# United States Patent [19]

**Billings**

[11] **3,776,403**

[45] **Dec. 4, 1973**


[54] **HOSE MINDER**


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[52] **U.S. Cl.** ..... **214/137,** 214/DIG. 11

[51] **Int. Cl.** ..... **B66f 9/00**

[58] **Field of Search** ..... 137/615, 616, 616.3, 137/616.5, 616.7; 214/DIG. 11, 135, 136, 137, 138; 191/12 R



[56] **References Cited**

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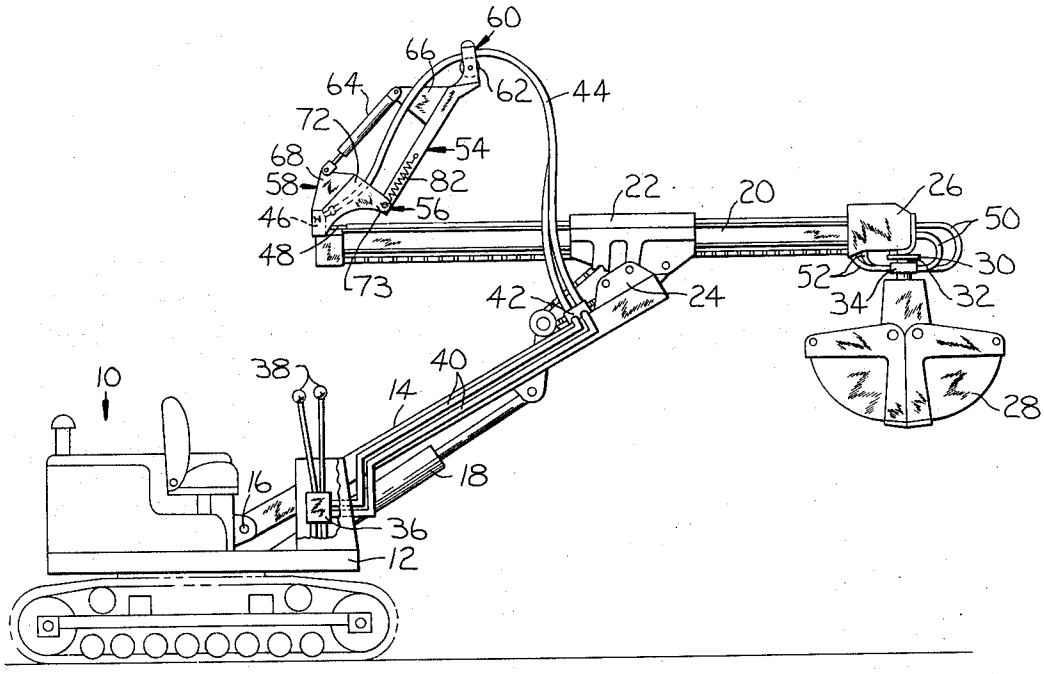
*Assistant Examiner*—John Mannix
*Attorney*—Arthur L. Morsell, Jr.



[57] **ABSTRACT**

An elongated controlling arm is hingedly connected at one end to the inner end of a dipper stick of an earth-moving crane to serve as a controller for hydraulic or pneumatic hoses which extend between the dipper stick and a boom on which the dipper stick is slideably mounted. A roller is mounted on the free end of the arm for rollably engaging the hoses. The arm is spring biased away from the boom so as to keep the hoses under tension in all positions of the boom and dipper stick. In addition, the connection of the controller arm to the dipper stick includes a pair of springs which resiliently hold the arm in contact with a bracket mounted on the dipper stick and allow the arm to be rocked from side to side in the bracket without becoming damaged or without damaging outside objects such as glass windows or siding of buildings.


