

Sept. 8, 1942.

L. A. BURROWS ET AL

2,295,075

HEATING DEVICE

Filed Feb. 8, 1941

Fig. 1

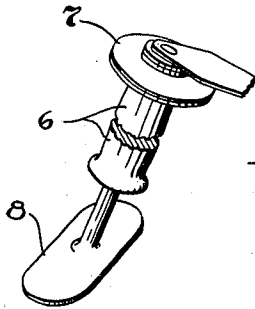
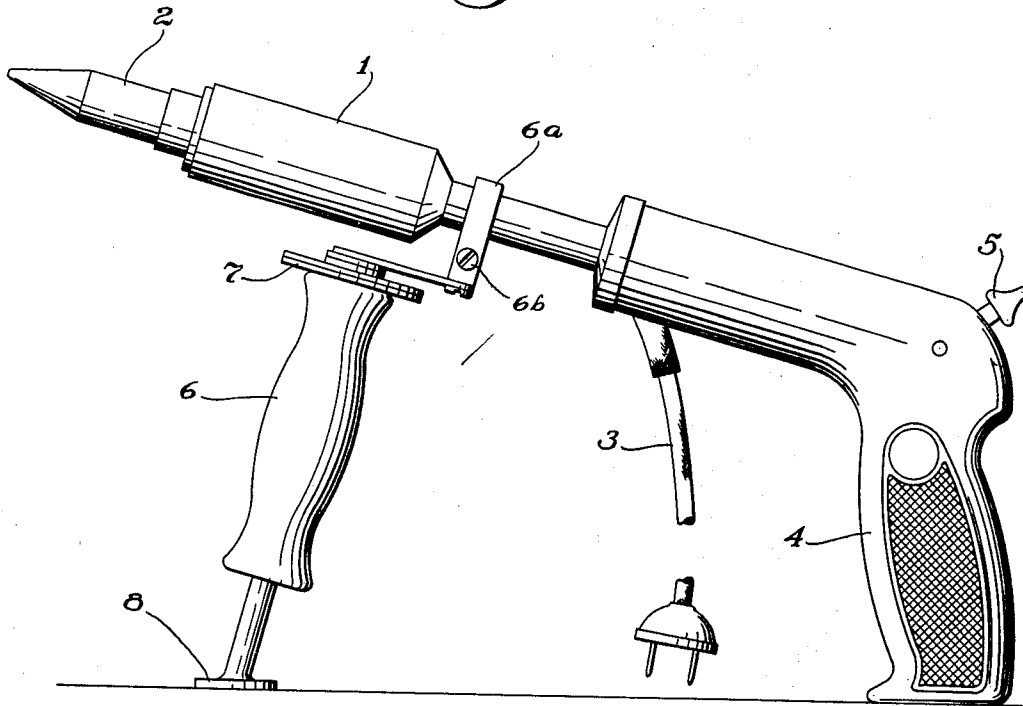


Fig. 2

Lawton A. Burrows
Roger W. H. Gentry
David L. Lewis, Jr.

INVENTORS

BY *Thos. A. Wilson*

ATTORNEY

UNITED STATES PATENT OFFICE

2,295,075

HEATING DEVICE

Lawton A. Burrows and Roger W. H. Gentry,
Woodbury, N. J., and Davis L. Lewis, Jr.,
Swarthmore, Pa., assignors to E. I. du Pont de
Nemours & Company, Wilmington, Del., a cor-
poration of Delaware

Application February 8, 1941, Serial No. 378,022

2 Claims. (Cl. 219—21)

This invention pertains to an improved heating device, and more particularly to such a device which can be employed readily for supplying a controlled quantity of heat to a given object, even though said object affords a very small surface.

The need for a heating device of this type is great, because the production of various articles of manufacture includes steps wherein it is essential that heat be supplied to a locus of very small area. The employment of explosive rivets in the production of various articles is a specific instance. Since the use of explosive rivets usually is characterized by the employment of a large number of these, it becomes essential that their initiation be effected easily and quickly. Usually such initiation has been accomplished by heating the rivet. Care must be taken, however, to prevent direct heating of the structure being riveted, because otherwise the requisite temperature control is not attained, with the result that the rivet is not expanded properly. This undesirable feature may even result when the rivets have been anodically oxidized in order to improve their resistance to corrosion, and being in such condition, restrict the flow of heat from the rivet to the surrounding structure. If the source of heat is brought into contact with both the rivet and the structure immediately about the rivet, the heat tends to pass more rapidly into the structure because it does not possess the oxide film. Excessive cooling of the heater tip is apt to occur in such event. In such case, the rivet usually does not expand suitably, if at all.

The object of the present invention is an improved heating device which is adapted for the application of heat to surfaces of small area. Another object is such a device which can be handled readily. A further object is a heating device capable of supplying a controlled rate of heat input to an article of low surface area. A still further object is such a heating device which is provided with means which facilitate guiding and general handling of the device.

The foregoing objects are accomplished by a structure which is illustrated in the accompanying drawing in which Figure 1 is a view in elevation of the device resting upon a horizontal surface, and Figure 2 is a perspective view of the auxiliary handle with its surface-engaging foot.

