No. 748,398. PATENTED DEC. 29, 1903.

W. G. MIDDLETON.

DRILL CHUCK.

APPLICATION FILED MAR. 23, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

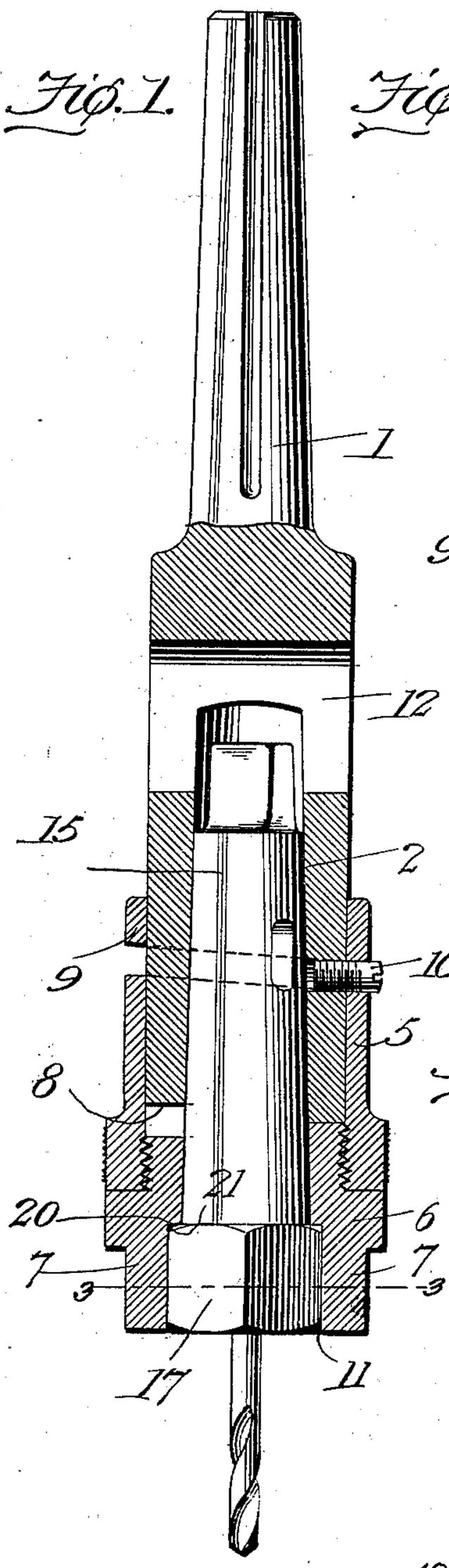


Fig. 2.

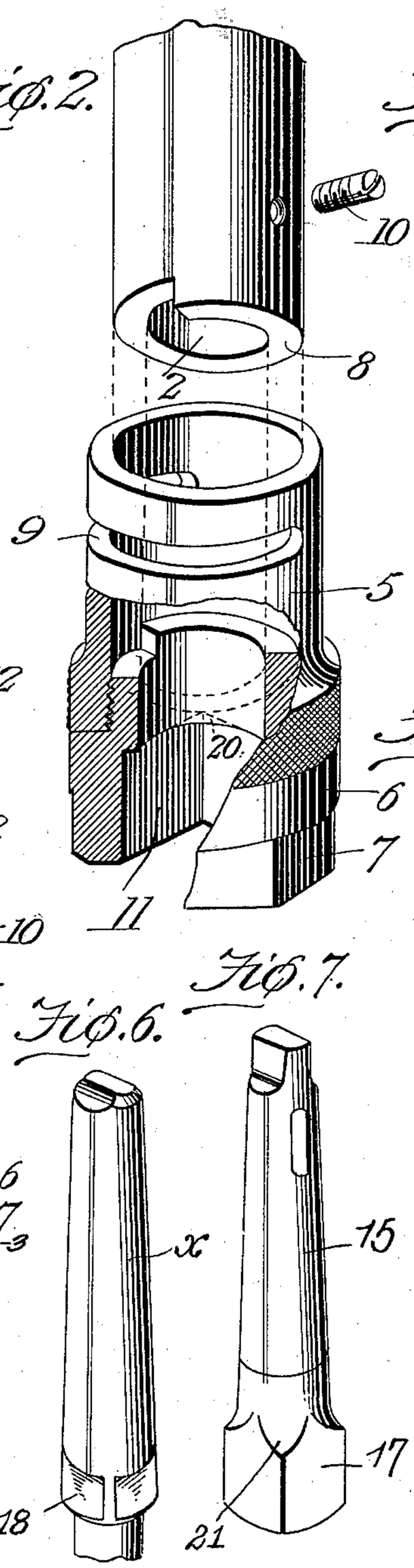


Fig. 4.

