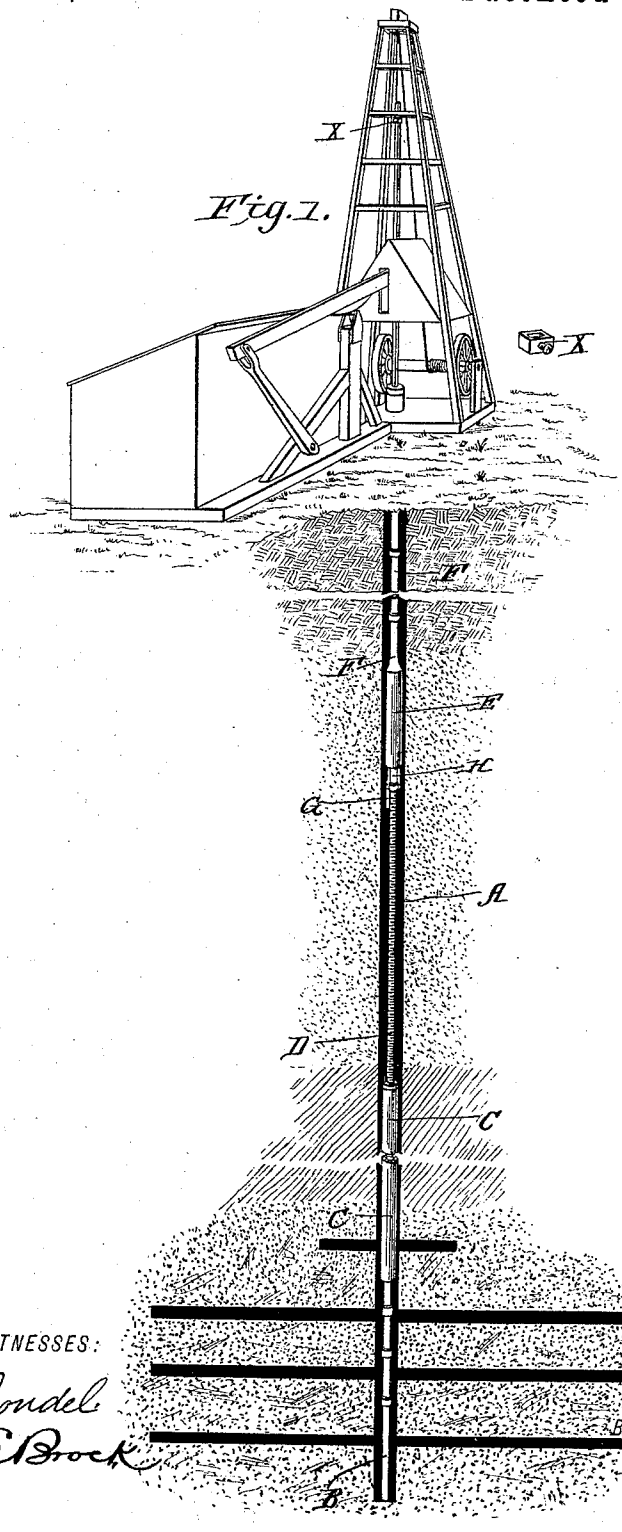
(No Model.) 3 Sheets—Sheet 1.

J. L. ADDISON.

GROOVE CUTTING MACHINE FOR OIL OR GAS WELLS.

No. 449,459. Patented Mar. 31, 1891.

Fig. 1.



