(No Model.)

4 Sheets—Sheet 1.

G. E. WITHERELL.

SCREW MACHINE.

No. 545,400. Patented Aug. 27, 1895.

Fig. 1.

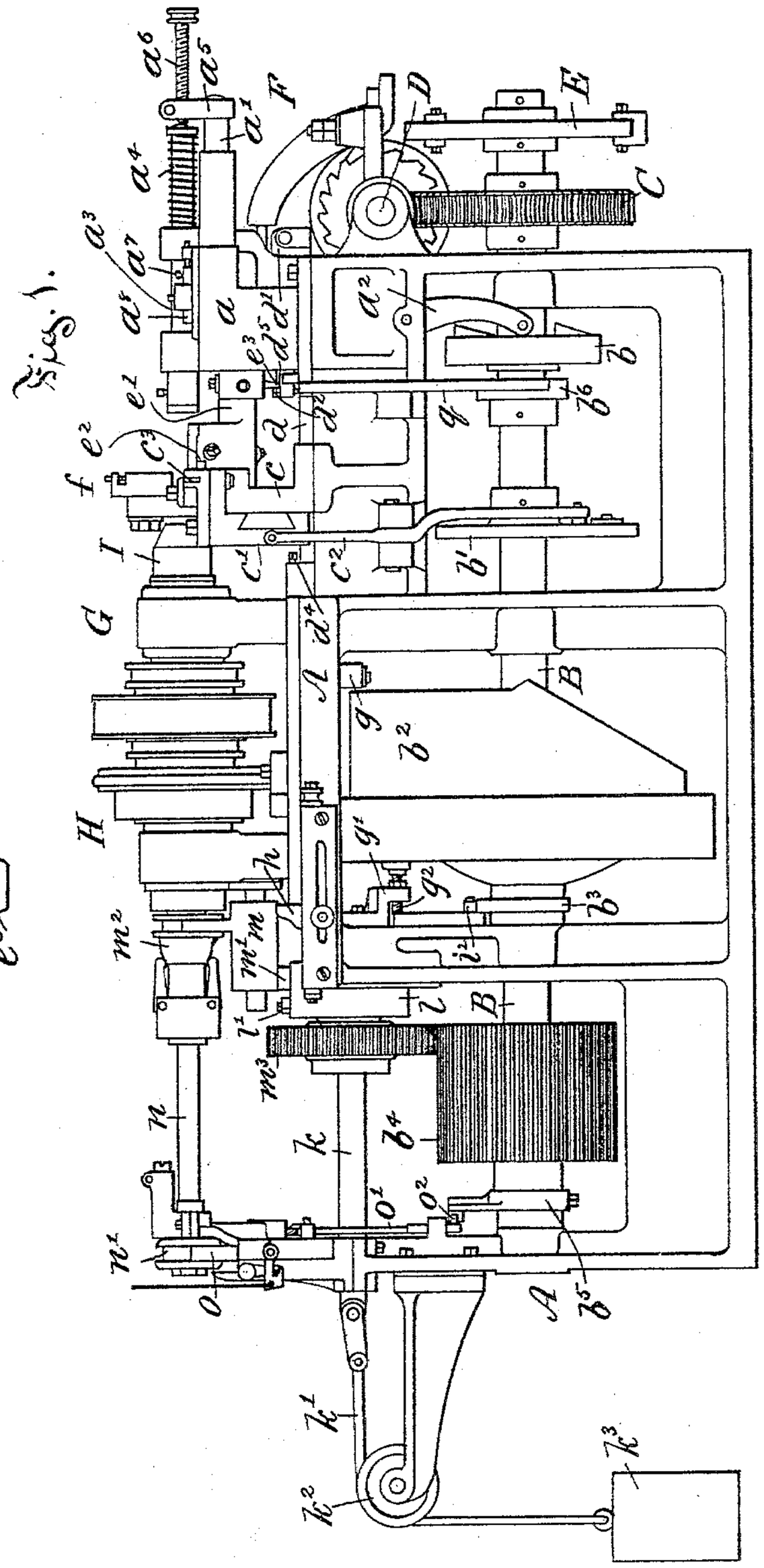


Fig. 7.