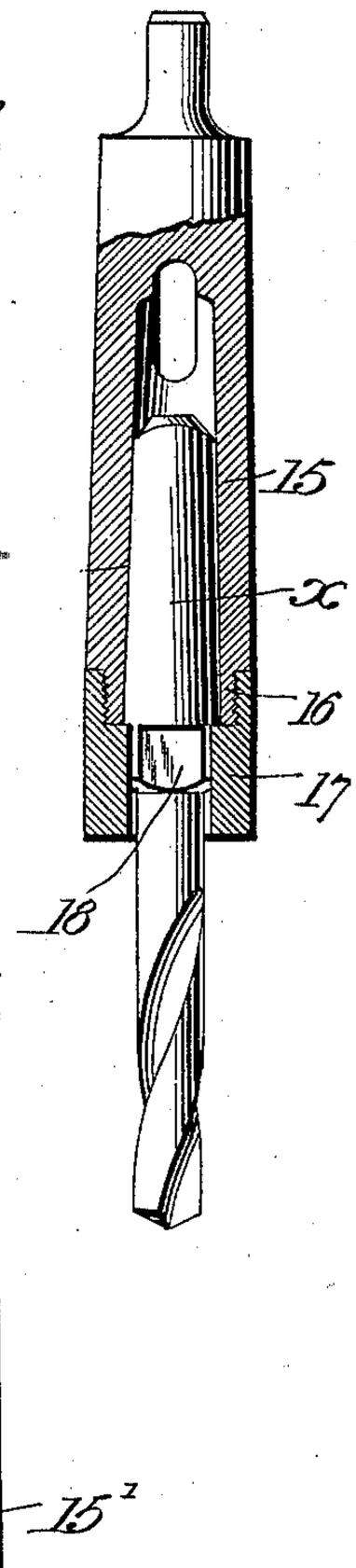


Fig. 5.

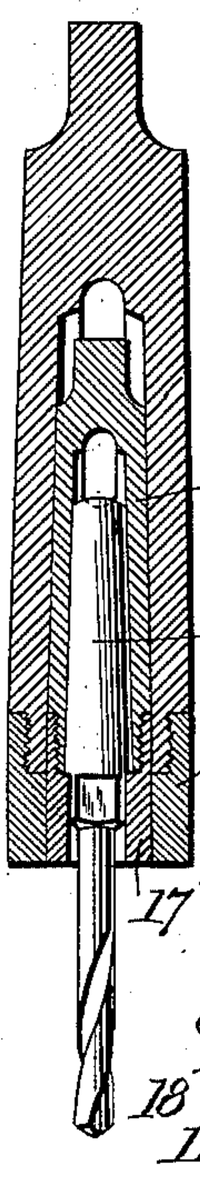
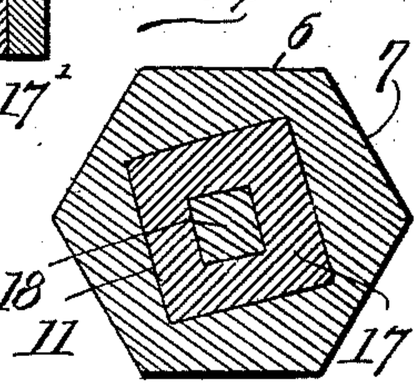


Fig. 6.

Fig. 7.

Fig. 3.



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DRILL CHUCK.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 8.

