

2 Sheets—Sheet 1.

No. 401,180.

Patented Apr. 9, 1889.



INVENTORS.

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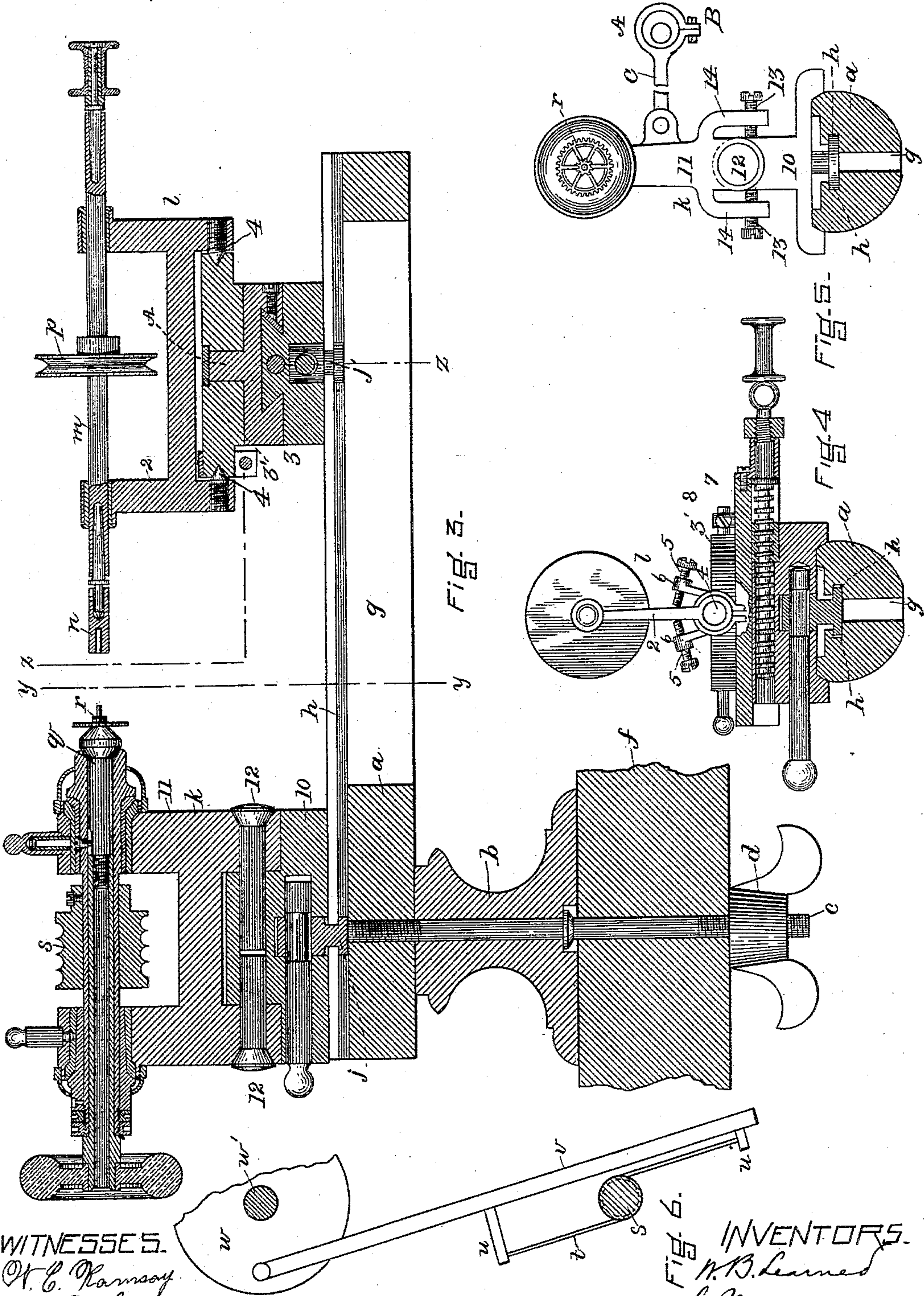
(No Model.)

2 Sheets—Sheet 2.

W. B. LEARNED & L. MURRAY.
PINION FACING MACHINE.

No. 401,180.

Patented Apr. 9, 1889.



WITNESSES.
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UNITED STATES PATENT OFFICE.

WILLIAM B. LEARNED AND LEONIDAS MURRAY, OF BOSTON, MASSACHUSETTS, ASSIGNORS OF ONE-HALF TO THE E. HOWARD WATCH AND CLOCK COMPANY, OF SAME PLACE.