WITNESSES:

M. D. Blondel

Chas. E. Brock

INVENTOR:

Joseph L. Addison

BY Munn & Co

ATTORNEYS

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

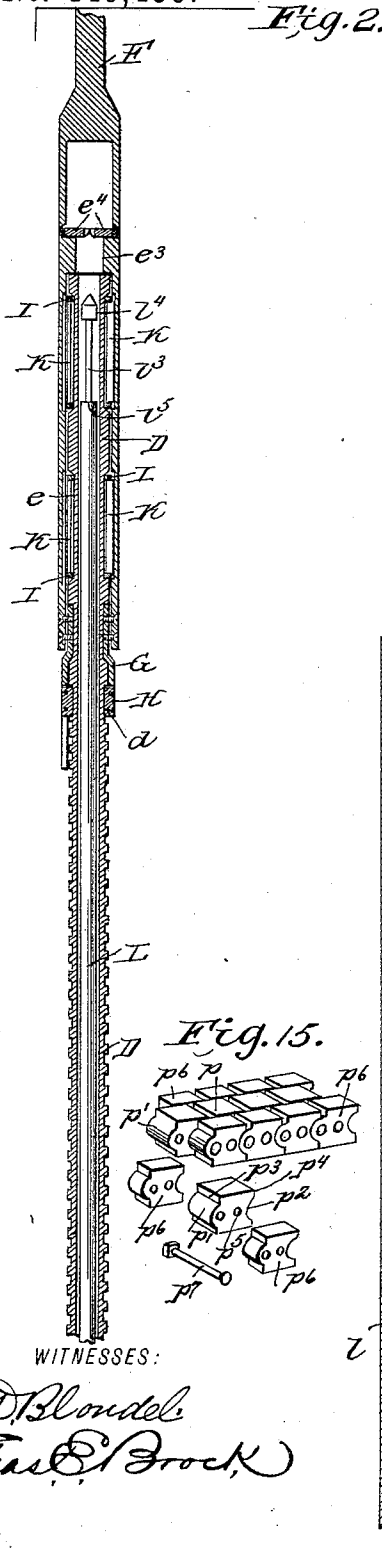
(No Model.) 3 Sheets—Sheet 2.

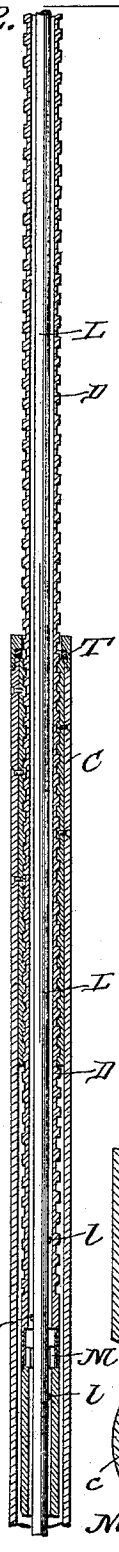
J. L. ADDISON.

GROOVE CUTTING MACHINE FOR OIL OR GAS WELLS.

No. 449,459. Patented Mar. 31, 1891.

Fig. 2.





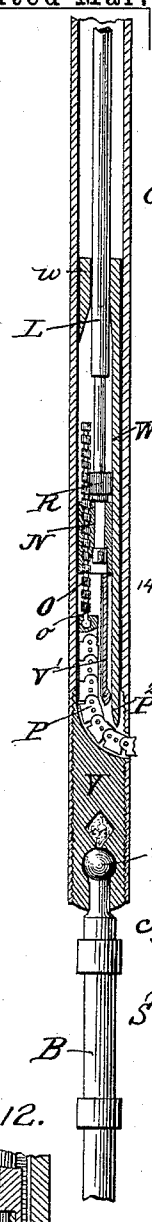


Fig. 13.

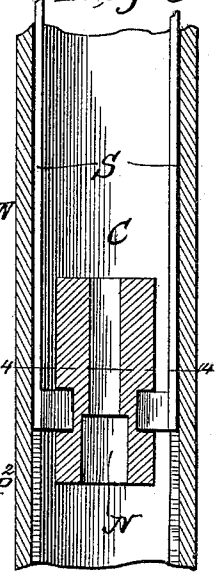


Fig. 14.

