

No. 715,390.

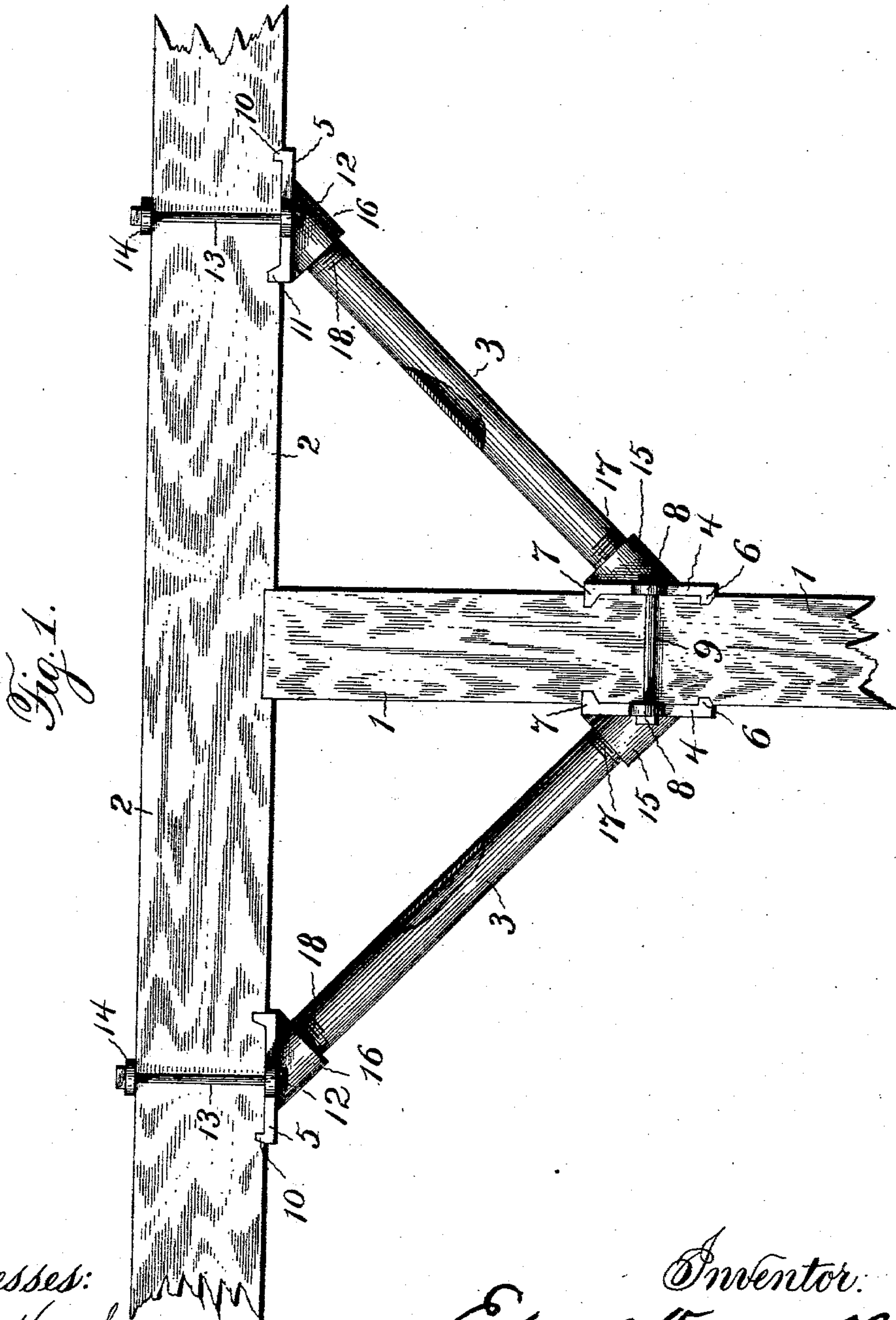
Patented Dec. 9, 1902.

E. KIDWELL.
BRACE FOR STRUCTURES.

(Application filed Aug. 16, 1897.)

(No Model.)

3 Sheets—Sheet 1.



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3 Sheets—Sheet 2.

Fig. 2.

