W. TUCKER.

ENGINE-LATHE.

No. 170,605. Patented Nov. 30 1875.

FIG. 1.

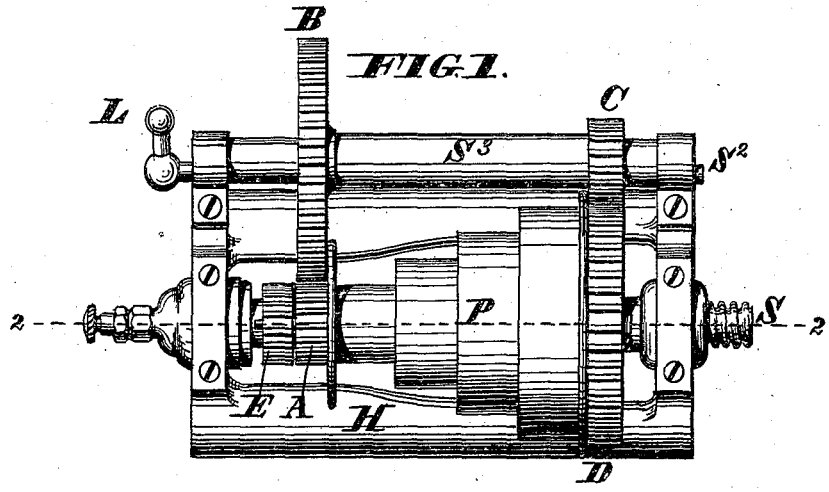


FIG. 2.

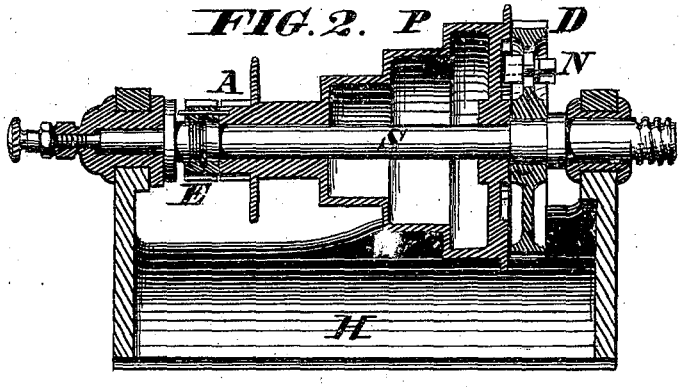


FIG. 3.

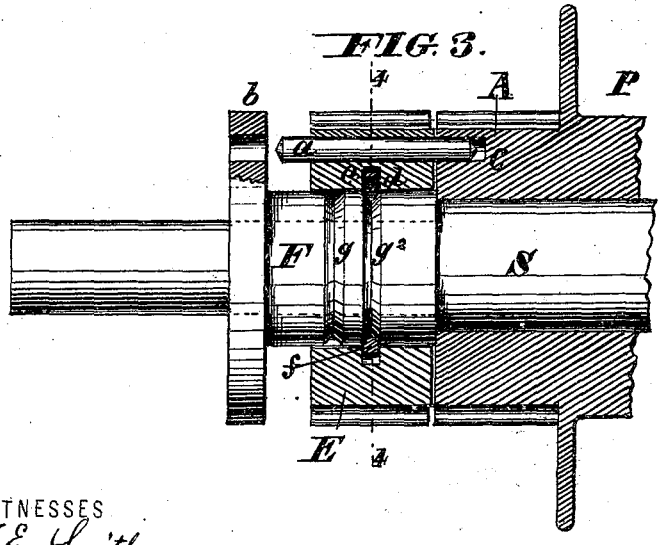
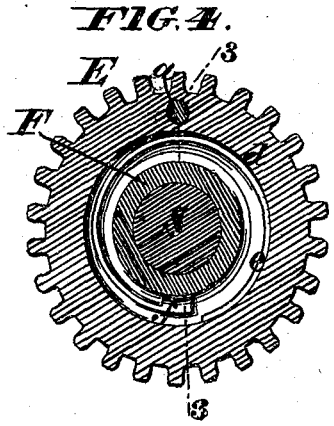


FIG. 4.



WITNESSES

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IMPROVEMENT IN ENGINE-LATHES.

Specification forming part of Letters Patent No. **170,605**, dated November 30, 1875; application filed May 17, 1875.

To all whom it may concern:

Be it known that I, WILLIAM TUCKER, of Fiskedale, in the county of Worcester, in the State of Massachusetts, have invented a new and useful Improvement in Engine-Lathes, of which the following is a specification:

The objects accomplished by this invention have reference to the operation of cutting screws in engine-lathes.

My present invention consists in means for giving to engine-lathes the capacity of cutting screws in a longer range of pitches than has heretofore been practicable, and this without any corresponding increase of gearing or complication of parts, and to an extent that could not, as I believe, be practically accomplished in the usual way—*i. e.*, by change of gears of different numbers of teeth, as hereinafter set forth.

Figure 1 is a plan view of so much of a lathe-head of recent and approved pattern as is necessary to illustrate this invention embodied therein. Fig. 2 is a vertical longitudinal section of the same. Fig. 3 is a sectional elevation, showing the novel features of construction on a larger scale. Fig. 4 is a transverse section on the line 4 4, Fig. 3.

The sections represented in Figs. 2 and 3 are on the lines 2 2 and 3 3, Figs. 1 and 4.

H represents the housing of the lathe-head; S, the primary spindle; S^2, the secondary spindle; S^3, a sleeve-shaft on the latter; P, the cone-pulleys or "cone" on the primary spindle, and A B C D E the gears. Of these, the first four gears, A B C D, are employed for "back-gearing" in ordinary manner. The first gear A is attached to the cone and transmits its motion to the second and third, B C, which are fast on the sleeve-shaft S^3. The third gear C transmits the motion to the fourth, D, which is fast on the primary spindle S. The transmitting-gears A C are small and of equal size, each having twenty-six teeth. The two larger ones B D are also equal and have seventy-eight teeth each. This causes each pair of gears to slow the motion and increase the power three times. From the cone to the lathe-spindle there is, consequently, a multiplication of nine times the power imparted to the cone, while the latter has ninefold greater speed than the spindle. The back gears are thrown into and out of mesh by means of a lever-handle, L, on the secondary spindle S^2, which is an oscillating eccentric.

To provide for driving the primary spindle at the same speed as the cone, the gear D, which is fast on the spindle, is slotted, the contiguous face of the cone is constructed with a notched groove, and a "locking-nut," N, is applied within these.

When the nut is fastened within the notch the cone is made one with the spindle, through the medium of the gear, which is now fast to each. When the cone and spindle are thus connected the back gears must be thrown out of mesh.

The fifth gear E of those above referred to is that which drives the feed and the leading-screw of a screw-cutting lathe. This "feed-gear" is common to all engine-lathes; but heretofore it has been made fast to the primary spindle on which it is mounted, so as to have always the same speed as the spindle.

The objects of the present invention are accomplished by adapting this gear to be attached at will to the primary spindle or to the cone direct.

In the illustration a flanged bushing, F, is made fast to the spindle at this point, and the feed-gear is adapted to slide thereon. The gear is provided with a clutch-pin, *a*, projecting at each end, the bushing with a correspondingly-perforated flange, *b*, and the cone-gear A with a corresponding hole, *c*.

An annular chamber, *d*, Fig. 4, is formed within the feed-gear. A spring, *e*, made in the form of a divided ring, and carrying a V-shaped head or detent, *f*, is arranged in this chamber, and a pair of circumferential V-grooves, *g* g^2, are cut in the periphery of the sleeve of the bushing F, to receive the detent *f*, for holding the feed-gear in its different positions on the bushing. The V shape of the detent adapts it to rise out of the respective grooves when end pressure is applied to the feed-gear for shifting it.

When the feed-gear is shifted so as to throw its pin *a* into the hole in the flange *b*, it is made fast to the spindle. When it is slid so as to throw its pin into the hole *c* it is made fast to the cone. This movement of the feed-

gear can always be made when the cone and large spindle-gear are locked together, as then the pin of the feed-gear is in line with both holes. When the feed-gear is attached to the cone-gear it is apparent that it is not back-geared with the spindle, but is driven directly by the belt without change by the back gears, although they may be in mesh so as to back-gear the spindle. This is what it is desirable to accomplish, as in cutting coarse screws the spindle must have a comparatively-slow motion, while the movement of the tool-carriage must be relatively fast. When the feed-gear is attached to the flanged bushing the lathe will do all and no more than an ordinary lathe. Suppose its capacity of pitches in this condition to be two, three, four, five, six, seven, eight, nine, ten, twelve, thirteen, fourteen, sixteen, eighteen, twenty, twenty-two threads per inch. Now, by simply shifting the feed-gear, so as to attach it to the cone-gear, an additional range of pitches is obtained, as follows: two-ninths, three-ninths, four-ninths, five-ninths, six-ninths, seven-ninths, eight-ninths, nine-ninths, ten-ninths, twelve-ninths, thirteen-ninths, fourteen-ninths, sixteen-ninths, eighteen-ninths, twenty-ninths, twenty-two-ninths threads per inch. This is owing to the relative speeds of the cone and the back-geared spindle, which are nine to one in the illustration.

It will be observed that no gears are employed in addition to those which are essential to the first result, and the only additional pieces are the appurtenances of the sliding feed-gear, which are exceedingly simple, compact, and inexpensive in the illustration, but may be even more so. For example, a simple collar made fast on the spindle to correspond with the perforated flange *b* might take the place of the bushing, and the detent and its appurtenances be dispensed with.

Any approved substitute device may also be employed instead of the clutch *a b c*, if preferred, without departing from the invention.

Any preferred means may be used to convey the motion from the feed-gear to the various kinds of feed mechanism, and to the leading-screw.

It is deemed impracticable to get the proposed range of pitches by multiplying gears, first, because the requisite room could not be afforded, and, secondly, because too much power would be lost by friction in gearing down for the work, and up again for the feed to the required extent for coarse threads and spiral cutting.

This invention renders possible on a lathe a kind of work that has not before been done in this way: The work may have a slow rotation, while the cutting-edge of the tool moves with relative rapidity parallel to its axis.

The coarsest cut of thread in the scales herein given — two-ninths per inch, or one thread to four and one-half inches—is within the range of a small six-foot lathe, improved as herein proposed.

The following is claimed as new—namely:

1. The feed-gear E, adapted to be attached at will either to the primary spindle or to the cone direct, substantially as described, for the purpose set forth.

2. The combination, in an engine-lathe, of a primary spindle, S, a cone or cone-pulleys, P, back gears A B C D, and a feed-gear, E, adapted to be attached at will either to the spindle or to the cone direct, as herein described, for the purpose specified.

3. The bushing F, having the perforated flange *b* and groove $g\ g^2$, the spring *e*, having the detent-head *f*, the double-ended clutch-pin *a*, and the clutch-hole *c* in the cone-gear A, in combination with the primary spindle, cone, and feed-gear of an engine-lathe, as herein shown and described, for the purposes set forth.

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