No. 706,665.

Patented Aug. 12, 1902.

W. T. S. JOHNSON.

ENGINE LATHE.

(Application filed Nov. 23, 1901.)

(No Model.)

2 Sheets—Sheet 1.

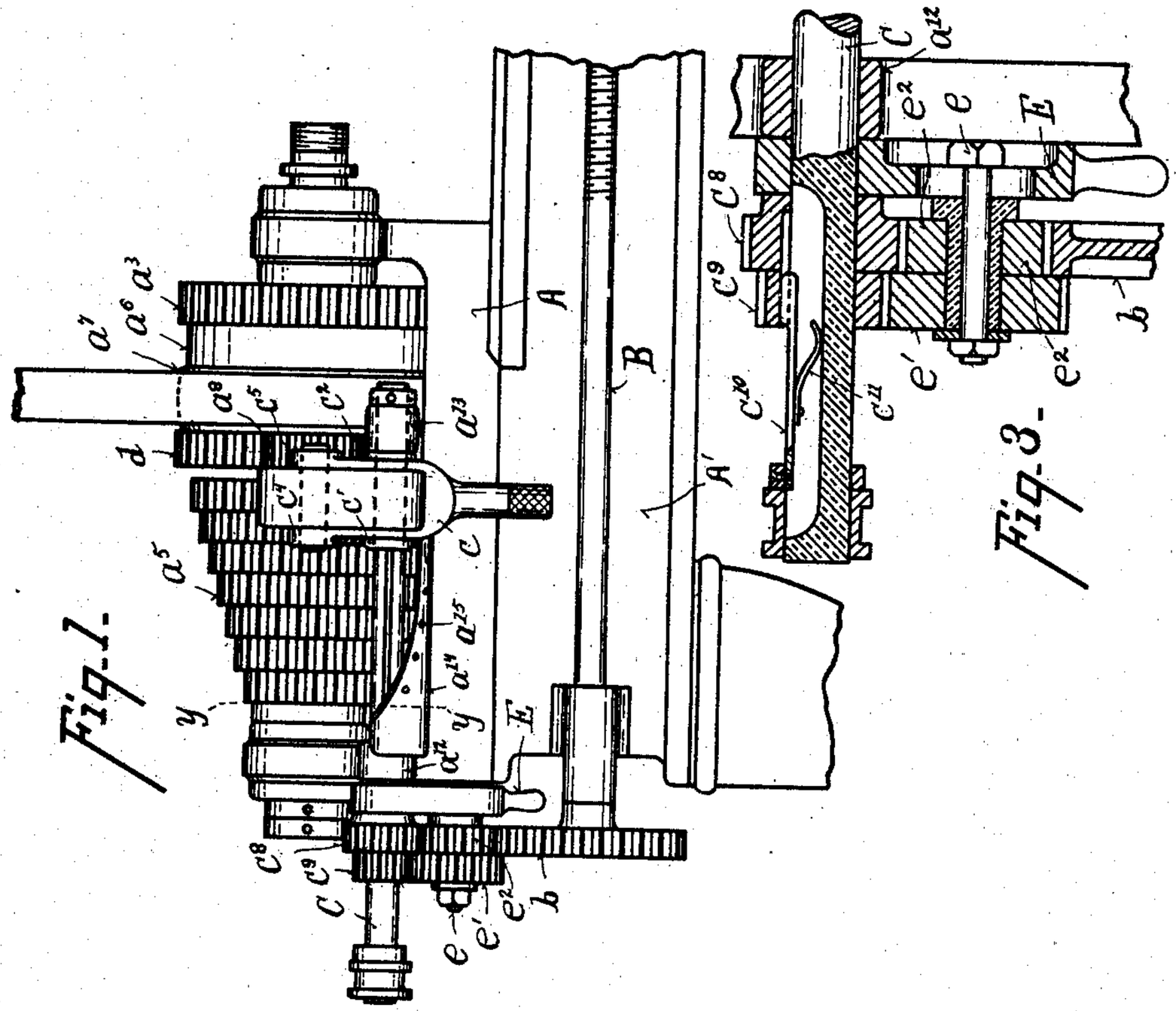

Fig. 1.

Fig. 3.

