

UNITED STATES PATENT OFFICE

1,932,454

METAL DRAWING

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No Drawing. Application November 30, 1929
Serial No. 410,883

7 Claims. (Cl. 205-21)

My invention relates to the cold drawing of metals through dies to reduce or otherwise change the cross section, as in drawing wires and tubes.

In the cold drawing of metals through dies it is common practice to use a lubricant to prevent excessive wear of the dies and to facilitate the operation and it is among the objects of my invention to provide improved methods of lubrication for the purposes referred to.

I have produced excellent lubrication by coating the metal to be drawn with a composition containing particles of metal which are ductile and softer than the metal to be drawn and a vehicle adherent to metals. The particles of ductile metal are the lubricant, the vehicle serving to hold the particles of metal in place until they are engaged by the die. The best vehicles are those which are adherent, flexible and tough but which have a body of small bulk so that the metal particles will not be disengaged when the shape or wire is distorted as it enters the die and so that a comparatively large quantity of the metal particles in the coating will enter or wedge into the die with the metal to be drawn. The metal used for lubrication is preferably in the form of powder consisting of flat, scale-like particles which are composed of ductile metal that is softer than the drawn metal, but lenticular or slightly rounded particles can also be used. The edges of the flat particles appear to overlap in such a way that the particles which are engaged by the die serve to draw unengaged particles into the die. A suitable coating consists of a mixture of paint-like or lacquer-like material which is made by stirring the metal powder into a vehicle which will dry into an adherent coating in the air or by baking.

As an illustration of my invention, one part by volume of fine, flaky aluminum powder was made into a paint by adding it to three parts by volume of bronzing liquid, a quick drying lacquer-like vehicle composed principally of amyl acetate. A fully annealed descaled bar of a tough ferrous alloy containing about 0.20% carbon and 25% chromium was covered by painting this composition on the bar. Upon drying in the air a thin adherent coating, composed largely of aluminum, remained on the bar. Upon drawing the bar through the die some of the coating was scraped off and some of the aluminum passed through the die as an extremely thin adherent coating on the drawn metal. The drawn metal had a smooth surface which was unscored. By successively annealing, descaling and recoating with the aluminum mixture, long lengths of wire were

drawn to a small diameter without difficulty. A similar bar was given a coating consisting only of bronzing liquid. This bar was drawn through the same die. Only short lengths of the metal could be drawn without scoring and eventually fracturing the metal. Similar unsatisfactory results were obtained when the metal was passed through powdered graphite, powdered soap, or a mixture of these two powders before it was passed through the die.

Other metals or alloys which are ductile and softer than the metal to be drawn, such as brass, copper, tin, zinc or lead may be used instead of aluminum, and various vehicles may be used. Cellulose ester solutions, quick drying varnishes, lacquer-like materials and other non-oily vehicles which produce adherent tough coatings may be used instead of bronzing liquid. Instead of using an air drying vehicle, a varnish which hardens into a tough adherent coating by baking may be used. A powdered metal, alloy or combination of metals which is softer than the metal to be drawn and has the best ductility to suit the properties of the metal to be drawn, may be selected and added to a vehicle which will produce a tough, adherent coating. The material admixed with the metal powder to cause the latter to adhere to the work is used solely for that purpose, and it may have substantially no lubricating properties of its own.

I claim:

1. The method of cold drawing metals which comprises coating the metal with a vehicle containing scale-like particles of aluminum; hardening the coating into a tough adherent film, and drawing the metal through a die.
2. The method of cold drawing metals which comprises coating the metal with bronzing liquid, said liquid comprising a quick drying vehicle having suspended therein particles of aluminum, and forcing the metal through a die.
3. The method of cold drawing metals which comprises coating the metal with a bronzing liquid containing a quick drying vehicle and suspended scale-like particles of aluminum, drying the coating to form a tough adherent film, and forcing the metal through a die.
4. The method of cold drawing metal articles which comprises coating the article with a vehicle containing not less than substantially one part by volume of scale-like particles of aluminum to three parts of vehicle and drawing the article through a die.
5. The method of cold drawing metals which comprises coating the metal with a vehicle con-

taining scale-like particles of aluminum, said particles being present in sufficient amount to completely protect the metal and drawing the metal through a die.

protective coating on the article, and drawing the article through a die.

5 6. The method of cold drawing metal articles which comprises coating the article with a vehicle containing particles of aluminum, said vehicle being fluid enough to allow the formation from said particles of aluminum of a scale-like

7. The method of cold drawing metals which comprises coating the metal with a vehicle containing scale-like particles of aluminum, said vehicle being so fluid that it does not assist materially in the lubrication, and drawing the metal through a die.

RUSSELL FRANKS.

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