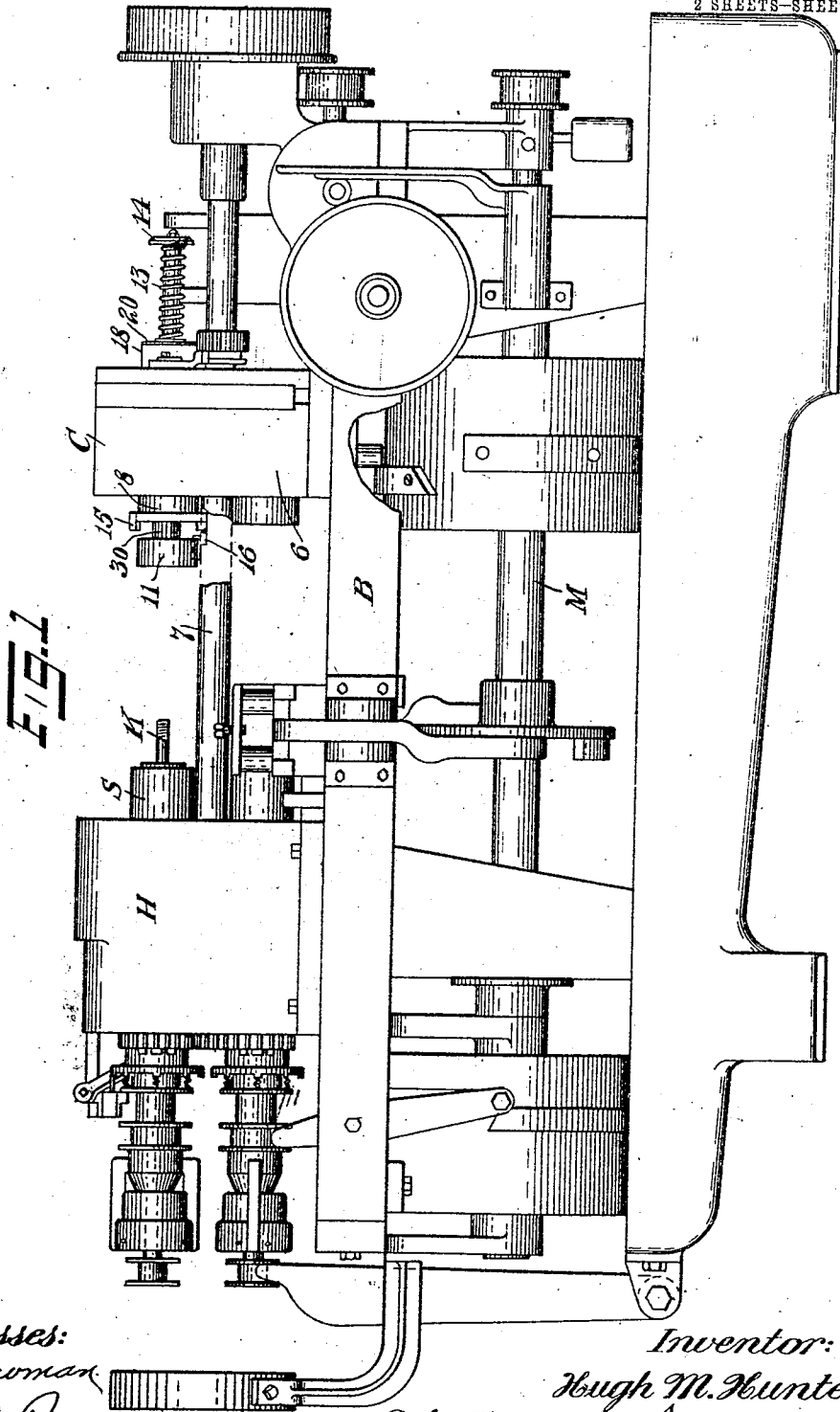


H. M. HUNTER.
LEFT HAND THREADING DEVICE.
APPLICATION FILED JULY 13, 1909.

976,880.

Patented Nov. 29, 1910.

