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(57)

ABSTRACT(75) Inventor: **Wayne H. Murphy**, Pottstown, PA
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PHILADELPHIA, PA 191072950(73) Assignee: **Pennsy Corporation**, West Chester, PA(21) Appl. No.: **10/760,749**(22) Filed: **Jan. 20, 2004****Related U.S. Application Data**(60) Provisional application No. 60/441,427, filed on Jan.
21, 2003.**Publication Classification**(51) **Int. Cl.⁷ B61G 5/06**(52) **U.S. Cl. 213/76**

A support assembly suspends the end of an elongated flexible member such as the end of an elongated railroad air brake hose in a predetermined elevation. The assembly includes an elongated suspension strap having spaced apertures which are elongated lengthwise of the strap and resilient wire attachment clips, each formed of a single piece of wire. One of the clips attaches the strap to a fixture on the end of the rail car and another attaches the strap to the end of the air hose. Each clip has a first end terminating in a hook which is dimensioned to pass through a selected strap aperture when the clip is angularly positioned relative to the length of the strap but which is retained within the aperture when the clip is oriented lengthwise of the strap. The clips further comprise a first arm which extends from the hook, and a second arm which is joined to the first to form a U-shaped portion which is capable of being grasped by the hand of a worker. The two are resiliently biased away from one another but are sufficiently flexible so that the second end may be relatively easily squeezed towards the first and captured by the hook at the end of the first leg. A loop at the end of the second arm is depressible by the thumb of the hand of a worker gripping the U-shaped portion to facilitate capturing the end of the second arm within the hook.

