J. H. JANN.

TURRET FEED CONTROL.

APPLICATION FILED NOV. 9, 1916.

1,254,232.

Patented Jan. 22, 1918.

6 SHEETS—SHEET 1.

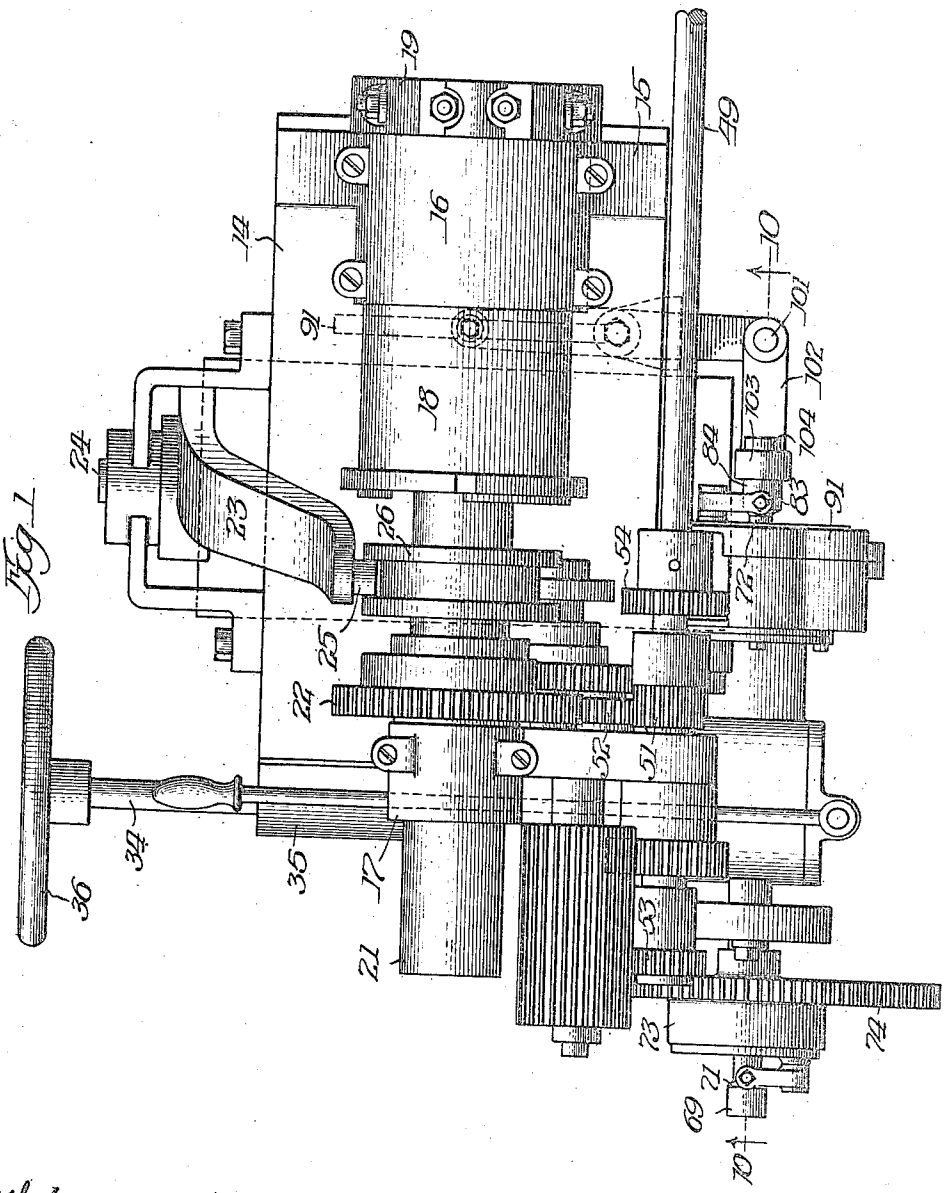


FIG. 1

Witnesses:
F. C. Davison
R. Burkhardt.

Inventor
John H. Jann
By Pond & Wilson
Attys

J. H. JANN.

TURRET FEED CONTROL.

APPLICATION FILED NOV. 9, 1916.

1,254,232.

Patented Jan. 22, 1918.

