H. SCHLESINGER, DEC'D.
A. SCHLESINGER, ADMINISTRATOR.
LATHE.
APPLICATION FILED MAR. 1, 1906.

908,146.

Patented Dec. 29. 1908.

4 SHEETS—SHEET 1.

Fig. 1.

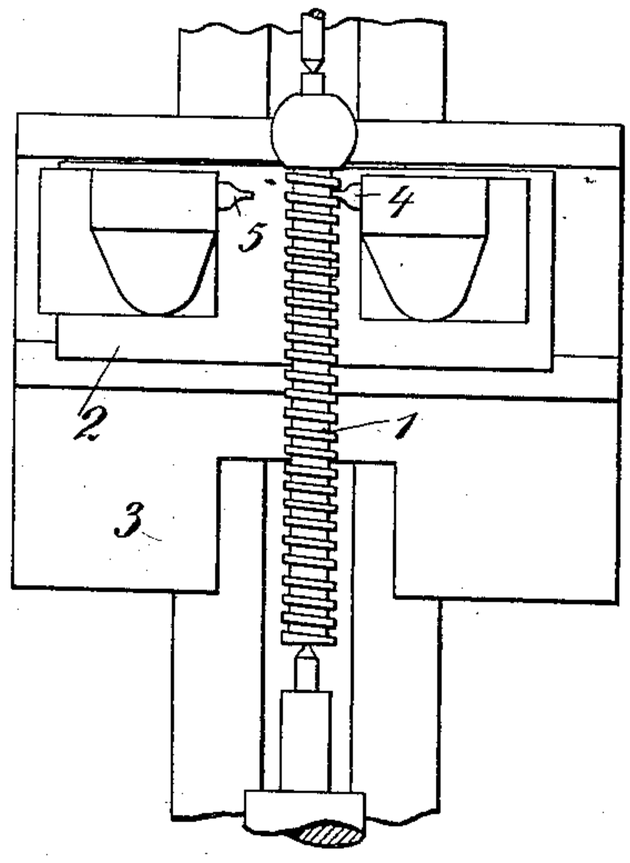


Fig. 2.

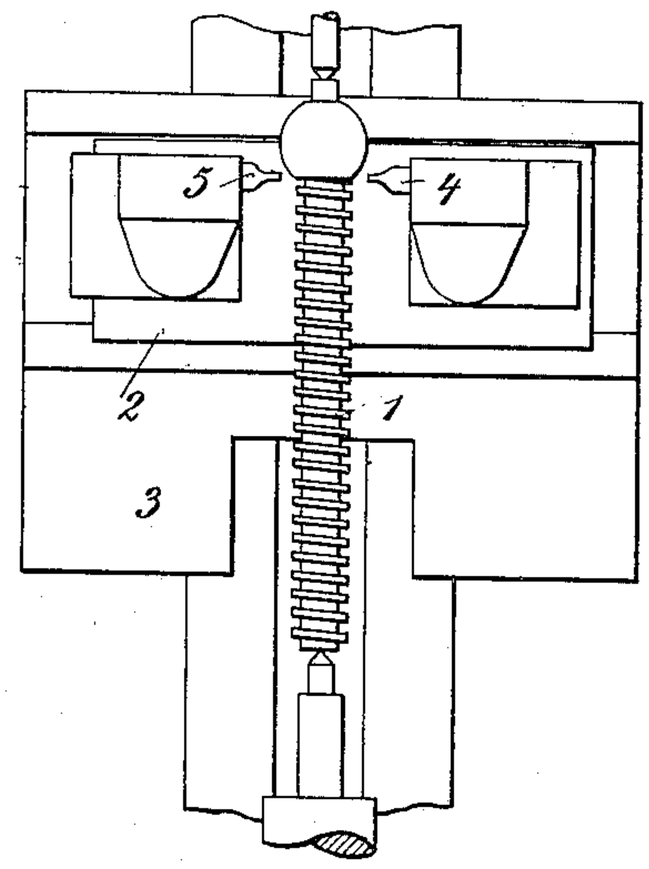
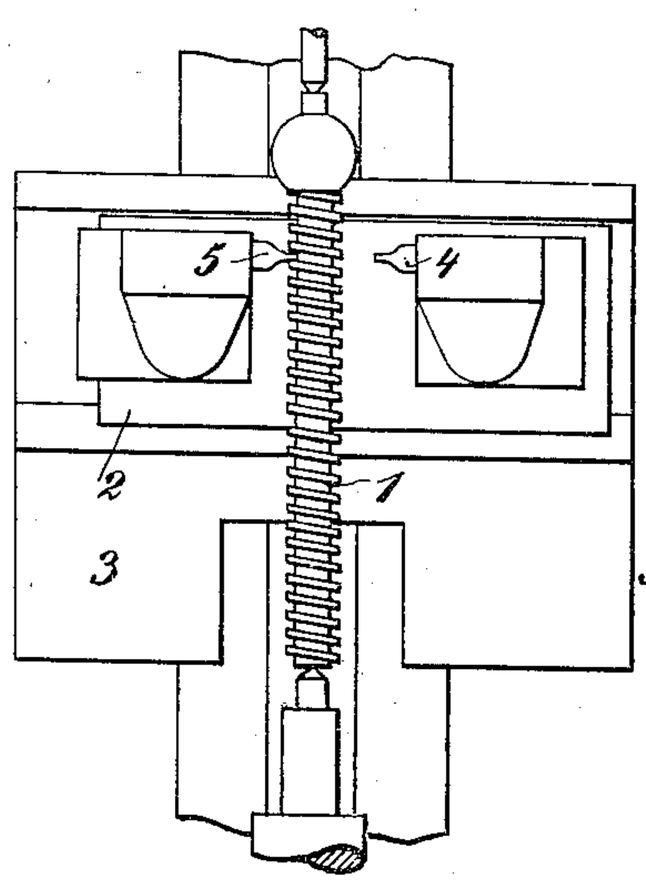


