thus drawing the plates together, and producing a friction, which it is necessary to overcome before shear can come upon the rivets. Whether this friction will continue indefinitely is doubtful, for rivets occasionally become loosened when the structure is subjected to oft-repeated loads: so it is not legitimate to depend upon the friction in order to reduce the number of rivets. Perhaps it is on account of this factor that rivets are seldom, if ever, proportioned to resist the bending-moments that come upon them, notwithstanding the fact that it is this last consideration, which, in most cases, should determine the number of rivets to be employed.

Again: if the friction were to be depended upon, it would be only right to allow for the initial tension on the rivets, which tension is sometimes great enough to force off the heads.

It will probably have been noticed by the reader, that shearing-stress upon rivets has been omitted altogether from consideration. The author would hesitate before making the broad assertion that rivets cannot shear, although it is probable that bending is the stress which ruptures rivets that are generally considered sheared. This much, though, he will state as the result of both theoretical investigation and many practical cases of designing, that, when rivets are proportioned for bending and bearing, they will have more than sufficient strength to resist shear. Sharp edges on rivet holes will certainly cut the rivets, but this is not shear proper; and it may be possible that there is a certain kind of fixedness about a well-driven rivet which will make the bending-moment less than its calculated value.

Should the reader wish to verify the statement concerning bending and shearing stresses, he can do so by using an intensity of shearing-stress of three tons for bridges of Class A, and one of three tons and three-quarters for those of Classes B and C. The theoretical proof is identical with the one for pins given in Chapter X.

"Countersinking" is a term used to denote the sinking of rivet heads into the plate so as to make them flush with its surface. The least allowable depth for the countersinking is a quarter of an inch, and the least thickness of plate used for this purpose should be three-eighths of an inch: for rivets exceeding