

H. E. BOYD.

Machines for Cutting Screw-Taps.

No. 169,080.

Patented Oct. 26, 1875.

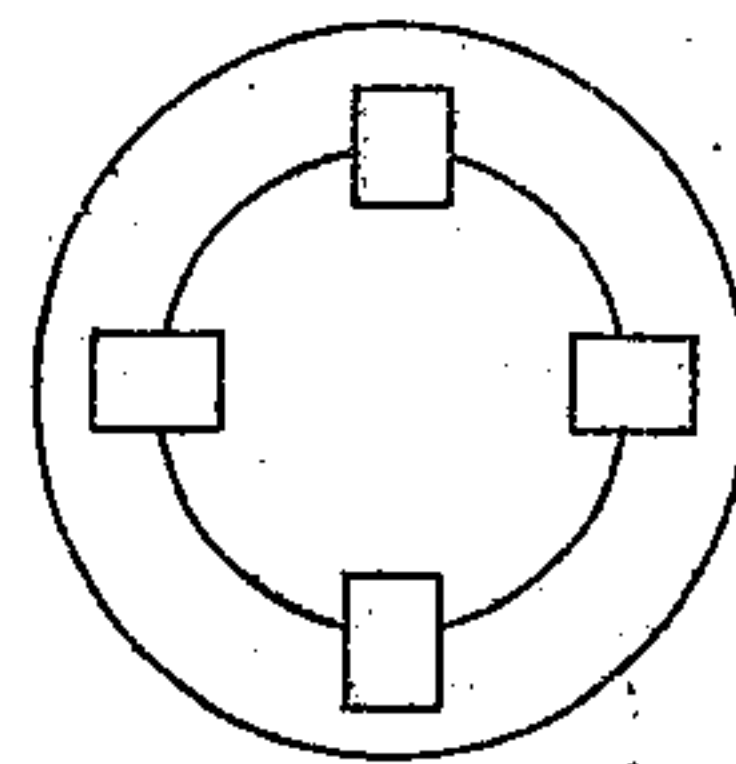
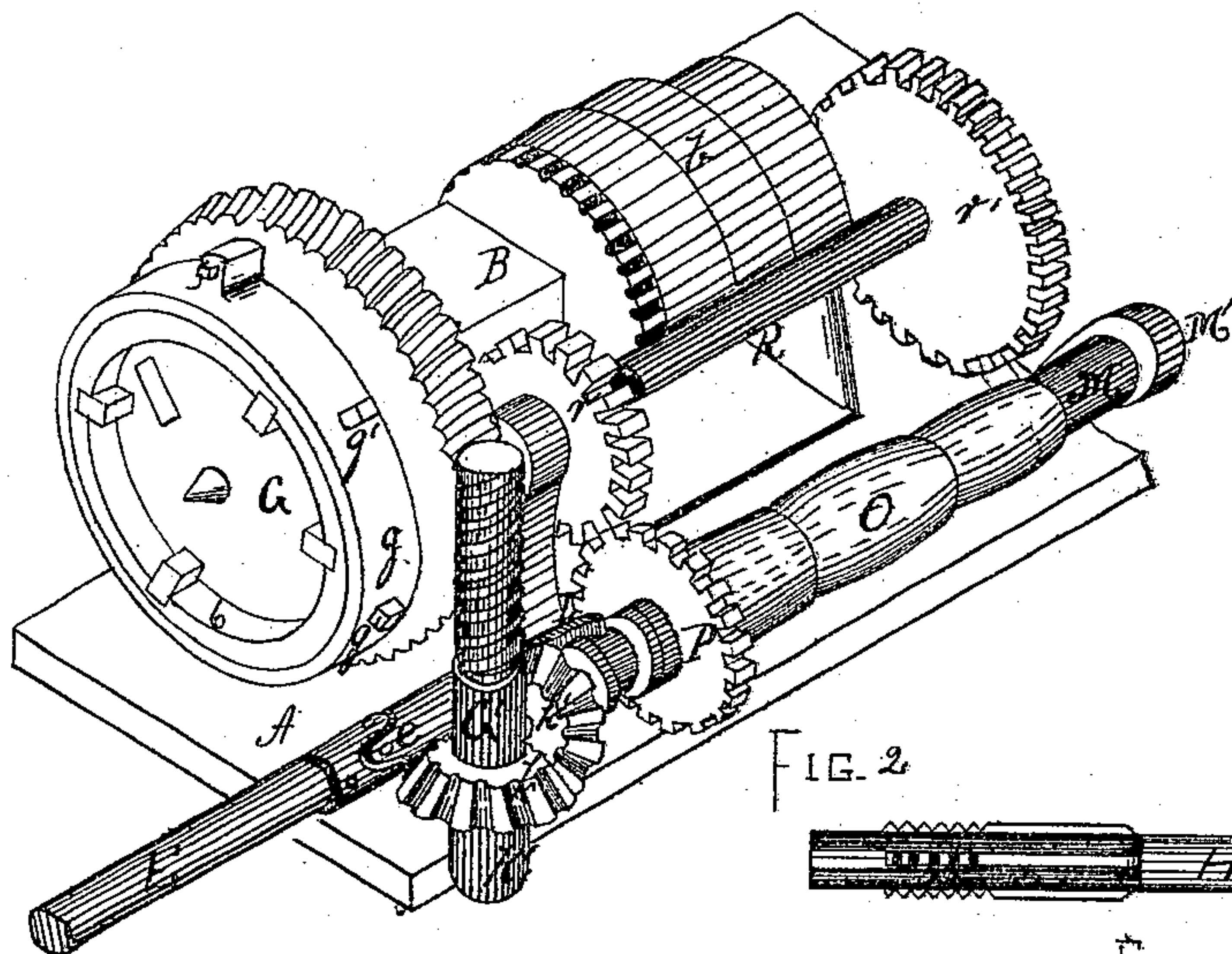


