J. H. Luther,

Cutting Pipes in Oil Wells.

No. 111,220. Patented Jan. 24. 1871.

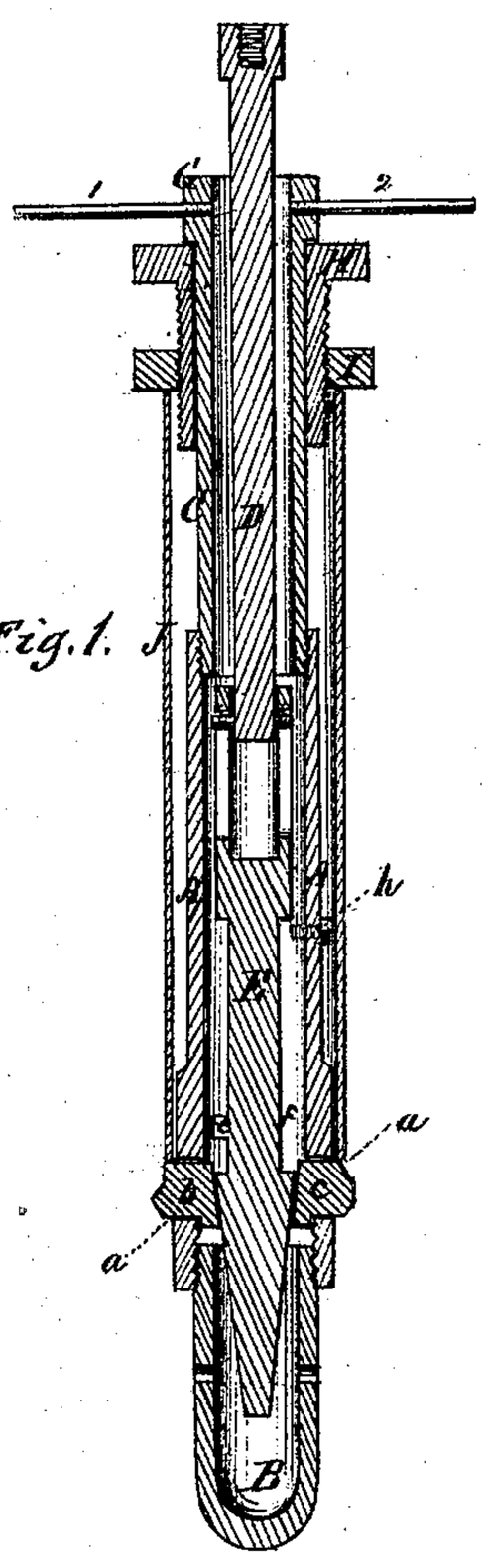


Fig. 1.

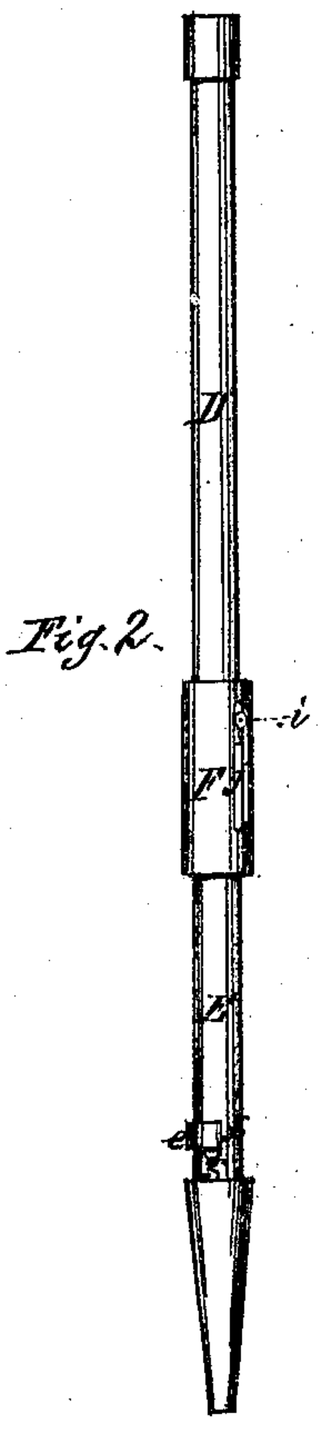


Fig. 2.


Fig. 3.

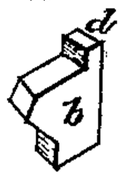


Fig. 4.

Witnesses.
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# Anited States Patent Office.

JAMES H. LUTHER, OF PETROLEUM CENTRE, PENNSYLVANIA.