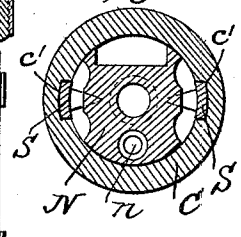
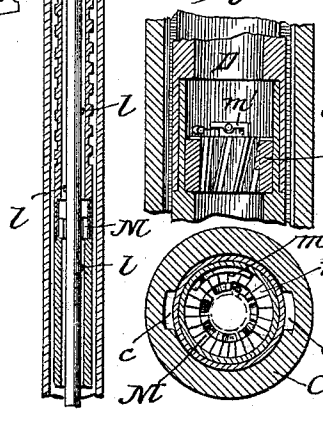


Fig. 15.

Fig. 12.



WITNESSES:

W. D. Blondel.

Chas. E. Brock.

INVENTOR

Joseph L. Addison.

BY Munn & Co

ATTORNEYS

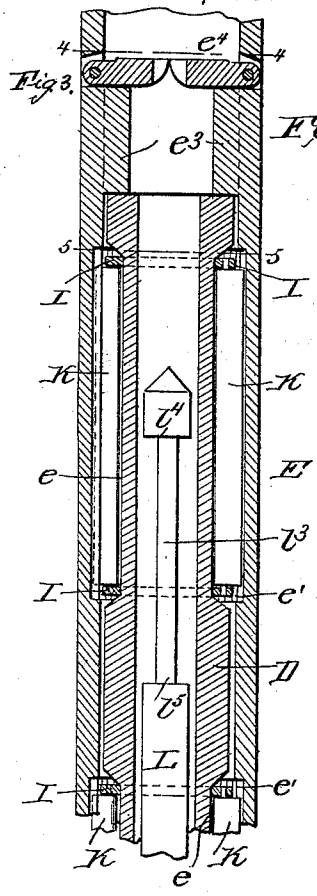
THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

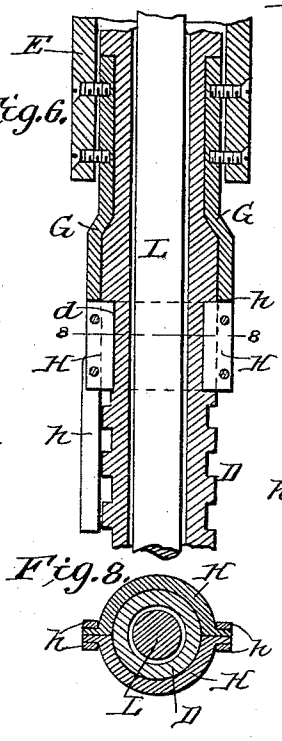
(No Model.) 3 Sheets—Sheet 3.

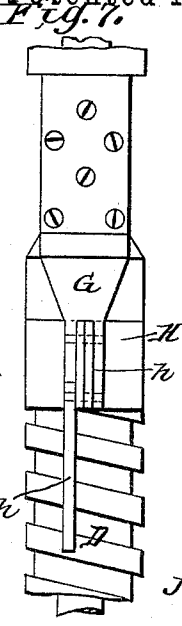
J. L. ADDISON.

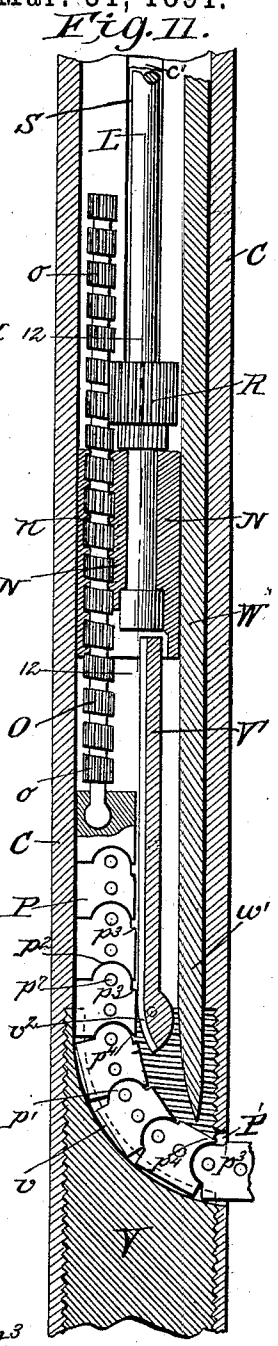
GROOVE CUTTING MACHINE FOR OIL OR GAS WELLS.

