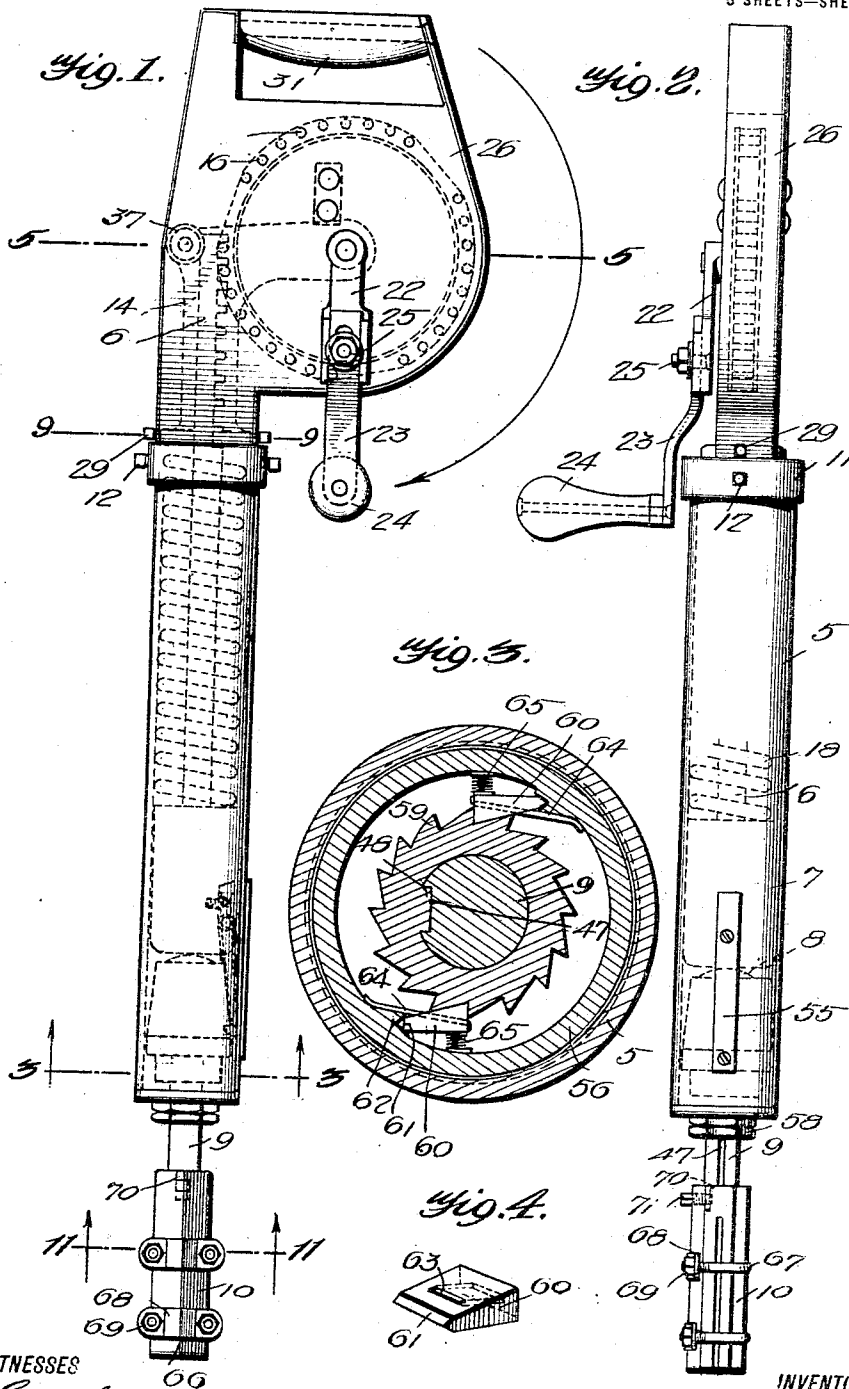


1,244,386.

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HAMMER DRILL.
APPLICATION FILED MAY 9, 1917.

Patented Oct. 23, 1917.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.

Fig. 5.

