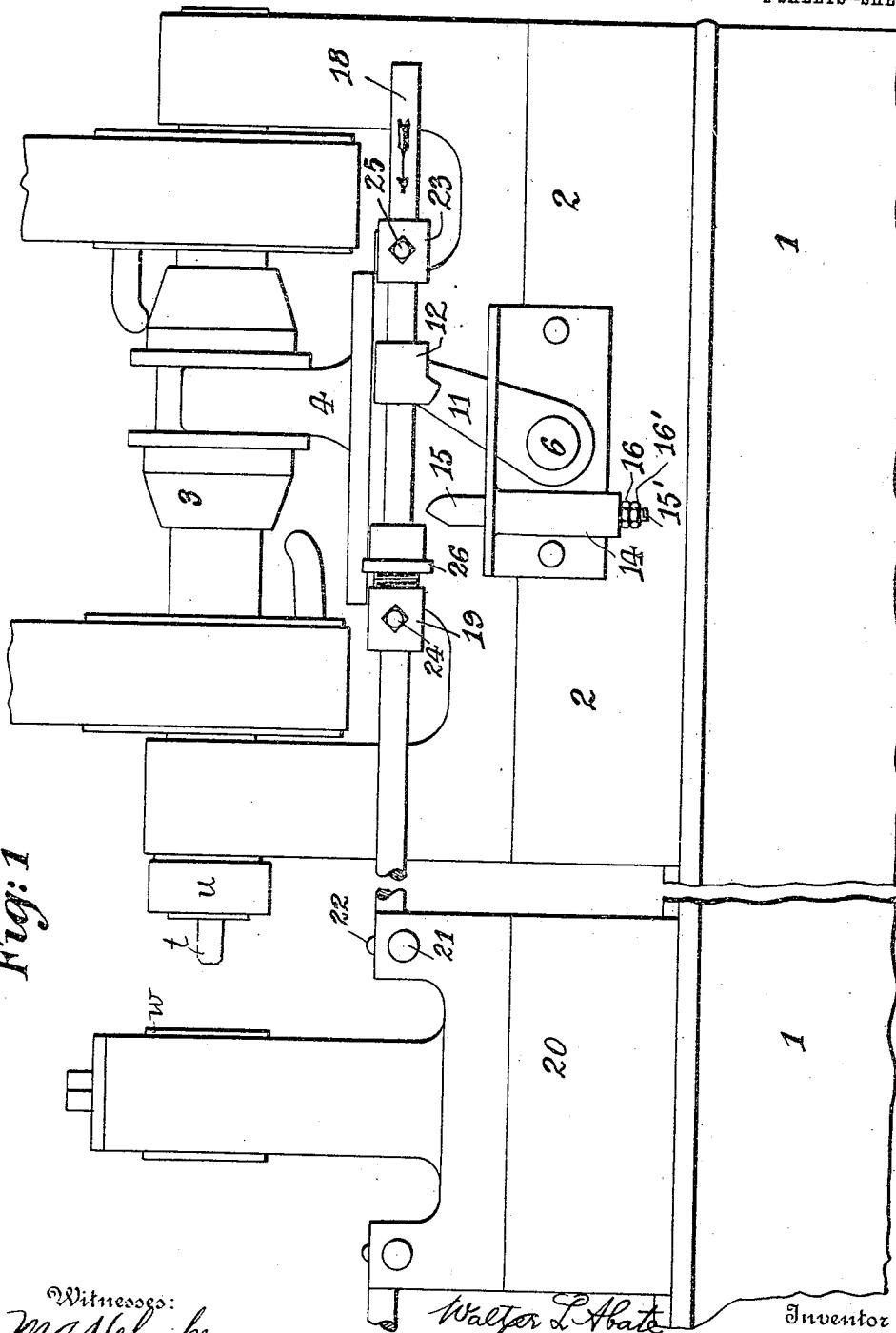


APPLICATION FILED MAY 2, 1908.

