June 23, 1970 C. A. TEMPLETON 3,516,703

DAMPENER RELEASE, RUNNING AND PULLING TOOL

Filed April 1, 1968 3 Sheets-Sheet 1

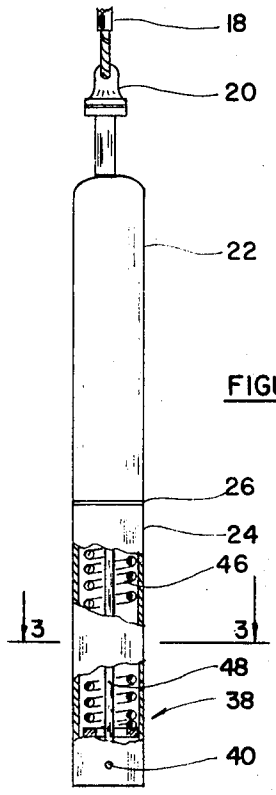


FIGURE 1

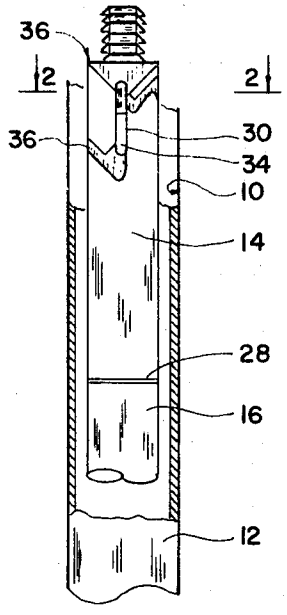


FIGURE 1A

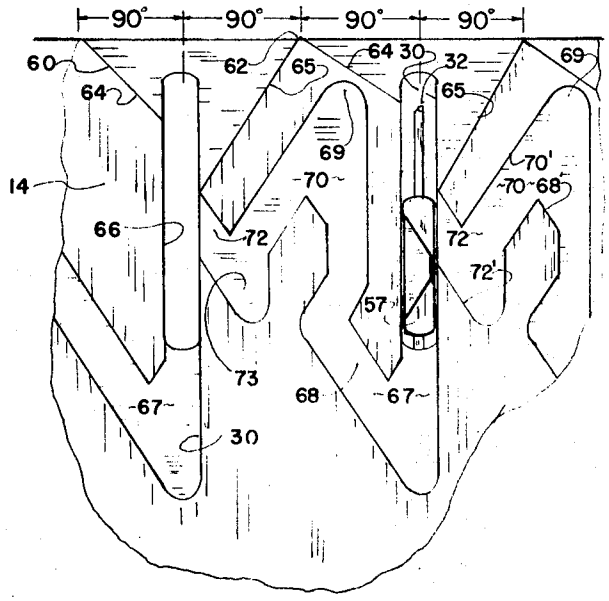


FIGURE 5

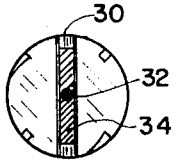


FIGURE 2

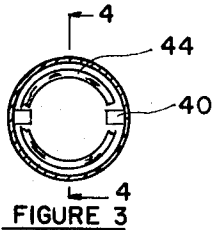


FIGURE 3

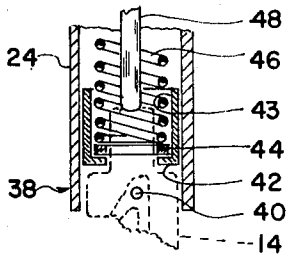


FIGURE 4

INVENTOR.
CHARLES A. TEMPLETON
BY: MARCUS L. BATES

DAMPENER RELEASE, RUNNING AND PULLING TOOL

Filed April 1, 1968 3 Sheets-Sheet 2

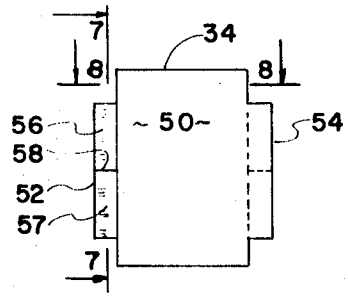


FIGURE 6

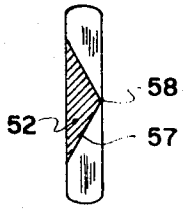


FIGURE 7

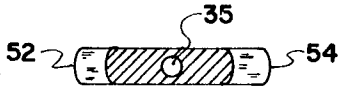


FIGURE 8

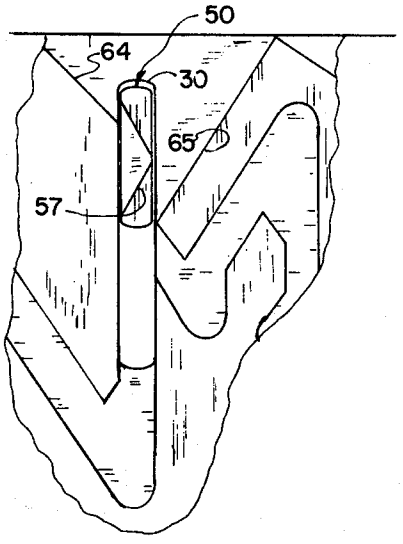


FIGURE 8a

INVENTOR.
CHARLES A. TEMPLETON
BY: MARCUS L. BATES

June 23, 1970 C. A. TEMPLETON 3,516,703

DAMPENER RELEASE, RUNNING AND PULLING TOOL

Filed April 1, 1968 3 Sheets-Sheet 3

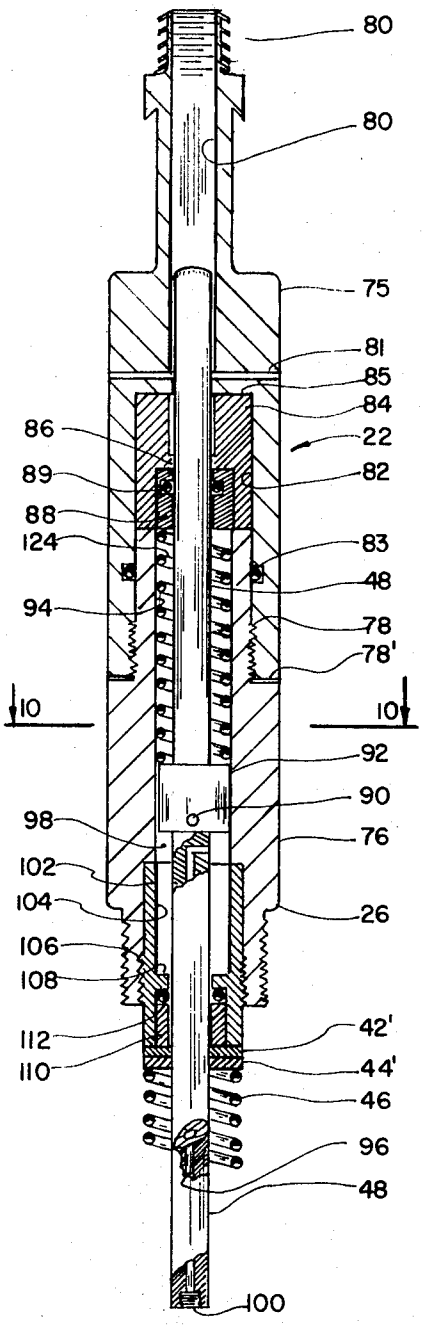


FIGURE 9

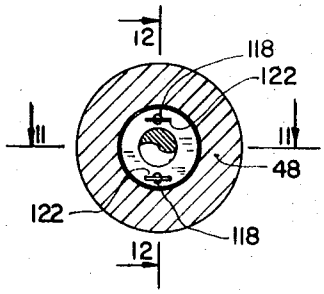


FIGURE 10

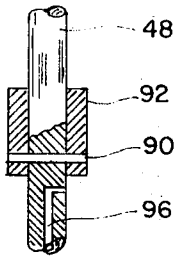


FIGURE 11

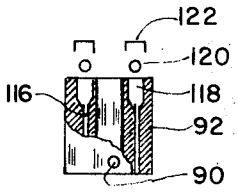


FIGURE 12

INVENTOR.
CHARLES A. TEMPLETON
BY: MARCUS L. BATES

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3,516,703

DAMPENER RELEASE, RUNNING AND PULLING TOOL

Charles A. Templeton, P.O. Box 2761, Odessa, Tex. 79760

Filed Apr. 1, 1968, Ser. No. 717,609
Int. Cl. E21b 31/00
U.S. Cl. 294—86.17 14 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus for running retrievable objects into and out of bore holes which includes a dampener release in combination with a running and pulling tool. The pulling tool is comprised of a barrel and a mandrel, with the mandrel being affixed to the retrievable object while the barrel is affixed to the dampener release. The lower terminal end of the barrel and the upper terminal end of the mandrel include releasable engaging means associated therewith which cooperate together in a manner whereby relative downward movement of the barrel with respect to the mandrel enables oppositely disposed fingers to ride in a set of slots which guidably permit the release of the barrel with respect to the mandrel when the barrel is lifted upwards. Upon disengagement of the barrel from the mandrel, a second downward movement of the barrel with respect to the mandrel permits the oppositely disposed fingers to ride through the series of slots whereupon the fingers engage the mandrel to thereby enable the entire combination to be lifted from the bore hole as a string of tools. The dampener release includes