I. E. HINDMAN.

LATHE.

APPLICATION FILED SEPT. 19, 1918.

1,323,633.

Patented Dec. 2, 1919.

8 SHEETS—SHEET 1.

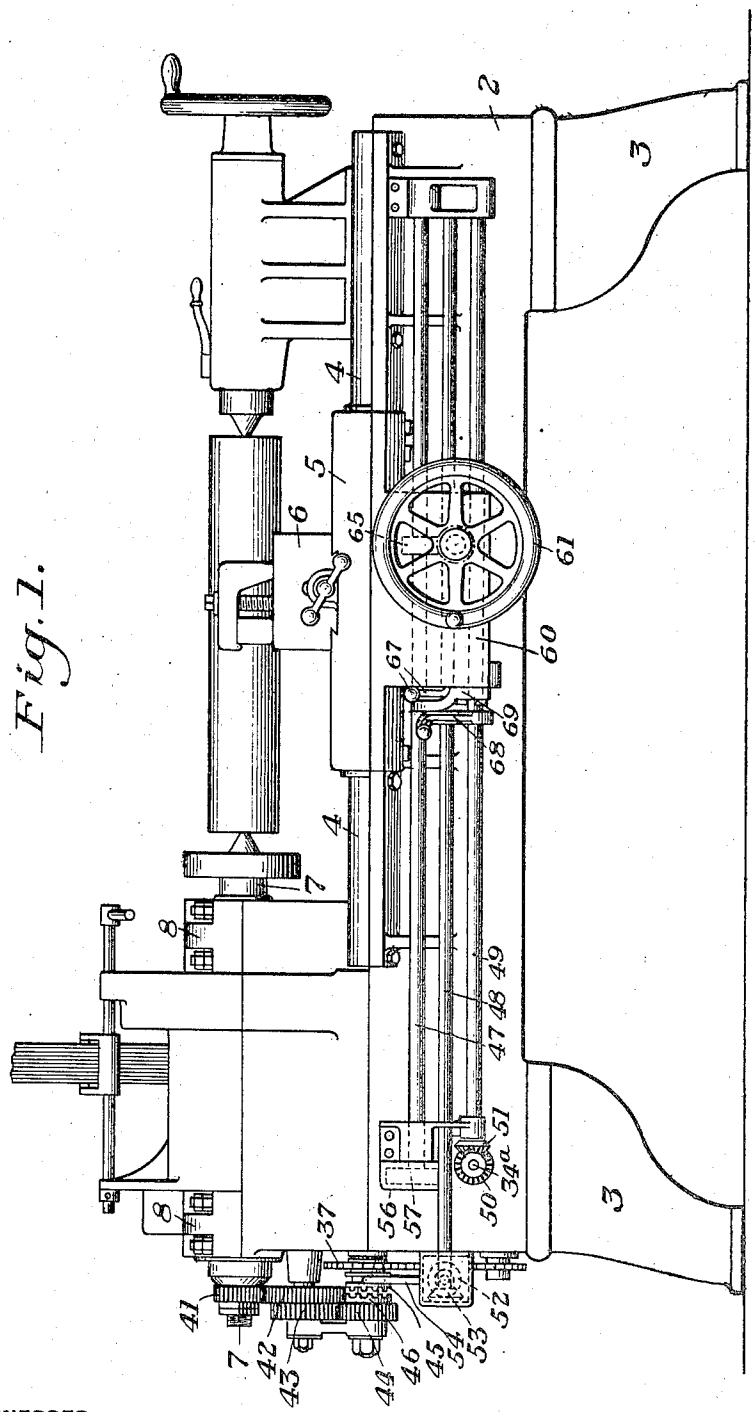


Fig. 1.

WITNESSES

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by Bakewell, Bigines & Parmele

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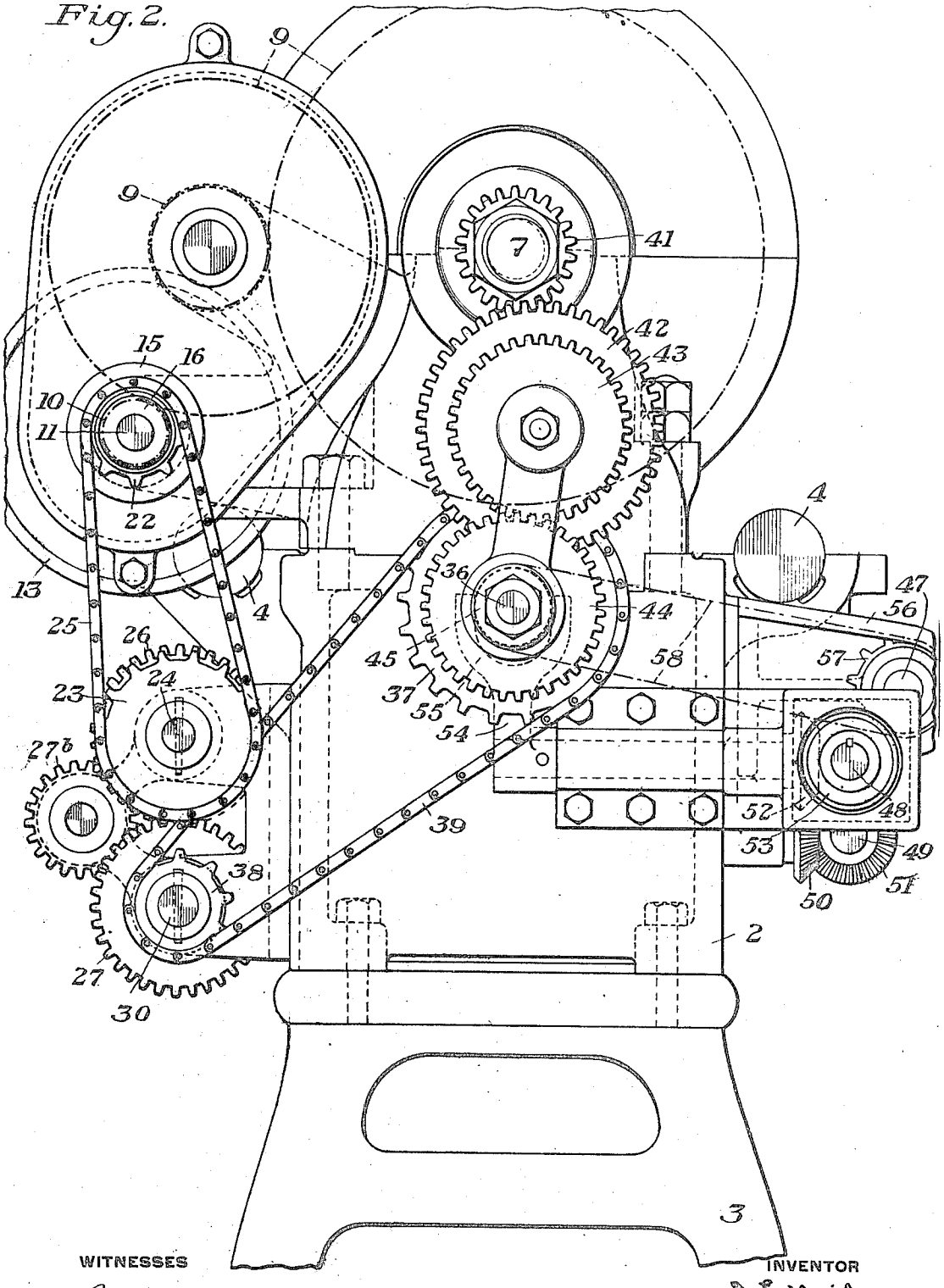
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8 SHEETS—SHEET 2.