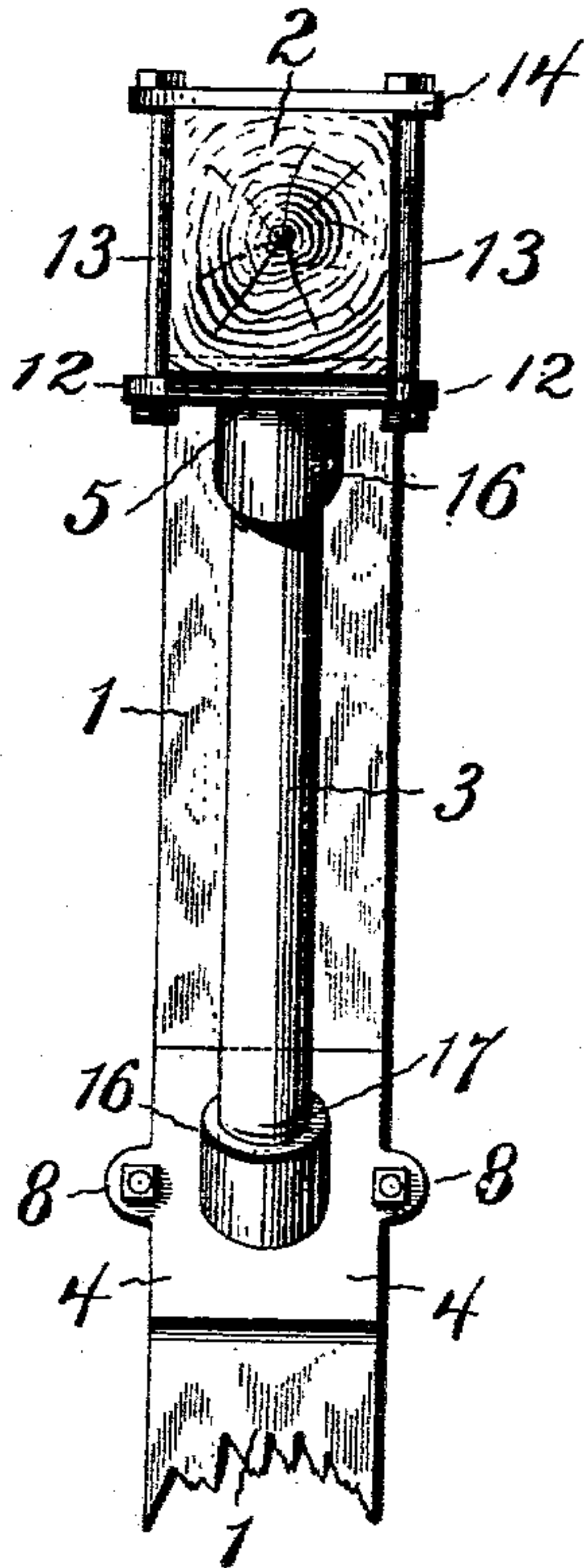


Fig. 3.

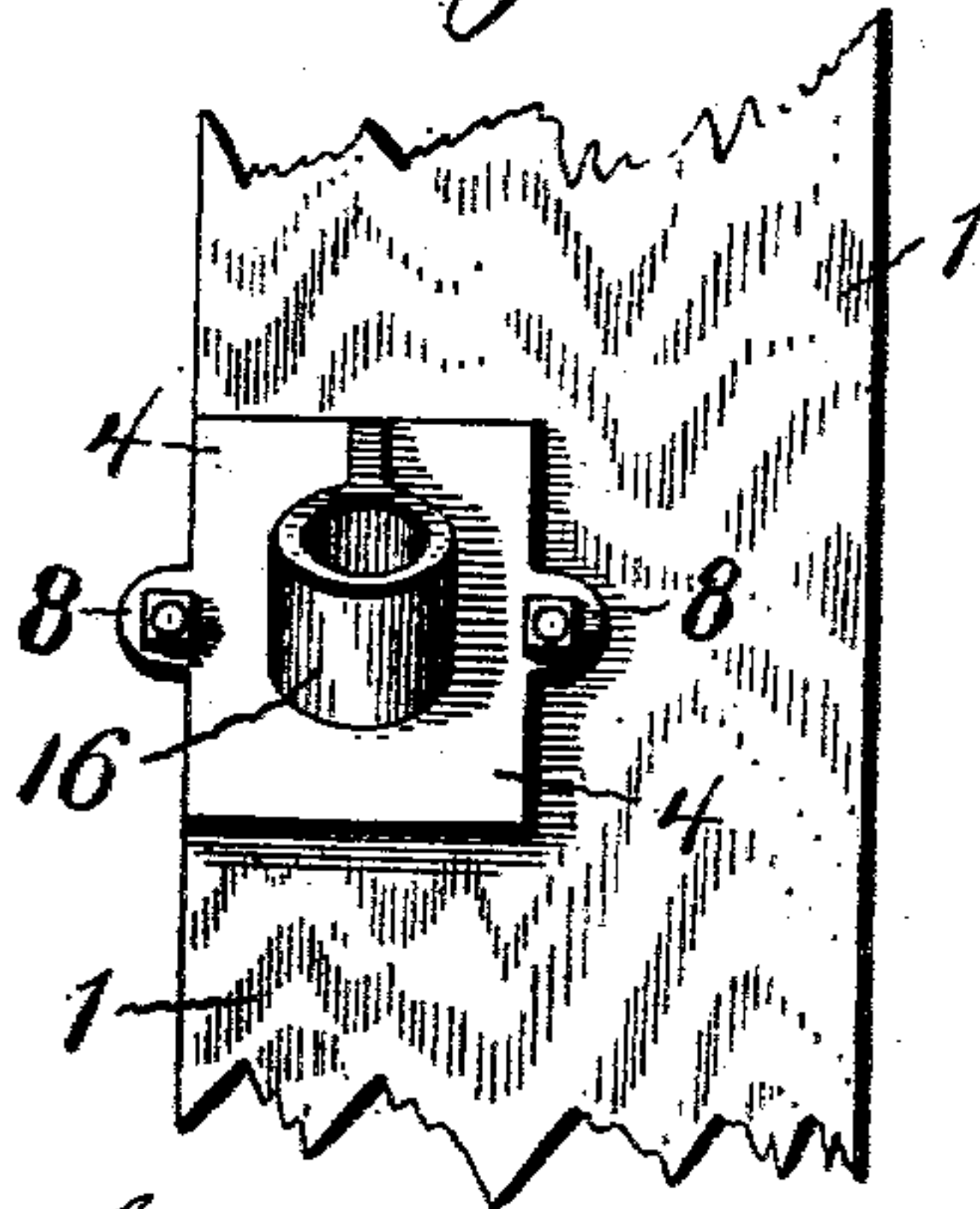


Fig. 4.

