United States Patent [19]

Burgeson

[11] **3,792,725**

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[54] **HAMMER**

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[52] **U.S. Cl.** ..... **145/29 R,** 145/29 B, 145/36

[51] **Int. Cl.** **B25c 1/00,** B25d 1/00

[58] **Field of Search** .... 145/29 R, 29 A, 29 B, 29 C, 145/29 D, 36, 30; 254/26

[56] **References Cited**

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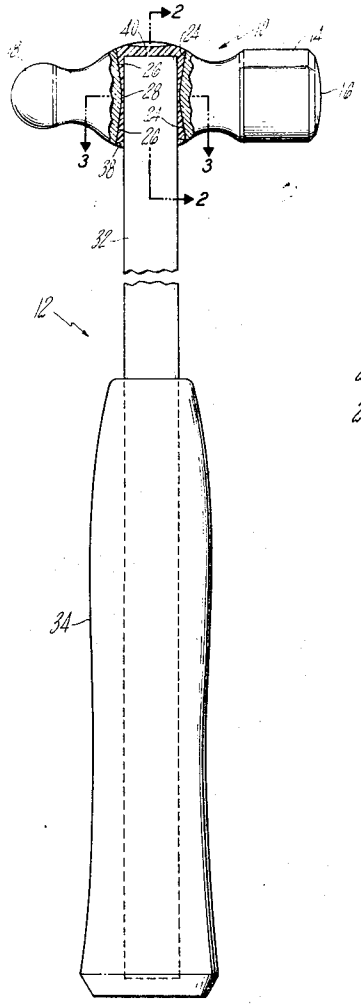
[57] **ABSTRACT**

A new and improved interconnection is provided between the striking element and handle of a percussive tool. The striking element is provided with an eye having side walls converging from both ends thereof to provide a portion of reduced cross section located at the axis of percussion of the tool and the tool handle is of generally rectangular cross section with its corners tangentially and frictionally engaging the portion of reduced cross section to provide an interference fit therewith. The interconnection permits adjustable positioning of the head relative to the handle for achieving a balanced angular relationship between the striking face of the head and the handle of the tool. A suitable impact resistent resin fills the cavity between the handle and the side walls of the eye to form a sleeve extending continuously along the length of the aperture on each side of the handle, but gradually increasing in thickness toward both ends of the eye.

8 Claims, 3 Drawing Figures



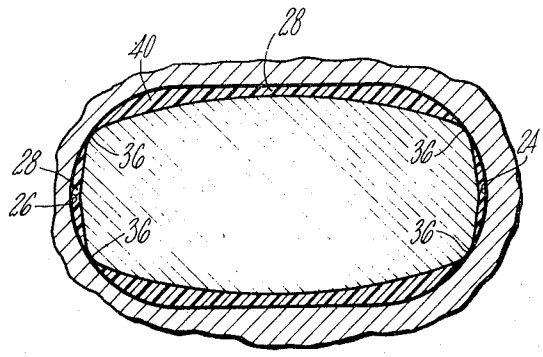
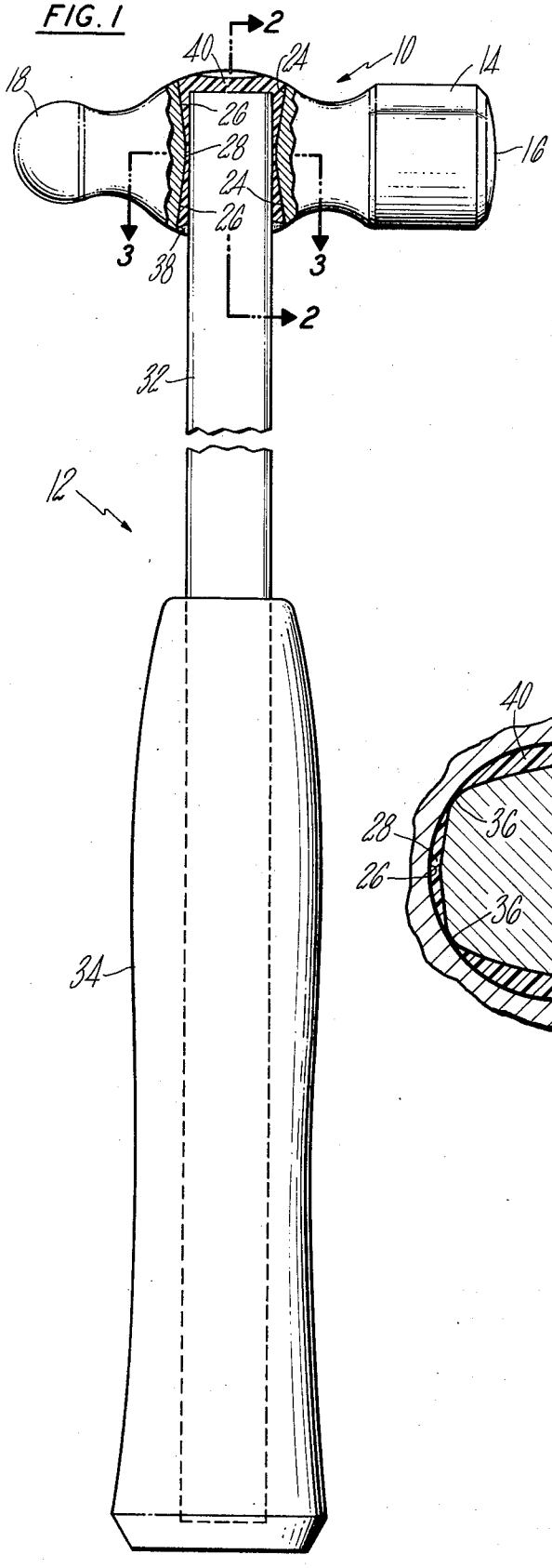