Fig. 2.



WITNESSES

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8 SHEETS—SHEET 3.

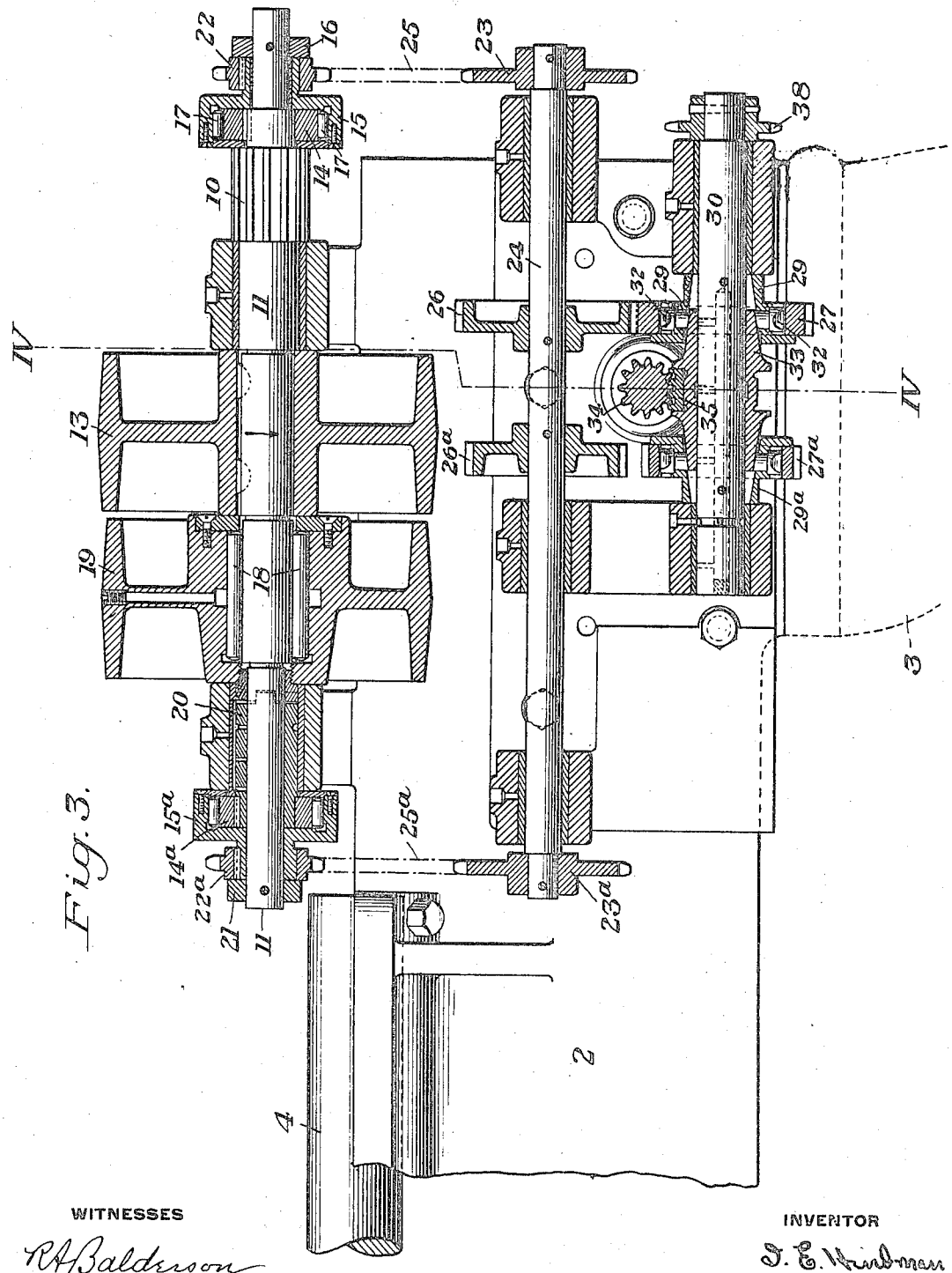


Fig. 3.

WITNESSES

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8 SHEETS—SHEET 4.

Fig. 4.

