Aug. 29, 1961 F. O. BOHN 2,998,071

WIRELINE FEED-IN DEVICE

Original Filed Oct. 3, 1955 2 Sheets-Sheet 1

FIG. 1.

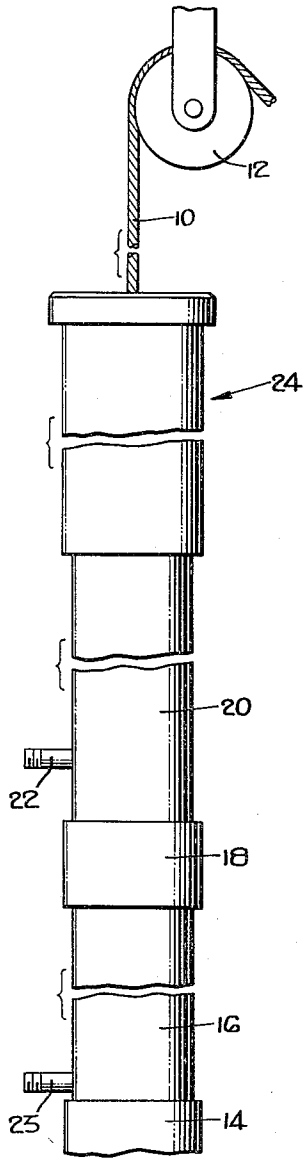


FIG. 3.

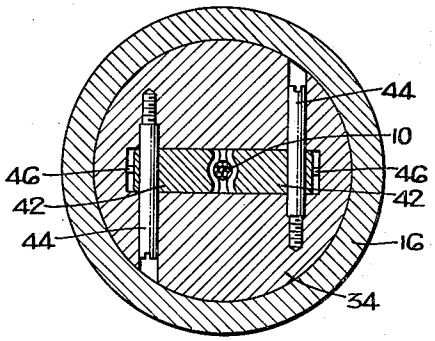
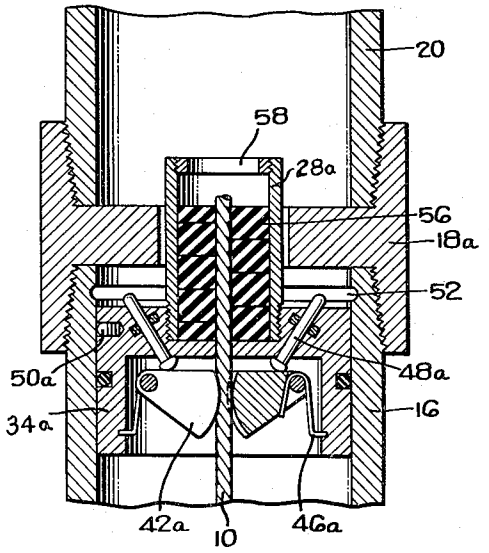


FIG. 4.



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FIG. 2a.

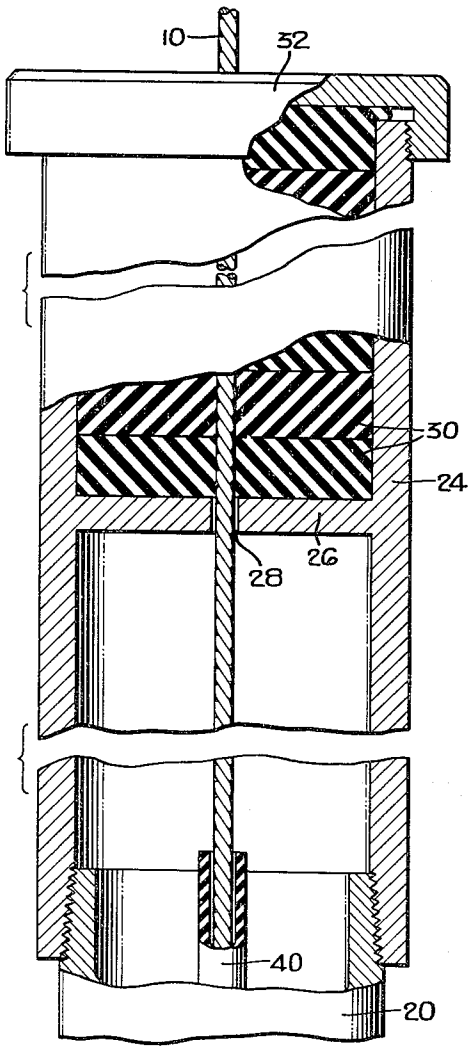
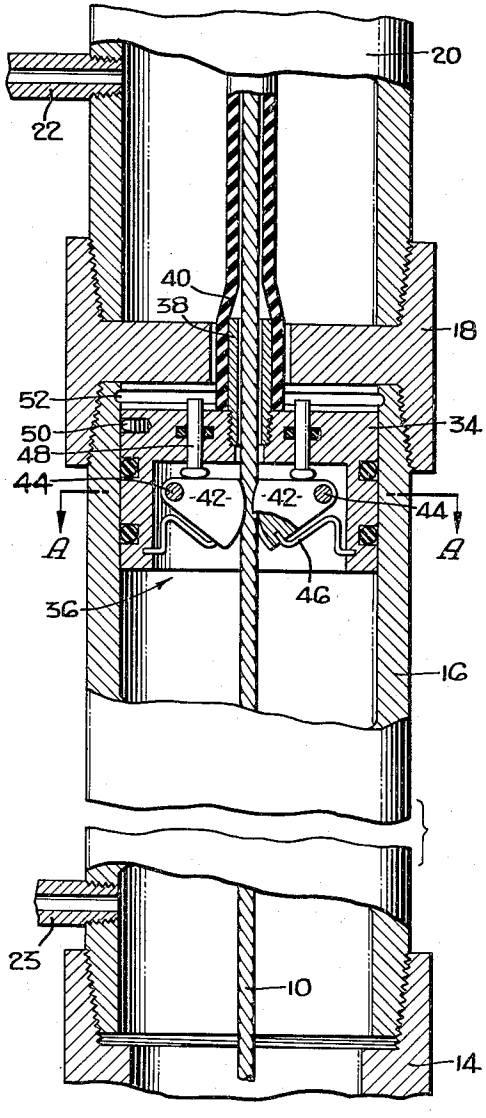


FIG. 2b.



