J. M. REAMS.

RATCHET DRILL.

APPLICATION FILED FEB. 17, 1909.

966,597.

Patented Aug. 9, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

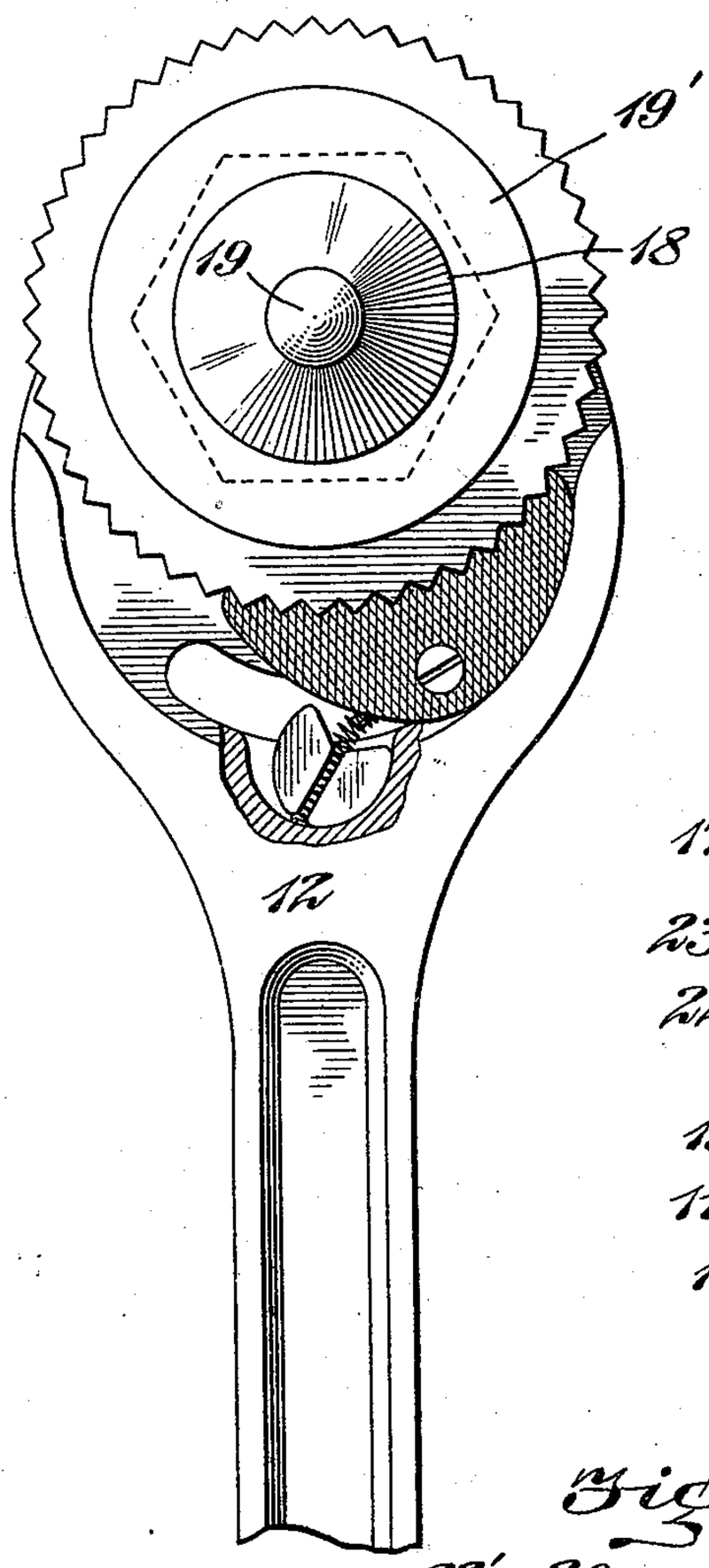


Fig. 2.

