

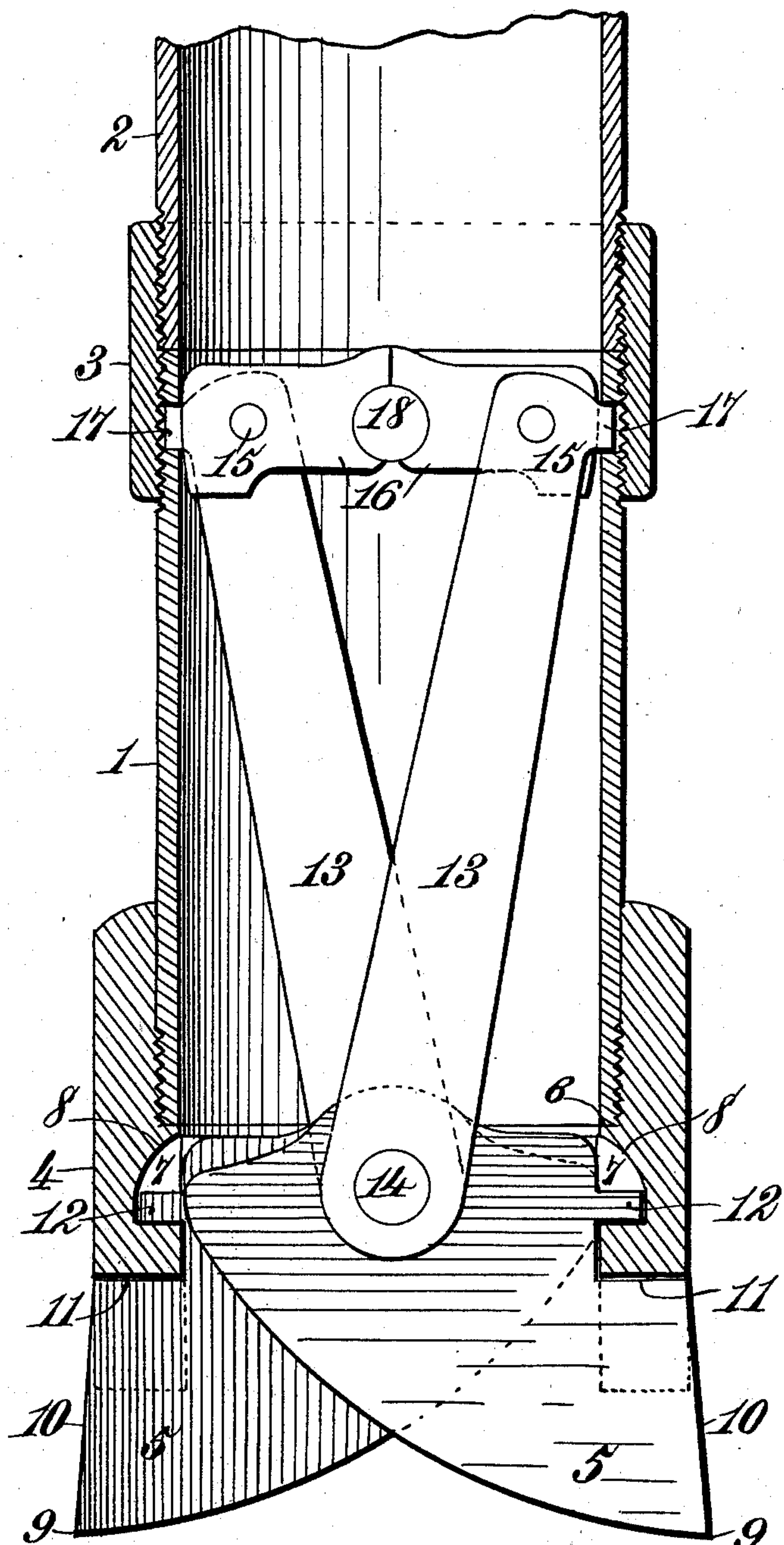
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J. W. SLOAN.
BIT FOR WELL DRILLING APPARATUS.

(Application filed July 22, 1901.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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BIT FOR WELL-DRILLING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 698,415, dated April 22, 1902.

Application filed July 22, 1901. Serial No. 69,309. (No model.)

To all whom it may concern:

Be it known that I, JAMES W. SLOAN, a citizen of the United States, residing at Corsicana, in the county of Navarro and State of Texas, have invented new and useful Improvements in Bits for Well-Drilling Apparatus, of which the following is a specification.

