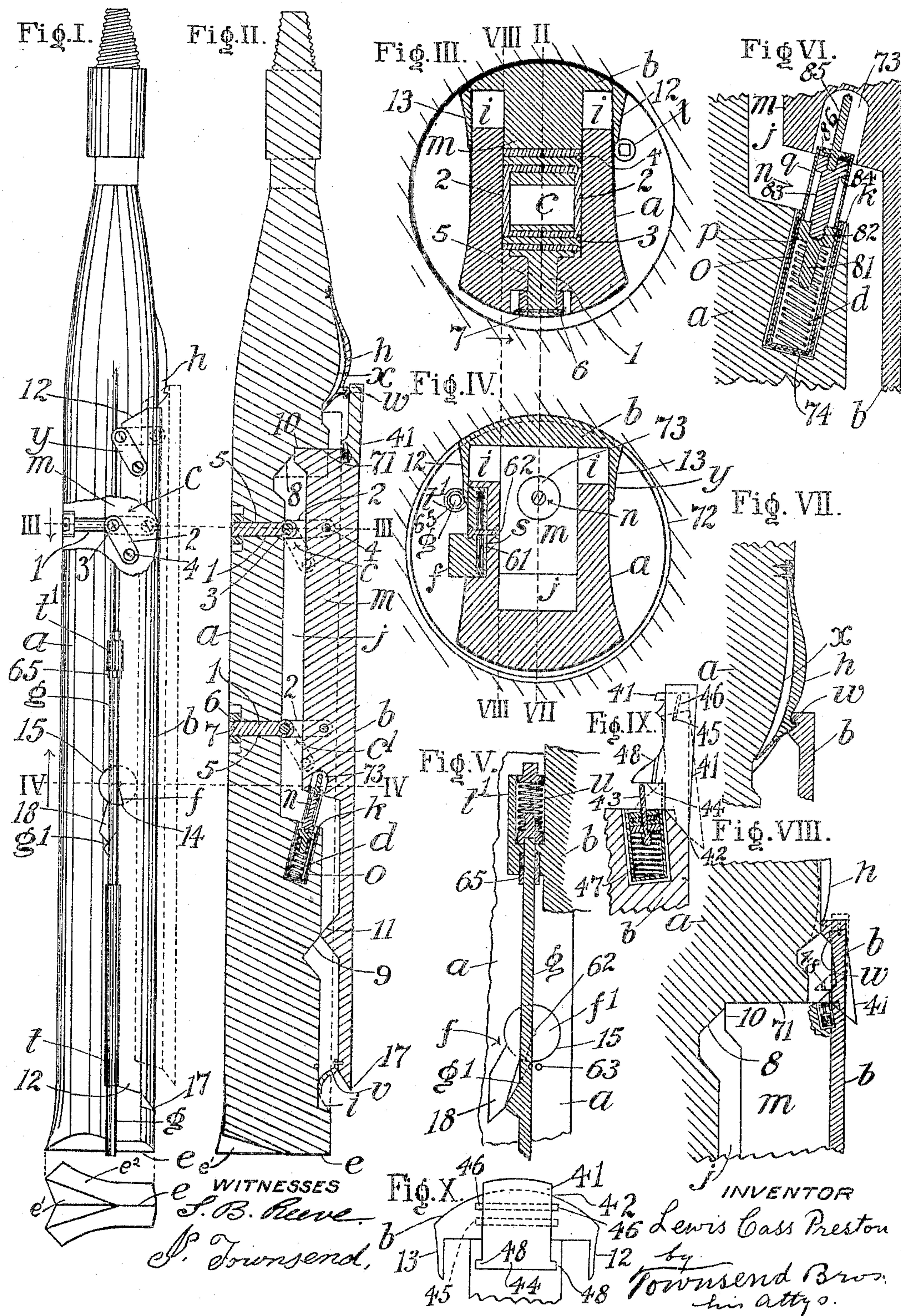


L. C. PRESTON.
COMBINATION DRILL AND REAMER.

APPLICATION FILED FEB. 14, 1901.

NO MODEL.