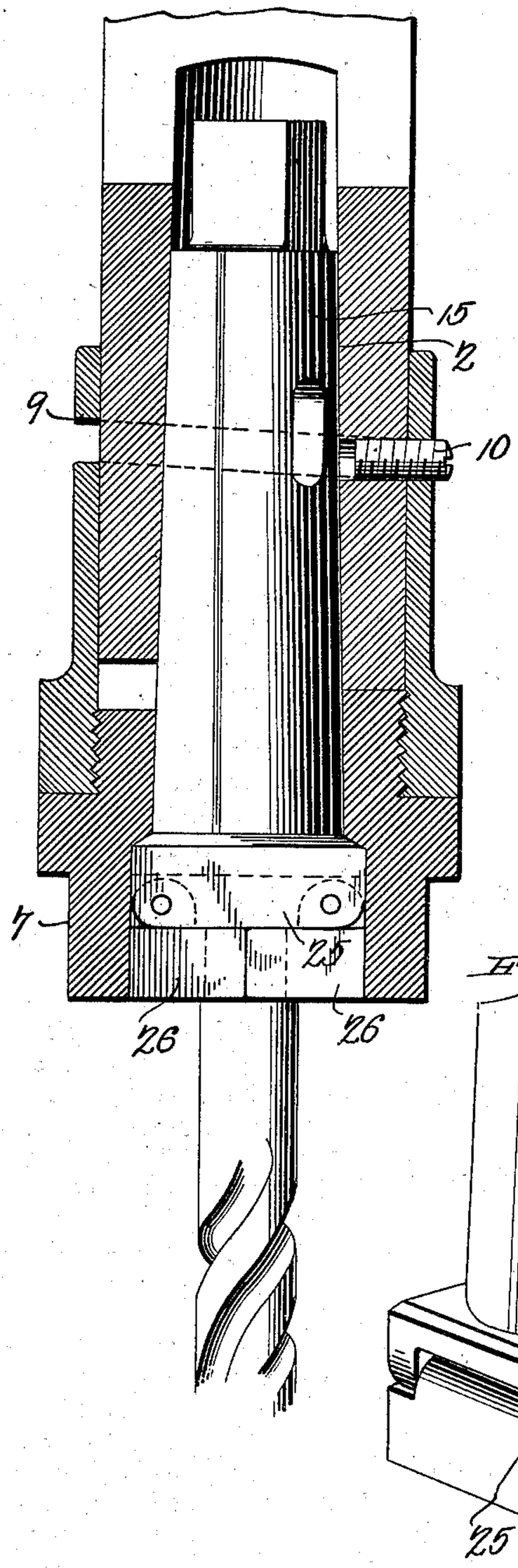


Fig. 11.

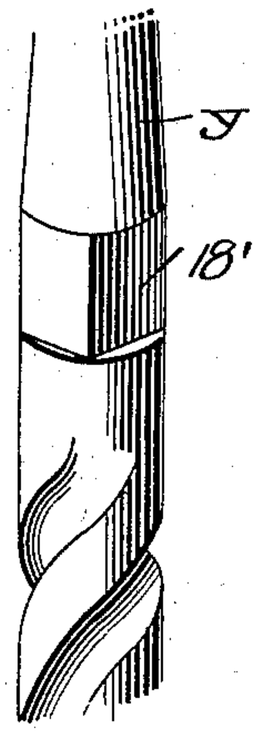


Fig. 9.

