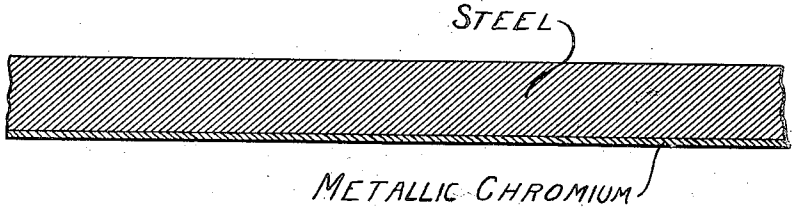
Oct. 14, 1924. 1,511,555

V. YNGVE

TOOL

Filed Dec. 5, 1923



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UNITED STATES PATENT OFFICE.

VICTOR YNGVE, OF SOUTH ORANGE, NEW JERSEY, ASSIGNOR TO MANHATTAN ELECTRICAL SUPPLY COMPANY, INC., OF NEW YORK, N. Y., A CORPORATION OF MASSACHUSETTS.

TOOL.

Application filed December 5, 1923. Serial No. 678,552.

To all whom it may concern:

Be it known that I, VICTOR YNGVE, a citizen of the United States, residing at South Orange, in the county of Essex and State of New Jersey, United States of America, having invented certain new and useful Improvements in Tools, do hereby declare that the following is a full, clear, and exact description of the same.

This invention relates to tools and more particularly to forming tools or dies such as are used in molding, drawing, etc., a large variety of articles.

As well known, tools such as punches, dies, etc., for treating materials of inherent rigidity such as metals, ores, carbon and other substance, comminuted or solid, which retains its shape until affected by a tool, are made of readily malleable metals that are sufficiently hard and smooth to withstand abrasion and wear generally thus to prevent the marring of the articles to be manufactured. Steel lends itself best for this purpose; it is hard, malleable and takes a high polish. In difficult drawing operations dies of great hardness are often required. In certain cases non-malleable material must be used that has to be ground to the desired shape because even hard steel dies would be marred to such an extent that after a few operations it would be necessary to discard them. In dies and punches for tablet or briquette making machines it was necessary to exercise the greatest care in selecting steel of proper hardness and finish. Notwithstanding this, such dies were worn out after a few days or hours of use necessitating not only the replacement of an expensive tool, but also the costly stoppage of the manufacturing process.

As above indicated, materials of great hardness, tensile strength, etc., were sought and in certain cases materials (e. g., steelite) were selected which could not be forced into shape. Obviously, all this added greatly to the cost of manufacturing and in certain cases no metals were available for the construction of commercially practicable dies. Applicant has found, for instance, that in tablet or briquette making machines dies even of the hardest steel available were worn out very rapidly and in cases when the tablet or briquette mixture contained hard, gritty substances (ores, carbon, metallic particles, etc.), dies wore out after one or two hours of operation.

It is the object of the present invention to provide a tool or die of steel or other readily malleable and inexpensive material and which will resist abrasion and wear generally for a relatively long period of time.

With this object in view, in accordance with the present invention, the wearing surface of the tool or die is provided with a relatively thin coating of hard, wear-resisting material which is preferably applied by means of an electro-plating process.

Metallic chromium has been found particularly advantageous for this purpose. Chromium is exceedingly hard, holds its bright, silver-like luster and resists corrosion almost indefinitely. The die is preferably electroplated (steel does not lose its temper during chromium plating), and best results are obtained by using Sargent's solution containing 245 g/L chromic acid and 3 g/L chromium sulphate, and a current density of 13.4 amp./sq. dm. (125 amp. sq. ft), using a chromium anode. In a tablet or briquette molding operation in which steel dies were discarded after a few hours of use, steel dies of the same quality when plated in the above described manner remained in use for a week or more and not even a microscopic examination revealed any corrosion or abrasion.

What I claim is:

1. As a new article of manufacture, a steel forming tool, the wearing surface of which is coated with metallic chromium.

2. As a new article of manufacture, a forming tool for shaping material of inherent rigidity consisting of relatively soft metal electroplated on its wearing surface with a layer of chromium.

3. As a new article of manufacture, steel briquette molding punches and dies, the wearing surfaces of which are electroplated with metallic chromium.

4. As a new article of manufacture, a tool for compacting comminuted materials the wearing surfaces of said tool being electroplated with metallic chromium.

5. As a new article of manufacture, a chromium plated compacting die.

In witness whereof, I hereunto subscribe my name this 4th day of December, 1923.

VICTOR YNGVE.