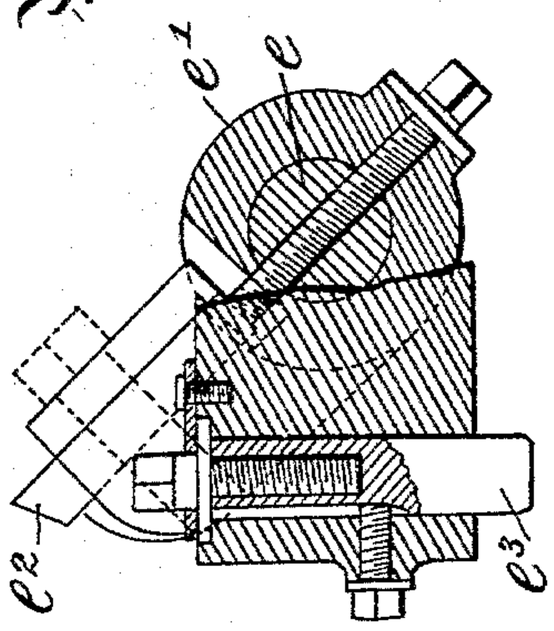
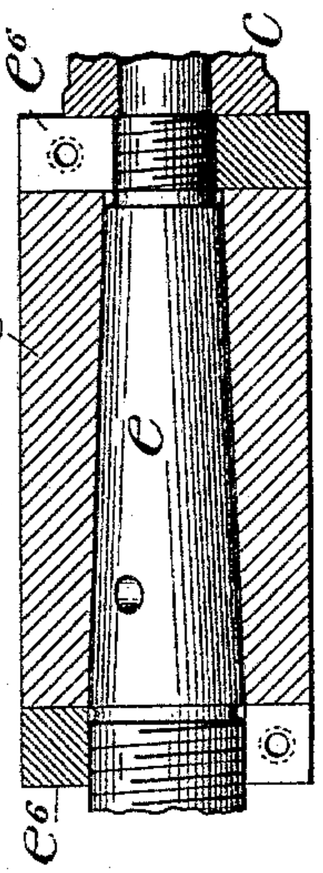


Fig. 9.



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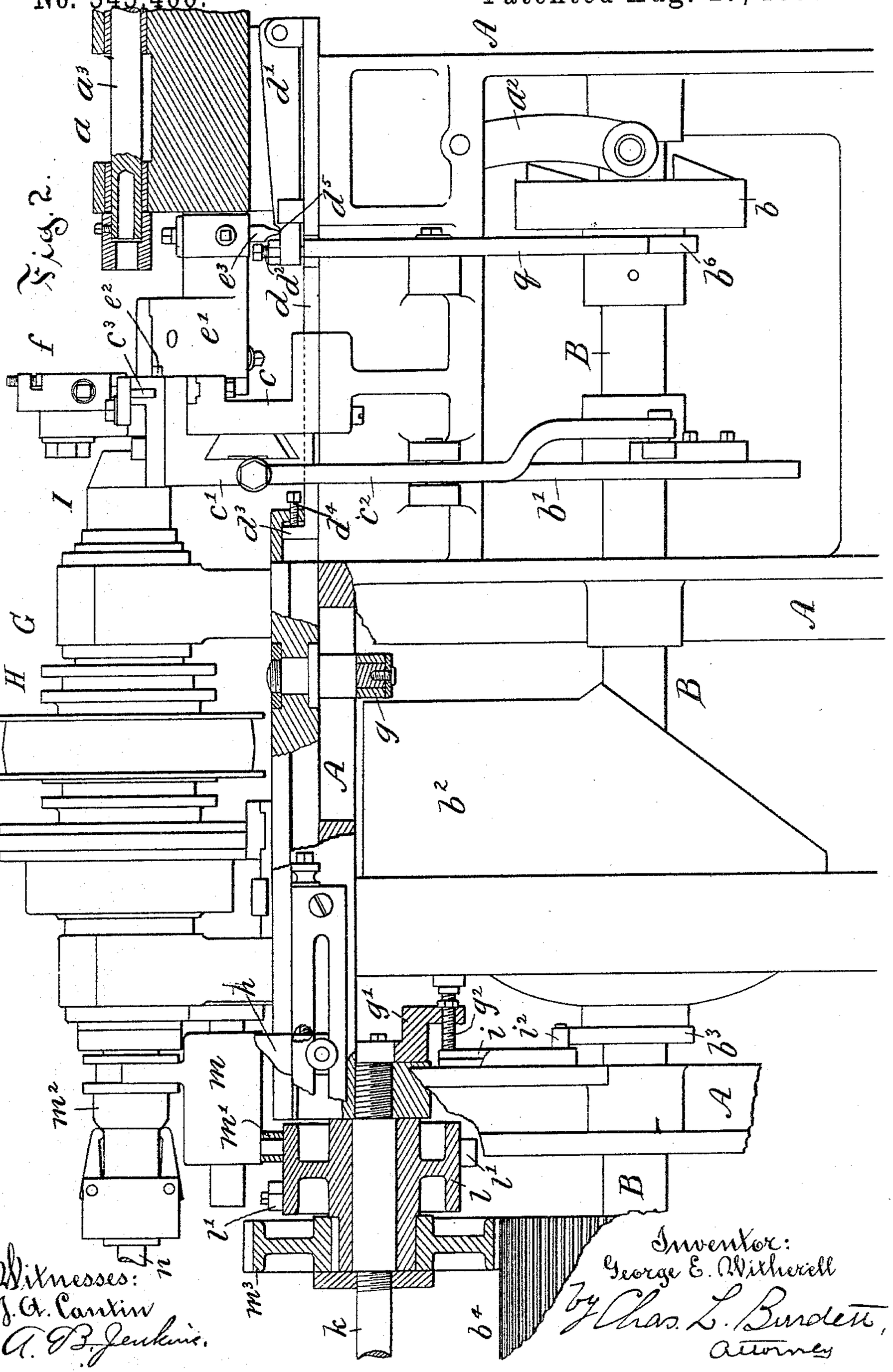
(No Model.) 4 Sheets—Sheet 2.

