April 28, 1959 J. H. BOSTOCK ET AL 2,884,073

WELL TOOLS

Filed Nov. 8, 1956

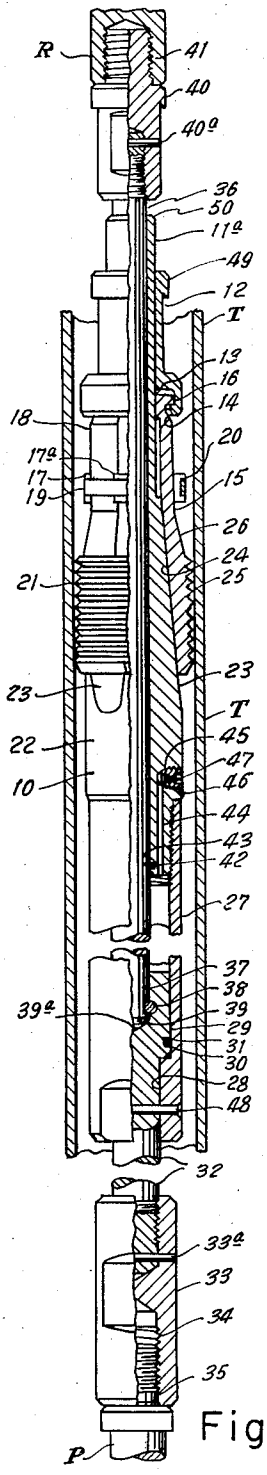


Fig. 1

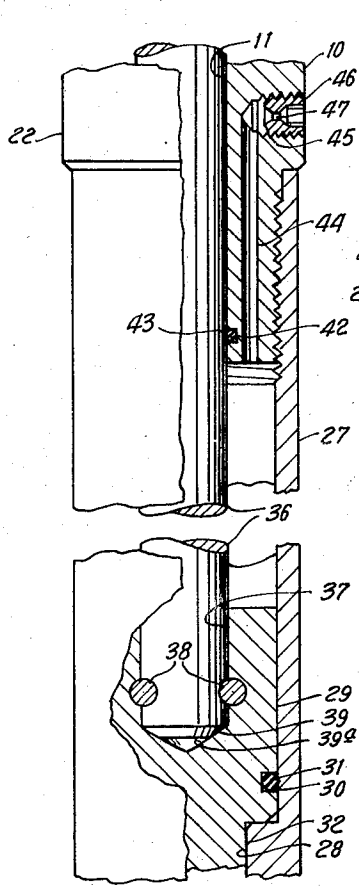


Fig. 2

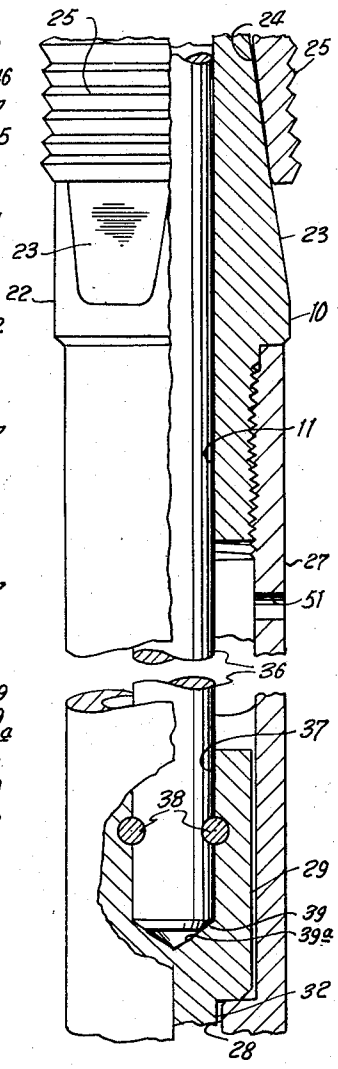


Fig. 3

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United States Patent Office 2,884,073 Patented Apr. 28, 1959

2,884,073

WELL TOOLS

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Application November 8, 1956, Serial No. 621,156

12 Claims. (Cl. 166—218)

This invention relates to new and useful improvements in well tools, more particularly to safety devices for flexible line well tools.