**11 Claims, 9 Drawing Figures**



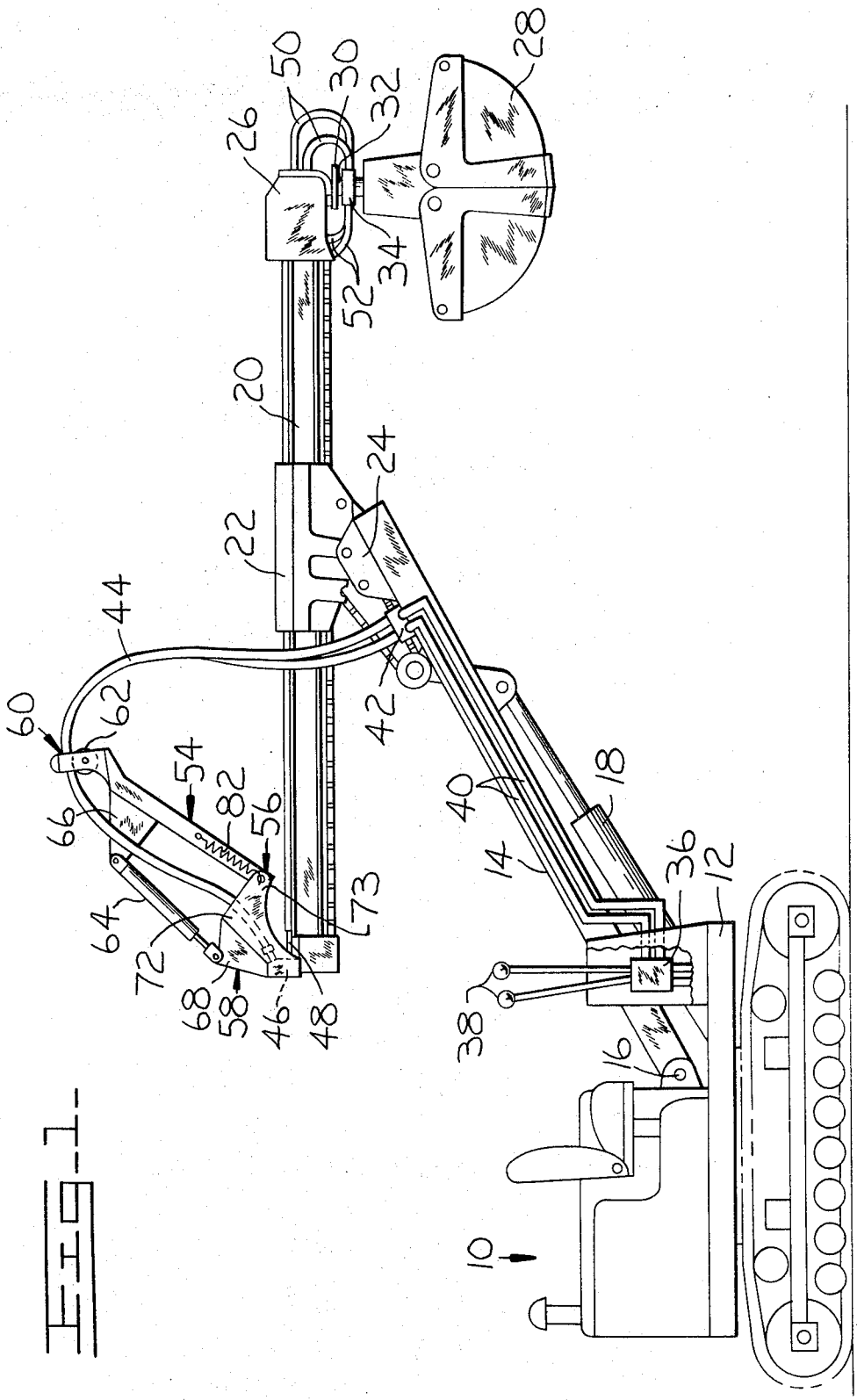

