No. 643,191. Patented Feb. 13, 1900.

W. LODGE.

SPEED CHANGING GEAR FOR ENGINE LATHES.

(Application filed July 27, 1899.)

(No Model.) 2 Sheets—Sheet 1.

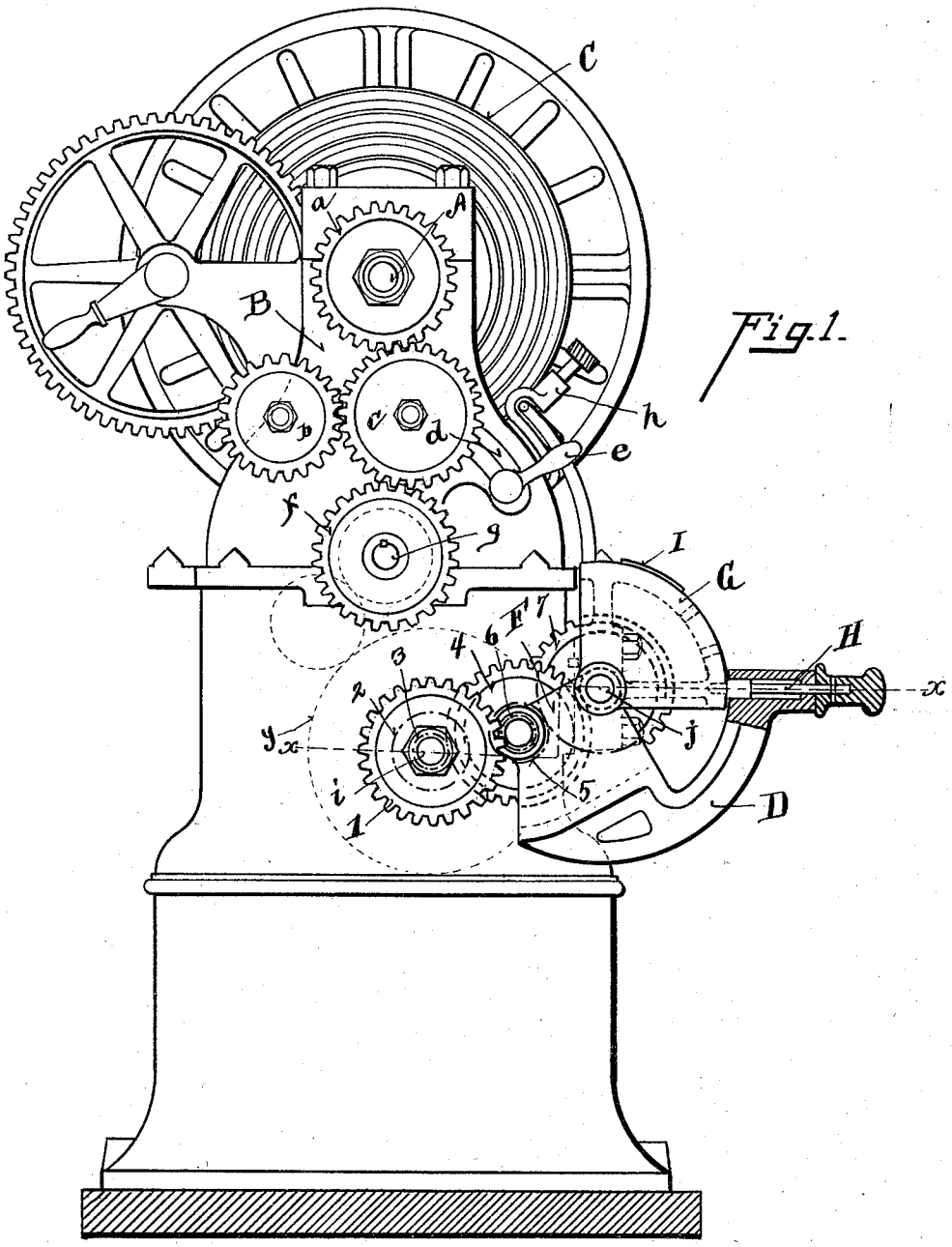

Fig. 1.

Witnesses
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(No Model.) 2 Sheets—Sheet 2.

Fig. 2.

