A stuffing box for use in sealing around a wireline used in the running and pulling wireline equipment in oil and gas wells under pressure. The stuffing box has a removable internal body for enlarging the usable bore through the box to permit passage of tools under certain emergency conditions. The stuffing box is particularly characterized by a fishing neck type head configuration on an internal body which is removable from the housing of the box without rotation. One specific form of the stuffing box includes a union type coupling for attaching the box to a lubricator without rotation. A more specific form of union type coupling is a hand operated quick union. The stuffing box is especially useful in situations where wireline well tools become lodged extending through the valves in the well surface system precluding pressure sealing around the tools by the valves while dislodging and removing the tools.

12 Claims, 7 Drawing Figures
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STUFFING BOX FOR WIRELINE WELL APPARATUS

This invention relates to well head equipment and more particularly relates to stuffing boxes for use with wireline equipment in running and pulling tools in oil and gas wells under pressure.

The use of wireline equipment and procedures is well known in the oil and gas industry for running a multitude of different types of well tools and other well equipment in oil and gas wells while the wells are under pressure. The equipment and techniques involve the use of a wireline or cable to support the tools and other equipment when running them into and withdrawing them from a well. Additionally, the wireline serves to communicate forces when manipulating such tools and other equipment in the well. Generally, a wireline system comprises a lubricator including a wireline valve which couples with the well head Christmas tree above the master valve, at least two sections of tubing or pipe connected together by a suitable form of union with the lower end of the two sections of the pipe coupled to the wireline valve, and a wireline stuffing box on the upper end of the upper tubing section to permit a wireline to move into and out of the lubricator while the lubricator is under pressure from the well. A particular form of such wireline equipment is illustrated and described at pages 3,493 and 3,494 of the COMPOSITE CATALOG OF OILFIELD EQUIPMENT AND SERVICES, 1972-73 Edition, published by World Oil, Houston, Texas.

During the running or pulling of a string of tools through wireline surface equipment, the tools may become lodged somewhere along the length of the well tubing and surface fittings at a location at which one or more of the tools prevents the closure of the well valves and of the wireline valve so that the lubricator above the valve cannot be pressure isolated from the well to perform the required emergency operations to remove the lodged tools. Generally, when such tools are stuck in a well, the wireline is pulled loose, and it is necessary to go in with additional pulling tools and other equipment to grasp, release, and remove the tools. Thus, equipment and techniques are required to permit access to the lubricator to engage the stuck tools while well pressure is within the lubricator. While stuffing boxes with removable cores or bodies are known, they generally are engaged in the stuffing box housing in a manner which requires some rotation of the body for removal and they are not equipped with facilities for grasping by conventional wireline equipment.

It, therefore, is a principal object of the invention to provide a new and improved stuffing box for use with wireline surface equipment in the running and pulling of wireline tools and other equipment in oil and gas wells under pressure.

It is another object of the invention to provide a new and improved wireline stuffing box which has a removable body.

It is another object of the invention to provide a new and improved wireline stuffing box which has an internal body that is removable without rotation in the housing of the stuffing box.

It is another object of the invention to provide a wireline box having a removable internal body including a fishing neck type head for grasping by a pulling tool to withdraw the body from the housing.

It is a further object of the invention to provide a new and improved wireline stuffing box which is connectible into a lubricator by a quick union type coupling. In accordance with the invention, there is provided a wireline stuffing box having a removable internal body held within the housing of the stuffing box by circumferentially spaced locking screws. The removable body has a fishing neck type head for engagement by conventional wireline pulling tools. The housing of the stuffing box is connectible to a tubing section of a lubricator of the wireline surface equipment for mounting the stuffing box above a well head. In one preferred form of the stuffing box, the housing is connectable in the lubricator by a quick union type coupling. The body is removable without rotation from the stuffing box housing. In using the stuffing box, the entire internal body of the box is removed to enlarge the available useful bore through the housing to admit suitable pulling tools through the housing to engage the lodged or stuck tools in the well.

