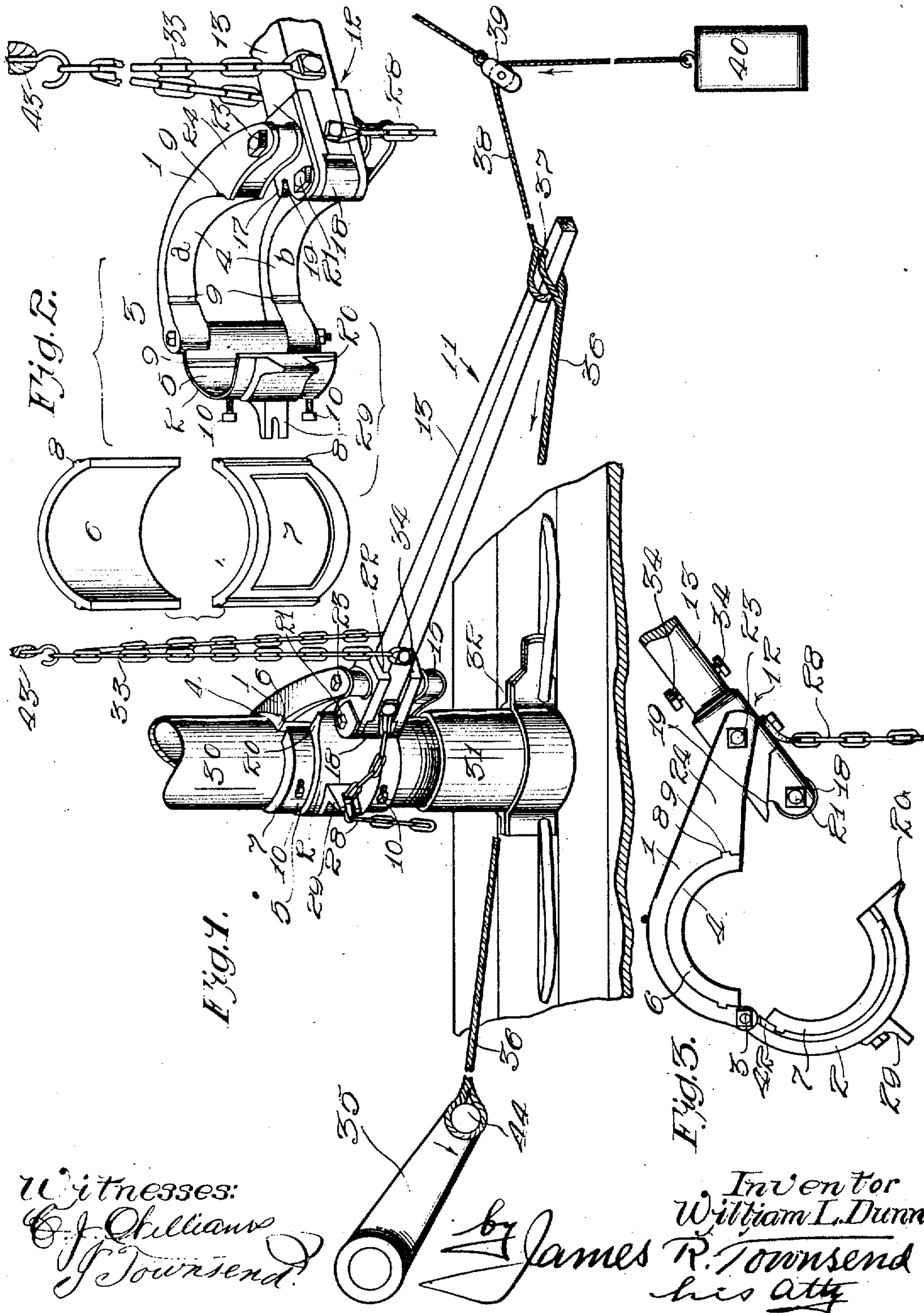


APPARATUS FOR SCREWING WELL CASING.

APPLICATION FILED SEPT. 19, 1907.