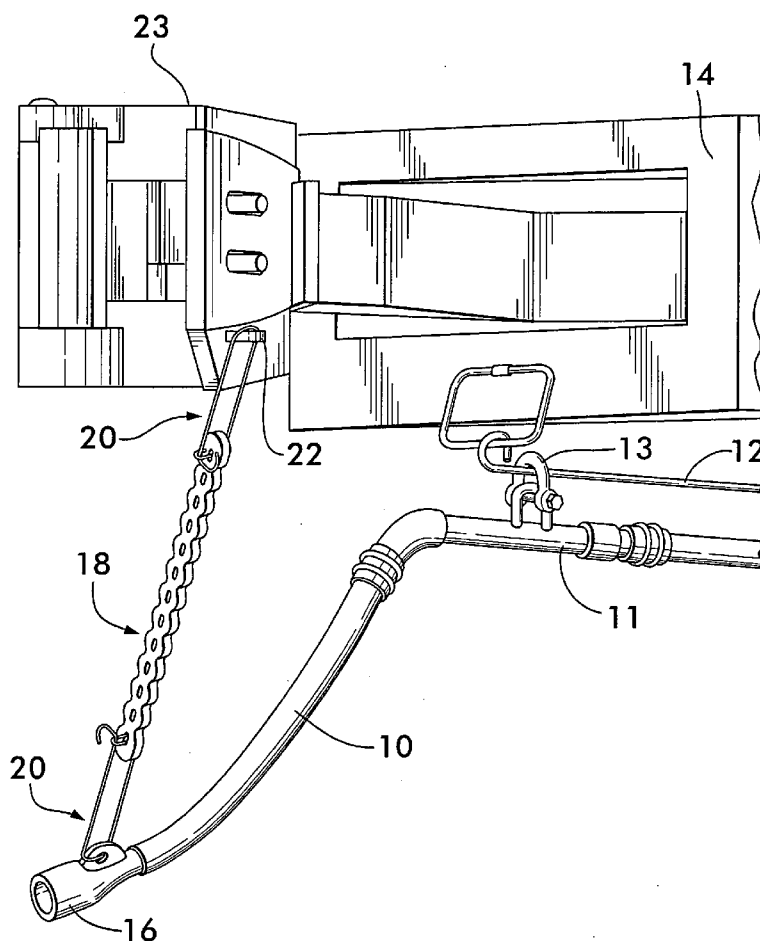
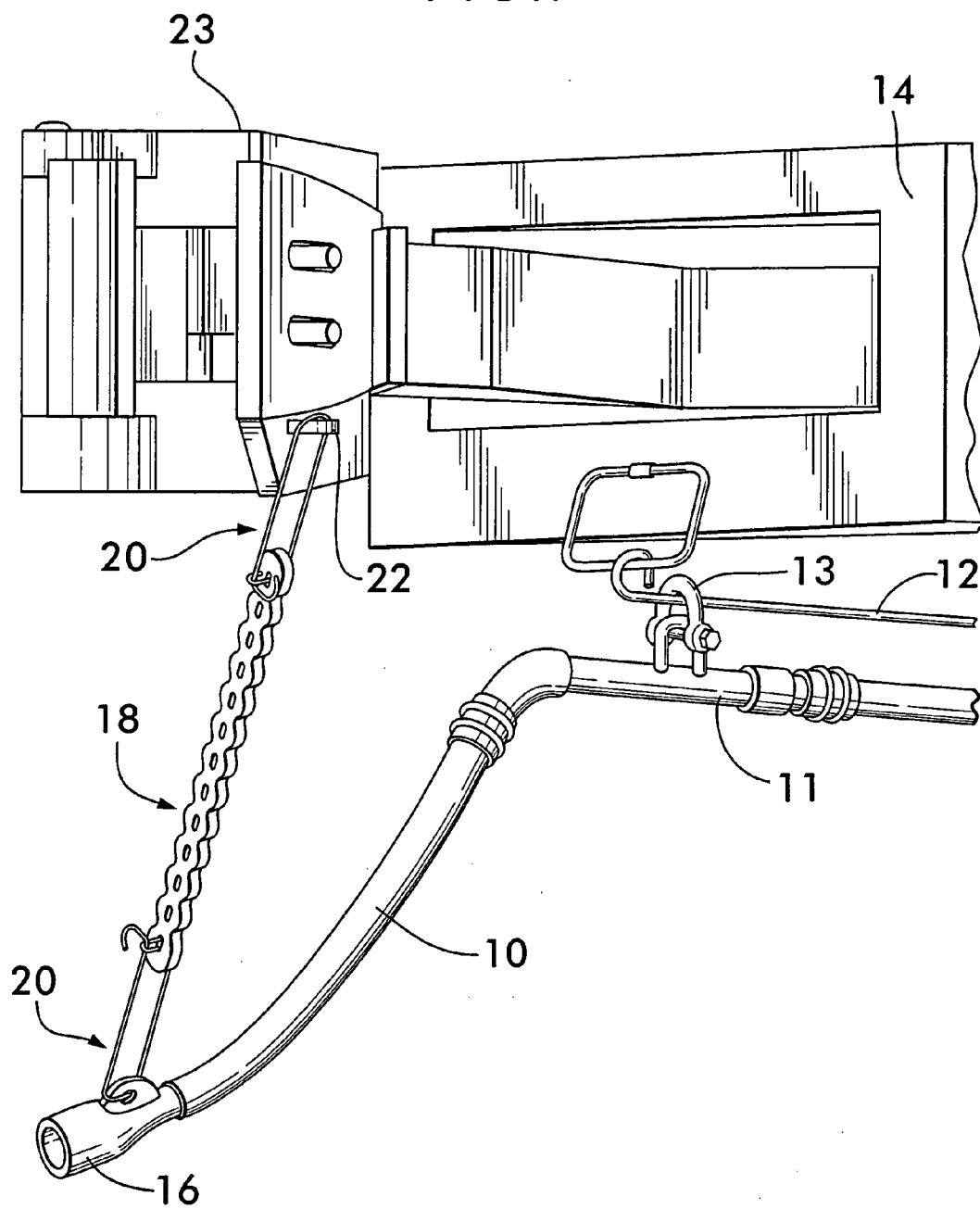