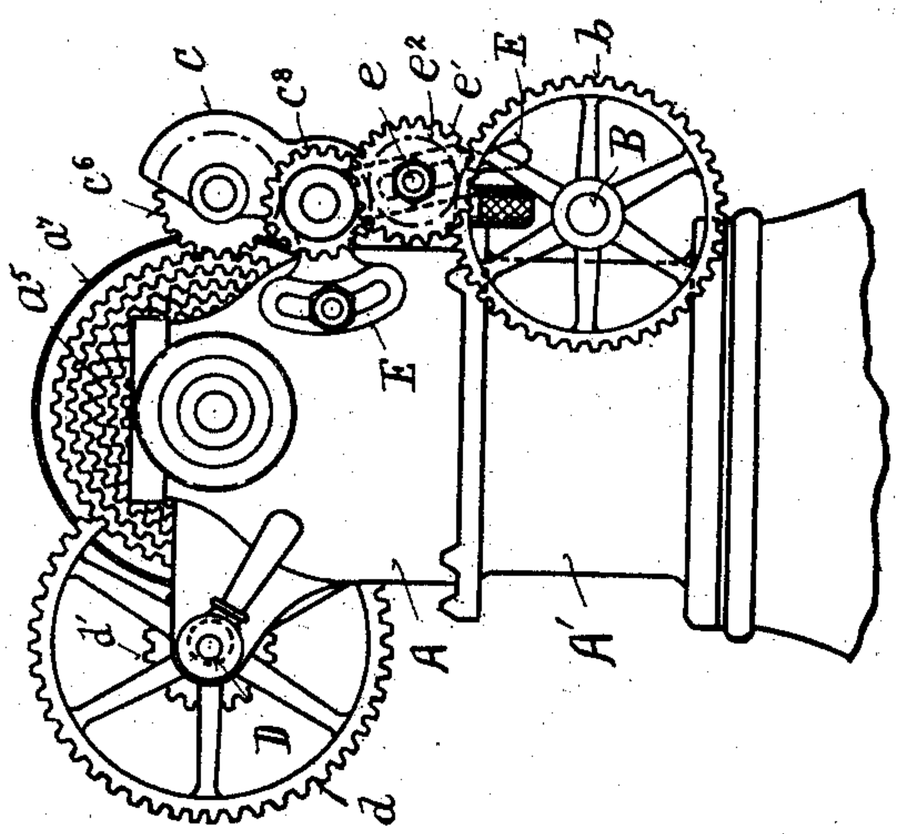

Fig. 2.

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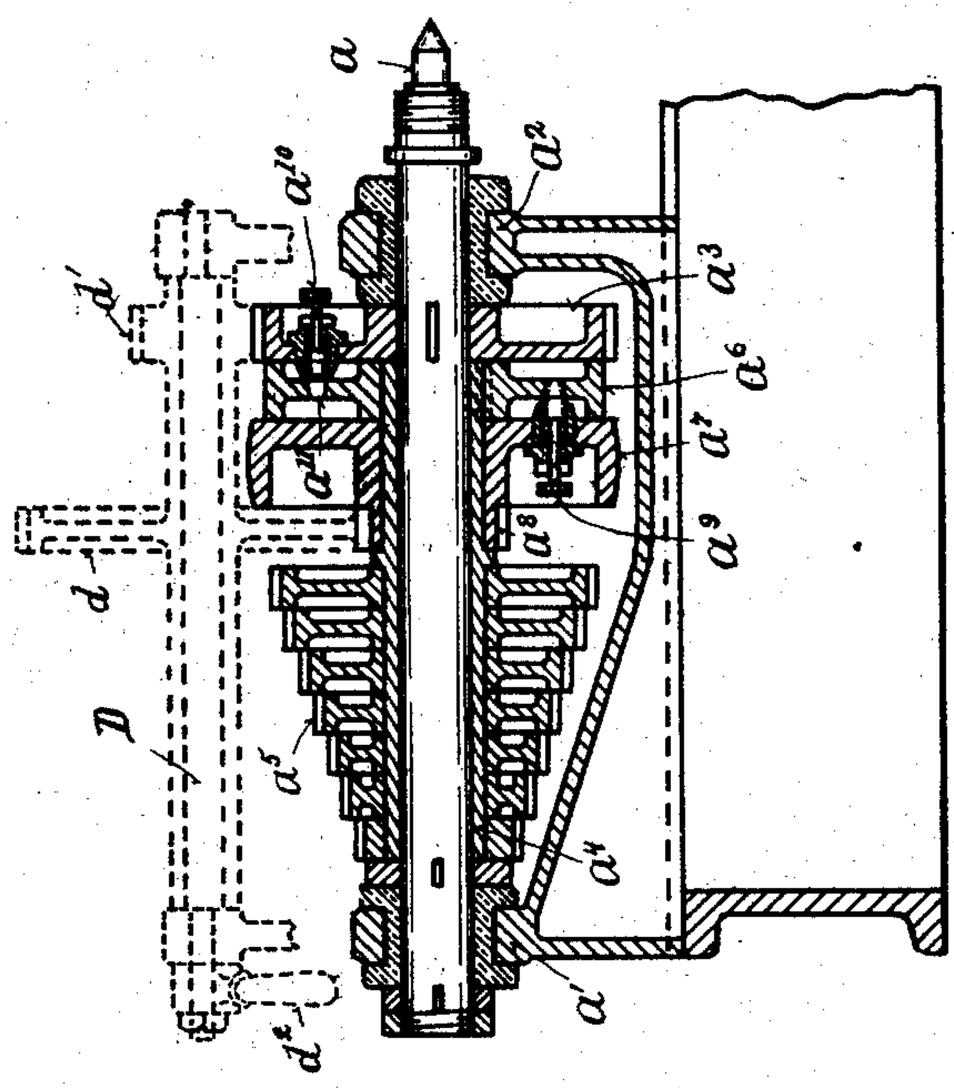

