W. T. HOGAN.

BOLTING UP DEVICE.

APPLICATION FILED SEPT. 26, 1918.

1,303,665.

Patented May 13, 1919.

2 SHEETS—SHEET 1.

Fig-1

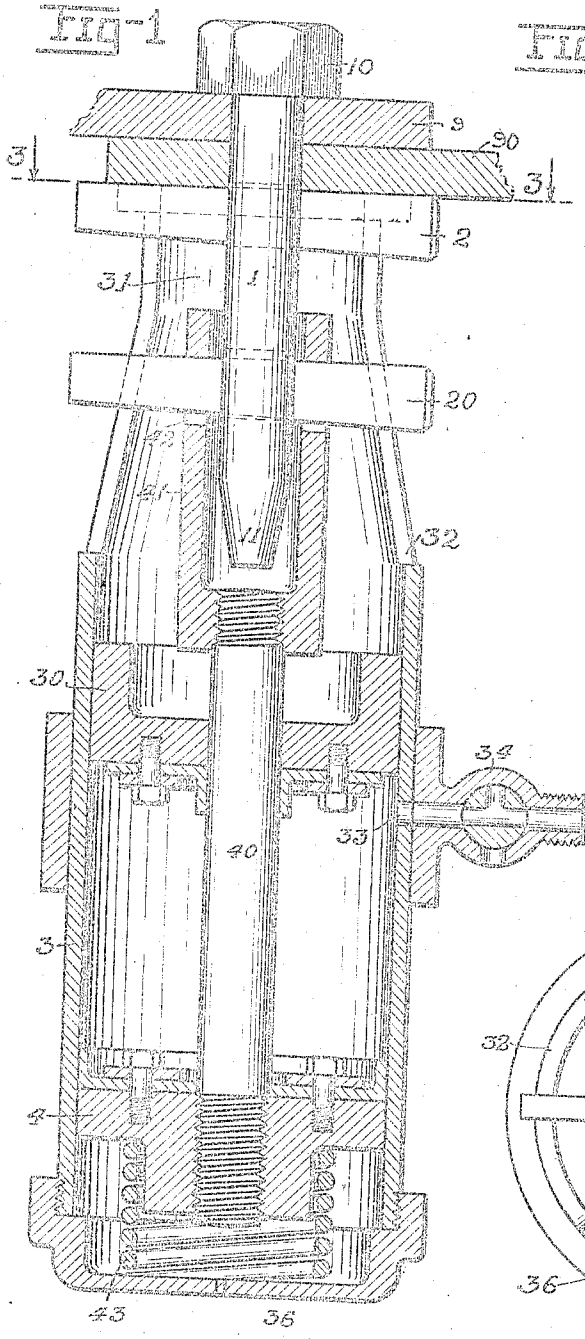


Fig-2

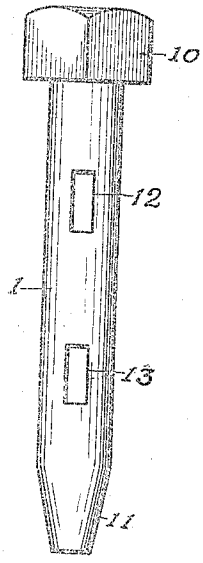
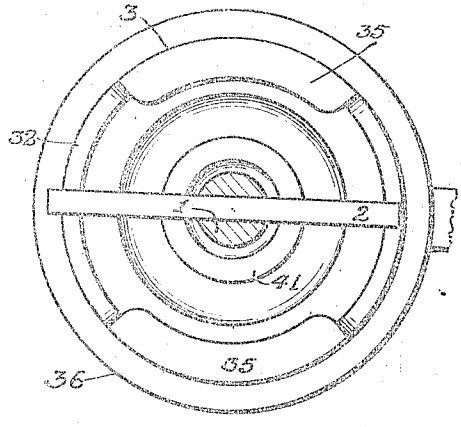


Fig-3



INVENTOR

William T. Hogan.

BY

Henry L. Reynolds.

ATTORNEY

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2 SHEETS—SHEET 2.

