

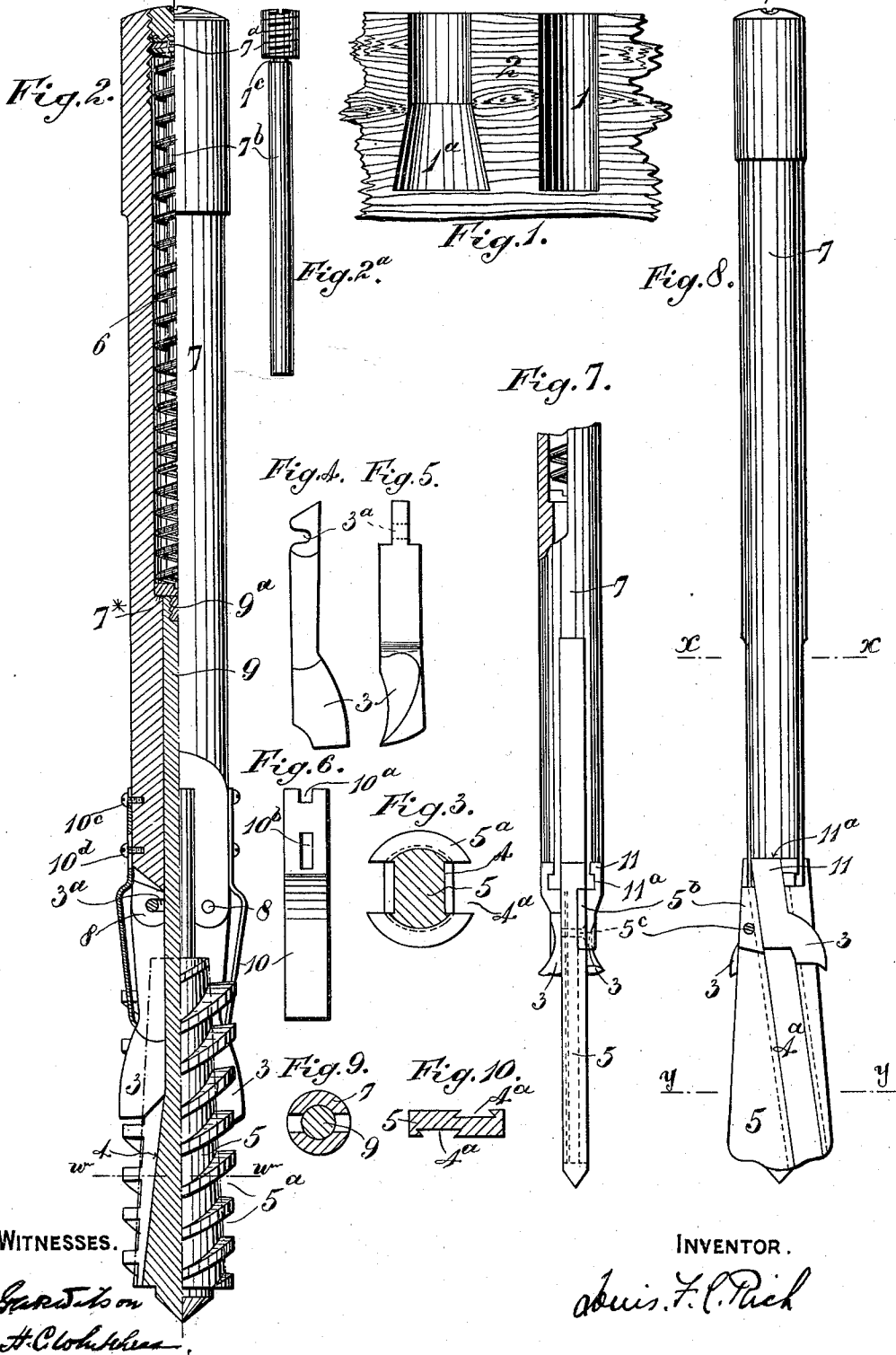
(No Model.)

2 Sheets—Sheet 1.

L. F. C. RICH.
TOOL FOR BORING CONICAL HOLES.

No. 605,259.

Patented June 7, 1898.



WITNESSES.

Spencer
H. C. Johnson

INVENTOR.