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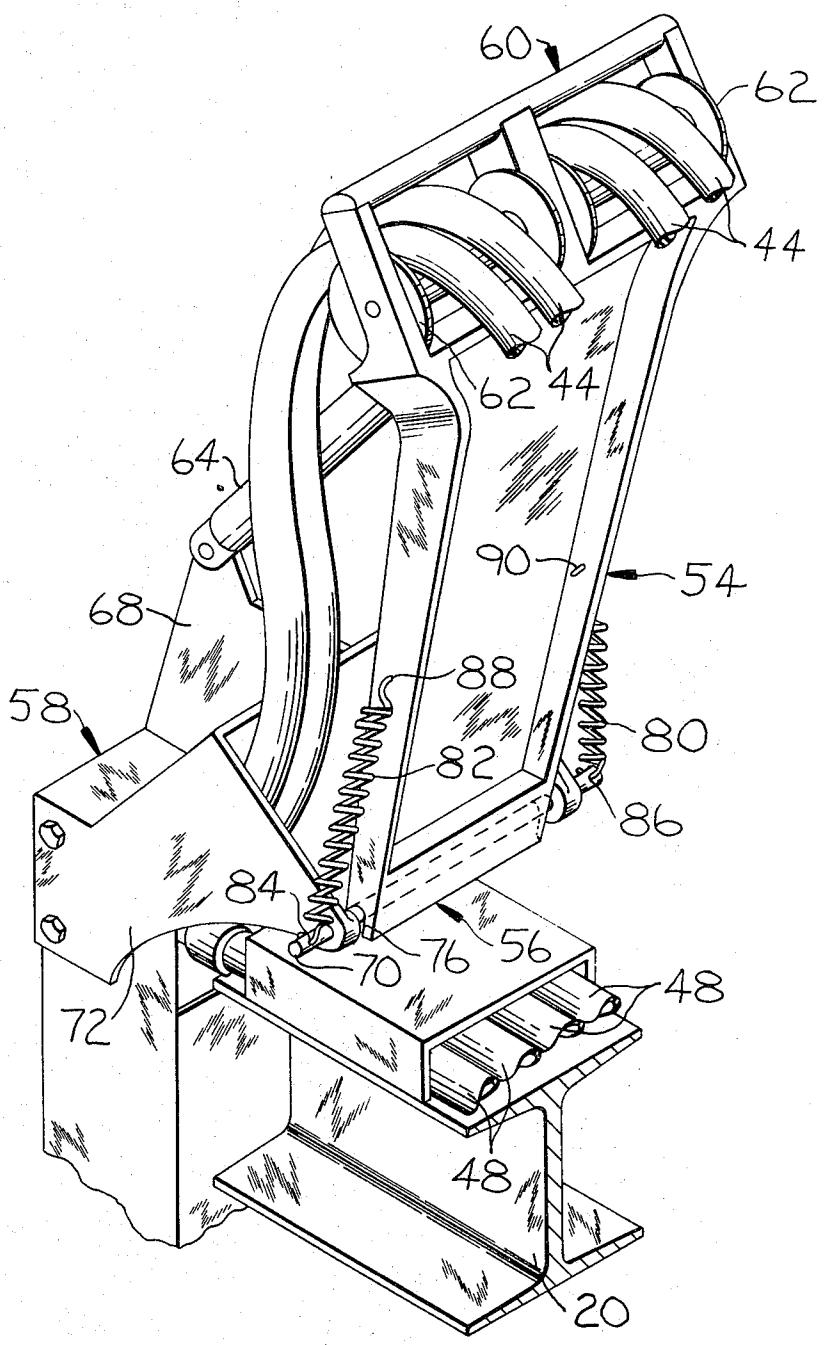
FIG-1-

