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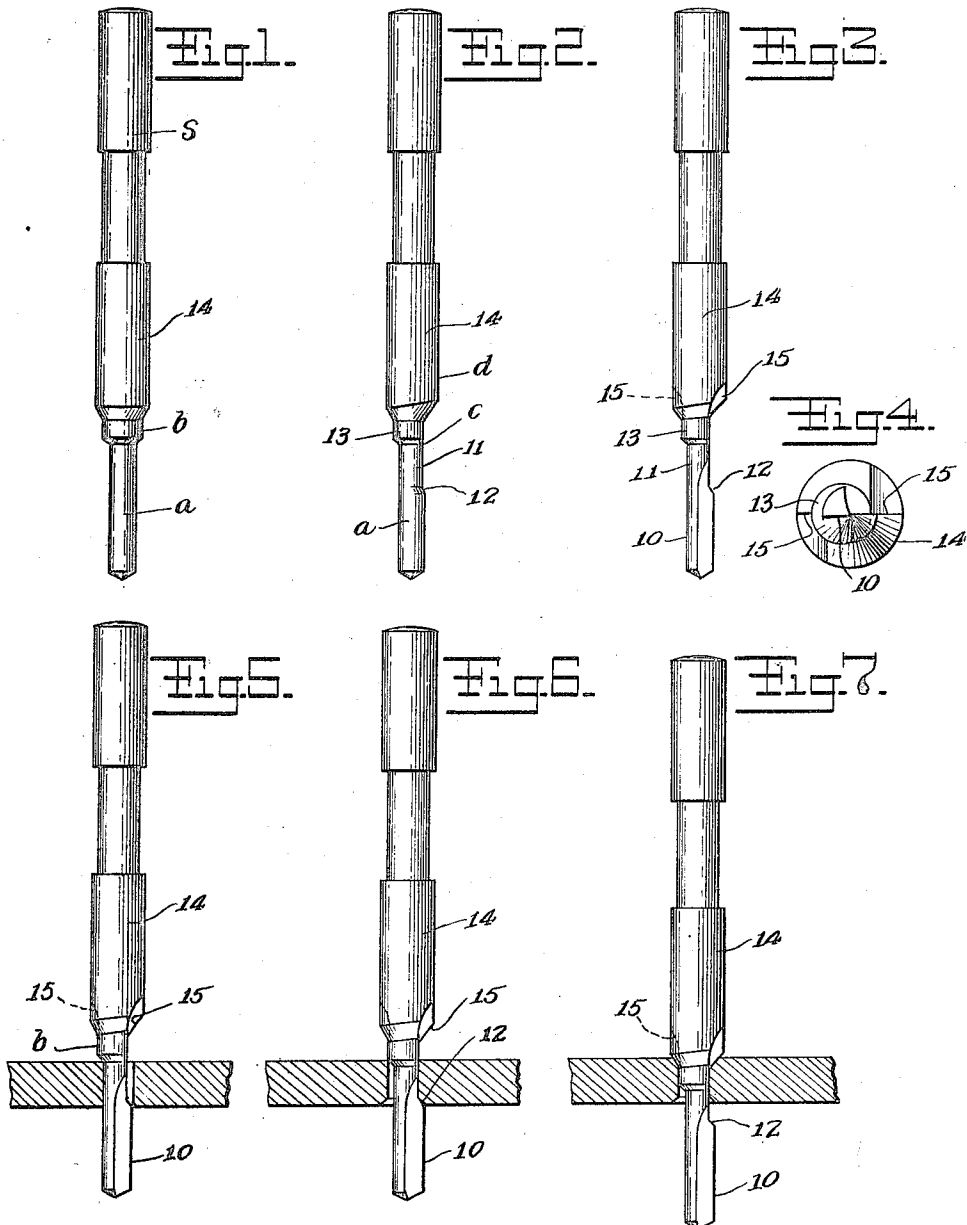
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A. E. SIMPSON