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2,998,071

WIRELINE FEED-IN DEVICE

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Continuation of application Ser. No. 538,093, Oct. 3, 1955. This application Feb. 10, 1958, Ser. No. 714,432
16 Claims. (Cl. 166—77)

This invention relates to wireline feed-in devices adapted for feeding a wireline into a closed chamber against pressure tending to expel the wireline from the chamber. More specifically, the invention relates to means adapted for use at the upper or casinghead end of oil or gas wells to feed into the casing or to means attached to the upper end of the casing a wireline against the pressure of the well. It is well known that some oil and gas wells are operated under considerable pressure and that when it becomes necessary to lower instruments or tools within the casing or well, considerable difficulty may be experienced in feeding into the well against such pressure the wireline supporting the apparatus. The invention contemplates means for greatly facilitating drawing into the well or closed chamber a wireline against the pressure there existent; and contemplates the provision of means whereby relatively long lengths of wireline may be rapidly and continuously drawn into the pressurized portion of the well head. It is contemplated that the apparatus of the present invention include or be used in connection with suitable means for holding against expulsion from the pressurized chamber or well a previously drawn-in portion of the wireline, during periods of time intervening between individual wireline drawing-in operations or strokes.

This application is a continuation of copending application Serial No. 538,093 filed October 3, 1955, and now abandoned.

This invention is related in certain aspects to that disclosed in an application of David R. Jackson, Serial No. 538,176, filed on October 3, 1955, and now abandoned in favor of continuation application Serial No. 714,431 filed February 10, 1958.

While the apparatus of the present invention is of general applicability in drawing a wireline into a chamber under pressure, it will be illustrated and described in connection with apparatus located at the casinghead of a typical oil or gas well. In that particular environment a tool or other apparatus may be lowered through suitable gate valve means and into the well while the well is under pressure, suspended upon a suitable wireline which extends through means forming a part of or attached to the wellhead structure, which acts to seal the wireline extending therethrough against the pressure of the well. Such sealing means, which may be of a commercially known type or as shown, exert considerable friction upon the wireline and thus in general tend to prevent downward motion of the apparatus or tool and wireline into the well under the influence of gravitation; at least until a considerable extent of wireline is in the well. As a consequence, various means and expedients have heretofore been proposed for forcing the wireline into the well against the pressure of the well and against the friction exerted by the sealing means. None of these previously proposed devices or apparatus appears to have been uniformly successful regardless of the pressure of the well, and the present invention, accordingly, contemplates as a principal object the provision of simple means whereby a wireline may be readily and rapidly fed into a well or similar closed pressure chamber, irrespective of the magnitude of the pressure. A further and subsidiary object of the present invention is the provision of

means for efficiently and rapidly drawing into such a well or closed chamber under pressure a relatively long length of wireline in a single continuous drawing operation. Other objects and advantages of the invention will hereinafter be made or become apparent in connection with the following description of a preferred embodiment of the invention and a modification of one portion or part of such embodiment, considered in conjunction with the accompanying drawings in which:

FIGURE 1 is a view in elevation, partly fragmentary in nature, illustrating the environment and relative location of the apparatus of the present invention as applied for operation upon a typical oil or gas well casinghead structure;

FIGURES 2*a* and 2*b* are fragmentary sectional views in elevation of a preferred form of apparatus according to the principles of the invention, the upper end of FIGURE 2*b* constituting a continuation of the lower end of FIGURE 2*a*;

FIGURE 3 is a sectional view of apparatus depicted partly in section in FIGURE 2*b*, the view being taken on a plane coincident with line A—A in FIGURE 2*b*, and illustrating a mode of mounting certain wireline engaging or gripping elements; and

FIGURE 4 is a fragmentary sectional view in elevation depicting a modification of certain parts of the apparatus illustrated in FIGURE 2*b*.

Referring now to the drawings, and first to FIGURE 1, **10** designates a wireline which may be of the piano wire or single element type, or may be a multi-strand wireline comprising spirally twisted elements. The wireline is supplied from a conventional hoist drum (not shown) and coursed around a suitable guide sheave **12** supported by conventional means, only a portion of which is shown. The wireline extends downwardly from the sheave through means presently described and into a well casing therebelow. Preferably, but not necessarily, the apparatus necessary to a practice of the invention is incorporated into a wireline lubricator structure, wherein it may utilize a portion of the lubricator tubing as a cylinder for containing operating parts. In either case, the invention comprehends utilizing the pressure of the well fluid to aid in reducing the work necessary to feed in a wireline. At **14** is depicted the upper end of a tubular member which may be the well casing or part of the casinghead structure, in which is contained gas or other well fluid under pressure, and through which the wireline passes as it courses into and from the well. Supported by and extending upwardly from member **14** is a cylinder **16**, preferably forming a part of a lubricator structure and used for a purpose presently to be disclosed. Supported on the upper end of cylinder **16** is a special coupling member **18** into the upper end of which is secured a length of high pressure tubing **20** for a purpose hereinafter more fully explained. Superimposed upon the upper end of tubing **20** and secured thereto is a suitable sealing or packoff means **24** which performs functions hereinafter fully described. The sealing means **24** may, if desired, be a conventional packing gland structure; or may be a wireline seal containing structure of the type shown in detail in FIGURE 2*a*. It will be understood that the wireline **10** passing downwardly from sheave **12** extends successively through sealing means **24**, tubing **20**, coupling **18**, cylinder **16** and tubular member **14**, and is held against expulsion from the chamber formed by member **14** and the associated structure by the pressure of the well fluid, by the sealing means **24**. This will be more fully explained in connection with the apparatus depicted in FIGURE 2*a*.

