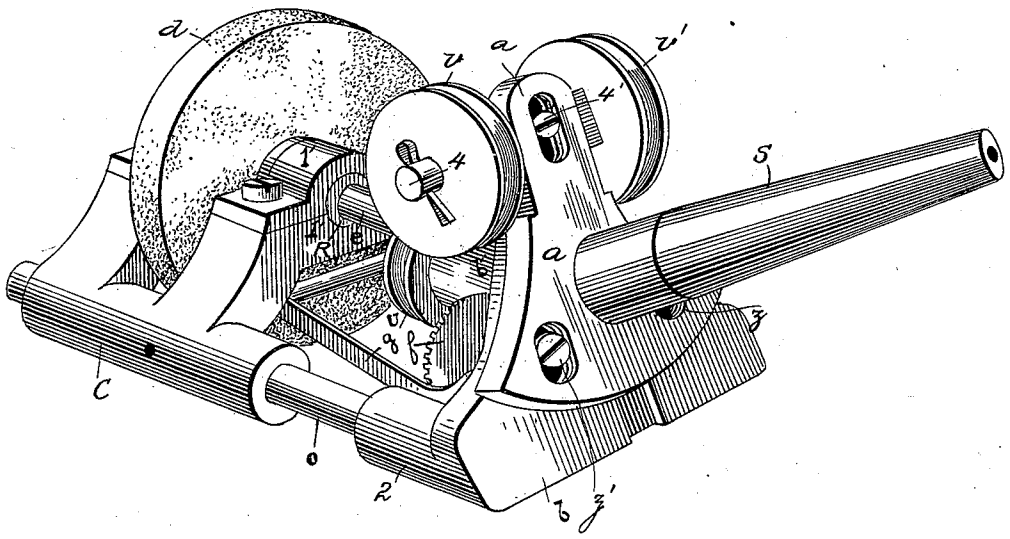
(No Model.) 2 Sheets—Sheet 1.

H. E. HAWES.

MACHINE FOR GRINDING OR TRUING LATHE CENTERS.

No. 478,599. Patented July 12, 1892.

Fig. 1.