Fig. 3.



WITNESSES:
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A. H. Davis

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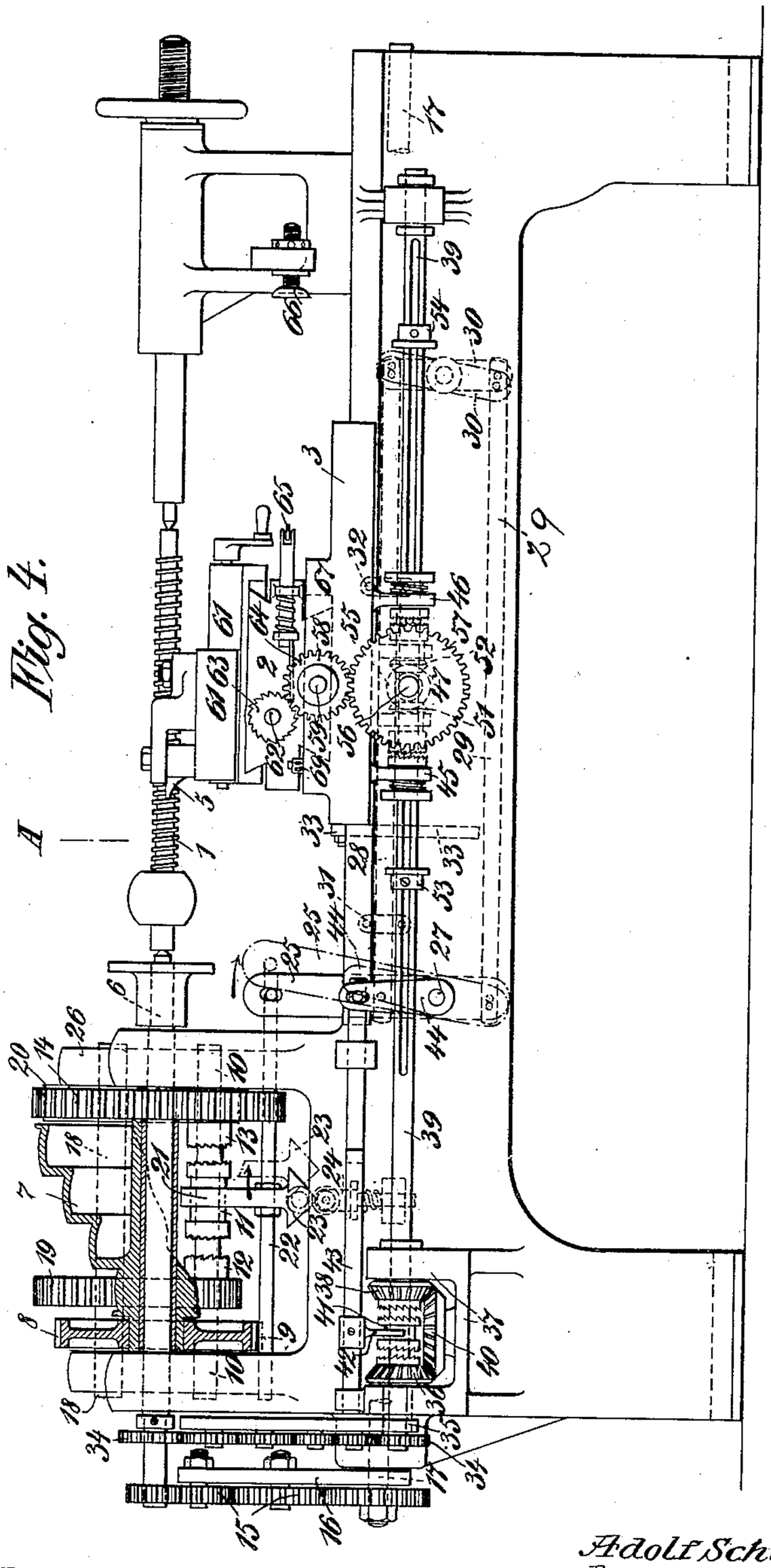
4 SHEETS—SHEET 2.

