HAMMER WITH SOLID STEEL HANDLE
Charles W. Maguire, Belleville, N.J., and George W. Merrow, Bloomfield, and Robert F. West, Simsbury, Conn., assignors to The Stanley Works, New Britain, Conn., a corporation of Connecticut
9 Claims. (Cl. 145—29)

This invention relates to portable impact tools and particularly concerns hammers and similar tools having handles forged of solid steel.

A primary object of the invention is to provide an improved impact tool such as a hammer of the type having a handle forged of solid steel which is capable of withstanding the roughest usage and yet maintaining a tight connection between its handle and the hammer head.

Another object of the invention is to provide an improved impact tool of the type described having a steel head forged separately of its solid steel handle and which is adapted to be assembled to provide a durable non-fused connection having good shock absorbing characteristics. Included in this object is the aim of reducing the operational steps and the manufacturing cost required to produce a finished hammer of the type having a solid steel handle.

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

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth and the scope of the application which will be indicated in the appended claims.

In the drawing:
FIG. 1 is a side view, partly broken away, of a hammer incorporating the invention;
FIG. 2 is a longitudinal view of a handle constructed in accordance with the invention;
FIG. 3 is an enlarged fragmentary section view of the hammer taken along line 3—3 of FIG. 1;
FIG. 4 is an enlarged transverse section view of the handle taken along line 4—4 of FIG. 1; and
FIG. 5 is an enlarged transverse section view of the handle taken along line 5—5 of FIG. 1 with its sheath omitted for clarity of illustration.

Referring now in detail to the drawing, FIGS. 1—5 illustrate a preferred embodiment of the invention as applied to a claw hammer generally comprising a metallic head 10 and an elongated handle 12. The head 10 is of conventional construction having an impact end 16 and a claw end 18. Between the impact and claw ends 16 and 18 is an elongated eye 20 which extends into the head 10 from an entrance end 21 of the eye, generally perpendicular to the longitudinal axis of the head 10.

As shown, the eye 20 is relatively deep and terminates somewhat short of extending completely through the head 10 to provide a closed inner end 22 for the eye 20. In the specific illustrated embodiment, the eye 20 is of uniform circular cross section from end-to-end forming a substantially smooth inner wall surface 24. The head 10 is forged and then machined to provide the above described structure.

The handle 12 is solid steel. To minimize the number of manufacturing operations and the cost required to produce a finished assembly, the entire handle 12 is forged separately from the head and then conjoined to the head as described more specifically below.

The elongated handle 12 is generally rectangular with a relatively long grip portion 26 forming one of its ends. The grip portion 26 includes a thin flat web section 28 having marginal ribs 30 on its lower end and sides defining enlarged edges such that a transverse section of the grip portion is generally in the form of an I beam as seen in FIG. 5.

To minimize any vibrations which may be transmitted through the handle 12 from the hammer head to the hands of a user and, at the same time, to provide a properly balanced hammer, a plurality of aligned apertures 32 are formed in longitudinally spaced relation in the web section 28 of the grip portion 26. At its upper end, a longitudinal rib 36 is formed on each face of the web section 28 with the individual ribs 36 respectively extending alongside opposite side edges of the grip portion 26.

A sheath 38, preferably formed of rubber, is permanently bonded by a suitable adhesive to the grip portion 26. The outer surface of the sheath 38 tapers inward as indicated at 39 to merge into the contour of an enlargement 40 formed between opposite ends of the handle 12. The enlargement 40 defines the upper end of the grip portion 26 and the lower end of an adjacent intermediate portion 42 of the handle 12, portions 26 and 42 having side edges in continuation with one another.

As best seen in FIGS. 2 and 4, the intermediate portion 42 includes a pair of opposed faces 44 and 46 which smoothly curve inward toward one another from the enlargement 40 and then gradually diverge at the upper end of the intermediate portion 42. The faces 44, 46 respectively merge into an enlarged flange 48 adjacent the end of the handle 12. If desired, raised surfaces 49 may be provided on the faces 44, 46 to receive impressions of suitable indentations.

The flange 48 defines a relatively short end portion 50 at the top of the handle 12 which is designed to be fitted into the eye 20 of the head 10. The flange 48 and the end portion 50 preferably are both of circular cross section.

The end portion 50 is of smaller diameter than the flange 48 which is formed with an annular shoulder 52 extending around the lower end of portion 50.

In order that the assembled hammer will withstand the roughest usage without failing or becoming loose, end portion 50 is provided with a wall 54 formed by an elongated hole 56 axially extending into the end portion 50 of the handle 12. The hole 56 is preferably of circular transverse section and the wall 54 is in concentric relation to the longitudinal axis of the handle 12 to form a uniform wall thickness. To provide a base 58 for the wall 54 of increased thickness, the hole 56 has a reduced inner portion 60 forming a conically shaped surface which is illustrated as being inclined inwardly to terminate in the plane of the annular shoulder 52 of the flange 48 which defines the lower end of portion 50. Thus it will be seen that the assembled hammer is provided with a throat of increased thickness in the region of the eye entrance and 21 of the head 10.

