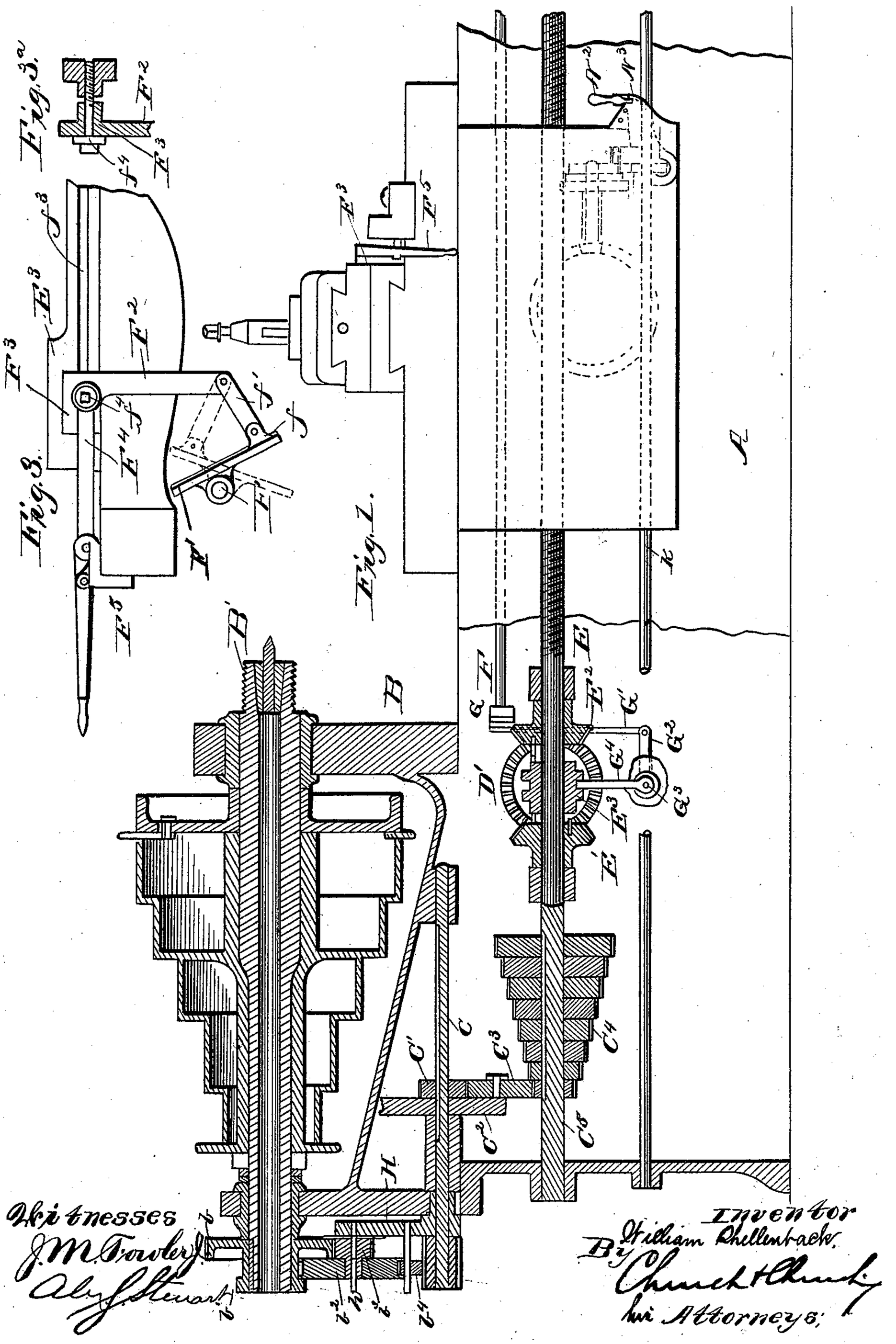
(No Model.) 2 Sheets—Sheet 1.

W. SHELLENBACK.

ENGINE TURNING LATHE.

No. 518,164. Patented Apr. 10, 1894.



THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

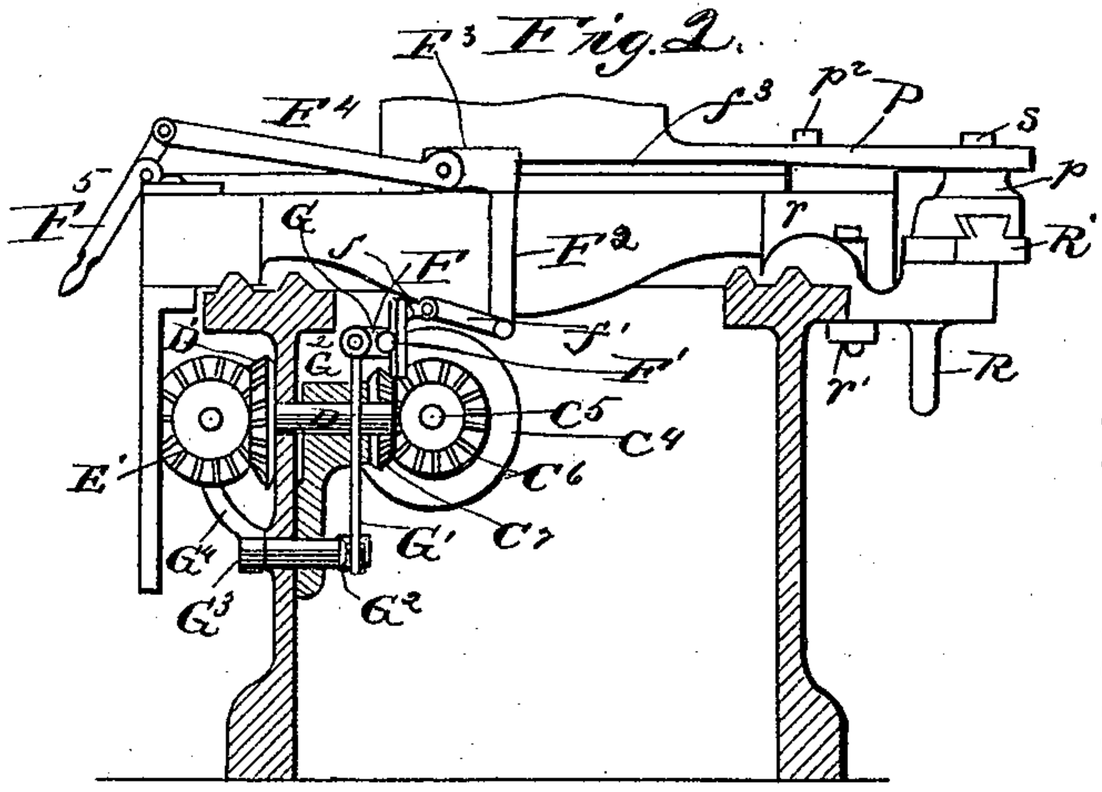


Fig. 4.

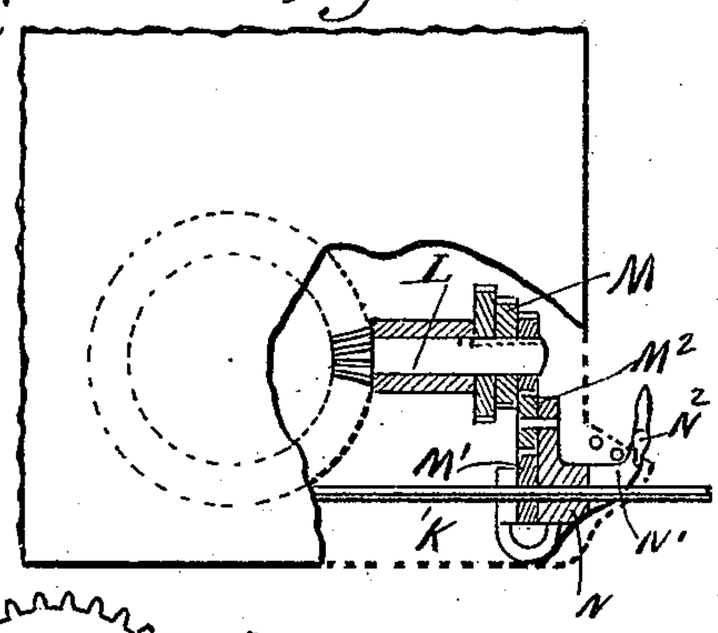


Fig. 5.

