

preciably small, being detected only by the most refined measurements, that it need not be considered in practice.

The usual method of testing a bar for its elastic limit, is to fasten to one end of the testing-machine, or to the bar itself, close to the point at which it is grappled, a rod or bar free to move at the other end, to which free end is attached an index-point. Before the strain is applied, the test-bar is scratched under this index, which mark, after the bar is put under strain, will gradually move past the stationary index, and if the strain has not exceeded the elastic limit of the bar so soon as it is removed, the mark will return to its former position under the index. Successive applications and removals of the strain are required usually to determine the elastic limit, else it might be unwittingly passed under a continually increasing power. After becoming satisfied as to the elastic qualities of the bar, a final application of the strain can be made in order to tear the bar in two, care being taken to note how much it stretches before final rupture. This process of stretching to rupture, exhibits not only the ductility of the iron, but also the degree of uniformity, shown by a greater or less inequality in the amount of stretching at different portions of the bar.

The beauty of the cold-bend test is, that it shows simply and inexpensively the same qualities (excepting uniformity) that the testing apparatus measures in pounds and inches, and for practical purposes nothing else is needed. The result of many thousands of experiments on American irons shows that for bridge purposes, bar-iron