

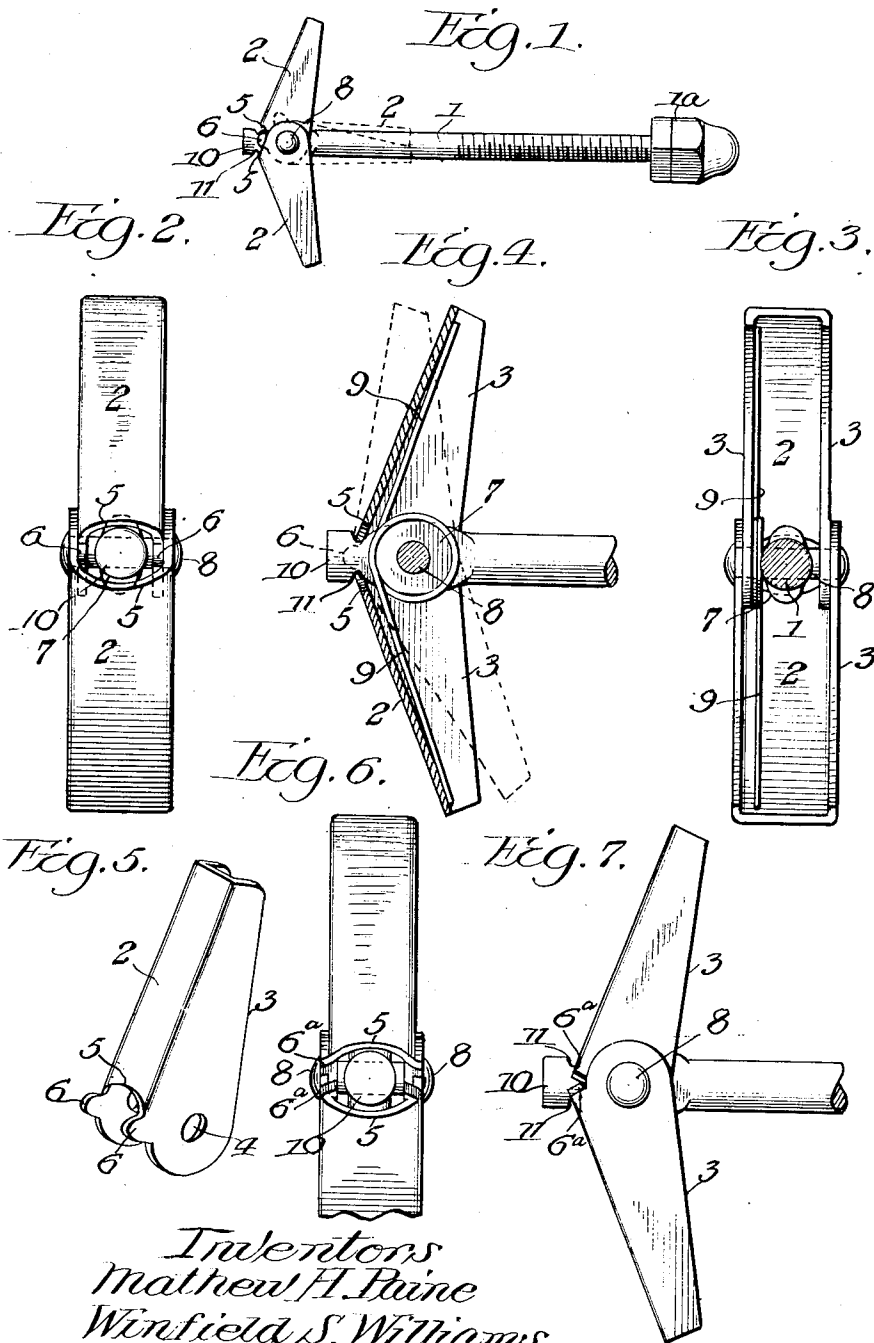
M. H. PAINE AND W. S. WILLIAMS.

ANCHORING DEVICE.

APPLICATION FILED MAY 18, 1917.

1,396,278.

Patented Nov. 8, 1921.



Inventors
Matthew H. Paine
Winfield S. Williams
by *Wm. S. Williams* atty.

UNITED STATES PATENT OFFICE.