G. E. WITHERELL.

SCREW MACHINE.

No. 545,400. Patented Aug. 27, 1895.



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SCREW MACHINE.

No. 545,400. Patented Aug. 27, 1895.

Fig. 3.

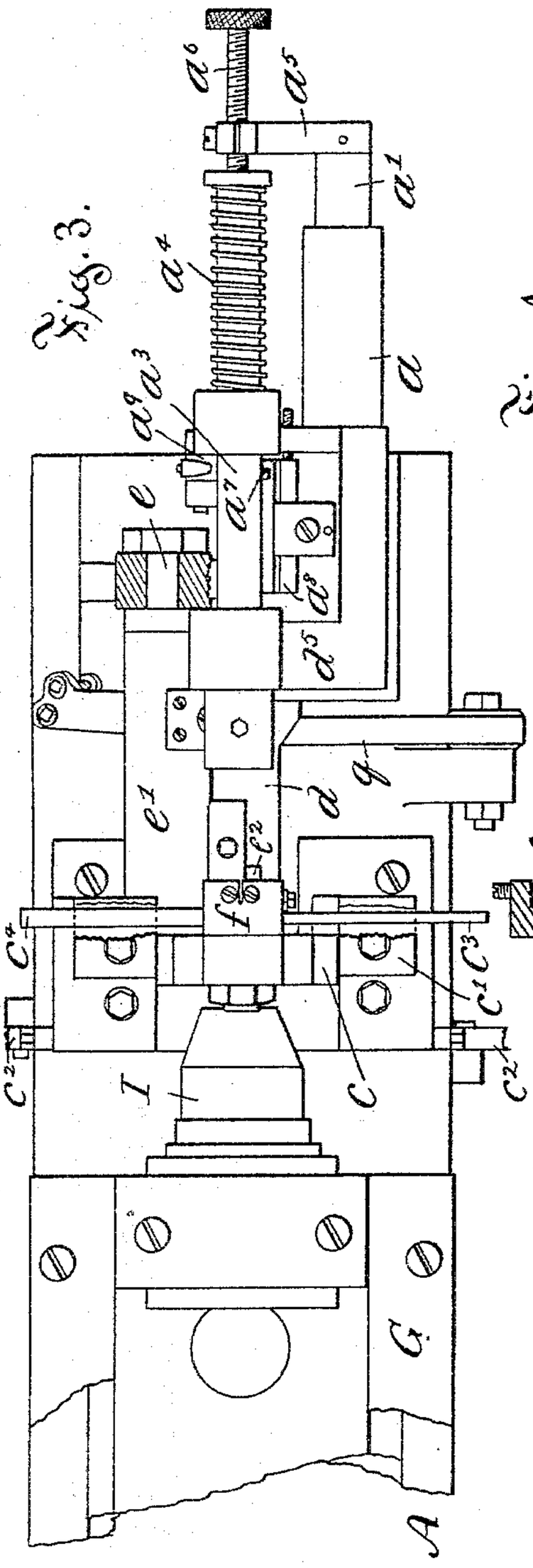

Fig. 4.