2 SHEETS-SHEET 1.



Witnesses:

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By his Attorney,

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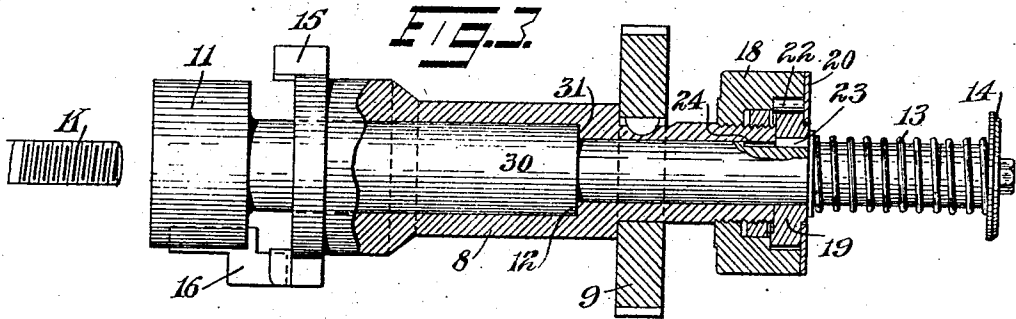
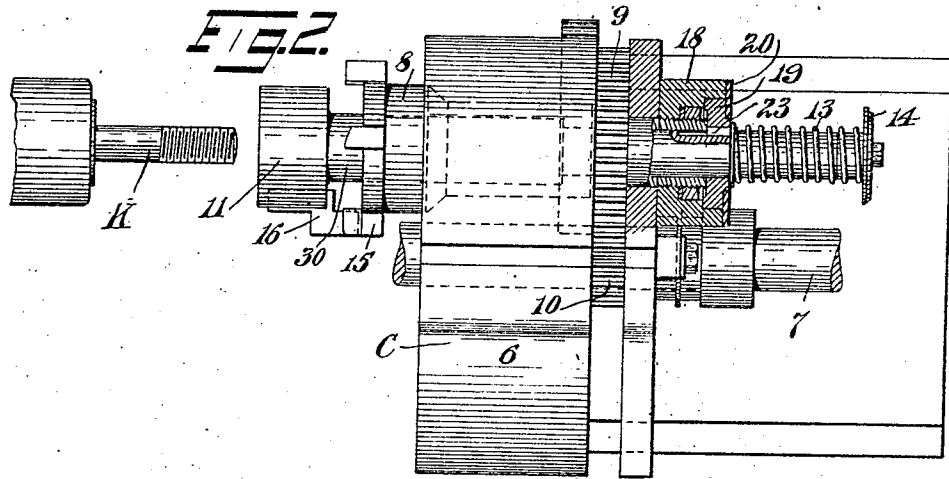


FIG. 4

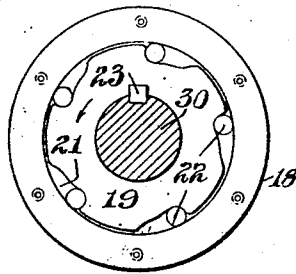
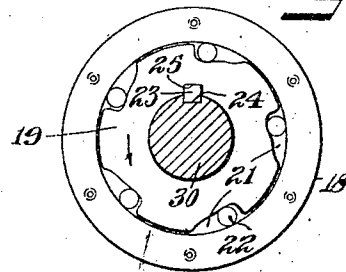


FIG. 5



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UNITED STATES PATENT OFFICE.

HUGH M. HUNTER, OF CLEVELAND, OHIO, ASSIGNOR TO THE NATIONAL ACME MANUFACTURING COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

LEFT-HAND-THREADING DEVICE.

976,880.

Specification of Letters Patent. Patented Nov. 29, 1910.

Application filed July 13, 1909. Serial No. 507,294.

To all whom it may concern:

Be it known that I, HUGH M. HUNTER, 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 Left-Hand-Threading Devices, of which the following is a specification.

This invention relates to the type of machine tools generally known as automatic screw machines in which different tools are automatically and successively caused to operate on one or more pieces of stock in the machine. This invention relates especially to the thread-cutting mechanism of such machines and has for its object to provide an improved means for operating a die to cut a thread.

A further object of the invention is to provide means for operating a die in connection with a stock spindle that is rotated in the direction generally used for right hand threads, whereby a left hand die will cut a thread on the stock.

A further object of the invention is to provide means for rotating the stock at a certain speed and means for rotating an endwise movable die spindle at a certain predetermined speed less than that of the stock or in other words to retard the rotation of the die spindle during the cutting of the thread, the organization being such that after the thread has been cut, the die spindle is then permitted to rotate at the increased speed of the stock and thereupon the speed of the stock spindle is arrested while that of the die spindle is maintained at the same speed whereby the die will back off from the thread on the stock.

In the accompanying drawings illustrating one embodiment of my invention Figure 1 shows in elevation a screw machine with my device applied thereto. Fig. 2 is a plan view of the tool carrier and showing one stock spindle and the end of the stock. Fig. 3 shows most of the parts shown in Fig. 1, being partly in section and Figs. 4 and 5 show the roller clutch in the free position and in the locked position respectively.

