

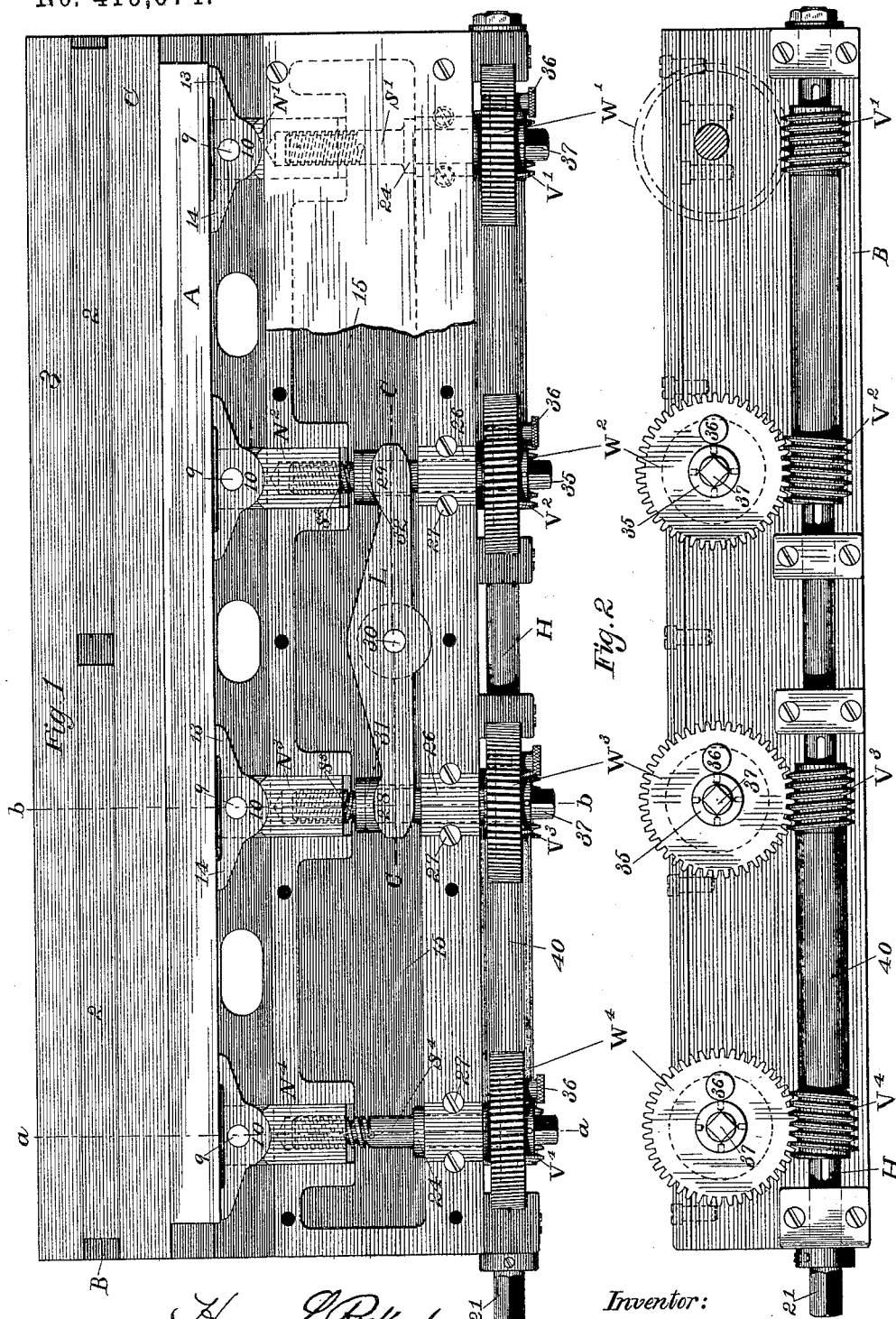
(No Model.)

3 Sheets—Sheet 1.

F. H. RICHARDS.
WORK HOLDER.

No. 419,074.

Patented Jan. 7, 1890.



Witnesses: { *Henry L. Rolland.*
L. E. Heermann. } Inventor: *Francis H. Richards*

(No Model.)

