(No Model.)

# F. H. RICHARDS.

## MILLING MACHINE VISE.

No. 419,885. Patented Jan. 21, 1890.

*Fig. 1*

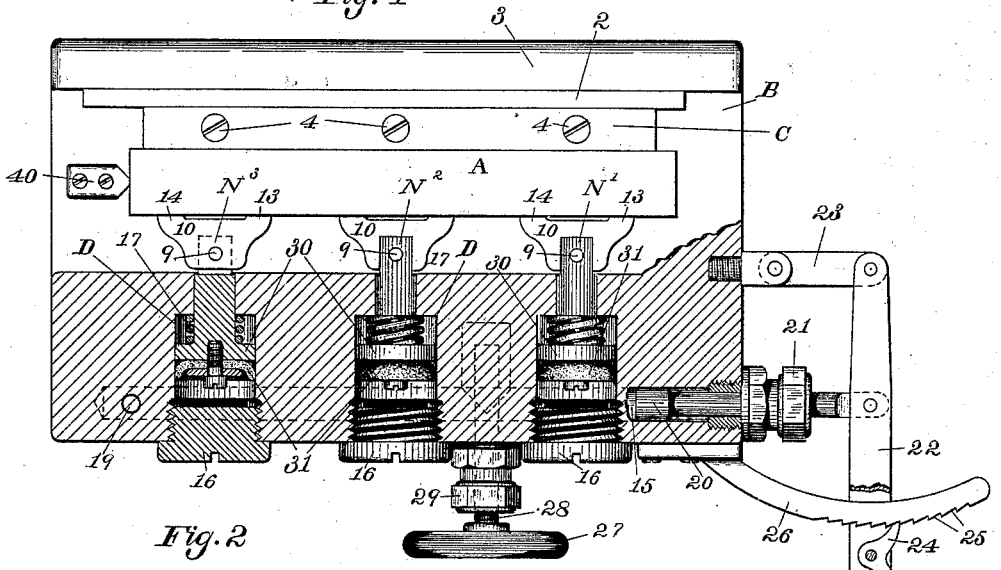



*Fig. 2*

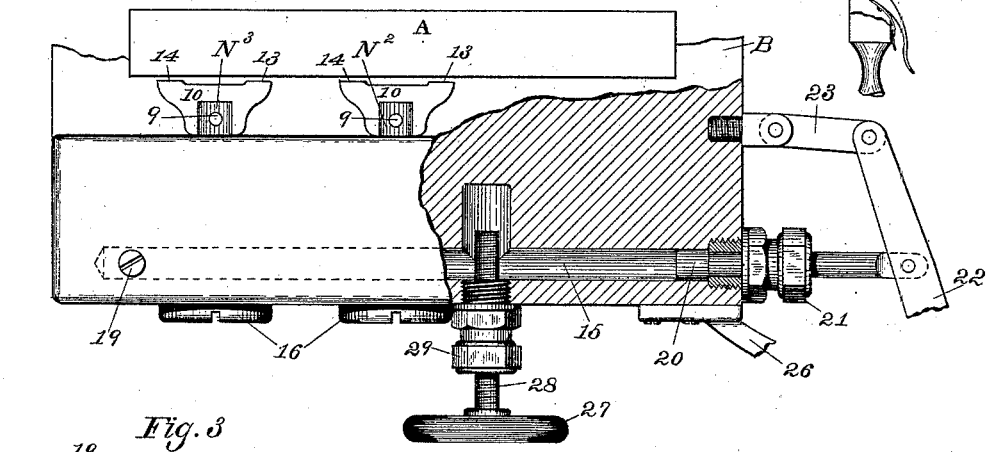



*Fig. 3*

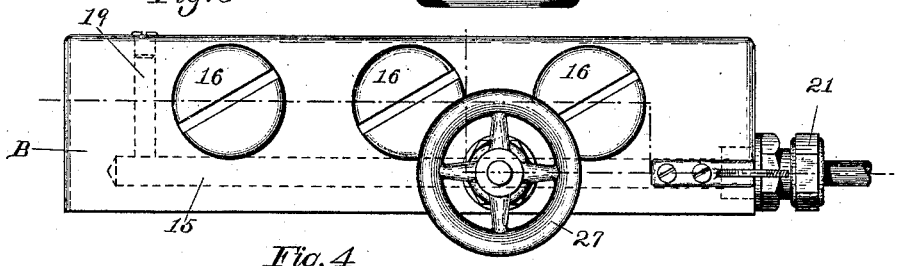
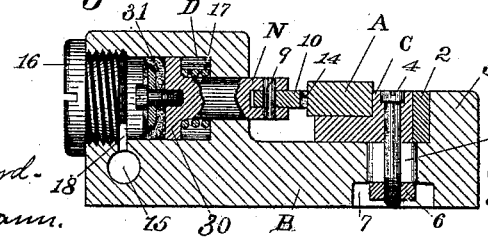



*Fig. 4*

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# UNITED STATES PATENT OFFICE.