FIG. 6

FIG. 2



FIG. 5

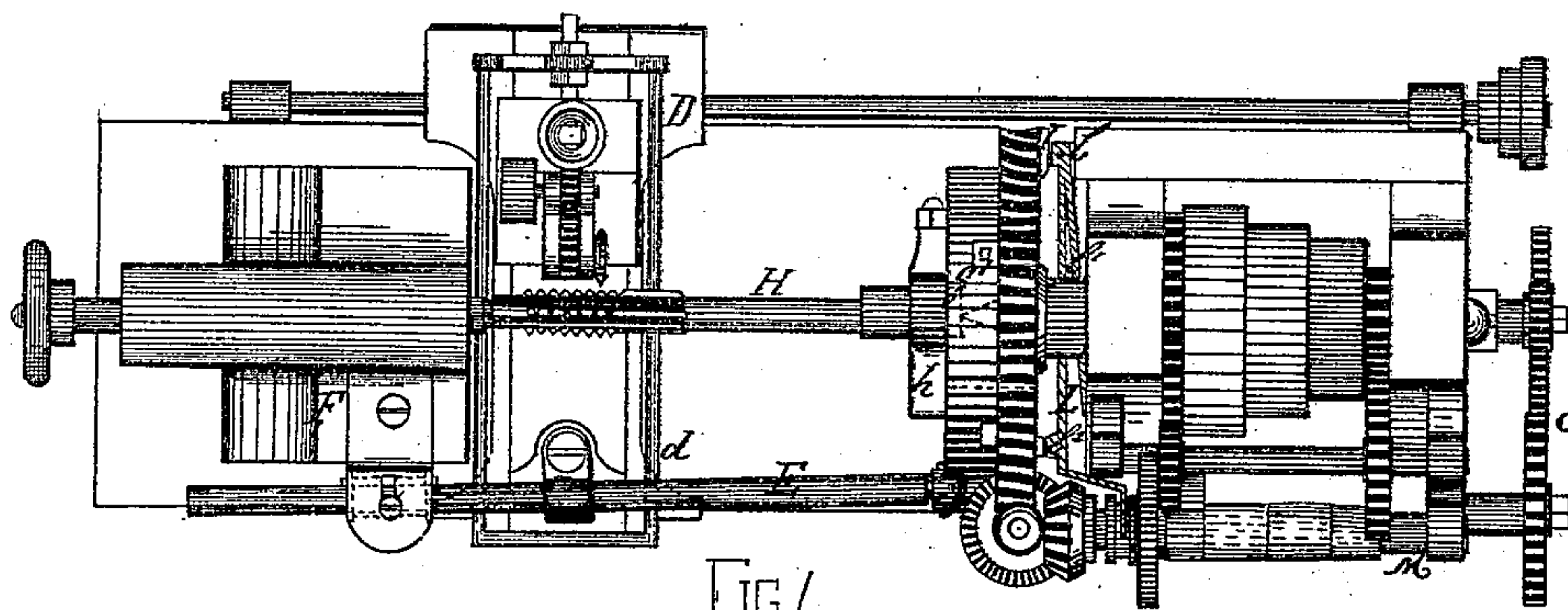


FIG. 1

WITNESSES.

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# UNITED STATES PATENT OFFICE.

HENRY E. BOYD, OF McKEESPORT, PENNSYLVANIA.

## IMPROVEMENT IN MACHINES FOR CUTTING SCREW-TAPS.

Specification forming part of Letters Patent No. **169,080**, dated October 26, 1875; application filed July 21, 1875.

*To all whom it may concern:*

Be it known that I, HENRY E. BOYD, of McKeesport, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Cutting Screw-Taps and internal threads of pipe and bolt dies; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing, forming a part of this specification, in which—

Figure 1 is a plan view of an engine-lathe to which the devices embodying my invention have been applied. Fig. 2 is a perspective of the face-plate of head-stock, or the worm-wheel and driving-gear, with the attachment for cutting the internal thread of pipe or bolt dies. Fig. 3 is a side elevation of the engine-lathe and my devices attached thereto. Fig. 4 is an enlarged sectional view of the driving-spindle and the devices by which the change of speed is accomplished; and Figs. 5 and 6 are views of a screw-tap and pipe or bolt dies.

Like letters refer to like parts wherever they occur.

My invention relates to the manufacture of screw-taps and pipe and bolt threading dies, and has for its object the construction of devices which may be applied to an engine-lathe when it is desired to cut the internal thread of a pipe or bolt die, and which can be readily removed when the lathe is to be employed either for cutting screw-taps or for its ordinary uses, and also to modify the construction of the driving-gear, by which the speed of the face-plate and blank is controlled, so that said gearing does not require to be removed from the lathe when not employed for its specific purpose, and does not impede the other uses of the lathe.

The invention consists, first, in combining with a face-plate of a lathe, having a ring or holder for securing a blank, mechanism for changing the speed of the face-plate and a cutting-tool for cutting the blank; and, second, in providing the hub of the speed-pulley with friction-blocks, and the hub of the slow pulley or gear wheel with spring-pawls, by means of which and a clutch and taper central spindle operated from the face-plate, the

speed will be automatically altered according to the work.

I will now proceed to describe my invention, so that others skilled in the art may make and use the same.