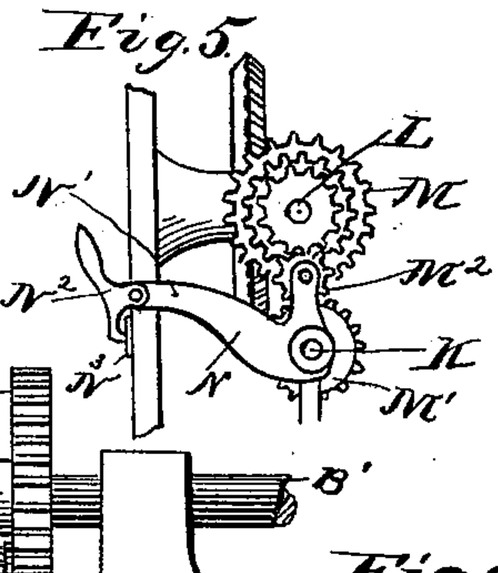


Fig. 6.

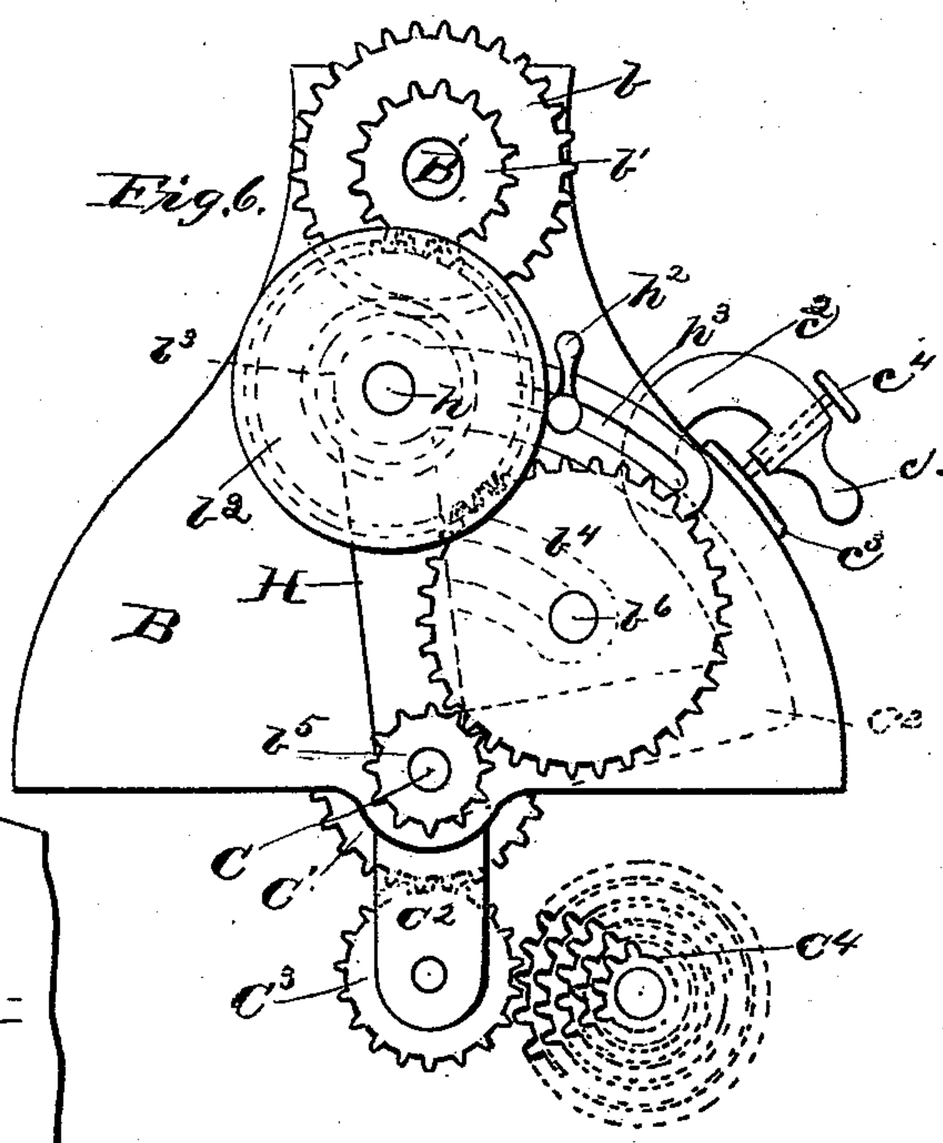


Fig. 7.