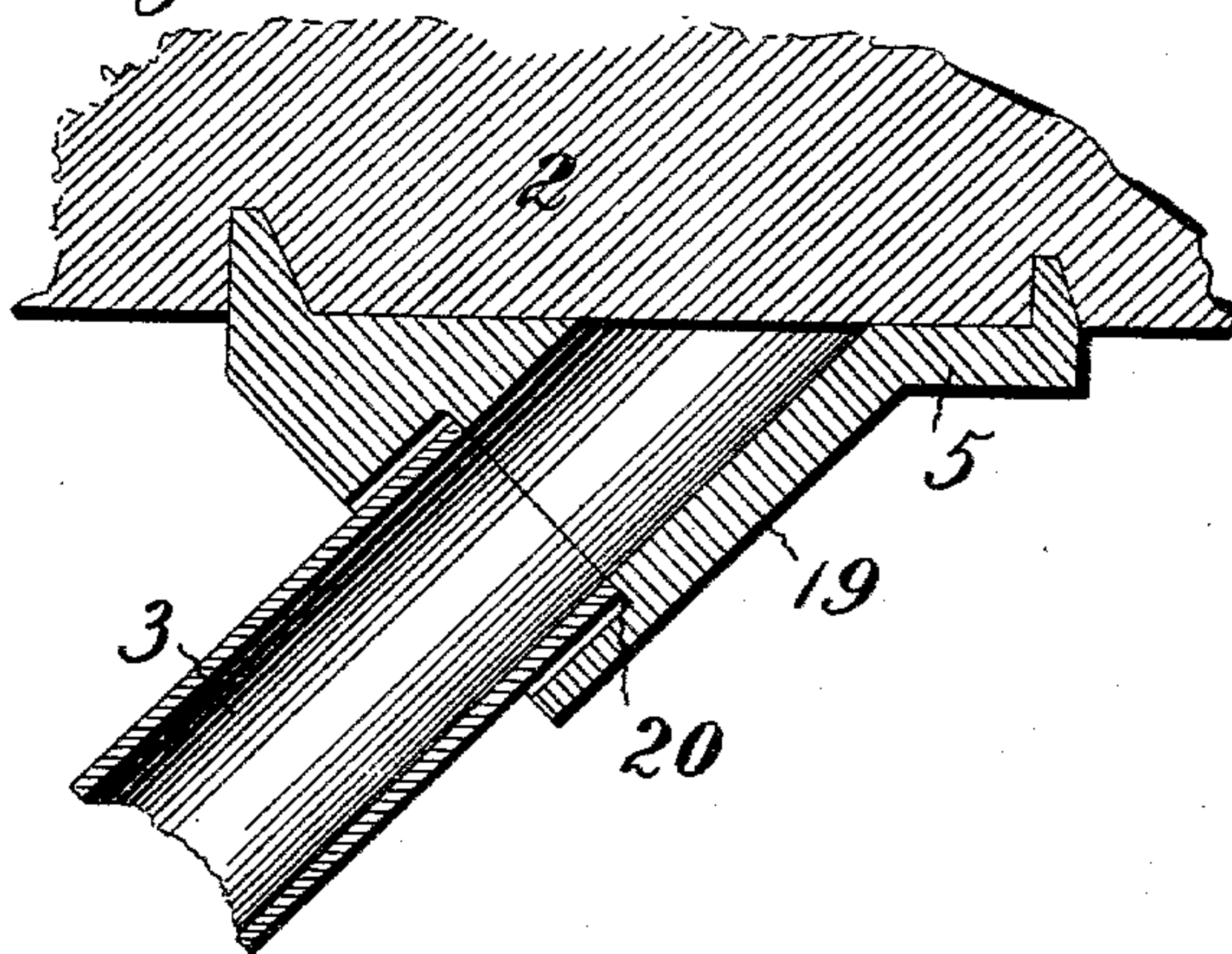
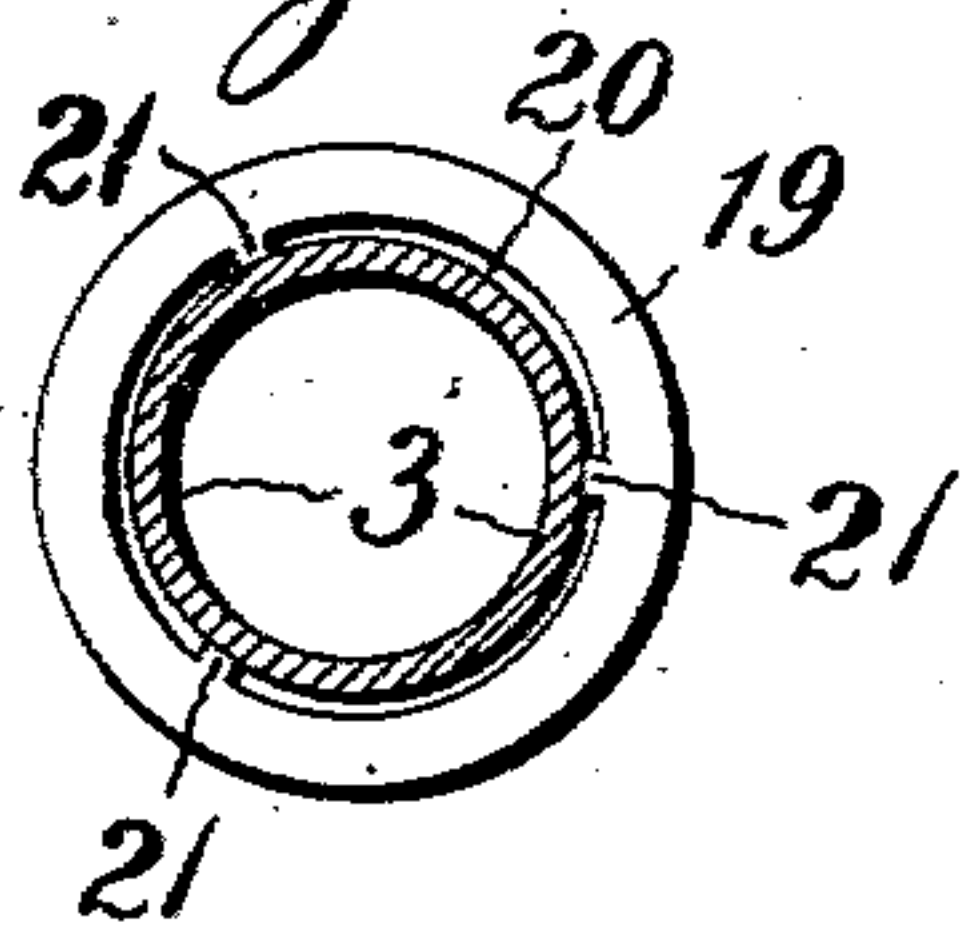


Fig. 5.



