No. 867,749. PATENTED OCT. 8, 1907.

LA VERNE W. NOYES.

TIE ROD.

APPLICATION FILED MAY 15, 1907.

Fig. 1.

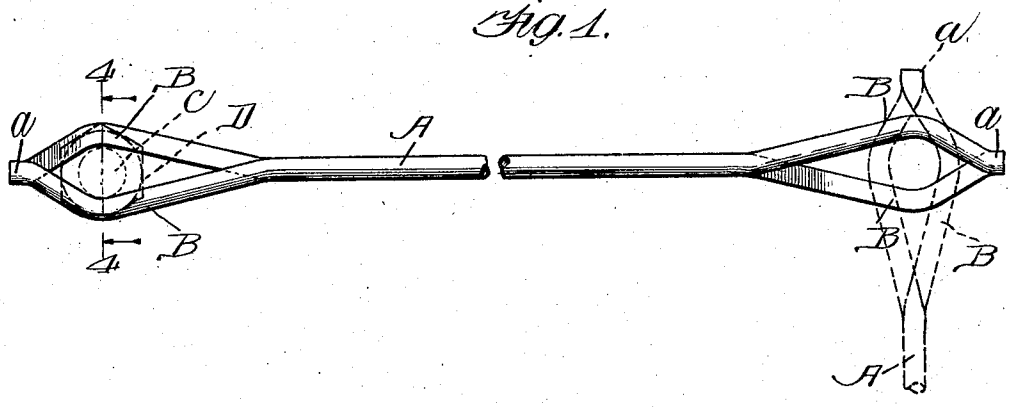


Fig. 2.

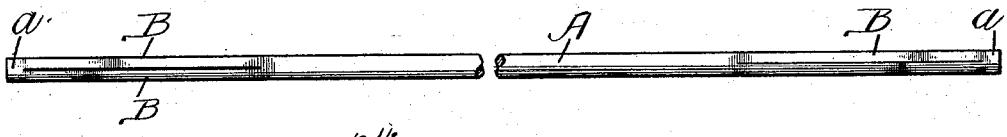


Fig. 6.



Fig. 3.

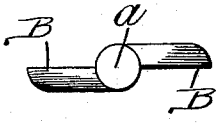


Fig. 4.

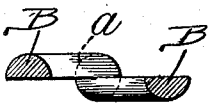
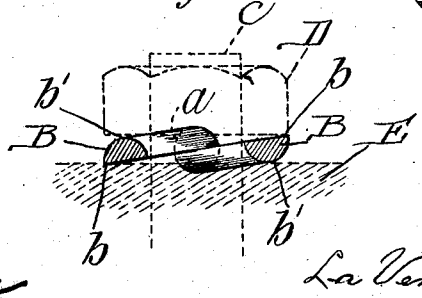


Fig. 5.



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TIE-ROD.

No. 867,749. Specification of Letters Patent. Patented Oct. 8, 1907.

Application filed May 15, 1907. Serial No. 373,809.

To all whom it may concern:

Be it known that I, LA VERNE W. NOYES, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Tie-Rods, of which the following is a specification.

The original object of the present invention was to improve the construction of a tie-rod with respect to the formation of the eye (or eyes) through which the securing bolt or rivet passes, and hence this embodiment of the invention is hereinafter particularly described. But the invention resides in the formation of the eye and is equally applicable to any rod, bar, pin, stud or, in short, any part requiring an eye, slot or opening of any shape through it, for whatever purpose it may be used, and I therefore reserve to myself the exclusive right to apply it to any and all such parts without further specifically enumerating them.

The invention consists in the features of novelty that are hereinafter described with reference to the accompanying drawing, which is made a part of this specification and in which,—

Figures 1 and 2 are, respectively, a plan and a side elevation of a tie-rod embodying the invention, an intermediate portion of the rod being broken away to indicate indefiniteness of length. Fig. 3 is an end view thereof. Fig. 4 is a transverse section thereof on the line, 4—5, Fig. 1, looking in the direction of the arrows. Fig. 5 is a transverse section on the same line, showing by dotted lines approximately the relations of the parts when the eye is clamped by a bolt and nut to another part. Fig. 6 is an elevation showing two eyes crossed.

