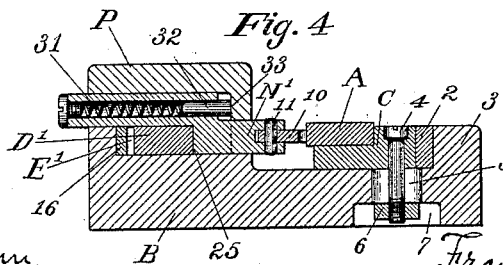
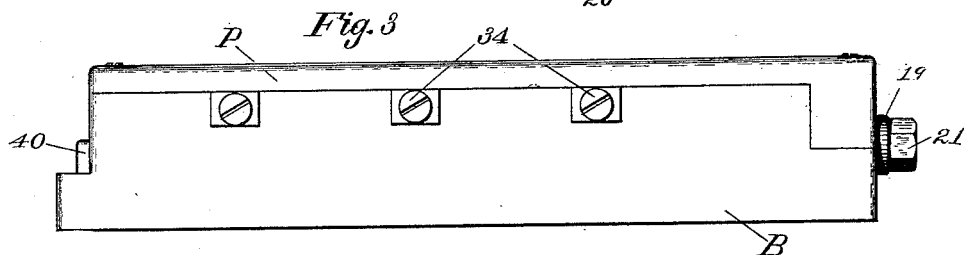
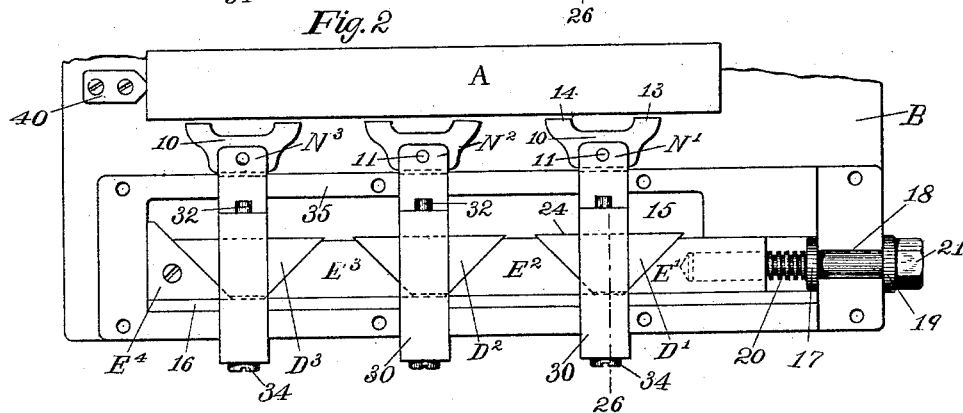
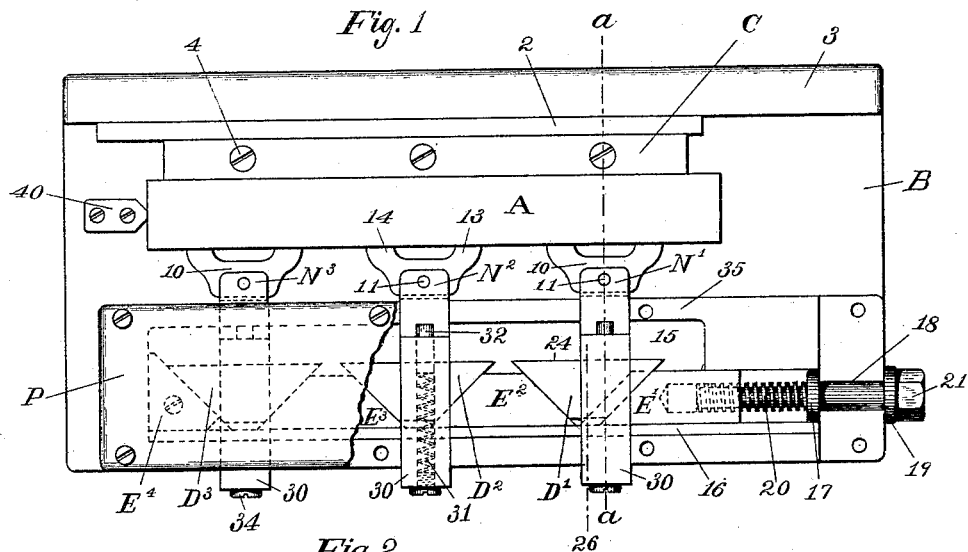


(No Model.)

F. H. RICHARDS.
MILLING MACHINE VISE.

No. 419,072.

Patented Jan. 7, 1890.



Witnesses:
H. L. Reckard
L. E. Hermann.

Inventor:

Francis H. Richards

UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT, ASSIGNOR TO ECKLEY
B. COXE, OF DRIFTON, PENNSYLVANIA.

MILLING-MACHINE VISE.

SPECIFICATION forming part of Letters Patent No. 419,072, dated January 7, 1890.

Application filed December 6, 1888. Serial No. 292,846. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Vises for Milling-Machines, of which the following is a specification.

This invention relates to vises or work-holders for use on milling-machines, metal-planers, and multiple drills, and on other machines in which the pieces to be operated upon should be simultaneously clamped at several points in the length thereof, the object being to furnish such a vise in which the several clamps may be operated from one screw or spindle.

In the drawings accompanying and forming a part of this specification, Figure 1 is a plan view, with the vise-cover removed, of a vise embodying my improvements; Fig. 2, a plan view of a portion of the bed-plate and the clamp-moving devices; Fig. 3, a view in front elevation, and Fig. 4 a vertical section on line *a a* of Fig. 1.