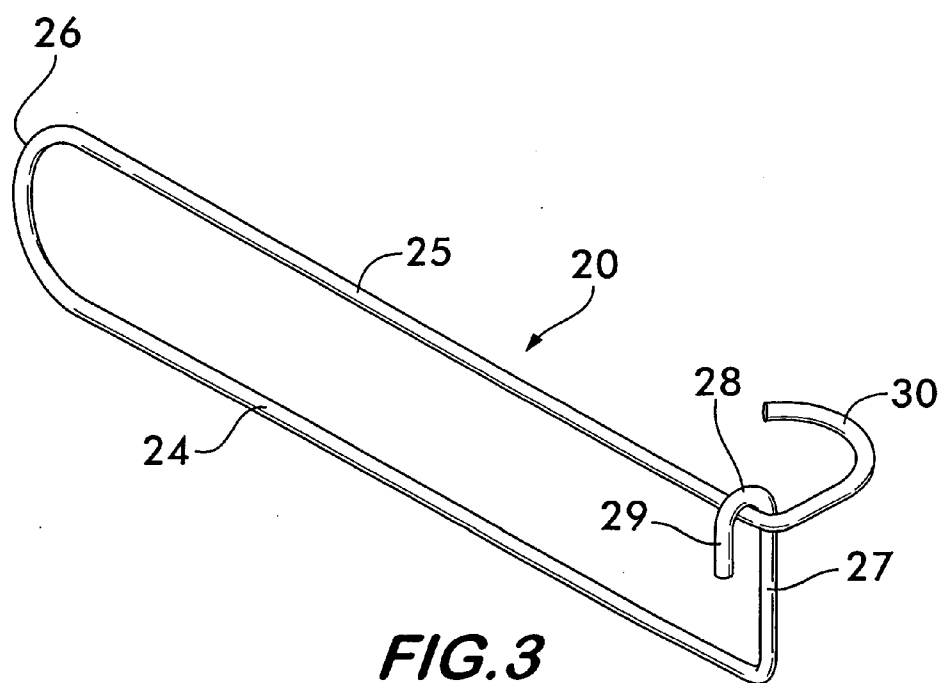
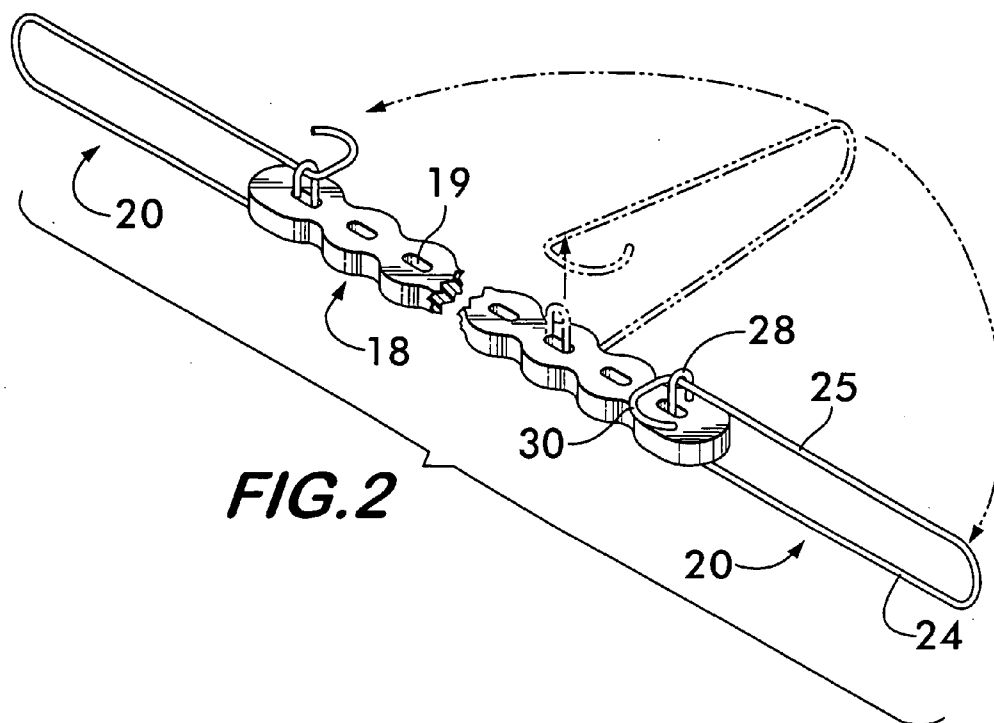


