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TOOL AND RETAINING MEANS THEREFOR

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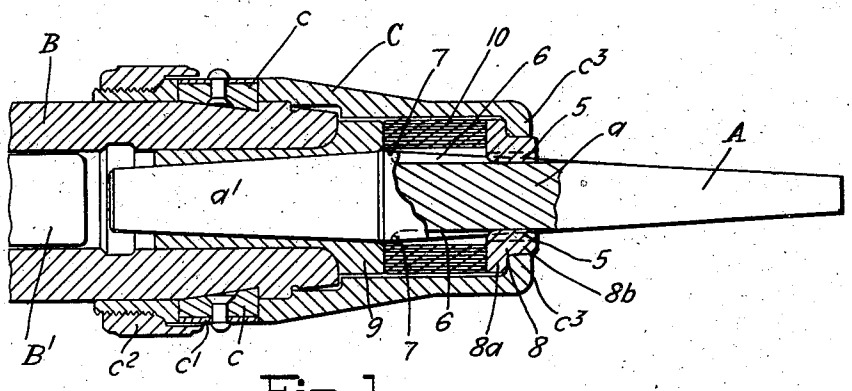


Fig. 1

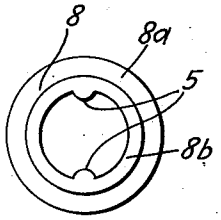


Fig. 2

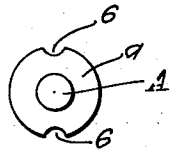


Fig. 3

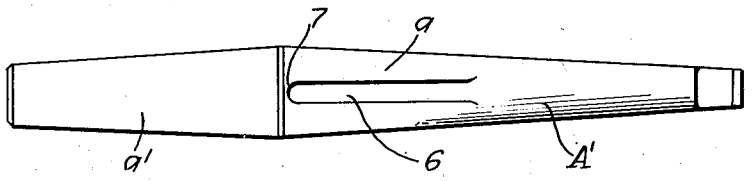


Fig. 4

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UNITED STATES PATENT OFFICE

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TOOL AND RETAINING MEANS THEREFOR

Application filed January 17, 1928. Serial No. 247,314.

This invention relates to tools for use with percussive machines and to improved ways and means for retaining such tools in operative relation with such machines. It has special application to tools of tapered form used for cutting, punching, rivet busting and the like. In some respects it may be considered as a further development of and improvement upon the structures disclosed and claimed in my Patent No. 1,609,136 issued November 30, 1926, for retainer for rivet-cutting tools.

In using a tapered tool with a retainer of the type disclosed in the above patent, the tool frequently wedges in the opening in the barrel nut retainer thereby causing annoyance and delay to the operator who is under the necessity of freeing the tool by striking the same against the work or by loosening it by blows with another tool.

One object of the invention is to provide an improved form of tapered tool and retainer arrangement therefor which will prevent binding and wedging of the tool. Other objects will be apparent from the detailed description which follows.

In order to illustrate the invention one concrete embodiment thereof is shown in the accompanying drawings in which:

Fig. 1 is a sectional view through the front end of a percussive machine disclosing a tool of the described type with retaining means therefor;

Fig. 2 is a front end elevational view of a detail of the retainer arrangement;

Fig. 3 is a front end elevational view of the tool shown in Fig. 1;

Fig. 4 is a top plan view of the working tool similar to that shown in Figs. 1 and 3 but having a chisel end.

The embodiment of the invention chosen for the purpose of illustration comprises a working tool A or A′ arranged to be secured to the front end B of a percussive machine of any suitable or desired type by retaining means indicated at C. As indicated, the tool A projects within the front end of the percussive machine, such as the cylinder B of a pneumatic hammer to receive upon its shank end the blows of the percussive member such as piston B′. The retaining means C conforms substantially to that disclosed in my Patent No. 1,609,136, referred to above, having latching blocks c carried by an annular spring c' and engaging suitable recesses in cylinder B of the percussive machine. An annular locking nut c^2 such as disclosed in my copending application Serial No. 94,684—filed March 15, 1926, may be utilized to lock the barrel retainer C against removal.