In the machine shown in Fig. 1, which is a multiple spindle machine, the spindles S and the stock K are carried by a head H, and means are provided whereby the stock is rotated when brought to position for engagement with the die. The tool carrier C

is slidable along the bed B of the machine and operated from the main driving shaft M intermittently by suitable means, not shown. The carrier C shown also in Fig. 2 has a head 6 through the center of which runs a driving shaft 7 that is suitably operated from the main shaft by means not shown. At another portion of the head is a bearing aperture in which rotates the sleeve 8 shown best in Fig. 3 and which carries a gear 9 fast thereto meshing with a gear 10 fast on the shaft 7 by which the sleeve is rotated from the shaft.

In the bore of the sleeve 8 rotates freely the spindle 30 carrying at one end the die 11 that is in alinement with the stock K in the stock spindle S, at the proper stage in the operation of the machine when the thread is to be cut on the stock. The die spindle is endwise movable in the sleeve but has a shoulder 31 normally pressed against a shoulder 12 in the bore of the sleeve by a coil spring 13 that engages a washer 14 fast on the die spindle extremity, while the other end of the spring engages the sleeve or a member fast thereon. But this permits the die to be advanced toward the stock and the coil spring will be thereby compressed serving to return the die when free to shift. In the normal position of these members, a clutch member on the sleeve is in engagement with a clutch member connected with the die spindle. One or more longitudinally projecting pins 15 on the sleeve serve to engage with a clutch pin 16 shown as fast to the die 11 itself. Therefore the rotation of the sleeve by the gears from the shaft 7 will normally cause the rotation of the die; but if the die is advanced permitting the pin 16 to swing free from the clutch pins 15, then the die spindle is free from the sleeve at this clutch end.

The method of cutting the left hand thread with the stock spindle constantly rotated to cut a right hand thread is to rotate the die at a relative speed less than that at which the stock is rotated, and then as sufficient thread is cut, without stopping the rotation of the die spindle sleeve, to arrest the stock, whereupon the continued rotation of the die will cause it to run off from the thread on the stock, for the reason that the relative movements of these two members are thereby reversed. During the cutting operation therefore, the rotation of the die

sleeve and spindle slower than the stock will have a tendency to cause the stock to carry the die spindle around with it at the same speed and the driving means for the die spindle and the sleeve therefore act negatively or as a retarding mechanism. But in the usual operation of these multiple spindle machines, since the tool carrier has a number of tools, as many as or more than the number of stock spindles, the tool carrier is given a limited movement of advance toward the stock, and then is arrested, or shortly thereafter caused to recede. Upon the advance of the carrier, the die will be brought into engagement with the end of the die spindle, and the die being rotated by the said means from the shaft 7, the thread will be started on the end of the stock. As soon as a few threads are cut these threads will act as a screw and the die as a nut whereby the die will be drawn up onto the stock. The stopping of the carrier at this point will cause the die to advance and the die spindle to move endwise in the sleeve, compressing the coil spring 13. But this will cause the pin 16 of the clutch device to move off from the pin 15 of the clutch on the sleeve. The several parts are so arranged that at the time these members disengage sufficient thread will have been cut on the stock. The disengagement of this clutch device will cause the die spindle to be free from the sleeve and hence no longer retarded from being advanced with the rotating stock and the two will rotate together at the same speed and hence the die will not cut any more thread and will rotate at the same speed as the stock. At this point the rotation of the stock is arrested, and therefore means are provided whereby the die and spindle will be rotated or carried around with the sleeve, that is constantly rotated, which will serve to reverse the relative movements of the die and stock causing the die to run off the stock. A clutch device is provided between the die spindle and the sleeve that will permit the die spindle to rotate in the same direction that the sleeve is rotated by the gears from the shaft 7 at a greater speed than that of the sleeve, but which means will cause the two members to lock and the sleeve to drive the spindle as soon as the rotation of the die spindle is reduced to that of the sleeve which will result as soon as the rotation of the stock is arrested to stop the stock. In the construction illustrated a clutch is shown connecting these members, in the nature of a roller clutch. The other end of the sleeve 8 carries a head 18 secured thereto. A collar 19 is mounted on the die spindle and located inside of the head at one end, and a flat ring 20 secured to the head retains the collar 19 in the same endwise position inside of the head. This collar is provided with sockets 21 in its periphery having

their bottom arranged at an angle relative to the tangent at that point, all extending in the same rotative direction. Rollers 22 are located in the sockets between the same and the bore of the head 18. The rotation of the head in one direction will cause the rollers to ride up the incline and to jam or lock by a wedging action whereupon the collar will be carried around with the sleeve. Obviously the rotation of the collar in the same direction, but faster than the head on the sleeve will be permitted. The collar is suitably connected with the die spindle to permit the endwise movement of the latter relative to the sleeve and head, yet cause the collar and die spindle to rotate together. A key 23 rides in a slot 24 in the die spindle, and is also located in a slot 25 in the bore of the collar, by which means the collar can slide on the die spindle yet always rotate therewith.