2 SHEETS—SHEET 1.

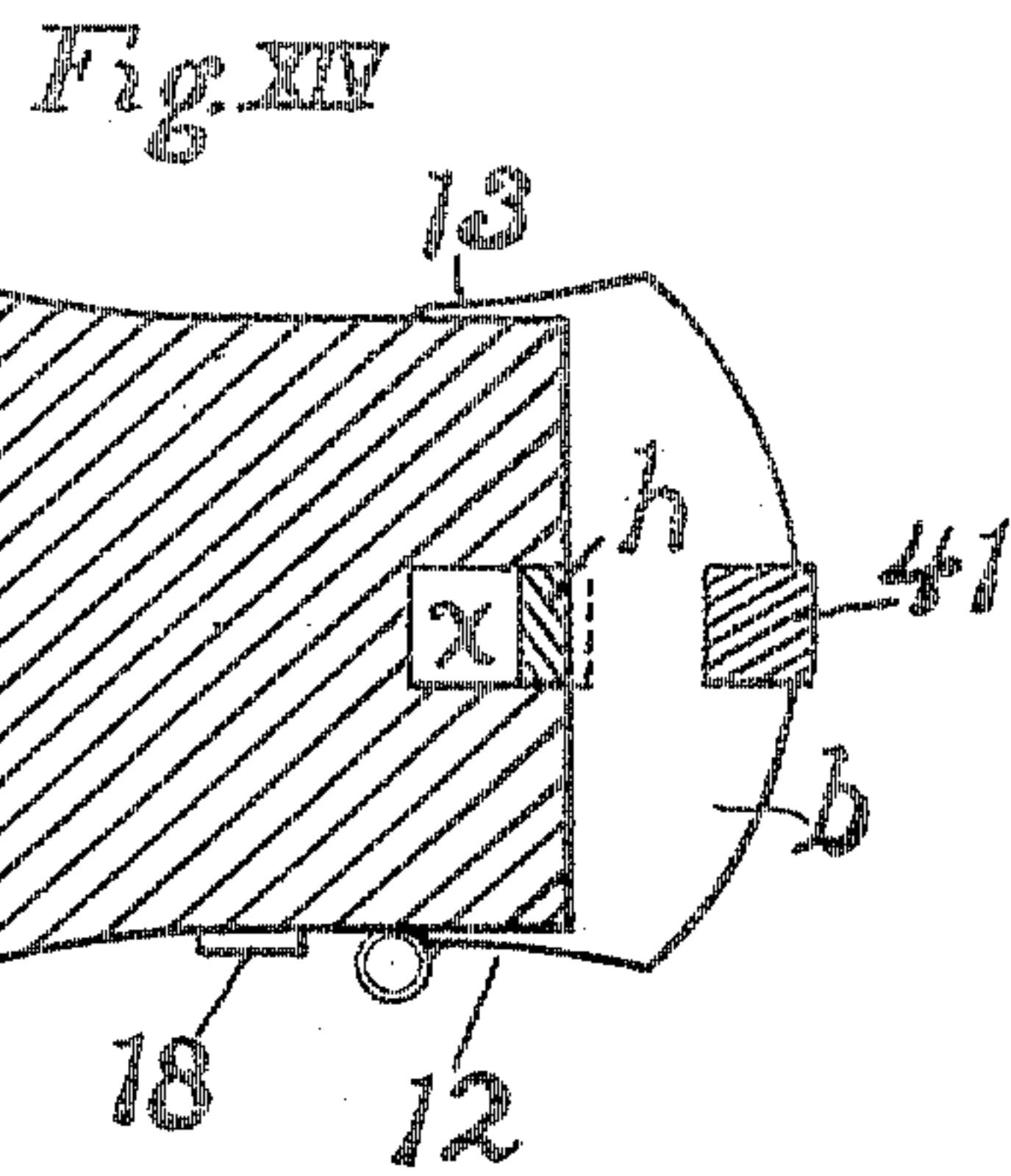
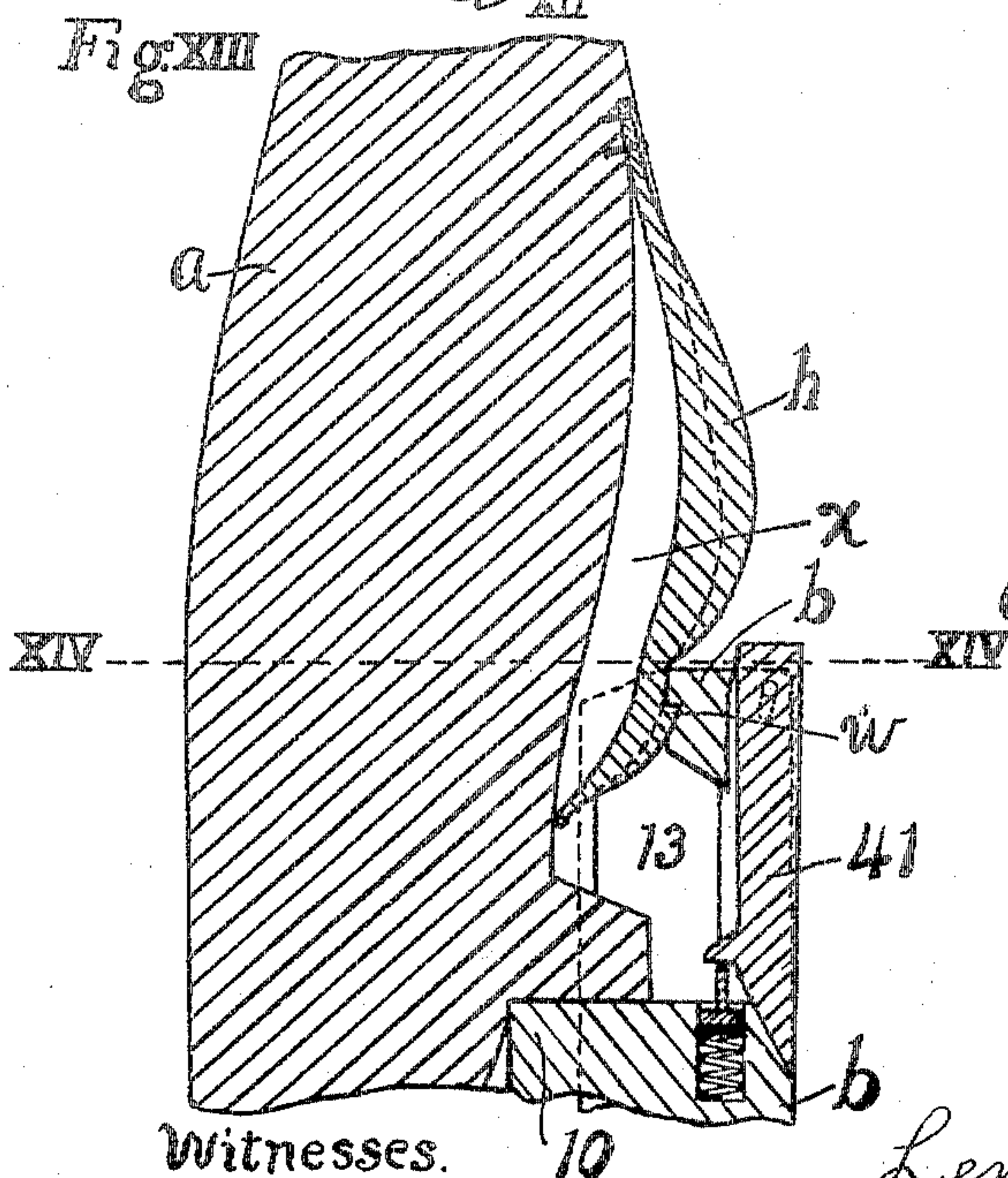