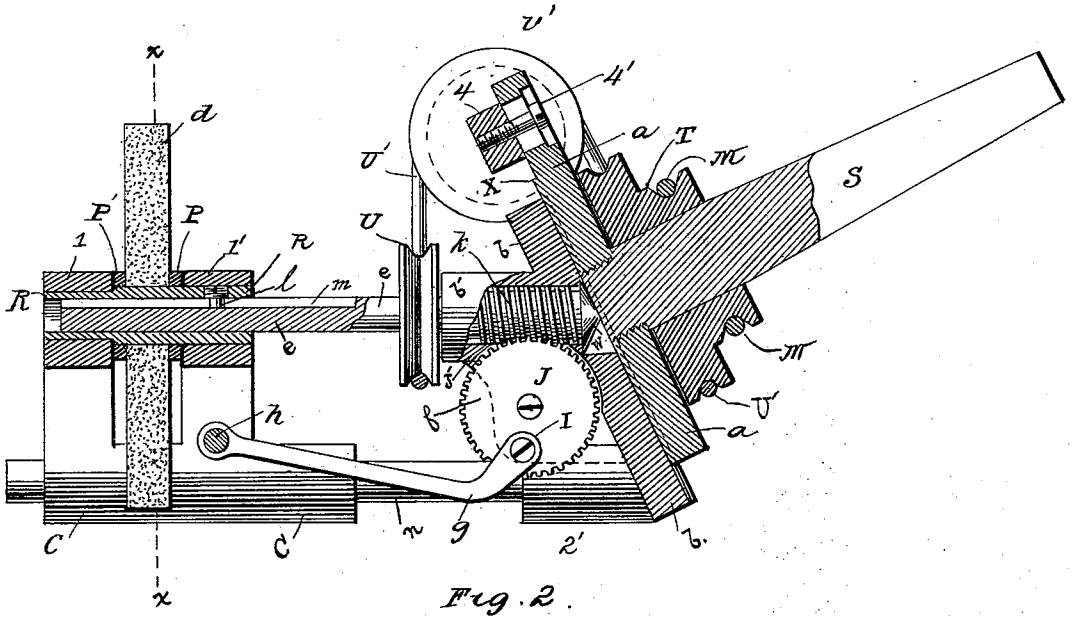


Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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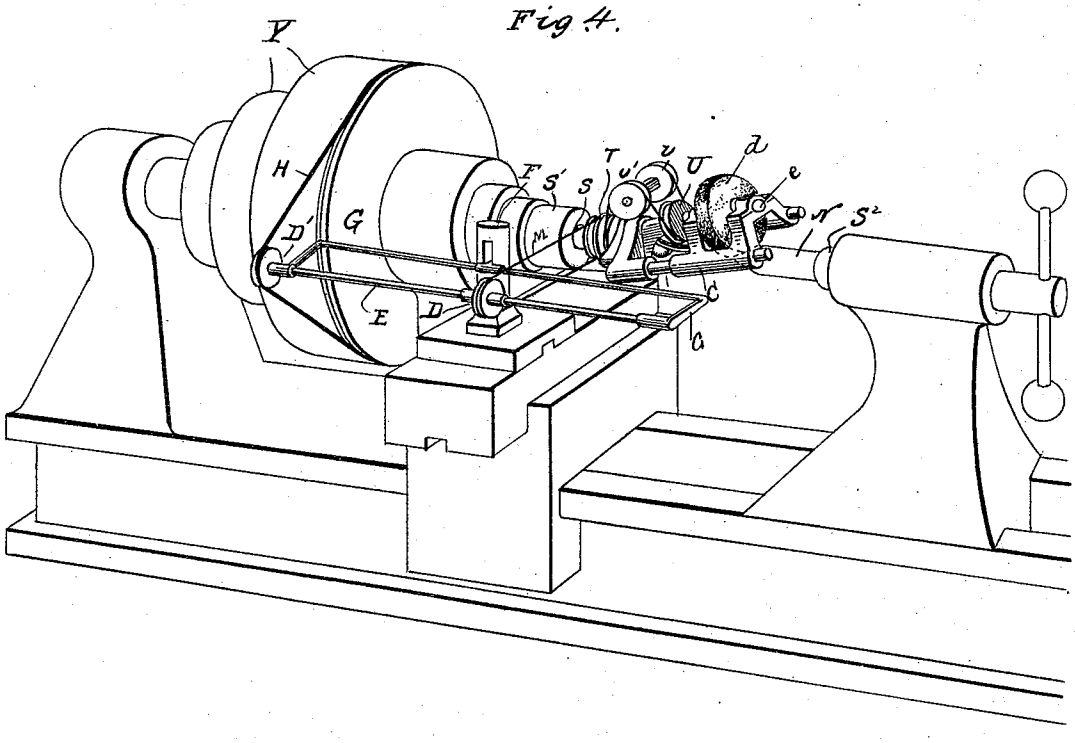
Fig 4.



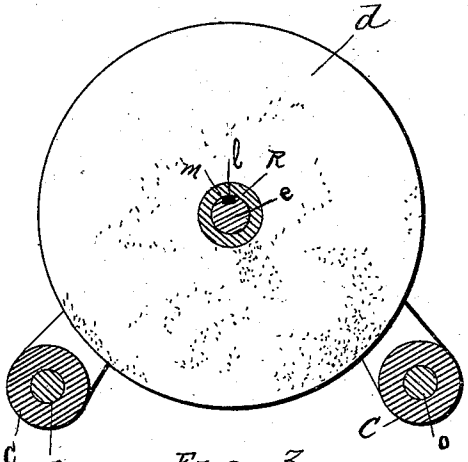


Fig. 3.

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MACHINE FOR GRINDING OR TRUING LATHE-CENTERS.

SPECIFICATION forming part of Letters Patent No. 478,599, dated July 12, 1892.

Application filed November 20, 1891. Serial No. 412,483. (No model.)

To all whom it may concern:

Be it known that I, HERBERT E. HAWES, of the city of Brooklyn, county of Kings, and State of New York, have invented a new and useful Improvement in Machines for Grinding or Truing Lathe-Centers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, in which—

Figure 1 represents a perspective view of said mechanism; Fig. 2, a view, partly in side elevation, partly in central vertical section, and partly broken away to show worm, of parts of Fig. 1, all as hereinafter described; Fig. 3, a cross-section of Fig. 2 at line X X; Fig. 4, a general perspective view of my mechanism.

The object of my invention is to grind lathe-centers, but particularly the center used in the "dead" or "tail" spindle and so as to obtain automatically and with comparatively no additional trouble or expense a complete and exact alignment and coincidence between points and axes of the lathe-centers.

Heretofore, as is well known, such centers have been ground to the required conical shape at their extremities by securing them separately in the usual manner in the "live-spindle" socket of the lathe and revolving them against a proper grinding-surface—such as an emery-wheel—the axis of which during the grinding remained fixed relatively to the axes of revolution of the live-spindle. By this former process both centers were ground substantially alike; but on placing the dead-spindle center in the dead or tail spindle socket it was found, as a rule, that the pointed extremities of the two spindles did not coincide exactly, neither did their axes, nor did the central axes of the dead-center coincide with the axes around which was rotated the live-spindle and the center carried thereby. The difficulties of correcting this lack of alignment and coincidence and the evil results thereof upon the lathe-work are well understood.

