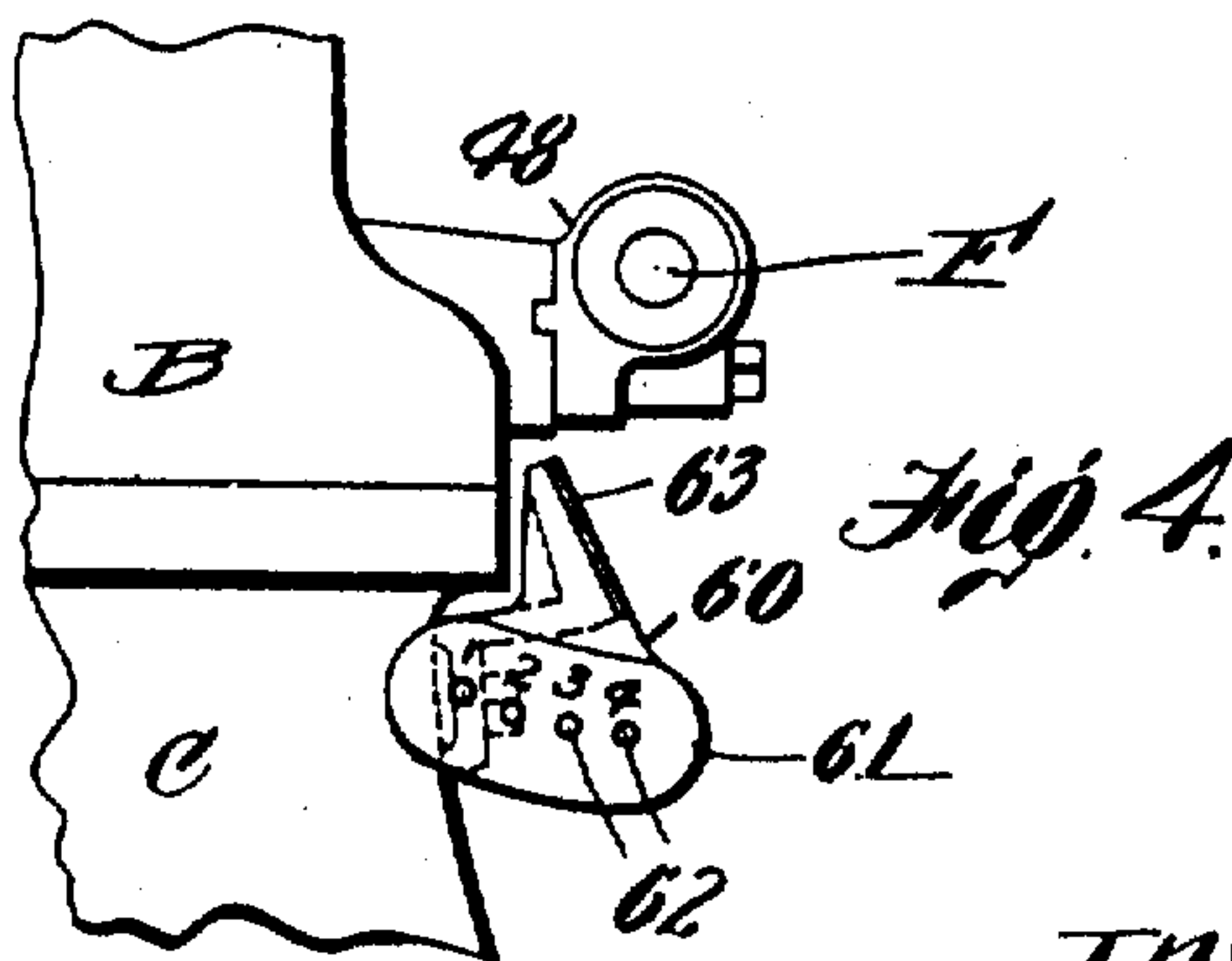
