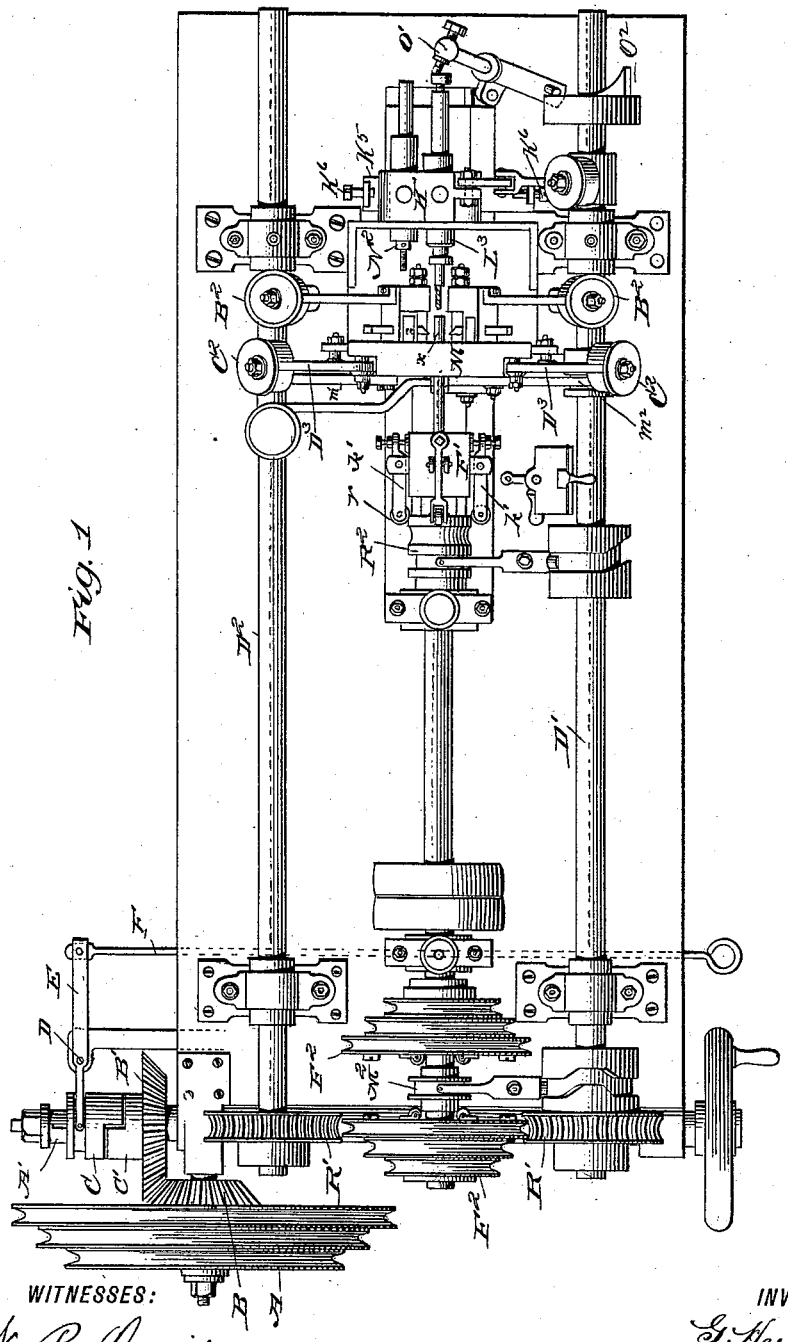
(No Model.) 4 Sheets—Sheet 1.

G. HEYNE.

SCREW MACHINE.

No. 414,906. Patented Nov. 12, 1889.

Fig. 1.



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(No Model.) 4 Sheets—Sheet 2.