Fig. 4.

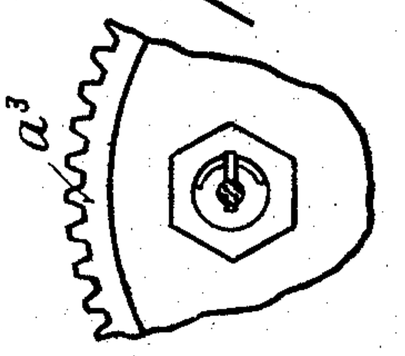

Fig. 7.

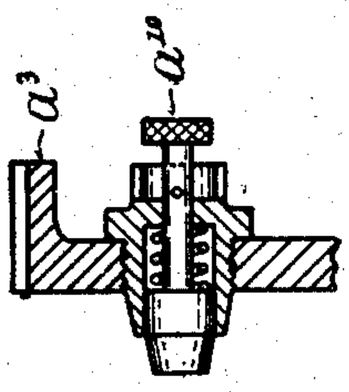

Fig. 6.

Fig. 5.

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UNITED STATES PATENT OFFICE.

WILLIAM T. S. JOHNSON, OF CINCINNATI, OHIO.

ENGINE-LATHE.

SPECIFICATION forming part of Letters Patent No. 706,665, dated August 12, 1902.

Application filed November 23, 1901. Serial No. 83,354. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM T. S. JOHNSON, a citizen of the United States of America, and a resident of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Engine-Lathes, of which the following is a specification.

The object of my invention is both to simplify the means for varying the ratios between the rates of rotation of the live-spindle and the feed-rod or lead-screw and to enlarge the field of possible variations in said ratios. This object is attained by the means described in the specification and illustrated in the accompanying drawings, in which—

Figure 1 is a view in side elevation of as much of an engine-lathe as is necessary to illustrate my invention, showing the live-spindle, cone-gear, lead-screw, and intermediate gearing. Fig. 2 is an end view of the same. Fig. 3 is a detail longitudinal section, upon an enlarged scale, of the gearing upon the end of the intermediate shaft for coupling it to the feed or lead-screw. Fig. 4 is a central vertical longitudinal section taken upon line $x\ x$ of Fig. 5, the back gearing being projected upward above the parts standing in front of it. Fig. 5 is a transverse sectional view taken upon line $y\ y$ of Fig. 1. Figs. 6 and 7 are detail views, upon an enlarged scale, of the spring-pins for coupling the pulley, the disk secured upon the sleeve which carries the cone-gears, and the gear-wheel secured to the spindle.

In the drawings the head-stock A, live-spindle a, the lead-screw B, intermediate shaft C, between spindle a and screw B, shaft D, carrying the back gears, and one end of lathe-bed A′ only are shown, since the tail-stock, carriage, and their connections are of ordinary construction.

