March 8, 1955 G. R. HUNT 2,703,423

LINE CLEANER HAVING RUBBER ROLLERS TO SQUEEZE THE LINE

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Fig. 1.

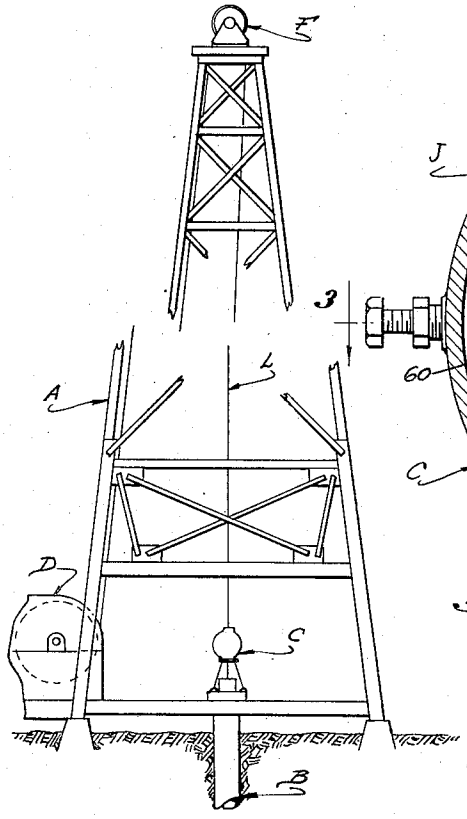


Fig. 2.

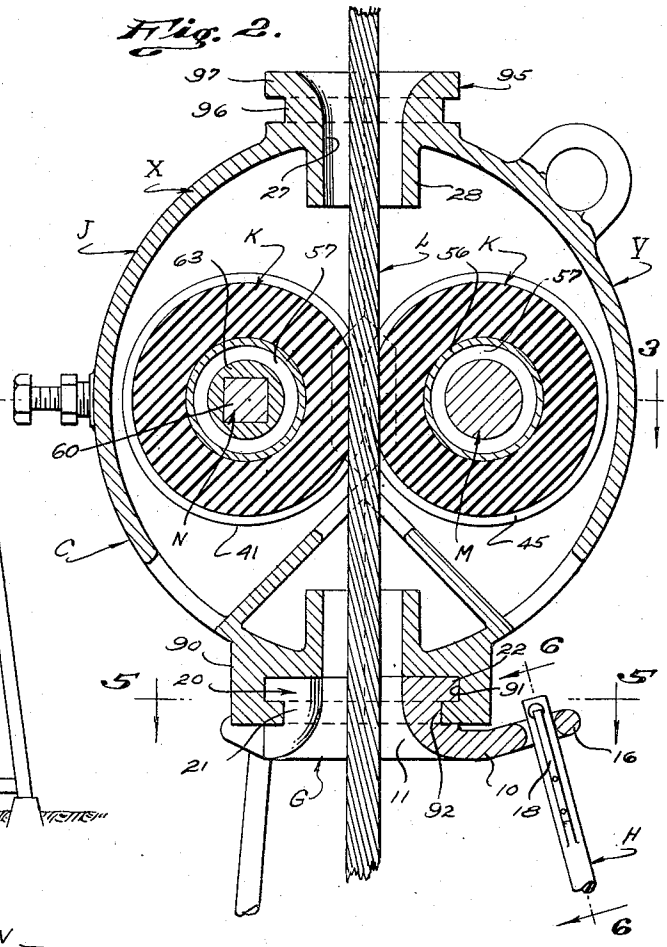


Fig. 3.

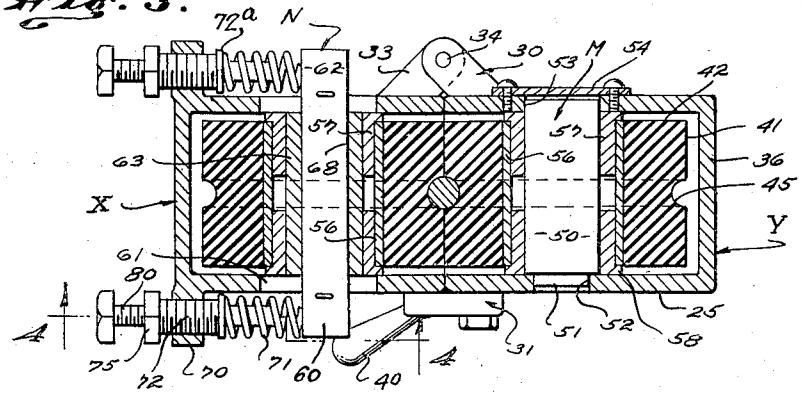
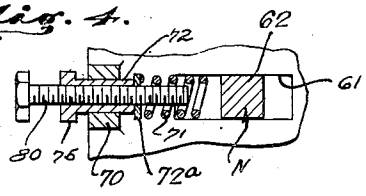