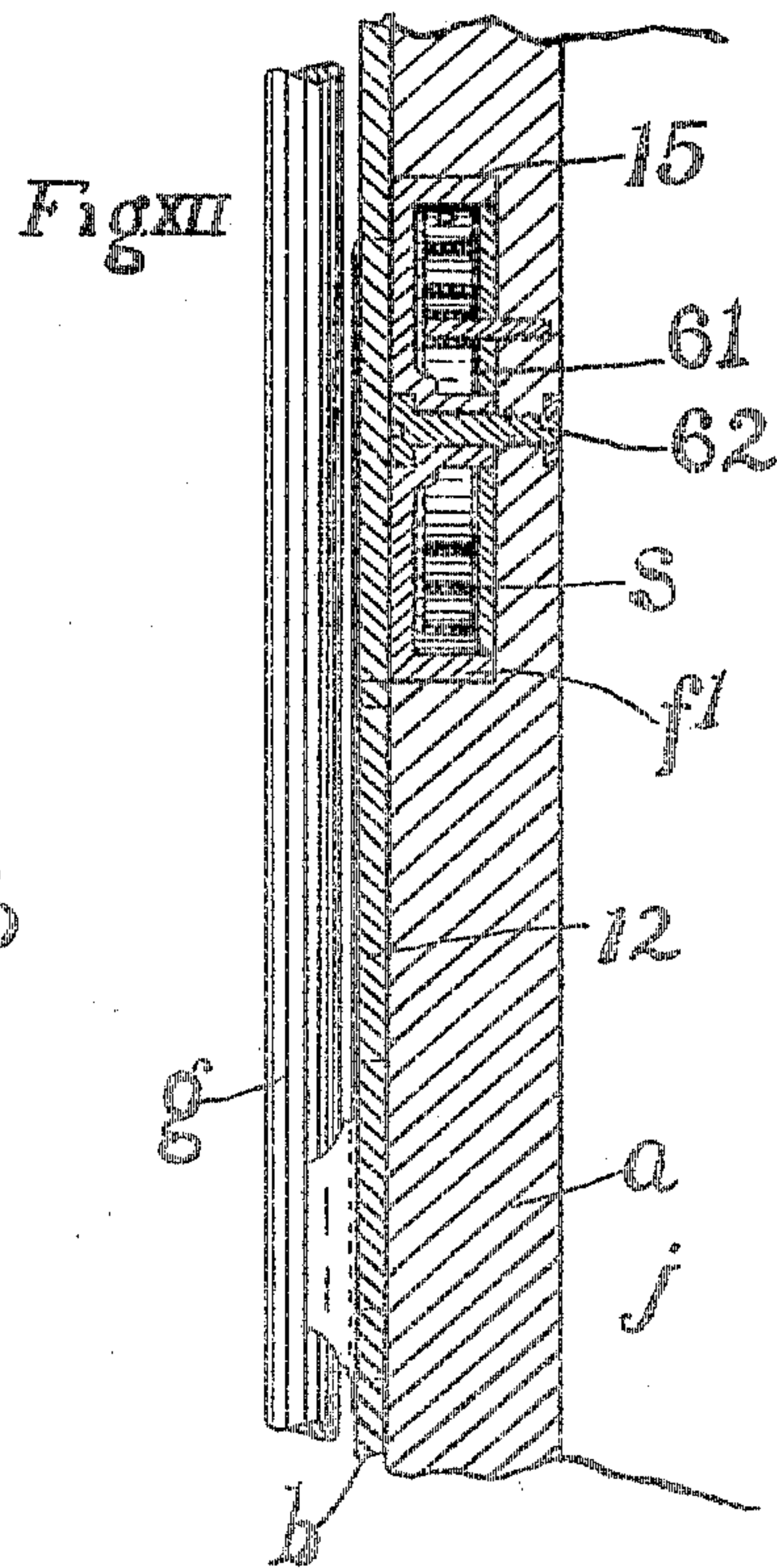
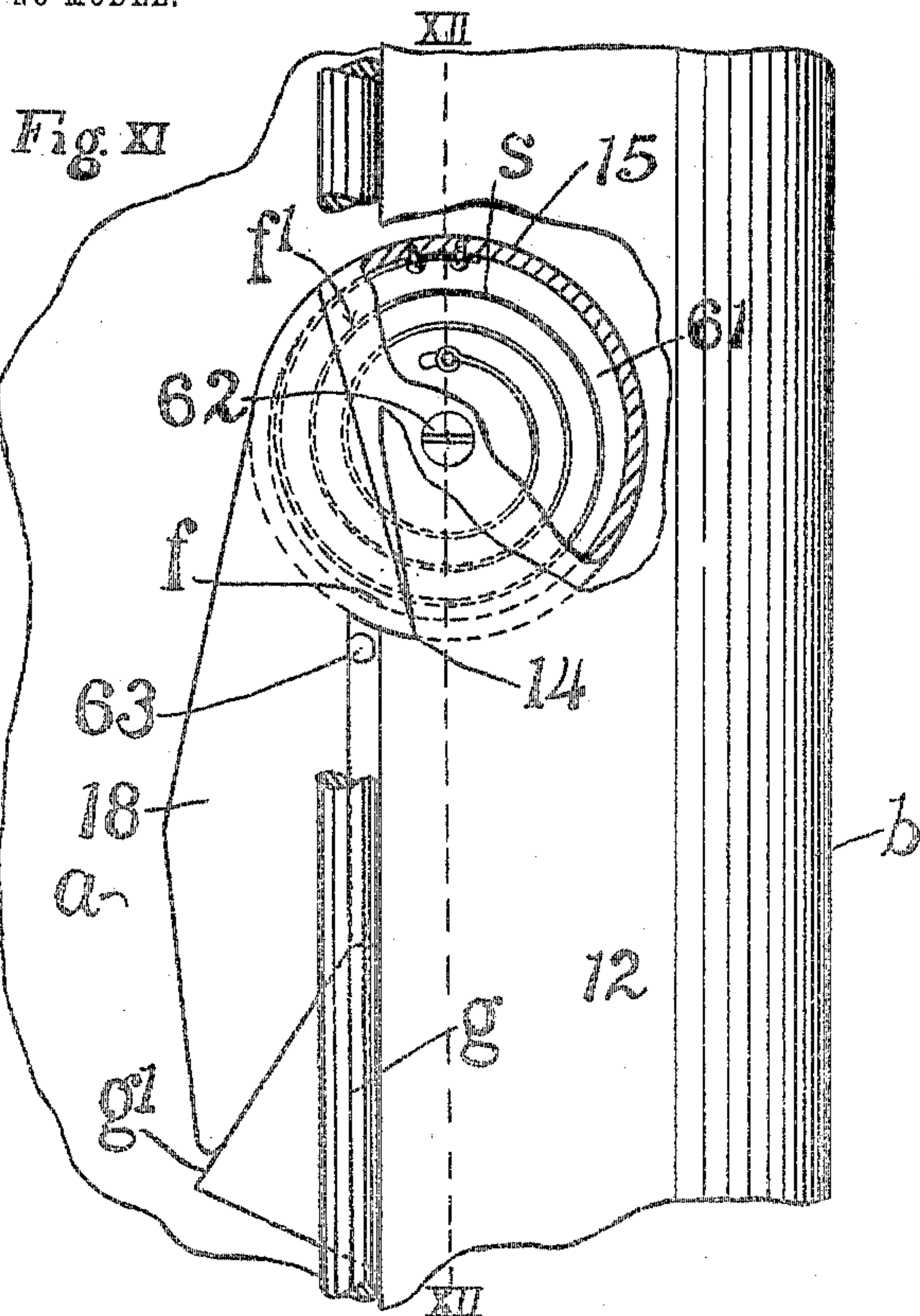