This invention relates to certain new and useful improvements in bits for well-drilling apparatus.

The invention relates to a rotary expansion bit for use in connection with well-drilling apparatus; and it has for its object to provide a bit capable of being adjusted and removed without withdrawing the well-tubing, and, furthermore, to provide a bit capable of drilling a hole larger than the well-tubing to accommodate the insertion of the casing-sections within the drilled hole.

In certain districts at a depth of five hundred or six hundred feet below the earth's surface a heavy and deep stratum of quicksand is encountered. This has given great annoyance, since the quicksand closes in as well as caves in upon the drilling machinery and makes it next to impossible and exceedingly expensive with the ordinary appliances now in vogue to drill in such territories. Cable-rigs for drilling cannot be employed, and only the rotary system of drilling has proved successful. So far to my knowledge no appliance by which the drilling can be proceeded with after encountering the quicksand could be employed to overcome the objection as above set forth, except in the following manner, which is to remove the entire line of casing or pipe, remove the drilling-bit therefrom, then readjust the casing or pipe, and proceed with a smaller bit and casing or pipe until another uncontrollable obstacle is encountered, when it becomes necessary to repeat the operation just described. By this arrangement it will be observed that the well is gradually decreased in size as the depth increases, and under such a manner of drilling it becomes necessary, as aforesaid, to remove the iron pipe or casing at every juncture or change, causing great inconvenience on account of the caving in of the well both from the quicksand and otherwise.

By the form of bit hereinafter described the foregoing objections are overcome and the driller of the well can remove the bit without removing the iron casing or pipe to which the bit is attached from the hole should the driller encounter quicksand or other obstacle which would settle around the pipe or casing, and thereby prevent the same from being removed or dislodged.

A further advantage of the invention hereinafter to be described is to enable the driller to remove the bit without removing the iron casing already in the well, and thus permitting the driller to proceed to a farther depth with a smaller pipe or casing and bit.

It should be further stated that frequently the quicksand and other obstacles fixedly lodge the pipe in the well, so that it cannot be removed, and efforts to remove the same results in breaking or pulling the pipe in twain, occasioning thereby great loss.

The invention further aims to construct a rotary bit used in connection with well-drilling apparatus which shall be extremely simple in its construction, strong, durable, efficient in its operation, comparatively inexpensive to manufacture; and to this end it consists of the novel combination and arrangement of parts hereinafter more specifically described, illustrated in the accompanying drawing, and particularly pointed out in the claims.

In describing the invention in detail reference is had to the accompanying drawing, forming a part of this specification, and which illustrates a vertical sectional view of an oil-well casing with my improved bit secured thereto and in position for operating.

Referring to the drawing by reference-numerals, 1 denotes the lower section of the iron pipe or casing, provided near its top with a pair of openings, the function of which will be hereinafter described.

The reference-numeral 2 denotes a section of the pipe or casing, which is connected to the section 1 by means of the coupling 3. The sections 1 and 2 are exteriorly screw-threaded and the coupling 3 interiorly screw-threaded, so that the latter can secure the sections 1 and 2 together. This form of coupling is

the ordinary means employed for this purpose when drilling wells. The lower section 1 may be termed a "nipple."

The lower end of the section 1 is exteriorly screw-threaded and has secured thereto a metallic shoe 4, forming a brace for the bits 5. The metallic shoe 4 has its inner face constructed of two different diameters, forming thereby the shoulder 6, which is engaged by the lower edge of the casing 1. The larger diameter of the shoe 4 is screw-threaded, so that it can be secured to the section 1. The inner face of the shoe 4 below the shoulder 6 is provided with a pair of substantially diametrically opposite recesses 7, the top wall of which is formed in a curvilinear manner, as at 8, the function of which will be hereinafter described.

The bits 5 are substantially quadrant-shaped, with their points 9 projecting out of alignment with the periphery of the shoe 4 and the side edges 10 of the bits extending upwardly and inwardly at an inclination and terminating in a shoulder 11. The bits 5 are further provided with laterally-projecting ears 12, adapted to engage in the recesses 7. The shoe 4 is formed with a pair of substantially diametrically opposite openings in the bottom thereof to permit the bits to project therethrough as well as therefrom, the shoulder 11 of the bits engaging the top of the recesses. The portion of the side edges of the bits between the shoulder 11 and the ears 12 engages the inner face of the shoe 4, as shown.