Fig. 4.



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Fig. 5.

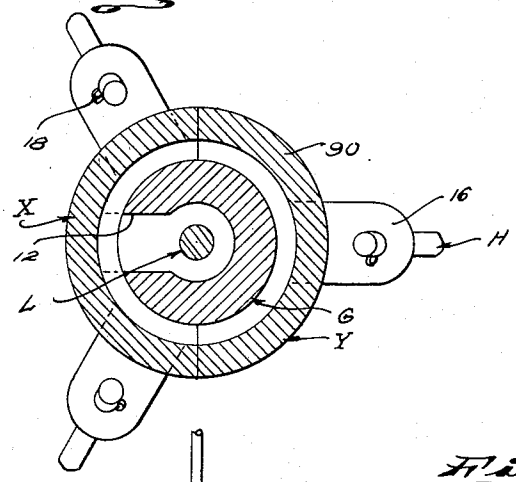


Fig. 6.

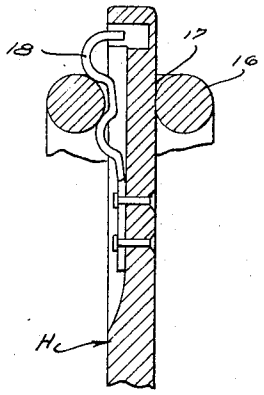


Fig. 8.

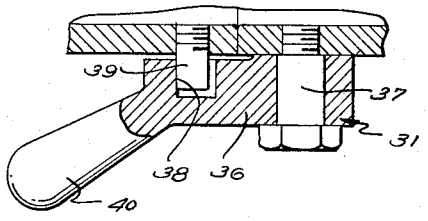


Fig. 7.

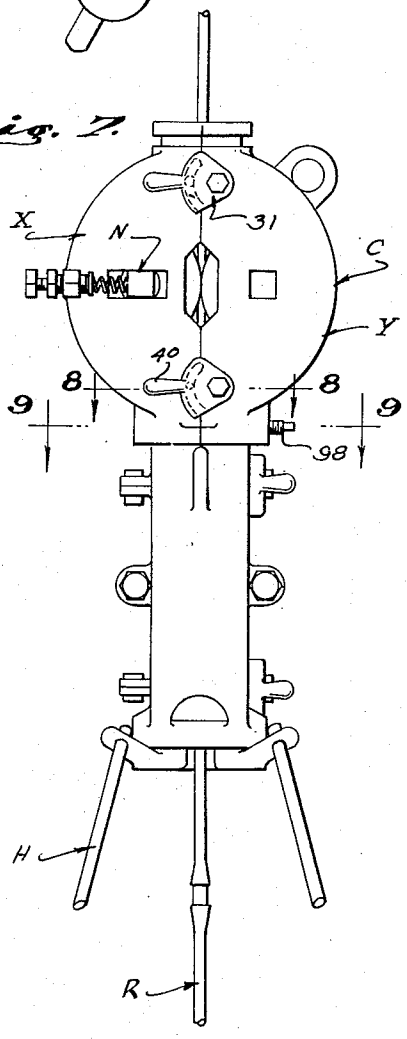
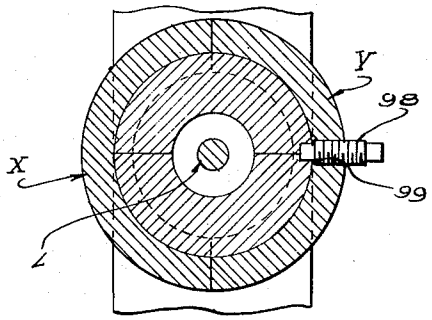


Fig. 9.