PINION-FACING MACHINE.

SPECIFICATION forming part of Letters Patent No. 401,180, dated April 9, 1889.

Application filed May 6, 1887. Serial No. 237,296. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM B. LEARNED and LEONIDAS MURRAY, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Pinion-Facing Machines, of which the following is a specification.

This invention relates to the operation of finishing or polishing the ends of the leaves or teeth of watch or clock pinions, said operation being technically known as "facing." This operation is performed by subjecting the end of the pinion to a facing-shell, which is a cylindrical piece of metal having a central hole which receives the staff of the pinion, the end of the shell surrounding said hole presenting an annular polishing-face, which is in contact with the ends of the pinion-leaves, and performs the facing or polishing operation thereon. The shell should have some freedom of lateral movement across the pinion end, so that it will not leave concentric marks thereon, and the shell should also be capable of rocking slightly during the operation, so that it will impart to the pinion end a slight concavity which so reflects the light as to give the pinion end a highly desirable appearance.

It has been common for the operator in facing by hand to hold the facing-shell in one hand while presenting it to the pinion, and at the same time rotating or oscillating the pinion by a "fiddle-bow" held in the other hand, the pinion being inserted in a collet, which has a grooved pulley engaged with the string of the fiddle-bow. The slight movements of the shell, which are necessarily produced by the involuntary movements of the operator's hand and arm, are found to produce very perfect results in imparting a polish free from tool-marks, and in giving to the pinion end the slight concavity which is so much desired.

In Letters Patent of the United States granted to W. B. Learned February 22, 1887, No. 358,402, a facing-shell is shown in engagement with a holder adapted to rotate the shell, the holder being adapted to rock slightly

while in contact with the pinion, and thereby imitate the motion of a shell held and presented by the operator's hand.

The present invention has for its object to provide a power-driven machine in which the facing-shell is adapted to rock on the spindle or holder that rotates it, as shown in the above-named patent, and in which either the said spindle or the chuck that holds the pinion is adapted to rock, or in which both the spindle and chuck are adapted to rock, so that any desired degree of freedom of movement of the facing-shell relatively to the pinion on which it acts may be attained.

To these ends our invention consists in the improvements which we will now proceed to describe.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a side elevation of our improved machine. Fig. 2 represents a top plan view of the same. Fig. 3 represents a longitudinal section on line *x x*, Fig. 2. Fig. 4 represents a section on line *z z*, Fig. 3, looking toward the right. Fig. 5 represents a section on line *y y*, Fig. 3, looking toward the left. Fig. 6 represents a side view of an operating device for the head-stock spindle.

The same letters of reference indicate the same parts in all the figures.

In the drawings, *a* represents a bed secured to a pedestal, *b*, which is provided with a vertical rod, *c*, and a clamping-nut, *d*, working on the threaded lower end of said rod and adapted to secure the pedestal *b* to a bench, *f*, as shown in Fig. 3.

The bed *a* has a longitudinal groove, *g*, in the side of which are formed the smaller grooves, *h h*, which receive the ears of the clamping-lugs *j j'*, attached, respectively, to the head-stock *k* and tail-stock *l*.

m represents the spindle or holder which supports the facing-shell *n*, said shell being engaged with the spindle, so as to rotate therewith and rock thereon, substantially as shown in the Learned patent above referred to.

The tail-stock is adapted to slide on the base *a*, and is provided with any suitable de-

vices whereby pressure may be applied to the lug j' to lock the latter to the bed. The portion 2 of the tail-stock, in which the spindle or holder m is journaled, is connected, by
 5 pivots or trunnions 4 4, with the base 3 of the tail-stock, said trunnions being arranged to permit the spindle or holder m to rock laterally, and thus impart a rocking motion to the facing-shell, in addition to the independent
 10 rocking motion of the shell upon said spindle. The extent of lateral motion permitted by the described construction of the tail-stock is limited by screws or stops 5 5 in lugs 6 6, attached to the base of the tail-stock, said
 15 screws being adjustable, so that they may either prevent any oscillating motion of the pivoted portion 2 of the tail-stock, as shown in Fig. 4, or may permit any desired extent of such motion. The base of the tail-stock
 20 has an upper section, 3', which is adapted to turn on the lower portion of said base and supports the pivots or trunnions 4 4. The section 3' has an arm or stud, 7, standing between adjustable screws 8 8, which limit the
 25 turning motion of the section 3', and may be adjusted to permit said section to oscillate to any desired extent horizontally, and thus permit the spindle m to oscillate horizontally, the facing-shell being thus given an additional
 30 freedom of movement. The screws 8 8 may be adjusted, however, so that the section 3' cannot turn. The upper section, 3', may be adapted to turn, as described, by any suitable means. In Fig. 3 we have shown the
 35 said section 3' journaled on a beaded stud, A, affixed to the lower portion of the base and constituting a center on which the section 3' may rotate or oscillate horizontally.

