May 9, 1967

J. T. PARRETT

3,318,199

FLUID FEED LINES

Filed Oct. 21, 1965

2 Sheets-Sheet 1

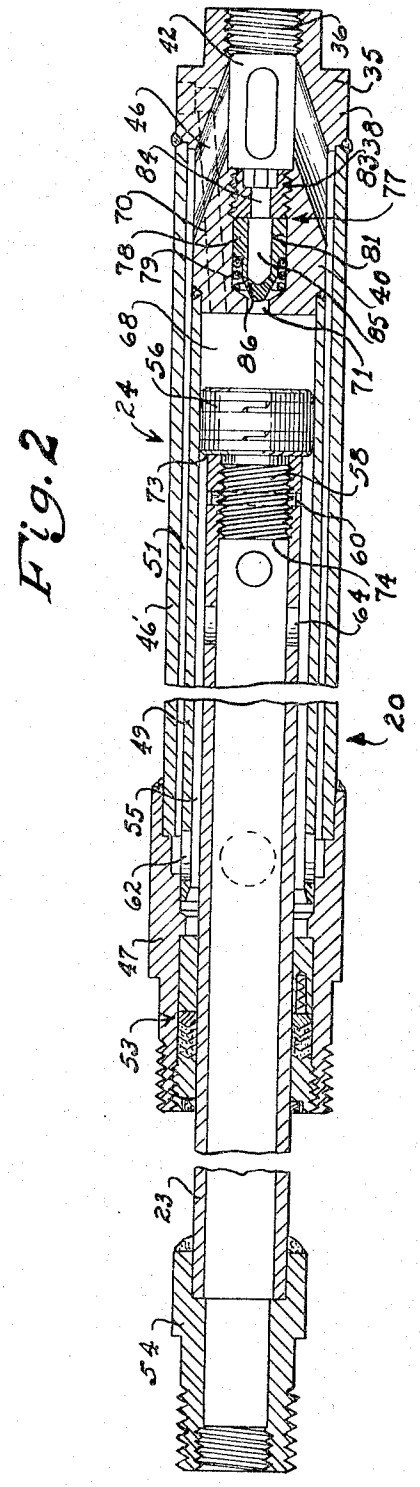


Fig. 2

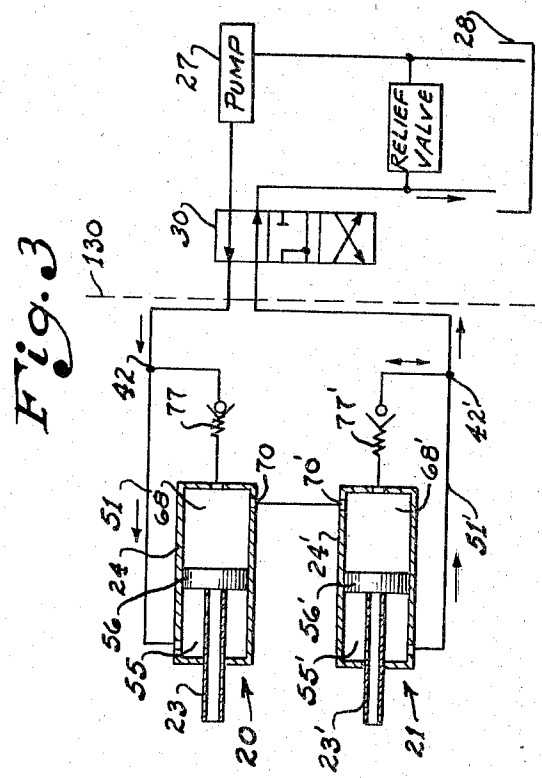


Fig. 3

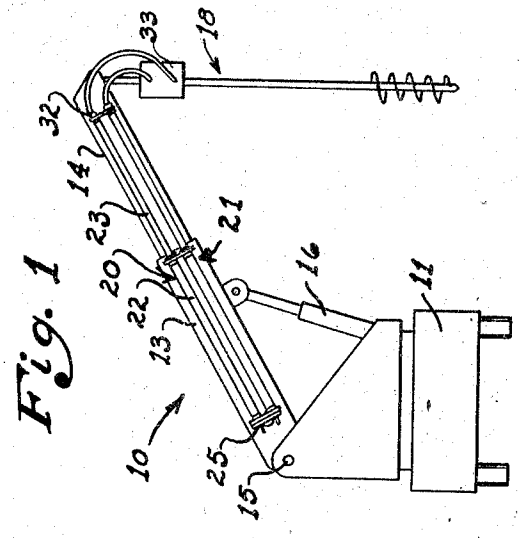


Fig. 1

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Fig. 5

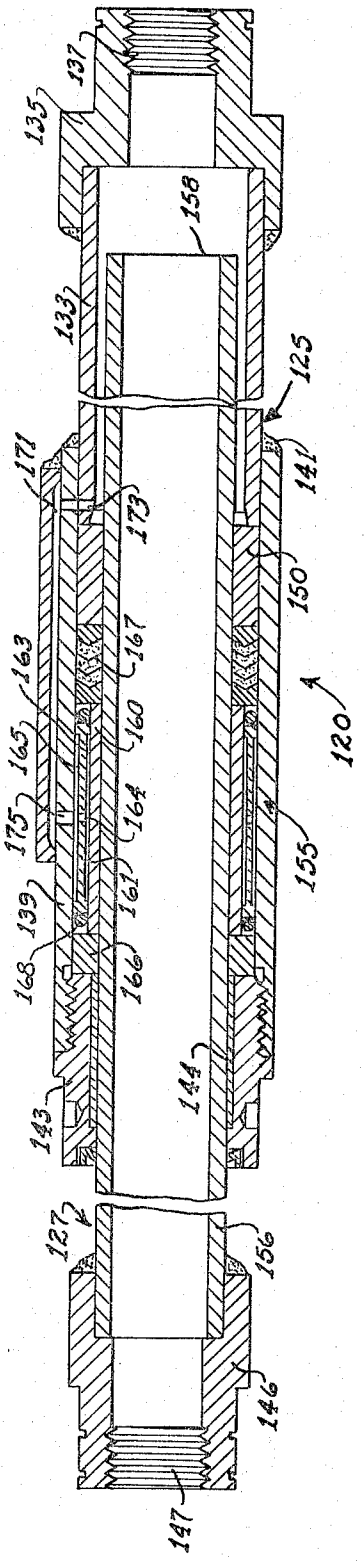
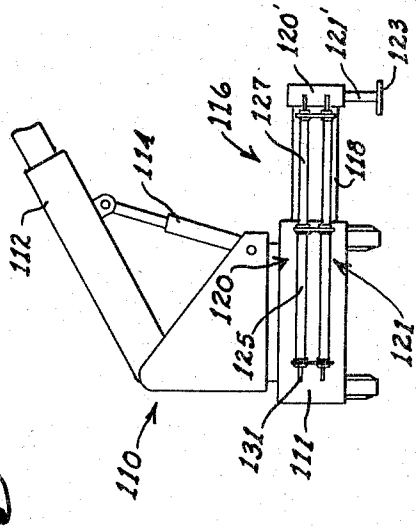


Fig. 4



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FLUID FEED LINES

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16 Claims. (Cl. 91—462)

This invention relates generally to a fluid or hydraulic system, and more particularly to a hydraulic system for conveying fluid to a remotely positionable motor.

One means employed in the past to convey hydraulic fluid from a source of fluid under pressure to a remotely positionable motor has been what is commonly known in the art as telescopic feed lines. These feed lines find their principal use on mobile cranes and derricks. One type of such equipment utilizes a telescopic type boom in which the boom tip may be extended or retracted axially to vary the length of the boom to match operational requirements. Oftentimes such equipment utilizes hydraulically operated tools suspended from the boom tip. To convey motive fluid from the machine base to these power operated tools it has been conventional to employ telescopic feed lines having sections fixed to the movable portions of the boom which allow the boom to be extended or retracted independently of the operation of the hydraulic tools.

Another application of telescopic feed lines in the same environment is in connection with "outrigger" cylinders, which are used to stabilize mobile equipment to prevent overturning. One method of mounting outrigger cylinders is to fasten them to the ends of horizontal telescopic type beams which allow the outrigger cylinders to be moved horizontally outwardly from the side of the equipment to secure a wider base. The outrigger cylinders are mounted vertically on the ends of the beams, and after extending the beams are operated to contact the ground and thus support the equipment.

In prior known telescopic feed lines in both of the above described applications, a rigid inner tube is provided slidable within a rigid outer tube in telescopic fashion. A severe limitation on the utility of these telescopic feed lines is that the end of the inner tube is subjected to hydraulic fluid pressure within the tubes and forms what might be termed a hydraulic actuator which tends to separate the inner tube from the outer tube. The force created by this hydraulic actuator action within the prior known feed lines tends to buckle the extending portion of the inner tube in column action. While it is theoretically possible to strengthen the inner tube to withstand this column action, this has not proved to be a desirable solution.