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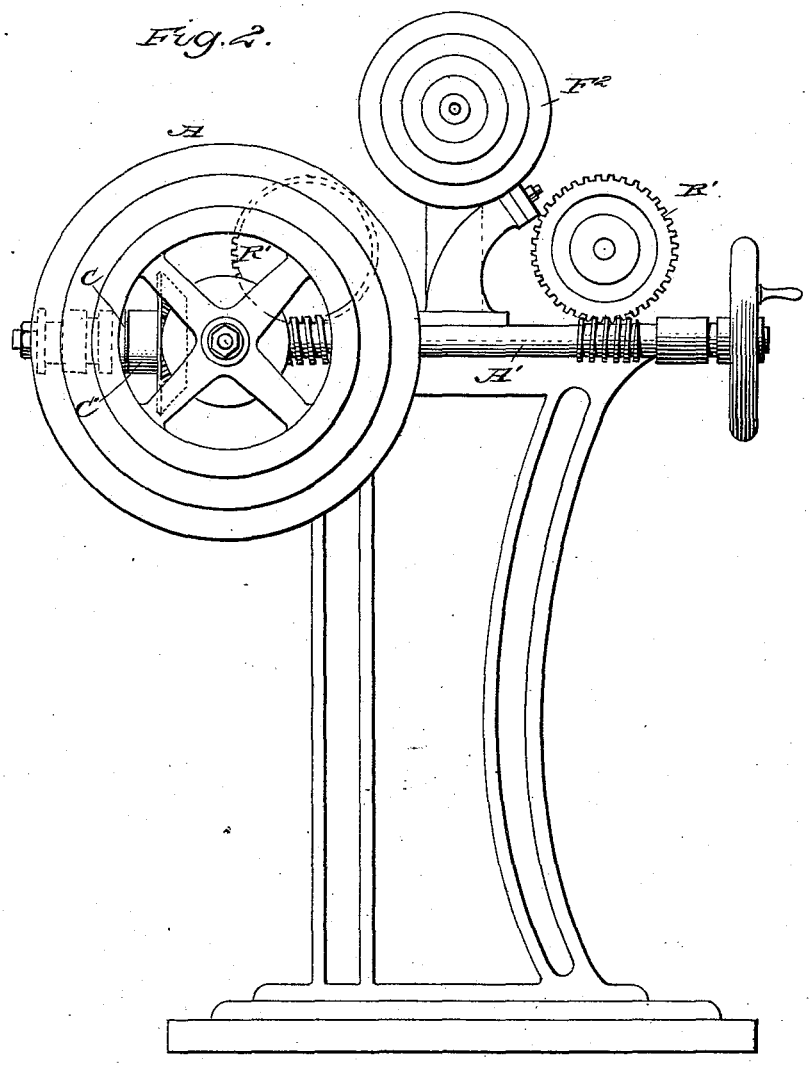
Fig. 2.



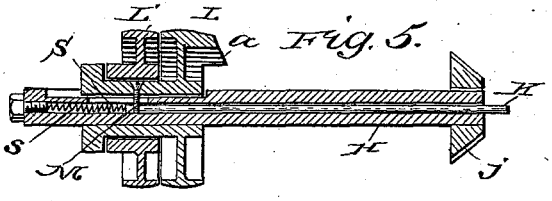


Fig. 5.

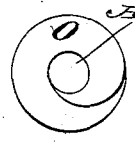


Fig 6.

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Fig. 3.

