No. 749,492. PATENTED JAN. 12, 1904.

W. LODGE.

VARIABLE SPEED MECHANISM FOR LATHES.

APPLICATION FILED JUNE 12, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

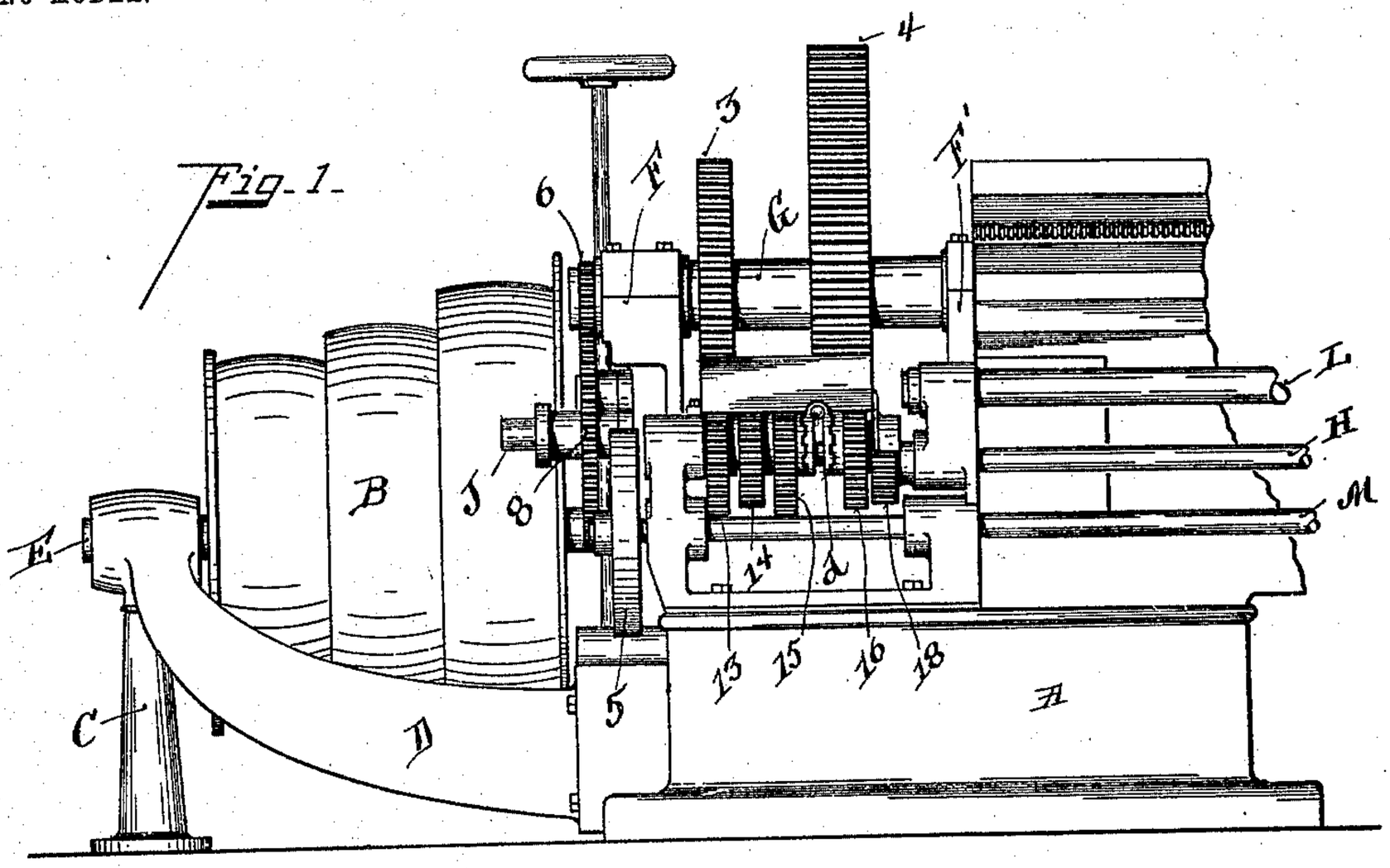