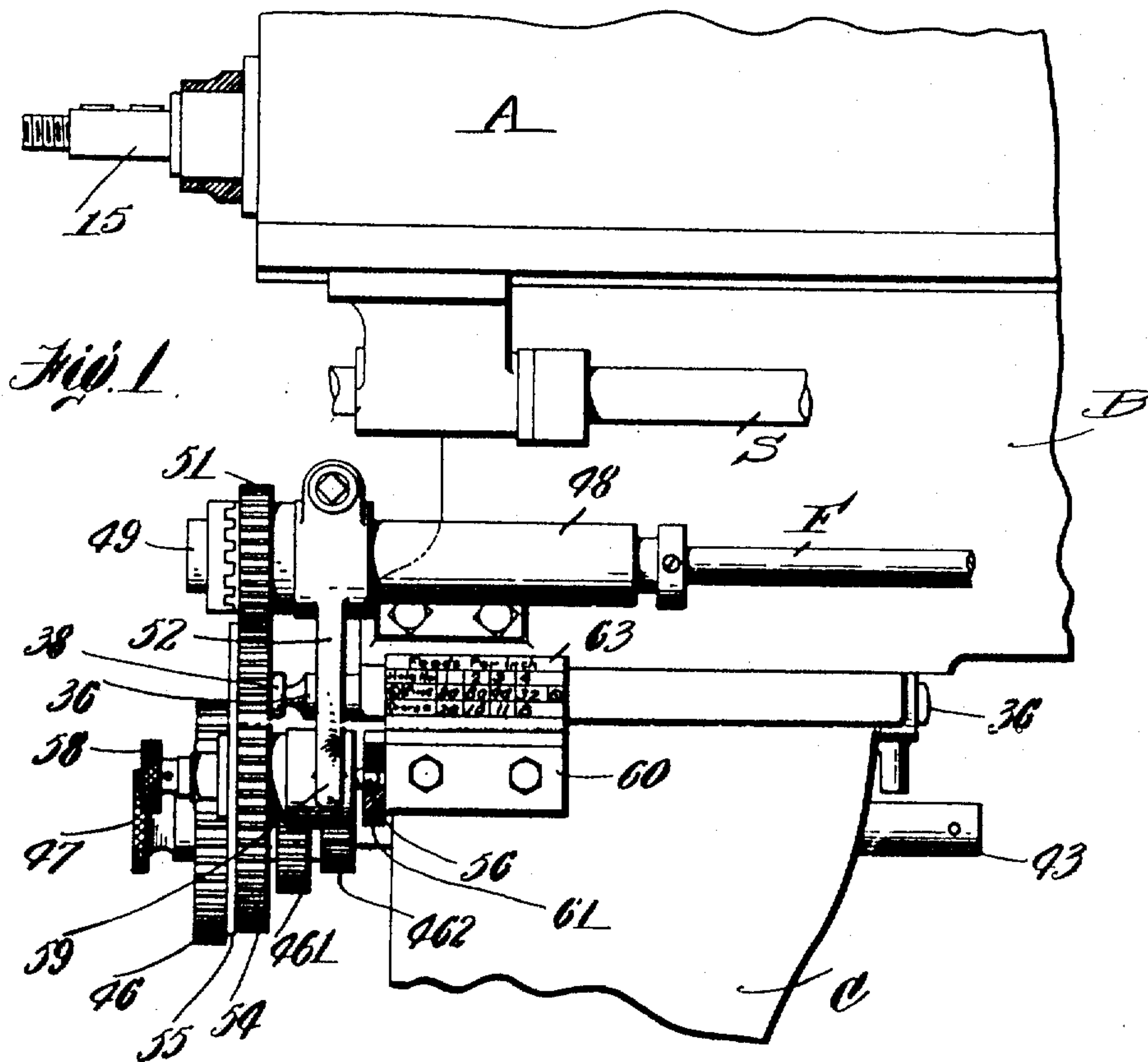


