(No Model.) 2 Sheets—Sheet 1.

# J. R. McMILLAN.

## COMBINED VISE, LATHE, AND DRILLING MACHINE.

No. 350,760. Patented Oct. 12, 1886.

FIG. 1.

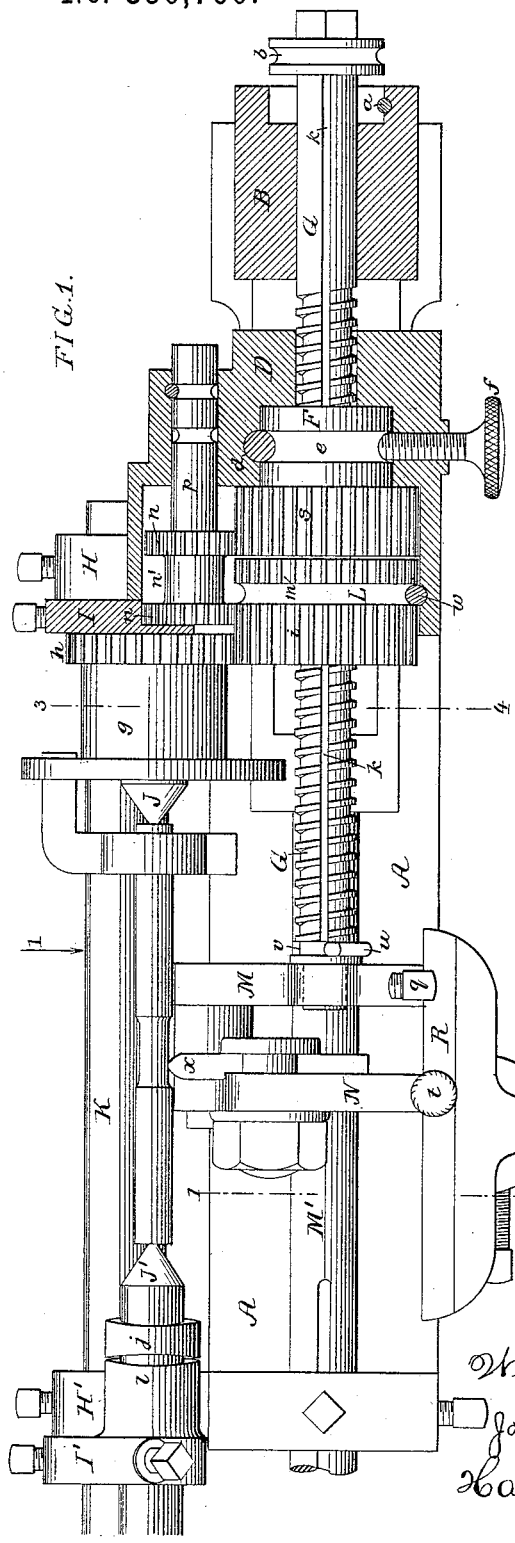


FIG. 7.

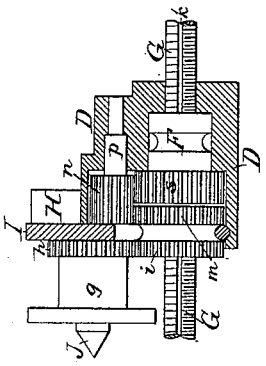


FIG. 6.

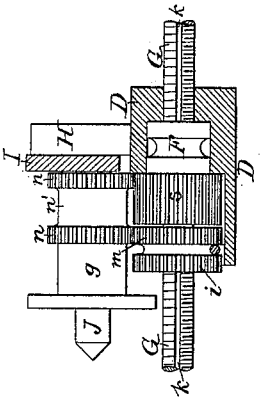
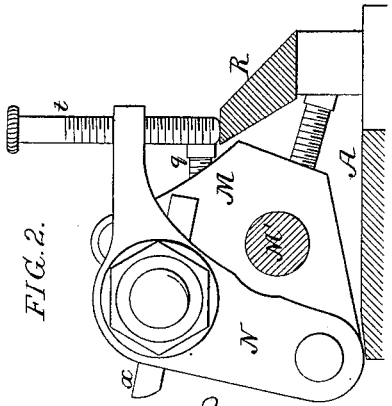


FIG. 2.



