

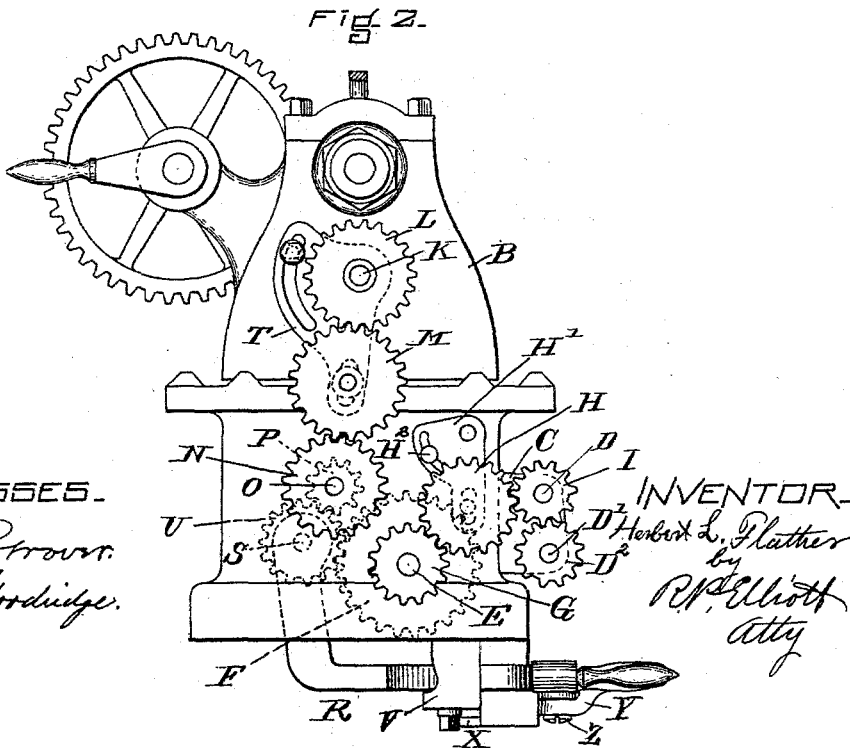
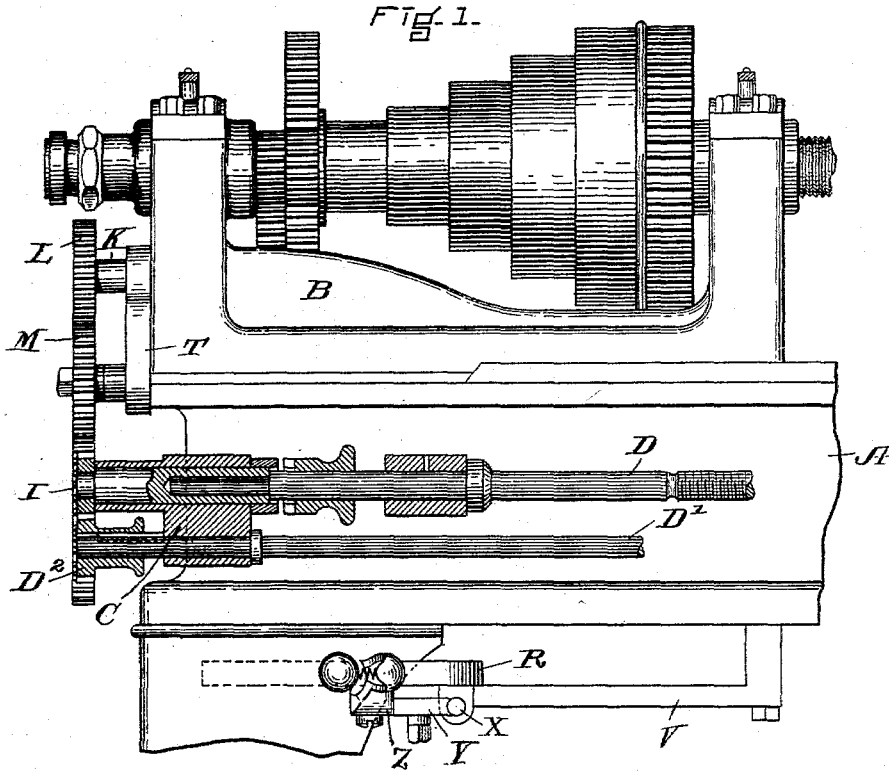
(No Model.)

2 Sheets—Sheet 1.

H. L. FLATHER.
FEED MECHANISM FOR ENGINE LATHES.

No. 592,966.

Patented Nov. 2, 1897.



WITNESSES.
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INVENTOR.
Herbert L. Flather
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R. W. Elliott
 Atty

(No Model.)

