

No. 679,384.

Patented July 30, 1901.

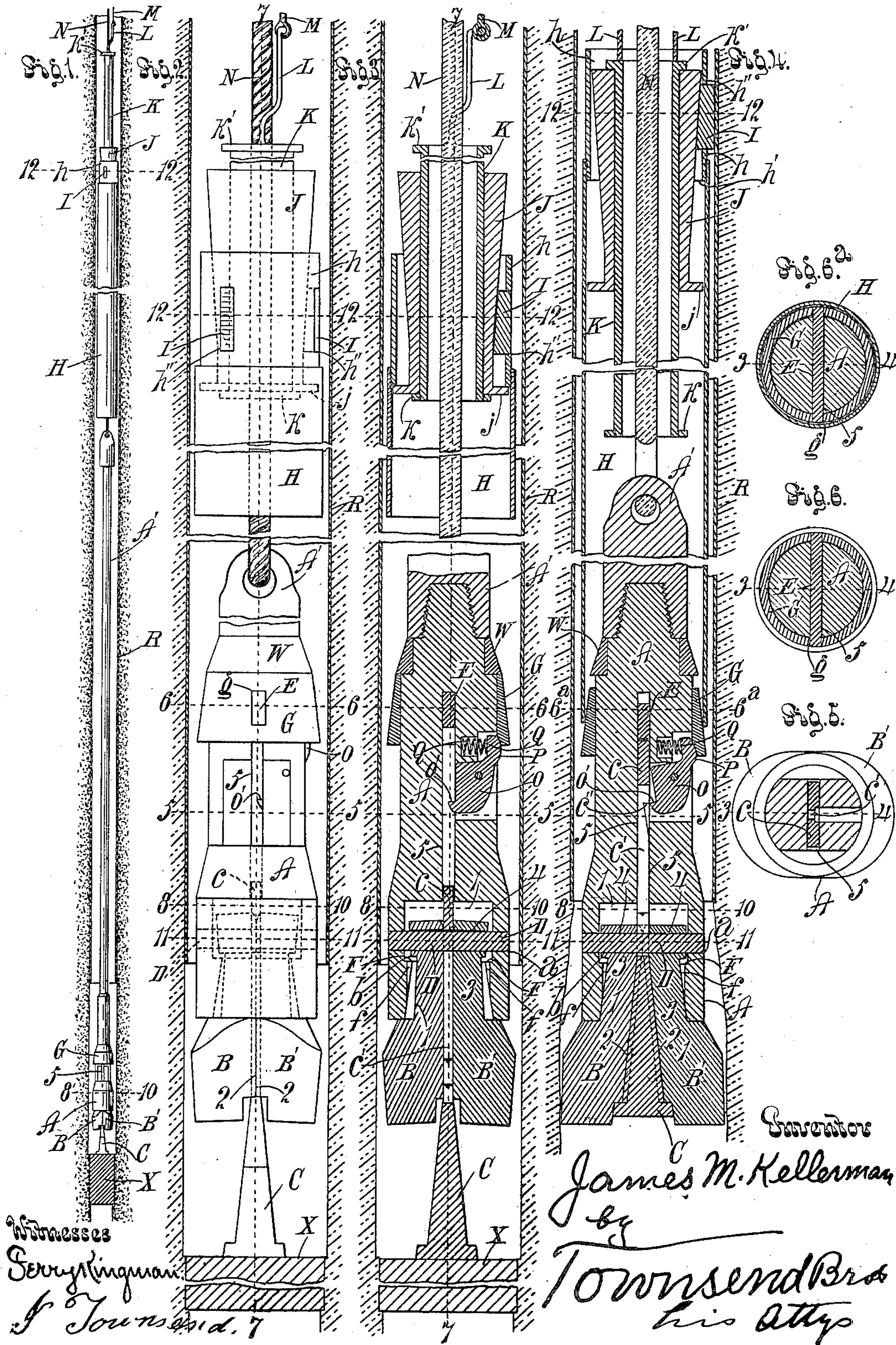
J. M. KELLERMAN.

EXPANDING UNDERREAMER AND DRILL.

(Application filed Oct. 16, 1899.)

(No Model.)

3 Sheets—Sheet 1.





No. 679,384.

Patented July 30, 1901.