FIG. 1



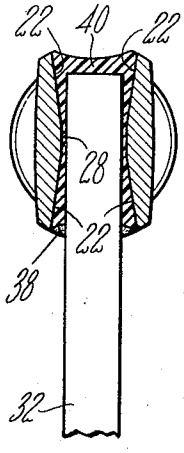


FIG. 2

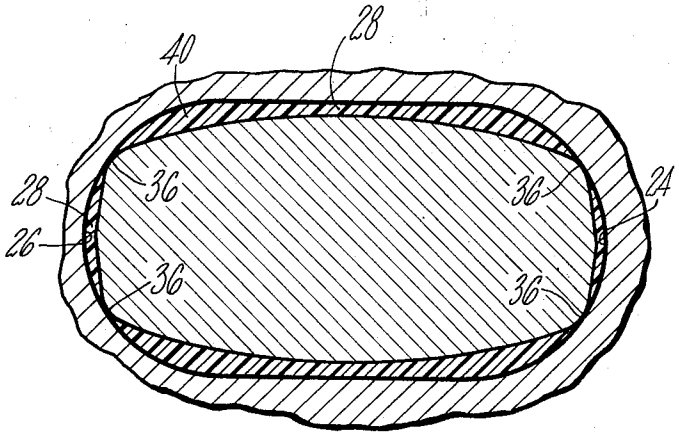


FIG. 3

HAMMER

BACKGROUND AND SUMMARY OF THE INVENTION

The present invention relates generally to hand tools designed for percussive use and more particularly is concerned with a new and improved connection between the handle and the striking element or head of the percussive tool.

In recent years, increased interest has been shown in the use of tool handles made from glass fiber reinforced resins and similar synthetic materials. However, the use of such materials is necessarily accompanied by certain inherent drawbacks peculiar to those materials. Some of these drawbacks are discussed in U. S. Pat. No. 3,578,825. Additionally, manufacturing techniques that place great reliance upon mass production tend to result in products which evidence unwanted variations, particularly in the components of the hand tools. In percussive tools such as hammers, these variations can affect the balance or feel of the tool thereby reducing its acceptance as a quality product.

Accordingly, the present invention has as an object the provisions for a new and improved hand tool of the percussive type that can be manufactured on a mass production basis, yet is designed so as to obviate the effect of manufacturing variations. Included in this object is the provision for assuring the balance and feel of high quality hand tools in mass produced units.

Another object of the present invention is to provide a new and improved hand tool wherein the connection between the striking element and the handle can be appropriately adjusted to assure a correct relationship between the handle and the striking face of the tool irrespective of manufacturing variations that might be present in the eye of the striking element. Included in this object is the provision for a secure yet adjustable interference connection between the eye of the striking element and the handle to assure concentric and balanced positioning of the handle.