2 Sheets—Sheet 2.

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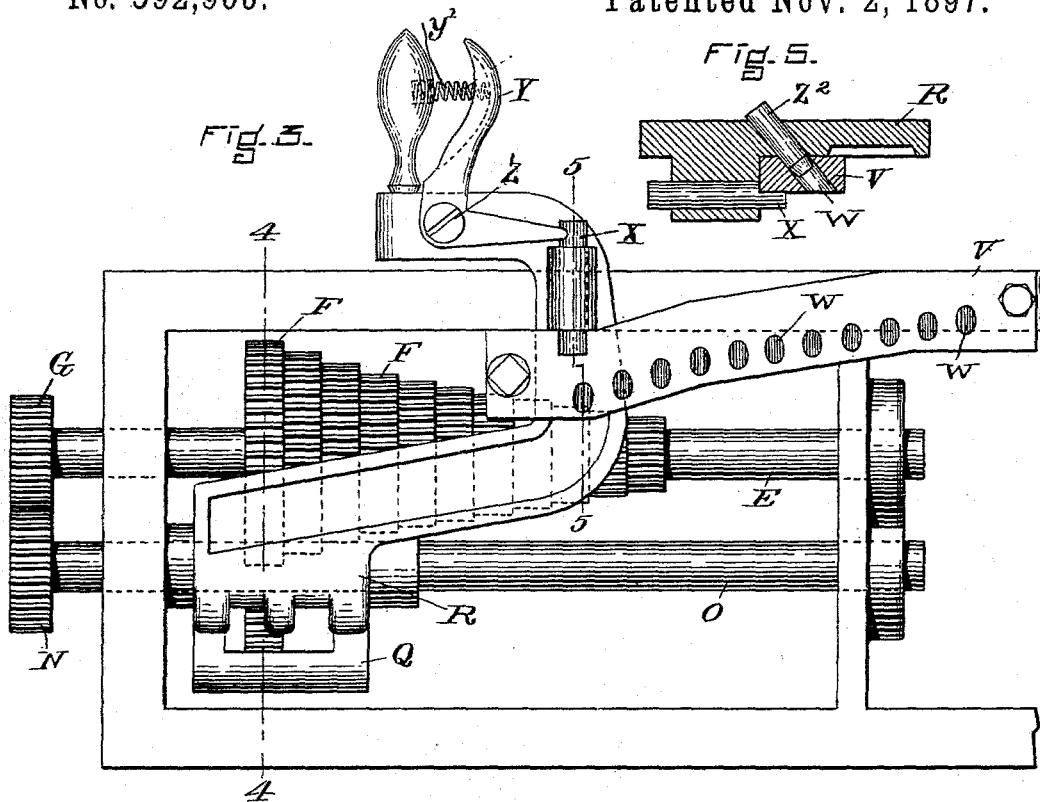


FIG. 3.

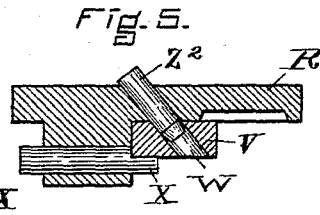


FIG. 5.

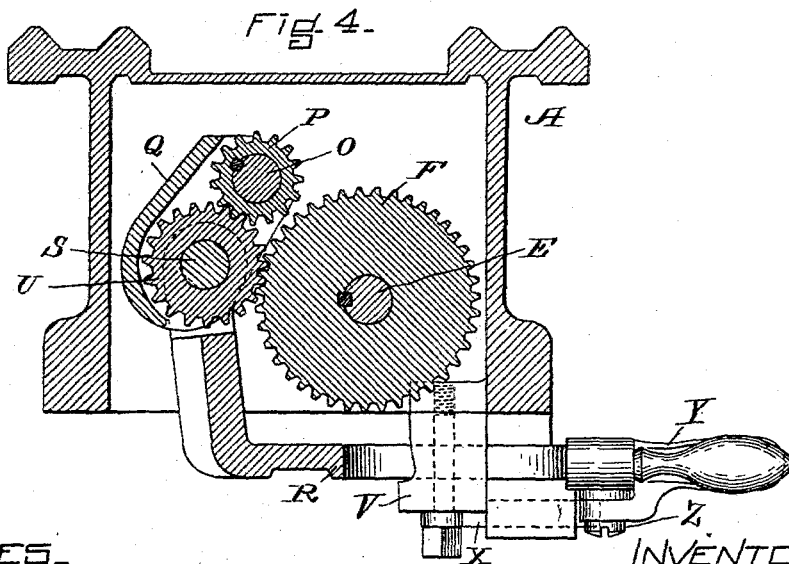


FIG. 4.

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UNITED STATES PATENT OFFICE.

HERBERT L. FLATHER, OF NASHUA, NEW HAMPSHIRE.

FEED MECHANISM FOR ENGINE-LATHES.

SPECIFICATION forming part of Letters Patent No. 592,966, dated November 2, 1897.