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Fig. 3

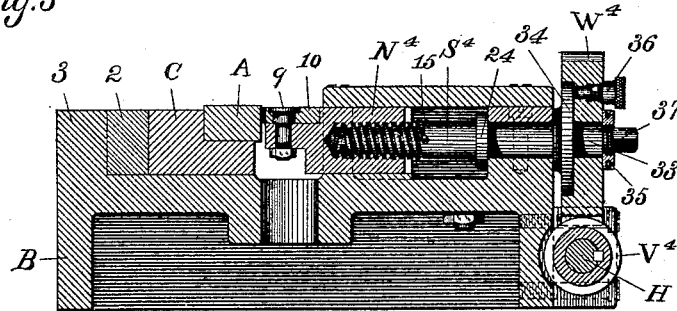


Fig. 4

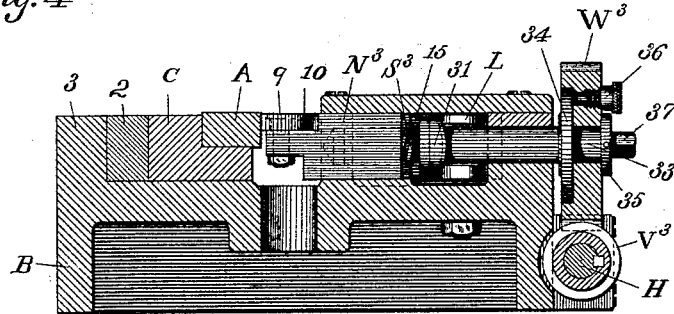
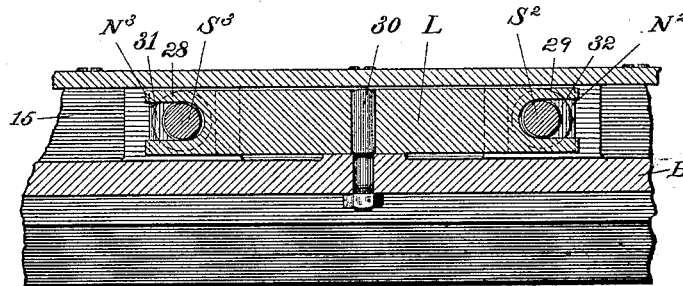


Fig. 5



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(No Model.)

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Fig. 6

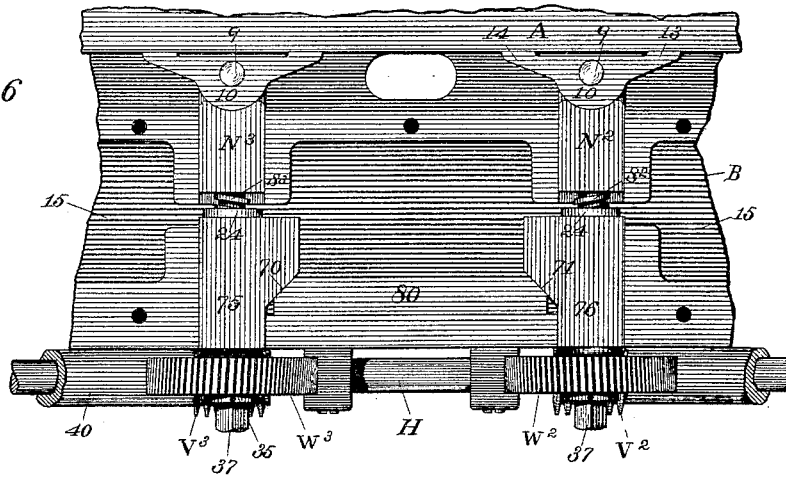


Fig. 7

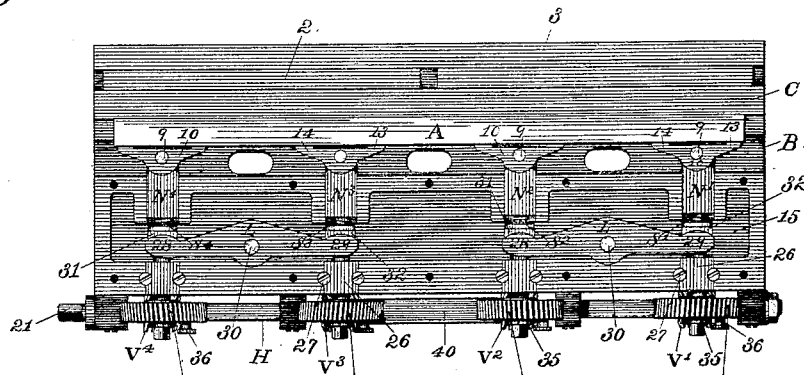
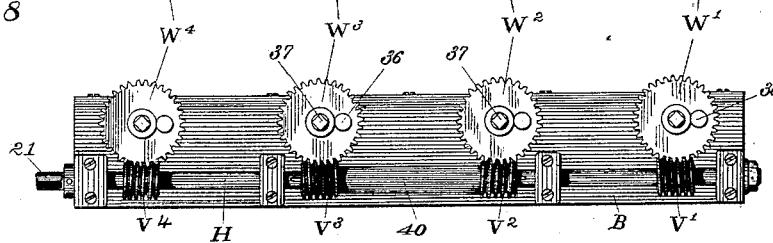


Fig. 8



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UNITED STATES PATENT OFFICE.

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WORK-HOLDER.

SPECIFICATION forming part of Letters Patent No. 419,074, dated January 7, 1890.

Application filed May 7, 1889. Serial No. 309,957. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Work-Holders, 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 or jaws may be operated from a single actuating element, as a screw or spindle, through equalizing devices, which shall equalize the pressure on the several clamps.

In the drawings accompanying and forming a part of this specification, Figure 1 is a plan view, partially in section, of a vise or work-holder embodying my improvements and showing the jaws or clamps closed onto a piece of work held in the vise. Fig. 2 is a front elevation of the same. Fig. 3 is a cross-section in line *a a*, Fig. 1. Fig. 4 is a section in line *b b*, Fig. 1. Fig. 5 is a section in line *c c*, Fig. 1. Fig. 6 illustrates a modified construction of the central equalizer. Figs. 7 and 8 are views similar to Figs. 1 and 2, but drawn on a smaller scale, showing a further modification of construction and arrangement.