FIG. 1





AIR HOSE STRAP ASSEMBLY

RELATED APPLICATION

[0001] This application is based on and claims the benefit of U.S. Provisional Application No. 60/441,427, filed Jan. 21, 2003.

FIELD OF THE INVENTION

[0002] This invention relates to air hose suspension straps for rail cars and the like and especially to a simplified, reliable and readily adjustable strap assembly for maintaining a flexible device such as the end of a rail car air hose at a desired height above the rail structure.

BACKGROUND OF THE INVENTION

[0003] Failure to maintain rail car air hoses at a proper height above the rail structure is a significant cause of unintended air hose coupling separation leading to emergency braking and stopping of the train and sometimes even derailment. Obviously, emergency braking is a cause of time-consuming and, thus, costly train delays, as a crew member must walk the length of the train looking for the cause and, if it is found that there is an uncoupled air hose, the crew member must reconnect the couplings before returning to the engine.

[0004] To eliminate the problem, it is known to provide air hose straps interconnected between the coupler or a frame member of the car and the end of the air line. Known straps have a fastening system including wire clips which have a hooked end which fits through one of a plurality of apertures on the strap. The wire is then looped back so that it is captured by the hook. The free end is then fitted through an adjacent aperture in the strap.

[0005] The looped portion of one of the prior art clips extends through an aperture in a bracket on the bottom of the rail car coupler. The second clip is identical to the first. The looped portion of the second clip fits through an aperture integral with the glad hand fitting on the end of the air hose. Although these assemblies are effective in supporting the end of the air hose, the clips are difficult to open and close and almost impossible to apply or remove if the worker is wearing the required work gloves. If the straps have not been properly installed or should the strap material elongate over time, readjustment becomes necessary to avoid the risk that the air hose will strike a cross tie, a grade crossing, a switch or other track structure causing air hose separation.

SUMMARY AND OBJECTS OF THE INVENTION

[0006] The present invention provides a solution to the problems identified above by utilizing an ergonomically designed strap and clip system which substantially simplifies application problems, providing for easy installation and adjustment of strap length. The clips used in the present invention are preferably provided with a loop portion comprised of resilient legs biased angularly apart. A clip according to the invention has a thumb release loop at the end of one leg which makes it easy for a worker wearing work gloves to grasp the resilient legs with one hand and open and close the clip by depressing and/or releasing the thumb release loop with the thumb of the same hand. The system further includes a strap including a multiplicity of spaced

apertures, preferably elongated in the direction of the long axis of the strap, and extending in a line running from one end of the strap to the other. Each aperture is elongated to allow for insertion of a hook on the end portion of one leg of the clip. The hook projects outwardly from the other end of the aperture to capture the thumb release portion and assure retention of the clip within the selected aperture. Preferably, the hook can be passed through the aperture only when the clip is angularly disposed with respect to the long axis of the strap. When the clip is aligned with the long axis of the strap, the side walls of the aperture block passage of the hook.

[0007] In use, a first clip is passed through the aperture of a bracket underneath the rail car coupler. The hook end of the clip is turned so that the hook is aligned with the long axis of the selected aperture and then pushed through the aperture and locked in place upon depression of the thumb release loop and slight lateral movement so that it is captured by the hook. The second clip is passed through an aperture in the glad hand and inserted into a selected aperture in the strap in the manner described above for the first clip.

[0008] In preferred form, the strap is preferably made of a urethane or equivalent polymer material which is weather resistant, having ultraviolet ray protection and exhibiting little or no elongation set. Should a strap need adjusting in the field for whatever reason, a worker can easily make the adjustment in the field without removal of the clip from the coupler aperture and without use of any tools. A dog-bone or like sinuous profile molded into the side edges of the strap makes it easily gripped by the gloved hand of a worker. The sinuous profile provides extra strap thickness proximal to the apertures which provides extra strength to the strap.