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2 SHEETS—SHEET 2.



Witnesses.
C. F. Riehy.
J. Townsend

Inventor:
Lewis Cass Preston
by Townsend Bros.
his attys.

UNITED STATES PATENT OFFICE.

LEWIS C. PRESTON, OF WESTON, OREGON.

COMBINATION DRILL AND REAMER.

SPECIFICATION forming part of Letters Patent No. 776,865, dated December 6, 1904.

Application filed February 14, 1901. Serial No. 47,364. (No model.)

To all whom it may concern:

Be it known that I, LEWIS CASS PRESTON, a citizen of the United States, residing at Weston, in the county of Umatilla and State of Oregon, have invented a new and useful Combination Drill and Reamer, of which the following is a specification.

The object of this invention is to produce a superior practical tool for drilling wells, which will readily pass through the well-casing in either direction and which will drill the hole below the casing sufficiently large to allow the casing to readily follow the tool down.

In this invention I apply to one edge of the drill-body a runner connected with said body to allow the runner to move longitudinally and laterally relative to the body—that is to say, the runner has a movement upward and outward in one direction and downward and inward in the other direction, said runner being seated in a gain in the body of the drill and being spring-supported and a latch being provided for holding the runner down in opposition to the spring and a cam device being provided for forcing the runner outward when the spring moves said runner upward relative to the drill-body. I also provide means for releasing the latch, said means being carried by the runner and arranged to move longitudinally thereof and being adapted to extend below the end of the drill to engage the ground below the drill when the runner is in its retracted position and the drill fully lowered.

A further object of my invention is to allow the drill to be heated for sharpening without taking the drill to pieces and without taking the temper out of the runner-supporting spring.

A further object is to so construct the cutting edge of the drill that it will cut more freely and more rapidly and will not wedge into crevices at the bottom of the hole being drilled and can be sharpened with but little difficulty.