As a matter of accepted practice, certain subsurface well flow control devices are installed in and removed from the tubing of oil and gas wells by flexible or wire line operated running and retrieving tools. Often a pressure differential exists across such an installed subsurface control device, which tends to unseat the control and move such control up the tubing. If a subsurface control device is used to blank off or close an opening through the wall of the tubing from its bore to the tubing-casing annulus, a pressure differential may exist across the flow control device which will become effective when the control device is removed from its blanking or aperture closing position to rapidly move the control device up the tubing.

Equalizing devices are often built into subsurface flow controls. However, in certain instances the conditions in the well bore are such that it is almost impossible to equalize pressures across the control device; and, control devices not having equalizing devices incorporated therein do not provide for prior equalization of pressures across the control device.

The unbalanced pressures acting across a subsurface flow control device generally rapidly move the control device upwardly within the tubing once the device is released from its locked or seated position in the tubing. This rapid and usually violent upward movement frequently results in the entanglement of the string of retrieving tools with the suspending flexible or wire line, requiring a laborious and expensive fishing job for removal of the wire line and the tools.

Accordingly, one object of this invention is to provide an improved well tool safety lock which may be run into a well on a flexible line, such as a wire line or cable, and which is arranged to be connected with the pulling or removing tool for removing a subsurface well device from the well.

It is a further object of the invention to provide a safety lock which is adapted to prevent rapid and violent upward movement of a suspended well device when said device has been released from anchored, seated or locked position in the well bore.

It is another object of the invention to provide a well tool safety lock which may be made up in the string of pulling tools and which is adapted to be locked in place in the tubing before a subsurface well device having unbalanced fluid pressure applied thereto is released from its secured position, whereby the kinetic energy of the rapidly moving subsurface well device may be dissipated and said device stopped from upward movement.

An additional object of the invention is to provide a well tool safety lock incorporating a shock absorber or damping structure therein for the absorption or dissipation of the kinetic energy of a rapidly moving subsurface well device.

Another object of the invention is to provide a safety

lock in which the damping properties of a shock absorber incorporated therein may be varied as desired to so control the damping action of the shock absorber.

A purpose of the invention is to provide a well tool safety lock of the type described having gripping or arresting means which ride on the wall of the well bore in non-gripping engagement as the tool is lowered therethrough, said gripping means being arranged to assume a gripping position upon upward movement of the safety lock, whereby further upward displacement of said safety lock is prevented; the gripping means being so constructed that it may be retracted from gripping position by operations from the surface so as to permit removal of the safety lock from the well bore or tubing.

An important object of the invention is to provide a pulling tool safety lock of the type described having gripping means which may be actuated to grip the walls of the tubing within which said safety lock is lowered before the subsurface well device which it is desired to remove from the well is released from its locked position.

Additional objects and advantages of the invention will be readliy apparent from the reading of the following description of a device constructed in accordance with the invention, and reference to the accompanying drawings thereof, wherein:

Figure 1 is a view, partly in section and partly in elevation, of an improved safety lock showing the same being lowered through a well tubing;

Figure 2 is an enlarged view of the central portion of the tool showing particularly one form of the energy-dissipating mechanism; and,

Figure 3 is an enlarged view of the central portion of a modified form of the invention.

In the drawings, the numeral **10** designates an elongate mandrel having a bore **11** therethrough. The upper portion **11***a* of the mandrel is substantially cylindrical, and a slip-supporting sleeve or carrier **12** is slidable longitudinally thereon. The lower portion **13** of the bore of the carrier is enlarged and formed with an internal annular flange **14** therein. The upper ends of gripping elements or slips **15** extend into the enlarged bore of the carrier and have outwardly projecting lugs or hooks **16** which engage the upper surface of the flange **14** for swingingly suporting said griping elements on said flange.