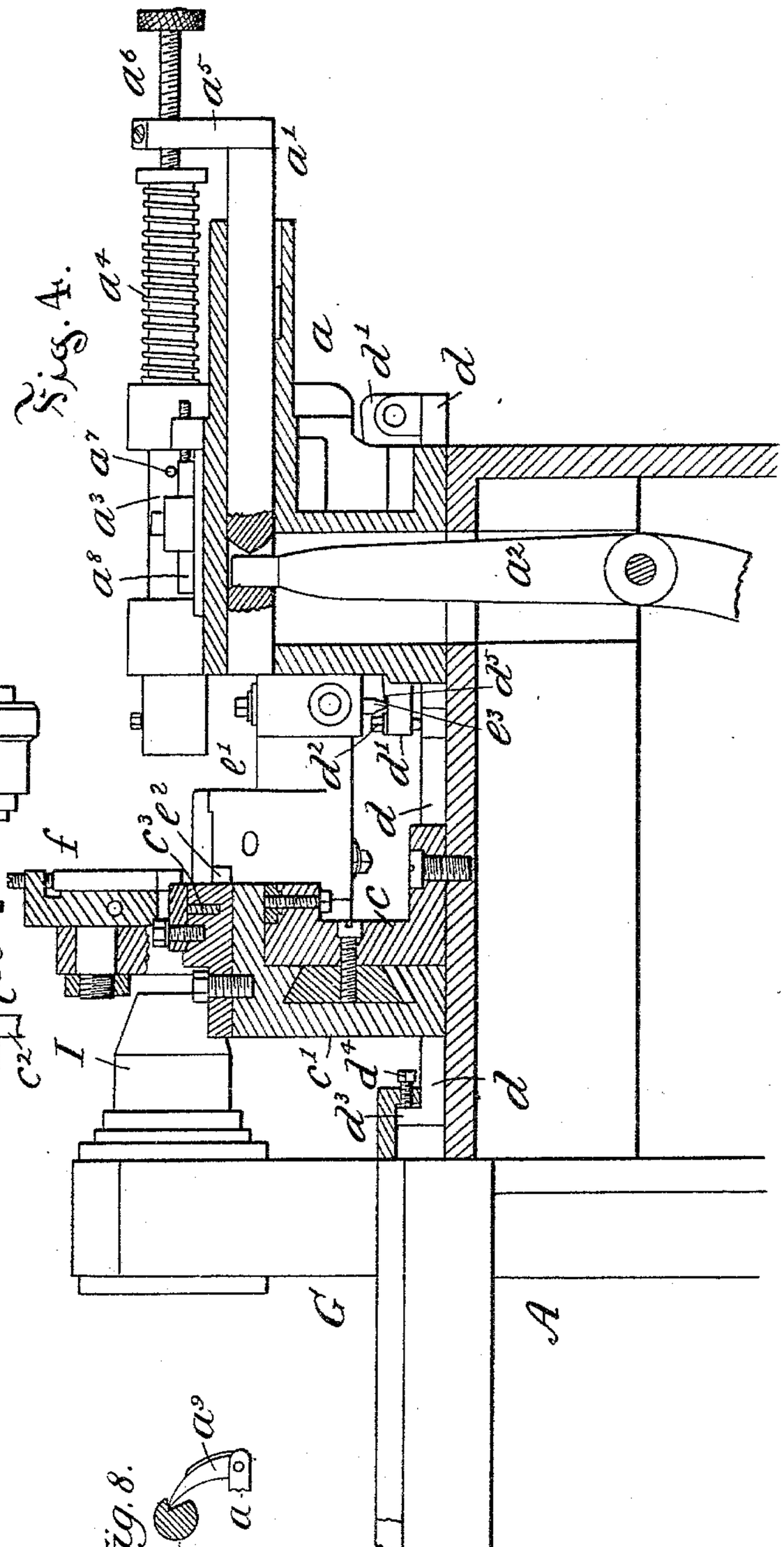

Fig. 8.

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(No Model.) 4 Sheets—Sheet 4.

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