My invention may be embodied in various forms.

The accompanying drawings illustrate the form in which I prefer to embody my invention.

Figure I is a side view of a drill embodying

my invention, parts being broken away to expose some of the parts which would otherwise be hidden. The runner is shown in solid lines retracted to allow the tool to be lowered through the well-casing. Dotted lines show the working position of the runner. Fig. II is a longitudinal section on line II VII, Figs. III and IV, showing the runner extended in solid lines and retracted in dotted lines. Fig. III is a cross-section on line III III, Figs. I II, cutting through the upper connection between the runner and drill-body. The runner is shown in working position in the well-hole below the casing. (Not shown.) Fig. IV is a cross-section looking up on line IV IV, Figs. I and II, cutting through the latch. The parts are shown in working position in the well-hole. Fig. V is a detail of the latch mechanism, showing a fragment of the runner and showing the latch in unlatched position. Fig. VI is an enlarged sectional detail of the runner-supporting follower, its supporting-spring, and its insulating and retaining case. Fragments of the drill-body and runner are also shown. Fig. VII is an enlarged fragmental sectional detail on line II VII, Figs. III and IV, showing the spring-catch for the upper end of the runner. Fig. VIII is an enlarged fragmental sectional detail of the upper end of the runner at one side of the spring-catch. Line VIII VIII, Figs. III and IV, indicate the line of section. Fig. IX is a sectional detail of the upper end of the runner and the sliding extension thereof. Fig. X is an end view of the upper end of the runner with the sliding extension in place. Fig. XI is a fragmental detail view of the latch mechanism *f*, on enlarged scale. Fig. XII is a section on line XII XII, Fig. XI. Fig. XIII is a sectional detail, on enlarged scale, to more clearly show how the bow-spring and the walls of the groove in which the bow-spring is seated exclude clogging matter. Fig. XIV is a cross-section on line XIV XIV, Fig. XIII.

a indicates the drill-body; *b*, a runner mounted on one edge of the body and connected with said body by means, preferably links, as shown, to allow the runner to move longitudinally and laterally relative to the body—that is to say, to allow the runner to swing upward and outward

and downward and inward. Preferably two link connections $c c'$ are employed. Each of these link connections consists of an eyebolt 1, two link-bars 2, a pivot-bolt 3, pivoting the link-bars 2 to the eyebolt 1, and a pivot-bolt 4, pivoting the link-bars to the runner. The eyebolts respectively pass through holes 5 in the drill-body and are fastened by nuts 8 and cotter-pins 7, passed through the bolts to hold the nuts from unscrewing.

d indicates a spring for normally holding the runner up away from the cutting edge e of the drill. Cam devices are provided between the runner and the drill-body to hold the runner away from said body when in its spring-supported position. These cam devices may be variously arranged and consist in oblique upwardly and outwardly extending faces 8 9 on the drill-body, which are engaged by inward projections 10 11 on the runner, so that when the runner-operating spring d forces the runner upward relative to the drill-body the oblique cam-faces will cause the runner to move outward away from the axis of the drill-body until held from further movement by reason of the links which connect the runner to the drill-body. The upper projection 10 also engages the upper end wall 71 of the groove j , hereinafter mentioned.

f indicates a latch for holding the runner in opposition to the spring d .

g indicates a rod or plunger constituting latch-releasing means and playing longitudinally of the runner and adapted to extend below the drill-body when the runner is in its retracted position to engage the ground, to be upheld thereby, to release the latch on the descent of the drill-body, thus allowing the runner to be thrown upward by the runner-operating spring d .

h indicates a spring-catch to catch the runner when the runner is in its spring-supported position and being arranged to extend beyond the face of the body of the drill to be engaged by the well-casing 72 and inwardly pressed thereby to release the runner to allow said body to slide up along the runner while the runner is held by its upper end, engaging the lower end of the well-casing on the upward movement of the drill, thus to allow the runner to be again brought against said drill-body to be caught by the latch and to allow the tool to be withdrawn through the well-casing.

The drill-body is provided on its edge with a gain i , in which the runner seats when in its retracted position. Said drill-body is provided in the gain with a longitudinal groove j and at the lower end of the groove with a spring-receiving socket k . The runner is fitted in the gain when in its retracted position and is provided with a projection m to extend into the groove, and the two jointed links or connecting devices $c c'$ are connected, respectively, by one member with the drill-body and

by the other member with said projection. The runner-operating spring d is seated in the socket k to operate upon said projection m to normally hold the runner upward. This spring preferably operates through the medium of a follower n , which, together with the spring, is contained in a case o , the spring being seated in the case and supported thereby and the follower being furnished with a shoulder p to rest upon the spring to compress said spring, and the case being provided with a perforated top q , screwed or otherwise fastened on said case above said shoulder and through which perforated top the follower projects. The spring is preferably of such tension that when the top q is in place on the follower it can only be seated on the case by great force. To construct this part of the appliance, the top q may be seated under hydraulic pressure and screwed into place. As shown, such top consists in a short section of pipe screwed into the case. The case will be inserted into the spring-receiving socket k with the follower projecting upward to engage the lower end of projection m of the runner, so that the runner may be applied to the drill-body in its uppermost position and can only be retracted by considerable force.

73 indicates a socket in the projection m and into which the follower and the upper end of the top q project. When the runner is retracted, the top member q will be chambered in the socket 73 and the follower will be chambered in the case and its top.