Figure 1 depicts a general side view of a preferred structure of the present invention. Numeral 1 refers to a section of the heating device in which is located the heating element (not shown). Fitted in close contact with this element so that maximum heat exchange relation-

ship will be attained is the member 2 which constitutes the contact end of the heating device, this contact end or tip being constructed of metal or alloys having very high heat conductivity.

5 The contact member likewise possesses high stability with respect to oxidation and corrosion. Silver is the preferred material, although silver-containing alloys are also very desirable. The heating tips may assume widely-varying shapes in order that they may be employed in those applications where movement of the heating device is greatly restricted. Connection of the heating element to a suitable electrical source is attained by means of the cord 3. Handling of the device is facilitated by means of a handle or grip constructed of non-conducting material such as plastic, wood, and the like, said grip being suitably disposed about the conduits enclosing the source of power for the heating element at the extremity opposite to the one where the contact member is located. As shown, this member 4 is in the form of a pistol grip. Temperature control of the contact member is attained by suitable manipulation of the multiple switch 5. Attached to the device at a position substantially midway between the contact member and the handle is the stand 6 which is employed as a guiding as well as a supporting device. The connecting member 6a is so designed that the stand 6 can be rotated about the surface of the conduit. This is particularly important in those instances where the structure dealt with is of such form that working space is limited, and where heating tips of various shapes are employed because it facilitates contact of said tips with the surface to be heated. The member 6a may be removed readily, means for effecting such removal being shown at 6b. The connecting member 6a may be constructed of metal, in which case insulation is effected by means of the member 7. Connection between the stand and the metal link is made in such manner that the stand is also rotatable about its longitudinal axis, since this characteristic likewise facilitates handling. At the base of the stand is the rest member 8, which is designed to permit resting the entire assembly on any flat surface, since the base of the pistol grip and this member are sufficient to keep the entire device in an upright position. This latter characteristic is rather important in view of the fact that it tends to obviate damage which might result from accidental contact of the hot tip with surrounding objects.

A heating device of this type has proved very satisfactory when employed for the firing of explosive rivets, even though the rivet head is very

small, say on the order of 0.25" in diameter. In supplying heat to the rivets, the contact member or tip of the heating device is of suitable shape and dimensions so that it fits the shape of the rivet to be heated. After the tip has attained the requisite temperature, the heating device is quickly brought into such position that said tip makes a close contact with the rivet and slight pressure is applied to insure such contact whereby the heat flows through the metal body of the rivet causing initiation of the explosive charge. Since it is essential that the tip heat only the rivet and not any of the metal structure which is to be fastened together, the need for a device which permits exact contact with the rivet in ready manner will be appreciated.

As indicated in the foregoing, the rate of heat input to the rivet should be controlled carefully. Thus, if the rivet be heated too rapidly, the performance of the charge is affected, with the result that, after initiation thereof, insufficient expansion of the rivet has occurred. On the other hand, if the rivet is heated up too slowly, there once again is failure of suitable expansion for the reasons set forth in the foregoing, namely, burning or partial detonation rather than complete detonation of the explosive charge. Because of the exact control required, contact of the heated tip with part of the structure about the rivet causes the formation of a rivet which has not been expanded properly and which therefore does not join the metal structures satisfactorily. In addition, in those cases where the structures to be riveted contain aluminum, the contact of the heated element with such structures may have a tendency to heat-treat the body in such manner that resistance to corrosion is materially decreased or to weaken it structurally.

A heating device of the type disclosed in the foregoing is applicable for the rapid and facile application of heat to small articles such as rivets. If handled with ordinary care, it eliminates disadvantages resulting from accidental contact of a hot body with the structure to be riveted

and makes it possible to attain the rate of heat input that is required in those instances where a close control of temperature is required.

It will be understood that the preferred embodiment described above is not intended as limiting the invention, having been given merely by way of illustration. Thus, the invention permits of variation without departing from its spirit or scope. We intend therefore to be limited only in accordance with the following patent claims.

We claim:

1. In a heating device suitable for explosive rivets, a heat-producing member having at one extremity a pistol grip provided with means for controlling the temperature attained, and being adapted to serve both as guider and support, and having at the other extremity a structure holding in heat-exchange relationship a contact member of high heat conductivity, and a rotatable stand connected to the heat-producing member along a plane substantially perpendicular to that of said heat-producing member, said rotatable stand being insulated from the heated region and being provided with a hand grip and base so that it is capable of acting as a support for said heating device.

2. In a heating device suitable for explosive rivets, a heat-producing member having at one extremity a pistol grip adapted to serve both as guider and support, and having at the other extremity a structure holding, in position for heat-exchange engagement, a contact member of high heat conductivity, and a stand connected to the heat-producing member having its longitudinal axis substantially perpendicular to that of said heat-producing member, said stand being insulated from the heated region and being provided with a hand grip and a base for engagement with a substantially horizontal surface so that it is capable of acting as a support for said heating device.

LAWTON A. BURROWS.
ROGER W. H. GENTRY.
DAVIS L. LEWIS, JR.