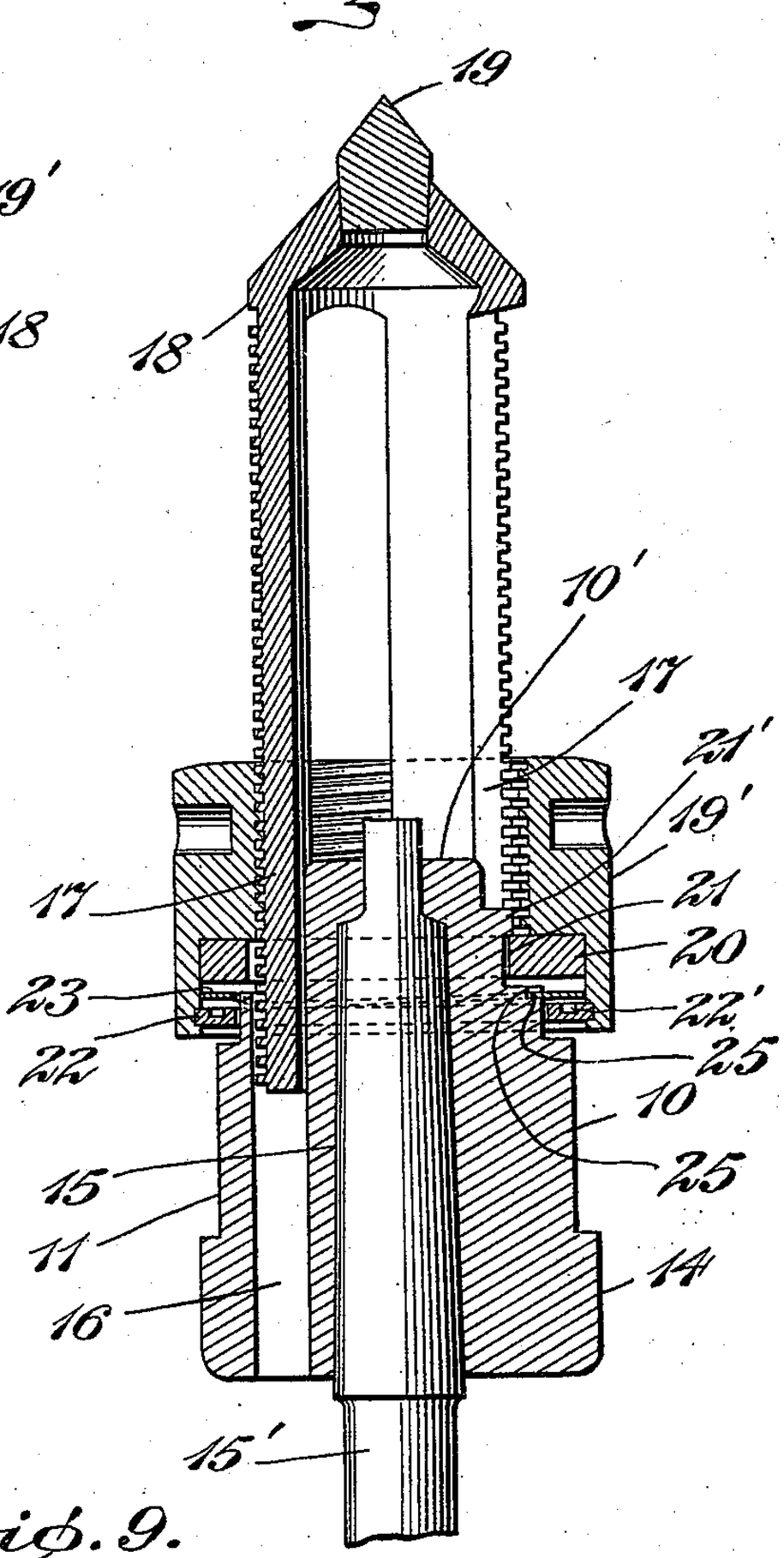
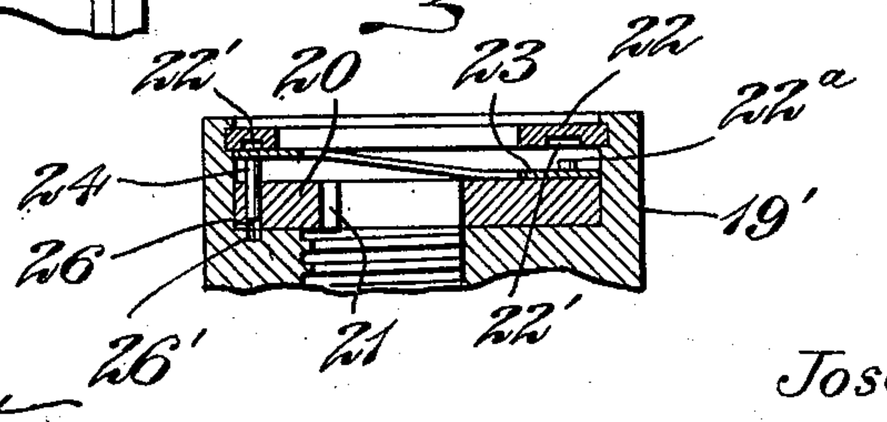


Fig. 9.



WITNESSES

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2 SHEETS—SHEET 2.

24

Fig. 3.