The constructor will use his judgment with regard to the tension of the spring.

In order that the drill can be sharpened without detaching the runner, the spring is preferably incased in an insulating-jacket 74, preferably made of asbestos, so that the drill may be heated without taking the temper out of the spring.

The latch-releasing means g consists in a plunger carried by the runner b and arranged to slide therealong and furnished with an oblique face g' to engage the latch and release the same when the plunger is moved upward. The runner b is furnished with two edge walls 12 13, which extend on the opposite sides, respectively, of said drill-body, one of said walls being furnished with a catch 14 to engage the latch f . Said latch f is furnished with a circular portion f' , seated in a circular recess 15 in the side of the drill-body and being embraced by the edge wall 12, which is provided with the catch 14. s indicates a latch-operating spring to normally hold the latch in position to engage the catch.

61 indicates a leather washer on which the latch is seated. The purpose of this leather is to prevent water and cuttings from getting into the hollow of the latch which contains the spring s .

62 indicates a pin at the center of the latch to fasten the latch to the drill-body.

63 indicates a stop-pin in the drill-body to prevent the latch from turning too far.

t indicates a plunger-incasing guide on the runner to carry and protect the plunger.

5 u is a spring for holding the plunger in its depressed position normally out of the way of the latch when the runner is retracted.

65 indicates a stuffing-box to keep the water and cuttings away from the spring.

10 v indicates a spring-shield between the drill-body and the lower end of the runner and arranged to slope upward and outward between the drill-body and the runner to close the space between such drill-body and the lower end of the runner to prevent the cuttings from getting in between the runner and the drill-body, thus to leave the runner free to seat in the gain i when said runner is brought into contact with the casing in the operation of withdrawing the tool from the well.

The catch h is a bow-spring carried by the drill-body and extending between said drill-body and the upper end of the runner to catch the runner, which is provided with a shoulder w . This bow-spring is bowed outward to extend beyond the edge of the drill-body above the runner to be engaged by the well-casing to release the catch on the upward movement of the drill-body in withdrawing the same through the casing.

30 x indicates a channel which chambers the bow-spring catch h and fits the sides thereof to prevent any material from entering between the bow-spring and the drill-body to clog the spring.

The plunger-operating spring u is contained in a case t' , fixed to and carried by the runner b and forming the support for said plunger. The spring u in such case depresses the plunger below the lower end of the drill when the runner is in its retracted position, but allows the runner and drill-body to move downward along said plunger, thus to bring the oblique face g' of the plunger to engage the latch and withdraw the same from the catch 14.

50 The latch f is chambered on its inner face to contain the spring s , which operates it, and said spring is fastened at one end to the latch and at the other end to the body of the drill in any ordinary manner.

The lower end of the runner b is furnished with a cutting edge or lip 17 to ream away the sides of the well being drilled after the latch has been released, as hereinbefore detailed.

60 In practical operation the workman, before lowering the tool into the well, will depress the runner b and catch it with the latch f . Then the tool will be lowered into the well until the plunger reaches the bottom of the hole and is thereby upheld while the drill-body and runner continue to descend. This

will bring the arm 18 of the latch into engagement with the oblique face g' of the plunger, thus throwing the latch out of engagement with the catch 14. Then the runner-operating spring will throw the runner upward and the action of the cam-faces will move the runner outward until it is held stationary by the connecting parts. It is to be understood that the links are arranged to slant downward when the plunger is retracted, thus tending to carry the runner outward as it moves upward. The cams 10 and 11 on the runner project inward from the face of the runner, and the drill-body is provided with recesses at the inner ends of the faces 8 and 9, into which these cams seat when the runner is in its retracted position. When the runner has been thrown into its uppermost position, the bow-spring catch h catches the runner. This assists in giving greater stability to the runner in its cutting position and prevents looseness. This catch is designed to prevent any working of the runner up and down along the drill-body after the runner has been thrown into its uppermost position. In the act of withdrawing the drill from the bottom of the well the spring-catch h will engage the lower end of the casing, allowing the runner to be held by the casing while the drill-body ascends sufficiently to seat the runner in the gain in the drill-body and to thereby allow the latch to catch the runner and hold it, after which the tool is readily withdrawn through the casing.

In order to assemble the runner-operating plunger and spring and their case and the top thereof and also to prevent any cuttings from entering the case, I construct the follower as shown in detail in Fig. VI, in which 81 indicates the lower member of the follower furnished with a screw-threaded socket 82 in its upper end, which upper end is fitted to the inside of the case k to rest upon the spring d . 83 indicates an intermediate member, the lower end of which is screwed into the socket 82 and the upper end of which is furnished with a head 84, which is fitted in the tube or pipe section q , which forms the top of the case. 85 indicates the top member of the follower, the lower end of which top member is screwed into the head 84 of the body member 83 of the follower. 86 indicates a packing-leather clamped between the head of the member 85 and the head 84 of the member 83. Said leather 86 fits tightly in the tubular top q and prevents any liquid from entering the case through said tube. Said tubular top q of the case is extended up into the socket 73 and has sufficient longitudinal play therein to accommodate the movement of the runner, and the top member 85 of the follower normally projects beyond the upper end of the tube q a distance equal to the play of the follower, so that when the runner is retracted the fol-

lower is forced down into the case and the top member of the case is fully seated in the socket 73.

y indicates links on the outside of the drill-body and runner connecting the upper end of the runner with the drill-body to give greater strength and stability to the upper end of the runner.

