E. C. HENN.

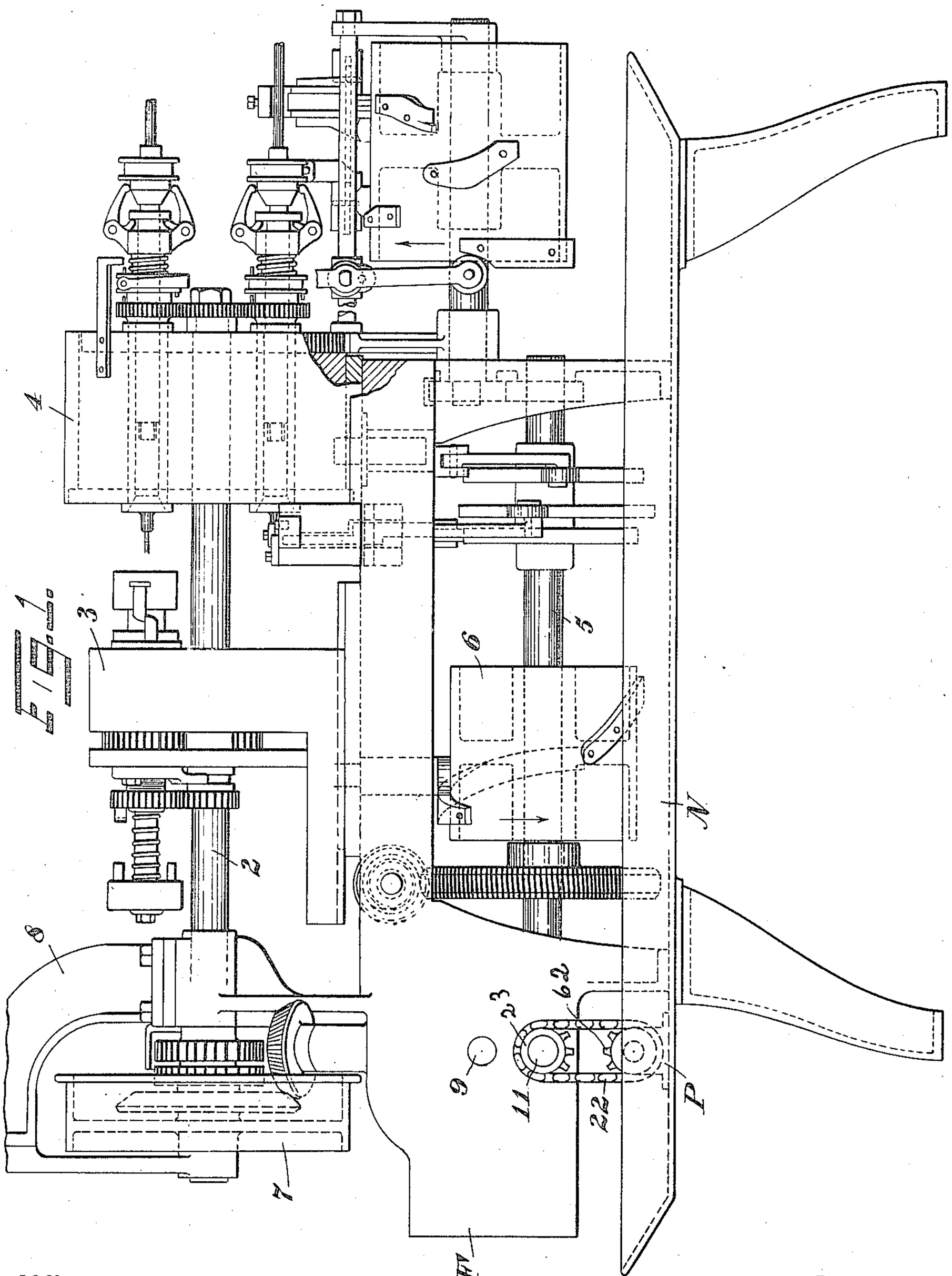
SINGLE BELT DRIVE FOR AUTOMATICS.

APPLICATION FILED OCT. 25, 1909.

985,590.

Patented Feb. 28, 1911.

