

[54] SAFETY APPARATUS

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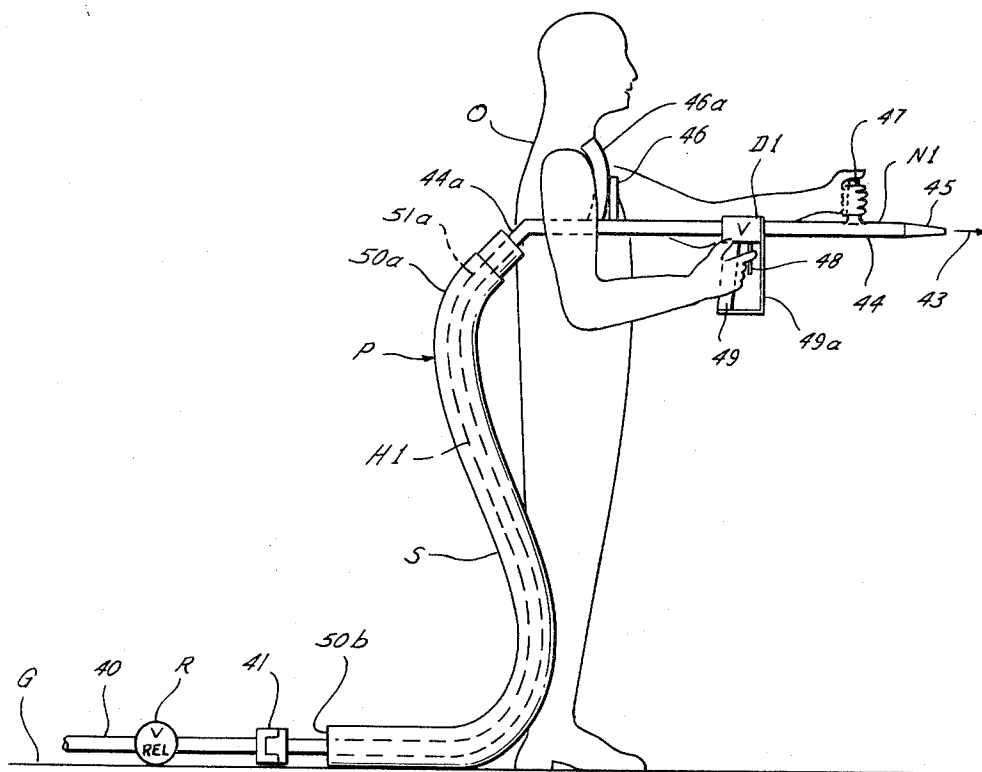
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