Louis F. C. Rich

L. F. C. RICH.
TOOL FOR BORING CONICAL HOLES.

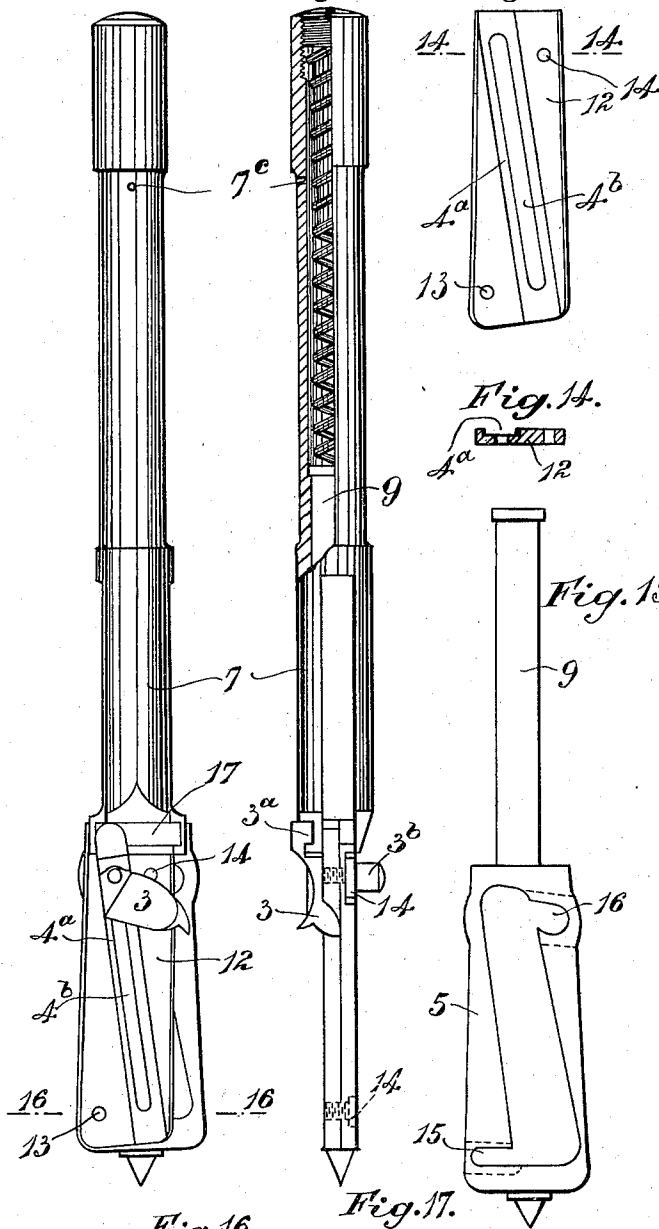
No. 605,259.

Patented June 7, 1898.

Fig. 11.

Fig. 12.

Fig. 13.



WITNESSES.
W. H. Wilson
H. C. Toluphan

INVENTOR.
Louis F. C. Rich

UNITED STATES PATENT OFFICE.

LOUIS FREDERICK CHARLES RICH, OF CHELTENHAM, ENGLAND, ASSIGNOR
TO HIMSELF, AND JOHN HENRY HULL, OF NEW YORK, N. Y.

TOOL FOR BORING CONICAL HOLES.

SPECIFICATION forming part of Letters Patent No. 605,259, dated June 7, 1898.

Application filed September 27, 1897. Serial No. 653,110. (No model.)

To all whom it may concern:

Be it known that I, LOUIS FREDERICK CHARLES RICH, a subject of the Queen of Great Britain and Ireland, residing at Cheltenham, in the county of Gloucester, England, have invented Improvements in Tools for Boring Conical Holes in Metal, Wood, and other Materials, of which the following is a specification.

10 This invention relates to augers or boring-tools (hereinafter called "augers") by means of which it is possible to widen the inner end of the cylindrical hole bored in wood and other material by means of cutters that are
15 forced gradually outward in a lateral direction during the rotation of the auger by causing them to travel over inclined surfaces, forming the bottom of recesses cut in a guide-piece, so that the widened portion of the hole
20 receives a conical shape.