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SPEED CHANGE GEARING FOR LATHES.  
APPLICATION FILED MAR. 8, 1907.

916,525.

Patented Mar. 30, 1909.

3 SHEETS—SHEET 1.



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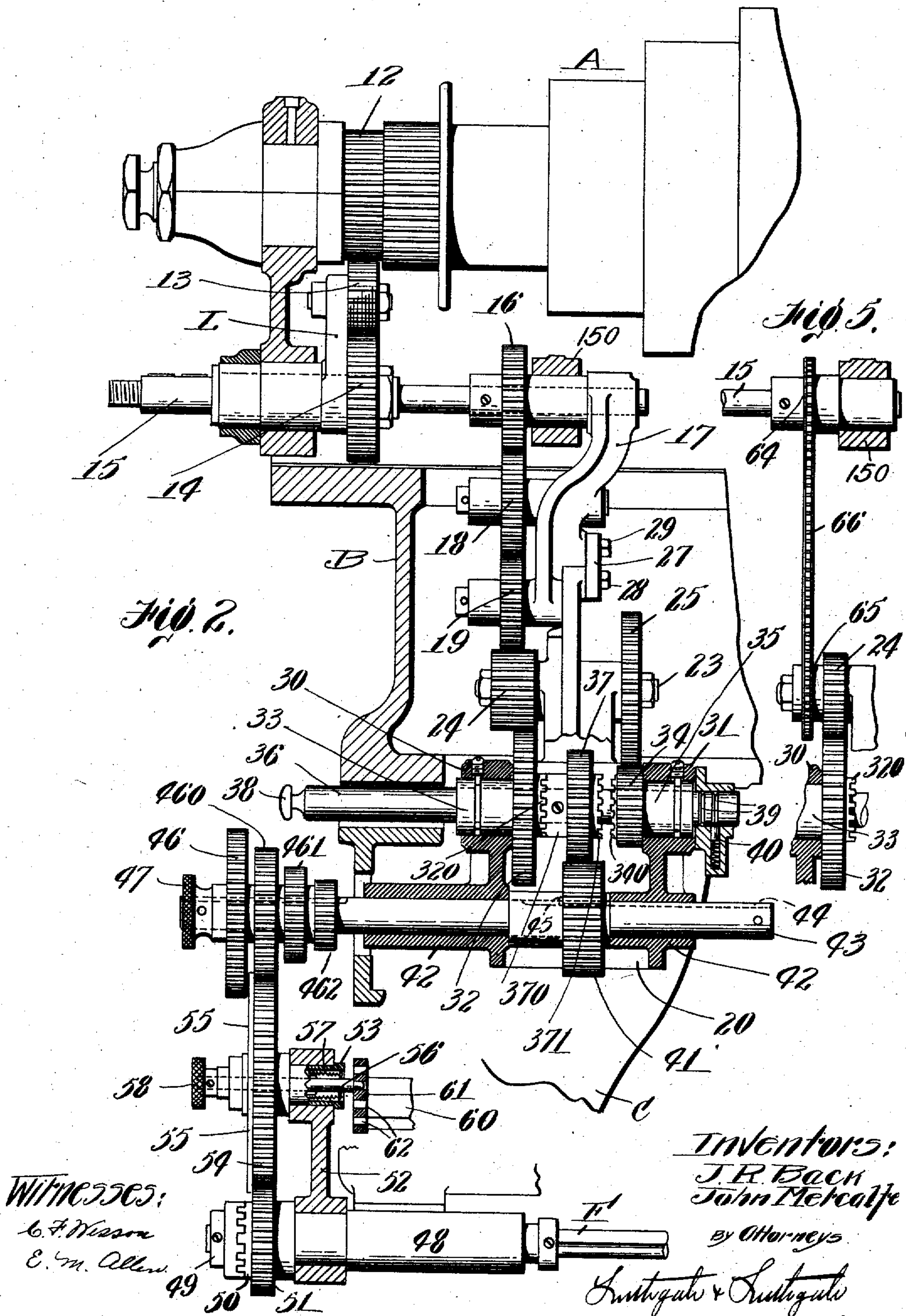
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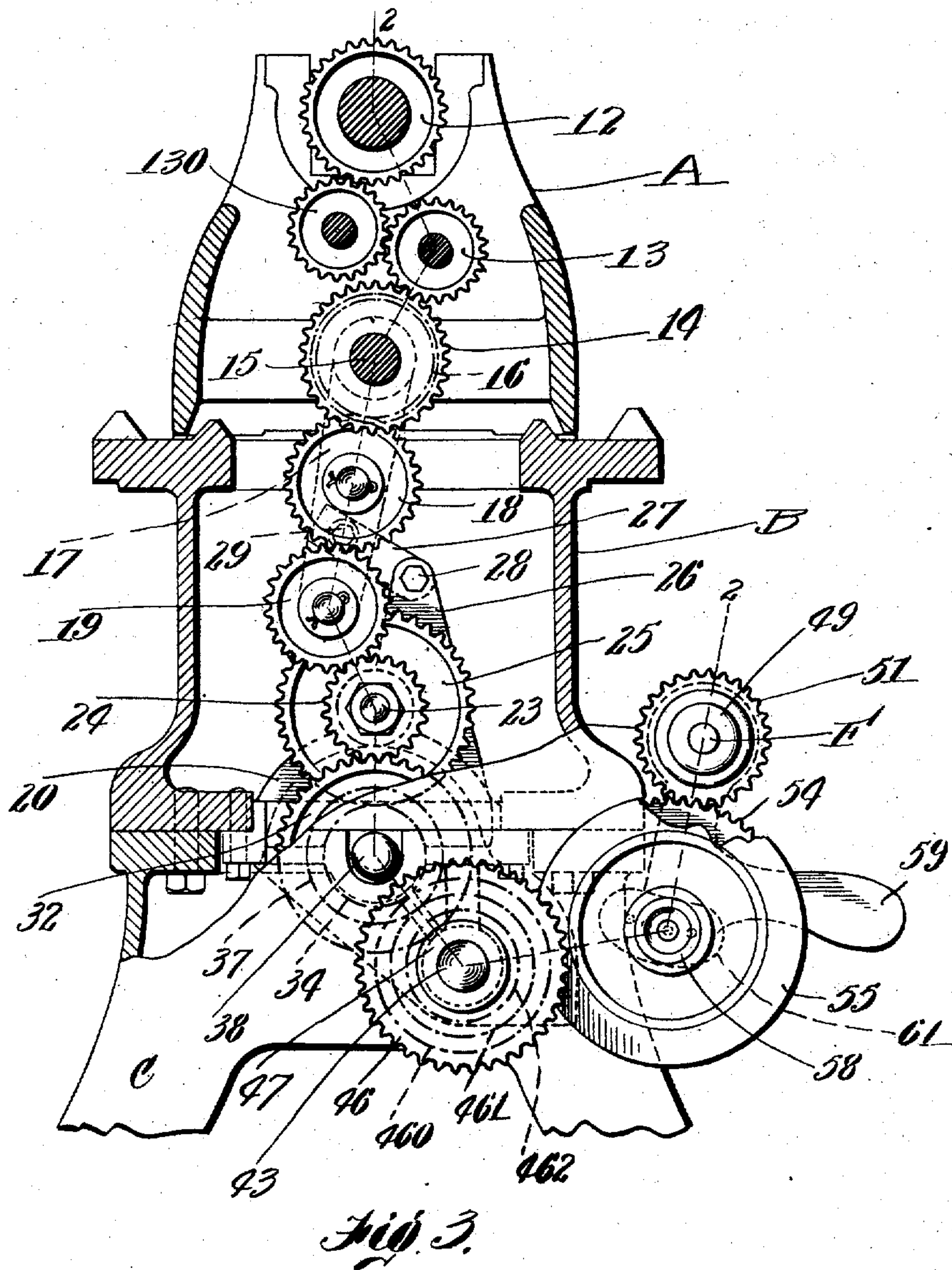
3 SHEETS—SHEET 2.