The foregoing objects and advantages of the invention will be evident from the following detailed description of preferred embodiments thereof taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a longitudinal side view in elevation and section of one form of wireline stuffing box embodying the invention;

FIG. 2 is an enlarged view in section along the line 2--2 of FIG. 1;

FIG. 3 is a view in section and elevation of another form of wireline stuffing box embodying the invention;

FIG. 4 is a side view in elevation of the wireline stuffing box and sheave assembly in operation on the upper end of a lubricator;

FIG. 5 is a side view in elevation of a complete assembly of wireline surface equipment illustrating the use of two of the stuffing boxes of the invention for manipulating stuck tools in the well;

FIG. 6 is an enlarged fragmentary view in section and elevation illustrating the function of a blowout preventer plunger in the stuffing box for closing the flow passage through the stuffing box when the wireline is pulled from the box under pressure; and

FIG. 7 is a longitudinal fragmentary view in section and elevation illustrating an intermediate stage in the removal of the internal body from the stuffing box.

Referring to FIG. 1, a preferred form of stuffing box embodying the invention includes a housing 11 and a removable internal body 12 which is releasably locked in place in the housing by circumferentially spaced radial screw assemblies 13.

A sheave assembly 14 is mounted on the stuffing box for guiding a wireline into the stuffing box when the box is the uppermost component in the wireline surface equipment for a well. The body 12 is removable from the stuffing box housing to effectively increase the bore through the box for the emergency passage of tools which exceed the diameter of the wireline.

The removable body 12 of the stuffing box 10 has a head end portion comprising a fishing neck 15 having a flange 20 for grasping the neck to pull the body 12 from the stuffing box housing. The fishing neck has a bore 21 sized to accommodate a wireline for handling the tools and other equipment manipulated by wireline operations in the well on which the stuffing box is mounted. The fishing neck is provided with a pair of
longitudinally spaced ports 22 and 23 communicating the bore of the fishing neck with an annular oil space 24 defined around the fishing neck within the housing 31 to permit oil flow between the annulus and the bore 21 for lubricating the wireline. Some oil placed on the wireline for lubrication flows into the annulus 24 as the wireline goes through the stuffing box into the well. As the wireline is pulled from the well, the oil flows back from the annulus to lubricate the wireline. The fishing neck has an externally threaded lower end portion 24 engaged in an upwardly opening counterbore 25 of a central body member or tubular cartridge 30. The cartridge 30 has a longitudinal bore 31 which holds a plurality of ring-shaped packing members 32 for sealing around a wireline moved through the stuffing box. A tubular upper packing gland 33 is held in the bore 31 against the top packing ring 32 by the lower end of the fishing neck. The bottom packing ring 32 rests on a lower packing gland 34 which has radial side ports 35 communicating with an annulus 40 defined around the gland within the cartridge 30. The lower gland is enlarged along the lower end portion 41 providing an upwardly facing external shoulder which engages a stop shoulder 30a in the cartridge 30 at the upper end of a downwardly opening counterbore 42. A bottom stop or sub 43 is threaded into the lower end portion of the cartridge 30 to support a longitudinally movable blowout preventer plunger 44. The plunger 44 is disposed in a chamber 30b defined by the bore 30a and an upwardly opening counter-bore 45 of the stop 43. The plunger includes a deformable rubber or plastic plug 50 having a bore through which a wireline runs. The plug 50 has an external flange portion 51 below which the plug is molded into an internally flanged and grooved metal sleeve 52. The plunger is slidable along the chamber 30b between the open normal operating position of FIG. 1 and an upper closed position illustrated in FIG. 6.