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LINE CLEANER HAVING RUBBER ROLLERS TO SQUEEZE THE LINE

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7 Claims. (Cl. 15—210)

This invention has to do with a line cleaner and it is a general object of the invention to provide a structure useful and highly effective for cleaning a line or like element operated in a well, or the like.

In carrying out various operations in and about a well or derrick a line or like element is operated in the well, usually through the casing and into the fluids or materials present in the well. When such a line is withdrawn from the well it is dirty or carries with it materials from the well such as oil, mud, water, etc. Such lines are usually operated rapidly and if the materials carried thereby are not removed they create not only an unsightly and most inconvenient condition, but also a hazard, in that such materials become widely distributed throughout the derrick and on surrounding property.

Devices have been proposed and used to eliminate material from a line as it is withdrawn from a well, such devices commonly being in the nature of wipers having relatively fixed or stationary wiping elements through or between which the line is dragged. Since the action obtained with such devices is a dragging action the line engaging elements are subject to being worn rapidly and to tearing, and the results gained are not always altogether satisfactory.

The structure provided by this invention is characterized by a pair of cooperating rollers or cleaning elements, the rollers being mounted so that their peripheries join or abut and the line is engaged or passes between the rollers. As the line is moved or operated the rollers turn or revolve and material carried by the line is cleaned therefrom by a squeezing action rather than a mere wiping action.

The structure involves a case that carries the cleaning rollers and it is preferred that the case be sectional, in which case the sections are hinged together around the line and are secured in engagement around the line by cam latches or the like. One roller or cleaning element is carried in each section of the case and when the case is closed or assembled around the line the rollers are in proper cooperative engagement with the line.

The invention provides for relative movement and adjustment of the rollers and in one form it mounts one roller on a fixed axis while the other roller is on an axis that shifts in a horizontal plane or laterally of the line relative to the first mentioned or fixed roller. Means are provided adjustably holding the shiftable roller in place and preferably include springs that urge the shiftable roller toward the fixed roller and set screws are provided for holding the shiftable roller in fixed position if desired.

Mounting means is provided for carrying a unit constructed as above described and preferably involves a plate with an opening passing the line and held by anchoring devices or ties that may be fastened to the well head or to suitable derrick parts. A coupling element is provided on the plate and the case that carries the rollers is secured to the plate, preferably by means of a coupling element on the case that cooperates with the coupling element on the plate. The invention provides a coupling element on the upper end of the case corresponding to the coupling element on the plate so that a plurality of cases constructed as above described can be coupled together in a vertical series, one above the other where it is desired that the line be cleaned with more than one set of cleaning elements or rollers.

It is a general object of this invention to provide a line cleaner of the general character referred to in which the desired cleaning action is gained by cooperating rollers between which the line is engaged which rollers operate to strip or squeeze material carried by the line from the line and in which there is no frictional dragging action such as is characteristic of ordinary wiping devices.

Another object of the invention is to provide a structure of the general character referred to that is simple and easy to operate, both to apply it to a line and to remove it therefrom.

It is a further object of the invention to provide a line cleaner in which the elements that engage the line are such as to properly accommodate the line and are such as to pass enlargements or projections on the line without in any way impairing the construction or action of the device.

A further object of the invention is to provide a simple, practical, inexpensive construction for a cleaning device, or the like, whereby two or more units of the structure can be assembled in series relation to act on a common line in order to gain the desired cleaning action.

The various objects and features of my invention will be fully understood from the following detailed description of a typical preferred form and application of the invention, throughout which description reference is made to the accompanying drawings, in which:

Fig. 1 is a view illustrating a typical well equipped with a casing and derrick and showing a line carried by the derrick and extending into the casing and through a cleaner provided by the present invention. Fig. 2 is an enlarged vertical sectional view of the cleaner provided by the present invention showing it in operating position in connection with a line. Fig. 3 is a plan section taken as indicated by line 3—3 on Fig. 2. Fig. 4 is an enlarged sectional view taken as indicated by line 4—4 on Fig. 3. Fig. 5 is a plan section taken as indicated by line 5—5 on Fig. 2. Fig. 6 is an enlarged detailed sectional view taken as indicated by line 6—6 on Fig. 2. Fig. 7 is a side elevation of structure embodying the present invention showing two line units embodying the present invention coupled together, one above the other to act in series. Fig. 8 is an enlarged detailed sectional view taken as indicated by line 8—8 on Fig. 7, and Fig. 9 is an enlarged detailed plan section taken as indicated by line 9—9 on Fig. 7.