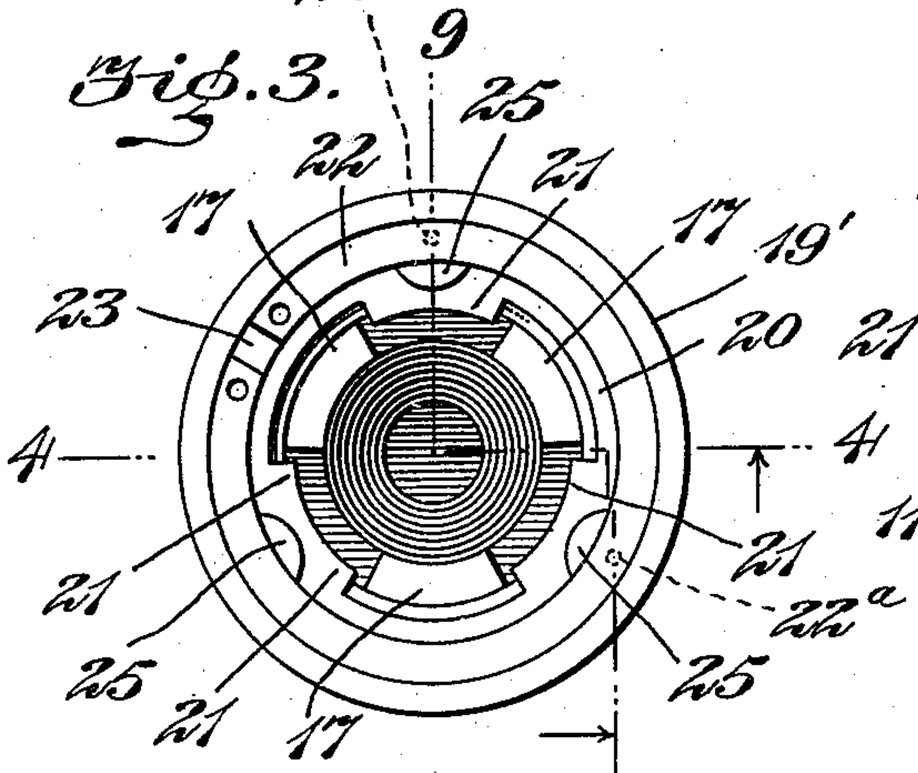


Fig. 5.

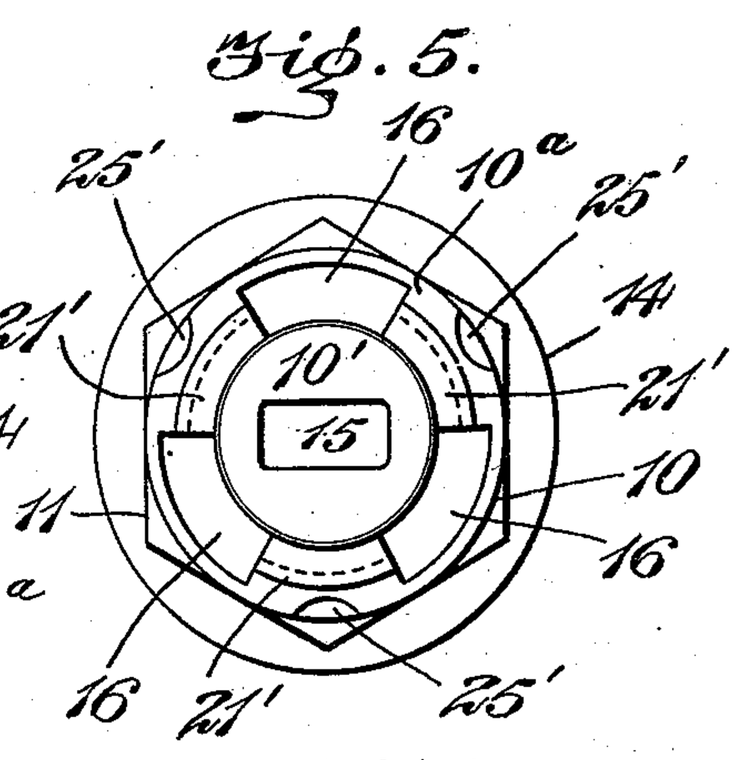


Fig. 4.

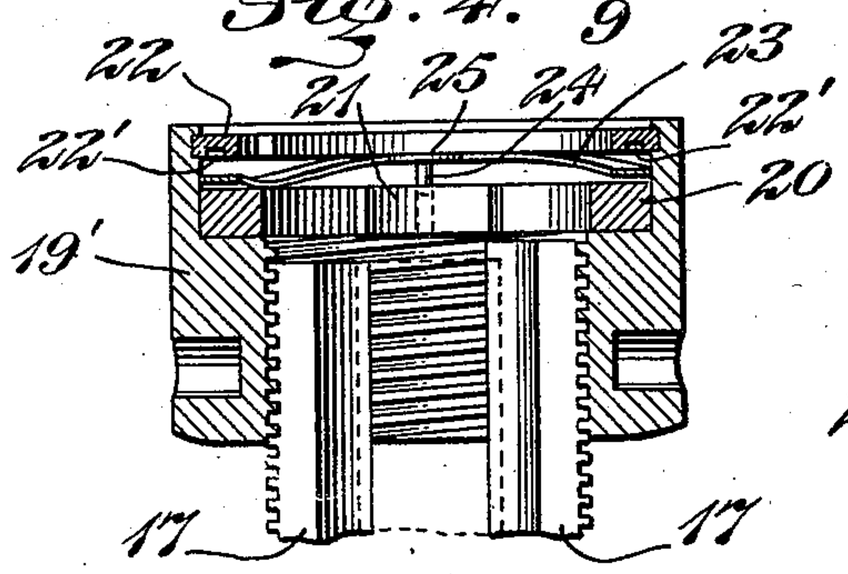


Fig. 6.