DRILL

Filed April 6, 1921

2 Sheets-Sheet 1



Inventor
Albert E. Simpson
By his Attorney
E. W. Marshall

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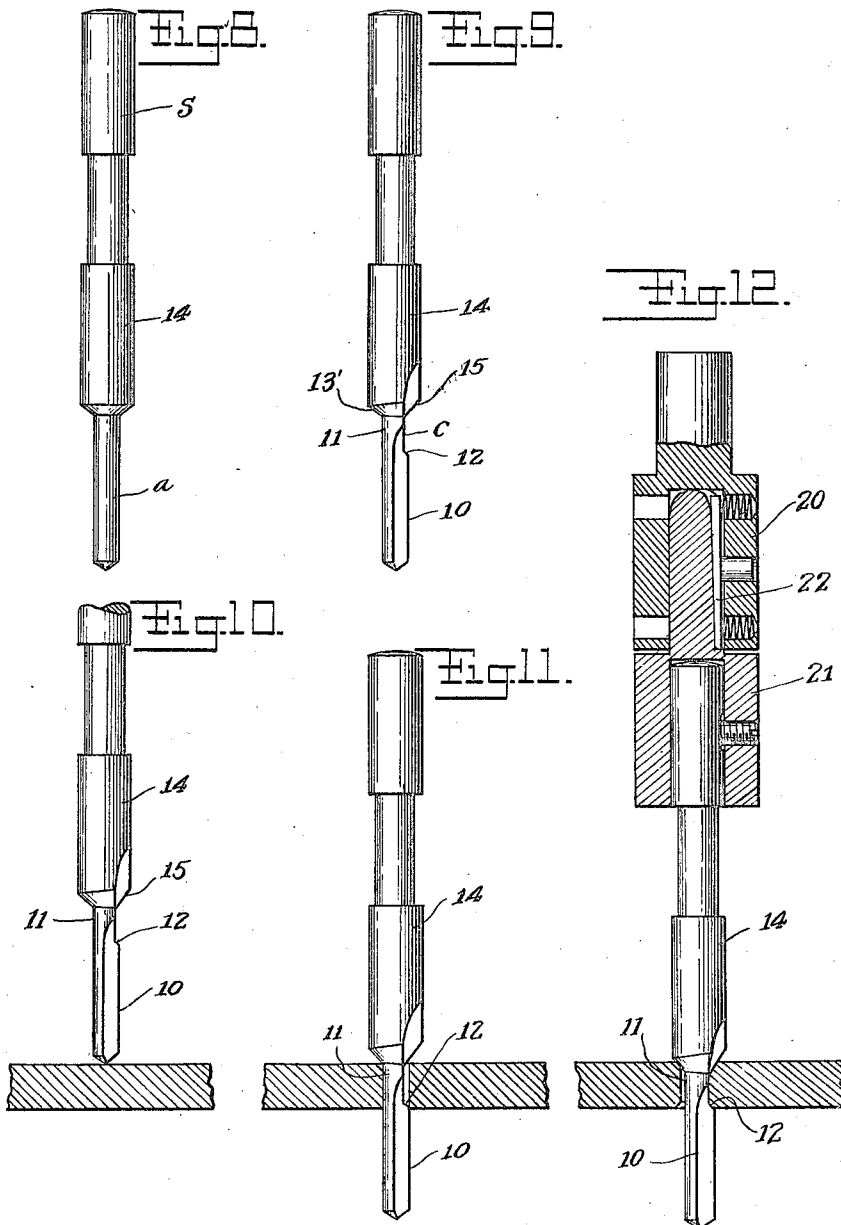
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UNITED STATES PATENT OFFICE.

ALBERT E. SIMPSON, OF BURY, ENGLAND.

DRILL.

Application filed April 6, 1921. Serial No. 458,949.

To all whom it may concern:

Be it known that I, ALBERT E. SIMPSON, a subject of the King of Great Britain, and a resident of Bury, England, have invented certain new and useful Improvements in Drills, of which the following is a specification.

This invention relates to a tool which is designed to countersink the bottom edge of a hole made by the tool. The tool takes the form of a drill so constructed that both edges of the hole made by it may be countersunk simultaneously or the bottom edge may be countersunk independently of the top edge.

The novel features of the invention will appear from the detailed description thereof taken in connection with the accompanying drawings forming part of this specification.

Referring to the drawings:

Fig. 1 is an elevation showing the blank from which is made a tool or drill embodying my invention.

Fig. 2 is an elevation showing the blank in another stage of manufacture.

Fig. 3 is an elevation showing a drill made from the blank shown in Figs. 1 and 2.