Now this invention has reference to various improvements in augers of the kind referred to, as I shall now proceed to explain with the aid of the accompanying drawings, wherein—

25 Figure 1 shows a piece of wood or other material in which are bored cylindrical holes, the inner ends of which it is desired to enlarge. Fig. 2 shows, partly in side elevation and partly in section, one construction of my
30 improved auger specially suitable for use in enlarging holes in metal. Fig. 3 is a cross-section on the line *ww* of Fig. 2. Figs. 2^a, 4, 5, and 6 are detail views hereinafter more particularly referred to. Figs. 7 and 8 are
35 elevations at right angles to each other, showing a modified construction of auger adapted for use with wood and like material; and Figs. 9 and 10 are cross-sections thereof on the lines *xx* and *yy*, respectively, of Fig. 8.
40 Figs. 11 and 12 are elevations at right angles to each other, the latter partly in section, showing a further modified construction of auger suitable for use with wood and like material. Figs. 13 to 17 are detail views there-
45 of, hereinafter more particularly referred to.

Fig. 1 shows cylindrical holes 1 in a piece of wood or other material 2, and at 1^a is shown how the inner ends of such holes are to be enlarged by the cutters 3, Fig. 2, which are
50 caused to travel over the inclined ways 4, forming the bottom of recesses 4^a, cut in a

guide-piece 5. Now according to this invention in order to retain the guide-piece 5 in the widened hole 1^a and permit the cutters 3 to be easily withdrawn after the boring out
55 without damaging the side of the hole and without its being necessary to provide the guide-piece with any special clamping or fixing device which is objectionable there is employed according to this invention a spiral
60 spring 6, Fig. 2. This spring is placed in a tube 7, to which the cutters 3 are jointed by pin 8, and the spring bears with one end against a plug 7^a, screwed into the end of the tube 7, and with the other end against the
65 spindle 9, which carries the guide-piece 5. The spring 6, which loosely surrounds a spindle 7^b on the plug 7^a, has a constant tendency to press the tube 7 upward on the spindle 9. This spindle 9, which may be made in one
70 with the guide-piece, as shown in Figs. 2 and 3, or have separate guide-pieces attached to it, is held in the tube 7 by a screw 9^a, which abuts against a shoulder 7^x in the tube when the spindle and tube are pressed fully apart.
75 To enable the cutters 3 to be quickly removed for sharpening, each of them is provided at its upper end with an open slot 3^a, (see Figs. 4 and 5,) by means of which they can be simply hooked onto the pivot-pins 8 of the
80 tube 7. Blade-springs 10 press the cutters 3 against the inclined surfaces 4. These springs are provided with two slots 10^a and 10^b, Fig. 6, through which pass the screws 10^c and 10^d. The upper slot 10^a is short and open,
85 so that upon loosening the screws 10^c and 10^d and drawing down the spring the slot 10^a comes out of engagement with the screw 10^c, and the blade-spring 10 can then be turned
90 about the screw 10^d so far that it no longer presses on its cutter 3. This cutter can then be easily removed from the pivot-pin 8.

To prevent the cutters 3 from being thrown outward by centrifugal force and consequently boring a larger hole than desired or
95 injuring the widened hole, which might take place when the tool is driven at a high velocity, the sides of the recesses 4^a in which the cutters work may be undercut in dovetail fashion and the corresponding cutters be
100 guided in these undercuts.

To facilitate the escape of the shavings or

cuttings produced by the cutters 3, the exterior of the cylindrical guide-piece 5 may be provided, as shown, with a number of spiral grooves 5^a, (see Figs. 2 and 3,) or the guide-piece 5 may be made of simple conical form without such grooves 5^a, as indicated in dotted lines in Fig. 2.

The spindle 7^b, Figs. 2 and 2^a, is of such a length that it abuts against the inner end 9^a of the spindle 9 when the latter has ascended within the tube 7 to the distance that is to be cut by the cutters 3 when within a hole 1, Fig. 1.

It is also desirable that the normal position of the cutters 3 be capable of being altered in order to compensate for the wearing away of their cutting edges by use and sharpening. This adjustment is effected by means of the screw-plug 7^a, which can be screwed more or less into the upper end of the tube 7, whereby the distance between the inner end of the spindle 7^b and the screw 9^a can be altered and the travel of the spindle 9 consequently regulated, and it is possible to push the cutters 3 forward when they are worn away. In order to enable the spring 6 to be more easily changed, it is loosely mounted on the spindle 7^b, but its upper end is located in a groove 7^c of the spindle 7^b, in order to prevent the spring from falling off the latter and to facilitate its removal.