MATHEW H. PAINE, OF GLENELLYN, AND WINFIELD S. WILLIAMS, OF CHICAGO,
ILLINOIS, ASSIGNORS TO PAINE COMPANY, A CORPORATION OF ILLINOIS.

ANCHORING DEVICE.

1,396,278.

Specification of Letters Patent.

Patented Nov. 8, 1921.

Application filed May 18, 1917. Serial No. 169,553.

To all whom it may concern:

Be it known that we, MATHEW H. PAINE of Glenellyn, Illinois, and WINFIELD S. WILLIAMS of 4533 Greenwood Ave., Chicago, Illinois, citizens of the United States of America, have invented a certain new and useful Improvement in Anchoring Devices, of which the following is a specification.

This invention relates to improvements in anchoring devices, and more particularly to toggle bolts of the double-wing type, such as are now commonly used for supporting objects against hollow walls or ceilings. The present application is a continuation in part of application Serial No. 772,590, filed June 9, 1913, now Patent No. 1,269,302, dated June 11, 1918.

One object of the present invention is to provide a toggle bolt which shall be extremely simple in construction and operation, strong, durable, and economical to manufacture. Another object is to provide in a toggle bolt means for yieldingly resisting the expansion of the wings, particularly during the latter part of their travel toward anchoring position. The resistance is, preferably, such that the wings are normally arrested in such angular relation that their outer extremities only are first presented for engagement with the wall, said resistance yielding upon bringing pressure to bear upon the wings, as in tightening up on the bolt, so as to permit further expansion of said wings into their final anchoring position, at which time their inner extremities engage with the bolt and their entire wall-engaging surfaces, are in operative position. As first arrested, the wings are free to be adjusted angularly of the bolt without altering their angular relation to each other.

Other objects and advantages of the invention will become apparent to those skilled in the art from a reading of the following description, taken in connection with the accompanying drawings, wherein two forms of the invention are illustrated.

Figure 1 is a side elevation of a toggle bolt constructed in accordance with the present invention;

Fig. 2 is an end view of the same;

Fig. 3 is a bottom view thereof;

Fig. 4 is a side view with portions broken away, to illustrate more clearly the assembly of the parts;

Fig. 5 is a perspective view of one of the wings;

Fig. 6 is an end view of another form of the invention, showing the wings just previous to their initial position of expansion in order to illustrate more clearly the formation of the lugs; and

Fig. 7 is a side view of the device shown in Fig. 6, the lugs in this figure being shown in engagement.

Referring more in detail to the drawings, the device is shown as comprising a bolt 1, screw-threaded at one end for engagement by a nut 1^a. Near the other end the bolt is oppositely flattened, as at 7, and provided with an opening through which is inserted a pin or rivet 8 forming oppositely projecting trunnions as shown. The wings or truss members of the device are shown at 2, these members being, preferably, U-shaped in cross section and having side walls 3, 3, and a top or connecting wall. At their inner extremities the side walls, 3, 3 overlap, as shown in Fig. 1, these overlapping ends being apertured, as at 4, for pivotal mounting upon the pin 8. After the wings have been thus positioned the exposed ends of the pin 8 are upset, so as to provide retaining heads, as shown. Resilient means, such as spring wire 9, is coiled about the pin 8, in such wise that the ends of said wire project in opposite directions from the bolt within the channel portions of the wings, the spring being so mounted that these oppositely projecting ends thereof bear outwardly and upwardly against the top or connecting walls of the wings, tending normally to expand the latter, as shown in the drawings.

In the drawings, one of the wings 2 is shown slightly narrower than the other wing, so that in assembling the device the inner end of the narrow wing may fit between the side walls of the other wing.

At the inner end of each of the wings the top or connecting wall is cut away, so as to provide what may be termed a semi-circular neck indenture 5, these indentures together forming an opening through which the end 10 of the bolt may protrude. According to the present invention it is contemplated to provide on one of the wings yieldable resisting means, shown in the drawings in the form of upstanding lugs 6. These lugs in the form of invention illus-