a depending biased shaft which bears against the upper extremity of the mandrel in a manner whereby relative motion of the barrel towards the mandrel occurs over a much longer time interval as compared to a normal separation type motion. This action prevents inadvertent release of the pulling tool from the retrievable object, should any component of the combination inadvertently strike the bore hole wall and become arrested when the string is being run into the hole.

BACKGROUND OF THE INVENTION

In utilizing a pulling tool in conjunction with a retrievable object which is to be run into and out of a bore hole, the retrievable object, or some component associated therewith, often strikes the inside periphery of the bore hole whereupon the entire assembly may be suddenly arrested, thereby enabling the pulling tool to prematurely release the retrievable object. This action permits the retrievable object to freely fall to the bottom of the bore hole whereupon considerable damage or loss of the retrievable object occurs. The retrievable object may be an encapsulated package of instruments, a bridge plug, or any other object which may need to be placed into the bore hole. Some time, as in the example of the instrument package, it is desirable to utilize the pulling tool in order to place the package at a predetermined depth, and after a suitable lapse of time it is desirable to return the package to the surface of the earth in order to analyze the data contained therein. It is also sometime desirable to place various other objects at different spaced apart elevations within the bore hole whereupon the objects are later removed from their downhole position and returned to the surface of the earth.

SUMMARY OF THE INVENTION

The present invention comprehends a combination of tools for running and pulling objects down hole in a bore hole. Included in the combination is a dampener release which may be attached to a hoisting means, such as a wire line having a swivel thereon, with the dampener release being secured to a pulling tool. The pulling tool includes a barrel and mandrel with the mandrel being attached to a retrievable object which is to be placed downhole in the bore hole. The barrel and mandrel have means associated therewith which enable them to releasably cooperate together to provide an assembled string of tools which depend from the swivel of the wire line in the following order: the dampener release, barrel, mandrel, and the retrievable object. When this string of tools is lowered into the bore hole, should any component thereof inadvertently strike a portion of the bore hole wall, the dampener release cooperates with the mandrel and barrel to thereby prevent disengagement therebetween.

