the parts together and reduce them to proper form and size, may prevent crystallization immediately at the welded point, still on either side are portions which may have been heated so as to change the arrangement of particles, and not subjected to sufficient hammering to counteract the deteriorating tendency. Hence, a break is more liable to take place a little on one side, than immediately through the welded part.

To obviate this liability, the parts to be welded should be enlarged by upsetting several inches from the end, so as to admit of re-drawing under the hammer a little beyond where the intense heat has reached.

But theory aside for the moment, although the avoidance of welding in work to be exposed to great stress is desirable, it is nevertheless a fact established by large experience, that welded parts will bear as great a strain as takes place in well proportioned bridge work, with as much certainty as ever has been realized in any department of the means of locomotion.

Danger lurks everywhere at all times. In railroad travel, boilers burst, rails break, wheels and axles break, etc., etc., but the failure of a weld in bridge work is rare indeed, and very few authenticated cases can be referred to.

I would, however, prefer a weld in the straight part rather than in the end of a link, unless made with an excess of section around the bend. Whether a bend around a pin of 1½ or 2 times the diameter of the link iron is more liable to break than the straight sides of the link, I can refer to no reliable authority to determine. The longitudinal strain is no greater in the bended, than in the straight parts, if well fitted to the pin. But of course, it can not be expected to have a fit so close as to ensure a firm pressure quite round the