In accordance with the present invention, the above described disadvantages in prior known telescopic feed lines have been overcome by providing a telescopic feed line which balances or overcomes the inherent undesirable extending force in prior known feed lines so that a feed line of any length may be made without any tendency to buckle.

It is therefore a primary object of the invention to provide a new and improved telescopic feed line for delivering fluid to a remotely positionable motor which eliminates the column or axially compressive force on the extending portion of the inner tube to overcome the problem of buckling in prior known telescopic feed line constructions.

A further object of the present invention is to provide a new and improved telescopic feed line of the type described above which places a continuous tensile force on the inner tube of the telescopic feed line to prevent buckling thereof and which is adapted to be operative even when the feed line is collapsing or extending so that the remotely positionable motor may be continuously driven without interruption if desired.

A further and more specific object of the present invention is to provide a new and improved telescopic feed line in accordance with one embodiment disclosed in this specification in which the inner telescopic tube has an enlarged piston at one end thereof slidable within the outer tube and defining therein a hydraulic chamber which receives high pressure fluid from the pressure source to place the inner tube under a continuous tensile force.

A still further object of the present invention is to provide new and improved telescopic feed lines in accordance with the embodiment described generally immediately above in which the piston also defines a second chamber within the outer tube, with this chamber being connected to low pressure so that there is no compressive or column action on the inner tube of the telescopic feed line.

Still another object of the present invention is to provide a new and improved hydraulic system of the type described above employing telescopic feed lines in which two identical feed lines of the type described are provided for selectively conveying fluid to and from the motor, with a control valve for selectively connecting each of the feed lines to a source of fluid under pressure or to a drain, each of the outer tubes being provided with normally open poppet valves responsive to high pressure fluid in the respective feed lines for connecting the chambers on one side of the piston to a low pressure return passage to maintain these chambers at low pressure and prevent any compressive force on the inner tube.

A still further object of the present invention is to provide a new and improved hydraulic system of the type described immediately above particularly adapted for conveying fluid to a fluid operated tool on the end of an extendable boom, with the feed lines arranged so that they convey fluid to the tools in any extended position of the boom and even when the boom is extending or distending.

Still another object of the present invention is to provide a new and improved hydraulic circuit for supplying fluid to a remotely positionable motor through new and improved hydraulic feed lines according to another embodiment of the present invention in which the normally compressive forces on the extending end of the inner tube are eliminated or counteracted by a sleeve-like clamp surrounding the inner tube and mounted within the outer tube, actuable by hydraulic fluid from the pressure source to clamp the inner tube and prevent any tendency to extend it from the outer tube.

A more specific object of the present invention is to provide a new and improved hydraulic system for supplying fluid to remote loads where a first member carries a second exensible support member with the second member having a motor at the distal end thereof, with a source of fluid under pressure adapted to provide hydraulic fluid for the motor, with a feed line for conveying fluid from the source to the motor means including a first tube fixed with respect to the first member, a second tube fixed with respect to the second member in telescopic relation with the first tube so that upon extension of the second member the tubes will extend, there being provided means for connecting the first tube to the source of fluid under pressure and the second tube to deliver fluid to the motor means, there being also provided spaced seals defining a chamber within the distal end of the first outer tube and engaging the inner tube, a flexible sleeve within the chamber between the seals and adapted to selectively clamp against the inner tube with generally radial passage means in the outer tube extending from the chamber, axially extending passage means connected with said radial passage to a second radial passage means in said first tube communicating

with the interior of the first tube, the first and second tubes being spaced apart adjacent the second radial passage so that the latter passage can communicate with high pressure fluid flowing through the tubes and the sleeve member clamps against the inner tube in response thereto.

Another object of the present invention is to provide a new and imporved hydraulic system of the type described immediately above particclarly adaptable for delivering fluid to and from an outrigger cylinder at the end of an extensible beam adapted for use in balancing mobile equipment.

Other features and advantages of the invention will be apparent from the following description of certain embodiments thereof taken in conjunction with the accompanying drawings. Of the drawings:

FIG. 1 is a side elevation of a mobile derrick with feed lines according to one embodiment of the present invention for conveying fluid to a rotary fluid operated tool on the distal end of the boom.

FIG. 2 is a cross section of a feed line which is particularly suitable for use with the embodiment shown in FIG. 1.

FIG. 3 is a generally schematic illustration of a hydraulic fluid circuit adapted for use in the embodiment shown in FIGS. 1 and 2.

FIG. 4 is a side elevation of a mobile derrick or crane having outrigger cylinders employing feed lines according to a second embodiment of the present invention; and

FIG. 5 is a cross sectional view of a feed line according to the second embodiment of the present invention.