Engagement between the barrel and mandrel is attained by the provision of inwardly depending fingers attached near the lower depending end of the barrel which cooperates with slots provided on the outer peripheral surface of the upper marginal end of the mandrel. A latch associated with the slots of the mandrel forces the fingers to be guidably positioned within the provided slots whereby upon lowering the barrel in a telescoping manner about the mandrel the fingers follow the slots until the barrel is lifted whereupon upward movement of the barrel positions the fingers into a lifting position provided by the slots. When it is desired to disengage the barrel from the mandrel, the barrel is again lowered whereupon the fingers cooperate with the slots and latch, with the fingers being guided through the slots whereupon the barrel may be lifted clear of the mandrel. At any time the barrel can again be lowered onto the mandrel whereupon the mandrel can once again be lifted by the barrel since the fingers will again be forced to follow the above first described path.

The dampener includes a depending shaft member which bears against the mandrel to thereby preclude sudden movement between the mandrel and the barrel. Therefore, separation of the pulling tool by a sudden movement between the barrel and mandrel, such as may be caused by any component of the string abutting the wall of the bore hole, is precluded by the action of the dampener.

It is therefore an object of the present invention to provide a dampener release which can be used in combination with a pulling tool for running retrievable objects into and out of bore holes.

Another object of the present invention is the provision of a dampener release device which precludes the inadvertent actuation of a pulling tool.

A still further object of the present invention is the provision of a pulling tool which enables the release or pick-up of a retrievable object which is located down hole in a bore hole to be performed a multiplicity of times, if desired.

A further object of the present invention is to provide a new combination which enables retrievable objects to be lowered within a bore hole without subjecting the object to inadvertent loss.

Still another object of the present invention is the provision of a pulling tool which is comprised of telescopingly arranged parts which cooperate together in a manner to permit pick-up or release of an object to be carried out a multiplicity of times.

