May 2, 1961 W. H. PECK 2,982,556

RETAINER FOR PIERCING TOOL

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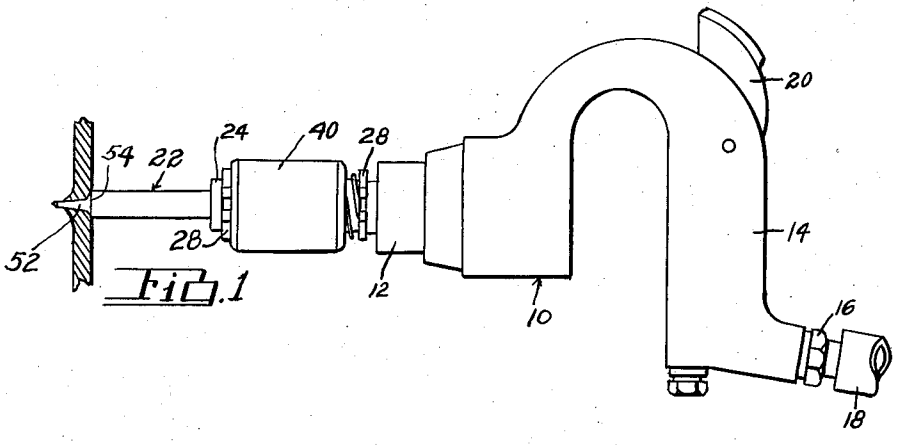


Fig. 1

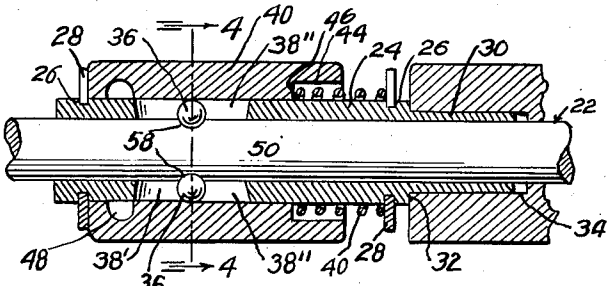


Fig. 2

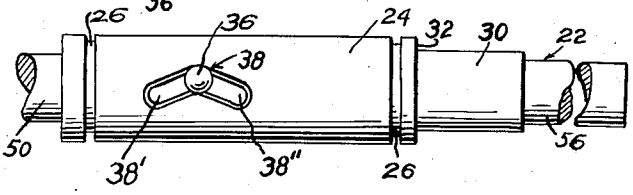


Fig. 3

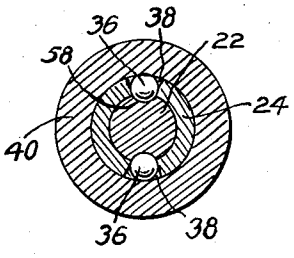


Fig. 4

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# RETAINER FOR PIERCING TOOL

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3 Claims. (Cl. 279—19)

This invention relates to a tool retainer for retaining a tool, such as a punch, in operative relation with a pneumatic hammer of the percussion type.

The tool herein illustrated is shown as a punch for piercing holes in sheet metal members, after which self tapping screws are threaded into the hole.

In forming holes through the sheet metal member in this manner, the punch is provided with a sharp pointed piercing nose which is pierced through the metal by a series percussion blows at the opposite end of the tool. The pointed piercing nose spreads the metal and flares, a flange on the back side surface of the metal, thereby increasing the thread area for the screw, and since the nose is driven into the metal by the hammer blows it is tightly held in the hole causing resistance to its removal. The operator is required to tip the axis of the tool from one side to the other to remove the tool, resulting in distribution of the hole.

It is an object of the present invention to provide means within the tool retainer, cooperating with the shank of the tool, for producing oscillatory movement to the tool when a pulling force is applied to the tool in removing it from the hole, thereby facilitating removal of the tool without distortion of the hole.

Another object of the invention is to provide a tool retainer which will permit limited movement axially of the tool with respect to the axis of the retainer.

A further object of the invention is to provide a retainer for holding the tool which may be manufactured as a unit assembly and press fitted in the operating end of the hammer.

Other objects and advantages of the invention will more fully appear from the following description taken in connection with the accompanying drawings in which:

Fig. 1 is a side elevational view of a pneumatic hammer showing the improved retainer and punch applied thereto;

Fig. 2 is an enlarged cross sectional view of the retainer showing the shank of the tool inserted in the retainer;

Fig. 3 is a top plan view of the ball cage sleeve showing the tool shank therein and the ball race slot; and

Fig. 4 is a cross sectional view taken on line 4—4 of Fig. 2.

Referring to the drawings, I have shown a pneumatic hammer **10**, of the percussion type, having a barrel **12** and a handle **14**. The handle has a connection **16** for communication with an air pressure line **18** connected to a source of pressure, not shown. A control is shown at **20** for admitting the air pressure to the operating parts of the hammer which are of conventional construction. The tool, herein illustrated as a punch **22**, is received in the open end of the retainer, more clearly shown in Fig. 2.

The tool retainer includes a ball cage sleeve **24** having an axial bore therethrough for receiving the tool **22** which has a sliding fit therein. The outer diameter of



the ball cage sleeve **24** is provided with axially spaced grooves **26** for receiving snap washers **28** having an outer diameter greater than the outer diameter of the ball retainer sleeve. One end of the ball cage sleeve has its outer diameter reduced, as at **30**, providing a shoulder **32** which limits the inward movement of the retainer against the outer end of the barrel **12** when the reduced end **30** is press fitted into a bore **34** in the open end of the barrel **12**.

