May 5, 1959 C. M. LAY 2,884,816

METHOD OF FORMING INDESTRUCTIBLE TYPE IMPACT TOOLS

Original Filed Aug. 23, 1957 2 Sheets-Sheet 1

FIG. 1

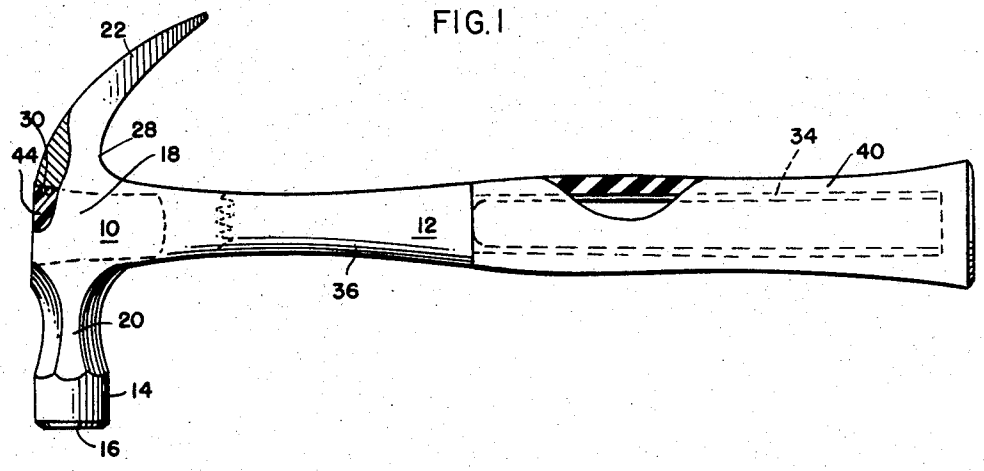


FIG. 2

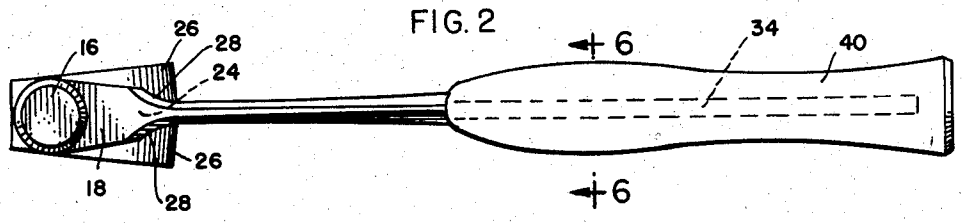
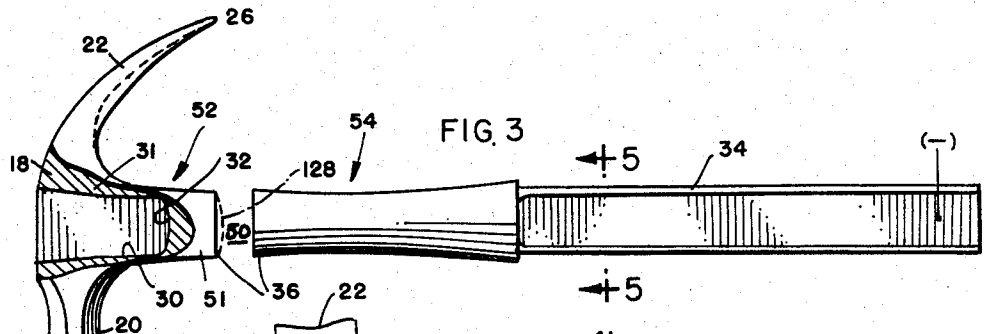


