THE USE AND ABUSE OF STEEL.

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(*Concluded from page 402.*)

DESIGNERS hardly seem to pay sufficient attention to this matter, and misunderstandings have occurred as regards hardening tests for the case-hardened surface. Steel makers know that with a high nickel case-hardened steel or a nickel chrome case-hardening steel the same glass-hard surface cannot safely be obtained as with the common carbon case-hardening steel. It is therefore necessary for the designer to consider whether he wishes to obtain the properties of a nickel steel in that portion of the metal immediately underneath the case, or whether he wishes to have it with such properties as

Fig. 17.

Fig. 18.

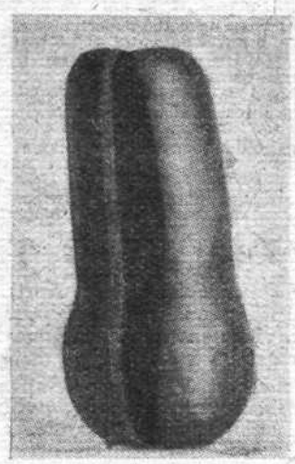

Fig. 19.

Fig. 20.

Fig. 17.—Cracked nickel chrome bar. Crack extended into centre of bar. Fig. 18.—Cracked nickel chrome bar. Fig. 19.—Turnbuckle from nickel chrome bar. Extensive pipe, opened out on hammering ends. Fig. 20.—Nickel chrome bar. Cracks developed during tensile test.

can be obtained with a carbon steel, in the latter case obtaining a harder surface.

Specifications exist which call for practically a glass-hard surface coupled with physical properties requiring the use of an alloy steel of a composition that cannot possibly be expected to give this surface.

A most important point at the moment is output. The steel maker is using every endeavour to produce steel free from roaks, flaws, and cracks, but it is a fact that in spite of care, a quantity of faulty steel is delivered to the machine shop, and sometimes a large amount of work is done on it before the defects are found. Detailed inspection can do a great deal to prevent such steel leaving the steel maker; numbers of examples, however, can be put forward showing that much labour in this country is at present being wasted in machining faulty steel. (Figs. 17–28.)

In connection with this, inspectors are often blamed for matters which have nothing whatever to do with them. A case has recently occurred where a department was blamed for passing an alloy steel which is supposed to have given some 55 tons ultimate, and was found by Brinell test to be of some 28 to 30 tons.

It is quite obvious that a batch of steel represented by the original test piece which gave the higher figure, could not possibly give the lower figure, even as rolled, the inference being that a mix-up had occurred in the firm's stores. It is absolutely essential that when a consignment of steel arrives at a works, care be taken to store it in such a way that the test report representing that steel may at any time be co-related with it. An Inspection Branch is not a Stores Branch; the duty therefore falls on the contractor's stores.

One point of considerable difficulty has been experienced in the making of bolts, nuts and screwed parts. It is essential for aeroplane work that certain bolts should be made of alloy steel with a comparatively high tensile strength. Such steel is obviously more difficult, and in some cases almost impossible, to thread in automatics. In the case of a steel which is used very largely for aeronautical work (of some 50 tons tensile) there is no doubt that it takes about five times as long to put through an automatic as a common carbon steel, while the wear and tear on the dies is also very much greater.

It is considered that firms making screwed parts are to blame in not having realised this fact at an earlier date, but it is hardly fair to the designer for the manufacturer to complain after acceptance of a contract. It is obvious that bolts made of high tensile steel must be more expensive than

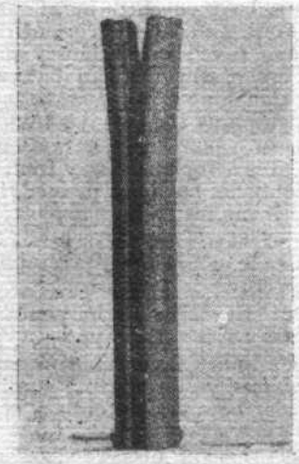

Fig. 21.

Fig. 22.

Fig. 23.

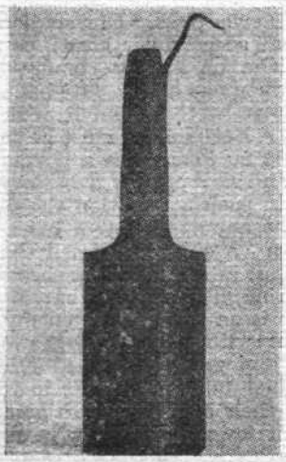

Fig. 24.

Fig. 21.—Partly machined nickel chrome bar, showing internal flaw. Fig. 22.—Tensile test piece, showing metal tongue. Fig. 23.—Partly machined turnbuckle from cracked bar. Fig. 24.—Tensile specimen, showing tongue due to effect in rolling.