The spindle m is adapted to slide freely in
 40 the bearings formed for it in the swinging portion 2 of the tail-stock, and is pressed and held forward by the operator during the facing operation. A pulley, p , affixed to the spindle m , receives motion from a suitable
 45 motor.

The head-stock k is composed of a base, 10, bearing on the bed a , and a frame, 11, in which the head-stock spindle q is journaled, said frame being connected to the base by
 50 bolts or pivots 12 12, which permit said frame and spindle to rock laterally, said rocking motion being controlled by screws or stops 13 13, inserted in ears 14 14 on the frame 11 and bearing against the base 10. The pinion r ,
 55 held by the head-stock spindle, may therefore be oscillated or moved back and forth laterally to any desired extent to move the end of the pinion across the acting face of the facing-shell. It will be seen, therefore, that
 60 provision is made for any desired extent of lateral motion, either of the spindle carrying the facing-shell or of the pinion being faced, or of both, so that any desired freedom of
 65 lateral movement of the pinion end and facing-shell relatively to each other may be attained.

The head-stock spindle has a spirally-grooved pulley, s , upon which is wound a cord, t , Fig. 6, corresponding to the string of
 an ordinary watch-maker's fiddle-bow, said
 70 cord being attached to a device whereby it may be rapidly reciprocated to rapidly reverse the rotation of the head-stock spindle and the pinion therein.

In Fig. 6 we have shown the cord t attached
 75 to arms $u u$ on a rod, v , which is eccentrically pivoted to a disk, w , on a driving-shaft, w' , and is moved thereby to give the head-stock spindle the described motion, the cord t being wound around the spirally-grooved pulley s . Any other suitable devices may be employed to reciprocate said cord.

The jar attending the operation of the machine and the rapid reversal of the rotation of the head-stock spindle may be relied upon
 85 to produce the described lateral movements of the shell-carrying spindle m and head-stock spindle q . We prefer, however, to give the head-stock spindle a positive lateral reciprocating movement by means of an eccentric, A, on a driving-shaft, B, and a rod, C,
 90 connecting said eccentric with the pivoted frame 11, in which the head-stock spindle is journaled.

If desired, the tail-stock spindle m may be
 95 positively moved by similar means.

The machine thus organized is capable of imparting a beautiful finish to pinion ends, the result being quite as desirable as that produced by the old hand method first above
 100 described and much more rapid and economical.

We claim—

1. In a pinion-facing machine, the combination of a supporting-bed, a head-stock having a pinion-holding spindle, a tail-stock having a laterally-movable portion, a spindle journaled in said movable portion, and thereby adapted to reciprocate laterally, and a facing-shell supported by said spindle and having an independent rocking movement thereon, as set forth.

2. In a pinion-facing machine, the combination of a supporting-bed, a tail-stock having a spindle, a facing-shell supported by said
 115 spindle and having a rocking or oscillating motion thereon, and a head-stock having a laterally-movable portion, and a pinion-holding spindle journaled in said movable portion, and thereby adapted to reciprocate laterally, as set forth.

3. A lathe-stock composed of a base, a frame pivoted to said base, and a spindle journaled in said frame, combined with power-driven devices, as an eccentric, A, and connecting-
 125 rod C, whereby a continuous rapid rocking or oscillating motion may be automatically imparted to said frame and spindle, as set forth.

4. In a pinion-facing machine, the combination of a spindle having a grooved pulley, a facing-shell supported by said spindle and

adapted to rock, a cord engaged with said pulley, and power-driven devices, as a crank-wheel, *w*, and rod *r*, for reciprocating said cord and jarring or rocking the facing-shell,
5 as set forth.

In testimony whereof we have signed our names to this specification, in the presence of

two subscribing witnesses, this 30th day of April, 1887.

WILLIAM B. LEARNED.
LEONIDAS MURRAY.

Witnesses:

C. F. BROWN,
ARTHUR W. CROSSLEY.