Fig. 4.



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4 SHEETS—SHEET 3.

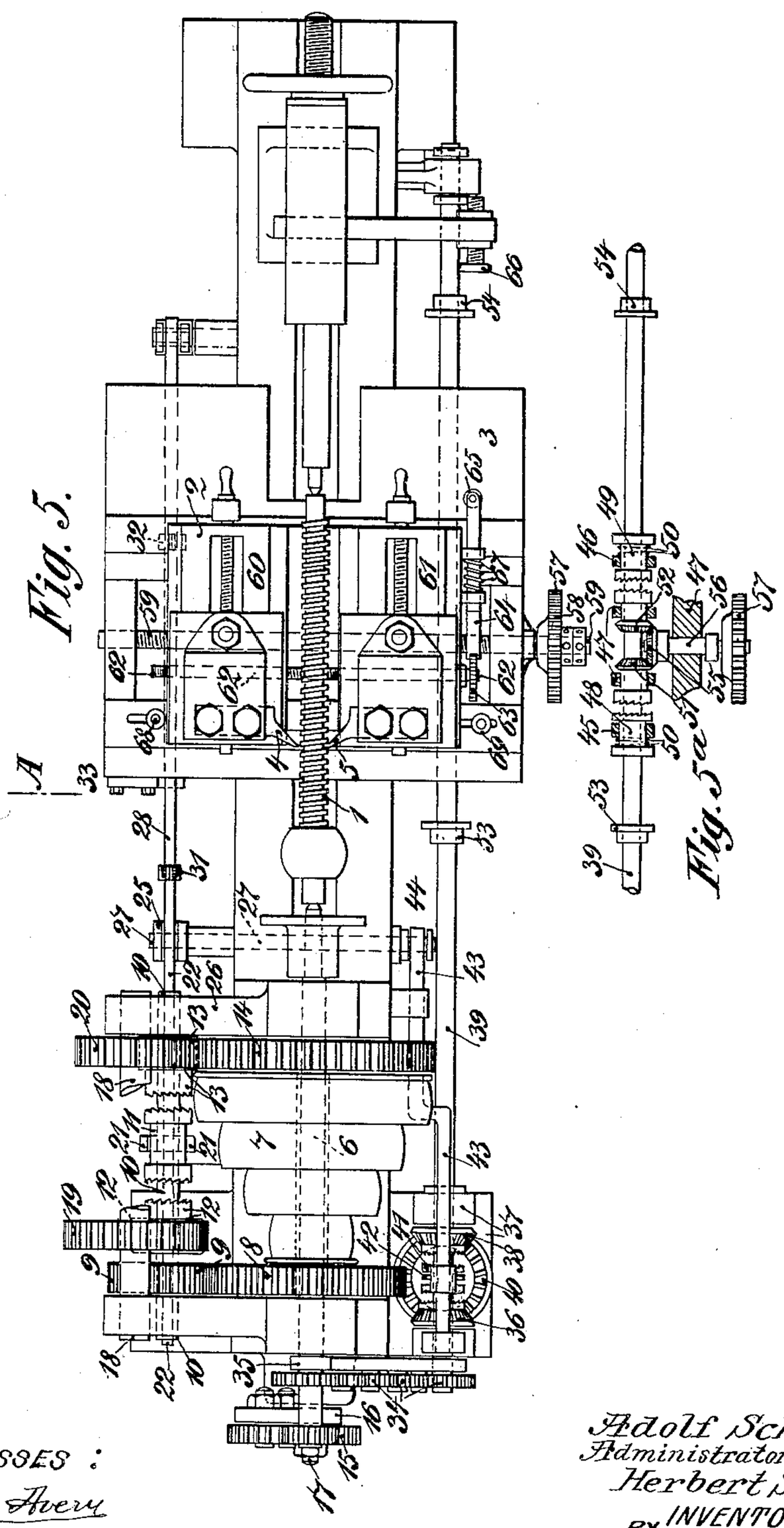

Fig. 5.

Fig. 5a.