2 SHEETS—SHEET 1.



Witnesses:
G. J. Okellian
J. Townsend

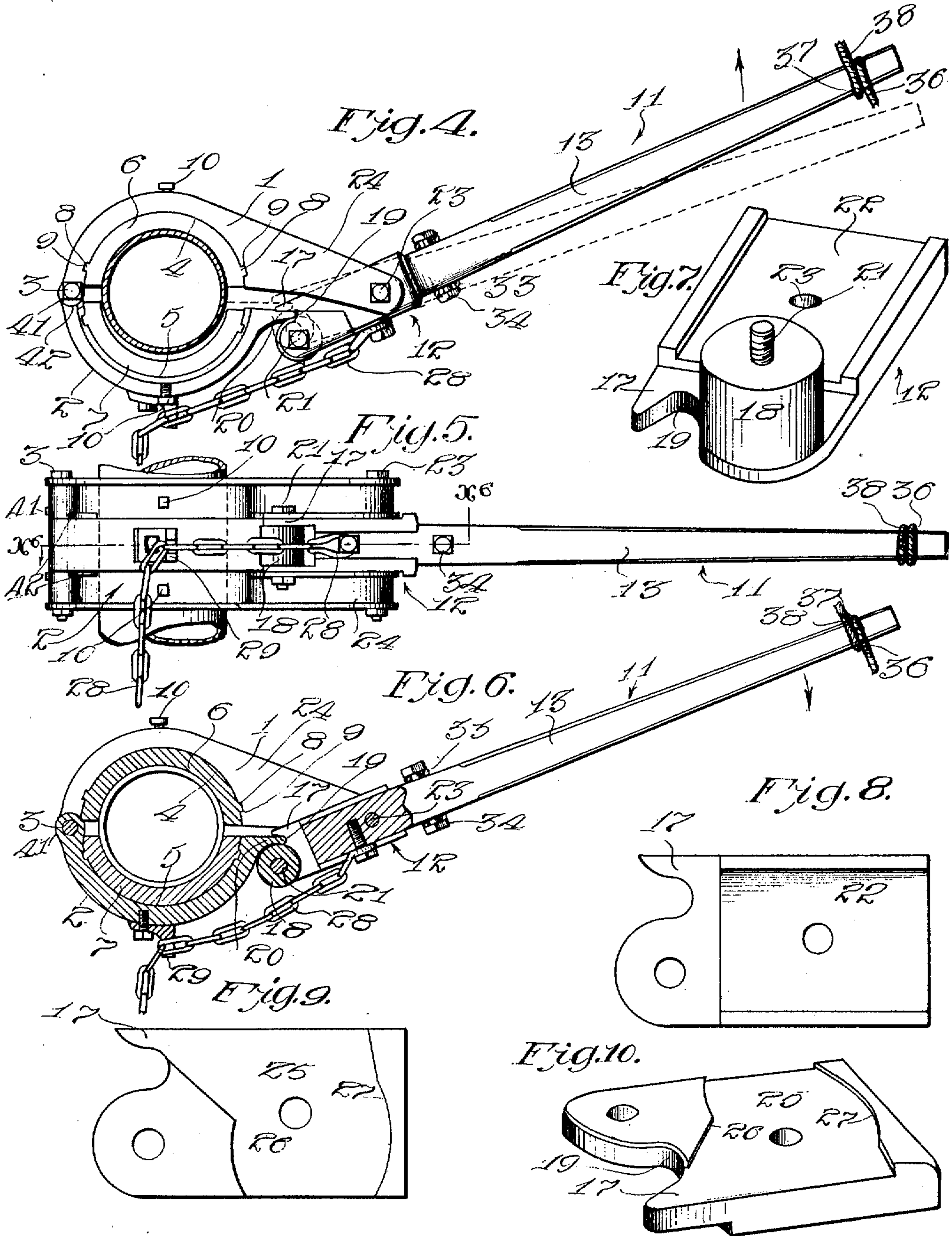
Inventor
William L. Dunn
by James R. Townsend
his atty

W. L. DUNN.

APPARATUS FOR SCREWING WELL CASING.

APPLICATION FILED SEPT. 19, 1907.

2 SHEETS—SHEET 2.



Witnesses:

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UNITED STATES PATENT OFFICE.

WILLIAM L. DUNN, OF SANTA BARBARA COUNTY, CALIFORNIA.

APPARATUS FOR SCREWING WELL-CASING.

No. 883 630.

Specification of Letters Patent.

Patented March 31, 1908.

Application filed September 19, 1907. Serial No. 393,742.

To all whom it may concern:

Be it known that I, WILLIAM LINCOLN DUNN, a citizen of the United States, formerly residing in Orcutt, in the county of Santa Barbara and State of California, now residing on the Western Union Oil Company's lease on the Careaga rancho, in said county and State, have invented a new and useful Apparatus for Screwing Well-Casing, of which the following is a specification.

An object of this invention is to provide practical and convenient means for screwing and unscrewing well-casing without liability of injury to the same.

This invention includes a well-casing wrench comprising two jaw members adapted to practically encircle the casing, and means for clamping said jaw members together in such manner as to engage the casing so tightly as to prevent any possible slippage between the casing and the jaw members on the operative stroke of the handle of the wrench.