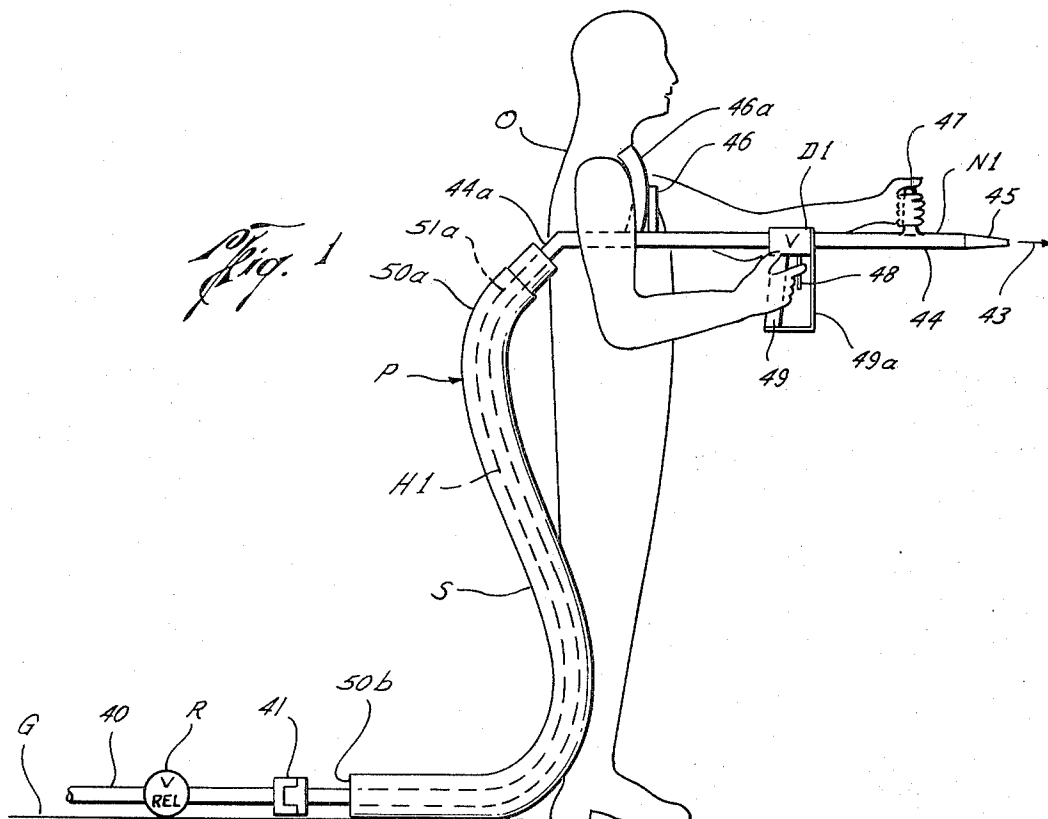
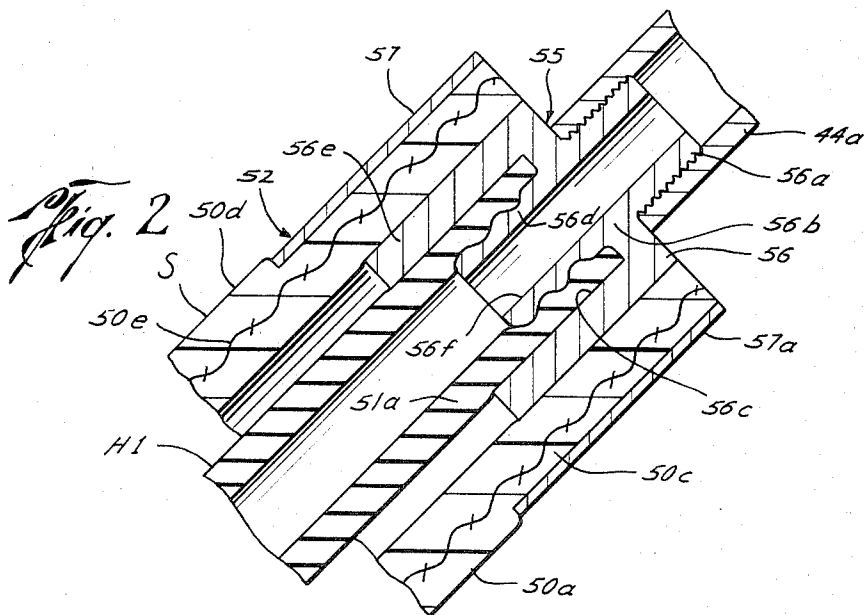
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[57] ABSTRACT