These and other objects of the present invention will be more fully understood as the remainder of this specification is studied in conjunction with the accompanying drawings, wherein, whereever possible, like numerals refer to like parts throughout the several figures.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 schematically sets forth a side elevational, part cross-sectional, view of the dampener and barrel which is for use in conjunction with the tool of FIG. 1A;

FIG. 1A schematically sets forth a cross-section of a bore hole, within which there is seen a side elevational part of a tool string made in accordance with the present invention, with some parts thereof being broken away in order to more clearly illustrate the operation thereof;

FIG. 2 is an enlarged cross-sectional view taken along line **2—2** of FIG. 1A;

FIG. 3 is an enlarged cross-sectional view taken along line **3—3** of FIG. 1, with some parts removed and not shown;

FIG. 4 is a cross-sectional view taken along line **4—4** of FIG. 3;

FIG. 5 is an enlarged, partly schematical partly diagrammatical, hypothetical fragmentary view, shown in an unrealistic arrangement for the purpose of illustrating the manner in which a portion of the device seen in FIG. 1A is fabricated;

FIG. 6 is an enlarged plan view of part of the device seen in FIGS. 1A, 2, and 5;

FIG. 7 is a cross-sectional view taken along line **7—7** of FIG. 6;

FIG. 8 is a cross-sectional view taken along line **8—8** of FIG. 6;

FIG. 8*a* is similar to FIG. 5, but with the latch of FIG. 8 being in another operative position;

FIG. 9 is an enlarged longitudinal cross-sectional view of part of the device seen in FIG. 1, with some parts thereof being shown unsectioned, and other parts theerof being broken away in order to better illustrate the relationship of the various components thereof;

FIG. 10 is a cross-sectional view taken along line **10—10** of FIG. 9;

Fig. 11 is a partly cross-sectional view taken along line **11—11** of FIG. 10; and

FIG. 12 is an exploded view which illustrates part of the device seen in FIGS. 9 through 11.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Looking to the details of FIGS. 1 and 1A there is seen illustrated by the arrow at numeral **10** a bore hole having a casing **12** therein. Telescopingly or reciprocatingly received within the casing is a tool string which includes a mandrel **14** having a retrievable down hole object **16** threadedly affixed to the lower depending end thereof. A wire line **18** having a swivel **20** thereon is secured to a dampener release **22**, which in turn is threadedly engaged with a barrel **24**. The barrel and mandrel cooperate together to form a running and pulling tool. The barrel threadedly engages the dampener release at **26** while the mandrel threadedly engages the down hole retrievable object at **28**.

Looking now to the details of FIG. 2 in conjunction with FIGS. 1 and 1A there is seen a vertically extending slot **30** extending diametrically through the mandrel and having a vertically extending pin **32** which maintains a latch **34** reciprocatingly captured therein. Various grooves generally illustrated by the arrows at numeral **36** extend about the outer peripheral surface of the upper marginal end portion of the mandrel as will be described in greater detail later on in the specification.

Looking now to the details of FIGS. 3 and 4 in conjunction with FIGS. 1, and 1A there is seen illustrated a first releasable engaging means **38** which forms part of the lower portion of the barrel and which includes oppositely disposed inwardly directed fingers **40**, each having one end rigidly attached to the inner peripheral wall surface of the barrel. The depending free ends of the fingers are of a size and configuration which enables each to be

slidably received within the before mentioned grooves **36**. Resting against the fingers and reciprocatingly received within the inside peripheral wall of the barrel is a washer **42** in the form of a piston inasmuch as it has upwardly depending walls associated therewith which forms a skirt. Friction reducing means in the form of a "Teflon" washer **44** is interposed between spring **46** and the piston. A shaft **48** downwardly depends from and reciprocates within the main body of the dampener release, the details of which will be more fully discussed later on.

Looking again to FIGS. 1, 1A, and 2 in conjunction with FIGS. 5 through 8 wherein there is disclosed the details of the before mentioned latch **34** which includes main body portion **50** and oppositely disposed guide means **52** and **54**. Guide means **52**, for example, includes upper and lower converging faces **56** and **57** which converge with respect to the horizontal to meet at apex **58**. It will be noted that the direction of convergence of the faces of each guide means are oppositely disposed with respect to one another.