Fig. 4 is an end view of the drill shown in Fig. 3.

Figs. 5, 6 and 7 are views showing three stages in drilling and countersinking both sides of a plate by the same tool.

Fig. 8 is an elevation showing a blank from which is made another form of drill embodying my invention.

Fig. 9 is an elevation showing a drill made from the blank shown in Fig. 8.

Figs. 10, 11 and 12 are views showing three stages in drilling and countersinking both sides of a plate by the drill shown in Fig. 9, Fig. 12 additionally showing in section a form of chuck that may be used for holding the drill.

In the drawings like characters of reference indicate like parts throughout the several views.

The tool consists of a drill 10; a body portion 11, of less radius than the drill, arranged eccentrically thereto whereby a step 12 is formed, this step forming a cutting edge, and an eccentric or body portion 13 of greater radius than said reduced portion arranged eccentrically with respect to said reduced portion. The arrangement is such that after the drill has passed through the

plate or other object being drilled, the cutting edge 12 is forced laterally against the lower edge of the hole by the eccentric 13 which, as the drill is pushed through the hole, tends to find a seat in the hole.

In the form of the invention shown in Fig. 3 the eccentric 13 is of the same diameter as the drill 10 and it will therefore enter the hole made by the drill. The shoulder between the two portions 11 and 13 is beveled. As the shoulder is forced into the hole the cutting edge 12 is forced against the bottom edge of the hole thus countersinking the same. The cutting action continues until the eccentric 13 has fully entered the hole when further downward movement of the tool will be without effect since such movement merely moves the cutting edge 12 away from the edge of the hole. However, it is often desirable to countersink the upper edge of the hole and means are therefore provided for that purpose. The eccentric or body portion 13 is surmounted by an enlarged body 14. The shoulder or step adjacent the body portion 13 is beveled and milled to provide one or more cutting edges 15 which, when the part 13 is entered into the hole, serve to countersink the plate as will be readily understood. In other words the tool functions like any ordinary countersink drill from the body portion 13 upwardly except, of course, that the tool has a wobbly motion due to the eccentricity of the drill with respect to the body portion 13.

The axial distance between the cutting edge 12 and the beveled shoulder of the eccentric 13 will be of the same thickness as the plate or other object being drilled. The amount of throw or eccentricity between the reduced body portion 11 and the drill at one end and the portion 13 at the other end will vary according to the diameter of the countersink desired at the underside of the plate.

In the form of the invention shown in Fig. 9, the vertical distance between the root of the cutting edge 15 and the root of the bevel of the eccentric part 13', which corresponds to the part 13 of the tool shown in Fig. 3, is quite small as compared with that in the other form of the invention. The mode of operation of the tools, however, is substantially the same. The beveled shoulder 13' meets the edge of the hole ahead of the cutting edge 15 and forces the cutting edge 12 into engagement with

the bottom edge of the hole. The cutting edge 15 subsequently comes into contact with the upper edge of the hole and countersinking of both edges will then take place at the same time. Countersinking of both ends of the hole will cease in both forms of the invention when that part of the reduced body portion 11 between adjacent cutting edges 12 and 15 is brought into contact with the wall of the hole.

The method of forming the tool will be readily understood from Figs. 1, 2 and 8. A bar is turned to provide a suitable shank S whereby the tool may be suitably held. The part "a" is concentric to the shank and forms the drill 10. The part "b" is cut away on one side and the part "c" is cut from the part "a". The beveled end of the part "d" after being milled for the edge 15 is backed off to provide clearance for the cutting edge.

In the drill shown in Fig. 9 the edge 15 is backed off so as to be a short distance above the diametrically opposite bevel as will be readily understood. Only one cutting edge 15 is formed since the point diametrically opposite said edge is the heel which rubs on the upper edge of the hole during the countersinking operation.

Any suitable means may be provided for holding the tool so as to permit the necessary wobbling during the countersinking operation. In Fig. 12 I have shown a simple form of chuck for this purpose which consists of two socket members 20 and 21 which are loosely connected, a spring-pressed key 22 in the member 20 entering a key way in the stem of the member 21 to prevent relative rotation. The shank of the drill is suitably secured to the socket member 21 as by a set screw.

