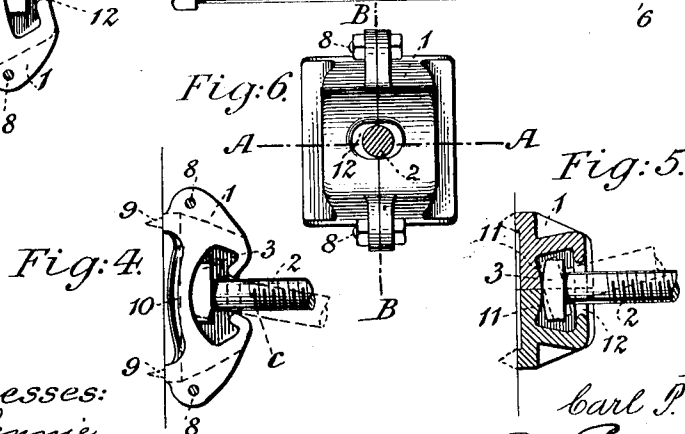
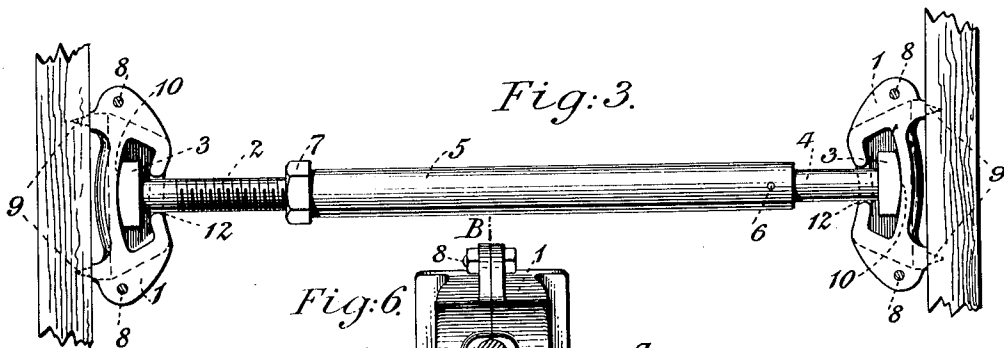
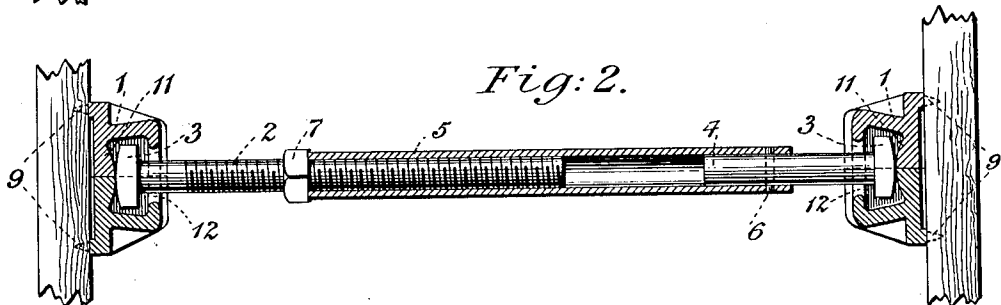
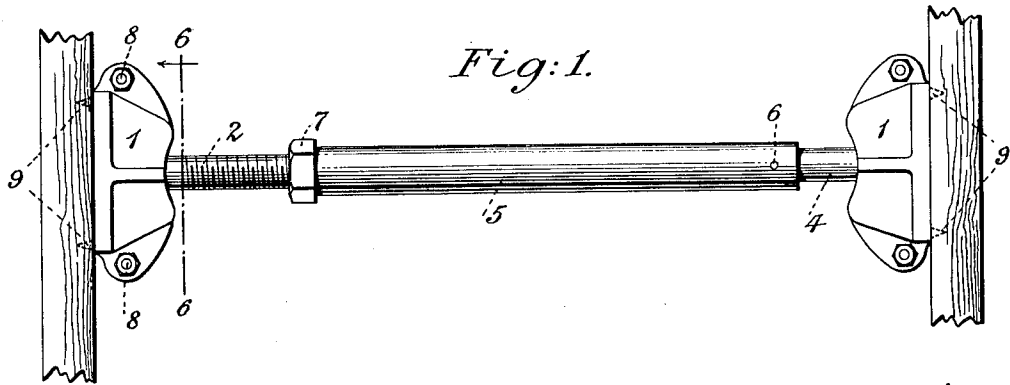


No. 891,897.