The present invention provides a line cleaner and it is particularly practical for use on a line, or the like, operated in a well and in such case it can be employed to advantage immediately above a well casing or casing head. In the drawings I illustrate typical well equipment including a derrick A located over a well casing B which is equipped with a suitable head C. The derrick includes a line handling hoist D that operates a line L over a sheave or crown block F so that the line extends vertically from the top of the derrick and into the casing.

A simple application of the present invention includes a single unit or cleaner engaged with the line L and carried by a mounting G held by ties H so that it is located a suitable distance above the casing head C. The invention contemplates use of one or more cleaners or units embodying the present invention and therefore, in Figs. 1 and 2 of the drawings, I show a single unit carried by the mounting G whereas in Fig. 7 I show two units carried by the mounting G, the units being arranged one above the other. The construction of the several cleaner units is preferably alike and therefore I will proceed to describe one unit in detail, it being understood that such description is equally applicable to as many units as may be employed.

The mounting G by which the cleaner is held through the ties H may be fixed to or integral with the case of the cleaner unit. However, it is preferably a separate element characterized by a horizontally disposed plate 10 having a central vertical opening 11 which passes the line L. The plate is preferably provided with a lateral opening or passage 12 which facilitates engagement of the plate with the line L so that the line is located centrally in the opening 11.

The plate 10 is carried or anchored in the desired position by means of a plurality of ties H shown as rods or rod-like elements that extend downward from the plate and are suitably anchored as to the head C or to a part of the derrick. In the case illustrated there are three cir-

cumferentially spaced ties H and each tie is coupled to an ear 16 that projects from the plate. Each tie is engaged through an opening 17 in an ear 16 and is yieldingly held therein by a spring tongue 18, the tongue being anchored in a recess in the tie as clearly illustrated in Fig. 6 of the drawings. Through such construction the several ties normally hold the plate 10 in a horizontal position above the casing or casing head and in line therewith so that the line L passes through the plate centrally of the opening 11 therein.

Through the construction just described the plate 10 is releasably held by the ties H, so that an enlargement or part on the line that catches on the plate or which should be too large to pass through the opening 11, if moved upwardly into engagement with the plate as the line operates, will simply lift the plate away from the ties, rather than causing injury of the structure. The detachable or releasable connections between the ties and the plate may, in practice, vary widely in form and construction, the particular structure illustrated being merely for purpose of illustration.

The particular mounting plate 10 illustrated in the drawings further includes a coupling means 20 preferably at the upper side of the plate. In the particular case illustrated, the coupling means involves a neck 21 concentric with opening 11 and projecting upwardly from the top side of the plate 10 and a head or enlargement 22 on the upper end of the neck. The neck 21 and head 22 are shown round in cross section and are concentric with the opening 11 so that they are normally concentric with the line L. In the preferred form of the invention the plate 10 with the ears 16 thereon, as well as the neck 21 and the head 22 on the neck, are formed as a single unit or are integrally connected as shown throughout the drawings.

The cleaner unit provided by the present invention and carried by the mounting G is shown as including, generally, a case J, enclosing a chamber cooperating cleaner elements in the form of rollers K, mounting means M and N mounting the rollers in the case, and various other features all of which will be hereinafter described.

The case J, which is in effect a body, may vary widely in form and construction, it being preferred, however, that it be a sectional element such that the sections can be shifted relative to each other to enable the cleaner to be engaged with or removed from the line L. In the preferred arrangement the case is formed in two sections and each carries one of the rollers K. In the particular case illustrated in the drawings the case is a drum-shaped structure characterized by flat parallel round or disc-shaped sides 25 and a curved or round outer wall 26 that connects the peripheral edges of the sides. Diametrically opposite line passing openings 27 are provided in the outer or curved wall 26 of the case, the openings 27 being made large enough to pass the line L with substantial clearance. In the case illustrated line guides or collar-like parts 28 are provided in the case projecting inward from the wall 26 and are arranged concentric with the openings 27 to provide adequate guide means for the line. It will be understood that in practice structures other than the simple guide collars 28 and guide openings 27 may be provided to guide the line if desired.