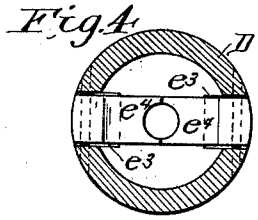
No. 449,459. Patented Mar. 31, 1891.

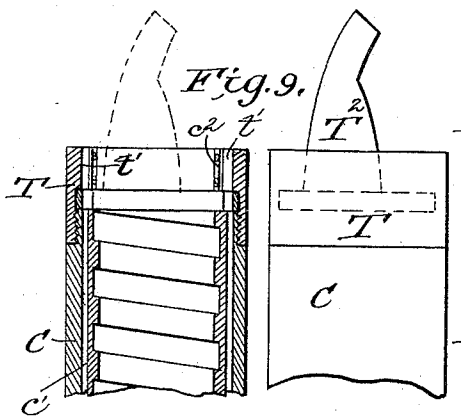


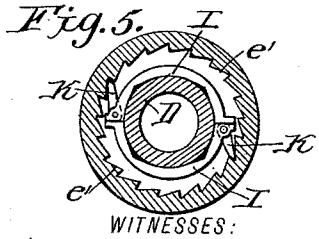


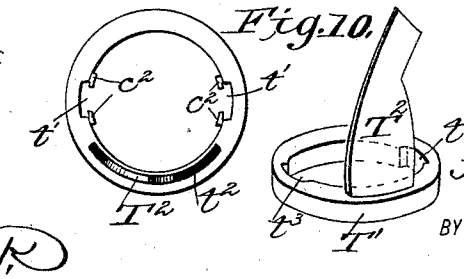












WITNESSES:

W. D. Blondel

Chas. E. Brock

INVENTOR:

Joseph L. Addison

BY Munn & Co

ATTORNEYS

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOSEPH L. ADDISON, OF QUAKER CITY, OHIO.

GROOVE-CUTTING MACHINE FOR OIL OR GAS WELLS.

SPECIFICATION forming part of Letters Patent No. 449,459, dated March 31, 1891.

Application filed December 31, 1890. Serial No. 376,418. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH L. ADDISON, of Quaker City, in the county of Guernsey and State of Ohio, have invented a new and useful Improvement in Groove-Cutting Machines for Oil or Gas Wells, of which the following is a specification.

This invention relates, generally, to well-boring machines, and more particularly to an improved reaming or groove-cutting apparatus, whereby grooves or channels may be cut laterally from the main bore of the well.

Heretofore when oil or gas wells have become "spent" or exhausted it has been usual to renew them or increase their flow by opening fresh fissures, channels, or cavities, and this opening has been accomplished by exploding a cartridge at the desired point in the well, whereby the sides of the well adjacent to said cartridge are blown away and an exit produced for the product. This method, however, has certain disadvantages incident thereto, such as the closing of fissures, passages, or channels by dirt, rock, &c., being thrown into the same by the explosion.

The object of my invention is to avoid the difficulty hereinbefore referred to and produce a machine which will bore grooves or channels laterally from the main bore of the well, thus reaching all encysted cavities or passages and maintaining an open exit for the product.

With this object in view my invention consists, essentially, of a cylindrical casing supported at any desired point in the well and adapted to be revolved on its support, said casing carrying a flexible chain provided with a cutting-bit at its lower or outer end, which chain and bit are adapted to be forced laterally outward from the casing while the same is in revolution, thereby cutting a horizontal groove or channel around the said casing at that point.

My invention consists, also, in the mechanism employed to revolve the cylinder and project the chain laterally, and also in certain details of construction and combination of parts, all of which will be more fully hereinafter described, and pointed out in the claims.