trated in Figs. 1 to 5 inclusive are provided on the narrow wing, and so positioned as to engage the wall of the neck indenture 5 of the other wing upon expansion of said wings. This arrangement is preferably such that the wings are normally arrested in their outward movements at such point that the outer extremities of said wings are first presented for engagement with the wall, said lugs 6 being yieldable when pressure is brought to bear upon the wings, as in tightening up on the bolt to permit of further expansion of said wings into their final anchoring position, wherein the lower edges of the side walls of the wings are in substantial alinement and the walls of the neck indentures 5 in firm engagement with opposite sides of the bolt. In this manner a more rigid clamping or gripping action is secured between the wall-engaging surfaces or edges of the wings and the wall, while at the same time a very rigid truss is formed by the wings, by reason of their ultimate engagement with the sides of the bolt. The sides of the bolt which are engaged by the neck indentures 5 of the wings, when the latter are forced into final anchoring position, are preferably notched, as at 11, so that when the device is in operative or final position a portion of the strain which would ordinarily be confined to the pin 8 is taken by the bolt, as will be readily appreciated.

In the form of the invention illustrated in Figs. 6 and 7, the construction of the inner ends of the wings is slightly modified, so as to provide lugs slightly different from the lugs 6 shown in the form previously described. In this second form of the invention the side walls of each of the wings terminate in lugs 6^a, the lugs on the narrow wing being flared outwardly, while the lugs on the other wing are flared inwardly. These lugs or extensions are so constructed and arranged as to yieldingly resist the outward expansion of the wings to produce the same results as above described in connection with the other form of the invention. These lugs 6^a first coact to arrest the outward movements of the wings at a point where only their outer extremities are presented for engagement with the wall. Upon bringing pressure to bear upon the wings, however, the lugs 6^a coact to permit a further expansion of the wings into final anchoring position, with the top or connecting walls of the wings in engagement with the bolt. During this final positioning of the wings the lugs 6^a, by reason of their angular engagement, are forced laterally in opposite directions, tending toward an overlapping or interlocking engagement.

In both forms of the invention, it will be observed that the wings, when expanding under the influence of the spring 9, will first

come into contact with each other at their lug extremities and thus be arrested in their movements before arriving at their final anchoring position. As the wings are made of comparatively light material, the lugs readily yield under pressure, so as to permit of the wings assuming their final positions against the sides of the bolt upon bringing sufficient pressure to bear. The co-action between the lugs 6^a in permitting this final expansion of the wings has already been described. The lugs 6, in yielding to permit of this action, bend inwardly as the wings are forced further apart, tending to pass under or impinge beneath the top or connecting wall of the adjacent wing.

In construction work, where the device illustrated is largely utilized, the inner surfaces of the walls, ceilings, tiles, etc., are apt to be more or less uneven, oftentimes decidedly so. The device, according to the present invention, readily adapts itself to the unevenness of these surfaces, this being due largely to the initial position which the wings assume, wherein the said wings may be freely adjusted angularly of the bolt, without altering their angular relation to each other.

It will be observed that in toggle bolts such as herein described, the wings may adjust themselves to the various irregularities in the wall and ceiling surfaces encountered, while at the same time providing a very firm and rigid attachment. For example, the wings may assume a position with relation to the bolt such as shown in dotted lines in Fig. 4, or a position wherein one wing is in final position and the other wing in an intermediate position, but, nevertheless, functioning by reason of the lug engagement at its inner extremity. The importance of the means for yieldingly resisting the final expansion of the wings will thus be apparent. The wings are also capable of adjustment into many other operative positions. In fact, in some cases, particularly in the attachment of objects which are light in weight, the wings have been found to afford the requisite support prior to their full expansion, and in many such cases the wings are not forced into their final anchoring position. As will be appreciated, however, full expansion of at least one of the wings is desirable, as the strength and rigidity of the device are greatest when the wings are so positioned.

In using one of the devices, a hole of suitable size is bored in the wall, ceiling, or the like, to which the object is to be secured. The bolt 1 is then inserted in a hole in the object to be made fast, and the nut 1^a placed thereon after which the said bolt is pushed head foremost into the hole in the wall, the pressure operating to force or contract the wings 2, 2 into overlapping relation against

the sides of the bolt as shown in dotted lines in Fig. 1, thus permitting the entire head to pass freely through the hole, whereupon the wings, through the medium of the tension means 9, are expanded into the truss position, as defined by the lug extremities of said wings, wherein only the outer extremities of the latter are presented for engagement with the wall. The nut 1^a is then tightened up, and as the pressure brought to bear upon the wings increases the latter are further expanded into their final anchoring position, as previously described.

