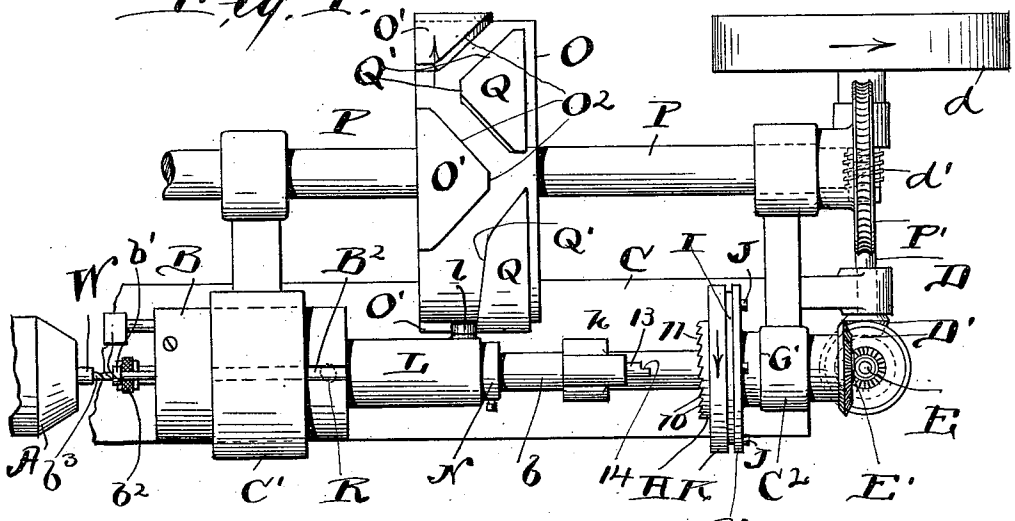
(No Model.) 2 Sheets—Sheet 1.

J. B. CLYNE.

MACHINE FOR MAKING SCREWS, NIPPLES, &c.

No. 554,812. Patented Feb. 18, 1896.

Fig. 1.



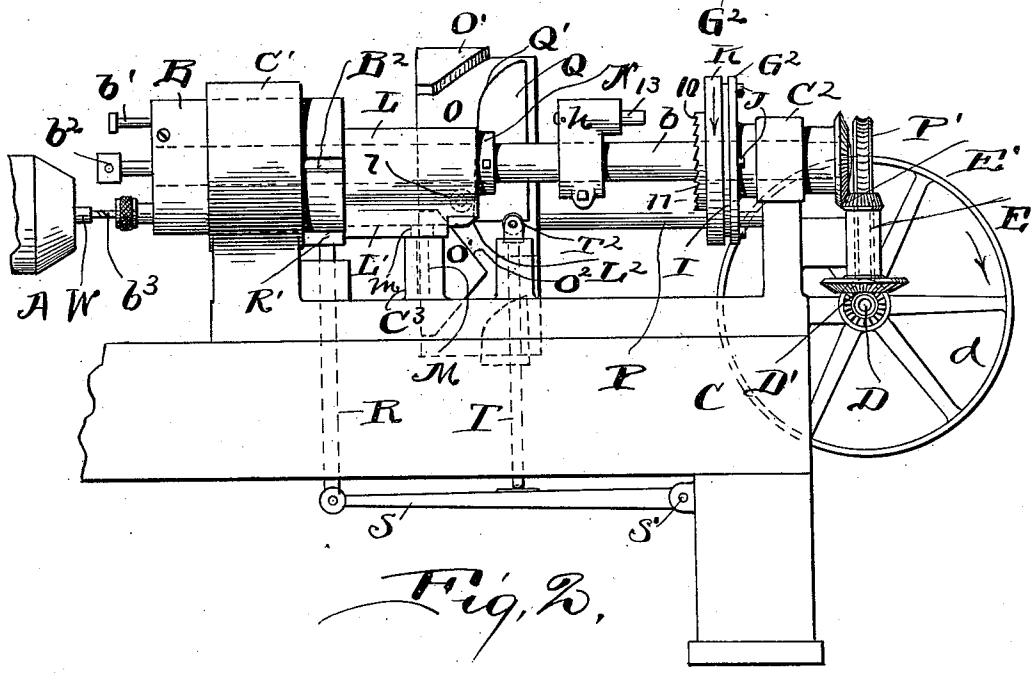


Fig. 2.