An external flange **17** formed intermediate the ends of the mandrel has a plurality of angularly spaced slots **17***a* formed therein through which the handles or shanks **18** of the gripping elements loosely slidably extend. A continuous annular retaining band or ring **19**, secured in an external groove **20** in the flange **17**, retains the handles or shanks of the gripping elements within the slots of the flange. The lower gripping slip portions **21** of the gripping elements are enlarged so that said slip portions engage the flange **17** and will not pass through the slots in the flange, and upward movement of the sleeve and the gripping elements is thus limited by this engagement of the slip portions with the flange. The downward movement of the carrier and gripping elements is limited by the engagement of the lower part of the carrier with the flange **17** of the mandrel.

Slightly below the flange **17**, the external diameter of the mandrel is enlarged, and this enlargement **22** is provided with downwardly and outwardly inclined or beveled flats or expander surfaces **23**. The inner surfaces **24** of the slip portions of the gripping elements are correspondingly beveled and are slidable on such expander surfaces. Thus, the expander surfaces move the slip portions of the gripping elements radially outwardly upon movement of the mandrel upwardly relative to the gripping elements. The outer surface of each slip portion is provided with serrations or gripping teeth **25** adapted to engage the inner wall of a well conductor or tubing

T to hold the mandrel of the safety lock against upward movement when said gripping elements are so moved outwardly to locking or gripping position. Figure 1 shows the safety lock in anchored position in the tubing.

A downwardly and outwardly beveled portion **26** is provided on the outer surface of the lower portion of the shank of each gripping element. This beveled portion is engaged by the inner surface of the retaining ring **19** when the mandrel is moved downwardly relative to the gripping elements, thereby causing the gripping elements to be moved inwardly away from gripping contact with the wall of the tubing, whereby the gripping teeth are not damaged or worn off as the tool is moved through the well tubing.

The lower portion of the mandrel is reduced in diameter and an elongate cylinder **27** is threadedly connected thereto. A piston **29** is slidably positioned within the cylinder, being retained therein by an internal annular flange **28** at the lower end of the cylinder. An O-ring seal means **30** is located in an annular groove **31** in the piston and seals between the piston and the cylinder.

An elongate piston rod **32** is formed on the lower end of the piston and extends downwardly through the flange **28** in the lower end of the cylinder. The lower end of the piston rod is threadedly connected to an adaptor sub **33**, said adaptor sub being internally threaded at its lower end, as at **34**, for threaded connection with the threaded pin **35** of a pulling tool P. A pin **33***a* extends transversely through corresponding holes in the adaptor sub and the piston rod to prevent inadvertent disconnection of their threaded attachment. The pulling tool P may be one of several well known types adapted to engage and support an installed subsurface well flow control device for removing said device from the tubing T.

An elongate central member or prong **36** extends downwardly through the bore **11** of the mandrel and into an axial counterbore or blind hole **37** in the upper face of the piston. The lower end of the prong is retained in position in the piston by means of frangible pins **38** which extend through mating holes formed in the piston and prong and provides a shearable connection between the prong and the piston. The lower end of the prong is beveled at **39** to engage the corresponding conical bevel **39***a* at the bottom of the counterbore. Thus, the prong cannot move downwardly relative to the piston and is restrained from upward movement relative thereto by the frangible pins **38**. A fishing neck **40** is threadedly attached to the upper end of the prong, and an externally threaded pin **41** is provided on the upper end of said fishing neck. This threaded pin is adapted for threaded connection to a standard flexible line lowering mechanism including the usual sinker bar and jars (not shown) so that the assembly can be lowered into and manipulated within the tubing T. A pin **40***a* extends transversely through corresponding holes in the fishing neck and the prong to prevent accidental or inadvertent disconnection of the threaded attachment of the fishing neck and the prong.

An O-ring seal means **42** is positioned within an internal annular groove **43** in the bore of the mandrel and has sealing engagement with the prong **36** extending through said bore. A longitudinal flow passageway **44** is formed in the lower end of the mandrel and communicates with a lateral port **45** opening inwardly from the outer surface of the mandrel. A filler plug or bushing **46** having a flow restrictive orifice **47** therethrough is threaded into the lateral port for controlling passage of fluid through said port. In operation, the threaded bushing **46** is removed from the assembled device and the cylinder is filled through the port with a viscous fluid such as oil. The bushing is then replaced, the orifice **47** being the only avenue of fluid communication to the outside of the cylinder.