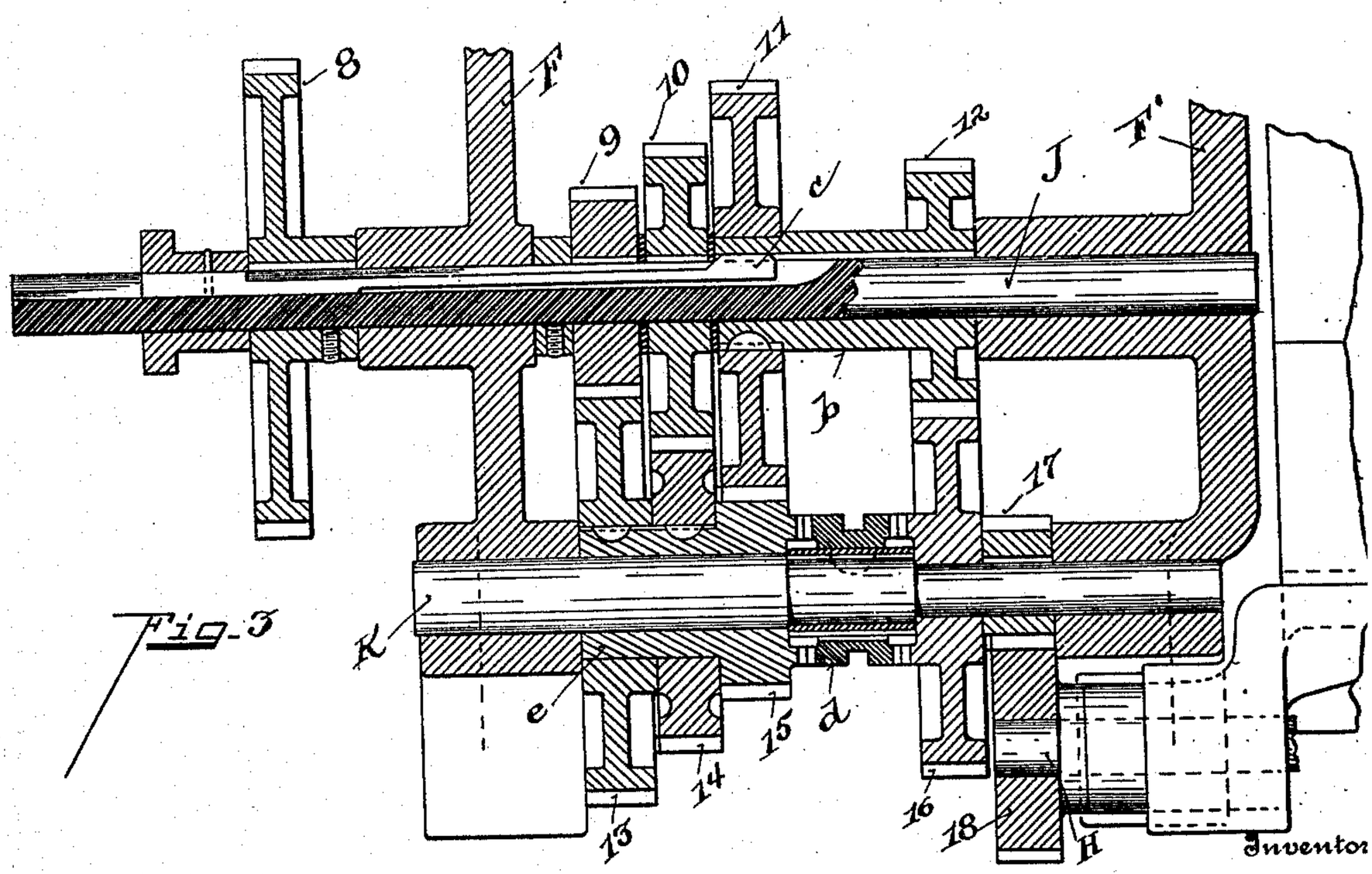


Fig. 3



Witnesses
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Louise Beck

Inventor
William Lodge
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NO MODEL. 2 SHEETS—SHEET 2.

