

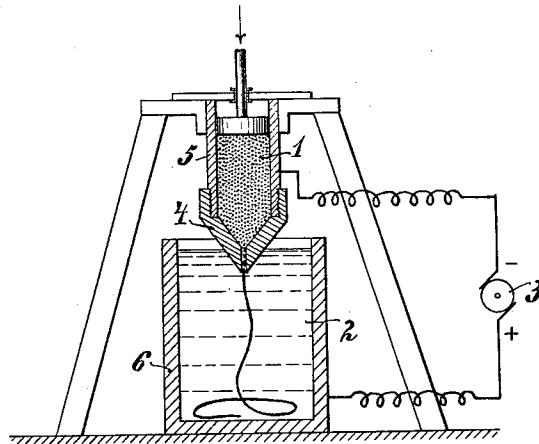
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PROCESS OF PRODUCING BARS, BANDS, TUBES, WIRES, FIBERS, AND THE LIKE, OF METAL.

APPLICATION FILED MAY 3, 1909.

947,162.

Patented Jan. 18, 1910.



Witnesses:

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# UNITED STATES PATENT OFFICE.

OTTO SCHALLER, OF STEGLITZ, NEAR BERLIN, GERMANY.

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947,162.

Specification of Letters Patent.

Patented Jan. 18, 1910.

Application filed May 3, 1909. Serial No. 493,678.

*To all whom it may concern:*

Be it known that I, OTTO SCHALLER, a citizen of the German Empire, and resident of Steglitz, near Berlin, German Empire, have invented a new and useful Improved Process of Producing Bars, Bands, Tubes, Wires, Fibers, and the Like of Metal, of which the following is a full, clear, and exact description.

The process, forming the object of the present invention, serves to produce bars, bands, tubes, wires, fibers and the like of metal, having any desired cross section, up to the very finest fibers, and it consists in spraying the metal, in a finely divided form—eventually in the form of paste—into a liquid, which may for instance, be acidified or to which salts, such as alum, soda, common salt, ammonia or sal ammoniac, have been added, the said liquid forming one pole (the positive) and the paste the other (the negative) pole of a source of electric current. If a suitable voltage is chosen, the moment the mass contacts with the liquid under the influence of the electric current, it will glow, and will sinter to a solid metal before it could even dry or oxidize, for instance, in the air. If water, and such liquids are employed as will be split or decomposed by the electric current, a reduction of any oxids, which may be present in the mass will take place simultaneously. Owing to the reduction of cross-section due to the glowing, the advantage is attained that the opening of the jet remains free and does not become choked up, thus rendering it possible to attain the very finest threads or filaments, such for instance, as employed for embroidering, or filigree work, or for incandescence lamps. The fineness of the metal must of course be proportionate to the size of the jet or nozzle. A comparatively large opening will admit of a coarser grain of metal, but the process enables the employment of the finest nozzle or jet openings. Special binding and reducing mediums may be added to the mass such as tarry or gelatinous masses. These binding means are usually only employed in connection with the coarser kinds of fibers, *i. e.* those of greater cross section. As reducing means gases or carbon may be mixed in. The mass or paste may consist of a single metal or a mixture of different metals. All metals capable of being finely divided are suitable to form the

mass. In addition to the more common metals, such as iron, aluminium, copper, tungsten and their alloys, the precious metals or rare earths, such as platinum, silver, gold, iridium, titanium, tantalum, osmium may be employed. In this process, the mass will not dry or oxidize on leaving the nozzle, if the latter is in the liquid. In this case a glass nozzle or a nozzle of some other suitable material of a non-conducting nature and insulated as regards the liquid, is advantageously selected. The receptacle containing the mass may be utilized as current feed for the same, and the nozzle may, as usual, be interchangeably connected to the same. The opening of the nozzle may, however, be above the current conducting liquid and if in this case, it is desired to prevent any possibility of a drying or oxidizing of the mass the latter as it leaves the nozzle, may be surrounded by indifferent or inducing gases or vapors or by a liquid floating on the current conducting liquid and possessing similar properties. The current feed to the liquid may be effected by an electrode placed in the liquid or by the liquid holder.

When it is desirable that the metal should cease to glow after it reaches the bottom of the holder, either the depth of the latter should be sufficiently great, or a second holder of non-conducting material may be arranged below the nozzle opening, in order to offer resistances to the current corresponding to the prolongation of its path or the current feed to the liquid may be arranged close to the point of entrance of the mass into the liquid. The filament or fiber may first be led through a conducting liquid and then through a non-conducting one or the filament may be drawn out of the liquid after it has sintered together. The instances here cited do not, of course, exhaust all the means suitable for the purpose mentioned.

Increased density or strength may be imparted to the mechanically or incolloidal form finely divided metal in the sprayed mass or paste as it sinters together under the influence of the electric current, by placing the contents of the holder containing the liquid under constant or varying pressure. For this purpose the nozzle is led through an opening of the otherwise closed holder and rendered as tight as possible. The pressure may be generated by the air or gas or mixture of gases above the liquid which is com-

pressed either directly or by liquid pressure, or the compression may be generated or increased by the gases formed during the glowing process. The electric tension may  
5 be regulated by hand or automatically in dependence on this pressure.

The holder may be provided with a gage, thermometer, and safety valve and is advantageously provided with peep holes.

10 The accompanying drawing shows an apparatus for carrying out the invention.

In the drawing 1 indicates the paste; 2, the liquid; 3 the source of current; 4 the nozzle; 5 the receptacle and 6 the liquid  
15 holder.

I claim as my invention:—

1. A process of producing bars, tubes, bands, wires, fibers and the like of metal, which consists in that a mass containing

more or less finely divided metal is contacted 20 with a current conducting liquid, the said liquid being connected to the positive pole and the mass to the negative pole of a source of electricity.

2. A process of producing bars which consists in forcing a mass containing more or less finely divided metal through a nozzle having its outer end immersed in a liquid, the said liquid being connected to the positive pole and the mass to the negative pole 30 of the source of electricity.

In testimony whereof I affix my signature in the presence of two witnesses.

OTTO SCHALLER.

Witnesses:

WOLDEMAR HAUPT,  
HENRY HASPER.