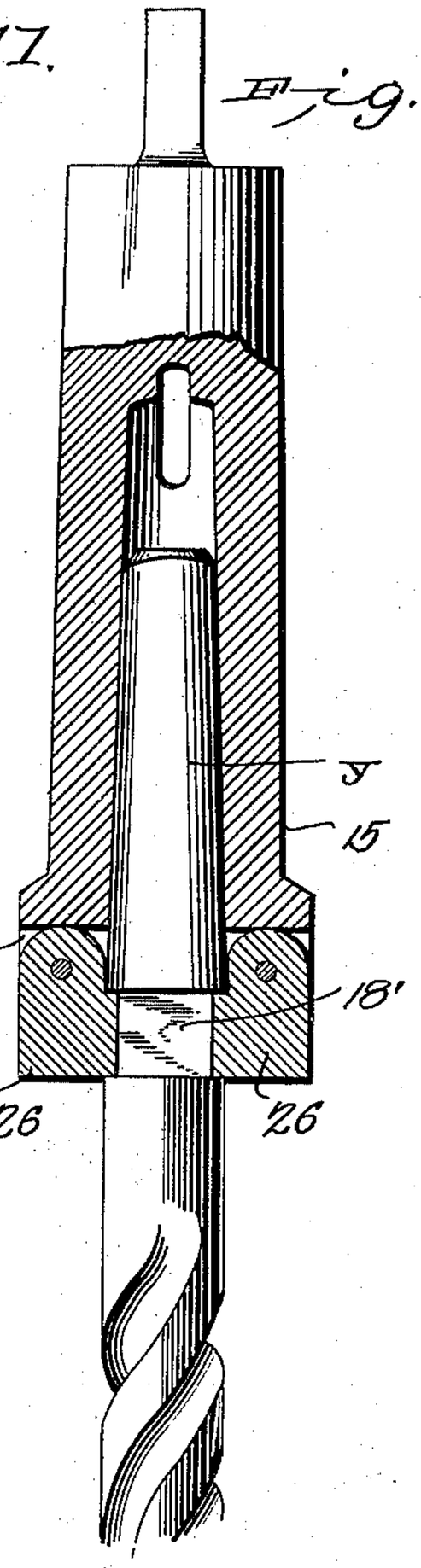
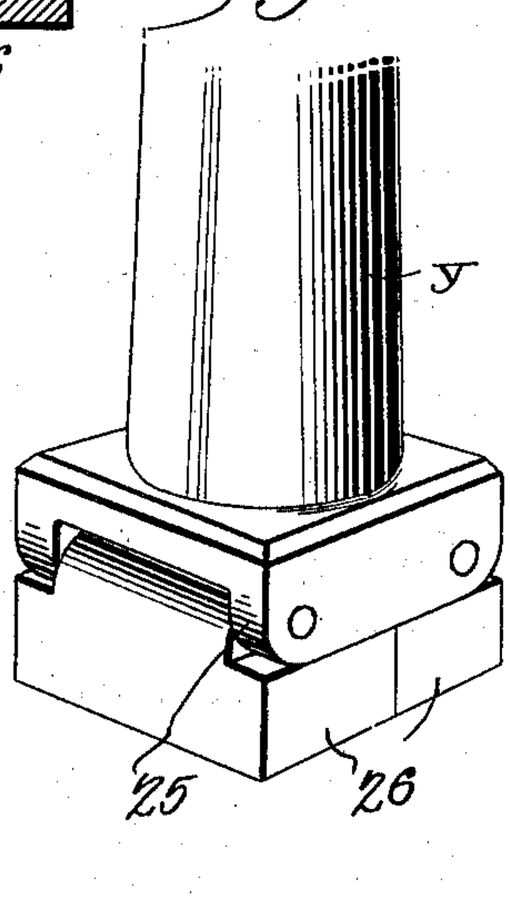


Fig. 10.



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No. 748,398. Patented December 29, 1903.

UNITED STATES PATENT OFFICE.

WILLIAM GREEN MIDDLETON, OF AUGUSTA, GEORGIA.

DRILL-CHUCK.

SPECIFICATION forming part of Letters Patent No. 748,398, dated December 29, 1903.

Application filed March 23, 1903. Serial No. 149,184. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM GREEN MIDDLETON, a citizen of the United States, residing at Augusta, in the county of Richmond and State of Georgia, have invented a new and useful Drill-Chuck, of which the following is a specification.

This invention relates to certain improvements in drill-chucks, and has for its principal object to provide a novel form of chuck into which the shanks of drills, reaming or similar cutting tools may be readily inserted or removed.

The chuck, while adapted for the reception of the shanks of standard drills, is made especially with a view of receiving and firmly clamping drill-shanks from which the tangs have been broken, and which under ordinary circumstances would be discarded as useless.

A further object of the invention is to provide a drill-chuck so arranged that the shank of the drill may be positively forced into the socket member and positively withdrawn from the same by the employment of an ordinary form of wrench or similar tool.

A still further object of the invention is to provide a form of drill-chuck which may receive drill-shanks of any desired size, the shanks of the smaller drills being first inserted in suitable bushings to be afterward clamped in the main socket member.