PATENTED JUNE 30, 1908.

C. P. ASTROM.
TRENCH BRACE.

APPLICATION FILED AUG. 7, 1906.



Witnesses:
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UNITED STATES PATENT OFFICE.

CARL P. ASTROM, OF ORANGE, NEW JERSEY.

TRENCH-BRACE.

No. 891,897.

Specification of Letters Patent.

Patented June 30, 1908.

Application filed August 7, 1906. Serial No. 329,582.

To all whom it may concern:

Be it known that I, CARL P. ASTROM, a citizen of the United States to the extent of having duly taken the necessary steps required by law to declare my intention of becoming such citizen, and a resident of Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Trench-Braces, of which the following is a specification.

My present improvement relates to braces useful in a number of connections among which is its application to trench braces; in other words, to braces used in excavations to prevent the shoring timbers from collapsing inward.

The accompanying drawings show one form which my invention may take in a trench brace. I do not limit myself, however, to this particular form, but mean to include all others within the scope of my invention as claimed.

In the drawings Figure 1 shows my improved trench brace in elevation. Figs. 2 and 3 are sectional views of the same, the sections being taken at right angles to each other and some of the parts being shown in elevation. Figs. 4 and 5 are detailed sectional views at right angles to each other showing one shoe of the brace with end of bolt broken away. These views show how the shoe and bolt constitute a universal joint, and how at the same time it is impossible for the bolt to twist or turn about its axis in the shoe; Fig. 6 is a top elevation of one of the shoes with the bolt shank in section as same appears when looked at in the direction of the arrow from a section through the line 6—6 in Fig. 1.

Describing now my improved trench brace as shown, said brace comprises two shoes 1, the bottom of each of which abuts against timbers on opposite sides of the trench to be shored. To prevent the shoes from twisting when the brace is tightened up, spikes or sharp corners 9 are preferably provided on the bottoms of the shoes.

The shoes 1 consist preferably of castings made in two parts and bolted or riveted together at 8. This construction is best shown in Fig. 6. It will be noted that the shoes are formed hollow inside, and that this cavity is pierced at the top of the shoe by an elongated opening 12 (see Fig. 6). The purpose of the cavity is to receive the bolt-head 3, and the purpose of the opening 12 is to allow the

shank of the bolt to project through it as shown.

The heads 3 of the bolts are rounded on the top to form bearing surfaces for them against the bottom of the cavities in the shoes. These portions of the shoes are likewise rounded as follows: In the first place it will be noted that the cavity in the shoes is longer in one direction than the other. The long direction will hereafter be designated the longitudinal direction of the shoe or cavity, and is in the direction of the line B—B in Fig. 6, while the short direction will hereinafter be designated the transverse direction of the shoe or cavity, and is in the direction of the line A—A of the same figure.

The head 3 of the bolt is proportioned to the transverse direction of the cavity so that it is impossible for the head of the bolt to turn or twist within the cavity. In other words the sides of the cavity in a transverse direction abut more or less closely against the sides of the head of the bolt (see Fig. 5). Coming back now to the description of the curved bearing surfaces for the bolt head in the bottom of the cavity in each shoe, it will be seen from an inspection of Figs. 4 and 5, that in a longitudinal direction the bottom of the cavity is concavely formed whereas in a transverse direction the bottom of the cavity is convexly formed (Fig. 5). These in connection with the curvature of the bolt-head and the action of the shank of the bolt within the elongated opening 12 in the top of the shoe constitutes an easy working universal joint of great strength the arrangement and operation of which will now be described.