Witnesses.
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James B. Clyne
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(No Model.) 2 Sheets—Sheet 2.

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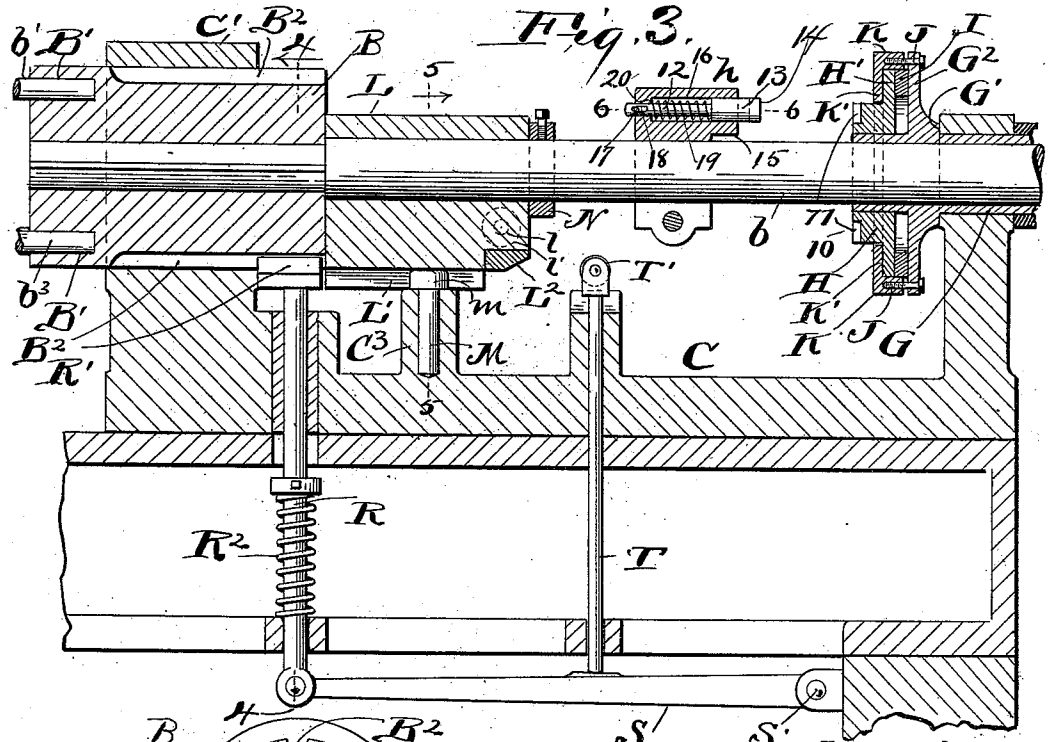

