should stand at least 50,000 lbs. per square inch before rupture, should have an elastic limit not less than 20,000 lbs. per square inch, and should elongate at least twelve per cent of its length (or 1\(\frac{1}{2}\) inches to the foot), before ultimate strength is reached. Most of the first-class bridge-builders use a higher grade iron than the above, which is given simply as a minimum quality for highway-bridges, easily attainable. Angle-iron and plate-iron, as usually applied, are from ten to fifteen per cent weaker than good bars, and, therefore, bridges built from such irons should have proportionately just so much excess of metal over bridges built from bars, a requirement that the buyers of iron bridges, in this country at least, have not as yet learned to insist upon. Before passing from this subject, it should be remarked that the tables of strength of wrought-iron are based upon experiments made on small bars, having cross-sectional areas of about one inch. Large bars will not show the same ultimate strength that small ones do, of the same make, a fact that must be borne in mind when specifications are being prepared. For example, the same iron in a bar having one inch area may require a strain equivalent to 10,000 lbs. per square inch to rupture it, in excess of that required when formed in a bar having an area of four or five inches. Until a comparatively recent date, no attention was paid to the effect of the form of the specimen to be tested. Test specimens are simply short pieces of iron, three or more inches long, the middle of which is grooved down to exact gauge, and which be-