I accomplish the object of my invention by means of the mechanism hereinafter described and illustrated by the drawings.

d is an ordinary grinding-wheel, having its periphery covered with emery or other suitable grinding-surface. It is fixed upon a hollow arbor or sleeve R and rotated by feather *l* of latter engaging in longitudinal spline or groove *m* in wheel-shaft *e*. Wheel-arbor R revolves in bearings 1 1′, which constitute a part of frame C, which slides back and forth upon the guides *n o*, rigidly secured to frame *b*, supported upon base-plate *a*, fixed to tapered plug S, shaped to fit the sockets S′ S″ in lathe-spindles.

Wheel-arbor R is provided with collar P and threaded nut P′, between which wheel *d* is clamped. These collars and the wheel fill the space between wheel-bearings 1 1′, and thus prevent longitudinal movement of arbor R.

Sliding frame C is reciprocated by means of lever *g*, attached to frame C by screw-pin *h* or otherwise and by shouldered screw I to geared worm-wheel *f*, actuated by worm *k* on wheel-shaft *e*, said attachment being so effected as to admit of pin *h* and screw I turning partially in their bearings in lever *g*. The geared worm-wheel *f* rotates upon a fixed central bearing-screw J, fixedly secured to projection J′ upon the frame *b*. A small corner of projection J′ only is shown in the drawings, Fig. 2, the wheel *f* concealing it and the dotted line showing the position of J′. Worm-wheel *f* rotates in engaging contact with worm *k* on wheel-shaft *e*. The inner end of shaft *e*, carrying the worm *k*, revolves in suitable bearing or lug *b*′, rigidly secured to frame *b*. Axes of shaft *e*, its said bearing *b*′, and guides *n o* are parallel.

2 2′ are lugs secured to frame *b* and connecting latter with guides *o n*, respectively. On shaft *e* is fixed pulley U. Shaft *e* is held against endwise movement by head or shoulder W abutting against bottom and sides of the counterbore or enlargement of shaft bearing in the lug *b*′, (see Fig. 2,) where a portion of the wall of *b*′ is broken away to show the construction.

To enable frame *b* to be moved away from or toward the center of revolution of the grinding apparatus, plate *a* is provided with feather or projection X, (see dotted lines in Fig. 2,) fitting into corresponding groove or

depression in plate *a*, plate and frame being clamped together by screws *z z'* passing through slots, whereby, as will readily be understood, frame *b* with its attached parts may be moved toward and away from the center of plug S and secured by tightening the screws at the distance therefrom desired. Part of plug S nearest to plate *a* is left straight as bearing for double pulley T.

v v' are a pair of idler-pulleys revolving upon bearing-shaft 4. This bearing-shaft 4 is flattened and adjustably clamped to plate *a* by screw 4' sliding in slot extending radially from center of plug S. The tapered plug S, being fitted in the usual manner into the socket of the live-spindle of the lathe, is rotated thereby, and thus the grinding-wheel *d* is caused to revolve in an orbit around the extremity of the lathe-center to be ground thereby, while at the same time the said grinding-wheel is caused to rotate upon its own axes as follows: Pulleys D D' upon a counter-shaft E, secured to tool-post F or otherwise in any convenient manner—as, for instance, by means of the frame G—are connected, the one D' with the cone-pulley of the lathe by belt H, the other D with double pulley T by belt M, (shown in section, Fig. 2,) and the pulleys U, idler-pulleys *v v'*, and double pulley T are connected by another belt U', as will be readily understood. The rotation of the cone-pulley thus rotates the pulley D', carrying thereby the intermediate shaft E, rotating in frame G, and thus causes the pulley D to rotate, which, through the belt M rotates the double pulley T, which in turn, through the belt U', causes the idler-pulleys *v v'* to rotate, and also the pulley U, rotating therewith the wheel-shaft *e*, whereby the grinding-wheel *d* is caused to rotate upon its own axes while it is being simultaneously revolved by the rotation of the live-spindle of the lathe in an orbit concentric with the latter's axis of rotation.

The operation of my invention is as follows: My grinding mechanism described having been secured, as aforesaid, in the socket of the live-spindle of the lathe and the belts and intermediate shafts adjusted, a lathe-center is secured in the usual way within the dead or tail spindle socket to be ground on its exposed end to the usual cone shape. The frame *b* is then moved and adjusted relatively to the plate *a*, and so as to bring the grinding-edge of the wheel *d* into the required contact with the end of the lathe-center N, which is to be ground, the latter being advanced and adjusted by moving the tail-spindle S' in the usual manner. The idler-pulleys are also moved and adjusted and fastened so as to tighten the belt. Power being applied in the usual way to the cone-pulley, the grinding-wheel *d* is caused to rotate and revolve, as aforesaid, and is at the same time moved longitudinally back and forth over the surface which is being ground by the sliding of the frame C, which is caused to reciprocate on its guides *n o*, as aforesaid. By the latter movement a cone surface of any desired width may be ground irrespective of the width of the grinding-wheel and undue and uneven wear of the grinding-surface of the wheel is obviated. The rotation of the grinding-wheel on its own axis produces the grinding effect required, and its revolution in an orbit around the axis of rotation of the live-spindle insures the grinding down of the lathe-center into a cone, whose apex and axis are exactly coincident with said axis of rotation of the live-spindle.

