A. O. MATHISON.

WORK HOLDING DEVICE.

APPLICATION FILED JAN. 29, 1919.

1,346,504.

Patented July 13, 1920.

2 SHEETS—SHEET 1.

Fig. 1

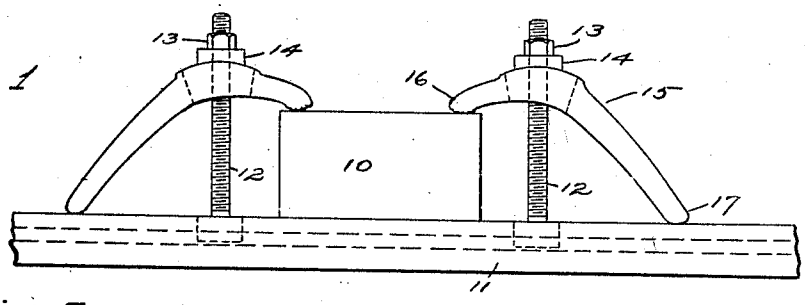


Fig. 2

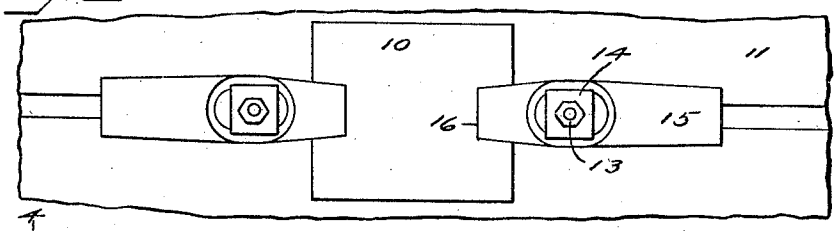


Fig. 3

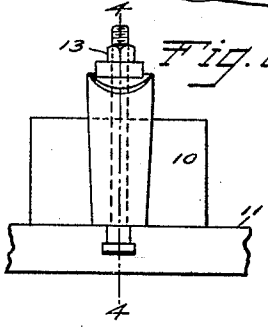
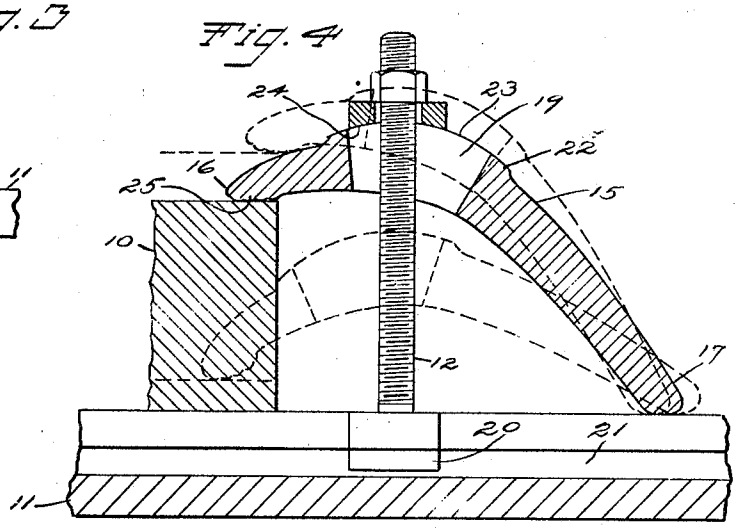


Fig. 4



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2 SHEETS—SHEET 2.