In order to facilitate the cutting and prevent the cutting edge *e* from wedging in crevices of the rock, the end of the drill is furnished with a tapering groove *e'* and is beveled, as indicated at *e''*, whereby said cutting edge is formed in the shape of a Y, as shown in the projection at the lower part of Fig. I. The main body of the drill is preferably oblong in cross-section, as indicated in Figs. III and IV, and is not conformed to the shape of the cutting edge. The bifurcations or arms of the Y extend toward the side of the drill opposite that on which the runner *b* is mounted, and in practical operation the runner *b*, being an eccentric and engaging the wall of the well, holds the stem portion of the Y-cutting edge which appears at the right, at the bottom of the projection in Fig. I, away from the wall of the well and crowds the bifurcated portion of the V-shaped edge over to the other side of the well, so that the greater portion of the cutting is performed by the bifurcation of the Y edge. By means of the form shown the cutting is performed practically by two cutting edges instead of one, and the form of the drill is such that it can readily be sharpened.

The shoulder 71 forms a solid and strong support for the upper end of the projection *m*, which is there enlarged by the cam 10, so that the runner is held solidly against the force of the blows in the work of reaming.

In order to cause the casing to completely throw the runner down into place and cause the latch *f* to catch into the catch 14, I provide at the top of the runner a sliding extension 41, which slides in a slot 42 in the upper end of the runner *b*. The lower end of the runner extension 41 is beveled downward and outward, and the lower end wall of the slot 42 slopes downward and outward to conform thereto.

43 is a spring-operated follower mounted in the upper end of the runner and arranged to press against the lower end of an arm 44 of the runner extension to press the same upward.

45 indicates a pin in the runner extension 41, extending from the sides of said extension into grooves 46 in the side walls of the slot 42. These grooves slant inward downwardly, and when the sliding extension is in the position in which it is normally held by the spring-operated follower 43 the upper end of the sliding extension 41 projects outward and upward from the face of the runner.

In practical operation when the tool is being withdrawn from the well the sliding ex-

tension 41 of the runner will engage the shoe of the casing and will thereby be pressed downward and inward, thus forcing the oblique lower end of the sliding extension outward and downward to form a lateral extension of the runner, which will cause the casing to force the runner far enough down to allow the latch *f* to catch in the catch 14. When the shoe of the lower end of the casing slides past the upper end of the sliding extension 41, the spring 47 will throw the sliding extension upward, thus allowing the lower beveled end of the sliding extension to be retracted into the slot 42 out of the way of the casing. By this means provision is made for withdrawing the bit provided with the projecting cutting edge *e* and allowing the bit, with its runner, to pass freely up through the casing.

48 indicates shoulders projecting from the sides of the arm 44 to prevent the lower end of the sliding extension from being thrown too far out when the casing has driven the sliding extension down.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. In a drill, the combination of a drill-body; a runner mounted on one edge of the body; means connecting said runner with said body to allow the runner to move longitudinally and laterally relative to the body; a spring for normally holding the runner up away from the cutting edge of the drill; cam devices being provided between the runner and said body to hold the runner away from said body when in its spring-supported position; a latch for holding the runner in opposition to the spring; and latch-releasing means playing longitudinally of the runner and adapted to extend below the drill-body to engage the ground to be held thereby to release the latch.

2. In a drill, the combination of a drill-body; a runner mounted on one edge of said body; links connecting said runner with the body to allow longitudinal and lateral movement of the runner; a spring for normally holding the runner up away from the cutting edge of the drill; cam devices being provided between the runner and said body to hold the runner away from said body when in its spring-supported position; a latch for holding the runner in opposition to the spring; and latch-releasing means playing longitudinally of the runner and adapted to extend below the bit to engage the ground to release the latch.

3. In a drill, the combination of a drill-body; a runner mounted on one edge of said body; means connecting said runner with said body to allow longitudinal and lateral movement of the runner; a spring for normally holding the runner up away from the cutting edge of the drill; cam devices being provided between the runner and said body to hold the runner away from said body when in its spring-supported position; a latch for holding the runner in

opposition to the spring; latch-releasing means playing longitudinally of the runner and adapted to extend below the drill to engage the ground to release the latch; and a spring-catch to catch the runner when in its spring-supported position, and being arranged to extend beyond the face of the runner to be engaged by the casing to thereby release the runner to allow said body to slide along the runner to allow the runner to be again brought against said body to be caught by the latch.

4. In a drill, the combination of the drill-body provided on one edge with a gain and provided in the gain with a longitudinal groove and at the lower end of the groove with a spring-receiving socket; a runner fitted in the gain and furnished with a projection to extend into the groove; two jointed links, each of which consists in two members hinged together, said links being respectively connected by one member with the drill-body and by the other member with said projection; a spring in said socket to operate upon said projection to normally hold the runner upward; cam devices being provided between the runner and said body to hold the runner away from said body when in its spring-supported position; a latch fastened to said body for holding the runner in opposition to the spring; latch-releasing means playing longitudinally of the runner and adapted to extend below the drill to engage the ground to release the latch to allow the runner to be thrown up by the spring.

