

Nov. 24, 1959

B. SILVESTON

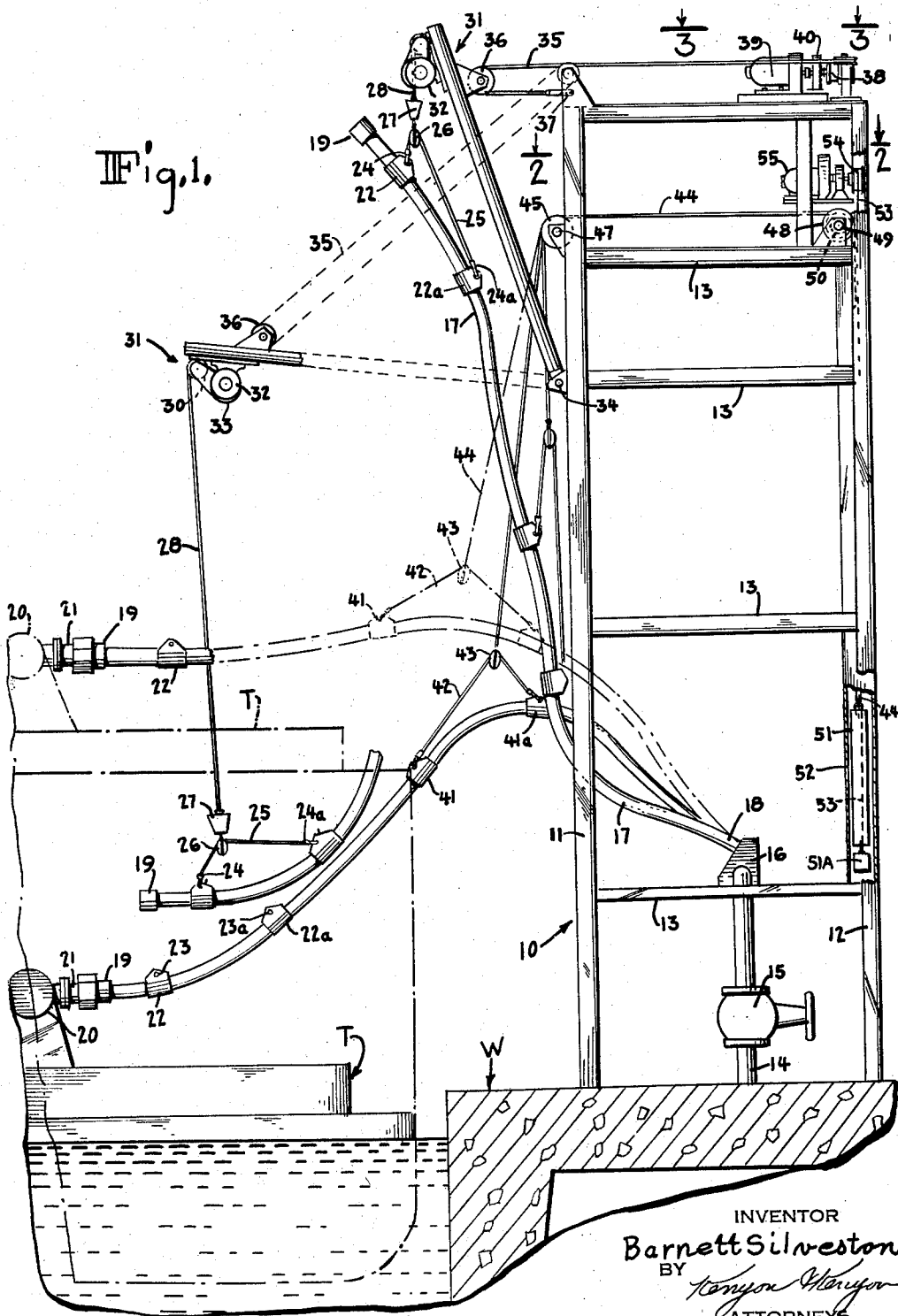
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HOSE HANDLING STRUCTURE FOR TRANSFERRING FLUID
MATERIAL BETWEEN SHIP AND SHORE

Filed May 10, 1957

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Fig. 1.



