

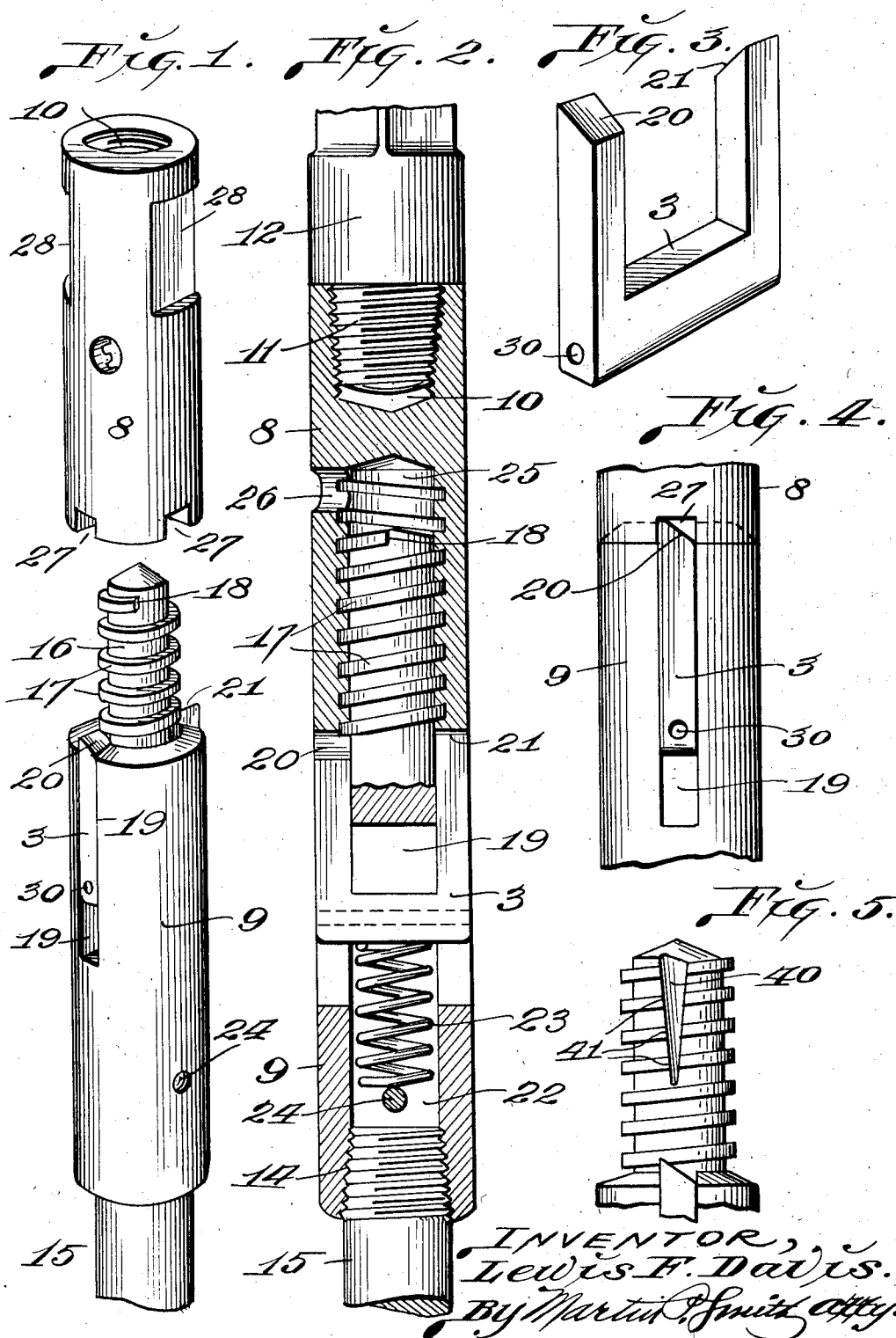
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DEEP WELL PUMP PLUNGER ATTACHMENT

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DEEP-WELL PUMP-PLUNGER ATTACHMENT.

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The present invention relates to couplings and attachments for deep well plunger pumps and pertains more particularly to devices for attaching the sucker rods to the pump plunger or working barrel.