6 SHEETS—SHEET 2.

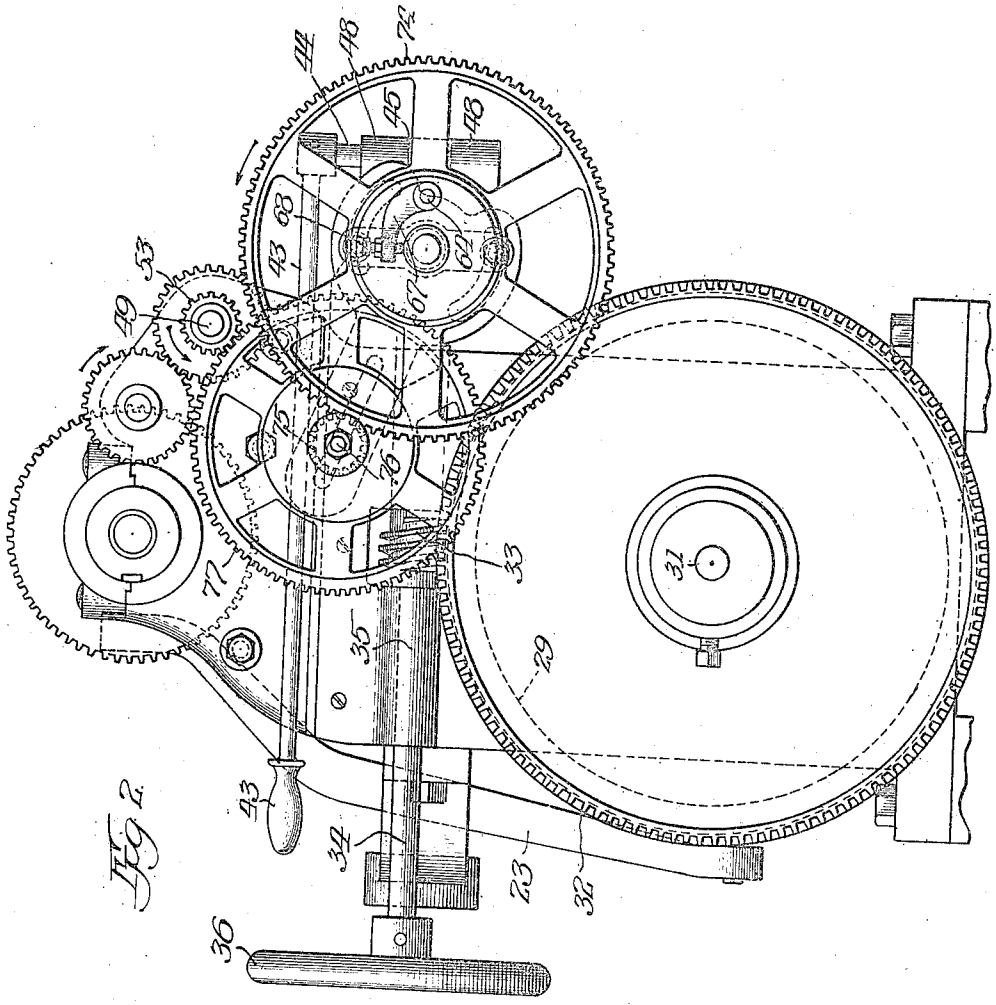


Fig 2.

Witnesses:
F. E. Dobson
R. Burkhardt.

Inventor
John H. Jann
By Pond & Wilson
Attys.

J. H. JANN.

TURRET FEED CONTROL.

APPLICATION FILED NOV. 9, 1916.

1,254,232.

Patented Jan. 22, 1918.