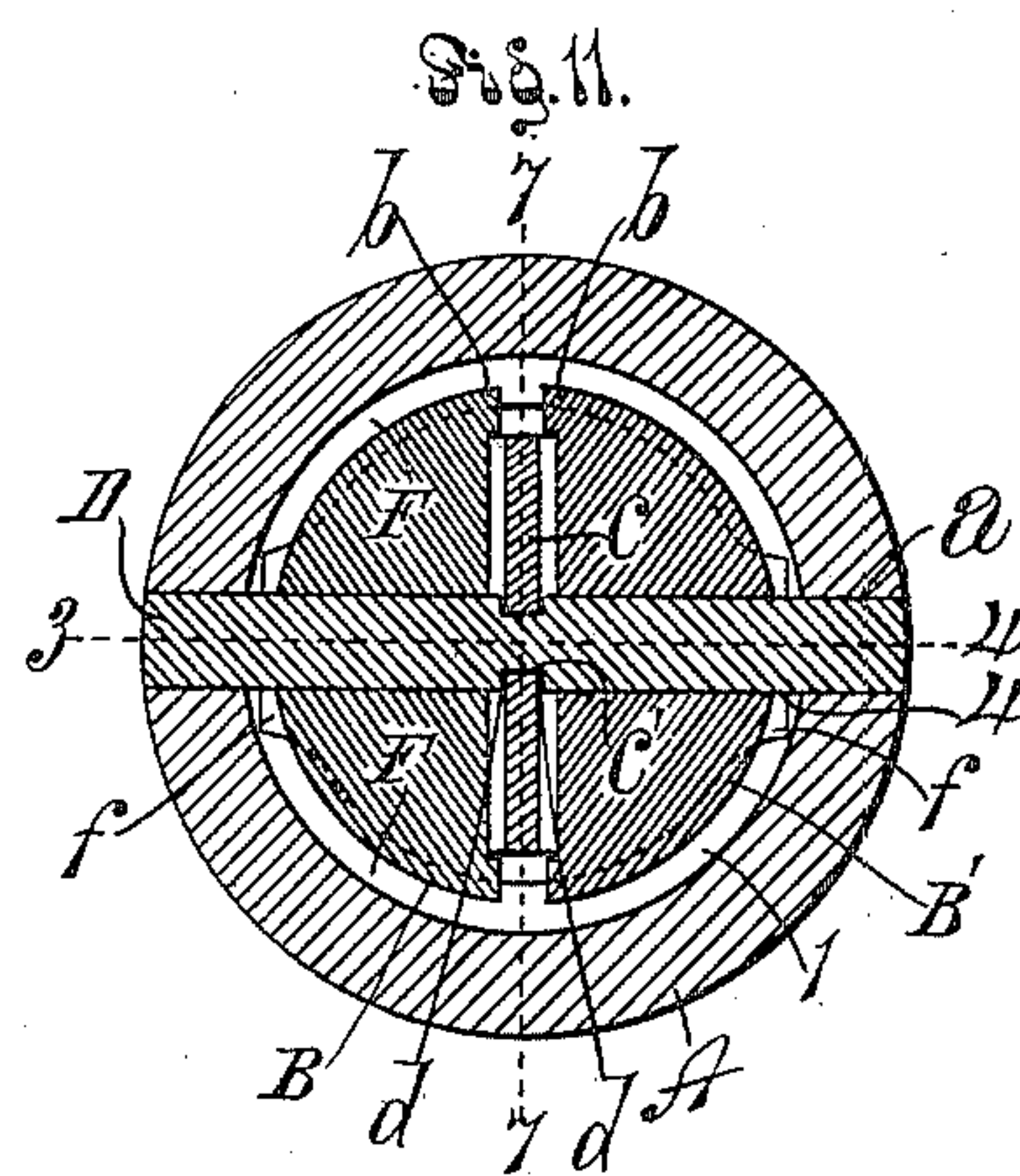
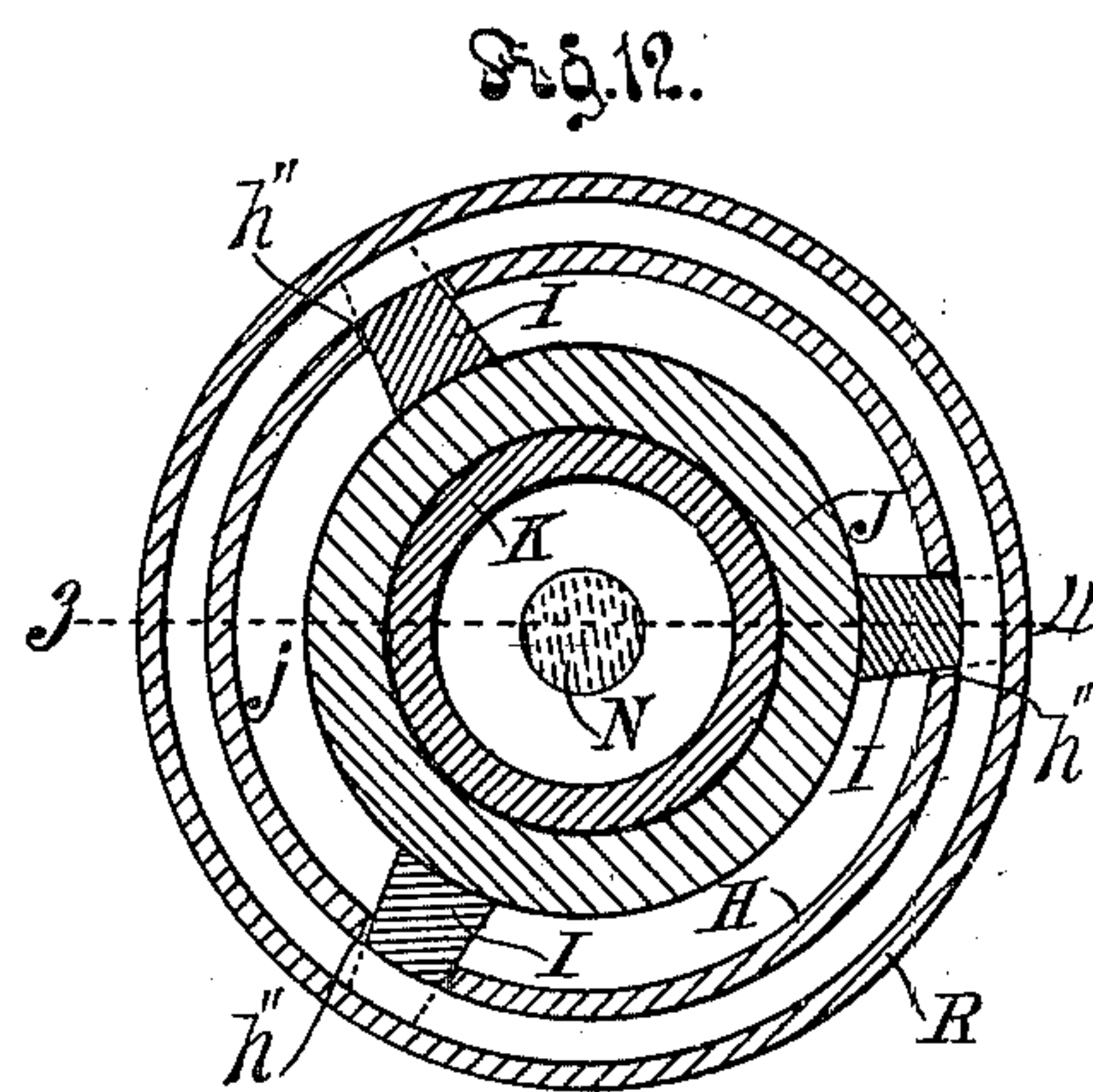