Ball receiving slots **38** are formed in the wall of the ball cage sleeve **24** for reception of balls **36** having a diameter greater than the wall thickness of the ball cage sleeve **24**. The slots have side walls which are preferably tapered to prevent the balls from passing entirely through the slots. The slots are arranged radially opposite each other and each have portions **38'** and **38''** sloping in reverse helical directions. These slots **38** form raceways for directing the balls **36** through a tortuous path.

A sleeve **40**, slidably fitted to the outer periphery of the ball cage sleeve **24**, is axially movable between washers **28** and a spring **42**, positioned in a counterbore **44**, between the washer **28** at the right and the shoulder **46**, formed by the counterbore, urges the sleeve **40** against the washer **28** at the left. The inner diameter of the sleeve **40** is provided with an annular groove **48** adjacent its left hand end for permitting the balls **36** to be moved radially outwardly when the sleeve **40** is moved to the right against the resistance of the spring **42**. When the sleeve is in the position shown in Fig. 2 the balls **36** are held radially inwardly by the inner surface of the sleeve **40** between the groove **48** and the shoulder **46**.

The tool retainer is a self contained unit which may be applied to the open end of any pneumatic hammer.

The tool herein illustrated is a round, hard steel member having a straight shank portion **50** with a sharp pointed punch portion **52** projecting from one end thereof. This projection has a major diameter at the flat end portion **54** tapering outwardly to a sharp point. The major diameter is curved outwardly to produce a curved edge on the hole formed in sheet metal member so that a screw is easily inserted in the hole. The opposite end **56** of the tool is formed flat to receive the impact blows of the well known pneumatic hammer.

Intermediate the opposite ends of the tool are depressed recesses **58** in the peripheral surface of the tool shank. These recesses have a depth approximately equal to one third of the diameter of the ball **36** and are formed on a radius equal to the radius of the ball **36**.

The retainer assembly is applied to the pneumatic hammer by press fitting the reduced end portion **30** in the open end of the barrel **12**. To insert the tool, the sleeve **40** is slid on the ball cage sleeve **24** toward the pneumatic hammer which positions the groove **48** over the balls **36**. The tool is then slid into the bore through the ball cage sleeve **24**. The inserted end **56** of the tool moves the balls radially outwardly into the groove **48** permitting the tool to be fully inserted into operative position with the balls received in the depressed recesses **58**. The spring **42** then forces the sleeve **40** toward the outer end of the ball cage sleeve **24** with the cylindrical inner surface of the sleeve **40** retaining the balls in the slots **38**. The tool is free for limited axial movement within the bore through the ball cage sleeve **24**, determined by the length of the grooves or slots **38**, but is retained therein by the ends of the slots in the portions **38'** and **38''**. Since the slot portions **38'** and **38''** extend in opposite helical directions, the tool is oscillated in two directions during its axial movement in either direction relative to the retainer and pneumatic hammer.

When piercing a hole through a metal member, the

operator presses the pointed end **52** of the tool on the metal. This pressure forces the tool inwardly of the hammer and when the hammer is operating the percussions within the hammer force the tool outwardly, driving the pointed end **52** through the metal. The balls **36**, carried by the tool and guided in the slots **38**, **38'** and **38''**, cause the tool to be oscillated in two opposite directions as it pierces the hole. When the operator withdraws the tool from the hole by a pull, the action causes the tool to be slid outwardly relative to the retainer and hammer. Due to reversed helical slot **38**, the tool is given a double oscillatory movement to loosen the point **52** in the hole formed in the metal.

It will be understood that one or more balls may be used and that various changes, including the size, shape and arrangement of parts, may be made without departing from the spirit of the invention, and it is not my intention to limit its scope other than by the terms of the appended claims.

I claim:

1. A retainer for a straight shank tool including a ball cage sleeve having a straight bore through and a straight outer peripherial surface for press fit reception in the barrel of a pneumatic hammer, axially spaced grooves in the outer periphery of said ball cage sleeve, snap ring washers received in the grooves, an outer sleeve slidably carried on the outer periphery of said ball cage sleeve between said snap washers, the inner periphery of said outer sleeve having an annular groove therein, a compression spring between one of said snap washers and one end of said outer sleeve, a ball receiving slot having portions sloping in reverse helical directions formed in the wall of said ball cage sleeve, a ball in said slot, in combination with a straight shank having an annular recess formed in its outer peripherial surface for receiving said ball.



2. A retainer for a straight shank tool comprising, a ball cage sleeve having a straight bore therethrough for reception in the barrel of a pneumatic hammer of the percussion type, a continuous slot having portions sloping in reverse helical directions formed in the wall of said ball cage sleeve, a tool shank having axial movement in the bore of said ball cage sleeve, a ball receiving recess in the outer periphery of said tool shank radially opposite the slot in said sleeve, a ball in said slot and ball receiving recess in said tool shank, and means for positioning the ball radially in said slot.

3. A retainer for a tool for use in a pneumatic hammer of the percussion type, comprising a sleeve having a bore for reception of a straight shank tool attached to said pneumatic hammer, a helical slot in the wall of said sleeve for the reception of a ball, a ball in said slot having a diameter greater than the thickness of said sleeve wall, means for positioning said ball radially whereby said ball is free for radial movement out of said bore or partially projected into said bore, in combination with a tool having a shank adapted for sliding fit within said bore, and provided with a spherical recess in its outer periphery for the reception of said ball when said ball is projected in said bore by said projecting means, whereby rotary movement is imparted to said tool by the ball riding in said helical slot when the tool is reciprocated in said sleeve.

**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 2,161,969 | Mange | June 13, 1939 |
| 2,608,413 | Peck | Aug. 26, 1952 |
| 2,823,040 | Fishcher | Feb. 11, 1958 |