Referring now to FIGURE 2*a*, means **24** comprises a generally cylindrical high pressure member having an

internal transverse support wall **26** provided with a central aperture **28** through which wireline **10** is adapted to pass without appreciable friction. Above wall **26** is a cavity in which are mounted packing means comprising a plurality of resilient sealing pads **30** of suitable material such as synthetic rubber. The pads are held under compression to effect a tight sealing relationship with wireline **10** by means of an apertured cap member **32** as indicated. Referring now to both FIGURES 2*a* and 2*b*, the lower end of member **24** is secured to the upper end of tubing **20** by a suitable pressure-tight joint. Tubing **20**, which is provided to accommodate operating means hereinafter more fully described, is secured at its lower end in the upper part of a specially formed coupling **18**, as indicated. The chamber provided by the interior of high pressure tubing **20** is adapted to receive and have exhausted therefrom an operating fluid which may be well fluid under high pressure, through a suitable tubing **22**, under conditions and for a purpose hereinafter explained. Coupling **18** is provided with a central axial aperture through which wireline **10** and other means hereinafter described are adapted to pass freely, and through which operating fluid under high pressure introduced through tubing **22** may pass downwardly and be expelled upwardly by a piston means presently described.

Cylinder **16** is provided with a smooth internal bore in which is reciprocably mounted reciprocable means in the form of piston means, indicated generally at **36** and comprising a piston **34** having a generally centrally located axial aperture or wireline passage as indicated. Suitably secured in piston **34** and forming an upper extension of the wireline passage just mentioned is a short tube **38** upon the exposed exterior portion of which is contractively mounted an expanded end of a resilient wireline sealing sleeve **40** made of suitable material such as synthetic rubber. Sleeve **40** is so formed as to pass, when in relaxed state, the wireline therethrough in a loose sliding fit, and its composition is such that it is relatively self-supporting in the attitude pictured.

Also mounted on piston **34** for reciprocatory movement thereby is a wireline gripping means comprising a plurality of wireline engaging or gripping dogs **42—42** mounted on respective pivot pins **44—44** and stressed in an upward direction, as pictured; that is, in a wireline gripping direction, by means of springs **46** in a manner evident from the drawing. Dogs **42** are formed with wireline engaging faces of non-uniform radii, and as shown, with such faces of increasing radius downwardly and of cross-sectional configuration to provide good gripping faces, as shown in FIGURE 3. Normally resting upon the upper flat surfaces of dogs **42** are respective dog-releasing plungers **48** each of which extends through a respective sealed bore formed in the upper portion of piston **34** as indicated. Well fluid under pressure contained in the portion of cylinder **16** below piston **34** may be prevented from leaking upwardly past the piston and past plungers **48** into the space thereabove by suitable sealing means such as chevron seals, or O-rings as indicated. Piston **34** may, if desired, be retained in an idle position substantially in contact with the lower interior face of coupling **18** by suitable ball and spring detent means such as are indicated generally at **50**, the ball of the means in that position engaging in a portion of a groove **52** formed near the upper end of the interior of cylinder **16**. When piston **34** is raised to near its uppermost position by the well fluid therebeneath, the upper ends of plungers **48** engage the lower interior surface of coupling **18** and are forced downwardly relative to the piston, and force the dogs **42** to rotate downwardly out of engagement with the wireline, against the force exerted by the respective springs **46**. Under this condition the wireline is free to travel upwardly or downwardly, free from engagement by the dogs. Thus, until piston **34** is forced downwardly by operating fluid supplied through tubing **22**, the detent may hold the wireline advancing means in the idle position substantially free of the wireline. When operating fluid under pressure somewhat greater than the pressure of the well fluid is introduced through tubing **22**, the pressure in the region above piston **34** and within high pressure tubing **20** increases until the ambient pressure in that region is in excess of the well pressure, at which time operating fluid passes downwardly through the aperture in coupling **18**, and also tends to commence leaking downwardly through sleeve **40** and along wireline **10**, thereby creating a venturi effect within the sleeve at a location above tube **38**. The resulting reduction in pressure within sleeve **40** and increase in pressure on the exterior of sleeve **40** causes an inward collapse of the sleeve into engagement with wireline **10**. This inward collapse of the sleeve into engagement with the wireline serves as an efficient seal against any substantial leakage of operating fluid past the piston means into the lower chamber of cylinder **16**. Upon continued admission of operating fluid through tubing **22**, piston **34** is forced downwardly, permitting upward travel of plungers **48** relative to piston **34** and contemporaneous upward rocking of dogs **42** until the latter tightly grip the wireline, after which time continued downward movement of piston **34** effects downward feeding or draft of an extent of wireline through the sealing means provided by pads **30**. Downward movement of piston **34** may be, and preferably is, accompanied by outward movement of well fluid from below the piston through a suitable tubing **23**.