4 SHEETS—SHEET 1.



Witnesses:

L. C. Badeau.

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By his Attorney, F. W. Richards.

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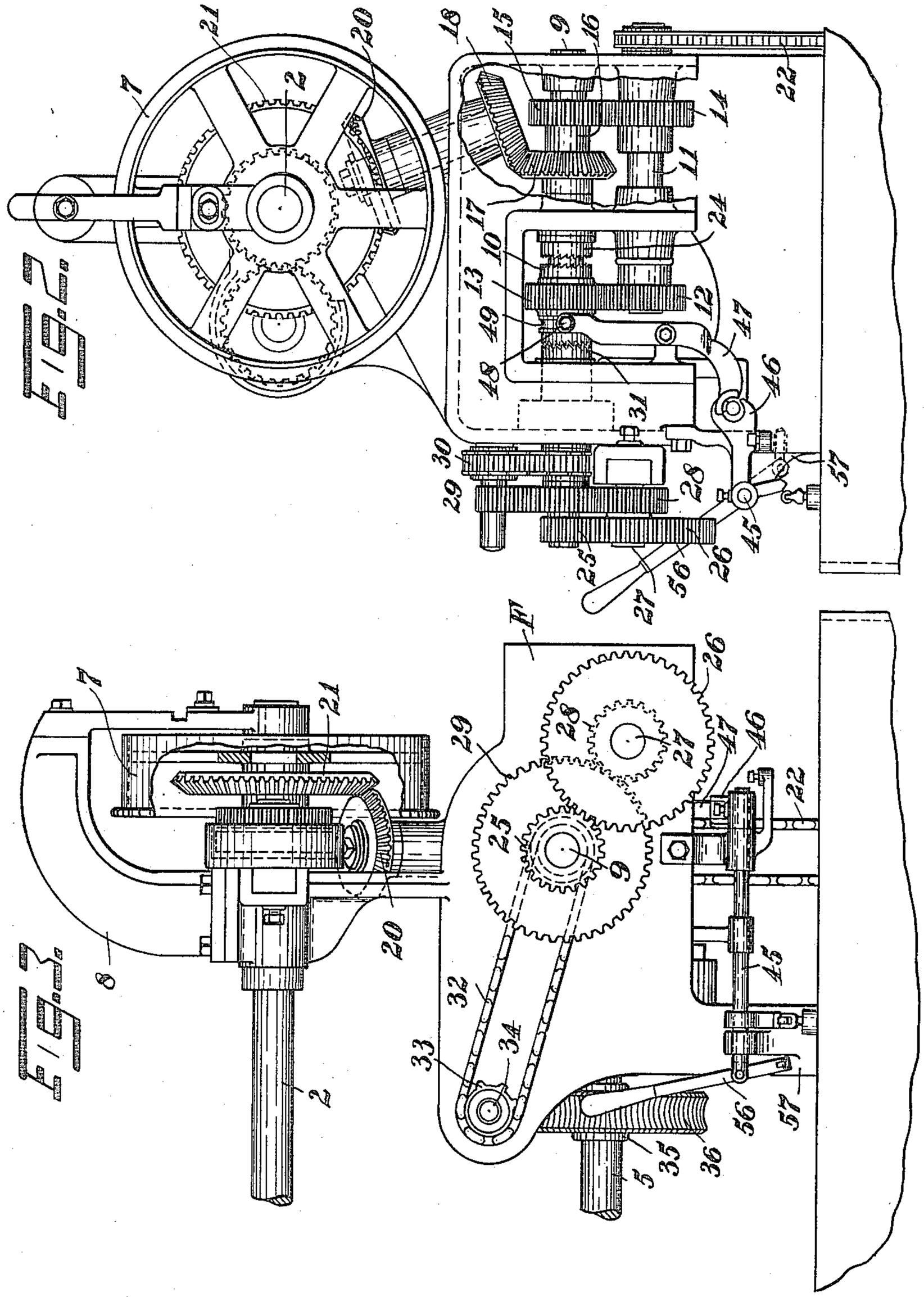