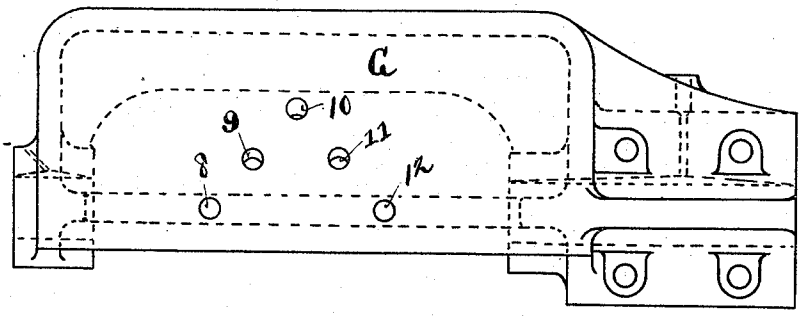
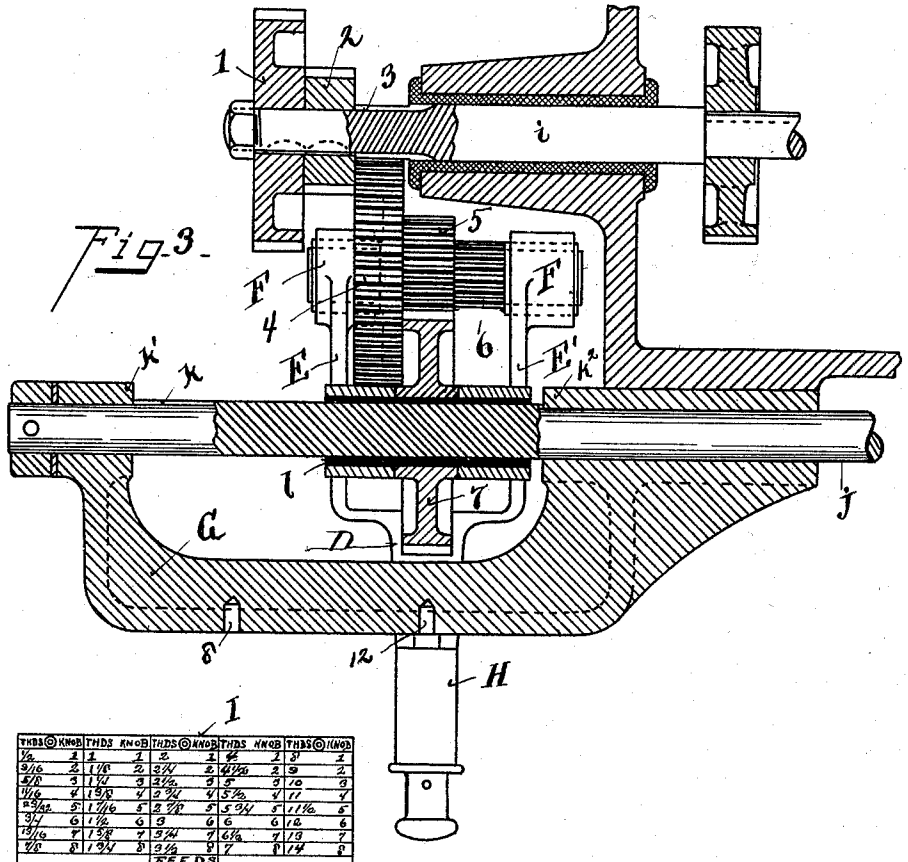


Fig. 3.



1

THDS	KNOB	THDS	KNOB	THDS	KNOB	THDS	KNOB	THDS	KNOB
1/2	1	1	1	2	1	4	1	31	1
9/16	2	1 1/8	2	3 1/4	2	4 11/16	2	9	2
5/8	3	1 1/4	3	3 1/2	3	5	3	10	3
11/16	4	1 3/8	4	3 3/4	4	5 1/2	4	11	4
23/32	5	1 1/2	5	3 7/8	5	5 3/4	5	11 1/2	5
3/4	6	1 1/2	6	3	6	6	6	12	6
13/16	7	1 5/8	7	3 1/4	7	6 1/2	7	13	7
7/8	8	1 3/4	8	3 1/2	8	7	8	14	8
				FEEDS					
3	5 1/4	6 TO 11 1/2		12	31	34 TO 92		98	98

Fig. 4.

Witnesses:
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UNITED STATES PATENT OFFICE.

WILLIAM LODGE, OF CINCINNATI, OHIO, ASSIGNOR TO THE LODGE & SHIPLEY MACHINE TOOL COMPANY, OF SAME PLACE.

SPEED-CHANGING GEAR FOR ENGINE-LATHES.

SPECIFICATION forming part of Letters Patent No. 643,191, dated February 13, 1900.

Application filed July 27, 1899. Serial No. 725,272. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM LODGE, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Speed-Changing Gears for Engine-Lathes, of which the following is a specification.