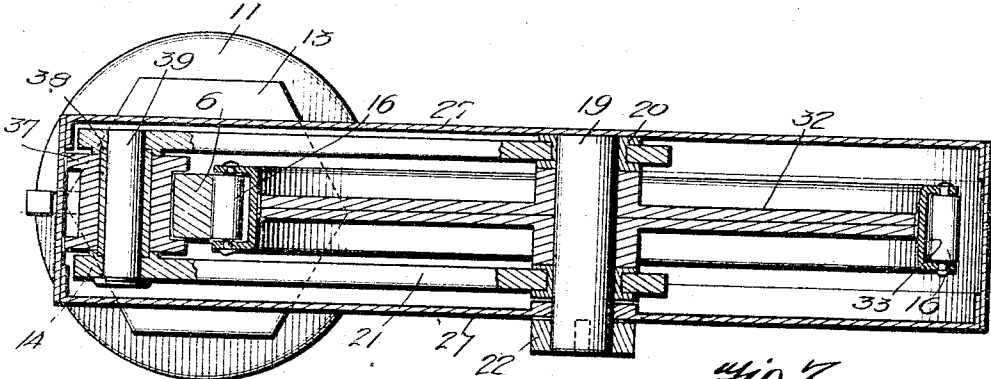
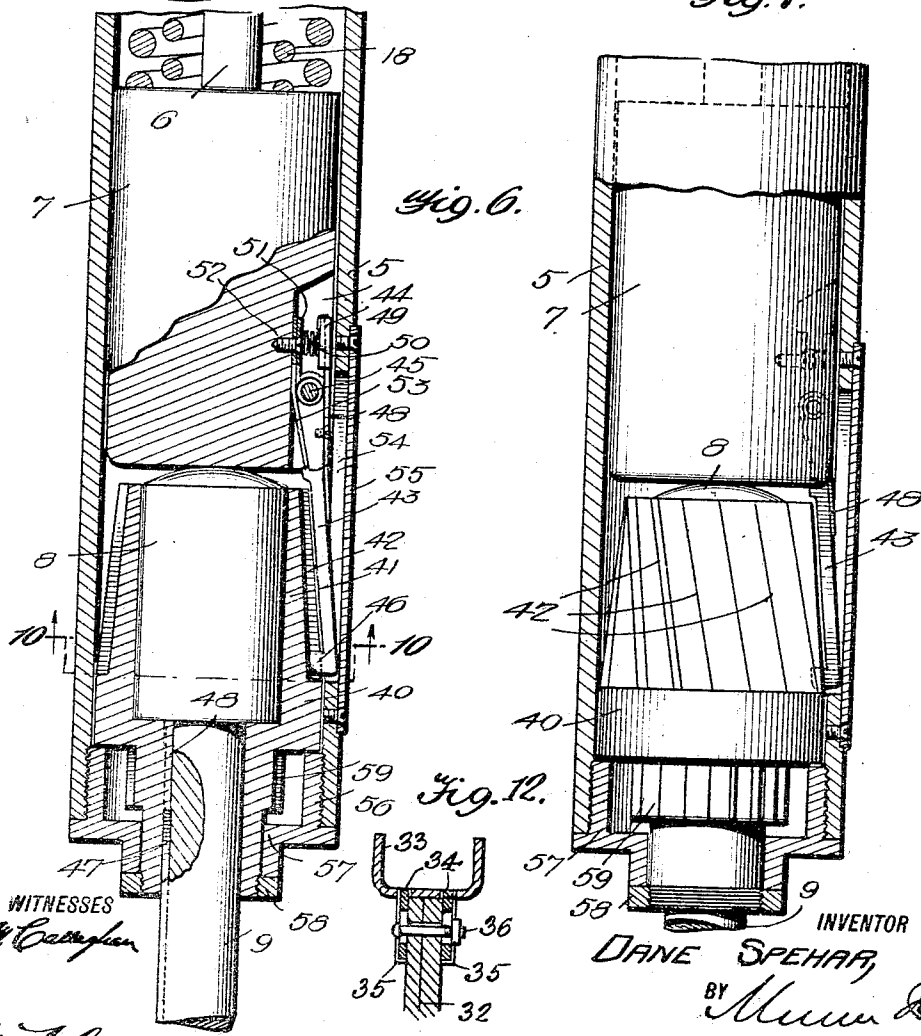


Fig. 7.



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 3 SHEETS—SHEET 3.

Fig. 8.