Further objects of the invention are:— rapid and, convenient operation of the wrench by motive power; positive and immediate clamping of the casing to turn the same on the operative stroke, and ready and immediate releasing of the casing on the return stroke of the wrench; ease of adjustment to and removal from the casing; ready reversal of the wrench from the screwing to the unscrewing position; ready adjustability to different-sized well casings; cheapness, simplicity, and strength of construction; ready assembling and disassembling of parts, and ready removal and replacement of parts in case of breakage.

Another object is to provide a casing-wrench in which the application of the power to clamp the jaw members on the casing is effected through antifriction means.

So far as I am aware, there has not heretofore been provided any casing-wrench in which it is possible to clamp the gripping members of the wrench on the casing with sufficient force to prevent slippage without the intervention of dies, teeth, serrations, or other forms of roughened surface to cut into the casing to prevent slippage.

An object of this invention is to provide a casing-wrench in which the gripping faces that engage the casing are as smooth as, or smoother than the surface of the casing to be gripped, dispensing entirely with the necessity of any teeth, dies or cutting edges that

might cut into or abrade the surface of the casing.

In practical use, wrenches provided with dies, teeth, or cutting edges are unsatisfactory; said teeth, dies, or cutting edges being a source of constant trouble and expense for the reason that they become dull and require sharpening and are a seat of weakness, being very subject to breakage, and thereby causing much loss of time.

An object of this invention is to absolutely do away with all of the objections above enumerated.

The wrench may be used as a pipe-wrench, but is more particularly designed for screwing up such large pipe as is used as casing in oil-wells, which pipes stand perpendicularly and have to be screwed up very tight. This wrench is purely a friction wrench with respect to its grip upon the pipe to be turned, but is antifriction as regards the application of the power for drawing the gripping faces toward each other to grip the pipe.

For the purpose of operating the wrench with the greatest efficiency and least loss of power through friction, an antifriction roller operable by a lever that is pivoted to one gripping member, is provided to engage a nose on another gripping member, said gripping members being hinged together to practically encircle the pipe to be turned. Provision is also made whereby the same general tool may be fitted with bushings, thus to make the gripping surfaces accurately fit the particular sized casing that is to be screwed.

Wrenches of sufficient strength for screwing well-casing sufficiently tight, are necessarily massive and of great weight, and owing to the difficulty of operating the same by hand it is customary in practical operation to use the same only for the final screwing home of the casing. The workmen usually start a casing and screw it home as tightly as possible by means of a hand-spike caught in a loop of rope twisted around the casing. By this means the workmen are able to screw the casing down by pushing the hand-spike around in the manner of turning a capstan. The labor of thus screwing the casing home is so great as to usually require the service of two or four men to get the same tight enough to be economically handled by the casing wrenches heretofore known.

An object of my invention is to make a

casing-wrench which will so readily take hold and let go that at the outset, immediately after the casing has been started to screw into place, the wrench may be applied and may be operated by a jerk-line fastened to the crank of the well-rig band-wheel; a weight or other suitable returning device being applied to take up the slack of the jerk-line and return the wrench to take a new hold at each revolution of the crank. Such an operation would be impracticable with casing wrenches which depend upon indenting the casing in order to avoid slippage.

The accompanying drawings illustrate the invention.

Figure 1 is a fragmental perspective view showing the casing-screwing apparatus as applied in practical use on a medium-sized casing. Fig. 2 is a fragmental view of the casing-wrench shown in Fig. 1 swung free from the casing. The bushings that are in use in Fig. 1 are shown removed from the gripping members in Fig. 2. Fig. 3 is a plan showing the wrench open to be swung onto the casing. The suspension chains are omitted. Fig. 4 is a plan showing the wrench with the parts in released or back-stroke position, the slack and clearance being exaggerated in order to make the same noticeable. Fig. 5 is an elevation of the wrench in place on a well-casing, a fragment of which is shown. Fig. 6 is a section on line $x-x$, Fig. 5. Fig. 7 is a view of the head or pivoted end of the lever, one of the cheek-pieces of said head being removed. Fig. 8 is a view of the inside face of one of the cheeks of the head. Fig. 9 is a view of the outside of the cheek. Fig. 10 is a perspective edge view of one of the cheeks. Fig. 11 is an end view of one of the cheeks.

1 and 2 are the gripping members hinged together at 3 and adapted to practically encircle the casing to be screwed. Each of these gripping members has a gripping face as 4, 5, respectively, the same being preferably adapted to receive bushings, as 6, 7, to adapt the same gripping members to fit various smaller sizes of well-casing. Said bushings may be constructed in pairs of duplicates, and may be fastened to the gripping members by any suitable means, as by feathers 8 in notches 9 and by set-screws 10.