FIG. 3



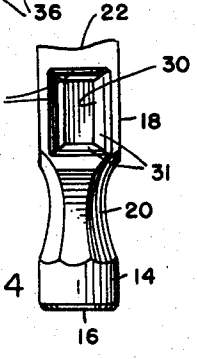


FIG. 4

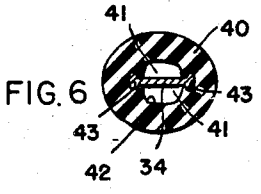


FIG. 6

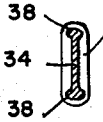


FIG. 5

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METHOD OF FORMING INDESTRUCTIBLE TYPE IMPACT TOOLS

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FIG. 7

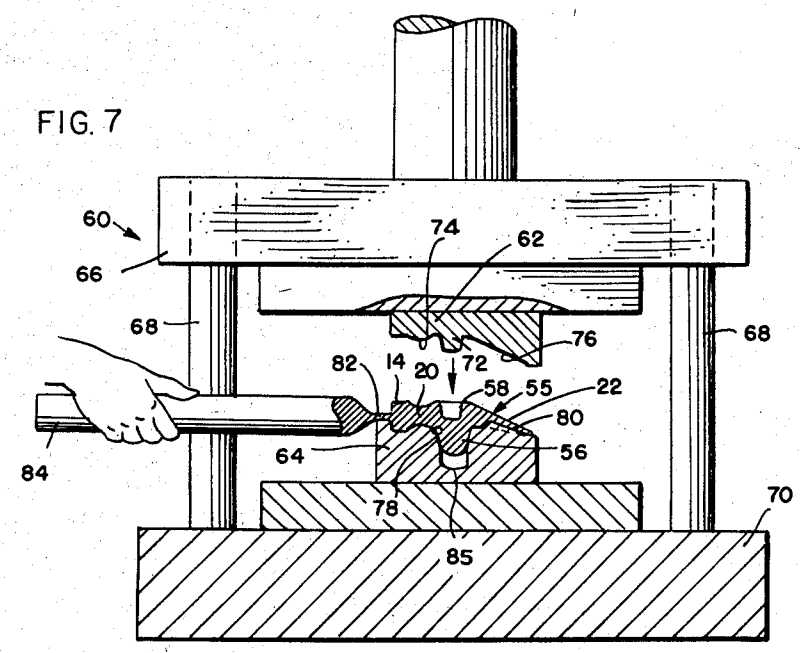
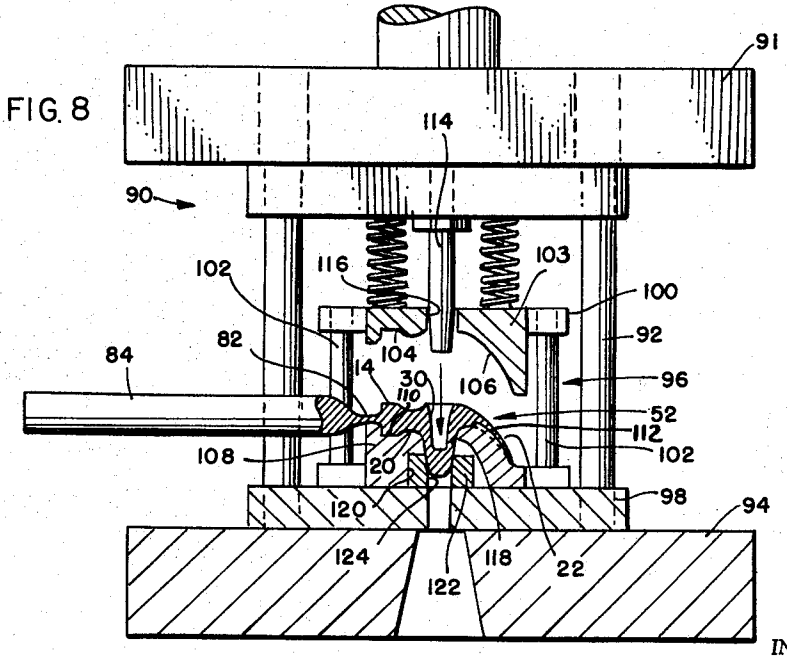


FIG. 8



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METHOD OF FORMING INDESTRUCTIBLE TYPE IMPACT TOOLS

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Original application August 23, 1957, Serial No. 679,833. Divided and this application June 4, 1958, Serial No. 739,930

3 Claims. (Cl. 76—103)

The present invention relates to portable impact tools and has particular reference to a novel method of forming the same. The invention has been illustrated and described herein in connection with the formation of a carpenter's claw hammer of the type shown and described in my co-pending application Serial No. 679,833, filed August 23, 1957, for "Hammer Construction," of which the present application is a division. The invention may, however, find use in connection with other forms of claw hammers, as well as with other types of impact tools, as for example machinists' hammers, blacksmiths' hammers, bricklayers' hammers and similar tools. The invention is specifically concerned with the construction and formation of hammers of the so-called "indestructible type" having a steel shank which is integral with the striking head thereof.