As will be obvious, the present improvements are susceptible of various changes and modifications without departing from the spirit of the invention, and accordingly it is not desired to limit or restrict the same to the particular construction or arrangement of parts herein illustrated, except where limitations appear in the appended claims.

We claim:—

1. In a device of the character described, a supporting member, truss elements pivotally associated therewith, tension means normally tending to expand said elements laterally with respect to said supporting member, and means for yieldingly resisting such expansion.

2. In a device of the character described, a supporting member wings pivotally associated with said member near one end thereof, and spring means normally tending to expand said wings, the latter when fully expanded being adapted to engage said member at their pivoted ends to form a truss transverse with respect thereto, said wings being provided with coating parts adapted to arrest temporarily the expanding movement of said wings prior to such engagement.

3. In a device of the character described, a supporting member, wings pivotally associated with said member, means for expanding said wings to a position transverse with respect to said member, and means for yieldingly resisting such expansion.

4. In a device of the class described, a supporting member, wings pivotally mounted thereon, means for normally causing said wings to assume a position transverse with respect to said member, each of said wings being provided with elongated bearing surfaces adapted to engage a wall when said wings are fully expanded, and means for arresting the expanding movements of said wings at a point where only the outer extremities of said surfaces are in position to engage the wall, said arresting means being yieldable under pressure to permit of full expansion of said wings.

5. In a device of the character described, a supporting member, wings pivotally associated with said member, means for expanding said wings to a position transverse with

respect to said member, and means for resisting the expanding movements of said wings as the latter approach their position of maximum expansion.

6. In a device of the character described, a supporting member, wings pivotally associated with said member, means for expanding said wings to a position transverse with respect to said member, and means for resisting the expanding movements of said wings as the latter approach their position of maximum expansion, said wings when in the last-named position engaging the sides of said supporting member.

7. In a device of the kind described, the combination of a bolt and wings pivotally mounted in operative relation to the bolt, each wing being provided with a wall-engaging surface, there being means independent of the bolt for arresting the swinging movements of the wings at a point where they assume such relative angular relation that they contact with the wall only at their extremities, said arresting means being yieldable under pressure to permit of the further expansion of said wings into engagement with said wall over the entire of said surfaces.

8. A toggle head having inter-engaging wings with bearing surfaces normally in such angular relation to each other that they engage with a wall only at their extremities, said bearing surfaces being maintained in such relation by the interengagement of the wings.

9. In a device of the kind described, the combination with a bolt, of coaxially pivoted wings carried by the bolt, said wings being U-shaped in cross section and arranged to fold upon the bolt with the side walls of said wings overlapping the bolt, there being means independent of the bolt for yieldingly resisting the unfolding movement of the wings with respect to each other.

10. In an anchoring device, a supporting member, a pin passing through said member, wings substantially U-shaped in cross section, mounted on said pin, and means normally tending to distend said wings into operative position.

11. In an anchoring device, the combination with a bolt of a pair of anchoring wings swingingly associated with said bolt, means to distend said wings, and means integral with said wings to normally hold the same in such position that they may be freely adjusted angularly of the bolt without altering their angular relation to each other.

12. In a device of the kind described, the combination of a bolt, a pair of wings pivotally mounted in operative relation with the bolt on opposite sides thereof and provided with bearing surfaces, and means for normally causing the wings to swing out from the bolt a fixed distance only, whereby the bearing surfaces of the wings tend to

remain in definite angular relation to each other, the portions of the wings adjacent the bolt being cut away to provide a clearance therearound, whereby the wings may be
5 freely adjusted angularly of the bolt without altering their angular relation to each other.

13. In a device of the kind described, the combination of a bolt, a pair of wings pivotally mounted in operative relation with
10 the bolt on opposite sides thereof and provided with bearing surfaces, and means for normally causing the wings to swing out from the bolt a fixed distance only, whereby
15 the bearing surfaces of the wings tend to remain in definite angular relation to each other, the portions of the wings adjacent the bolt being cut away to provide a clearance therearound, whereby the wings may be
20 freely adjusted angularly of the bolt without altering their angular relation to each other, said wings when subjected to pressure being capable of expansion beyond said fixed distance and into engagement with opposite
25 sides of said bolt.

14. An expansion device comprising, in combination, a bolt, a pair of wings pivotally mounted upon the bolt, the wings being U-shaped in cross section and having
30 inter-engaging shoulders for determining their initial position of expansion with respect to each other, each of said wings at its pivotal end having a portion of its body cut away to provide an opening through
35 which the bolt may protrude without engaging with the wings when the latter are in such initial position.