The cartridge 30 is longitudinally slidable in a bore 53 of a section 54 of the stuffing box housing 11. The bore 53 is reduced slightly in diameter along a lower portion 55 providing an upwardly facing tapered shoulder 59 engaged by a downwardly facing tapered stop shoulder 60 on the cartridge 30 for supporting the removable stuffing box body 12 in the housing. The cartridge 30 has a plurality of circumferentially spaced side opening locking recesses 61 which are equal in number aligned to cooperate with the locking screw assemblies 13 for releasably holding the body 12 in the stuffing box housing. A small lateral bore 62 communicates each of the locking recesses 61 of the cartridge with the central bore through the cartridge for pressure relief purpose. The relationships of the various passages and the annulus 40 in the body 12 at the recesses 61 are shown in FIG. 2. The cartridge 30 carries a pair of longitudinally spaced external annular ring seals 63 and 64 in external annular recesses around the cartridge above and below the locking recesses 61 for sealing between the cartridge and the housing section 54 above and below the locking screw assemblies 13.

A radially movable pressure release valve 65 is threaded into a graduated bore 70 provided between two of the locking screw assemblies 13 in the housing section 54, as particularly evident in FIG. 2. The inward end of the bore 70 opens through a port 71 into the annulus 40 around the lower gland 34 in the cartridge to permit a bleed down of pressure from the bore through the removable body of the stuffing box. The tapered inward end of the valve 65 cooperates with a valve seat surface 72 at the inward end of the bore 70 for controlling communication through the lateral ports 71. The valve 65 permits the pressure within the stuffing box above the plunger 44 to be bled down for shifting the plunger upwardly to a sealing position within the removable body 12 to change or adjust the packing 32 while the stuffing box is under pressure. Also, grease is injected through the valve 65 into the bore 42 between the plunger 44 and the gland 34 to lubricate the wireline as it is withdrawn from the well and to minimize or eliminate wireline freezing problems which often occur at wellheads.

Each of the screw assemblies 13 used to releasably lock the removable body 12 within the stuffing box housing includes a screw 73 having a threaded portion 74 which engages a threaded lateral bore 75 in the housing section 54. Each of the screws 73 has a tapered inward end portion 80 engageable in one of the locking recesses 61 of the cartridge 30 of the removable body 12 for locking the body in the housing of the stuffing box. Each screw 73 is disposed through an externally threaded nut 81 engaged in an enlarged threaded outward end portion of the lateral bore 75. A ring seal 82 within an annular recess in the inward end face of the nut 81 seals between the nut and the body 54. Another ring seal 83 within each nut seal within the nut around the screw 73 passing through the nut. Each screw 73 has flat side faces 84 for engagement of a wrench to rotate the screw for releasing and locking the removable body 12 in the stuffing box housing. Each nut 81 has an enlarged inner bore portion 85 which receives the threaded section of the screw 73 when the screw is retracted outwardly for releasing the removable body 12 from the housing.

The section 54 of the stuffing box housing is enlarged along a lower portion 90 providing an upwardly facing external annular stop shoulder 91 for engagement by an internally threaded collar 92 comprising a component of an Ottis quick union of the nature shown and described in page 494 of the COMPOSITE CATALOG OF OIL FIELD EQUIPMENT AND SERVICE, supra, to permit manual connection of the stuffing box housing to an end of one of the tubing sections of a lubricator. The housing section 54 is reduced in diameter along a lower end portion 93 providing a pin end having ring seal 94 for engagement with a quick union box end, not shown, on such pipe end of the lubricator.

