(No Model.)

J. THOMSON.

BENCH VISE.

No. 255,700. Patented Mar. 28, 1882.

Fig. 1.

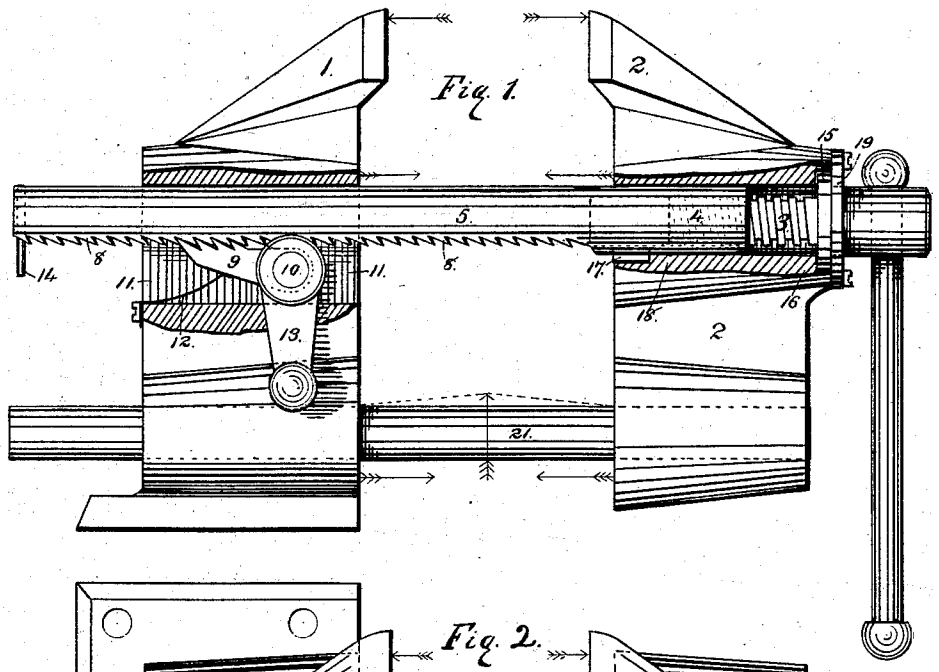


Fig. 2.

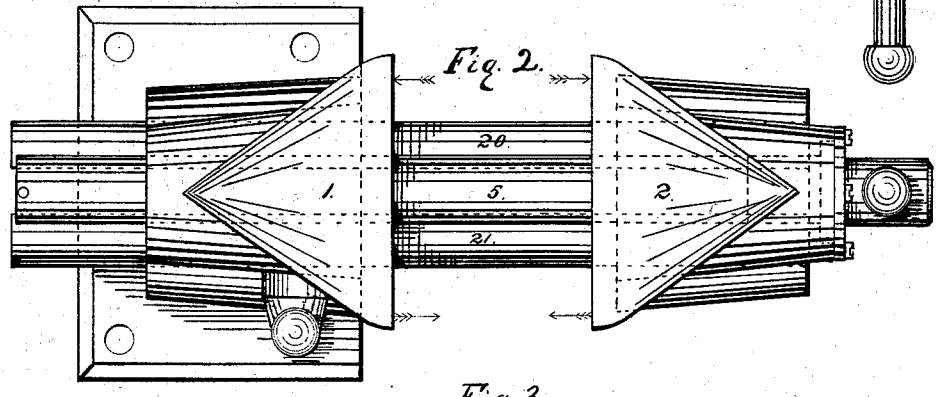


Fig. 3.

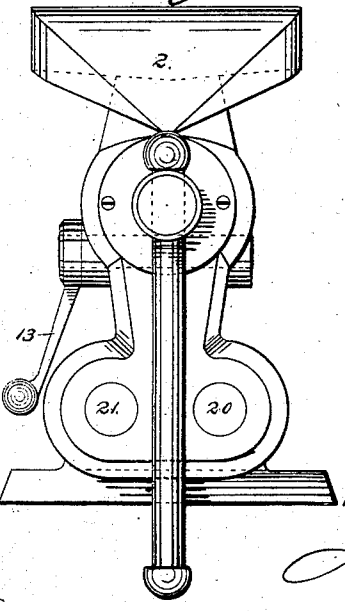


Fig. 4.

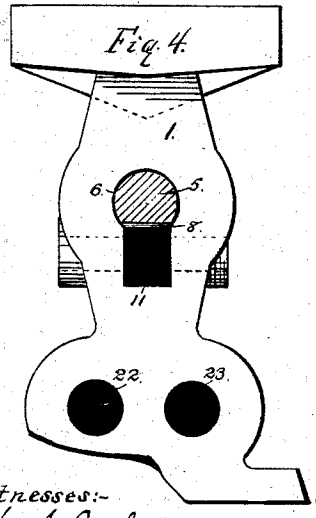


Fig. 5.