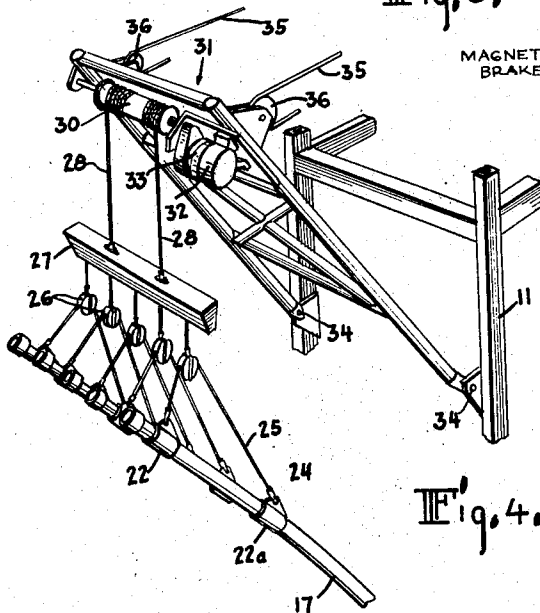
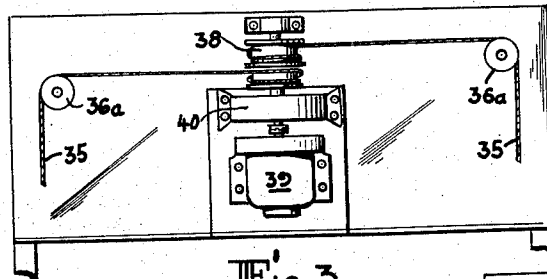
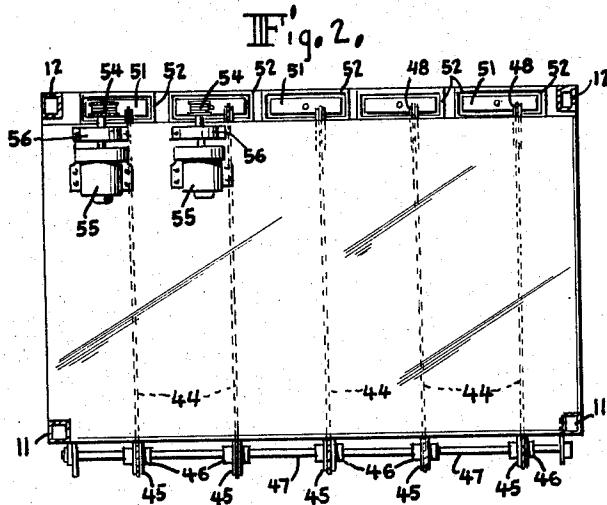
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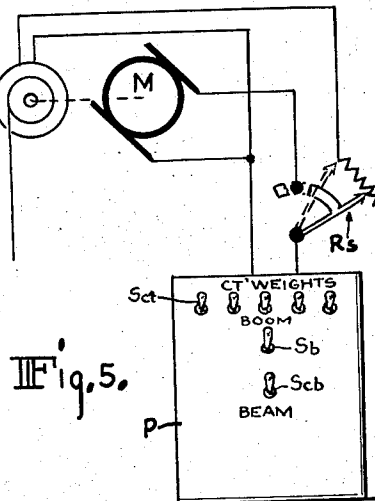
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Filed May 10, 1957

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MAGNETIC
BRAKE



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2,914,080

HOSE HANDLING STRUCTURE FOR TRANSFERRING FLUID MATERIAL BETWEEN SHIP AND SHORE

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Application May 10, 1957, Serial No. 658,293

5 Claims. (Cl. 137—236)

This invention relates to novel hose handling structure for transferring fluids between ship and shore installations.