The stuffing box housing section 54 is reduced in diameter along an upper portion 95 defining an upwardly facing external stop shoulder 100. The upper end of the reduced portion 95 of the housing section 54 is threaded into a tubular body end 101 which forms a component part of an Ottis quick union at the upper end of the stuffing box. The body end 101 has an internal annular flange 102 which limits the extent to which the box end may be threaded onto the housing portion 95. A tubular staff weldment 103 is rotatably mounted on a pair of spaced roller bearings 104 and 105 on the housing portion 95. The lower roller bearing 104 is supported on the stop shoulder 100 of the housing 54, while the upper bearing 105 is engaged between the lower end of the box end 101 and an internal shoulder 110 within the staff weldment 103. A ring seal 111 in an external annular recess of the body section 54 seals between the body and the lower end staff weldment.
Internal and external ring seals 112 and 113, respectively, seal within and around the box end 101 between the housing portion 95 and the upper end of the staff weldment. A grease fitting 114 secured through the staff weldment permits injection of grease into an annulus 115 within the staff weldment around the body between the seal 111 at the lower end and the seals 112 and 113 at the upper end for lubricating the roller bearings. A vertical staff mounting plate 120 is secured to the staff weldment 103 to support the sheave staff 121. The sheave staff is connected to the mounting plate 120 by a plurality of spaced bolts 122. A handle 123 is secured to the plate 120 for handling the sheave assembly on the stuffing box housing. A sheave 124 is mounted in a forked upper end of the staff 121 by a shaft 125. A sheave guard 130 is secured from the sheave staff over an upper portion of the sheave to keep the wireline from accidentally running off the sheave. The sheave assembly is automatically aligned at any position 360° around the stuffing box housing by the wireline on the sheave.

A collar 140 is threaded on the box end 101 holding a tubular plug 141 within the box end around the fishing neck 15. Spaced wipers 142 are supported in internal annular recesses of the plug 141 around the fishing neck. A ring seal 143 within an external annular recess around the plug 141 seals between the plug and the box end 101.

In normal usage, the stuffing box 10 is mounted on the upper end of a lubricator 150, see FIG. 4, of a surface equipment assembly for wireline operations as shown at page 3,493 of the COMPOSITE CATALOG OF OIL FIELD EQUIPMENT AND SERVICES, supra. The new and improved stuffing box 10 is substituted for the stuffing box 1 illustrated in the reference. By including the new improved stuffing box 10 in the lubricator of the wireline surface equipment, wireline access may be had to the lubricator for dislodging and removing stuck well tools which prevent conventional functioning of the wireline valve included in a conventional lubricator and the well master valve.

FIG. 5 illustrates the use of the stuffing box 10 in a wireline surface equipment assembly of the nature shown in the reference for dislodging and removing such stuck well tools. The lubricator 150 is mounted on a Christmas tree 151 secured above a suitable master valve, not shown, which normally could be closed in the absence of stuck wireline tools extending through the valve. A wireline valve 152 is connected by a swage or tree connection 153 to the Christmas tree. Lower, middle and upper lubricator sections 154, 155, and 160 are secured together and connected on the wireline valve 152 by a coupling 161. The lubricator sections are coupled together by Otis quick unions 162 to permit manual disconnection when required to gain access to the lubricators. A telescoping gin pole assembly 163 is provided to aid in handling the lubricator sections and other equipment required to be lifted in manipulating the wireline system. A wireline pulley 164 and a weight indicator 165 are connected with the Christmas tree to facilitate handling a wireline 170 used to support the various wireline tools, not shown, within the well. A two way bleed-off valve 171 is connected into the side of the lower lubricator section 154 to bleed off the pressure in the lubricator at times when it is disassembled for the admission or removal of wireline tools. The valve 171 may exhaust directly to the atmosphere or to a flow line to an upper lubricator 150' as explained below.

In normal operation of conventional wireline surface equipment, either the master and/or the wireline valves are closed to permit lubricator installation or removal. The pressure is bled from the lubricator through the valve 171 to the atmosphere, and the lubricator is broken at the quick union 161. While supported by the gin pole assembly the lower end of the lubricator is manually pushed to one side to permit access into the lubricator. The tool to be run into the well is connected to the wireline which extends over the sheave 124, through the stuffing box into the lubricator and is run out enough to secure the tool to the line. The tool is pulled inside the lubricator which is then reassembled at the quick union. The valves are reopened to admit well pressure to the lubricator and the tool is then run into the well.

