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E. GAIRING

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INTERCHANGEABLE BORING AND COUNTERBORING TOOL

Filed March 29, 1926

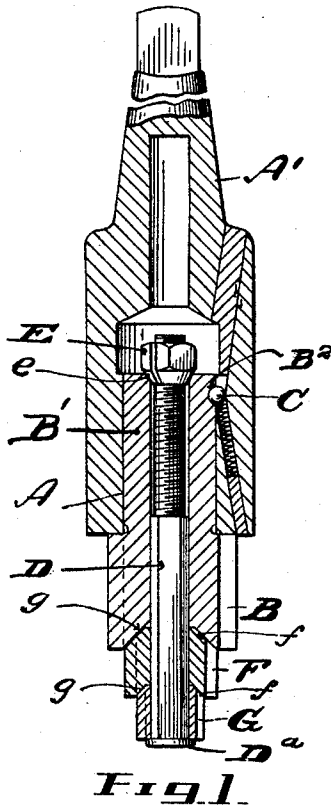
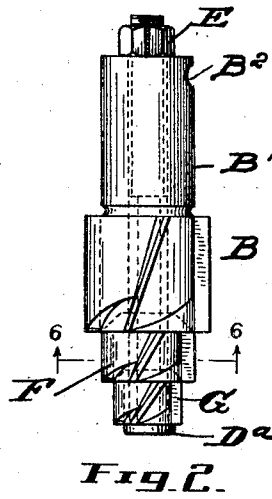
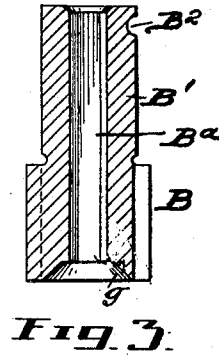
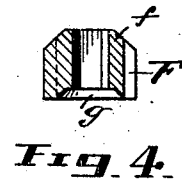
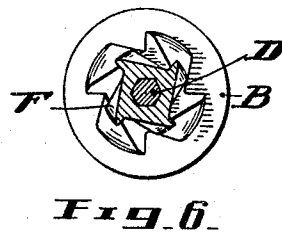
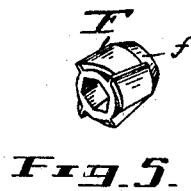
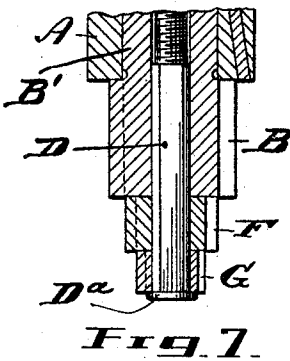
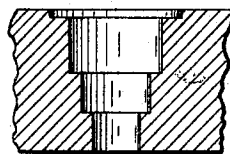


Fig. 8. Emil Gairing

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UNITED STATES PATENT OFFICE.

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INTERCHANGEABLE BORING AND COUNTERBORING TOOL.

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This invention relates to boring and counterboring tools shown in the accompanying drawings and more particularly described in the following specification and claims.

5 The primary object of my invention is to provide a counterboring tool comprising a plurality of cutters adapted to be nested and locked together as a unit for insertion in a holder in such a manner as to insure a positive driving relation between the several cutters, whereby they may bore and counterbore, or cut a plurality of stepped bores and counterbore, and also spot-face the work if desired.

10 A further object of the invention is to provide for inter-changeably grouping together a plurality of cutters, which are adapted to be nested and held in interlocked relation in a holder, whereby any combination of cutters may be assembled together to adapt the tool for a great variety of work. In other words, if the work is a simple boring and counterboring job, cutters of proper size are assembled and locked together in the holder to provide a bore and counterbore of predetermined diameter and also spot-face the work. If the job requires a plurality of stepped bores, the required number of cutters are assembled and locked together in the holder, whereupon a hole of the desired character may be bored.

A further object of the invention is to increase the life of the tool,—as the several cutters may be sharpened from time to time when required,—and still be nested and locked together in any combination desired.

35 A further object of the invention is to increase production and reduce the cost of operation through the use of this device, as any of the cutters—when broken by accident or when worn out—may be abandoned for a new cutter without the necessity of discarding the entire tool.

40 A further object of the invention is to provide for an absolute locking and driving relation between the several cutters when secured together in the holder that they may operate as a unitary device.

45 A further object of the invention is to provide against any possible lateral displacement of the cutters in relation to each other, thereby insuring accuracy in boring operations.