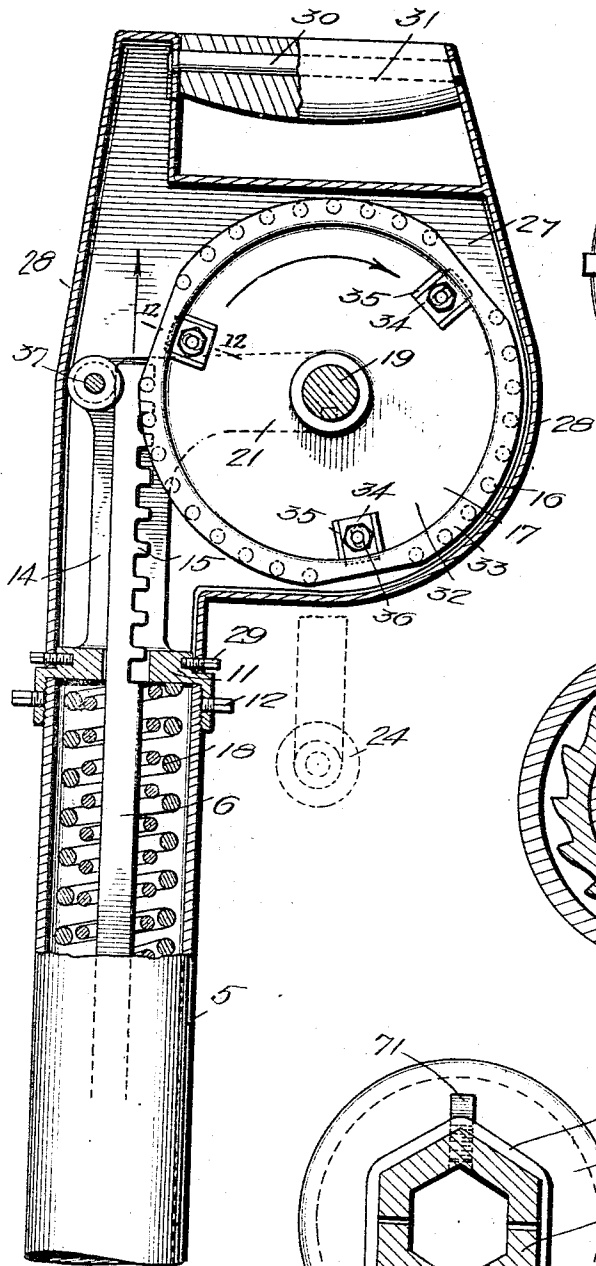


Fig. 9.

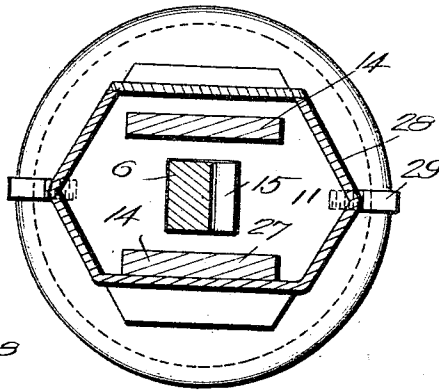


Fig. 10.

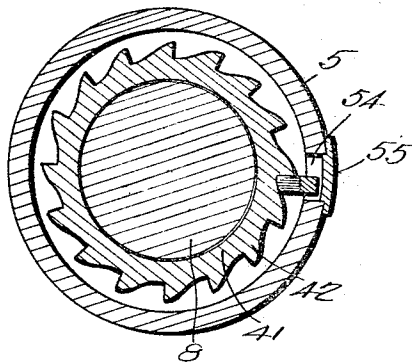
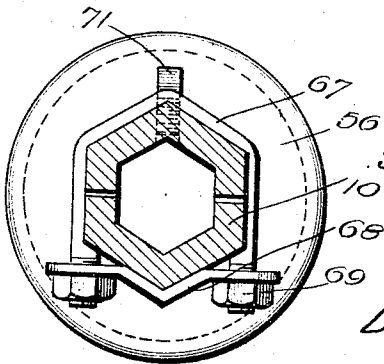


Fig. 11.



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Specification of Letters Patent.

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Application filed May 9, 1917. Serial No. 167,522.

To all whom it may concern:

Be it known that I, DANE SPEHAR, a citizen of the United States, and a resident of Miami, in the county of Gila and State of Arizona, have invented an Improvement in Hammer-Drills, of which the following is a specification.

One of the principal objects of my present invention is to provide an improved hand prospecting drill, of the hammer type, so constructed as to be collapsible whereby to be placed in a hand bag or satchel for transportation, the drill being designed particularly for use in quarry and mine work.