The drum-like case J with the line passing openings 27 is arranged on the line so that one opening 27 is at the bottom of the case while the other is at the top of the case, as shown in Fig. 2 of the drawings. In accordance with the present invention the case is divided vertically and diametrically into two halves or like sections X and Y. In the preferred form of the invention the case sections X and Y are pivotally connected together as by hinges 30 and they are normally secured together or in operating position by releasable latches 31. In the case illustrated there are vertically spaced hinges 30 involving lugs 33 projecting from one side 25 of the case and carrying vertical hinge pins 34.

One or more latches 31 occur at the opposite side 25 of the case and the latches are preferably cam-type devices which, when engaged, cinch or clamp the case sections tightly together. In the particular case illustrated each latch 31 involves a body 36 pivotally mounted on one case section by a pivot pin 37 and having a cam socket 38 receiving a lug or pin 39 that projects from the other case section. It will be apparent that by suitably shaping the cam opening or socket 38 in the body 36 the desired clamping or cam action can be gained. A suitable handle 40 may be provided on the latch body 36 to facilitate convenient operation thereof. By providing two latches 31 on the case and by locating them one above the other, as shown in Fig. 7, the body sections are dependably and securely maintained in the desired closed or assembled position around the line L.

The rollers K are preferably formed of rubber, or the like, and as shown in the drawings each roller is of simple form and construction and is characterized by a flat axially disposed periphery 41. In the case illustrated the rollers have flat ends 42 and they are located in the case J so that one roller is carried in each case section, the rollers being carried by the mounting means M and N so that their peripheries 41 abut or are in suitable pressure engagement centrally of the structure and so that the line L is completely engaged or embraced by the cooperating rollers. In practice the rollers may be formed of rubber or rubber-like material sufficiently soft or deformable so that the peripheries 41 of the rollers may be plain and straight and are simply deformed by the presence of the line between the rollers. In the particular case illustrated, however, line receiving channels or grooves 45 are provided in the rollers and cooperate to define an opening between the rollers that tightly or snugly passes the line.

The mounting means M carries one of the rollers in casing section Y and in the form of the invention illustrated it is such as to mount the roller in section Y on a fixed axis. In the case illustrated the mounting means M is characterized by a mounting pin of shaft 50 horizontally disposed in the case J and having its ends supported in the sides 25. The particular shaft illustrated has a polygonal end 51 engaged in a polygonal opening 52 in one side 25 and the shaft is engaged in a bore or round opening 53 in the other side 25. A retainer 54 is secured to the last mentioned side 25 to hold the shaft in place as clearly shown in Fig. 3 of the drawings.

In practice suitable bearing means is provided between the roller and the shaft 50. In the case illustrated a liner 56 is tight in the roller, in fact, it may be bonded to the roller, and suitable bearing bushings 57 are engaged in the liner from each end and are tight therein. The bushings 57 rotate freely on the shaft 50. The bushings 57 are shown with end flanges 58 which engage the inner faces of the sides 25 so that the roller is suitably spaced from the sides and is maintained in the case against axial movement or shifting therein.

The mounting means N mounts the other roller in the section X of the case and in the case illustrated it involves a liner 56 tight in or bonded to the roller and bushings 57 tight in the liner and corresponding to the bushings of means M. A cross bar 60 extends through case section X and is carried in horizontal guideways 61 in the sides 25 of section X so that the bar shifts longitudinally relative to the roller carried by means M and has end portions 62 projecting outward from or beyond the sides 25. A collar 63 on the bar 60 has a round exterior rotatably supporting the bushings 57. In the particular case illustrated the bar 60 is polygonal, preferably square, in cross sectional configuration and the collar 63 has an opening 68 slidably passing the bar.

The present invention provides means supporting the collar K in casing section X so that it is bodily shiftable laterally or in a horizontal direction relative to the roller in casing section Y. The means provided by the invention is adjustable and preferably supports the roller in section X so that it is cushioned or is yieldingly held in position to cooperate with the roller in section Y. In the particular case illustrated in the drawings the roller in casing section X is supported in the desired manner through structure engaged with the ends or heads 62 of the bar 60.

