

(No Model.)

S. E. FREEMAN.

SHANK FOR HOLDING ROTARY CUTTING TOOLS OR TOOL HEADS.

No. 503,656.

Patented Aug. 22, 1893.

FIG. 2.

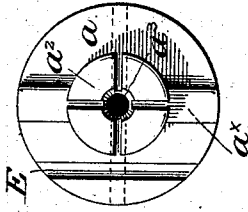


FIG. 1.

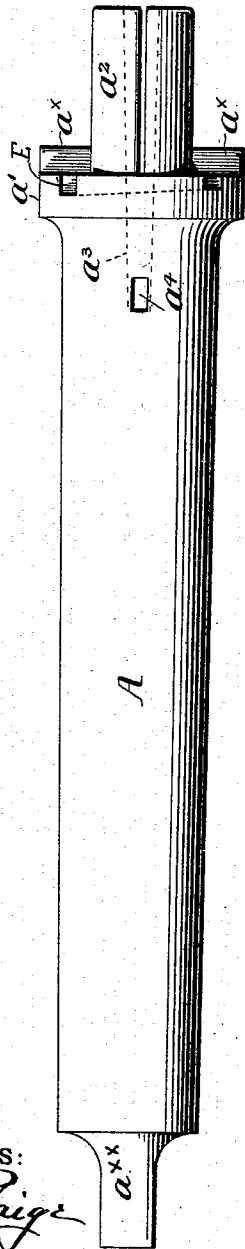


FIG. 3.

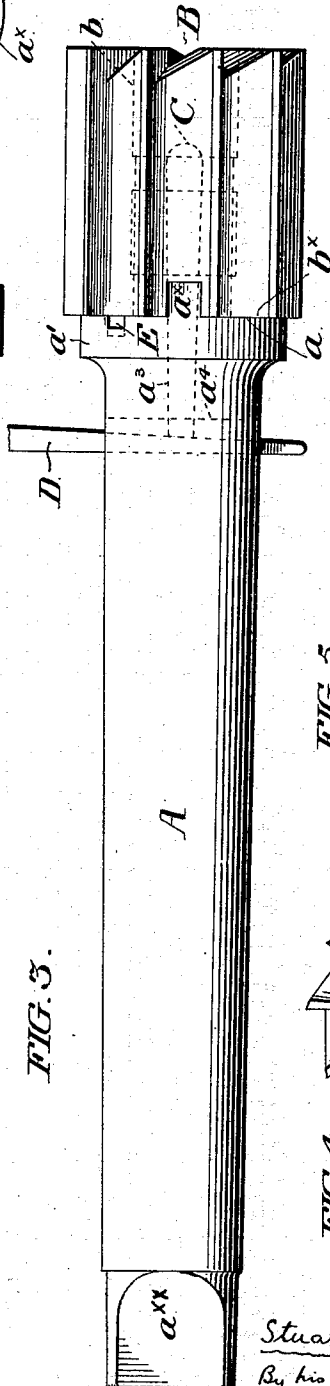


FIG. 5.



FIG. 6.

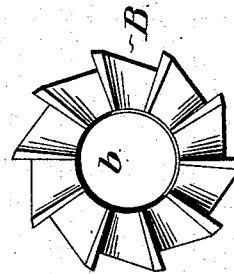


FIG. 4.

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SHANK FOR HOLDING ROTARY CUTTING-TOOLS OR TOOL-HEADS.

SPECIFICATION forming part of Letters Patent No. 503,656, dated August 22, 1893.

Application filed August 5, 1892. Serial No. 442,222. (No model.)

To all whom it may concern:

Be it known that I, STUART E. FREEMAN, a citizen of the United States, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Shanks for Holding Rotary Cutting-Tools or Tool-Heads, of which the following is a specification.

My invention relates to a class of implements consisting of a mandrel or shank, provided or mounted in connection with means to occasion its rotation, to which a series of tool heads differing in either character or size, are adapted to be at will applied. In the practical employment of implements of this class, and especially when they are operated by power, it has been found difficult to provide a means for uniting the tool head to the mandrel which combines with capacity for expeditious operation the required reliability of attachment.

It is the object of my invention to provide a means for uniting a tool head and mandrel which shall be simple in construction and of few parts, and at the same time shall possess the necessary firmness of attachment under the great strain to which the parts are subjected in operation.

In the drawings I show and herein I describe a good form of a convenient embodiment of my invention, the particular subject-matter claimed as novel being herein-after definitely specified.

The tool-head forming part of the implement which I have elected to illustrate as presenting a good embodiment of my invention, happens to be a cutter head, of a character largely employed in the mechanic arts. It is, however, to be understood that my invention is applicable to tool heads of a character other than that depicted.

In the accompanying drawings, Figure 1 is a view in side elevation of the mandrel of my improved implement, the cutter head being supposed removed. Fig. 2 is an end view of the same, sight being taken toward the face. Fig. 3 is a view in side elevation of my improved implement with the cutting head in place thereon, illustrating also the applica-

tion of the drifting pin to occasion the removal of the taper pin. Fig. 4 is an end view of the cutter head. Fig. 5 is a view in perspective of the taper pin. Fig. 6 is a view in perspective of the drifting pin.

Similar letters of reference indicate corresponding parts.

In the drawings, A indicates the mandrel proper, the rear end $a^{\times}$ of which is adapted for engagement with any suitable mechanism for rotating it. The free end of the mandrel is conformed to constitute a slight radial enlargement a' , dressed off to form a plane face a perpendicular to the axis of the mandrel, and turned down to form an expansible shank a^2 projecting as an axial continuation of the mandrel from the center of the plane face.

a^3 is a taper bore, conveniently of circular section, axial with respect to said shank, and extending from the free end of the latter through which it opens, to any desired point intermediate of the length of the mandrel where it opens into a transverse diametric channel a^4 opening through the side of the mandrel. In order to render it expansible, the wall of said shank is longitudinally slotted by any desired number of slots, into a series of sectors adapted to be forced outward.