Referring now to FIGS. 1 to 3 wherein the first embodiment of the present invention is illustrated, and particularly to FIG. 1 thereof, a mobile derrick or crane generally designated by the numeral **10** is seen to consist of a frame member **11** and an extensible boom including a first member **13** and a second member **14** axially slidable with respect to member **13**. Boom member **13** is pivotally connected to the frame as at **15** and the boom is raised or lowered in arcuate movement by a suitably connected hydraulic actuator **16**. The distal end of boom member **14** carries a fluid or hydraulically operated tool **18** which may take the form of a rotary auger. However, it should be understood that other tools may be usable as well. It should also be noted here that conventional means are provided for extending boom member **14** and for fixing it at a desired location with respect to member **13**.

For conveying fluid under pressure to the hydraulic tool **18** and for returning fluid therefrom, hydraulic feed lines **20** and **21** are provided. These feed lines are identical in construction so that when reference herein is made to the construction of one of them it will be understood that it applies equally well to the other. Feed lines **20** and **21** consist of an outer tube **22** fixed to boom member **13** and an inner tube **23** fixed to boom member **14** and slidable within the outer tube **22**. The lower ends **25** of each of the outer tubes **22** are adapted to be selectively connected to a source of fluid under pressure, such as pump **27** (FIG. 3) or a tank **28** through a directional control valve **30** described in more detail below. The distal ends **32** of the inner tubes **23** are hydraulically connected to the opposite sides of a motor **33** which drives the tool **18**.

In this manner hydraulic fluid is supplied from a source to a remotely positionable motor **18** through the hydraulic feed lines **20** and **21**, with the feed lines being collapsible and extensible so that they permit the boom members **13** and **14** to be extended as desired without interfering with the operation of the tool **18**.

Referring now to FIG. 2 wherein the telescopic feed lines **20**, **21** are shown in more detail, the outer tube **24** is seen to include a generally cylindrical fitting **35** having an internally threaded boss **36** adapted to be connected through a suitable hydraulic fitting to the directional control valve **30** shown in FIG. 3. Fitting **35** has an annular flange **38** and a cylindrical axially extending projection **40**. A centrally disposed bore **42** extends through the fitting **35**

and communicates with four circumferentially spaced angularly extending passages **46** in the fitting **35**. The telescopic outer tube **24** has an outer sleeve **46'** fixed at one end to the flange **35** and at the other end to fitting **47**. An inner sleeve **49** is fixed at one end to cylindrical projection **40** and at the other end to fitting **47**. Sleeves **46'** and **49** are spaced defining an axially extending passage **51** which communicates with the passages **46** in the fitting **35**.

Fitting **47** has suitable bearing and seal means generally indicated by the numeral **53** which slidably receive the inner tube **23**. The outer end of the inner tube **23** carries a suitable fitting **54** adapted to be connected through flexible conduits to one of the ports in motor **33**. The outer diameter of tube **23** is less than the inner diameter of sleeve **49** so that there is defined therebetween a chamber **55** closed at one end by the seal **53** and at the other end by a solid piston **56** carried by the inner end of tube **23**. Piston **56** has a projection **58** threaded within the tube **23** and locked therein by a suitable pin **60**.

Communication is provided between passage **51** between the sleeves **46'**, **49** and the chamber **55** between the inner tube **23** and the sleeve **49** by radial ports **62** at one end of sleeve **49**. To permit fluid flow from the chamber **55** to the inside of tube **23** and hence to the motor **33**, radial ports **64** are provided at the inner end of tube **23**. Thus, it may be seen that when high pressure fluid is delivered to bore **42** in fitting **35** it flows through ports **46** to the axial annular passage **51**, hence through radial ports **62** and **64**, through the inside of tube **23** to drive the motor **33** and the tool **18**. Piston **56** defines within the inner sleeve **49** a second chamber **68** adapted to be placed in communication with low pressure through either passage **70** or **71** in the fitting **35** as will appear hereinafter.

It may thus be seen from the construction of the present invention described with reference to FIG. 2 that all the compressive or column forces on the inner tube **23** have been eliminated and in fact in this embodiment a continuous tensile force is applied to tube **23** by high pressure fluid in chamber **55** acting on the annular piston area **73** and the fluid in the inside tube **23** acting on surface **74** of the piston **56**. All the axially compressive or column forces acting on tube **23** have been eliminated as will appear obvious due to the fact that chamber **68** is continuously connected to low pressure.