During the operation of the wireline system in handling a tool in the well, the tool may become lodged at a location preventing closure of the master valve and the wireline valve. When such valves are inoperative, there remains no mechanism for pressure isolating the lubricator to gain access to the well. In other words, the well cannot be shut in and the lubricator opened to the atmosphere to introduce another wireline tool for the purpose of retrieving the one that is stuck. The wireline 170 generally is broken loose from the stuck tool and pulled from the stuffing box so that it is clear of the bores through the plug 34, the packing rings 32 and the fishing head of the removable body 12. Under such circumstances, a new and improved stuffing box 10 permits procedures which will allow such access to the well.

In order that the stuck tool may be fished from the well, it is necessary that a second upper lubricator 150' and stuffing box be installed on the existing lower lubricator and stuffing box so that the removable internal body 12 may be withdrawn from the existing stuffing box to permit access to the lower lubricator with the necessary retrieval tools. At the time that the wireline 170 was pulled from the stuffing box 10 in attempting to withdraw the stuck tool, the resulting pressure differential across the blowout preventer plunger 44 forced the plunger upwardly to the sealing position illustrated in FIG. 6. In the upper sealing position, the plug 50 of the plunger deforms sufficiently along an upper end portion to extrude slightly into the lower end of the lower packing gland 34 for sealing the lower end of the bore through the gland so that well pressure is held by the plunger. The inward end portions 80 of the lock screws 73 are within the locking recesses 61 of the removable body cartridge holding the internal body 12 in place in the stuffing box. The sheave 124 and supporting sleeve staff 121 are removed from the mounting plate 120 by disengagement of the bolt 122 to provide the necessary clearance for mounting the second upper lubricator 150' on the lower lubricator. The upper lubricator includes components identical with those of the first lower existing lubricator. The components of the upper lubricator shall be referred to by the same reference numerals as the lower lubricator with the additional designation of a prime mark ('). Thus, the upper lubricator is made up of the connector 153', the wireline valve 152', the lower, intermediate, and upper lubricator sections 154', and 155' and 160' interconnected by the spaced quick unions 162', and the stuff-
In assembling and mounting the upper lubricator on the stuffing box 10 of the lower lubricator, the collar 140 and the plug 141 of the stuffing box are removed to permit the connection of the adapter 153 to the box 101. This may be done by use of a suitable fitting on the bottom of the adapter 153 which is engageable in the box 101 in a manner similar to the plug 141 and held in place by reconnecting the collar 140. In assembling the upper lubricator and mounting it on the stuffing box of the lower lubricator, a suitable pulling tool is connected with the wireline 170 which extends through the upper stuffing box 10'. The pulling tool is then pulled into the lubricator section or sections connected with the stuffing box, depending upon the length of the tool, preliminary to final assembly of the upper lubricator. For example, if the pulling tool is sufficiently short, the upper stuffing box 10' may be assembled with the upper lubricator section 160 and the tool then pulled by means of the wireline into the lubricator section after which the stuffing box and upper lubricator sections are connected with the middle and lower lubricator sections by the upper quick union 162'. If the pulling tool, however, is so long that two lubricator sections are required to house it, before complete assembly of the lubricator, the upper and middle lubricator sections 155' and 160' are assembled with the upper stuffing box 10' and the pulling tool is drawn into the lubricator sections.