A safety shroud assembly for safely conducting a high pressure fluid including a flexible fluid conductor and a rigid handle and nozzle assembly, the flexible conductor having a flexible shroud positioned thereabout whereby high pressure leaks from the conductor are confined to the shroud to prevent injury to a person in the immediate area.

8 Claims, 2 Drawing Figures





SAFETY APPARATUS

BACKGROUND OF THE INVENTION

The field of this invention is a safety shroud assembly providing for the safe discharge of high pressure fluid.

In operating and using hydraulic cleaning apparatus such as disclosed in U.S. Pat. No. 3,335,962, issued to Schmidt, an operator holds a discharge nozzle to direct fluid at high pressure from the nozzle toward the object being cleaned. The discharge nozzle is connected to a source of high pressure fluid through a flexible fluid conductor which allows the operator to manipulate the discharge nozzle as necessary. During the operation of the cleaning apparatus, the fluid pressure in the flexible conductor may reach 10,000 pounds per square inch or higher.

A potentially dangerous situation arises if a leak occurs in the flexible conductor near the operator. The pressure of the leaking fluid is so high that an operator in the path of such leak may be injured. It has been found that the likelihood of leaks in the flexible conductor is greater at the end of the conductor connected to the discharge nozzle, which makes the potential danger even greater since it is this end of the flexible conductor which is closest to an operator holding the discharge nozzle.

SUMMARY OF THE INVENTION

The present invention relates to a new and improved safety shroud assembly which solves the safety hazard of fluid at high pressure leaking from a fluid conductor by confining such leaking fluid to a shroud positioned about the conductor. In the safety shroud assembly of the preferred embodiment of this invention, a shroud is positioned about and attached to the end of a flexible fluid conductor which is connected to a rigid handle and discharge nozzle assembly. In this manner, fluid leaking at high pressure near the end of the flexible fluid conductor connected to the discharge nozzle is confined to the shroud and is directed out the open end of the shroud, which is a sufficient length away from the attached end to avoid any danger to the operator holding the discharge nozzle.

In another aspect of this invention a relief valve is mounted in line with the flexible fluid conductor to relieve the pressure in the conductor if such pressure exceeds a predetermined amount thereby providing a safety package for high pressure fluid control. And, the flexible fluid conductor is releasably attached to a source of high pressure fluid so that a worn conductor can be easily replaced.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a view in elevation illustrating the shroud safety package of this invention in position to protect an operator; and

FIG. 2 is a view in section of the connection of the flexible conductor and shroud to the rigid handle and discharge nozzle assembly of the safety shroud assembly of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to the drawing, the letter P represents a safety package for conducting fluids at high pressures. The safety package P includes a flexible fluid

conductor or hose H-1 having a rigid handle and discharge nozzle assembly N-1 attached thereto so that fluid conducted at a high pressure through a line 40, a swivel coupling 41 and the flexible conductor H-1 can be directed outwardly through the nozzle assembly N-1. The rigid handle and nozzle assembly N-1 includes an intermediate elongated portion 44 having attached thereto a nozzle portion 45 which has an orifice or restriction internally thereof to concentrate the path and increase the pressure of the fluid. A shoulder brace 46 including a shoulder pad 46a is attached to intermediate handle portion 44 and a handle or grip 47 is also attached to the intermediate handle portion 44 but is spaced from the shoulder brace 46 so that an operator O can secure the assembly N-1 against his body to prevent harm from any sudden movements of the assembly N-1 due to pressure variations therein. The intermediate elongated handle portion 44 has a bore (not shown) therethrough to conduct fluid from the flexible conductor H-1 to the nozzle portion 45.

A dump valve D-1 is mounted with the intermediate portion 44 and includes a trigger 48 which can be pivoted to open and close the dump valve D-1. Another handle 49 is positioned near the trigger 48 by means of the L-shaped bracket 49a so that the operator O can grip the handle 49 and use one or more fingers to pivot the trigger 48 in order to open and close the dump valve D-1, the operation of which will be described in further detail hereinafter.

A flexible shroud S of any suitable flexible material of sufficient strength is positioned about the fluid conductor H-1 for confining any spray streams of fluid leaking from the fluid conductor H-1 to prevent injury to the operator O or any other operator who is within the range of injury from such leaking fluid. The flexible shroud S is mounted at end 50a to end 51a of the fluid conductor H-1 so that any leaks at end 51a of the fluid conductor H-1 are deflected and directed along the shroud S and out of the open end 50b thereof, which is open to the atmosphere. The shroud S is normally about six feet in length, but the length may vary so long as it is of sufficient length that any fluid leaking from the conductor H-1 is discharged from the open end 50b remotely from the operator O. The shroud S may be rubber with a metal reinforcing layer 50c.