In the drawing, A is the frame of the usual engine-lathe, having a head-stock, B, provided with pulleys *b*, and imparting power to the feed-screw C through a series of intermediate cog-wheels, *c*. D is the tool-rest, which receives its motion from feed-screw C, and upon the rest is secured a revolving cutter, provided with a driving-pulley. The slide of the tool-post is connected by a link, *d*, to a rod, E, one end of which is provided with a movable eccentric connected by a spline-feather to the rod, and journaled in a bracket secured to the tail-stock. Thus the rod is provided with a bearing, central with the opposite end bearing, and one which, owing to the eccentric sliding on the rod, enables the tail-stock of the lathe to be moved up when turning small work. The opposite end of the rod E is connected with an universal joint, so as to center off the line of axis of said joint and of the bearing, whereby the rod E, when oscillated, acts as an eccentric. On the journal of rod E, next the face-plate, is an arm, which stands in the path of a cam upon the face-plate, so that at intervals the rod E is slightly rotated or oscillated, and thus draws forward the cutter at the time the blank is being cut, so as to give the "clearance" or "relief" required in the thread of the tap or die. G indicates the face-plate of the lathe, toothed on its circumference to form a worm-wheel, which gears with the worm G'. To the face of G, Fig. 2, is secured a ring or similar holding device, *g*, provided with thumb or set screws *g'*, the whole acting as a check or clutch to hold a pipe or bolt die while the internal thread thereof is being cut. This ring G may be removed when not required for its specific purpose. H is a tap-blank, supported between the centers of the head and tail stock, and clamped to the worm-wheel or face-plate G by the usual dog *h*, which takes into a slot in the face-plate.

Upon the rear of the face-plate G, or that side of the face-plate next to the driving-pul-



leys, at regular intervals corresponding to the cuts to be made on the blanks, are a series of cams or inclines, I, which actuate the shipping-lever of the driving-gear and the eccentric rod E, which brings the cutter up to its work. L is the shipping-lever, located between the rear side of the face-plate and the brackets, which support the driving-pulleys of the head-stock. It is pivoted, as at *l*, to the frame A, or to the head-stock, and is held forward by a spring or similar device, *l'*, so that a projection or cam, *l''*, upon it impinges against the rear of the face-plate, and at regular intervals engages with the face of one of the cams I, which forces back the lever, and changes the position of the clutch on the driving-shaft. At the same time that the face of cam I actuates lever L, the side of cam I engages with an arm, secured to the end of eccentric rod E, oscillating or slightly rotating the rod in such a manner as to force in the tool-carriage and bring the cutter into action, the cams on the face-plate thus serving to actuate simultaneously the speed-changing and the cutting mechanisms. G' is a vertical worm, stepped in a bracket, K', secured to frame A, said worm gearing with the toothed face-plate, and by means of beveled cog-wheels *k k'* with a driving-shaft, which receives its power from the pulleys of the head-stock. M indicates the driving-shaft, through which the power is transmitted to the face-plate, with which the blank revolves, and, as the speed with which the blank is rotated is varied at regular intervals, for the reasons before stated, I construct this shaft and its pulleys as follows, with special reference thereto: The shaft M is bored out for about two-thirds of its length, for the reception of a tapered spindle, *m*, and is cut away at *n*, to seat a set of friction-blocks, *o*, which are held in position by the hub of the speed-pulley O. The spindle *m* is secured to the sliding clutch N by a pin, *p*, which passes through a slot in the shaft M, so that the spindle moves with the sliding clutch, and both the clutch and the spindle rotate with the shaft. O is the speed pulley or pulleys, which, in fact, is a tapered sleeve slipped upon shaft M, and which revolves loosely when not clutched to the shaft by the friction-blocks *o*. P is a gear-wheel, by which the slow motion is imparted to the shaft, and like the speed-pulley is loose upon shaft M, but the hub of P is provided with a set of spring-dogs, *p'*, which take into notches in the shaft M, thus permitting the gear to slip on the shaft when the shaft is driven by the speed-pulley, but causing the wheel to clutch the shaft when the slow motion is required, and the speed-pulleys are running loose upon the shaft. The shaft M is journaled in brackets M', attached to the frame A, or to the head-stock, and the speed-pulleys are driven by belting from the pulleys of the head-stock, but the slow motion is obtained through gear-wheels *r r'* on shaft R, located between shaft M and the pulleys of the head-stock, and

journaled in the same bracket as M. The pinion *r* may slide upon shaft R, being held by a feather, *s*, or other suitable means, and it will be apparent that by simply sliding the pinion *r* out of gear with P, and unshipping the belts from the speed-pulleys, the head-stock will be freed from the remaining driving-gear, and the lathe may be used in the usual manner without the removal of any devices, except those employed to secure the pipe or bolt-die to the face-plate.

