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SAFETY RAZOR BLADE AND THE LIKE AND THE PRODUCTION THEREOF

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Fig. 1.

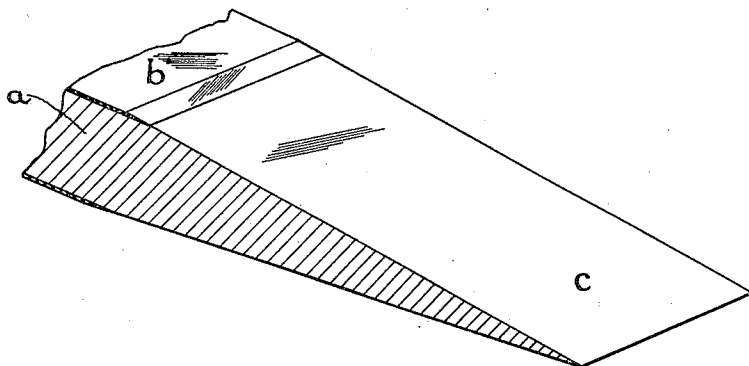
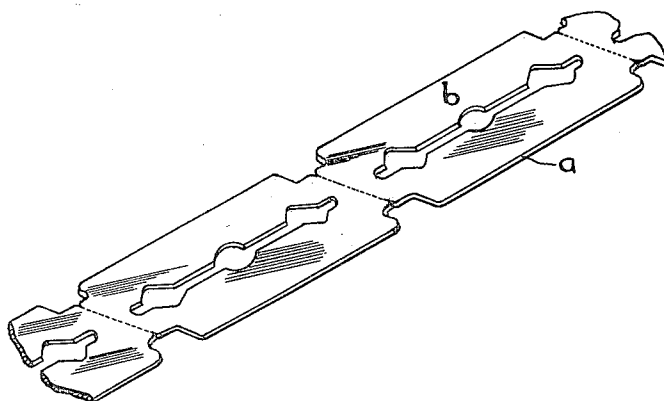


Fig. 2.



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SAFETY RAZOR BLADE AND THE LIKE AND
THE PRODUCTION THEREOF

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Mass., a corporation of Delaware

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6 Claims. (Cl. 30—91)

The present invention relates to safety razor blades and the like and the production thereof, and is particularly applicable to safety razor blades of the thin flexible type which are intended to be bent transversely and maintained in a condition of curvature during use, but is also applicable to other types of safety razor blades.

The object of this invention is to facilitate the manufacture of safety razor blades and the like from "stainless" steels, more particularly chromium steels of the kind suited for cutlery use which are sufficiently high in chromium to enable them to be produced with good stainless and corrosion resisting properties throughout.

In order to develop the stainless and corrosion resisting properties of such high chromium alloy steels as well as to give them their cutting powers, it is necessary that they be hardened and finally ground and polished in order to remove all scale, oxide and surface defects, etc. The scale or oxide produced during hardening, however thin it may be, is very difficult to remove and if one endeavours to remove it from metal which is in the nature of thin strip such as is used for the production of safety razor blades of the kind above particularly referred to, there is a great risk that the underlying metal may be distorted and become unsuitable for edge production in automatic machinery.

It is possible easily to protect from oxidation during hardening the surface of steel hitherto normally used for the production of razor blades, by passing illuminating gas, hydrogen or other reducing gas or mixture of gases through the furnace or muffle in which the steel is being heated.

In the case of high chromium steels, it is impossible to protect the surface in that way during hardening, and it becomes covered with a thin coating of oxide which it is extremely difficult to remove.

Now, in accordance with the present invention I am enabled to prevent the formation of this objectionable oxide and to produce blanked or unblanked sheet or strip stock or blanks for the manufacture of safety razor blades and the like which is or are highly resistant to corrosion and oxidation without being ground and polished after hardening.

To this end my invention broadly consists in coating the stainless, e. g., the high chromium alloy steel previous to hardening with a thin layer of metal or metal alloy which is corrosion resisting at atmospheric temperatures, and which

enables the hardening of the steel to be effected without tarnishing and/or discolouring and/or oxidizing.

In this way I am able to produce, and particularly to facilitate the economic manufacture as hereinafter appears of, safety razor blades or the like from blanked or unblanked sheet or strip stock or blanks of chromium alloy steel whose or each of whose unground and unpolished surface has been protected previous to hardening by means of a thin layer of suitable metal or metal alloy, whereby the cutting edges of such blades or the like when formed on the hardened steel possess the remarkable stainless and corrosion resisting properties which are characteristic of the chromium alloy steel of which they are made and the bodies of the blades or the like are given the oxidation and corrosion resistance properties of the chosen metallic coating.

In a preferred way of carrying my invention into practical effect I use a steel containing approximately 15% of chromium, 1% carbon, and 1% manganese, the remainder being iron with the usual fortuitous impurities which requires a hardening temperature of approximately 1,050° C., and coat it with nickel.

In cases where the invention is applied to the manufacture of safety razor blades in strip form, I prefer to coat the steel strip, preferably after it has been perforated, with a layer of nickel by use of any one of the well-known electrolytic plating methods. The layer of nickel must be sufficiently thick to prevent the formation of the dark coloured oxide which is formed during hardening on the surface of high chromium steels, and a suitable thickness is approximately .00025", but I may use a thinner or a thicker coating than this, but prefer not to use a coating considerably less than this figure.