In recent years there have appeared on the market claw hammers in which the handles or shanks are formed of steel and are integral with the hammer heads, such hammers to a limited extent supplanting or more aptly supplementing the widely known and used hickory handle claw hammer. These "indestructible" hammers, as currently constructed, offer a few advantages over conventional wooden handle hammers but they are also possessed of numerous limitations. Chief among the advantages afforded are increased strength and a permanent union between the hammer head and shank. Whereas, in the case of a wooden handle hammer having an impact head for nail-driving purposes with integral claws for nail-pulling purposes, the hammer will ordinarily withstand even the roughest usage when put to the use for which it is intended, the wooden hammer handle, when used for unintended purposes, as for example wrecking, will frequently break or come loose. Such is not the case with so-called indestructible hammers having integral steel shanks. Similarly, a wooden hammer handle will, in time, dry out and become subject to looseness, splitting or to shearing forces at its region of juncture with the impact head while, obviously, such limitations are not attendant upon the use of integral steel hammer shanks. These factors, together with the fact that indestructible type hammers possess design possibilities whereby they may be made in a variety of attractive styles possessing eye-appeal, are ascribed as possible reasons why such hammers have met with a modicum of success on the market.

On the other hand, indestructible hammers of the type briefly outlined above and as presently manufactured are possessed of numerous limitations, principal among which are lack of resiliency which renders them awkward in the hands of an experienced carpenter or workman; the tendency for impact to set up undesired harmonic vibrations; the inability under prevalent manufacturing processes to produce a hammer assembly of correct or accepted proportions and balance; and the large number of operations which are required to produce the combined head, claw and shank unit of the hammer assembly.

Inasmuch as these indestructible type hammers are invariably formed with a solid steel head, claw and shank unit, the force of the impact is carried directly from the head and into the shank where it is felt by the hand of the user. At the same time a secondary and slightly out-of-phase impact is applied to the hand of the user by virtue of the initial shock traveling across the hammer head and into the hammer claw which is caused to vibrate and send a secondary impact back to the shank following closely on the heels of the initial and somewhat stronger impact force. Thus the solid steel construction of such hammers as currently manufactured does not afford the shock absorbing resiliency of conventional hickory handle hammers.

Due to the greater density and weight of steel as compared to wood, these solid steel indestructible types of hammers are not balanced properly, which is to say that they are handle-heavy and cannot successfully be subjected to the usual tests for proper balance. The art of constructing hammers, particularly carpenters' claw hammers is an exacting one. In few other arts does such a little difference make such a big difference. The term "balance" is not readily definable, but it may be stated that a properly balanced hammer, particularly a carpenter's claw hammer, is one which in the hands of an experienced carpenter gives him a sense of satisfaction and confidence in his manipulation of the tool. It is one which is easily aimed and will find impact squarely at the desired point of impact. A hammer which is not properly balanced feels awkward or heavy in the hand of the experienced user and in swinging the same, centrifugal and other forces are set up which give an unnatural feeling to the user just as does an improperly balanced golf club or tennis racket to the expert. One test for proper balance commonly employed by prospective purchasers of conventional sixteen ounce hammers is to place the hammer head down, on a flat level surface, allowing the weight of the hammer to be borne on the curved surface of the claws near the base thereof so that the hammer assumes a rocking position on this curved surface with the handle extending upwards at an acute angle with respect to the flat supporting surface. Then if the hammer is capable of assuming a stable degree of equilibrium, this is an indication of proper hammer balance. On the other hand, if the hammer cannot be thus supported and instead it possesses an unstable degree of equilibrium, this is an indication that the hammer is not properly balanced. So far as is known, present day solid head and shank indestructible hammers are incapable of passing such a test.

Present day indestructible hammers of the type briefly outlined above will vibrate after impact, the vibration being accentuated in the claw region of the hammer. Not only is such vibration unpleasant to the sense of touch but repeated vibration over a long period of time sets up stresses in the body of the hammer in the vicinity of the claw which, in time, weakens the metal in this region so that upon a subsequent occasion when the claw is used for leverage purposes, one or both claws will break away from the head.