Witnesses:
John E. Parker
Harry Drury

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Howson & Sons

(No Model.) 2 Sheets—Sheet 2.

# J. R. McMILLAN.

## COMBINED VISE, LATHE, AND DRILLING MACHINE.

No. 350,760. Patented Oct. 12, 1886.

FIG. 3.

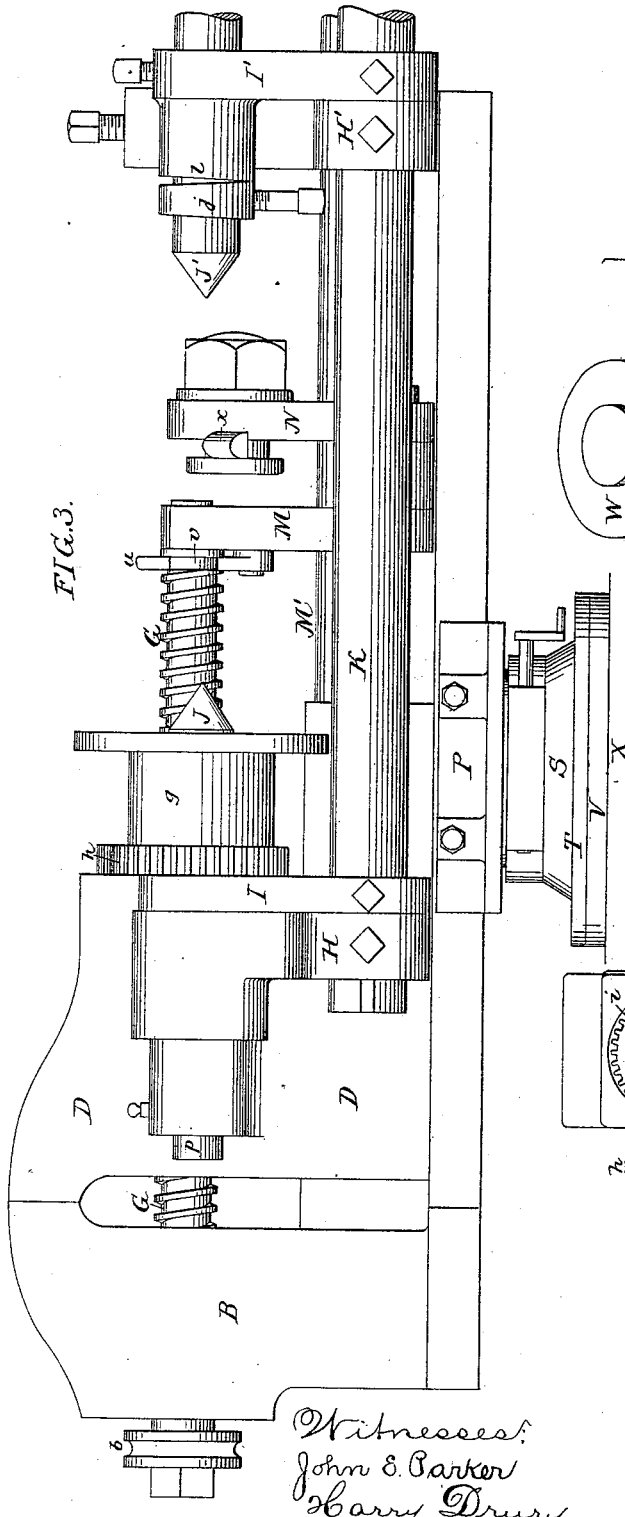


FIG. 5.