A shear pin **48** is installed in matching holes through the flange **28** at the lower end of the cylinder and the upper end of the piston rod to initially hold the piston rod and the piston in their lowermost position relative to the cylinder. The size, material, shear strength and number of the frangible pins **38** are adjusted so that their strength is greater than that of the shear pin **48**. Thus, when upward force is exerted on the prong, the shear pin **48** normally will be fractured before the frangible pins **38**.

The lengths of the prong, the cylinder and the piston rod are such that the safety lock may be assembled as described with the piston in its lowermost position. Further, their lengths are such that, when the safety lock is locked in a well tubing string and the attached pulling tool has engaged the subsurface control to be removed, the piston and the pulling tool connected to the piston rod may be moved upwardly relative to the mandrel and sleeve a distance sufficient to completely unseat the subsurface control. The diameters of the cylinder bore and the prong are such as to provide the desired capacity of the viscous damping fluid.

In use, the safety lock is assembled as described, the frangible pins **38** being installed to retain the prong in place in the piston. The piston is also fixed in its lowermost position in the cylinder by means of the shear pin **48**. The cylinder is then filled with a suitable damping fluid through the port **45** and the bushing **46** installed.

A pulling or retrieving tool P is connected to the lower end of the safety lock, as shown, and the pin **41** of the prong is made up in the lower end of a set of tools (not shown) for running on a flexible line. Such tools normally include a rope socket attached to the flexible line, a sinker bar attached to the rope socket, a set of jars attached to the sinker bar, and a swivel or knuckle joint R attached to the jars. With such a string of tools it is possible, by means of the weight of the sinker bar and the jars, to deliver upward and downward blows through the knuckle joint to the attached device.

The assembly, consisting of the string of wire line tools, the safety lock and the attached pulling tool, is lowered through the tubing until the pulling tool engages the subsurface well flow control device to be removed. During this lowering operation, the gripping teeth of the gripping elements have a slight sliding contact with the inner wall of the tubing. Upon engagement of the flow control device by the pulling tool, a few downward blows of the jars are delivered to assure that the pulling tool has supportingly engaged the flow control device and to unlock the control device from its locked position in the tubing. These downward jarring blows also permit the carrier and the gripping elements to move to their lowest position on the mandrel with the gripping elements being moved outwardly by the inclined flats of the mandrel, until the gripping teeth of the gripping elements are in gripping engagement with the tubing wall.

Upward blows are then delivered to the prong of the safety lock by means of the jars of the flexible line operated tools. Upward movement of the prong first moves the entire assembly upward relative to the carrier and the gripping members, thereby wedging the gripping members into tighter engagement with the tubing well. The mandrel and the cylinder are thus anchored against any further upward movement.

Continued upward blows of the jars then shear the pin **48** and cause the prong and the piston to be moved upwardly relative to the cylinder; and the flow control device is moved upwardly from its seated position in the tubing.

With the flow control device unseated and unlocked, any pressure differential across such device which would cause the flow control device to be blown rapidly upwardly, acts on said flow control device. The flow control device may thus be moved rapidly upwardly, moving with it the pulling tool, piston and prong. As the piston moves upwardly the fluid which originally filled the

cylinder is ejected through the flow restrictive orifice 47 of the bushing 46. The piston is thus slowed or damped in its upward movement by the restricted flow of the fluid in the cylinder outwardly through the orificed bushing. Upward movement of the piston is limited by its engagement with the lower end of the mandrel.