Although hammers are made in various sizes, and although the proportions of the various constituent parts of a hammer may vary widely, a standard carpenter's claw hammer usually has a 16 ounce head and handle which is of the order of slightly greater than 13 inches in length. The overall longitudinal extent or length of the hammer head is approximately five and one-half inches. Any material deviation from these dimensions or from such weight of the hammer head will not be tolerated by a carpenter. These dimensions and hammer weight are applicable to both wooden handle hammers and to indestructible type hammers. For these reasons, manufacturers of indestructible type hammers make an

effort to maintain the same general size, weight and shape as between the indestructible type hammers and the conventional wooden handle hammer. However, manufacturing difficulties arise which have heretofore prevented the indestructible type of hammer from being a substantial replica of the wooden handle hammer insofar as shape and weight are concerned and manufacturers have been obliged to effect a compromise in the proportions of indestructible type hammers. Due to the fact that integral head and shank type hammers are solid and are devoid of the usual hollow eye into which the wooden handle is inserted and in which it is anchored, the additional metal involved, if the same shape and dimensions are to be preserved, will lead to the construction of a hammer having a head which is materially overweight. In other words, an indestructible type hammer having a solid metal head of the same shape and head of a wooden handle claw hammer with a 16 ounce head will have a head which weighs approximately 20 ounces. For this reason, indestructible type hammers are currently manufactured so that the heads thereof are approximately 16 ounces in weight but have the size and shape the equivalent of the size and shape of a wooden handle claw hammer the head of which is 13 ounces.

Finally, conventional forging processes do not lend themselves readily to the construction of one-piece integral head and shank type hammers. Where the head and shank are forged together, the operation calls for the use of relatively deep drawing operations utilizing dies of considerable depth. Furthermore, multi-stage forging operations are required to shape the handle region of the hammer and these are followed by auxiliary pressing and other shaping operations which are costly procedures and materially increase the cost of the article.

The present invention is designed to overcome the above noted limitations that are attendant upon the manufacture of indestructible type hammers of the general character heretofore set forth by overcoming the manufacturing difficulties attendant upon the production of such hammers. Toward this end, the invention contemplates the provision of a novel method of forming such hammers and, by which method there is produced a functionally integral head and shank unit which, when assembled in a hammer construction, affords a degree of resiliency which gives to the hammer as a whole improved shock-absorbing qualities which hitherto have been unattainable in connection with the manufacture of indestructible type hammers. The specific method of the present invention is productive of the improved hammer construction shown and described in my co-pending application, referred to above, and the method is not applicable to conventional indestructible type hammers having solid hammer heads which are devoid of surface voids or depressions. The novel virtues of the hammer construction which is produced by the present method have been set forth in detail in such co-pending application and they have been referred to herein only insofar as they pertain to and are a result of the method involved in forming the hammer construction according to the present invention.

It is among the principal objects of the invention to provide a method of forming indestructible type hammers, the method involving the use of a series of sequential drop forging operations, the net result of which is to cause a distribution of metal during the forging process as to produce a hammer of correct or accepted proportions and of the proper weight, particularly insofar as the weight of the head portion per se is concerned.

Another and important object of the invention is to provide a novel method of forming indestructible hammers of the unitary head and shank variety which will produce a hammer possessing the advantageous features briefly outlined above and which involves the elimination of a large number of shaping operations which are ordinarily required in the production of hammers of this sort, the various operations involved being of a relatively simple nature and requiring no special skill on the part of the operator, the process as a whole being conducive toward uniformity in the manufacture of the hammers.

In carrying out this last mentioned object of the invention, it is contemplated that the head portion of the hammer including the impact head proper and the claw, together with a limited portion or extent of the shank, be constructed as a single unit by a process involving an initial drop forging operation, followed by a trimming operation and a subsequent final pressing operation which results in the production of the head portion of the hammer and a limited extent of the shank portion thereof in substantially its completed form. The remainder of the shank portion of the hammer is separately formed by a simple forging operation and, thereafter, the die formed portion of the shank is butt welded to the head so that it forms a continuation of the shank extension on the head and finally, smoothing operations are performed to produce the finished head and shank unit. By such a process, deep drawing operations are avoided and the cost of the dies involved is materially reduced. Additionally, intricate shaping operations involving the use of skilled labor are eliminated and a high level of production at a reasonable cost may be attained.

Other objects and advantages of the invention, not at this time enumerated, will become more readily apparent as the nature of the invention is better understood.