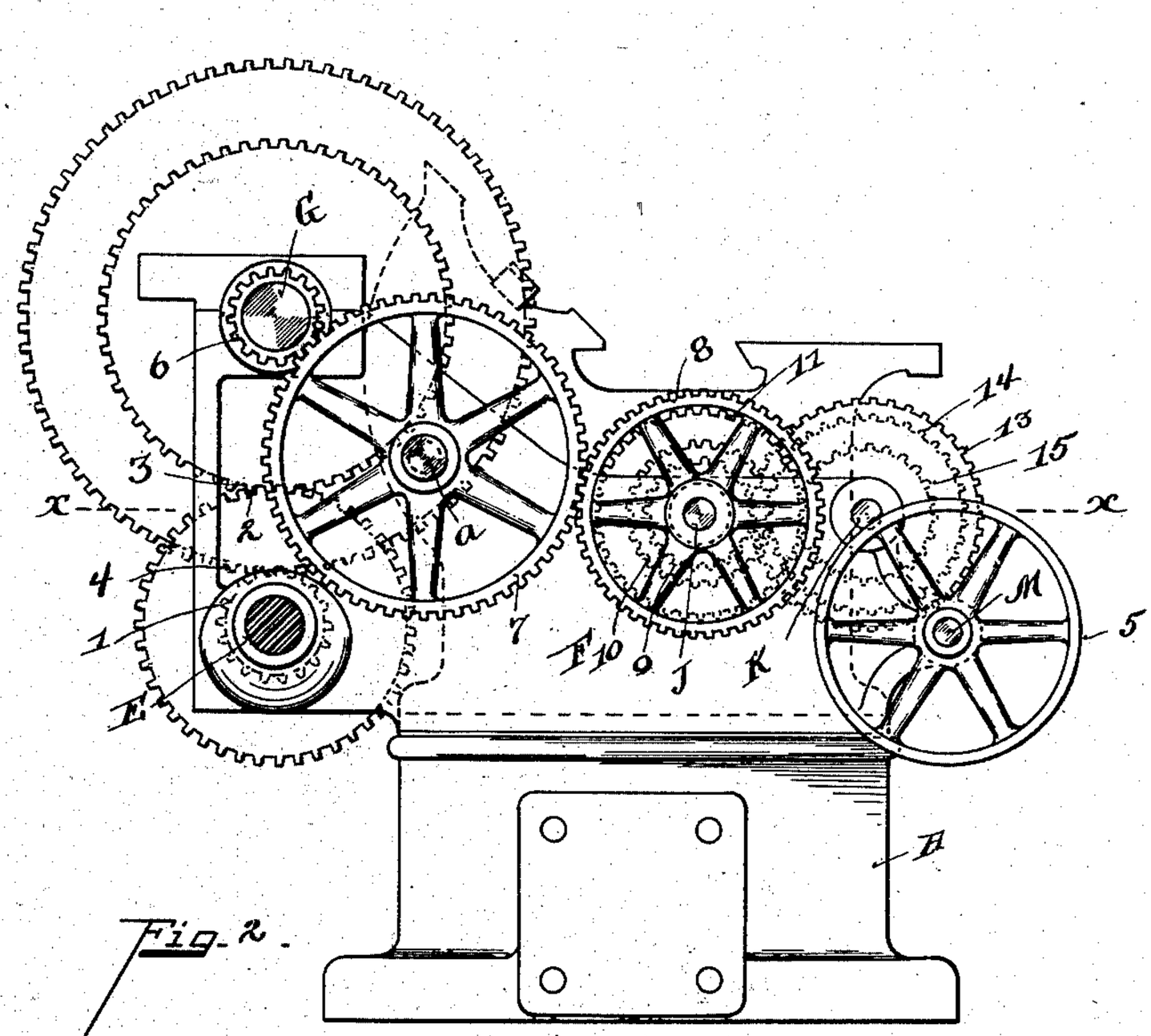

Fig. 2.