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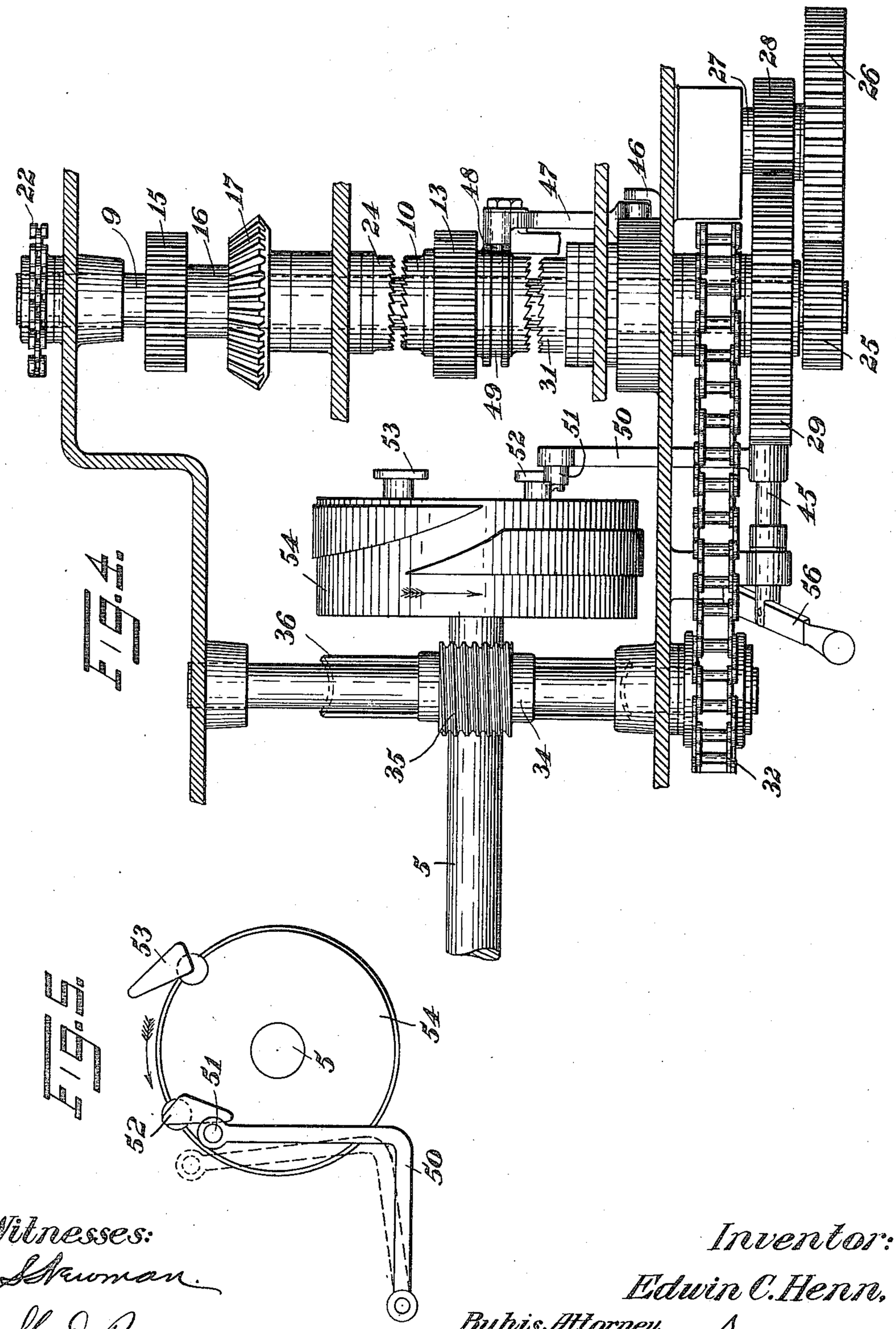

FIG. 4.

FIG. 5.

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4 SHEETS—SHEET 4.

FIG. 6.

