

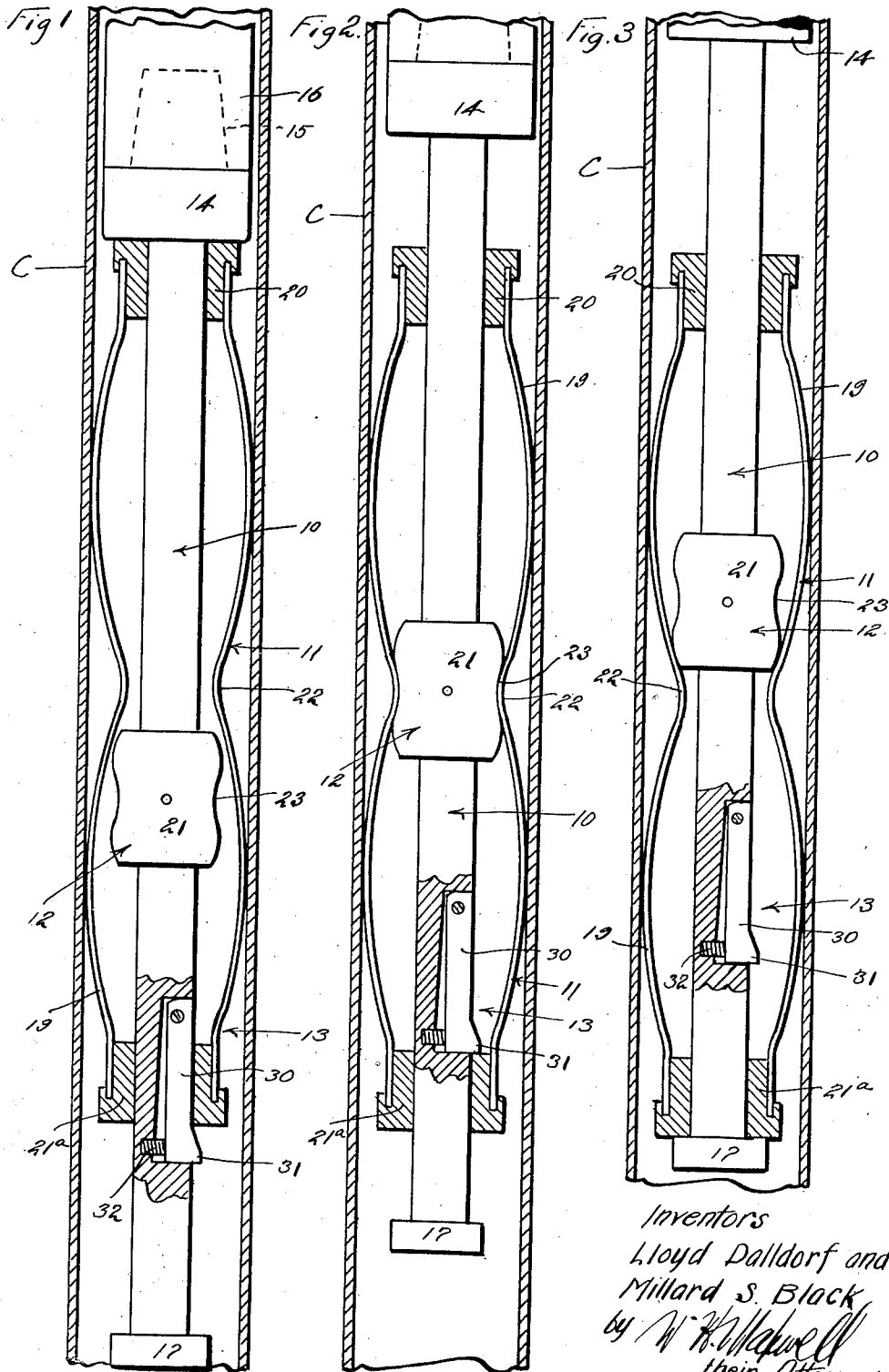
April 21, 1931.

