

April 3, 1951

V. M. BUNTS ET AL
EXPLOSIVE RIVET FIRING DEVICE

2,547,437

Filed Aug. 22, 1947

FIG. 1.

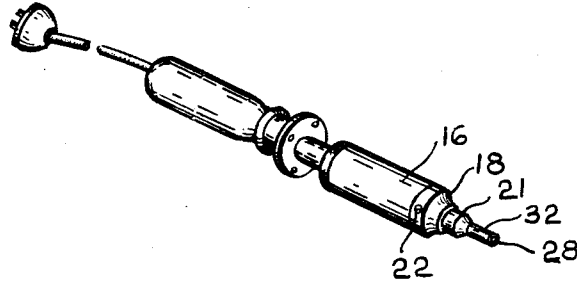


FIG. 2.

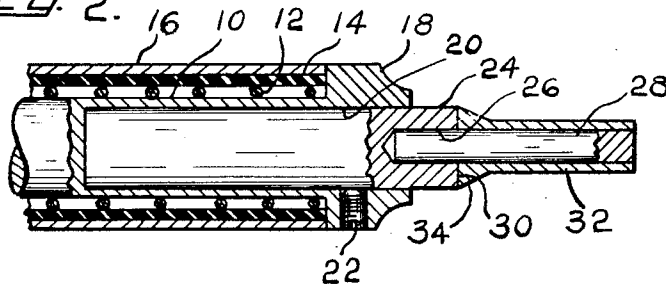
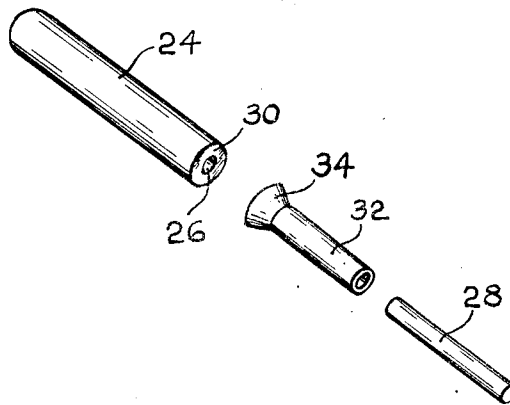
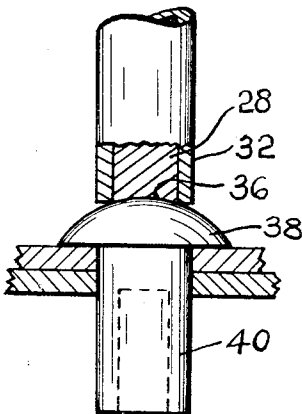


FIG. 4.

FIG. 3.



INVENTORS
VERNON M. BUNTS
HENRY C. HOLBERT
BY *J. O. Keiper*
ATTORNEY

UNITED STATES PATENT OFFICE

2,547,437

EXPLOSIVE RIVET FIRING DEVICE

Vernon M. Bunts, East Syracuse, and Henry C. Holbert, Syracuse, N. Y., assignors to Easy Washing Machine Corporation, Syracuse, N. Y., a corporation of Delaware

Application August 22, 1947, Serial No. 770,062

3. Claims. (Cl. 218—19)

1

This invention relates to heating irons for the setting and exploding of explosive rivets.

In the art of setting explosive rivets, it is necessary to convey heat to the rivet head by contact therewith of a heated bar which, in order to conduct heat satisfactorily, is usually made of a good heat conductive material such as relatively pure copper. Such material is relatively soft and ductile, and is constantly subjected to the elevated temperature required for quickly exploding the rivet through contact with the head thereof. When the rivet is set in sheet metal members having some resiliency or yield, the reactive shock from the rivet head against the detonating iron is increased, all resulting in the upsetting of the copper tip. In the course of heating a number of rivets at a relatively fast rate, which requires relatively high iron heat, the tip of the iron mushrooms, and in a short space of time, becomes impractical of further use.

The present invention relates to a riveting iron construction which is so adapted as to prevent the mushrooming action of the iron tip, while at the same time being capable of delivering heat to the rivet head with the same dispatch as heretofore accomplished with plain, pure copper tips. The invention more particularly involves the use of a copper tip having the end portion thereof positioned within a steel or other hard metal sleeve or jacket capable of constraining while hot the copper tip from expanding or upsetting radially as a result of the axial shock received from the rivet upon detonation. The arrangement of such a sleeve, while reducing somewhat the diameter of the copper heat conductor, by its nature acts as a slight heat insulator and permits the tip to operate at the same or a slightly higher temperature so that no loss in efficiency or time taken in exploding rivets is occasioned by the construction.

The above and other novel features of the invention will appear more fully hereinafter from the following detailed description when taken in conjunction with the accompanying drawing. It is expressly understood, however, that the drawing is employed for purposes of illustration only and is not designed as a definition of the limits of the invention, reference being had for this purpose to the appended claims.

In the drawing, wherein similar reference characters refer to similar parts throughout the several views:

Figure 1 is a perspective view of an electric iron having a tip constructed in accordance with the invention;

2

Figure 2 is a longitudinal section of the tip construction;

Figure 3 is an enlarged showing of a tip in engagement with the head of an explosive rivet; and

Figure 4 is an exploded view in perspective showing the parts of which the tip is composed.