In the accompanying two sheets of drawings forming a part of this specification, a preferred embodiment of a carpenter's claw hammer constructed in accordance with the principles of the present invention has been illustrated and the method by means of which the hammer is constructed has been portrayed in somewhat schematic fashion.

In these drawings:

Fig. 1 is a side elevational view of a carpenter's claw hammer constructed in accordance with the principles of the present invention with certain parts being broken away to more clearly reveal the nature of the invention;

Fig. 2 is a front elevational view of the structure shown in Fig. 1;

Fig. 3 is an expanded side elevational view of forged head and shank section units respectively, illustrating schematically the manner in which these units are joined together to produce a unitary hammer assembly;

Fig. 4 is a fragmentary end view of the hammer shown in Figs. 1 and 2;

Fig. 5 is a sectional view taken substantially along the line 5—5 of Fig. 4;

Fig. 6 is a sectional view taken substantially along the line 6—6 of Fig. 2;

Fig. 7 is a fragmentary sectional view taken substantially centrally and vertically through a pair of dies associated with a drop forge hammer utilized in connection with the present method; and

Fig. 8 is a fragmentary sectional view taken substantially centrally and vertically through a pair of dies associated with a forging press employed in connection with the present method.

Referring now to the drawings in detail and in particular to Figs. 1, 2 and 4, the improved tool which is formed by the present method has, for exemplary purposes, been illustrated herein as being in the form of a carpenter's claw hammer of the indestructible type and which, for purposes of discussion herein, is of more or less standard dimensions, i.e. it is provided with a sixteen ounce head, a thirteen inch shank and has a longitudinal spread across the head portion of five and one-half inches. While other dimensions and weights are contemplated, the weights and dimensions mentioned above will, if adhered to, provide a hammer which is generally acceptable to carpenters and similar tradesmen.

The hammer head is designated in its entirety at **10** and is integral with the handle shank **12**. The head **10** in the illustrated form of the invention is of the bell-faced type and includes a cylindrical impact head proper **14** having a circular impact surface **16**. The impact head proper **14** is connected to one side of the medial body portion **18** by a constricted portion **20** which is polygonal in cross section and the other side of the body portion **18** is connected to the claw region **22**, the latter region being bifurcated as at **24** to provide the usual diverging claws **26**. The shank **12** merges with the head **10** along gradually formed curved surfaces **28** as is customary in the formation of these indestructible type hammers. The medial body portion **18** of the hammer head **10** is formed with a relatively deep socket **30** therein which is generally rectangular in cross section as seen in Fig. 4 and the four walls **31** of which converge inwardly toward each other in the outer regions of the socket. The bottom wall of the socket is slightly dished as shown at **32** in Figs. 1 and 3. The provision of the socket **30** constitutes one of the important features of the present invention and its nature and function will be more fully described hereinafter.

The shank **12** is comprised of a proximate grip section **34** and a distal connecting section **36** by means of which the grip section is operatively connected to the head **10**. The distal section **36** is generally elliptical in transverse cross section, the ellipse having a relatively short minor axis and a relatively long major axis so that this portion of the shank is relatively thin in the transverse direction of the hammer as a whole. The proximate grip section **34** is generally flat and the longitudinal side edges thereof are formed with marginal ribs **38** so that the section is generally H-shape in cross section.

The grip section **34** is adapted to receive thereover a tubular handle proper or sheath **40** (Figs. 1, 2 and 6) which may be formed of any suitable material but which is preferably formed of a material having good shock absorbing qualities as for example an elastomeric material such as rubber, either natural or synthetic, a rubber substitute or the like. It is also contemplated that the sheath **40** may be formed of turned leather or of a suitable plastic material. The sheath **40** is formed with a relatively deep socket **42** therein (Fig. 6) and into which the grip section **34** of the shank **12** may be inserted by telescoping the sheath **40** over this portion of the shank during the final assembly of the hammer. A pair of oppositely disposed T-shaped slots **43** are formed in the wall of the sheath to receive the marginal ribs **38** and, when the sheath **40** is fully received on the grip portion **34**, the web portion of the latter extends across the socket **42** with clearance regions **41** existing between the wall of the sheath and the web part of the grip portion. The specific nature of the sheath **40** forms no part of the present invention and no claim is made herein to any novelty associated therewith, such a sheath being shown and described in my co-pending application Serial No. 685,187, filed on September 20, 1957, and entitled Handle Construction for Hammers and Similar Impact Tools.