The operation of the device is as follows: The rotation of the sleeve will carry the die around with it at a certain speed, and the stock being rotated at a greater speed, the engagement of the die with the stock upon advance of the carrier, will cause the die to cut the thread by reason of the engagement of the pins of the clutch. Upon arrest of the carrier the threads already cut by the die will serve to advance the die endwise until the pins disengage. Now, the roller clutch will permit the die spindle upon these pins freeing the die spindle to rotate with the stock at a greater speed than that of the sleeve, whereby the die will cease to cut on the stock. But upon the stock being arrested at this stage; as soon as the speed of the die is reduced to that of the sleeve, the roller clutch will engage, and as the speed of the stock is further reduced, the reverse relative movements of the die and stock will cause the die to run off from the stock. As soon as the die leaves the stock, the spring will return it to position of engagement of the two pin portions of the clutch, and the carrier now returns to its former position. Having thus described my invention, I claim:

1. In a multiple spindle lathe, the combination of a carrier, a sleeve rotatable in the carrier, a die spindle rotatable in the sleeve, a clutch member connected with the die spindle, a clutch member on the sleeve arranged to engage the clutch member on the die spindle, said members being arranged to disengage upon relative endwise movement of the die spindle and sleeve, and a clutch having one member connected with the sleeve and the other member connected with the die spindle, the latter clutch being organized to cause the sleeve to drive the die spindle in one direction but to permit the die spindle to travel faster than the sleeve in the same direction.

2. In a multiple spindle lathe, the combination of a carrier, a sleeve rotatable in the carrier but prevented from endwise movement, a die spindle rotatable in the sleeve, a clutch member connected with the die spindle, a clutch member on the sleeve arranged to engage the clutch member on the die spindle to prevent the die spindle rotating faster than the sleeve is rotated in a certain direction, said members being arranged to disengage upon endwise movement of the die spindle in the sleeve, a spring arranged to normally retain the die spindle in position with said clutch members in engagement, and a clutch having one member secured to the sleeve and the other member connected to the die spindle, the latter clutch being organized to cause the sleeve to drive the die spindle in said certain direction but to permit the die spindle to travel faster than the sleeve in said direction, said clutch members being constructed and arranged for constant operative engagement throughout the endwise movement of the die spindle in the sleeve.

3. In a threading machine, the combination of a work carrying spindle, actuating means for rotating the spindle at a predetermined speed, stopping means for holding the work carrying spindle stationary at a predetermined time, a die spindle carrying a die, shifting means for actuating the die toward and from the work, actuating means for rotating the die spindle at a predetermined speed during the threading operation and less than that of the work carrying spindle, and means effective to permit at a predetermined time the rotation of the die spindle at the same speed as the work carrying spindle, but at a greater speed than the speed of the die actuating means, the organization being effective to permit the die to back off on the stoppage of the work carrying spindle on the continued rotation of such die spindle.

4. In a multiple spindle lathe, the combination of a carrier, a sleeve rotatable in the carrier, means for preventing endwise movement of the sleeve on the carrier, a die spindle rotatable in the sleeve, a clutch member connected with the die spindle, a clutch member on the sleeve arranged to engage the clutch member on the die spindle to

prevent the die spindle rotating faster than the sleeve is rotated in a certain direction, said members being organized and arranged to disengage upon endwise movement of the die spindle in the sleeve, and a clutch having one member secured to the sleeve and the other member connected to the die spindle, the latter clutch being organized to cause the sleeve to drive the die spindle in said certain direction but to permit the die spindle to travel faster than the sleeve in said direction, and means on said clutch members constructed and arranged to retain them in operative engagement throughout the endwise movement of the die spindle in the sleeve.

5. In a threading machine, the combination of a work carrying spindle, actuating means for rotating the spindle at a predetermined speed, stopping means for holding the work carrying spindle stationary at a predetermined time, a die spindle carrying a die, shifting means for actuating the die toward and from the work, actuating means for rotating the die spindle at a predetermined speed during the threading operation and less than that of the work carrying spindle, and means effective to permit at a predetermined time the rotation of the die spindle at the same speed as the work carrying spindle, but at a greater speed than the speed of the die actuating means, the organization being effective to permit the die to back off on the stoppage of the work carrying spindle on the continued rotation of such die spindle, said means comprising a clutch member on the die spindle having notches in the periphery with the bottom walls inclined in the same rotative direction, a sleeve loose on the spindle, a clutch member on the sleeve surrounding the said clutch member, rollers in the notches between the two clutch members permitting free relative movement in one direction but causing rotation of the die spindle by the sleeve in the other direction, the sleeve clutch member being connected therewith for axial movement but rotating therewith.

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Witnesses:

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