Application filed May 24, 1897. Serial No. 637,981. (No model.)

To all whom it may concern:

Be it known that I, HERBERT L. FLATHER, of Nashua, in the county of Hillsborough and State of New Hampshire, have invented certain new and useful Improvements in Feed Mechanism for Engine-Lathes, of which the following is a specification.

My invention shows a new improvement in the feed mechanism of engine-lathes, wherein two sets or series of interchangeable gears are used in connection with a cone of gears arranged step-like and attached to a supplementary shaft for the purpose of driving the feed-screw and feed-rod, and means for rapidly changing the speed of said feed-screw and feed-rod.

The object of my invention is, first, to provide means for rapidly changing the speed of feed-screw and feed-rod; second, to enable the operator to obtain a greater range or number of different speeds of the feed-screw and feed-rod than has been possible heretofore, and, third, to provide a simple and easily-operated device for changing the speed of feed-screw and feed-rod, the same being located in a position where it is free from dust and chips, all of which has been accomplished by the mechanism herein shown and set forth, reference being had to the drawings which accompany these specifications.

Similar letters refer to similar parts throughout the several views.

Figure 1 is a side elevation of a section of a lathe-bed and head-stock with my improved feed mechanism attached. Fig. 2 is an end elevation of same and shows a side elevation of my improved locking device. Fig. 3 represents an inverted plan of the inside of the lathe-bed, cone of gears, supplementary shaft upon which same is mounted, the shaft which drives said supplementary shaft, and a plan of my improved locking device. Fig. 4 is a cross-section through line 4 4 on Fig. 3. Fig. 5 is a cross-section through line 5 5 on Fig. 3.

The lathe-bed A has mounted thereon the head-stock B and a suitable bearing C attached to its side, in which the feed-screw D and the feed-rod D' rotate.

The feed-screw D is driven by the shaft E at varying speeds by a series of differential gears F, attached to and arranged step-like on said shaft E, the gear G, mounted on the

outer end of shaft E, the intermediate gear H, mounted on a swinging arm H' and adapted to enmesh with said gear G, and the gear I, mounted on the outer end of the feed-screw D, and adapted to enmesh with the gear H. Said gears G, H, and I are interchangeable and may be removed, so that others of different sizes can be substituted for them.

The shaft E is driven by a series of interchangeable gears L, M, and N from the stud K. Said stud K has a bearing in the head-stock and is driven from the live-spindle in the usual manner and is provided with the usual reversing mechanism, so that said stud K may be revolved in either direction. The interchangeable gear L is mounted on the outer end of the stud K and meshes with the gear M, which is mounted on the swinging arm T. Said gear M in turn meshes with the interchangeable gear N, which is mounted on the outer end of the shaft O. The said shaft O has mounted thereon the pinion P in such manner as to slide longitudinally on and turn with the shaft O. One end of section Q of the lever R is mounted on the shaft O, so as to have a free movement in every direction, the other end being forked to receive one end of the lever R, to which it is attached by the fulcrum-pin S. The intermediate gear U is mounted and turns freely on said fulcrum-pin S and is adapted to enmesh with and be driven by the pinion P. Said intermediate gear U is also adapted to enmesh with any one of the series of differential gears F and slides longitudinally as desired by means of the lever R.

Having fully described the mechanism by which the feed-screw D is driven from the live-spindle of the lathe, I will now describe the method by which the intermediate gear U is enmeshed with the different members of the series of differential gears F.

The outer end of the lever R rests upon and is guided and retained in position by the guide-bar V, which is secured to the under side of the lathe-bed A. Said guide-bar V is provided with a series of holes W, drilled at an angle with its top, deflecting downward and inward and adapted to receive the pin Z², which is secured in the end of lever R at the proper angle. The said pin Z² forms part of a locking device for retaining the lever R

in a proper position to enable the intermediate gear U to enmesh with any desired gear of the series of differential gears F. The remaining parts of the locking device consist of the series of holes W, which are drilled in the guide-bar V in such position that when the pin Z² is in any one of said holes W the intermediate gear U will mesh properly with the gear of the series of gears F, with which said hole W aligns. The pin Z² prevents the lever R from moving longitudinally, and the locking-pin X, which is adapted to slide under the guide-bar V, prevents the lever R from being lifted up. Said locking-pin X slides in a bearing in the lever R and is operated by the spring y' and the lever Y, which is fulcrumed on the screw Z.

It will be noticed that the guide-bar V is set at an angle to the axis of the series of gears F, said angle conforming to the peripheries of the said series of gears F.

The feed-rod D' is driven by means of the gear D², attached to its outer end and adapted to enmesh with the gear I. The gear D² is attached to the feed-rod D' in such manner as to turn with but slide longitudinally on same, so that the said gear D² may be disengaged from the gear I at will.