In the event well fluid is employed as operating fluid for operating piston **34** downwardly, tubing **23** may be connected by conventional valve means to the intake of the pump supplying the operating fluid to tubing **22**, whereby the pump need supply only a little more than the difference between the pressures above and below the piston. The downward drawing of the wireline may continue until piston **34** reaches the end of its possible extent of inward or downward travel, which in the illustrated embodiment of the invention is reached when the lower skirt of the piston contacts a suitable stop means such as that conveniently provided by an internal shoulder formed as indicated in the upper interior of the tubular member **14** forming a portion of the casinghead. It is evident that the extent of downward stroke of piston **34** and equivalent length or extent of wireline drawn into the casing is dependent principally upon the length of cylinder **16**, and may be as great as is convenient or desired. Thus by provision of a suitably long cylinder **16**, a relatively long length of wireline may be fed into the chamber or well in one continuous movement. It is evident that during the drawing-in or feeding-in movement of the wireline, the force applied by the operating fluid upon the upper face of piston **34** must exceed the force applied to the piston by the well fluid plus the force necessary to overcome the frictional forces including that exerted upon the wireline by the packing pads **30** in the sealing means **24**. The work necessary to operate the apparatus, and represented by the stroke of the piston multiplied by the difference between the forces exerted upon it by the well and operating fluids, may be lessened in obvious manner by utilizing the well fluid, either to operate the pump supplying operating fluid to tubing **22**, or as operating fluid fed to the pump to have its pressure increased. Following a working stroke of piston **34** in a downward or wireline drawing-in direction, return of the piston and associated apparatus is effected by releasing the operating fluid supplied through tubing **22** so that the operating fluid may escape or be discharged from above the piston and permit return of the latter under the action of the pressure of the well fluid. Release of the operating fluid may be by a reverse flow through tubing **22** under control of a valve, and may be to the atmosphere or to a suitable container. It is obvious that the return stroke of piston **34** need not be complete, that is, need not be such as to cause engage-

ment of plungers 34 with the lower face of coupling 18, and the return stroke or movement may be terminated short of a position in which the ball of the detent means 50 engages in groove 52. Further, it is evident that upon commencement of an upward stroke of piston 34 the dogs 42 will be induced by the wireline to rock downward to a slight extent sufficient to relieve their tight grip upon the wireline, after which they will slide idly along the wireline during the remainder of the return stroke. During the nonworking or return stroke of the piston the wireline is held from expulsion from the chamber under influence of the pressure of the well fluid, by the grip exerted on the line by the packing or sealing means 24.

A modification of the piston means and appurtenant apparatus is illustrated in FIGURE 4. In that figure a modified form of piston 34*a* supports a plurality of wireline gripping dogs 42*a* which are spring-loaded or urged toward wireline gripping position by means of respective springs 46*a* of any suitable type, such as those depicted. The wireline gripping dogs may be rotated downwardly to wireline releasing position by means of respective plungers 48*a* mounted in individual sealed bores formed through the upper wall of piston 34*a*, as the plungers engage the lower face of coupling 18*a* in a manner similar to that previously described in connection with dogs 42.

Suitably mounted in a recess in the upper face of piston 34*a* for movement therewith is a tubular member 28*a* in which is positioned a spiral packing member 56 of resilient material such as synthetic rubber, so formed as to provide a closely fitting seal for the wireline extending through the piston, and also formed to closely fit the internal wall of member 28*a*. Upward escape of packing member 56 from tubular member 28*a* may be prevented by suitable means such as a retainer ring 58 secured in the upper interior of member 28*a* as indicated. A modified form of coupling 18*a* interconnects tubing 20 with cylinder 16, and is provided with a central aperture of somewhat greater diameter than that of member 28*a*. Piston 34*a* may be retained in an idle position by engagement of a detent means 50*a* comprising a spring-urged ball which may be engaged in the internal groove 52 formed in the upper interior of cylinder 16. Upon reciprocation of the piston means comprising piston 34*a*, packing member 56 is relatively free to move upwardly and downwardly in its retaining tubular member 28*a*, but will in general during downward movements of the piston be forced downwardly into engagement with the upper face of the piston by the pressure of the operating fluid introduced through tubing 22.

It may be noted from the previous description of the apparatus that the wireline gripping and drawing means carried by piston 34 forms in effect a unidirectional clutch means movable in wireline drawing and return movements by the piston means at the latter is reciprocated by alternate application and release of operating fluid through tubing 22, and it will be evident that any desired number of wireline gripping dogs 42 may be employed, depending upon the particular design selected for the apparatus. For the sake of convenience in illustrating the principles of the invention, two such wireline gripping dogs or slips have been shown. It also is evident that the extent of each wireline drawing-in movement of the piston and associated means is limited only by the length of cylinder 16 and that the wireline advancing and return movements of the piston and associated means may be regulated as regards frequency and extent by manually operated or automatically operated valve means interposed between the supply of pressurized operating fluid and tubing 22. The operating fluid may obviously be exhausted either to the atmosphere, as when compressed air or well gas is employed, or may be exhausted to a suitable container as when a suitable hydraulic fluid or well liquid is employed. As the piston and wireline gripping means moves in wireline advancing direction the wireline is drawn through the sealing means thereabove, against the frictional holding force applied to the wireline by the pads 30. During return movement of the piston and wireline advancing means, the wireline is held against expulsion from the closed chambers therebeneath by the holding effect of the pads 30 in sealing means 24. The reciprocating wireline advancing means comprising the piston 34 and operated by means including the pressurized operating fluid, is seen to be suitably guided and restrained for reciprocatory movement of the desired magnitude and order by the guiding and restraining surfaces formed by the interior wall of cylinder 16 and the adjacent surfaces of the members with which the cylinder is connected. The reciprocatory wireline advancing means including the piston operates in a chamber in which fluid under at least well pressure exists, the chamber being separated or divided into first (upper) and second (lower) chamber portions by the piston means. As operating fluid under greater than well pressure is introduced into the upper chamber portion above the piston, the excess of pressure causes the wireline engaging means including tube 40 or packing 56 to tightly engage the wireline extending along the wireline path between sheave 12 and the well. Continued admission of operating fluid results in downward movement of the piston and concurrent drawing in of more wireline by the wireline engaging means traveling with the piston. The wireline is drawn from the low-pressure region outside the structure and into the high-pressure chamber through a blow-by or pack-off means such as pads 30, against all the forces tending to resist feeding-in movement. As the piston and wireline engaging and gripping means return upwardly in an idle return movement, the wireline may be restrained from return movement by the inertia of the tools or equipment suspended thereby in the well, or by wireline holding means such as are in this case represented by pads 30, or by a combination of such means.