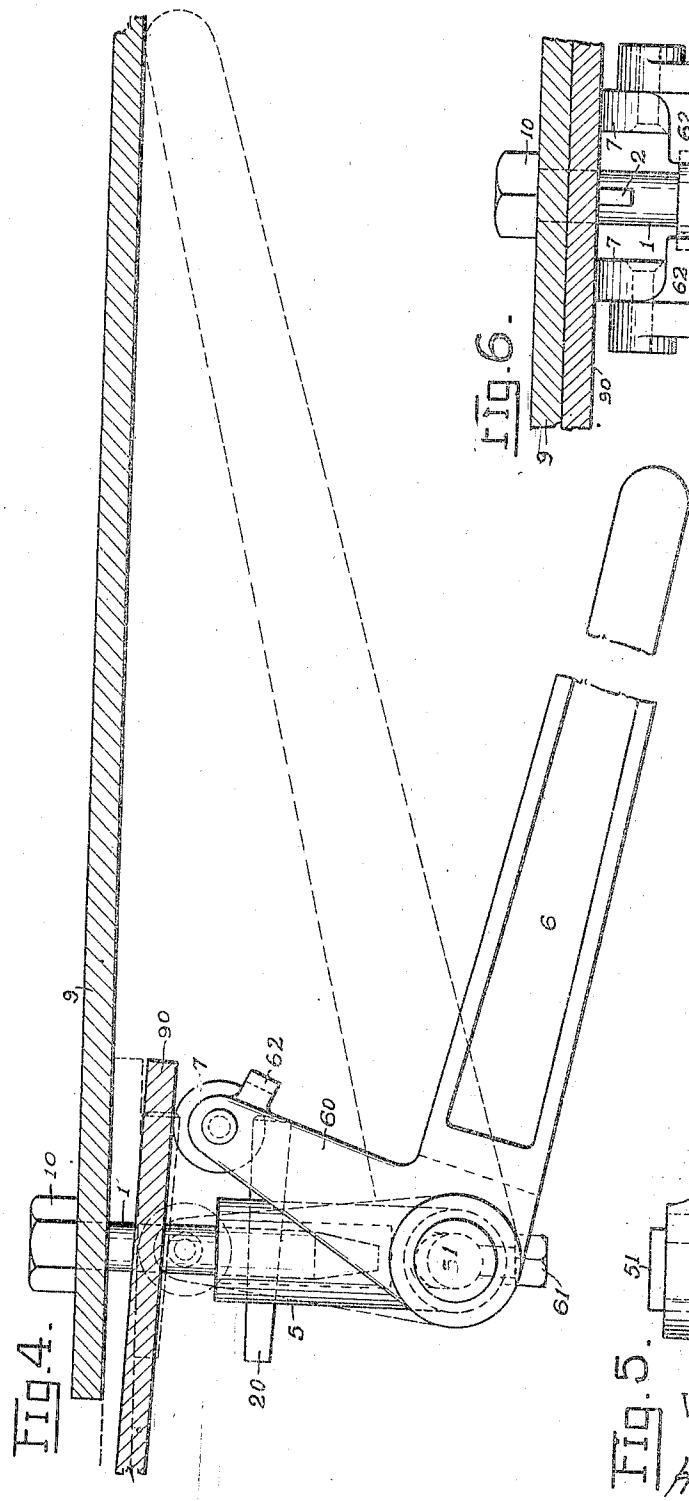


Fig. 4.

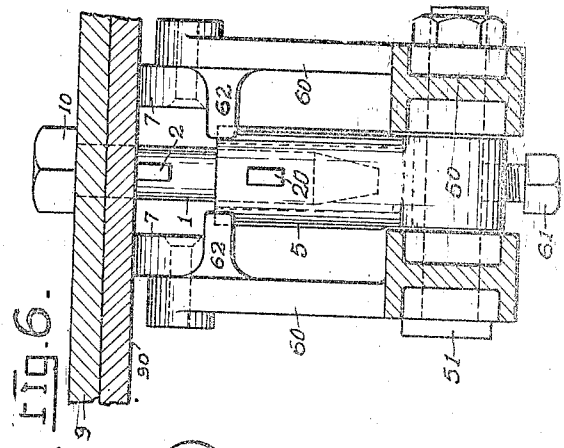


Fig. 6.

