(No Model.)

W. A. LLOYD.

REAMING TOOL FOR USE IN SINKING BORED WELL CASINGS.

No. 344,744. Patented June 29, 1886.

Fig. 2.

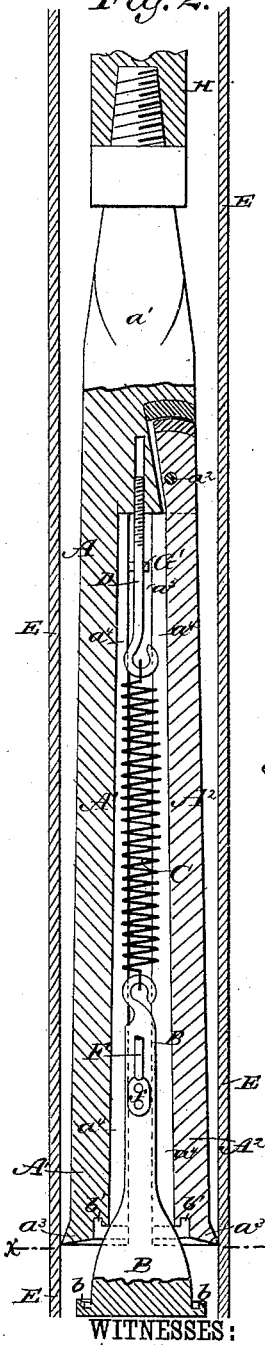


Fig. 1.

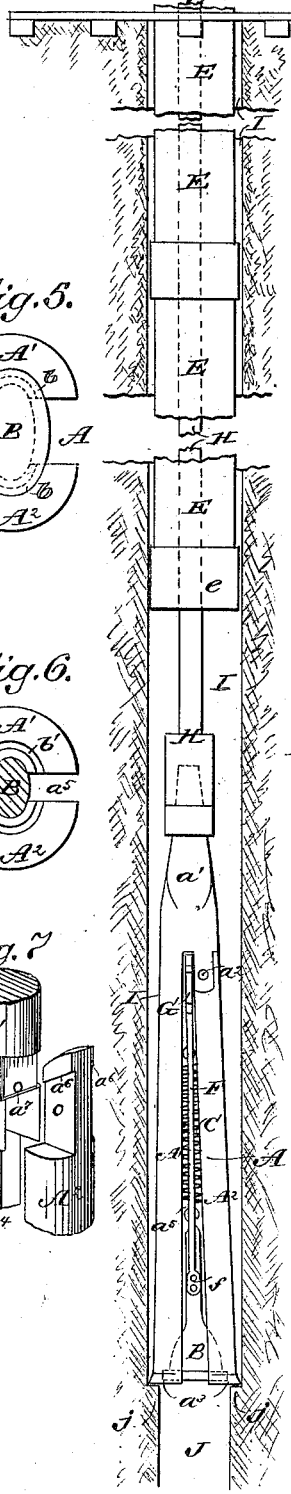


Fig. 3.

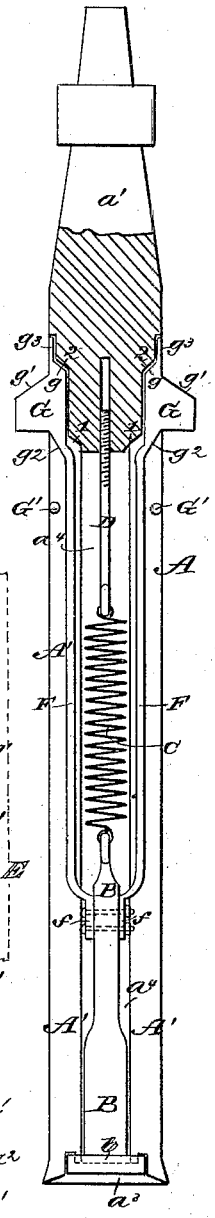


Fig. 5.

Fig. 4.

