O. B. MOORHEAD.

PROCESS OF SECURING METALLIC MEMBERS TOGETHER.

APPLICATION FILED MAR. 10, 1919.

1,379,036. Patented May 24, 1921.

Fig. 1.

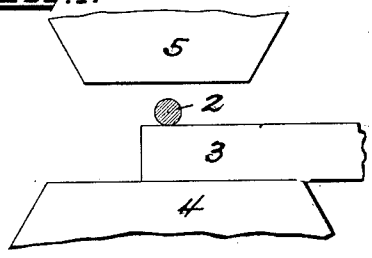


Fig. 4

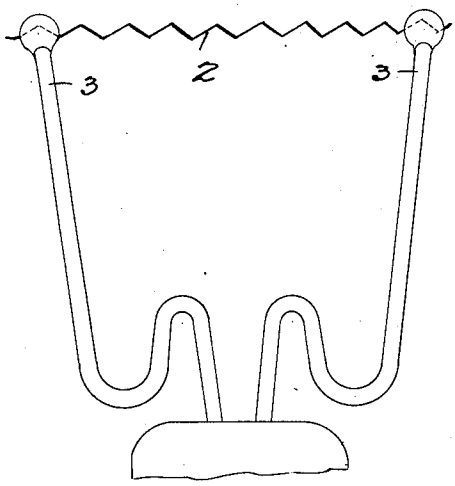


Fig. 2.

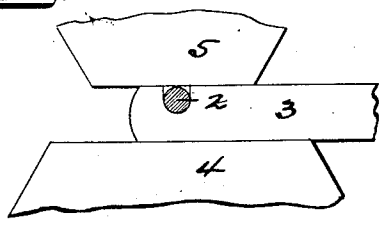
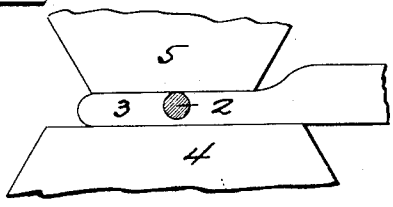


Fig. 3.



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PROCESS OF SECURING METALLIC MEMBERS TOGETHER.

1,379,036. Specification of Letters Patent. Patented May 24, 1921.

Application filed March 10, 1919. Serial No. 281,883.

To all whom it may concern:

Be it known that I, OTIS B. MOORHEAD, a citizen of the United States, and a resident of the city and county of San Francisco and State of California, have invented a certain new and useful Process of Securing Metallic Members Together, of which the following is a specification.

The invention relates to a process of securing metallic members together, and particularly to a process of securing a fine or thin element of hard metal to a larger element of softer metal.

An object of the invention is to provide a simple, rapid and efficient method of securing metallic members together.

Another object of the invention is to provide a method of firmly and tightly securing metallic members together in mechanical and electrical contact.

The invention possesses other advantageous features, which, together with the foregoing, will be set forth at length in the following description, where I shall outline in full, that form of the method which is illustrated in the accompanying drawings forming part of the present specification. In said drawings I have shown one method of procedure in carrying out the process of my invention, but it is to be understood that I do not limit myself to such method, since the invention, as expressed in the claims, may be performed by a plurality of methods.

Referring to said drawings, which show the parts greatly enlarged,—

Figure 1 shows the initial position of the metallic elements.

Fig. 2 shows the position of the members during the operation.

Fig. 3 shows the position of the members at the end of the operation.

Fig. 4 is an elevation of one form of finished product.

The process of my invention contemplates securing together tightly, both in a mechanical and an electrical sense, a hard, fine or thin, metallic element, and a softer and relatively larger metallic element. The process is particularly adapted to the attachment of metallic incandescent lamp filaments to their supports or lead wires, the attachment of filaments in electron and vacuumized relay tubes to their supports or lead wires and the attachment of any filament or fine wire of hard metal to a larger supporting or conducting wire or element of softer metal. I have employed the process successfully in securing tungsten filaments to nickel supports in the manufacture of electron relays. The tungsten filament 2 is fine and hard and the nickel wire or support 3 is larger and softer. The tungsten wire and the nickel wire are placed in superposed relation, with one resting on the other. In the drawings I have shown the tungsten filament 2 resting on the nickel wire 3, but this arrangement may be reversed. The two elements may lie at an angle to each other or be alined, depending upon the product being manufactured. The two elements in superposed relation are placed on an anvil 4 and struck a sharp blow with a hammer 5, the blow being preferably of sufficient force to embed the hard element in the soft element and flatten out the soft element, which, when the connection is made at the end of the soft element, assumes the spatulate form shown in Fig. 4.

The action of the hammer is, first, to drive the hard element into the soft element, as shown in Fig. 2. The further movement of the hammer flattens the soft element, causing a flow of the soft metal around the hard element, substantially closing the aperture in the soft metal made by the entrance of the hard metal. The operation is then complete, although, if desired, the flattened end may be struck one or more additional blows, which cause the entrance aperture to close entirely.

Instead of striking one hard blow sufficient to embed the hard element and flatten the soft element, several lighter blows may be struck, each blow performing a portion of the operation performed by the hard blow, but for purposes of economy, I prefer to complete the process with one blow. The metallic elements which I have employed are small, so that the hammer blow is of rather small force, but when larger elements are used, the blow must be heavier.

I claim:

1. The process of securing together a thin hard metallic element and a larger and softer metallic element, which consists in arranging the elements in superposed relation and subjecting the elements so arranged to a suitable number of blows to press the

hard element in the softer element and cause a flow of the metal of the softer element.

2. The process of securing together a thin hard metallic element and a larger and softer metallic element, which consists in arranging the elements in superposed relation and pressing the hard element into the softer element and causing a flow by pressure of the metal of the softer element over the hard element.

3. The process of securing a tungsten filament to a support of softer metal, which consists in superposing the end of the filament and the softer metal and striking the metals so arranged a blow of sufficient force to press the tungsten filament into the softer metal and flatten the softer metal.

4. A new article of manufacture, comprising a metallic supporting element having a flattened portion and a thin element of harder metal than the support secured in a compressed portion of the support.

In testimony whereof, I have hereunto set my hand at San Francisco, California, this 4th day of March 1919.

OTIS B. MOORHEAD

In presence of—
H. G. PROST.