Looking more particularly now to the details of FIG. 5, wherein the before mentioned grooves **36** are illustrated in greater detail, it should be understood that this figure is a hypothetical representation of the grooves, which is presented as though the upper portion of the mandrel were unrolled like a scroll, and for this reason two slots **30** are seen illustrated. One should understand, of course, that only one slot exists which is fabricated with the slot diametrically extending through the mandrel. The surface **14** of the mandrel has been milled or cut away at **60, 62** for 180° about the outer periphery of the mandrel, thereby leaving edge portions **64, 65** which converge together to form a groove **66** with the groove **66** also lying superimposed for a limiting length of its distance along the before mentioned slot. The bottom-most portion of the last named groove enlarges at **67** and again converges into a groove at **68** where the groove leads upwardly at first one and then another angle with respect to the vertical, and then to a pick-up point **69**. Grooves **70** and **72** meet at enlargement **73**. Groove **72** communicates with the vertically extending groove **66** which also contains or is superimposed upon the before mentioned slot within which there is located the reciprocal latch **34**.

It will be noted that face **56** of the latch is aligned with side wall **72'** of groove **72** when the latch is in its lowermost position, while face **57** of the latch is aligned one groove width above the side wall formed by edge portion **65** when the latch is in its uppermost position, regardless of which side the diametrical slot is viewed from. This is best understood by comparing FIG. 5 to FIG. 8*a* which illustrates the two extreme positions of the latch.

Looking now to the details of FIG. 9 in conjunction with FIGS. 1 and 10 through 12, wherein there is illustrated the details of the before mentioned dampener release. As seen illustrated in the various figures, the release includes upper body member **75** which is threadedly attached to lower body member **76** by means of the screw threads **78** which enables each member to mate and to form interface **78'**. Threads **80** provide attachment means for a swivel or the like, while the threads at shoulder **26** enable the dampener to be attached to the before mentioned barrel. Downwardly depending from the lower extremity of the dampener is the before mentioned shaft **48** which bears against the fishing neck of the mandrel. As seen in the drawing, the shaft is reciprocatingly received within both of the main body members of the dampener release. The upper body member includes passageway **80** which more or less extends longitudinally along and through the central axis of the dampener. Radial passageways **81** communicate with the exterior of the upper body member. Counterbore **82** receives insert **84** therein with the insert bearing against a shoulder of the upper body member at interface **85** in accordance with the pressure exerted thereagainst by means of threads **78**. Inwardly directed shoulder **86** of the insert cooperates with an oilite bronze bushing **88** which is press fitted into

the insert and provided with an annulus which accommodates O-ring **89**.

Pin **90** secures piston **92** to the shaft with the piston fitting in loose tolerance relationship as it reciprocates within the polished portion **94** of the dampener. Drilled passageway **96** communicates the chamber **98** of the before mentioned cylinder with the ambient to provide a means for filling the dampener by means of the removable plug **100**.

Insert **102** includes inner peripheral wall surface **104** which is coextensive with cylinder wall **94**, with the insert being threadedly attached to the lower body member at **106**. Inwardly directed shoulders **108** bear against the shaft and cooperates with the press fitted bushing **110** to form an O-ring groove **112** which circumferentially extends in sealing relationship with respect to the outer peripheral wall surface of the shaft.

The piston **92** includes two longitudinally extending pasageways **116** which enlarge at **118** to thereby provide a caged seat for ball **120**, with the ball being loosely captured by means of U-shaped keepers **122**. The springs form retainers and are driven into the illustrated detents. Return spring **124** is maintained compressed between the piston **92** and bushing **88**, with the spring also bearing against the U-shaped keepers.

OPERATION

In operation the dampener release is preferably attached to a wire line by means of a swivel in the usual manner, although the dampener release could equally well be attached to the end of a drill string, tubing, or the like. The mandrel of the pulling tool is secured to the retrievable down hole object which is to be run into and left in the hole, while the barrel of the pulling tool is threadedly attached to the lower depending end of the dampener release. The mandrel is attached to the barrel by merely telescoping the end thereof into the barrel by pushing the two together with a downward force being exerted therebetween which causes the inwardly depending fingers to follow edge portions **64, 65** where they then automatically travel down groove **66, 72**, then up groove **70**, and into the lifting position at **69**, while at the same time the spring **46** is compressed and the shaft **48** bears against the fishing head. The fishing and pulling tool is now assembled along with its retrievable object and dampener release and the tool string is ready to be run into the hole. The relative position between the barrel and mandrel with the combination in this configuration is best seen in FIG. 4.