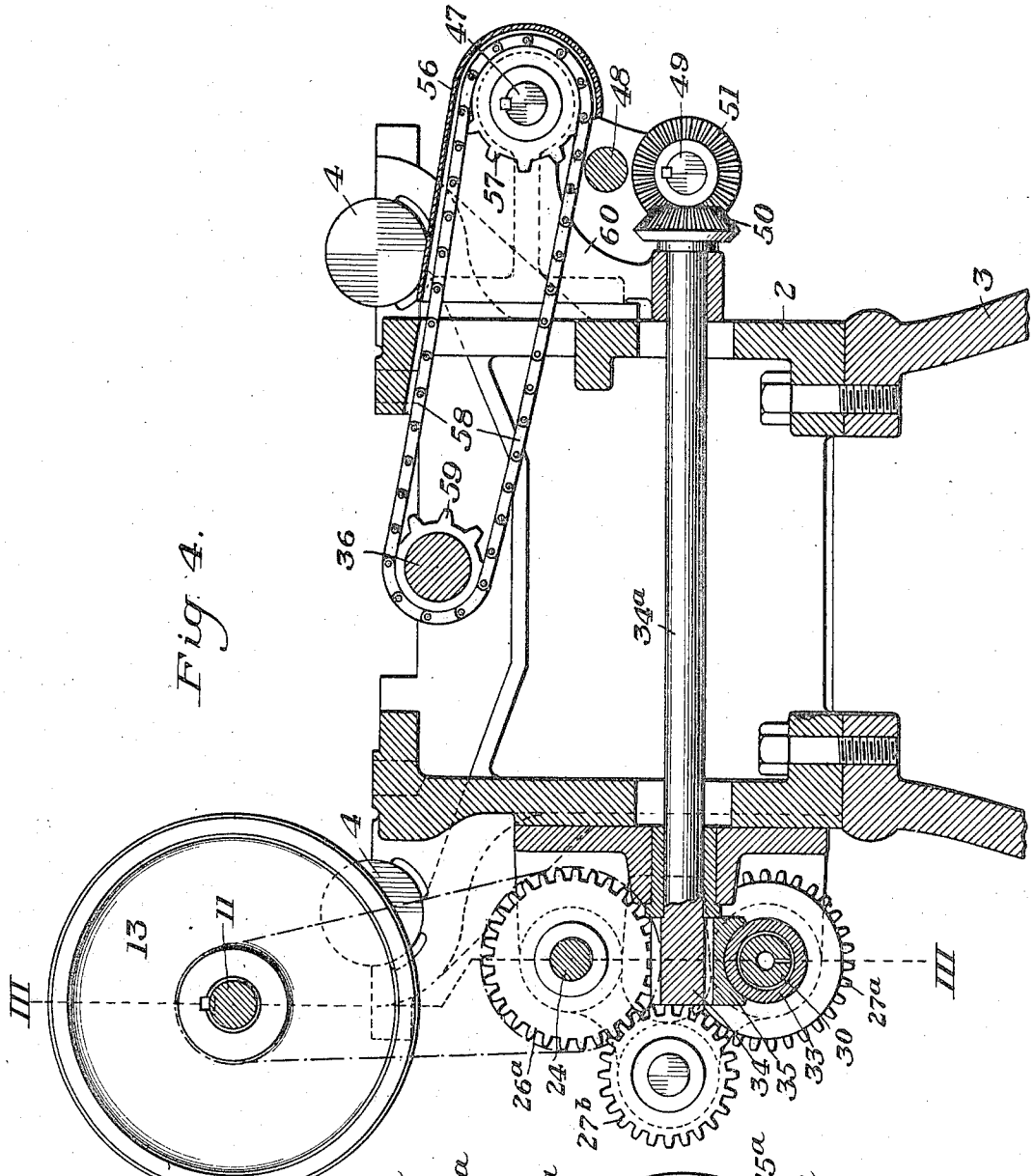


Fig. 5.

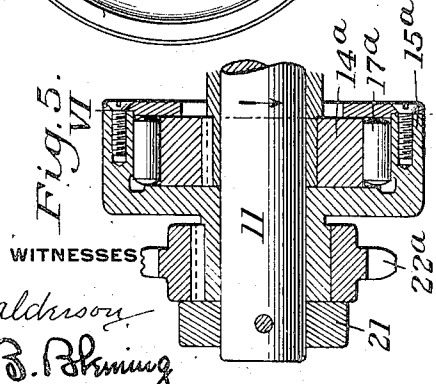
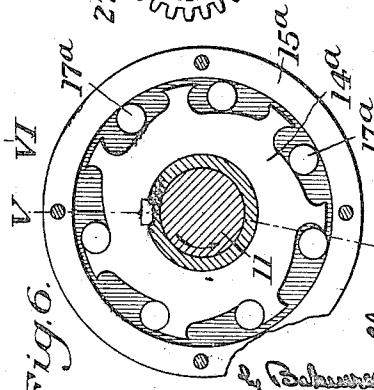


Fig. 6.



WITNESSES

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LATHE.

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8 SHEETS—SHEET 5.

Fig. 7.

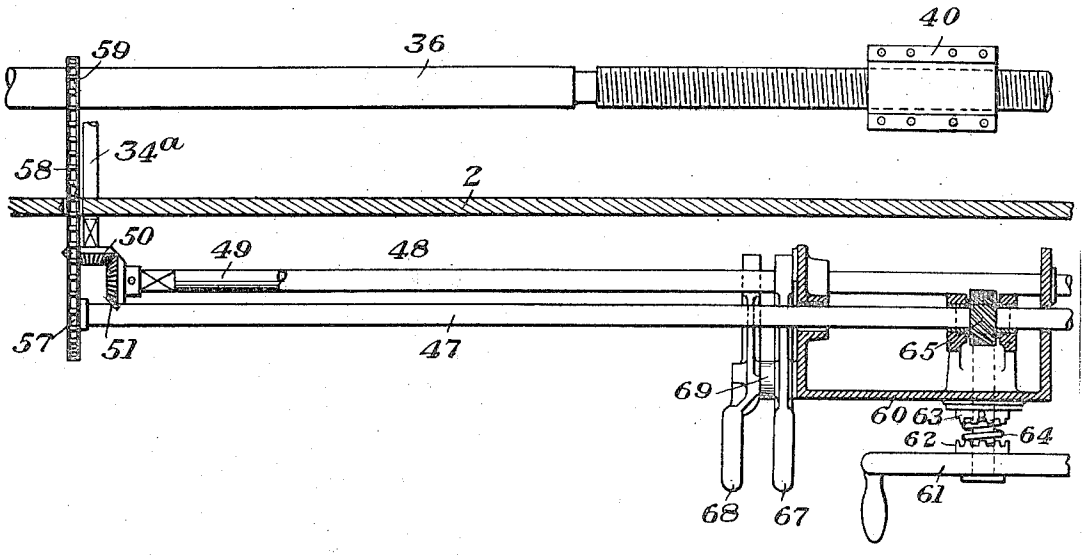
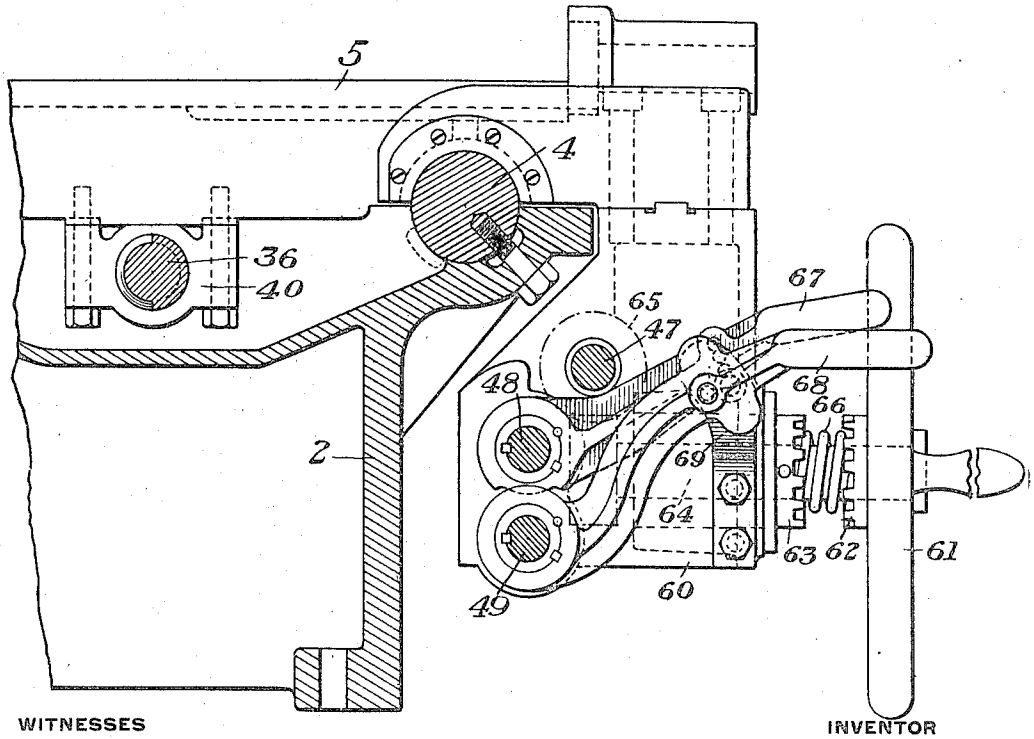


Fig. 8.