SCREW MACHINE.

No. 545,400. Patented Aug. 27, 1895.

Fig. 5.

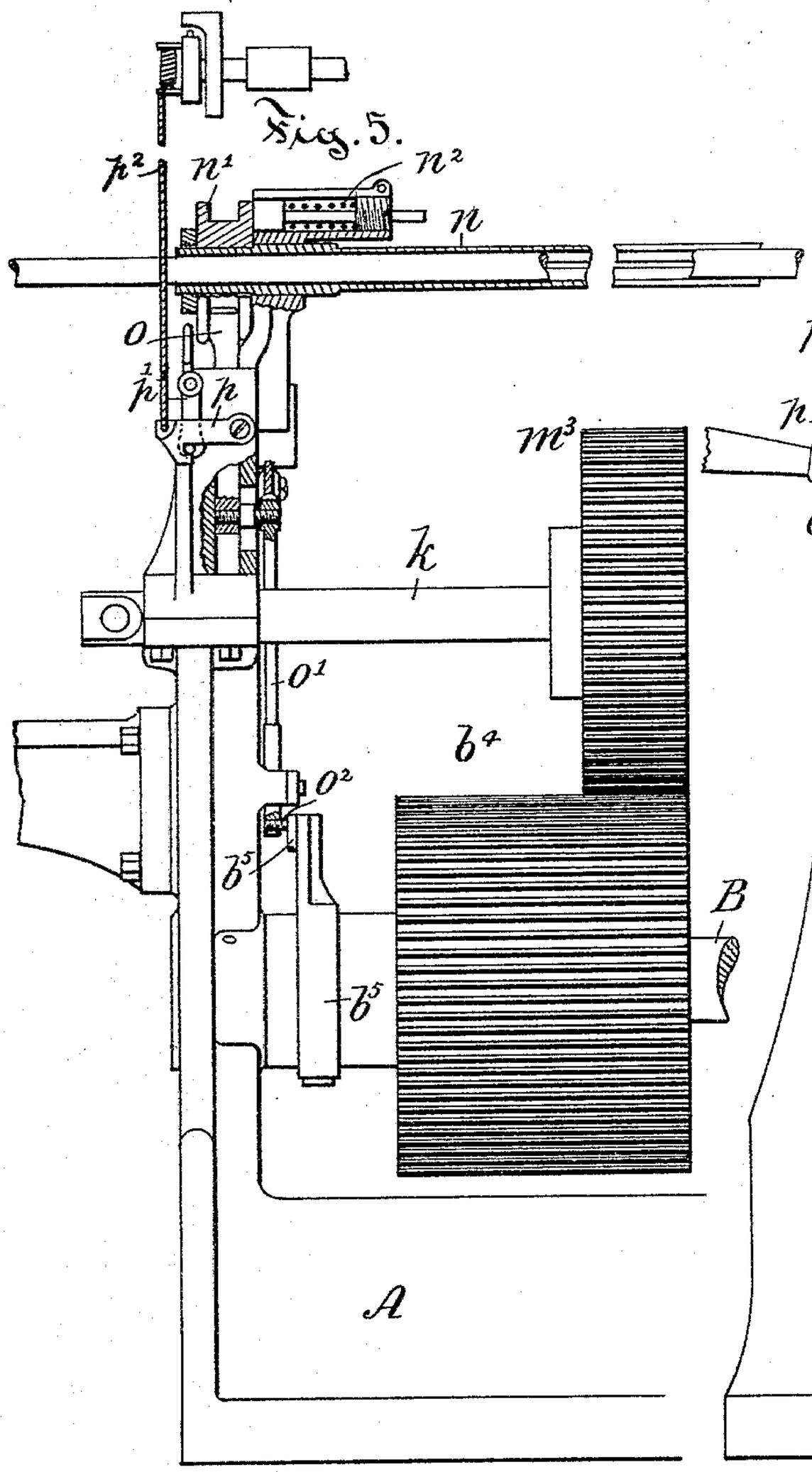
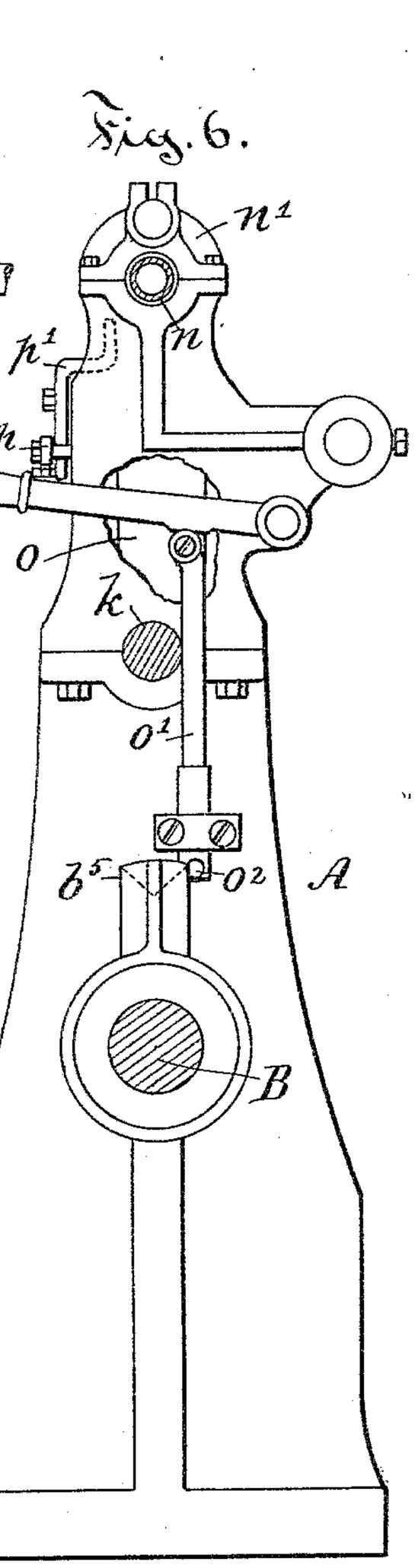