In the light of the preceding disclosure of a preferred embodiment of apparatus according to the principles of the invention, many modifications thereof will occur to those skilled in the art to which it pertains, and accordingly, I do not wish to be limited to the specific details of the structures illustrated and described, but what I claim is:

1. A wireline feed-in device for drawing wireline along a wireline path into a zone of fluid existing at superatmospheric pressure, comprising: a body formed with a cylindrical chamber exposed at one end to said zone, said body also being formed with an operating fluid receiving-chamber aligned with and fluidly communicating with said cylindrical chamber and extending away from the end of said cylindrical chamber remote from said zone, said wireline being movable through said chambers into said zone; means restraining said body fixed relative to said zone; a piston slidably disposed in said cylindrical chamber for reciprocation therein towards and away from said zone, said piston being formed with an aperture through which extends said wireline; seal means in said aperture slidably engaging said wireline means on said body substantially sealing the end of said operating fluid reeciving-chamber remote from said zone from the atmosphere, said wireline extending through said means; wireline gripping means carried by said piston that grip said wireline solely during movement of said piston towards said zone so as to draw said wireline into said zone, said gripping means releasing said grip during movement of said piston away from said zone; and means on said body for admitting an operating fluid existing at a pressure higher than the pressure within said zone into said operating fluid receiving chamber so as to urge said piston towards said zone.

2. A wireline feed-in device for drawing wireline along a wireline path into a zone of fluid existing at superatmospheric pressure, comprising: a body formed with a cylindrical chamber exposed at one end to said zone, said body also being formed with an operating fluid receiving-

chamber aligned with and fluidly communicating with said cylindrical chamber and extending away from the end of said cylindrical chamber remote from said zone, said wireline being movable through said chambers into said zone; means restraining said body fixed relative to said zone; a piston slidably disposed in said cylindrical chamber for reciprocation therein towards and away from said zone, said piston being formed with an aperture through which extends said wireline; seal means in said aperture slidably engaging said wireline packing means on said body substantially sealing the end of said operating fluid receiving-chamber remote from said zone from the atmosphere, said wireline extending through said packing means; wireline gripping means carried by said piston that grip said wireline solely during movement of said piston towards said zone so as to draw said wireline into said zone, said gripping means releasing said grip during movement of said piston away from said zone; said packing means frictionally restraining said wireline against movement away from said zone during movement of said piston away from said zone; and means on said body for admitting an operating fluid existing at a pressure higher than the pressure within said zone into said operating fluid receiving chamber so as to urge said piston towards said zone, said piston being returned when said operating fluid is withdrawn from said operating fluid receiving-chamber by the force of the fluid in said zone.

3. A wireline feed-in device for drawing wireline along a wireline path into a zone of fluid existing at superatmospheric pressure, comprising: a body formed with a cylindrical chamber exposed at one end to said zone, said body also being formed with an operating fluid receiving-chamber aligned with and fluidly communicating with said cylindrical chamber and extending away from the end of said cylindrical chamber remote from said zone, said wireline being movable through said chambers into said zone; a piston slidably disposed in said cylindrical chamber for reciprocation therein towards and away from said zone, said piston being formed with an aperture through which extends said wireline; seal means in said aperture slidably engaging said wireline means on said body substantially sealing the end of said operating fluid receiving-chamber remote from said zone from the atmosphere, said wireline extending through said means; wireline gripping means carried by said piston that grip said wireline solely during movement of said piston towards said zone so as to draw said wireline into said zone, said gripping means releasing said grip during movement of said piston away from said zone; means on said body for admitting an operating fluid existing at a pressure higher than the pressure within said zone into said operating fluid receiving chamber so as to urge said piston towards said zone; and means interposed between said gripping means and said body for automatically urging said gripping means to a wireline releasing position whenever said piston is moved away from said zone to within a predetermined distance of the end of said cylindrical chamber remote from said zone.

4. A wireline feed-in device for drawing wireline along a wireline path into a zone of fluid existing at superatmospheric pressure, comprising: a body formed with a cylindrical chamber exposed at one end to said zone, said body also being formed with an operating fluid receiving-chamber aligned with and fluidly communicating with said cylindrical chamber and extending away from the end of said cylindrical chamber remote from said zone, said wireline being movable through said chambers into said zone; means restraining said body fixed relative to said zone; a piston slidably disposed in said cylindrical chamber for reciprocation therein towards and away from said zone, said piston being formed with an aperture through which extends said wireline; seal means in said aperture slidably engaging said wireline packing means on said body substantially sealing the end of said operating fluid receiving-chamber remote from said zone from the atmosphere, said wireline extending through said means; wireline gripping means carried by said piston that grip said wireline solely during movement of said piston towards said zone so as to draw said wireline into said zone, said gripping means releasing said grip during movement of said piston away from said zone, said packing means frictionally restraining said wireline against movement away from said zone during movement of said piston away from said zone; means on said body for admitting an operating fluid existing at a pressure higher than the pressure within said zone into said operating fluid receiving-chamber so as to urge said piston towards said zone, said piston being returned when said operating fluid is withdrawn from said operating fluid receiving-chamber by the force of the fluid in said zone; and means interposed between said gripping means and said body for automatically urging said gripping means to a wireline releasing position whenever said piston is moved away from said zone to within a predetermined distance of the end of said cylindrical chamber remote from said zone.