Letters Patent No. 111,220, dated January 24, 1871.

## IMPROVEMENT IN TOOLS FOR CUTTING OFF PIPES IN OIL-WELLS.

The Schedule referred to in these Letters Patent and making part of the same.

*To all whom it may concern:*

Be it known that I, JAMES H. LUTHER, of Petroleum Centre, in the county of Venango and State of Pennsylvania, have invented certain new and useful Improvements in Tools for Cutting off Pipe in Oil-Wells; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawing making a part of this application.

The object of my invention is to provide a tool which will effectually cut off the casing of oil-wells at any desired point, and also assist, if necessary, in raising the same, and consists of a rotating cylinder carrying cutters, which are forced against the surface to be cut by the pressure of a wedge-shaped mandrel, constructed and operating as will be more fully set forth.

To enable those skilled in the art to make and use my improved cutting-tool, I will proceed to describe the construction and operation of the same, referring by letters to the accompanying drawing, in which—

Figure 1 is a vertical cross-section of my improved tool;

Figure 2, a side view of the mandrel; and

Figures 3 and 4, perspective views of the "cutters."

Similar letters denote like parts in the several views

A represents the cutter-cylinder, which is made in sections, put together by means of the usual "couplings," the lowest section being the one represented.

This section A has its lower end for a short distance reamed out and threaded, and receives the male thread of a tapered end-piece, B, which serves to guide the cylinder into the casing, and at the same time prevents the sediment from interfering with the proper working of the cutters.

The upper end or section C is a simple piece of tubing, with a cross-T, provided with two levers, 1 2, screwed into it, and adapted to be connected with each successive section of the cylinder.

The lower end of the cylinder A is slotted, as seen at *a*, for the passage of the cutters *b* and pressers *c*, the one being immediately opposite the other, so that the presser *c* will always cause the cutter *b* to impinge against the surface to be cut and steady the cylinder.

These cutters and pressers (any desired number of which may be used) are constructed as more clearly seen at figs. 3 and 4, with the proper faces, and also with a lip, *d*, that holds them in place and prevents them dropping outwardly through the slots *a*.

This lip rests against the interior of the cylinder at that point where it is slightly reamed out, just above the top edge of the guide B, leaving their back edge, when the cutters are thrust out to their greatest diameter, about flush with the interior of the other part of the cylinder.

These cutters are put in place from the inside, and are held in by the mandrel, which is made in two parts, D and E. The lower part or section E terminates in an inverted frustum of a cone or wedge, and at the proper distance from the top of said wedge is a stop-ring, *e*, which has a channel cut through it at one side, as seen at *f*.

On the under side of said ring, next to this channel, is a stop-pin, *g*, which prevents the mandrel from being turned off the stop-pin *h*, in the side of the cylinder, when it is desired for it to rest thereon, until it shall have been first lifted slightly.

This stop-pin *h* is made with a thread, so that it may be drawn out sufficiently to admit of the insertion and complete withdrawal of the mandrel. The upper portion or section of the mandrel D is the same size, and provided at its top end with a thread for securing to it the sucker-rod, and at its bottom end with a stop or "jar"-pin, *i*.

The two sections D E are coupled by a slotted coupling-joint, F, the slot *j* permitting the moving therein of the pin *i*, so that a "jar" may be effected.

Underneath the cross-T G, and around the upper section C of the cylinder, is arranged a collar, consisting of the two parts H and I, the upper, H, constructed, as clearly shown, with a threaded stem running in the female-thread in the lower portion I, so that the said collar may be lengthened or shortened.

The bottom surface of this collar when in use rests upon the top of the casing, which is represented by the letter J.

Having described the construction of the several parts, I will now describe the operation of my improved tool.

In preparing for the insertion of the tool within the casing the mandrel D E is put in the cutter-cylinder A, and the stop-pin *h* having been screwed in the proper distance, the ring *e* on the mandrel rests upon said pin, which allows the cutters to be drawn back to their smallest diameter. The cutter-cylinder with its cutters is then lowered into the casing, lengthened by additional sections until the cutters are below the lower end of the casing or tube to be cut.

A sufficient length of sucker-rod is then lowered within the cylinder until the lower end enters the screw in upper end of the tapered mandrel, and is secured thereto. The mandrel is then lifted by said sucker-rod until the pins or shoulders *g* are free of the stop-pin *h*, when it is turned until the channel *f* and

stop-pin *h* are in line. It is then lowered again, and the tapered or wedge-shaped end passes down between and behind the cutters, thus forcing them out to their greatest diameter. The cutter-cylinder is then lifted up until the top surface of the cutters strike the lower end of the casing or tube to be cut.