In the drawings I show lugs 70 projecting from the sides 25 of a casing section X and compression springs 71 operate between the lugs 70 and the heads 62 of the bar 60. Adjustable stops 72 are carried by the lugs 70, being preferably threaded thereto, and the springs 71, which are preferably helical springs, act between the stops 72 and the heads 62. Each stop is shown provided with a polygonal part 75 that can be conveniently engaged by a wrench or the like. It will be apparent from Fig. 3 of the drawings how the stops 72 can be adjusted to vary the pressure with which the springs 70 urge the roller supporting bar 60 toward the center of the structure in order to hold the roller which is carried by the

bar in the desired manner relative to the roller supported in casing section Y.

A positive stop means may be provided for supporting or holding the bar **60** so that it is positively held in position relative to the roller in section Y. In the case illustrated set screws **80** are threaded through the stops **72** and extend into or through the springs **71** to guide the springs. The set screws **80** may be operated inwardly to positions where they engage the heads **62** of the bar or they may be positioned to limit the extent that the bar can be moved against the resistance of the springs **71**.

In the particular form of the invention illustrated, suitable washers **72a** are engaged on the set screws **80** to occur between the spring **71** and the stop **72** and establish a suitable seat for the spring.

Through the construction just described the rubber or rubber-like material employed in the rollers K may be such as to pass any parts or elements on the line L and likely to be operated through the cleaner or the structure can be set so that the springs **70** yieldingly support the roller in section X so that an enlargement or object on the line is passed by cooperation or yielding of the rollers and also by lateral shifting of the roller in section X of the casing. It will be apparent that through the construction provided an object on the line which is of substantial size will engage the mounting plate **10** and cause the plate to be disengaged from the ties H so that the entire cleaner is lifted with the line. When objects are small enough to pass through the plate **10** the structure provided as above described is such as to allow such parts to readily pass through the cleaner either by flexure or deformation of the rollers or by lateral shifting of the roller in casing section X or both.

In accordance with the broader principles of the invention any suitable means may be provided for coupling or fastening the cleaner as above described to the mounting G. In the preferred form of the invention a releasable coupling means is provided and is such that when the casing sections X and Y are latched together or are in operating position around the line L the casing is effectively and dependably coupled to the mounting G.

In the particular construction illustrated, where the coupling means **20** on the plate **10** is constructed as above described, a depending collar **90** is provided on the lower portion of casing J. The collar **90** has a socket **91** which receives the enlargement or head **21** on neck **22** and it has a restricted opening **92** which passes the neck **91**. It will be apparent from Fig. 2 of the drawings how the collar **90**, being located centrally at the bottom of the case J is divided with the case and is therefore in two sections which assemble around the structure on the plate **10**. When the parts are engaged, as shown in Fig. 2, the case **10** is effectively secured on the plate with the line passing and handling parts of the cleaner in proper aligned relation to the line L.

In accordance with the present invention I preferably provide a coupling means **95** at the top of the case J and I from such coupling means the same as, or to correspond with, the coupling means **20** on the plate **10**. As shown in the drawings, the coupling means **95** involves an upwardly projecting neck **96** carrying an enlargement or head **97**. The neck **96** corresponds in size and shape with the neck **21** and the head **97** corresponds in size and shape with the head **22**. Through this construction one case J can be arranged above another and coupled thereto, as shown in Fig. 7 of the drawings, and in practice as many cases can be coupled together in series along the line L as circumstances require. When cases J are thus coupled together it may be desired to secure or lock them against relative rotation. For this purpose I provide a stop screw **98** on the depending collar **90** of each case, which stop screw may be operated to enter a notch or opening **99** in the head engaged in the collar.

The cleaning elements or rollers employed in carrying out the invention may, in practice, be rubber or rubber-like material so that they are resilient and deformable to accommodate the line and are such as to conform to the contour thereof and to pass projections or objects on the line that may be operated through the structure. When I employ the term "rubber" in the claims I mean to include not only rubber, but any rubber-like material or composition. Further, it will be apparent that the structure may be used to clean an element other than a line, for instance, it may be used to clear a rod, and in Fig. 7 of the drawings I illustrate a rod R engaged through two assembled cleaners and I show a projection or coupling on the rod such as will readily pass through the cleaners. In the following claims when I refer to a "line" or to a "line cleaner" I refer to a cleaner that will operate on not only a line but also on other like or equivalent elements, as for example, on rods, etc.