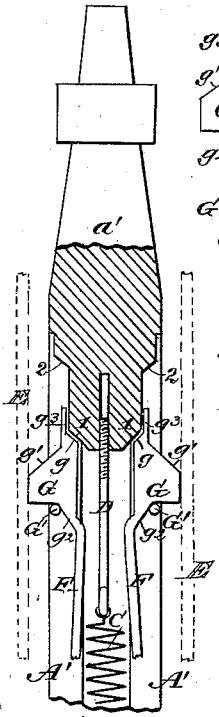
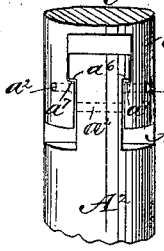


Fig. 6.

Fig. 7.

Fig. 8.



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WILLIAM ALEXANDER LLOYD, OF MACKSBURG, OHIO.

REAMING-TOOL FOR USE IN SINKING BORED-WELL CASINGS.

SPECIFICATION forming part of Letters Patent No. 344,744, dated June 29, 1886.

Application filed October 5, 1885. Serial No. 179,031. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM ALEXANDER LLOYD, of Macksburg, in the county of Washington and State of Ohio, have invented a new and Improved Reaming-Tool for Use in Sinking Bored-Well Casings, of which the following is a full, clear, and exact description.

My invention relates to reaming-tools adapted to ream out bores made in the earth by solid drills or tools passed through the inside of the partly-sunk casings of oil or Artesian wells, and so that said bores may be enlarged to the full exterior diameter of the casings, to allow the latter to be sunk as the boring proceeds.

The object of the invention is to facilitate this work by providing a simple, readily-adjustable, and effective expansible tool of improved construction, by using which the well-casing may be sunk to shut out surface or drainage water without allowing the earth to cave in, and permitting a boring and casing of the well at a considerable saving of time and labor over other means of performing the work.

The invention consists in certain novel features of construction and combination of parts of the reaming-tool, all as hereinafter fully described and claimed.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a central vertical section of a bored well with the casing applied and partly broken away, and shows also in side elevation my improved reaming-tool as at work in the well. Fig. 2 is a vertical sectional elevation of the reaming-tool in larger size and showing it in its contracted condition, as when passing through the well-casing, which latter is shown in section. Fig. 3 is a sectional elevation of the reaming-tool taken at right angles to Fig. 2, and showing the tool-expanding head raised to expand the cutters, as when the tool is in use. Fig. 4 is a sectional elevation of the upper part of the reaming-tool and shows the adjustment of the expander-catches when the reaming-tool is contracted to pass through the well-casing, which is shown in dotted lines. Fig. 5 is a view of the lower or cutting end of the tool when expanded for use. Fig. 6 is a view of the cutting end of the tool when contracted, and shows the expander-head in section on the line x x, Fig. 2; and Figs. 7 and 8 are detail views of the joint of the hinged jaw with the head of the tool.

The letter A indicates the reaming-tool, the body of which is formed in two main parts, the part of jaw A′, with which the head a' of the tool is formed, and the jaw A^2, which is pivoted on a pin, a^2, to the head of the tool, and so as to swing toward and from the jaw A′, to contract and expand the tool at its lower end, and the upper end of the jaw A^2 will preferably be fitted with a steel cap-plate to work on a steel facing-plate set into the head of the tool, and as indicated by the darkly-shaded section lines in Fig. 2. The lower ends of both jaws are dressed so as to provide the cutting-lip a^3 on each jaw, and the lips are undercut at their outer faces for more effective action of the cutters. The upper extremity of the jaw A^2 is provided with shoulders a^6, which incline downward and inward, and are adapted to catch upon correspondingly-inclined shoulders a^7, formed in the tool-head a', if the pivot-pin a^2 and the spring (hereinafter mentioned) should break, and thus prevent loss of the jaw A^2 down the hole, and as will be understood from Figs. 7 and 8, the pin a^2, being shown broken and the shoulders a^6 a^7 in contact in Fig. 8. The downward and inward incline of the shoulders prevents easy slip of the head of the jaw A from the socket made for it in the tool-head a'. The inner faces of the jaws A′ A^2 of the tool are recessed longitudinally, as at a^4, and separated, as at a^5, to give space for the expander, which is made with a head or block, B, tapered backward from its outer end and connected at its inner end to one end of a spring, C, the inner end of which is connected to the head a' of the tool, and preferably by attaching the spring to a screw eye or bolt, D, which is threaded into a hole in the head, so that the screw may be turned in or out to regulate the tension of the spring, the normal action of which is to draw the tapering head B upward between the opposite jaws A′ A^2 of the tool, to throw the jaw A^2 outward