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4 SHEETS—SHEET 4.

Fig. 6.

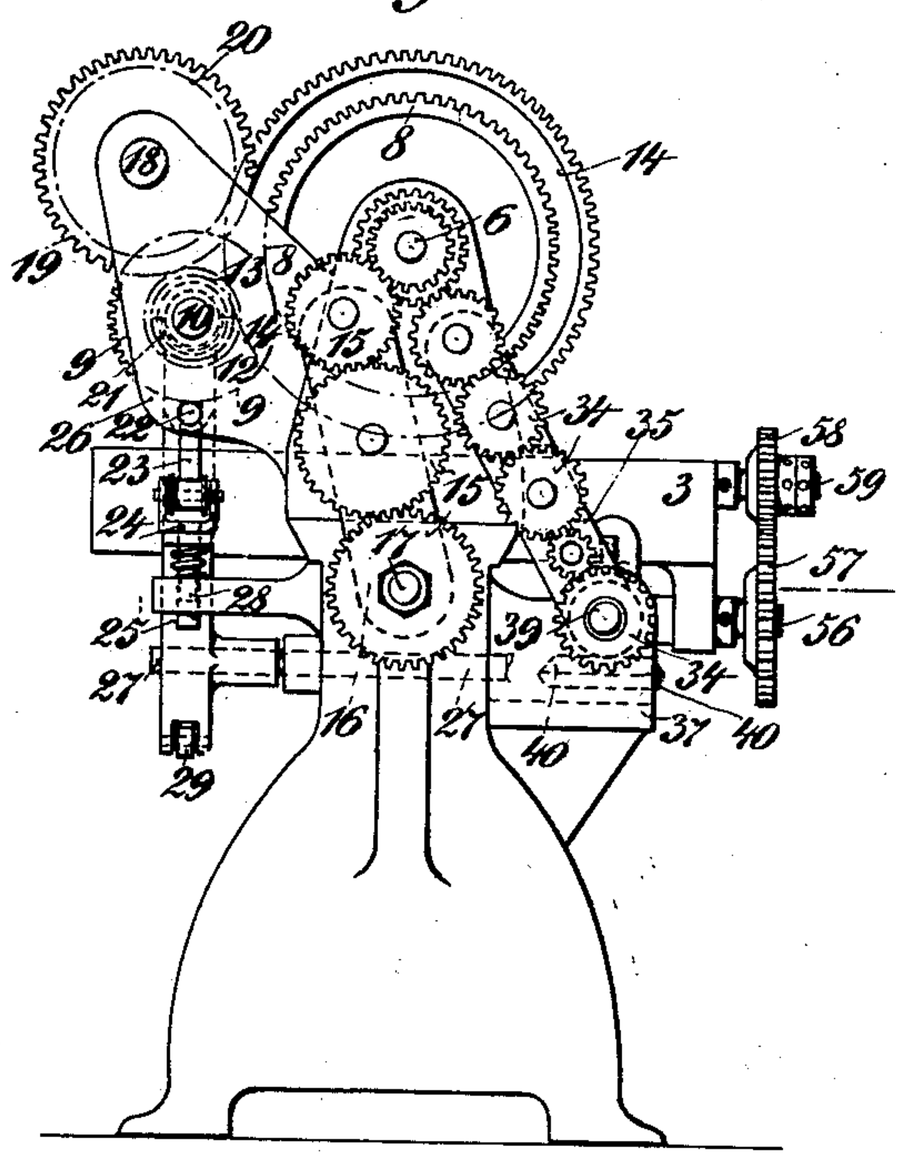
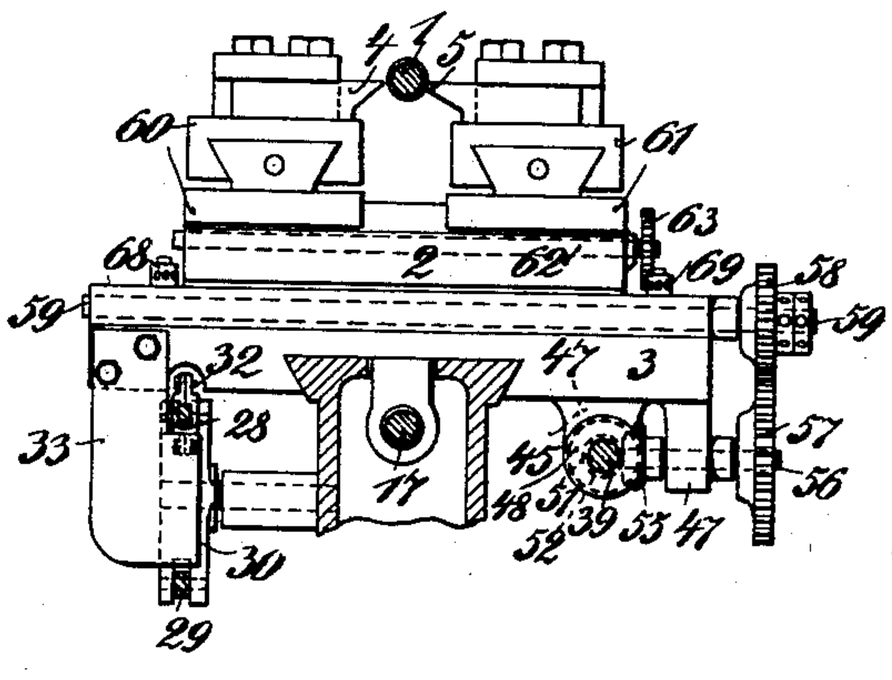


