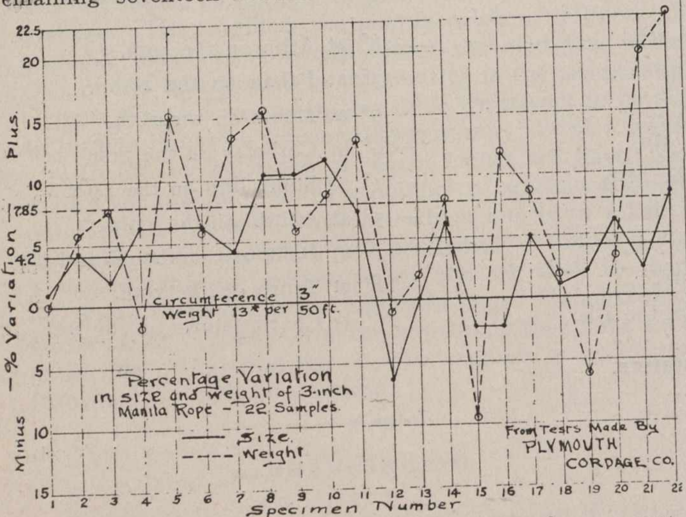
VARIATIONS IN MANILA ROPE.

Tests of rope made by the Plymouth Cordage Company, of Plymouth, Mass., bring out some interesting facts regarding the differences in circumference and weight in a set of samples supposedly of the same size. Twenty-two specimens of "three-inch" manila produced by different makers were tested. The variations in weight and size are shown graphically in the curve below.

Of the twenty-two samples, just one was 3 ins. in circumference, three were smaller, and the remaining eighteen larger than their normal size. Assuming a weight of 13 pounds in a length of 50 feet as standard, one sample answered to these specifications, four were lighter, and the remaining seventeen heavier.



The average variation in weight was +7.85 per cent. with a maximum of +22.6 per cent. and a minimum of —9.61 per cent. The variations in size were not only less, but quite differently distributed. The average deviation was +4.2 per cent. with a maximum of +11.6 per cent. and a minimum of —6.3 per cent. As will be seen by a glance at the curve, in two cases the variation in size was plus, while the weight variation for the same sample was minus, while in one case the reverse was the case. Throughout the series there appears to be little, if any, connection between the weight and size.

These tests bring out facts which may, perhaps, be familiar to the ropemaker, but to the average person they are decidedly surprising. That a total maximum variation in weight of 32.2 per cent. and in circumference of 17.9 per cent. should be found in a batch of twenty-two samples of 3-in. rope is nothing less than astonishing. It is understood similar tests have been made by the Plymouth Cordage Company. The publication of the results of these will be awaited with interest.

RAIL JOINTS.*

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The perfect rail joint is at present purely theoretical, and it will continue to be so, as long as wheel meets joint in the fight for supremacy. A perfect rail joint is a joint of few parts, in which none of the parts could ever be worked loose or worn under the loads applied on the joint. Such a joint should be easily and simply connected to the rail, and as easily disconnected when the rail has worn out. It should be capable of being applied to the second and succeeding new rails, and have such strength that it will hold the rail ends as rigid as the balance of the rail. This joint in elastic track construction must be rigid enough vertically to prevent any deflection of the joint beyond the limit of elasticity of the metal, and in a rigid or non-elastic track construction it must be rigid enough vertically to prevent any deflection, either temporary of permanent. In other words, this rail fastening must hold the rail ends so that there will be no bending upward or downward at the joint. It should require no special form of rail, requiring no increase in the cost of the rail itself. Present practice, based on past experience, is a long way from the perfect joint.

An ideal practical joint is a joint embodying such of the elements of the previously described perfect joint as are at present practical, to the extent that this joint will equal the life of the rail, and, it might be added, materially prolong the life of the rail without any further attention to the joint itself. The joint should require no maintenance during the life of the rails which it connects and supplements. With such a joint applied to the rail ends there would be no tearing up of paving or paving concrete during the life of the rail, for the purpose of making any repairs to or replacing the joint.

The third element necessary to attain a perfect joint, which is cited in the report of the committee, puts a burden on the joints that properly belongs to the rail itself. No two strips of rails rolled will, when cut up into rail lengths, and the rail cut from one strip butted to the rail cut from the other, have exactly the same cross section and be of exactly the same depth. It is this difference in the plane of the heads of the two abutting rails that causes the cupping of the receiving rail, and it is to prevent this condition arising and to remedy this defect, having once risen, that resort has been made to grinding the heads of the rail. On a new track, every joint, no matter of what form, should be ground to a perfectly plane surface before the track is given over for the operation of cars, or if this is not possible at the time, it should be done before cars have operated over the joint long enough to start the cup in the receiving rail. No bolted splice plate in use to-day will comply with this specification for an ideal practical rail joint, for as yet there has been no means of absolutely preventing the bolts from working loose under traffic. The development of the splice plate has been toward a combination of the splice plate and rail base support. The three most prominent joints of this character are mentioned in the report of the committee. Experience with these combination fastenings has shown that while they are a great improvement over the simple splice plate, they require more or less maintenance, and to make them more efficient they should be capable of being stepped, so that whenever a cup appears at the joint the fastenings can be stepped and replaced and the cup ground out of the joint. Of the joints now in service the forms that come nearest to this ideal practical joint are the cast welded, electric welded and the Clark joints. Mr. Clark has had great success with his joint, as has Mr. Kerwin with his cast-weld joint, for the welding of which he has designed and uses a water jacket to prevent the heating of the heads of the rail. In the tracks of the Detroit United Railway, some 32 kinds of joints are used on 27 different sections of rail, ranging from the 18-in. 4-hole 4-lb. strap plate to the 108-lb. 30-in. 8-hole continuous rail joint and the cast-welded joint. Most of these joints were inherited by the company from the several independent companies acquired by purchase or lease. Mr. Kerwin has been experimenting in an endeavor to attain an ideal practical joint, to maintain and add to the life of these joints and the rails to which they are connected. In conclusion, attention is called to a very exhaustive report by F. C. Schmitz to the Pennsylvania Railroad. This report appeared in a serial article in the Railroad Gazette of 1900 under the title "Some Notes on Rail Joint Fastenings." It treats at length of the same problems which are being encountered to-day.

*Abstract of paper read before the American Street & Interurban Railway Engineering Association, Atlantic City, N.J., October 10-14, 1910.