The string may now be lowered into the desired downhole position within the bore hole. As the retrievable object comes to rest at the desired downhole position, the weight of the barrel, dampener release, and swivel bears against the shaft, with the shaft being forced slowly upwardly into the body members as fluid is displaced from chamber **98** where it leaks across and through the piston and into chamber **94**. This action continues until the first releasable engaging means is released from the second releasable engaging means, that is, the fingers are released from the grooves as they travel along the above described groove path.

The action between the first and second releasable engaging means occurs as follows: as the upper extremity of the mandrel is telescopingly received within the barrel, diametrically opposed fingers engage the downwardly depending cut-outs which converge to form the upper extremity of groove **66**, thereby guiding the fingers into vertical groove **66**. As each finger contacts the oppositely disposed faces **56** of the latch, the finger is forced into groove **72** since face **56** is aligned with side wall **72'** of the groove. The finger continues until it bottoms at the lower end of groove **72** whereupon "pick-up" or vertical upward travel of the barrel causes the fingers to travel up the sloped groove **70** to where it reaches its lifting position at **69**. So long as an upward force is maintained by the wire line, the fingers will remain within the lifting position. When it is desired to disengage the first releasable engaging means from the second engaging means, the tension is released from the wire line an amount which enables the fingers to travel down into groove **68** in accordance with the rate of travel of shaft **48** which continues to abut the fishing neck of the mandrel. Should the fingers contact edge portion **68'** during this manipulation of the tool the sloped side wall surface thereof will slidably force the fingers downwardly into groove **68** where the finger will ultimately arrive within the enlarged portion **67**. Pick-up of the wire line will now cause the fingers to travel back up the vertical groove **66** whereupon the latch will be carried therewith until it travels to its uppermost position within slot **30**, that is, until face **57** is aligned one groove width above edge portion **65**, thereby permitting the finger to slide between face **57** of the latch and edge portion **65** of the groove, respectively, all in a manner as illustrated in FIG. 8*a*. This action releases the barrel from the mandrel. At any time, the barrel can be set back down upon the mandrel, whereupon the fingers will again be guidably positioned back into the lifting position in the before described manner.

Looking now again to the details of the barrel and dampener release, it will be seen that the inside diameter of the barrel is sufficiently large to telescopingly accommodate the outside diameter of the fishing neck which is located on the mandrel, with the piston **42** being held in abutting relationship against the upper shoulder of the mandrel while the fishing neck is centrally received therethrough. Spring **46** is free to turn within the barrel since it compresses "Teflon" washer **44** against the piston while the opposite end of the spring is compressed against both the illustrated "Teflon" and metallic washers **42', 44'**, respectively. This cooperative action between the barrel, dampener, and mandrel maintains the fingers upwardly biased into the lifting position of the grooves so long as there is tension on the wire line. The shaft end is held against the face of the fishing neck where it can be forcibly moved in an upward direction at a slow rate as compared to its rapid rate of travel in a downward direction.

The action of the dampener release is best understood by observing FIGS. 1, 1A, and 4 in conjunction with FIGS. 9 through 12 wherein there is seen the before mentioned piston which is rigidly affixed to the shaft, with the piston being reciprocatingly received within the cylinder which forms the upper and lower chambers, and with the chambers being separated from one another by the piston. Spaced apart O-rings at **83, 89**, and **112** maintain the apparatus in sealed condition, with a suitable hydraulic fluid filling each of the two chambers. Radial passageways **81** assure equal pressure being applied to each of the depending shaft ends. The illustrated one-way check valves allow communication between the upper and lower chambers by means of the drilled passageways which extend through the piston. The check valves allow fluid flow therethrough when the piston travels downwardly, but precludes rapid travel of the piston in the up direction. Accordingly, while the piston can rapidly reciprocate in a downward direction since fluid is readily transferred from the lower into the upper chamber, travel of the shaft in an upward direction can be attained only in accordance with the rate of leakage of fluid through the check valves and around the piston. Therefore, in running the device into the hole, should the mandrel or retrievable object suddenly be arrested, the inwardly directed fingers will be maintained secured within lifting position since the shaft cannot be forced into the main body of the dampener release with sufficient rapidity to effect substantial relative motion between the mandrel and barrel of the pulling tool. On the other hand, when it is desired to release the barrel from the mandrel, the weight of the barrel and dampener release is sufficient to over-

come the tension of springs **46** and **124**, and accordingly, continued downward force due to gravity acting upon the device permits sufficient leakage to occur through and around the piston of the dampener release, so that after a suitable time delay, the fingers of the barrel will travel downwardly along the grooves in the before described manner, whereupon the barrel becomes separated from the mandrel by applying tension to the wire line. The specific time delay required of the tool can be ascertained before running down hole with it.