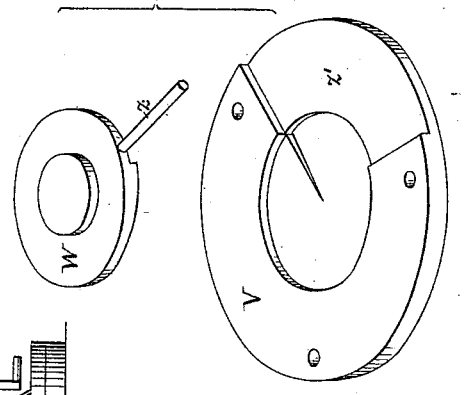
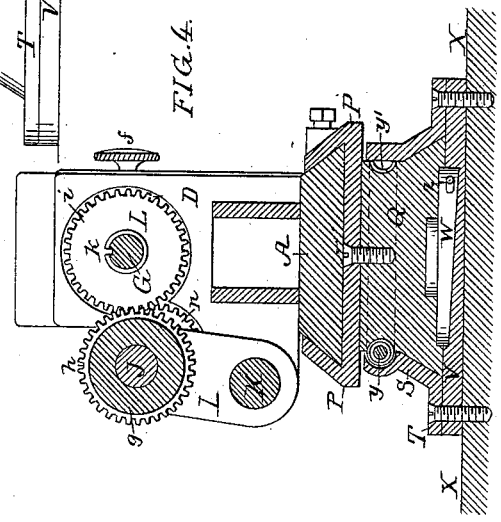


FIG. 4.



Witnesses:
John S. Parker
Harry Drury

Inventor:
J. R. McMillan
by his Attorneys
Howson & Sons

# UNITED STATES PATENT OFFICE.

JAMES R. McMILLAN, OF PHILADELPHIA, PENNSYLVANIA.

## COMBINED VISE, LATHE, AND DRILLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 350,760, dated October 12, 1886.

Application filed January 19, 1885. Serial No. 153,267. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES R. McMILLAN, a citizen of the United States, and a resident of Philadelphia, Pennsylvania, have invented certain Improvements in Combined Vise, Lathe, and Drill, of which the following is a specification.

My invention consists of certain improvements in, or additions to, the combined vise and lathe forming the subject of my Letters Patent No. 292,342, dated January 22, 1884, the objects of my improvements being to provide an effective feed for the slide-rest of drill, to permit the free throwing of the same into or out of action, to provide effective means for driving the face-plate of the lathe, and to otherwise modify the construction of the device, so as to render it more effective.

In the accompanying drawings, Figure 1 is a sectional plan, partly in elevation, of the improved vise and lathe; Fig. 2, a transverse section on the line 1 2, Fig. 1; Fig. 3, a side view looking in the direction of the arrow 1, Fig. 1; Fig. 4, a transverse section on the line 3 4, Fig. 1; Fig. 5, a detached perspective view of part of the clamp shown in Fig. 4, and Figs. 6 and 7 views of modified forms of feed-gear.

A is the base-plate of the device, secured to or forming part of which at one end is fixed jaw B of the vise, a movable jaw, D, being suitably guided on the base, and being recessed for the reception of the nut F, to which is adapted the operating-screw G of the vise, the latter passing through an opening in the jaw B, to which it can be confined longitudinally by the engagement of a transverse pin, *a*, with the grooved collar *b* on the screw-stem. The nut is secured to the movable jaw D by means of a transverse pin, *d*, adapted to an annular groove, *e*, in said nut, and the latter may be prevented from turning in the jaw D by means of a set-screw, *f*. When the screw-stem G is longitudinally confined in the fixed jaw B of the vise, and the nut F confined to the movable jaw, the latter will, on turning the screw-stem, be moved from or toward the fixed jaw in the same manner as an ordinary vise; but when the movable jaw has been moved up against the fixed jaw and locked in position by a suitable set-screw, and the screw-stem has been released from the jaw B, and the nut F permitted to turn in the jaw D, the device can be used as a lathe or drill in the same manner as that described in my former patent, and the peculiar construction of the parts for the attainment of this purpose I will now proceed to describe.