Still another object of the present invention is to provide a new and improved hand tool of the type described which not only possesses the improved characteristics mentioned hereinbefore, but also achieves these characteristics while using a handle of uniform cross section, the entire design evidencing improved economies of manufacture and consistent reliable operation.

Other objects will be in part obvious and in part pointed out in more detail hereinafter.

These and related objects are accomplished in accordance with the present invention by providing a percussive hand tool comprising a striking element having an eye with side walls converging from both ends thereof so as to provide a portion of reduced cross section located at the tool's axis of percussion, said reduced portion being of generally elliptical configuration. The tool handle is of generally rectangular cross section with its corners tangentially and frictionally engaging the portion of reduced cross section to provide an interference fit therewith. This interconnection provides a fit which acts as a universal joint to permit adjustable positioning of the head relative to the handle for achieving a balanced angular relationship between the striking face of the head and the handle of the tool. A suitable impact resistent resin fills the cavity between the handle and the side walls of the eye to form a continuous sleeve extending uninterruptedly along the length of the aperture on each side of the handle and gradually increasing in thickness toward each end of the eye to fully surround the handle.

A better understanding of the invention will be obtained from the following detailed description and the accompanying drawing which set forth an illustrative embodiment indicative of the way in which the principles of the invention are employed.

A BRIEF DESCRIPTION OF THE DRAWING

In the drawing:

FIG. **1** is a plan view, partially broken away and partially in section, of a ball peen hammer incorporating the features of the present invention;

FIG. **2** is a sectional view taken along the line **2—2** of FIG. **1**; and

FIG. **3** is an enlarged sectional view taken along the line **3—3** of FIG. **1.**

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring now to the drawing in greater detail wherein like reference numerals indicate like parts throughout the several figures, the invention is illustrated as embodied within a ball peen hammer comprised of a striking element or head **10** and an elongated handle **12** secured to the head. The striking element **10** has the customary poll and bell **14** at one end terminating in a broad striking surface **16** and the smaller ball peen **18** on the opposite end thereof. The axis of percussion of the head extends centrally through the striking element from approximately the center of the striking surface to the apex of the ball peen. In the embodiment illustrated, the axis of percussion is essentially located along the section line **3—3** of FIG. **1.**

A medial aperture or eye extends fully through the head in a direction transverse to the axis of percussion. As can be seen in FIGS. **1** and **2,** the eye has side walls **22** and front and rear walls, **24** and **26** respectively, which are substantially smooth and unbroken and taper inwardly in a converging fashion from opposite ends of the eye to provide a central portion **28** of reduced cross section located approximately at the axis of percussion. As shown in FIG. **3,** the portion **28** of reduced cross section is of generally elliptical configuration. As will be appreciated, the entrance and exit ends of the eye may assume a more rectangular configuration or other suitable configuration. However, the elliptical shape illustrated is generally preferred throughout the length of the eye.

In the preferred embodiment, the handle **12** secured to the striking element is an elongated glass fiber reinforced rod **32** of substantially uniform cross section along its entire length and is covered by a suitable resilient grip **34** on the free end thereof. The handle preferably exhibits a generally rectangular cross section and does not vary in cross sectional demension at that portion thereof positioned within the eye of the hammer head. This is a particularly desirable feature not only from the standpoints of size control and the savings involved in using a straight rod as opposed to a tapered member, but also from the view point of the strength characteristics of the handle. Although the glass fiber reinforced rod exhibits a slight transverse curvature in the side walls thereof, as best shown in FIG. **3,** the exact configuration thereof may vary substantially depending

upon the size of the rod and the specific configuration of the eye of the hammer head. It is essential however, that the corners **36** of that portion of the rod positioned within the eye provide an interference fit with the portion **28** of the eye exhibiting the smallest cross sectional opening and that these corners frictionally engage the walls of the eye in a tangential manner. This facilitates a degree of angular adjustment of the head relative to the longitudinal axis of the hammer handle, which adjustment will obviate and overcome manufacturing variations in either the striking element or the handle. The intimate frictional contact with the side walls of the eye by means of only the corners of the handle provides slightly greater than point contact at four spaced locations around the side walls of the eye. The sides of the handle remain spaced from the eye even at this narrowest portion of the eye and in fact throughout their entire length. Additionally, due to the elliptical configuration, the point contact, as shown, is predominantly with the front and rear walls, **24,26** of the eye on opposite sides of the axis of percussion. Thus, in the preferred embodiment illustrated, there is direct and intimate contact between the handle and the walls of the eye at four spaced points all lying within a transverse plane extending through the axis of percussion of the hammer head. This provides a fulcrum having the versatility of a universal joint and permitting multidirection adjustment of the striking surface relative to the hammer handle and grip. The properly balanced position of the handle in the head is thus achieved despite the presence of irregularities or variations in the eye or other portions of the striking element or handle.