Patented Jan. 4, 1910.

Fig: 1



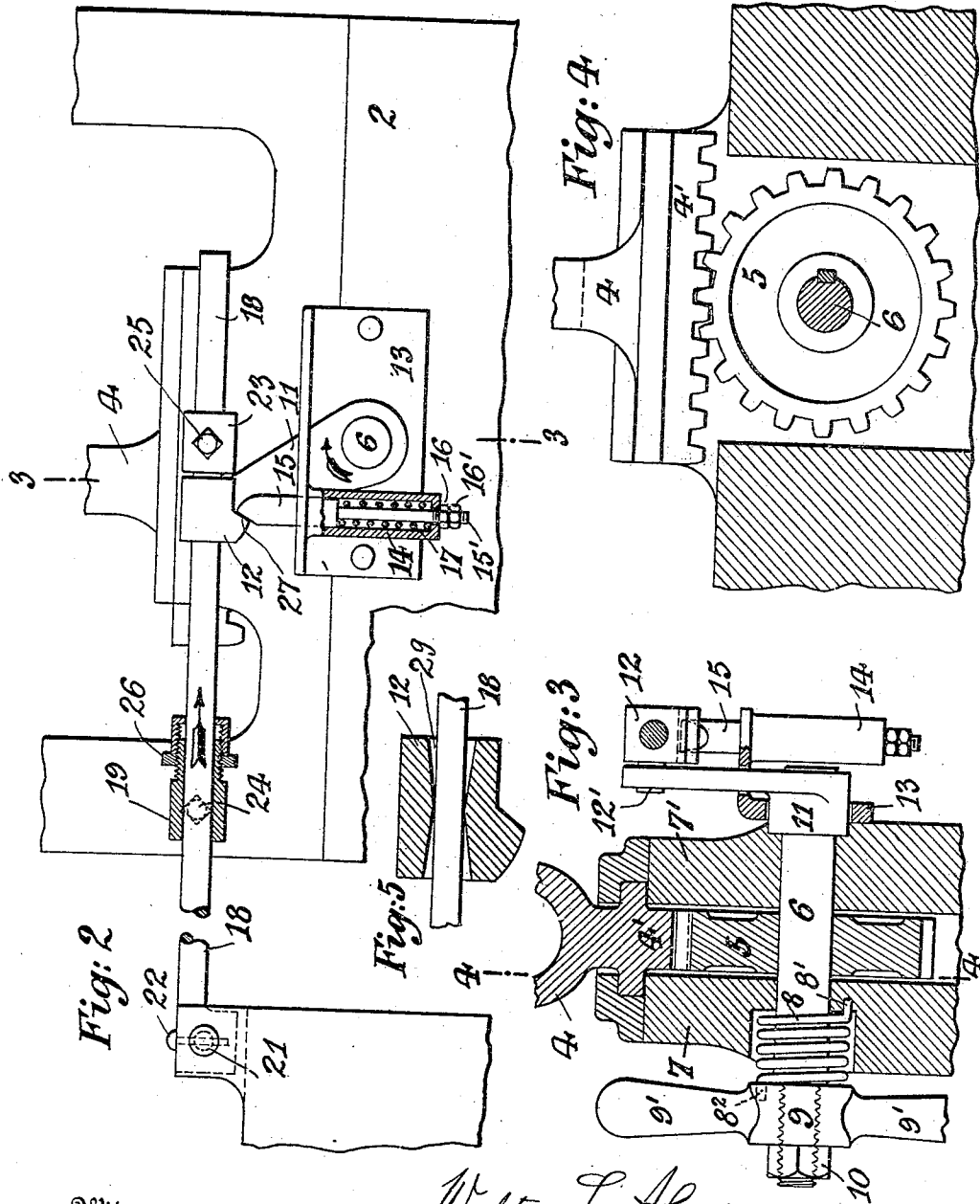
Witnesses:
Mastelmke
V. Braun

Walter L. Abate
Inventor
by Schreiter & Mathews
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945,665.

