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(54) HYDRAULIC CONNECTION AND METHOD

(71) We, MASSEY-FERGUSION SERVICES NV, a Corporation of the Netherlands Antilles, located at Abraham de Veerstraat 7A, Curacao, Netherlands Antilles, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a method for establishing a fluid-tight connection between a hydraulic unit mounted on one side of a wall member and a fluid line on the other side of the wall member. Additionally the invention is also concerned with an assembly comprising a connected hydraulic unit and line, and a hydraulic connector assembly suitable for use in connecting the hydraulic unit and line.

The invention has been developed for use on tractors in, for example, the connection of a hydraulic unit in the form of a valve block mounted within a housing with, for example, a pump and/or draft link lift cylinders mounted outside the housing. The invention is not however limited to this use and can find application in a number of other fields.

It is an object of the invention to provide an improved method for establishing a fluid-tight connection between a hydraulic unit and a fluid line disposed on opposite sides of a wall member. The term "fluid line" as used above and through this specification and accompanying claims is to be interpreted as a convenient shorthand form of the expression "line for the passage of fluid".

According to a first aspect of the invention we provide a method for establishing a connection for transmitting fluid under pressure between a port in a hydraulic unit on one side of a wall member and a fluid line on the other side of said wall member; said method comprising the steps of:

providing a hydraulic fitting terminating in a threaded end and also providing a standpipe;

forming a cylindrical recess surrounding and in communication with the port in the

hydraulic unit and also forming a cylindrical recess in said one end of the hydraulic fitting;

forming a threaded aperture in said wall member in generally concentric alignment with the cylindrical recess in the hydraulic unit;

inserting one end of the standpipe into the cylindrical recess in the hydraulic unit in a fluid tight relationship therewith;

screwing the threaded end of the fitting into the threaded aperture with the other end of the standpipe being received in the cylindrical recess of the fitting in a fluid tight relationship therewith; and

securing the fluid line to the other end of the fitting in a fluid tight relationship therewith.

Thus using the above method it is possible to provide a connection which can be easily connected and disconnected between for example, a valve block mounted within a tractor housing and the previously referred to external pump and lift cylinders.

In accordance with a second aspect of the invention we provide an assembly comprising in combination a wall member provided with a threaded aperture, a hydraulic unit on the one side of the wall member, a fluid line on the other side of the wall member, and a connector assembly extending between a port in the unit and the line via said aperture, the unit being provided with a first cylindrical recess disposed about the port, and the connector assembly comprising:

(a) a fitting to which an end of the fluid line is connected in fluid tight relationship, one end of the fitting being threaded into said threaded aperture, the fitting also being provided with a second cylindrical recess in communication with the fluid line, and

(b) a standpipe, one end of which is received within the first cylindrical recess in fluid tight relationship therewith and the other end of which is received within the second cylindrical recess in fluid tight relationship therewith,

the parts being so arranged and constructed that fluid under pressure may be transmitted between the fluid line and the

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hydraulic unit through said connector assembly.

5 Preferably the standpipe is provided with an O-ring at each end to provide fluid tight connection with the associated recess.

One embodiment of the present invention will now be described, by way of example only, with reference to the accompanying drawings in which:—

10 Figure 1 is a somewhat schematic rear perspective view of a portion of a tractor in which the principles of the present invention have been incorporated;

15 Figure 2 is a view of the hydraulic connection between a valve body supported within a detachable part of the housing of the tractor shown in Figure 1 and, various lines for the passage of fluid which are positioned external to the housing, and

20 Figure 3 is an enlarged detail of the structure shown in Figure 2.

Referring first to Figure 1, a portion of the rear of a tractor is illustrated, the tractor being generally indicated at 10. The tractor is provided with a three point implement hitch linkage which includes a pair of right and left hand draft links 12 each of which is interconnected with an associated lift arm 14 by a lift link 16. The lift arms are moved up and down by hydraulic cylinders 18 one end of each cylinder being connected to a suitable structure 20 on the tractor frame. The operation of the cylinders is controlled by a valve 22 (Figure 2) mounted within a housing 24. The housing 24 is in fact a cover member having side walls 32 which is detachably mounted on the remainder of the tractor housing (not numbered) to allow easy access to components in the interior of the remainder of the housing during servicing. The valve 22 is mounted on the inside of the cover member 24 by fasteners.

45 One end of each fluid line 28 is connected with a lift cylinder 18, and the other end is adapted to be interconnected with the valve 22 by a hydraulic connection in accordance with this invention. One end of a fluid line 30 (Figure 2) is connected with a pump, the other end being adapted to be interconnected with the valve 22 also by a hydraulic connection in accordance with this invention.