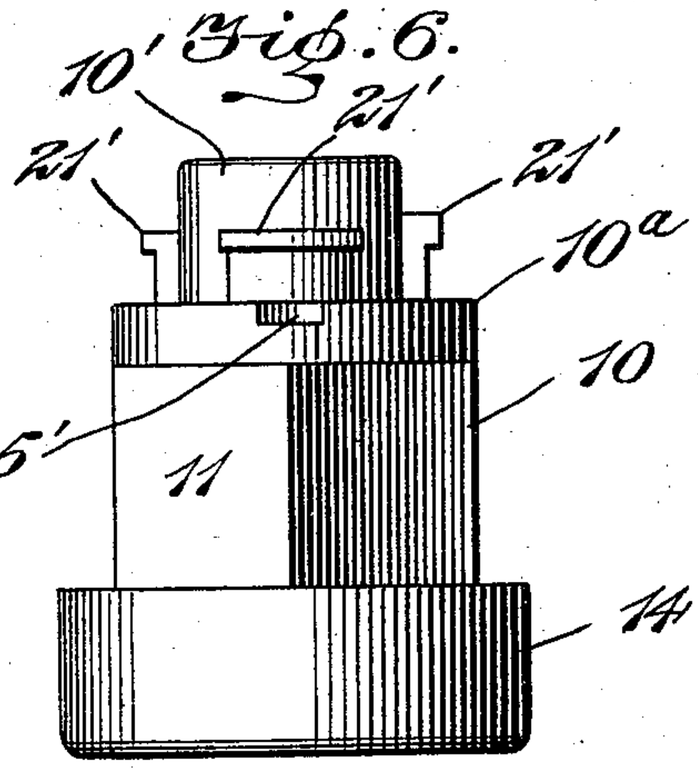


Fig. 7.

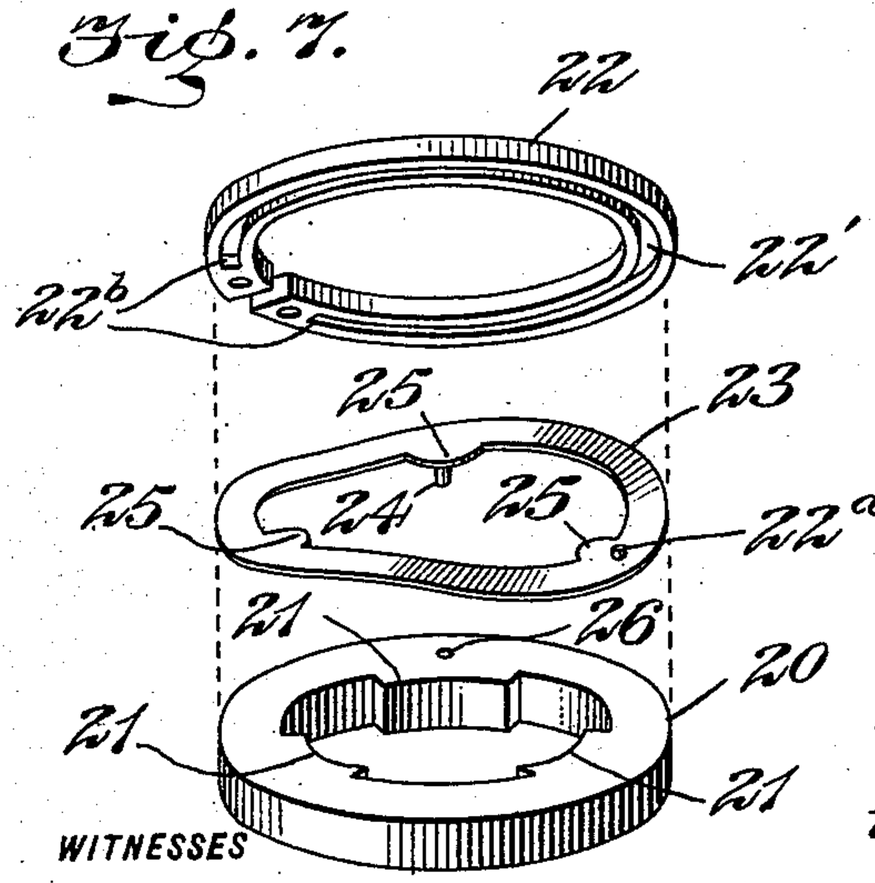
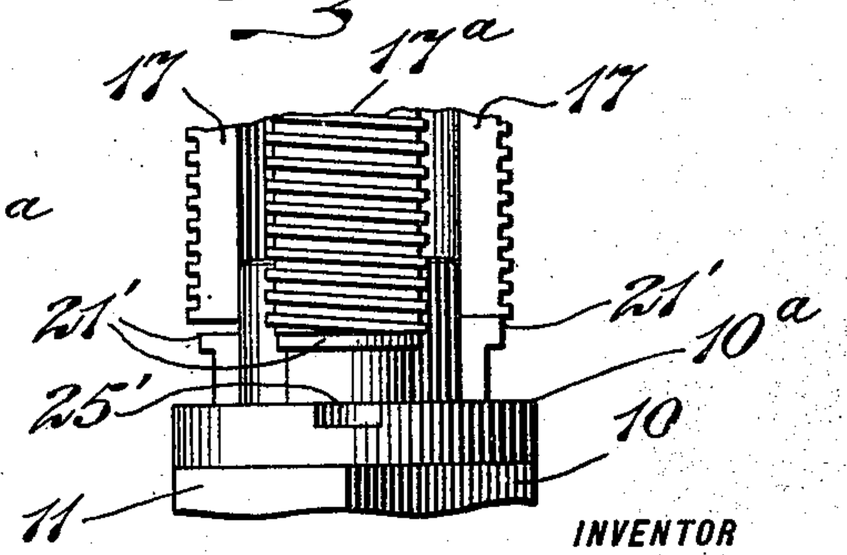