5. A wireline feed-in device for drawing wireline along a wireline path into a zone of fluid existing at superatmospheric pressure, comprising: a body formed with a cylindrical chamber exposed at one end to said zone, said body also being formed with an operating fluid receiving-chamber aligned with and fluidly communicating with said cylindrical chamber and extending away from the end of said cylindrical chamber remote from said zone, said wireline being movable through said chambers into said zone; means restraining said body fixed relative to said zone; a piston slidably disposed in said cylindrical chamber for reciprocation therein towards and away from said zone, said piston being formed with an aperture through which extends said wireline; seal means in said aperture slidably engaging said wireline means on said body substantially sealing the end of said operating fluid receiving-chamber remote from said zone from the atmosphere, said wireline extending through said means; jaw means carried by said piston that grip said wireline solely during movement of said piston towards said zone so as to draw said wireline into said zone, said jaw means automatically releasing said grip during movement of said piston away from said zone; and means on said body for admitting an operating fluid existing at a pressure higher than the pressure within said zone into said operating fluid receiving-chamber so as to urge said piston towards said zone, said piston being returned when said operating fluid is withdrawn from said operating fluid receiving-chamber by the force of the fluid in said zone.

6. A wireline feed-in device for drawing wireline along a wireline path into a zone of fluid existing at superatmospheric pressure, comprising: a body formed with a cylindrical chamber exposed at one end to said zone, said body also being formed with an operating fluid receiving-chamber aligned with and fluidly communicating with said cylindrical chamber and extending away from the end of said cylindrical chamber remote from said zone, said wireline being movable through said chambers into said zone; means restraining said body fixed relative to said zone; a piston slidably disposed in said cylindrical chamber for reciprocation therein towards and away from said zone, said piston being formed with an aperture through which extends said wireline; seal means in said aperture slidably engaging said wireline packing means on said body substantially sealing the end of said operating fluid receiving-chamber remote from said zone from the atmosphere, said wireline extending through said means; jaw means carried by said piston that grip said wireline solely during movement of said piston towards said zone so as to draw said wireline into said zone, said jaw means automatically releasing said grip during movement of said piston away from said zone;

and means on said body for admitting an operating fluid existing at a pressure higher than the pressure within said zone into said operating fluid receiving-chamber so as to urge said piston towards said zone, said piston being returned when said operating fluid is withdrawn from said operating fluid receiving-chamber by the force of the fluid in said zone.

7. A wireline feed-in device for drawing wireline along a wireline path into a zone of fluid existing at super-atmospheric pressure, comprising: a body formed with a cylindrical chamber exposed at one end to said zone, said body also being formed with an operating fluid receiving-chamber aligned with and fluidly communicating with said cylindrical chamber and extending away from the end of said cylindrical chamber remote from said zone, said wireline being movable through said chambers into said zone; means restraining said body fixed relative to said zone; a piston slidably disposed in said cylindrical chamber for reciprocation therein towards and away from said zone, said piston being formed with an aperture through which extends said wireline; seal means in said aperture slidably engaging said wireline means on said body substantially sealing the end of said operating fluid receiving-chamber remote from said zone from the atmosphere, said wireline extending through said means; jaw means carried by said piston that grip said wireline solely during movement of said piston towards said zone so as to draw said wireline into said zone, said jaw means automatically releasing said grip during movement of said piston away from said zone; means on said body for admitting an operating fluid existing at a pressure higher than the pressure within said zone into said operating fluid receiving-chamber so as to urge said piston towards said zone, said piston being returned when said operating fluid is withdrawn from said operating fluid receiving-chamber by the force of the fluid in said zone; and means interposed between said jaw means and said body for automatically urging said jaw means to a wireline releasing position whenever said piston is moved away from said zone to within a predetermined distance of the end of said cylindrical chamber remote from said zone.

8. A wireline feed-in device for drawing wireline along a wireline path into a zone of fluid existing at super-atmospheric pressure, comprising: a body formed with a cylindrical chamber exposed at one end to said zone, said body also being formed with an operating fluid receiving-chamber aligned with and fluidly communicating with said cylindrical chamber and extending away from the end of said cylindrical chamber remote from said zone, said wireline being movable through said chambers into said zone; means restraining said body fixed relative to said zone; a piston slidably disposed in said cylindrical chamber for reciprocation therein towards and away from said zone, said piston being formed with an aperture through which extends said wireline; seal means in said aperture slidably engaging said wireline packing means on said body substantially sealing the end of said operating fluid receiving-chamber remote from said zone from the atmosphere, said wireline frictionally extending through said means; jaw means carried by said piston that grip said wireline solely during movement of said piston towards said zone so as to draw said wireline into said zone, said jaw means automatically releasing said grip during movement of said piston away from said zone; means interposed between said jaw means and said body for automatically urging said jaw means to a wireline releasing position whenever said piston is moved away from said zone to within a predetermined distance of the end of said cylindrical chamber remote from said zone; and means on said body for admitting an operating fluid existing at a pressure higher than the pressure within said zone into said operating fluid receiving-chamber so as to urge said piston towards said zone, said piston being returned when said operating fluid is withdrawn from said operating fluid receiving-chamber by the force of the fluid in said zone.

9. A wireline feed-in device for drawing wireline along a wireline path into a zone of fluid existing at super-atmospheric pressure, comprising: a body formed with a cylindrical chamber exposed at one end to said zone, said body also being formed with an operating fluid receiving-chamber aligned with and fluidly communicating with said cylindrical chamber and extending away from the end of said cylindrical chamber remote from said zone, said wireline being movable through said chambers into said zone; means restraining said body fixed relative to said zone; a piston slidably disposed in said cylindrical chamber for reciprocation therein towards and away from said zone, said piston being formed with an aperture through which extends said wireline; seal means in said aperture slidably engaging said wireline means on said body substantially sealing the end of said operating fluid receiving-chamber remote from said zone from the atmosphere, said wireline extending through said means; a plurality of jaw elements pivotally carried by said piston; biasing means interposed between said jaw elements and said piston to urge said jaw elements into gripping engagement with said wireline solely during movement of said piston towards said zone so as to draw said wireline into said zone, said jaw elements relaxing said engagement during movement of said piston away from said zone and sliding freely along said wireline; and means on said body for admitting an operating fluid existing at a pressure higher than the pressure within said zone into said operating fluid receiving-chamber so as to urge said piston towards said zone, said piston being returned when said operating fluid is withdrawn from said operating fluid receiving-chamber by the force of the fluid in said zone.