Upon spindle a, between its journal-bearings a' and a^2 in the head-stock, a toothed wheel a^3 is secured and a long sleeve a^4 is rotatably mounted. Upon sleeve a^4 a cone of toothed wheels a^5 and a disk a^6 are secured, and a pulley a^7, upon whose hub is secured a pinion a^8, is rotatably mounted. Cone-gear a^5 is shown with seven toothed wheels of gradually-increasing size; but the number and sizes may be varied. Pulley a^7 and wheel a^3 carry longitudinal spring-pins a^9 and a^{10}, respectively, which may be pushed into perforations a^{11} in disk a^6 to lock the disk to them. Shaft D is mounted eccentrically and carries a large toothed wheel d and a small pinion d', so that by throwing handle d^2 wheel d may be made to mesh with pinion a^8 and pinion d' with wheel a^3.

Shaft C is journaled adjacent to and parallel to spindle a in brackets a^{12} and a^{13} upon the head-stock. A yoke c has two inwardly-projecting perforated arms c' c^2 to slide upon shaft C, and between said arms a small toothed wheel c^3 is splined upon said shaft to rotate therewith and to have a longitudinal slipping motion thereon with the yoke, which at its upper end has two inwardly-projecting arms c^4 c^5, between which is journaled a toothed wheel c^6, which is always in gear with wheel c^3 and which by slipping the yoke along shaft C may be brought into gear with any one of the wheels of cone-gears a^5.

Beneath shaft C projects a curved plate a^{14}, which is secured to or formed integral with the head-stock and has in it a series of perforations a^{15}, one of which comes in a line with each of the toothed wheels of cone-gear a^5. Yoke c has at its lower end an inwardly-projecting spring-pin c^7, which engages perforations a^{15} in plate a^{14} to hold wheel c^6 in mesh with the wheel of the cone-gear with which it has been placed in gear.

Upon the projecting end of shaft C are two loose toothed wheels c^8 c^9 of different sizes, either of which may be made fast upon the shaft by means of a sliding spline c^{10}, seated in the shaft and held upward by a spring c^{11}. Journaled upon shaft C is likewise an adjustable support E, which carries a stud-shaft e, upon which are journaled two spur-wheels e' e^2, which rotate together and one of which is in mesh with wheel c^8, the other with wheel c^9. Wheel e^2 meshes with a large gear-wheel b, secured upon the end of lead-screw B. It is thus seen that the rate of rotation of lead-screw B bears one of two ratios to that of intermediate shaft—one ratio when wheel c^9 is fast on shaft C and another when wheel c^8 is fast thereon.

In operation when back gear D is out of

gear with toothed wheels a^3 a^8 pins a^9 a^{10} couple disk a^6 to pulley a^7 and to toothed wheel a^3. Disk a^6 rotates cone-gear a^5, and wheel a^3 rotates spindle a at the same rate of rotation. It is seen that without the back gear by simply moving yoke c along on shaft C and bringing wheel c^6 into gear with the successive toothed wheels of cone-gear a^5 seven different rates of rotation relative to spindle a can be imparted to shaft C and that, therefore, by securing first wheel c^9 and then c^8 upon shaft C fourteen different rates of rotation relative to the live-spindle can be imparted to the lead-screw. By disengaging pin a^{10} from disk a^6, leaving pin a^9 in engagement therewith, and by throwing back gear d d' into gear with wheels a^8 a^3 fourteen additional different rates of rotation between the live-spindle and the lead-screw may be had. Leaving the back gear in gear, as just described, by disengaging pin a^9 from disk a^6 and pushing pin a^{10} into engagement with said disk fourteen further additional rates of rotation of the lead-screw may be secured.

The convenience of a lathe of my invention in cutting screws is readily recognized, as by it screws of a great variety of pitch may be cut without any change of gear-wheels and with a minimum amount of adjustment of parts.

It is obvious that many mere mechanical variations may be made in mechanism shown without departing from the spirit or scope of my invention—as, for instance, in the variable-speed mechanism connecting the spindle and the intermediate shaft the cone-gearing might be secured to shaft C and the slipping yoke c and toothed wheels c^3 and c^6 might be mounted upon spindle a in a manner similar to that in which they are shown mounted upon shaft C.

What I claim is—

1. In a lathe in combination with the bed, carriage, lead-screw and head-stock thereof, the live-spindle mounted in the head-stock, a sleeve mounted rotatably upon the spindle, a pinion, means for securing it upon the sleeve, a gear-wheel secured to the spindle, means for coupling and uncoupling the sleeve with the spindle, back gear to be thrown into gear with the pinion on the sleeve and gear-wheel on the spindle when the sleeve and spindle are uncoupled from each other, means for throwing the back gear into gear with the sleeve and spindle and means for coupling the sleeve with the lead-screw, substantially as shown and described.