Since the pressure differential tending to violently blow the flow control device upwardly within the tubing, and which may suddenly come into effect on the unseating and unlocking of the flow control device, may be of the order of 1000 pounds per square inch or more, a large amount of kinetic energy must be absorbed or dissipated in the piston-cylinder-orifice shock-absorbing or damping system. The composition of the damping fluid in the cylinder and its viscosity may be adjusted in accordance with the differential expected. Similarly, the size of the orifice in the bushing or filler plug and the number of the flow passageways, radial ports and orificed bushings provided, may be varied as needed. Alternately, if more than one flow passageway and bushing are provided, some of the orifices in the bushing may be closed if desired. By these variations the ability of the safety lock to absorb various amounts of kinetic energy may be controlled. Once the flow control device has been completely unseated and the initial rapid upward movement after unseating has been stopped, the pressure differential acting to force the device upwardly has usually been dissipated and the device is then no longer subject to unbalanced pressure conditions.

After the piston has moved to its upper limit of movement, additional upward blows are delivered by the jars, shearing the frangible pins 38 securing the prong to the piston. The prong can then be pulled upwardly from the device and removed from the well by means of the string of wire line operated tools.

A pulling or retrieving tool is then connected to the lower end of the string of wire line operated tools in place of the prong, and this string of tools is lowered to remove the safety lock and the pulling tool and the subsurface flow control device connected thereto. The pulling tool of the string of wire line operated tools is of a type adapted to grasp the fishing neck 49 of the carrier on the safety lock and deliver a downward blow to the upper end 50 of the mandrel. In this manner the mandrel 10 may be driven downwardly relative to the carrier and the gripping members. The beveled flats of the mandrel thus no longer force the gripping members outwardly, and the retaining ring of the mandrel retracts the gripping members from gripping contact with the wall of the tubing. The entire assembly is thus free to be removed upwardly through and from the tubing.

Obviously, when the safety lock is used in anticipation of a pressure differential which would tend to blow a flow control device upwardly in a well tubing, and when such differential is not found, the pulling operation is conducted in the normal manner described above.

It will be seen that a safety lock has been provided to which may be attached a pulling tool for removing a subsurface flow control device across which it is anticipated that a substantial pressure differential may exist during the pulling operation which might violently blow said flow control device upwardly in the well tubing. The safety lock may be anchored in position in the well tubing before the flow control device is released from its locked or seated position therein. A shock-absorbing device is incorporated in the safety lock whereby the kinetic energy of the upwardly moving flow control device may be dissipated or absorbed by such shock-absorbing or damping mechanism. The shock-absorbing mechanism is adjustable for different degrees of energy absorption or dissipation. The safety lock is readily removable after use and can be reset for subsequent use without difficulty.

A slightly modified form of the invention is shown in Figure 3. In this form the O-ring seal means and the orificed bushing or filler plug are eliminated. Similarly, the flow passageway and radial port are eliminated in the mandrel. A port 51 is provided in the cylinder wall near the upper end of the cylinder 52 for the introduction of a shock-absorbing fluid.

In this form of the invention the clearances between the prong and the mandrel bore, between the piston and the cylinder, and between the piston rod and the flange opening in the lower end of the cylinder, are all small so as to provide a relatively close sliding fit between the elements.

In operation, this modified form of the safety lock is assembled in a string of wire line operated tools in a manner similar to that already described for the first form of the invention. The cylinder is filled with the desired shock absorbing fluid and the entire assembly lowered into the well tubing. When the retrieving tool of the assembly has grasped the subsurface flow control device to be retrieved and the flow control device has been unlocked by means of downward blows of the jars of the string of tools, upward blows of the jars are then employed to first set and lock the gripping members of the safety lock in position in the tubing and thus secure the mandrel and cylinder in position against upward displacement. Further upward blows of the jars are then employed to shear the shear pin 48 and allow upward movement of the piston relative to the mandrel. The subsurface flow control device is thus removed upwardly from its seated and locked position in the tubing; and if a pressure differential is present to violently blow the flow control device upwardly within the tubing, such upward movement causes the shock-absorbing fluid to be displaced by the piston through the port 51 in the cylinder wall. Work is performed on the fluid by forcing the fluid outwardly through the ports, thereby dissipating the kinetic energy of the rapidly moving flow control device. The remainder of the operational steps with this modified form of the invention are identical with those of the original form.