With these and other objects in view the invention consists in the novel construction and arrangement of parts hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a transverse sectional elevation of a drill-chuck constructed in accordance with the invention, a number of bushings being shown in order to illustrate the employment of the device for the holding of small drills or similar tools. Fig. 2 is a detail perspective view of the main drill-socket and coupling-sleeve detached. Fig. 3 is a sectional plan view of the device on the line 3 3 of Fig. 1. Fig. 4 is a detail sectional view of one of the body-bushings, which may be employed in connection with drill-shanks having broken tangs. Fig. 5 is a similar view showing a modification of the construction of the securing-nut employed where the body-bushing is adapted for the reception of a second bushing carrying a drill of still smaller diameter. Fig. 6 is a detail perspective view of the shank end of an ordinary form of drill, such as is shown in Fig. 4. Fig. 7 is a similar view of a bushing employed to hold drill-shanks from which the tangs have been broken. Fig. 8 is a sectional view similar to Fig. 1, illustrating a modified construction of bushing. Fig. 9 is a transverse sectional elevation of the bushing removed from the chuck. Fig. 10 is a detail perspective view of the lower portion of the bushing. Fig. 11 is a similar view of a portion of a drill-shank being held by the bushing shown in Figs. 9 and 10.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The drill-chuck proper, as shown in Figs. 1 and 2, comprises the usual tapering shank 1, adapted to fit into the drill spindle or lathe where the tool is employed, and at its lower end is provided with a tapering socket 2, adapted for the reception of drill-shanks. The outer surface of the socket member is cylindrical in form and receives a cylindrical sleeve 5, the lower portion of which is provided with an internal thread for the reception of a hollow threaded nut 6, permanently connected to the sleeve 5 and having at its lower portion a polygonal wrench-engaging surface 7. The lower end of the socket member 2 and the upper end of the nut 6 are provided with interfitting helical cam-faces 8, arranged to fit closely against each other, so that when turned in one direction the nut and sleeve will be moved upwardly on the socket member and when turned in the opposite direction will be lowered. In the outer sleeve 5 is a helical cam-groove 9, arranged on a winding inclined plane corresponding to that of the helical cams 8 and serving to receive a pin or stud 10, screwing into a threaded opening in the socket member 2,

the stud serving to lock the sleeve to the socket and insure longitudinal movement of the sleeve when the latter is turned.

The lower portion of the nut 6 is provided with an angular socket 11, preferably of rectangular form, in order to correspond to the rectangular lower portion of the shanks of drills of ordinary construction, so that when the shank of a drill is inserted into the socket its rectangular portion will enter the correspondingly-shaped socket 11, and when the nut 6 is turned in the proper direction the drill-shank is turned with the nut and forced up into the tapering socket 2, being firmly held therein during the drilling operation, and as the drill-stock is always turned to the right while working the working force of the drill will merely tend to tighten the same in its socket. To release the drill from the socket, the nut 6 is turned to the right, this effecting through the cam-groove 9 and cams 8 a downward and outward movement of the nut 6 and sleeve 5 and causing the loosening of the drill-shank in the socket, the shank being moved outward to an extent sufficient to permit its ready removal by hand or gravity.

Where drill-shanks are provided with tangs, their removal from the socket member is readily effected in the usual manner by the insertion of a suitable tool through the transverse slot 12 at or near the upper end of the socket member and extending across the conical receiving-socket; but in the present instance, where the socket is designed especially for the reception of drill-shanks from which the tangs have been broken, it becomes necessary to exercise some positive force on the shank in order to effect the removal of the drill, the upper end of the drill-shank broken in this manner being inaccessible.