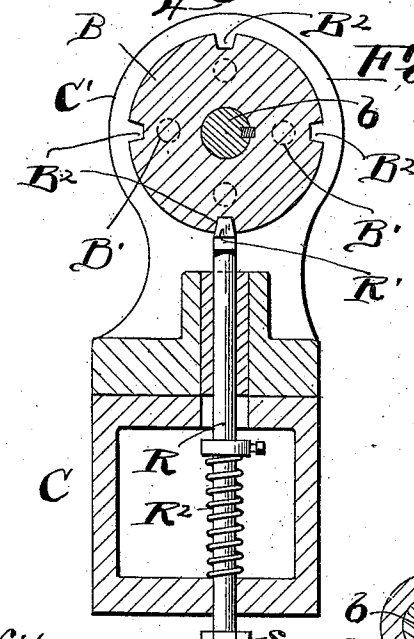

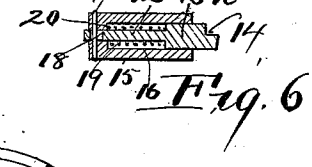

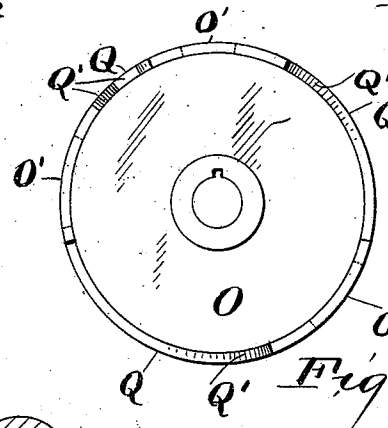

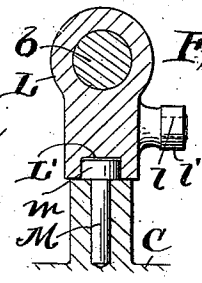

Witnesses.
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his Attorneys

UNITED STATES PATENT OFFICE.

JAMES B. CLYNE, OF CLEVELAND, OHIO, ASSIGNOR TO THE CLEVELAND MACHINE SCREW COMPANY, OF SAME PLACE.

MACHINE FOR MAKING SCREWS, NIPPLES, &c.

SPECIFICATION forming part of Letters Patent No. 554,812, dated February 18, 1896.

Application filed July 5, 1895. Serial No. 554,918. (No model.)

To all whom it may concern:

Be it known that I, JAMES B. CLYNE, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Machines for Making Screws, Nipples, &c.; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

My invention relates to improvements in lathes or metal-working machines more especially designed for making screws, nipples used in the attachment of the spokes of a bicycle-wheel to the wheel-rim, &c.; and it consists in certain features of construction and combinations of parts hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a top plan of that portion of the machine that embraces my invention. Fig. 2 is a front side elevation of the same. Fig. 3 is an elevation of a portion of the machine mostly in central vertical longitudinal section. Fig. 4 is a vertical section on line 4 4, Fig. 3. Fig. 5 is a vertical section on line 5 5, Fig. 3. Fig. 6 is a horizontal section on line 6 6, Fig. 3. Some features in Figs. 4, 5, and 6 are not in section. Fig. 7 is an end elevation of cam-wheel O.

Referring to the drawings, A designates the work-holder, that is rotated in any approved manner. It is not considered necessary to show the mechanism for rotating the work, because the same forms no part of my present invention.

B designates the tool-stock, that is preferably circular in cross-section, as shown in Figs. 1, 2, and 4, and is operatively mounted upon a horizontally-arranged shaft *b*, suitably supported from the stationary framework C of the machine and arranged directly opposite to the work-holder. In the case illustrated the tool-stock, mounted upon one end of shaft *b*, has bearing in a box C′ rigid with framework C, and the shaft at or near its opposite end is supported as will hereinafter appear.

The tool-stock within its tool-bearing end is provided with any suitable number of pockets B′ for the reception of the tools required in the operation of the machine. The tool-stock is therefore provided with as many pockets B′ as there are tools to be used for any work for which the machine is adapted. The tool-stock in the case illustrated is provided with four tool-receiving pockets B′ and the work-holder is shown bearing a piece W of metal to be bored and threaded internally and shaped externally to form a nipple suitable for use in securing the spoke of a bicycle-wheel to the wheel-rim.

I would here remark that work of the character indicated—such, for instance, as screws, nipples, &c.—is made from wire or metallic rods, and the wire or rod is automatically fed through the work-holder while it is rotated with the holder.

In the manufacture of nipples for use in securing the spokes of bicycle-wheels to the wheel-rims three tools are required—namely, a drill for boring the screw-threaded hole in the stock of which the nipple is constructed, a tool for milling or shaping the blank externally, and another tool for gaging the length of the nipple. The tool-stock in the case illustrated is, therefore, provided with the three tools indicated, and hence three of the tool-receiving pockets in the tool-stock are occupied, whereas the remaining tool-receiving pocket is empty. The tool-receiving pockets B′, and consequently the tools of the tool-stock, are arranged at suitable intervals about the axis of the tool-stock. Hence the arrangement of parts is such that the axis of the tool-stock is located such a distance out of line with the axis of the work-holder that the tools of the tool-stock shall be adapted to be brought successively into engagement with the work to be operated upon. As already indicated, four tools are required for making some kinds of work for which the machine is designed, whereas less than that number of tools—as, for instance, three in the case illustrated—are required in making other articles for the manufacture of which the machine is designed. It is, therefore, obvious that if, for instance, the tool-stock has four tool-receiving pockets arranged equal distances apart, as in the case illustrated, and only three of said pockets are occupied by tools required to perform their functions successively, the tool-stock must be given a quarter-turn in bringing two of the tools into operative po-