FIG. 2



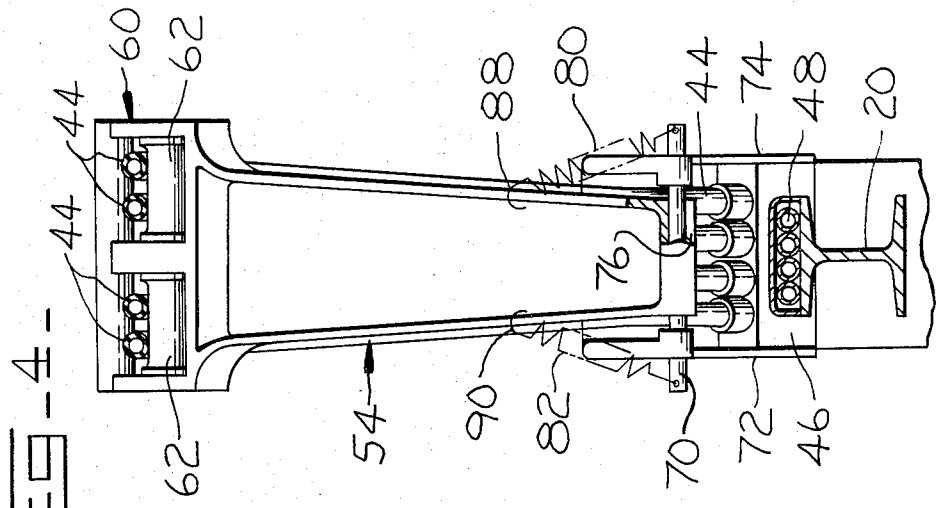

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FIG-4-

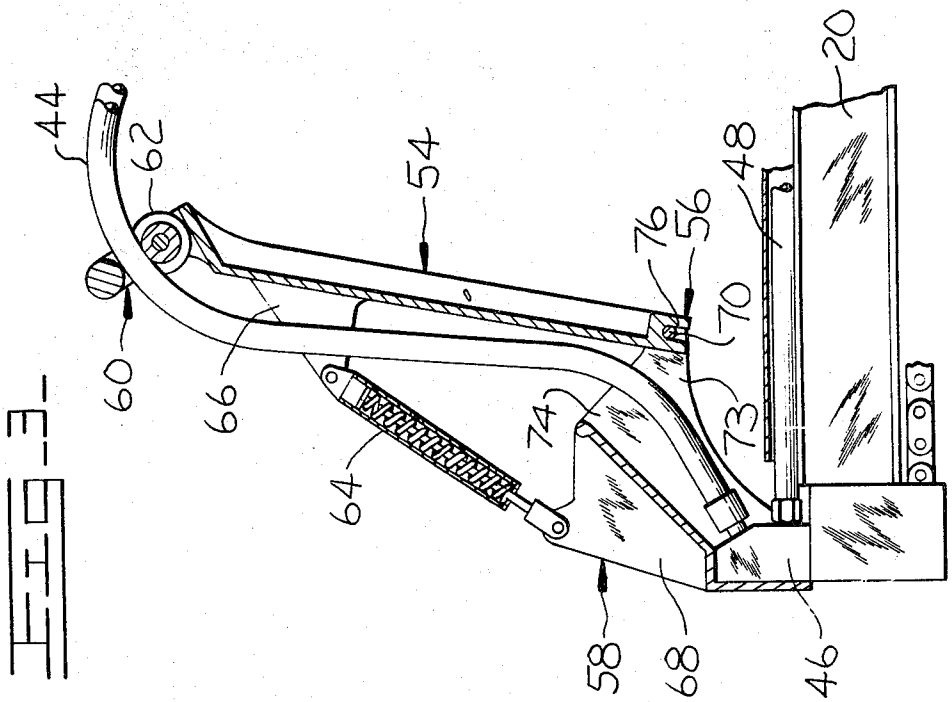
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FIG-3-