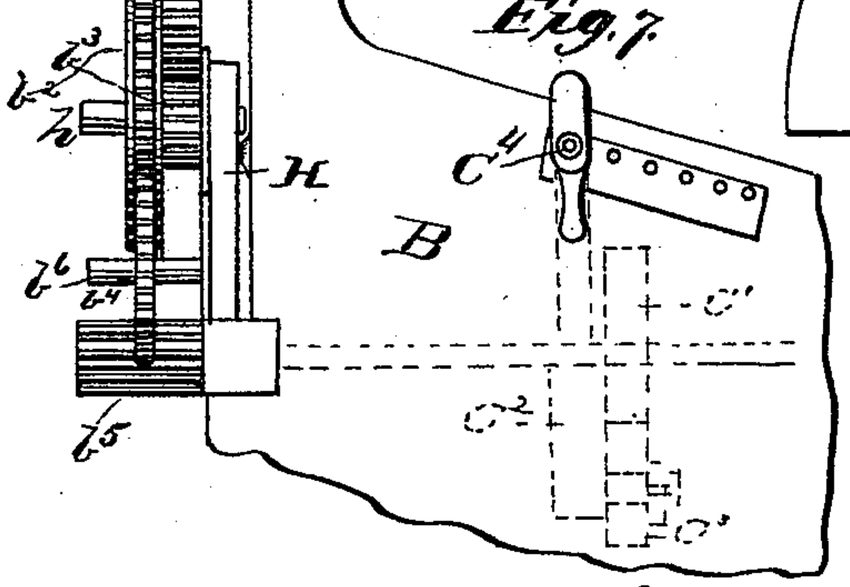
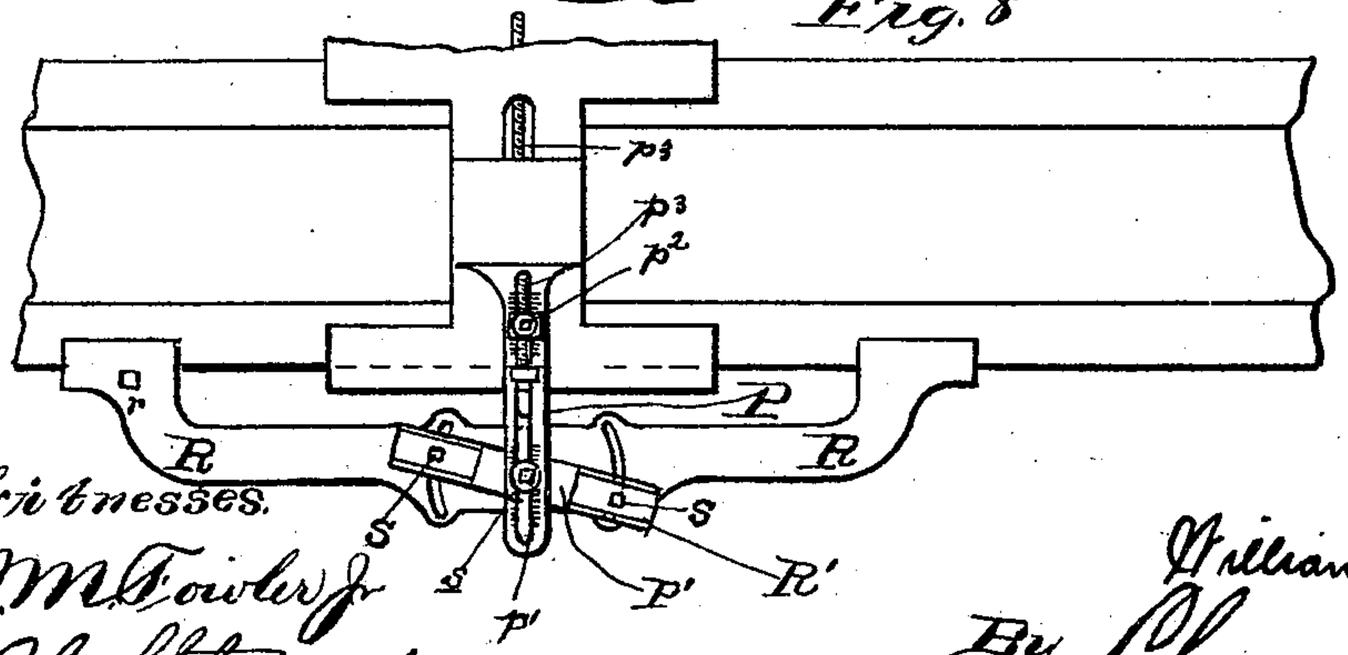


Fig. 8



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UNITED STATES PATENT OFFICE.