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No. 749,492. Patented January 12, 1904.

UNITED STATES PATENT OFFICE.

WILLIAM LODGE, OF CINCINNATI, OHIO.

VARIABLE-SPEED MECHANISM FOR LATHES.

SPECIFICATION forming part of Letters Patent No. 749,492, dated January 12, 1904.

Application filed June 12, 1903. Serial No. 161,200. (No model.)

To all whom it may concern:

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

My invention relates to the head-stock of an engine-lathe, and comprises the organization and arrangement of the gear-wheels for driving the spindle-operating shaft and the organization and arrangement of the gear-wheels between the spindle-operating shaft and the carriage-operating shaft.

My invention further relates to a rapid-reduction lathe of the particular type illustrated in Patent No. 723,704, granted March 24, 1903, to Montstream, Schellenbach, and Lodge. This machine is designed to reduce considerable depth of metal in one cut, and hence the transmission devices require a peculiar construction and arrangement, the features of which are fully set forth in the accompanying drawings, making a part of this specification.

Figure 1 is a front elevation of my improvement. Fig. 2 is an end elevation thereof. Fig. 3 is a sectional view on line *x x* of Fig. 2.

A represents the bed of the lathe; F F′, the portion of the head-stock forming end journal-bearings for the various shafts.

D represents a bracing-arm extending from the bed A to a pedestal C, in the end of which is journaled a driving-shaft E, bearing the cone-pulleys B. The other end of shaft E is journaled in the head-stock F F′.

G represents the shaft for operating the spindle, and it is journaled in the head-stock F F′.

1 2 represent gear-wheels of different diameter on shaft E, adapted to be slid thereon.

3 4 represent gear-wheels fixed on shaft G, intermeshing with gears 3 and 4, respectively. Any suitable means may be employed to bring gear-wheels 1 and 2 to intermesh with gears 3 and 4, respectively, whereby two different speeds are transmitted to the spindle-operating shaft G. (See Fig. 2.)

Outside of the head-stock F on the end of shaft G is fixed a pinion 6, (see Figs. 1 and 2,) intermeshing with an intermediate gear-wheel 7, mounted on the stud-shaft *a*, journaled in the head-stock F.

J is a shaft journaled in the head-stock F F′ upon the end thereof. On the outside of the head-stock F is a gear-wheel 8, intermeshed with the intermediate gear-wheel 7.

K represents a shaft opposite shaft J, likewise journaled in the head-stock F F′, and upon these two shafts between bearing-supports F F′ are mounted the variable-speed gearing, which will be later described.

H represents a shaft for operating the carriage directly. It is driven from shaft K.

L represents a stationary shaft forming one of the means for operating the carriage.

M represents a reversing-shaft for the carriage, it being a fast-speeded shaft operated by a belt-engaging pulley-wheel 5 on the end of said shaft.

9 10 11 12 represent gear-wheels loose on shaft J. Gear-wheels 11 and 12 are keyed or formed upon the hub-sleeve *b* of gear 12, which is loose on the shaft J.

c represents a spring-key sliding internal of shaft K and adapted to clutch gears 9 or 10 or 11 and 12 on shaft J. On shaft K are loosely mounted the coöperating different-diameter gear-wheels 13 14 15 16, meshing with the driving gear-wheels 9, 10, 11, and 12, respectively. Gear-wheel 15 has a hub-sleeve *e*, upon which gear-wheels 13 and 14 are keyed. Hub-sleeve *e* is loose on shaft K, and gear-wheels 13, 14, and 15 revolve thereon as a unit. Gear-wheel 16 is loose on shaft K. Between the sleeve *e* and the hub of gear-wheel 16 on shaft K is interposed a shifting clutch *d*, adapted to fix gear-wheels 13 14 15 or gear-wheel 16 on shaft K. Between gears 9 10 11 and loose on shaft J are interposed rings, the function of which is to prevent key *c* from engaging two gears at a single instant.

17 represents a gear-wheel fixed on shaft K and intermeshing with a gear-wheel 18, fixed to the end of shaft H. (See Fig. 3.)