A relief valve R such as disclosed in U.S. Pat. No. 3,595,222, issued to Goss et al, is mounted in line 40 for relieving fluid pressure in line 40, fluid conductor H-1 and nozzle N-1 whenever the pressure exceeds a predetermined value and thus cooperates with the flexible shroud S to provide a safety package to protect operator O.

A connection means generally designated as 55 is provided for connecting the fluid connector H-1 to the nozzle N-1 so that fluid at high pressure can be conducted therebetween. The connection means 55 includes an adapter 56 which has a threaded male portion 56a threadedly mounted within internally threaded end portion 44a of the nozzle N-1. The adapter 56 further includes a female portion 56b having annular recess 56c for receiving the fluid conductor H-1. The annular recess 56c is formed by inner, ridged circular wall 56d and outer deformable circular wall 56e.

The fluid conductor end 51a is mounted with the adapter 56 by inserting the end 51a into the annular recess 56c. Thereafter, the deformable outer wall 56e is clamped, crimped, pinched or otherwise pressed in-

wardly against the conductor end 51a to lock the fluid conductor H-1 against the ridged inner wall 56d. The adapter 56 has a bore 56f therethrough so that fluid communication is provided between the fluid conductor H-1 and the nozzle N-1.

A mounting means 52 mounts end 50a of the flexible shroud S with the end 50a of the fluid conductor H-1. The shroud end 50a is positioned over adapter wall 56e and clamping sleeve 57 of metal or other suitable material is mounted over shroud portion 50c, which has a diameter slightly less than that of the remainder of the flexible shroud S such that the outer surface 57a of the clamping sleeve 57 fits substantially flush with the outer surface 50d of the remainder of the shroud S. After the clamping sleeve 57 has been positioned over shroud portion 50c, it is clamped, crimped, pinched or otherwise pressed against the shroud portion 50c to lock the flexible shroud S against the outside wall 56e of the adapter 56.

The safety package P, which has been heretofore described, is used to conduct a fluid at high pressure through flexible fluid conductor H-1 and nozzle assembly N-1 while preventing harm to an operator O holding the nozzle assembly N-1 by providing a flexible shroud S positioned about the fluid conductor H-1. The fluid conductor H-1 is attached to a source of high pressure fluid such as disclosed in U.S. Pat. No. 3,335,962, by means of the coupling 41, which is preferably a swivel coupling and releasable from the rest of the hose.

In the operation and use of this invention, the dump valve D-1 is manipulated to control the flow of fluid at high pressure through the nozzle portion 45. For example, under idling conditions, the flow through the nozzle is negligible with the dump valve D-1 open so that the fluid drains through the valve D-1. When the operator is ready to use the nozzle assembly N-1 for a cleaning operation, he closes the dump valve D-1 by squeezing the trigger 48 so that all of the fluid from the fluid source is discharged through the nozzle portion 45. With the dump valve D-1 closed, the fluid pressure in the fluid conductor H-1 and nozzle assembly N-1 may increase from 3,500 pounds per square inch to approximately 10,000 pounds per square inch.

As previously mentioned, the shoulder brace 46 and handle 47 on intermediate handle portion 44 are provided so that the operator O can secure the nozzle N against his body so that any sudden changes in pressure, which may cause the nozzle N-1 to suddenly move or whip, are easily handled by the operator without losing control of the nozzle N-1.