The distance from the bottom of said tube, where it is desired to make the cut, having been ascertained or determined, the tapered mandrel is lifted, turned and brought to rest in its first position on the stop-pin *h;* the cutter-cylinder is now lifted a distance equal to that from the bottom of the casing to the point where it is to be cut, (the cutters being forced back to their smaller diameter,) the cylinder is secured at this point by the collar H I, resting upon the top of the casing or usual thimble. The mandrel is then allowed to go back to its second position, behind and between the cutters, and sufficient pressure is allowed to force the cutters out properly during the cutting operation, which is effected by rotating the cutter-cylinder by means of the levers 1 2.

It frequently becomes necessary to "gap" or cut out an annular space in the casing, to allow the water to wash with it the sediment through said gap or space down below the cut end of the casing, and thus relieve it from the pressure of said water and sediment, and allow the casing to be freely withdrawn; this "gaping" is accomplished by running down the upper stemmed portion H of the collar, upon which the cross-T of the cylinder is resting; this, of course, lowers gradually the cylinder and the cutters, which latter begin and continue (as the lowering is continued) to ream or turn off from the upper edge of the incision made by said cutters, thus producing a gap equal in width to the distance traveled by the upper portion of the collar. (This collar is also used for compensating, for the shortening of the cylinder, by the tightening of the several screw-joints.)

This finishes the cutting and gaping process, and the next step is the raising of the casing, which is accomplished in the following manner:

(Supposing the casing to have its upper end resting upon the clamps,) to determine whether it is now free to be lifted, the cutter-cylinder is left to rest by its cutters on the top edge of the lower piece of casing until a lift is taken on the casing, and if it be found that the casing is free, it is lowered again, the taper mandrel lifted and deposited in its first position, and the sucker-rods are withdrawn, leaving the cylinder and mandrel down; the cylinder is now in a similar manner, withdrawn, and as it rises (the mandrel being sufficiently out of the way) the cutters are forced into their smallest diameter and offer no impediment to the withdrawal of the cylinder. The casing now having been entirely cleared, it is, in a similar manner, withdrawn. But, on the other hand, it having been determined that the casing "sticks" to such an extent that there is fear of parting it if too great a strain be exerted, the taper mandrel and sucker-rod is allowed to remain in the position they occupied during the cutting and gaping process, and a lift taken on the cutter-cylinder and casing together, the latter resting on the top face of the distended cutters.

If the casing does not then move, the fact is thus established that the sediment is behind some other thimble or coupling higher up, the pressure of the sucker-rods is partially relieved, and the cylinder with its cutters is raised until the next coupling is reached, which is determined by the cutters seeking to distend to the larger diameter of the coupling, and thus bobbing, as it were, the sucker-rod; it is then raised above the thimble or coupling, and the cutting and gaping process renewed at this point, and so on until the seat of the difficulty is found and overcome. The sediment has now all passed down on the inside of the casing remaining in, and the cutter-cylinder may be lowered until the cutters are distended underneath the lower edge of piece or pieces left, and they too withdrawn.

Again, suppose the casing to have been parted below the surface of the well, at any point, the operation would then be as follows:

The cutters having made the cut or gap, as before, they are left distended, and a lift taken on the cylinder and continued until the upper end of the casing approaches the surface, when it is clamped, the cutter-cylinder and sucker-rods withdrawn, and the casing taken out, as before.

Having described the construction and operation of my improved tool,

What I claim as new, and desire to secure by Letters Patent, is—

1. The cutter-cylinder A, provided with the adjustable pin *h*, slots *a*, cutters *b*, pressers *c*, and beveled guide or end, constructed and operating in the manner and for the purposes set forth.

2. The mandrel D E, having its lower extremity terminating in an inverted frustum of a cone, or wedge-shaped, and provided with a stop-ring and pins, and the upper extremity of its top section threaded, and bottom provided with "jar"-pin the two coupled by the slotted coupling F, all constructed and operating substantially in the manner and for the purposes set forth.

3. In combination with the cylinder proper and top section having the cross-T and levers, the collar H I, constructed and operating substantially in the manner and for the purposes hereinbefore set forth.

4. The cutters *b*, and pressers *c*, provided with lips *d*, to retain them in place, and having their backs beveled, in combination with the tapered mandrel E, as and for the purposes set forth.

Witness my hand and seal to the foregoing specification this 9th day of June, A. D. 1870.

J. H. LUTHER. [L. S.]

Witnesses:

WM. C. MCINTIRE,

T. H. UPPERMAN.