50 Figure 2 shows a view of the cover member 24 which supports the valve body partly broken away and removed from the remainder of the housing as it would be immediately prior to servicing. The portion of the cover member 24 which overlies the valve 22 and to which the valve is secured has been broken away together with the top left hand corner of the cover member. The right and left sidewalls 32 of the housing 24 are each provided with threaded apertures 34 which receive fittings indicated generally at 36. The valve 22 has a number of ports

38 (Figure 3) and the valve body is fixed relative to the sidewalls 32. A plurality of standpipes indicated generally at 40 are provided, each standpipe 40 interconnecting an associated port 38 with a conduit 42 in the fitting 36. According to this invention the exterior portion of the valve body 22 adjacent the port 38 is counterbored to provide a cylindrical recess as can be seen at 44 (illustrated in Figure 3 wherein a portion of the standpipe has been broken out) and similarly, that end of the fitting which is threaded is also counterbored to provide a cylindrical recess 46. Each end of the standpipe 40 is provided with a groove 48 which receives a pair of O-rings 50. In this connection it should be noted that it is desirable that the counterbores be of the same diameter so that either end of the standpipe can be inserted into the associated counterbore.

According to the method of this invention for establishing a fluid tight connection, the sidewalls 32 are provided with threaded apertures 34. The valve body is provided with cylindrical recess in communication with each of its ports 38, the recesses being in generally concentric alignment with the threaded apertures 34 when the valve body is mounted on the cover plate of the housing. A fitting 36 which is threaded at one end is provided for each aperture 34, the same end also being provided with a cylindrical recess 46. A standpipe 40 is also provided for each aperture 34, the standpipe 40 having a pair of O-rings at either end. The ends of the standpipe are so dimensioned that they can be received in the counterbores 44, 46. The standpipes are then inserted into the cylindrical recesses in the valve body 22 and then the fittings 36 are screwed into the threaded apertures 34, and, as they are being screwed into the threaded apertures 34 the other ends of the standpipes will be received in the counterbored portions 46 of the fittings 36. The length of each standpipe 40 is such that when the fitting is fully screwed into the aperture 34 until the flange 54 of the fitting 36 contacts the outer wall 56 of the sidewall 32, the standpipe will be almost fully inserted into both of the counterbored portions 44, 46. Finally it is only necessary to connect the terminal end portion 52 of the appropriate fluid line 28 or 30 to the other end of the fitting 36.

Each standpipe 40 and its associated fitting 36 thus together form a hydraulic connector assembly for connecting the valve 22 and the lines 28, 30.

60 The standpipes 40 and fittings 36 are mounted on the cover member before the cover member is secured to the remainder of the housing. The cover member 24 may be connect with the remainder of the housing either before or after the connection of

the ends of the lines 28, 30 with the associated fittings.

5 While each threaded aperture 34 should be in generally concentric alignment with the associated cylindrical recess 44 in the valve body, it should be noted that this construction permits some misalignment of the parts. Thus, in one commercial embodiment, a misalignment of the centres of the aperture 34 and recess 44 of 0.012 inches has been found acceptable when using a standpipe of 7.75 inches in length.

10 To disassemble the structure shown in Figure 2 it is only necessary to disconnect the terminal end portion 52 of each of the fluid lines 28 or 30 from the associated fittings 36 and then to unscrew the fitting from the housing wall 32. When the fitting is removed from the aperture 34 it will be obvious that either one end or the other end of the standpipe will no longer be received in its associated cylindrical recess. To complete the disassembly it is only necessary to pull the standpipe from the other cylindrical recess.

WHAT WE CLAIM IS:—

1. A method for establishing a connection for transmitting fluid under pressure between a port in a hydraulic unit on one side of a wall member and a fluid line on the other side of said wall member; said method comprising the steps of:

35 providing a hydraulic fitting terminating in a threaded end and also providing a standpipe;

forming a cylindrical recess surrounding and in communication with the port in the hydraulic unit and also forming a cylindrical recess in said one end of the hydraulic fitting;

40 forming a threaded aperture in said wall member in generally concentric alignment with the cylindrical recess in the hydraulic unit;

inserting one end of the standpipe into the cylindrical recess in the hydraulic unit in a fluid tight relationship therewith;

50 screwing the threaded end of the fitting into the threaded aperture with the other end of the standpipe being received in the cylindrical recess of the fitting in a fluid tight relationship therewith; and

55 securing the fluid line to the other end of the fitting in a fluid tight relationship therewith.

2. A method according to claim 1 in which said standpipe is provided with an O-ring at each end to provide fluid tight connection with the associated recess.

60 3. An assembly comprising in combination a wall member provided with a threaded aperture, a hydraulic unit on the one side of the wall member, a fluid line on the other side of the wall member, and a

connector assembly extending between a port in the unit and the line via said aperture, the unit being provided with a first cylindrical recess disposed about the port, and the connector assembly comprising:

70 (a) a fitting to which an end of the fluid line is connected in fluid tight relationship, one end of the fitting being threaded into said threaded aperture, the fitting also being provided with a second cylindrical recess in communication with the fluid line, and

75 (b) a standpipe, one end of which is received within the first cylindrical recess in fluid tight relationship therewith and the other end of which is received within the second cylindrical recess in fluid tight relationship therewith,

80 the parts being so arranged and constructed that fluid under pressure may be transmitted between the fluid line and the hydraulic unit through said connector assembly.