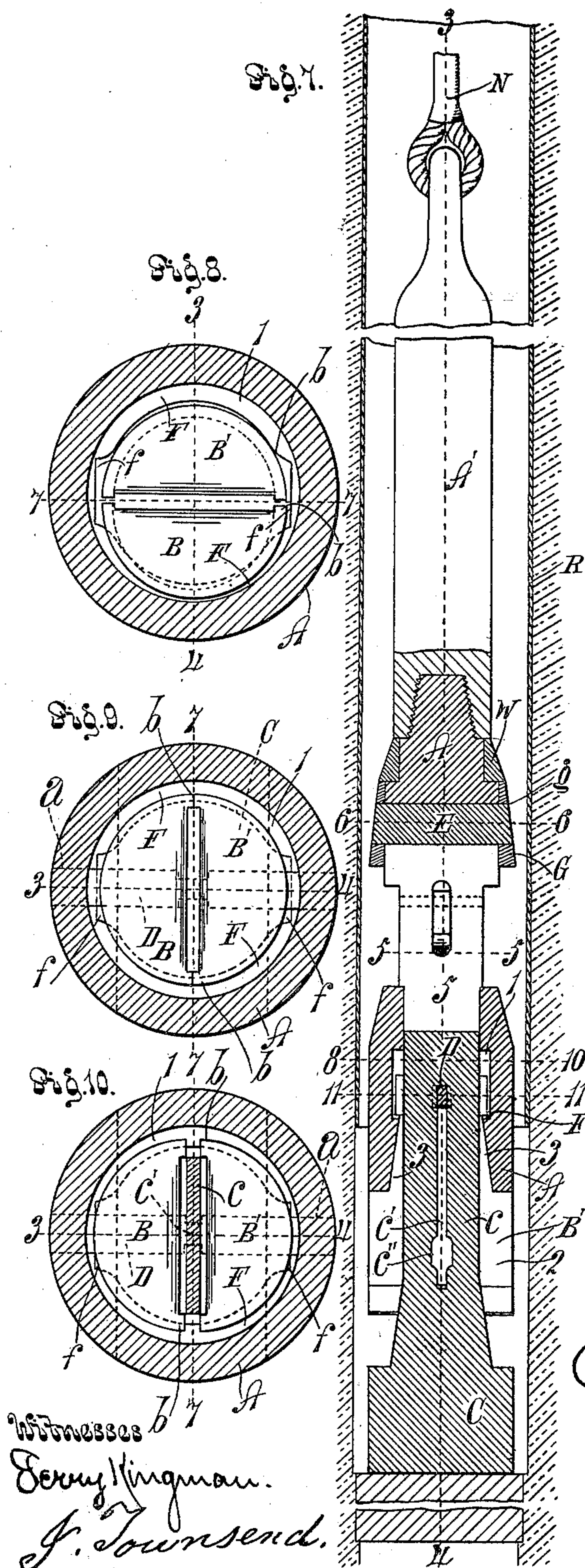
J. M. KELLERMAN.