Fig. 8.



WITNESSES

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JOSEPH M. REAMS, OF NEW YORK, N. Y.

RATCHET-DRILL.

966,597. Specification of Letters Patent. Patented Aug. 9, 1910.

Application filed February 17, 1909. Serial No. 478,415.

To all whom it may concern:

Be it known that I, JOSEPH M. REAMS, of the borough of Manhattan, in the city, county, and State of New York, have invented certain new and useful Improvements in Ratchet-Drills, of which the following is a full, clear, and exact specification, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates particularly to a ratchet drill device by means of which the drill may be rotated in positions not readily accessible, the drill being inserted in the drilling head or socket and turned with a step by step motion while the drill is advanced by means of a feed-screw which is rested against a fixed support.

This application is, in part, a continuation of my application filed September 27, 1907, Serial No. 394,795.

The object of my invention is to secure improvement in the devices heretofore devised for this purpose, and to provide a compact tool with a maximum feed capacity, which will be simple and inexpensive, strong and durable.

Notwithstanding the compactness of my tool, the drill can be driven a comparatively long distance without readjustment of the backing against which the thrust of the drill is exerted.

The invention involves other features of importance all of which will be fully set forth hereinafter and particularly pointed out in the drawings.

Reference is had to the accompanying drawings, in which—

Figure 1, is a plan view of the device with the ratchet wrench in position; Fig. 2 is a vertical section; Fig. 3 is a bottom plan view of the feed nut, showing the feed-screw therein; Fig. 4 is a section on the line 4—4 of Fig. 3; Fig. 5 is a plan view of the body showing, among other things, the drill socket, and the recesses for the feed-screw; Fig. 6, is a side elevation of the body. Fig. 7, is a perspective view of parts contained within the feed-nut, a ring having lugs to engage the wings on the body of the drill socket as well as the fingers of the feed-screw, a split ring to hold the parts within the feed-nut, and a ring having a bend in its circumference providing it with spring action, to keep the first mentioned ring in position; Fig. 8, is a side view of portions of the body and feed-screw, the fingers of the feed-screw (two of which are short) being superposed on the wings of the body, two of said wings also being short. Fig. 9, is a section on the lines 9—9 of Fig. 3.

The body has a portion 11 of hexagonal or other angular or non-angular sectional form (see Figs. 2 and 6), designed to be received by the head of the ratchet wrench or other instrument for rotating the drill. A ratchet wrench for this purpose is indicated at 12 in Fig. 1, and may be of any desired form of construction. It may be, for example, as illustrated in the drawings herein, the type of ratchet wrench shown in my patent of July 14, 1908, No. 893,097.

The body 10 has a flange 14 to engage the head of the wrench and a socket as at 15, to receive the drill 15′ or other tool. The body also has a plurality of longitudinal recesses 16, which in the drawings are three in number. These passages receive the fingers 17 of the divided feed-screw 18 permitting the fingers to slide freely through them. The head of the feed-screw 18 extends along the outer surface of the fingers 17, and the end of the body 10 opposite the flange 14 is reduced as at 10′, so as to leave the threads of the fingers exposed when the latter are inserted into the body.