Fig. 5

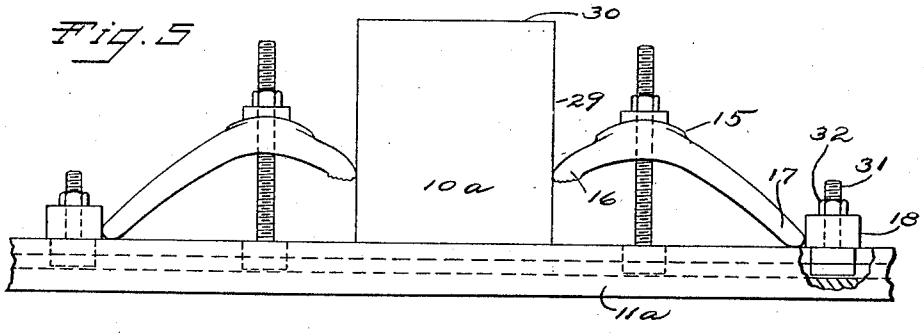


Fig. 6

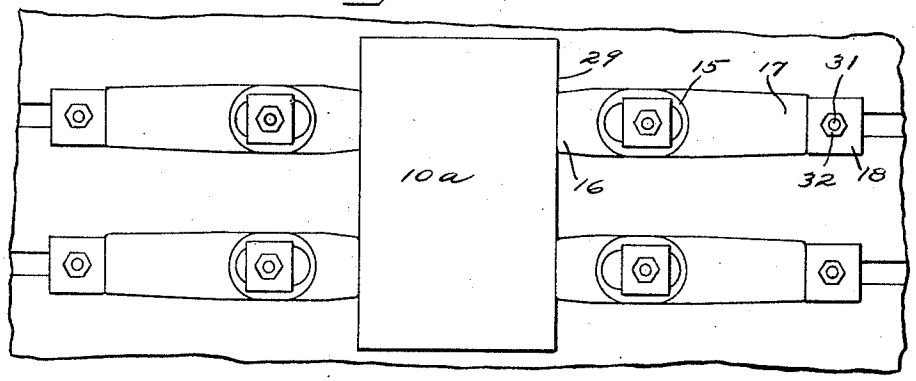


Fig. 7

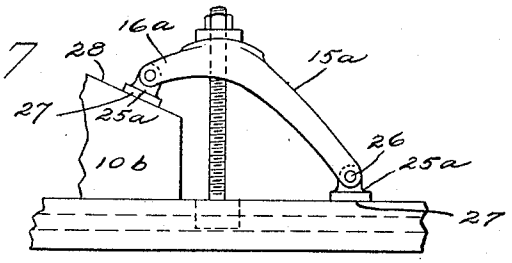
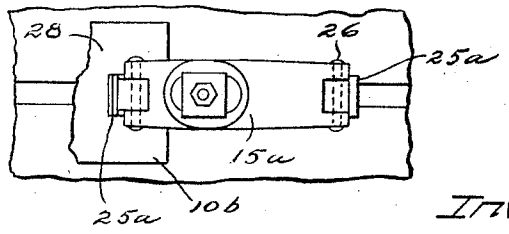


Fig. 8



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UNITED STATES PATENT OFFICE.

ALBERT OLAI MATHISON, OF NEW BRITAIN, CONNECTICUT.

WORK-HOLDING DEVICE.

1,346,504. Specification of Letters Patent. Patented July 13, 1920.

Application filed January 29, 1919. Serial No. 273,735.

To all whom it may concern:

Be it known that I, ALBERT OLAI MATHISON, a citizen of the United States, residing at New Britain, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Work-Holding Devices, of which the following is a specification.

My invention relates to improvements in work holding devices, and the object of my improvement is to produce a device that is operative for the same general purpose as the work holding combination shown in my Patent No. 1,281,624, October 15, 1918, and the devices in common use of the form using a strap and bolt, one of the ends of the strap bearing on the work and the other end serving as a fulcrum in bearing engagement with a block or packing piece, and which differs from such devices in common use in that because of the peculiar form and construction work pieces of different heights, extending over a considerable range in size, can be firmly and reliably clamped without change in the parts or in the general arrangement of the work holding device structure, and without the use of a block or packing piece.

In the accompanying drawing:—

Figure 1 is a front elevation showing a pair of my improved work holding devices in use for holding a piece of work on the bed of a machine, the bed being in part broken away.

Fig. 2 is a plan view of the same.

Fig. 3 is an end elevation of the same.

Fig. 4 is a sectional view on an enlarged scale on the line 4—4 of Fig. 3.

Fig. 5 is a front elevation on the same scale as Fig. 1 showing a set of my improved work holding devices in use for holding a piece of work by side pressure, leaving the entire top surface clear and unobstructed for planing or finishing.

Fig. 6 is a plan view of the same.

Fig. 7 is a side elevation of a modified form of work holding device.

Fig. 8 is a plan view of the same.

My improved work holding device is adapted to hold a piece of work 10 on the bed 11 of a planer or other machine structure or on the face plate of a lathe, is held in operative, clamping position by means of a bolt 12 and nut 13, preferably with a saddle piece 14 between the nut 13 and the device, and comprises a single piece 15 of peculiar form that serves as the work holding device proper.

One end 16 of the device 15 bears upon the work 10, as shown in Fig. 1, or against the side of the work 10^a, as shown in Fig. 5, and the other end 17 bears upon the bed 11 only, as shown in Fig. 1, or bears on the bed 11 and also against a stop device 18, as shown in Fig. 5, according to the nature of the work that is held in working position by the clamping devices, a plurality of such devices being employed under the usual conditions of use.