**916,525.**

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3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

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## SPEED-CHANGE GEARING FOR LATHES.

No. 916,525.

Specification of Letters Patent.

Patented March 30, 1909.

Application filed March 8, 1907. Serial No. 361,235.

*To all whom it may concern:*

Be it known that we, JOHN R. BACK and JOHN METCALFE, citizens of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Speed-Change Gearing for Lathes, of which the following is a specification.

The object of this invention is to provide a new and improved gearing for transmitting power from the head-spindle of a lathe to the feed-rod thereof, so that different relative speeds can be imparted to the feed-shaft, and which gearing for the main part will be concealed and out of the way.

To this end the invention consists in arranging a train of gears extending down from the head-stock inside of the bed and partly inside of the leg under the head-stock end of the bed. This train of gearing is arranged in a gear-frame which is fixedly secured in position preferably to the underside of the bed, and which extends partly into the said leg. Journaled in said frame is a shaft which projects outside of the leg, and which carries a series of gears, and is arranged so that power can be imparted from any one of these gears to the feed-shaft of the machine.

The details of the invention are shown in the accompanying three sheets of drawings, referring to which,

Figure 1 is a side elevation of enough of an engine lathe to illustrate the arrangement and location of the improved form of gearing, Fig. 2 is a sectional elevation with part of the gearing projected out to illustrate its operation, Fig. 3 is an end elevation partly broken away to show the interior gearing in transverse sectional view, Fig. 4 is a detail view showing the dial-plate and feed-shaft box, and Fig. 5 is a view of a modified form of gearing.

Referring to the drawings and in detail, A designates the head-stock of an engine lathe which is secured on the end of a bed B. The bed B is supported on the usual legs, the legs under the head-stock end of the bed being shown as at C. These parts are arranged as is common in engine lathes.

Secured on the head-spindle of the lathe is a transmitting pinion 12. Tumbler gears 13 and 130 are secured on studs arranged on a rocking lever L so that either of said tumbler gears can be engaged into the transmitting pinion 12, whereby power can be taken from

the head-spindle in either direction. The tumbler gears 13 and 130 are meshed together, and the tumbler gear 13 is in engagement with a gear 14 which is secured on a feed reversing-shaft 15. The shaft 15 is journaled in the hub of a rocking-lever L, and in a cross-bar 150 on the head-stock.

Hung on the end of the shaft 15 is the arm 17 which has suitable hubs, projecting from which are studs on which are loosely journaled intermeshing gears 18 and 19, the gear 18 meshing with a gear 16 on the shaft 15 and forming a connecting driving mechanism.

Secured to the bottom of the bed is a gear-frame 20. Journaled in a bearing formed in the top of the same is a shaft 23 which has two gears 24 and 25 secured on the same. The gears 19 and 24 come in line, and the arm 17 may be locked to engage these gears accurately. A projection 26 extends up from the gear-frame 20, and a link 27 is attached thereto by a screw 28. A screw 29 which is threaded into the arm 17 enters the link 27. By this arrangement the gear-frame 20 can be secured to the underside of the bed, and the lever 17 can be rocked to mesh the gears 19 and 24 accurately, and then the screws 28 and 29 can be tightly clamped to secure the parts fixedly in position, whereby accurate fitting between the head-stock and gear-frame 20 is not required and the frame cannot be loosened without loosening the screws. The gear-frame also has bearings 30 and 31. A gear 32 meshing with the gear 24 has its hub 33 journaled in the bearing 30, the gear being kept in place therein by means of a screw threaded into said bearing engaging a groove cut in the hub 33 as shown. A gear 34 has its hub 35 similarly journaled in the bearing 31, the gear 34 meshing with the gear 25. The gear 32 has clutch-teeth 320 formed on the face thereof opposite its hub, and the gear 34 has similar clutch-teeth 340 formed on the face thereof opposite to its hub.