WITNESSES

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LATHE.

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8 SHEETS—SHEET 6.

Fig. 10.

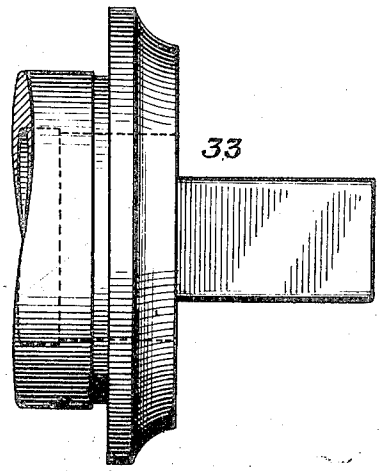


Fig. 9.

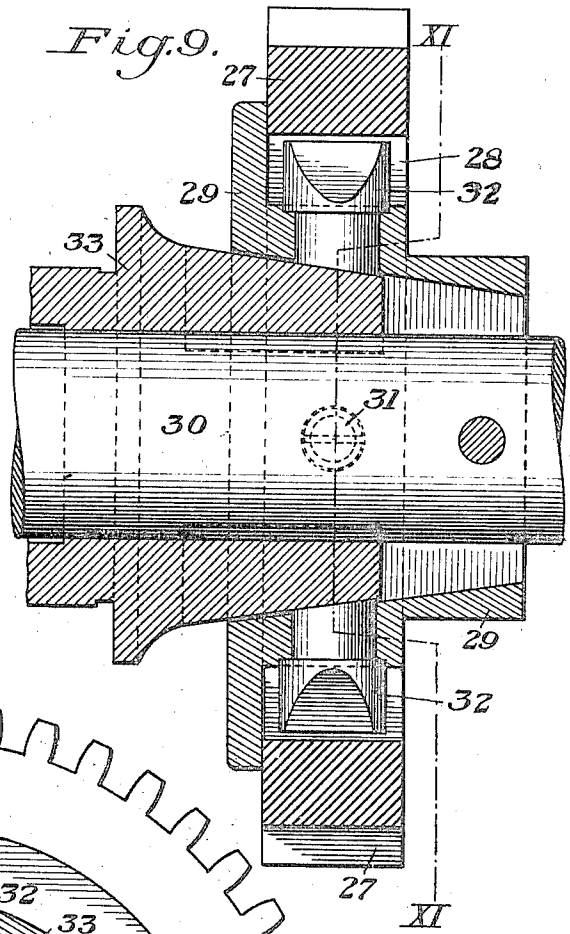
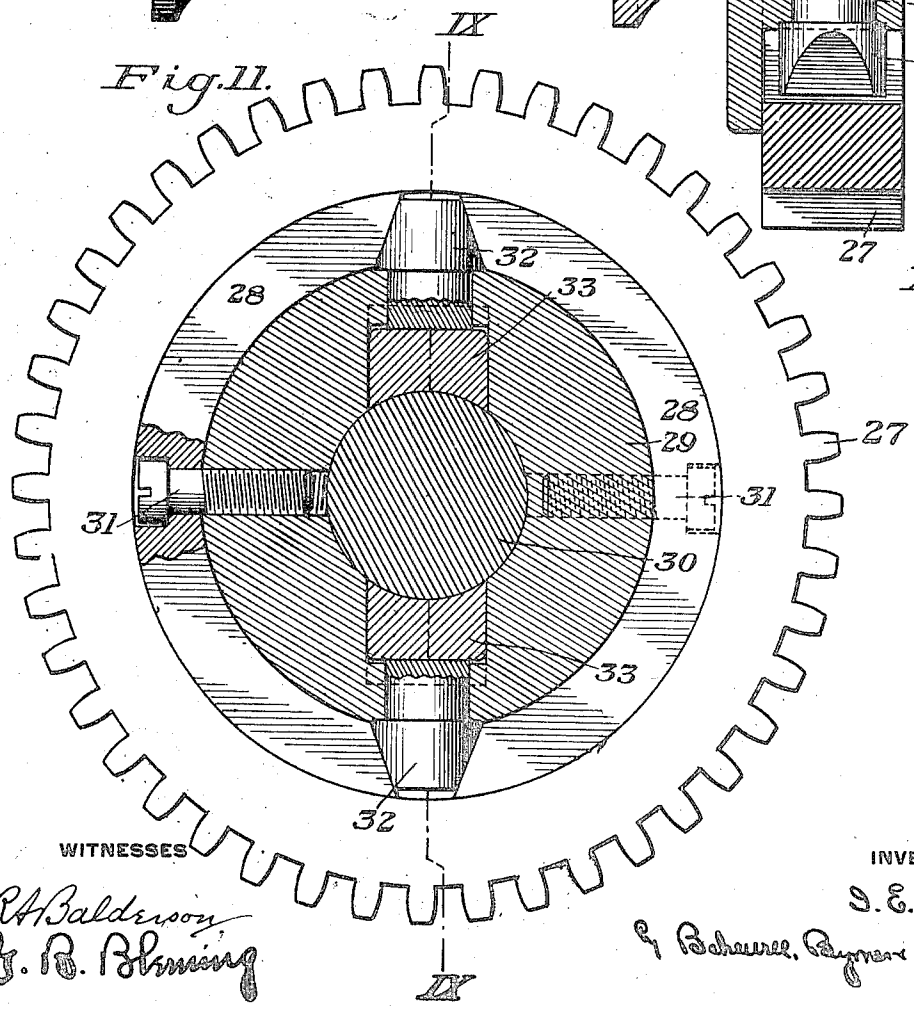


Fig. 11.



WITNESSES

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LATHE.

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8 SHEETS—SHEET 7.

Fig. 12.

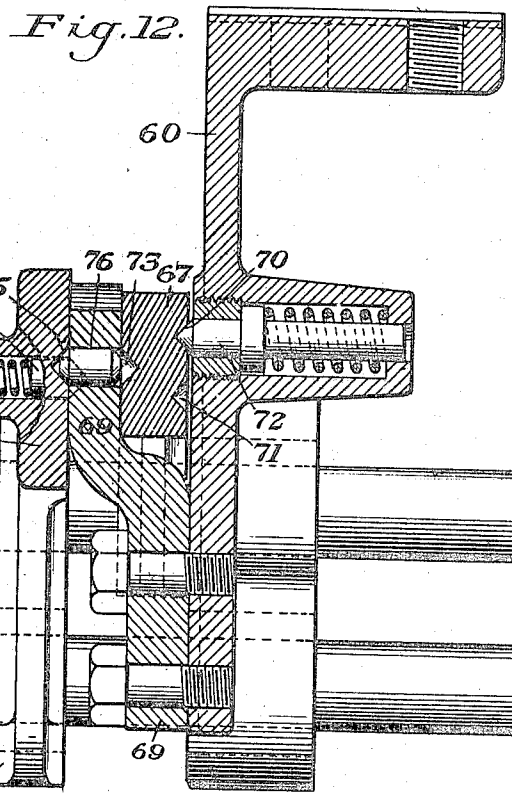


Fig. 13.