It should be understood that the pulling and running tool can be used without the dampener release, and vice versa. Where the dampener release is not placed in the tool string, the wire line swivel **20** is directly attached to the upper threaded terminal end of the barrel, with the retrievable object attached to the lower depending end of the mandrel. This arrangement enables the retrievable object to be released from the barrel in a minimum of time, since the time delay action brought about by the presence of the dampener release is not included in the tool string.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will ready occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

I claim:

1. Apparatus for running retrievable objects into and out of bore holes comprising:

a dampener release means and a pulling tool;

said pulling tool including a barrel and a mandrel, first releasable engaging means on said barrel, second releasable engaging means on said mandrel; said first and second releasable engaging means adapted to be telescopingly fastened together when the barrel is telescopingly moved into engaging contact with the mandrel, and adapted to become released from each other when again telescopingly moved together;

said pulling tool having one end which is adapted to be connected to a retrievable object, and another end connected to said dampener release means to thereby form a tool string which is adapted to be connected to a hoisting means for running the string into and out of bore holes;

said dampener release means cooperating with said first and second releasable engaging means to thereby enable said barrel and mandrel to be telescopingly moved apart at a rapid rate of travel and to be moved towards each other at a slow rate of travel.

2. The improvement of claim **1** wherein said barrel includes an upper terminal end connected to said dampener release means and a lower terminal end which includes said first releasable engaging means;

said mandrel having an upper terminal end which includes said second releasable engaging means and a lower terminal end which is adapted to be connected to the recited retrievable object;

part of said mandrel being telescopingly received within part of said barrel when said first and second engaging means are releasably connected together.

3. The improvement of claim **1** wherein said first releasable engaging means includes a finger, and said second releasable engaging means includes means forming a series of grooves, all connected together to form a lifting position and an entrance opening;

latch means for guiding said finger from said opening to said lifting position when it is desired to engage said mandrel and barrel, and for guiding said finger from said lifting position back to said opening when it is desired to release said barrel from said mandrel, whereby:

a downward followed by an upward motion of said barrel with respect to said mandrel enables said barrel and mandrel to engage one another, and another downward followed by an upward motion of said barrel with respect to said mandrel enables said barrel and mandrel to become disengaged from one another.

4. The improvement of claim **3** wherein said series of grooves includes a vertical groove with means forming a slot in communication therewith and superimposed thereon;

said latch means including upper and lower faces, said latch means being reciprocatingly received within said slot whereby:

said upper face guides said finger into said another groove when said mandrel and barrel are being engaged with one another; and, said lower face guides said finger out of said vertical groove when said mandrel and barrel are being released from one another.

5. The improvement of claim **1** wherein said first releasable engaging means includes a finger having a free depending terminal end with the remaining end being rigidly affixed to said barrel;

said second releasable engaging means includes means forming a groove, said groove having a converging entrance opening leading to a vertically disposed portion thereof, the lower extremity of said vertically disposed portion being connected to a lifting position by a groove placed at an acute angle with respect to said vertical groove, another groove connected to said vertical groove between said opening and said lower extremity, and located at a downwardly disposed angle with respect to said vertical groove, said another groove connecting said lifting position by an upwardly disposed groove;

latch means for guiding said finger along a preselected groove path whereby;

when said barrel telescopingly receives said mandrel, said finger enters said opening, travels along said another groove to said lifting position; and, when said finger leaves said lifting position, said finger travels along said groove placed at an acute angle to said vertical groove where it can be lifted therefrom to thereby free said barrel from said mandrel.

6. The improvement of claim **5** wherein said vertical groove includes means forming a slot superimposed thereon;

said latch means including upper and lower faces, said latch means being reciprocatingly received within said slot whereby:

said upper face guides said finger into said another groove when said mandrel and barrel are being engaged with one another; and, said lower face guides said finger out of said vertical groove when said mandrel and barrel are being released from one another.

7. Apparatus for hoisting retrievable objects into and out of bore holes comprising:

a dampener release means, a pulling tool, said pulling tool comprised of first and second releasable engaging means which enables said pulling tool to be separated into two different components by longitudinal movement therebetween;

said dampener release having a body portion attached to said first releasable engaging means and shaft means cooperating with said second releasable engaging means;

means for permitting rapid extending movement of said shaft means and for preventing rapid retracting movement of said shaft means whereby:

said first and second releasable engaging means are prevented from moving rapidly towards each other to thereby prevent inadvertent release of one from the other.