10. A wireline feed-in device for drawing wireline along a wireline path into a zone of fluid existing at super-atmospheric pressure, comprising: a body formed with a cylindrical chamber exposed at one end to said zone, said body also being formed with an operating fluid receiving-chamber aligned with and fluidly communicating with said cylindrical chamber and extending away from the end of said cylindrical chamber remote from said zone, said wireline being movable through said chambers into said zone; means restraining said body fixed relative to said zone; a piston slidably disposed in said cylindrical chamber for reciprocation therein towards and away from said zone, said piston being formed with an aperture through which extends said wireline; seal means in said aperture slidably engaging said wireline means on said body substantially sealing the end of said operating fluid receiving-chamber remote from said zone from the atmosphere, said wireline extending through said means; a plurality of jaw elements pivotally carried by said piston; biasing means interposed between said jaw elements and said piston to urge said jaw elements into gripping engagement with said wireline solely during movement of said piston towards said zone so as to draw said wireline into said zone, said jaw elements relaxing said engagement during movement of said piston away from said zone and sliding freely along said wireline; release elements carried by said piston and engageable with said body whenever said piston is moved away from said zone to within a predetermined distance of the end of said cylindrical chamber remote from said zone so as to automatically urge said jaw elements to relax their engagement with said wireline; and means on said body for admitting an operating fluid existing at a pressure higher than the pressure within said zone into said operating fluid receiving-chamber so as to urge said piston towards said zone, said piston being returned when said operating fluid is withdrawn from said operating fluid receiving-chamber by the force of the fluid in said zone.

11. A wireline feed-in device for drawing wireline along a wireline path into a zone of fluid existing at super-atmospheric pressure, comprising: a body formed with a

cylindrical chamber exposed at one end to said zone, said body also being formed with an operating fluid receiving-chamber aligned with and fluidly communicating with said cylindrical chamber and extending away from the end of said cylindrical chamber remote from said zone, said wireline being movable through said chambers into said zone; means restraining said body fixed relative to said zone; a piston slidably disposed in said cylindrical chamber for reciprocation therein towards and away from said zone, said piston being formed with an aperture through which extends said wireline; packing means on said body substantially sealing the end of said operating fluid receiving-chamber remote from said zone from the atmosphere, said wireline extending through said means; wireline gripping means carried by said piston that grip said wireline solely during movement of said piston towards said zone so as to draw said wireline into said zone, said gripping means releasing said grip during movement of said piston away from said zone; said packing means frictionally restraining said wireline against movement away from said zone during movement of said piston away from said zone; means on said body for admitting an operating fluid existing at a pressure higher than the pressure within said zone into said operating fluid receiving-chamber so as to urge said piston towards said zone, said piston being returned when said operating fluid is withdrawn from said operating fluid receiving-chamber by the force of the fluid in said zone; and a resilient sealing member carried by said piston and extending towards said operating fluid receiving-chamber, said sealing member having a wireline-receiving passage aligned with the aperture of said piston and contracting into substantially fluid-tight engagement with said wireline solely during movement of said piston toward said zone.

12. A wireline feed-in device for drawing wireline along a wireline path into a zone of fluid existing at super-atmospheric pressure, comprising: a body formed with a cylindrical chamber exposed at one end to said zone, said body also being formed with an operating fluid receiving-chamber aligned with and fluidly communicating with said cylindrical chamber and extending away from the end of said cylindrical chamber remote from said zone, said wireline being movable through said chambers into said zone; means restraining said body fixed relative to said zone; a piston slidably disposed in said cylindrical chamber for reciprocation therein towards and away from said zone, said piston being formed with an aperture through which extends said wireline; means on said body substantially sealing the end of said operating fluid receiving-chamber remote from said zone from the atmosphere, said wireline extending through said means; wireline gripping means carried by said piston that grip said wireline solely during movement of said piston towards said zone so as to draw said wireline into said zone, said gripping means releasing said grip during movement of said piston away from said zone; means on said body for admitting an operating fluid existing at a pressure higher than the pressure within said zone into said operating fluid receiving-chamber so as to urge said piston towards said zone; means interposed between said gripping means and said body for automatically urging said gripping means to a wireline releasing position whenever said piston is moved away from said zone to within a predetermined distance of the end of said cylindrical chamber remote from said zone; and a resilient sealing member carried by said piston and extending towards said operating fluid receiving-chamber, said sealing member having a wireline-receiving passage aligned with the aperture of said piston and contracting into substantially fluid-tight engagement with said wireline solely during movement of said piston toward said zone.

13. A wireline feed-in device for drawing wireline along a wireline path into a zone of fluid existing at super-atmospheric pressure, comprising: a body formed with a cylindrical chamber exposed at one end to said zone, said body also being formed with an operating fluid receiving-chamber aligned with and fluidly communicating with said cylindrical chamber and extending away from the end of said cylindrical chamber remote from said zone, said wireline being movable through said chambers into said zone; means restraining said body fixed relative to said zone; a piston slidably disposed in said cylindrical chamber for reciprocation therein towards and away from said zone, said piston being formed with an aperture through which extends said wireline; seal means in said aperture slidably engaging said wireline, packing means on said body substantially sealing the end of said operating fluid receiving-chamber remote from said zone from the atmosphere, said wireline extending through said means; jaw means carried by said piston that grip said wireline solely during movement of said piston towards said zone so as to draw said wireline into said zone, said jaw means automatically releasing said grip during movement of said piston away from said zone; means on said body for admitting an operating fluid existing at a pressure higher than the pressure within said zone into said operating fluid receiving-chamber so as to urge said piston towards said zone, said piston being returned when said operating fluid is withdrawn from said operating fluid receiving-chamber by the force of the fluid in said zone; and a resilient sealing member carried by said piston and extending towards said operating fluid receiving-chamber, said sealing member having a wireline-receiving passage aligned with the aperture of said piston and contracting into substantially fluid-tight engagement with said wireline solely during movement of said piston toward said zone.