Fig. 3 shows pins upon the clutch, for gripping the slow pulley, which are well-known devices for clutching the pulleys, and may be substituted for the spring-dogs *p'* of P.

The operation of these devices is as follows: When cutting a tap the die-ring *g* may be left upon the face-plate, or removed therefrom, as preferred. It is not in the way, but performs no function. The tap-blank previously grooved longitudinally is secured between the centers of the head and tail stock, Fig. 1, and power is applied through the speed-pulleys O to shaft M, and from thence through worm G' to the face-plate G, which is revolved rapidly until cam I of the face-plate comes in contact with the projection *l''* on shipping-lever L, forcing back lever L, and causing clutch N to slide upon shaft M, so as to engage with gear-wheel P, the clutch at the same time imparting an end-wise motion to taper spindle *m*, which frees the friction-blocks *o*, and permits sleeve or speed pulley O to revolve loosely upon its shaft, so that shaft M is now driven only by the slow pulley, and the speed of the face-plate is decreased during the cutting. At the same time that cam I engages with lever L the side of the cam actuates an arm attached to eccentric rod E, and oscillates or slightly rotates eccentric rod E, which brings forward the tool-carriage and cutter. As soon as the cam I passes the arm of E and the projection *l''* of L, the lever and eccentric rod are brought back to their first position by springs or other suitable devices, the lever L again sliding the clutch N on shaft M, so as to throw the slow pinion or pulley out of gear, and drawing forward the taper spindle *m*, which motion is assisted by a spring, *t*, acting on the end of the spindle, so as to force out the friction-blocks *o*, and thus clutch the speed-pulley, which again revolves the face-plate rapidly until another cam, I, strikes lever L. The reverse rotation of eccentric rod E, caused by a spring, has, in the meanwhile, withdrawn the cutter. These several operations of the machine are repeated until the tap is fully cut, the tool-rest being fed along the frame by the feed-screw in the usual manner.

When a pipe or bolt die is to be cut, the ring *g* is secured to the face-plate, and the die, Fig. 6, is secured within the ring or holder by means of the thumb or set screws *g'*, care being taken that the bits correspond with the cams on the face-plate. The cutter, which should have a shaft of sufficient length to reach through the die, is then brought forward



and adjusted within the die on the side next to the worm, power is applied through shaft M, and the devices then operate as before specified in describing the cutting of the screw-tap.

Among the advantages of these devices may be noted the ease, rapidity, and accuracy with which dies for pipe or bolts may be cut, and the compactness of the driving-gear, and devices for changing the speed of the face-plate, the construction of the latter being such that, if desired, they can be used with the lathe for other purposes than those specified, and when not in use they need not be detached from the machine, as they do not interfere with the other uses to which an engine-lathe is applied.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination of the face-plate, pro-

vided with a ring or holder for securing the blank, suitable mechanism for changing the speed of the face-plate, and the cutting-tool for cutting the blank, substantially as specified.

2. The combination of the loose pulley O, and friction-blocks with the hollow shaft, and tapered central spindle, substantially as and for the purpose specified.

3. The combination of the loose pulley P, or pinion having its hub provided with spring-pawls, the hollow shaft and tapered central spindle, and the loose pulley O, and friction-blocks.

In testimony whereof I, the said HENRY E. BOYD, have hereunto set my hand.

HENRY E. BOYD.

Witnesses:

F. W. RITTER, Jr.,  
W. N. PAXTON.