One of the dangers encountered in the use of such hydraulic cleaning apparatus is the possibility of very high pressure leaks which might cause injury to the operator O or to any other person in the immediate area. If any such leaks occur, they are more likely to occur in the fluid conductor portion 51a, which is connected to adapter 56, since it is this portion of the fluid conductor which is subject to more direct stress from bending or flexing as the operator manipulates the handle and nozzle assembly N-1 about. The flexible shroud S mounted about the adapter 56, which connects the fluid conductor H-1 to the nozzle N-1, is provided to confine any such leaks to the flexible shroud S and to direct the leaking high pressure fluid outwardly through the open end 50b of the flexible shroud S away from the operator O and at dissipated or reduced pres-

sure. The flexible shroud is of such length that the open end 50b is positioned sufficiently away from the operator O that the leaking fluid is directed away from the operator O. The open end 50b of the flexible shroud S is preferably located on the ground G and is exposed to the atmosphere so that any fluid coming out of the shroud S is directed to the ground at reduced pressure to thereby prevent any harm to the operator O.

It is to be noted that the flexible shroud of this invention may be steel, plastic, rubber or any other material that will withstand and deflect the high pressure spray stream from a leak in the flexible fluid conductor H-1. The shroud may also be reinforced with fibers, strands or webbing of any suitable material such as metal. The material for the shroud S need not be so strong as to contain or withstand the ultimate pressure of the leaking fluid since leaking fluid is circulated outwardly through the open end 50b of the shroud S. Also the shroud S is only subject to such high pressure streams of spray at those particular points where leaks do occur.

The swivel coupling 41 is releasable so that the flexible conductor H-1 can be removed from line 40 and, the conductor can also be removed from adapter 56 so that an entire worn or damaged conductor can be replaced. The particular adapter 56 is only an example of a suitable connector for connecting the handle and nozzle assembly N-1 to the flexible conductor H-1. The conductor H-1 and rigid handle and nozzle assembly N-1 can be connected in any way, so long as they are releasably connected and high pressure fluid can be conducted to the nozzle portion 45.

The foregoing disclosure and description of the invention are illustrative and explanatory thereof, and various changes in the size, shape and materials as well as in the details of the illustrated construction may be made without departing from the spirit of the invention.

We claim:

1. Apparatus for safely conducting a fluid at high pressure, comprising;

a flexible fluid conductor for conducting a fluid at high pressure;

a flexible shroud means positioned about said conductor for confining any fluid leaking from said conductor to prevent injury to an operator in the area of said flexible conductor;

mounting means mounting one end of said shroud means to one end of said conductor for directing any leaks at said one end of said conductor out the other end of said shroud means; and

said other end of said shroud means being open to atmosphere about said conductor to provide a discharge for high pressure fluid at a reduced pressure.

2. The structure set forth in claim 1, wherein:

said shroud means is positioned about said conductor for sufficient length to direct any leaking fluid away from such operator.

3. The structure set forth in claim 1, including:

a rigid handle and nozzle assembly; and

connecting means connecting said handle and nozzle assembly to one end of said flexible fluid conductor to provide a safety shroud assembly.

4. The structure set forth in claim 3, including:

a relief valve mounted with said flexible conductor to relieve fluid pressure in said flexible conductor

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whenever said pressure exceeds a predetermined value thereby providing a safety package for said safety shroud assembly.

5. The structure set forth in claim 3, wherein: said rigid handle and nozzle assembly includes a rigid 5 shoulder bracing means.

6. The structure set forth in claim 3, including: a source of high pressure fluid;

said fluid conductor being connected to said source for receiving such fluid; and 10

a dump valve mounted with said handle and nozzle assembly for controlling the discharge of fluid through said rigid handle and nozzle assembly.

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7. The structure set forth in claim 6, wherein:

said safety shroud assembly includes a releasable coupling releasably attaching said source of high pressure fluid to said flexible conductor so that said safety shroud assembly is detachable from said source.

8. The structure set forth in claim 7, wherein:

said connecting means is releasable whereby said shroud means and flexible hose are detachable from said rigid handle and nozzle assembly as well as from said source.

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