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## MILLING-MACHINE VISE.

SPECIFICATION forming part of Letters Patent No. 419,885, dated January 21, 1890.

Application filed February 6, 1889. Renewed December 13, 1889. Serial No. 333,596. (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 Milling-Machine Vises, 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 a single actuating device, as a screw or spindle, acting through a fluid column.

In the drawings accompanying and forming a part of this specification, Figure 1 is a plan view, largely in section, of a vise embodying my improvements and showing the jaws or clamps closed onto a piece of work held in the vise. Fig. 2 is a similar view showing the clamps opened. Fig. 3 is a front elevation. Fig. 4 is a cross-sectional view of the vise.

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, respectively, by a series of slides or pistons that are all actuated through one fluid column from the same actuating devices.

In the drawings, N designates without choice any one of a series of slides carrying the clamp-jaws, these slides being particularly referred to, as N′ N², &c. Other duplicated details are or may be referred to in the same manner.

Each slide N, as a means for lessening the number of jaws required in any particular case, has on the inner end thereof a swivel-jaw or clamp-jaw proper 10, pivoted in the center thereof at 9 to the rearward or inner end of said slide N. Thus the pressure of the slide N is transmitted to the bar A at two points 13 14, and only half as many slides N are required as would be the case if each said slide bore directly on said bar.

The bed B has a series of cylinders D bored therein to receive the sliding pistons N. These pistons have a head 30 and a packing 31 for receiving the pressure of the fluid forward of the same. A cap 16 is screwed into each cylinder to close the same, and a channel 15 communicates by ports 18 or otherwise with all the cylinders. Springs 17 on the slides forward of heads 30 serve to retract the slides and jaws.

For actuating the fluid column (which may be supplied through a hole 19, that is closed by a screw) to operate the slides, I provide a plunger 20, which plunger works through the stuffing-box 21, (usually made separate from and screwed into the bed,) and is operated by a lever 22, that is connected to link 23, and is locked in place by the catch 24 engaging with notches 25 on the quadrant 26, these actuating and locking devices being well known. The cylinders D between caps 16 and heads 30, and also the channel 15, being full of fluid, if the plunger is forced into said channel all the pistons and jaws will be forced out with proportionate power; but the lever-actuated plunger is not in practice so well adapted for exerting a high pressure as a screw, and hence I employ in the preferred form of my improved vise shown in the drawings the lever for quick adjustment, and also employ a screw-plunger for obtaining the greater force required for completing the clamping. This plunger 28 works in an ordinary stuffing-box 29, similar to stuffing-box 21, and has a hand-wheel 27, whereby it is actuated. When the slides N are to be driven out, the operator first forces in the plunger 20 and locks the

same, which is very quickly done. Next the operator screws in the plunger 28 until the required pressure upon the fluid is obtained to drive out the pistons N with a sufficient force. It should be understood, however, that in some cases only one of the said plungers may be used, and that such one may be either the plunger 20 or the plunger 28, preferably the latter one.

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 10 is required. The piece A being then laid on said stationary jaw, the plungers are forced in, as described, until all the pistons 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. It will of course be understood that the slides N may bear directly on the work held, the jaws 10 being dispensed with; hence I specify that said slides are adapted to bear against the work held in the vise, and do not limit myself to the use of the said jaws.

Having thus described my invention, I claim—

1. In a work-holder, the combination, with the bed-plate having a fixed jaw, of the pistons adapted to bear on the work held, the several cylinders for said pistons being connected, and a plunger constructed to be driven into the fluid column to force out the pistons, all substantially as described.

2. In a work-holder, the combination, with the bed-plate having a fixed jaw, of a series of pistons, each adapted to bear on the work held, the cylinders for said pistons being connected, one plunger constructed and arranged for quick adjustment of the pistons and another plunger constructed and arranged for forcing the same, all substantially as described.

3. In a work-holder, the combination, with the bed-plate having a fixed jaw, of the pistons N, packed substantially as described, the cylinders for said pistons being connected, the plunger 20, and means, substantially as described, for operating and locking said plunger, all substantially as described.

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