A clutch rod 36 is journaled in the hubs 33 and 35 and said clutch rod carries a gear 37 having clutches 370 and 371 on its side faces. This gear 37 is secured to the clutch rod. The clutch rod 36 extends out through the leg C and has a knob 38 thereon by which the same may be shifted to engage the clutches 320 and 370 or 340 and 371. By this arrangement, power may be taken to the gear 37 either through the gears 24 and 32 or through the gears 25 and 34, whereby either one of



two different speeds can be given to the gear 37, as these gear ratios are different, owing to the different sizes of the gears.

The clutch rod has two grooves 39—39, engaging which is a spring-pressed plunger 40 arranged in a hub projecting from the gear-frame, whereby the clutch rod is held in either of its positions.

The gear 37 meshes with a wide-faced gear 41, the hub of which is secured between bearings 42—42 formed on the gear-frame 20. The gear 41 is arranged on a sliding shaft 43 fitting in said bearings 42—42, said shaft being provided with a keyway 44 which is engaged by a key 45 projecting from the hub of the gear 41. The sliding shaft 43 projects outside of the leg of the lathe through a hole in the same, and has keyed thereon a cone of gears as 46, 460, 461 and 462. As many gears may be used as desired, four being shown in the present instance. The sliding shaft 43 is also provided with a knob or handle 47 by which it may be operated.

The gears on the cone are slightly separated from each other so that a groove will be left between each of the engaging faces of the gears.

F designates the feed-shaft of the machine which is journaled in bearings secured to the bed of the lathe, the bearing 48 under the head-stock being illustrated. On the end of the feed-shaft is secured a clutch 49 which engages clutch-teeth 50 formed on the side of a gear 51 running on the hub of the bearing or box 48. This clutch forms a usual disconnecting mechanism, whereby the operation of the feed-shaft may be stopped by throwing out the clutch, and need not be further described herein.

Journalled on the hub of the feed-rod bearing 48 is a swinging lever 52 fitted in the end of which is a hollow stud 53 on which is loosely journaled a gear 54 having an extending flange 55. A pin 56 is fitted in said hollow stud 53 and is kept normally in its right-hand position by a spring 57. This pin is provided with a knob 58. The lever 52 is provided with an operating handle 59. A small bracket 60 is secured to the front of the leg and carries an index-plate 61 having a series of holes 62 which can be engaged by the pin 56. By this arrangement, as many different speeds can be imparted from the sliding shaft 43 to the feed-rod F as there are gears in the cone, four such speeds being indicated in the present instance. When it is desired to adjust this train of gearing the knob 58 is pulled, releasing pin 56. The operating handle 59 is raised, freeing the gear 54 from the cone of gears. Then the sliding shaft 43 is operated by its knob 47 to bring the desired gear of the cone 46, 460, 461, 462 in line with the gear 54 when the handle 59 is pushed down bringing the gear 54 in engagement with the proper gear of the cone.

The pin 56 then snaps in place, holding the gear 54 in proper mesh, and the flange 55 on said gear engages between two of the gears in the cone of gears, or on the outer face of gear 46, and holds the sliding shaft in position. An index plate 63 is arranged on the bracket 60 in convenient position to indicate to the operator the positions necessary for any determined feed. Thus by the arrangement described, eight different speeds can be imparted to the feed-rod, as there are four gears in the cone, and as two changes can be obtained by manipulating the clutch-rod 36.

Instead of using the train of gears 16, 18, 19 and 24 in some instances we propose to use a sprocket-pinion 64 on the shaft 15 which communicates power to a sprocket-gear 65 secured on the side of the gear 24 by a sprocket-chain 66 as indicated in Fig. 5.