The principal object of the invention is to provide means whereby a string of sucker rods may be quickly attached to the plunger while said plunger reposes within the pump jacket, thus permitting of placing the plunger within the pump jacket before lowering into a well and subsequently running in the sucker rods and securing them to the plunger.

It will be understood in the consideration of the invention that in the case of deep well pumps, particularly in the case of a cupless steel plunger close working fits are provided between the plunger and jacket. In lowering a plunger with the rods, the plunger accumulates silt and grit. Such accumulations make it difficult to fit the plunger in the jacket, and even when so fitted, the accumulations rapidly score the plunger and jacket, and may even cause the plunger to score almost immediately after it is put in operation.

It is therefore another object of the invention to provide a coupling or attachment which will permit of fitting the plunger in the barrel above ground, lowering the completely assembled pump into the hole at the lower end of the tubing, and subsequently running the sucker rods down the tubing and securing the plunger thereto.

The plunger of a deep well pump is subject to the hydrostatic pressure of a column of fluid extending from the fluid level to the top of the ground, and such pressure, in many wells, is considerably over 1000 pounds to the square inch. Therefore the strain on any attachment or coupling coming between plunger and the rods is extremely great, and it is another object of the invention to provide a device well capable of withstanding the strain.

My invention contemplates the employment of two parts with screw threads for connecting same, and inasmuch as the attaching takes place at the remote part of the well, under a bath of silt filled oil, it is another object of the invention to insure of the parts being screwed together efficiently without interference of the part of the silt and sand.

Another object of the invention is to provide for securely and automatically locking the screw-threaded parts together so that swiveling of the rods or plunger will not result in their becoming disconnected.

Still other objects and advantages of my invention will appear hereinafter.

I have illustrated by the accompanying drawing, a preferred embodiment of my invention, so that those skilled in the art may apply my invention in either the same or other embodiments.

In the said drawings, Fig. 1 is a perspective view of the complete coupling showing the two complementary parts detached.

Fig. 2 is a view of the coupling mainly in vertical section, showing the parts attached to each other with the upper section attached to a sucker rod coupling and the lower end attached to the plunger "sub".

Fig. 3 is a view in perspective of a part hereinafter known as the pawl.

Fig. 4 is a fragmentary view in elevation of the central part of the coupling showing the pawl in normal locking position.

Fig. 5 is an elevational view of a modified form of the upper part of that which is hereinafter known as the lower section of the coupling.

More especially, in carrying out my invention, I employ two coupling members or sections 8 and 9 respectively. Member 8, known as the upper member is provided at its outer or upper end with a common standard screw-threaded socket 10, into which the pin 11, of a sucker rod coupling 12, is adapted to be threaded.

It will be understood that the sucker rod coupling is part of the sucker rod string (not shown) leading up through the tubing (not shown) to the surface. The usual arrangement of tubing, pump jacket, pump plunger, sucker rods, ball and cage etc. is well understood and needs no illustration or description. The lower member 9 is provided with the socket 14 into which a "sub" 15 is threaded. The "sub" is employed to connect the ball-cage, (not shown) of the plunger with the lower section.

The lower section, shown individually in Fig. 1 is provided with an upwardly ranging stud 16.

In conformance with salient features of my invention, the thread 17 is square in section and terminates abruptly in a square or

chisel end, as at 18. The square thread provides great strength in conformance with the great service strains and stresses to which the plunger is subjected while in use. Below the stud, the member 9 is provided with a vertically extending slot 19 disposed diametrically through the member and intersecting opposite sides of its perimeter. In the slot, the U-shaped pawl 3 is adapted to slide vertically. The pawl terminates in the inclined surfaced ends 20 and 21 respectively; one end being inclined oppositely to the other. The member 9 is actually tubular, and providing a bore 22 in which a spring 23 is disposed. The spring is limited in downward movement by a pin 24 passing horizontally through the bore. Accordingly the thrust of the spring is normally thrust upwardly, as shown in Fig. 1 until stopped by abutment with the lower end of the stud; the stud providing an upper closure for the bore 22.

The upper section or female member of the coupling is provided with an internally threaded bore 25 so that it may be screwed down over the stud. The bore is closed at the upper end and conforms in every way to the stud so that when the members are connected, the bore of the upper member is occupied by the stud to the exclusion of mud and like accumulations. Said bore is vented by an opening 26 close to the upper end.