In Fig. 4 is illustrated a construction of auxiliary bushing which may be employed when the drill-stock is to receive a drill of small size. On reference to this figure it will be seen that the tang is broken from the drill *x* and the shank is clamped in a conical bushing 15, which may be inserted in the conical socket 2. The lower end of the bushing 15 is extended to form a depending threaded flange 16 for the reception of a nut 17, having a rectangular outer face, which may fit within the rectangular socket 11 and nut 6. In the nut 17 is a rectangular opening, and at the upper end of said opening are shoulders to receive the outwardly-projecting portions of the shank formed by cutting away the lower end of the latter in the production of the rectangular portion 18 of the shank, and when this rectangular portion is inserted in the nut 17 and the latter is turned on the threaded flange 16 the shank of the drill will be forced up firmly into the socket and held in place therein during the drilling operation, while the rectangular nut 17 being engaged in the socket 11 of nut 6 will be positively turned from the main drill-stock and prevent all danger of loosening the drill while at work. When the drill is to be removed, the nut 6 is turned in the manner before described and positively forces the bushing from the socket 2. It will be noted that between the angular socket 11 and the lower portion of the circular bore of the nut 6 there is formed an angular shoulder 20, one of these being disposed at each corner of the rectangular socket, and such shoulders engage against the corresponding rectangular portions 21 of the nut 17 in order to effect the positive disengagement of the latter nut and bushing. The drill proper may be readily disengaged from the bushing by unscrewing the nut 17, the turning of the latter loosening the drill-shank in the socket 15, so that it may be readily removed by hand. Where a drill of much smaller size is to be employed—as shown, for instance, in Fig. 5—the drill *y* is inserted in a similar bushing 15′, having at its lower end a nut 17′, corresponding in shape and function to the nut 17; but when this is to be effected it is preferred not to insert a smaller mandrel from the top of the nut 17, as is the case with the drill *x*, (shown in Fig. 4,) and to accomplish this a nut 23, having a rectangular socket of sufficient size to receive the nut 17′ being substituted for the nut 17, (shown in Fig. 4,) so that it is unnecessary to wholly remove the nut 23 from the bushing in order to permit the removal of the smaller bushing 15′. As the smaller drills require less force to hold them in place, it does not become absolutely necessary to provide for the application of any direct and positive pulling of the shanks from the sockets, as is the case with the larger drills and larger bushings, although in each case the helical cam, which may take the form of a helical thread as an equivalent, (see Fig. 4,) exercises positive pressure in forcing the drill-shank into its receiving-socket.

With a chuck of the class described drills of any size from which the tangs have been broken may be employed until worn out and may be as firmly clamped and as readily placed in position and removed as perfect drills.

In Figs. 8, 9, 10, and 11 is illustrated a slightly-modified construction of bushing for engaging with drills having broken tangs, the chuck remaining the same as previously described. The broken drill is first cut down in order to form a rectangular surface, as indicated at 18′ in Fig. 11, there being shoulders at the upper and lower ends of the rectangular sides for engagement with the improved bushing. The shank of the bushing is of a construction similar to that already described, while the rectangular lower portion of said bushing is modified in order to properly engage with the squared portion 18′ of the drill. In this case the squared lower end of the bushing is provided with a pair of flanges 25, between which are pivoted the lower members 26, suitably shaped to engage

with the squared portion 18′ of the drill and firmly hold the same, as illustrated more clearly in Fig. 9. When the jaws are closed and the squared portion of the shank is in the correspondingly-shaped socket of the drill-stock, the jaws will be held closed and firmly engage with the drill.

Having thus described the invention, what is claimed is—

1. A tool-receiving chuck comprising a pair of members of which one has a tapered bore for the reception of a tool-shank and the other a non-circular portion for the reception of a non-circular portion of said tool-shank, a winding inclined plane on one member, and means carried by the second member for engaging the inclined plane, thereby to effect longitudinal movement of the tool-shank.

2. In combination, a member having a tapering socket, a secondary member associated therewith and having means for engaging a tool-shank, and a winding inclined plane carried by one member and engaging coöperating means on the second member for effecting positive longitudinal movement of the tool-shank.

3. The combination with a member having a tapering receiving-socket, of a secondary clamping member associated therewith and provided with means for engaging a tool-shank, a winding inclined plane on one member, and means carried by the second member for engaging the inclined plane, thereby to effect longitudinal movement of the tool-shank during the rotative movement of said second member.

4. The combination with a drill having a tapering tool-receiving socket, of a secondary member having a tool-shank-engaging socket, interfitting helical cams formed at the adjacent ends of the two members, a helical cam-slot in the second member, and a pin carried by the first member and engaging the walls of said slot.

5. In a device of the class specified, a chuck having a tapering socket and provided at its outer end with a non-circular recess forming a continuation of such socket, a removable bushing held therein and having a tapering shank adapted to the socket, and a pair of pivotally-mounted tool-engaging jaws carried by the shank portion and held in clamping position by the walls of said non-circular recess.

6. In a device of the class specified, a chuck having a tapering socket, a removable bushing held therein and provided with a tapering tool-receiving socket, the lower portion of said bushing being substantially rectangular and adapted to a correspondingly-shaped portion of the chuck, the rectangular portion of said bushing including a pair of movable jaws having recesses for the reception of the drill, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

WILLIAM GREEN MIDDLETON.

Witnesses:
W. N. BENTON,
RUFUS H. BROWN.