To all whom it may concern:

Be it known that HARRY BREARLEY, residing at Sheffield, Yorkshire, England, have invented a certain new and useful Improvement in Cutlery, of which the following is a full, clear, and exact description.

My invention relates to new and useful improvements in cutlery or other hardened and polished articles of manufacture where non-staining properties are desired and has for its object to provide a tempered steel cutlery blade or other hardened article having a polished surface and composed of an alloy which is practically untarnishable when hardened or hardened and tempered. This alloy is malleable and can be forged, rolled, hardened, tempered and polished under ordinary commercial conditions.

The invention results from the discovery that the addition of certain percentages of chromium and carbon to iron will produce a steel capable of taking a polish and having the characteristics above referred to. I have discovered that the addition to iron of an amount of chromium anywhere between nine per cent. (9%) and sixteen per cent. (16%) and also an amount of carbon not greater than seven tenths per cent. (7%) will result in a product which, made into knife blades, has the said characteristics.

I have further found from experiments that steels containing less than eight per cent. (8%) of chromium are relatively tarnishable whatever the amount of carbon that they contain up to the limit at which they cease to be malleable and capable of being hardened and tempered. I have also found that when the amount of carbon exceeds seven tenths per cent. (7%) the polished steel is tarnishable whatever the amount of chromium it may contain and that this condition corresponds with the appearance in the steel of free carbides, which are distinguishable microscopically on polished and etched specimens.

A typical composition for the untarnishable steel blades embodying my invention would be as follows: carbon .30 per cent.; manganese .30 per cent.; chromium 13.0 per cent.; iron 86.4 per cent. In producing such steel I preferably use an electric arc melting furnace. It can be readily made in such furnace. It forge easily into sheets or strips such as are required for knife blades and can be hardened and tempered by ordinary commercial processes.

Knife blades embodying my invention are made from the steel above referred to being formed, hardened and polished by grinding or buffing in the ordinary manner, the product being a polished cutlery blade similar in appearance to other polished blades but possessing the remakable quality of being practically untarnishable when subjected to the ordinary uses to which knife blades are subjected, because made from the alloy above described. My blades are tempered so as to be sufficiently resilient for ordinary requirements.

Small amounts, up to say one or two per cent. of nickel, copper, cobalt, tungsten, molybdenum and vanadium appear to be without influence on the untarnishable property of the steel.

In practice it is best not to attempt to obtain an alloy containing above .4% of carbon, but rather to try to obtain an alloy containing an amount of carbon less than .4% thus leaving a wider margin for variations from the alloy sought to be produced since the desired result is attained when considerably less carbon is present.

This application is a continuation of my application Serial No. 17,856, filed March 8th 1915.

As is evident to those skilled in the art, my invention permits of various modifications without departing from the spirit thereof or the scope of the appended claims.

What I claim is:

1. A hardened and polished article of manufacture composed of a ferrous alloy containing between nine per cent. (9%) and sixteen per cent. (10%) of chromium and carbon in quantity less than seven tenths per cent. (7%).

2. A hardened, tempered and polished cutlery blade composed of a ferrous alloy containing between nine per cent. (9%) and
sixteen per cent. (16%) of chromium and carbon in quantity less than seven tenths per cent. (7%), and not containing any microscopically distinguishable free carbids.

3. A hardened and polished cutlery article composed of a ferrous alloy containing between nine per cent. (9%) and sixteen per cent. (16%) of chromium and carbon in quantity less than six tenths per cent. (6%).

4. A hardened and polished article of manufacture composed of a ferrous alloy containing approximately carbon 0.30% manganese 0.30% and chromium 13.0%.

HARRY BREARLEY.