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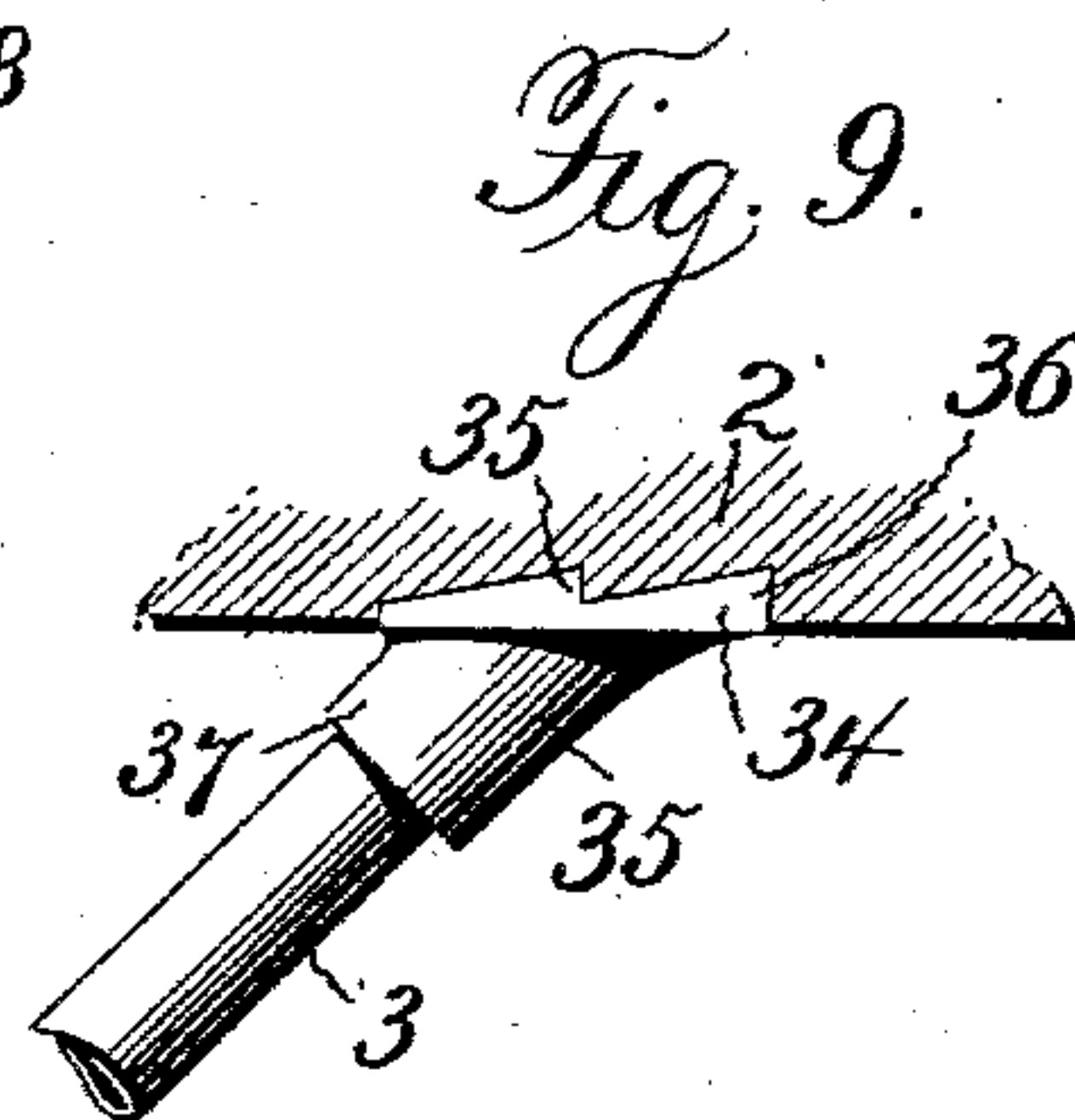
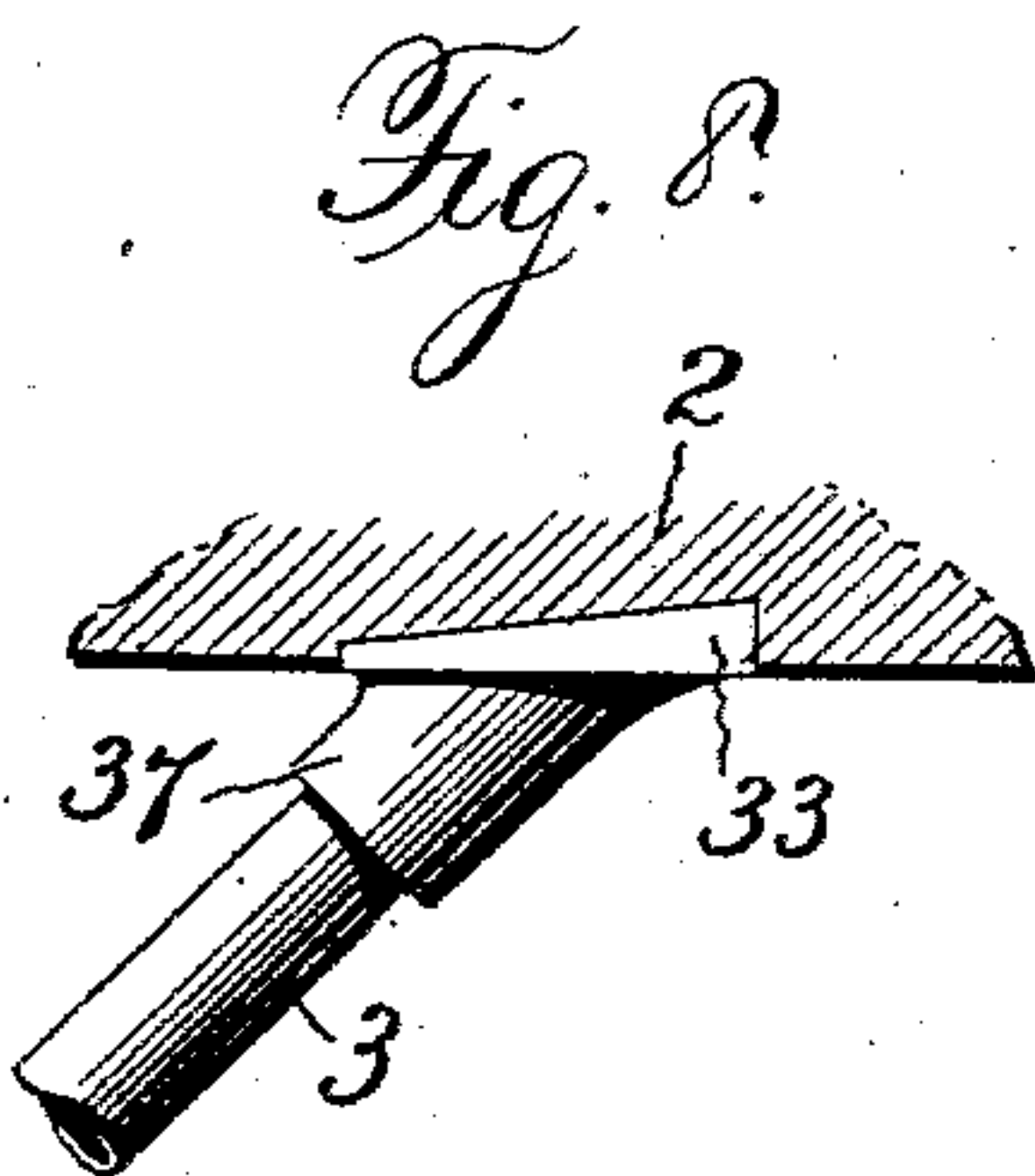
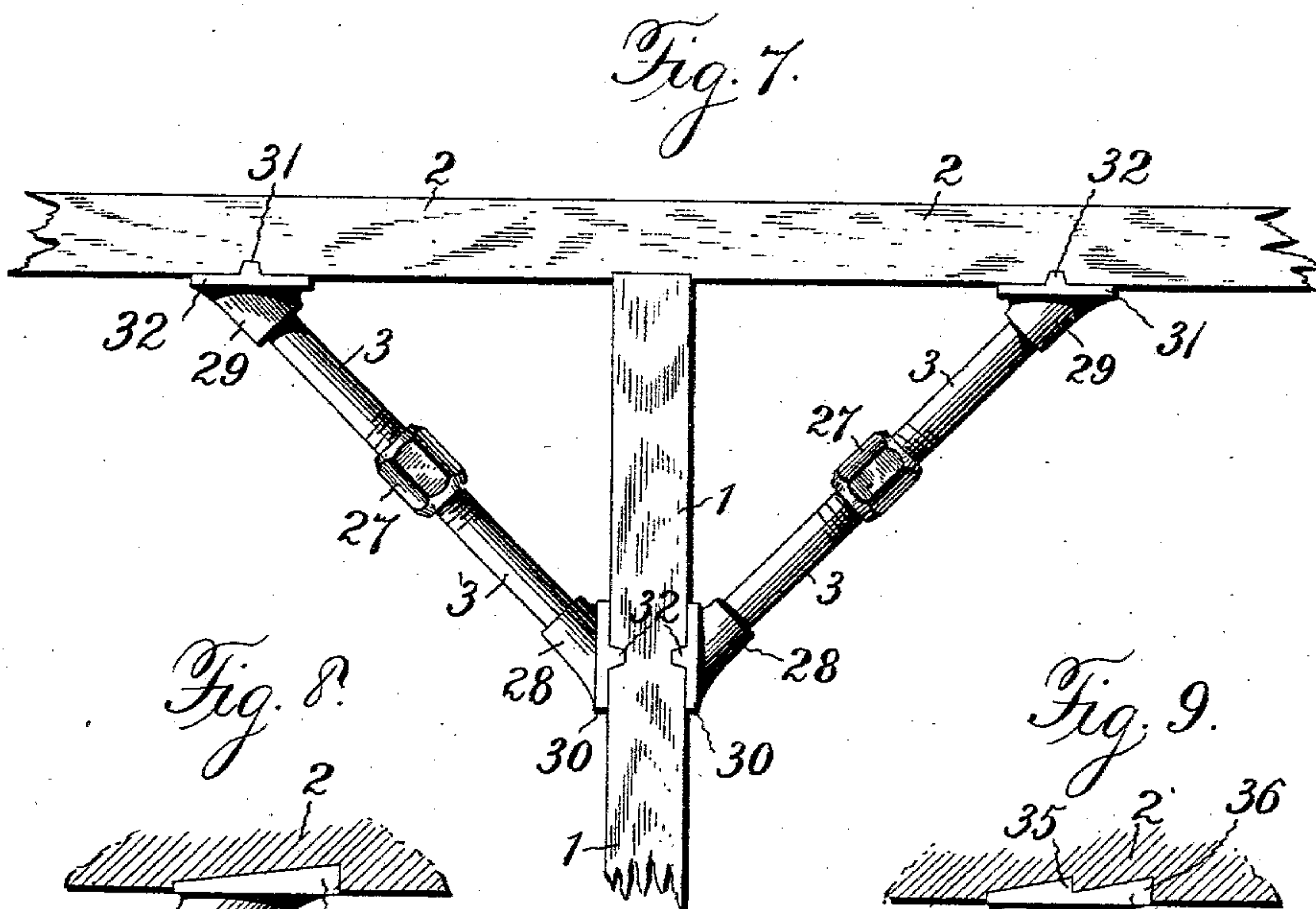