L. DALLDORF ET AL
TAIL PIECE FOR WELL TOOLS

1,801,334

Filed Jan. 11, 1926

2 Sheets-Sheet 1



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their Attorney

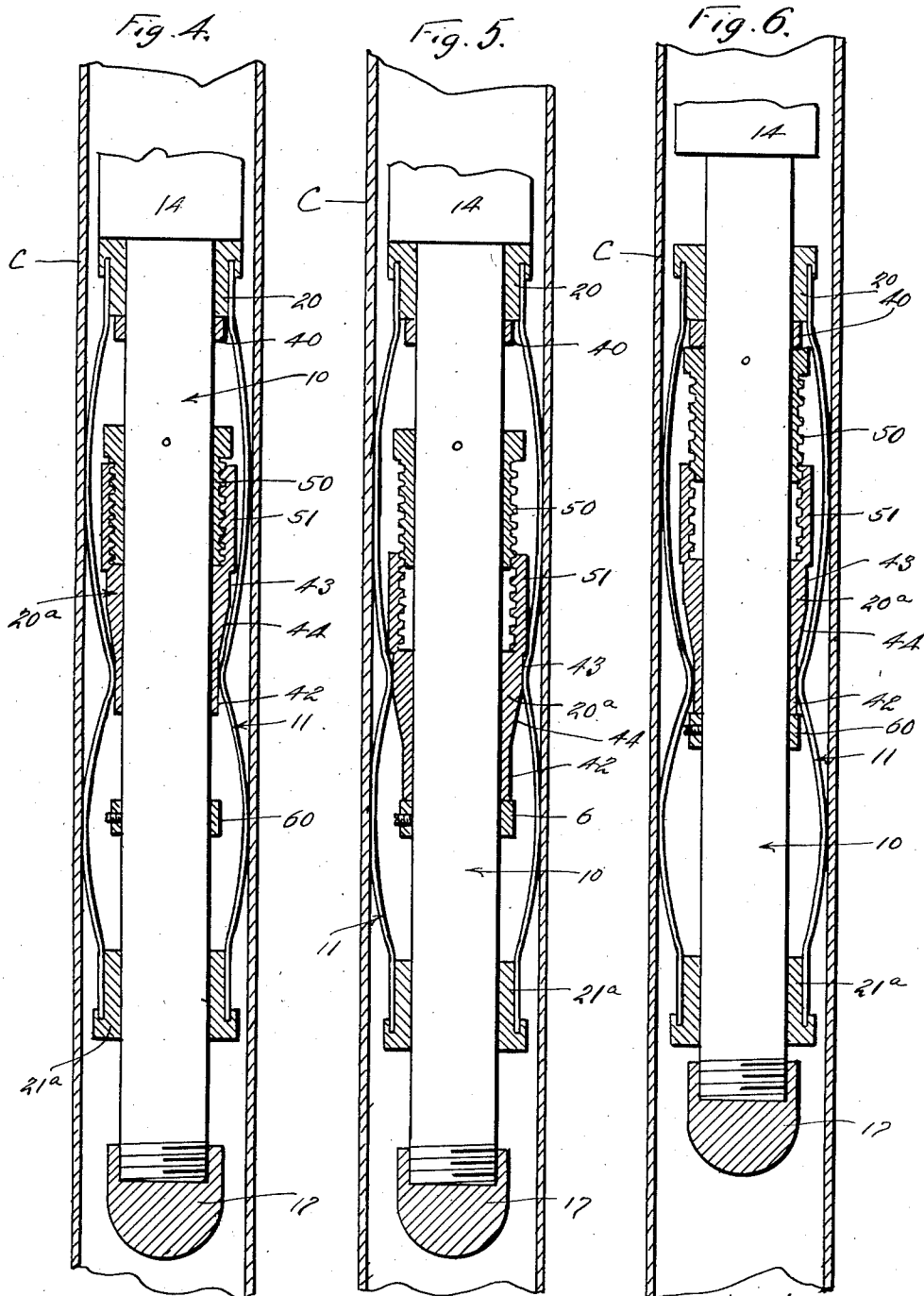
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UNITED STATES PATENT OFFICE

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TAILPIECE FOR WELL TOOLS

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This invention relates to a well drilling tool and has particular reference to a tool useful during various operations occurring during the drilling of wells, such, for instance, as fishing objects out of wells, cutting casings in wells, perforating casings in wells, etc.

Various well tools, for example, fishing tools, casing cutters, perforators, etc. are ordinarily equipped with or attached to a tool or device known as a tail piece, the function of which is to resist movement in the well or casing and thereby form anchorage, or a relatively fixed means, with reference to which the tools may be operated. Tail pieces ordinarily comprise a plurality of leaf springs mounted and related so that they normally bear outwardly against the casing with sufficient force to offer considerable frictional resistance to movement of the device relative to the casing. The usual type of tail piece is proportioned so that it can be slid or moved in the casing in order to allow it to be operated or moved to the desired position in the casing.