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MACHINE TOOL.
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

WALTER L. ABATE, OF MOUNT VERNON, NEW YORK.

MACHINE-TOOL.

945,665.

Specification of Letters Patent.

Patented Jan. 4, 1910.

Application filed May 2, 1908. Serial No. 430,567.

To all whom it may concern:

Be it known that I, WALTER L. ABATE, of Mount Vernon, county of Westchester, and State of New York, have invented certain new and useful Improvements in Machine-Tools, whereof the following is a full, clear, and exact specification, reference being had to the accompanying drawings, wherein—

Figure 1 is a rear elevation of an automatic engine lathe, constructed according to my improvements; Fig. 2 is a fractional detail in elevation, partly sectional view, showing the operating parts of my improvement in a position opposite to that shown in Fig. 1; Fig. 3 is a sectional view on lines 3—3 indicated in Fig. 2; Fig. 4 is an elevation and partly sectional view on lines 4—4 indicated in Fig. 3; and Fig. 5 is a cross-sectional detail view of the lock-block.

My invention relates to automatic machine tools and consists more particularly in an improved mechanism for starting and reversing the motion of the gear driving the carriage (or the tool) and of the means, as hereinafter more fully explained with reference to the drawings, connected with the reciprocating part of the machine, for setting and releasing the reversing mechanism at predetermined points, and thus governing the motion with absolute exactness, between any two points, determined according to the exigencies of the work.

The drawings illustrate the application of my improvement to a tapping or screw-threading tool. The heads 2, set upon the bed 1 of the lathe, are of the construction ordinarily employed for such tools. They are exactly alike, and therefore, only one is shown in full. The work-piece *w* is secured in the carriage and is fed to the tools *t* set in chucks *u* secured on spindles rotating in the heads.

Numeral 3 indicates the reversing clutch and 4 is the arm engaging therewith and actuating the clutch. Arm 4 is secured to, or made integral with, the rack-bar 4' (see Figs. 3 and 4), meshing with cog-wheel 5, keyed to shaft 6. This shaft is housed in bearings provided in the sides 7 and 7' of the head 2. The end, 8', of the spring 8, coiled on shaft 6, is fixed in the side 7, and its other end, 8², is fixed in collar (screw-nut) 9. Spring 8 is set to turn shaft 6 in the direction indicated by the arrow in Fig. 2 and its tension is adjusted, by turning collar 9, to turn shaft 6 and the cog-wheel 5,

keyed thereto, with sufficient force to cause the rack-bar 4' and the arm 4 to shift the clutch and reverse the motion of the tool spindle when set in action. Handles 9' serve for turning collar 9 when adjusting spring 8, and when the spring is thus adjusted collar 9 is locked in position by lock-nut 10. After that handles 9' serve for operating the reversing device or for setting it by hand. Rock-arm 11 is secured on the other end of shaft 6, and lock-block 12 is pivoted to its free end by stud 12'. Bracket 13, secured to the base of the head 2, supports casing 14 wherein spring-finger 15, shaped in the form of a plunger, fitted in the casing 14, is housed. Spring 17, coiled on the stem 15' of the spring-finger, projects the latter from the casing 14 but its stem 15', projected through a bore in the bottom of the casing 14, is screw-threaded and nut 16, screwed on its end, holds it against spring 17. Nut 16 also serves for adjusting the position of finger 15 relatively to block 12. Lock-nut 16' is provided for locking nut 16, thus securing finger 15 in its adjusted position. Spring-finger 15 engages with the lock-block 12, holding the reversing mechanism when set for action, until lock-block 12 is pushed over by collar 19, as explained farther on, at the point when the motion of the tool is to be reversed. The form of the block 12 and of the point of the finger 15, shown in Figs. 2 and 3 in enlarged detail, are designed with this object in view, and spring 17 yields, permitting the finger 15 to be receded into the casing 14, when the block 12 is pushed in either direction. Lock-block 12 is provided with bore 29, flared on both ends to permit rod 18 to slide through it, and the block 12 to slide upon rod 18 with minimum of friction.