[0009] In summary, the rail car air hose suspension assembly comprises a flexible elongated suspension strap having a plurality of spaced apertures disposed lengthwise thereof and extending therethrough, said strap having a first end secured to said air hose and a second end; and

[0010] a resilient clip, preferably formed of a resilient wire, includes an elongated loop portion attachable to the end of the rail car coupler. The elongated loop portion includes first and second arms biased to a position of angular divergency. The first and second arms are relatively movable from the position of angular divergency to a position in which the arms are generally parallel, the first of the arms has a distal end portion bent toward the second arm at a first bend angle, the distal end portion terminating in a hook, the hook being dimensioned for selective insertion through one of the apertures, said inserted hook projecting beyond the aperture for capturing said second arm when the arms are in said generally parallel position.

[0011] An important objective of the invention is the provision of a clip and suspension strap assembly which can be installed and adjusted without the use of tools by a worker who can make the installation without removal of his gloves. In preferred embodiments, the distal end of the second of the arms is configured into a thumb loop sized to be easily depressed by the thumb of a worker whereby said second arm is disengaged from said hook. The elongated loop is ergonomically designed so that its arms can be grasped by the fingers of the gloved hand of a worker who can move the first and second arms by depression and release of the thumb loop with the thumb of the same hand.

[0012] A further preferred aspect of the invention is the provision of oblong apertures extending longitudinally of the strap, the apertures permitting insertion of the hook when the hook is aligned with the long axis of the aperture and preventing withdrawal of the hook when the hook is out of alignment with the long axis.

[0013] How the foregoing and various other aspects and objectives are achieved will now become apparent upon reference to the following detailed description when taken in reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] FIG. 1 is a view depicting an air hose assembly showing a strap formed in accordance with the invention suspending the end of the air hose from the coupler of a rail car;

[0015] FIG. 2 is a detailed view of the air hose strap assembly illustrated in FIG. 1; and

[0016] FIG. 3 is a view on an enlarged scale with respect to FIG. 2 showing a preferred form of clip used with the assembly of FIGS. 1 and 2.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0017] As illustrated in FIG. 1, an air hose 10 connected to train line 11 is suspended on a trolley 12 by means of an apertured fitting 13 suspended from coupler carrier 14. The end of air hose 10 is provided with a coupling member or glad hand 16 which couples with a like coupling member on the end of the air hose for an adjacent rail car.

[0018] According to the invention, the end of the air hose is suspended at a predetermined height above the rail structure by means of the strap assembly illustrated more particularly in FIG. 2. The strap assembly includes a strap member 18 provided with spaced apertures 19 extending along its long axis. It is preferred that the apertures be elongated in the lengthwise direction of the strap as best seen in FIG. 2 for reasons to be explained below. Gripping of the strap is facilitated by means such as molded-in sinuous undulations 18a in its side edges. As can be seen in FIG. 2, the sinuous undulations maximize the material cross-section proximal to the sides of the apertures to provide increased strength to the strap.

[0019] The invention further provides a pair of resilient attachment clips 20, one of which is shown in FIG. 3 in an enlarged form with respect to FIGS. 1 and 2. According to the invention, each clip 20 is preferably formed of a single piece of resilient, formable wire. As can be seen in FIG. 1, one of the clips is attached to the rail car body by passage of one end of an open clip through an aperture in a fitting 22 typically provided on the underside of coupler 23; the other clip being attachable at or near the end of air hose 10 as, for example, by passage through the aperture of a fitting on the glad hand coupling member 16.