for expanding the tool. The tapered sides of the head B, which face the jaws A′ A², (see Fig. 2,) are formed with upwardly-projecting lips *b b*, which lock into grooves *b′ b′*, formed in the ends of the jaws A′ A², when the spring C draws the head B fully upward, at which time the bottom face of the head stands above the sharp outer edges of the cutting-lips of the jaws, so as not to interfere with their effective cutting action. (See Figs. 1 and 3.) By the interlocking of the head B with the jaws A′ A² at *b b′* the jaws will be held against further expansion, so as to cut the hole for the well-casing E to a uniform diameter.

Instead of the lips *b*, the head B may have half-dovetailed flanges, as indicated by the dotted lines in Fig. 2, and which will enter correspondingly-shaped recesses in the ends of the jaws A′ A², and will have the same effect. It will be noticed that the tension of the spring C will hold the jaw A² up into its socket if the pivot-pin a^2 should break.

To opposite sides of the top of the expander-head B are fixed at *f f′* the elastic or spring metal rods F F, which lie in the space a^5, between the jaws A′ A² of the tool, and at their upper ends are provided with the heads or catches G G, which have the inclined faces or shoulders *g g*, which are adapted to lock under opposite lower shoulders, 1 1, formed at the lower end of the head *a′* of the tool, as in Fig. 4, when the tool is contracted, and are adapted also to lock under opposite upper shoulders, 2 2, as in Fig. 3, when the tool is expanded. The upper edges of the catches G are beveled downward and outward, as at *g′*, to cause the catches and the expanding-head B to be lowered, and the catches to be forced inward, when the catches are brought against the lower end or shoe *e* of the casing E, in withdrawing the reaming-tool from the casing.

The letters G′ G′ indicate pins or studs, which are fixed to the inner face of the tool-jaw A′ in such positions that inclined faces g^2 g^2 of the opposite expander-catches, G G, will strike said pins and automatically force the catches inward, so as to lock their shoulders *g g* under the shoulders 1 1 of the tool-head *a′*, to allow the tool to contract. It is obvious that these pins G′ G′ also will form rests for the catches G G should the expander-spring C or its connection D break, and thus will prevent loss of the expander down the hole when the tool is in use. Stems g^3, on the upper ends of the catches G, form stops for the catches against shoulders on the head of the tool.

The letter H indicates the boring-bar, to which the head *a′* of the reaming-tool A is to be connected. The letter I indicates the full-sized bore of the well, and the letter J indicates the smaller bore of the well, which is made by a drill entered through the casing E, and which bar J is to be enlarged or reamed out by the reaming-tool A, to allow the casing to be lowered into the bore of the well.

