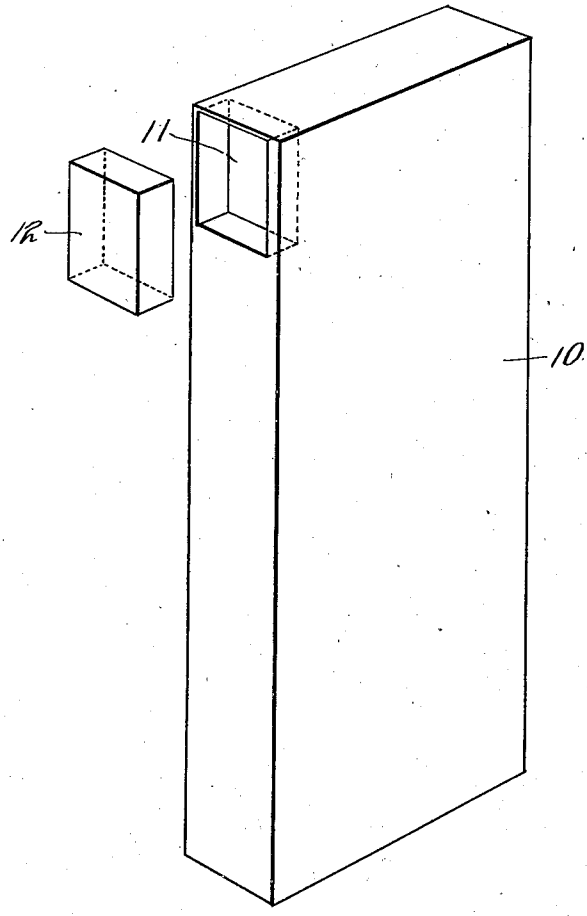
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MEANS AND METHOD OF CEMENTING TUNGSTEN CARBIDE TO OTHER METALS

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By

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UNITED STATES PATENT OFFICE

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MEANS AND METHOD OF CEMENTING TUNGSTEN CARBIDE TO OTHER METALS

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This invention relates to methods of cementing or brazing tungsten carbide and similar materials to a steel shank or base to be used in making various kinds of cutting tools, punches, dies, etc.

Heretofore it has been generally believed that tungsten carbide could not be heated to temperatures in excess of 2000 degrees F. without serious injury to the tungsten carbide and furthermore that joining tungsten carbide to a steel base of a shank required expensive and special equipment and that the work must be done in an atmosphere of gas which would not affect the tungsten carbide. This belief limited the making of carbide tools to only a few skilled persons familiar with a delicate process and prohibited its use except with expensive apparatus. I have discovered that tungsten carbide tools can be cemented to a steel base or shank by a process which is simple and easily practiced by any one skilled in this art.

Referring to the accompanying drawing which is made a part hereof the figure indicates a machine tool shank or base showing a hardened cutting block of tungsten carbide or other hard metal cemented to the base.

In the drawing numeral 10 indicates a shank of steel having a socket cut out at 11 to receive a cutting block 12 of suitable hard metal such as tungsten carbide. In carrying out my process I place in the bottom of the recess 11 a special cement which is spread to about $\frac{1}{32}$ of an inch in depth and the tungsten carbide bit 12 which has been polished clean is placed in the recess on the top of the cement. A liberal quantity of dry powdered boric acid or some of its derivatives, such as borax or borax glass is sprinkled all over the top of the bit and completely filling the crevices in the shank around the bit. The tool is then placed in a suitable tool heat treating furnace which is maintained at sufficient low temperature so as not to heat the bit too suddenly. The tool is then transferred to another ordinary heat treating furnace and the tool heated to a temperature sufficient to thoroughly melt the cementing medium. If the cement is any of those compounds covered by my prior Patents No. 1,699,346 or 1,362,472 the temperature should be about 2200 to 2350 degrees F. If copper or its compounds are used as a joining medium the temperature need not exceed 2000 degrees F. Since boric acid and its compounds mentioned above melt at a relatively low temperature and become fluid the entire surface of the bit and the joint itself is completely sealed from the gases of the furnace during the heating. When the tool is brought up to the proper high temperature it is taken from the furnace and the excess of the cementing medium is at once squeezed out with a suitable means such as a press vice, etc. If carried out as described in my previous patents this squeezing operation would unduly chill the tungsten carbide bit and cause it to crack. To avoid this danger I place between the bit and the press a piece of steel of sufficient thickness which is heated to approximately the same temperature as the bit. By doing this the squeezing operation above mentioned can be carried out without chilling the bit. The pressure is maintained for a short time so as to allow the cementing medium to set and then the tool is placed at once in warm powdered lime or Sil-O-Cel powder and allowed to cool slowly.

