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METHOD OF MAKING FORGING TOOLS

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Dies and punches for the forging or shaping of hot metallic blanks require physical characteristics which permit operation at relatively high temperature with minimum loss of structural strength and of high resistance to compression stresses and to wear. Such dies have heretofore been made by machining operations performed upon cold metal.

The object of the present invention is to provide a method of making forging tools which shall impart the above-mentioned desirable characteristics to the metal composing the tools.

I have discovered that greatly increased durability may be obtained by making the dies by means of operations carried out while the metal is at or above the temperature at which the dies are to be used.

While various formulas may be used in making up the metallic composition to be employed in the manufacture of the tools, satisfactory results may be obtained by adding from 2% to 15% of nickel and from 0.5% to 5% of chromium to a cast-iron mixture which contains from 1% to 2.5% of silicon.

In practicing my invention, I cast the metal into approximately the desired form in a chill mold, making the thickness of the various parts of the casting slightly greater than is desired in the finished tool. The casting is removed from the chill mold as soon as it has solidified and while it is still at a temperature above approximately 1600° Fahrenheit, and is immediately placed in heated master dies and subjected to pressure in excess of the pressure required to produce flow and to form the tool to the required finished dimensions. The tool is then removed from the master dies while at a temperature above, say, 1000° Fahrenheit and held at a temperature between about 1000° Fahrenheit and about 1200° Fahrenheit for a soaking period, the length of which depends upon the constituents of the casting, but which is usually an hour or longer. The tool is then quenched in any cooling medium, after which the tool may be completed by machining those surfaces of the tool which are to be inserted in the usual die-holder or the like.

By means of my improved process, I impart to the metal physical properties which permit the tool to be used at relatively high temperature with a minimum loss of strength and hardness, the characteristics of the surface of the tool being such as to make the tool highly resistant to wear.

I claim as my invention:

1. The method of making a forging tool or the like of cast iron which consists in casting the metal in a chill mold, the thickness of the various parts of the casting being made slightly greater than is desired in the finished tool, removing the casting from the mold promptly after solidification and while still at a temperature above approximately 1600° Fahrenheit, immediately subjecting the casting to pressure in master dies in excess of the pressure required to produce flow, removing the casting from the master dies while at a temperature above about 1000° Fahrenheit, soaking the casting at a temperature between 1000° Fahrenheit and 1200° Fahrenheit, and quenching.

2. The method of making a forging tool or the like of cast iron which consists in casting the metal in a chill mold, removing the casting from the mold promptly after solidification and while still at a temperature above approximately 1600° Fahrenheit, immediately subjecting the casting to pressure in master dies to produce flow of the metal, removing the casting from the master dies while at a temperature above about 1000° Fahrenheit, soaking the casting at a temperature between 1000° Fahrenheit and 1200° Fahrenheit, and quenching.

3. The method of making a forging tool or the like of cast iron which consists in casting the metal in a chill mold, removing the casting from the mold promptly after solidification, immediately subjecting the casting to pressure in master dies to produce flow of the metal, removing the casting from the master dies while at a temperature above that at which the tool is to be used, soaking the casting at a temperature between 1000° Fahrenheit and 1200° Fahrenheit, and quenching.

4. The method of making a forging tool or the like of cast iron which consists in casting the metal in a chill mold, removing the casting from the mold promptly after solidification immediately subjecting the casting to pressure in master dies to produce flow of the metal, maintaining the casting for not less than about an hour, at a

temperature above that at which the tool is to be used, and quenching.

5. The method of making a cast iron forging tool or the like which consists in casting the metal in a chill mold, removing the casting from the mold promptly after solidification and while still at a temperature above approximately 1600° Fahrenheit, immediately subjecting the casting to pressure in master dies in excess of the pressure required to produce flow, removing the casting from the master dies while at a temperature above about 1000° Fahrenheit, and soaking the casting at a temperature between 1000° Fahrenheit and 1200° Fahrenheit, and quenching.

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