In the arrangement shown the feed-rod D' may be driven at a greater number of speeds than has been possible heretofore. The feed-rod D' may be disconnected and remain idle while the feed-screw is in operation.

The gears G, H, and I are detachable, so that others having a different number of teeth may be substituted in their places.

The series of gears F may be composed of any convenient number of gears attached to the shaft E, the said gears having a gradually-increasing number of teeth from the smallest to the largest, in a fixed ratio with relation to the gears L, N, and P, the gears G and I, and the pitch of the feed-screw D, so that the feed-screw D may be driven at varying speeds, according as the intermediate gear U is enmeshed with the different gears of the series of gears F, such speeds having been predetermined from the pitch of thread on the feed-screw and number of teeth in the interchangeable gears and series of gears F.

The drawings show the gear U as engaged with the largest of the series of gears F, and the feed-screw D revolving at the slowest rate of speed attainable by use of the interchangeable gears shown.

When it is desired to run the feed-screw D at a different rate of speed, the operation is as follows: The locking-pin X is withdrawn from the bar V by pressing on the lever Y. Then lift up the lever R and withdraw the pin Z² from the hole W, when the lever R may be moved sidewise, carrying the intermediate gear U until it is in position to enmesh with the desired gear of the series of gears F. The lever R is then dropped, causing the said lever R to become locked in the proper position.

The interchangeable gears L, M, and N may be substituted by others of different sizes, thereby driving the shaft O at varying speeds. The gears G, H, and I may also be changed and others of different sizes substituted therefor.

The number of different speeds at which the feed-screw D may be driven is therefore the number of changes of the first series of interchangeable gears multiplied by the number of gears in the series of gears F and the result obtained multiplied by the number of changes of the second series of interchangeable gears, the final result being the number of speeds of the said feed-screw D obtainable with a given number of gears.

I am aware that a series of differential gears arranged step-like has been used heretofore by others, same being shown in patents to Miles, No. 111,859, of February 14, 1871; Shellenbacker, No. 460,183, February 2, 1892; and Norton, No. 470,591, March 8, 1892, but the combination of interchangeable gears with a series of differential gears has never to my knowledge been used in the manner and form herein shown.

I do not claim the application of a series or cone of gears to the mechanism of lathes broadly, but only in the manner and form shown in my improved devices.

Having now fully described my invention, what I claim is—

1. In a lathe of the class described, the combination of a series of interchangeable gears driven from the live-spindle of the lathe, a shaft driven by said interchangeable gears, a pinion mounted to turn with and slide thereon, an intermediate gear meshing with said pinion, a series of differential gears arranged step-like on a second shaft and adapted to enmesh with said intermediate gear, a second series of interchangeable gears driven by said second shaft, and the feed-screw driven by said second series of interchangeable gears, substantially as described.

2. In a lathe of the class described, the combination of a series of interchangeable gears with a shaft driven by said interchangeable gears, a pinion mounted to turn with and slide on said shaft, an intermediate gear in mesh with and driven by said pinion, a series of differential gears arranged step-like on a second shaft, means for engaging said intermediate gear with any one of the said series of differential gears, a second series of interchangeable gears, a feed-screw driven by same, and a feed-rod driven by the said feed-screw, substantially as described.

3. The combination in a lathe, of a live-spindle with a series of differential gears, arranged step-like, connected by a series of interchangeable gears; a second series of interchangeable gears connecting said cone of differential gears with a feed-screw, substantially as described.

4. The combination in a lathe, of a bed having a rectangular recess in one end, bear-

ings in the walls of said recess, two shafts adapted to rotate in said bearings, a pinion mounted to turn with and slide on one of said shafts, a jointed lever fulcrumed on said shaft, an intermediate gear mounted on said lever, a second shaft and a series of differential gears arranged step-like mounted thereon, means for meshing any one of said series of differential gears with the said intermediate gear, a feed-screw, and a series of gears connecting same with said second shaft, substantially as described.

5. The combination of a shaft, a pinion mounted thereon to turn with and slide on said shaft, a jointed lever loosely fulcrumed on said shaft, an intermediate gear mounted on the fulcrum joining the parts of said lever, a series of differential gears mounted step-like on a second shaft adapted to enmesh with said intermediate gear, a guide-bar supporting the outer end of said lever, a pin in

said lever adapted to fit in any one of a series of holes drilled in said guide-bar, a locking-pin attached to said lever and adapted to retain said lever in position, substantially as described.

6. The combination of the shaft O, the pinion P, member Q of lever R, intermediate gear U, fulcrum S, series of differential gears F, lever R, pin Z², guide-bar V, provided with series of holes W, locking-pin X, lever Y, screw Z, and the spring y', substantially as shown and described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 23d day of April, A. D. 1897.

HERBERT L. FLATHER.

Witnesses:

F. MERKEL,
N. I. HALL.