Occasionally a subsurface flow control device may be so firmly lodged in its position in the tubing that it is impossible to unseat same in the usual manner by the upward blows delivered through the prong and piston rod. In this event, upward blows of the jars are continued until the frangible pins 38 securing the prong to the piston are sheared. The prong is then removed upwardly from the safety lock and the well tubing. A suitable retrieving tool is made up on the lower end of the string of wire line operated tools in lieu of said prong, and the fishing neck 49 of the carrier is grasped. After the gripping elements of the safety lock have been released and retracted from gripping position by a downward blow of the pulling tool on the upper end 50 of the mandrel, as previously described, upward blows are delivered to the safety lock. If the pulling tool P, originally made up on the lower end of the safety lock, is of such type as to release on continued upward blows delivered thereto (such as that shown in the patent to H. C. Otis, No. 1,898,261), the pulling tool P may be actuated to disengage it from the flow control device. The safety lock and the pulling tool P carrier thereby may then be removed from the well, leaving the subsurface flow control device in its initial position. Other methods can then be utilized to remove the flow control device from its position in the tubing.

The modified form of the invention has all the advantages of the form first described and merely omits the O-ring seal means and the orificed bushing. The elimination of these items provides the further advantage of economy and ease of manufacture.

The foregoing description of the invention is explanatory only, and changes in the details of the construction illustrated may be made by those skilled in the art, within the scope of the appended claims, without departing from the spirit of the invention.

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

1. A well tool adapted for use with removing devices for removing subsurface well flow controls from a well flow conductor, said well tool including: elongate support means; a piston on said support means intermediate the ends of said support means; a mandrel slidably mounted on the support means above the piston; a cylinder carried by the mandrel and slidably telescoping the piston; means forming a fluid passageway from the interior of the cylinder above the piston to the exterior thereof; gripping means slidably mounted on the mandrel; expander means on said mandrel engageable with said gripping means and movable with respect to said gripping means for moving said gripping means between retracted non-gripping position and expanded gripping position upon relative upward movement of the mandrel with respect to said gripping means, whereby said gripping means is adapted to engage and grip said well flow conductor to limit upward movement of said mandrel therein; and connecting means on the lower end of said elongate support means adapted to be connected with a removing device for removing subsurface flow controls from a well tubing.

2. A well tool adapted for use with removing devices for removing subsurface well flow controls from a well flow conductor, said well tool including: elongate support means; a piston on said support means intermediate the ends of said support means; a mandrel slidably mounted on the support means above the piston; a cylinder carried by the mandrel and slidably telescoping the piston; means forming a fluid passageway from the interior of the cylinder above the piston to the exterior thereof; gripping means slidably mounted on the mandrel; expander means on said mandrel engageable with said gripping means and movable with respect to said gripping means for moving said gripping means between retracted non-gripping position and expanded gripping position upon relative upward movement of the mandrel with respect to said gripping means whereby said gripping means is adapted to engage and grip said well flow conductor to limit upward movement of said mandrel therein; connecting means on the lower end of said elongate support means adapted to connect said support means to a removing device for removing subsurface flow controls from a well tubing; and means releasably connecting the cylinder and support means when the piston is in its lowermost position in the cylinder, said means being releasable to permit the piston to move upwardly within the cylinder.

3. A well tool adapted for use with removing devices for removing subsurface well flow controls from a well flow conductor, said well tool including: elongate support means; a piston on said support means intermediate the ends of said support means; a mandrel slidably mounted on the support means above the piston; a cylinder carried by the mandrel and slidably telescoping the piston; means forming a fluid passageway from the interior of the cylinder above the piston to the exterior thereof; gripping means slidably mounted on the mandrel; expander means on said mandrel engageable with said gripping means and movable with respect to said gripping means for moving said gripping means between retracted non-gripping position and expanded gripping position upon relative upward movement of the mandrel with respect to said gripping means; said gripping means being adapted to engage and grip said well flow conductor to limit upward movement of said mandrel in said flow conductor when in expanded gripping position; connecting means on the lower end of said elongate support means adapted to connect said support means to a removing device for removing subsurface flow controls from a well tubing; and flow restricting means releasably mounted in the passageway from the interior of the cylinder to the exterior thereof for restricting flow of fluids through the said passageway, whereby upward movement of the piston in said cylinder is restrained by said flow restricting means in said passageway.