The rectangular socket **30** provided in the medial body portion **18** of the hammer head **10** may be left exposed so that it assumes the appearance which it has when it emerges from the shaping operation in the manufacture of the head portion of the hammer as seen in Fig. 3, but preferably this socket **30** is filled with a vibration dampening substance such as a suitable thermoplastic or thermosetting material as indicated at **44**. Alternatively, it may be filled with a hickory plug which, if desired, may be concealed by an outer veneer of the plastic material.

The hammer construction described above is possessed of good shock-absorbing qualities, has proper balance, and is not subject to extreme harmonic vibration, besides possessing all of the advantageous features of conventional indestructible type hammers such as strength, rigidity, hammer shank unity, etc. These former attributes of the hammer are, to a large extent, made possible by the provision of the socket **30**.

Insofar as the shock-absorbing qualities of the hammer are concerned, it is to be noted that the four walls **31** of the socket **30** are of relatively thin construction, especially in the base region thereof. Thus, any impact shock which is applied to the hammer head proper **14** will be transmitted through the reduced neck portion **20** to the relatively thin side walls **31** of the socket **30**. Much of this impact shock will be dissipated in these side walls and only a limited portion thereof will be conducted from the side walls to the shank portion **12**. A limited portion of this impact shock will also be transmitted through the side walls **31** to the claw portion **22** where, in the absence of the filler material **30**, a relatively small amount of vibration may be set up in the claw but the extent of such vibration will not be nearly as great as in the case of an indestructible hammer having a solid head devoid of the rectangular socket **30**. When the socket **30** is filled with a vibration-dampening substance such as the plastic material **44**, the duration of any harmonic vibration set up in the claw region **22** will be materially reduced, much in the manner that the vibrations of a tuning fork or a resonant bell are effectively dampened when the hand is applied thereto. By such an arrangement, prolonged harmonic vibration of the claw region **22** is prevented and there will be no structural weakening of the metal of the claw region as is the case in connection with solid head hammers. Furthermore, reduction in the vibrational effects of the claw portion **22** will materially reduce any secondary impact shock which may be transmitted from the claw to the shank **12**.

Proper balance of the hammer assembly is made possible by virtue of the fact that the space consumed by the socket **30** possesses no metal mass and therefore adds no weight to the body of the head. The head may thus be constructed along conventional lines insofar as its shape and size is concerned and a full sixteen ounce head and claw unit may be made to have the usual five and one-half inch longitudinal spread.

The method involved in the construction of the above-described indestructible type hammer has been somewhat schematically illustrated in Figs. 3, 5, 6, 7 and 8. As shown in Fig. 3, the head portion in its entirety and a limited extent of the shank **12** are formed as a single integral unit while the remaining portion of the shank is formed as a separate unit. The two units are then joined together by a butt welding operation at a region designated at **50** in Fig. 1 to produce the one-piece hammer construction, after which the handle grip **40** is applied to the shank **12**.

The unitary portion of the hammer which includes the head **10** and a limited portion **51** of the shank **12**, which is formed separately from the remaining portion of the shank is shown at the left hand side of Fig. 3 and has been designated in its entirety at **52**. This remaining portion of the shank has been designated in its entirety at **54**. The unit **52**, which for convenience of description will hereinafter be referred to as the "head forging," is evolved from a series of forging and pressing operations, the nature of which will be set forth in detail presently. The unit **54**, which will hereinafter be referred to as the "shank forging" is formed by a single drop forging operation.

To produce the head forging **52**, initial conventional forging operations in a series of development dies are resorted to to produce a preformed "slug" **55** such as has been shown in Fig. 7 wherein the general shape of the hammer head **10** is fairly well developed including the impact head proper **14**, the constricted connection portion **20**, the claw portion **22** which has not yet been bent to the proper angle relative to the shank of the completed hammer, a short protuberance **56** which affords backing metal for subsequent drawing into shank shape, and a relatively shallow socket portion **58** which will