Fig. 7.



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UNITED STATES PATENT OFFICE.

ADOLF SCHLESINGER, OF WERDOHL, GERMANY, ADMINISTRATOR OF HERBERT SCHLESINGER, DECEASED.

LATHE.

No. 908,146. Specification of Letters Patent. Patented Dec. 29, 1908.

Application filed March 1, 1906. Serial No. 303,714.

To all whom it may concern:

Be it known that HERBERT SCHLESINGER, deceased, late a subject of the Emperor of Germany, has invented certain new and useful Improvements in Lathes, of which the following is a specification.

The invention has for its object a lathe in which two oppositely situated tools or groups of tools become operative alternately upon the forward and rearward movement of the lathe saddle and upon the alternate right and left hand rotation of the spindle.

The essence of the invention is, that one of the tools, or one of the group of tools, is automatically brought into operative position at the beginning of the travel of the saddle, one tool being brought into position when the saddle is moved in one direction, and the other tool being brought into position when the saddle is moved in the other direction. This not only affords the possibility of increasing the production but also of producing more cheaply. Attention to the machine is merely confined to clamping and releasing the work. The return of the saddle is utilized in the work, thereby largely economizing time and labor.

The novel turning lathe in accordance with this invention is illustrated by way of example in the accompanying drawing in which:

Figures 1–3 illustrate the operation diagrammatically. Fig. 4 represents the lathe in side elevation. Fig. 5 shows it in plan. Fig. 5ª shows the engaging mechanism of the tool carriage. Fig. 6 represents the lathe in end elevation, and Fig. 7 represents a section on the line A—A of Fig. 5. Figs. 1, 2 and 3 illustrate the tools for the lathe diagrammatically in three different positions.

The description which follows relates only to screw-cutting, but it will of course be understood that any other turning operations may be effected with this lathe; upon it cylindrical, slightly conical or the like bodies may be formed.