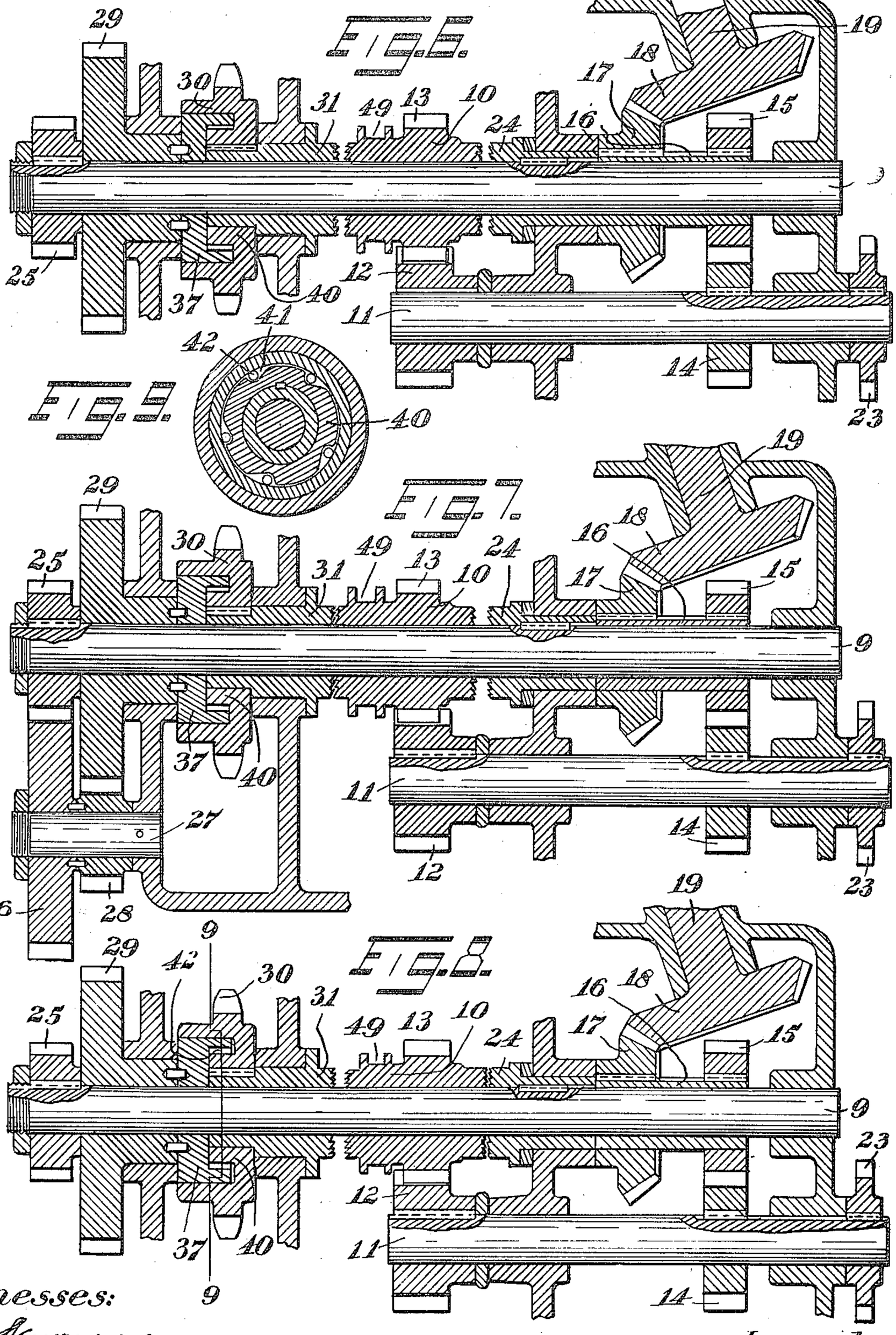

FIG. 9.

FIG. 7.

FIG. 8.

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UNITED STATES PATENT OFFICE.

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SINGLE-BELT DRIVE FOR AUTOMATICS.

985,590. Specification of Letters Patent. Patented Feb. 28, 1911.

Application filed October 25, 1909. Serial No. 524,315.

To all whom it may concern:

Be it known that I, EDWIN C. HENN, a citizen of the United States, residing in Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Single-Belt Drives for Automatics, of which the following is a specification.