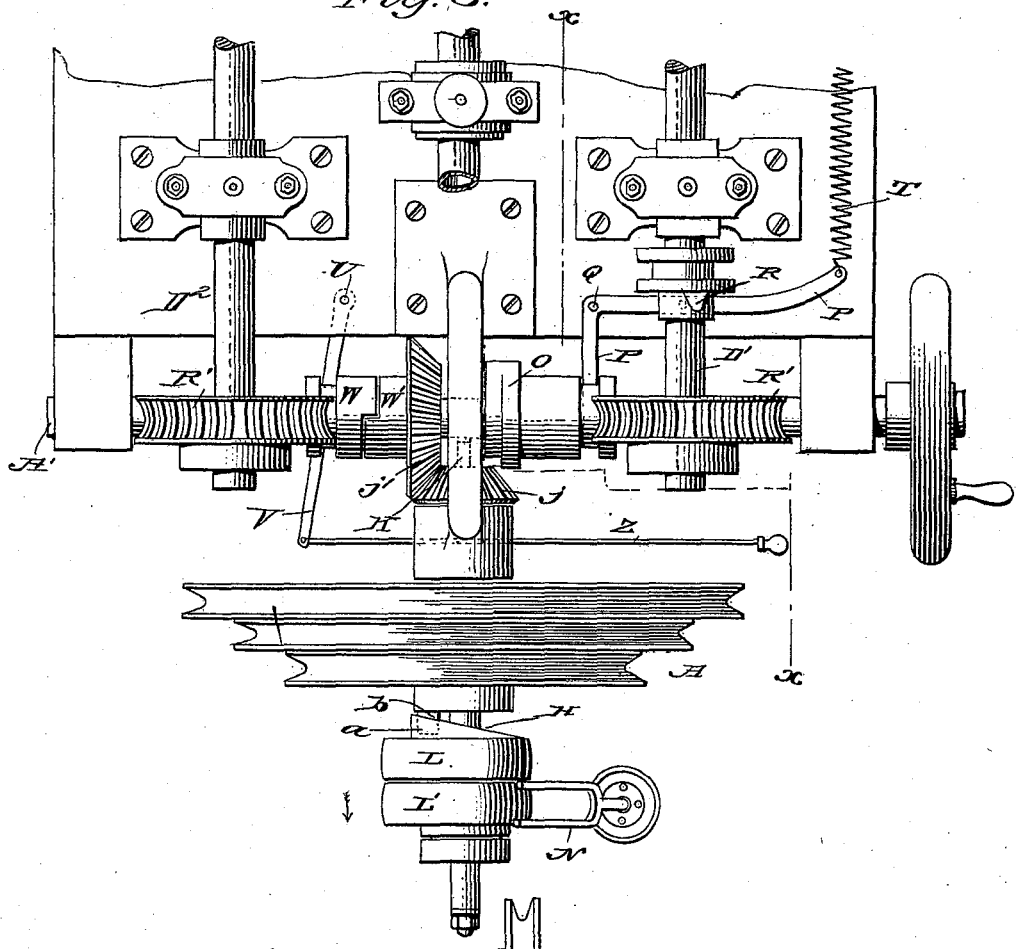
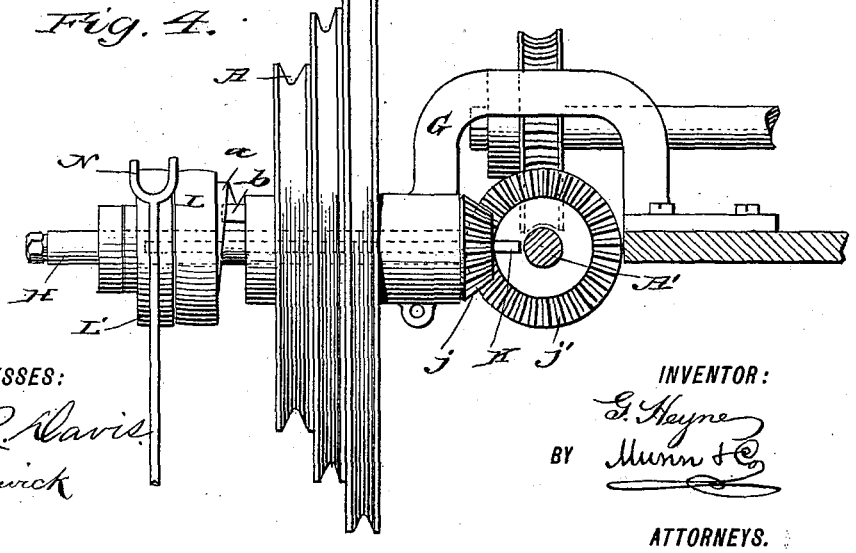


Fig. 4.



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SCREW MACHINE.

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Fig. 7.