By clutching gear-wheels 1 or 2 to shaft E two speeds may be given to the spindle-operating shaft G.

The variations between the spindle-operat-

ing shaft G and the carriage-operating shaft are effected as follows: Assuming the clutch *d* to be engaging the hub-sleeve *e* and the key *c* to be in position shown in Fig. 3, it is obvious that the speed is transmitted through gear-wheels 11, 15, 17, and 18. If the key *c* be shifted one step to the left, obviously the speed is transmitted through gear-wheels 10, 14, 17, and 18. If key *c* is shifted the third step to the left, obviously the speed is transmitted through gear-wheels 9, 13, 17, and 18. Key *c*, being in the first-described position shown in Fig. 3, fixing sleeve *b* to shaft J, and clutch *d* being shifted to fix gear-wheel 16 to shaft K, obviously the speed is transmitted through gear-wheels 12, 16, 17, and 18. If clutch *d* remain attached to the hub of gear-wheel 16 and key *c* be shifted the second step to the left of the position shown in Fig. 3, obviously the speed is transmitted through gear-wheels 10, 14, 15, 11, 12, 16, 17, and 18. If clutch *b* remain in engagement with the hub of gear-wheel 16 and the key *c* be shifted the third step to the left of the position shown in Fig. 3, obviously the speed will be transmitted through gear-wheels 9, 13, 15, 11, 12, 16, 17, and 18, in the order named. Thus by this simple arrangement six variations of speed may be obtained between the spindle-operating shaft and the carriage-operating shaft, and all the speed-varying gear-wheels are firmly mounted upon shafts having substantial bearings at each end in the frame of the head-stock. This arrangement gives all the variations of speed required in a heavy-power machine of this caliber and at the same time gives to the speed changing and transmitting devices the substantial rigidity and security essential in a machine designed to do this class of work.

Having described my invention, I claim—

1. In an engine-lathe a frame, a spindle-operating shaft, and a carriage-operating shaft, journaled in the frame, a pair of shafts journaled in the frame, transmitting devices between the first of said shafts and the spindle-operating shaft, and between the second shaft and the carriage-operating shaft, a plurality of different-diameter gear-wheels loose on one of said shafts, a sliding key adapted to fix any of said gear-wheels to said first shaft, two or more of the gear-wheels on the second shaft being separated from the other gear-wheels on said shaft and fixed to revolve on a common hub, and a shifting clutch on said second shaft between the said separated gear-wheels, substantially as described.

2. In an engine-lathe, a frame, a spindle-operating shaft, a carriage-operating shaft, and two parallel intermediate shafts journaled in the frame, gear-wheels connecting the parallel intermediate shafts to the carriage-operating and spindle-operating shafts, gear-wheels loose on one of said intermediate shafts, a sliding key for fixing any selected one to its shaft, intermeshing opposing gear-wheels on the other intermediate shaft, all of said last-named gears save one being fixed to rotate on a common hub, a shifting clutch on said second intermediate shaft between the common gear-wheel hub and the hub of the remaining gear-wheel which is loose on said second shaft, substantially as described.

3. In an engine-lathe, a frame, a spindle-operating shaft, a carriage-operating shaft, and two intermediate shafts journaled in the frame, gear-wheels between one of said shafts and the spindle-operating intermediate shaft, and gear-wheels between the other intermediate shaft and the carriage-operating shaft, a series of different-diameter gear-wheels on the first intermediate shaft, loose thereon, two of said gear-wheels having a common hub, a sliding key on the first shaft adapted to fix any of said gear-wheels to the said shaft, intermeshing different-diameter gear-wheels on the second shaft all of which save one are mounted on a common hub loose on said second shaft, the remaining gear-wheel being loose on said second shaft, and a shifting clutch on the second shaft between said gear-wheels having a common hub and said remaining gear-wheel, adapted to fix either said hub or said single gear-wheel to said second intermediate shaft, substantially as described.

In testimony whereof I have hereunto set my hand.

WILLIAM LODGE.

Witnesses:
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Oliver B. Kaiser.