Ordinary tail pieces, such as I have referred to, are in many cases badly worn and materially weakened by their being forced through the casing to the desired point so that their efficiency when in operating position is more or less decreased. It is an object of the present invention to provide a tail piece which can be readily slid or moved into the desired position in the casing and can, when in position, be actuated or set to grip or engage the casing in a particularly effective and secure manner.

Another object of our invention is to provide a tail piece having variable frictional engagement with the casing.

A further object of our invention is to provide a tail piece operable at any desired point in the casing so that its pressure engagement with the casing is increased and is releasable when it is desired to relieve the increased pressure engagement.

The various objects and features of our invention will be best and more fully understood from the following detailed description of typical forms and applications of the

invention throughout which description reference is had to the accompanying drawings in which

Figs. 1, 2 and 3 are longitudinal sectional views of a tail piece embodying our invention, Fig. 1 being a view showing the tail piece in the position in which it may be run into a casing, Fig. 2 is a view showing the tail piece set in the casing so that it offers high frictional resistance to movement in the casing and Fig. 3 being a view showing the tail piece released so that it is in position to be easily withdrawn from the casing.

Figs. 4, 5 and 6 are longitudinal sectional views of another form of our invention showing the tail piece in the position in which it may be run into a casing. Fig. 5 is a view showing the tail piece actuated or set to tightly grip or engage the casing and Fig. 6 is a view showing the tail piece released or in condition to be easily withdrawn from the casing.

Our invention is, as we have outlined, suitable for application to, or use in connection with, tools intended for distinctly different operations and in fact to tools having various modes of operation, it being applicable, generally, to situations in which a tail piece can be used. In accordance with the broader aspects of our invention we provide a tail piece with variable resistance, that is, a tail piece operable to offer various amounts of frictional resistance to movement in a casing. In carrying out our invention we may employ various forms or types of construction and may vary the construction to suit, or in accordance with, the particular tool in combination with which the device is to be used, for instance, the mechanism or construction employed in a device to be used in combination with a tool to be operated by reciprocation or longitudinal movement in a casing, may be materially different from that employed in a device to be used in combination with a tool to be operated by rotation in a casing. These being two typical situations or types of tools in combination with which our device or invention may be advantageously employed, we have chosen to set forth in Figs. 1, 2 and 3 of the draw-

ings, a form of our invention suitable for use in combination with a tool to be operated by longitudinal movement in the casing, while in Figs. 4, 5 and 6 we have shown a form of our invention suitable for use in combination with a tool to be operated by rotation in the casing. We have in these two forms of our invention set forth different types of mechanism in order to illustrate variations of construction such as are within the scope of our invention. Further our invention is suitable for embodiment in, or application to a tool as a unitary part thereof for embodiment in the form of an independent device or unit to be attached to the tool.

In Figs. 1, 2 and 3 of the drawings we set forth a form of the invention particularly suited for use in connection with a tool to be operated by longitudinal movement in a casing. The device includes, generally, a body 10, casing engaging means 11, operating means 12 for the casing engaging means 11, and control means 13. The body 10 may be in the form of a comparatively long rod or tube, round in cross section and provided at its upper end with an enlargement or head 14 having a tapered screw threaded pin, or the like, 15, by which the device may be connected to a suitable part 16 of a tool or part connected with a tool. At its lower end the body 10 may be provided with an enlargement or projection for instance, in the form of a nut 17.

The casing engaging means 11 may include a plurality of casing engaging members 19, for instance, in the form of leaf springs. The springs 19, of which there may be two or more, symmetrically arranged around the body 10, are carried by the body so that they normally engage the inner wall of the casing C to offer frictional resistance to movement of the device in the casing. In accordance with the broader aspects of our invention the springs 19 may be mounted in various manners it being preferred to mount or support them at their ends, for instance, by means of upper and lower collars 20 and 21a, respectively, carried on the body 10. In the particular case under consideration the ends of the springs 19 are fixed to the collars and the collars are mounted on the body 10 for operation longitudinally of the body, it being preferred to slidably fit the collars on the body.