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 (not shown) in the usual manner.

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 force

is transmitted to the jaws through equalizers that accommodate the movement of each jaw to the width at that point of the piece to be clamped thereby. 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 referred to in the same manner. Each clamp or 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 parts N are required as would be the case if each said slide bore directly on said bar. The bed B, forward of the clamp-jaws, is chambered, as at 15, to receive the screws S for operating the slides N, which screws are provided with collars 24. The screws are fitted into the slides N as into nuts, and are journaled in boxes (or under caps) 26, held in place by screws 27 in a well-known manner. The middle pair of screws S (see Fig. 1) are arranged to react against the opposite ends 28 29, respectively, of the equalizer or lever L, which is pivoted at 30 within the bed B, substantially as shown. To secure a proper bearing of said screws on said lever, the screws may be provided with concaved washers 31 32, which fit on the said rounded forked ends of the lever L. (See Figs. 1, 4, and 5, also the double arrangement thereof in Fig. 7.)

For actuating the screws S, I provide each one with a worm-gear W, which is rotated by a worm V. These wheels are one or more of them revoluble on the stems 33 of said screws, being held thereon in front of the fixed disk 34 by a nut 35. A suitable pin or key, as 36, is removably fixed in the gear and extends into one of a series of holes in said disk. By removing the pin and applying a wrench to the head 37 the screw may be turned as may be required when setting the vise to receive and hold tapering pieces of work. The screws S are formed or arranged in pairs, of which one, as S¹, is right-hand, and the other S² left-hand.

Consequently the worms V^4 and V^3 , driving said screws, are made of opposite pitch. Both said worms are formed or fixed on one sleeve 40, which is splined to and has a free longitudinal movement on the driving-shaft H, which shaft may be rotated by a crank (not shown) to be fitted on the squared end 21. According to this mode of construction and arrangement, when the shaft H is properly rotated, the jaws N^3 and N^4 are driven out by the screws S^3 and S^4 , respectively, until said jaws bear against the work A; but if it shall happen that one of said jaws comes to a bearing before the other the sleeve 40 will then slide on shaft H and thus serve to rotate the other screw more rapidly, and thus bring both jaws to bear equally, for it will be remembered that the wheels W react against each other and not against any fixed bearing. Each pair of screws S' and S^2 and S^3 and S^4 are "equalized" between themselves, as stated; but a further equalization is necessary—to wit, between the pairs of screws. This is effected by a third equalizer acting between one member of the first pair and one member of the second pair. This third equalizer is the lever L, acting between screws S^2 and S^3 , and whose operation is substantially similar to that of the said sleeve 40, together with the worms V thereon.

In Fig. 6 I have shown one equivalent for the said third equalizer, which is also equally applicable by proper structural changes for use as the first or second equalizer. In this modification the bearings 75 and 76 are made to slide and have inclines 70 71 bearing on the ends of the sliding bar 80, which bar is thus a substitute for the lever L and serves the same purpose.

In Figs. 7 and 8 are shown another modification, in which the sliding equalizer 40 is placed between the pairs of screws, while the lever form is used between the members of each pair. In this arrangement there is no new mode of operation, and no further description is deemed necessary to a proper understanding thereof.

Having thus described my invention, I claim—

1. In a work-holder, the combination, with the bed-plate and jaws, substantially as de-

scribed, of two pairs of thrust members, each pair being equalized between themselves, and a third equalizer between one member of each pair, the thrust members being arranged and connected for simultaneous operation, substantially as described.

2. In a work-holder, the combination, with the bed-plate and jaws, of a pair of screws operating a pair of jaws, and gearing, substantially as described, simultaneously operating said screws, one member of said gearing being a sliding equalizer and driving-worm, all substantially as described.

3. In a work-holder, the combination of a pair of screw-actuated jaws, the pair of screws actuating said jaws and each provided with a worm-wheel, the shaft H, and sleeve 40, splined to said shaft and having the oppositely-pitched worms meshing with said wheels, respectively, substantially as described.

4. In a work-holder, the combination of two pairs of equalized thrust members, one member of each pair being arranged for two independent movements, and an equalizer, substantially as described, between said members arranged for independent movements, all substantially as described.

5. In a work-holder, the combination of the series of jaws, the series of screws actuating said jaws and having worm-wheels, substantially as described, a sliding equalizer between and actuating each pair of said screws, and a lever-equalizer between the pairs of screws, all substantially as described.

6. In a work-holder, the combination of a pair of jaws, the screws actuating said jaws, an equalizer actuating said screws through wheels thereon, and means, substantially as described, detachably connecting said wheels to said screws, substantially as described.

7. In a work-holder, the combination of the pair of threaded jaws, screws S' and S^2 , having flange 34, wheels W, revoluble on said screws and carrying the pin 36, and shaft H, geared to actuate said wheels, substantially as described.

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