[0020] With reference to FIGS. 1 and 3, each wire clip comprises an elongated loop portion formed by a pair of resiliently diverging arms 24 and 25 each extending from a reverse bend portion 26. Arm 24 terminates in an end section 27 which has a first bend of about 90° with respect to the axis of leg 24. The end is then turned back upon itself forming a

hook 28 which lies in a plane which is at an angle of about 90° relative to the plane of the first bend. The hook is relatively dimensioned so as to only fit through a selected strap aperture 19 when oriented so that it is aligned with the long axis of the selected aperture. The width of the apertures is selected so that once the hook is inserted and moved out of alignment with the long axis of the strap, the hook cannot be accidentally withdrawn. Leg 25 is provided with a looped end portion 30 configured to be conveniently engageable by the thumb of a worker gripping the two arms with the fingers of his or her hand. The arms are long enough to provide sufficient leverage so that when gripped by the gloved hand of a worker of average strength, they can be readily compressed together. When the hook is pressed through the selected aperture and the arms of the clip are compressed to move them into a substantially parallel position, relieving thumb pressure will allow the leg 25 to be captured by the hook.

[0021] In summary, a clip is passed through the aperture on the coupler and held with the hook 28 in alignment with the long axis of a selected strap aperture near one end of the strap. The hook is passed through the aperture and the clip rotated slightly so that the hook is captured within the aperture. The looped end portion 30 is then depressed until the leg 25 is brought into alignment with the opening of the hook 28. Thumb pressure is released, and due to the biasing forces, the legs of the clip spread apart causing the leg 25 to be captured within the confines of the hook 28. The clip at the opposite end of the strap is passed through the aperture in the fitting at the end of hose 10 and is fastened to the strap in the manner just described.

[0022] Readjustment of strap length can be readily accomplished by lining up the upper clip with the long axis of its aperture, depressing the thumb release loop 30 to first move arm 25 out of the confines of hook 29, using the thumb release to move the arm slightly to the side whereupon it is free from the hook, aligning the hook with the long axis of the aperture, selecting the appropriate aperture and, with the hook aligned with the new selected aperture, inserting the hook until it projects through the aperture. Once the hook is fully inserted, use of the thumb release will place the leg 25 within the hook, thereby completing the readjustment process.

[0023] The thumb release portion of the clip makes it easy to open and close the clip during installation or when readjustment becomes necessary. The clip does not need to be removed from the coupler to adjust the height of the air hose, simplifying and speeding the adjustment operation. The oblong apertures contribute to ease of adjustment of the clip and positively lock the clips in place once the hook end is inserted in a selected aperture. The sinuous undulations in the side edges of the strap allow for a firm grip even when heavy work gloves are worn. No tools are required for application or removal of a strap.

What is claimed is:

1. A support assembly for suspending the end of an air hose on the end of a rail car in a predetermined elevated position, said air hose having an end coupling connectable to an end coupling of an adjacent car, wherein said end couplings have apertured attachment members and said support assembly comprises:

an elongated suspension strap having apertures spaced lengthwise thereof, said strap being suspended from an end of the rail car in overlying relation to said air hose;

an attachment device for securing the strap to the end coupling of said rail car, said attachment device comprising a resilient wire clip, said clip comprising first and second interconnecting arms biased to an open position diverging away from each other and being manually relatively movable toward one another to a closed position, and defining an elongated loop interconnectable to the aperture of said end coupling, said first arm having a bent over end forming a hook, said hook being dimensioned to pass through a selected one of the apertures in said strap and being shaped to capture said second arm when said arms are manually relatively moved from said open position to said closed position.

2. An assembly according to claim 1, wherein said apertures are elongated in the direction of the strap long axis, said apertures and said hook being relatively dimensioned to allow for passage of said hook through a selected aperture when the arms of the clip are angularly disposed relatively to the long axis of the strap and to block passage of the hook when the arms are co-axially in alignment with the long axis of the strap.

3. An assembly according to claim 1, wherein the second clip arm terminates in a second looped portion sized to be depressed by the thumb of a worker manually grasping the clip arms, said depression of said second loop allowing for disengagement of the second arm from the clip.

4. An assembly according to claim 3, wherein said apertures are elongated in the direction of the strap long axis, said apertures and said hook being relatively dimensioned to allow for passage of said hook through a selected aperture when the arms of the clip are angularly disposed relatively to the long axis of the strap and to block passage of the hook when the arms are co-axially in alignment with the long axis of the strap.