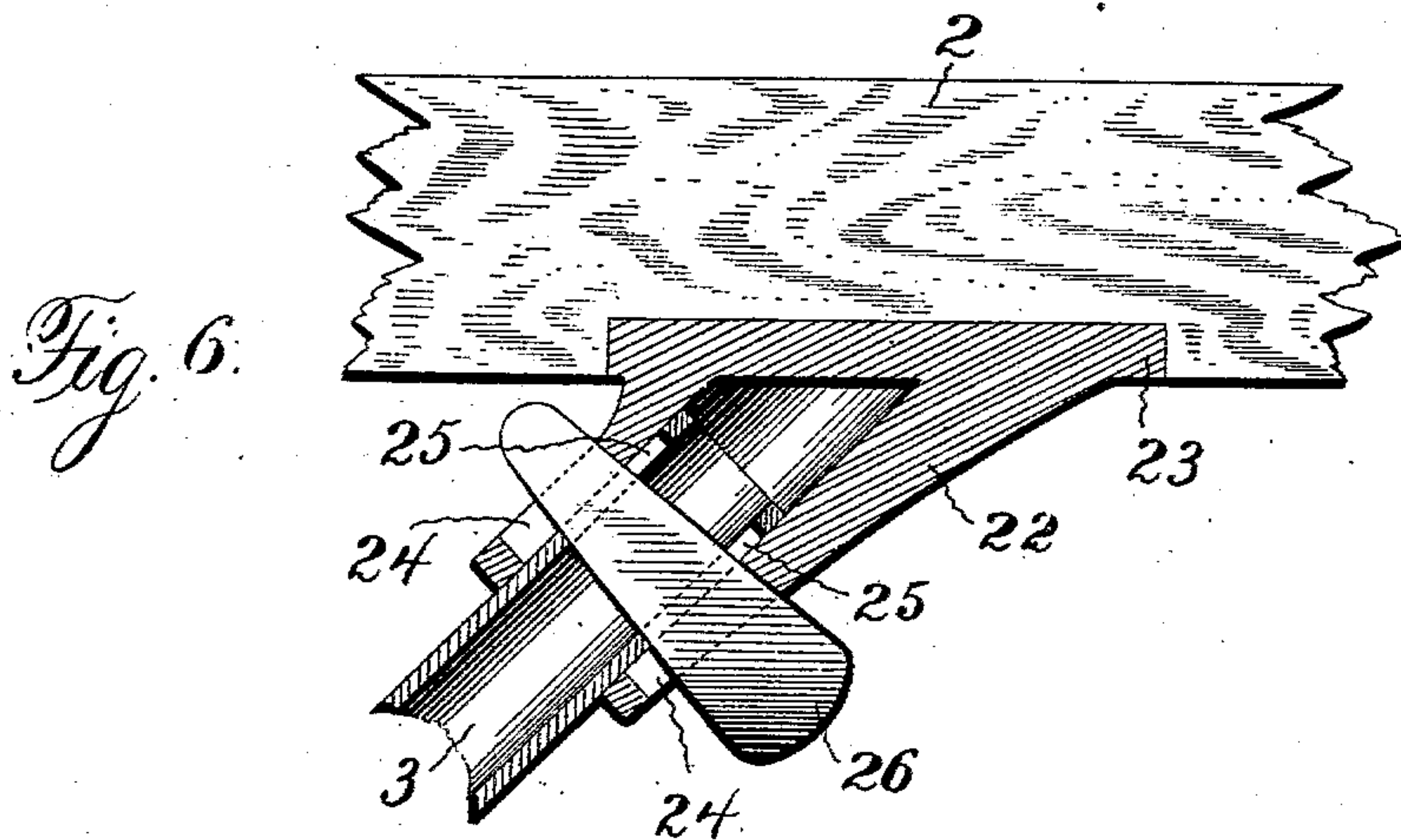
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BRACE FOR STRUCTURES.
(Application filed Aug. 16, 1897.)