This invention relates to the class of machines known as automatic screw machines, and has for its object to provide an improved driving mechanism whereby the tool head is returned after operation at a greater speed than it is fed forward during operation.

One of the objects of the invention is to provide in connection with a differential speed control for the shaft from which the tool head is operated, a clutch device whereby the slow speed gearing is not actuated when the high speed actuating device is operated.

A further object of the invention is to provide a handle or lever whereby the high and low speed control can be engaged at will, and which lever will also throw in or out of operation the automatic controlling means for the low and high speed.

In the accompanying drawing illustrating embodiments of my invention Figure 1 shows the machine in side elevation. Fig. 2 is an end elevation of the upper portion of the machine. Fig. 3 is a side elevation of the parts shown in Fig. 2. Fig. 4 is a plan view of the parts shown in Fig. 2. Fig. 5 is a detail of the control for the clutch. Fig. 6 is a vertical section through the clutch shaft and adjacent parts. Figs. 7 and 8 are similar views with the parts in different positions; and Fig. 9 is a section on the line 9—9 indicated in Fig. 8.

The frame of the machine is indicated generally by F, and in suitable bearings carries a shaft 2, passing centrally through the tool head 3 and the turret 4 for the stock. The frame also carries a secondary shaft 5 mounted below the head and turret in suitable bearings, which shaft carries a cam drum 6, for reciprocating the tool head 3 in the usual manner at proper intervals. This shaft also carries other cam devices for various uses customary in these machines. The shaft 2 is continuously driven by suitable means such as a belt pulley 7 fast thereon adjacent the bracket 8 supporting the shaft 2 at this end.

At the end of the machine in suitable bearings is supported a clutch shaft 9 carrying loose thereon a slidable double clutch member 10, having clutch teeth at the opposite ends; which clutch member is actuated by any suitable means whereby it is continuously driven from the driving shaft 2, in its various endwise positions. A stub shaft 11 is mounted adjacent the shaft 9 in suitable bearings and carries a gear 12 meshing with the gear portion 13 on the clutch member 10 in its several endwise positions. Shaft 11 also carries a gear 14 meshing with a gear 15 fast on sleeve 16, the latter turning loose on the shaft 9. A bevel gear 17 fast on sleeve 16 meshes with a bevel 18 on an inclined shaft 19; and the latter also carries a bevel gear 20 meshing with a bevel 21 fast on the said shaft 2. By this means the stub shaft 11 is constantly rotated from the shaft 2, and the clutch member 10 will have continuous rotation in its endwise positions, and turns freely on the clutch shaft 9.

An oil pump P carried by the pan N of a base is driven through a chain 22 and sprocket 62 actuated by a sprocket 23 fast on the stub shaft 11; by which means the oil pump will be continuously driven and not affected by any of the differential speed mechanism or the controlling devices for throwing certain parts into and out of operation, as further described herein.

A clutch member 24 is keyed on the shaft 9 and engaged by the double clutch 10 when shifted in that direction, whereby rotation is imparted to this shaft. A pinion 25 is keyed on the outer end of this shaft 9 and meshes with a gear 26 on a short shaft 27, which latter carries a pinion 28 pinned to gear 26 meshing with a gear 29 mounted loose on the shaft 9; by which means the latter gear is rotated by the shaft 9 at a reduced speed from that of the shaft. A sprocket 30 is secured to a clutch member 31 loose on the shaft 9, which clutch member will be engaged by the double clutch member