Figs. 7 to 10, inclusive, show a modification of the auger in which the guide-piece 5 is flat and has inclined grooves 4^a running on its opposite faces obliquely to its axis. The cutters 3 are thus caused to move outward as they descend and thereby widen the hole to a corresponding degree. The cutters are held in the grooves 4^a by the undercut sides of the latter, Fig. 10. Instead of connecting the cutters 3 with the tube 7 by means of pins 8 (see Fig. 2) their upper ends 11 are in this case made hook-like and engage in slots 11^a of the tube 7 in such a manner that the cutters can move laterally. To enable the cutters to be withdrawn for sharpening or changing, a part of the groove 4^a is limited by a flange 5^b, that can be detached by withdrawing a screw 5^c.

Figs. 11 and 12 show a modification in which a single cutter 3 is mounted in a groove 4^a, formed in a plate 12, which is shown separately in elevation in Fig. 13 and as regards its upper part in section on the line 14 of Fig. 13 in Fig. 14. This plate 12 is so mounted on the guide-piece 5 (shown separately in elevation with its spindle 9 in Fig. 15) that it can be moved transversely thereon, so as to vary the initial distance of the cutter 3 from the axis of the tool to adapt the tool for widening holes of different diameters, and can be turned on the guide-piece 5 in order to alter the angle made by the groove 4^a with the axis of the tool, so as to vary the conicity of the enlarged part 1^a of a hole, Fig. 1. For these purposes the plate 12 is secured to the guide-piece 5 by set-screws 13 and 14, which pass through slots 15 and 16, respectively, in the guide-piece 5

and fit in screw-threaded holes in the plate 12, (see Fig. 12 and Fig. 16, which is a section on the line 16 of Fig. 11,) the heads of the set-screws 13 and 14 being received in suitable recesses made in the guide-piece 5. (See Fig. 12 and dotted lines in Fig. 15.) The irregular shape of the slot 16 is necessitated by the unequal adjustment allowed at the top and bottom of the guide-piece 5. In the example shown the lateral adjustment allowed at the top is half that allowed at the bottom. The cutter 3 is connected to the tube 7 by a cylindrical projection 3^a, which engages in a transverse groove 17 in the latter. The cutter 3 is retained in place in the groove 4^a in the example shown by a spring-nut 3^b, (see Fig. 12 and Fig. 17, which is a plan of the auger inverted,) that fits on a screw-threaded projection, (not shown,) extending from the cutter 3 through a slot 4^b, made through the plate 12, and bears against the rear face of the guide-plate 12.

The tube 7 may advantageously in all cases be provided with a hole 7^c (see Figs. 11 and 12) to allow of the free egress of air when the spindle 9 ascends in the tube 7.

What I claim is—

1. An auger comprising a spindle or rod provided near its lower end with a guide-surface or guide-surfaces inclined to the axis of the said spindle or rod, a tubular holder mounted on the said spindle or rod and capable of being slid longitudinally thereon, a cutter or cutters attached to the lower end of the said holder, means for keeping the said cutter or cutters to the said guide-surface or guide-surfaces, and a spring adapted to force apart the upper ends of the said spindle or rod and the said holder, substantially as and for the purpose set forth.

2. An auger comprising a spindle or rod provided near its lower end with a guide-surface or guide-surfaces inclined to the axis of the said spindle or rod, a tubular holder mounted on the said spindle or rod and capable of being slid longitudinally thereon, a cutter or cutters attached to the lower end of the said holder, means for keeping the said cutter or cutters to the said guide-surface or guide-surfaces, a spring adapted to force apart the upper ends of the said spindle or rod and the said holder, and means for limiting the downward movement of the said holder on the said spindle or rod, substantially as and for the purpose set forth.

3. An auger comprising a spindle or rod provided near its lower end with a guide-surface or guide-surfaces inclined to the axis of the said spindle or rod, a tubular holder mounted on the said spindle or rod and capable of being slid longitudinally thereon, a cutter or cutters attached to the lower end of the said holder, means for keeping the said cutter or cutters to the said guide-surface or guide-surfaces, a spring adapted to force apart the upper ends of the said spindle or rod and the said holder, and means for limiting the separation of the said holder from the said spindle or rod, substantially as and for the purpose set forth.

ration produced by the said spring, substantially as and for the purpose set forth.