WILLIAM SHELLENBACK, OF RICHMOND, INDIANA.

ENGINE TURNING-LATHE.

SPECIFICATION forming part of Letters Patent No. 518,164, dated April 10, 1894.

Application filed April 23, 1892. Serial No. 430,369. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM SHELLENBACK, of Richmond, in the county of Wayne and State of Indiana, have invented certain new and useful Improvements in Engine Turning-Lathes; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the letters of reference marked thereon.

This invention relates to improvements in lathes such for instance, as shown and described in Patent No. 468,183, dated February 2, 1892, to which reference is made, and it has for its object to simplify and improve the mechanism of such lathes whereby they may be more easily and quickly adjusted and adapted for use in turning a greater variety of work.

With these ends in view, the invention consists in certain novel details of construction and combinations and arrangements of parts all as will be hereinafter described and pointed out particularly in the appended claims.

In the accompanying drawings: Figure 1 is a front elevation, partially in section of the head stock, carriage and a portion of the bed of a lathe constructed in accordance with my invention, the tail stock being omitted. Fig. 2 is a transverse section through the bed showing the controlling mechanism for the lead or feed screw with the carriage in outline. Figs. 3 and 3ª are details of a portion of the carriage showing the reversing mechanism for the lead or feed screw. Fig. 4 is a detail of the lower right hand corner of the apron showing gear controlling the apron feed. Fig. 5 is a detail showing the same in end elevation. Fig. 6 is an end elevation of the head stock. Fig. 7 is a detail front elevation of the same with parts in section. Fig. 8 is a top plan showing the bed, base of the carriage and mechanism for moving the tool stock transversely of the bed to turn articles having different diameters at different points in their length, cones, for instance.

Similar letters of reference in the several figures indicate the same parts.

The bed A of the lathe, together with the head stock B and tail stock are as usual formed of castings made as light as is consistent with the necessary strength, and of suitable form to inclose as much as possible of the gearing and other operating mechanism. The live spindle B′ journaled in the head stock has the usual cone of belt pulleys and from its outer end gearing, to be presently specifically described, communicates its motion to a counter shaft C having a gear wheel C′ connected thereto by a feather and groove or otherwise to permit of a longitudinal movement and also having a tumbler C^2 mounted loosely thereon and adapted to carry the gear wheel C′ with it when moved longitudinally of the shaft.

On a projection of the tumbler C^2 in position to mesh with the gear wheel C′ is an idler C^3 adapted to mesh with any one of the pile of gears C^4 of different diameters and which I shall term, the "cone of gears," mounted rigidly on the second counter shaft C^5 and from which motion is imparted to the lead or feed screw as follows:

Referring to Figs. 1 and 2 it will be seen that a bevel gear wheel C^6 is mounted on the shaft C^5, which gear wheel meshes with a similar gear wheel C^7 on a short transverse shaft D, and from the latter, the motion is transmitted through the bevel gear D′ to one or the other of a pair of similar gears E′ E^2 on the lead or feed screw E. These two gears E′ E^2 are mounted loosely on the screw and in order to connect one or the other as desired, to rotate the screw right or left, a clutch block E^3 is keyed to the screw between the gears and is adapted to be moved into engagement with either gear. Other clutch and gearing mechanism, such as are common may be substituted, but the form shown is preferred as it permits the counter shafts to be located directly below the spindle and leaves room for the location of practically all the gearing within the head stock and bed. The screw communicates motion to the carriage in the ordinary manner but in order to place the direction of rotation of the screw and through it the direction of longitudinal movement of the carriage under the direct control of the workman stationed at the carriage or under the control of the top or transverse slide, a clutch operating shaft F extends along the front of the bed and has a block F′ connected thereto by a spline and groove, or similar connection to permit of independent mo-