To assemble the head and handle into a functionally integral hammer construction, the end portion 50 of the handle 12 is forced with a press fit into the eye 20 of the head to bottom the annular shoulder 52 of the handle against the head 10 with a slight clearance being provided between the closed end 22 of the eye 20 and the top of the handle end portion 50. Interference resulting from a difference in the order of 4 to 10 mils in the diameters between the handle end portion 50 and the eye 20 of the head has been found to work satisfactorily. The exterior surface 62 of the wall 54 therefore directly engages the inner wall surface 24 of the eye 20 throughout the extent of their opposed surfaces, and the top outer edge of the end portion 50 is chamfered as shown at 64 to facilitate the assembly of the hammer whereby the head and handle are firmly secured with the end portion 50 under a compressive force.
By virtue of the described structure of the solid steel handle 12 having a hollow end portion 50, wall 54 is sufficiently resilient to assure that neither the end portion 50 of the handle 12 nor the portion of the head 10 surrounding its eye 20 will be stressed beyond their elastic limits. In this regard, it has been found that an end portion 50 having a wall 54 with a uniform thickness in the order of 0.095 inch produces good results. The resiliency of the wall 54 virtually eliminates any tendency of the eye 20 to gradually become enlarged or permanently deformed upon repeated impact and thereby result in the handle separating from the head as would occur, e.g., if the handle were to be formed with a solid end portion connected to the hammer head.

It has also been found that the formation of destructive stresses, resulting in fatigue failure of the handle 12 caused, e.g., by marks formed in machining the end portion, can be reduced so as to maintain the formation of such stresses well below the elastic limit of the steel. For this reason, the bottom of the hole 56 adjacent its reduced inner portion 60 is rounded to provide an arcuate juncture 66 between the wall 54 and its base 58. A radius of approximately 1/2-inch is preferred. In addition the annular shoulder 52 of the flange 48 of the handle is provided with a rounded inside corner 68 merging with the exterior surface 62 of the end portion 50 to preclude formation of destructive stresses. In this regard a radius of about 0.03 inch has provided good results. Thus in the critical region of the throat where failure or breakage is most likely to occur, added strength and durability is provided by the increased thickness at the base of the wall 54, and the above described structure of the specific illustrated embodiment effectively eliminates formation of destructive stresses in the handle 12.

It will be evident from the foregoing description that the hammer construction of this invention is particularly suited for economical manufacture and assembly in addition to providing a properly balanced hammer giving a natural feeling to the hands of a user. Moreover, a tight head-to-handle connection is featured which assures dimensional stability of the assembled parts despite repeated rough usage.

As will be apparent to persons skilled in the art, various modifications and adaptations of the structure above described will become readily apparent without departing from the spirit and scope of the invention, the scope of which is defined in the appended claims.

We claim:

1. A hammer and the like including a work engaging head having an eye extending into the head from an entrance of the eye intermediate the ends of the head, and an elongated solid steel handle having one end portion fitted into the eye, the improvement which comprises the handle having a hole extending axially into its one end portion and terminating in the region of the entrance of the eye to form a resilient wall within the eye of the head, the wall of the one end portion of the handle being under compression and inwardly deflectable to prevent the eye of the work engaging head from becoming enlarged and to firmly maintain the head and the handle in secured relation.

2. The device of claim 5 wherein the hole extending axially into the one end portion of the solid steel handle is of uniform transverse section, the hole having an inner portion of reduced size terminating in the region of the entrance of the eye and forming a base for the wall of increased wall thickness thereby to provide a throat at the juncture of the head and handle of increased strength.

3. The device of claim 5 wherein the solid steel handle includes intermediate its ends a flange of enlarged cross section bottomed in direct engagement against a portion of the head surrounding the entrance of the eye, and the flange having a shoulder portion rounded inward and merging with the wall of the one end portion of the handle.

4. The device of claim 5 wherein the solid steel handle includes a grip portion at its end opposite the one end portion of the handle, the grip portion having transverse apertures formed therein thereby to dampen vibrational stresses transmitted through the handle and to balance the same.

5. The device of claim 6 wherein the one end portion of the solid steel handle includes a concave interior wall surface in the region of the entrance of the eye providing an arcuate juncture between the wall and its base inside the one end portion of the handle.

References Cited by the Examiner

UNITED STATES PATENTS
1,669,701 5/1928 Estwing 145—29 X
1,707,787 4/1929 Estwing 145—29 X
2,846,277 8/1958 Marsh 145—29 X

FOREIGN PATENTS
628,656 10/1961 Canada.

WILLIAM FELDMAN, Primary Examiner.
R. V. PARKER, Jr., Assistant Examiner.