In the drawings forming a part of this specification, and in which the same letters of reference indicate same parts, Figure 1 is a perspective view of my improved apparatus. Fig. 2 is an enlarged vertical section of the same. Fig. 3 is a vertical section in detail of the screw-holder. Fig. 4 is a section on line 4 4, Fig. 3. Fig. 5 is a section on line 5 5, Fig. 3. Fig. 6 is a detail sectional view of the hanger. Fig. 7 is a side view of the same. Fig. 8 is a section on line 8 8, Fig. 6. Figs. 9 and 10 are detail views of the collar and cam-shaped shoulder. Fig. 11 is a vertical section of the chain-feeding devices. Fig. 12 shows the spirally-grooved collar arranged in the screw. Fig. 13 is a section of the casing and threaded block through which the feed-shaft turns. Fig. 14 is a section on line 14 14, Fig. 13. Fig. 15 is a detail view of the flexible chain.

Referring to the drawings, A indicates a well of any particular depth, which has become spent or exhausted of its oil or gas, and wherein is supported my improved groove or channel cutting apparatus, which is supported by the vertical rods B, located at the bottom of the well, a sufficient number of rods being employed to hold the boring or channeling appliance adjacent to the portions to be grooved. This boring or channeling apparatus consists of a cylindrical casing C, resting on and revoluble upon the supporting-rod, said casing carrying the boring or channeling or cutting devices, the tubular screw D for revolving the cylindrical casing and operating the boring or channeling devices, the holder E to which the screw is attached, the drive-rods F, attached to the holder and adapted to reciprocate the same.

The derrick, windlass, and engines may be of any approved patterns, they forming no part of my invention. The holder E is tubular, as shown, for the greater portion of its length, the top being closed and integral with one of the drive-rods F. An annular shoulder e^3 is formed upon the inner side of the holder near its upper end, and above the said shoulder are pivoted the dogs e^4. The screw D is also tubular, and is held at its upper end within the holder E by means of the hangers G and collar H, said collar surrounding the screw at a reduced portion d of the screw, the upper end of the screw resting against the shoulder e^3 in the holder. The collar H is made in two sections, the opposing ends

being secured between the arms h of the hanger, as clearly shown. One arm of the hanger extends considerably below the others, the purpose of which will appear farther on. In the inner surface of the holder below the shoulder e^3 is cut an annular recess or recesses at one or more places e, and said recessed portion is provided with a ratchet-face e'. Adjacent to the ratchet-faces e' the screw D is reduced upon its exterior, and around each reduced portion is secured a collar I, carrying pawls K at diametrically-opposite points, said pawls being adapted to engage the ratchet-faced portions of the holder and prevent the screw turning in both directions within the holder. The portion of the screw below the holder is threaded externally and works in the cylindrical casing C, the said casing having an internally-threaded upper portion, whereby when the screw is forced down within the casing by the weight of the drive-rods and holder the casing will be revolved, the screw being held rigid by means of the pawls K and ratchets e', as before described.