In Figs. 1–3, 1 is the work (in this case the screw to be cut) 2 is the common transverse support for the two tools or groups of tools or for the tool holders, 3 is the lathe saddle, reciprocated longitudinally of the machine. The support 2 is displaceable in the transverse direction on the saddle. 4 and 5 are the two oppositely situated tools, which make their cut alternately. The tool 4 cuts when the saddle moves towards the head of the screw 1, while this latter turns towards the tool. During the return of the saddle the screw turns in the opposite direction, when the tool 5 makes its cut.

Fig. 1 shows the tool 4 almost at the end of its cut at the head of the screw 1. At the end of its cut the tool is withdrawn from the screw before the stopping of the machine, which precedes the reversal in the direction of running of all the moving parts, occurs. Fig. 2 shows the position of the tools at the moment at which the machine stops during the alteration of the direction of travel of the saddle. The tool 5 must travel the same distance towards the screw 1 as the tool 4 moves away from it. When the reversal in position of the tools is finished, the saddle 3 begins to run back. The screw then rotates in the opposite direction and the tool 5 becomes operative. At the end of the return travel the operations are repeated. A constant alternation of the two tools is therefore effected upon the forward and backward travel of the saddle 3 respectively. During the alteration in the direction of running of the saddle the tools may be fed forward by the thickness of cut required; this may be done by tightening the two tool holders by means of a right and left handed screw spindle in the known manner, as is hereinafter explained.

The constructional form of turning lathe illustrated in Figs. 4 to 7 of the drawings show the tool 5 operative. The remaining parts such as the operating lever, clutches and the like are stationary; this is during the travel of the carriage or saddle. The mandrel 6 carries the freely rotatable driving or stepped pulley 7 to which the gear wheel 8 is made fast. This gear wheel transmits its rotation to the gear wheel 9 which is keyed upon the shaft 10. Upon this shaft 10 there is mounted a double tooth clutch 11, which is displaceable in the longitudinal direction but rotates with the shaft 10. In addition, gear pinions 12 and 13 are rotatably mounted on the shaft 10 but are prevented from longitudinal displacement. The pinions 12 and 13 are provided on one side with clutch teeth corresponding with the clutch teeth of the double clutch coupling 11. The position of the clutch here shown is only possible at the moment at which the operative parts are reversed. Ac-

cording to the position in which the other parts are shown the clutch 11 would be in engagement with the clutch teeth crown of the pinion 13. In this case the clutch 11, which follows the direction of running of the shaft 10, would drive the pinion 13. This is in mesh with the gear wheel 14 which is fast upon the mandrel 6 and therefore drives it in the corresponding direction. By means of the gear wheels 15, which are mounted on the part 16, the leading screw 17 is driven and the saddle 3 is displaced towards the head end of the screw which is being cut. The screw blank or work 1 is driven in the direction of rotation of the mandrel 6 by means of a driver. When the saddle 3 has reached the end of its travel, the reversal of the direction of rotation and running of the moving parts takes place. This is effected in the following manner: The clutch 11 is withdrawn from the clutch teeth crown of the pinion 13 and brought into engagement with the crown of clutch teeth of the pinion 12, whereby this latter rotates in the same direction as the shaft 10. The pinion 12 then drives the gear wheel 19 fast upon the shaft 18. The shaft 18 is therefore rotated and rotates the gear wheel 20. The gear wheel 20 meshes with the gear wheel 14 of the mandrel 6. The shaft 18 now rotates in the opposite direction to the rotation of the shaft 10, so that the gear wheel 14, the mandrel 6, the change wheels 15, and the leading screw 17 likewise alter their direction of rotation and reverse the movement of the saddle 3.

