube hingeably connected to the riser; and a firehose winder mechanism attached to the horizontal main stay tube and configured to receive and wind a firehose; wherein the tongue, the riser, and the horizontal main stay tube of the assembly are movable between a closed configuration for stowing the firehose winder and an open configuration where the horizontal main stay tube is reversibly locked and displaced substantially vertically with respect to the tongue.

2. The firehose winder of claim 1, wherein when the assembly is in the closed configuration, the riser is positioned immediately adjacent to and substantially parallel with the tongue, and the horizontal main stay tube is positioned immediately adjacent to and substantially parallel with the riser.

3. The firehose winder of claim 1, wherein the firehose winder mechanism further comprises: a shaft extending through the horizontal main stay tube; a crank arm attached to the shaft; a handle attached to the crank arm; a center mount plate attached to the shaft and positioned on a side of the

horizontal main stay tube opposite the crank arm; and two hose mount pins attached to and extending away from the center mount plate, the two hose mount pins configured to receive and wind the firehose; wherein the crank arm is a two-piece crank arm formed from a near portion that is nearer to and attached to the shaft and a far portion that is further from the shaft, the handle attached to a distal end of the far portion, the near and far portions being extensible relative to one another, whereby the handle may be moved closer to or further from an axis of the shaft.

4. The firehose winder of claim 1, wherein the firehose winder mechanism comprises: a shaft positioned through at least one hole formed in the horizontal main stay tube; a two-piece crank arm comprising a near portion and a far portion, the near portion attached to the shaft where the length of the near portion is perpendicular to an axis of the shaft, the far portion movably coupled to the near portion; a handle attached to the far portion; a center mount plate attached to the shaft and positioned on a side of the horizontal main stay tube opposite the two-piece crank arm; and, two hose mount pins attached to and extending away from the center mount plate, the two hose mount pins configured to receive and wind the firehose.

5. The firehose winder of claim 1, further comprising a hold-down mechanism mounted on the horizontal main stay tube for applying a downward force on the firehose as the firehose is wound onto the firehose winder mechanism.

6. The firehose winder of claim 5, the hold-down mechanism comprising: a lower slide hose hold-down coupled to the horizontal main stay tube, the lower slide hose down having a first length perpendicular to the horizontal main stay tube and a first curved contour formed perpendicular to the length of the lower slide hose hold-down; an arm rotatably coupled to the horizontal main stay tube; an upper slide hose hold-down rotatably coupled to the arm, the upper slide hose down having a second length perpendicular to the horizontal main stay tube and a second curved contour formed perpendicular to the length of the upper slide hose hold-down; and, a spring coupling the horizontal main stay tube and the upper slide hose, the spring urging a downward force onto the firehose.

7. The firehose winder of claim 1, further comprising an adjustable width mechanism for aligning and guiding the firehose laterally as the firehose is wound onto the firehose winder mechanism.

8. The firehose winder of claim 7, wherein the adjustable width mechanism comprises: a fixed hose guide; a hose sizer tube having a plurality of index holes, the hose sizer tube attached to and extending laterally away from the horizontal main stay tube; a guide slider movable coupled to the hose sizer tube, the guide slider having a retractable pin for engaging with the index holes; and a movable hose guide coupled to the guide slider.

9. The firehose winder of claim 1, further comprising: a stow pin mount plate attached to the riser, the stow pin mount plate having a length extending perpendicular from a length of the riser; a first retractable pin connected to the stow pin mount plate, the first retractable pin configured to secure the horizontal main stay tube adjacent to the riser; and, a second retractable pin connected to the stow pin mount plate, the second retractable pin configured to secure the horizontal main stay tube adjacent to the tongue.

10. The firehose winder of claim 1, wherein the assembly further configures a toggle clamp for removably locking the horizontal main stay tube in place when the assembly is in the open configuration.

11. A firehose winder comprising: an assembly comprising: a tongue for connecting to a hitch of a vehicle; a riser hingeably connected to the tongue; a horizontal main stay tube hingeably connected to the riser; and, a firehose winder mechanism attached to the horizontal main stay tube configured to receive and wind a firehose, the firehose winder mechanism having an adjustable crank arm with a handle where the handle may be moved relative to an axis of the shaft.

12. The firehose winder of claim 11, wherein the tongue, the riser, and the horizontal main stay tube of the assembly are movable between a closed configuration for stowing the firehose winder and an open configuration where the horizontal main stay tube is reversibly locked and displaced

vertically with respect to the tongue.
13. The firehose winder of claim 11, wherein when the assembly is in the closed configuration, the riser is positioned immediately adjacent to and parallel with the tongue, and the horizontal main stay tube is positioned immediately adjacent to and parallel with the riser.
14. The firehose winder of claim 11, further comprising a hold-down mechanism mounted on the horizontal main stay tube for applying a downward force on the firehose as the firehose is wound onto the firehose winder mechanism.
15. The firehose winder of claim 14, the hold-down mechanism comprising: a lower slide hose hold-down coupled to the horizontal main stay tube, the lower slide hose down having a first length perpendicular to the horizontal main stay tube and a first curved contour formed perpendicular to the length of the lower slide hose hold-down; an arm rotatably coupled to the horizontal main stay tube; an upper slide hose hold-down rotatably coupled to the arm, the upper slide hose down having a second length perpendicular to the horizontal main stay tube and a second curved contour formed perpendicular to the length of the upper slide hose hold-down; and, a spring coupling the horizontal main stay tube and the upper slide hose, the spring urging a downward force onto the firehose.
16. The firehose winder of claim 11, further comprising an adjustable width mechanism for aligning and guiding the firehose as the firehose is wound onto the firehose winder mechanism.
17. The firehose winder of claim 16, wherein the adjustable width mechanism comprises: a fixed hose guide; a hose sizer tube having a plurality of index holes, the hose sizer tube attached to and extending laterally away from the horizontal main stay tube; a guide slider movable coupled to the hose sizer tube, the guide slider having a retractable pin for engaging with the index holes; and a movable hose guide coupled to the guide slider.
18. The firehose winder of claim 11, further comprising: a stow pin mount plate attached to the riser, the stow pin mount plate having a length extending perpendicular from a length of the riser; a first retractable pin connected to the stow pin mount plate, the first retractable pin configured to secure the horizontal main stay tube adjacent to the riser; and, a second retractable pin connected to the stow pin mount plate, the second retractable pin configured to secure the horizontal main stay tube adjacent to the tongue.
19. A firehose winder comprising: an assembly comprising: a tongue for connecting to a hitch of a vehicle; a riser hingeably connected to the tongue; a horizontal main stay tube hingeably connected to the riser; a firehose winder mechanism attached to the horizontal main stay tube and configured to receive and wind a firehose; and, a hold-down mechanism mounted on the horizontal main stay tube for applying a downward force on the firehose as the firehose is wound onto the firehose winder mechanism.
20. The firehose winder of claim 19, the hold-down mechanism comprising: a lower slide hose hold-down coupled to the horizontal main stay tube, the lower slide hose down having a first length perpendicular to the horizontal main stay tube and a first curved contour formed perpendicular to the length of the lower slide hose hold-down; an arm rotatably coupled to the horizontal main stay tube; an upper slide hose hold-down rotatably coupled to the arm, the upper slide hose down having a second length perpendicular to the horizontal main stay tube and a second curved contour formed perpendicular to the length of the upper slide hose hold-down; and, a spring coupling the horizontal main stay tube and the upper slide hose, the spring urging a downward force onto the firehose.