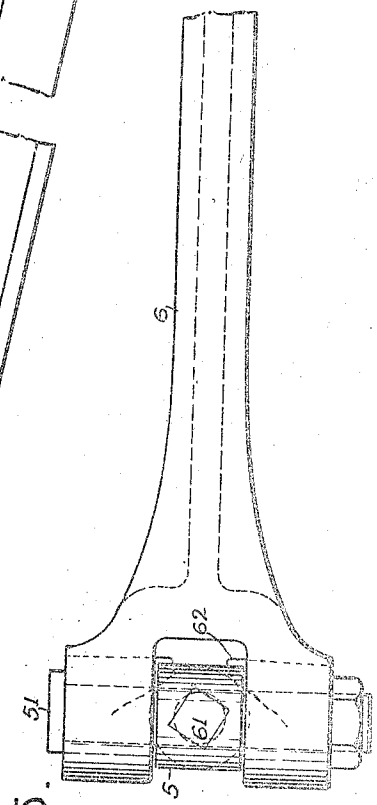


Fig. 5.

INVENTOR

William T. Hogan.

BY

Henry L. Reynolds

ATTORNEY

UNITED STATES PATENT OFFICE.

WILLIAM T. HOGAN, OF SEATTLE, WASHINGTON, ASSIGNOR OF ONE-HALF TO HENRY L. REYNOLDS, OF SEATTLE, WASHINGTON.

BOLTING-UP DEVICE.

1,303,665. Specification of Letters Patent. Patented May 13, 1919.

Application filed September 26, 1918. Serial No. 255,877.

To all whom it may concern:

Be it known that I, WILLIAM T. HOGAN, a citizen of the United States, and resident of the city of Seattle, county of King, and State of Washington, have invented certain new and useful Improvements in Bolting-Up Devices, of which the following is a specification.

My invention relates to an apparatus which is intended for use in connection with the work which in ship building, is referred to as bolting up. It consists of an improved apparatus and means by which plates may be temporarily secured in close contact preparatory to their being permanently secured by riveting.

My invention comprises the means which will be herein illustrated for doing this work and consists of the principal combinations of parts which will be defined by the accompanying claims.

The object of my invention is to provide an improved means for temporarily securing these plates in position preparatory to riveting which will very materially reduce the time required for doing this work, and the consequent expense.

My invention consists in the use of means operating upon a principle and in a manner which enables this work to be done much easier and more rapidly than is possible by the means customarily employed.

The accompanying drawings will illustrate means which I have devised for accomplishing this result, the same being those which I now prefer to use for this purpose. The constructions shown are given, not as in any sense limiting my invention thereto, but as illustrative of the principles employed.

Figure 1 is a longitudinal sectional view of a device for accomplishing this work, in which a power jack, preferably air operated, is employed for forcing the plates securely together as a preliminary to the application of the final holding or securing means.

Fig. 2 is a separate view of one of the bolts employed for this work, the same being taken from a point at right angles to that of the bolt shown in Fig. 1.

Fig. 3 is a section taken upon the plane of the line 3—3 of Fig. 1.

Fig. 4 is a side view, Fig. 5 an outer face view, and Fig. 6 an end view of another form of apparatus employed for drawing plates together, the same being operative by hand through the medium of a lever. The bolt employed is the same as that shown in Fig. 2.

In the operation of ship yards the first step in securing the plates of a ship in place, is to place them in position with holes therein for the reception of the rivets by which they are to be permanently secured, and temporarily secure them in proper position by the use of bolts. These bolts are placed in a certain percentage of the holes and the nuts are turned down so as to draw the plates forcibly together and hold them in this position until rivets may be placed in the other holes and riveted down, after which the bolts are removed and rivets placed in these holes also.

This operation of temporarily securing the plates together by bolts is what is referred to as "bolting-up". This work is very laborious and consumes considerable time. In fact the workmen employed in this one operation far exceed the number of those employed in any other one operation in the constructing of ships.

It is a slow and tedious operation for the reason that the bolts may be long enough so that, even if the plates are somewhat separated, they may be drawn down and held tightly together. To turn up a nut on a bolt through a distance of two or three inches of the length of the bolt, often working in a position which is disadvantageous, requires a great deal of time and is also hard work. In consequence, the number of bolts which one pair of men can secure during a day's work is quite small.

The bolt which I contemplate using for this work is shown in Figs. 1 and 2. This bolt 1 has no threads. Its head 10 may be of any suitable shape. Preferably such a bolt would be provided with an end 11 which is somewhat pointed, this being desirable merely for convenience in inserting it into the hole, and also to enable the bolt to act somewhat as a drift bolt, to insure accurate registering of the holes in the two plates.

In Fig. 1 I have shown two plates, 9 and 90, which plates are provided with holes which match when the plates are properly positioned. Through these holes a bolt 1 is placed. At the time of placing the bolt,

the two plates may be separated a considerable distance. It is necessary that these plates be brought together and secured in accurate and tight contact until they can be permanently secured by rivets.