EXPANDING UNDERREAMER AND DRILL.

(Application filed Oct. 16, 1899.)

(No Model.)

3 Sheets—Sheet 2.



Witnesses  
 Jerry Kingman.  
 J. Townsend.

Inventor  
 James M. Kellerman  
 By Townsend Bros.  
 His Attys



No. 679,384.

Patented July 30, 1901.

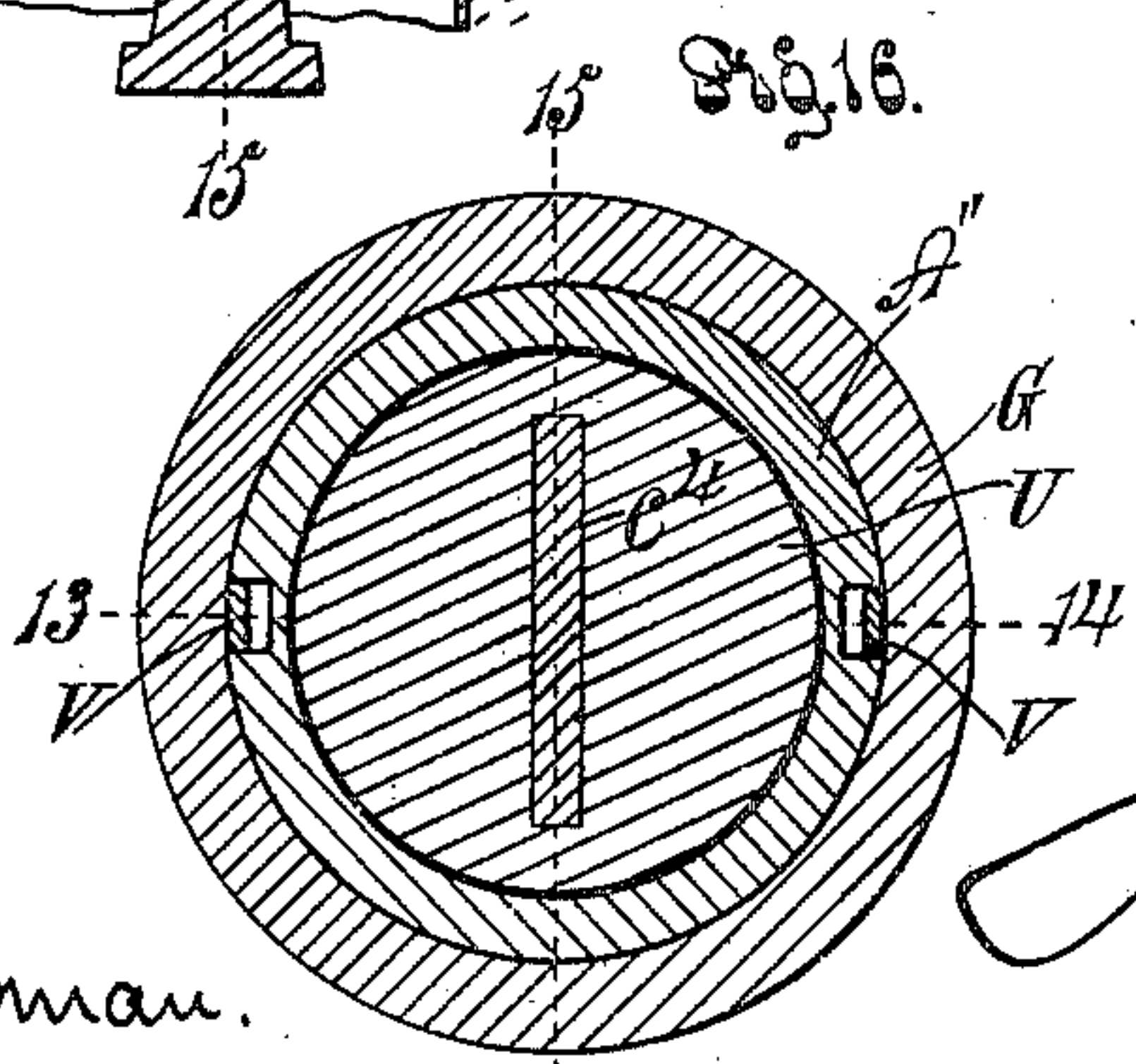
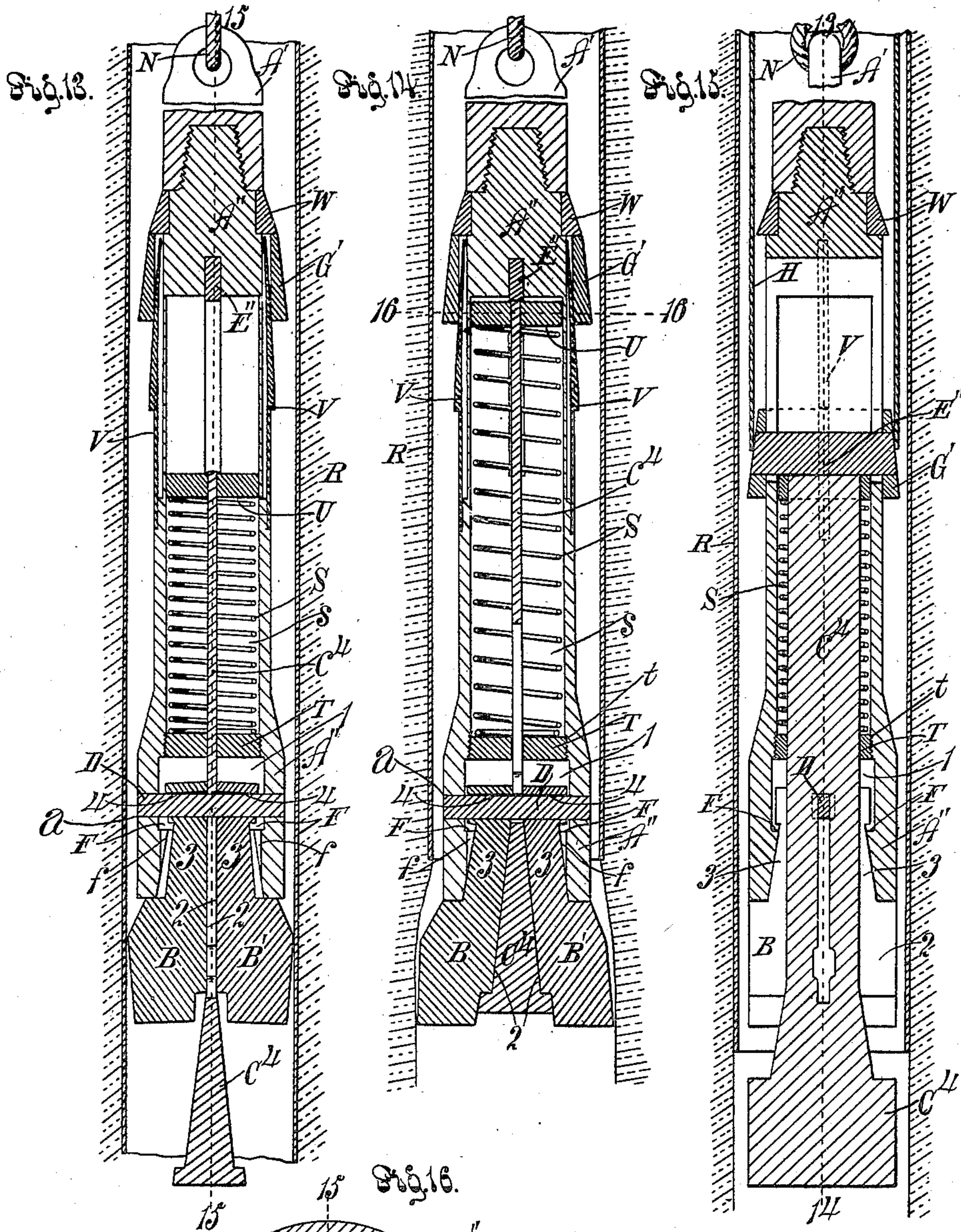
J. M. KELLERMAN.