6 SHEETS—SHEET 3.

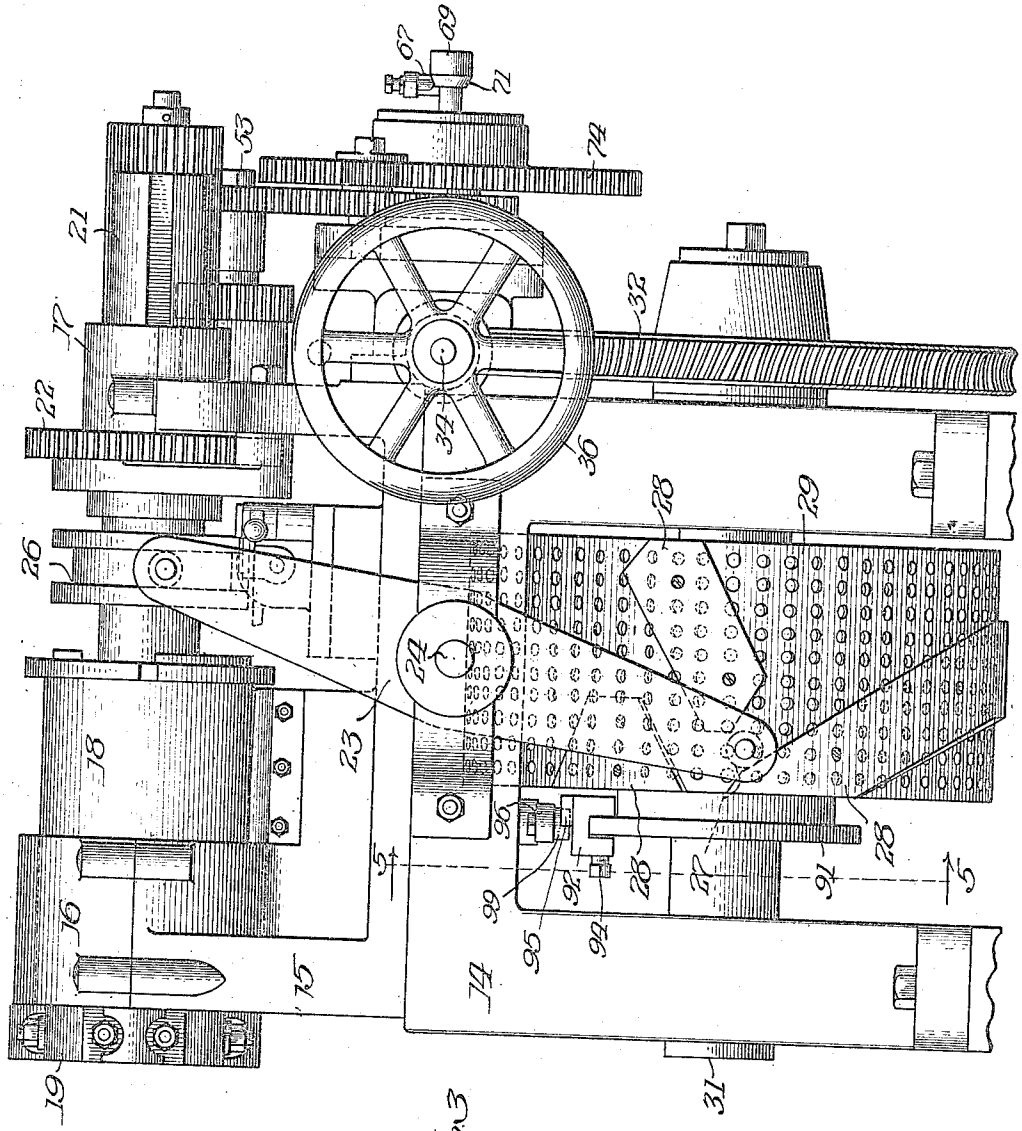


Fig 3

Witnesses:

Fred. C. Dorison

R. Burkhardt.

Inventor

John H. Jann

By Pond & Wilson

Attys.

J. H. JANN.

TURRET FEED CONTROL.

APPLICATION FILED NOV. 9, 1916.

1,254,232.

Patented Jan. 22, 1918.

6 SHEETS—SHEET 4.

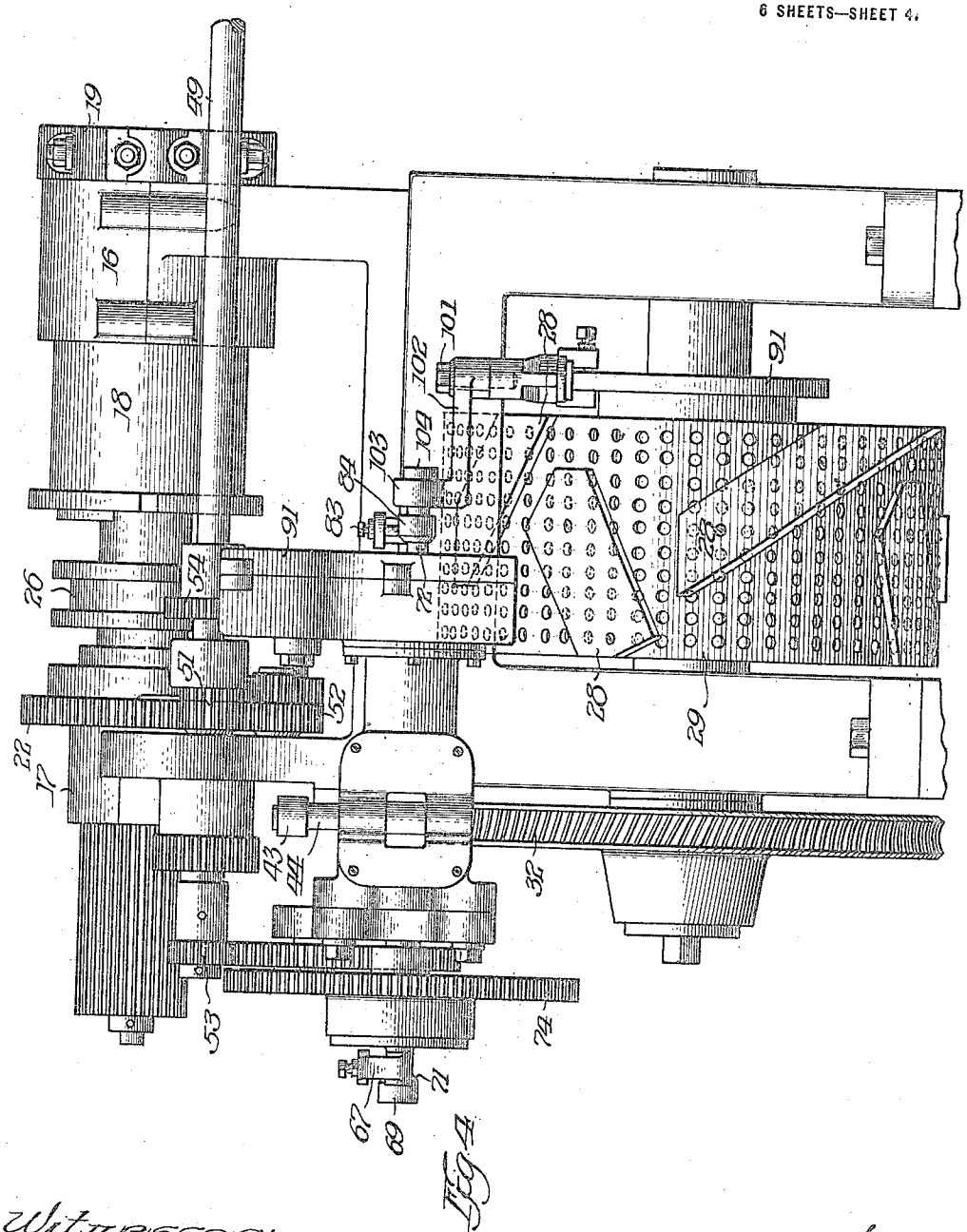


Fig 4

Witnesses:

Fred. G. Dieterich

R. Burkhardt.

Inventor

John H. Jann

By Pond & Wilson

Attys.