To grind or "true" the lathe-center which is to be used in the live-spindle socket, I secure the plug S in the socket of the dead or tail spindle, readjust the belts after moving the pulley D to the required position upon the intermediate shaft E, and secure within the socket of the live or head spindle the center which is to be ground. The latter is of course caused to rotate by the rotation of the live-spindle and the grinding-wheel being adjusted, as aforesaid, so as to make the required contact is simultaneously rotated and moved backward and forward longitudinally, as described, thus effecting the grinding. In this case, however, it will of course be understood that the grinding-wheel *d* does not revolve, this being rendered unnecessary by the rotation of the center which is being ground.

Fig. 4 of the drawings shows the application of my mechanism to an ordinary lathe, the grinding mechanism being shown in position within the socket of the live-spindle and brought down by adjustment, so as to apply the edge of the grinding-wheel to the extremity of the center N. By means of my said mechanism and method of grinding the centers both centers are automatically and necessarily ground so that their apexes will exactly meet in the very center of the longitudinal axis of rotation of the live-spindle of the lathe and this irrespective of any bend through defect in the dead-center or dead-spindle socket or inaccurate alignment of the lathe-sockets or of the centers themselves.

What I claim as new, and desire to secure by Letters Patent, is the following:

1. The combination of the live-spindle of a lathe with a grinding-wheel revolving in an orbit concentric with the axes of rotation of said live-spindle, substantially as and for the purpose described.

2. The combination of the live-spindle of a lathe with a rotating grinding-wheel revolving in an orbit concentric with the axes of rotation of said live-spindle, substantially as and for the purpose described.

3. The combination of the live-spindle of a lathe with a rotating and simultaneously reciprocating grinding-wheel revolving simultaneously in an orbit concentric with the axes of rotation of said live-spindle, substantially as and for the purpose described.

4. The combination, with the live-spindle, of revolving and rotating grinding-wheel thereby

revolved in orbit concentric with said spindle's axis of rotation, substantially as and for the purpose described.

5. The combination of live lathe-spindle and actuating-pulley T, both having same axis of rotation, and rotating and revolving grinding-wheel revolving in orbit concentric with said axis, substantially as and for the purpose described.

6. The combination of live lathe-spindle and actuating-pulley T, both having same axis of rotation, and rotating, revolving, and reciprocating grinding-wheel revolving in orbit concentric with said axis, substantially as and for the purpose described.

7. The combination of plug S, pulley T, frame *b*, shaft *e*, wheel *d*, pulleys *v v'*, and pulley U, all connected together substantially as and for the purpose described.

8. The combination of plug S, pulley T, frame *b*, shaft *e*, wheel *d*, pulleys *v v'*, pulley U, and arbor R, all connected together substantially as and for the purpose described.

9. The combination of plug S, pulley T, frame *b*, shaft *e*, wheel *d*, pulleys *v v'*, pulley U, arbor R, bearings 1 1', worm *k*, worm-wheel *f*, connecting-rod *g*, sliding frame C, spline *m*, and feather *l*, all connected together substantially as and for the purpose described.

10. The combination of plug S, pulley T, frame *b*, shaft *e*, wheel *d*, pulleys *v v'*, pulley U, arbor R, bearings 1 1', worm *k*, worm-wheel *f*, and guide-rods *n o*, all connected together substantially as and for the purpose described.

11. The combination of plug S, pulley T, frame *b*, shaft *e*, worm *k*, worm-wheel *f*, connecting-rod *g*, sliding frame C, and wheel *d*, and pulleys *v*, *v'*, and U, substantially as and for the purpose described.

12. The combination of plug S, pulley T, frame *b*, base-plate *a*, shaft *e*, pulleys *v v'* U, and wheel *d*, substantially as and for the purpose described.

13. The combination of lathe cone-pulley Y, counter-shaft E, pulleys D D', live-spindle S', plug S, pulley T, frame *b*, shaft *e*, and wheel *d*, all connected together substantially as and for the purpose described.

14. The combination of lathe cone-pulley Y, counter-shaft E, pulleys D D', live-spindle S', plug S, pulley T, frame *b*, shaft *e*, wheel *d*, worm *k*, worm-wheel *f*, connecting-rod *g*, sliding frame C, and guides *n o*, all connected together substantially as and for the purpose described.

HERBERT E. HAWES.

Witnesses:
WM. COTTER DICK,
WM. J. WHITEHOUSE.