The means 12, provided by our invention for operating the casing engaging means 11 in this casing, includes an operating member 21 operable into and out of position where it operates upon the springs 19 to increase the force or pressure with which they engage the casing C. In this particular form of the invention the operating member 21 is mounted directly on the body 10 and is fixed relative to the body so that it is moved to op-

erate the casing engaging means by operation of the body 10 relative to the casing engaging means. In accordance with the preferred form of our invention the springs 19 are provided with parts 22 adapted to be directly engaged by the operating member 21, these parts are preferably located intermediate the ends of the springs and may be in the form of inwardly bent or concave parts such as we have illustrated in the drawings. By forming the parts 22 in this manner and by locating them about midway between the ends of the springs each spring has two spaced casing engaging parts, one at either side of its part 22. The operating member 21, in this form of the invention is merely in the form of an enlargement or projection on the body 10 proportioned to engage the parts 22 and move them outwardly when the device is operated as hereinafter described. In practice it is desirable to form the operating member as a sleeve, or the like, which fits around the body 10 and to provide it with a concave seat 23 to receive and hold the inwardly bent parts 22 of the springs 19 as shown in Fig. 2. In the particular construction under consideration the operating member 21 is movable relative to the casing engaging means 11 between a position where it is out of engagement with the parts 22 below said parts to a position where it is out of engagement with said parts above them. In Fig. 1 of the drawings we have illustrated the operating member 21 out of engagement below parts 22 which is the position in which the device is run into the casing. In Fig. 2 we have illustrated the operating member in position where it is in engagement with the parts 22 holding them out so that the springs 19 engage the casing C with great pressure and in Fig. 3 we illustrate the operating member in position out of engagement with the parts 22 above said parts in which position the device is adapted to be withdrawn from the casing.

The control means 13 which may or may not be incorporated in the device as circumstances may require is a suitable device which operated to allow operation of the member 21 from the position shown in Fig. 1 to that shown in Fig. 3 but prevents its return beyond the position shown in Fig. 2. This device may comprise a latch 30 pivotally mounted in the body 10 so that it has a head 31 projecting from the body at a point along the body to cooperate with one of the collars, for instance, the lower collar 21a. A spring 32 is provided in connection with the latch to normally hold it in position where the head 31 projects from the body. The latch is located in the body so that its head 31 is below the collar 21a when the parts are in the position shown in Fig. 1. As the device is actuated to the position shown in Fig. 2 the collar 21a engages the head 31 of the latch

to depress the latch until the collar has passed below the head whereupon the latch assumes the position in which the head engages over the collar as shown in Fig. 2. It is to be noted that the head 31 of the latch is shaped so that it is depressed by downward movement of collar, but presents a shoulder which positively prevents upward movement of the collar. The lower collar 21a having passed below the head of the latch the device can be operated to move the operating means member 21 between the position shown in Fig. 2 and that shown in Fig. 3, but cannot be operated to return the member to the position shown in Fig. 1.

In operating the device just described, it is suitably connected with a tool, for instance, it is connected to the lower end of the tool and is run into the casing to the desired point. During the running of the device into the casing the casing engaging means is in its uppermost position with relation to the body 10 so that the head 14 at the upper end of the body engages the collar 20 to push the means 11 through the casing. When it is desired to operate the tool connected with the device the drill pipe or other means carrying the tool or device is pulled upwardly until the operating member 21 is in position to expand or actuate the parts 22 of the springs as shown in Fig. 2. The parts 22 of the springs being thus held out or expanded, the pressure with which the springs 19 engage the casing is greatly increased so that the device operates as a particularly effective resistance or anchorage with reference to which the tool may be operated. When it is desired to withdraw the tool and device from the casing the drill pipe may be moved upwardly to disengage the member 21 from the parts 22, thus allowing the springs 19 to assume their normal position in which they offer a normal frictional resistance to movement in the casing. The particular device which we have set forth is intended for use in combination with a tool operated by downward movement in the casing. This being the case when the device has been operated to the position illustrated in Fig. 2 downward movement imparted to the body 10 by operation of the tool will not cause the member 21 to be disengaged from the parts 22 of the springs because of the latch or control means operating to prevent downward movement of the member 21 relative to the parts 22 from the position shown in Fig. 2.

In the form of the invention illustrated in Figs. 4, 5 and 6 of the drawings, we have shown a construction particularly suited for cases in which the tool connected with the device is to be operated by rotation in the casing and we have shown another form of operating means. In this case the body 10 and casing engaging means 11 may be substantially the same as in the case first described. The means 11 is movable longitudinally of