11 is a lever or handle for the wrench which preferably comprises a head 12 and detachable handle-bar 13. The back gripping member 1 is preferably constructed in two parts, a , b , each being pivoted at one end to the front gripping member 2 by a bolt 3 and being provided at the other end with an extension 15, between which extensions the head 12 of the lever handle 11 is pivoted by a bolt 23.

The head 12 is provided with a tang 17 and with an antifriction roller 18 spaced

apart to afford a recess 19 to receive a nose 20 of the front gripping face 2. Said head is preferably formed of two members which I term cheeks, each of which is provided with a tang 17, and between which cheeks the roller 18 is pivoted by a bolt 21. Said cheeks are each provided with a recess 22 to fit the end of the handle-bar 13 which is thereby rigidly held when the cheeks are fastened together by means of the pivot bolt 23 and the extensions 24 which are provided on the back gripping member 1 for the purpose of pivotally connecting the bar 13 with said back gripping member.

The cheeks are complementary to each other, and each is provided on its outer face with a recess 25 to receive the end of the extension 24 which pivotally engages such cheek. The walls 26, 27 of said recess are arranged to form stops to limit the pivotal movement of the bar 13 on the back gripping member 1.

28 is a flexible connection, preferably a chain fastened to the head of the lever and adapted to engage a retaining lug 29 on the front gripping member 2 to limit the releasing movement of said gripping member on the back stroke of the wrench. The nose 20 of the front gripping member 2 is tangentially arranged to receive pressure from the roller 18 to draw the front gripping member 2 toward the back gripping member 1 upon a forward movement of the free end of the bar 13 when the wrench is applied to a well-casing; and a connection 28 in practical use will be given enough slack to allow the bar 13 to swing on the pivot 23 at the back stroke of the wrench sufficiently to slightly open the space between the gripping members, but not sufficient to allow the nose 20 to be withdrawn from the recess 19 between the tangs 17 and the roller 18, so that immediately upon the succeeding forward stroke of the wrench, caused by application of power to the free end of the bar 13 while the wrench is on the casing, the antifriction roller 18 will immediately force the nose toward the extensions 24 of the back gripping member, thereby closing the gripping members upon the casing. The leverage thus effected is such that the gripping faces even though polished where they contact with the casing, will produce such a friction on the casing as to prevent any slipping between the gripping faces and the casing, so that as the free end of the bar 13 swings forward the casing must turn. The grip on the casing increases as the power necessary to turn the casing increases, so that there is no liability of slippage from beginning to end of the operation of screwing the casing home.

30 designates the loose casing-joint to be screwed into the collar 31 on the upper end of the casing in the well.

32 designates the usual elevators.

33 designates suspension chains fastened to pins 34 in the bar 13.

35 is the crank of the band-wheel of the well-rig.

36 is a jerk-line caught in a notch 37 in the rear side of the bar 13 and connecting the free end of the lever with the crank 35 for the application of power to operate the wrench.

38 designates a line passing over a pulley 39 and connected with a weight 40 to afford means for effecting the back stroke of the wrench.

The gripping members 1 and 2 are preferably constructed to open only a sufficient width to allow the wrench to be applied to and withdrawn from the casing. Stops 41 and 42 are provided to prevent the wrench from opening too wide.

In practical operation, the workmen will handle the wrench by means of a line 43 operated by the power of the well-rig and caught into the suspension chains or swing 33, thus to readily move the wrench as may be required.

It is to be understood without illustration, that in starting the well, pipe-tongs may be required, as usual heretofore, to hold the well-casing while the joint 30 is being screwed thereinto. In the drawings it is assumed that the casing has reached such depth in the well that the friction thereon is sufficient to prevent the casing from rotating in the well with any power that may be necessary to screw the casing home. The workmen will first start the casing-joint 30 in the collar 31 in the usual way, turning the same by hand until the threads take hold. They may then immediately bring the gripping members in place on the joint 30 and shut the gripping member 2, so as to bring the nose 20 into the recess 19, whereupon the lever 11 will be swung forward to lock the nose in said recess, and then the slack connection 28 will be caught on the retaining lug 29 at such point as to hold the nose 20 of the front gripping member 2 from swinging out of the recess 19. Then the loop of the take-up connection 38 will be caught over the free end of the lever 11 to cause the weight to draw the lever backward, and the ends of the jerk line 36 will be respectively brought over the free end of the lever and caught into the notch 37, and over the wrist-pin 44 of the crank 35, and thereupon the apparatus is ready for operation. Then the engine will be started and as the crank 35 rotates, it swings the free end of the wrench lever forward and allows the weight 40 to return it backward once at each complete revolution. At each forward stroke of the wrench the antifriction roller 18, acting on the nose 20 automatically forces the gripping faces toward each other, and at the back stroke the tangs 17 acting on the nose 20 force the grip-