The double clutch tooth coupling 11 is displaced by the following means: The double clutch coupling 11 is half surrounded by a fork 21 in the middle. Below the fork 21 forms a triangle 23 and is mounted fast on a rod 22, which is mounted below the shaft 10 and is displaceable in the longitudinal direction. If the rod 22 is displaced in the longitudinal direction, the fork 21 participates in this movement and carries the clutch 11 with it. Beneath the triangle 23 of the fork 21 there is arranged a striking bolt 24 pressed upward by a spring, which at its upper part carries a roller which under the influence of the spring of the striking bolt presses on the inclined faces of the triangle 23 and thus presses the fork 21 into the locking position after the clutch 11 is reversed. Upon the end of the rod 22 projecting out of the bearing block 26 a double lever 25 is mounted. This is fast upon a rock shaft 27 which passes through the bed of the lathe. Upon the double lever 25 rods 28 and 29 are jointed at equal intervals from the axis of rotation. At the movable tool stock end of the lathe there is also a double lever 30, which rocks around a bolt on the bed of the lathe. This lever serves for the parallel guidance of the rods 28 and 29. Upon the rod 28 adjustable stops 31 and 32 are arranged which limit the forward and backward travel of the saddle 3. Upon that side of the saddle which is directed towards the head end of the lathe, a tappet 33 is arranged which strikes against the stop 31 when the saddle runs forward and against the stop 32 when it runs backwards. If the double clutch tooth coupling 11 is in engagement with the clutch teeth of the gear wheel 13, as above stated the saddle runs towards the head end of the lathe. The double levers 25 and 30 are therefore situated in the position shown in Fig. 4 in broken lines. If the saddle strikes with its tappet against the stop 31, the clutch 11 engages in the clutch crown of the pinion 12. The operation of the clutch is assisted by the striking bolt 24.

The means for throwing the tools in and out of gear is as follows: The mandrel 6 carries the gear wheels 34, which are arranged on the part 35. The gear wheels 34 act directly on the bevel pinion 36 which is mounted on the bearing block 37. The mandrel 6 is therefore in direct connection with the leading screw 17 and with the bevel pinion 36. The bearing block 37 also carries the bevel pinion 38. The shaft 39 passes through the bevel pinions 36 and 38 but is independent of the rotation of these wheels. The bevel pinions 36 and 38 are in mesh with a bevel gear wheel 40 so that a change gear is constituted. The bevel pinions 36 and 38 are provided, on their sides which are directed towards each other, with clutch teeth, the profile of which is adapted for the same direction of rotation. Between the bevel pinions 36 and 38 a displaceable double clutch tooth coupling 41 is mounted on the shaft 39 and splined thereto. The clutch 41 is surrounded by a fork 42 which is displaceable in the longitudinal direction by means of the rod 43. The rod 43 is fitted to the lever 44 which is keyed fast on the shaft 27 carrying the double lever 25. The lever 44 must therefore participate in the same inclined movements as the double lever 25. On the reversal of running of the mandrel, the altered direction of rotation is transmitted to the bevel pinion 36 by the gear wheels 34. This pinion is therefore necessarily reversed with the mandrel 6. Assuming that the mandrel 6 is running with a left hand rotation, so that the bevel pinion 36 will be rotating in that direction also, the bevel pinion 38 will run with a right hand rotation. If the clutch 11 is in engagement with the gear wheel 13, the clutch 41 is also in engagement with the bevel pinion 38 owing to the connection of the double lever 25 with the lever 44 and the rod 43. The bevel pinion therefore rotates towards the right and with it the shaft 39. By reversing the double lever 25 the clutch 41 is coupled with the clutch tooth crown of the

bevel pinion 36. The clutch 41 and with it the shaft 39 must therefore participate in the constant rotation of the bevel pinion, that is to say the shaft 39 rotates towards the right as before. Beneath the saddle 3 there are two bearings 45 and 46 and between them a bearing block 47. In the bearings 45 and 46 there are mounted clutch tooth couplings 48 and 49 which are connected with the shaft 39 by splines and are pressed by means of spiral springs 50 or the like with the unserrated face against the inner walls of the bearings 45 and 46. In the bearing block 47 the change gear 51, 52, 55 is arranged. The bevel wheels 51 and 52 are provided with clutch tooth crowns and are mounted loose upon the shaft 39.

The engagement of the clutches 48 and 49 in the clutch teeth crowns of the bevel wheels 51 and 52 is effected by means of the stops 53 and 54 adjustable on the shaft 39. The stop 53 is so adjusted before the work is started that as soon as the carriage has reached the end of its forward travel and the tppet 33 is about to encounter the stop 31, the clutch 48 is forced into the clutch teeth crown of the bevel wheel 51 by striking against the stop 53. When the reversal of running has been effected, the return movement of the saddle 3 begins, the shaft 39 continuing to rotate in the same direction and the clutch 48 driving the bevel wheel 51 until it is withdrawn from its clutch teeth crown. The same operation is repeated at the reversal at the other end of the lathe by the stop 54, which couples the clutch 49 with the bevel wheel 52.