It may be found convenient to use a steel clip placed around the bit to take the place of the recessed shank, the clip serving as a retainer for the boric acid.

Instead of boric acid other chemicals may be substituted and may serve the same purpose in excluding air but most of such chemicals would volatilize at the higher cementing temperature and leave the bit exposed to the gases of the furnace.

My above described method makes it possible to cement tungsten carbide to a steel shank with the ordinary heat treating equipment now in universal use.

It will be obvious to those skilled in the art that various changes may be made in my device without departing from the spirit of the invention and therefore I do not limit myself to what is shown in the drawing and described in the specification, but only as indicated in the appended claims.

Having thus fully described my said in-

vention, what I claim as new and desire to secure by Letters Patent, is:

1. The method of cementing a tungsten carbide block to a base which comprises applying a cementing compound to the base, pressing the tungsten carbide block thereto, covering the block and the base with a quantity of boric acid, subjecting the whole to a temperature sufficient to melt the boric acid to provide a coating to insulate the block and the base from injurious gases in the furnaces, and then heating the assembled base and block to a temperature sufficient to melt the cementing compound, and removing the shank and tool and subjecting the cementing compound to a pressure while it cools, substantially as set forth.

2. The method of cementing a tungsten carbide block to a base which comprises applying a cementing compound to the base, pressing the tungsten carbide block thereto, covering the block and the base with a quantity of boric acid, subjecting the whole to a temperature sufficient to melt the boric acid, and then heating the assembled base and block to a temperature sufficient to melt the cementing compound, removing the shank and tool and subjecting the cementing compound to a pressure while it cools, and jacketing the assembled unit to prevent rapid cooling, substantially as set forth.

3. The method of cementing a high speed cutting tool to a base which comprises applying a cementing compound to the base, applying the tool thereto, covering the base and the tool with a boric acid derivative, applying a temperature sufficient to melt the boric acid derivative to coat the tool and the base, and subjecting the whole assembly to a temperature sufficient to melt the cementing compound, and subjecting the tool and base to a pressure to hold them tight together during the cooling of the cement, substantially as set forth.

4. The method of cementing a high speed cutting tool to a base which comprises applying a cementing compound to the base, applying the tool thereto, covering the base and the tool with a boric acid derivative, applying a temperature sufficient to melt the boric acid derivative to coat the tool and the base, subjecting the whole assembly to a temperature sufficient to melt the cementing compound, subjecting the tool and base to a pressure to hold them tight together during the cooling of the cement, and applying an insulating powder about the tool and the base to prevent too rapid cooling, substantially as set forth.

5. The method of cementing a block of tungsten carbide to a base which comprises hollowing out the base to fit the said block applying cementing compound to the said hollow, placing the block in the hollow and covering the same with a boric acid derivative, subjecting the block to a temperature sufficient to melt the boric acid derivative, then subjecting the block and the base in a closed chamber to a temperature sufficient to melt the cementing compound, then placing the base and the block in a device whereby they may be pressed together and covering the whole with a powder to allow them to cool slowly, substantially as set forth.

6. The method of cementing a block of tungsten carbide to a base which comprises hollowing out the base to fit the said block applying cementing compound to the said hollow, placing the block in the hollow and covering the same with a boric acid derivative, subjecting the block to a temperature sufficient to melt the boric acid derivative, then subjecting the block and the base in a closed chamber to a temperature sufficient to melt the cementing compound, then placing the base and the block in a device whereby they may be pressed together and covering the whole with a powder to allow them to cool slowly, and insulating the block and the base against contact with the pressing means to prevent a sudden cooling of the block, substantially as set forth.

In witness whereof, I have hereunto set my hand at Indianapolis, Indiana, this 14th day of November, A. D. nineteen hundred and twenty-nine.

WILLIAM R. CHAPIN.