ping faces from each other, so that the successive automatic closing and opening of the wrench is effected and the casing joint or section 30 is gripped and turned at each forward movement and is instantaneously released at each backward movement of the lever, thus rapidly and forcibly screwing the casing home. The speed at which the joint 30 may be screwed home is thus made dependent upon the rapidity of the rotation and the length of stroke of the crank. When the workman notes by the strains on the jerk line that the casing is nearly screwed home, he will slow down the engine, so that the final screwing home may be accomplished without undue strains.

To unscrew the casing the wrench will be reversed endwise to bring the bar 13 on the reverse side of the casing, the rear gripping member being still kept at the back away from the crank which will again be connected with the bar as before, and the take-up device being again connected with the bar, the engine will be set in motion to apply the power to the wrench as before, thus causing the casing to turn in the direction opposite to that first described.

I claim:—

1. A wrench provided with means for automatically opening and closing the gripping members thereof, means to suspend the wrench, a power crank, a jerk line connecting the crank with the wrench to close the gripping members and turn the wrench in one direction, and a take up connected with the wrench to open the wrench and turn it in the other direction.

2. A wrench comprising two gripping members hinged together, one of said members being provided with a nose, a lever pivoted to the other member and provided with means to engage the nose to open and close said members, and means to prevent the withdrawal of the nose from operative position.

3. A wrench comprising two gripping members hinged together, one of said members being provided with a nose and the other an extension, a lever pivoted to the extension and provided with a recess to receive the nose and adapted to operate upon the nose to force the gripping members toward each other.

4. A wrench comprising two gripping members hinged together, one of said members being provided with a nose and a lever pivoted to the other gripping member and provided with antifriction means to engage the nose to close the gripping members.

5. A wrench comprising two gripping members hinged together, one of said members being provided with a nose, a lever pivoted to the other of said members, and a roller on said lever to engage the nose.

6. A wrench comprising two gripping

members provided with a semi-circular gripping face and hinged together, one of said members being provided with a nose, a lever pivoted to the other of said members and provided with a tang and a roller, spaced apart to receive the nose, said roller being adapted to engage the nose to force the gripping members toward each other, and a tang being adapted to force the gripping members apart.

7. A wrench comprising two gripping members hinged together, one being provided with a nose and with a retaining lug, a lever pivoted to the other gripping members and provided with means to engage the nose to open and close the gripping members, and a flexible stay to detachably connect the lever with the retaining lug.

8. A wrench comprising two gripping members hinged together, a lever pivoted to one of said gripping members and adapted to engage the other gripping member to open and close the wrench, means to limit the pivotal movement of the lever on its gripping member, and means to connect the lever with the other gripping member to limit the opening movement of said other member.

9. A wrench comprising two gripping members hinged together, a lever pivoted to one of said members and provided with anti-friction means to close the other member, and means to temporarily limit the opening movement of the other lever.

10. A wrench comprising two gripping members hinged together, two recessed cheek members, each provided with a tang, a bar in the recesses of said cheek members, a roller pivoted between the cheek members, a recess being formed between said roller and said tangs, a pivoted bolt connecting the cheek members and bar with one of said

gripping members, the other of said gripping members being provided with a nose to be engaged by said roller and tangs.

11. A wrench comprising two gripping members hinged together, two recessed cheek members, each provided with a tang, a bar in the recesses of said cheek members, a roller pivoted between the cheek members, a recess being formed between said roller and said tangs, a pivoted bolt connecting the cheek members and bar with one of said gripping members, the other of said gripping members being provided with a nose to be engaged by said roller and tangs, and a detachable flexible connection between the bar and said other gripping member.

12. In a casing wrench provided with gripping members hinged together and having semi-circular gripping faces, bushings detachably connected with said faces and having semi-circular gripping faces, a lever pivotally connected with one of said gripping members and provided with means for automatically moving the other gripping member to open and close the wrench.

13. A wrench comprising a gripping member, another gripping member hinged thereto and composed of two pieces, a lever pivotally connected between said two pieces and provided with means for moving the other gripping member to open and close the wrench, and means to retain the other gripping member in position to be engaged by said lever.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 23d day of August, 1907.

WILLIAM L. DUNN.

In presence of—

JAMES R. TOWNSEND,
JULIA TOWNSEND.