14. A wireline feed-in device for drawing wireline along a wireline path into a zone of fluid existing at super-atmospheric pressure, comprising: a body formed with a cylindrical chamber exposed at one end to said zone, said body also being formed with an operating fluid receiving-chamber aligned with and fluidly communicating with said cylindrical chamber and extending away from the end of said cylindrical chamber remote from said zone, said wireline being movable through said chambers into said zone; means restraining said body fixed relative to said zone; a piston slidably disposed in said cylindrical chamber for reciprocation therein towards and away from said zone, said piston being formed with an aperture through which extends said wireline; means on said body substantially sealing the end of said operating fluid receiving-chamber remote from said zone from the atmosphere, said wireline extending through said means; jaw means carried by said piston that grip said wireline solely during movement of said piston towards said zone so as to draw said wireline into said zone, said jaw means automatically releasing said grip during movement of said piston away from said zone; means on said body for admitting an operating fluid existing at a pressure higher than the pressure within said zone into said operating fluid receiving-chamber so as to urge said piston towards said zone, said piston being returned when said operating fluid is withdrawn from said operating fluid receiving-chamber by the force of the fluid in said zone; means interposed between said jaw means and said body for automatically urging said jaw means to a wireline releasing position whenever said piston is moved away from said zone to within a predetermined distance of the end of said cylindrical chamber remote from said zone; and a resilient sealing member carried by said piston and extending towards said operating fluid receiving-chamber, said sealing member having a wireline-receiving passage aligned with the aperture of said piston and contracting into substantially fluid-tight engagement with said wireline solely during movement of said piston toward said zone.

15. A wireline feed-in device for drawing wireline along a wireline path into a zone of fluid existing at super-atmospheric pressure, comprising: a body formed with a cylindrical chamber exposed at one end to said zone, said body also being formed with an operating fluid receiving-

chamber aligned with said cylindrical chamber and extending away from the end of said cylindrical chamber remote from said zone, said wireline being movable through said chambers into said zone; means restraining said body fixed relative to said zone; a piston slidably disposed in said cylindrical chamber for reciprocation therein towards and away from said zone, said piston being formed with an aperture through which extends said wireline; means on said body substantially sealing the end of said operating fluid receiving-chamber remote from said zone from the atmosphere, said wireline extending through said means; a plurality of jaw elements pivotally carried by said piston; biasing means interposed between said jaw elements and said piston to urge said jaw elements into gripping engagement with said wireline solely during movement of said piston towards said zone so as to draw said wireline into said zone, said jaw elements relaxing said engagement during movement of said piston away from said zone and sliding freely along said wireline; means on said body for admitting an operating fluid existing at a pressure higher than the pressure within said zone into said operating fluid receiving-chamber so as to urge said piston towards said zone, said piston being returned when said operating fluid is withdrawn from said operating fluid receiving-chamber by the force of the fluid in said zone; and a resilient sealing member carried by said piston and extending towards said operating fluid receiving chamber, said sealing member having a wireline-receiving passage aligned with the aperture of said piston and contracting into substantially fluid-tight engagement with said wireline solely during movement of said piston toward said zone, said resilient sealing member being of smaller cross-section than said aperture so as to permit fluid communication between said chambers.

16. A wireline feed-in device for drawing wireline along a wireline path into a zone of fluid existing at superatmospheric pressure, comprising: a body formed with a cylindrical chamber exposed at one end to said zone, said body also being formed with an operating fluid receiving-chamber aligned with said cylindrical chamber and extending away from the end of said cylindrical chamber remote from said zone, said wireline being movable through said chambers into said zone; means restraining said body fixed relative to said zone; a piston slidably disposed in said cylindrical chamber for reciprocation therein towards and away from said zone, said piston being formed with an aperture through which extends said wireline; means on said body substantially sealing the end of said operating fluid receiving-chamber remote from said zone from the atmosphere, said wireline extending through said means; a plurality of jaw elements pivotally carried by said piston; biasing means interposed between said jaw elements and said piston to urge said jaw elements into gripping engagement with said wireline solely during movement of said piston towards said zone so as to draw said wireline into said zone, said jaw elements relaxing said engagement during movement of said piston away from said zone and sliding freely along said wireline; release elements carried by said piston and engageable with said body whenever said piston is moved away from said zone to within a predetermined distance of the end of said cylindrical chamber remote from said zone so as to automatically urge said jaw elements to relax their engagement with said wireline; means on said body for admitting an operating fluid existing at a pressure higher than the pressure within said zone into said operating fluid receiving-chamber so as to urge said piston towards said zone, said piston being returned when said operating fluid is withdrawn from said operating fluid receiving-chamber by the force of the fluid in said zone; and a resilient sealing member carried by said piston and extending toward said operating fluid receiving-chamber, said sealing member having a wireline-receiving passage aligned with the aperture of said piston and contracting into substantially fluid-tight engagement with said wireline solely during movement of said piston toward said zone, said resilient sealing member being of smaller cross-section than said aperture so as to permit fluid communication between said chambers.

References Cited in the file of this patent

UNITED STATES PATENTS

1,853,856	Gattrell	Apr. 12, 1932
2,555,145	McKinney	May 29, 1951
2,748,870	Basham et al.	June 5, 1956

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,998,071 August 29, 1961

Floyd O. Bohn

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 6, line 58, column 7, lines 10, 42, and 74, column 8, lines 37 and 67, column 9, lines 22, and 57 and 58, and column 10, lines 17 and 49, after "wireline", each occurrence, insert a semicolon; column 7, line 18, for "zone;" read -- zone, --.

Signed and sealed this 6th day of February 1962.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents