Oct. 16, 1923. 1,470,608

T. K. HINE

FITTING UP BOLT

Filed Nov. 24, 1919 2 Sheets-Sheet 1

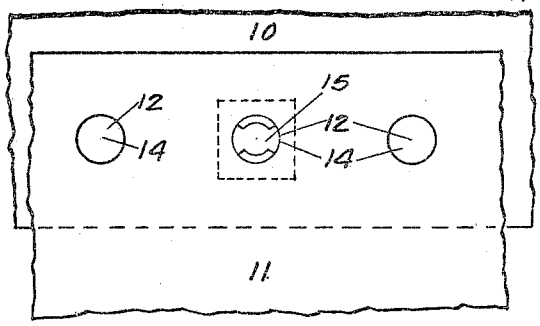


Fig. 1

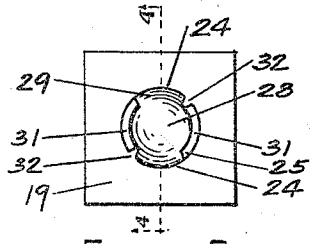


Fig. 2

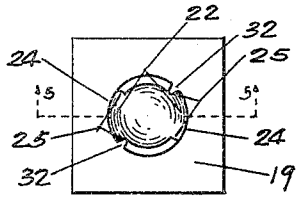


Fig. 3

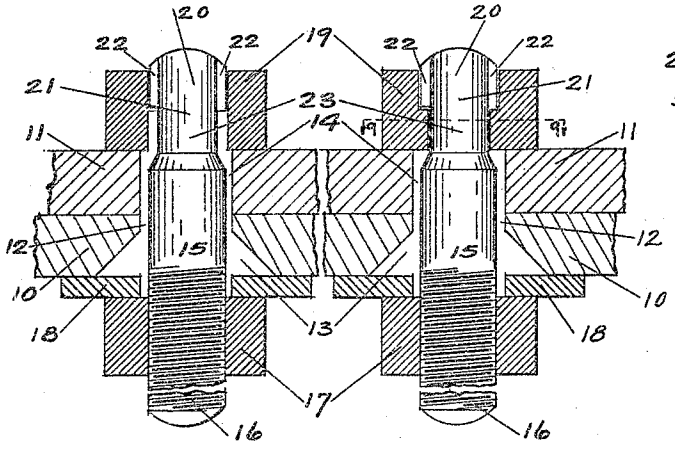


Fig. 4

Fig. 5

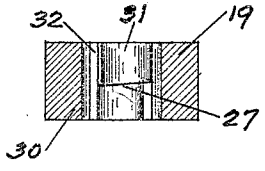


Fig. 6

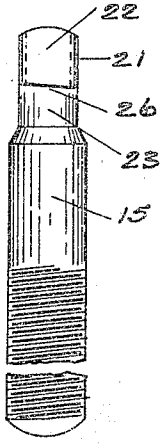


Fig. 7

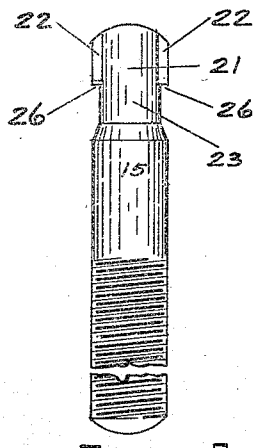


Fig. 8

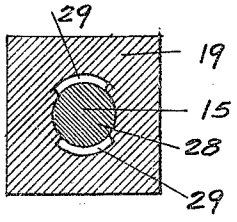


Fig. 9

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T. K. HINE

FITTING UP BOLT

Filed Nov. 24, 1919 2 Sheets-Sheet 2

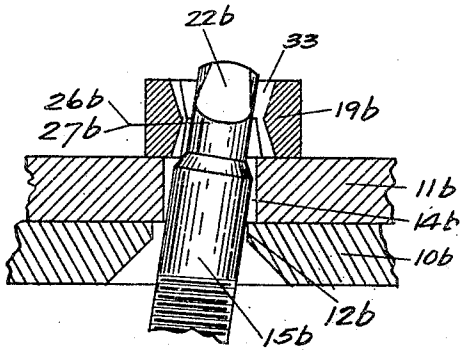


Fig. 10

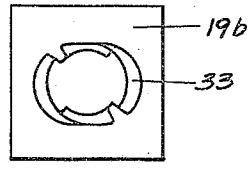


Fig. 11

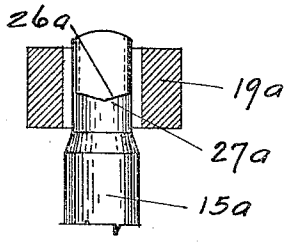


Fig. 12

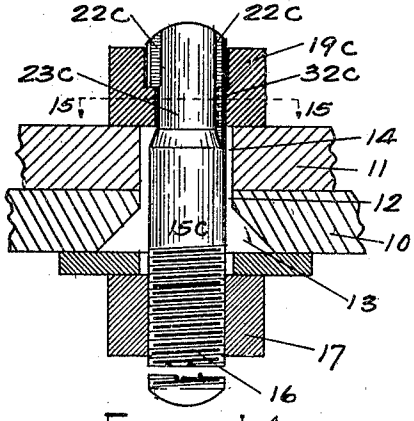


Fig. 14

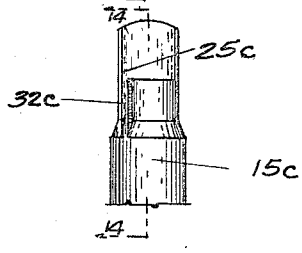


Fig. 13

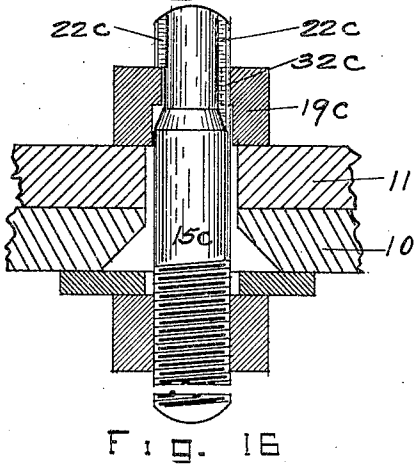


Fig. 16

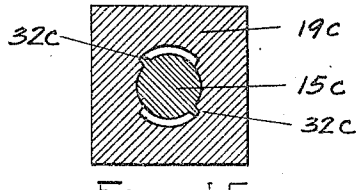


Fig. 15

INVENTOR

Frederick K. Hine

BY Louis M. Schmidt

ATTORNEY

Patented Oct. 16, 1923. 1,470,608

UNITED STATES PATENT OFFICE.

TREDICK KITTREDGE HINE, OF NEWINGTON, CONNECTICUT.

FITTING-UP BOLT.

Application filed November 24, 1919. Serial No. 340,334.

To all whom it may concern:

Be it known that I, TREDICK KITTREDGE HINE, a citizen of the United States, residing at Newington, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Fitting-Up Bolts, of which the following is a specification.

My invention relates to improvements in fitting-up bolts, of the form used in steel shipyards and structural steel plants in the preliminary operations of assembling steel plates for holding such plates together during the operation of reaming the holes for the rivets and placing the rivets in position, the fitting-up bolts being generally placed in alternate holes and finally removed and replaced by a rivet, and the object of my improvement is to produce a fitting-up bolt that when in operative position is manipulated substantially after the manner of the ordinary bolt in common use for the purpose specified, comprising at one end a screw thread on which is mounted a nut for bearing against one face of the overlapping plates, and having at the other end a head for bearing against the opposite face that in contour and the form of the periphery and in the structural features comprises the following characteristics: The said head as regards the contour and exterior form corresponds to the forms of heads in common use, being of symmetrical, non-circular form, preferably square for heavy and rough work, suitable to be engaged by a wrench, and being the counter-part of the nut in such form, and which head, in addition to being used and operated after the manner of the ordinary head that is fixedly secured to the bolt body is in my improved construction removably secured to the said bolt body.

As a further detail, the construction is such that the head end of the bolt is provided with means for being removably connected with the bolt head without enlargement of the overall diameter over or in excess of the diameter of the bolt body, so that the bolt can be entered and removed from the rivet holes by means of the head end, after the head has been removed, and without removing the nut from engagement with the threaded end of the bolt. The provision in such a combination of a head that is operable substantially after the manner of the ordinary fixed head I believe to be novel.

As a further detail, the form of structure provided is such as to conserve the strength of the cooperating parts.

In the accompanying drawing:—

Figure 1 is a side elevation of parts of a pair of overlapping structural plates having rivet holes in registration and having the body portion of one of my improved fitting-up bolts positioned in one set of such holes, and as viewed from the head end,

Figure 2 is a similar view on an enlarged scale of the fitting-up bolt and adjacent parts shown in Fig. 1 and showing the head entered upon the said head end, previous to being turned to the holding position.

Figure 3 is a similar view with the head turned to the holding position.

Figure 4 is a sectional view on the line 4—4 of Fig. 2.

Figure 5 is a sectional view on the line 5—5 of Fig. 3.

Figure 6 is a sectional view of the head only.

Figure 7 is a side elevation of the head end of the bolt body.

Figure 8 is a side elevation of the same turned ninety degrees from the position shown in Fig. 7.

Figure 9 is a sectional view on the line 9—9 of Fig. 5.

Figure 10 is a sectional view, corresponding to Fig. 5, of a modified form of construction in use for holding together a pair of plates having the bolt holes slightly out of registration, the bolt body being positioned at an angle to the said plates.

Figure 11 is a plan view of the head shown in Fig. 10.

Figure 12 is a fragmentary view, part in side elevation and part in section, showing another modification of the engaging portions of the bolt body and head, being in the form of a V-shaped tooth or projection and a recess to correspond.

Figure 13 is a side elevation of another modification, having the limiting stop lug on the bolt body.

Figure 14 is a sectional view on the line 14—14 of Fig. 13.

Figure 15 is a sectional view on the line 15—15 of Fig. 14.

Figure 16 is a sectional view correspond-

ing to Fig. 14 and showing the same parts as are shown in the said Fig. 14 with the head reversed relatively to the other parts.

In one form of structural plate construction that is common in shipyards and for which my improved form of fitting-up bolt is adapted there is an outer plate 10 superimposed upon an inner plate 11, the said plates having holes for the rivet that are in registration, comprising the hole 12 in the outer plate 10 that is of countersunk form, as shown at 13, on the outer side, and the hole 14 in the inner plate 11, and the fitting-up bolts are used for holding the parts together during the reaming and assembling operations.

The said fitting-up bolt comprises the bolt body 15 that extends through the holes 12 and 14, has the threaded end portion 16 on the outer end, on which is mounted the nut 17, a washer 18 being interposed between the said nut 17 and the opposed outer plate 10, and having on the inner end the head 19 that is opposed to the inner plate 11.

The bolt body 15 is a substantial fit for the holes 12 and 14, so as to provide as great strength as possible, and the inner or head end 20 thereof is removably connected to the bolt head 19 in a manner to be described, and by means that permit of maintaining the overall diametral dimension within the limits of the corresponding dimension of the bolt body 15, so that the bolt can be inserted from the outer side of the plates 10 and 11 freely. Thus the head end 20 is projected through the plates and beyond the inner face, and the head 19 mounted thereon, after which the nut 17 is tightened in the usual manner, and may also be loosened in the usual manner. In no case, however, will it be necessary to entirely remove the nut 17, because, in lieu thereof, the bolt head 20 is removed, preferably after the strain has been taken off from the parts, by turning the nut a few threads.

In the preferred form of construction the interengaging parts of the head end 20 and the head 19 comprise some form of inclined seat or the equivalent, such as corrugations and the like, involving a slight rise or outward movement of the head relatively to the bolt body in disengaging the said head, so that in case the parts are under maximum strain the only feasible and practicable way to loosen the parts is to turn the nut, as described.

The connecting means for the bolt body and the head are as follows:—The head end portion 20 comprises an axial shaft 21 of cylindrical form and of suitable length to extend through the head 19, and which is provided at the outer portion with a pair of radially directed wings 22 that overhang the inner and strictly cylindrical portion 23 of the said shaft 21.

The outer, peripheral edges 24 of the wings 22 are concentric with the axis, having a diameter substantially equal to that of the bolt body 15, and the two side edges 25 of each are directed radially, the wings 22 being thus of fan-tail form.

The inner longitudinal or bottom edge portions 26 of each wing 22, at the junction with the cylindrical, connecting portion 23 of the shaft 21, is in the form of a shoulder that serves as a bearing seat in cooperation with a correspondingly shaped seat 27 in the head 19, and which serve as the active holding parts. The said seats 26 and 27 may be flat, positioned in a radial plane, or may be inclined, as shown.

The head 19, as shown, is square and has the axial portion provided with an opening of suitable form to receive and engage with the bolt body as follows:—the said opening comprises an axially directed main portion 28 having a cylindrical form of side wall to fit the shaft 21 and a pair of radial branches 29 on opposite sides for admitting the wings 22.

The combined opening formed by the main portion 28 and the radial branches 29 is in the form of a key-hole opening, suitable for admitting the shaft 21 and wings 22, and this form of opening extends through the lower part 30 of the head 19, and in the upper part thereof the branches 29 have lateral, circumferential extensions 31, in the counter-clockwise direction as viewed from the outer end, that permit of turning the bolt body 15 and provide the seats 27, and open spaces for housing the two wings 22. Rotative movement of the wing 22 in the lateral, circumferential extension 31, in each case is limited by a stop 32 provided on the head 19 at the junction of the seat 27 and the opposite branch opening 29.

The seat 27 is inclined, as mentioned, the inclination in the head being inward towards the stop 32, so that the said stop 32 and the seat 27 combine to form a generally V-shaped pocket for receiving the correspondingly formed cooperating portions of the wing 22 formed by the seat or shoulder 26 and the radial wall 25 of the said wing 22.

Thus, as described, a lifting movement of the bolt body relatively to the head will be required to effect a disengagement of these parts, as mentioned.

In the form shown in Fig. 12 the bolt body 15^a and head 19^a are provided with cooperating seats 26^a and 27^a that are of shallow V-shape instead of being inclined continuously in one direction.

A modification of this form is shown in Fig. 10 in which the seats 26^b and 27^b are rounded to provide for a rocking movement to meet the special conditions shown in the

said figure. Thus the hole 12^b in the outer plate 10^b is out of registration with the hole 14^b in the inner plate 11^b, and the bolt body 15^b is positioned at an angle to the plates. In order to permit the head 19^b to be seated flatwise against the inner plate 11^b the opening 33 for receiving the bolt body 15^b is flared outwardly, as shown, on each side of the medial radial plane.

For ordinary use the form shown in Fig. 14 has certain advantages over that shown in Fig. 5, the difference in structure generally consisting of providing the stop lugs 32^c for limiting the relative rotative movement of the bolt body 15^c and the head 19^c on the said bolt body instead of on the head, the stops 32 on the head being omitted. This simplifies the construction of the head 19^c.

As a detail, the stop lug 32^c is in the form of a rib, one on each side, that extends continuously from the bolt body 15^c, along the connecting shank portion 23^c, up to and so as to merge with the wing 22^c, the engaging edge of the lug or rib being flush with and in continuation of the radial side wall 25^c of the said wing 22^c. Thus the ribs 32^c provide material that serves to resist tensile strain and thereby to reinforce the head end portion of the bolt body 15^c.

The particular construction described also permits of using the head 19^c in the reversed position, as is shown in Fig. 16, which is a convenient arrangement of the parts under some conditions.

I claim as my invention:—

1. In combination, a pair of structural plates having overlapping portions that are provided with rivet holes in registration, and a fitting-up bolt for holding the said plates together during the assembling operations, the said bolt comprising a body that extends through the said holes, a threaded portion at one end for a nut, and a head removably and rotatively mounted on the other end, the said head and other end having interengaging seats that are operative to connect said head and bolt in one position of the head, and said bolt and head being provided with means for limiting the said rotative movement in one direction to engage said seats and in the other direction to disengage them, and the said head being of equilateral, polygonal form, so as to be adapted to be operated by means of a wrench.

2. A fitting-up bolt comprising a bolt body having a head receiving portion at one end and a head removably mounted thereon, the said head receiving portion comprising a shaft portion for being extended through the said head and a pair of radial wings on opposite sides of the outer part of the said shaft portion, the said head being slotted to admit the said shaft and wings and having at one end extensions of the slot for housing the said wings and providing seats for the said wings, stops for limiting the position of the said wings relatively to the said seats, and the said seats and the opposed, cooperating portions of the said wings being inclined so as to increase the holding effect under pressure.

3. A fitting-up bolt as described in claim 2, and the said stops being in the form of integral, longitudinally disposed ribs on the said head receiving portion.

4. A fitting-up bolt comprising a bolt body and a head removably mounted on the said body, the said body having at one end a wing supporting part provided with a plurality of radial wings and a shaft part connecting the said wing supporting part and the adjacent portion of the body, the said head having a slot that comprises an axial portion and radial extensions for admitting the said wing supporting part and wings, and operatively housing the said shaft part, and having unslotted parts intermediate the said extensions provided with seats for receiving the said wings, and being adapted to be brought into registration with the said wings by a relative rotative movement of the parts, means for limiting such rotative movement, and the said means comprising a projection on the said shaft part for engaging with the opposed unslotted part of the head.

5. A fitting-up bolt as described in claim 4, and the said projection being in the form of a rib that extends the entire length of the said shaft part so as to merge at one end with the said adjacent part of the body and at the other end with one of the wings, whereby the material of the said rib in use will serve as a reinforcement of the shaft part for resisting tensile strain.

6. A fitting-up bolt comprising a bolt body and a head, the said bolt body having at one end a shaft that is provided with radial wings, the said head having an opening for admitting the said shaft and wings and having seat structures for being brought into registration with the said wings by a relative rotative movement of the said body and head, and means on the said shaft for cooperating with the said seat structures for limiting such rotative movement.

TREDICK KITTREDGE HINE.