tion longitudinally of the shaft, the block projecting on each side of the shaft. To this block is connected by an adjustable clip f a link f' pivoted at the opposite end to the lower end of an arm F^2 of a clutch slide or carriage F^3 working in a channel f^3 in the side of the upper slide and to which it may be clamped at any point by the bolt f^4 to shift the clutch rod automatically as the slide moves in one direction or the other. To move the clutch slide F^3, by hand, a link F^4 connects it to the end of a lever F^5 pivoted at the front of the carriage. When turned to horizontal position this lever, it will also be noticed, locks the clutch slide against transverse movement with the main slide and thereby keeps the clutch in one position. The clip f may be adjusted as indicated in dotted lines, Fig. 3, to a point either above or below the clutch shaft to secure the proper shifting in cutting right or left hand threads, as will be readily understood. The connection between the clutch shaft and clutch is preferably formed by a crank arm G on said shaft, connected by a link G' with an arm G^2 of a transverse shaft G^3 mounted in a bearing in the bed and having another arm G^4 projecting from the front end into engagement with the clutch block all as shown clearly in Figs. 1 and 2.

Returning now to the head stock and gearing first mentioned, it will be seen from Figs. 6 and 7 that the tumbler C^2 is provided with an arm c^2 the end of which curves over the gage-plate c^3 on the head stock and has a locking pin or key c^4 for co-operating with any one of a series of holes in said plate. The position of these holes and the shape of the tumbler are such, as that when the locking pin is in any one of the holes the idler gear will be in mesh with some one of the gears in the cone, there being an independent hole for each gear in the cone, thus the gears may be shifted easily and quickly from the front of the machine, to vary the speed of the screw, limited only by the number and size of gears in the cone.

To enable the speed to be varied much more than would be possible without the employment of a very large cone the gearing between the spindle and first counter shaft is made changeable thus, two rigidly connected gears $b\ b'$ having sixty four and thirty two teeth respectively are rigidly mounted on the spindle B' and on stud h of a segment H pivoted on the counter shaft C is a pair of flanged gears b^2, b^3 having sixty four and thirty two teeth respectively and adapted to be thrown into mesh with either of the gears $b\ b'$; the latter being separated sufficiently to permit the gear b^2 to pass up between them when the gears b b^3 are in mesh (see Fig. 7). From the gear b^2 or b^3 the power is transmitted through an idler wheel b^4 to the gear b^5 on the end of counter shaft C, and in order to permit the changing of the gears as well as to throw the idler into mesh with either b^2 or b^3 it, the said idler b^4 is mounted on a stud b^6 adjustably held in a segmental slot in the segment H (dotted lines Fig. 6) and the segment itself is held in adjusted position by the set screw h^2 entering the head stock through a segmental slot h^3. It will be noted that the gears b^2, b^3 are flanged and they, as well as the idler b^4, are mounted on headless or smooth studs, the flanges being relied on to keep the gears in position, thus the changes may be effected quickly and easily by shifting the segment until the gears disengage, then shifting the gears and again moving the segment up into position with the gears in mesh. The idler b^4 and gear b^5, of course, remain in mesh at all times, the segment being pivoted on the shaft C and the segmental slot in which the stud b^6 is held is formed with the shaft as a center.

In connection with the foregoing mechanism I employ an apron feed mechanism and also a separate mechanism for moving the upper slide transversely of the bed. The apron feed differs from the ordinary feeds only in the mechanism for connecting the apron feed shaft K and the gearing carried by the apron. The ordinary apron gearing is indicated in dotted lines Figs. 1 and 4 as it forms no part of the present invention. It has been found desirable in these apron feeds, to provide a means for quickly and easily changing the speed and to accomplish this, I mount on a short shaft L, journaled in a bearing on the inside of the apron and having a gear l in mesh with one of the ordinary gears as shown, a cone or series of gears M of different diameters. The apron feed shaft K is adapted to be connected with any one of these gears by a gear M' rotating with the shaft, and an idler M^2 journaled on a carrier N pivoted on the shaft K and embracing the gear M' to carry it longitudinally on the shaft. The carrier N is provided with a forwardly projecting arm N' having a locking dog N^2 adapted to engage any one of a series of holes in a gage plate N^3 on the end of the apron. The holes in the gage plate and arm are so positioned, that the idler may be thrown into mesh with any one of the gears in the cone by changing the locking dog from one hole to another. The workman may thus change the speed and lock the parts without having access to the gears at all, which may be entirely inclosed by the apron and carriage away from débris from the tool.