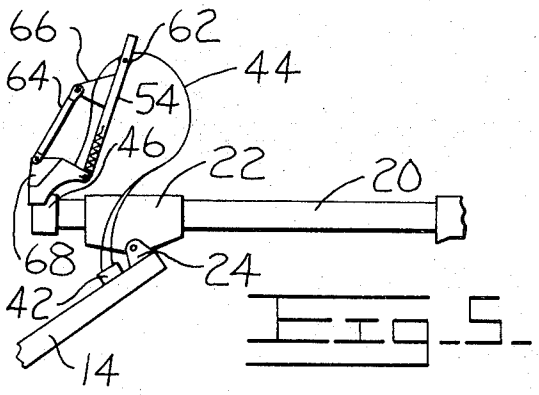


Fig. 5

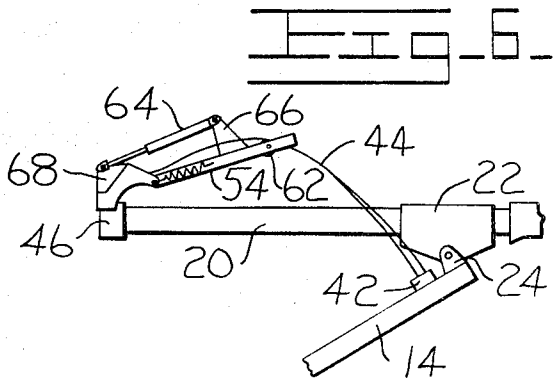


Fig. 6

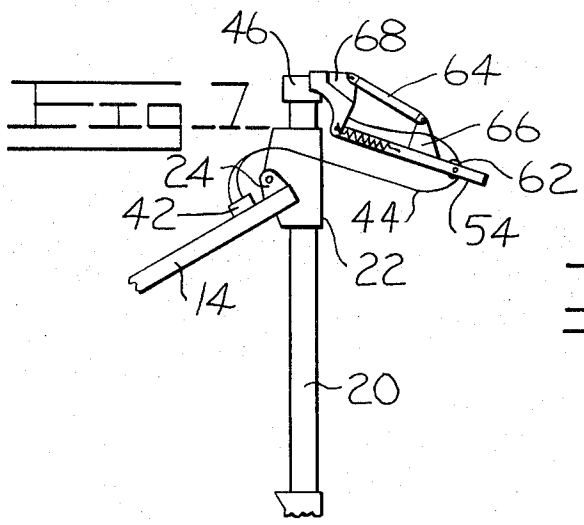


Fig. 7

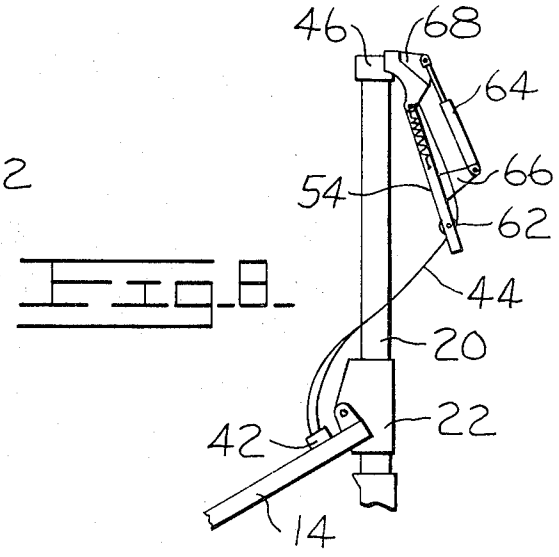


Fig. 8

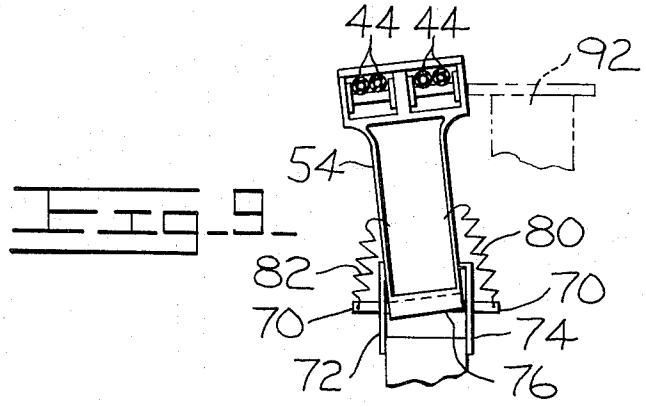


Fig. 9

# HOSE MINDER

## BACKGROUND OF THE INVENTION

This invention relates in general to hydraulically operated devices and more particularly to devices in which one or more hydraulic hoses are connected between two members that are movable relative to each other. In the past, when hydraulic hoses have been connected between two members that are movable relative to each other, the portion of the hoses extending between the two members has been allowed to hang freely with enough slack to accommodate the maximum separation between the surfaces to which the hoses were attached. This arrangement has proven workable in cases where the relative movement of the members was small, but where the relative movement of the members was large, chafing and/or kinking of the hoses has resulted and this has led to premature failure of the hoses. One example of such an application is the case of earth-moving cranes which have hydraulic hoses extending between their booms and dipper sticks. Since the booms and dipper sticks have a wide range of movement relative to each other and a wide variety of relative positions, a relatively large slack length must be provided between the two members, and this leaves room for a good deal of chafing and kinking of the hoses during relative movement of the boom and dipper stick. Loose hanging hoses also create likelihood of the hoses being damaged between the trench and the boom when digging, and there is the danger of loose hoses catching on truck bodies when such bodies are being loaded in close quarters.

As another example, there are hydraulic hoses connected between the beds and carriages of certain types of milling machines such as those having hydraulic feeds.

Accordingly, the principal object of this invention is to provide a hydraulic hose controller for preventing chafing and/or kinking of a hydraulic hose or hoses which extend between two members that are movable with respect to each other.

Another object of the invention is to provide a hydraulic hose controller of the above-noted character which is resiliently mounted so as to be yieldable in response to lateral forces applied thereto.

A further object of the invention is to provide a hydraulic hose controller of the above-noted character which maintains a continuous force on said hydraulic hose or hoses in a direction to take up slack in the hose and prevent kinking or tangling.

An additional object of this invention is to provide a hydraulic hose controller of the above-noted character which is particularly suitable for use in conjunction with a crane having a boom and a dipper stick with hydraulic hoses connected between the two relatively movable members.