The outer end of the feed-screw has a center point 19, which may be of any desired construction. The nut 19′ is interiorly threaded to engage the feed-screw. The nut is also provided with three interlocking members, consisting of a bearing ring 20, split ring 22 and spring ring 23. The bearing ring 20 has inwardly extending lugs 21 to engage corresponding wings 21′ on the body 10, and which are intended to hold the feed-nut rotatably to the body. These lugs 21 when engaged by the fingers of the feed-screw also prevent the ring 20 from rotating with the feed-nut. In a recess in the feed-nut 19′ is the split ring 22 to keep the parts in position and to lock with the two other rings, when required, as hereinafter ex-

plained. Between the split ring 22 and the bearing ring 20 is the spring ring 23, having a bend in its circumference, as shown in perspective in Fig. 4 which serves as a spring to press the bearing-ring 20 away from the split-ring 22, thus holding the ring 20 in such position that its lugs may bear upon the wings 21′. The spring-ring 23 is provided with a pin 24 which fits loosely into a corresponding hole 26 in bearing-ring 20, so that these two rings will normally rotate together when the body 10 is rotated by the actuating tool. On the inner-face of the nut 19′ which is the bearing for the bearing-ring 20 is a hole 26′ corresponding to the hole 26 in the bearing-ring; and when lateral pressure is applied inwardly to the spring ring 23, the pin 24 will be forced through the hole 26 into the hole 26′ in the feed-nut, and when so held the rings 23 and 20 will be held against rotation relatively to the feed-nut. The ring 23 also has lips 25 which fit into corresponding recesses 25′ in the shoulder portion 10ª. When the body 10 is to be operatively connected to the other parts, the wings 21′ are placed between the lugs 21 of the ring 20, the lips 25 being in contact with the outer face of the shouldered portion 10′. Pressure being applied, the body is given a partial turn, turning therewith the rings 20 and 23 until the pin 24 in hole 26 coincides with hole 26′ in the nut, into which latter hole the pin 24 then enters. The rings 20 and 23 being thus temporarily held against rotary movement to the feed-nut, the body is further turned independently of the rings 20 and 23, until the wings 21′ are completely behind the lugs 21, when the ears 25 of the ring 23 coincide with the recesses 25′ of the body 10 and immediately spring into place therein, automatically withdrawing the pin 25 from the hole in the feed-nut and holding the bearing-ring 20 and spring ring 23 in proper position relatively to the body so that the forks of the feed-screw may enter between the wings 21′ and the lugs 21 of the bearing-ring 20. Thus the two rings 20 and 23 are locked to the body, so as to rotate therewith, and have a free and independent movement with respect to the rotation of the feed-nut.

The split ring 22 is provided with a groove on its under side as at 22′, into which the short pin or knob 22ª may be formed by pressure applied on the parts (as when the nut is forced away from the body), and said pin or knob 22ª will travel idly in said groove until it strikes the end of said groove 22′, as at 22ᵇ, thereby preventing the rings 23 and 20 from rotating further in that direction, and thus permitting the wings 21′ of the body 10 to be removed from behind the lugs 21 of the ring 20 after the fingers 17 of the feed-screw 18 have been withdrawn therefrom. Ordinarily, the mere friction in the parts against the turn of the body, after the lips 25 of the spring ring 23 have been withdrawn from recesses 25′, will enable the operator to withdraw the wings 21′ from behind the lugs 21 of the ring 20. The stop provided by the knob 22ª striking at 22ᵇ, is an additional means for separating the parts in the contingency of their sticking.

It is obvious that if the fingers of the feed-screw were of equal length, and the wings 21′ also of equal length the feed-screw might be so extended when the device is working against a fixed support that the fingers would emerge from the recesses 16 and become fast on the wings 21′ in the position shown in Fig. 8, from which position it would be difficult to move them, without taking out the backing or fixed support. To obviate such difficulty, I have provided the feed-screw with two short fingers and one long finger, and the body with two short wings and one long wing, as best shown in Fig. 8, so that when the fingers of the feed-screw emerge from the recesses 16 of the body, the feed-screw ceases to rotate until the long finger comes around and contacts with the long wing. This action serves as a warning that the feed-screw has been extended to its maximum capacity, and that further extension of the screw may lodge the long finger on the long wing. If the rotation of the feed-nut be reversed, however, the long finger will thereupon strike the long wing, thus holding the fingers over the recesses 16 of the body, into which they will return on further rotation of the feed-nut in the same direction.

