

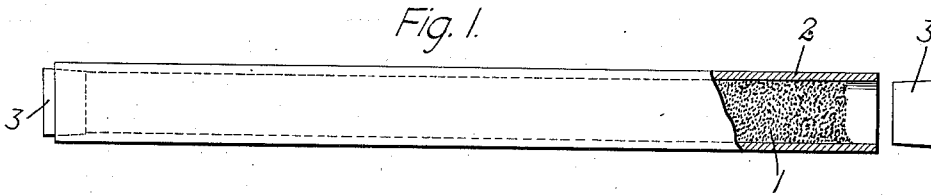
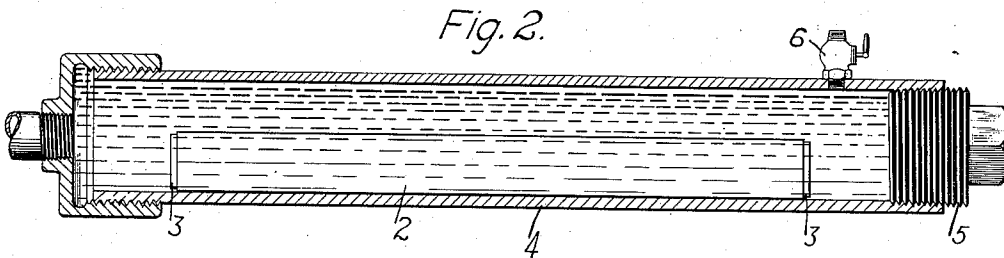
H. D. MADDEN.

PROCESS OF PREPARING BILLETS OF REFRACTORY MATERIALS.

APPLICATION FILED MAR. 28, 1912.

1,081,618.

Patented Dec. 16, 1913.



WITNESSES:

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PROCESS OF PREPARING BILLETS OF REFRACTORY MATERIALS.

1,081,618.

Specification of Letters Patent.

Patented Dec. 16, 1913.

Application filed March 28, 1912. Serial No. 686,944.

To all whom it may concern:

Be it known that I, HARRY D. MADDEN, a citizen of the United States, and a resident of Bloomfield, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Processes of Preparing Billets of Refractory Materials, of which the following is a specification.

My invention relates to processes of preparing billets from colloidal or powdered refractory metals and similar materials, such as tungsten, molybdenum, etc., preliminary to the manufacturing of wires or filaments therefrom, and it has for its object to provide a very simple and inexpensive process of preparing coherent billets of such material which shall be uniformly compacted and devoid of strata and of sufficient strength to withstand the subsequent treatment and working to which they are subjected in the reduction thereof to wire or filament form.

Billets of tungsten, molybdenum and similar refractory metals and materials have heretofore been manufactured by the compacting of the colloidal or powdered metal or material, in which form it is obtained from the oxid or ore, the billets being swaged, rolled or drawn for the purpose of rendering the material thereof ductile and of producing wires or filaments suitable for use in incandescent lamps. Considerable difficulty has heretofore been experienced in the production of coherent billets that are devoid of cracks and strata and are of sufficient strength to withstand the subsequent handling and working without fracture. The difficulties have probably been due to the hard and abrasive character of the material, and particularly of tungsten, and to the manner in which it has been compacted, the abrasive character of the material preventing a thorough and uniform compacting thereof when pressure is applied thereto at only one or a few points while contained in rigid molds.

According to the present invention, the powdered material is compacted by hydraulic or similar pressure applied directly thereto while contained in a pliable mold, with the result that the material is uniformly compacted and the billet is rendered uniform and possesses a satisfactory degree of strength.

Figure 1 of the accompanying drawing

represents a mold containing powdered material preparatory to being compacted according to the present process, and Fig. 2 represents a part of the apparatus by means of which the compacting is effected.

The powdered or colloidal tungsten or other material 1 is first loosely packed in a rubber or other suitable pliable tube 2 constituting the mold, the ends of which are provided with stoppers 3. When the billets are to be formed from tungsten or molybdenum and similar materials, I prefer to employ the pure powdered or colloidal material obtained from the trioxid by reduction by means of zinc, as I have found that the material obtained in this manner produces superior coherent billets. However, powdered or colloidal materials obtained by other reduction processes may be employed if desired, though they have not been found to produce as good results as zinc-reduced material. The material is also preferably employed in pure or unadulterated form rather than in connection with a binding agent which requires removal by subsequent treatment. The tube containing the powdered material is then placed in any suitable receptacle 4, in which it may be subjected to a very high hydraulic or other fluid pressure for a brief period, the pliable tube or mold permitting of the uniform application of the high pressure to the powdered material in substantially all directions, with the result that the powdered material is compacted into a rod or billet having a high degree and uniformity of strength.

The receptacle 4 may be conveniently in the form of a tube or pipe that communicates at one end with a pump (not shown) for forcing water or other fluid into it under great pressure, the pipe being provided at its other end with a screw plug 5 that is removable to permit of inserting and removing the filled molds. The pipe is also provided with a cock 6 for permitting the escape of air when water is admitted to the pipe.

I claim as my invention:

1. The process of manufacturing coherent metallic billets which consists in subjecting bodies of powdered metal to high pressure substantially uniformly exerted thereon in all directions.

2. The process of manufacturing coherent

metallic billets from powdered metal which consists in placing the same in pliable molds and subjecting the molds to hydraulic pressure.

5 3. The process of manufacturing coherent metallic billets from powdered metal which consists in subjecting bodies of the powdered metal to high fluid pressure.

10 4. The process of manufacturing coherent metallic billets from powdered abrasive

metals which consists in placing the same in rubber molds and subjecting the molds to fluid pressure.

In testimony whereof, I have hereunto subscribed my name this 21st day of March, 15 1912.

HARRY D. MADDEN.

Witnesses:

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