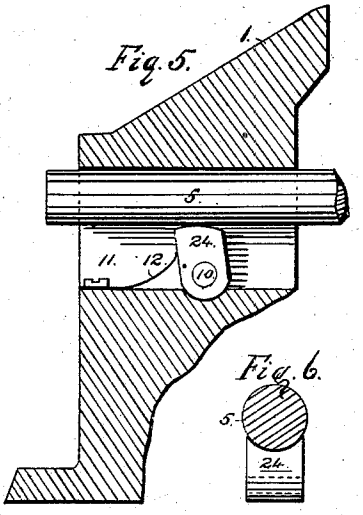


Fig. 6.

Witnesses:-
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UNITED STATES PATENT OFFICE.

JOHN THOMSON, OF BROOKLYN, NEW YORK.

BENCH-VISE.

SPECIFICATION forming part of Letters Patent No. 255,700, dated March 28, 1882.

Application filed January 9, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOHN THOMSON, a citizen of the United States, residing in the city of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Bench-Vises, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to what are known as "parallel screw-vises," and has for its object the production of a vise of this class which will be stronger, lighter, more rigid and compact in structure, which can more quickly and readily be made to accommodate itself to the varying sizes of the work to be clamped, and which will be more powerful in its action than those heretofore produced.

To that end the invention consists in certain details of construction and combinations of parts, all of which will be hereinafter fully set forth, and pointed out in the claims.

In said drawings, Figure 1 is a side elevation of a parallel vise embodying this invention, the jaws being broken away in places to show the interior mechanism. Fig. 2 is a plan view, and Fig. 3 a front elevation, of the same. Fig. 4 is a front elevation of the back jaw, the ratchet-rod being shown in section and the crank-arm of the pawl being removed. Figs. 5 and 6 illustrate modifications to be hereinafter referred to.

As is usual in screw-vises of this class, the jaw 1 is secured to the bench or other solid support, and the jaw 2 is caused to move bodily to and from the jaw 1, the two always remaining substantially parallel.

In screw-vises of this class as heretofore constructed the screw, which is of considerable length, passes loosely through the movable jaw and works in a nut formed in or just in rear of the fixed jaw, and the jaws are moved to and from each other only by the action of the screw. This means of opening and closing the jaws is necessarily slow, and when, as is frequently required, the spread of the jaws has to be changed considerably, it occasions delay and useless expenditure of labor. To avoid this slow process and to provide for the rapid adjustment of the jaws to work of varying sizes the screw 3 is made shorter than usual and works in a nut, 4, tapped to a suitable depth in the end of the sliding rod 5, that connects the two jaws. The rod 5, which in the present instance is shown as round, but which may be polygonal, slides freely back and forth in a bearing, 6, formed in the jaw 1, the end which is formed to constitute the nut 4 entering a corresponding bearing, 7, formed in the jaw 2. One side of the sliding bar 5 is preferably flattened, as clearly shown in Fig. 4, and is provided with a series of ratchet-teeth, as 8, which engage with a pawl, 9, that is housed in a recess, 11, formed in jaw 1, just below the bearing of rod 5, said pawl projecting from a stud, 10, that extends inside of the jaw-body, where it carries a crank-arm, 13. The pawl is held in engagement with the ratchet by a spring, 12, but can be readily withdrawn from such engagement, when desirable, by a proper movement of said crank-arm 13.

From the foregoing it will readily be apparent that by a proper movement of the pawl 9 the jaws may be quickly adjusted with respect to each other by a sliding movement, and when so adjusted the slow and powerful movement necessary to secure the work firmly may be accomplished by the usual rotary movement of the screw. Thus when the jaws require to be adjusted to receive a piece of work of large dimensions, it is only necessary to operate the crank-arm 13, so as to disengage the pawl 9 from the ratchet 8, when the jaw 2 is free to be moved to any desired distance from the jaw 1, the pin 14 serving to prevent the bar 5 from being entirely withdrawn from its bearings. The jaws being set at the required relative distance apart, the crank-arm 13 is released to permit the pawl to engage with the ratchet and suspend any further outward movement of the bar 5. If the screw 3 is now properly rotated, it will be drawn into the nut 4 in the end of rod 5, thus slowly shortening said rod; and as its fixed collar 15 impinges against the bearing 16 of the jaw 2, and the pawl 9 at the same time locks the jaw 1 to the rod 5, the shortening of said rod will consequently cause the jaws to be slowly and powerfully drawn together to clamp the work very firmly between them. Since in this vise as ordinarily operated the screw 3 is required only to move the jaw a very short distance, it can be made of

fine pitch, thus making the vise very powerful in its nipping action. The reverse movement of the screw to release the nip upon the work will be sufficient to provide for the subsequent nipping action, while it frees the parts to admit of the quick adjustment. Sufficient amplitude of action is given the screw in all cases, so that with the jaw set to approximate a certain average of work it may then be operated, as in the case of an ordinary screw-vise, by means of the screw alone. This feature adapts the vise for clamping a yielding substance, as a coiled spring, which would not be the case were this action limited.