B is the tool head, shown in the drawing as a cutter head, and being provided with a bore b of size corresponding to the normal diameter of the expansible shank, upon which shank it is, in its application, seated. The rear face $b^{\times}$ of the tool head corresponds to the face a of the mandrel, and said faces are provided with means by which they are locked to secure their conjoint rotation, such means preferably consisting of a stud or studs on the one taking into a recess or recesses formed in the other.

In the drawings I show the mandrel face a as provided with two studs, $a^{\times}$, disposed on opposite sides of the shank,—projecting from it, and the tool face as embodying two corresponding recesses adapted to receive said studs when the tool is in position upon the shank.

In applying the tool head to the shank it is

seated upon the latter and adjusted until the studs take into the recesses, whereupon the respective faces of the mandrel and tool head come into close contact. The tool head so mounted upon the shank is retained against longitudinal movement by the expansion of the shank against the wall of its bore, and this I prefer to accomplish by the use of an axial taper pin shown in the drawings and designated C therein. This pin is of such diameter and proportions as to allow of the entrance of its smaller end within the bore of the unexpanded shank, but its advance, as it is driven in, causes it to bear as to its body portion against the sectors of the shank and wedges them outward against the bore of the tool head. When the pin has been thus driven it is allowed to remain in position during the use of the tool, and by its presence retains the head securely in place upon the shank. The pin is of such length and the parts are so proportioned that when said pin is driven into the limit of its movement its advance end extends a certain distance within the channel a^* . In order then to eject the taper pin C to permit of the removal of the tool head, a drift pin D may be forced into said channel, and said drift pin, presenting beneath and acting against the advance end of the taper pin will occasion such ejection of it as will release it from its wedged engagement with the shank. Inasmuch, however, as the shank sectors, notwithstanding the removal of the pin, may still retain their expanded set to such an extent as to require some force to remove the tool head, my invention further comprehends the following means by which such force may be conveniently applied.

E is a groove cut in the mandrel face a , extending conveniently from edge to edge thereof, passing as near to its center as is consistent with clearing the shank, and of uniformly graduated depth from one end to the other. The drift pin D is adapted to said groove, and tapered to match its graduated depth, that is to say its opposite edges exist in planes bearing the same relation to each other as do the planes of the face a and the bottom of the groove E. When then it is desired to remove the cutting head, said drift pin D is driven into the groove with its inclined edge facing the bottom of the groove, its straight edge existing at first below, but in all positions constantly in a plane parallel to that of the face a , and, as the forward end of the drift pin in its advance reaches the shallow end of said groove the straight edge of the drift pin will rise to and coincide with the face a , and in the further advance of the drift pin said edge, rising evenly and uniformly above the level of the face a , will encounter and force the tool head away from said face, until said tool head is free from studs a^* , so that, after said initial movement, the removal of the tool head by hand may be easily accomplished.

Having thus described my invention, I claim—

1. An implement consisting of a mandrel provided with an expansible shank and embodying a bore, a taper pin adapted to be entered within the bore of the shank, a transverse channel in communication with said bore, and a pin adapted to be entered in said channel, substantially as set forth.

2. An implement consisting of a mandrel provided with an expansible shank and embodying a bore, a tapering pin adapted to be entered within said bore, a transverse channel in communication with said bore and in line with the point of the pin when driven home, substantially as set forth.

3. As an article of manufacture, a mandrel provided with an expansible shank, and provided with a projecting stud, a tool head embodying a bore of such size as to receive the unexpanded shank and embodying a recess adapted to receive the stud, and means for expanding the shank, substantially as set forth.

4. In combination with a tool head provided with a bore, a mandrel provided with an expansible shank adapted to be entered in said bore, means for expanding said shank, said head and mandrel each having a face perpendicular to the axis of the said shank which faces are in close contact when the tool head is in position, a groove of gradually diminishing depth formed in one of said faces, and a pin having one straight and one inclined edge adapted to be entered in said groove to occasion the partial separation of the tool head from the mandrel, substantially as set forth.

5. An implement consisting of a mandrel having an expansible shank and a plane face perpendicular thereto, a tool head having a bore adapted to receive the said shank and a face corresponding to the face of the mandrel, which faces are in close contact when the tool head is in position upon the mandrel, means for expanding the shank, means for preventing the rotation of the tool head with respect to the mandrel, said means consisting of a projection on one of said devices taking into a recess in the other, and a groove formed in one of the said faces, substantially as set forth.

6. An implement consisting of a mandrel having an expansible shank, and embodying a bore the inner end of which opens into a transverse channel, a tool head having a bore adapted to receive the said shank, said tool head and mandrel having corresponding opposing faces which are brought into close proximity to each other when the tool head is in position upon the mandrel, one of the said faces being provided with projections and the other with corresponding recesses, a pin adapted to be entered in the bore of the shank to occasion the expansion of said shank, said

pin being of such length that when in position its advance end extends within the transverse channel, and a groove of gradually diminishing depth formed in the face of the
5 mandrel, the entrance of a correspondingly shaped pin within which will occasion the starting of the tool head from its seat, substantially as set forth.

In testimony that I claim the foregoing as my invention I have hereunto signed my name to this 2d day of August, 1892.

STUART E. FREEMAN.

In presence of—

ARTHUR FALKENAU,
HUGO L. HUND.