J. H. JANN.

TURRET FEED CONTROL.

APPLICATION FILED NOV. 9, 1916.

1,254,232.

Patented Jan. 22, 1918.

6 SHEETS—SHEET 5.

Fig 7

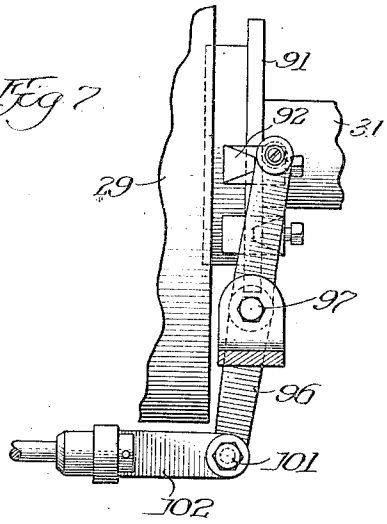
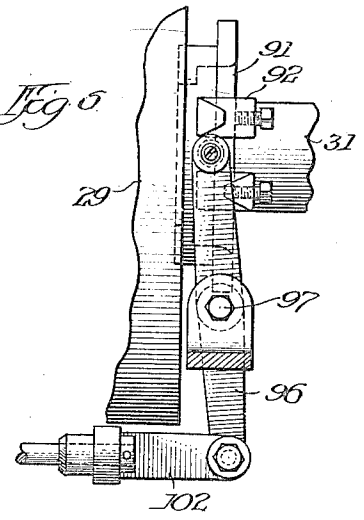


Fig 6



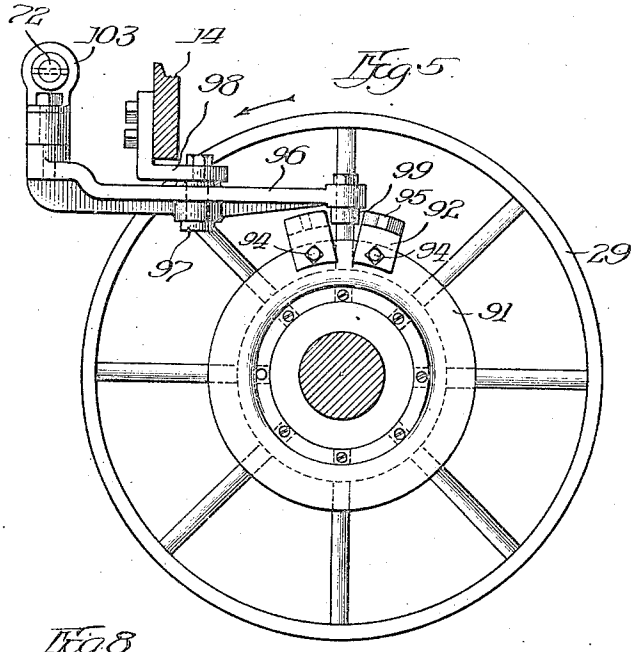


Fig 5

Fig 8

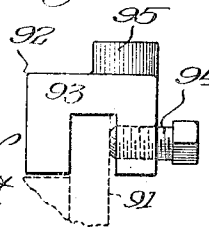
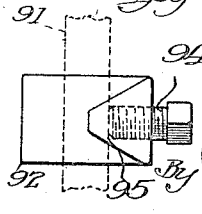


Fig 9



Witnesses:

F. D. Brown

R. Burkhardt

Inventor

John H. Jann

By Pond & Wilson

Attys.

J. H. JANN.

TURRET FEED CONTROL.

APPLICATION FILED NOV. 9, 1916.

1,254,232.

Patented Jan. 22, 1918.