The boring or channeling appliances are arranged near the lower end of the casing, and within the casing and tubular screw is arranged a vertical shaft L, extending from the boring or channeling appliance nearly to the top of the holder E, the upper portion of said shaft being reduced for a suitable distance at l^3, forming the upper and lower shoulders l^4 and l^5, the purpose of which will be explained hereinafter. The portion of this shaft within the screw D is provided with a series of spirally-arranged spurs l, and near the lower end of the screw and within the same is arranged a spirally-grooved sleeve or collar M, through which the said spurs pass as the screw is moved upward and downward. The screw is recessed to receive this grooved collar, the upper face of which is serrated, as at m, adapted to be engaged by the pawl m', pivoted to the inner side of the screw, said pawl and ratchets being so arranged that when the screw descends the grooved collar will be held firm, whereby the spurs l upon the shaft L, passing through said grooved collar, will cause the shaft L to revolve. When the screw is moving upward, however, the grooved collar M is permitted to turn and the shaft L remains stationary. The lower end of the shaft L is journaled in a block N, located near the lower end of the casing, the lower end of said shaft having a shoulder formed thereon and resting beneath the said block N. A threaded aperture n is formed in the block to one side of the shaft L, and in said aperture works a threaded feed-shaft O, the lower end of said feed-shaft being swiveled to the upper or inner end of a flexible chain P, said chain being adapted to be forced out through an aperture P′, made in the side of the casing, and upon the free or outer end of said chain is attached a cutting implement P″. The flexible chain P is constructed of a series of central links p, each having a transverse tongue p' at one end and a transverse groove p^2 at the other end, the shoulders p^3 and p^4 upon the front or upper sides of the tongue, respectively, being cut away in order to permit the chain to bend in an upward or forward direction. The central links are also provided with two transverse bores p^5. Side links p^6, similar in construction to the central links, are arranged upon each side of the same to break joints with the central links, the central and side links being united by the transverse bolts p^7, passing through the bores, as clearly shown in the drawings.

The feed-shaft O is grooved or serrated longitudinally, as at o, thus making an axially-elongated pinion which is adapted to be engaged by a pinion R, secured upon the shaft L above the block, which pinion will be revolved as the screw descends, in consequence of the spirally-grooved collar and spirally-arranged spurs upon the shaft L, thereby forcing the threaded feed-shaft down through the threaded block N and the chain laterally out of the casing. The upper portion of the cylindrical casing is threaded internally, in which the tubular screw works to revolve the cylinder, and to carry the threaded block with it I employ the rods S, arranged upon opposite interior sides of the casing in the grooves c', formed in the sides of the casing, and confined within these grooves by the strips c'' overlapping said groove, as clearly shown. The lower ends of the rods S rest in recesses formed in the side faces of the threaded block, thus preventing said block from turning independent of the cylinder. These rods extend upwardly to within a short distance of the top of the casing, and upon the top of said casing is secured an annular cap T, having an inwardly-projecting flange t, which is formed with two openings t' at diametrically-opposite points, said openings being of sufficient size to permit the passage of the rods S. Between the openings t' is formed a larger opening t''.

An annular collar T′ is confined between the head of the casing and the cap T, said collar T′ having a cam-shaped shoulder T″, which projects through the opening t'' in the cap, and this collar T′ is also provided with two openings t''' of the same size and shape as the opening t' in the cap T. The cam-shoulder T″ is adapted to be engaged by the extended arm of the hanger at certain times, whereby the annular collar T′ is moved around, bringing the openings t''' in register with the opening t', whereby the rods S can be passed upward, and also the threaded block when it is desired to draw the chain into the casing g, as will be more fully explained hereinafter.

A chain-guiding trough V is arranged at the bottom of the casing, the upper end of said guide being curved downwardly toward the opening in the side of the casing, and is formed with a groove v in which the chain

operates. This trough or guide may be made in one or two pieces, as desired, and in the lower end of the plates or blocks forming said trough is formed a bearing v', adapted to receive the supporting-journal upon which the cylinder revolves.

A chain-guiding bar V′ is secured to the under side of the threaded block N and projects downwardly upon the forward side of the flexible chain, the lower end of said bar being curved at v^2 parallel with the curve of the chain-trough, whereby the chain is guided in its downward and outward movement.

A chisel W is arranged in the lower part of the casing above the drilling apparatus, said chisel consisting of a collar or head-piece w, which surrounds the shaft L, and a bit or tongue W′, which projects downward through the threaded block, its lower end resting directly above the chain P, the purpose of this chisel being to cut the chain off in case it is desired to hurriedly remove the apparatus from the well, and the manner of operating this chisel will presently appear.