As indicated in Figs. 1, 3 and 4, working tool A, which may take the form of a punch as shown in Fig. 1, or A′ in the form of a chisel as indicated in Fig. 4, or have a working end of any other desired shape, has a tapered portion a extending towards the working end, said end projecting through a bore in retainer C which is in axial alignment with the piston chamber of the percussive machine. Suitable means are provided for guiding working tool A or A′ for limited movement relative to machine B and retainer C without wedging or binding while positively preventing its ejection from retainer C. The preferred means is a spline and groove construction. For convenience in manufacture the splines are on the retaining means while the grooves are formed in the working tool. By preference two splines 5 (Figs. 1 and 2) are provided at diametrically opposite points and projecting into the bore provided by the tool retaining means and through which the working tool extends. The working tool has cooperating grooves 6, Figs. 1, 3 and 4, at diametrically opposite points in the tapered portion a thereof, these grooves being in substantial parallelism with the axis of the tool as indicated in Fig. 1. The ends 7 of grooves 6 cooperate with splines 5 to form stops limiting the outward movement of tool A relative to retainer C.

While the splines may be formed upon barrel nut retainer C directly if desired, by preference the outer end of retainer C is formed with an inturned flange c^3 (Fig. 1) leaving an opening of substantial size and a separate abutment piece or collar 8 is provided having a bore of reduced size with the splines 5 extending therewithin. Abutment collar 8 has a radially projecting flange 8a

which cooperates with flange c^3 of retainer C and an extended portion $8b$ which telescopes within the bore of flange c^3. By preference also, an adapter bushing 9 is provided which fits within the end of cylinder B of the percussive machine and receives the shank end of the working tool which may be tapered if desired as indicated at a', the inner surface of the bushing being shaped to fit the shank of the tool. A spacing collar 10 of resilient material such as rubber is disposed in retainer C yieldingly to maintain bushing 9 and abutment 8 in engagement with cylinder B and flange c, respectively, the inner diameter of collar 10 being sufficient to permit free movement of the working tool A within the limits provided by the bushing 9 and by the cooperating stops 5 and 7. When tool A is at the outer limit of its movement, the force of the blow delivered by piston b' will be received by bushing 9 and absorbed by resilient spacer 10.

The provision of the diametrically opposed cooperating grooves 6 and splines 5 enables the operator accurately to direct the tool through the work since they comprise guides for the working tool in substantial parallelism with the axis of the latter. The bore through abutment collar 8 is of sufficient size freely to receive the greater portion of the tapered part a of the working tool and stops 7 cooperating with splines 5 prevent the working tool from being forced out far enough to wedge or bind in the bore. Hence the present invention permits the use of a tool of greater strength and endurance by reason of its tapered shape without the difficulties heretofore experienced in using such tools which result from their tendency to wedge and bind in retainers of the barrel type and without the disadvantages due to loose fit of the tool in the retainer when it is in its rearward position.

While a preferred form of the invention has been herein shown and described, it is to be understood that the invention is not restricted to the specific details thereof but covers all changes, modifications, and adaptations within the scope of the appended claims.

I claim as my invention:—

1. The combination with a percussive machine of a working tool extending into said machine to receive the blows thereof, said tool being tapered toward its working end, and retaining means for said tool providing a spline and groove connection permitting limited movement of the tool without binding or wedging of the tapered portion thereof with the retaining means on said machine, said tool and means requiring mounting of the former in the latter as a prerequisite to the insertion of the tool in and the application of said means to said machine.

2. The combination with a percussive machine of a working tool extending into said machine to receive the blows thereof, said tool being tapered toward its working end, and retaining means for said tool comprising a member telescopingly receiving said tool, said member having a fixed projection or spline and said tool having a groove in the tapered portion thereof to cooperate with said projection.

3. The combination with a percussive machine of a working tool extending into said machine to receive the blows thereof, said tool being tapered toward its working end, a barrel retainer secured to said machine and having an opening of a size to permit passage therethrough of said tool, an abutment collar within said retainer for preventing the ejection of said tool, and cooperating guide means on said abutment member and on the tapered portion of said tool permitting limited movement of the latter but preventing wedging engagement of the tapered portion of said tool with said collar and insertion of said tool in any other manner except from the interior of said retainer.