5. In a drill, the combination of the drill-body provided on one edge with a gain and provided in the gain with a longitudinal groove and at the lower end of the groove with a spring-receiving socket; a runner fitted in the gain and furnished with a projection to extend into the groove; two jointed links, each of which consists in two members hinged together, said links being respectively connected by one member with the drill-body and by the other member with said projection; a spring in said socket to operate upon said projection to normally hold the runner upward; cam devices being provided between the runner and said body to hold the runner away from said body when in its spring-supported position; a latch fastened to said body for holding the runner in opposition to the spring; latch-releasing means playing longitudinally of the runner and adapted to extend below the drill to engage the ground to release the latch to allow the runner to be thrown upward by the spring; and a spring-catch to catch the runner when in its spring-supported position and being arranged to extend beyond the face of the runner to be engaged by the casing to thereby release the runner to allow said body to slide along the runner to allow the runner to be again brought against said body to be caught by the latch.

6. In a drill, the combination of a drill-body;

a runner mounted on one edge of the body; means connecting said runner with said body to allow the runner to move longitudinally and laterally; a spring for normally holding the runner up away from the cutting edge of the drill; said body being provided on one side with a gain in which the runner seats when in its retracted position, and said body being also furnished with upwardly and outwardly sloping faces and said runner furnished with downwardly and inwardly sloping faces to engage the sloping faces of said body; a latch for holding the runner in opposition to the spring; and latch-releasing means for engaging the ground at the bottom of the hole to release the latch when the drill is fully lowered.

7. A drill comprising a body; a runner at one edge of the body provided at its lower end with a cutting-lip; means connecting the runner with the body to allow the runner to move upward and outward on said body; a spring for normally holding the runner up; cam-shoulders being provided on the body above and below said spring to engage with the runner to operate the same for reaming the hole substantially as set forth.

8. The combination of a drill-body; a runner mounted on one edge of said body; means connecting said runner with said body to allow the runner to move longitudinally and laterally; a spring for normally holding the runner up away from the cutting edge of the drill; cam devices being provided between the runner and said body to hold the runner away from said body when in its spring-supported position; a latch for holding the runner in opposition to the spring; a plunger carried by said runner and arranged to slide therealong and to project below the drill when the runner is in its retracted position, said plunger being furnished with an oblique face to engage the latch and release the same when the plunger is moved upward.

9. The combination of the drill-body; a runner mounted on one edge of said body and furnished with two edge walls which extend on the opposite sides respectively of said body, one of said walls being furnished with a catch; a latch furnished with a circular portion seated in a circular recess in the side of said body and being embraced by the wall provided with said catch; a spring to normally hold the latch in position to engage the catch; and a plunger carried by the runner and adapted to extend below the drill when the runner is retracted and to release the latch when the drill-body descends after the plunger engages the bottom of the hole being drilled.

10. In a drill, the combination of a drill-body; a runner connected with said body to move longitudinally and laterally of said body; and a spring-shield between the drill-body and the lower end of the runner to slope upward and outward between the drill-body and the

runner to close the space between such drill-body and lower end of the runner.

11. In a drill, the combination of a drill-body; a runner connected with the body to
5 move longitudinally and laterally of the body; a bow-spring catch carried by the drill-body and extending between said drill-body and the upper end of the runner to catch the runner and hold it in its uppermost position and be-
10 ing bowed outward to extend beyond the face of the runner to be engaged by the well-casing to release the catch; said body being furnished with a groove which fits the sides of the bow-spring to prevent clogging.

12. In a drill, the combination of a drill-body; a runner connected with said body to move longitudinally and laterally of the body; a spring to throw the runner upward; cams being provided to hold the runner outward when
20 in its spring-supported position; a spring-containing case fixed to the runner; a plunger carried by said case and furnished with an oblique face to engage the latch to release it; and a spring in the case to depress the plunger be-
25 low the lower end of the drill when the runner is in its retracted position and to allow the oblique face of the plunger to release the latch when the plunger rests upon the ground and the drill-body is allowed to descend.

13. A drill furnished with a runner mounted on one edge thereof; an insulated case seated in the socket in the drill-body; a follower in said insulated case and projecting therefrom to operate the runner; and a spring in said in-
35 sulated case for operating the follower.

14. The combination with the drill-body; of a runner mounted on one side of the drill-body and connected thereto to move upward and outward and downward and inward; a latch for
40 holding said runner in its retracted position

and a sliding extension at the upper end of the runner to engage the shoe of the casing and thereby retract the runner far enough to latch the same; and a spring for retracting the runner extension when the same has moved past
45 the shoe of the casing.

15. The combination of the drill-body; the runner connected therewith to move outward and upward and downward and inward and furnished at its upper end with a slot, the lower
50 end of which slopes downward and outward; a runner extension fitted in said slot and having its lower end beveled to engage the lower end wall of the slot; means for slidingly holding the runner extension in the slot; and a
55 spring for normally holding the runner extension in position to be engaged by the shoe of the well-casing.

16. The combination with the runner slotted at its upper end and furnished with grooves in
60 the side walls of its slot, said slot having a downwardly and outwardly sloping end wall; a runner extension sliding in said slot and furnished with an upwardly and outwardly sloping face at the lower end; a pin for the upper
65 end of said extension projecting into the grooves in the walls of said slot to guide the upper end of said extension; a spring for normally holding the upper end of the extension extended and the lower end in the slot; and
70 shoulders on the extension to prevent its withdrawal from the slot.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, at Los Angeles, California,
75 this 2d day of February, 1901.

L. C. PRESTON.

Witnesses:

JAMES R. TOWNSEND,
JULIA TOWNSEND.