15. An expansion device comprising, in combination, a bolt, a pair of wings pivotally mounted upon the bolt, the wings being U-shaped in cross section and having
40 a portion thereof at the pivotal end of each cut away to provide an opening through which the bolt may protrude without engaging with the wings in one position of expansion, the latter being formed to engage with
45 each other in such position.

16. In a device of the class described, the combination of a bolt, coaxially pivoted
50 wings carried by the bolt, tension means normally causing the wings to assume distended positions, and a shoulder on one of said wings arranged to engage with the other wing to limit the opening movement
55 of said wings as effected by said tension means.

17. In a device of the class described, the combination of a bolt, coaxially pivoted wings carried by the bolt, tension means
60 normally causing the wings to assume distended positions, and a shoulder on one of said wings arranged to engage with the other wing to limit the opening movement of said wings as effected by said tension
65 means, said wings when subjected to pressure

being expansible beyond such limit and into engagement with opposite sides of said bolt.

18. In a device of the class described, the combination of a bolt, coaxially pivoted wings associated with said bolt, and means
70 independent of the bolt for resisting the expansion of said wings with respect to each other.

19. In a device of the class described, the combination of a bolt and coaxially pivoted
75 wings associated with said bolt, said wings being provided with inter-engaging shoulders for resisting the expansion of said wings with respect to each other.

20. In a device of the class described, the combination with a bolt, of wings pivotally
80 associated with said bolt, one of said wings being adapted to engage the other to check the lateral outward travel of the wings.

21. In a device of the class described, the combination of a bolt and coaxially pivoted
85 wings associated with said bolt, said wings being provided with inter-engaging shoulders for resisting the expansion of said wings with respect to each other, said shoulders being yieldable under pressure.

22. In a device of the class described, a bolt, wings pivotally associated therewith,
90 means tending to expand said wings, and means for checking such expansion in such wise that the outer extremities of said wings are first presented for engagement with a wall.

23. In a device of the class described, a bolt, and wings pivotally associated therewith,
100 said wings being movable outwardly into truss formation with their inner ends in engagement with said bolt, said bolt being notched to receive said ends.

24. An expansion device comprising, in combination, a bolt, a pair of wings pivotally mounted upon the bolt, the wings being U-shaped in cross section and having
105 a portion thereof at the pivotal end of each cut away to provide an opening through which the bolt may protrude without engaging with the wings, the latter being formed to engage with each other when expanded.

25. In an anchoring device of the character described, the combination with a bolt,
115 of a pair of anchoring members pivotally associated with said bolt, said members at their inner extremities being designed to interlock when expanded to thereby form a truss.

26. In an anchoring device, the combination of a bolt having a pivotal bearing, and an expanding member composed of two
125 truss elements co-axially pivoted upon said bearing, there being tension means to automatically force said truss elements into opposed truss engagement with each other.

27. In a device of the kind described, the combination of a bolt, a pair of wings pivotally
130

otally mounted in operative relation to the bolt on opposite sides thereof and provided with bearing surfaces and means for normally causing the wings to swing out from the bolt a fixed distance only whereby the bearing surfaces of the wings tend to remain in a definite angular relation to each other, the portions of the wings adjacent the bolt being cut away to provide a clearance therearound whereby the wings may be adjusted angularly of the bolt without altering their angular relation to each other.

28. A toggle head having wings with bearings surfaces normally in such angular relation to each other that they engage with the wall only at their extremities, the engaging portions of the bearing surfaces being pointed to provide barbing contact.

29. In a device of the class described, the combination with a bolt, of an anchoring member pivotally associated with said bolt,

and tension means normally tending to position said member transversely with respect to said bolt, said member when in such position being capable of angular adjustment with respect to the bolt.

30. In a device of the class described, the combination with a bolt, of an anchoring member pivotally associated with said bolt, said member being U-shaped in cross section and arranged to fold upon the bolt with the side walls of said member overlapping the bolt, and tension means normally tending to position said member transversely with respect to said bolt, said member when in such position being capable of angular adjustment with respect to the bolt.

MATHEW H. PAINE.

WINFIELD S. WILLIAMS.

Witnesses:

BENJ. F. METHIEN,

M. H. MARTENSEN.