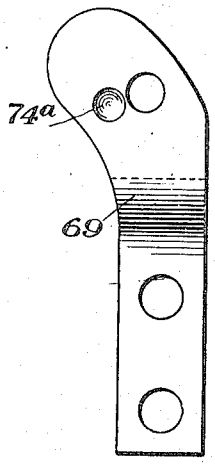


Fig. 14.

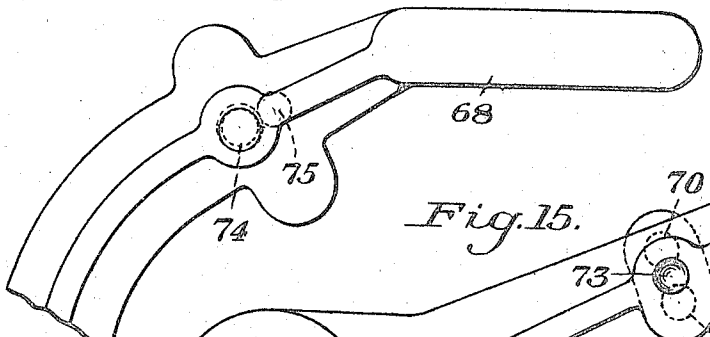
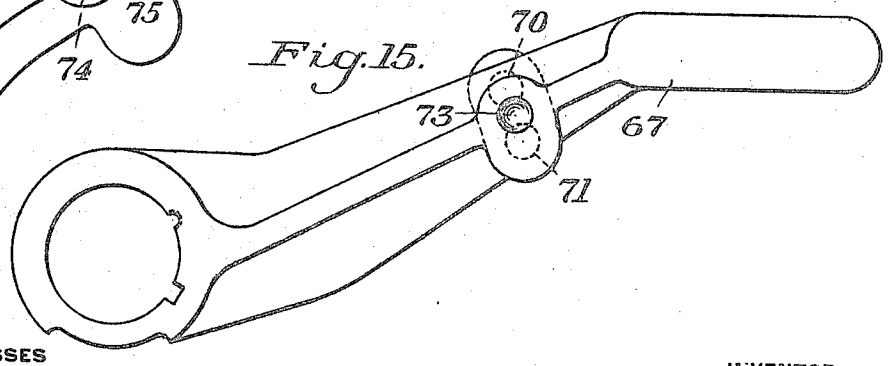


Fig. 15.



WITNESSES

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APPLICATION FILED SEPT. 19, 1918.

1,323,633.

Patented Dec. 2, 1919.

8 SHEETS—SHEET 8.

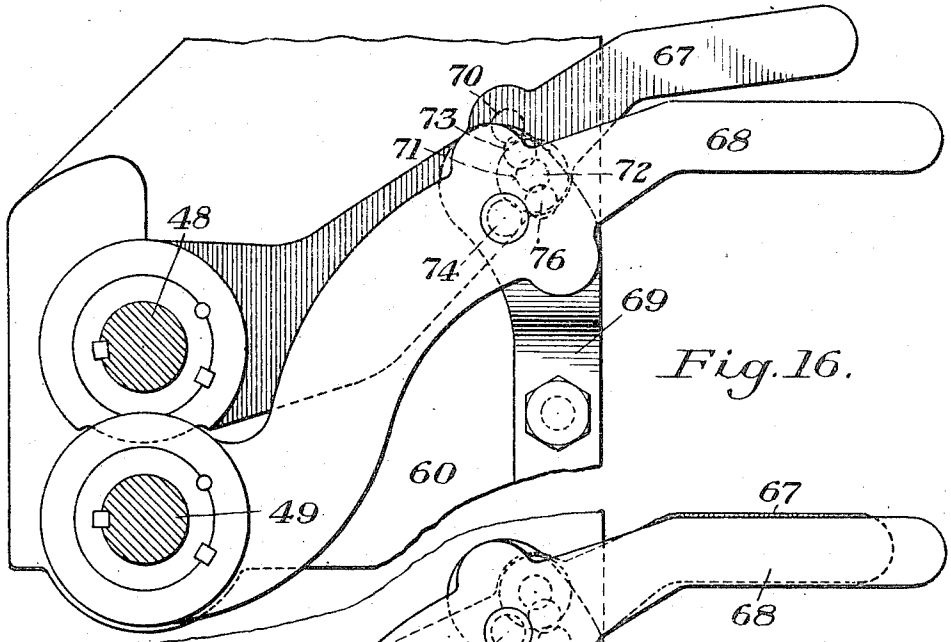


Fig. 16.

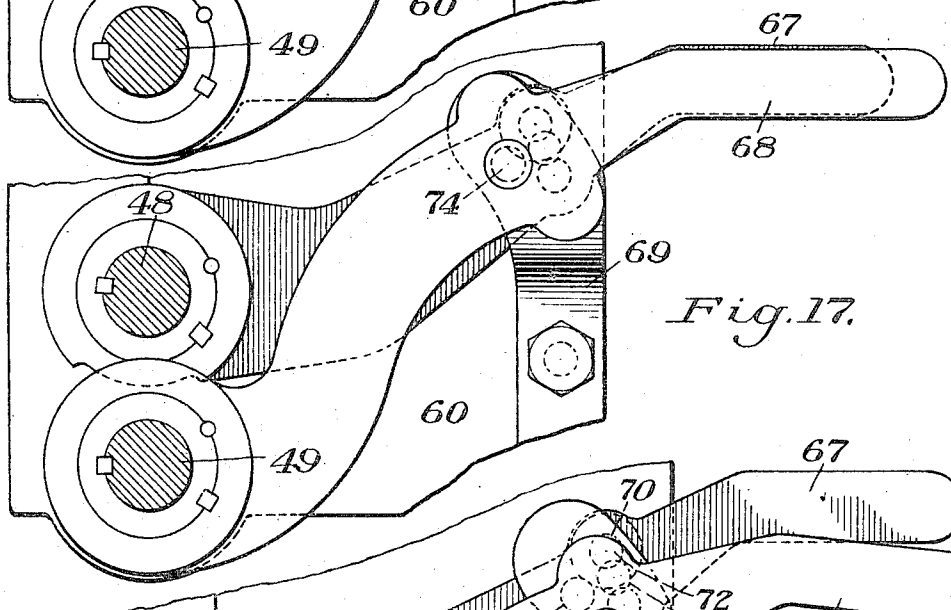


Fig. 17.