Fig. 6.



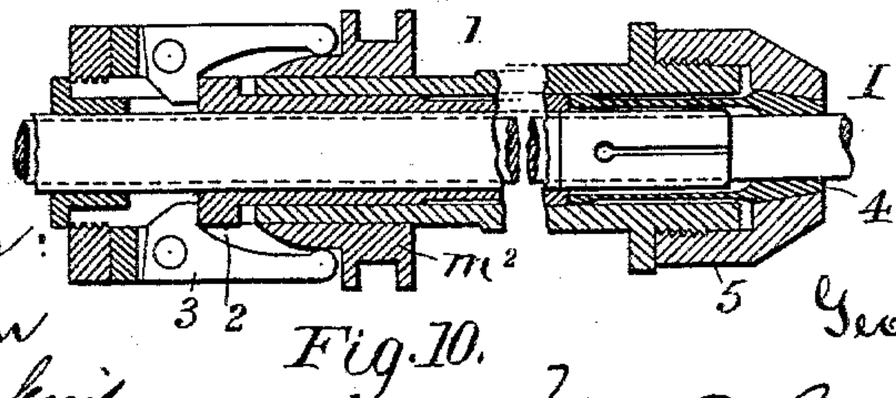


Fig. 10.

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UNITED STATES PATENT OFFICE.

GEORGE E. WITHERELL, OF HARTFORD, CONNECTICUT, ASSIGNOR TO THE HARTFORD MACHINE SCREW COMPANY, OF SAME PLACE.