10 when shifted in that direction. This sprocket member 30 is thereby driven direct by the double clutch member through the said actuating means, to drive a chain 32 engaging a sprocket 33 fast on a worm shaft 34; and a worm 35 on the latter engages a worm wheel 36 fast on the second shaft 5, by which means the latter is driven at a considerably reduced speed from that of the driving shaft 2. A clutch member 37 located inside of the clutch portion of the sprocket 30, is secured to the said gear 29, which clutch members are shown in section in Fig. 9. The sprocket 30 has a clutch portion 40 provided with inclined slots 41 each carrying a roller 42 by which means the rotation of the clutch member 37 from the reduction gearing will cause the rollers to grip and actuate the sprocket 30; which motion will result from the driving of the shaft 9 by the double clutch member 10 in engagement with the clutch member 24, as shown in Fig. 8. This will cause the sprocket to revolve at a speed much less than that of the clutch shaft 9. But when the double clutch member 10 is shifted in the opposite direction as shown in Fig. 7, the clutch shaft 9 and the reduction gearing will not be driven thereby, but the clutch member 31 will be actuated and serve to directly drive the sprocket 30. In this position of the parts the rollers will rotate and the turning of the clutch portion 40 of the sprocket 30 will not actuate the clutch member 37, and therefore the reduction gearing will not be driven, but will remain stationary; or else will simply rotate slowly from their own momentum for a short time after the disengagement of the other clutch members. This will result in a considerable saving in friction and in power to drive the machine.

After the tool carriage 3 has accomplished its work it is necessary to retract it to permit the indexing of the stock head or turret, and then advance it again to its working position. This is accomplished at a greater speed than that at which the tool carriage is advanced during the working operation, and consequently the said clutch device is automatically shifted and controlled from this second shaft 5. Suitable means for effecting this operation are shown as comprising a shaft 45 suitably supported to swing and also to move endwise. An arm 46 on the shaft 45 is pivoted to a lever 47 whose other end carries a pin 48 engaging a groove wheel 49 on the double clutch member 10; whereby rocking the shaft 45 will swing the lever and shift the clutch member. Shaft 45 also carries an arm 50 having a pin 51 arranged to engage cams 52 and 53 fast on a disk 54 secured to the cam shaft 5. These cams serve to alternately swing the arm 50 and rock the shaft 45, whereby the clutch member 10 is shifted twice for each revolution of the shaft 5. This will shift the clutch member to alternately engage its coöperating clutch members, and the described mechanism will through the chain and worm wheel serve to drive the shaft 5 at two different speeds during a revolution.

A lever or handle 56 is pivoted to the end of the shaft 45 and has its extremity secured in a bearing 57, whereby the handle can both rock the shaft 45, and also shift it endwise. By the latter movement the arm 50 can be shifted out of position for engagement with the cams 52 and 53, whereby the differential speed mechanism will not be shifted but remain in whatever position placed. The swinging of the lever 45 will serve to shift the double clutch member, whereby either the high or the low speed can be connected, or an intermediate position may be effected whereby the secondary shaft will not be actuated. And either of these controls can be effected independent of the other.

Having thus described my invention, I claim:

1. In a screw machine, the combination with the frame, of a shaft, a slidable tool head operatively connected with the shaft, means for driving the shaft continuously, a second shaft supported below said shaft, means on the second shaft for reciprocating the tool head, driving means between the first shaft and the second shaft including differential speed mechanism, controlling means whereby the second shaft is alternately driven at lower and higher speeds, a lever connected with said differential speed actuating means arranged to throw the same out of position for engagement with the controlling means on the second shaft.

2. In a screw machine, the combination with the frame, of a shaft, means for driving the shaft continuously, a second shaft supported below said shaft, driving means between the first shaft and the second shaft including differential speed mechanism, controlling means whereby the second shaft is alternately driven at lower and higher speeds, a lever connected with said differential speed actuating means arranged to throw the same out of position for engagement with the controlling means on the second shaft, said lever being also arranged to control the differential speed actuating means at will.

3. In a screw machine, the combination with the frame, of a shaft, means for driving the shaft continuously, a second shaft supported below said shaft, driving means between the first shaft and the second shaft including differential speed mechanism, controlling means whereby the second shaft is alternately driven at lower and higher speeds, a shaft supported to rotate and also shiftable endwise, said shaft being connected with the differential speed actuating means

and also connected with the control of said speed actuating means from the second shaft, whereby the rocking of the shaft will control one of said means and the endwise movement of the shaft will control the other of said means, each of said operations being independent of the controlling movement of the other operation.