Referring to Figures 1 and 2, there is shown a typical hand electric iron or heating unit such as is ordinarily employed for soldering purposes, the tip of which is constructed in accordance with the invention to adapt it for detonating explosive rivets. The iron is provided with a central hollow core member 10 around which is located a heating coil 12, an insulating layer 14 and an outer protecting shell 16. The core is provided with an integral collar 18; the hollow bore 20 being adapted to receive the shank end of a tip assembly. The collar is also provided with a set screw 22 for affixing the shank of such tip assembly within the core.

In order to provide a tip adapted to contact the heads of rivets of the explosive type which will withstand the repeated shock or detonation of the rivet contacted and the heat of the tip, the contacting end of the tip is protected with a sleeve of relatively hard material such as steel or the like.

In the form shown, the shank portion 24 of the tip assembly is provided with an end bore 26 into which a reduced diameter round copper contacting member 28 in the form of a rod is inserted with a relatively snug fit. The shoulder 30 thus formed by the end of the shank portion 24 and the contacting member 28 is adapted to receive and position a steel sleeve 32 having a beveled end portion 34 suitably shaped to abut smoothly against the shoulder 30. The shank portion may be preferably tin or nickel plated to prevent oxidation and thereby assure good heat conductive contact with the heater sleeve 10.

In practice, the contacting end 36 of the contacting member 28 is protected against mushrooming by the sleeve 32, as is shown in Figure 3, the projecting end of the contacting member and sleeve being of substantially the same length. As shown in Figure 3, the contacting end has become from slight use somewhat concave, to afford a contacting area with the head 38 of an explosive rivet 40. The steel sleeve 32 terminates at or just short of the surface of the head 38 and thereby confines the contacting tip from flowing or mushrooming as a result of the shock of detonation and the soft nature of the copper

particularly due to the elevated temperature at which it is maintained by the electric iron.

Irons of the type disclosed are employed to fire rivets at intervals of three to four seconds and when protected by the sleeve thus described, require touching up only after many hours of service by simply grinding the end face enough to provide a square end. After many days of service and touching up as aforesaid described, it may be desirable to replace the tip. This is readily accomplished by removing the sleeve 32 which may not necessarily make a very tight contact with the contacting bar and thereafter removal of the contacting bar from the shank to make room for the insertion of a new contacting bar. It will be readily appreciated by those skilled in the art, that the construction is such as to afford a tight connection between the contacting bar and the shank portion for the transfer of heat therebetween. The steel sleeve being of relatively low conducting material acts to some extent as a heat insulator, causing the contacting bar to conduct heat more readily to the tip without substantial heat loss. The slight air gap between the sleeve and the contacting bar adds to the insulating value of the sleeve.

While it is preferable to form the shank and contacting member of relatively pure copper because of the superior heat conducting characteristics of such material, other materials having similar properties may be used if desired. The retaining shank may be made of drill steel or other material as may be found suitable. The tip end of the contacting member may be flat to contact flat head rivets, or may assume the concave shape shown for round head rivets.

Though a single practical embodiment of the invention has been illustrated and described, it is understood that the invention is not limited to the particular iron shown or the particular shape of the parts illustrated. As various changes in construction and arrangement of the parts may be made without departing from the spirit of the invention, as will be apparent to those skilled in the art, reference will be had to the appended claims for a definition of the limits of the invention.

We claim:

1. An explosive rivet firing device comprising a shank portion adapted for exposure to a source of heat, a heating means surrounding said shank, a heat conducting rod extending axially from said shank and terminating in an end face having a plane contacting surface, said rod being of a material of high heat conductivity and relatively low resistance to mushrooming from rivet explosion recoil in the region adjacent said end

face, said rod at its rear end being received in an axially directed socket in said shank and abutting the bottom of said socket, and a sleeve snugly surrounding said rod, and terminating substantially flush with said end face, said sleeve being of a relatively hard material of relatively low heat conductivity and capable of confining said rod against radial expansion and preventing mushrooming under the recoil effect of an exploding rivet in contact with the end face, the rear end of said sleeve abutting the front end of said shank for securing said sleeve against axial movement along said rod in a direction away from said end face.

2. A device according to claim 1, in which the rod is of copper, and the sleeve of steel.

3. An explosive rivet firing unit for insertion in a rivet exploding tool having means for transmitting heat to said firing unit comprising a heat conducting rod terminating in a single transverse continuous smooth end contacting surface, said rod being of a material of high heat conductivity and relatively low resistance to mushrooming in the region adjacent the end surface from rivet explosion recoil acting substantially normal to said end surface, and a sleeve snugly surrounding said rod and terminating substantially flush with the marginal edge of said single end surface at all points thereof to confine the rod, said sleeve being of a relatively high strength hard material of relatively low heat conductivity and capable of confining said rod against radial expansion and preventing mushrooming under the recoil effect of an exploding rivet head in contact with said end surface, and rigid abutment means contacting with said rod and said sleeve for preventing rearward axial movement of said rod and sleeve and maintaining the sleeve end substantially flush with the forward end surface of said rod.

VERNON M. BUNTS.
HENRY C. HOLBERT.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
399,387	Dolan	Mar. 12, 1889
863,247	Yeatman	Aug. 13, 1907
1,061,376	Heany	May 13, 1913
1,127,970	Dryfoos	Feb. 9, 1915
1,140,136	Eldred	May 18, 1915
1,189,581	Kicklighter	July 4, 1916
1,679,518	Fowle	Aug. 7, 1928
2,411,859	Harwood	Dec. 3, 1946