In operation a sufficient number of supporting-rods are secured to the bottom of the casing and the casing lowered. The boring or channeling mechanism is arranged in the lower part of the casing, and at its upper end the casing is threaded internally and adapted to receive the driving-screw, which works in the casing, but does not reach the boring or channeling mechanism. The upper end of the cylindrical casing is provided with the cap which confines the annular collar carrying the upwardly-projecting shoulder and locks the rods S in place, which prevents the threaded block from turning. The upper end of the screw is secured in the holder by means of the collar H and hanger G, the extended arm of the hanger being adapted to strike the shoulder of the annular collar and move the same around until its openings register with the openings in the cap of casing, which will permit the rods S to be withdrawn, lifting the threaded block and chain. The upper end of the screw within the holder is provided with pawls, which prevent the screw revolving when descending, but when it is drawn up the screw turns in the casing C and the collar H.

The boring or channeling mechanism, as has been described, consists of the flexible chain-feed shaft, threaded block, revoluble shaft and gear, guide bar or rod, and guide-trough. Now when the screw descends the grooved collar M is held rigid within the same and the revoluble shaft L revolved. This operates the boring or channeling mechanism, as already described, and as the screw descends in the casing and cannot revolve the casing must necessarily revolve. As the screw ascends all these operations are reversed.

In boring or channeling the upper drive-rod works simply in a bearing at the top of the well, and upon said rod is secured a collar X, which prevents the holder descending sufficiently to have the hanger-arm strike the shoulder on the annular collar. When it is desired to withdraw the chain, however, the collar X is removed and the arm of the hanger will now strike the shoulder, moving the collar around until its apertures register with the apertures of the casing-cap. When the holder descends the extra distance, the top of the rod or shaft L is forced between the dogs in the holder, and when the holder is again lifted the shoulder l^4 will strike against the dogs and the rod will be lifted, and with it the threaded block, on account of the shoulder on end of shaft L, and as the apertures in cap and collar register the rods S can be slid upward out through said openings. When the threaded block is moved up, the feed-shaft is also moved, and consequently the chain is drawn in. In case the chain cannot be drawn in the lower end of the screw may be used as a hammer to strike against the chisel in the casing, thus cutting off the chain. The reduced portion of the revoluble shaft between the shoulders l^4 and l^5 permits the holder and screw to be worked on said shaft in order to get the required momentum for chiseling. After the chain has been withdrawn or cut off the apparatus can be drawn up and disconnected in the usual manner.

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

1. The combination, with a revoluble cylindrical casing, of a flexible chain arranged within the casing and provided with a cutting implement at its free or outer end, a feed-shaft connected with the inner end of the chain to force the said chain laterally outward from the casing, substantially as shown and described.

2. The combination, with a revoluble cylindrical casing, of a flexible chain provided with a cutting implement, a feed-shaft connected to the flexible chain, and a drive-rod for operating the feed-shaft, substantially as shown and described.

3. The combination, with a revoluble cylindrical casing, of a flexible chain, the feed-shaft connected therewith, the drive-rod for operating the feed-shaft, and the drive-shaft for operating the drive-rod, substantially as shown and described.

4. The combination, with a revoluble casing, of a flexible chain arranged therein and carrying a cutting implement at its free or outer end, a threaded feed-shaft connected with its upper or inner end, and a threaded block through which the threaded feed-shaft is fed, substantially as shown and described.

5. The combination, with a revoluble casing, of a flexible chain arranged therein and carrying a cutting implement at its free or outer end, a threaded feed-shaft swiveled to the inner or upper end of said chain, a threaded

block arranged within the casing and through which the feed-shaft is fed, and a revoluble shaft adapted to turn and feed the feed-shaft, substantially as shown and described.

6. The combination, with a revoluble casing, of a flexible chain arranged therein and carrying a cutting implement at its free or outer end, a threaded feed-shaft swiveled at its upper or inner end, said shaft being serrated or grooved longitudinally, a threaded block through which the feed-shaft turns, a revoluble shaft, and gear connected therewith adapted to mesh with the longitudinal serrations or grooves of the feed-shaft and turn said shaft, whereby it is fed through the threaded block and forces the chain from the casing, substantially as shown and described.