4. In a screw machine, the combination with the frame, of a shaft, means for driving the shaft continuously, a second shaft supported below said shaft, driving means between the first shaft and the second shaft including differential speed mechanism, controlling means whereby the second shaft is alternately driven at lower and higher speeds, said differential speed control comprising a slidable clutch member arranged to effect the high and low speeds respectively in different endwise positions, a shaft supported to rock and also to shift endwise, the shaft being connected with the said clutch member to shift it to said positions when rocked, said shaft being also connected with the said second shaft controlling means for the differential speed whereby the endwise shifting of the shaft will throw said control out of operation.

5. The combination with the frame of a shaft rotatably supported, means for driving the shaft continuously, a second shaft, means for driving the second shaft at differential speeds from the first shaft comprising a clutch shaft, a sleeve loose on the clutch shaft, means for driving said sleeve from the said driving shaft, a clutch member fast on the clutch shaft, a gear fast on the said sleeve, a stub shaft having a gear fast thereon meshing with the latter gear by which the stub shaft is continuously driven, a second gear fast on the stub shaft, a double clutch member loose on the clutch shaft having a gear meshing with the second gear on the stub shaft whereby the clutch member is continuously rotated, a clutch member locked on the clutch shaft and engaged by the said double clutch member when shifted in one direction, a driving member having operative connections with the said second shaft, a clutch member secured to said driving member and loose on the clutch shaft but arranged to be engaged by said shiftable clutch member when moved away from engagement with its said clutch member, a clutch member driven from the said clutch shaft at a reduced speed, the latter clutch member being connected with said driving member causing the latter to be driven at the same speed as the clutch member but permitting the driving member to be driven at a greater speed than the clutch member, whereby in one position of the clutch member shiftable on the clutch shaft the said driving member will be driven at the same speed as the clutch shaft, while in the opposite position of the shiftable clutch member the said driving member will be driven at a reduced speed.

6. The combination with the frame of a shaft rotatably supported, a second shaft, means on the second shaft for shifting the tool carrier, means for driving the second shaft at differential speeds from the first shaft, comprising a clutch shaft, a sleeve loose on the clutch shaft, means for driving said sleeve from the said driving shaft, a clutch member fast on the clutch shaft, a gear fast on the said sleeve, a stub shaft having a gear fast thereon meshing with the latter gear by which the stub shaft is continuously driven, a second gear fast on the stub shaft, a double clutch member loose on the clutch shaft having a gear meshing with the second gear on the stub shaft whereby the clutch member is continuously rotated, a clutch member located on the clutch shaft engaged by the said clutch member when shifted in one direction, a driving member having operative connections with the said second shaft, a clutch member secured to said driving member and loose on the clutch shaft but arranged to be engaged by said shiftable clutch member when moved away from engagement with its said clutch member, a clutch member driven from the said clutch shaft at a reduced speed, the latter clutch member being connected with said driving member causing the latter to be driven at the same speed as the clutch member but permitting the driving member to be driven at a greater speed than the clutch member, whereby in one position of the clutch member shiftable on the clutch shaft the said driving member will be driven at the same speed as the clutch shaft, while in the opposite position of the shiftable clutch member the said driving member will be driven at a reduced speed, and means controlled by the second shaft for automatically shifting the said movable clutch member on the clutch shaft.

7. The combination with the frame of a shaft rotatably supported, a second shaft, means on the second shaft for shifting the tool carrier, means for driving the second shaft at differential speeds from the first shaft, comprising a clutch shaft, a sleeve loose on the clutch shaft, means for driving said sleeve from the said driving shaft, a clutch member fast on the clutch shaft, a gear fast on the said sleeve, a stub shaft having a gear fast thereon meshing with the latter gear by which the stub shaft is continuously driven, a second gear fast on the stub shaft, a double clutch member loose on the clutch shaft having a gear meshing with the second gear on the stub shaft whereby the clutch member is continuously rotated, a clutch member located on the clutch shaft engaged by the said clutch member when

shifted in one direction, a driving member having operative connections with the said second shaft, a clutch member secured to said driving member and loose on the clutch shaft but arranged to be engaged by said shiftable clutch member when moved away from engagement with its said clutch member, a clutch member driven from the said clutch shaft at a reduced speed, the latter clutch member being connected with said driving member causing the latter to be driven at the same speed as the clutch member but permitting the driving member to be driven at a greater speed than the clutch member, whereby in one position of the clutch member shiftable on the clutch shaft the said driving member will be driven at the same speed as the clutch shaft, while in the opposite position of the shiftable clutch member the said driving member will be driven at a reduced speed, means controlled by the second shaft for automatically shifting the said movable clutch member on the clutch shaft, means for shifting said clutch member independently of said controlling means.