sition and must be rotated a half-turn in order to bring the remaining tool into an operative position.

In Figs. 1 and 2 of the drawings the drill b^3 of the tool-stock is shown in an operative position. The tool b' for gaging the work occupies the tool-receiving pocket that is located diametrically opposite the pocket occupied by the drill and the milling or shaping tool b^2 occupies one of the tool-receiving pockets between the pockets occupied by the gage and drill.

We will suppose that, in the case illustrated, the gage first performs its function, that the milling or shaping tool is next called into requisition, and that the drill's services are required for the last operation upon the work. The tool-stock will have been given a quarter-turn in bringing the milling or shaping tool into operation after the gage has performed its function and will have been given another quarter-turn in bringing the drill into operation after the shaping or milling tool has performed its function, and must be given a half-turn in bringing the gage again into an operative position for the new blank to be operated upon after the drill has completed its operation upon the piece of work. Means is, therefore, provided for rotating the tool-stock intermittently and the distance required to bring the next succeeding tool into an operative position when the tool last operating has performed its function.

D represents the driving-shaft of the machine, which shaft is arranged horizontally and at right angles to shaft b, and is located a suitable distance below said shaft b and suitably supported from the stationary framework of the machine. Shaft D is provided with a driving-pulley d, to which power is applied in any approved manner.

Driving-shaft D at its forward end is suitably intergeared, as at D', with a suitably-supported upright shaft E, that at its upper end is suitably intergeared, as at E', with a sleeve G that extends through and has bearing in a box C^2 rigid with the stationary framework of the machine and is loosely mounted upon and affords bearing for shaft b. Sleeve G, at the inner end of box C^2, is provided with an annular shoulder G' that engages said end of the box and prevents outward displacement of the sleeve, and said sleeve, at any suitable point between shoulder G' and its inner extremity, is provided with an annular flange or collar G^2. The one and relatively stationary member H of a toothed clutch is loosely mounted upon the inner end of sleeve G a suitable distance from the inner end of flange or collar G^2. Clutch member H is provided with an external annular flange H', and a friction-ring I, composed of leather or any suitable material, is interposed between said flange and the opposing face of flange or collar G^2, and said friction-ring is adjusted and held in the desired frictional engagement with the opposing faces of flanges G^2 and H' by means of any suitable number of screws J, having their heads engaging the outer side of flange G^2 and extending through said flange into correspondingly-threaded holes formed within a metallic ring K that engages the periphery of flange H' of the clutch member and friction-ring I, and is flanged internally, as at K', to engage that side of flange H' that faces away from the friction-ring. The movable member h of the clutch is rigidly mounted upon shaft b in any approved manner and is adapted to be brought into operative engagement with member H upon reciprocating the shaft in the required direction, and it will be observed that when operative connection is established between the two members of the clutch the tool-stock will be rotated. The reciprocation of the tool-stock-bearing shaft in the direction required to move the movable clutch member toward the relatively stationary clutch member takes place quickly after the operation of the operating-tool; and I would here remark that the stock forming the blanks or work operated upon is, as already indicated, advanced as required during the aforesaid reciprocation of the tool-stock.

Mechanisms for automatically advancing the work in lathes or metal-working machines are well understood by persons skilled in the art and do not need illustration in this application.