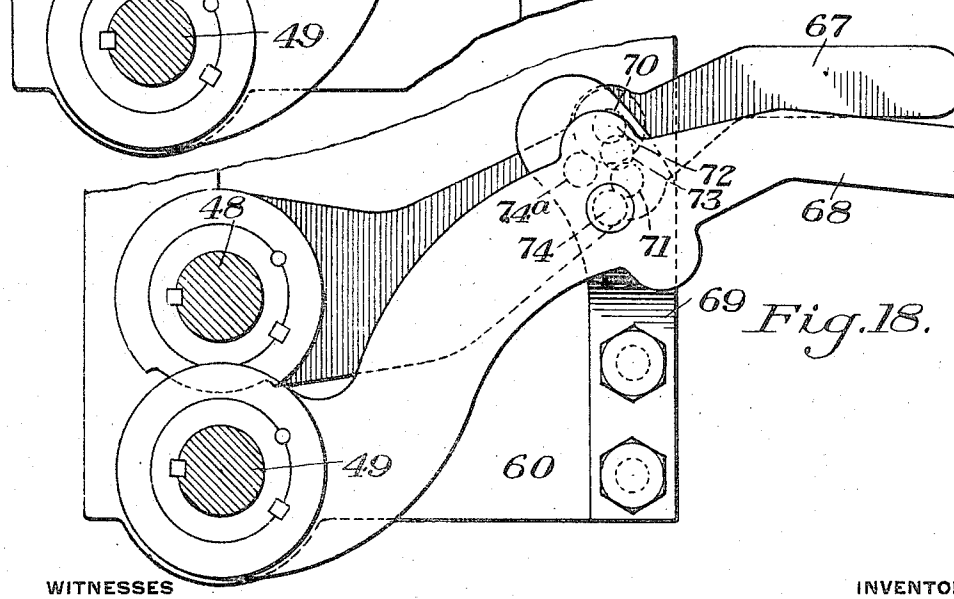


Fig. 18.

WITNESSES

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UNITED STATES PATENT OFFICE.

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LATHE.

1,323,633. Specification of Letters Patent. Patented Dec. 2, 1919.

Application filed September 19, 1918. Serial No. 254,754.

To all whom it may concern:

Be it known that I, ISAIAH E. HINDMAN, a citizen of the United States, residing at Bellevue, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Lathes, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a front view of one form of lathe to which my improvements have been applied.

Fig. 2 is an end view of the same.

Fig. 3 is a detail sectional view on the line III—III of Fig. 4.

Fig. 4 is a similar view on the line IV—IV of Fig. 3.

Fig. 5 is a detail sectional view of the clutch on the line V—V of Fig. 6.

Fig. 6 is a similar view on the line VI—VI of Fig. 5.

Fig. 7 is a detail plan view in skeleton form illustrating the clutch operating devices and the hand mechanism for the lead screw.

Fig. 8 is a detail vertical sectional view through the clutch operating shafts.

Fig. 9 is a detail sectional view on the line IX—IX of Fig. 11, showing one of the clutches for the quick return mechanism.

Fig. 10 is a detail face view of a portion of one of the clutch members.

Fig. 11 is a detail sectional view on the line XI—XI of Fig. 9.

Fig. 12 is a detail sectional view illustrating the locking devices for the clutch operating levers.

Fig. 13 is a face view of the bracket for the clutch locking pin.

Figs. 14 and 15 are detail face views of the clutch levers, and

Figs. 16, 17 and 18 are diagrams illustrating the various positions occupied by the clutch levers.

This invention relates to an improvement in lathes and is designed to provide a cheap and efficient mechanism whereby the tool or the saddle can be quickly returned to the starting of the cut. Another object of my invention is to provide mechanism which is so arranged that the speed of the lead screw can be accelerated to return the saddle or tool to the beginning of the cut. A still further object of my invention is to provide clutch mechanism for controlling the movement of the lead screw during the cutting operation, as well as a clutch mechanism for controlling the quick return movement of the tool, together with means for interlocking the clutch actuating levers so that only one clutch can be in operation at one time.

A still further object of my invention is to provide hand actuated means for the lead screw which is arranged to actuate the lead screw when both clutches are in their inoperative positions.

Further objects of my invention will readily be appreciated from the description and illustrations.

The precise nature of my invention will be best understood by reference to the accompanying drawings, which will now be described, it being premised, however, that various changes may be made in the details of construction of the various parts as well as their arrangement, without departing from the spirit and scope of my invention as defined in the appended claims.

In the drawings, the reference character 2 designates the bed of the lathe which is supported on feet 3. This bed is provided with cylindrical ways or shears 4 on which the saddle 5 is adapted to move. This saddle 5 is arranged to receive the usual tool carriage 6 to operate on work which is rotated by the spindle 7 of the lathe. The spindle 7 of the lathe is rotatably mounted in bearings 8 which form part of the housing for the spindle driving mechanism and is driven by means of gearing 9 from a pinion 10 on a main power shaft 11. The main power shaft 11 is mounted in bearings connected to the head of the lathe and keyed thereto is a driving pulley 13. Mounted on the end of the shaft 11, adjacent to the pinion 10, is a clutch member which is more clearly illustrated in Figs. 5 and 6, and comprises a clutch member 14 keyed to the shaft 11, and which is arranged to be rotated thereby. Loosely mounted on the shaft 11 and surrounding the clutch member 14 is a second clutch member 15, which is held from endwise movement on the shaft by means of a collar 16. Interposed between the clutch members 14 and 15 are rollers 17, which are arranged to lock the members 14 and 15 when the shaft is moved in one direction, but to permit free move-

ment of the clutch member 15 in the same direction as the shaft is driven.

Loosely mounted on roller bearings 18 on the shaft 11 is a pulley 19 which is connected to a sleeve 20 mounted within one of the bearings for the shaft 11. Connected to the sleeve 20 is a clutch member 14^a which is similar to clutch member 14, and rotatably mounted on the shaft 11 and surrounding the clutch member 14^a is a second clutch member 15^a similar to the clutch member 15. This clutch member 15^a is held from endwise movement by means of a collar 21 connected to the shaft 11, the arrangement being such that when the loose pulley is operated, its clutch member 15^a will be rotated in the same direction as the clutch member 15 when the belt is on the tight or power pulley 13.

Connected to the clutch member 15 is a sprocket wheel 22 which is connected to a sprocket wheel 23 on a shaft 24, by means of a sprocket chain 25, and connected to the clutch member 15^a is a similar sprocket wheel 22^a which is connected to a sprocket wheel 23^a on the shaft 24 by means of a sprocket chain 25^a; the arrangement being such that the shaft 24 is driven when the belt is either on the pulley 13 or the loose pulley 19, for the purpose hereinafter described.

26 is a gear wheel connected to the shaft 24 and which meshes with a gear wheel 27. The gear wheel 27 is rotatably mounted on a split ring 28 connected to a clutch 29, which is connected to a shaft 30. The split ring members 28 are secured to the hub of the clutch member 29 by means of screws 31, and 32 are wedge members between the ring members 28 which are arranged to expand the ring members and force them into contact with the gear wheel 27, so that the shaft 30 will be rotated by means of the gear wheel 26. These wedge members are forced radially by means of one end of a double cone member 33 mounted on the shaft 30, and which is arranged to be moved endwise by a pinion 34 on a shaft 34^a which extends from the rear of the lathe to the front thereof. This pinion 34 meshes with a rack 35 mounted in a groove in the cone member 33, the arrangement being such that the cone member can rotate with relation to the rack 35. 26^a is a second gear wheel connected to the shaft 24, which is arranged to actuate a gear wheel 27^a through the medium of a pinion 27^b, the arrangement being such that the gear wheel 27^a is rotated in the reverse direction from the gear wheel 27. This gear wheel 27^a also forms part of a clutch 29^a similar to the clutch 29, and when the member 33 is moved to the left the shaft 30 will be rotated in the same direction as the shaft 24, and when the cone member 33 is moved to the right the shaft 30 will be rotated in the opposite direction from the shaft 24. When, however, the cone 33 is in its central position the shaft 30 will remain idle, as neither of the clutches will be in driving connection therewith.