4. A well tool adapted for use with removing devices for removing subsurface well flow controls from a well flow conductor, said well tool including: elongate support means; a piston on said support means intermediate the ends of said support means; a mandrel slidably mounted on the support means above the piston; a cylinder carried by the mandrel and slidably telescoping the piston; means forming a fluid passageway from the interior of the cylinder above the piston to the exterior thereof; gripping means slidably mounted on the mandrel; expander means and movable with respect to said gripping means on said mandrel engageable with said gripping means for moving said gripping means between retracted non-gripping position and expanded gripping position upon relative upward movement of the mandrel with respect to said gripping means; said gripping means being adapted to engage and grip said well flow conductor to limit upward movement of said mandrel therein when in expanded position; connecting means on the lower end of said elongate support means adapted to connect said support means to a removing device for removing subsurface flow controls from a well tubing; and sealing means on the exterior of the piston slidably engageable with the bore wall of the cylinder to provide a fluid seal between said piston and cylinder.

5. A well tool adapted for use with removing devices for removing subsurface well flow controls from a well flow conductor, said well tool including: elongate support means; a piston on said support means intermediate the ends of said support means; a mandrel slidably mounted on the support means above the piston; a cylinder carried by the mandrel and slidably telescoping the piston; means forming a fluid passageway from the interior of the cylinder above the piston to the exterior thereof; gripping means slidably mounted on the mandrel; expander means on said mandrel engageable with said gripping means and movable with respect to said gripping means for moving said gripping means between retracted non-gripping position and expanded gripping position upon relative upward movement of the mandrel with respect to said gripping means whereby said gripping means is adapted to engage and grip said well flow conductor to limit upward movement of said mandrel therein when in expanded position; connecting means on the lower end of said elongate support means adapted for connection of said support means to a removing device for removing subsurface flow controls from a well tubing; and means on the lower end of the cylinder engageable with the lower end of the piston to limit downward movement of the piston in said cylinder.

6. A well tool adapted for use with removing devices for removing subsurface well flow controls from a well flow conductor, said well tool including: elongate support means; a piston on said support means intermediate the ends of said support means; a mandrel slidably mounted on the support means above the piston; a cylinder carried by the mandrel and slidably telescoping the piston; means forming a fluid passageway from the interior of the cylinder above the piston to the exterior thereof; gripping means slidably mounted on the mandrel; expander means on said mandrel engageable with said gripping means and movable with respect to said gripping means for moving said gripping means between retracted non-gripping position and expanded gripping position upon relative upward movement of the mandrel with respect to said gripping means; said gripping means being movable to expanded position to engage and grip said well flow conductor to limit upward movement of said mandrel in said well flow conductor; connecting means on the lower end of said elongate support means adapted to connect said support means to a removing device for removing subsurface flow controls from a well tubing; means releasably

connecting the cylinder and support means when the piston is in its lowermost position in the cylinder, said means being releasable to permit the piston to move upwardly within the cylinder; and flow restricting means releasably mounted in the passageway from the interior of the cylinder to the exterior thereof for restricting flow of fluids through the said passageway, whereby movement of said piston in said cylinder is likewise restricted.