The operation of the device is as follows: The body 10 is inserted in position in the ratchet-wrench. Assuming the feed-nut to be in place upon the feed-screw, the fingers of the latter are withdrawn interiorly so as not to interfere with the wings 21′ of the body, which are then inserted between and then back of lugs 21 of the ring 20 as heretofore described. The feed-nut becomes rotatably locked to the body in this position because of the lips 25 of the spring ring 23 slipping into the recesses 25′ of the body. The tool is then contracted by rotating the feed-screw until its long finger 17ª contacts with the long wing 21′ when the forks of the feed-screw will be in position to enter the spaces between the lugs 21 of the ring 20 and the recesses 16 of the body 10. When the long finger 17ª contacts with the long wing 21′ the contraction continues without interruption as the forks of the feed-screw enter said spaces between said lugs of said ring and the recesses of the body. After the long finger contacts with the long wing 21′, as aforesaid, the further contraction of the tool may be effected by rotation of the nut, while the fingers and body are held against rotation, or by rotating the body and fingers

while the nut is held against rotation. When the tool is contracted until the point 19 is close to the nut 19′, the drill 15′ may be inserted into the socket 15; the center point 19 is placed against a backing or fixed support and the drill is rotated in the direction to extend the screw, being fed to its work by a back and forth motion of the wrench, thus imparting to the drill a step by step motion, the feed being continued by the operator holding the nut stationary. The maximum extension of the screw will be indicated to the operator by the screw ceasing to rotate when the two short fingers of the screw emerge from the recesses of the body; and further rotation of the body portion of the tool will not cause renewed rotation of the screw until the long wing 21′ comes around and contacts with the long finger 17ª of the screw. By reversing the movement of the tool, the long wing 21′ strikes the long finger 17ª on the opposite side and guides it and the other fingers into their respective recesses.

Having described my invention, what I claim is:

1. In a ratchet drill, the combination of a furcated feed-screw, a body adapted to engage the drill and having slideways to receive the forks of the feed-screw and rotatable therewith, and a feed-nut in threaded engagement with the screw and having a thrust connection with the body.

2. In a ratchet drill, the combination of a furcated feed-screw, a body adapted to engage the drill and having slideways to receive the forks of the feed-screw and rotatable therewith, a feed-nut in threaded engagement with the screw, and means for releasably holding said feed-nut rotatably to said body.

3. The combination of a furcated feed-screw, a body adapted to engage a drill and having slideways to receive the forks of the feed-screw and rotatable therewith, a feed-nut in threaded engagement with the screw, means for releasably holding said feed-nut rotatably to said body, and means for rotating said body.

4. A ratchet-drill having a body to engage the drill and provided with longitudinal recesses, a feed-screw divided to fit into and slide in the recesses in said body and rotatable therewith, and a feed-nut having threaded engagement with said feed-screw and having a thrust connection with said body.

5. The combination of a body adapted to engage a drill, a feed-screw slidable with respect to said body, a feed-nut to engage the feed-screw and having means to engage wings on the body to detachably and rotatably secure the feed nut to the body.

6. The combination of a body to engage a drill, a feed-screw slidable with respect to said body, a feed-nut to engage the feed-screw and having a ring with lugs to engage the body, and means on the body for engaging the lugs on the ring in the feed-nut.

7. The combination of a body to engage a drill, a feed-screw slidable with respect to said body, a feed-nut to engage the feed-screw and having a ring with lugs to engage wings on the body of the drill socket.

8. The combination of a body adapted to engage a drill, a feed-screw slidable with respect to said body, a feed-nut to engage the feed-screw and having a ring moving freely therein with lugs to engage the wings on the body, and means for yieldingly pressing said ring inwardly into said nut so that its lugs will bear upon said wings.

9. The combination of a body adapted to engage a drill, a feed-screw slidable with respect to said body, a feed-nut to engage the feed-screw and having a ring moving freely therein with lugs to engage wings on said body, means for yieldingly pressing said ring inwardly into said nut so that its lugs will bear upon said wings and means for locking said ring to said body so as to rotate therewith.

10. The combination of a body adapted to engage a drill, a furcated feed-screw slidable with respect to said body, a feed-nut to engage the feed-screw, and having a ring with lugs to engage wings on the body, one of the wings on the body being higher than the other wings, and one of the forks of the feed-screw being longer than the other forks.

11. The combination of a body adapted to engage a drill, a furcated feed-screw slidable with respect to said body, a feed-nut to engage the feed-screw and having a ring with lugs to engage wings on the body, one of the wings of the body being higher than the other wings, and one of the forks of the feed-screw being longer than the other forks, and means for yieldingly pressing said ring inwardly into the nut so that its lugs will bear against said wings.

12. The combination of a furcated feed-screw, a body adapted to engage a drill and having slideways to receive the forks of the feed-screw and rotatable therewith, a feed-nut in threaded engagement with the feed screw and having a thrust connection with the body, the body having wings to engage the feed-nut, and the feed-nut having means to engage said wings.