The clamping bolt 12 extends upwardly from the bed 11 through a slot 19 in the device 15, having the head 20 engaged with the T-slot 21 of the usual form in the said bed 11.

The slotted portion 22 of the device 15 is positioned intermediate the ends 16 and 17, the said device 15 being operated as a lever of the third class.

The device 15 that serves as the work holding device proper or the clamp is generally in the form of an arch, is curved from end to end, the fulcrum end 17 being rounded for engaging with the bed 11 in different positions, and the work engaging end 16 being in the form of a foot, of generally rounded form and having a roughened surface for engaging with the work 10.

The slot 19 is of appreciable length for permitting of shifting of the position of the bolt 12 therein for adjustment to different sizes of work and for permitting of proper fitting of the parts in different positions the upper periphery 23 of the slotted portion 22 and the under surface 24 of the saddle 14 that rides thereon are similarly, uniformly curved, as shown.

The parts are constructed and arranged so that with a clamp having an overall length of about eight inches the clamping bolt would be operative to hold the clamp with both ends bearing on the bed or with work held under the working end 16 having a thickness of about four inches.

Also, in all positions within the range mentioned the position of the saddle 14 will be appreciably higher than the level of the part of the work engaging foot 25 of the work engaging end 16, so that there will in all cases be an effective downward pressure of the foot 25 against the work.

In detail, the work holding device proper 15 comprises structurally and operatively

the following features:—Considering the position of use, there are two generally downwardly directed branches, the one, on one side, terminating in the work engaging end 16, and the other, on the other side, terminating at the fulcrum 17, and being appreciably longer than the first branch mentioned, and furthermore, serving as the power arm. These two branches meet at the apex portion, which corresponds to the slotted portion 22, and which serves as the power receiving portion for receiving the clamping pressure.

The first mentioned branch, which may be designated as the work engaging branch, is relatively short; the power arm is relatively long and is substantially straight; and the two branches are so related that they meet in all positions of use at an obtuse angle. The curved form given to the different parts of the contour, as shown, are features merely of design.

Because of the construction and arrangement of the parts, as described, in use a toggle effect is obtained that results in an effective holding of the work.

By having the power arm long and substantially straight a minimum of angular movement, with a corresponding minimum of shifting of the bearing for the clamping devices suffices for the range of work provided.

In the modification shown in Figs. 7 and 8 the clamp 15^a is provided at each end with a swinging foot 25^a that is pivotally connected to the body portion by means of a pivotal pin 26 and has on the end face a bearing face or bearing surface 27 of appreciable area. This arrangement provides for obtaining a surface contact, as distinguished from a line contact, and, particularly as applied to the work engaging end 16^a, is adapted to provide such surface contact with surfaces that deviate from the horizontal or are inclined relatively to the top surface of the bed 11, as in the case of the inclined top surface 28 of the work 10^b.

When used as shown in Figs. 5 and 6 the devices are used in pairs that operate each as a vise, the members of a single pair cooperating to serve as a single vise, and generally more than one pair would be used, such as the two pairs shown in Fig. 6 for holding the work 10^a by bearing against the side wall 29 thereof. In this case the top surface 30 of the work 10^a is clear and unobstructed, and may be operated on freely.

The fulcrum end 17 bears against the top surface of the bed 11 and also bears against the stop 18.

The stop 18 may be in the form of a block that is held in place by a bolt 31 and nut 32, as shown.

By adjusting the parts so that the work engaging end 16 will be elevated slightly above the bed 11, by reason of the arched form of the clamp 15, an effective clamping pressure is readily applied to the work, that is as to direction downwardly and inwardly inclined such as to approach a toggle effect. With a pair of such devices arranged as described and coöperating a powerful clamping hold on the work will be obtained with no auxiliary devices provided other than the stops 18.

The periphery 23 of the wall portion for the slot 19 and the under portion 24 of the saddle 14 are similarly rounded so as to fit one another in all positions throughout the range provided and the curvature of these surfaces 23 and 24 is so related to the operation of the clamp with the bearing end 17 serving as a fulcrum that a substantially horizontal seat is provided for the clamping nut 13 on the upper face of the saddle 14 in all of the different positions of the parts.

I claim as my invention:—

A work holding device operating as a lever of the third class in coöperation with a clamping device in the form of a bolt and nut, comprising a work engaging branch and a power arm branch that meet at an angle at an apex portion that is slotted and rounded for receiving the clamping means, and in all positions of use the said power arm branch being appreciably elongated relatively to the said work engaging branch and positioned relatively to the said work engaging branch so that the said angle is an obtuse angle.

ALBERT OLAI MATHISON.