Each bolt 1 is provided with a key seat, as 12, which is designed for the reception of a key 2. This key seat, as herein shown and as I prefer to make it, consists of a slot which passes through the axis of the bolt from side to side and the key 2 is a flat key, adapted to pass through said slot and also preferably slightly tapering or varying in width, as is clearly shown in Fig. 1.

The position of the slot 12, the same being the one which is nearest the head of the bolt, should be such that its edge nearest to the head 10 is not at a greater distance from the inner surface of the head than the combined thickness of the two plates, 9 and 90, which it is to secure together. Preferably this distance should be a trifle less than the combined thickness of these two plates, as has been indicated in Fig. 1.

It is evident that if the two plates 9 and 90 be drawn firmly together and a key 2 be placed in position such as is shown in Fig. 1 and then drawn snugly home, the key 2 will hold the two plates thus firmly together until the key has been driven out. In this manner the plates may be held as securely together as would be possible by the use of an ordinary bolt.

The bolt 1 should be of such a length as to have a materially projecting end, and this projecting end should be provided with means whereby it may be engaged by some means through which power may be applied so as to draw the plates firmly together preparatory to inserting the locking or holding key 2. The means which may be employed for this purpose are quite varied. I have herein shown two such means, one designed to be operated by fluid under pressure, such as air, and the other operated through the means of a lever by hand.

In Figs. 1 and 3 I have shown a device designed for operation by a fluid under pressure. This fluid would preferably be air. This device has a cylinder 3, in which is mounted for reciprocation, a piston 4, which piston has a rod 40 extending through the inner head 30 of the cylinder and provided upon its outer end with means by which it may be securely connected with the bolt 1. At the point 33 the cylinder is provided with a port for the inlet or discharge of the fluid by which the piston is operated. This may be controlled manually by any convenient means. For this purpose I have shown the use of a three-way valve 34, which may be operated by hand.

As a convenient and practical means for securing the piston rod 40 to the bolt 1, I have shown a short cylinder or sleeve 41, which is fixedly secured to the piston rod and the bore of which is sufficient to fit over the bolt 1. This sleeve has two key ways or holes 42 at opposite sides, of such shape as to fit a key 20, which key is substantially and may be identically, the same as the key 2, by which the plates are held after being drawn together. The bolt 1 has a second key way 13 placed outwardly from the key way 12 for the reception of this second key.

The cylinder 3 is provided with extensions 31 which form feet, adapted to engage the surface of the plate 90 and serve as thrust members through which the power is applied to the plate 90 to force it strongly against the plate 9. The head 10 of the bolt 1 engaging the opposite or outer surface of the plate 9, acts to resist the strain in the opposite direction. I have shown the feet 31 as herein consisting of a segmental portion of the cylinder 3. I have shown these as having their outer ends provided with an inwardly extending flange 35. The purpose of this is merely to furnish a somewhat larger surface for engagement with the plate 90. These feet 35 engage the plate at opposite sides of the rivet hole. Between them are openings 32 through which the bolt is accessible for the insertion of the keys 2 and 20.

To insure projection of the piston rod and the socket member 41 carried thereby, as soon as the fluid pressure is removed, I have employed a helical spring 43 which is placed between the outer surface of the piston 4 and the cap 36 of the cylinder.

In the operation of this device the bolt 1 would be put through the holes of two plates by the man at one side thereof. At the other side of the plate a second man, with the power jack above described, or some equivalent mechanism, would connect the socket member 41 with the end of the bolt by means of the key 20. The fluid pressure would then be admitted to the cylinder. This would powerfully force the two plates together and make it possible to insert the holding key 2.

The position of the key way 12, as before stated, would be made to correspond with the thickness of the plates which are to be secured together. If there are slight variations in the thickness of the plates, either due to inequality of rolling or to any other conditions, a washer or washers may be employed to take care of this difference. Upon insertion of the holding key 2 it should preferably be slightly driven in place. It will therefore hold the plates securely together after the fluid pressure jack has been removed, as it would be immediately upon driving the key 2 well home. When the fluid pressure is exhausted from the cylinder, the spring 43 will cause withdrawal of the cylinder and projection of the piston

rod. The key 20 will then be removed and the apparatus is ready for application to the next bolt.