6 SHEETS—SHEET 6.

Fig 10

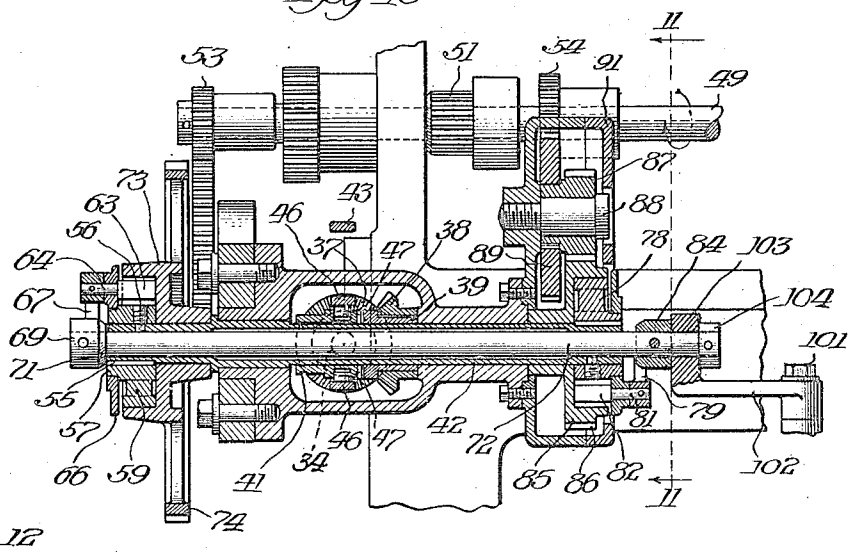


Fig 12

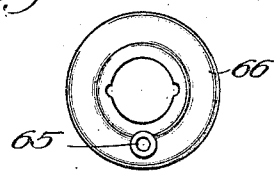


Fig 13

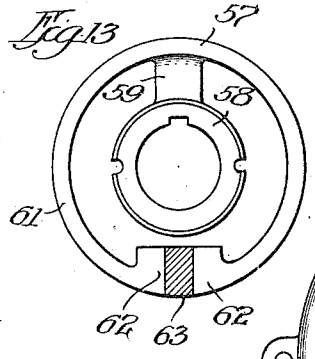
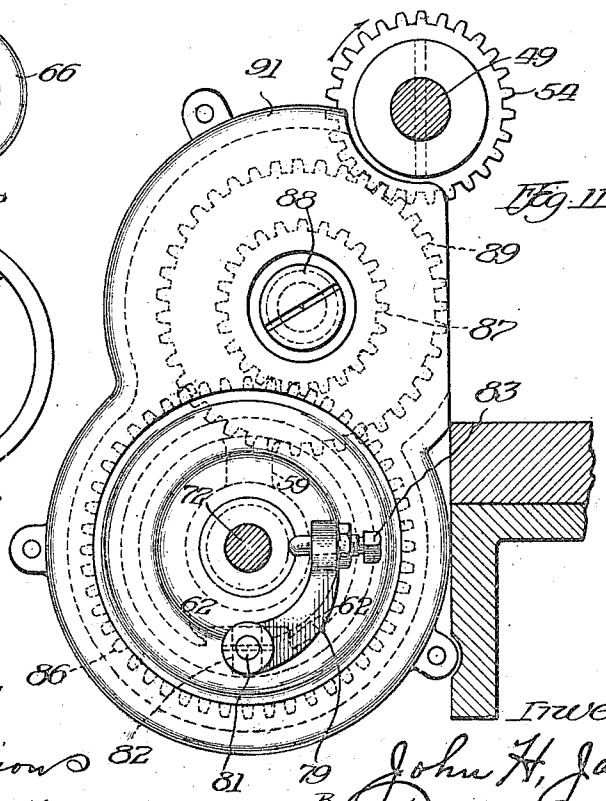


Fig 11



Witnesses:

F. E. Darion

A. Burkhardt

Inventor

John H. Jann

By Pond & Wilson

Attys.

UNITED STATES PATENT OFFICE.

JOHN H. JANN, OF CHICAGO, ILLINOIS.

TURRET-FEED CONTROL.

1,254,232. Specification of Letters Patent. Patented Jan. 22, 1918.

Application filed November 9, 1916. Serial No. 130,367.

To all whom it may concern:

Be it known that I, JOHN H. JANN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Turret-Feed Controls, of which the following is a specification.

This invention relates in general to metal-working machines, particularly automatic screw machines, and has especial reference to mechanism for controlling the speed of the longitudinal feed movements of the tool-carrying turret.

In the operation of machines of this character the speed at which the tool-carrying turret can be advanced during the actual operation of the tools is fixed within certain limits, depending upon the kind of tool employed and the character of the work being done, and the composition of the material being operated upon. In order to save time and thereby secure the highest efficiency from the machine it is desirable however, that the advance of the turret to working position and also the return movement of the turret be much faster than the movement during the working portion of the advance stroke. With this end in view my invention contemplates the provision of mechanism which will advance the turret at high speed to the working point, then will reduce the speed to that required for the working portion of the stroke and will subsequently withdraw the turret upon its return movement at high speed, thus reducing the time consumed by idle movements of the turret to a minimum.

Another object of my invention is to provide mechanism for controlling the advance and retractive movements of the turret, which will include novel means capable of manual adjustment for determining or varying the points in the travel of the turret at which the moving speed will be changed.

A further object of my invention is to provide mechanism for the purpose above set forth which will be simple in construction, positive and accurate in its operation and capable of being readily and quickly adjusted to vary the points at which the speed of movements of the turret will be changed.

Other objects and advantages of my invention will be readily appreciated as the same becomes better understood by reference to the following description when considered in connection with the accompanying drawings. Referring to the drawings,—

Figure 1 is a plan view of an automatic screw machine embodying my invention, only such parts being shown as are necessary for an understanding of the construction and operation of the mechanism in which my invention is incorporated;

Fig. 2 is an end view of the machine looking toward the right in Fig. 1;

Fig. 3 is a side elevation of the machine looking toward the right in Fig. 2;

Fig. 4 is a side elevation of the opposite side of the machine;

Fig. 5 is a fragmentary view partially in section, taken on the line 5—5 of Fig. 3;

Fig. 6 is a plan view of the construction shown in Fig. 5;

Fig. 7 is a similar view of the same parts in another position;

Fig. 8 is a detail elevation showing one of the adjustable cam members;

Fig. 9 is a plan view of the structure shown in Fig. 8;

Fig. 10 is a fragmentary sectional view taken substantially on the line 10—10 of Fig. 1;

Fig. 11 is a transverse view partially in section on the line 11—11 of Fig. 10;

Fig. 12 is a detail showing a clutch plate or cover; and

Fig. 13 is a detail view of the expansible clutch member.