The operation is as follows: The well-bore I will be made by suitable drills to any depth from the ground-surface to which it may be sunk without danger of the caving in of its side walls, which depth will vary with the nature of the strata of earth through which the drill passes, and the drill will be withdrawn, and the casing E will be lowered in jointed lengths, as usual, until within about ten feet of the bottom of the well-bore I, so as to give room for the operation of the reaming-tool A, which is about five feet long. As large a drill as may safely be passed through the inserted well-casing E, then will be fixed to the bar H and lowered through the casing to the bottom of the bore I, and will bore a hole, as at J, too small to admit the pipe E, and for as great a depth as permissible, without allowing the earth to cave in. This drill then will be withdrawn, and the reaming-tool A will be fixed to the boring-bar, and the expanding-head B will be forced outward by pressure on the catches G of the rods F, or otherwise, until the catch-shoulders *g* pass below or against the shoulders 1 of the head *a′* of the tool A, and so as to allow the jaw A² to be swung inward to contract the tool and at the same time admit the catches G within the casing, and so that the entire tool A may be passed downward through the casing. When the catches G pass below the shoe *e* of the casing, they will be pressed outward by the tension of the spring C as the expander-head B is drawn upward by the spring to expand the reaming-tool to the full diameter of the well-bore I, and the shoulders *g* of the catches G will rest on the shoulders 2 of the head *a′* of the tool as the lips *b* of the head B lock into the grooves *b′* of the tool-jaws A′ A², to hold them expanded. The reaming-tool now will be operated by the boring-bar to cut away the side walls, *j*, of the bore J to the full size of the bore I for a safe depth, and the tool A then will be lifted by the boring-bar in the bore I, and the inclined ends or faces *g′* of the catches G will strike the end of the shoe *e* and force the catches and the retainer-head B downward, as in Figs. 2 and 4, so that the reaming-tool A may contract, so as to be drawn upward through the casing E. The casing now will be lowered again to within about ten feet of the bottom of the bore I, as before, and the boring at J will be resumed and the drill withdrawn, and the reaming-tool A will again be passed through the casing to enlarge the bore J, and the casing will again be forced downward, as before, and so on by successive stages will the casing be sunk into the earth, and without allowing the earth to cave in, so that the well may be bored and cased with economy of time and labor over other methods of performing the work, as there is little or no danger of losing the tools in the bores when the earth is prevented from caving in onto them.

It is evident that the shoulders 2 2 of the head *a′* of the tool are not essential to the suc-

cessful operation of the reaming-tool, as the locking of the lips *b* of the head B with the ends of the jaws A′ A′ will be a sufficient stop to limit the rise of the catches G as the expander is drawn upward by the spring C; but the use of the stop-shoulders 2 2 is preferred.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The reaming-tool A, constructed with a fixed jaw, A′, and a pivoted jaw, A^2, with ends formed as cutters and provided with shoulders 1 1 at its head *a′*, and an expander consisting of a tapering head or block, B, placed between the jaws A′ A^2, a spring, as at C, tending to draw the head inward for expanding the tool, and catches, as at F G, fixed to head B, and having shoulders *g*, adapted to lock against the head-shoulders 1 1 to allow the jaw A^2 to swing inward for contracting the tool, substantially as herein set forth.

2. In a reaming-tool, the pivoted jaw connected with the tool-head by a joint providing shoulders, as at a^6 a^7, on the jaw and head, respectively, substantially as specified, whereby should the jaw-pivot break the jaw will be retained by the tool-head, as set forth.

3. In a reaming-tool comprising a head, *a′*, a jaw, A′, fixed thereto, a jaw, A^2, pivoted thereto, and an expander consisting of a tapering head, B, and a spring, C, connected therewith, the combination, with the tool-head *a′*, the expander-head B, and the spring C, of the screw-bolt D, connecting the spring adjustably to the head *a′*, substantially as herein set forth.

4. In a reaming-tool, the combination, with the cutter-jaws A′ A^2, adapted for expansion, substantially as specified, and the expanding-head B, of catches G G, fixed to head B and formed with inclined edges or faces *g′*, substantially as and for the purpose herein set forth.

5. In a reaming-tool, the combination, with the cutter-jaws A A′, and the expanding-head B, provided with catches G G, and arranged substantially as specified, of pins G′ G′, fixed in one of the jaws and acting to draw the catches inward, and also to prevent loss of the expander should its connections break, substantially as herein set forth.

6. In a reaming-tool, the combination, with the cutter-jaws A′ A^2, and the expanding-head B, arranged substantially as specified, of lips *b* on the head, and slots *b′* in the jaws, to which the lips are adapted, substantially as herein set forth.

7. In a reaming-tool, the combination, with the jaws A′ A^2, and the expander comprising a spring-drawn tapering head, B, placed between the jaws, of catches G, held to head B, and provided with shoulders *g*, and the head *a′* of the tool being provided with opposite shoulders, 1 1 and 2 2, substantially as herein set forth.

WILLIAM ALEXANDER LLOYD.

Witnesses:
SAMUEL BESS,
FRANK BESS.