The upper section has its lower edge provided with a plurality of spaced notches 27 adapted to receive corresponding ends of the U-shaped pawl. The member is also provided with flats 28, so that it may be engaged by a wrench (not shown). Accordingly, the U-shaped pawl is provided with an aperture 30 in which a rod (not shown) may be inserted to manually retract the pawl so that the upper ends are brought below the upper end of the slot.

In employing the device as a connection between sucker rods and a pump plunger, the plunger is placed in the pump jacket or casing, and the assembled pump thus lowered into the well at the end of the tubing. Before the plunger is even placed in the jacket, the lower end of my improved attachment is connected to the plunger by means of the "sub".

After the tubing is lowered, the sucker rods are run in, the first and lowermost rod being fitted with the upper member of my improved attachment. As the said lowermost sucker rod approaches the pump plunger, the two sections of my coupling assume the relative positions in which they are shown in Fig. 1. Further lowering brings the member 8 down over the member 9, the conical end of the stud facilitating centering. Right hand rotation of the rods causes the threads of the stud to engage with the threads in the upper member. A few turns

bring the lower end of the upper member into contact with the pawl. Continued turning of the upper member results in a pawl and ratchet action, or overrunning clutch action between the notched end of the upper member and the resilient protruding pawl. Further rotation brings the parts into abutment, as shown in Fig. 2; the pawl positively locking the parts against reverse rotation with regard to each other.

Under usual conditions, the threaded parts will be covered with accumulations of sand, silt and other interfering substances.

As the abrupt end of the thread on the stud progresses, it will drive all such accumulations before it and eventually eject them through the aperture 26. With the pawl parts fully connected, the sucker rod is ready to be reciprocated and the coupling is amply strong to safely carry the entire load, particularly inasmuch as the thread cleaning provision insures complete screw threaded engagement of the two sections of the coupling. When occasion arises to pull out, the coupling causes the plunger to be pulled out with the rods. To break the coupling, a rod or the like is inserted in the aperture 30 so that the U-shaped pawl may be retracted sufficiently to permit of turning the upper coupling to the left so that it may be unscrewed.

In the form of the invention shown in Fig. 5, the stud is provided with a vertical recess 40 providing a chip clearance or break in the threads similar to a common tap. As this form of stud moves forward, the resultant square cut ends 41 of the threads drive the accumulation before it, ejecting them through the outlet aperture.

While I have shown and described a specific embodiment of my invention and have specified certain constructions and arrangements of parts I do not limit myself to any specific construction or arrangement of parts and may alter same as I desire without enlarging the scope of my invention within the appended claims.

I claim as my invention:

1. In a coupling of the class described, a coupling member provided with a central bore, an axially disposed threaded stud projecting from said coupling member beyond said bore, slots formed in said member at the sides of said bore, a spring pressed U-shaped pawl occupying said bore and slots, the ends of the legs of which pawl project beyond the body of the coupling member to the sides of said threaded stud, an internally threaded member adapted to receive said threaded stud and the end of said threaded member being provided with notches that are adapted to receive the ends of the legs of said U-shaped pawl.

2. In a device of the class described, a cylindrical member provided with a central

bore, a threaded stud protruding vertically from said bore, a diametrically disposed vertical slot equally bifurcating the upper part of the cylindrical member and intersecting
5 the bore, a U-shaped pawl member having a pair of spaced free ends with oppositely inclined tips and a lower horizontal connecting bar; said U-shaped member vertically
10 slidable in the slot with the bar below the innermost end of the stud, and the spaced ends disposed to respective sides of the stud and capable of protruding beyond the cylindrical member, a spring urging said U-shaped pawl upwardly and a complementary
15 coupling member provided with an axially arranged threaded recess adapted to receive

the threaded stud of said cylindrical member.

3. In a coupling of the class described, a pair of coupling members, a threaded stud
20 projecting from the end of one of said members, the other member having an internally threaded recess that is adapted to receive said stud and a U-shaped pawl arranged for
25 sliding movement in one of said coupling members, and the free ends of the legs of which pawl are adapted to engage in notches formed in the end of the other coupling member when the two members are connected.

In testimony whereof I affix my signature.
LEWIS F. DAVIS.

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