My invention relates to an improvement in engine-lathes of the general type and character shown and described in the patent to W. Shellenback, No. 518,164, granted April 10, 1894.

The features of my invention are more fully set forth in the description of the accompanying drawings, forming a part of this specification, in which—

Figure 1 is an end elevation of an engine-lathe, showing my improvement applied. Fig. 2 is a front plan view of the housing for my improvement. Fig. 3 is a section on line *x x*, Fig. 1. Fig. 4 represents the index-plate.

My invention relates more particularly to a certain speed-changing-gear system, generally known as the "secondary speed-changer." This improvement is applicable to engine-lathes in general which employ a cone of gears and tumbler system in which the cone of gears is not mounted on the lead-screw, and it may be located either between the spindle and cone of gears and tumbler system or between the latter-named elements and the lead-screw. The latter-described location is preferred, as it is more in harmony with the disposition and arrangement of the other lathe parts, as I desire to use them in my engine-lathes. This secondary speed-changing system constitutes a multiple of the range of speeds obtainable from the cone of gears and tumbler, the value of the multiple being determined by the number and arrangement of gears selected to make up the system.

My invention is an improvement in all respects over the secondary speed system of the said Shellenback patent and over the secondary speed systems used hitherto in engine-lathes of this class.

The improvements pertain particularly to the facility of manipulation, greater range of speed attainable with the fewest number of parts, the said parts being completely enhoused, and general convenience and efficiency of operation.

A represents the usual spindle, mounted on head-stock B, having a cone of driving-pulleys C. *a* represents a driving gear-wheel on the end of the spindle. *b c* represent reversing gear-wheels on the quadrant *d*, operated by the lever *e* to reverse the direction of rotation derived from gear *a*. Gear *c* is in mesh with gear *f* on the end of the tumbler-shaft *g*. On the tumbler *h* is the usual pinion splined on shaft *g* and the transmitting-gear on the end of the tumbler-shaft in mesh with the said pinion. *i* represents the shaft carrying the cone of gears, receiving its speed by the engagement of the tumbler-transmitter gear-wheel with any selected number of the cone of gears *y*. These parts are common to the older type of engine-lathes named.

In order to extend the range of speed obtainable to cover exhaustively the range of work which may be desired of the lathe and to render such particular speeds desired easily ascertained and conveniently and expeditiously effected, I provide the following instrumentalities:

Upon the end of the cone-shaft *i* projected through the head-stock of the lathe I locate a train of driver-gears 1 2 3, splined to the shaft.

j represents the lead-screw, the end of which is also projected through the lathe head-stock slightly farther than the cone-shaft. Upon this lead-screw I pivot the quadrant D, adapted to slide and rock thereon. The end of this quadrant is projected beyond the lead-screw in the form of a yoke E E′, carrying between them the stud-shaft F. Upon this stud I mount a train of compound intermediate gears 4 5 6, pinned together.

7 represents the driven gear-wheel carried by the quadrant, splined upon the lead-screw. It is in mesh with one of the train of compound gears on the stud-shaft F—for convenience of location the middle one 5. The outer end of the quadrant is upturned and engages over a housing G. This housing is supported over the projected end of the lead-screw and cone-shaft incasing the upper por-

tion of the change-speed devices supported thereon. This housing is bolted at its inner end to the ordinary lathe-housing or otherwise suitably secured thereto. The quadrant is provided with a spring detent-pin H in its outer end, adapted to engage with any selected one of the holes 8, 9, 10, 11, and 12 in the housing G. These holes represent the respective positions of the tumbler-handle in the various arrangements of gear adjustments.

I represents the index-table, arranged opposite the locking-holes 8, 9, 10, 11, and 12, indicating the speeds obtainable from each hole by proper recourse to the cone of gears and tumbler.

The preferred method of securing the driven gear to the lead-screw and quadrant is as follows: The lead-screw is provided with a key *k* between its end bearings *k'* *k*². Upon this key is splined the bushing *l*. The driven gear 7 is tightly driven on the bushing, so as to revolve therewith. The bushing forms a bearing for the quadrant, and the bushing and gear slide in unison therewith on the lead-screw for changing speeds.

The value of the secondary speed-changing system is optional; but I have selected the gears with a view to getting as full a range of speed changes as possible. To illustrate, start with the first column, indicating one-half thread to the inch on the first line. When the cone-and-tumbler system have been exhausted under this column, the moving of quadrant to the second column multiplies the previous range of speeds indexed in column 1 by two, and the next column multiplies column 2 by two, and so on, so that counting progressively the speed of the lead-screw is multiplied by two in each movement of the quadrant from one column to the next.