Rotatably mounted in suitable bearings in the bed of the lathe is a lead screw 36, and connected thereto at the front end of the lathe is a sprocket wheel 37. This sprocket wheel 37 is connected to a sprocket wheel 38 on the shaft 30 by means of a chain 39, so that when said shaft 30 is rotated in either direction, the lead screw 36 will move the saddle 5 by means of a nut 40, which is connected to the saddle and which engages the thread on the lead screw.

The foregoing mechanism constitutes the driving mechanism for the quick return of the saddle, the ordinary feed for the lathe being the same as that on the lathes of today, and comprises a pinion 41, connected to the spindle 7 of the lathe, which meshes with a gear wheel 42 connected to a pinion 43. The last mentioned pinion 43 meshes with a gear wheel 44 loosely mounted on the lead screw 36. Movably mounted on the lead screw 36 is a clutch member 45 which is arranged to be moved into and out of engagement with a clutch member 46 on the gear wheel 44, so that when said clutch members are in engagement with each other, the lead screw will be operated by means of the regular feed mechanism. Rotatably mounted in bearings on the front of the lathe are shafts 47, 48 and 49. The shaft 49 is connected to the shaft 34^a by means of bevel gears 50 and 51, so that when said shaft is rotated in one direction the cone member 33 on the shaft 30 will be shifted to connect one of the clutches with the shaft 30, and when moved in the other direction will release said clutch and shift the cone member to its central or neutral position; or if moved far enough, will connect the other clutch member with the shaft 30. The shaft 48 is connected by means of bevel gear wheels 52 and 53 with a rocker arm 54 having a yoke 55 on the end thereof, which is connected to the clutch member 45. When the rocker arm is moved in one direction, the clutch members 45 and 46 will be moved into engagement with each other so that the lead screw 36 will be actuated by the lathe spindle. Connected to the shaft 47 and within a casing 56 on the front of the lathe is a sprocket wheel 57 which is connected by means of a sprocket chain 58, with a sprocket wheel 59 on the lead screw 36. 60 is an apron connected to the saddle 5 and is provided with bearings for each of the shafts 47, 48 and 49, and is arranged to slide over said shafts when the carriage is moved along the ways. Rotatably mounted in suitable bearings on the apron is a hand wheel 61 which is provided with a clutch member 62 adapted to engage a clutch member 63 on a stub shaft

64 rotatably mounted in the apron. This stub shaft 64 is provided with a skew gear which meshes with a skew gear 65 on the shaft 47.

Interposed between the two clutch members 62 and 63 is a spring 66 which is arranged to hold the clutch members out of engagement with each other. 67 is a clutch actuating lever connected to the shaft 48 for actuating the clutch member 45, and 68 is a similar clutch lever connected to the shaft 49 for actuating the cone member 33 for the clutches 29 and 29a. These clutch levers 67 and 68 are on opposite sides of a bracket 69 which is connected to the apron, as can be more clearly seen in Fig. 12. The clutch lever 67 is provided with two detents 70 and 71 which are arranged to be engaged by a spring-pressed plug 72 mounted in the apron for holding the lever 67 in its adjusted position. These detents 70 and 71 are on the side of the lever adjacent to the apron. 73 is a third detent on the other side of the lever in the side adjacent to the bracket 69. The clutch lever 68 is provided with a spring-pressed plunger 74 which is arranged to engage a detent 74a in the bracket 69 when the clutch lever 68 is in its central or neutral position. The side of the lever 68 adjacent to the bracket 69 is provided with a detent 75, and slidably mounted in an opening in the bracket 69 is a pin 76 which is arranged to be seated in the detents 73 and 75 in the levers 67 and 68, respectively. The pin 76 is arranged to prevent either of the clutch levers 67 or 68 from being moved after the other lever is moved to throw its clutch into operative position. As shown in Fig. 12, the pin 76 is in line with the detents 73 and 75, so that either lever 67 or 68 can be moved as both clutches for the lead screw driving mechanism are disconnected.

In the drawings, both clutch levers 67 and 68 are thrown to their neutral positions, or the positions in which both sets of lead screw driving mechanisms are disconnected from the lead screw. If it is desired to throw the regular feeding mechanism into operation, or the gears 41 to 44, the clutch lever 67 is elevated to bring the detent 71 into register with the plug 72. This movement of the clutch lever will throw the clutch member 45 into engagement with the clutch member 46. This movement of the clutch lever will also shift the detent out of alinement with the pin 76, and thereby lock the clutch lever 68 against movement.

In Figs. 16 to 18, I have diagrammatically illustrated the clutch levers in different positions to clearly show how one of said members is locked against movement when the other lever has been moved to throw the clutch into operative position. In Fig. 17 both clutch levers are in their neutral positions and the positions therein correspond with the positions of the levers shown in Fig. 12. In Fig. 16 the clutch lever 67 has been shifted to throw its clutch into operation so that the pin 76 only registers with the opening 75 in the clutch lever 68. In Fig. 18 the clutch lever 67 is in its neutral position, while the lever 68 has been shifted to throw one of its clutch members into operation, and in this case the pin 71 is only in register with the detent 73 in the lever 67, while the holding plug 72 is in engagement with the detent 70.

The advantages of my invention result from the provision of quick return actuating mechanism for a lathe, which is arranged to operate the lead screw independent of the regular lead screw operating mechanism, together with clutch mechanisms arranged to connect either the regular lathe lead screw mechanism, or the quick return mechanism. By this arrangement I am enabled to use the lead screw for actuating the saddle either by means of the regular feed mechanism or by means of the quick return mechanism, all of which are driven by the same belt. They result furthermore, from the provision of lead screw actuating mechanism which is adapted to be actuated by the driving belt when the driving belt is placed on the loose pulley, when the lathe spindle is at rest, furthermore, from the provision of a third lead screw actuating mechanism whereby the lead screw may be actuated by hand when both of the power mechanisms are disconnected.

In some of the claims I have used the terms "driving pulley" and "loose pulley", but desire it to be understood that these terms as used are broad enough to cover a fixed driving connection and a loose driving connection other than pulleys in which the fixed driving connection performs the same function as the driving pulley and the loose driving connection performs the same function as the loose pulley ordinarily employed.

I claim:

1. A lathe having a lead or feed screw for moving the tool holder, a spindle for rotating the work, a driving pulley for the spindle, driving means connecting the spindle and the lead screw, means for connecting and disconnecting the driving means between the spindle and the lead screw, a loose pulley, and other means for actuating the lead screw arranged to be connected to the driving pulley or the loose pulley, substantially as described.