Another object of the invention is to provide a drill of the class described having an improved means for effecting a delivery of blows by the hammer, and having an improved arrangement for effecting a rotary motion of the drill bit.

A further object resides in an improvement in the construction and arrangement of the detailed parts of the drill.

With these and other objects in view which will become apparent as the description proceeds, the invention resides in the construction, combination and arrangement of parts hereinafter more fully described and claimed, and illustrated in the accompanying drawings, in which like characters of reference indicate like parts throughout the several figures, of which—

Figure 1 represents a side elevational view of a hand drill constructed according to my present invention.

Fig. 2 represents an edge elevational view thereof.

Fig. 3 represents a view in section taken horizontally on the plane indicated by the line 3—3 of Fig. 1.

Fig. 4 represents a view in perspective of one of the dogs for holding the ratchet head against reverse rotation.

Fig. 5 represents an enlarged sectional view taken horizontally on the plane indicated by the line 5—5 of Fig. 1.

Fig. 6 represents an enlarged vertical sectional view taken through the lower portion of the casing showing the hammer and the anvil and associated parts.

Fig. 7 represents a view similar to Fig. 6 showing the parts in elevation, the casing being shown in section.

Fig. 8 represents a view in section taken through the upper portion or handle portion of the drill, the internal parts being

shown partially in section and partially in elevation.

Fig. 9 represents a view in section taken horizontally on the plane indicated by the line 9—9 of Fig. 1.

Fig. 10 represents a view in section taken on the plane indicated by the line 10—10 of Fig. 6, looking in the direction indicated by the arrows.

Fig. 11 represents a view in section taken on the plane indicated by the line 11—11 of Fig. 1, looking in the direction indicated by the arrows.

Fig. 12 is a sectional detail of the operating wheel on the line 12—12 of Fig. 8.

Referring more particularly to the drawing the drill includes a cylindrical casing 5 within which is arranged for reciprocation a shank or spindle 6 of the drill, such spindle being formed at its lower end with a relatively heavy cylindrical head or hammer 7 adapted through reciprocation of the spindle 6 to deliver blows to the anvil 8 which is formed on the upper end of stem 9, which stem carries the holder 10 in which the drilling tool is held.

The upper end of casing 5 is screw threaded to receive the internally threaded flange portion of a cap 11. This cap is equipped with the set screws 12 for securing it detachably upon the casing 5. The cap has a polygonal nut 13 formed integrally therewith whereby a wrench may be used in turning the cap onto and off of the upper end of the casing. Formed integrally with the nut 13, or welded thereon, is a pair of spaced standards 14 between which the upper end of the spindle 6 projects, the spindle being squared and extending through a squared opening in the cap 11 whereby to be held against rotation. This spindle end is provided with the rack teeth 15 adapted to be engaged by the roller teeth 16 of a drive wheel 17 whereby to periodically lift the spindle 6 against the action of the compound spring 18. This compound spring consists of the inner and outer spiral springs mounted upon the spindle 6 and interposed between the hammer or head 7 and the casing 11. When the spindle 6 is moved upwardly the springs are placed under compression.

The drive wheel 17 is mounted on an axle or shaft 19 which is journaled in bushings 20 carried at the outer ends of arms 21 formed at the upper ends of the standards

14 and which project laterally from said standards. One end of the axle 19 has keyed thereon the inner member 22 of a crank handle, the outer member 23 of which
 5 is provided with a handle 24 and is adjustably mounted upon the inner member 22 by a bolt and slot connection indicated generally at 25.

Carried on the cap 11 is a casing, indicated generally at 26, which casing incloses the drive wheel 17 and the standards 14 and associated parts. The casing includes the side plates 27, which at their lower ends may be welded or otherwise fixed to the cap 11.
 10 The edges of the plates are bridged, and the housing thus closed by the strap irons 28, which at their lower ends are secured to the cap through the medium of screws 29, the upper ends of the strap irons being connected together by a pin 30 on which a handle 31 is positioned. The casing takes the contour shown in the drawings, the handle 31 being arranged at the upper end
 15 of the drill in convenient position to be held in one of the hands of the operator, while the wheel 17 is rotated by the other hand through manipulation of the crank arm 22.

