May 1, 1945. J. LUSA 2,374,761

COUNTERBORE

Filed July 16, 1943

Fig. 1.

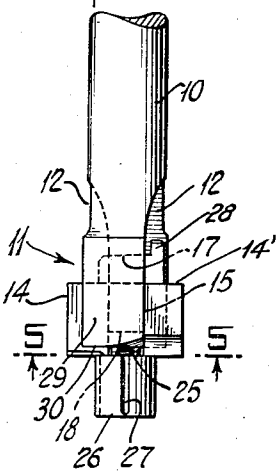


Fig. 2.

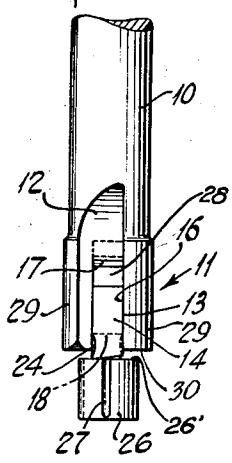


Fig. 3.

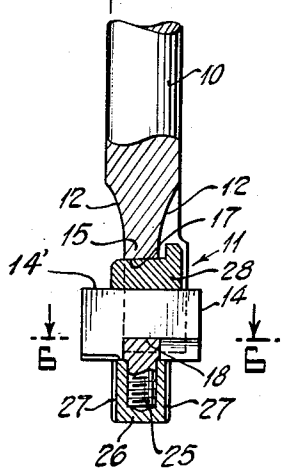


Fig. 4.

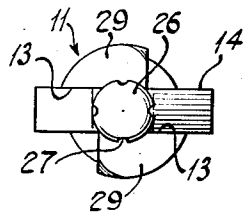


Fig. 5.

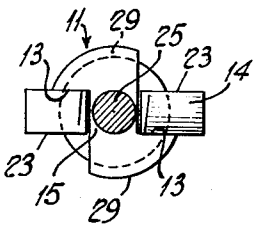


Fig. 6.

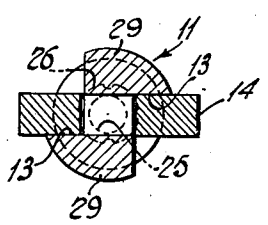


Fig. 7.

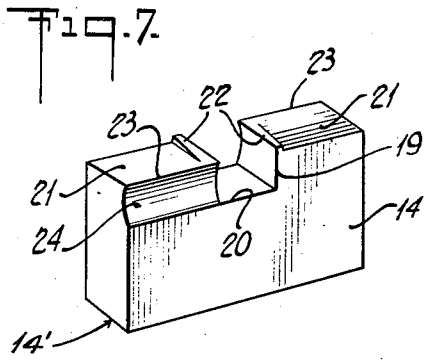
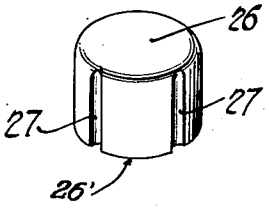


Fig. 8.



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COUNTERBORE

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6 Claims. (Cl. 77—58)

This invention relates to tools in general and especially to counterboring tools of the adjustable or exchangeable type.

One of the prime objects of the present invention is to provide a counterboring tool wherein both the cutting bit as well as the pilot are exchangeable and are individually removable in respect to one another and in respect to the shank of the tool.

Another object of the present invention is to provide a boring tool with exchangeable bits and pilots, and wherein the bits are held in wedge-engagement with the tool shank, and wherein the pilot is so constructed and arranged, that as the tool operates the pilot will exert a progressively increasing pressure against the tool bit.

The foregoing and still further objects and important advantages of the present invention will become more fully apparent from the ensuing description in connection with the accompanying drawing, which latter discloses one of the presently preferred forms of my device, and in which drawing:

Figure 1 is an elevation of a portion of my tool, showing the full side of the bit thereof.

Figure 2 is a similar view of my tool, with the bit in end view.

Figure 3 is a partial longitudinal section through the tool, exposing the tool bit.

Figure 4 is a bottom view of Figure 1.

Figure 5 is a similar view, with the pilot removed.