subsequently be deformed into the socket 30. The initial forging may be a drop forging operation which is performed on cylindrical rod stock in the usual manner of such forging operations and the development process is conducted until the slug 55 is produced, the operation of forming the slug being illustrated in Fig. 7 and constituting the penultimate major operation in the final production of the head forging 52. This operation is a drop forging operation which may be conducted in a drop hammer such as has been fragmentarily shown at 60, utilizing upper and lower dies 62 and 64 respectively. The upper die 62 is carried by the drop hammer proper 66 while the lower die 64 is operatively mounted on the bed plate 70 of the drop hammer machine 60. The drop hammer proper 66 is slidable on guide members 68. The upper die 62 is formed with a downwardly projecting protuberance 72 which forms the relatively shallow socket portion 58 in the slug 55 and with surfaces 74 and 76 which form the impact and constricted portions 14, 20 and the claw portion 22 respectively. The lower die 64 similarly is formed with head and claw forming surfaces 78 and 80 respectively and with a vertical socket 82 to allow for drawing of the protuberance 56. It is to be noted that the slug 55 remains connected by means of a sprue 83 to the original cylindrical rod stock 84.

Fig. 8 illustrates the step of pressing the slug 55, which is still attached to the stock 84, to substantially the final shape of the head forging 52. This operation utilizes a forging press such as has fragmentarily been shown at 90. The press 90 includes an upper movable part or ram 91 which is slidable on vertical guide posts 92 and a lower bed plate 94. A jig assembly 96 supported on the bed plate 94 includes a lower block 98 and an upper carriage 100 which is vertically slidable on guide posts 102. The carriage 100 serves to support an upper die 103 having shaping surfaces thereon including a surface 104 for shaping the impact head and constricted portion of the head forging and a surface 106 for shaping the claw portion. The lower block 98 serves to support a lower die assembly including a die block 108 having head and claw shaping surfaces 110 and 112 respectively. The carriage 100 is provided with a depending shaping plunger 114 which passes through an opening 116 formed in the upper die 102 and is designed for cooperation with a registering opening 118 provided in the die block 108 in producing the relatively deep socket 30 in the head forging 52. The underneath side of the die block 108 is recessed as at 120 to receive a replaceable die insert 122 having a tapered bore 124 therein in registry with the bore 118 and in which bore 124 the short shank section 51 (see also Fig. 3) of the head forging 52 is formed. A series of compression springs 126 are interposed between the carriage 100 and ram 91 so that upon initial downward movement of the ram, the upper die 102 is lowered into engagement with the slug 55 positioned on the lower die 108 and thereafter, as the ram 91 continues its downward movement the shaping plunger 114 enters the socket 58 and engages the bottom wall thereof and effects a drawing operation on the metal in the vicinity of the protuberance 56 and forces the same downwardly into the bore 124 in the insert 122 as shown in Fig. 8. At the same time, the springs 126 become compressed and, at the time that the ram 91 reaches the bottom of its stroke, these springs "go solid" and limit the extent of forming operations.

It will be understood that the specific form of forging press 90 illustrated and described herein is only exemplary and other forms of such presses capable of accommodating the dies 102 and 108 and forming element 114 may be employed if desired. It is to be noted that for purposes of clarity, the completely forged unit 52 is shown as resting in the lower die 108 with the upper die 102 and plunger 114 withdrawn. In actual practice, however, withdrawal of the upper die and plunger will serve to extract the forging 52 from the lower die, the forging adhering to the plunger 114 so that when the latter assumes its retracted position within the opening 116, automatic stripping of the die 102 will take place.

After the pressing operation involving the dies 102 and 108 has been completed, the forged unit 52 is removed from the apparatus 90 and suitable trimming operations are performed on the unit to remove any flash which may have accrued from the pressing operation and to sever the head forging from the sprue 82 and from the cylindrical stock 84.

Inasmuch as the depth to which the metal of the slug 55 may be forced in the die insert 122 may vary somewhat in successive forming operations due to slight variations in the physical phenomena involved, such as temperature variations, differences in the consistency of the metal of the slug 55, the manner in which the slug is positioned on the die 108, the character of the flash which determines the extent to which the dies may be closed upon each other, etc., a subsequent trimming or clipping operation is performed upon the forged unit 52 as indicated at 128 in Fig. 3 to remove a portion of the metal at the extreme end of the protuberance 51 which, in the finished article, constitutes a part of the hammer shank 12. In this manner, uniformity in the length of the protuberances 51, and consequently in the length of the shanks 12 as a whole, is assured.