Collars 19 and 23 are set on rod 18, one on each side of block 12, and set screws 24 and 25 serve to secure them to it in the position as each particular work requires. Rod 18 and the collars 19 and 23 operate the reversing device. Collar 23 is an ordinary set collar. Collar 19 is screw-threaded on the end turned toward block 12, and a micrometer adjusting collar 26 is fitted thereon. The object of this is to permit a very exact adjustment of the point at which the reversing device is released, my improved reversing device being intended for use on machine tools employed for very accurate and exactly dimensioned work. Collar 19

effects the releasing of the reversing device, and as this must be made to occur exactly at the predetermined point, the setting of the collar 19 by the set-screw 24 could not well
 5 be depended upon to produce the releasing of the reversing device exactly at the point. Therefore, the micrometer adjusting collar 26 is provided to permit such exact adjustment. Collar 23 serves for returning the
 10 reversing device back into its position for the forward run of the carriage, and for that no such minute adjustment of its position upon rod 18 is required. The setting of collars 19 and 23 on the rod 18 determines
 15 the limits of the work of the tools employed in the machine upon the work-piece.

Rod 18 is actuated by the motions of the reciprocating part of the lathe. In the form illustrated in the drawings, it is detachably
 20 connected to the carriage 20. For this purpose the base of the carriage 20 is slotted to form a socket for the enlarged butt on the end of rod 18 (see Fig. 2) which is set in this slot and secured therein by bolt 21 and cross-pin 22. The manner of connecting the rod
 25 18 to the movable part of the machine is subject to modifications to conform to variations in the types of machine tools whereon the device is used.

30 As shown in Fig. 2, the reversing device is set in position for the forward motion of the tool, lock-block 12 being interlocked with finger 15 and rod 18 moving in the direction indicated by the arrow, that is, toward the
 35 reversing device. As this motion progresses, collar 19 is brought in contact with the block 12, and then pushes it, finger 15 being simultaneously pressed downward, the abutment 27 sliding on the tapered face in contact
 40 therewith, until when the lowermost point of the abutment 27 reaches the top of finger 15, the block 12 and the reversing mechanism are released. Then spring 8, reacting, turns shaft 6 and rock-arm 11 with block 12 to the
 45 right; cog-wheel 5, keyed to the shaft 6, turns with it and moves rack-bar 4' and arm 4 to the right, whereby clutch 3 is shifted and the motion of the tool reversed. All these motions are simultaneous and practically
 50 instantaneous. Then also the motion of rod 18 is reversed, and as it proceeds in this reversed direction, collar 23 is brought in contact with block 12 and pushes it, and rock-arm 11, to the left (in opposite direc-
 55 tion to that it was moved before reversing), turning thereby shaft 6, cog-wheel 5, rack-bar 4' and arm 4, until abutment 27 of block 12 has slid over the top of finger 15, when the shifting of the clutch 3 is effected and the
 60 motion of the tool again changed.

The machine shown in the drawings, is provided with duplicate reversing devices, one for each head, and consequently, the car-
 65 riage, which reciprocates between the two heads, has two rods 18 attached thereto, one

on each end, and each operating the reversing device of the corresponding head. These devices are exactly alike, except that they operate in opposite directions. Each of them, however, is capable of operating inde-
 70 pendently of the other and each could be used on a tool with only one head. Arm 4, operating the clutch, could be replaced by a device for shifting a belt or by any other de-
 75 vice for operating a reversible gear for rotating the spindle. It is, I believe, equally plain, that, instead of the cog-wheel 5 and rack-bar 4', other mechanically equivalent devices could be employed for actuating the
 80 arm 4 or some other device for shifting the clutch.