(No Model.)

3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

EDGAR KIDWELL, OF HOUGHTON, MICHIGAN.

BRACE FOR STRUCTURES.

SPECIFICATION forming part of Letters Patent No. 715,390, dated December 9, 1902.

Application filed August 16, 1897. Serial No. 648,440. (No model.)

To all whom it may concern:

Be it known that I, EDGAR KIDWELL, a citizen of the United States, residing at Houghton, in the county of Houghton and State of Michigan, have invented certain new and useful Improvements in Braces for Structures; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to braces for structures; and the object of my invention is to provide certain improved features in braces for the purpose indicated and also to provide for certain other improvements in the way of applying the braces, so that the strength of the structure can be much increased and the girders or stringers can be readily adjusted, so as to bring the same to their normal or proper position in the event that they should be displaced therefrom by reason of shrinkage or other causes.

It is well known that the shrinkage of the posts or girders in structures or of the braces employed in connection with the same often causes the frame to lose its rigidity, and when such is the case the stability of the whole structure is seriously impaired, and the structure has then to be lined up. Under such circumstances efforts are made to restore the stringers to their normal position by driving wedges into the joint between brace and stringers, or brace and post, in order to lengthen the brace sufficiently to take up the slack in the joints caused by shrinkage of post, stringer, and brace. This involves much labor and also expense and is not always attended with the most satisfactory results.

For the purpose of more effectively bracing the structure in the first instance than heretofore, and also to provide simple and efficient means for readily and satisfactorily lining up or restoring the parts to their normal or proper position in case they should from any cause depart therefrom, I have devised my improved form of brace and also provide for the novel application of the braces

in relation to each other and to the posts and the stringers which are to be acted upon by the braces.