When the rod 5 is of round form it is prevented from turning with the screw by means of the spline or feather 17, which extends into a groove or slot, 18, in the jaw 2.

The screw 3 is prevented from being withdrawn from jaw 2, either when its action is reversed or when the jaws are being separated, by the cap 19, placed outside of collar 15 and secured by screws to the jaw 2. The cap 19 is placed upon the hub of screw 3 before securing the hand-lever to position, and hence is removable from the hub of the screw only by detaching said hand-lever.

The jaws 1 2, as will readily be seen, can be brought together to adapt the vise to nip a piece of work of small size by simply pushing jaw 2 inward, the ratchet-teeth in such case sliding idly past the end of the pawl. By this construction the screw and strain bearing surfaces are incased, and hence protected from dust and filings. The jaws 1 2 are sustained in their parallel relation to each other both vertically and horizontally by the guide-rods 20 21, which are rigidly set in the jaw 2, but which slide freely in bearings 22 23 in the jaw 1.

When a piece of work or other material that may yield unevenly under pressure is being clamped the strain upon the parts tends to throw the jaws out of their vertical parallel relation, the direction of the forces exerted in such case being indicated by the arrows, Fig. 1.

The rods 20 21 are located at a distance from rod 5, from center to center, considerably greater than the distance of the clamping-faces of the jaws from said rod, and, being made of hard rolled wrought-iron or steel and having bearings of considerable extent in the jaw 1, they are sufficiently rigid to successfully resist the strain to which they are subjected and substantially preserve the parallel relation of the jaws.

It should be borne in mind that the clamping-faces, or the center of the part being clamped, constitutes a fulcrum acted upon by the power at rod 5, and restrained from vertical deflection by the rods 20 21.

When a piece of work is clamped out of center, or at the extreme edges of the jaws, the tendency (in addition to that of the vertical parallel) is also to throw the jaws out of their parallel relation horizontally, the direction of this strain being indicated by the arrows in Fig. 2. Such a double or cross strain is the severest test to which a vise is subject, causing an additional torsional effect upon the jaws. It will readily be seen that this tendency is counteracted by the two slide-bars 20 21 much more effectually than by the single large bar heretofore used, even though the former are of small size and contain considerably less material than the latter.

In Figs. 5 and 6 is shown a friction-clutch which may be substituted for the pawl 9 and ratchet 8. The clutch 24 is fixed upon a shaft, as 10, the same as the pawl 9, and is thrown out of engagement with the rod 5 in the same manner. The clutch is, however, set so that it bears against the solid wall of the recess 11, instead of entirely upon the shaft 10, as does the pawl. When the rod 5 is slid in the direction for closing the jaws the clutch is not called into action; but upon any attempt to move the rod in the opposite direction it is locked by the action of the clutch.

Fig. 6 shows the end of the clutch 24 as made slightly concave, so as to come into contact with more of the surface of rod 5.

If it is found desirable, the end of the clutch and the lower side of the rod may be serrated or milled, so as to insure a positive bite between them.

It will readily be seen that the double guide-rods 20 21 may be used to advantage in vises provided with an ordinary screw or in vises operated by other means than a screw, and also that the devices herein described for operating the jaws may be used to advantage in vises having only a single guide-rod or a tail-piece cast solid with one of the jaws.

What I claim is—

1. The combination of the jaws, as 1 2, the guide-rods 20 21, rigidly attached to one of the jaws and sliding in the other jaw, the sliding rod, as 5, having bearings in both jaws, and provided with the nut, as 4, and ratchet, as 8, with the pawl, as 9, and screw, as 3, and means for operating said pawl and screw, substantially as described.

2. The combination of the jaws, as 1 2, a guide-rod rigidly secured to one jaw and sliding in the other, a sliding rod, as 5, having bearings in both jaws, a mechanism for locking said rod 5 in different positions in one of the jaws, and a screw and nut, as 3 4, and means for operating said screw and nut, substantially as described.

3. The combination of the jaws, as 1 2, a guide-rod rigidly secured to one jaw and sliding in the other, a round sliding rod, as 5, having bearings in both jaws and provided with a feather, as 17, for holding it in position, a mechanism for locking said rod 5 in different positions in one of the jaws, a screw and nut, as 3 4, and means for operating said screw and nut, substantially as described.

4. The combination of the jaws, as 1 2, a

guide-rod rigidly secured to one jaw and sliding in the other, the sliding rod, as 5, having bearings in both jaws, and provided with the nut, as 4, with the screw, as 3, having shoulder 15, and the cap, as 19, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JOHN THOMSON.

Witnesses:
J. A. HOVEY,
A. N. JASBERA.