The reference-numeral 13 denotes a pair of brace-rods which are pivotally connected at their lower ends by means of the pins or bolts 14 to the bits 5. The upper ends of the rods 13 are connected by means of the bolts 15 to the ends of the hinge 16. The upper ends of the rods 13 are provided with laterally-extending studs 17 which engage in the openings in the upper end of the casing. The reference-numeral 18 denotes a means for connecting a pull-up to the hinge 16.

The section 1 of the casing will be from eighteen to twenty-four inches in length, according to the size of the bit used. The office of the brace-rods 13 is to keep the bits 5 in place while the same are in operation and also to unlock the bits when desiring to remove the same. The inclined tops of the recesses 7 permit a clearance for the ears 12 when the bits are removed, and the ears 12 when in position in the recesses 7 form a brace for the bit when the same is being rotated and hold the bit in position to prevent the bit from dropping. The studs 17 in the openings in the section 1 form a means for securing the rods 13 in their bracing position when the bits are in an operative position. Assuming that the bit is in position, as shown, by pulling upon the hinge 16 the sections thereof are brought together, elevating the rods 13, removing the studs 17, drawing the bits 5 within the section 1 of the casing, so

that they can be pulled up into and through the iron pipe or casing to the surface. It will be understood that the bit is secured to the section 1 before the drilling begins. It will also be understood that the bit extends through the openings in the lower part of the shoe 4, so that the bits will project therefrom and drill a hole larger than the external diameter of the shoe, as well as the external diameter of the pipe or casing, the shoe 4 operating the bits.

It is not claimed for this invention that the bit can be replaced after once removed from its place, since the bit must be adjusted on the surface; but after the bit has been removed a smaller one can be employed.

I am fully aware that prior to my invention bits have been constructed which can be replaced in the same pipe; but such bits are not practical for use in quicksand territories for many reasons, among which is that the quicksand seeps up into the inside of the pipe and prevents readjustment and also that such bits are very expensive and impracticable. None of these objections can be urged against the construction set forth herein, and it is thought that many advantages from such a construction can be readily understood from the foregoing description, taken in connection with the accompanying drawing, and it will also be observed that minor changes may be made in the details of construction without departing from the general spirit of my invention.

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

1. In combination, a pipe-section, a shoe carried in the lower end thereof and having a portion of its inner face of the same internal diameter as the pipe-section, removable bits arranged in and provided with integral means engaging with the shoe to prevent the dropping down thereof, means pivotally connected to the top of the bits and arranged within and engaging in the wall of the pipe-section for locking the bits in operative position, and a hinge connected to the upper end of said means and adapted when extended to cause said locking means to engage in the pipe-section and when contracted to release the said locking means so the bits can be removed.

2. In a rotary bit, the combination with a pipe-section, of a shoe suitably connected thereto, a pair of bits arranged in said shoe and adapted to extend therefrom, lateral ears integral with the bits and engaging in the shoe to prevent the dropping down of the bits, brace-rods connected at their lower end to said bits and provided with studs adapted to engage in the pipe-section, and a hinge suitably connected with the upper end of said rods and adapted when extended to cause the studs of the rods to engage in the pipe-section for locking the bits in an operative position and when contracted to release the said

studs from their engagement with the pipe-section so that the bits can be removed.

3. The combination with a pipe-section, of a shoe connected to the lower end thereof, a pair of removable bits arranged in the said shoe, a pair of brace-rods connected with the lower end of the bit and engaging in the pipe-section and cooperating with the shoe for locking the bits in an operative position, and means connected to the rods and adapted when extended to cause the said rods to engage with the pipe-section for locking the bits in an operative position and when contracted to release the rods from their engagement with the pipe-section, so that the bits can be removed.

4. A pair of quadrant-shaped bits provided with shoulders and laterally-extending ears, brace-rods pivoted at their lower end to the said bits and provided with studs, a hinge connected to the upper end of the brace-rods, in combination with a brace-shoe adapted to

receive the ears of the bits as well as permitting the latter to project therethrough.

5. The combination, with a pipe-section and a shoe connected thereto, of a pair of quadrant-shaped bits provided with shoulders and laterally-extending ears adapted to engage in the shoe for the purpose set forth, a pair of rods, means extending through the lower end of said rods for pivotally connecting the bits thereto as well as together, a hinge adapted to engage in the pipe-section for the purpose set forth, and separate means for connecting the ends of said hinge to the upper end of the said rods.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JAMES W. SLOAN.

Witnesses:

C. C. JESTER,
WILLIAM J. HOFF.