Referring to Fig. 4 it will be noted that here the bolt can rock longitudinally relative to the shoe or vice versa the shoe can rock in the same direction relative to the bolt. In doing this the head of the bolt slides lengthwise of the cavity in the shoe; in other words it bears on or follows the concave curvature of the shoe bottom. Furthermore it will be noted that this motion of the bolt-head is approximately circular, pivoting about the imaginary center C (Fig. 4) due to the fact that the sides of the short diameter of the elongated opening 12 at the top of the shoe more or less snugly confine the bolt shank (see Figs. 4 and 6).

In Fig. 5 it is shown how the shoe and bolt can swing relatively to each other in the opposite direction of that in Fig. 4; in other

words in directions transverse to the shoe. In this case the convex curvature of the shoe bottom is presented to the bolt-head. These surfaces do not slide on each other as before but rock on each other. The elongated opening in the top of the shoe is located with its long diameter transverse to the shoe (see Figs. 5 and 6) and consequently permit the rocking motion aforesaid.

- 10 Having now described the universal character of the joints between the bolts and shoe, it will now be necessary to complete the description of the brace, to state that one of the bolts, namely 2, is threaded as shown, 15 and of such size as to telescope within the tube 5. The other bolt need not be threaded. It is secured by its shank to the other end of the same tube 5 permanently by the pin 6. A nut 7 is provided on the threaded 20 bolt 2.

The action of the device described will now be clear.

- When the brace is in place as shown in Fig. 1, to brace the timbers apart it is only necessary to use a wrench on the nut 7 to force 25 the threaded bolt and its sleeve or tube 5 in opposite directions outwardly and thereby drive the shoes against the timbers to be shored. The universal character of the joints between the bolt-heads and the shoes, 30 takes up any twist or getting out of plumb of the timbers, while the snug fitting of the bolt-heads within the shoe cavities in their transverse direction, prevents turning of said bolts in the shoes which would otherwise 35 take place when the nut 7 is tightened up to operate the brace.

Having thus described my invention, what I claim is:

- 40 1. In combination, a shoe in which the bottom of its cavity is concavely curved in its longitudinal direction and convexly curved in its transverse direction,—and in which there is an elongated opening in its 45 top, the long diameter of which is located in the transverse direction of the shoe-cavity;

and a bolt projecting out of said opening with its head in the shoe-cavity; said head being free to slide longitudinally on the bottom of the shoe and being confined transversely by the sides of the shoe-cavity to prevent rotation of the bolt-head within the shoe. 50

2. In a trench brace the combination of two pairs of members, each pair of which 55 comprises a shoe and a bolt,—the shoe having the bottom of its cavity concavely curved in its longitudinal direction and convexly curved in its transverse direction and also having an elongated opening in its top, 60 the long diameter of which is located in the transverse direction of the shoe-cavity,—the bolt projecting out of said opening with its head in the shoe-cavity said head being free to slide longitudinally on the bottom of the shoe and being confined transversely by the 65 sides of the shoe-cavity to prevent rotation of the bolt-head within the shoe; screw threads on one of said bolts; a sleeve secured to the other of said bolts and adapted to telescope over the shank of the threaded 70 bolt; and a nut cooperating with the thread on said last named bolt.

3. In a trench brace, the combination of a lengthwise adjustable connecting-member 75 having a shoe at each end, the shoe having a face in contact with the end of the connecting-member, said face being concave in one direction and convex in a direction at right-angles to the former, the shoe and connecting-member being adapted to each other to have 80 sliding contact between the end of said connecting-member and the concave portion of the shoe, and rolling contact with its convex portion. 85

In witness whereof, I have signed my name to the foregoing specification in the presence of two subscribing witnesses.

CARL P. ASTROM.

Witnesses:

MOLLY M. MULLIGAN,
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