To a stud, H, on the jaw D, and a similar stud, H′, on the frame A, is secured a rod, K, and to this rod, near one end, is hung an arm, I, which carries the head-center J of the lathe, the tail-center J′ being carried by an arm, I′, hung to the rod K near its opposite end. On the head-center is free to turn a face-plate sleeve, *g*, having a spur-wheel, *h*, the latter gearing into a pinion, *i*, on a sleeve, L, carried by the screw-stem G, which has a longitudinal key-seat, *k*, for the reception of a key or feather in the sleeve L, so that said sleeve must turn with the screw-stem, which, however, is free to move longitudinally independently of the sleeve. Secured to or forming part of said sleeve L is a spur-wheel, *m*, which is adapted to gear into a pinion, *n*, free to turn on a pin, *p*, adapted to an opening in one side of the jaw D, this pinion also gearing into a spur-wheel, *s*, secured to or forming part of the nut F of the vise. The pinion *i* and the spur-wheel *s* have the same number of teeth; but the spur-wheel *m* has one or more teeth more or less than the spur-wheel *s*. The pinion *n* has a recess, *n′*, and the pin *p*, on which said pinion turns, can be adjusted longitudinally in the opening of the jaw D, so that said pinion *n* will be caused to gear together either the pinion *i* and spur-wheel *s* or the spur-wheel *m* and the spur-wheel *s*. When the pinion *i* and the spur-wheel *s* are geared together, there will be no longitudinal movement of the screw-stem if the said stem is rotated, for, owing to the similarity in the number of teeth in the wheel *s* and the pinion *i*, the nut will rotate at precisely the same speed as the screw-stem; but if the wheels *m* and *s* are connected by the pinion, the speed of rotation of the nut will, owing to the differential character of the teeth of the two wheels, be slightly more or less than that of the screw-stem, so that there will be a longitudinal movement of the latter to an extent proportionate to this difference. The end of the screw-stem G is constructed both for the re-

ception of a drilling-tool and for attachment to the slide-rest of the lathe. When used for drilling, the shank of the drill is secured to the end of the screw-stem by a chuck or other suitable means, the work being clamped to the end standard of the base-plate, said standard being preferably adjustable on the base-plate. In this case the arms I I′, carrying the lathe-centers, may be thrown down out of the way. When the lathe is to be used, however, the drill is removed from the screw-stem, and the slide-rest is applied to the frame. This rest consists of a plate, M, which bears at its lower end upon the base-plate A, and is guided by a longitudinal rod, M′, and has a projection, *q*, bearing upon a rest, R, secured to the base.

Hung to the lower portion of the plate M is an arm, N, to which is bolted a cutting-tool, *x*, the outer end of the arm having a set-screw, *t*, which bears upon the rest R, and by the adjustment of which the arm can be vibrated so as to carry the tool *x* from or toward the work in the lathe.

The slide-rest is connected to the feed-screw by means of a lever, *u*, hung to the plate M, and adapted to a recess, *v*, near the end of the stem, so that if it is desired to stop the feed of the tool at any time without shifting the pinion *n* it can be readily done by throwing the lever *u* out of engagement with the groove *v* and drawing back the screw-stem. When it is desired to effect a quick return of the screw-stem, the sleeve L may be unlocked from the jaw D by withdrawing the pin *w*, adapted to openings in the said jaw and to an annular groove in the sleeve, said sleeve being then moved longitudinally on the screw-stem, so that the spur-wheel *m* is free from engagement with the wheel *n*, whereupon the nut F may be prevented from turning by means of the set-screw *f*, and the screw-stem retracted by turning the same backward.

In the modified form of gearing shown in Fig. 6 the pinion *n* is carried by the sleeve *g*, and the latter is adjustable longitudinally on the head-center of the lathe, so that the pinion may be caused to gear the wheel *s* either to the pinion *i* or the wheel *m*. The pinion in this case serves as the means of transmitting power to the sleeve *g*, the spur-wheel *h* being dispensed with. The gearing shown in Fig. 1 is preferred to that shown in Fig. 6, however, as it permits the lathe-center to be thrown down out of the way without throwing the pinion *n* out of gear.

In the modification, Fig. 7, a pinion, *n*, is shown which is not recessed or adjustable, the change in this case being effected by removing, reversing, and reapplying the sleeve L.

The base-plate A is secured to the bench or table X by means of a clamp, Figs. 3, 4, and 5, which will permit the device to be adjusted to any desired angle and secured in position after adjustment.