The drive wheel includes the annular web portion 32 to the periphery of which the rim 33 is detachably secured. This rim is U-shaped in cross section and is in the form of a channel and is detachably secured to the web 32 through the medium of the keys 34. These are arranged at spaced intervals
 20 around the wheel, as shown in Fig. 8, and are in the nature of plates placed on opposite sides of web 32 and slidable radially in guides 35. The plates 34 constituting each key are slotted and through them and through a registering opening in web 32 extends a bolt 36 which may be tightened for securing or clamping the plates 34 against web 32. These plates normally, at their
 25 outer ends, extend into openings cut in the floor of the rim or channel member 33 so as to prevent accidental removal of this rim from the wheel. If it is desired to remove the rim for any reason the bolts 36 are loosened, the plates 34 moved inwardly toward the hub of the wheel, whereby to disengage the rim, and the latter is then free to be taken off. This rim carries the transversely arranged roller teeth 16 which, as hereinbefore stated, cooperate with the rack teeth 15 in lifting the spindle 6 against the tension of the compound spring 18. The roller teeth are arranged, as indicated in Fig. 8, in a plurality of series, suitable distances occurring between the series to allow
 30 movement of the spindle 6 downwardly under the tension of the compressed springs, after the last roller of a series leaves the rack teeth and before the first roller of the succeeding series engages with the rack teeth. Thus it will be understood that as

the wheel is rotated the spindle 6 will, in rapid succession, be alternately lifted against the tension of the spring and then released whereby to deliver a blow to the anvil 8. This alternate lift and release of
 35 the spindle will occur three times to each revolution of the drive wheel, so that the action will be relatively rapid, and a relatively great number of blows during any given period will be delivered to the anvil 8. At the upper ends of the standards 14 and between them is arranged a flanged roller 37 between the flanges of which the upper end of the spindle 6 is guided. This roller is mounted on a cylindrical bushing 38 (see Fig. 5), which in turn is mounted on a pin 39 carried by the uprights, as shown.

The stem 9, together with the anvil 8, is reciprocally mounted relatively to the body of the drill, in a ratchet head indicated generally at 40. This ratchet head is rotatable within the lower portion of the casing 5, and is machined from one piece of metal preferably, and includes an upper tapered portion 41 which is provided with parallel inclined or spiral ratchet shoulders 42.

Adapted to cooperate with these ratchet shoulders, in effecting an intermittent step by step rotation of the drill stem 9, is an arm 43 pivotally mounted at its upper end within a recess 44 in hammer 7, on a pin 45. The arm at its lower end carries a lug 46 which engages with the successive shoulders 42 as the spindle 6 reciprocates in effecting a step by step rotation of the ratchet head. The stem 9 is provided with a longitudinal key way 47 which rides over a key or lug 48 formed integrally with the ratchet head and projecting into the bore thereof, whereby the stem will be rotated as the ratchet head is rotated, and at the same time will be allowed to reciprocate relatively to the ratchet head. The arm 43 at its upper end is equipped on one side with a leaf spring 48^a which at its upper end is engaged in a clip 49 which acts as the bearing for one end of a relatively small coiled spring interposed between the clip 49 and the hinge element 51 secured by means of a screw 52 to the base of the recess 44 formed in the hammer 7. This hinge element carries the pin or pintle 45 on which the arm 43 is pivotally mounted. The hinge element also acts to secure against the floor of the recess, a spring 53 which is arranged on the opposite side of arm 43 from spring 48^a and which cooperates with the last-named spring in normally tending to move the arm toward the center of the casing. By having the arm thus spring tensioned it will be forced toward the center of the casing whereby to always be in position to properly engage with one of the inclined shoulders 42 upon the downward stroke of the spindle 6. An opening at 54, allowing access to the arm 43 and as-
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sociated parts, is cut in the casing 5 and this opening is normally closed by a suitable plate 55.

The lower end of casing 5 is closed by a cap 56, threaded into place and upon which cap the ratchet head rotatably bears. This cap has a reduced portion 57 into which the lower reduced end of the ratchet head projects. The lower extremity of the ratchet head is externally threaded for receiving a locking nut 58, as shown. The body portion of the ratchet head within the cap 56 is reduced and is formed with a series of ratchet teeth 59, with which the dogs 60 (see Fig. 3) cooperate in preventing reverse rotation of stem 9. Each of these dogs tapers toward its inner end and is beveled to form a knife edge 61 engaging in a channel formed in a lug 62 which projects from the inner surface of cap 56. The dog is provided with a slot 63 therein through which the free end of a leaf spring 64 engages for retaining the dog in place. The other end of the spring is suitably secured to the cap 56. Between the dog and the adjacent wall of the cap is arranged a coiled spring 65 which bears the dog outwardly to engage with the ratchet teeth 59. Any desired number of these dogs may be utilized, the arrangement shown involving the use of two of the dogs arranged at diametrically opposed points with respect to the ratchet head 40. As the ratchet head is rotated, carrying with it the stem 9, the dogs engage in the succeeding rack teeth and effectually prevent reverse rotation of the ratchet head.