13. The combination of a furcated feed-screw, a body adapted to engage a drill and having slideways to receive the forks of the feed-screw and rotatable therewith, a feed-nut in threaded engagement with the feed-screw and having a thrust connection with the body, the body having wings to engage the feed-nut, one of said wings being higher than the other wings, and one of the forks

of the feed-screw being longer than the other forks.

14. The combination of a furcated feed-screw, a body adapted to engage a drill and having slideways to receive the forks of the feed-screw and rotatable therewith, a feed-nut in threaded engagement with the feed-screw and having a thrust connection with the body, the body having wings to engage the feed-nut, one of said wings being higher than the other wings, and one of the forks of the feed-screw being longer than the other forks, and means connected with the feed-nut for engaging the wings on the body.

15. The combination of a furcated feed-screw, a body adapted to engage a drill and having slideways to receive the forks of the feed-screw and rotatable therewith, a feed-nut in threaded engagement with the feed-screw and having a thrust connection with the body, the body having wings to engage the feed-nut and the feed-nut having a ring moving freely therein with lugs to engage the wings on said body, means for yieldingly pressing said ring inwardly into said nut so that its lugs will bear upon said wings, and means for locking said ring to said body so as to rotate therewith.

16. The combination of a body adapted to engage a drill, a feed-screw slidable with respect to said body, a feed-nut to engage the feed-screw and having a ring with lugs to engage wings on the body, a second ring with a bend in its circumference and having a spring action to keep the first mentioned ring in position with its lugs bearing upon said wings, and also having means for detachably connecting it to said first mentioned ring and making it rotatable therewith, and means for holding said rings in said feed-nut.

17. The combination of a body to engage a drill, a feed-screw slidable with respect to said body, a feed-nut to engage the feed-screw and having a ring with lugs to engage wings on the body, a ring with a bend in its circumference and having a spring action to keep the first mentioned ring in position with its lugs bearing upon said wings and also having means for detachably connecting it to the first-mentioned ring and making it rotatable therewith, means for confining said rings in said feed-nut, and locking devices for detachably holding said wings behind the lugs upon said first mentioned ring.

18. The combination of a body adapted to engage a drill, a feed-screw slidable with respect to said body, a feed-nut to engage the feed-screw and having a ring moving freely therein with lugs to engage wings on the body, means for yieldingly pressing said ring inwardly into said nut so that its lugs will bear upon said wings, and means for releasing said wings from said lugs.

19. The combination of a body adapted to engage a drill, a feed-screw slidable with respect to said body, a feed-nut to engage the feed-screw and having a ring moving freely therein with lugs to engage wings on the body, a ring with a bend in its circumference and having a spring action to yieldingly press the first mentioned ring inwardly into said nut so that its lugs will bear upon said wings, a split ring to confine the two first-mentioned rings in the nut, and means for releasing said wings from said lugs, comprising a shoulder on the under side of the split ring and a projection on the upper side of the spring ring.

20. The combination of a body to engage a drill, a feed-screw slidable with respect to said body, a feed-nut to engage the feed-screw and having a ring with lugs moving freely in said nut to engage the body, means on the body for engaging the lugs on the ring in the feed-nut, and automatic means for locking said ring to said nut to permit the engagement of said lugs with said means on the body.

21. The combination of a body to engage a drill, a feed-screw slidable with respect to said body, a feed-nut to engage the feed-screw and having a ring with lugs to engage wings on the body, and automatic means for locking said ring to said nut to permit the engagement of said lugs with said wings.

22. The combination of a body adapted to engage a drill, a feed-screw slidable with respect to said body, a feed-nut to engage the feed-screw and having a ring moving freely therein with lugs to engage wings on the body, means for yieldingly pressing said ring inwardly into said nut so that the lugs will bear upon said wings, and automatic means for locking said ring to said nut to engage the lugs of the ring with the wings of the body.

23. The combination of a body adapted to engage a drill, a feed-screw slidable with respect to said body, a feed-nut to engage a feed-screw and having a ring moving freely therein with lugs to engage wings on the body, a spring-ring for pressing the first mentioned ring inwardly into said nut so that its lugs will bear upon said wings, a pin on said spring ring arranged to pass through apertures in said ring with lugs and in the feed-nut, whereby said rings are connected to each other and, when pressure is applied laterally, said rings are held to said nut against rotation.

24. The combination of a body adapted to engage a drill, a feed-screw slidable with respect to said body, a feed-nut to engage the feed-screw and having a ring moving freely therein with lugs to engage wings on the

body, a ring having a spring action to yieldingly press the first mentioned ring inwardly into said nut so that its lugs will bear upon said wings and having a pin releasably connecting it to said first mentioned ring, said pin being adapted, on lateral pressure, to pass into an aperture in the nut, and means for releasing said wings from said lugs, comprising a shoulder on the under side of the split-ring and a projection on the upper side of the spring-ring.

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Witnesses:
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