As described above, the feed lines **20** and **21** are adapted to either deliver fluid under high pressure to the motor **33** or to return fluid therefrom to the tank **28**. Toward this end normally open poppet valves **77** are provided for permitting communication between chamber **68** and passage **42** when the latter passage is connected to the tank **28** which is of course at a relatively low pressure. Poppet valve assembly **77** consists of a movable piston-like valve member **78** slidable in fitting **35** and spring biased to its open position by a coil spring **79** seated within a bore **81** in the fitting **35**. Spring **79** biases the valve member **78** against a normally stationary plug **83** which has a central opening **84** therethrough. The movable valve member **78** also has a passage **85** therein which conveys fluid from chamber **68** and restricted passages **86** when the valve is open. When high pressure fluid is admitted to passage **42** fluid will flow through passage **84** in plug **83** and into bore **85** in the movable valve member causing the valve member to close and preventing the flow of fluid under pressure to chamber **68**. On the other hand, when passage **42** is connected to drain by the directional control valve **30**, spring **79** will move valve member **78** to a position against the plug **83**, thereby opening the valve and permitting fluid to flow from chamber **68** to chamber **42** and tank or vice versa. The manner in which passages **70** and **71** maintain chamber **68** in continuous communication with low pressure and permit the boom to be extended as desired without interrupting fluid flow to the tool will be described below with reference to FIG. 3.

In viewing FIG. 3, directional control valve **30** is a conventional four-way directional control valve as shown only schematically. For the sake of clarity the reference

numerals designating telescopic feed line 21 in FIG. 3 are the same as those of the line 20 except that they are primed to distinguish therebetween although, as noted above, both feed lines are identical in construction. With the control valve 30 in its lowermost position as shown, the hydraulic circuit is such that high pressure fluid will be delivered from pump 27 through the control valve 30, through feed line 20 to one side of the hydraulic motor 33 and from the other side of the hydraulic motor 33 through the feed line 21, through control valve 30 and to the tank 28. High pressure fluid flowing through the control valve 30 and into passage 42 closes the check valve 77. Fluid flows through passage 51 into the rod end of piston 56 and through tube 23 to the motor. At this time chamber 68 communicates with the low pressure side of the system through passage 70 which is interconnected with passage 70', chamber 68' in the feed line 21, open poppet valve 77' and port 42'. As control valve 30 places port 42' at low pressure at this time poppet valve 77' is open and permits this low pressure communication. Fluid flows from the motor 33 to the tank through rod 23', passage 51', port 42', and control valve 30. The boom may be extended or retracted at this time and it will have no effect on the operation of the hydraulic feed line circuit shown in FIG. 3. Thus, if the inner tubes 23 and 23' are moved to the right or to the left in the outer tubes 24 and 24', as shown in FIG. 3, the same hydraulic relationships will be maintained. For example, if tubes 23 and 23' were moved to the left by extending boom member 14 when feed line 20 is pressurized, fluid will flow through passage 42' and poppet 77' to both chambers 68 and 68'. At the same time the volume of chambers 55 and 55' will be reduced.

One important feature of the present construction is that for every foot of collapsed length of the tubes 23 and 24 the inner tube is permitted to extend a substantially equal length from the outer tube. This permits the use of a smaller collapsed length feed line for a given operational requirement, that is, a given extended length.

If control valve 30 is placed in its central position both hydraulic feed lines 20 and 21 will be ported to tank. On the other hand, if the control valve is moved to its upper position, hydraulic feed line 21 is connected to high pressure and hydraulic feed line 20 is connected to tank. This simply reverses the operation of the system providing a symmetrical output and permitting the motor 33 to rotate the tool 18 in a reverse direction if desired. The operation of the system in this mode is the same as that described above, except reversed so that it need not be described in detail.

Referring now to FIGS. 4 and 5, wherein the second embodiment of the present invention is shown, and particularly with reference to FIG. 4, a mobile derrick or crane 110 is seen to include a frame member 111 and an extendable boom 112 adapted to carry an operating implement at its distal end (broken for clarity in FIG. 4). The boom 112 is carried by the frame 111 and is adjustable with respect to the frame by means of a hydraulic cylinder 114. An outrigger assembly 116 is provided for stabilizing the crane or derrick and resisting the tilting moments thereon caused by loads imposed on the boom. The assembly 116 includes a horizontally extending beam 118 extendable and retractable with respect to the frame 111. Suitable means (not shown) are provided for clamping the beam 118 at its extended position to the frame 111. The end of the beam 118 carries a hydraulic cylinder 120' which has a piston slidable therein. The piston carries a rod 121' having a generally flat plate 123 at the end thereof defining a jack member which engages the ground to give the frame 111 the necessary support.