The apparatus shown in Figs. 4, 5 and 6, is a hand device in which the power for pressing the plates together is secured through the operation of a lever. The member 5 is a socket member equivalent to the member 41 shown in Fig. 1. This is identical in construction with the member 41 excepting that at one end it is provided with a head 50 through which is a transverse hole adapted to receive the bolt 51 by which it is pivotally connected with the operating lever.

The operating lever as shown consists of the lever arm 6 and the two thrust arms 60, these two being placed approximately at right angles to each other. The two thrust arms 60 are separated from each other enough so that they lie, one at each side of the socket piece 5. The pivot bolt 51 passes through the point of intersection of these two arms and thus permits the socket member 5 to swing about this point.

At the outer ends of the thrust arms 60 I prefer to pivotally mount friction rollers 7. The length of these thrust rods 60 is adjusted so that the distance from the pivot axis of the bolt 51 to the outer surface of the friction wheels 7, corresponds with the distance from the pivot axis through the socket member 5 and the bolt 1 to the adjacent surface of the plate 90 when the two plates have been drawn securely together.

For convenience in adjusting this relationship I may connect the socket member 5 to the lever member 6 in such manner as to adjust its length. This may be done by using an adjusting screw 61 which is placed in the outer or pivot end of the socket member 5, and engages the pivot bolt 51. Any other suitable means for such adjustment may be employed.

In using this device the lever 6 is swung back at the time of connecting the socket member 5 with the bolt 1. As shown in Fig. 4, this may be done so as to accommodate for a considerable separation of the plates. In Fig. 4 the two plates are shown in full lines as being quite materially separated, this being a condition which may exist prior to the application of the device to draw them together.

By throwing the lever 6 toward the plate it will assume a position corresponding, at least approximately, to the position shown by the dotted lines. This will force the plates securely together and permit of the insertion of the holding key 2. After this has been done the key 20 may be removed and the device applied to the next bolt.

The position of the two arms 6 and 60 may be so chosen that at the time the arm 6 contacts with the plate 9 the arm 60 will be on or near, possibly a trifle past, the dead center, in which latter case the pressure between the parts will resist throwing backward of the arm 6. On approaching this position the lever acts after the nature of a toggle and is capable of exerting a very strong effort by the application of only a moderate pull on the lever 6.

To prevent the lever passing too far beyond this point in case the plate 9 was curved or shaped in such a way as to not act as a stop, I have shown lugs 62 extending from the outer ends of the arms 60, so as to engage with the socket member 5 and prevent swinging too far beyond the dead center.

It will be evident to any mechanic that various devices which will exert a strong pull and which may be operated quickly, may be designed for accomplishing the purposes intended for the devices herein illustrated. These devices as illustrated are given only as examples of mechanisms which may be employed for this purpose and mechanisms which I now prefer to use.

It is evident that this plan of securing plates together in which bolts and keys are employed instead of bolts and nuts, permits of inserting and securing a very much greater number of bolts than would be possible where ordinary bolts are used and the nuts must be turned down through a considerable distance. The use of this old and common type of bolt with a nut necessitates one man to hold the bolt at one side and another man to turn the nut upon the other side of the plates and the use of considerable time for each bolt. It has been stated by competent men connected with ship building, that the application of one hundred and sixty bolts is considered an average day's work for two men working together under the average working condition. By the use of the mechanism herein described a very much greater number of bolts may be secured in the same length of time.

What I claim as my invention is:

1. A bolting-up device for plates comprising a bolt having a key seat and a key therefor adapted to hold the plates when drawn together, and means for applying power through said bolt to draw the plates together so that the key may be inserted in said seat.

2. A bolting-up device for plates comprising a bolt having a key seat and a key therefor adapted to hold the plates when drawn together, and means for engaging the bolt outwardly of its key seat to apply power to the plates to force them together so that the key may be inserted in said seat.

3. A bolting-up device for plates comprising a bolt having a key seat and a key adapted to enter said seat to hold the plates when drawn together, said bolt having a second key seat nearer its end, a power de-

vice having a socket member adapted to fit over said bolt and a key way adapted to register with the outermost key way in the bolt, and a key adapted to enter their key ways to secure said socket piece and the bolt together.

4. A bolting-up device for plates comprising a power device and a bolt provided with means for interlocking engagement and ready disengagement with said power device, and also having a key-receiving slot positioned to engage a key inserted therein with an outer face of one of the plates when the plates are drawn into contact, and a key adapted to enter said slot in the bolt to hold the plates in contact.

Signed at Seattle, Washington, this 19th day of September, 1913.

WILLIAM T. HOGAN.