With the pulling tool inside the lubricator, the lubricator is assembled at the appropriate quick union so that the complete surface assembly for removal of the body 12 from the lower stuffing box 10 and the fishing out of the stuff tool comprises the upper and lower lubricators as illustrated in FIG. 5. The wireline 170 is threaded over the pulley 124' of the upper sheave 14' and downwardly around the wireline pulley 164. The bleed-off valve 171 of the lower lubricator is connected by a flow line 180 to the bleed-off valve 171' of the upper lubricator. The wireline valve 152' of the upper lubricator is open so that the upper lubricator may be pressured throughout its entire length from the upper stuffing box 10' downwardly to the lower stuffing box 10. The bleed-off valves 171 and 171' are then opened to pressure up the upper lubricator to the existing well pressure within the lower lubricator. It will be recalled that at the time the wireline was originally pulled from the lower lubricator and stuffing box, the blow out preventer plunger 44 in the stuffing box 10 moved upwardly to seal off the upper end of the lower lubricator at well pressure, and since the lower wireline valve and master valve cannot be closed due to the stuff tool extending through them, the lower lubricator has remained at well pressure throughout the procedure of assembling the upper lubricator on it.

When the upper lubricator 150' is brought up to well pressure through the line 180 there is no pressure differential across the blow out preventer plunger 44 so that the removable body 12 of the stuffing box 10 may be released from the housing of the box and pulled out of the lubricator to clear the bore through the stuffing box housing for subsequent wireline operations. With no pressure differential across the blow out preventer plunger, the lock screws 73 are rotated to retract the screws until the inward end portions 80 of the screws are withdrawn from the locking recesses 61 of the cartridge 30 of the removable internal body 12. FIG. 7 illustrates the retracted positions of the lock screws freeing the removable body from the stuffing box housing. Preferably, the blow out preventer plunger 44 is formed of a rubber-like material of a resiliency which causes it to relax and return to its original shape when the pressure differential is removed across the plunger by equalization of the pressures above and below the plunger through the line 180. The relaxation of the pressure differential and the return of the blow out preventer plug to the normal shape permits the plunger to drop back to the position shown in FIGS. 1 and 7. The wireline pulling tool 190 previously installed in the upper lubricator during the assembly of the lubricator is manipulated by means of the wireline 170 lowering the pulling tool into engagement with the fishing neck 15 of the removable body 12. Pulling prongs 191 on the pulling tool are engaged with the pulling flange 20 of the fishing neck so that the pulling tool may lift the removable body. The entire body is pulled upwardly from the housing 11 of the stuffing box so that all of the interconnected parts of the housing from the fishing deck downwardly through the stop 43 are removed from the housing as a unit. The bore 53 through the housing body 95 is thus fully open to permit wireline operation through the stuffing box housing.

The pulling tool along with the removable body 12 are lifted into the upper lubricator above the wireline valve 152'. The wireline valve 152' and the valves 171 and 171' are then closed and the pressure within the upper lubricator is bled off by venting the valve 171' to the atmosphere until the pressure within the upper lubricator is atmospheric. The upper lubricator is then broken at the quick union 161' and the removable body 12 is released from the tool 190 to disconnect the body from the wireline. Suitable retrieving tools are connected with the wireline for engaging and removing the stuff tools within the flow conductor. The upper lubricator is then reassembled at the quick union so that the surface wireline equipment combination is again as shown in FIG. 5. The pressure in the upper lubricator is equalized with the lower lubricator through the line 180 or the by-pass valve in the wireline valve 152'. The wireline valve 152' is then opened and the retrieval tools are run downwardly to engage, release and pull out the stuff tool. After the stuff tool is pulled upwardly into the lower lubricator, the master valve (not shown) or the wireline valve 152 is again closed, the pressure is bled down through the valve 171, and the lower lubricator is broken at the quick union 161. The retrieving tool along with the recovered stuff tool are lowered and removed from the lubricator.

Subsequent wireline operations may then be carried out in accordance with previously discussed procedure using the equipment assembly shown in FIG. 5, or, alternatively, the removable body 12 may be reinstalled in the stuffing box 10 and the upper lubricator assembly removed to reduce the height of the wireline equipment on the well and thus minimize the problems in carrying out the future wireline operations. With the stuff tool removed, of course, reassembly of the lower lubricator and removal of the upper lubricator may be done with the master valve closed.