Telescopic feed line assemblies 120 and 121 are provided for delivering fluid from a suitable source to the opposite sides of the piston in the actuator cylinder 120'. As in the embodiment of FIGS. 1 to 3, the feed lines 120 and 121 are identical in construction so that it will be understood that a descriptive reference to one applies equally as well to the other. The feed lines 120 and 121 have an outer tube member 125 affixed with respect to the frame 111 and an inner tube member 127 slidable within the outer tube member 125 and affixed with respect to the movable outrigger beam 118. Each of the tubes 120 and 121 is adapted to either conduct fluid to or from the hydraulic actuator 120' so that the jack 123 may be positively driven either upwardly or downwardly.

The telescopic feed tubes 120 and 121 require a somewhat simplified version of the hydraulic circuit in FIG. 3. More specificially, the portion of the hydraulic circuit in FIG. 3 to the right of dotted line 130 may be hydraulically connected to the ends 131 of the outer tubes 125 as shown in FIG. 4. This portion of the hydraulic circuit operates in a manner similar to that described above with respect to FIG. 3 and suffice it to state that the control valve 30 is operable to selectively port high pressure fluid from pump 127 through either of the feed lines 120 and 121 to raise and lower the jack 123 as desired.

Referring to FIG. 5 and the construction of the telescopic feed lines 120 and 121 in more detail, the outer tube 125 is seen to include a tubular sleeve 133 having a fitting 135, suitably fixed to the end thereof as by welding. It should be understood that tube 133 is broken in FIG. 5 for the sake of illustration and that in actual practice it is of considerably longer length. Fitting 135 has threaded opening 137 which is adapted to receive a hydraulic fitting connected to the control valve 30. At the left end of the tubular sleeve 133 is a relatively short sleeve 139 which surrounds the distal periphery of tubular sleeve 133 and is welded thereto as at 141. A suitable end cap 143 is threaded within the distal end of sleeve 139 and carries a suitable bearing member 144 which slidably receives the inner tube 127.

The inner tube 127 has a suitable fitting 146 at the end thereof which is threaded as at 147 to receive a hydraulic fitting connected to one side of the hydraulic jack cylinder 120'. As with the tubular sleeve 133, the inner tube 127 is broken in FIG. 5 for clarity, but it should be understood that it too is of substantially greater length. It is sufficient to state at this point that he inner tube 127 and the outer tube 125 are constructed so that when collapsed the inner tube 127 projects only slightly from the outer tube 125 to accommodate the fitting 146, and that for every increment of collapsed length the inner tube 127 may be extended from the outer tube a substantially equal distance. Another annular bearing member 150 is received within the sleeve 139 and abuts one of tubular sleeve 133. Bearings 144 and 150 serve to align and guide the inner tube 127 within the outer tube 125.

In the FIGS. 4 and 5 embodiment, a tube locking assembly 155 is provided for preventing any compressive or column force on the extending portion 156 of the inner tube 127. As noted generally above, the hydraulic reaction forces on the end 158 of the inner tube tend to force the inner tube from the outer tube 125. As beam 118 in FIG. 4 is fixed to the frame 111, the inner tube is incapable of such movement when the outrigger assembly 116 is positioned and fixed so that this hydraulic force on the inner tube end 158 would, in a conventional construction, tend to collapse or buckle the extending portion 156 of the inner tube 127.

The tube locking assembly 155 includes a phenolic resin sleeve 160 which surrounds and closely fits the inner tube 127. The sleeve 160 is somewhat flexible so that it may be selectively clamped against the inner tube. Toward this end another sleeve 161 is provided surrounding the phenolic resin sleeve 160 and has a reduced plurality of axial extending grooves 163 on the inner surface thereof that define hydraulic chambers which carry fluid to effect the constriction of the sleeve 160. Radial passage 164 communicates with the chamber 163 and with a circumferentially extending chamber 165 on the outer periphery of sleeve 161.

Suitable annular seals **166** and **167** flank the ends of sleeve **160** to prevent the egress of hydraulic fluid along the inner tube. O-ring seals **168** are seated between the sleeve **160** and the outer sleeve **139** adjacent the ends of sleeve **161** to prevent the escape of hydraulic fluid from chamber **165** and chamber **163**.

For the purpose of providing communication between the chamber **165** and high pressure fluid flowing through the feed line, an axial extending projection **170** is fixed to the outer surface of sleeve **139** and has a fluid passage **171** formed therein. Passage **171** communicates with the interior of the tubes **125** and **127** through a radial passage **173** extending through sleeves **139** and **133**. The other end of passage **171** communicates with chamber **165** through another radial port **175** in sleeve **139** adjacent tube lock assembly **155**. The size and number of passages **173** and **175** may be varied, as desired, to achieve the necessary clamping action. It should be noted that the outer diameter of tube **127** is less than the inner diameter of tubular sleeve **133** so that fluid may flow therebetween.