Similar characters designate like parts in all the figures.

The bed-plate of the vise is designated by B, and is preferably furnished with a supplemental bed or adjustable jaw C, on which to place the piece A to be operated upon. Said jaw C is backed up by a blocking-piece 2, which is to be changed to accommodate various widths of pieces A, and the blocking 2 is supported against lateral movement by the abutment 3 of the bed-plate. The jaw C is or may be held down by screws 4, which pass through slots 5 and are furnished with nuts 6, adapted to slide in the chambers 7, formed in the under side of the bed-plate.

For clamping the bar or piece A against the jaw C, I employ a series of clamp-jaws which are operated by a series of co-operating thrust devices, in which series the first said device operates the first jaw, and at the same time transmits force to the second device, and this to the third, and so on to the end of the series.

In the drawings, N designates any one of the clamp-jaws without choice, these being particularly referred to as N', N², &c. Other duplicated details are referred to in the same manner. Each clamp-jaw N as a means for

lessening the number of jaws required in any particular case has on the inner end thereof a swivel-jaw 10, pivoted in the center thereof at 11 in a slot 12, formed in said sliding jaw N. Thus the pressure of the jaw N is transmitted to the bar A at two points 13 14, and only half as many jaws N are required as would be the case if each said jaw bore directly on said bar. The forward part of the bed B is channeled, as at 15, to receive a series of thrust-blocks D and a corresponding series of wedges E, through which said blocks are operated. Forward of the wedges E, I usually place a steel or bronze shoe 16, (especially when the bed B is made of cast-iron,) on which the wedges may slide and to reduce the friction. For operating the first wedge or actuating-slide I make a screw-thread therein and provide a powerful screw 20, which is journaled in the bed-plate at 18 between collars 17 and 19 and has a head 21, whereby to turn the screw. By this or equivalent means a longitudinal movement in either direction may be imparted to the first wedge E'. The bearing-faces of the said wedges and blocks are made inclined at about forty-five degrees to their lines of movement, and the opposite ends of the same block (or wedge) is inclined in opposite directions. The block D' bears on its parallel side 24 against the shoulder or rear face 25 of the jaw N' and forces said jaw outward until the bar A stops the further movement thereof. At this time any further movement of wedge E' forces the block D' along parallel to its own movement, and thus forces the wedge E² against the block D² to drive forward the jaw N². In like manner any required number of said elements may be operated from the first wedge; but it should be noticed that in practice the proportions of the several parts should be such, including the working-stroke of the jaws N, that the center line 26 of either block D shall not pass beyond the bearing-surface 25 of the jaw, thereby avoiding any tendency of said block to turn out of proper position between the wedges on either side thereof. At the further end of the series from the operating-wedge E' the last wedge E⁴ forms a fixed inclined abutment. The third block D³ having a given amount of longitudinal movement, the block

D² has twice and the block D³ three times that movement. The movement of the respective wedges varies in similar ratio.

For securing greater resistance to their lateral movement, while permitting a free fitting of them, the jaws N are extended forward over the said wedges and blocks, this extension being designated by 30 and containing a spring 31 for retracting the jaw. A plug 32 slides in the spring-receiving hole in said part 30 and bears against the abutment 33 of the cap P, which covers the entire series of jaws and their operating devices. A screw 34 closes the outer end of the said bore in extension 30. By means of this construction the distance 35 may be quite short without permitting the jaws N to be cramped in their ways by the movement under pressure of the blocks D against said jaws, and also the otherwise necessary width of the vise is materially reduced.

In preparing to use the vise the position of jaw C is first adjusted by suitable blocking at 2, so that only a slight movement of the jaws N is required. The piece A being then laid on said stationary jaw, the wedge E' is forced along until all the jaws N are driven out with a force sufficient to properly retain said piece A in place. A fixed stop 40 is usually provided for locating the piece A longitudinally of the vise.

Having thus described my invention, I claim—

1. In a work-holder, the combination, with the bed-plate, of the fixed jaw, the clamp-jaws, the thrust-blocks bearing on said clamp-jaws, wedges intermediate to said blocks, and means, substantially as described, for sliding the wedges and blocks, the abutting surfaces

of the wedges and blocks being inclined to their lines of motion, all substantially as described.

2. In a work-holder, the combination, with the bed-plate having a fixed jaw, of the clamp-jaws, the blocks D, wedges E, and means, substantially as described, operating the wedges and blocks, said blocks and the intermediate wedges having their opposite ends inclined in opposite directions, substantially as described.

3. In a work-holder, the combination of a bed-plate having cap P, the jaw N, means, substantially as described, adapted to force out said jaw, and the spring in said jaw arranged to retract the same, substantially as described.

4. In a work-holder, the combination of the bed-plate, the jaws N, having extensions 30, the series of blocks D, bearing on the faces 25 of said jaws, and wedges, substantially as described, operating said blocks from the movement of the first wedge, substantially as described.

5. In a work-holder, the combination of the fixed jaw, the movable jaws arranged to move crosswise to the fixed jaw, the screw arranged to actuate the slide lengthwise to said fixed jaw, and intermediate blocks and wedges, substantially as described, all coacting substantially as described.

6. The combination, with a bed-plate and the sliding jaw, of the fixed inclined abutment E⁴, the thrust-block D³, and the wedge E³, all substantially as described.

FRANCIS H. RICHARDS.

Witnesses:

SAML. W. POWEL,
HENRY L. RECKARD.