The means or mechanism employed for effecting the aforesaid reciprocation of the tool-stock-bearing shaft comprises, preferably, the following: A sleeve L is rigidly mounted upon shaft b at the inner end of the tool-stock, which sleeve upon its under side is preferably provided with a longitudinal groove or recess L' that is engaged by the head m of a pin M extending downwardly into a boss C^3 formed upon the stationary framework of the machine, and the engagement of the head of said pin with the side walls of the aforesaid recess or groove prevents circumferential displacement of the sleeve. Groove or recess L' in the under side of sleeve L is long enough to accommodate the endwise movement of the sleeve during the reciprocation of the tool-stock-bearing shaft.

The tool-stock prevents collar L from moving endwise of the supporting-shaft in the one direction, and a collar N, rigidly mounted upon the shaft at the other end of sleeve L, prevents endwise displacement of said sleeve in the opposite direction. Sleeve L upon its rear side is provided with a roller-bearing stud or lug l, and the roller l' is adapted to be engaged by cams O' suitably secured, preferably removably, to the periphery of the cam-wheel O, that is operatively mounted upon shaft P, arranged a suitable distance rearward of and parallel with shaft b and suitably supported from the stationary framework of the machine. Shaft P is suitably intergeared with the driving-shaft D and prefer-

ably by means of a worm-wheel P′ operatively mounted upon the cam-wheel-bearing shaft and meshing with a worm *d′* formed upon the driving-shaft. The working surfaces O² of cams O′ have such trend that they will slide the tool-stock-bearing shaft in the direction required to bring clutch member *h* into operative engagement with the companion clutch member H, and thereby establish operative connection between the tool-stock and driving-shaft and retain the two clutch members in operative engagement with each other until the required fractional turn has been given to the tool-stock. For instance, a half-turn, as has already been observed, must be given to the tool-stock in bringing one of the three tools shown into an operative position. Hence the cam O′, employed for effecting said turn of the tool-stock, is necessarily constructed somewhat differently from the remaining cams O′, employed for effecting a quarter-turn of the tool-stock. Wheel O is provided with as many cams O as there are fractional turns to be given to the tool-stock during one complete rotation of the tool-stock-supporting shaft. In the case illustrated, therefore, cam-wheel O is provided with three cams O′ arranged at suitable intervals upon the periphery of said wheel. Cam-wheel O is also provided upon its periphery with another set of cams Q arranged at suitable intervals circumferentially of the wheel and adapted to engage roller *l′* and actuate the tool-stock-bearing shaft in the direction required to interrupt operative engagement with the two clutch members *h* and H, and thereby operatively disconnect the tool-stock from the driving-shaft, and the trend of the working surfaces Q′ of cams Q is such that the tool-stock shall be gradually advanced during the operation of the tools. Wheel O has, therefore, as many cams Q as there are cams O′, and cams Q are so arranged relative to cams O′ that a cam Q shall have come into operative engagement with roller *l′* as soon as a cam O′ has performed its function.

To prevent circumferential displacement or vibration of the tool-stock during the operation of the tool, means for positively locking the tool-stock in the operative position of the tool is provided, and consists preferably of an upright bolt R provided at its upper end with a head R′ adapted to snugly engage longitudinal grooves or recesses B², formed in the periphery and arranged longitudinally of the tool-stock, and a spiral spring R² suitably confined upon bolt R acts in the direction to retain the bolt in its operative position.

The tool-stock is provided with as many recesses or grooves B² as there are tool-receiving pockets B′ and the arrangement of said grooves or recesses is such that one of them is opposite the head of the bolt in the operative position of any one of the tools with which the tool-stock is provided. Bolt R extends downwardly through the adjacent portion of the stationary part of the machine, and, at its lower end, is operatively connected with the outer end of the vertically-tilting lever S that is fulcrumed at its opposite end, as at S′, to a stationary member of the machine, and at any suitable point between its fulcrum and outer end supports an upright pin T that extends upwardly through the adjacent portion of the stationary part of the machine and, at its upper end, is provided with a roller T′ adapted to be engaged by an incline L² formed upon sleeve L, and the trend of said incline and the arrangement of parts are such that the incline shall have come into engagement with roller T′ and shall have depressed pin T to actuate the engaging-lever S in the direction and to the extent required to render bolt R inoperative immediately before operative engagement is completed between the two clutch members *h* and H.