As fluid is ported to the fitting **137** from the directional valve **30**, a portion of this fluid flows around the space between the inner end of tube **127** and the tubular sleeve **133**, through radial passage **173**, axial passage **171**, radial passage **175**, into annular chamber **165**, through radial ports **164**, and into the chamber **163**. High pressure fluid in chamber **163** effects a contraction of the phenolic resin sleeve **160** so that it grips the inner tube **127**. The tube clamp **155** is designed so that it exerts a sufficient gripping force on tube **127** to counteract the hydraulic force acting on the end **158** of the inner tube **127** throughout the pressure range for which the feed lines are designed. Thus, the compressive force on the inner tube caused by the hydraulic fluid flowing therein terminates at the tube lock **155** so that the extending portion **156** of the inner tube **127** is free from this compressive force or column action and has no tendency to buckle.

Thus, it may be seen that in both of the embodiments of FIGS. 1 to 3 and 4 and 5 applicant has provided a telescopic feed line in which the extending portion of the inner telescopic tube is free from any column force which in prior known devices tended to collapse and buckle same.

Having described my invention as related to the embodiments shown in the accompanying drawings, it is my intention that the invention be not limited by any of the details of description, unless otherwise specified, but rather be construed broadly within its spirit and scope as set out in the accompanying claims.

I claim:

1. A fluid system, comprising: a first member, a second member engaging said first member and being extensible with respect thereto, motor means associated with said second member, a source of fluid under pressure; and feed line means for conveying fluid from said source to said motor means including a first tube fixed with respect to said first member, a second tube fixed with respect to said second member and in telescopic relation with said first tube so that upon extension of said second member the tubes will extend, means connecting said second tube to deliver fluid to said motor means, means for preventing the buckling of said tubes under pressure including means for restraining extension of the inner one of said tubes from the outer one of said tubes.

2. A fluid system as defined in claim **1**, and further including second feed line means for returning fluid from said motor to a drain including a third tube fixed with respect to said first member, a fourth tube fixed with respect to said second member and in telescopic relation with said third tube, means for conveying fluid from said motor means to said fourth tube, and means for conveying fluid from said third tube to said drain.

3. A fluid system as defined in claim **2** wherein each of said first and second feed line means is adapted to convey fluid to and from said motor to provide a reversible system, and control valve means for selectively porting fluid from said source to either of said first or second feed line means.

4. A fluid system, comprising: a first member, a second member engaging said first member and being extensible with respect thereto, motor means associated with said second member, a source of fluid under pressure; and feed line means for conveying fluid from said source to said motor means including a first tube fixed with respect to said first member, a second inner tube fixed with respect to said second member and telescoped within said first tube, said first and second tubes being constructed so that for each increment of collapsed length of the tubes the inner tube may project a substantially equal increment from said first tube, means connecting said first tube to said source of fluid under pressure, means for connecting said second tube to deliver fluid to said motor means, means for preventing the buckling of said tubes under pressure including means for restraining extension of the inner one of said tubes from the outer one of said tubes when the first member is stationary with respect to the second member, said means for preventing buckling of said inner tube being effective in substantially all extended positions of said first and second tubes.

5. A fluid system for supplying fluid to a remote load, comprising: a first member, a second member engaging said first member and being extensible with respect thereto, motor means carried by said second member, a source of fluid under pressure; and feed line means for conveying fluid from said source to said motor means including a first tube fixed with respect to said first member, a second tube fixed with respect to said second member and in telescopic relation with said first tube so that upon extension of said second member the tubes will extend, one of said tubes being the inner tube and slideable within the other of said tubes, piston means on the end of said inner tube, said piston having a greater diameter than said inner tube so that it defines a fluid chamber between the inner and outer tubes, and passage means in said first tube for conveying fluid under pressure to said chamber to provide a force tending to collapse said tubes, said first and second members being selectively adjustable so that collapsing of said tubes is prevented.

