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THE VALUE OF SCIENCE
IN THE
SMITHY AND FORGE.

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With 75 Illustrations, mostly Photomicrographs.

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PREFACE.

It is not usual for anyone who is constantly engaged in the workshop to attempt to write and lecture on the practical application of modern science. Mr Cathcart, however, who has been thoroughly trained in practical smith-work in the blacksmith's shop, has not only attempted but has succeeded in writing on the subject, showing clearly how much benefit blacksmiths would derive if they were to apply more science in the conduct of their everyday work. It is evident that the author has by patient study mastered the elements of metallography and the effect of heat on the structure of iron and steel, for he has in most lucid language sought to show how such knowledge can be applied. Knowing that there is still much prejudice in the mind of the practical worker against theory, the author has taken some pains to show that the practical worker himself bases his practice on theory, and that "theory and practice are inseparable." "The practical man is always of necessity a theoretical man, whether he admits it or not." What is clearly shown is the necessity for blacksmiths having more theory in order that their practice may be the more perfect. Most of the very excellent photomicrographs illustrating the lecture are Mr Cathcart's own work. As a result of his private research on welding iron, he has revealed the interesting fact that, when heating to welding temperature in
a smith's forge, the iron absorbs carbon on the surface, and that the juxtaposed faces of finished welds, in such cases, may contain between 0·2 per cent. and 0·8 per cent. carbon, and are actually steel. As a consequence, the welded portions show greater tensile strength than the iron on each side of the weld.

If the little encouragement and assistance I have given the author has helped him in his study of metallography, and led to the better understanding of iron and steel, I am deeply gratified. I feel sure that Mr Cathcart's book will do much to lead others to see the value of modern science in the blacksmith's shop.

J. E. STEAD.

MIDDLESBRO'.
PREFATORY NOTE.

I have read Mr Cathcart's manuscript with very great interest. With his "thesis"—the value of science in the workshop—I need hardly say I am in complete agreement, and I would further say that he has upheld it admirably.

His treatment of the subject in the early pages is excellent. Much of the distrust of technical education—or training in science, as I should prefer to call it—is due to writers who ought to know better, but who, lacking any sound knowledge of science themselves, and priding themselves on being "practical men," have endeavoured to make people believe that there are two classes of men connected with any craft or profession: those who are practical men and those who know something of the science pertaining to the craft;—as if a man could not be a "practical man" if he had taken the trouble to learn the science that underlies the processes with which he deals.

The latter part of the work has naturally been of special interest to me, as it contains many matters which I have not hitherto studied in such detail, and these are undoubtedly of great importance to men of his craft, as well as to those practising other branches of engineering.

His "conclusion" is very excellently put and very true.
I look forward to the publication of Mr Cathcart's work. It will be of very great interest and value to many outside the circle of his own great craft. One cannot but admire the perseverance with which he has laboured to achieve the results he records. His own photomicrographs are splendid and intensely interesting, and anyone who masters what he offers for study will know a great deal of which most smiths and engineers have very little conception—much less true understanding.

ARCHIBALD BARR.

Anniesland, Glasgow,
24th August 1915.