Figure 6 is a section taken on lines 6—6 of Figure 3.

Figure 7 is an enlarged perspective view of the tool bit, and

Figure 8 is an enlarged perspective view of a pilot member.

Referring now specifically to the figures, numeral 10 denotes the shank of my tool which is provided with an end enlargement 11, forming the head of the shank. Portions of this head are removed, such as by milling and indicated at 12, in order to provide two oppositely disposed bearing faces or seats 13 for the exchangeable tool bit 14.

By the removal of the material from the head and parts of the shank body, there is provided a reduced central head portion 15, as may be readily observed from Figures 3 and 5. In that reduced central head portion is arranged a through-slot 16 of a substantially rectangular shape. The long, parallel side walls of the slot are so distanced from each other as to snugly accommodate tool bit 14. The short wall 17 of the slot, remote from the end of the head, is tapered, whereas the opposite end wall 18, near the head end, is perpendicular to the longitudinal centre axis of the shank.

Tool bit 14, as clearly shown in Figure 7, comprises an oblong body having a central recess 19 with a straight bottom face 20. The upper or cutting ends of the bit, extending to the left and right of the recess are bevelled, as indicated at 21, and adjacent to recess 19 there are provided spacing ridges 22, which project above the top surfaces of bit ends 21 and serve for affording chip-clearance when the tool is in operation. These projections 22 also have an additional purpose which will become evident later. Cutting ends 21 have cutting edges 23 with the required rake-clearance obtained by a simple undercutting or grinding operation, as indicated at 24.

Referring now to Figures 1 to 5, inclusive, the reduced middle portion 15 of the shank head extends into a threaded element 25 for the reception of an exchangeable pilot 26, which latter is preferably provided with a straight end face 26' and longitudinal flutes 27 for accommodating and gathering chips which may remain in the pilot hole from the preceding drilling operation. In Figures 1, 2 and 3 it will be seen that a wedge member 28 is placed between the tapered end wall 17 of slot 16 and the straight bottom edge 14' of exchangeable tool bit 14. Both the wedge and the tool bit rest with their side faces against bearing or seating surfaces 13 of head enlargements 29, terminating in specially shaped end surfaces 30.

Assembly and operation

In assembling my device, the tool bit 14 is first inserted into slot 16 so that its recess 19 engages the straight slot end 18 and thus interlocks with the reduced center portion of the shank. In this manner the bit is centrally held in the tool shank. Now, wedge 28 is inserted between tapered end wall 17 of the slot and the straight end edge of tool bit 14.

It will be observed that bearing or seating faces 13 form extensions of the long walls of slot 16 and that the major portions of the bit side faces, opposite to its cutting edges, rest against these bearing faces 13. In this manner the tool bit is effectively supported during the boring operation.

To complete the assembly of the tool, pilot 26 of the proper size is selected and is secured to threaded element 25 of the shank. When the pilot is tightened, its straight end face 26' eventually comes to rest against projections 22, extending from tool bit 14. As will be clearly seen from Figure 2, the end face 26' of the pilot clears ends 30 of shank head enlargements 29, thus providing ample chip-clearance.

It is to be noted that the arrangement of the pilot and its relation to the tool bit is such that when the tool is in operation the pilot will have the tendency of becoming ever tighter in respect to threaded element 25, whereby the pilot will

exert a progressively increasing pressure against projections 22 of the tool bit and thereby augment the locking engagement of the tool bit by the wedge 28. Thus as the device operates, its parts instead of chattering, as is usually induced by a strenuous machine operation, will be more solidly united, whereby any possibility of the tool parts becoming loosened is effectively prevented.

Attention is invited also to the arrangement of solid portions 29 of the head, and especially to their end faces 30. The latter are curved so as to allow an unrestricted backward flow of chips between them and pilot 26. It will be also noted that the opposite seating surfaces 13 of solid head portions 29 provide an ample support for the largest surface areas of bit 14, whereby the latter receives a substantial backing during the forceful machine operations.