5. A support assembly for suspending the end of an air hose on an end of a rail car in a predetermined elevated position, said air hose having an end coupling connectable to the end coupling for an end of an air hose of an adjacent rail car, said assembly comprising:

an elongated suspension strap having a plurality of spaced apertures, said apertures extending through said strap;

a pair of resilient attachment clips, each formed of a unitary piece of resilient strip material;

one of said clips being attached to one end of said rail car;

the other of said clips being attachable to the air hose adjacent the end thereof;

each said clip having a first end terminating in a hook, said hook being shaped to be passed through one of said plurality of apertures and dimensioned when passed through to clear the surface of the strap by a predetermined amount, the clip having an elongated looped portion extending from said hook shaped end, said looped portion being comprised of a first leg extending from the shank of the hook, said first leg terminating in a reverse bend, said reverse bend being followed by a second leg extending beyond said hook, said clip being flexible and resilient for relative movement of said legs

to allow the end of said second leg to be yieldably captured by said hook, the predetermined clearance being established by insertion of said hook through a selected one of said apertures, each said aperture dimensioned to allow for passage of the hook when the hook is in a first position, the end of the second leg being thereafter movable into interlocking interengagement with the hook.

6. An assembly according to claim 5, wherein said apertures have an oblong shape with a length allowing for passage of the hook when the legs of the clip are disposed substantially perpendicularly to the long axis of the suspension strap and for retaining the hook when the legs are disposed in positions not substantially perpendicular to the long axis of the suspension strap.

7. An assembly according to claim 5, wherein the second leg of the clip terminates in a second looped portion smaller than said elongated looped portion and lying in a plane extending substantially perpendicularly to said first looped portion, said second looped portion being sized for ease of depression by the thumb of a workman for disengaging the end of the second leg of the clip from the hook.

8. An assembly according to claim 5, wherein said elongated looped portion is of sufficient length to be conveniently gripped by the gloved hand of a worker.

9. An assembly according to claim 5, wherein said suspension strap has side walls of a sinuous profile, the width of the strap being greater proximal to each aperture than between the apertures.

10. An assembly according to claim 9, wherein the cross-section of the strap material proximal the apertures is at least as great as the cross-section between the apertures.

11. An assembly for supporting the end of an air hose suspended from an end of a rail car body comprising:

a flexible elongated suspension strap having a plurality of spaced apertures disposed lengthwise thereof and extending therethrough, said strap having a first end secured to said air hose and a second end;

a resilient wire clip, said clip including an elongated loop portion attachable to the end of the rail car body, said elongated loop portion including first and second angularly disposed arms resiliently biased to a position of angular divergency, said first and second arms being relatively movable from said position of angular divergency to a position in which said arms are generally parallel, the first of said arms having a distal end portion bent toward the second arm at a first bend angle, the distal end portion terminating in a hook, said hook being dimensioned for selective insertion through one of said apertures, said inserted hook projecting beyond said aperture for capturing said second arm when said arms are in said generally parallel position.

12. An assembly according to claim 11, wherein the side walls of the strap have a sinuous profile with side wall portions proximal to each aperture projecting relatively outwardly and side wall portions between apertures extending relatively inwardly.

13. An assembly according to claim 11, wherein said first and second arms lie in a first plane and said hook is formed to lie in a second plane perpendicular to said first plane.

14. An assembly according to claim 13, wherein said second arm terminates in a loop, said loop being formed to lie in a third plane perpendicular to said first and second

plane, said loop being sized for depression by the thumb of a worker's hand holding the clip arm between the thumb and the fingers.

15. An assembly according to claim 14, wherein said apertures are elongated in the direction of the long axis of the strap, said apertures and said hook being relatively

dimensioned to allow for passage of said hook through a selected aperture when the arms of the clip are angularly disposed relatively to the long axis of the strap and to block passage of the hook when the arms are co-axially in alignment with the long axis of the strap.

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