To the accomplishment of the foregoing and such other objects as may hereinafter appear the invention consists in the construction and also in the application of the braces, as hereinafter particularly described and then sought to be specifically defined by the claims, reference being had to the accompanying drawings, forming a part hereof, and in which—

Figure 1 is a side elevation of a post and stringer with my invention applied thereto. Fig. 2 is an end elevation of Fig. 1. Fig. 3 is a view of a portion of a post, showing one manner of applying a socket thereto. Fig. 4 is a sectional view of a modified form of the invention. Fig. 5 is a cross-section through a brace, showing its socket in full lines and illustrating one feature of the invention. Fig. 6 is a side view of another modified form of the invention, showing the brace and socket in section. Fig. 7 is a side view of a stringer and a post with the invention applied in another modified form. Fig. 8 is a detail view showing one form of shoulder to the shoe, and Fig. 9 is a detail view showing another form of shoulder to the shoe.

In the drawings the numeral 1 designates a post, and 2 a stringer, of a suitable structure. On each side of the post and extending from the same to the stringer in diagonal lines are placed the braces 3, which may be of any approved form in cross-section and which preferably are formed of metal tubing, although they may be made of solid metal rods, so that under certain conditions both braces may act in compression. Yet under other conditions that may arise one brace may act in tension, while the other will act in compression. These braces are connected at their lower ends to the post 1 by shoes 4 and at their upper ends to the stringer 2 by shoes 5. The shoes 4 are formed on their inner faces with lugs 6 and 7, adapted to be set into corresponding recesses formed in the post 1. The lug 6 has its outer face and the lug 7 its inner face beveled, as illustrated, so that when stress or pressure is applied to the shoe it will be transmitted in diagonal lines from the lugs to the post, whereby the tendency to weaken

the post will be lessened and the connection will be rendered stronger than otherwise would be the case, and for the purpose of guarding against any liability to split the post in a line running from one lug to the other I make one of the lugs longer than the other, as illustrated, so that the two lugs to the shoe will not terminate on the same line, and hence the liability of splitting the post is reduced to the minimum. Each of the shoes 4 is also provided with side ears 8, so that bolts 9 may be passed through the opposite ears of the two shoes for the purpose of bolting the shoes to the post. The shoes 5 are likewise provided with lugs 10 and 11, constructed similarly to the lugs 6 and 7 of the shoes 4, and also formed with ears 12, through which will pass bolts 13, which at their opposite ends will pass through metal straps 14, so as to bolt the shoes to the stringer.

Each shoe 4 is provided with a socket 15 and each shoe 5 with a socket 16, which are threaded internally, so that one socket—say the socket 15—will receive the right-hand threads 17 on the lower end of the brace 3 and the other socket—say the socket 16—will receive the left-hand threads 18 on the upper end of the brace 3, or vice versa.

It will be observed that the sockets 15 and 16 of the shoes 4 and 5 extend obliquely from their respective shoes, so as to be in position to receive the brace 3, which extends diagonally from the post to the stringer. It will also be observed that the braces 3 extend from opposite sides of the post 1 to the stringer 2, so that one will act in opposition to the other—that is, assuming that the brace on one side is adjusted or turned so as to press upward the stringer on one side of the post the brace on the opposite side will resist any tendency of the stringer to tilt downward on that side, and in that sense one of the braces acts in opposition to the other. Therefore if there is any sagging of the stringer on one side of the post the brace on that side will be turned so as to force the timber upward and the brace on the opposite side will resist any downward strain thereon, and thus the structure can be lined up without disarranging the parts on the opposite sides of the post. It will therefore be seen that in order to effect the objects of this invention it is necessary that there should be employed two braces—one on each side of the post—so that one will assist the other in the discharge of its functions without causing one evil while remedying another. Further, if a stress, such as that caused by a heavy wind-pressure, tends to tilt over the frame in its own plane it is clear that the braces extending from one side of the posts are put in tension, while those extending from the opposite side act in compression, thereby supplying the resisting force necessary to hold the frame firmly in place. It is therefore seen that the braces are so disposed that while both are in com-

pression, so far as any stresses caused by loads on the structure are concerned, they are also so designed that any of them can resist a stress caused by forces external to the structure by acting in tension when such is necessary. The design contemplates the efficient discharge of all these functions. It will also be observed that the action of these braces, so far as their function in lining up a structure is concerned, is directly opposed to the function of a tie-rod, the function of a tie-rod being to draw parts together, while the function of these braces in lining up is to force the parts away from each other while certain others of the braces will act in compression. The braces can be turned by means of a pipe-wrench of any appropriate form suitable for the purpose.

By applying the two braces, one on each side of the post, as described, the structure is very effectually braced, in the first instance, and if from any cause the stringers or posts should be thrown out of line they can be very readily and easily lined up by a simple adjustment of one or the other of the brace-rods, as the condition may require.

While it is preferred to have the shoes of such dimensions that their ears will lie on opposite sides of the timber, so that the timber need not be bored for the bolts, still if the timber should be of such width that the shoes will not extend entirely across the surface of the same the shoes can be placed adjacent to one edge of the timber, as illustrated in Fig. 3 of the drawings, thus necessitating the boring of a single auger-hole through the timber for the passage of one of the bolts, and this auger-hole being at or near the center of the timber, as illustrated in Fig. 3, will not materially impair the strength of the same.

While it is preferred to have both ends of the brace-rods threaded, as described, still the invention admits of a modification in which only one end of the brace-rod need be threaded, the opposite end fitting freely within a socket 19, as illustrated in Fig. 4 of the drawings, said socket being formed with a seat 20 for the end of the brace rod or tube to bear against, as illustrated in that figure. It not infrequently happens in casting the sockets that some shrinkage takes place in the metal, and when that occurs the socket for the brace may be slightly too small for the reception of the end of the brace, especially as the braces are usually made from a standard size of tubing. Ordinarily under such circumstances it would be necessary to ream out the socket to bring it to a size to receive the end of the brace. Such machine-facing, however, is somewhat expensive. With the view of obviating such expense and labor I cast the sockets with internal ribs 21, so that if the socket should be a little too small from shrinkage I have simply to file or rasp the faces of these ribs in order to bring the socket

to the size to receive the end of the brace. This can be done very quickly and at the minimum of expense.