There are various constructions of reversing mechanisms for automatic machine tools known and used in the art, but none of these
 85 is arranged to be operated by a rod attached to the reciprocating part of the machine, and none in a manner to permit the governing, of the motion of the reciprocating part of the machine between any two points within the
 90 limits of its motion, or the reversing of the motion so exactly at a predetermined point; nor is any such device, heretofore known in this art, devised to make possible such a minute
 95 determining of the limit of the work and the setting of its parts so as to effect the reversing of the tool so exactly at that point as the improved device hereinbefore described.

I claim as my invention:—

1. A device for operating the reversible gear of a machine tool, the device comprising
 100 an arm, engaging with the reversible gear; a rack-bar; a shaft and a cog-wheel, meshing with the rack-bar, secured on the shaft; yielding means for actuating the
 105 shaft in one direction and means for holding it in set position; a rod, engaging with the means for holding the shaft in set position, means for reciprocating the rod, and means, adjustably connected with the rod, for releasing the shaft at a predetermined point. 110

2. A device for operating the reversible gear of a machine tool, the device comprising
 110 an arm, engaging with the reversible gear; a rack-bar; a shaft and a cog-wheel, meshing with the rack-bar, secured on the
 115 shaft; yielding means for actuating the shaft in one direction and means for holding it in set position; a rod, engaging with the means for holding the shaft in set position, means for reciprocating the rod, and means, ad-
 120 justably connected with the rod, for releasing the shaft at a predetermined point, and for again returning it to its set position.

3. A device for operating the reversible gear of a machine tool, the device comprising
 125 an arm, engaging with the reversible gear; a rack-bar; a shaft and a cog-wheel, meshing with the rack-bar, secured on the shaft; yielding means for turning the shaft
 130 in one direction; an arm secured to the shaft,

a perforated block pivoted thereto; a spring-actuated finger, set to interlock with the block; a stationary and a reciprocating part, means for moving the reciprocating part to and away from the stationary part and means, operatively connected with the block and with the reciprocating part of the machine tool, for disengaging the block from the finger at a predetermined point.

4. A device for operating the reversible gear of a machine tool, the device comprising an arm, engaging with the reversible gear; a rack-bar; a shaft, a cog-wheel, meshing with the rack-bar, secured on the shaft, yielding means for turning the shaft in one direction; an arm secured to the shaft, a perforated block pivoted thereto; a spring-actuated finger, set to interlock with the block; a stationary and a reciprocating part, means for moving the reciprocating part to and away from the stationary part; means, operatively connected with the reciprocating part of the machine tool, for disengaging the block from, and for again setting it in interlocking engagement with, the spring-actuated finger at predetermined limits of the motion of the reciprocating part of the machine tool.

5. A device for operating the reversible gear of a machine tool, the device comprising an arm, engaging with the reversible gear; a yielding mechanism for moving the arm in one direction; a locking device for holding the mechanism in set position; a rod engaging with the mechanism for moving

the arm, means for reciprocating the rod and means on the rod, set to release the locking device and then again set the mechanism moving the arm.

6. The combination with a machine tool containing a stationary and a reciprocating part, a reversible gear for moving the reciprocating part to and from the stationary part and a yielding mechanism for operating it in one direction, of a rod attached to the reciprocating part of the machine tool; means for operatively connecting the rod with the mechanism operating the reversible gear, and alternately setting and releasing the mechanism at a predetermined point.

7. The combination with a machine tool containing a stationary and a reciprocating part, a reversible gear for moving the reciprocating part to and from the stationary part and yielding mechanism for operating it in one direction, of a perforated block, pivoted thereto; a spring-actuated finger set to interlock with the block to hold the mechanism, operating the reversible gear, in position; a rod, mounted to slide in the block and attached to the reciprocating part of the machine tool; two collars set on the rod, one on each side of the block; means for fixing the collars in position on the rod, and means for attaching the rod to the reciprocating part of the machine tool.

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Witnesses:

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