2. A lathe having a lead or feed screw for moving the tool holder, a spindle for rotating the work, a driving pulley for the spindle, driving means connecting the spindle and the lead screw, means for connecting and disconnecting the driving means between the spindle and the lead screw, a loose pulley, other means for actuating the

lead screw, clutch connections between the driving pulley and the other means for actuating the lead screw, and clutch connections between the loose pulley and the other means for actuating the lead screw, substantially as described.

3. A lathe having a lead or feed screw for moving the tool holder, a spindle for rotating the work, a driving pulley for the spindle, driving means connecting the spindle and the lead screw, means for connecting and disconnecting the driving means between the spindle and the lead screw, a loose pulley, other means for actuating the lead screw, clutch connections between the driving pulley and the other means for actuating the lead screw, clutch connections between the loose pulley and the other means for actuating the lead screw, and reversible connections in the other means for actuating the lead screw arranged to actuate the lead screw in either direction by means of either the driving or loose pulley, substantially as described.

4. A lathe having a lead or feed screw for moving the tool holder, a spindle for rotating the work, a driving pulley for the spindle, driving means connecting the spindle and the lead screw, means for connecting and disconnecting the driving means between the spindle and the lead screw, a loose pulley, other means for actuating the lead screw, clutch connections between the driving pulley and the other means for actuating the lead screw, clutch connections between the loose pulley and the other means for actuating the lead screw, reversible connections in the other means for acuating the screw arranged to actuate the lead screw in either direction by means of either the driving or loose pulley, together with means for actuating said clutches, and interlocking devices arranged to prevent one actuating means for the lead screw from being thrown into operation when the other actuating means is in operation, substantially as described.

5. A lathe having a lead screw for moving the tool holder, a spindle for rotating the work, a driving shaft, a driving pulley on said shaft, actuating connections between the shaft and spindle for rotating the spindle, a loose pulley on the driving shaft, driving connections between the spindle and the lead screw, driving connections between the loose pulley and the lead screw, and means for connecting either the driving shaft or the loose pulley to the lead screw, substantially as described.

6. A lathe having a lead screw for moving the tool holder, a spindle for rotating the work, a driving shaft, a driving pulley on said shaft, actuating connections between the shaft and spindle for rotating the spindle, a loose pulley on the driving shaft, driving connections between the loose pulley and the lead screw, means for connecting either the driving shaft or the loose pulley to the lead screw, and interlocking connections between said last mentioned means and the first mentioned means for connecting and disconnecting the driving means between the spindle and the lead screw arranged to prevent the throwing of one mechanism into operation when the other is in operation, substantially as described.

7. A lathe having a lead or feed screw for moving the tool holder, a spindle for rotating the work, driving means for the spindle, driving means connecting the spindle and the lead screw, a clutch for connecting and disconnecting the driving means between the spindle and the lead screw, other means for actuating the lead screw connected to the spindle driving means, a clutch in the last mentioned means for actuating the screw adapted to connect and disconnect the screw from the driving means, and interlocking connections between said clutches for preventing one clutch from being thrown into operation when the other clutch is in operation, substantially as described.

8. A lathe having a lead or feed screw for moving the tool holder, a spindle for rotating the work, driving means for the spindle, driving means connecting the spindle and the lead screw, a clutch for connecting and disconnecting the driving means between the spindle and the lead screw, other means for actuating the lead screw connected to the spindle driving means, a clutch in the last mentioned means for actuating the screw adapted to connect and disconnect the screw from the driving means, interlocking connections between said clutches for preventing one clutch from being thrown into operation when the other clutch is in operation, and a third hand actuated means for the lead screw arranged to actuate the lead screw when the clutches are out of engagement, substantially as described.

9. A lathe having a lead or feed screw for moving the tool holder, a spindle for rotating the work, a driving pulley for the spindle, driving means connecting the spindle and the lead screw, means for connecting and disconnecting the driving means between the spindle and the lead screw, a loose pulley, other means for actuating the lead screw arranged to be connected to the driving pulley or the loose pulley, and hand actuated means for rotating the lead screw, substantially as described.

10. A lathe having a lead screw for moving the tool holder, a driving shaft, a spindle for rotating the work, actuating connections between the driving shaft and the spindle, a loose pulley on the driving shaft, feed screw actuating mechanism connecting the driving shaft with the lead screw, feed

screw actuating mechanism connecting the loose pulley with the lead screw, and reversible connections in the lead screw driving mechanism arranged to rotate the lead screw in either direction when connected with either the driving shaft or the loose pulley, substantially as described.

11. A lathe having a spindle for rotating the work, a driving shaft, actuating connections for the spindle connected to the driving shaft, a loose pulley on the driving shaft, a one-way clutching member on the driving shaft arranged to rotate the spindle driving mechanism when the driving shaft is rotated by the driving pulley, a one-way clutch connection between the loose pulley and the lead screw actuating mechanism arranged to actuate said mechanism when the loose pulley is rotated in one direction, and reversible clutching connections in the lead screw driving mechanism arranged to rotate said lead screw in either direction when connected with the driving shaft or the loose pulley, substantially as described.

12. A lathe having a lead or feed screw for moving the tool holder, a spindle for rotating the work, driving means for the spindle including a tight pulley, driving means connecting the spindle and the lead screw, means for connecting and disconnecting the driving means between the spindle and the lead screw, other means for driving the lead screw connected thereto and the driving means for the spindle, means for connecting and disconnecting said last mentioned driving means, a loose pulley adjacent to the other pulley, and driving connections between the loose pulley and the last mentioned driving means for the lead screw, substantially as described.

13. A lathe having a lead or feed screw for moving the tool holder, a spindle for rotating the work, driving means for the spindle, driving means connecting the spindle and the lead screw, a clutch for connecting and disconnecting the driving means between the spindle and the lead screw, a quick returning mechanism connecting the lead screw and the spindle driving means, said quick return means including a reverse motion, and a plurality of clutches in said quick return means for rotating the lead screw in either direction thereby, substantially as described.

14. A lathe having a lead or feed screw for moving the tool holder, a spindle for rotating the work, driving means for the spindle, driving means connecting the spindle and the lead screw, a clutch for connecting and disconnecting the driving means between the spindle and the lead screw, a quick return mechanism connecting the lead screw and the spindle driving means, said quick return means including a reverse motion, a plurality of clutches in said quick return means for rotating the lead screw in either direction thereby, and hand operated means for actuating the lead screw independent of either of the other lead screw actuating mechanisms, substantially as described.

15. A quick return mechanism for a lathe comprising a shaft, means for rotating said shaft, connections between said means and the lathe spindle for actuating the lathe spindle, a second shaft, a lead screw, driving connections between the second shaft and the lead screw, a plurality of driving connections between the first and second shafts arranged to rotate the shaft in either direction, two sets of clutch mechanisms between the two shafts, and means for actuating either of said clutches, substantially as described.

16. A lathe having a spindle, means for driving said spindle including a pulley, a lead screw, a quick return movement connected to the lead screw and the spindle driving mechanism, a loose pulley, driving connections between the loose pulley and the lead screw, and clutch mechanisms for connecting either of said mechanisms with the lead screw, substantially as described.

In testimony whereof I have hereunto set my hand.

ISAIAH E. HINDMAN.