well founded—that it could not be trusted. And further, if the material were uniform in quality, it was believed to require—perhaps it did at one time require - special careful handling while being worked, specially trained workmen to handle it, and altogether a gingerly kind of treatment which could not be obtained in ordinary circumstances. Not a few manufacturers saw that much of this was at least great exaggeration, if not pure fancy, and were firmly enough convinced of the value of the new material to go on using it through evil report and good. They staked much upon their belief, however, and were compelled to insist strenuously upon the steel makers leaving nothing undone which should ensure the uniform character of their material. The steel makers were nothing behindhand in the matter, and have probably done more in ten years to perfect their material than had ever before been done in such a case in half a century. Mr. Barnaby, in a paper which he read before the Institution of Naval Architects in 1875, put the question definitely thus: "What are our prospects of obtaining a material which we can use without such delicate manipulation and so much fear and trembling? . . . We want a perfectly coherent and definitely carburized bloom or ingot, of which the rolls have only to alter the form in order to make plates with qualities as regular and precise as those of copper and gunmetal, and we look to the manufacturers for it." I believe it may now be said with certainty that we have not been looking to the manufacturers in vain. In the first place, within the last few weeks I have been testing in my laboratory at University College ordinary commercial samples of all the three materials mentioned by Mr. Barnaby, and the following are the results, three similar pieces of each material being tested at a time: The difference between the highest and lowest tenacities of three bars of ordinary (cast) copper amounted to 29·5 per cent. of the strength of the highest, the same difference with ordinary gunmetal being 21.6 per cent., and with hard gun metal 12·4 per cent. With five sets of steel samples on the other hand, of different sizes, cut from ordinary boiler-plates, the differences were 1·5 per cent., 0.7 per cent., 7·1 per cent., 4·8 per cent, and 2·9 per cent respectively. Taking the mean in each case as a rough comparison, we have 21·2 per cent. in copper and gunmetal against 3·40 per cent. in mild steel, and even taking the highest and the lowest of the fifteen specimens (although they were of very different sizes) the difference is only 9·6 per cent. It is hardly too much to say that there is no iron in the market that can hold its uniformity and freedom from failure in working against the steel now supplied by our leading manufacturers, or that can stand equally well the same strictness and frequency in testing. Mr. William Denny, of Dumbarton, whose firm has been building ships very largely in steel since 1876, says that in one small steamer they are now building of iron they have had more failures than in their whole consumption of about 7,000 tons of steel. In the case of a number of light-draught steamers of iron which he at one time sent out to India in pieces, they were invariably annoyed more or less by corners of plates coming off, angle irons cracking, and so on, during shipment and transhipment. Last year he built and shipped in the same way six paddle steamers entirely of steel, without losing by breakages anything whatever. Another well-known mechanical engineer, who uses both steel and iron on a very large scale, tells me that he hardly ever has to return less than 15 per cent. of his best Yorkshire iron, on account of defects in working, while he absolutely never has any failure with steel. It would be easy to multiply testimony of this kind.