In the transfer of fluid material such as oil between a ship and a shore installation, serious problems exist with respect to the hoses or fluid transfer lines through which the fluid is transferred between the ship and the shore installations. Among the problems present are the adjustment of and the prevention of damage to the hoses or transfer lines resulting from the fact that the level of the ship relative to the shore changes frequently with tidal changes and also because of changes in the weight of the ship as it takes on or discharges cargo. Other problems involve the encumbrance of the wharf space by the hoses. Additional problems arise with respect to the hoses in use which on occasion tend to kink when they become slack as a result of changes in the level of the ship relative to its wharf.

In addition the hoses themselves are cumbersome and comparatively heavy. Their handling and movement between a storage position and an attaching position require the provision of mechanism that will permit easy connection and disconnection of the out-shore ends of the hoses with the ship at the beginning and at the completion of load transfer operations.

Principal objects and features of this invention are to provide simple efficient arrangements requiring minimum labor for the convenient positioning of the outer or off-shore ends of cargo hoses or transfer lines on a wharf for their connection to the manifold of the ship and their return to the wharf for storage.

Further objects and features of the invention are the provision of an arrangement of this character in which the connected hoses will be automatically adjusted, as the ship rises and falls during unloading and loading operations so that a substantially uniform tension will be maintained on all the hoses while they remain connected to the ship without the necessity for an operator in attendance.

Further objects and features of the invention are the provision of an arrangement of the character described wherein the hoses may be stored during periods of non use without encumbering the wharf space.

Additional objects and features of the invention are the provision of an arrangement which will eliminate excessive wear on the hoses during their use thus prolonging their useful lives.

Other objects and features of this invention will become apparent from the following description and the accompanying drawings, wherein:

Figure 1 is an elevational view partially in section of a hose handling arrangement embodying the invention;

Figure 2 is a view taken along the plane of line 2—2 of Figure 1;

Figure 3 is a view taken along the plane of line 3—3 of Figure 1 and

Figure 4 is a fragmentary perspective view of the upper portion of the arrangement of Figure 1; and

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Figure 5 is a schematic circuit diagram of an electrical control system that may be used with the arrangement of this invention.

Referring to the drawings, the reference character T denotes generally a ship or tanker tied up to a wharf W and between which a fluid load is to be transferred. A tower or super structure denoted generally by the character 10 is erected on and fixed to the wharf platform. This tower 10 comprises generally the vertical columns 11 and 12 joined by cross beams 13. As many pairs of vertical columns 11 and 12 may be utilized as is desired, preferably two.

Pipelines 14 in any number desired (only one of which is shown) from a shore located position, for example, a tank (not shown) terminate above the wharf deck in valves 15 and a hose connector 16 to which any desired number of flexible hoses 17 may have their inshore ends 18 connected by a conventional type coupling (not shown). The outer or offshore ends 19 of the flexible hoses 17 are adapted to be individually coupled to the manifold 20 of the vessel or tanker T which is provided with appropriate connecting members 21. It is intended that the flexible hoses 17 have their inshore ends 18 coupled permanently to the wharf connector 16 while their offshore ends 19 are removably and selectively coupled to respective connecting members 21 of the manifold 20 on the ship or tanker T.

A pair of spaced apart collars 22 and 22a secured to each hose 17 adjacent its offshore end and each provided respectively with hook eyes 23 and 23a are removably attachable to the hooks 24 and 24a, arranged respectively at the opposite ends of a length of cable 25. The cable 25 is supported on the pulley of a pulley block 26, which latter in turn is fastened to a carrying beam 27. The cable 25 and pulleys 26 correspond in number to the hoses 17 and serve respectively to removably suspend the individual hoses from the carrying beam.

The beam 27 in turn is suspended by the cables 28 which are wound onto the hoist or winch 30 which is carried at the outer end of a boom or frame 31 and is adapted to be driven or rotated in elevating and lowering direction, as for example, by the motor 32 equipped, if desired, with a conventional magnetic brake 33. The motor 32 and its magnetic brake 33 may be controlled by appropriate switches at a conveniently located control panel P situated at any desired position on the wharf deck.