Yet another object of this invention is to provide a hydraulic hose controller of the above-noted character which is simple in structure, reliable in operation, and relatively inexpensive.

## SUMMARY OF THE INVENTION

In accordance with this invention, the above-noted objects are attained by hingedly connecting an elongated controller arm to one of two movable members between which a hydraulic hose or hoses extend. The free end of the controller arm is adapted to slideably engage the hose or hoses, and the arm is spring biased away from the other movable member so as to continuously take up slack in the hose or hoses in all positions of the movable members.



## BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is an elevational view of an earth-moving crane incorporating one illustrative hydraulic hose controller of this invention, parts of the structure being broken away;

FIG. 2 is an enlarged perspective view of the hydraulic hose controller disclosed in FIG. 1;

FIG. 3 is an enlarged elevational cross-sectional view of the hydraulic hose controller shown in FIGS. 1 and 2;

FIG. 4 is an enlarged front cross-sectional view of the hydraulic hose controller shown in FIGS. 1, 2, and 3;

FIGS. 5, 6, 7, and 8 are reduced detail views showing different relative positions between the boom, dipper stick, and hydraulic hose controller of the embodiment disclosed in FIGS. 1 through 4; and

FIG. 9 is a reduced detail front view showing the hydraulic hose controller being knocked to the side by application of a lateral force thereto from an outside object.

## DETAILED DESCRIPTION OF THE INVENTION

Referring to FIG. 1, the numeral 10 denotes the tractor portion of an earth-moving crane, the tractor portion 10 including a turntable 12 upon which a boom 14 is pivotally mounted at 16. The boom 14 can be pivoted upwardly and downwardly about its pivotal connection by means of a hydraulic ram 18. A dipper stick 20 is slideably mounted in a saddle 22 which is pivotally connected to the boom 14 at an end bracket 24. An attachment head 26 is mounted on the end of the dipper stick 20 and a clamshell bucket 28 is attached thereto, there being a male pressure plate 30, a swivel shaft 32, and a hydraulic actuator 34. The attachment 26 has a female pressure plate on its bottom surface which interacts with the male pressure plate, as more clearly disclosed in my prior U.S. Pat. No. 3,143,229, dated Aug. 4, 1964. The swivel shaft 32 is adapted to support the clamshell bucket 28 or a variety of other implements such as twin hooks, trencher attachment, slope mowers, and the like. The hydraulic actuator 34 interacts with the swivel shaft 32 for rotatably adjusting the implements as is disclosed in detail in my prior U.S. Pat. No. 3,633,773, dated Jan. 11, 1972.