Having described only a typical preferred form and application of my invention, I do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to myself any variations or modifications that may appear to those skilled in the art and fall within the scope of the following claims.

Having described by invention, I claim:

1. A well line cleaner including, two releasably movable casing sections adapted to be engaged around a line, the sections having upper and lower portions with registering opposed recesses therein defining upper and lower vertically aligned openings adapted to pass the line, a rubber roller in each section, means supporting one roller in one casing section to rotate on a fixed axis, and means supporting the other roller in the other casing section on an axis parallel with and spaced from that of the first mentioned roller and shiftable laterally thereof, means at the exterior of the casing normally yieldingly urging the shiftable roller toward the first mentioned roller, the rollers having their peripheries engaged and adapted to engage the line tight between them where they are engaged.

2. A well line cleaner including, two relatively movable casing sections adapted to be engaged together around a line and each having spaced side walls, the sections having upper and lower portions with registering opposed recesses therein defining upper and lower vertically aligned openings adapted to pass the line, two rubber rollers, means mounting one roller on a fixed axis in one casing section, and means mounting the other roller in the other casing section to shift relative to the first mentioned roller including, a bar carried in guideways in the side walls of said other casing section, means rotatably supporting the said other roller on the bar, and spring means normally yieldingly urging the bar toward the first mentioned roller holding the rollers with their peripheries adopted to be engaged with the line between them including, a compression spring and an adjustable abutment engaged by the spring.

3. A well line cleaner including, two relatively movable casing sections adapted to be engaged together around a line, the sections having upper and lower portions with registering opposed recesses therein defining upper and lower vertically aligned openings adapted to pass the line, two rubber rollers, means mounting one roller on a fixed axis in one casing section, means mounting the other roller in the other casing section to shift relative to the first mentioned roller including, a bar carried in guideways in said other casing section, means rotatably supporting the said other roller on the bar, and spring means normally yieldingly urging the bar toward the first mentioned roller and adapted to hold the rollers with the peripheries engaged with the line between them, and stop means engageable with the bar to hold it against movement away from the first mentioned roller including a stop member adjustably carried by one of the casing sections.

4. A well line cleaner including, a base having a vertical opening adapted to pass a line and having an upwardly projecting headed projection thereon, and a unit including a case having hinged sections with parts at its lower end gripping the projection when the case is closed and defining an opening adapted to pass the line, latch means holding the case closed, and line engaging rubber rollers carried in the case, the case having an upwardly extending headed projection at its upper end corresponding to the projection on the base.

5. A well line cleaner including, a base having a vertical opening adapted to pass a line and having an upwardly projecting headed projection thereon, a unit including a case having hinged sections with depending parts gripping the projection when the case is closed and defining an opening adapted to pass the line, latch means holding the case closed, and line engaging rubber rollers carried in the case, the case having an upwardly extending headed projection at its upper end corresponding to the projection on the base, and a second unit including a case having hinged sections with depending parts gripping the projection on the case of the first mentioned unit when closed, latch means holding the second named case

closed and line engaging rubber rollers carried in the second named case.

6. A well line cleaner including, a case having upper and lower portions with vertically aligned round openings therein adapted to pass a line, the case having a drain opening in the lower portion thereof, a pair of engaged rubber rollers with annular registering grooves adapted to receive and embrace the line, means mounting one of the rollers in the case on a fixed axis and means mounting the other roller in the case to shift relative to the first mentioned roller and means normally yieldingly holding said other roller in pressure engagement with the first mentioned roller.

7. A well line cleaner including, two relatively movable casing sections adapted to be engaged around a line and having spaced sides defining a chamber, the sections having registering recesses forming vertically aligned openings at the top and bottom of the chamber and adapted to pass the line, a rubber roller in each section, means supporting one roller in one casing section to rotate on a fixed axis, and a member extending between the sides of the other casing section and supporting the other roller in said other casing section on an axis parallel with and spaced from that of the first mentioned roller and shiftable laterally of the first mentioned roller, the rollers having annular grooves about their peripheries adapted to be engaged with the line tight between them where they are engaged.

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