Another modification of the invention is illustrated in Fig. 6 of the drawings, wherein the socket is designated by the numeral 22, the shoe 23 of the socket in this form being set into a recess formed in the stringer, as illustrated. The socket 22 in this form of the invention is formed with the slots 24 and the end of the brace is formed with the slots 25, so that a cotter 26 may be passed through the slots, the upper face of the cotter bearing against the upper end walls of the slots in the socket and the lower face bearing against the lower end walls of the slots in the brace, thus enabling the brace to be adjusted, so as to exert an outward pressure in lining up the structure and producing substantially the same effect as in the form where the opposite ends of the brace are screw-threaded.

In Fig. 7 of the drawings I illustrate still another form of the invention, wherein each brace is formed of two members, the adjacent ends of the members being screw-threaded, as illustrated, and such ends coupled together by means of a nut or turnbuckle 27, which will engage with threads on the adjacent ends of the two members of the brace, said threads being right and left hand on the respective ends of the members, so that by turning the nut or buckle the brace will be extended or forced outward—that is, the two members be moved apart from each other—so as to produce substantially the same effect as when the brace is made of one continuous member with its opposite ends screw-threaded, as first described. In this modification (shown in Fig. 7) the opposite ends of the braces will either fit freely in the sockets 28 and 29 of the shoes 30 and 31 or else be permanently fixed to the sockets by being cast therewith, or otherwise, said shoes being provided with studs or lugs 32, which will fit in corresponding recesses formed in the post 1 and stringer 2, as illustrated.

In Fig. 8 of the drawings I have illustrated the shoe 33, formed with a beveled inner face and as fitting in a correspondingly-shaped recess made in the stringer 2, and in Fig. 9 the shoe 34 is shown as made with its inner face beveled or inclined, so as to form two shoulders 35 and 36, the shoe fitting in the correspondingly-shaped recess formed in the stringer 2. These shoes are formed with sockets 37 to receive the ends of the braces, as illustrated.

It will be observed that in each one of the forms of the invention illustrated the sockets to the shoes extend obliquely to the shoes so as to be adapted to receive the braces, which will be set diagonally with respect to the posts and stringers. It will also be observed that in each form of the invention the same principle of construction enabling the braces to be extended so as to exert an outward force in lining up the stringers exists and also that

it is contemplated under each form to arrange the braces on opposite sides of the post and have them extend diagonally therefrom to the stringers, so as to give the results or advantages hereinbefore more fully specified.

I have illustrated and described with particularity different forms of the invention, all of which embody the same features of novelty and operate upon the same principle, and it is obvious without further illustration that other forms embodying the invention can be employed.

I have employed the term "socket" as the most convenient designating term for the member or element to which it is applied; but in construing the specification and claims that member is to be understood as including any equivalent that admits of connecting the brace to the shoes, so as to permit the same adjustment of the brace to effect the same results.

Only one post and stringer are illustrated; but it will be understood that the same application of braces will be made to as many posts in the structure as may be necessary, their application to one post being sufficient for purposes of illustration.

Having described my invention and set forth its merits, what I claim is—

1. In bracing structures, the combination with a post standing at an angle to a horizontal plane, and a stringer of the structure, of braces extending diagonally from opposite sides of the post to the stringer, and secured thereto by suitable means, said braces having their post ends secured to the sides of the upright post, and means for adjusting the braces to exert an outward or inward strain to line up the structure, each brace and its adjusting means being secured one to the other, the post, stringer and braces being arranged in relation to each other, substantially as described, so that one brace may act in tension while the other will act in compression, substantially as set forth.

2. In bracing structures, the combination with a post standing at an angle to a horizontal plane, and a stringer of the structure, of means for bracing and lining up the structure, said means consisting of shoes each provided with a member extending obliquely therefrom, said shoes and their parts being secured by suitable means to the stringer and to the post, braces extending diagonally from one of said members to the other and connected at opposite ends to said members, said braces lying on opposite sides of the post, and means for adjusting the braces to exert an outward pressure to line up the structure, the post, stringer and braces being arranged in relation to each other, substantially as described, so that one brace may act in tension while the other will act in compression, substantially as set forth.

3. In bracing structures, the combination with a post standing at an angle to a horizontal plane, and a stringer of the structure, of

means for bracing and lining up the structure, said means consisting of shoes each provided with a member extending obliquely therefrom, said shoes being secured by suitable means two of them to opposite sides of the post and two of them to the stringer at opposite sides of the post, and braces extending diagonally from one of the shoes to the other, each of said braces having a right-hand-threaded connection at one end with one of the members of the shoes and a left-hand-threaded connection at the opposite end with the member of the other shoe, the post, stringer and braces being arranged in relation to each other, substantially as described so that one brace may act in tension while the other will act in compression, substantially as set forth.

4. A device for bracing and lining up a structure, consisting of shoes each provided with a member extending therefrom and having studs or lugs projecting from one face to enter the timber to which the shoe is to be attached, one of said studs or lugs being beveled on its inner face and the other beveled on its outer face, and a brace for connecting

the member of one shoe with the member of the other shoe, substantially as and for the purposes described.

5. A device for bracing and lining up a structure, consisting of shoes each provided with a member extending therefrom and having studs or lugs projecting from one face to enter the timber to which the shoe is to be attached, one of said lugs projecting farther than the other lug or stud from the shoe, and a brace for connecting the member of one shoe with the member of the other shoe, substantially as and for the purposes described.

6. A brace for structures comprising an upright post, a stringer, a brace, comprising shoes and lugs formed on the back of the shoes, one of said lugs being longer than the other, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

EDGAR KIDWELL.

Witnesses:

GEORGE WASS,

JAMES W. SHIELDS.