The rod, A, which may be of cylindric or any other shape in cross section, has at one end or at each end, an eye B, for the passage of a bolt C through the medium of which it is clamped by a nut, D, to another part E, the parts C, D and E being indicated by dotted lines. The eye is formed by a single operation of a pair of dies of appropriate shape which split the rod longitudinally in an axial plane and spread the resulting half-sections apart in directions parallel with said plane to form the two sides of the eye, so that when completed the two sides of the eye lie wholly upon opposite sides of said plane, respectively, and are spread apart in directions parallel therewith. Each side of the eye is integral with the main portion of the rod and with a stub end, *a*, thereof which the dies leave intact, and in cross section each side equals a full longitudinal half of the rod. The above described method of forming the eye causes but little disturbance of the fibers of the metal and actual tests show that the tensile strength of the eye is but little less than that of the undisturbed portion of the rod itself.

The eye will, of course, be made of the shape that is best adapted to meet the requirements of the particular use to which it is to be put. For a tie rod it is preferably of substantially the shape shown in the drawing. That is to say, at the outer end of the eye its sides are spread apart rather abruptly in order to afford an abrupt seat for the securing bolt and lessen or prevent its tendency to "creep" between them when tension is applied to the rod, while at the inner end of the eye its sides are spread apart more gradually, in order to bring them as nearly as practicable into parallelism with the line of strain.

An eye of the formation described has an advantage when it is clamped between a nut and some other part in that it will serve the purpose of a nut-lock. Upon reference to Fig. 5 it will be seen that the sides of the eye do not contact throughout their entire upper and lower surfaces with either the nut, D, or the part, E, but only at the points *b* and *b'* and that these points do not fall opposite each other. Consequently, when pressure in opposite directions is exerted upon these points it will tend to twist the sides of the eye and the resilience of the metal will cause the eye to act after the manner of a spring washer and lock the nut.

In the drawing the eye is shown as being located at or near the end of the rod, but manifestly it may be located at any point intermediate of the ends of the rod, or part in which it is formed.

The closest parallel straight lines that can touch both sides of the eye (say at the points *b* and *b'*) are closer together than two parallel straight lines touching the stub end *a* of the rod at diametrically opposite points and from this it follows that between these two sets of lines the thickness of the eye gradually increases, resulting in sloping shoulders. These shoulders are advantageous in a tie-rod or other part intended to sustain tensile strains, especially when two such rods are arranged at a greater or less angle to each other and so that the eyes are superposed, crosswise of each other, as indicated by dotted lines in Fig. 1 and shown in elevation in Fig. 6. When so arranged the eyes "nest" and one of the described sloping shoulders of each engages the side of the other and prevents the endwise slipping of each upon the other. The other sloping shoulder of each engages, or may engage one of the parts between which they are clamped.

What I claim as new and desire to secure by Letters Patent is:

1. A tie rod or other part having an eye, the two sides of which lie wholly upon opposite sides, respectively, of a given plane and are spread apart in directions parallel with said plane.

2. A tie rod or other part having an eye the two sides of which lie wholly upon opposite sides, respectively, of an axial plane of the rod, and are spread apart in directions parallel with said plane, each of said sides being equal in cross section to a longitudinal half of the rod.

3. A tie rod or other part having an eye the two sides of which lie wholly upon opposite sides, respectively, of an axial plane of the rod and are spread apart in directions parallel with said plane, the spread of the sides being abrupt at one end of the eye and more gradual at the other end.

4. A tie rod or other part having an eye formed by splitting the rod longitudinally in a plane of its axis and spreading the resulting half-sections apart in directions parallel with said plane to form the two sides of the eye.

5. A tie rod or other part having an eye the two sides of which are of semi-cylindric cross section and lie wholly upon opposite sides, respectively, of a given plane and are spread apart in directions parallel with said plane, the flat faces of the sides being parallel with said plane.

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