The boom or frame 31 is pivotally supported by the trunnions 34 from the offshore sides of the tower legs 11 so that the boom or frame 31 may be conveniently swung about its trunnions 34 as may be required for elevating and lowering of the boom. Cables 35 passing around frame supported pulleys 36 and 36a each has one of its ends anchored at 37 in any conventional way to the tower columns 11. The other ends of the cables 35 after being passed over pulleys 36a (Fig. 3) are connected in conventional way to the drum 38 of a motor driven winch 39. This winch 39 may be conveniently provided with a magnetic brake 40 of any conventional construction so that energizing of the motor and the brake by appropriate switches on the control panel P hereinabove mentioned will serve to elevate or lower the boom 31 as may be desired.

The individual hoses 17 are each provided adjacent the center or mid-points of their lengths with the spaced apart collars 41 and 41a. The respective pairs of collars 41 and 41a are each joined by a short cable length 42 passing over the pulley of a pulley block 43. Each pulley block 43 is secured to an end of a cable 44 which in turn passes around a sheave 45. The pulley sheaves 45 are individually supported in bearings 46 of appropriate kind that are carried on a cross bar 47 secured to the

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columns 11 of the tower 10. In the embodiment shown five hoses 17 are provided. In consequence five cables 44 are provided and five sheaves 45 are provided, one for each of the cables 44. The respective cables 44 also pass over respective sheaves 48 individually supported in bearings 50 carried on a cross bar 49 secured to an upper cross beam 13 of the tower 10. Each cable 44 has its other end attached to a counterweight 51. Five independent counterweights 51, each one secured to an end of a different one of the cables 44, are provided. These counterweights 51 are movable vertically upwardly and downwardly in the guideways 52 which are provided between the inshore vertical columns 12 of the tower 10. The independent counterweights 51A are each suspended from one end of an independent cable 53 the other end of which is secured to a winding drum 54 of a winch motor 55 also provided with a conventional magnetic brake 56. Each counterweight 51A is suspended below its corresponding counterweight 51 so that when desired each counterweight 51 may be elevated by elevating the appropriate counterweight 51A. Thus for purposes presently to be described, each individual one of the counterweights 51 may be independently elevated or lowered when its particular winch motor 55 and associated magnetic brake 56 are appropriately energized. The appropriate energization of the motors 55 and the magnetic brakes 56 may likewise be effected by suitable control switches located on the control panel P.

As is illustrated diagrammatically in Figure 5, the panel P is equipped with independent switches *Sc1* for the selective operation of the respective counterweight motors 55, with the switch *Sb* for the operation of the boom motor 39 and with the switch *Sch* for the operation of the carrying beam motor 32. The magnetic brakes associated with the respective motors are appropriately controlled by rheostat switches *Rs* that also may be located on the panel P for convenient operation.

It is to be understood that although the elevating mechanisms for the carrying beam 27, for the boom 31 and for the counterweights 51A have been conveniently described as electric winches any or all of these elevating or lowering mechanisms may be replaced by hydraulic or air operated mechanisms of conventional kinds or by other suitable operating means.

Operation

When not in use, the valves 15 are closed and the flexible hoses 17 are maintained in the full line upright position shown in Figure 1. At this time the hanging beam 27 is in its extreme elevated position as is the boom frame 31. When the tanker or ship T has been appropriately moored to the wharf W the winch motor 39 is energized in such direction as to permit its cables 35 to lower the boom or frame 31 about its trunnions 34 to the dotted-line position shown in Figure 1. At the same time, the winch 32 is operated to permit the cables 28 to lower the hanging beam 27. At the same time, the counterweights 51A and 51 are elevated by operation of the winch motors 55 so that the respective cables 44 are free to permit lowering of the mid-points of the respective hoses 17. These described cable lowering operations are carried out to bring the offshore ends 19 of the respective hoses 17 into convenient attaching position relative to the couplings 21 of the ship's manifold 20 irrespective of any particular level at which the ship may be with respect to the wharf.