EXPANDING UNDERREAMER AND DRILL.

(Application filed Oct. 16, 1899.)

(No Model.)

3 Sheets—Sheet 3.



Witnesses  
Serry Kingman.  
J. Townsend.

Inventor  
James M. Kellerman  
by Townsend Bros.  
his Attys.



# UNITED STATES PATENT OFFICE.

JAMES M. KELLERMAN, OF LOS ANGELES, CALIFORNIA.

## EXPANDING UNDERREAMER AND DRILL.

SPECIFICATION forming part of Letters Patent No. 679,384, dated July 30, 1901.

Application filed October 16, 1899. Serial No. 733,800. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES M. KELLERMAN, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Expanding Underreamer and Drill, of which the following is a specification.

The object of my invention is to provide a practical tool for drilling a hole larger than the casing or for underreaming a hole underneath the casing in a well.

In carrying out my invention I have provided positive means for expanding the bit or reamer and for releasing the bits to allow them to collapse in order to draw the tool out of the casing. I also provide against the use of any pivot-bolts in positions where any strain of the work will be applied.

It is an object of my invention to produce a tool of great strength which will not be liable to become broken and which will not be liable to come to pieces and drop any of its parts in the hole being drilled. In this device the expanding bits are loosely supported in a chambered stock by shoulders and are thrown outward at their lower ends by a wedge, and the wedge may be held in wedging position by a catch or by a spring or by both a catch and a spring. The catch may be of different forms and the device may be varied in its form without departing from my invention.

In the accompanying drawings I have shown the device in two of the forms in which it may be embodied. The wedge is shown both with and without a wedge-sustaining spring.

Figure 1 is a fragmental elevation showing my invention in a well with parts in position ready for expanding the bits for reaming beneath the well-casing, which is shown drawn up for a distance in order to allow a plug to be let down to the reaming-shoulder of the wall of the well below the casing, so as to hold the wedge while the tools are lowered on the wedge, thus to expand the bits. This plug is only required for underreaming beneath the casing when the tool is not provided with a wedge-sustaining spring. In case the tool is used as a drill the bottom of the hole will serve the purpose of the plug shown in this view. Where a wedge-sustaining spring is used, such spring serves the purpose of the plug. Fig. 2 is a fragmental elevation, on a

larger scale, showing more in detail the parts shown in Fig. 1. Parts are broken away to contract the view. Fig. 3 is a fragmental sectional detail in the plane indicated by line 3 4, Figs. 5, 6, 6<sup>a</sup>, 7, 8, 9, 10, 11, and 12. The parts are not shown in the same position in all of the views. In Figs. 1, 2, and 3 the tool is shown collapsed. Fig. 4 is a fragmental axial section on the same plane as Fig. 3, but showing the parts in position when the tool is expanded. Fig. 5 is a plan indicated by line 5 5, Figs. 2, 3, 4, and 7, with the wedge in wedging position and the bits expanded. Fig. 6 is a plan section on plane indicated by line 6 6, Figs. 2, 3, and 7. Fig. 6<sup>a</sup> is a plan section on line 6<sup>a</sup> 6<sup>a</sup>, Fig. 4. Fig. 7 is a sectional elevation on a plane indicated by line 7 7, Figs. 2, 3, 8, 9, 10, and 11, the stock being sectioned only in part. Fig. 8 is a section on a plane indicated by line 8 10 in Figs. 1, 2, 3, 4, and 7. In this view one of the bits B is shown fully inserted into place with its projection over the shoulder of the stock, while the other bit B' is shown in the inserting position. Fig. 9 is a plan section on said plane 8 10 in Figs. 2 and 3, showing the bits inserted and turned a quarter-turn from the position shown in Fig. 8, so that the bits cannot be withdrawn. Fig. 10 is a section on line 8 10, Figs. 1, 2, 3, and 7, with the wedge in place. Fig. 11 is a section on plane indicated by line 11 11 in Figs. 2, 3, 4, and 7. Fig. 12 is a section on line 12 12, Figs. 1, 2, 3, and 4, with the parts in the position indicated in Fig. 3. Fig. 13 is a vertical axial section of my invention as applied with a wedge-sustaining spring. The tool is shown in the act of descending in the casing. Line 13 14, Figs. 15 and 16, indicates the plane of section in Figs. 13 and 14. Fig. 14 is a view of the tool shown in Fig. 13 when the bits are expanded. Fig. 15 is an axial mid-section on line 15 15, Figs. 13 and 16. Fig. 16 is a plan section on line 16 16, Fig. 14.