Clutch member H consists preferably of a disk provided upon its working face with radially-arranged teeth 10 arranged at suitable intervals upon said face and forming radially-arranged notches or recesses 11 between the teeth, and the movable clutch member *h* comprises preferably a pin 12 provided at one end with a head 13 that terminates at its outer end in a tooth 14 adapted to engage the aforesaid recesses 11 in the stationary clutch member, and consequently the tooth of the movable clutch member is arranged radially to the axis of the supporting-shaft, so that said tooth, when the movable clutch member is brought into operative engagement with the stationary clutch member, shall properly engage the opposing radially-arranged recess in said stationary member. The pin 12 has bearing in and has a limited movement endwise of a sleeve or collar 15 rigidly mounted upon shaft *b*, which collar is provided with a horizontally-arranged hole 16 therethrough for the reception of the pin, and a stationary pin 17 that extends through a slot 18, formed in and extending longitudinally of the toothed pin 12, prevents circumferential displacement of said pin 12. A spiral spring 19 is confined upon pin 12 between the inner end of the toothed head of the pin and a shoulder 20 formed within said sleeve or collar near the slotted end of the pin. Slot 18 accommodates a limited longitudinal movement of pin 12, and spring 19 enables the movable clutch member to yieldingly engage the stationary clutch member and enables the movable clutch member to be pushed or crowded away from and by the stationary clutch member during the interval of interrupting operative connection between the clutch members. Also, by the construction hereinafter described, the stationary clutch member is capable of slipping upon the supporting and actuating sleeve, as required, if the complete withdrawal of bolt R from the tool-stock shall not have been effected when

the movable clutch member has been brought into operative engagement with the companion or stationary clutch member.

What I claim is—

1. In a machine of the variety indicated, the combination with a tool-stock-bearing shaft, whose tool-stock is provided with any suitable number of tools arranged at suitable intervals about the axis of the stock, and which shaft is capable of being slid endwise, of a suitably-rotated sleeve loosely mounted upon the shaft and provided with an annular flange or collar G^2, means for preventing endwise displacement of said sleeve, a clutch for establishing and interrupting operative connection between the sleeve and shaft, one member of the clutch being supported from and operatively connected with a shaft, and the companion clutch member being loosely mounted upon the aforesaid sleeve a suitable distance from the aforesaid flange or collar, a friction-ring interposed between said collar or flange and the adjacent stationary clutch member, means for establishing frictional contact between the friction-ring and the opposing surfaces of the sleeve flange or collar and adjacent clutch member, means for actuating the tool-stock-bearing shaft endwise in the direction required to effect operative engagement between the members of the clutch, and means for sliding said shaft in the opposite direction, the arrangement of parts being substantially as shown, for the purpose specified.

2. In a machine of the variety indicated, the combination with the tool-stock-bearing shaft whose tool-stock is provided with tools arranged at suitable intervals about the axis of the shaft, and which shaft is adapted to be slid endwise, of a suitably-rotated sleeve loosely mounted upon the shaft and provided with an annular flange or collar G^2, means for preventing endwise displacement of the sleeve, a clutch for establishing and interrupting operative connection between the sleeve and shaft, the reciprocating member of said clutch being operatively connected with the shaft, and the relatively-stationary clutch member being loosely mounted upon the sleeve and provided with an external flange H′, friction-ring I interposed between opposing surfaces of said clutch-flange and the sleeve flange or collar, ring K embracing the periphery of the clutch-flange and friction-ring and flanged internally to engage that surface of the clutch-flange that faces away from the friction-ring, and screws J for securing said ring K to the sleeve flange or collar and regulating the friction had between the friction-ring and opposing surfaces of said collar or flange and the flange on the adjacent clutch member, means for actuating the tool-stock-bearing shaft endwise in the direction required to effect operative engagement between the two clutch members, and means for actuating said shaft in the opposite direction, all arranged and operating substantially as shown, for the purpose specified.