6. A fluid system for supplying fluid to a remote load, comprising: a first member, a second member engaging said first member and being extensible with respect thereto, motor means carried by said second member, a source of fluid under pressure; and feed line means for conveying fluid from said source to said motor means including a first tube fixed with respect to said first member, a second tube fixed with respect to said second member and in telescopic relation with said first tube so that upon extension of said second member the tubes will extend, one of said tubes being the inner tube and slideable within the other of said tubes, piston means on the end of said inner tube, said piston having a greater diameter than said inner tube so that it defines a fluid chamber between the inner and outer tubes, said piston also defining a second chamber on the other side thereof in the outer first tube, passage means in said first outer tube for conveying fluid under pressure to said first chamber to provide a continuous collapsing force on said tubes, and means connecting said second chamber to drain to prevent a hydraulic extending force on said tubes, said tubes being in constant communication so that fluid flows from said first tube to said second tube and to said motor means while said first member moves with respect to said second member and while said first member is fixed with respect to said second member.

7. A fluid system as defined in claim **6** and further including second feed line means for returning fluid from said motor to a drain.

8. A fluid system as defined in claim **7** wherein said second feed line means includes a third outer tube fixed with respect to said first member, a fourth inner tube

fixed with respect to said second member and telescoped within said third tube, said fourth tube having a piston on the end thereof slideable within said third tube, said second piston being of greater diameter than said fourth tube to define a third chamber in said third tube, second passage means in said third tube for conveying fluid to said third chamber, said second piston defining a fourth chamber on the other side thereof within said third tube; and means for selectively connecting each of said first and second feed line means to said source of fluid under pressure or to a drain including a control valve connected to selectively deliver fluid from said source to said first chamber and from said third chamber or to said third chamber and from said first chamber, and means for communicating each of said second and fourth chambers continuously with said drain.

9. A fluid system as defined in claim **8** wherein said means for communicating each of said second and fourth chambers with said drain includes means connecting said second and fourth chambers together in fluid communication, and normally open poppet valves in each of said first and third outer tubes, said poppet valves being responsive to high pressure in said first and second passages to close selectively, preventing flow of high pressure fluid to said second and fourth chambers.

10. A fluid system as defined in claim **6** wherein said first outer tube includes an outer sleeve, an inner sleeve spaced from the outer sleeve and defining therein a portion of said passage means, a fitting at one end of said first tube adapted to be connected to said fluid pressure source, said fitting communicating with the space between the outer and inner sleeves, port means in the distal end of said inner sleeve for conducting fluid from said space to said first chamber, and port means in said inner tube for conducting fluid from said first chamber to said inner tube and to the motor means.

11. A fluid system as defined in claim **6** wherein said first and second members are an extendable boom, and a fluid operated tool on the end of said boom driven by said motor means.

12. A fluid system for supplying fluid to a remote load, comprising: a first member, a second member engaging said first member and being extensible with respect thereto, motor means carried by said second member, a source of fluid under pressure; and feed line means for conveying fluid from said source to said motor means including a first tube fixed with respect to said first member, a second tube fixed with respect to said second member and in telescopic relation with said first tube so that upon extension of said second member the tubes will extend, one of said tubes being the inner tube and slideable

within the other outer tube, a flexible sleeve member in said outer tube surrounding said inner tube, a fluid chamber in said outer tube around a portion of said sleeve, and passage means in said outer tube communicating said source of fluid under pressure with said chamber so that the sleeve selectively clamps the outer tube to the inner tube thereby preventing extension of the inner tube therefrom.

13. A fluid system for supplying fluid to a remote load, comprising: a first member, a second member engaging said first member and being extensible with respect thereto, motor means carried by said second member, a source of fluid under pressure; and feed line means for conveying fluid from said source to said motor means including a first tube fixed with respect to said first member, a second tube fixed with respect to said second member and in telescopic relation with said first tube so that upon extension of said second member the tubes will extend, said second tube being the inner tube and slideable within the first tube, spaced seals defining a chamber within the distal end of said first outer tube and engaging said inner tube, a flexible sleeve in said chamber between said seals adapted to selectively clamp against said inner tube, generally radial passage means in said outer tube extending from said chamber, axial extending passage means connected with said radially extending passage means, second radial passage means in said first tube communicating with said axial passage and with the interior of said first tube, said first and second tubes being spaced adjacent said second radial passage means so that said latter passage communicates with high pressure fluid flowing through said tubes.

14. A fluid system as defined in claim **13** and further including second feed line means for conveying fluid from said motor to a drain.

15. A fluid system as defined in claim **14** wherein said first and second feed line means are disposed in generally parallel fashion; and control valve means for selectively porting fluid under pressure to one of said feed line means and the other of said feed line means to drain whereby the system is reversible.

16. A fluid system as defined in claim **15** wherein said first and second extensible members are an adjustable outrigger for balancing a mobile mechanism, a vertically movable support driven by said motor means and adjustable to engage the ground to balance the mobile mechanism.

No references cited.

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