Mode of operation: The quadrant-handle is grasped by hand and moved to the particular hole opposite the column on the index-plate containing the particular speed. The pin engages the hole and locks the quadrant in position. The tumbler-lever proper is moved to the position indicated by the figure on the line of the column selected opposite the figure indicating the said speed. For instance, supposing five and one-half threads to the inch is the speed desired, the quadrant-handle is moved to the hole opposite the column 4 and locked to that hole, which would be hole 11. The tumbler-lever is next engaged with the fourth hole in the tumbler-plate. As shown, there are five holes, and so five possible speed changes and five columns. These changes are effected by the following gear adjustments: In the adjustment shown in Fig. 3 quadrant compound gear 4 is in mesh with gear 3 on the cone-shaft. The quadrant-handle would then be in lock with hole 12. Moving the quadrant by the usual rocking and longitudinal sliding movements into engagement with hole 11 would bring compound gear 4 into mesh with driving-gear 2, giving a different speed. Another similar move in the same direction would bring compound gear 4 into mesh with driving-gear 1 and the handle of the quadrant would be locked to hole 10. The next move in the same direction would bring compound gear 5 into mesh with driving-gear 1 and the quadrant-handle into locking engagement with hole 9. One more move in the same direction would bring compound gear 6 into mesh with driving gear-wheel 1 and the quadrant-handle into locking engagement with hole 8, completing the secondary speed changes obtainable from the system, as shown. It is obvious that it could be extended, as desired; but the range shown is more than enough for ordinary conditions of work. The lead-screw should be projected beyond the cone-shaft a distance equal to the width of the compound gears and the limb E of the quadrant, which provides sufficient space for the full longitudinal movement of the quadrant necessary to accomplish all the changes of the secondary speed system. It is obvious that a single movement of the quadrant-handle in the secondary speed system and another single manipulation of the tumbler-lever proper will suffice to effect any one of the indexed speeds, and the parts are automatically locked in such selected engagement.

It is obvious that the range of my secondary speed-changing devices can be extended or narrowed at will by selection of the number of driving and transmitting compound gears to be used without in any way departing from the principle of my invention.

Having described my invention, I claim—

1. In a variable-speed mechanism, the combination of a driving-shaft, a series of different-sized driving-gears mounted on the end of said shaft, a driven shaft, a quadrant mounted on said driven shaft and adapted to be rocked and slid thereon, a driven gear-wheel movable by said quadrant and splined on the driven shaft, a compound transmitting-gear train mounted on said quadrant in mesh with said driven gear, the said compound gears being adapted to selectively engage with the cluster of gears on the driving-shaft, and means for securing said quadrant in its adjusted position, substantially as specified.

2. In a variable-speed mechanism, the combination of a driving-shaft, a series of driving gear-wheels splined upon the end of said shaft, a driven shaft, a quadrant movably mounted on said driven shaft, a stud carried by said quadrant, a driven gear-wheel movable by the quadrant splined on the driven shaft, compound transmitting-gears mounted on said stud and meshing with said driven gear, the said compound gears being adapted to selectively engage with the series of gears on the counter-shaft, and means for securing said quadrant in its adjusted position, substantially as specified.

3. In a variable-speed mechanism, the combination of a driving counter-shaft, a series

of different-sized gears splined thereon, a driven shaft, a quadrant movably mounted thereon, a stud-shaft carried by said quadrant, a driven gear movable by the quadrant splined upon the driven shaft, compound transmitting-gears mounted on the stud-shaft in mesh with the driven gear, and adapted to selectively engage the series of driving-gears, and means for adjusting said quadrant and locking the same in position, substantially as specified.

4. In a variable-speed mechanism, the combination of a driving counter-shaft, a series of different-sized gears splined thereon, a driven shaft, a quadrant movably mounted thereon, a stud-shaft carried by said quadrant, a driven gear movable by the quadrant splined upon the driven shaft, compound transmitting-gears mounted on the stud-shaft in mesh with the driven gear and adapted to selectively engage with the series of driving-gears, a housing extended over the end of said driven shaft, the outer end of the quadrant being upturned and adapted to engage over said housing, said housing having locking-holes opposite the several respective positions of quadrant adjustment and a detent-pin carried by said quadrant adapted to engage in any one of said holes, substantially as specified.

In testimony whereof I have hereunto set my hand.

WILLIAM LODGE.

Witnesses:
OLIVER B. KAISER,
W. R. WOOD.