To automatically move the upper slide transversely, it is provided with a rearward extension P, Fig. 8, having two slots $p\ p'$ therein, in one of which is clamped the nut p^2 for the screw p^3 of the ordinary transverse feed under the control of the workman while in the other slot p' works and is adapted to be clamped a slide block P' working in an adjustable guide or way R' mounted on a supplemental carriage R. This supplemental carriage R is hung on the rear track of the lathe bed and when desired, may be clamped rigidly in position thereon by means of the

screw and plate $r\ r'$, Fig. 2, although in the ordinary operation of the lathe it is simply carried back and forth with the main carriage. The adjustable guide R′ is held in segmental slots in the supplemental carriage so as to be readily clamped at any desired angle by the bolts S.

In operation, the supplemental carriage is clamped in place and the guide set at the proper angle and clamped, then the nut p^2 is loosened, freeing the slide from the ordinary feed screw, the nut s is tightened clamping the slide to the slide block, then any movement of the main carriage longitudinally of the bed causes the slide to move transversely, by reason of its engagement with the slide block working in the guide way, arranged at an angle to the lathe bed, the resultant motion of the slide carrying the tool stock being diagonal. Of course the adjustable guide may be curved or irregular, but as shown it is adapted for straight surface work, such as tapers or cones.

From the foregoing description, it will be seen that the mechanism is simple as compared with other lathes of this character and capacity and by the simple arrangement of the shifting mechanism the workman may change the speed of either the screw or apron feed easily and quickly without removing or substituting gears and without labor, it being a simple matter to release one of the locking pins, move the tumbler or carrier for the movable gear and drop the locking pin into the desired hole. When the locking pin is in position it indicates that the gears are in operative engagement and the numbers on the gage plate indicate the exact rate of feed without computation on the part of the workman.

The changeable gearing between the spindle and counter shaft may be shifted quickly and easily by simply releasing the segment, hence all the changes within the range of the machine may be made without removing a single gear wheel or disorganizing the machine at all.

Having thus described my invention, what I claim as new is—

1. In an engine lathe, the combination with the spindle and feed screw, and the counter shaft from which the feed screw is driven, of the segment pivoted on said counter shaft, the gear wheel on the counter shaft, the gear wheels on the spindle and the idler gears carried by the segment movable longitudinally on their centers and meshing with either of the gear wheels on the spindle and with the gear on the counter shaft; substantially as described.

2. In an engine lathe, the combination with the spindle and gear wheel thereon, of the adjustable segment having the smooth stud, the gear wheels movably mounted on said stud and having the flanges embracing the gear wheel on the spindle when the same are in mesh and the feed screw driven from the gears on the segment; substantially as described.

3. In an engine lathe, the combination with the spindle having the different sized gear wheels thereon, the counter shaft from which the feed screw is driven and the gear wheel on said counter shaft, of the adjustable segment pivoted on the counter shaft, the different sized gear wheels journaled on said segment and bodily movable thereon to mesh with either of the gear wheels on the spindle and the idler gear completing the train of gears between the spindle and counter shaft; substantially as described.

4. In an engine lathe, the combination with the spindle and feed screw, of the different sized gear wheels rigidly mounted on the spindle and separated a distance equal to the thickness of one gear wheel and the movable gear wheels of different size rigidly connected together and adapted to mesh with one or the other of the gear wheels on the spindle, the one of said movable gear wheels not in mesh occupying the space between the gear wheels on the spindle, the feed screw being driven from said movable gear wheels; substantially as described.

5. In an engine lathe, the combination with the spindle, the feed screw, and a cone of gear wheels from which said feed screw is driven, a bell-crank tumbler movable longitudinally of the cone, a gear wheel and idler gear wheel carried by the tumbler and means for varying the speed transmitted to the gearing on the tumbler, of an extension of said tumbler protruding from the head stock and provided with means for retaining it in the desired position relative to a gage plate.

6. In an engine lathe, the combination with the spindle; the feed screw and a cone of gear wheels from which said screw is driven, a bell-crank tumbler movable longitudinally of the cone, gear wheel and idler gear wheel carried by the tumbler, included within the head stock; and means for varying the speed transmitted to the gearing on the tumbler, of an extension of said tumbler protruding from the head stock and provided with a pin for retaining it in the desired position relative to a gage plate.