The selected hoses 17 then have their particular offshore terminal ends connected to the respective couplings 21 of the manifold 20. The selected hoses then are uncoupled from the carrying beam 27 by disconnection of the hooks 24 and 24a from the eyes 23 and 23a of the collars 22 and 22a of such selected hoses. Carrying beam winch motor 32 is then operated to raise the cables 28 and thus again elevate the carrying beam 27. At the same time the boom controlling winch motor 39 is

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operated to cause cables 35 to again elevate the boom 31 to its full line position of Figure 1. Simultaneously the motors 55 of the counterweights 51A associated with the hoses 17 are operated to lower counterweights 51A and 51. In consequence, the unselected hoses 17 are lifted clear of the wharf deck to their initial positions shown in full line in Figure 1 while the selected hoses 17 remain coupled to the ship manifold 20 as shown in full line in Figure 1. The valves 15 of selected hoses 17 are then opened.

The counterweights 51 having been released by lowering the counterweights 51A, are free to tension the cables 44 which are connected to the mid-points of the selected hoses 17 through collars 41 and 41a and cables 42. The effect then of the counterweights 51 on the selected hoses is to maintain the mid-points of these hoses 17 in an elevated condition relative to the deck of the wharf and taut so as to prevent kinking. On rises of the tanker or ship T for example to its broken line position in Figure 1, the selected hoses will nevertheless have their mid-points maintained in the elevated condition because of the counter-balancing action of the counterweights 51 which latter also will tend to maintain substantially the same tautness or tension on the selected hoses 17 which are coupled to the manifold 20 of the ship or tanker T. If during such rises or falls of the ship or tanker T the latter should move away from the wharf to a reasonable extent the counter-balancing action of the corresponding counterweights 51 will still act to maintain uniform tautness or tension in the connected hoses.

When loading operations have been completed, the boom or frame 31 is again lowered as is the carrying beam 27. The open valves 15 of the selected hoses are closed and the said hoses are disconnected from the manifold 20. The hooks 24 and 24a are reconnected to the collars 22 and 22a of the respective uncoupled hoses 17 thus again attaching them to the hanging beam 27. The carrying beam 27 and the boom 31 are then again elevated restoring all the hoses to the full line position of Figure 1 which is the storing position therefor. Thus the hoses are maintained clear of the wharf deck when not in use and well within the face of the wharf. A noteworthy factor is that even during use all of the hoses are maintained clear of the wharf deck as well as of guard rails or of the deck of the ship so that wear on the hoses at all times due to contact abrasion is eliminated. Moreover, the carrying beam and boom arrangement permits convenient and ready handling of relatively massive hoses for connection and disconnection with a minimum of effort on the part of the operator.

While specific embodiments of the invention have been shown and described, variations in structural detail within the scope of the appended claims are possible and are contemplated. There is no intention, therefore, of limitation to the exact details shown and described.

What is claimed is:

1. In apparatus for facilitating the transfer of fluid loads between ship and shore installations, hose handling structure of the character described comprising pivotally supported boom means, a carrying beam supported from the boom means, flexible hoses supported independently from the carrying beam, means for lowering and raising the boom means about its pivotal support, means for lowering and raising the carrying beam relative to said boom means, means for coupling and uncoupling each flexible hose independently from said carrying beam whereby all said hoses may be lowered together from an elevated storage position on lowering of said boom means and of said carrying beam, selected of said hoses then connected as desired and respectively uncoupled from said carrying beam and thereafter unselected hoses returned to elevated storage position upon re-elevation of said carrying beam and of said boom means to initial positions, and individual counterweight-

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ing means for each hose connected to an intermediate portion thereof for maintaining substantially uniform tautness on each connected hose regardless of positional changes therein while it remains connected.