The parts described may be very easily assembled and put together, as the shaft 15 and its gears and the adjustable arm 17 and its train may be readily assembled with the head-stock. The gear-frame 20 may be secured to the bottom of the bed, and when the head-stock is put on the bed, proper adjustment can be made by swinging and setting arm 17, and as the sliding cone and swinging gear 54 do not require accurate arrangement, fitting between the feed-rod and its bearings and the gears carried by the gear-frame is not required. The gear-frame 20 may have its gears and shafts assembled on the bench, and can be bolted in place on the bed in its assembled condition.

By the arrangement described a simple and neat gearing is provided for giving the feed-rod different speeds, which gearing is concealed and is out of the way. The usual interchangeable and replaceable gears may be used between the shaft 15 and the lead-screw S for cutting screw-threads.

The arrangements herein described may be greatly varied by a skilled mechanic without departing from the scope of our invention as expressed in the claims.

Having thus fully described our invention, what we claim and desire to secure by Letters-Patent is:—

1. In a speed change mechanism for lathes, the combination with the head-stock and bed, of a gear frame fixedly supported at the bottom part of the bed, gearing carried entirely by said frame and located within the bed, whereby said gearing may be assembled on the frame before the frame is fixed to the bed, and connections inside the head and bed for connecting the spindle with said gearing after the frame is in place on the bed, said connections comprising an arm supported by the head stock, gears thereon, and means for fixing said arm with the gears thereon in mesh with said gearing.

2. In a speed change mechanism for lathes, the combination with the head-stock, bed, a



leg supporting the bed and the head-spindle, of a gear frame supported at the bottom part of the bed, gearing carried entirely by said frame and located within the bed, whereby  
 5 said gearing may be assembled on the frame before the frame is fixed to the bed, connections inside the head and bed for connecting the spindle with said gearing after the frame is in place on the bed, a feed rod, and gearing  
 10 journaled on the leg and located partly inside thereof for connecting the first named gearing with the feed-rod.

3. In a speed change mechanism for lathes, the combination with the head-stock, bed, and the head-spindle, of a gear frame supported at the bottom part of the bed, gearing carried entirely by said frame and located within the bed, whereby said gearing may be  
 15 assembled on the frame before the frame is fixed to the bed, and connections inside the head and bed for connecting the spindle with said gearing after the frame is in place on the bed.

4. The combination with the leg and bed of a lathe, of a gear-frame rigidly and immovably secured to said bed and having bearings extending upwardly into the frame and bearings extending downwardly into the leg, a speed change gearing supported solely  
 25 by said frame, said gearing comprising members mounted both in the upper part and under part of the frame and located respectively in the bed and leg, and means extending through the end wall of the leg for manipulating said gearing to change the speed  
 35 with which it transmits power.

5. In a speed changing mechanism for lathes, the combination with the head-stock, head spindle, a shaft, bed, and a gear on said shaft, of a gear frame located within and rigidly secured to the bed, gears assembled therein, and connections inside the head and bed for connecting the gear on said shaft with the gearing in said frame, said connections comprising an arm, gears thereon, and  
 40 means for rigidly securing said arm to the head-stock and gear frame.

6. In a speed changing mechanism for lathes, the combination with the head-stock, head spindle, a shaft, bed, the leg supporting the head-stock end of the bed, and a gear on said shaft, of a gear-frame located within and rigidly secured to the bed, gears assembled therein, and connections inside the head and bed for connecting the gear on said  
 50 shaft with the gearing in said frame, said connections comprising an arm, gears thereon, and means for rigidly securing said arm to the head-stock and gear frame, said frame having a slidable shaft projecting beyond  
 55 the end of the leg and bed, a cone of gears on the end thereof, and means for transmitting power from said cone of gears.

In testimony whereof we have hereunto set our hands, in the presence of two subscribing witnesses. 65

JOHN R. BACK.  
 JOHN METCALFE.

Witnesses:

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 C. FORREST WESSON.