8. The combination with the frame of a shaft rotatably supported, a second shaft, means on the second shaft for shifting the tool carrier, means for driving the second shaft at differential speeds from the first shaft, comprising a clutch shaft, a sleeve loose on the clutch shaft, means for driving said sleeve from the said driving shaft, a clutch member fast on the clutch shaft, a gear fast on the said sleeve, a stub shaft having a gear fast thereon meshing with the latter gear by which the stub shaft is continuously driven, a second gear fast on the stub shaft, a double clutch member loose on the clutch shaft having a gear meshing with the second gear on the stub shaft whereby the clutch member is continuously rotated, a clutch member located on the clutch shaft engaged by the said clutch member when shifted in one direction, a driving member having operative connections with the said second shaft, a clutch member secured to said driving member and loose on the clutch shaft but arranged to be engaged by said shiftable clutch member when moved away from engagement with its said clutch member, a clutch member driven from the said clutch shaft at a reduced speed, the latter clutch member being connected with said driving member causing the latter to be driven at the same speed as the clutch member but permitting the driving member to be driven at a greater speed than the clutch member, whereby in one position of the clutch member shiftable on the clutch shaft the said driving member will be driven at the same speed as the clutch shaft, while in the opposite position of the shiftable clutch member the said driving member will be driven at a reduced speed, means controlled by the said shaft for automatically shifting the said movable clutch member on the clutch shaft, means for throwing said controlling means in and out of action.

9. The combination with the frame of a shaft rotatably supported, a second shaft, means on the second shaft for shifting the tool carrier, means for driving the second shaft at differential speeds from the first shaft, comprising a clutch shaft, a sleeve loose on the clutch shaft, means for driving said sleeve from the said driving shaft, a clutch member fast on the clutch shaft, a gear fast on the said sleeve, a stub shaft having a gear fast thereon meshing with the latter gear by which the stub shaft is continuously driven, a second gear fast on the stub shaft, a double clutch member loose on the clutch shaft having a gear meshing with the second gear on the stub shaft whereby the clutch member is continuously rotated, a clutch member located on the clutch shaft engaged by the said clutch member when shifted in one direction, a driving member having operative connections with the said second shaft, a clutch member secured to said driving member and loose on the clutch shaft but arranged to be engaged by said shiftable clutch member when moved away from engagement with its said clutch member, a clutch member driven from the said clutch shaft at a reduced speed, the latter clutch member being connected with said driving member causing the latter to be driven at the same speed as the clutch member but permitting the driving member to be driven at a greater speed than the clutch member, whereby in one position of the clutch member shiftable on the clutch shaft the said driving member will be driven at the same speed as the clutch shaft, while in the opposite position of the shiftable clutch member the said member will be driven at a reduced speed, a shaft arranged to rock and also to shift endwise, the shaft being connected between said second shaft and the said shiftable clutch member whereby through the operation of the second shaft the clutch member will be reciprocated by the rocking of the shaft, said connection between said second shaft and the said rocking shaft being arranged to be thrown out of action by the endwise movement of the shaft.

10. In a screw machine, the combination with the frame, of a shaft, means for driving the shaft continuously, a second shaft supported below said shaft, driving means between the first shaft and the second shaft including differential speed actuating means controlled by the second shaft whereby the second shaft is alternately driven at lower and higher speeds, said differential speed control comprising a slidable clutch member

arranged to effect the high and low speeds respectively in different endwise positions, a shaft supported to rock and also to shift endwise, the shaft being connected with the said clutch member to shift it to said positions when rocked, said shaft being also connected with the said second shaft controlling means for the differential speed whereby the endwise shifting of the shaft will throw said control out of operation, the differential speed device including a reduction gearing, and a roller clutch arranged to disconnect the reduction gearing at the high speed operation.

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Witnesses:
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