2. In a lathe in combination with the bed, carriage, lead-screw and head-stock thereof, the live-spindle mounted in the head-stock, a sleeve mounted rotatably on the spindle, a driving-pulley and a toothed pinion mounted rotatably upon the sleeve, a plate or disk secured upon the sleeve, a gear-wheel secured upon the spindle, means for coupling the plate with both the pulley and with the gear-wheel on the spindle, back gear, means for throwing it into gear with the sleeve and the spindle, and means for coupling the sleeve and the lead-screw.

3. In a lathe in combination with the bed, carriage, lead-screw and head-stock thereof, the live-spindle mounted in the head-stock, a sleeve mounted rotatably upon the spindle, a pinion, means for securing it upon the sleeve, a gear-wheel secured to the spindle, means for coupling and uncoupling the sleeve with the spindle, back gear to be thrown into gear with the pinion on the sleeve and the gear-wheel on the spindle when the sleeve and the spindle are uncoupled from each other, means for throwing the back gear into gear with the sleeve and spindle, an intermediate shaft mounted in the head-stock adjacent to the live-spindle, variable-speed mechanism coupling the sleeve and the intermediate shaft and means for coupling the intermediate shaft and the lead-screw, substantially as shown and described.

4. In a lathe in combination with the bed, carriage, lead-screw and head-stock thereof, the live-spindle mounted in the head-stock, a sleeve mounted rotatably on the spindle, a driving-pulley and a toothed pinion mounted rotatably upon the sleeve, a plate or disk secured upon the sleeve, a gear-wheel secured upon the spindle, means for coupling and uncoupling the plate with both the pulley and with the gear-wheel on the spindle, back gear, means for throwing it into gear with the sleeve and the spindle, an intermediate shaft mounted in the head-stock adjacent to the live-spindle, variable-speed mechanism coupling the sleeve and the intermediate shaft and means for coupling the intermediate shaft and the lead-screw, substantially as shown and described.

5. In a lathe in combination with the bed, carriage, lead-screw and head-stock thereof, the live-spindle mounted in the head-stock, a sleeve mounted rotatably upon the spindle, a pinion, means for securing it upon the sleeve, a gear-wheel secured to the spindle, means for coupling and uncoupling the sleeve with the spindle, back gear to be thrown into gear with the pinion on the sleeve and the gear-wheel on the spindle when the sleeve and the spindle are uncoupled from each other, means for throwing the back gear into gear with the sleeve and spindle, variable-sized toothed wheels secured upon the sleeve, a shaft mounted in the head-stock adjacent to the live-spindle, a slipping yoke upon the shaft carrying gear-wheels to put the shaft in gear with one or another of the toothed wheels upon the sleeve and means for coupling the shaft and the lead-screw, substantially as shown and described.

6. In a lathe in combination with the bed, carriage, lead-screw and head-stock thereof, the live-spindle mounted in the head-stock, a sleeve mounted rotatably on the spindle, a driving-pulley having a toothed pinion secured to it and both mounted rotatably upon

the sleeve, a plate or disk secured upon the sleeve, a gear-wheel secured upon the spindle, means for coupling and uncoupling the plate with both the pulley and with the gear-wheel on the spindle, back gear, means for throwing it into gear with the sleeve and the spindle, variable-sized toothed wheels secured upon the sleeve, a shaft mounted in the head-stock adjacent to the live-spindle, a slipping yoke upon the shaft carrying gear-wheels to put the shaft in gear with one or another of the toothed wheels upon the sleeve and means for coupling the shaft and the lead-screw, substantially as shown and described.

7. In a lathe in combination with the bed, carriage, lead-screw and head-stock thereof, the live-spindle mounted in the head-stock, an intermediate shaft mounted in the head-stock adjacent to the live-spindle, variable-speed mechanism coupling the spindle and the intermediate shaft, loose pinions mounted upon the end of the shaft, a sliding spline for making any one of said pinions fast on the shaft, an adjustable support carrying a number of gear-wheels secured to one another and each in mesh with one of the pinions on the shaft, and a gear-wheel on the lead-screw in mesh with one of the gear-wheels of the adjustable support, substantially as shown and described.

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Witnesses:
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