An alternate form 10A of the stuffing box of the invention is illustrated in FIG. 3. A major portion of the components of the stuffing box 10A are identical to those of the stuffing box 10 and thus are designated by
the same reference numerals used in FIG. 1 and in the description of the box 10. Those parts of the stuffing box 10A which are somewhat modified while still performing similar functions as corresponding parts of the stuffing box 10 are referred to in FIG. 3 by the same reference numerals as used in FIG. 1 with the designation A added. The basic and only difference between the stuffing boxes 10 and 10A is that the box 10A is provided with conventional tubing threads instead of with hand operated quick unions. The entire removable body 12 from the box 10A is identical in all respects to the body 12 of the box 10. The housing body 54A has a lower end portion 200 which is internally threaded to permit engagement with the pin end of one of the sections of a lubricator. Otherwise the body 54A is identical in function and structure to the body 54 as previously described. The end 101A at the upper end of the housing of the stuffing box 10A has an upper end portion 201 which is internally threaded for engagement of the lower end of a lubricator to permit connection of an upper lubricator when performing wireline operations for removal of a stuck tool as explained in detail above in connection with FIG. 5. The plug 141A threads into the upper end of the end 101A to seal around the fishing neck 15 of the removable body 12 and close the upper end of the grease containing annulus 24. The plug 141A has upwardly opening lateral slots 202 for engagement by a spanner wrench to insert and remove the plug. Grease is injected into the bore 42 through the valve 65 to aid in lubricating the wireline run through the body of the stuffing box and minimize any freezing problem. The ports 22 and 23 in the fishing neck communicating with the bore 21 through the neck allow for some flow of oil between the bore and the annulus to lubricate the wireline. The function of the stuffing box 10A is identical in all respects to the box 10. The one difference in the procedure of interconnecting the lubricator and other tubing sections with the stuffing box is that one of the members, either the stuffing box housing or the tubing being connected to the housing, must be rotated to make the required connection with the threaded end 200 on the housing body 54A and the threaded end 201 of the end 101A.

In each of the stuffing boxes 10 and 10A the blow out preventer plunger 44, in addition to serving the safety function of closing off flow through the stuffing box when the wireline is pulled from the box, also permits the packing 32 in the box to be changed while the lubricator on which the box is mounted is under pressure. To shift the blow out preventer plunger to the closed position the valve 65 is rotated until the tapered inward end of the valve is moved off the seat 72 so that there may be flow through the port 71 and the valve to the annulus 40 communicating through the bottom packing gland 34 with the bore of the packing gland and body above the blow out preventer plunger. The bleeding down of the pressure above the plunger effects a pressure differential across the plunger causing the plunger to be forced upwardly to the closed position and deformed shape of FIG. 6 so that the well is shut in by the plug. The fishing neck 15 and the upper packing gland 33 may then be removed to replace the packing 32.

It will be recognized that each of the stuffing boxes illustrated and described includes the removable internal body which is disengaged from the housing of the stuffing box without the necessity of rotating the body. The body includes a fishing neck which permits coupling with suitable standard wireline pulling tools. Each of the stuffing boxes is adapted to be coupled with a lubricator included in the wireline surface equipment used. One of the forms of the stuffing box is equipped with quick unions which permit hand manipulated coupling of the box at each end with lubricators without rotation of either the box housing or the lubricator tubing section being coupled with the box. Thus, the hazards involved in the application of torque to the box and to the lubricator section involved are reduced. In the use of each of the boxes, the stuffing box in the lower lubricator must be manipulated under pressure in order to connect the upper lubricator. Any reduction of the hazard of the necessary steps involved in making up and disassembling the wireline surface equipment is beneficial, not only for safety considerations, but also due to the problems involved in working high in the air from a scaffold around the lubricators as they are assembled and disassembled to remove the stuck tools. The stuffing boxes are especially applicable to offshore wells where loss of well control can be very dangerous to the surrounding ocean and the well is extremely difficult to restore to normal operation. Thus, the invention is not only of great economic value but is a major contribution to protection of the ecology.