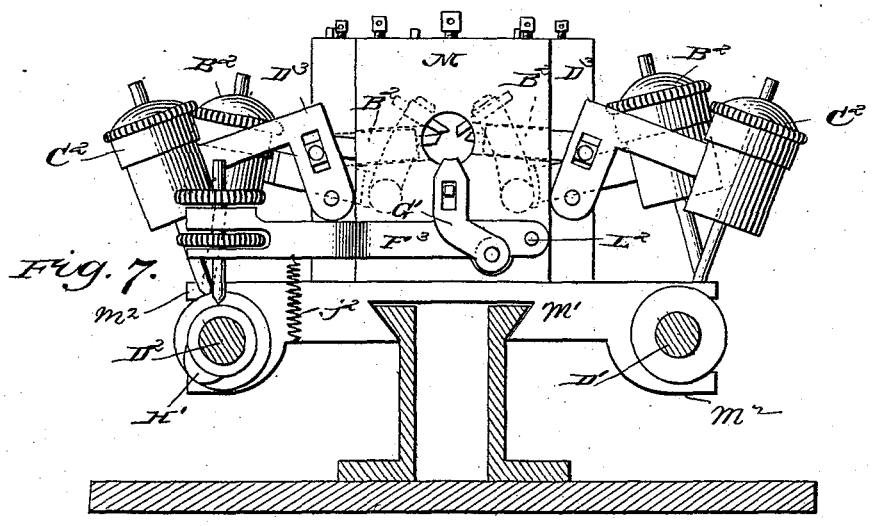
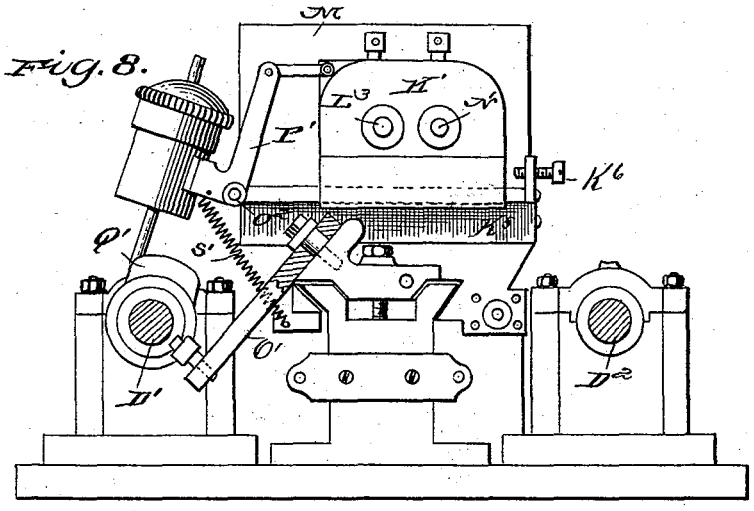


Fig. 8.



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UNITED STATES PATENT OFFICE.

GEORG HEYNE, OF OFFENBACH-ON-THE-MAIN, GERMANY.

SCREW-MACHINE.

SPECIFICATION forming part of Letters Patent No. 414,906, dated November 12, 1889.

Application filed November 27, 1888. Serial No. 291,962. (No model.)

To all whom it may concern:

Be it known that I, GEORG HEYNE, a subject of the Emperor of Germany, and a resident of Offenbach-on-the-Main, Germany, have invented new and useful Improvements in Screw-Machines, of which the following is a specification.

My invention relates to automatic screw and nut cutting machines, and is an improvement upon the machine shown and described in United States Letters Patent No. 289,655, granted and issued to me on the 4th day of December, 1883.

The invention consists in various combinations of devices for holding, feeding, turning, boring out, tapping, and cutting the rods or other pieces of metal from which the screws, nuts, or other similar articles are to be made, as hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference designate corresponding parts in the several views.

Figure 1 is a plan view of the machine. Fig. 2 is an end elevation of the same. Fig. 3 is a partial plan view of a modification of the mechanism shown at the left hand in Fig. 1. Fig. 4 is a transverse section taken on the irregular line *x x* in Fig. 3. Fig. 5 is a longitudinal section of the hollow shaft shown at the left hand in Fig. 4. Fig. 6 is a transverse section of the main driving-shaft shown in Fig. 3. Fig. 7 is an end elevation, partly in section, of the mechanism for cutting screws; and Fig. 8 is an end elevation of the mechanism for boring and tapping nuts.

The machine is in its general construction similar to that described in my aforesaid patent. It is set in motion from the cone rope-pulley A, and the rotation of this is communicated by the bevel-wheels B B′ to the main driving-shaft A′, which latter drives the shafts D′ D^2 by a worm-gearing and worm-wheels R′ R′. The shafts D′ D^2 operate the several parts of the machine by cams in the same manner as with my first before-named machine. The one end of the shaft A′ is feathered and provided with the clutch C. The clutch C is feathered on the shaft A′, and is connected by a groove with the forked end of the lever E, which latter is pivoted at D to an arm projecting laterally from the frame of the machine. The other end of the lever E is connected with a draw-bar F. The clutch is either disconnected or connected by the draw-bar F being drawn out or pushed in. In this manner the shafts D′ D^2 are quickly geared in or out of motion. As soon as the clutch C is thrown into gear with the clutch C′, which latter is firmly attached to the bevel-wheel B′, revolving on shaft A′, before named, the motion is thus communicated from the pulley A to the shafts D′ D^2, and by these to the several parts of the machine.