4. The combination with a percussive machine of a working tool extending into said machine to receive the blows thereof, said tool being tapered toward its working end, a barrel retainer secured to said machine and having an inturned flange at its outer end providing an opening of a size to permit passage therethrough of said tool, a flanged abutment collar arranged to cooperate with the end flange of said retainer for preventing the ejection of said tool, and cooperating guide means on said abutment member and on the tapered portion of said tool permitting limited movement of the latter and its insertion only before said retainer is applied to said machine but preventing wedging engagement of the tapered portion of said tool with said collar.

5. The combination with a percussive machine of a working tool extending into said machine to receive the blows thereof, said tool being tapered toward its working end, a barrel retainer secured to said machine and having an inturned flange at its outer end providing an opening of a size to permit passage therethrough of said tool, an abutment collar for said tool slidably fitting within said retainer, said collar having a radial flange for engagement with said retainer flange and having an extended portion for telescoping engagement with said abutment flange, and cooperating guide means on said abutment member and on the tapered portion of said tool permitting limited movement of the latter and its insertion only before said retainer and member are applied to said machine but preventing wedging engagement of said tool with said collar.

6. The combination with a percussive machine of a working tool extending into said

machine to receive the blows thereof, said tool being tapered toward its working end, a barrel retainer secured to said machine and having an opening of a size to permit passage therethrough of said tool, an abutment collar for said tool within said retainer, and a spline and groove connection between said collar and the tapered portion of said tool permitting insertion of said tool only from within said collar and limited movement of the same without permitting wedging or binding of the tapered portion of said tool in said collar.

7. The combination with the cylinder of a percussive machine of a tapered working tool arranged to extend within said cylinder to receiving the blows of said machine, an adapter bushing extending within said cylinder to receive the shank of said tool, a barrel retainer secured to said cylinder, an abutment collar within said retainer, resilient means encircling said tool between said adapter and said collar to maintain the same yieldingly in spaced relation, and cooperating means on said collar and on the tapered portion of said tool providing a positive stop while permitting limited movement of said tool without wedging or binding.

8. The combination with the cylinder of a percussive machine of a tapered working tool arranged to extend within said cylinder to receiving the blows of said machine, an adapter bushing extending within said cylinder to receive the shank of said tool, a barrel retainer secured to said cylinder, an abutment collar within said retainer, resilient means encircling said tool between said adapter and said collar to maintain the same yieldingly in spaced relation, and cooperating means on said collar and on the tapered portion of said tool providing a positive stop while permitting limited movement of said tool without wedging or binding, said means comprising a spline on said collar engaging a groove in said tool in substantial parallelism with the axis of the latter.

9. The combination with the cylinder of a percussive machine of a tapered working tool arranged to extend within said cylinder to receiving the blows of said machine, an adapter bushing extending within said cylinder to receive the shank of said tool, a barrel retainer secured to said cylinder, an abutment collar within said retainer, resilient means encircling said tool between said adapter and said collar to maintain the same yieldingly in spaced relation, and cooperating means on said collar and on the tapered portion of said tool permitting limited movement of said tool without wedging or binding, said means comprising diametrically opposed splines on said collar slidably received in grooves in said tool in substantial parallelism with each other and with the axis of the tool, the ends of the grooves engaging said splines as stops.

10. A working tool for use with a percussive machine, said tool having a portion tapered toward its working end and an axial groove having an open end and extending partially into said portion in substantial parallelism with the axis of the tool.

11. A working tool for use with a percussive machine, said tool having reversely tapered portions extending substantially to the ends thereof and diametrically opposed axial grooves with open ends and in substantial parallelism with the axis of the tool extending partially into the tapered portion which leads to the working end of the tool.

Signed by me at Detroit, in the county of Wayne, and State of Michigan, this 14th day of January, 1928.

EDWARD W. STEVENS.