My newly-invented expansion-drill and underreamer comprises a stock A, provided with a transverse opening or way *a* and with an axial shouldered chamber 1; two bits B B', each being flat on its inner face 2 and having a circumferentially-channeled neck 3 to seat in opposite sides of said chamber and also provided with a transverse way 4 to register with the transverse way *a* of the stock



A; a wedge C to seat between the bits B B' to hold them in expanded position and provided with a stem or upward extension *c*, which has a slot *c'* to register with the ways of the bits and stock; a pin D, inserted through the ways of the stock, bits, and stem; means for temporarily holding the wedge in its wedging position, and means for forcing the wedge out of wedging position. The stock A is provided with a slot 5, extending across and lengthwise of the stock at its upper end, the axial chamber 1 and the transverse opening or way *a* being at the lower end of the bit.

E indicates a pin inserted through the stock-slot 5 to engage the head of the wedge-stem *c* to force the wedge downward when it is desired to contract the reamer.

F indicates the shoulder of the wall of the chamber 1. The neck of each of the bits is provided with a projection *b* to fit over the shoulder F when the neck is sufficiently inserted into the chamber. The shoulder F of the chamber is notched, as at *f*, on opposite sides of said chamber.

In Fig. 8 one of the bits B is shown fully inserted into the chamber 1, and the other bit B' is shown in position for being inserted. The notches *f* allow the ends of the projection *b* of either of the bits to pass the shoulder F while the part B is fully inserted, as shown, and the part B' is laid on top of it, with the notches *f* at opposite edges of the joint between the two bits. When the two bits have been fully inserted and are turned a quarter of the way around, (from the position shown in Fig. 8,) as indicated in Fig. 9, neither one of them can be withdrawn from the stock, for the reason that the ends of the projection *b* will be stopped by the shoulder F. This positively secures the bits against all danger of dropping out. When the bits are in this position, the wedge C will be inserted to bring its stem *c* up into the stock between the bits B and B' and to project above the tops of said bits.

Any suitable means may be provided for temporarily holding the wedge in its upmost position for expanding the bits. In Figs. 1, 2, and 3 I have shown a latch for this purpose, and in Figs. 13, 14, and 15 I have shown a spring for this purpose.

I will now describe the means for forcing the wedge down.

G indicates a sliding member upon the stock A and provided with a keyway *g*. The key or pin E, which is to engage the top of the wedge-stem *c*, is mounted in the keyway *g* of the sliding member G and also in the slot 5 of the stock. This key extends in the path of the stem or extension *c* of the wedge. I provide suitable means for forcing the sliding member downward.

H indicates a weighted member having an upward extension *h*. Said weighted member is arranged to engage the sliding member G to force it downward. The weighted member preferably consists of a piece of pipe or

tube of considerable length to slide up and down with relation to the stock of the drill or reamer. I indicates friction-blocks mounted to slide radially of said weighted member to engage and disengage the walls of the well-casing. The outer faces of these blocks are preferably roughened, as indicated in Fig. 2. One or more of these blocks may be provided, as desired; but I prefer to use three friction-blocks, as indicated in Fig. 12, the same being arranged to slide radially of the extension *h* of the weighted member and being set at equal distances around a wedge J, which is provided for forcing said friction-blocks outward to engage the well-casing. The blocks are preferably wider at their inner portion than the way in which they slide, thus to prevent dropping out.

K indicates a carrier and jar for the block-wedge J. Said carrier moves independently of said wedge to serve as a jar for the wedge. The bail L and rope M constitute means for raising and lowering the carrier independently of the stock A, which is raised by the usual means, such as the rope N. The carrier K is provided with stops *k k'* to limit the movement of the carrier with relation to the wedge J, and the wedge J is provided with a stop *j* to engage with the stop *h'* on the weighted member H. The stop *h'* is preferably formed by the lower end of the extension *h* of the weighted member H. The weighted member H is preferably a long section of iron pipe, and the extension *h* is a shorter section of iron pipe screwed into the top of the long section, the extension *h* being slotted, as at *h''*, to receive the friction-blocks I. The wedge J is preferably a frustum of a hollow inverted cone, which fits around the body of the carrier K. The cone tapers downward, so that when the wedge is lowered with relation to the blocks I it will force said blocks I out through the slots *h''* of the extension *h*. By referring to Figs. 3 and 4 it will be seen that after the wedge C has been brought to rest the weighted member H may be lowered to rest upon the member G and that when the weighted member H engages the member G it will then be held from further descent unless it drives the member G down. If it comes to rest without driving the member G down, the carrier K will then be lowered until the projection or stop *k'* at the top of the carrier engages the top of the wedge J. The weight of the weighted member H and carrier K will then be exerted to force the wedge J downward, thereby wedging the blocks I out to firmly engage the casing R. If desired to wedge the blocks with considerable force, this can be done by raising and lowering the carrier K, which is made of metal, and allowing it to strike upon the top of the wedge J after the manner of operating jars. When the blocks have thus been wedged securely, so as to hold the weighted member H firmly, the tools will be drawn upward by the rope N, while the weighted member H remains



stationary by reason of the blocks I. This causes the ring G to remain stationary while the stock A slides up.