4. An assembly according to claim 3 in which said hydraulic unit is mounted with the first cylindrical recess in generally concentric alignment with the second cylindrical recess.

5. An assembly according to claim 3 or claim 4 in which the first and second cylindrical recesses are of the same diameter.

6. An assembly according to any one of claims 3 to 5 in which said standpipe is provided with an O-ring at each end to provide fluid tight connection with the associate recess.

7. An assembly according to any one of claims 3 to 6 in which said wall member is part of a housing and said hydraulic unit is a valve body disposed within said housing.

8. An assembly comprising the combination of:

a housing provided with a threaded aperture for receiving a fitting for a fluid line;

a valve body secured within said housing, said valve body being provided with a port, a cylindrical recess being provided in said body which surrounds and is in communication with said port and is in generally concentric alignment with the threaded aperture;

85 a standpipe provided with an O-ring at each end, one end being received within the cylindrical recess in the valve body; and

a hydraulic fitting threaded at one end, said one end being received within the threaded aperture, and said one end being provided with a second cylindrical recess, the other end of the standpipe being received within said second cylindrical recess.

9. A method for establishing a connection for transmitting fluid under pressure between an opening in a hydraulic unit on one side of a wall member and a fluid line on the other side of said wall member, said method being substantially as hereinbefore

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described with reference to the accompanying drawings.

5 10. An assembly comprising in combination a wall member provided with a threaded aperture, a hydraulic unit on the one side of the wall member, and a connector assembly extending between a port in the

unit and the line via said aperture, said assembly being constructed and arranged substantially as hereinbefore described with reference to and as shown in the accompanying drawings. 10

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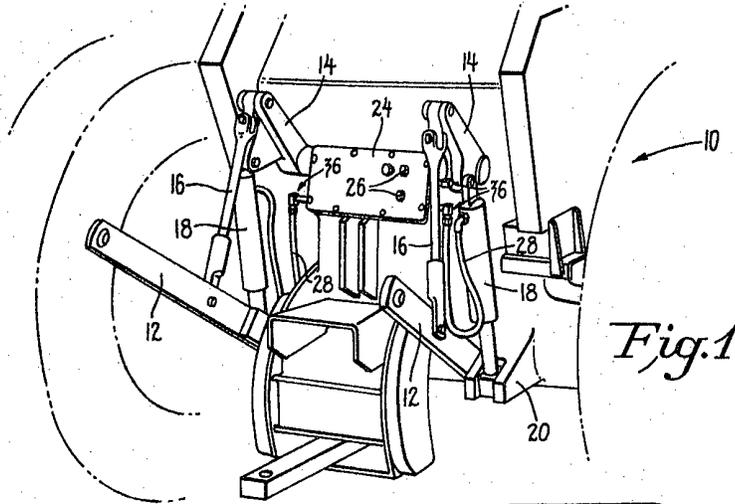


Fig. 1

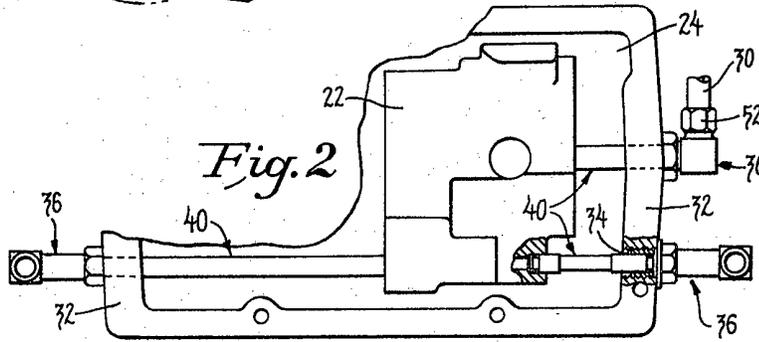


Fig. 2

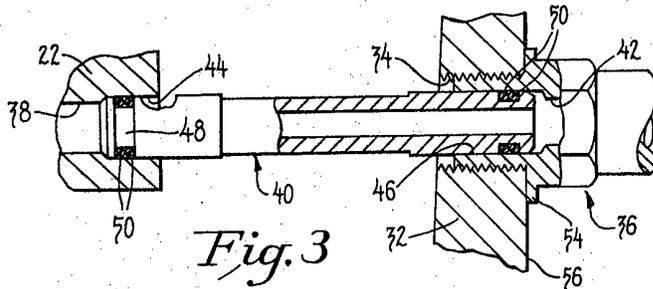


Fig. 3