In Figs. 3 to 6 a modification of the above-described mechanism is shown. The motion is communicated by an ordinary cord or belt to the cone-pulley A, which revolves loosely upon the shaft H, this latter being carried by the bracket or support G. The hollow shaft H carries at its one end the bevel-wheel *j*, which gears with the bevel-wheel *j′*, attached to the shaft A′. A pulley L is also mounted on the shaft H and connected to the same by feather and groove, so that it revolves with said shaft, but can be shifted in an axial direction.

Upon the hub of the pulley L is situated the loose pulley L′. The shaft H is provided with a slot S, through which a screw M passes and connects the hub of the pulley L with the rod K in said shaft. Thus upon the rod K being pushed into the shaft H the pulleys L and L′ will be shifted. As soon as the pressure on the rod K ceases a spiral spring *s*, inclosed within the end of the shaft H, pushes said rod, together with the pulleys L and L′, back to their original position. The pulley L is provided with a projection *a*, the cone-pulley A being also provided with a corresponding projection *b*. As shown in the drawings, Figs. 3 and 4, the cone-pulley A is connected to the pulleys L L′ by the engagement of the projections *a b*, before named. Thus the motion from the pulley A is transmitted through the pulley L, hollow shaft H, and bevel-gearing *j j′* to the shaft A′, and by the worm-gearing R′ R′ to the shafts D′ D^2, as before described. During this the driving-belt, passing through the rigid fork N, runs on the loose pulley L′. This belt is driven from the same shafting as the belt driving the cone-pulley A. If the rod K is now pushed outward in the direction of the arrow shown in

Fig. 3, the pulleys L L′ will shift along the hollow shaft H, and the driving-belt, guided by the fixed fork N, will be shifted from the pulley L′ to the pulley L at the same time that the projections *a* and *b* disengage. The shaft H now revolves at a greater speed, the cone-pulley turning loosely upon the same. By this mechanism the shaft H, bevel-gears *j j′*, and shafts A′ and D′ D^2 can be given a quicker or slower rotation, according as is required. To the shaft A is attached a sliding box O, which rotates with the said shaft, but can be moved in an axial direction. The end of the box O which is toward the rod K is turned down eccentrically, as shown in Figs. 3 and 6. The bell-crank lever P, pivoted at Q, is thrown forward by the projection R on the shaft D′ at the same time, and thus moves the eccentric end of the box O under the end of the rod K, by which this latter is pushed into the hollow shaft H and effects the shifting of the belt, as before described. As soon as the projection R passes off from the lever P the spring T, attached, respectively, to the outer end of said lever and the frame of the machine, withdraws the box O and lever P to their original position. The rod K being now relieved of pressure, the spiral spring *s*, inclosed within the end of the shaft H, pushes the rod K, and with it the pulleys L L′, back again to their original position, thus reshifting the belt by the fork N and causing the projections *a* and *b* to reengage and motion to be received from the cone-pulley A.

The lever V, (see Fig. 3,) pivoted at U, in combination with the draw-bar Z, moves the clutch W on the shaft A′ into or out of engagement with the clutch W′, fixed to the bevel-wheel *j′* on said shaft, in the same manner and for the same purpose as the clutches C C′ in Figs. 1 and 2. The lathe-spindle is driven from the cone-pulleys F^2 F^2, the one running to the right, the other to the left. These pulleys are connected alternately to the lathe-spindle, as the case requires, by the double clutch M^2, (see Fig. 1,) operated by the shaft D′.

My improved chuck F′ is shown in Fig. 1, and is similar to that described in my United States Patent No. 289,655, and represented in Figs. 20, 21, and 22 of said patent, with the exception that the ends of the levers K′ that rest on the ring R^2 are provided with friction-rollers *r*.

Figs. 1 and 7 represent my improved slide-rest M carrying four tools, which are all arranged at the back of the rest in such a manner that the front of the said rest is quite free. The two tool-holders and cutters B^2 are arranged in the same manner as in my United States Patent No. 289,655, before named. The two tool-holders C^2, however, operate their cutters by the levers D^3, these said cutters being held in grooves (shown in Fig. 7) in the slide M. The cutters are brought into action by cams mounted upon the shafts D′ D^2 in the same manner as in my before-named United States Patent.