In Figs. 2, 3, and 4, O indicates a latch 5 pivoted in the stock A and provided with a catch O' to catch in a notch c'' in the stem of the wedge. When the stock is drawn upward through the ring member G, a portion P of the latch engages the ring G and is there- 10 by forced inward against the pressure of the spring Q, which normally holds it out in the path of the ring or sliding member G. The portion or handle P has a sloping face to engage with the ring G, so that as the tool is 15 drawn up the catch is withdrawn from the notch c'' in the stem of the wedge, thus releasing the wedge and allowing the key E, which engages the top of the wedge, to force the wedge down, thus to withdraw it from be- 20 tween the bits and allow the bits to collapse as they are drawn up through the casing.

In the form shown in Figs. 13, 14, 15, and 16 a spring S is provided in the stock around the stem c<sup>4</sup> of the wedge C<sup>4</sup>. The spring is 25 held in the barrel by a plug T, which is screwed into the lower end of the spring-chamber s. U indicates the head of the stem c<sup>4</sup> of the wedge. The spring S presses up on the head U and normally holds the wedge C<sup>4</sup> in 30 its wedging position. V indicates spring-latches arranged to catch over the top of the sliding member G when such member is brought down into its lowest position, as indicated in Figs. 15 and 16, thus to hold the 35 wedge down to allow the tool to be drawn out of the casing. W indicates a shouldered projection on the stock to protect the upper end of the sliding member G.

Referring to Fig. 7, it will be noted that 40 the slot c' in the stem c of the wedge is provided with an enlargement C'' a short distance above the lower end of the slot, and by referring to Fig. 11 it will be seen that the pin D is notched at the middle, as indicated at d, 45 the notched portion fitting the narrow portion of the slot c', while the body of the pin D on each side of the notch is of a width to barely slip through the enlarged portion c'' of the slot. By this means the pin D can be 50 inserted only by bringing the notch c'' to register with the way a. Then the pin D may be driven in or out, as the case may be; but when the wedge C is at its upper or lower limit of movement it is impossible to with- 55 draw the pin D. This insures against any accidental loss of the pin D. The wedge-driving pin E is held in place by riveting or battering the outer ends of said pin after the pin has been inserted through the stock and 60 the ring G. The ring-retaining member W is held in place by the stem A', which is screwed onto the end of the stock in the ordinary manner.

The cross-head U of the spring-supported 65 wedge-stem c<sup>4</sup> is held in place by riveting or battering the top of the wedge-stem at the top of the cross-head.

The way for the pin E is arranged at right angles to the way for the pin D and extends over the top of the stem of the wedge, in the 70 line of the width of said stem, so as to engage with the entire top of said stem.

To assemble the tool shown in Figs. 13, 14, and 15, the plug T will be slid onto the stem, 75 and the spring S brought into place and secured by the cross-head U, which is fastened in place by battering or riveting the end of the stem c<sup>4</sup>. Then the cross-head U, the stem c<sup>4</sup>, spring S, and plug T will be inserted into the chamber s of the stock, and the wedge 80 and its stem will then be rotated, thus turning the plug T until it is screwed well into the screw-threaded seat t therefor in the stock and the wedge held with its width extending in a line drawn from one notch f to the other. 85 Then the bits will be inserted, one at a time, as suggested by Fig. 8, and when in place the wedge and bits will be turned a quarter-way around and the wedge brought into po- 90 sition to allow the pin D to be inserted. When the pin D is in place, the tool is ready for use.

To lower the tool shown in Figs. 13 to 16 into one well, the wedge will be drawn down, 95 as indicated in Fig. 13, and the tool collapsed. Then the bits will be inserted into the casing, which will hold them from expanding until they are below the casing. When the 100 bits are lowered to beneath the casing, the spring causes the wedge to force them out, so that they begin to cut the walls of the well, and upon further operation of the tool the bits will cut their way into the walls, being 105 forced out by the updrawn wedge until the bits are fully expanded. When it is desired to withdraw the tool from the well, the rope 110 M will be lowered to lower the member H, carrier K, and wedge J, and to force the ring G downward or to hold it while the stock of the tool is drawn upward by the rope M, thereby 115 withdrawing the wedge from beneath the bits B B' and drawing the ring G' down below the catches V, thus to prevent the spring from again drawing the wedge C<sup>4</sup> up to expand the bits. Then the rope M will be drawn 120 upward to lift the carrier K and the wedge J, and thus release the blocks I and allow the sliding member H to be drawn up. Then the tools can be drawn out of the well.

A' in Figs. 13, 14, 15, and 16 indicates 125 the form of stock provided with the wedge-lifting spring, and E' indicates the wedge-operating pin, which strikes upon the head of the wedge-stem c<sup>4</sup>. With these exceptions like characters represent like parts in the several views.