What is claimed and desired to be secured by Letters Patent is:

1. A stuffing box for coupling with a flow conductor to seal around a wireline for carrying out wireline operations in said flow conductor comprising: a housing having a bore therethrough; means for coupling said housing at a first end thereof with said flow conductor; a removable body in said bore of said housing; said body having a bore therethrough and means in said bore for sealing around a wireline passing through said body; means for securing a conduit with the second opposite end of said housing to provide an unobstructed passage through which said removable body may be withdrawn from said housing; sealing means between said removable body and said housing adapted to remain in sealing relationship between said body and said housing when said conduit is secured to said conduit for removal of said body; and means locking said body in said housing, said locking means being adapted to be operated from around said body to release said body from said housing after said conduit is secured to said housing and permit said body to be pulled from said housing by longitudinal force only through said conduit connected with said second end of said housing.

2. A stuffing box in accordance with claim 1 wherein said removable body has a head end portion adapted to be engaged by a wireline pulling tool for removal of said body from said bore of said housing by application of a force to said head end portion only of said body.

3. A stuffing box in accordance with claim 1 wherein said locking means between said housing and said removable body comprises at least one locking member adapted to be moved between a release position and a locking position without rotation of said removable body.

4. A stuffing box in accordance with claim 3 wherein said locking means comprises a plurality of circumferentially spaced radially movable locking screws en-
gageable with locking recess means provided in said remov-able body.

5. A stuffing box in accordance with claim 3 including quick union couplings at opposite ends of said housing for manual connection of said housing with flow conductors.

6. A stuffing box in accordance with claim 3 wherein said housing is provided with screw threads at opposite ends thereof for connection of said housing with flow conductors.

7. A stuffing box in accordance with claim 3 including a blow out preventer plunger movably disposed within the central flow passage through said removable body for closing said flow passage after withdrawal of a wireline extending through said removable body and said blow out preventer whereby said preventer plunger plugs said central flow passage responsive to a pressure differential applied across said plunger.

8. A stuffing box for use in sealing around a wireline for carrying out wireline operations in a well under pressure comprising: a housing having a longitudinal bore therethrough and means on opposite ends thereof for coupling said housing with a flow conductor at each end; circumferentially spaced radially movable locking screws having inward locking end portions secured through said housing; a longitudinally extending removable body secured within said bore of said housing and adapted to be releasably coupled in said bore by said locking screws through said housing for insertion and removal by longitudinal movement only, said removable body including a fishing neck and a bore coincident with said bore in said fishing neck, packing means disposed in said bore of said cartridge for sealing around a wireline movable through said removable body, said cartridge having external outwardly opening locking recesses for receiving said inward end portions of said locking screws for locking said removable body in said bore of said housing with said locking screws through said housing, a bottom stop secured into said cartridge and having a longitudinal bore communicating with said bore through said cartridge, and a blow out preventer plunger within said communicating bores of said cartridge and said bottom stops and movable between open and closed positions responsive to a pressure differential across said plunger for plugging said bore through said removable body responsive to said pressure differential, said plunger having a longitudinal bore coincident with the bores of said cartridge and said bottom stop for passage of said wireline through said plunger.

9. A stuffing box in accordance with claim 8 wherein said means for coupling said housing with flow conductors at opposite ends of said housing comprise manually operable quick unions.

10. A stuffing box in accordance with claim 8 wherein said means for coupling said housing at opposite ends of said housing to flow conductors comprise threads on said opposite ends of said housing.

11. A stuffing box in accordance with claim 9 including a wireline sheave assembly rotatably mounted on said housing for guiding a wireline into and out of said bore through said removable body.

12. A stuffing box in accordance with claim 10 including a sheave assembly rotatably mounted on said housing for guiding a wireline into and out of said bore through said removable body.

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