So far as I am aware it has not been possible prior to my invention to countersink the bottom edge of a hole by means of the tool that made the hole. It is therefore to be understood that while I have described the invention with considerable particularity the invention is not limited to the forms shown. I intend only such limitations as may be imposed by the appended claims.

What I claim is:

1. In combination, a drill having a body of given size, a drill stem extending eccentrically from one end of said body whereby a step is formed, a member extending eccentrically with respect to the drill from the other end of said body whereby a step opposite to the first named step is formed, said first named step being a cutting edge, and a cutting edge disposed rearwardly from said cutting edge.

2. A tool comprising a drill of the straight flute type; an inwardly directed step above the cutting point of the drill, the shoulder

formed by the step comprising a cutting edge, and an inclined abutment projecting from the drill above said step and at the opposite side of the drill.

3. A tool comprising a drill, a reduced body portion on said drill above the cutting point thereof arranged eccentrically with respect to the drill whereby a step is formed, said step forming a cutting edge and a body portion above said step of a radius greater than the radius of said reduced portion, said body portion being eccentrically arranged with respect to the drill and said reduced portion.

4. A tool comprising a drill, a reduced body portion on said drill above the cutting point thereof arranged eccentrically with respect to the drill whereby a step is formed, said step forming a cutting edge, another body portion above said reduced body portion of a radius greater than the radius of said reduced portion, said body portion being eccentrically arranged with respect to the drill and said reduced portion, and a cutting edge disposed rearwardly of the body portion and overstanding and spaced from said step.

5. A tool comprising a drill, a body portion of less radius than that of the drill arranged eccentrically with respect to the latter whereby a step is formed above the cutting point of the drill, said step forming a cutting edge, a cutting edge extending from the reduced body portion at a point above said step, and a projecting body portion between said cutting edges but on the opposite side of the drill, said body portion being of a radius greater than the radius of said restricted portion and eccentrically arranged with respect thereto.

6. Means for countersinking the under side of a plate comprising a tool having a drill, an inwardly directed cutting edge above the cutting point of the drill, a projection at one side of the tool opposite said cutting edge, said projection being eccentrically arranged with respect to the drill whereby as said projection is entered into the hole made by the drill, the latter is caused to run eccentrically with respect thereto and said edge brought into cutting engagement with the bottom edge of the hole.

7. A tool comprising a drill, an inclined cutting edge flaring upwardly and outwardly with respect to the drill, a second cutting edge flaring downwardly and outwardly with respect to the drill, a recessed portion on the drill between said cutting edges, and means projecting laterally of the drill opposite and between said cutting edges, said means being adapted to cause the drill to run eccentrically with respect to the hole made by the drill.

8. A tool comprising a drill, a recessed

portion at one side of the drill whereby a step is formed, said step being inclined downwardly and outwardly and forming a cutting edge longitudinally spaced from the point of the drill, and a part flaring outwardly and upwardly from the drill at a point above said step on the opposite side of the drill, said means serving to cause the drill to run eccentrically with respect to the hole made by the drill.

9. A tool comprising a drill, a reduced body portion on the drill longitudinally spaced from the point of the same, said portion being eccentric with respect to the drill whereby a step is formed at one side thereof, said step being a cutting edge, and a part projecting laterally from the drill diametrically opposite and above said step, said part serving to cause the drill to run eccentrically with respect to the hole made by the drill.

10. A tool for making a hole and counter-sinking both edges of the same comprising a drill, spaced opposed cutting edges remote from the cutting point of the drill, the roots of said cutting edges beginning at points in-

wardly of the cutting surface of the drill, and an inclined part opposite said edges for engaging the top edge of the hole made by the drill, to impart a transverse movement of the drill.

11. A combined drill and forward counter-sink comprising a drill having an eccentric enlarged rear body portion and a step forward thereof having a rearwardly directed cutting edge.

12. A combined drill and forward counter-sink comprising a drill having a forwardly tapered eccentric enlarged rear body portion and a step forward thereof having a rearwardly directed cutting edge.

13. A combined drill and forward counter-sink comprising a drill having a forwardly tapered eccentric enlarged rear body portion and a step forward thereof having a rearwardly directed cutting edge, there being also a further rearward enlargement concentric with that first mentioned and having a forward cutting edge.

In witness whereof, I have hereunto set my hand this 18th day of March 1921.

ALBERT E. SIMPSON.