4. An auger comprising a spindle or rod provided near its lower end with a guide-surface or guide-surfaces inclined to the axis of the said spindle or rod, a tubular holder mounted on the said spindle or rod and capable of being slid longitudinally thereon, a cutter or cutters attached to the lower end of the said holder, means for keeping the said cutter or cutters to the said guide-surface or guide-surfaces, a spring adapted to force apart the upper ends of the said spindle or rod and the said holder, and a screw inserted in the upper end of the said spindle or rod and having a head adapted to bear against a shoulder on the said holder, substantially as and for the purpose set forth.

5. An auger comprising a spindle or rod provided near its lower end with a guide-surface or guide-surfaces inclined to the axis of the said spindle or rod, a tubular holder mounted on the said spindle or rod and capable of being slid longitudinally thereon, a cutter or cutters attached to the lower end of the said holder, means for keeping the said cutter or cutters to the said guide-surface or guide-surfaces, a spring adapted to force apart the upper ends of the said spindle or rod and the said holder, and an adjustable stop for limiting the downward movement of the said holder on the said spindle or rod, substantially as and for the purpose set forth.

6. An auger comprising a spindle or rod provided near its lower end with a guide-surface or guide-surfaces inclined to the axis of the said spindle or rod, a tubular holder mounted on the said spindle or rod and capable of being slid longitudinally thereon, a cutter or cutters attached to the lower end of the said holder, means for keeping the said cutter or cutters to the said guide-surface or guide-surfaces, a screw-plug closing the upper end of the said holder, adjustable longitudinally therein, and carrying a downwardly-projecting spindle, and a spring surrounding the said downwardly-projecting spindle and pressing with its upper end against the said screw-plug and with its lower end against the said spindle or rod, substantially as and for the purpose set forth.

7. An auger comprising a spindle or rod provided near its lower end with a guide-surface or guide-surfaces inclined to the axis of the said spindle or rod, a tubular holder mounted on the said spindle or rod and capable of being slid longitudinally thereon, a cutter or cutters provided or each provided with a projection that engages in a transverse groove in the lower end of the said holder, and means for keeping the said cutter or cutters to the said guide-surface or guide-surfaces, substantially as and for the purpose set forth.

8. An auger comprising a spindle or rod, a

guide-surface near the lower end of the said spindle or rod and inclined to the axis thereof, means for varying the inclination of the said surface to the said axis, a tubular holder mounted on the said spindle or rod and capable of being slid longitudinally thereon, a cutter provided with a projection that engages in a transverse groove in the lower end of the said holder, and means for keeping the said cutter to the said guide-surface, substantially as and for the purpose set forth.

9. An auger comprising a spindle or rod, a guide-surface near the lower end of the said spindle or rod and inclined to the axis thereof, means for varying the distance of the upper end of the said guide-surface from the said axis, a tubular holder mounted on the said spindle or rod and capable of being slid longitudinally thereon, a cutter provided with a projection that engages in a transverse groove in the lower end of the said holder, and means for keeping the said cutter to the said guide-surface, substantially as and for the purpose set forth.

10. An auger comprising a spindle or rod, a guide-piece attached thereto near the lower end thereof, a guide-plate which is provided with a guide-groove inclined to the axis of the said spindle or rod and is secured to the said guide-piece at its upper or lower end by means of a set-screw passing through a transverse slot in one of them and fitting a hole in the other, a tubular holder mounted on the said spindle or rod and capable of being slid longitudinally thereon, and a cutter secured in the said guide-groove, capable of being slid longitudinally therein, and provided with a projection that engages in a transverse groove in the lower end of the said holder, substantially as and for the purpose set forth.

11. An auger comprising a spindle or rod, a guide-piece attached thereto near the lower end thereof, a guide-plate which is provided with a guide-groove inclined to the axis of the said spindle or rod and is secured at both ends to the said guide-piece by means of a set-screw passing through a transverse slot in one of them and fitting a hole in the other, a tubular holder mounted on the said spindle or rod and capable of being slid longitudinally thereon, and a cutter secured in the said guide-groove, capable of being slid longitudinally therein, and provided with a projection that engages in a transverse groove in the lower end of the said holder, substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LOUIS FREDERICK CHARLES RICH.

Witnesses:

GEORGE FREDERICK LODDER,
PERCY TALBOT COOKLEY.