After the formation of the head forging 52, the protuberance 51 is joined to one end of a preformed shank unit 54 in end-to-end relationship but a butt welding operation which has been schematically illustrated in Fig. 3. Utilizing conventional clamping apparatus the head forging 52 and shank forging 54 are arranged in axial alignment and a difference in electrical potential is established between the two parts so that when the parts are brought together welding current will flow from one part to the other. The parts are initially brought into flash contact with each other by shifting one part relative to the other until the adjacent aligned ends thereof make electrical contact. At this time considerable heat is generated at the region of contact and, when the appropriate welding temperature is attained in this region, the parts are further moved relative to and toward each other to effect the permanent union. The thus joined parts 52 and 54 may then be transferred to a suitable smoothing press to remove any flash which may have been created and to produce the finished head and shank unit.

To complete the hammer assembly, the handle grip 40 which, as previously stated may be formed of a suitable shock-absorbing material such as rubber, leather or an appropriate thermosetting or thermoplastic material, is telescoped onto the portion 34 of the shank 12 and held thereon by friction or by any suitable adhesive.

The invention is not to be understood as restricted to the details set forth since these may be modified within the scope of the appended claims without departing from the spirit and scope of the invention.

Having thus described the invention what I claim as new and desire to secure by Letters Patent is:

1. The method of forming a carpenter's claw hammer having a head portion providing an impact head proper at one end of the head portion, a claw part at the other end of said head portion, and a hollow medial body part, and a shank portion projecting outwardly from said medial body part, said method comprising forging a heated piece of metal to form a slug destined to become said head portion and a limited portion of said shank portion, said slug having an end portion which is to become said impact head proper, another end portion which is to become said claw part, and a solid intermediate portion which is to become said hollow intermediate body part and at least a limited extent of said shank portion, forcing a central surface region of said solid intermediate portion of the slug inwardly of said latter portion to produce a socket in said slug and displace the underlying metal of said solid intermediate portion

outwardly beyond the original confines of the slug to produce said limited extent of said shank portion, separately forging a piece of metal to produce the remainder of said shank portion, and butt welding said forged remainder of the shank portion to said limited extent of the shank portion on the forged slug.

2. The method of forming a carpenter's claw hammer having a head portion providing an impact head proper at one end of the head portion, a claw part at the other end of the head portion, and a hollow medial body part, and a shank portion projecting outwardly from said medial body part, said method comprising forging a heated piece of metal to form a slug destined to become said head portion and a limited portion of said shank portion, said slug having an end portion which is to become said impact head proper, another end portion which is to become said claw part, a solid intermediate portion which is to become said hollow intermediate body part and a limited extent of said shank portion adjacent its region of juncture with the head portion, and an outwardly protruding portion which is to become an adjoining extent of said shank portion, forcing a central surface region of said solid intermediate portion of the slug inwardly of said latter portion to produce a socket in said slug and displace the underlying metal of said solid intermediate portion outwardly beyond the confines of the slug to produce said limited extent of the shank portion while at the same time displace said outwardly protruding portion to produce said adjoining extent of the shank portion, separately forging a piece of metal to produce the remainder of the shank portion,

and butt welding said forged remainder of the shank portion to said adjoining extent of the shank portion on the forged slug.

3. The method of forming a carpenter's claw hammer having a head portion providing an impact head proper at one end of the head portion, a claw part at the other end of the head portion, and a hollow medial body part, and a shank portion projecting outwardly from said medial body part, said method comprising forging a heated piece of metal to form a slug destined to become said head portion and a limited portion of said shank portion, said slug having an end portion which is to become said impact head proper, another portion which is to become said claw part, a substantially solid intermediate portion having a relatively shallow socket formed therein and which is to become said hollow intermediate body part and a limited extent of said shank portion adjacent its region of juncture with the head portion, and an outwardly protruding portion in axial alignment with said shallow socket and which is to become an adjoining extent of the shank portion, forcing the bottom wall of said shallow socket, together with the underlying metal inwardly of the slug to extend said metal on the side thereof opposite said socket and produce said limited and adjoining extents of said shank portion, separately forging a piece of metal to produce the remainder of the shank portion, and butt welding said forged remainder of the shank portion to said adjoining extent of the shank portion on the forged slug.

No references cited.