After the nickel-plated strip has been washed and dried I harden it by passing it through a furnace chamber containing a reducing atmosphere which may with advantage be illuminating gas. After passing through the furnace the strip passes between water cooled blocks and emerges hardened and then passes through a tempering unit.

The surface so produced has a pleasing silver whitish colour and the strip may without further preparation of its surface be manufactured into blades. If, however, I require a particularly bright and pleasing finish, I may buff the surface, when it will readily assume a high lustre.

In another way of carrying out my invention I may use a coating of nickel-cobalt alloy. Sat-

isfactory results are obtained by forming on the steel by electrolytic plating methods an alloy consisting of 80% nickel and 20% cobalt but I may provide for more or less cobalt being present in the coating.

By manufacturing as above described in accordance with my invention I am enabled to eliminate the grinding and polishing process for scale removal, etc., hereinbefore referred to, which was previously necessary after hardening and which was attended with numerous disadvantages. The edges of the finished blades possess that remarkable degree of stainless and corrosion resisting properties which is characteristic of the steel from which they are made, whilst the nickel or nickel-cobalt alloy which forms a coating for the body of the blade resists oxidation and corrosion by virtue of the well-known resistance to oxidation and corrosion of metallic nickel and cobalt.

The presence of this nickel or nickel-cobalt alloy on the body of the blade has the further advantage that it enables me to etch the blades at a high rate of production and with the plant normally used for etching blades made from carbon steel. For instance, in one experiment I found that I was only able to etch stainless steel blades in the strip at a rate of approximately 5 blades per minute, whereas in the case of a strip of nickel or nickel-cobalt alloy coated blades I can obtain clear and distinctive etching at the rate of at least 150 blades per minute.

This is because there is no known acid that will etch chromium steel, except at an extremely slow rate, but several acids are available which will produce a black mark in nickel within two or three seconds.

In accordance with my invention, I am enabled to produce blades which possess the further advantage that their mechanical properties are improved when their surfaces are covered by such a tough and yielding layer of metal as nickel or nickel-cobalt alloy.

When the metallic coating is applied electrolytically it is more strongly adherent after hardening than before. There is, consequently, little or no risk of the coating stripping off and the blade becoming unsightly.

Blades made in accordance with my invention are to be distinguished from blades plated subsequent to hardening in that I confine my invention to the production of safety razor blades and the like made from chromium stainless steel or steel with similar properties which, when hardened and polished, is intrinsically corrosion and rust resisting, whereas nickel and other similar coatings have previously been applied to blades made from ordinary carbon steel with a view to protecting the body only of the blade from rust.

In the accompanying drawing,

Fig. 1 is a view in perspective showing a portion of a blade embodying my invention; and Fig. 2 is a view in perspective of an unfinished blade strip;

The body *a* of the blade shown in Fig. 1 is composed of chromium steel and may have the composition above-suggested. It is provided with a coating *b* of nickel or a nickel-cobalt alloy and is bevelled to a cutting edge *c* from which the protective coating has been removed by grinding.

In Fig. 2 is shown a fragment of blade strip

which has been perforated, edge-notched and scored to outline individual safety razor blades therein. The body *a* of the strip comprises chromium steel and it is provided with a surface coating *b* of nickel or nickel-cobalt.

While I have described my invention as particularly applicable to the production of safety razor blades, it is to be understood that it may be applied with advantage to fine edge tools of varied descriptions.

What I claim is:—

1. Process for the production of safety razor blades or the like with good stainless and corrosion resisting properties throughout, which comprises outlining individual blanks in blade stock of "stainless" cutlery steel in strip form, providing said strip with a thin surface coating of nickel, hardening said coated strip in a reducing atmosphere protecting the nickel against tarnishing and/or discolouration and/or oxidation, tempering the coated strip, and subsequently sharpening the individual blanks preparatory to severing them from the strip.

2. In a process for the production of safety razor blades or the like with good stainless and corrosion resisting properties throughout, the step of producing hardened blade stock, from which the blades or the like are to be worked, of "stainless" cutlery steel with a thin surface coating of nickel-cobalt alloy applied to the steel previous to hardening and protected during hardening substantially against tarnishing and/or discolouring and/or oxidizing by the use of a reducing atmosphere.

3. Process for the production of safety razor blades or the like with good stainless and corrosion resisting properties throughout, which comprises providing blade or the like stock of "stainless" cutlery steel from which the blades or the like are to be worked with a thin surface coating of nickel-cobalt alloy, hardening said coated blade stock in a reducing atmosphere protecting the nickel-cobalt alloy against tarnishing and/or discolouration and/or oxidation, and then tempering the coated blade stock preparatory to working the blades or the like therefrom.

4. Process for the production of safety razor blades or the like with good stainless and corrosion resisting properties throughout, which comprises outlining individual blanks in blade stock of "stainless" cutlery steel in strip form, providing said strip with a thin surface coating of nickel-cobalt alloy, hardening said coated strip in a reducing atmosphere protecting the nickel-cobalt alloy against tarnishing and/or discolouration and/or oxidation, tempering the coated strip, and subsequently sharpening the individual blanks preparatory to severing them from the strip.

5. A process for producing bright, scale-free blades from stainless steel, which consists in providing a stainless steel blank with a thin coating containing nickel, and then hardening and tempering the coated strip in a reducing atmosphere.

6. A safety razor blade or the like, having a hardened and tempered body of stainless steel, bevelled to an exposed cutting edge and protected upon the rest of its surface by a thin bright coating containing nickel.

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