By reference to the drawings it will be observed that the machine comprises a base or body 14 of suitable construction to carry the various mechanisms at one end of the machine, a bed 15 being mounted upon the base and constructed to provide bearings 16 and 17 in which the turret 18 equipped with the tool-holding head 19 and the shaft 21, upon which the turret is mounted, are adapted to respectively reciprocate. The turret head is provided with a plurality, preferably four, of tool-holding sockets and is adapted to be rotated or indexed to bring the sockets into alinement with the work carried by a work holder (not shown) at the other end of the machine, the indexing being done at proper intervals by suitable indexing mechanism (not shown) including a gear adapted to mesh with and drive the gear 22 mounted upon the turret shaft 21. Since the indexing mechanism is not a part of my present invention I have deemed it

unnecessary to illustrate and describe the same, but a practical and preferred type of indexing mechanism is disclosed in my prior Patent No. 1,022,086, granted April 2, 1912.

The turret is reciprocated longitudinally toward and from the work by means of a lever 23 fulcrumed on the base 14 at 24 and provided at its upper end with a stud 25 engaging in the groove of a collar 26 fixed upon the turret shaft 21. The lower end of lever 23 is provided with an antifriction roller 27 disposed in the path of travel of actuating cam plates 28 adjustably arranged upon the periphery of a drum or cylinder 29 provided with a multiplicity of perforations through which the bolts for securing the cam plates 28 to the cylinder may be inserted. It will be obvious that as the cam cylinder is revolved in a clockwise direction, viewing Fig. 2, the cam plates by engagement with the antifriction roller 27 will oscillate the lever 23 on its fulcrum to thereby reciprocate the turret toward and from the work. The cam cylinder 29 is fixed upon a shaft 31 mounted in the base of the machine, one end of this shaft being equipped with a worm wheel 32 fixedly secured on the shaft and adapted to be driven by a worm 33 fixed on a shaft 34 extending transversely of the frame and journaled in suitable bearings 35. This shaft is provided with a hand wheel 36 located in an accessible position to the operator by means of which the shaft may be manually turned to adjust the cam cylinder whenever it may be necessary to do so.

Referring now more particularly to Fig. 10, it will be observed that the end of the shaft 34, opposite to the hand wheel 36, is provided with a bevel gear 37 which meshes with and is driven by a companion bevel gear 38 fixed upon one element 39 of a clutch, the other element 41 of the clutch being splined upon a hollow shaft 42 so as to move longitudinally into and out of engagement with the clutch member 39, this movement being effected by means of a clutch lever 43, Fig. 1, secured to the upper end of a rock shaft 44 which is provided with a yoke 45, the bifurcated ends 46 of which are equipped with opposed inwardly extending studs 47 adapted to engage in a groove in the periphery of the clutch member 41. The shaft 44 is mounted in suitable bearings 48 attached to the main frame of the machine, and it will be obvious that by moving the lever 43 horizontally the clutch member 41 will be engaged with or disengaged from the clutch member 39, thereby connecting or disconnecting the shaft 34 with the hollow shaft 42.

Power is applied to the machine from any suitable source through a main drive shaft 49 which is provided with a pinion 51 from which power is transmitted through a train of suitable gearing 52 to the previously mentioned indexing mechanism, not shown. Power is transmitted from the shaft 49 to the hollow shaft 42 through either of two driving pinions 53 or 54 connected with suitable trains of mechanism, to be later described, and by which the hollow shaft 42 and, consequently, the worm shaft 34 are driven at either high or low speed as desired.

Adjacent its outer end or left hand end, viewing Fig. 10, the hollow shaft 42 has fixedly secured thereto, by means of a spline 55 and a stud screw 56, an expansible clutch member 57, shown on an enlarged scale in Fig. 13. This member as shown comprises the hub or collar 58 secured to the shaft as described and provided with a radially extending web 59 forming the sole connection between the hub and the circular expansible portion 61, which is split on the side opposite the web 59 and provided with enlarged bearing portions 62 spaced from each other a sufficient distance to receive between their opposed faces a block 63. This block is carried by a short shaft 64 which is journaled in a bearing 65 formed in a disk 66 which serves as a cover or outer face for the clutch member. The outer end of the shaft 64 is provided with an arm or lever 67, Figs. 2, 10 and 11, which carries at its outer end an adjustable set screw 68, the inner end of which is adapted to be engaged by a head or cam block 69 having a cam face 71 and mounted upon a longitudinally movable rod 72 adapted to reciprocate within the hollow shaft 42. When this rod is moved inwardly or to the right, into the position shown in Fig. 10, the head or block 69 will engage the screw 68 so that the cam surface 71 will force the free end of the lever 67 outwardly to thereby rock the shaft 64 and turn the block 63 into an angular position so as to separate the opposed ends of the extension ring 61, thereby expanding this ring into frictional engagement with the inner face of the other clutch member 73 which is rotatably mounted upon the hollow shaft 42. It will be manifest that by this construction the member 73 will be clutched to the shaft 42 by the longitudinal movement of the rod 72 to the right, and upon reverse movement of this rod the block 63 will be swung to the position shown in Fig. 13, thereby permitting the clutch ring 61 to contract due to the resiliency of the metal from which it is constructed so as to disconnect the clutch member 73 from the shaft.