7. A well tool adapted for use with removing devices for removing subsurface well flow controls from a well flow conductor, said well tool including: elongate support means; a piston on said support means intermediate the ends of said support means; a mandrel slidably mounted on the support means above the piston; a cylinder carried by the mandrel and slidably telescoping the piston; means forming a fluid passageway from the interior of the cylinder above the piston to the exterior thereof; gripping means slidably mounted on the mandrel; expander means on said mandrel engageable with said gripping means and movable with respect to said gripping means for moving said gripping means between retracted non-gripping position and expanded gripping position upon relative upward movement of the mandrel with respect to said gripping means; said gripping means being movable to expanded position to engage and grip said well flow conductor to limit upward movement of said mandrel in said conductor; connecting means on the lower end of said elongate support means adapted to connect said support means to a removing device for removing subsurface flow controls from a well tubing; means releasably connecting the cylinder and support means when the piston is in its lowermost position in the cylinder, said means being releasable to permit the piston to move upwardly within the cylinder; flow restricting means releasably mounted in the passageway from the interior of the cylinder to the exterior thereof for restricting flow of fluids through the said passageway; and sealing means on the exterior of the piston slidably engageable with the bore wall of the cylinder to provide a fluid seal between said piston and cylinder during telescopic movement of said piston relative to said cylinder, said flow restricting means restricting movement of said piston longitudinally of said cylinder.

8. A well tool adapted for use with removing devices for removing subsurface well flow controls from a well flow conductor, said well tool including: elongate support means; a piston on said support means intermediate the ends of said support means; a mandrel slidably mounted on the support means above the piston; a cylinder carried by the mandrel and slidably telescoping the piston; means forming a fluid passageway from the interior of the cylinder above the piston to the exterior thereof; gripping means slidably mounted on the mandrel; expander means on said mandrel engageable with said gripping means and movable with respect to said gripping means for moving said gripping means between retracted non-gripping position and expanded gripping position upon relative upward movement of the mandrel with respect to said gripping means; said gripping means being movable to expanded position to engage and grip said well flow conductor to limit upward movement of said mandrel in said conductor; connecting means on the lower end of said elongate support means adapted to connect said support means to a removing device for removing subsurface flow controls from a well tubing; means releasably connecting the cylinder and support means when the piston is in its lowermost position in the cylinder, said means being releasable to permit the piston to move upwardly within the cylinder; flow restricting means releasably mounted in the passageway from the interior of the cylinder to the exterior thereof for restricting flow of fluids through the said passageway; sealing means on the exterior of the piston slidably engageable with the bore wall of the cylinder to provide a fluid seal between said piston and cylinder during longitudinal telescopic movement of said piston in said cylinder, said flow restricting means also restricting movement of said piston longitudinally of said cylinder; and means on the lower end of the cylinder engageable with the lower end of the piston to limit downward movement of the piston in said cylinder.

9. A well tool for use with a removing device for removing subsurface controls from a well conductor, said well tool including: a support member adapted to be lowered into a well conductor; a mandrel member slidably mounted on said support member; gripping means slidable on said mandrel member between retracted non-gripping and expanded gripping positions thereon, said gripping means being normally in a non-gripping position to permit lowering of the tool; means on said mandrel member coacting with said gripping means for urging and holding the same in gripping position upon relative upward movement of the mandrel member with respect to said gripping means; a cylinder attached to said mandrel member; a piston slidable longitudinally between upper and lower positions within said cylinder and releasably secured to said support member; and a rod member depending from said piston and projecting below said cylinder and having a connecting member on its lower end.

10. A well tool for use with a removing device for removing subsurface controls from a well conductor, said well tool including: a support member adapted to be lowered into a well pipe; a mandrel member slidably mounted on said support member; gripping means slidable on said mandrel member between retracted non-gripping and expanded gripping positions thereon, said gripping means being normally in a non-gripping position to permit lowering of the tool; means on said mandrel member coacting with said gripping means for urging and holding the same in gripping position upon relative upward movement of the mandrel member with respect to said gripping means; a cylinder attached to said mandrel member; a piston slidable longitudinally between upper and lower positions within said cylinder and releasably secured to said support member; a rod member depending from said piston and projecting below said cylinder and having a connecting member on its lower end; and means releasably securing said rod member to said cylinder at the lower position of said piston in said cylinder.

11. A well tool of the character set forth in claim 1 in which said cylinder above the piston is filled with a shock-absorbing fluid.

12. A well tool of the character set forth in claim 9, wherein the means securing the rod member to said cylinder is releasable upon the application of a predetermined force thereto, and wherein the support member is releasable from its connection to said piston upon application of a force to said support member in excess of said predetermined force.

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