On the lower end of the stem 9 is mounted a hexagon drill holder 66 in which the drilling tool may be held. This holder is split and is equipped with the U-bolts 67 which at their ends project through the straps 68 and are provided with nuts 69 which may be tightened into place for binding the tool holder about the shank of the tool. The tool holder is fitted on the lower end of the stem 9 by means of a key 70 and a set screw 71 which is turned into engagement with the stem for effectually binding the tool holder on the stem.

In operation, the drill is supported in one hand of the operator and the other hand is used to rotate the drive wheel for effecting a movement of the drill shank into position for compressing the springs, and then releasing the shank, as already set out, whereby blows will be delivered with great rapidity against the anvil 8 and imparted through the stem 9 to the drill bit or tool held in the drill holder 10. The stem 9 will travel up and down relatively to the ratchet head, through a relatively small path of movement, estimated in the finished tool as being about $1\frac{1}{4}$ or 2 inches. As the spindle reciprocates the ratchet head and with it the stem and drill are automatically rotated through the

step by step movement already described. The path of reciprocation of the hammer 7 is greater in length than the path of reciprocation of anvil 8, so that the full force of the springs will be exerted in delivering a blow to the anvil as the hammer under the force of the springs is thrown against the anvil when the spindle is released. It may be noted that the lower portion of the arm 43, and the lug 46, bear against and are supported laterally by one of the walls of the opening 54, cut in the casing 5, so that the lateral strain imparted to the arm in effecting the step by step rotation of the ratchet head will be taken up by the casing and hence the arm will not become fractured or bent. One particularly noteworthy advantage accruing to the invention is the fact that the drill may be disassembled so as to be readily packed in a grip or suit case. To effect the result the set screws 12 which bind the cap 11 onto the casing, are loosened and the cap is then unscrewed carrying with it the standards 14 and the housing 27 together with the drive wheel, and also carrying the shank 6 and the compound spring together with the hammer 7. The shank may then be disengaged by drawing it outwardly from the casing 27. The stem carrying the anvil 8, and the ratchet head may then be removed from the casing by unscrewing the lower cap 56. Thus the parts may be disassembled and compacted into a relatively small space for convenience in transportation.

While I have described what I now believe to be the preferred embodiment of my invention, I may desire to make such changes in the construction, combination and arrangement of parts thereof, as do not depart from the spirit of the invention and the scope of the appended claims.

I claim:

1. In a drill, a spindle, a drive wheel for operating the spindle, said drive wheel including a central web portion, a rim substantially U-shaped in cross section mounted circumferentially on the web portion, teeth carried by the rim, keys adjustable radially of the web portion and mounted thereon and adapted to engage in recesses cut in the rim, and means for securing the keys in adjustable position whereby to detachably retain the rim in position on the web portion.

2. A drill, including a reciprocating spindle, a wheel for driving the spindle, said wheel including a central web portion, a detachable channel rim and teeth carried by the channel rim, and means mounted upon said web portion and movable outwardly thereon to detachably engage the channel rim and hold it in place.

3. In a drill, a ratchet head, a reciprocating member, an arm in cooperative relation to the ratchet head to impart rotation thereto, a clip secured to the reciprocating mem-

ber, a leaf spring at one side of the arm and engaging the said clip, a hinge element secured to the reciprocating member and having the said arm pivoted thereto, and a coil spring interposed between the hinge element and the clip and disposed on the side of the arm opposite that engaging the leaf spring. 5

4. In a drill casing having a longitudinal opening in a side thereof, a ratchet head mounted in the casing, a reciprocating member within the casing, an arm connected to

the reciprocating member and engaging the ratchet head to effect rotation thereof, said arm operating in the longitudinal opening of the casing and maintained in normal position thereby, and means for preventing reverse rotation of the ratchet head. 15

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."