7. The combination, with a revoluble cylindrical casing, of a flexible chain arranged therein and carrying a cutting implement at its free or outer end, a threaded feed-shaft swiveled to its upper or inner end, a threaded block rigid within the casing and through which the feed-shaft turns, a revoluble shaft adapted to operate the feed-shaft, and a support upon which the casing revolves, substantially as shown and described.

8. The combination, with a revoluble casing, of a support upon which said casing revolves, a flexible chain arranged within the casing, a threaded feed-shaft attached to the said chain, a threaded block, and revoluble shaft for operating said feed-shaft, and a chain-guiding trough or plate arranged in the bottom of the casing, substantially as and for the purposes described.

9. The combination, with a revoluble cylindrical casing having an opening in one side of the same, of a flexible chain arranged within the casing and adapted to be forced through the said opening, a threaded feed-shaft swiveled to the upper end of said chain, a threaded block through which said shaft is fed, a dependent chain-guiding rod secured to the under side of the said block, and a chain-guiding trough or plate arranged near the bottom of the cylinder, substantially as shown and described.

10. The combination, with a revolving cylinder having a hole in one side, of a support for said cylinder, a flexible chain arranged within the cylinder and carrying a cutting implement at its free or outer end, a threaded feed-shaft swiveled to the upper or inner end of said chain, a threaded block through which said feed-shaft turns, a revoluble shaft carrying a gear adapted to mesh with the feed-shaft and turn the same through the threaded block, the dependent chain-guide rod secured to the under side of the threaded block, and the chain-guiding trough or plate arranged in the bottom of the casing, substantially as shown and described.

11. The combination, with the drive-rod, of the holder, the screw held therein, the revoluble cylindrical casing, the drive-rod, feed-shaft, and flexible chain carrying a cutting implement upon its free or outer ends, substantially as shown and described.

12. The flexible chain carrying a cutting implement at its free or outer end, said chain consisting of a series of central links, each link having a transverse groove at one end and a transverse tongue at the opposite end, the shoulders of the tongues and grooves being reduced or cut away upon the forward or upper side of the links, and each link being provided with two transverse apertures, and a series of side links similar in construction to the central links, which side links are arranged to break joints with the central links, and the bolts for connecting the central and side links, substantially as shown and described.

13. The combination, with the supporting-rods, of the revoluble cylindrical casing, threaded block, feed-shaft, flexible chain, revoluble shaft having spurs thereon and the tubular screw working in the casing and revolving the same, and a grooved collar carried by the screw, through which the revoluble shaft works, substantially as shown and described.

14. The combination, with the revoluble casing, of the threaded block carrying the drilling appliances, the slide-rods holding the said block, the revoluble shaft, the cap for casing and annular collar confined thereby, the said collar and cap having openings adapted to register and permit the passage of the slide-bars, a shoulder attached to the collar, the screw, holder, and hanger, all arranged substantially as shown and described.

15. The combination, with the holder having the dogs and ratchet-faced recesses, of the screw-carrying pawls, the revoluble shaft passing through the screw and having spirally-arranged spurs, a grooved collar carried in the screw, the revoluble casing in which the screw works, and the threaded block in which the revoluble shaft is journaled and to which are connected the drilling appliances, substantially as shown and described.

16. The combination of the revoluble casing carrying the flexible chain and apparatus for operating the same, the revoluble shaft, a chisel carried upon said shaft and resting above the chain, the screw adapted to contact with said chisel, the holder, and drive-rods, all arranged substantially as shown and described.

17. The combination of the drive-rods, holder, screw, revoluble shaft, grooved collar in the screw, casing having a threaded upper portion, cap, and collar, constructed as described, the threaded block, feed-shaft, slide-bars, flexible chain, chain-guide rod, chain-trough, and supporting-rods, all arranged and adapted to operate as shown and described.

JOSEPH L. ADDISON.

Witnesses:
F. S. MISKIMEN,
T. M. JOHNSON.