8. The apparatus of claim **7** wherein said body portion

includes means forming a cylinder therein, a piston reciprocatingly received within said cylinder;

said shaft having one end connected to said cylinder, and with the remaining shaft end freely depending from said main body;

seal means between said shaft and said main body;

said piston dividing said cylinder into first and second chambers;

check valve means operatively associated with said piston for permitting fluid flow from said lower chamber into the upper chamber while retarding flow from said upper to said lower chamber, whereby:

said shaft provides the recited function of slow retracting movement as compared to the extending movement thereof.

9. The apparatus of claim **7** wherein said first releasable engaging means includes a cylindrical body having means forming a centrally disposed passageway therethrough;

means associated with the lower terminal end of said cylindrical body for engaging said second releasable engaging means;

the upper terminal end of said cylindrical body adapted to be attached to the lower depending end of said dampener release with said shaft extending through said centrally disposed passageway where the terminal of said shaft bears against the upper terminal end of said second releasable engaging means when the first and second releasable engaging means is assembled to each other;

biasing means located within said centrally disposed passageway for maintaining said first and second releasable engaging means biased in opposite directions with respect to one another.

10. A pulling tool for running retrievable objects into and out of bore holes comprising:

a barrel and a mandrel, first releasable engaging means on said barrel, second releasable engaging means on said mandrel; said first and second releasable engaging means adapted to be telescopingly fastened together when the barrel is telescopingly moved into engaging contact with the mandrel, and adapted to become released from each other when again telescopingly moved together;

said pulling tool having one end which is adapted to be connected to a retrievable object, and another end which is adapted to be connected to a hoisting means to thereby form a tool string which can be run into and out of bore holes;

said first releasable engaging means includes a finger, and said second releasable engaging means includes means forming a series of grooves, all connected together to form a lifting position and an entrance opening;

latch means for guiding said finger from said opening to said lifting position when it is desired to engage said mandrel and barrel, and for guiding said finger from said lifting position back to said opening when it is desired to release said barrel from said mandrel, whereby;

a downward followed by an upward motion of said barrel with respect to said mandrel enables said barrel and mandrel to engage one another, and another downward followed by an upward motion of said barrel with respect to said mandrel enables said barrel and mandrel to become disengaged from one another.

11. The pulling tool of claim **10** wherein said series of grooves includes a vertical groove with means forming a slot in communication therewith and superimposed thereon;

said latch means including upper and lower faces, said latch means being reciprocatingly received within said slot whereby:

said upper face guides said finger into said another groove when said mandrel and barrel are being engaged with one another; and, said lower face guides said finger out of said vertical groove when said mandrel and barrel are being released from one another.

12. The pulling tool of claim **10** wherein said first releasable engaging means includes a finger having a free depending terminal end with the remaining end being rigidly affixed to said barrel;

said second releasable engaging means includes means forming a groove, said groove having a converging entrance opening leading to a vertically disposed portion thereof, the lower extremity of said vertically disposed portion being connected to a lifting position by a groove placed at an acute angle with respect to said vertical groove, another groove connected to said vertical groove between said opening and said lower extremity, and located at a downwardly disposed angle with respect to said vertical groove, said another groove connecting said lifting position by an upwardly disposed groove;

latch means for guiding said finger along a preselected groove path whereby;

when said barrel telescopingly receives said mandrel, said finger enters said opening, travels along said another groove to said lifting position; and, when said finger leaves said lifting position, said finger travels along said groove placed at an acute angle to said vertical groove where it can be lifted therefrom to thereby free said barrel from said mandrel.

13. The pulling tool of claim **10** wherein said vertical groove includes means forming a slot superimposed thereon;

said latch means including upper and lower faces, said latch means being reciprocatingly received within said slot whereby:

said upper face guides said finger into said another groove when said mandrel and barrel are being engaged with one another; and, said lower face guides said finger out of said vertical groove when said mandrel and barrel are being released from one another.

14. The pulling tool of claim **12** wherein said series of grooves includes a vertical groove with means forming a slot in communication therewith and superimposed thereon;

said latch means including upper and lower faces, said latch means being reciprocatingly received within said slot whereby:

said upper face guides said finger into said another groove when said mandrel and barrel are being engaged with one another; and, said lower face guides said finger out of said vertical groove when said mandrel and barrel are being released from one another.

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ANDRES H. NIELSEN, Primary Examiner