The hydraulic actuator 34 is the most remote unit in the hydraulic system, said system including a control unit 36 mounted upon the turntable 12 of the crane. The control unit 36 includes a source of hydraulic fluid under pressure, a double acting hydraulic control valve, and manual controls 38 for the control valves as is well known in the art. The control unit 36 and other parts of the hydraulic system of the turntable are connected by means of hydraulic conduits 40 to a junction block 42 near the end of the boom 14. Although the hydraulic conduits 40 are shown diagrammatically in FIG. 1, it will be understood by those skilled in the art that the conduits 40 are mounted along the boom 14 in accordance with well-known prior art practices.

The junction block 42 is coupled by means of hydraulic hoses 44 to a junction block 46 (see FIG. 3) which is mounted on the inner end of the dipper stick 20. From junction block 46, the hydraulic fluid is con-

ducted through hydraulic conduits **48** (see FIG. **2** to the attachment **26** on the outer end of the dipper stick **20.** The hydraulic fluid is then conducted by means of hydraulic conduits **50** and **52** to the hydraulic actuator **34** or other hydraulically operated device. The hydraulic fluid which is applied through the hoses **50** and **52** to the hydraulic actuator **34** serves to rotatably adjust the clamshell bucket **28** and to open and close it as disclosed in detail in my above-noted U.S. Pat. No. 3,633,773.

The portion of the above-described hydraulic system that is of concern in connection with this invention is the portion which lies between the junction block **42** on boom **14** and the junction block **46** on dipper stick **20.** The hydraulic connection between these two junction blocks is effected by means of four hydraulic hoses **44.** Hydraulic hoses **44** are relatively long to accommodate the extreme separation that can occur between the junction blocks **42** and **46** as the crane is used for normal digging operations. FIGS. **5** through **8** show the different positions that can be assumed by the boom **14** and the dipper stick **20,** which variety of positions require the relatively long hoses **44.** It can be seen in FIGS. **5** through **8** that without some hose controlling means interacting between the dipper stick **20,** boom **14,** and hydraulic hoses **44,** the hoses **44** could become seriously damaged in a short time under normal operation of the crane. In accordance with this invention, however, such damage is prevented by means of the improved hydraulic hose controller.

The hydraulic hose controller of this invention includes an elongated retainer arm **54** which is hingedly connected at **56** to a bracket **58** which is mounted on one end of the dipper stick **20.** The other end of the controller arm **54** has an angled end **60** in the form of a guiding loop in which rollers **62** are mounted for rollably engaging and guiding the hydraulic hoses **44.** As best shown in FIG. **2,** two rollers **62** are provided to accommodate four hydraulic hoses **44** in this particular embodiment of the invention. Referring to FIG. **1,** the controller arm **54** is normally biased away from the boom **14** by suitable means such as an encased expansion spring **64** which is attached at one end to a fin **66** that projects from the upper portion **60** of controller arm **54,** the spring **64** being attached at its other end to a fin **68** or rearward projection which extends from the bracket **58.** The fins **66** and **68** extend rearwardly far enough from their respective members **54** and **58** to provide adequate clearance for the hoses **44** as they are guided around the rollers **62** and downward into the junction block **46.** The expansion spring **64** is long enough to provide a positive spring tension over the full range of variation of position between the dipper stick **20** and the boom **14** as illustrated in FIGS. **5** through **8.** FIGS. **5** and **7** show the positions where the spring **64** is in its shortest condition, and the FIGS. **6** and **8** show the positions where the spring **64** is in its most elongated condition. The spring assembly may be suitably adjusted to always urge the arm **54** to upright position.