It is, of course, obvious that threaded element 25, forming the terminus of head 11, must be truly concentric with the head body and with the ends of the tool bit in order to provide a true, central support for exchangeable pilot 26, which is to guide the tool bit.

Conclusion

The present invention contemplates the use of a single tool shank, and a set of tool bits of different sizes and a corresponding set of exchangeable pilot members, so that with the same tool shank any number of counterboring operations may be performed.

While in the foregoing description only one embodiment of the present invention is described, and only one representative embodiment of my tool is illustrated in the drawing for explanatory purposes only, be it understood that the shape of the tool and its component parts may vary and that changes and improvements may be incorporated therein in order to meet different conditions and requirements, and I, therefore, reserve for myself the right to make such changes and improvements in my invention without departing from the broad scope thereof, as expressed in the annexed claims.

I claim:

1. In a counterbore, a tool shank having an enlarged end forming the head, portions of the latter and of the shank body being removed to provide two opposite bit supports and seats and to reduce the center portion of the head, a substantially rectangular slot arranged in the reduced head portion, the short end of the slot removed from the end of the head being inclined, the head terminating in a threaded extension; a tool bit removably associated with said slot and bearing with its two opposite faces against said head seats and having a recess in engagement with the short end of the slot adjacent to said threaded extension, a removable wedge bearing against said bit and the inclined short end of the slot, said tool bit having projections adjacent to said recess and extending beyond the cutting edges of the tool bit, and a pilot removably associated with said threaded extension and having chip-relieving grooves and bearing with its flat bottom surface against said bit projections.

2. In a tool of the class indicated, a shank having an enlarged head provided with a bit-receiving through-slot, oppositely disposed bit seats forming extensions of the long walls of the slot, one of the short walls of the slot being tapered, the head terminating in a threaded extension, an exchangeable bit wedged in place between the short end walls of the slot and having chip-relieving projections, and a pilot member removably associated with said threaded head extension and bearing against said projections.

3. In a counterbore, the combination with a tool shank having a head, the latter being provided with at least two bit seats and a reduced, slotted center portion, of a counterboring tool bit, removably placed in the head slot and having a central recess for engagement with the reduced center portion of the head, two chip-relieving spacers adjacent to the recess and extending beyond the cutting edges of the bit, a threaded extension forming the terminus of the head, means for fastening the tool bit immovably in position with its cutting edges at right angles to the longitudinal center axis of the shank, and an exchangeable pilot member having chip-relieving means secured to the threaded extension and forcibly engaging said spacers of the tool bit, while remaining substantially distanced from the head body of the tool shank.

4. In a tool of the class indicated, a tool shank having a head with oppositely disposed bit seats and a reduced central portion provided with a slot having one of its short walls tapered, an exchangeable tool bit fitting into the slot and having a central recess adapted to engage the other short wall of the slot and the adjacent part of the head central portion, with which the bit interlocks, wedge means urging the bit against said other short slot wall, a central, threaded element extending from the shank head, a pilot member removably engaging said element and forcibly bearing against said tool bit, so that its pressure against the tool bit increases while the tool is being operated.

5. The combination with a slotted tool shank having an enlarged head portion and an axially extending reduced threaded end portion, the slot of the shank being located in said enlarged head portion and having straight and tapered short end walls, of a bit having a recess at its cutting end being removably disposed within the slot, the recess of the bit being adapted to engage the straight end wall of the slot and to straddle said reduced end portion of the shank, a wedge member driven between the bit and the tapered end wall of the slot, and an exchangeable pilot member in engagement with said threaded end portion and in forcible contact with said bit.

6. The combination with a one-piece slotted tool shank having an enlarged head portion terminating in an axially extending reduced threaded end or pilot portion, the body of the head portion being reduced by symmetrical, axially progressing recesses, the slot of the shank being disposed in the thus reduced head portion and having one straight and one tapered short end wall, of an exchangeable bit placed in the head slot and having a recess for engaging the straight end wall of the slot and for straddling said pilot portion, wedge means interposed between the tapered end wall and the bit for holding the latter against movement, and a pilot member removably associated with said threaded pilot portion and in forcible engagement with said bit.

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