A gear wheel 74 formed integrally with the clutch member 73 is adapted to mesh with and be driven by a pinion 75 mounted on a stub shaft 76 and formed integrally with a gear 77 which meshes with and is driven by the gear 53 on the shaft 49, all as shown in Fig. 1. It will thus be evident that power is transmitted from the shaft

49 to the hollow shaft 42 through the gear train, including gears 53, 77, 75 and 74, and the clutch, previously described, which is engaged or disengaged depending upon the position of the rod 72. The gears of this train are so proportioned that the shaft 42 and thereby the shaft 34 and the cam cylinder 29 will be driven at low speed, this driving train being employed to actuate the drum cylinder to advance the turret during the operating portion of its stroke.

Near the opposite or inner end of the hollow shaft 42 there is fixed to this shaft a clutch member 78 similar in construction to the member 57, previously described, which is actuated by a lever 79 mounted upon a short shaft 81 which carries the clutch-actuating block 82, this lever being also equipped with an adjustable set screw 83 which is engaged by a head or cam block 84 mounted upon the rod 72. The construction and operation of this clutch is substantially identical with the clutch at the opposite end of the shaft 42, but the clutch member will be expanded into frictional engagement with the surrounding clutch member 85 upon movement of the rod 72 to the left, viewing Fig. 10, which movement releases the clutch at the opposite end of this shaft.

Referring now to Figs. 10 and 11, it will be observed that driving connection is established between the shafts 49 and the shaft 42 through a gear train including a gear 86 formed integrally with the clutch member 85 which meshes with and is driven by a gear 87 mounted upon a stub shaft 88 and formed integrally with or rigidly connected to a gear 89 meshing with and driven by the gear 54 on the shaft 49. For purposes of safety this gear train is preferably inclosed in a casing or housing 91, as shown. When the rod 72 is in the position shown in Fig. 10 the clutch at the inner end of shaft 42 is released and the clutch at the outer end is engaged so that power is transmitted from the shaft 49 to the shaft 42 through the slow speed gear train. Upon movement of the rod 72 to the left the clutch at the outer end of shaft 42 is released and the clutch at the inner end is engaged so that power is transmitted from the shaft 49 to the shaft 42 through the gear train shown in Fig. 11, the gears of which are so proportioned that shaft 42 will be driven at high speed. The cam cylinder 29 will consequently be driven at relatively high speed so that the longitudinal movements of the turret will be effected at relatively high speed. The parts are so timed that the high speed movements of the turret take place upon the return stroke of the turret, and also upon the advancing stroke up to substantially the point at which the tools are brought into engagement with the work.

Referring now to the mechanism for actuating the rod 72 to control the clutches in the manner previously described, it will be observed from reference to Figs. 4 to 10 inclusive, that the hub of the cam cylinder 29 is provided at one end with a radial flange 91 upon which there may be adjustably mounted a plurality of cam members 92. Each of these cam members consists, as shown in Figs. 5 to 9 inclusive, of a grooved body 93 adapted to set over the flange 91, one leg of the body being provided with a set screw 94 by means of which the body may be securely clamped to the flange 91 in any desired position circumferentially of the flange. The upper face of the body is provided with a cam 95 which is adapted to actuate a lever as the cam cylinder 29 revolves and as will now be described.

This lever, which is designated by reference character 96, is fulcrumed by a pin or shaft 97 upon a bracket 98 mounted upon the base 14, as best shown in Fig. 5. One end of the lever is provided with an antifriction roller 99 disposed in the path of travel of the cams upon the flange 91, so as to be engaged by the cams upon revolution of the cam cylinder 29 to thereby rock the lever 96 in one direction or the other about its fulcrum. The other end of the lever is connected by a bolt 101 to a link 102 having an upturned end 103 provided with an opening through which the inner end of the rod 72 projects. The link is secured to the rod 72 between the cam member 84 and a collar 104 both of which are pinned to the rod as shown in Fig. 10. It will be evident therefore that as the lever 96 is oscillated on its fulcrum its motion will be transmitted through the link 102 to the rod 72 which is thereby moved longitudinally to engage and disengage the clutches mounted on opposite ends of the hollow shaft 42.