3. In a machine of the variety indicated, the combination with the tool-stock-bearing shaft whose tool-stock is provided with tools arranged at suitable intervals about the axis of the shaft, and which shaft is adapted to be slid endwise, a suitably-rotated sleeve loosely mounted upon the shaft, and means for preventing endwise displacement of the sleeve, of a clutch for establishing operative connection between the sleeve and shaft, one of the clutch members being operatively connected with the sleeve and being provided with recesses arranged radially to and at suitable intervals about its axis, and the companion clutch member being operatively connected with the shaft and comprising a pin arranged parallel with the shaft and having a tooth adapted to engage the aforesaid recesses, a collar or sleeve affording bearing for said pin and rigidly secured to the shaft, a spiral spring confined upon the pin and acting to retain the toothed end of the pin in position for operation, means for preventing circumferential displacement of the pin, means for sliding the tool-stock-bearing shaft to effect operative engagement between the clutch members, and means for actuating said shaft in the opposite direction, the arrangement of parts being substantially as shown, for the purpose specified.

4. In a machine of the variety indicated, the combination with a tool-stock-bearing shaft, whose tool-stock is provided with tools arranged at suitable intervals about the axis of the shaft, and which shaft is adapted to be slid endwise, a driving-shaft, a clutch for establishing operative connection between the driving-shaft and tool-stock-bearing shaft, one member of said clutch being operatively connected with the driving-shaft and the companion clutch member being operatively connected with and movable endwise with the tool-stock-bearing shaft, a collar rigidly mounted upon the tool-stock-bearing shaft at any suitable point between the clutch and tool-stock, and a roller-bearing sleeve loosely mounted upon the tool-stock-bearing shaft between said collar and the tool-stock, and means for preventing circumferential displacement of the sleeve, of a cam-shaft arranged parallel with the tool-stock-bearing shaft and operatively connected with the driving-shaft, said cam-shaft being provided with a cam-wheel that, upon its peripheral surface, is provided with two sets of cams, one set whereof is adapted to engage the roller of the aforesaid sleeve and actuate the tool-stock-bearing shaft endwise in one direction and effect operative connection between the members of the aforesaid clutch, and the other set of cams whereof is adapted to actuate said shaft in the opposite direction, all arranged and operating substantially as shown, for the purpose specified.

5. In a machine of the variety indicated, the combination of the reciprocating tool-stock-bearing shaft, whose tool-stock is provided

with tools arranged at suitable intervals about the axis of the shaft and is provided upon its periphery with grooves or recesses extending longitudinally of said periphery and arranged at suitable intervals, a driving-shaft, a clutch for establishing operative connection between the driving-shaft and tool-stock-bearing shaft, one member of said clutch being operatively connected with the driving-shaft and the companion clutch member being operatively connected with and movable endwise with the tool-stock-bearing shaft, a collar rigidly mounted upon the tool-stock-bearing shaft at any suitable point between the clutch and tool-stock, and a roller-bearing sleeve loosely mounted upon the tool-stock-bearing shaft between said collar and tool-stock, and provided with the incline L^2, means for preventing circumferential displacement of the sleeve, a cam-shaft arranged parallel with the tool-stock-bearing shaft and operatively connected with a cam-wheel that, upon its peripheral surface, is provided with two sets of cams, one set whereof is adapted to engage the roller of the aforesaid sleeve and actuate the tool-stock-bearing shaft endwise in one direction and effect operative connection between the members of the aforesaid clutch, the other set whereof is adapted to actuate said shaft in the opposite direction, of a bolt adapted to engage one of the aforesaid peripheral recesses or grooves in the operative position of any one of the tools of the stock, a tilting lever operatively connected with said bolt, and a roller-bearing pin engaging said lever and adapted to actuate the lever in the direction required to render the bolt inoperative, the roller of said pin being adapted to be engaged by the incline of the aforesaid sleeve, and the trend of said incline and the arrangement of parts being substantially as shown, for the purpose specified.

In testimony whereof I sign this specification, in the presence of two witnesses, this 24th day of June, 1895.

JAMES B. CLYNE.

Witnesses:
JOHN J. GRANT,
C. H. DORER.