In operating the form shown in Figs 1, 2, and 3 when the tool is used as an under- 130 reamer a block of wood X is dropped into the well to lodge at the reaming-shoulder beneath the casing. The casing being drawn up for a distance above the underreaming-shoulder, the tool will be lowered into the well until the wedge C rests upon the block



X. Then the tool will be lowered to force the wedge between the jaws until the catch O' catches in the notches c'', thus holding the wedge in place. Then the tool will be operated in the ordinary manner, and the block X will be driven down and broken up by the bits, to be afterward removed in the ordinary course of work.

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

1. An expansion-drill and underreamer comprising a stock provided with a transverse opening or way and with an axial shouldered chamber; two bits, each being flat on its inner face and having a circumferentially-channeled neck to seat in opposite sides of said chamber, and also provided with a transverse way to register with the transverse way of the stock; a wedge to seat between the bits to hold them in expanded position and provided with a stem which has a slot to register with the ways of the bits and stock; a pin inserted through the ways of the stock, bits and stem; means for temporarily holding the wedge in its wedging position; and means for forcing the wedge out of wedging position.

2. An expansion-drill and underreamer comprising a stock having a shouldered chamber and a transverse opening or way at its lower end; two bits, each provided with a neck to seat in opposite sides of said chamber and also provided with a transverse way to register with the lower transverse way of the stock; a wedge to seat between the bits to hold them in expanded position and provided with a stem which has a slot to register with the ways of the bits; a pin inserted through the ways of the stock, bits and stem; means for temporarily holding the wedge in its wedging position; and means for forcing the wedge out of wedging position.

3. An expansion-drill and underreamer comprising a stock with a slot extending across and lengthwise of the stock at its upper end and with an axial chamber and a transverse opening or way at its lower end; two bits, each provided with a neck to seat in opposite sides of said chamber and also provided with a transverse way to register with the lower transverse way of the stock; a wedge to seat between the bits to hold them in expanded position and provided with a stem which has a slot to register with the ways of the bits and which stem extends into said slot of the stock when the wedge is seated to hold the bits expanded; a pin inserted through the ways of the stock, bits and stem; means for temporarily holding the wedge in its wedging position; a pin inserted through the stock-slot to engage the head of the stem; and means for operating said last-named pin to force the wedge out of its wedging position.

4. In an expanding bit and underreamer, the combination of a stock provided with a chamber at its lower end, the walls of said chamber being shouldered; two bits, each provided with a neck to seat in said chamber

and provided at the upper end with a projection to fit over said shoulder when the neck is inserted; a wedge to wedge between said bits and provided with a stem to extend above the upper ends of said necks and to hold the necks outward with their projections over the shoulder; means for retaining the wedge in the stock; means for temporarily holding the wedge in its wedging position; and means for forcing the wedge out of its wedging position.

5. An expanding bit and underreamer comprising a stock provided at its lower end with a chamber with shouldered walls, the shoulder being notched on opposite sides of said chamber; two bits, each provided with a neck having a projection to extend over said shoulder to prevent withdrawal of the bits when the two bits are inserted and are turned to bring such projections over the shoulder away from the notches thereof; the ends of said projections being adapted to pass through the notches when the bit is brought into position for that purpose; and means carried by the stock for spreading the bits apart.

6. In an expanding bit and underreamer, the combination of a stock provided at its lower end with a transverse keyway and with a chamber with shouldered walls, the shoulder being notched on opposite sides of such chamber; two bits, each provided with a neck having a projection to extend over such shoulder when the bits are in position for that purpose and to pass through the notches when adjusted for that purpose; each of said bits being provided with a transverse hole or keyway, the two holes registering with said way of the stock when the bits are turned to bring the projections over the shoulder; a wedge provided with a stem inserted between the bits and provided with a slot to register with the said keyways; a key inserted in said keyways; and means for adjustably holding the wedge in its wedging position.

7. An expanding bit and underreamer comprising a slotted stock; two bits loosely secured in the lower end of the stock; a wedge for forcing the bits apart; a sliding member upon the stock and provided with a keyway; a key in said keyway and slot and extending in the path of an extension of the wedge; means for temporarily holding the wedge in its wedging position; and means for forcing the sliding member downward.

8. An expanding bit and underreamer comprising a slotted stock; two bits loosely secured in the lower end of the stock; a wedge for forcing the bits apart; a sliding member upon the stock and provided with a keyway; a key in the keyway and slot and extending in the path of an extension of the bit-wedge; means for temporarily holding the bit-wedge in its wedging position; a weighted member to engage the sliding member to force it downward; one or more friction-blocks mounted to slide radially of said weighted member to engage the walls of the well-casing; a wedge



for forcing said friction-blocks outward to engage the casing; a carrier for the block-wedge; and means for raising and lowering the stock.

9. The combination with operative parts of  
5 a well drilling or reaming tool, of a weighted member; one or more friction-blocks mounted to slide radially of said weighted member to engage the walls of the well-casing; a wedge for forcing said friction-blocks outward to engage the casing; and a carrier and jar for  
10 such wedge.

10. The combination with operative parts of a well drilling or reaming tool, of a weighted member; one or more friction-blocks mounted  
15 ed to slide radially of said weighted member

to engage the walls of the well-casing; a wedge for forcing said friction-blocks outward to engage the casing; and a carrier and jar slidingly connected with the wedge and provided with stops to limit its movement relative to the wedge. 20

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, at Los Angeles, California, this 7th day of October, 1899.

J. M. KELLERMAN.

Witnesses:

JAMES R. TOWNSEND,  
FRANCIS M. TOWNSEND.