As can be appreciated, this new and improved adjustable interconnection between the handle and striking head of the hammer permits application of the resilient grip **34** to the grip portion of the handle prior to mounting the handle in the head. In this way, the exact position of the grip and therefore the position of the user's hand is determined prior to connecting the handle to the hammer head. Thus, correct positioning of the grip and handle relative to the striking surface or face of the striking element can be accomplished with full assurance that subsequent operations will not disturb the concentric and balanced relationship desired between the striking surface and the handle of the tool.

After the handle **12** is driven into the eye of the striking element a sufficient distance so that the forward end thereof has passed well beyond the axis of percussion of the striking element and is positioned adjacent, but preferably recessed from the exit end of the eye, the handle and the striking face can be rotated or otherwise angularly positioned to provide the desired relative positional relationship. Thereafter, in accordance with the preferred embodiment, the grip end of the eye is sealed by placing a bead **38** of sealing material, such as a silicone resin, or the like, in the entrance opening of the eye. Thereafter, the handle is fixedly bonded and securely held within the tool head in its adjusted position by filling the entire cavity defined by the walls of the eye and the hammer handle with a suitable impact resistent resinous material, such as an epoxy resin or the like, which upon curing will provide a continuous sleeve **40** both along the entire length of the eye on each side of the handle and fully around the handle at each end of the eye. The epoxy sleeve **40** will be interrupted only where the corners **36** of the handle tangentially contact the portion **28** of reduced cross section. The nature of the resin is such that it will readily flow and fill the cavity and provide a sleeve which conforms to the cavity and exhibits a gradually increasing thickness as it extends toward opposite ends of the aperture.

Thus, as can be seen from the foregoing detailed description, the present invention provides a new and improved interconnection between the striking element and handle of a percussive tool. The interconnection permits the secure and correct relative positioning between the handle and the striking face of the tool and imparts concentric and balanced heft and feel to the tool while permitting the utilization of standardized mass production items and manufacturing techniques.

As will be appreciated by persons skilled in the art, various modifications, adaptations and variations of the foregoing specific disclosure can be made without departing from the teachings of the present invention.

I claim:

1. A hand tool for percussive use comprising a tool head having a striking surface, an axis of percussion extending through said head from said surface and an aperture spaced from said striking surface and extending entirely through said head in a direction normal to said axis of percussion; said aperture having side walls converging from both ends thereof to provide a portion of reduced cross section having a generally arcuate cross sectional configuration intermediate the ends of said aperture; a handle having a grip end and an opposite end positioned in said aperture a sufficient distance to traverse said portion of reduced cross section, said handle being of rectilinear cross section and having corners tangentially and frictionally engaging said portion of reduced cross section to facilitate balanced positioning of the handle relative to said striking surface; and a plastic sleeve extending continuously along the length of the aperture on each side of the handle and gradually increasing in thickness toward both ends of said aperture to fixedly stabilize said handle within said tool head.

2. The hand tool of claim **1** wherein the aperture's portion of reduced cross section is generally elliptical, the handle being of generally rectangular cross section and the corners of the handle providing an interference fit with said portion of reduced cross section, the handle being free of direct contact with the tool head at both ends of said aperture.

3. The hand tool of claim **1** wherein said portion of reduced cross section is located within a plane passing through said axis of percussion.

4. The hand tool of claim **1** wherein the portion of the handle within the aperture is of substantially uniform cross section along its entire length.

5. The hand tool of claim **1** wherein the direct contact between the handle and the tool head occurs at spaced points within a transverse plane passing through said axis of percussion.

6. The handle tool of claim **1** wherein the handle is a fiber reinforced shaft, said grip end being enclosed within a cushion grip member.

7. The hand tool of claim **1** wherein the plastic sleeve is formed of impact-resistent resin and fully conforms to the handle and the walls of the aperture to firmly bond the handle in position.

8. The hand tool of claim **1** wherein the plastic sleeve is formed from an epoxy resin.

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