7. In an engine lathe, the combination with the spindle, feed screw driven therefrom and reversing mechanism interposed between said feed screw and spindle, the clutch controlling said reversing mechanism, the clutch operating shaft, the carriage and upper slide thereon, the clutch slide carried by said upper slide and connections between said clutch slide and clutch operating shaft whereby by the transverse movement of the upper slide said clutch is operated as set forth.

8. In an engine lathe, the combination with the feed screw, reversing mechanism therefor, carriage and upper slide thereon having a groove or way therein, of the clutch operating shaft controlling the reversing mechan-

ism, the block mounted on said shaft, the clutch slide mounted in the way or groove in the upper slide, the bolt for clamping said clutch slide in position and connections between said clutch slide and block; substantially as described.

9. In an engine lathe, the combination with the feed screw, reversing mechanism therefor, carriage, upper slide and clutch operating shaft controlling the reversing mechanism, of the block on said clutch operating shaft, the clutch slide carried by the upper slide, the link connected to said clutch slide and the adjustable clip connecting said link and block whereby the direction of movement of the clutch operating shaft with relation to the movement of the upper slide may be changed; substantially as described.

10. In an engine lathe, the combination with the feed screw, carriage, upper slide thereon and clutch operating shaft controlling the reversing mechanism, of the block mounted on said clutch operating shaft and having the portions projecting on each side of said shaft; the clutch slide carried by the upper slide and the link and adjustable clip connecting said slide and block; substantially as described.

11. In an engine lathe, the combination with the feed screw, carriage, reversing mechanism for the feed screw and clutch operating shaft controlling the reversing mechanism, of the block mounted on said shaft the clutch slide connected to said block and moving longitudinally with the carriage, the operating handle for said clutch slide and the link connecting the slide and handle; substantially as described.

12. In an engine lathe, the combination with the bed, carriage, apron gearing thereon having a cone of gear wheels and apron feed shaft, of the gear wheel rotating with said shaft, the carrier and an idler wheel journaled thereon, meshing with the gear wheel on the shaft and adapted to mesh with any one of the gears in the cone; substantially as described.

13. In an engine lathe, the combination with the bed, carriage, apron gearing thereon having a cone of gear wheels, and the apron feed shaft, of the gear wheel on said shaft, the carrier moving with the carriage and pivoted on the shaft and the idler wheel on said carrier meshing with the gear wheel on the shaft and adapted to mesh with any one of the gear wheels in the cone; substantially as described.

14. In an engine lathe, the combination with the bed, carriage, apron gearing thereon having a cone of gear wheels and the apron feed shaft, of the gear wheel on said shaft, the carrier pivoted on the shaft and embracing the gear wheel, the idler wheel on the carrier meshing with said last mentioned gear wheel and adapted to mesh with any one of the gear wheels forming the cone and the arm on the carrier cooperating with a gage plate on the apron to indicate the position of the gears; substantially as described.

15. In an engine lathe, the combination with the bed, carriage, apron gearing carried thereby and embodying a cone of gear wheels and the apron feed shaft, of the gear wheel on the apron feed shaft, the carrier pivoted on said shaft and having the idler wheel meshing with said gear wheel and adapted to mesh with any one of the gears in the cone, the handle on the carrier, a locking catch on the handle and a gage plate on the carriage with which said catch cooperates; substantially as described.

16. In an engine lathe, the combination with the bed, longitudinally movable carriage and transversely movable slide mounted on said carriage and having the rearward projection, and the screw for moving said slide detachably engaged therewith, of the supplemental carriage, a clamp for holding it in adjusted position, the adjustable guide on said supplemental carriage and the slide block detachably connected with the transversely movable slide and working in the adjustable guide; substantially as described.

17. In an engine lathe, the combination with the bed, longitudinally movable carriage and transversely movable slide mounted on said carriage and having the slotted rearward projection, the screw for moving the slide and the nut connecting the slide and screw secured in the slot of the rearward extension, of the supplemental carriage, a clamp for holding it in adjusted position, the adjustable guide on said supplemental carriage and the slide block adjustably connected with the rearward extension of the slide and working in the adjustable guide; substantially as described.

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