Since the arm **54** extends a substantial distance from the end of the dipper stick **20** in some positions thereof, it is preferable to have the hinged connection between the arm **54** and dipper stick **20** resiliently yieldable in response to lateral forces so that if the arm **54** accidentally brushes against a structural unit it will not be damaged thereby. Such a resiliently yieldable mounting is provided at the end **56** of the arm **54.**

Referring to FIG. **2,** a rod **70** extends between the opposing side walls **72** and **74** of the bracket **58,** said side walls having a forward projection **73.** The lower end of the arm **54** is slotted as at **76** to slideably engage the rod **70.** The arm **54** is normally held in contact with the rod **70** by means of two angularly disposed springs **80** and **82** which connect between openings in the ends of the rod **70** at **84** and **86** and in the arm **54** at **88** and **90.** The distance between the side edges **72** and **74** of the bracket **58** is somewhat greater than the width of the arm **54** so that the arm **54** can be rocked laterally as illustrated in FIG. **9,** in which the arm **54** has been rocked to one side by contact with a structural unit **92.** It will be apparent to those skilled in the art that the amount of lateral motion that can be tolerated in this mounting is determined by the depth of the slot **76** and the clearance between the arm **54** and the sides **72** and **74** of the bracket **58.** In the preferred embodiment the arm **54** is an open rectangular frame as illustrated.

Although this invention has been described in connection with specific embodiments thereof, it should be understood that the invention is not limited to the disclosed embodiments, since many modifications can be made in the disclosed structure without changing its essential principles of operation. Many such modifications will be apparent to those skilled in the art, and this invention includes all such modifications as may fall within the scope of the following claims.

What I claim is:

**1.** A hydraulic hose controller in combination with a device having a first member which is movably connected to a second member, said device having a source of hydraulic fluid under pressure connected to said first member, having a hydraulically operated device attached to said second member, and having hydraulic conduit means connected between said source of hydraulic fluid and said hydraulically operated device, which conduit means includes a flexible hydraulic hose portion connected between said first and second members, said hydraulic hose controller comprising a controller arm hingedly connected at one end to said second member for movement toward and away from the latter, guiding means on the other end of said controller arm engaged by a portion of said hydraulic hose intermediate its length, and biasing means between said second member and said controller arm normally urging the arm away from said second member to thereby continuously prevent slack in said hose.

**2.** The combination as claimed in claim **1** in which there is means providing for yielding lateral movement of the controller arm in response to side impact.

**3.** The combination as defined in claim **1** wherein said guiding means includes roller means positioned to rollably engage the hose.

**4.** The combination as defined in claim **1** and further comprising a mounting bracket attached to said second member and to which said controller arm is hingedly connected.

**5.** The combination as defined in claim **4** wherein said mounting bracket has a rod extending between two laterally spaced portions thereof and wherein said controller arm is laterally slotted at said one end thereof to hingedly engage said rod while providing for relative lateral movement between the rod and arm.

6. The combination as defined in claim 5 and further comprising additional spring means connected between said mounting bracket and said controller arm for resiliently urging the controller arm to a position where the plot of the arm is fully engaged with said rod.

7. The combination as defined in claim 6 wherein the lower end of said controller arm is slotted throughout the width of said arm, said slotted portion being hingedly engaged with said rod and being resiliently urged in contact therewith by said additional spring means.

8. The combination as defined in claim 7 wherein said additional spring means comprises two springs each extending from one end of said rod to a corresponding side of said controller arm.

9. The combination as defined in claim 1 in which the first member is the boom of a crane, and in which the second member is a dipper stick which is slideably and pivotally connected thereto, and in which the hinged connection between the controller arm and dipper stick provides for pivotal movement of the arm toward the outer end of the dipper stick and toward a position of parallelism therewith.

10. The combination as claimed in claim 4 in which the mounting bracket has longitudinally spaced forward and rearward hinge projections, and in which the controller arm is hinged to said forward projections, and in which there is spring means connected between said rear projection and a projection from an upper portion of the arm, and in which a portion of the hose is guided between said arm and spring means toward said bracket.

11. The combination as defined in claim 5 in which the first member is the boom of a crane, and in which the second member is a dipper stick which is slideably and pivotally connected thereto, and in which the hinged connection between the controller arm and dipper stick provides for pivotal movement of the arm toward the outer end of the dipper stick and toward a position of parallelism therwith.

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