The feed mechanism (see Fig. 7) for feeding up fresh material is as follows: To the slide M is attached the lever F^3 at L^2, and to the lever F^3 is hinged the lever G′. If the lever F^3 is now lifted at its one end by the cam H′ on the shaft D^2, the end of the lever G′ will be firmly pressed against that part of the rod which projects beyond the chuck F′. At this moment the chuck releases the rod, and the slide M is moved in the direction of the spindle-axis. The rod is thus forced to follow this movement of the slide M and is drawn in as far as the slide moves. As soon as the slide arrives at the end of its path the end of the lever F^3 is liberated from the cam H′, and, together with the lever G′, is drawn back to its original position by the spring j^2, thus freeing the rod, which is now clasped by the chuck. As soon as this is effected the tools again come into operation, the one after the other.

I will now describe the mechanism for drilling and tapping the nuts, the same being shown in Figs. 1 and 8 of the drawings.

K^5 is a transverse guide rib or way on the upper side of the carriage or slide M in rear of the cutters B^2, and on this guide is mounted the slide K′, movable across the carriage or slide at right angles to the axis of the spindle, the slide K′ being limited in its movement by two set-screws K^6, mounted in lugs at the ends of the guide-rib K^5. In this slide K′ are mounted the drill L^3 and the tap N′ in such a manner that after having been pressed forward against the work by the lever C′ (see Fig. 1) they return to their original position as soon as the pressure is released. The normal position of the slide K′ is at the left-hand end of the guide K^5 in Fig. 8, and when the drilling and tapping is to commence the cam Q′ raises the weighted end of lever P′ against the action of spring *s′*, which moves the slide until the drill L^3 is in axial alignment with the rod *x*. The slide then remains at rest until the cam O^2 acts upon lever O′, which presses the drill forwardly in its bearings to bore a hole in the said rod, and then the weight and spring *s′* return the slide K to its normal position, which brings the tap N^2 in axial alignment with the hole. At this instant the cam O^2 again acts and causes the lever O′ to force the tap into the hole bored by the drill. The drill and the tap are returned to their normal positions or retracted from the work after being acted upon by lever O′ by means of encircling spiral springs. (Not shown.)

The fast and slow motions are given to the machine according to the work it is doing. Thus when the machine is cutting the thread on a screw it cannot be run as fast as when it is turning down a plain shank—that is to say, during thread-cutting, boring, and the like operations the machine is run at slow speed; but as soon as this is over and plain turning begins

again the machine is run at full speed. The slide M is moved in the direction of the spindle-axis, backward or forward, by the forked ends m' of the frame m^2, to which the slide M is attached, being operated by suitable cams situated on the shafts D' D^2. (See Figs. 1 and 7.)

Having thus described my invention and the manner of employing the same, what I claim, and wish to have secured to me by Letters Patent of the United States of America, is—

1. In an automatic lathe, the cone-pulley A, having the projection *b*, rotating loosely upon the hollow shaft H, in combination with the pulleys L L', the pulleys L having the projection *a*, the fixed belt-fork N, rod K, and gearing *j j'*, substantially for the purpose as described.

2. In an automatic lathe, the shaft A', box O, and lever P, in combination with the hollow shaft H, the rod K, pulleys L' L, and the fork N, substantially for the purpose as described.

3. In an automatic lathe, the clutches W W', lever V, and draw-bar Z, in combination with the gearing *j j'*, shaft A', and hollow shaft H, substantially for the purpose as described.

4. In an automatic lathe, a slide-rest M, having a group of cutting-tools, and a transverse slide on the slide M in rear of said cutters, having a tap and drill adapted to be brought successively into axial alignment with the central space between said group of cutters, substantially as set forth.

5. In an automatic lathe, a feed mechanism consisting of the levers F^3 and G', pivoted to the slide M and actuated by the cam H', and means for actuating the slide, substantially as described.

6. In an automatic lathe, a mechanism for drilling and tapping holes in the rod X, consisting of a revolving holder for the rod, and the slide K', actuated by the lever P' and cam Q', and provided with drill L^3 and tap N^2, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORG HEYNE.

Witnesses:
JOSEPH PATRICK,
F. NASSLACHER.