the body the movement being limited by a suitable stop ring 40 on the body 10 below the upper collar 20. The operating means in this case includes an operating member 20a adapted to be moved longitudinally relative to the body into and out of position where it engages and expands the parts 22 of the springs, in this case the member 20a is slidably carried on the body 10 and has a part 42 of small diameter, a part 43 of large diameter and a tapered part 44 extending between and joining the parts 42 and 43. When the member 20a is in its unactuated position and the means 11 is in its up position with relation to the body the part 42 of small diameter is opposite the parts 22 of the springs. The part 42 is not sufficiently large to hold the parts 22 of the springs out beyond what we will term their normal position. As the member 21 is moved or operated longitudinally of the body its tapered part 44 comes in engagement with the parts 22 of the springs forcing them outwardly until the part 43 of large diameter comes into engagement with them. In this form of the invention the operating member 20a is moved between the two positions just described, which positions are illustrated in Figs. 4 and 5 of the drawings, by a screw means. The screw means may embody a screw 50 fixed on the body 10 and screw threaded into a tubular extension 51 provided on the member 20a. The screw 50 may be fixed to the body by a pin 50a. The engagement of the member 20a by the parts 22 of the springs holds the member 20a against rotation so that rotation of the body causes operation of the screw relative to the member 20a. Suitable stop means is provided for limiting the operation between the member 20a and the screw 50 which stop means may be in the form of a stop collar 60 fixed on the body 10 to limit the downward movement of the member 20a. When the member 20a has been actuated to the position shown in Fig. 5 where the springs are expanded to engage the casing with maximum pressure and it is desired to release the springs, the body 10 may be moved upwardly so that it moves the member 20a upwardly with relation to the casing engaging means until the parts reach a position such as is shown in Fig. 6 where the springs are released.

In operating this last form of our invention the device is run into the casing with the parts in the position shown in Fig. 4, the springs offering their normal frictional resistance to movement relative to the casing. Upon reaching the desired point in the casing the body 10 is rotated to move the operating member 20a downwardly until the springs are expanded to exert their maximum pressure on the casing thus offering high frictional resistance to movement of the device relative to the casing. With the parts in this

position the tool connected with the device may operate, the device offering an effective anchoring means in the casing. When it is desired to withdraw the tool from the casing it is simply moved upwardly, which operation causes releasement of the springs so that the device is withdrawn from the casing with the parts in the position shown in Fig. 6.

From the foregoing description of our invention it will be apparent that the device may be arranged and proportioned so that it offers only comparatively slight frictional resistance during movement into and out of position in the casing and therefore is easily handled and is not subject to excessive wear as occurs in ordinary devices of this character. Further, when in position the device may be actuated or expanded to grip the casing very effectively, in fact the parts may be so designed and proportioned that the device when actuated engages the casing with considerably more pressure than can be obtained with an ordinary device of this character. It is to be noted that our invention may be effectively and practically carried out in forms which may be used in connection with standard tools of various kinds without interfering with or complicating the operation of the tools. It is also to be noted that our invention is capable of embodiment in simple practical forms of construction so that it is reliable, efficient and practical in operation.

Having described only a typical preferred form of our invention we do not wish to limit ourselves to the specific details set forth, but wish to reserve to ourselves any changes or variations that may appear to those skilled in the art or fall within the scope of the following claims.

Having described our invention we claim:

1. In a tail piece operable in a casing, a body, a leaf spring carried by the body for operating against the casing and having two spaced casing engaging parts, and releasable means for engaging the spring at a point between said parts to urge said parts toward the casing including a part on the body movable into and out of engagement with the spring.

2. In a tail piece operable in a casing, a body, a leaf spring carried by the body and adapted to engage the casing, the spring having an inwardly extending part intermediate its ends forming two spaced casing engaging parts, the spring and body being relatively movable, and an operating member carried by the body operable by movement of the body relative to the spring into and out of position where it engages the inwardly extending part of the spring to urge the spring toward the casing.

3. A tool for operation in a casing and including, a body, a spring carried by the body having spaced parts to engage the casing,

and a member carried by the body operable by longitudinal movement of the body to move relative to the spring to engage the spring between the spaced parts and actuate the spring relative to the casing.

4. A tool for operation in a casing including a body, an indented member fixed on the body, a spring carried by the body for movement longitudinally thereof and engaging the casing, the spring having a part to cooperate with the member to cause actuation of the spring and adapted to engage the indentation of the member, and releasable means for holding the spring and body against relative movement.

5. In a tail piece operable in a casing, a body, a leaf spring carried by the body operating against the casing and having two spaced casing engaging parts, and a part on the body movable into engagement with the spring at a point between said parts to urge said parts toward the casing.

In witness that we claim the foregoing we have hereunto subscribed our names this 15th day of December, 1925.

LLOYD DALLDORF.
MILLARD S. BLACK.