The bevel wheel 55 is rigidly connected with the shaft 56 upon which a gear wheel 57 is mounted, which wheel engages with the wheel 58. This latter is mounted by means of a friction device upon a screw spindle 59. The transverse movement of the support 2 is limited by stops 68 and 69 on the saddle 3. When said saddle 3 has reached the head end of the lathe, the transverse carriage 2 is displaced by means of the clutch 48, the bevel wheels 51 and 55, the shaft 56, the gear wheels 57 and 58 and the screw spindle 59, whereby the tool 5 is removed from the work shortly before the reversal of the running, and after the reversal the tool 4 is brought into the cutting position. The same operation is repeated at the back end of the lathe bed at the reversal of running by the striking of the clutch 49 against the stop 54, by means of the bevel wheel 52 and so forth and spindle 59, which displace the transverse carriage 2 in the reverse direction.

The following means is provided for feeding the tools by the desired thickness of cut: The tool 4 rests upon the support 60, the tool 5 on the support 61. The supports 60 and 61 are displaced by means of a right and left handed screw spindle 62 upon which the ratchet wheel 63 is mounted. In this wheel the longitudinally displaceable leaf spring 64 engages and is displaced by the striking of the roller 65 against the adjustable stop 66. After the feed at the beginning of the forward traverse of the main carriage 3 has taken place, the leaf spring 64 is returned to its original position by the spiral spring 67. When the desired depth of thread has been attained the rachet wheel 63 is forced out of the feed line of the leaf spring 64 by a previously adjustable striking spring (which is not shown as it is known in machine tools), thus interrupting the further feed of the tools.

What I claim and desire to secure by Letters Patent of the United States is:—

1. A lathe comprising a mandrel, a drive pulley, a connection between the drive pulley and the mandrel, means for reversing the connection, a saddle, means on each side of the saddle for supporting a tool, a leading screw for moving the saddle, a connection between the mandrel and the leading screw, a rod for operating the reversing means, stops on the rod for engagement by the saddle, whereby to move the same, a shaft arranged parallel with the leading screw, a connection between the mandrel and the shaft, bevel gears loosely journaled on the shaft, a bevel gear meshing with both of said gears, a clutch for connecting either of said gears with the shaft, a connection between the rod and the clutch, whereby the reversal of direction of rotation of the mandrel will have no effect on the shaft, means in connection with said last named shaft for moving said tools in unison in the same direction, so that when one is moved into engagement with the work, the other will be moved out of engagement with the work, a connection between the last named shaft and the moving means, and means for reversing the connection operated by the movement of the saddle.

2. A lathe comprising a mandrel, a drive pulley, a connection between the drive pulley and the mandrel, means for reversing the connection, a saddle, means on each side of the saddle for supporting a tool, a leading screw for moving the saddle, a connection between the mandrel and the leading screw, a rod for operating the reversing means, a shaft arranged parallel with the leading screw, a connection between the shaft and the mandrel, means operated by the rod for reversing said connection in unison with the reversal of the connection of the mandrel and the driving shaft, whereby to drive said shaft continuously in one direction, means in connection with said last named shaft for moving said tools in unison in the same direction, so that when one is moved into engagement with the work, the other will be moved out of engagement with the work, a connection between the last named shaft and

the moving means, and means for reversing the connection operated by the movement of the saddle.

3. A lathe comprising work supporting means, tools arranged upon opposite sides of the work supporting means, means for rotating the work, means for reciprocating the tools, means for changing the direction of rotation of the work at the end of the travel of the tools in each direction, a screw for moving said tools in unison and in the same direction whereby to engage one of the tools with the work, and to disengage the other, a shaft, a connection between the shaft and the screw, means for reversing the connection at each end of the travel of the work, a connection between the shaft and the work rotating means, for driving the shaft, means for reversing said connection, and means for operating the reversing means for the connection between the shaft and the screw and the reversing means for the connection between the shaft and the work rotating means in unison, whereby to drive the screws always in one direction.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses this 16th day of February 1906.

ADOLF SCHLESINGER,
Administrator of the estate of Herbert Schlesinger.

Witnesses:
OTTO KÖNIG,
ARTHUR MATTHÄUS.