50 With the foregoing and other objects in view which will appear as the description

proceeds the invention further resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed it being understood that changes may be made in the precise embodiment of the invention herein disclosed without departing from the spirit of the same.

In the drawings accompanying the specification:

65 Figure 1 is a longitudinal cross sectional view through a plurality of separable cutters locked in assembled relation and supported in a holder.

Figure 2 is a side elevation of a plurality of detachable cutters locked together to form a single unit.

Figure 3 is a longitudinal cross sectional view through one of the cutting tools provided with a central polygonal opening extending throughout its length.

Figure 4 is a cross sectional view through one of the detachable cutters adapted to coordinate with the cutter shown in the preceding figure.

Figure 5 is a perspective view of the same.

Figure 6 is a cross sectional view taken on or about line 6—6 of Figure 2.

Figure 7 is a fragmentary cross sectional view of a modification in which the respective ends of the cutting units are flat in contradistinction to the tapering end shown in the preceding figures.

Figure 8 is a cross sectional view through a fragment of metal, showing a bore comprising a stepped hole with a spot facing,—to indicate the character of the hole resulting from a certain assembly of the different cutters.

Referring now to the letters of reference placed upon the drawings:

A denotes the socket of a tool holder provided with a tapering shank A¹ adapted for insertion in a suitable chuck or other driving means,—not shown.

100 B indicates a boring tool, the shank B¹ of which has a short peripheral groove B² to receive a spring-urged ball C, partially lodged in a groove formed in the socket for locking the tool to the holder,—this feature however forms no part of the present invention and is shown here merely to indicate a means for locking the tool in the holder.

The boring or cutting tool B is formed

with a central polygonal opening B^a extending throughout its length to receive the correspondingly shaped shank of a bolt D, which is accurately machined to snugly fit therein.

The bolt D is preferably constructed with a relatively thin head D^a at one end, the other end of the bolt being reduced and screw-threaded to receive a split nut E, having a chamfered lower edge *e* adapted to be seated in a correspondingly tapered recess formed in the end of the tool shank.

F, G, are detachable cutters having a central polygonal opening corresponding with the shape of the bolt and machined to accurately fit the latter. These cutters may be provided with a tapering end *f* that they may be inter-changeably assembled with cutters of different lengths and diameters,—the respective cutters are each preferably formed with a tapering socket *g* to receive the corresponding tapering end of the cutter with which they may be assembled.

To put the device into use a group of cutters adapted to perform the required boring operation are assembled in proper relation upon the end of the bolt D which is then inserted in the cutter B, which has a shank for supporting the device in the tool holder.

Before inserting the cutter in the holder, the nut E is screwed onto the end of the bolt, thereby drawing the tapering ends of the respective cutters into impinging relation with the wall of the corresponding tapering socket of the adjacent cutters,—thus joining the several cutters together as a unit. The shank of the upper cutter is then inserted in the tool holder and locked therein by the spring-urged ball C, or other suitable engaging device.

In the modification shown in Figure 7 the ends of the several cutters are flat and upon connecting them together as a unit by the bolt, the flat contiguous surfaces of the several cutters impinge upon each other in-

suring in co-operation with the polygonal bolt and corresponding polygonal opening through the cutters a positive driving relation of the several parts as a unitary device.

Having thus described my invention what I claim is:

1. In a tool of the character described; a plurality of cutters having a central longitudinal polygonal opening extending through the cutters, each of said cutters having a tapering end adapted to project into a corresponding tapering socket in the end of the adjoining cutter, whereby they may be nested together when assembled; a bolt polygonal in cross section for a portion of its length extending through the polygonal openings of the several cutters; a nut screwed upon the end of said bolt adapted when adjusted to draw the several cutters into impinging nested relation, whereby they may operate as a unit; and means for supporting said unitary cutting device.

2. In a tool of the character described; a plurality of cutters of relatively different diameters having a central longitudinal polygonal opening extending through the cutters, each of said cutters provided at one end with a tapering socket and at its opposite end a tapering projection adapted to fit the tapering socket of the adjacent cutter when assembled end to end, one of said cutters having also a shank adapted to enter the socket of a tool holder; a bolt polygonal in cross section extending through and fitting the openings in the several cutters; a nut screwed upon the end of said bolt adapted when adjusted against the shank of the cutter to draw the several cutters into impinging relation to form a unitary device; a holder adapted to receive the shank of said cutter; and means adapted to engage said shank to secure the device in the holder.

In testimony whereof, I sign this specification.

EMIL GAIRING.