2. In apparatus for facilitating the transfer of fluid loads between ship and shore installations, hose handling structure of the character described comprising pivotally supported boom means, a carrying beam supported by the boom means, flexible hoses supported independently from the carrying beam, cable means for lowering and raising the boom means about its pivotal support, cable means for lowering and raising the carrying beam independently relative to said boom means, means for coupling and uncoupling each flexible hose independently of said carrying beam, and independent counterweight means for each hose and means to connect respective of said counterweight means to the mid-portion of each hose, whereby all of said hoses may be lowered together from an elevated storage position on lowering of said boom means and of said carrying beam, selected of said hoses then connected as desired and respectively uncoupled from said carrying beam and thereafter unselected hoses returned to elevated storage position upon re-elevation of said carrying beam and of said boom means to initial positions and said individual counterweight means serving to maintain uniform tautness on each connected hose regardless of positional changes therein while it remains connected.

3. In apparatus for facilitating the transfer of fluid loads between ship and shore installations, hose handling structure comprising, pivotally supported boom means operable from an elevated position to a lowered position, a carrying beam supported from the boom means, flexible hoses suspended independently from the carrying beam and each having a permanently connected end and an unattached end for attachment as desired, means for lowering and elevating the boom means about its pivotal support, means for lowering and raising the carrying beam relative to said boom means, means for coupling and uncoupling each hose independently from said carrying beam, independent counterweight means for each hose and means for attaching respective of said counterweight means independently to approximately the mid-points of respective hoses whereby all of the hoses may be lowered together from an elevated position on lowering of said boom means and of said carrying beam to bring the unattached ends of the hoses into position for attachment as desired, then selected of said hose ends attached as desired and said selected hoses uncoupled from said carrying beam and thereafter the unselected hoses returned to elevated storage position upon re-elevation of said carrying beam and of said boom means to initial positions and said independent counterweight means serving to maintain uniform tautness in each hose whose unattached end has been attached as desired regardless of positional changes therein while it remains attached.

4. In apparatus for facilitating the transfer of fluid loads between ship and short installations, hose handling structure comprising pivotally supported boom means, a

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carrying beam supported from said boom means, flexible hoses suspended independently from the carrying beam, cable means for lowering and elevating the boom means about its pivotal support, cable means for lowering and raising the carrying beam relative to the boom means, means for coupling and uncoupling each flexible hose independently from said carrying beam, independent counterweight means for each hose and means for attaching respective of said counterweight means independently to approximately the mid-points of respective hoses, whereby all of the hoses may be lowered together from an elevated position on lowering of said boom means and of said carrying beam, selected of said hoses then connected as desired and respectively uncoupled from said carrying beam and thereafter unselected hoses returned to elevated storage position upon re-elevation of said carrying beam and said boom means to initial positions and said independent counterweight means serving to maintain substantially uniform tautness on each connected hose regardless of positional changes therein while it remains connected.

5. In apparatus for facilitating the transfer of fluid loads between ship and shore installations, hose handling structure of the character described comprising pivotally supported boom means, a carrying beam supported by the boom means, flexible hoses supported independently from the carrying beam, cable means for lowering and raising the carrying beam independently relative to said boom means, pulley blocks on the carrying beam, detachable cables for the respective hoses mountable over respective pulley blocks, and removably attachable to the respective hoses for coupling and uncoupling each flexible hose independently from said carrying beam, and independent counterweight means for the mid-portion of each hose, whereby all of said hoses may be lowered together from an elevated storage position on lowering of said boom means and of said carrying beam, selected of said hoses then connected as desired and respectively uncoupled from said carrying beam by detachment of the detachable cables from the pulley blocks on the carrying beam over which they are mounted, and whereby unselected hoses may then be returned to elevated storage position on re-elevation of said carrying beam and said boom means to initial positions, and said independent counterweight means serving to maintain substantially uniform tautness in each connected hose regardless of positional changes therein while it remains connected.

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