The device consists of a plate, P, confined to the base-plate A of the vise, and having on the under side a conical block, Q, which is adapted to a tubular conical projection, S, on a plate, T, the latter being bolted to the bench or table X, between which and the plate T, however, is interposed a plate, V. A worm-wheel, *y*, is adapted to an annular worm, *y′*, cut in the block Q, the shaft of said worm-wheel being adapted to bearings in the projection S of the plate T, so that on turning said shaft the vise may be rotated on the table. A cam-disk, W, is adapted to a cam-shaped recess in the plate V and a recess in the under side of the block, Q, this cam-disk being adjustable by means of an arm, *z*, which is adapted to a recess, *z′*, in the plate V. When the wedge-block W is loosened, the block Q is free to turn in the projection S, and the vise can be adjusted at any angle desired, or can be adjusted longitudinally on the plate P; but when the wedge-block is tightened it presses the block Q firmly into the projection S, and thus locks the structure firmly in this position.

On the tail-center J′ of the lathe is a ring, *j*, which has a cam-face bearing against a similar cam, *l*, on the arm I′, so that when the tail-center of the lathe has been adjusted by hand, and the work is centered loosely between the same and the head-center, the ring *j* can be turned so that by engagement with the cam *l* it will force the tail-center toward the work and insure a firm centering of the same before said tail center is secured by the set-screw to the arm I′.

By hanging the arms I I′, which carry the lathe-centers, to the rod K, either arm can be moved longitudinally on the rod, provision being thus made for the reception of pieces of work of different lengths and for throwing the face-plate out of gear with the spindle G when necessary—as, for instance, when it is desired to drive the lathe by a belt—and by moving the rod K longitudinally in the studs H H′ both the head and tail centers may be adjusted simultaneously.

I claim as my invention—

1. The combination of the bearing D, forming the movable jaw of a vise, a tool or tool-carrier, and feed-gear, comprising the screw-shaft G of the vise, the nut F, with spur-wheel secured thereto, a spur-wheel keyed to the screw-shaft and having more or less teeth than said wheel on the nut, and a pinion gearing into said spur-wheel, all substantially as specified.

2. The combination of the bearing D, forming the movable jaw of a vise, a tool or tool-carrier, and feed-gear, comprising the screw-shaft G of the vise, the nut F, with spur-wheel *s*, a pinion, *i*, turning with the screw-shaft and having the same number of teeth as said wheel *s*, the wheel *m*, also turning with the shaft and having more or less teeth than the wheel *s*, and a pinion, *n*, whereby the wheel *s* may be geared either to the pinion *i* or to the wheel *m*, all substantially as set forth.

3. The combination of the bearing D, the lathe-centers, the tool or tool-carrier, the screw-

shaft G, the nut F, with spur-wheel *s*, the spur-wheel *m*, and pinion *i*, the pinion *n*, and the face-plate sleeve *g*, having a spur-wheel, *h*, gearing into the pinion *i*, all substantially as specified.

4. The combination of the lathe-centers and a feed-screw adapted to a nut on the fixed frame with the slide-plate M, connected to the end of said feed-screw, the guide-bar M′, the rest R, and the tool-carrying arm pivoted to the slide-plate and having a set-screw bearing upon said rest, all substantially as specified.

5. The combination of the lathe-centers, the feed-screw having a groove near the end, and the slide-rest having a latch-lever adapted to engage with said grooved end of the screw, all substantially as specified.

6. The combination of the frame A, the clamp-plate P, having a block, Q, with worm *y′*, a tubular projection, S, with worm-wheel *y*, and a locking device, all substantially as specified.

7. The combination of the frame A, the clamp-plate P, having a block, Q, the tubular projection S, the recessed plate V, and the cam-disk W, as specified.

8. The combination of the main frame, the lathe-centers, and face-plate sleeve, the operating-shaft G, and gearing whereby the face-plate can be driven therefrom, the rod K, and the arms I I′, carrying the lathe-centers and hung to said rod, whereby said centers can be thrown down out of the way and the face-plate thrown out of gear, all substantially as specified.

9. The combination of the main frame, the lathe-centers, and face-plate sleeve, the operating-shaft G, and gearing for driving the face-plate therefrom, the rod K, adjustable in respect to the main frame, and the arms I I′, carrying the lathe-centers and hung to said rod, so that said centers can be thrown down out of the way and the face-plate thrown out of gear, all substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES R. McMILLAN.

Witnesses:
JOHN M. CLAYTON,
HARRY SMITH.