On the drawings I have shown but two cam members mounted upon the flange 91, but it should be understood that the number of cam members employed is determined by the number of turret speed changes desired at each revolution of the cam cylinder. Since two cam members 92 are required for each tool in the turret head it will be obvious that if the head is equipped with four tools, eight cam members will be employed. These members are positioned circumferentially of the flange 91 so that the lever 96 will be rocked to move the rod 72 to the right into the position shown in Fig. 10, thereby connecting the shaft 42 to the driving gear 53 just as the tool approaches its working position with respect to the work. The shaft 42, and consequently the cam cylinder 29, will accordingly be driven at low speed so that the turret will be slowly advanced during the working portion of its

stroke. When the work of the tool has been completed and the turret begins to retract away from the work the next succeeding cam member 92 on the flange 91 engages the roller 99 and swings the lever 96 in the opposite direction to throw out the clutch at the left hand end of shaft 42, viewing Fig. 10, and throw in the clutch at the right hand end of this shaft so as to connect the shaft with the driving gear 54 which drives the shaft, and consequently the cam cylinder, at high speed. This high speed of the cam cylinder, resulting in rapid movement of the turret, will continue during the retractive movement of the turret and also during the advance movement of the turret until it again reaches working position, whereupon the next cam member 92 will actuate the lever 96 so as to throw out the high speed clutch and throw in the low speed clutch as previously described. It will be obvious from Figs. 5 to 9 inclusive that the cam members 92 are all substantially alike but are mounted on the flange 91 with their cam faces pointing in either one direction or the other, depending upon the direction that it is desired to move the lever 96. The only difference in the cams is that one set has one of the legs tapped to receive the setscrews while the other set has the other leg tapped so that the setscrews 94 are always disposed on the outer face of the flange 91, where they are readily accessible for purposes of removal or adjustment of the cam members. It will be manifest that by simply removing or adjusting the cam members 92 the points at which the speed changes of the turret will take place can be readily changed and regulated so as to accommodate the machine to work of various kinds and also to enable the machine to work at highest efficiency with varying numbers of tools in the turret.

It is believed that my invention and its mode of operation will be readily understood from the foregoing without further description, but it should be manifest that the structural details illustrated and described are capable of considerable modification and variation without departing from the essence of the invention, as defined in the following claims.

I claim:

1. In a machine of the character described, the combination of a power shaft, a plurality of drive gears fixed thereon, a hollow counter shaft, a plurality of driven gears loosely mounted thereon and connected respectively with said drive gears, a plurality of clutches adapted to connect said driven gears with said counter shaft, a rod disposed within said hollow counter shaft and connected with each of said clutches, a worm shaft driven from said counter shaft, a cam drum driven from said worm shaft, a turret slide, a lever actuated by said cam drum for reciprocating said slide, a second lever connected at one end with said rod and provided at its other end with a cam follower, and a plurality of cam members adjustably mounted on said drum in position to successively engage said follower whereby said second lever is actuated to move said rod in opposite directions so as to connect and disconnect said clutches in alternation.

2. In a machine of the character described, the combination of a power shaft, a plurality of drive gears fixed thereon, a counter shaft, a plurality of driven gears loosely mounted on said counter shaft and adapted to be driven from said driving gears respectively, a plurality of clutches adapted to connect said driven gears one at a time with said counter shaft, a clutch-operating rod connected with each of said clutches, a cam drum driven from said counter shaft, a turret slide, a lever actuated by said cam drum for reciprocating said slide, a second lever connected at one end with said clutch-controlling rod and having its other end disposed in operative relation to said cam drum, and a plurality of cam members adjustably mounted on said drum in position to successively actuate said second lever in opposite directions whereby said clutch-controlling rod is operated to connect and disconnect said clutches in alternation.

3. In a machine of the character described, the combination of a power shaft, a plurality of drive gears fixed thereon, a counter shaft, a plurality of driven gears loosely mounted thereon and connected respectively with said drive gears, a clutch for each of said driven gears whereby said gears are connected to said counter shaft, a clutch-controlling rod connected to each of said clutches, a worm shaft driven from said counter shaft, a manually operated clutch interposed between said counter shaft and said worm shaft, a cam drum driven from said worm shaft and equipped with a series of turret slide cams, a turret slide, a lever actuated by said cams for reciprocating said slide, a plurality of cam members adjustably mounted on said drum, a second lever adapted to be actuated by said cam members, and connections between said second lever and said clutch-controlling rod whereby said rod is shifted in opposite directions upon actuation of said lever to connect and disconnect said clutches in alternation.

4. In a machine of the character described, the combination of a power shaft, a plurality of drive gears thereon, a counter shaft, a plurality of driven gears loosely mounted thereon and connected with said drive gears, a clutch for each of said driven gears for connecting the same with said counter shaft, a rod connecting said clutches whereby the same are actuated, a cam drum

driven from said counter shaft, a lever actuated by said drum, a turret slide reciprocated by said lever, said drum being provided on its hub with a radial flange, a series of cam members adjustably mounted on said flange with their cam faces disposed in opposite directions, a second lever connected with said clutch rod and provided with a cam follower disposed in the path of said cam members, and means for locking said cam members to the drum in adjusted positions.

5. In a machine of the character described, the combination of a power shaft, a plurality of drive gears fixed thereon, a hollow counter shaft, a plurality of driven gears loosely journaled thereon and connected with said drive gears, a plurality of clutches interposed between said counter shaft and said driven gears, a clutch-controlling rod disposed within said counter shaft, clutch actuating means carried by said rod whereby said clutches are engaged and disengaged in alternation upon movement of said rod, a cam drum, a turret slide, means actuated by said drum for reciprocating said slide, a series of cam members adjustably mounted on said drum, a lever adapted to be actuated by said members, and a connection between said levers and said clutch rod whereby upon actuation of said lever said clutches will be engaged or disengaged in alternation.

JOHN H. JANN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."