SCREW-MACHINE.

SPECIFICATION forming part of Letters Patent No. 545,400, dated August 27, 1895.

Application filed June 18, 1894. Serial No. 515,001. (No model.)

To all whom it may concern:

Be it known that I, GEORGE E. WITHERELL, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Screw-Machines, of which the following is a full, clear, and exact description, whereby any one skilled in the art can make and use the same.

My invention relates to the class of machines for making tapered pins, screws, and the like; and the object of my invention is to provide a machine of this class in which articles having tapered or irregular surfaces may be produced and a thread turned on such surface, if desired, and a further object is to produce a machine of this class in which the production shall be greatly increased and the quality of the work produced shall be of a high degree of perfection.

To this end my invention consists in the details of the several parts making up the machine as a whole, and in the combination of such parts, as more particularly hereinafter described, and pointed out in the claims.

Referring to the drawings, Figure 1 is a view in front elevation of my improved screw-machine. Fig. 2 is a detail view, on enlarged scale, showing a portion of the machine in side elevation and a portion in vertical section. Fig. 3 is a detail top or plan view, on enlarged scale, of the right side of the machine, as shown in Fig. 1, and partly in section. Fig. 4 is a like detail view in vertical section of the machine. Fig. 5 is a detail front view, on enlarged scale and partly in section, of the left-hand side of the machine, as shown in Fig. 1. Fig. 6 is an end view, on enlarged scale, looking from the right side of the machine, as shown in Fig. 1, partly in section, and with parts broken away. Fig. 7 is an enlarged detail view in vertical cross-section through the taper bar. Fig. 8 is an enlarged detail end view showing the die-spindle and the spring-pawl in engagement with it. Fig. 9 is a detail view in vertical longitudinal section of the taper bar. Fig. 10 is a detail view in lengthwise section through the feed-plunger and spindle and adjacent parts, showing one form of mechanism for operating the chuck-jaws and with parts broken away.

In turning up work having irregular or tapered surfaces a larger part of the old machines employ a tool of considerable width conforming to the tapered or irregular surface, and usually of a width equal to the length of the surface to be turned. An objection to the use of such tools is that they are short-lived and require frequent grinding, and, owing to the width of the tool, difficulty in producing round work is encountered, and the strain brought to bear upon the tools causes them to be unsteadily held, which produces what is known as "chatter" work. These objections are overcome by me in the construction of my improved machine, herein described and illustrated, in which the letter A denotes the frame of the machine as a whole, comprising the bed, preferably provided with legs or standards.

A main shaft B is mounted in the frame, preferably underneath the bed, and supports the several cams and gears for operating the different parts of the machine. This shaft B is driven by means of a worm-gear C, which is in mesh with a worm on the shaft D. This shaft D is driven, as by means of a belt, from any suitable source of power, and preferably at different rates of speed, controlled by suitable and well-known mechanism, and operated through the medium of the cam E and belt-shifter F. A further description of this mechanism is deemed unnecessary herein, for the reason that it is old and well known, and for the further reason that it forms no part of the invention.

On the bed of the frame A and mounted to have a lengthwise reciprocation thereon is a carriage G, and in bearings in this carriage is suitably mounted a reverse motion H. The construction of this reverse motion is well known in the art and forms no part of the present invention, and for this reason a further and detailed description is omitted herein. This reverse motion is driven from any suitable source of power, and is provided at one end with a chuck I, in which is held in a well-known manner common to this class of machines a rod of metal to be operated upon.

On one end of the bed of the frame A is secured a die-spindle stand *a*, and in this stand and having a lengthwise movement therein is

a lever-shaft a'. The die-operating lever a^2 is pivoted to the frame with one end in engagement with the die-operating shaft a' and the other end in engagement with a die-operating cam b, secured to the main shaft B. There is also mounted in the die-spindle stand a and having a lengthwise reciprocation therein a die-spindle a^3. This die-spindle is provided at one end with suitable means for attachment thereto of a die for turning a thread. The opposite end of the die-spindle bears a spring a^4, with one end in contact with the die-spindle stand and the opposite end with a collar or like part on the die-spindle, the spring tending to hold the spindle normally out of engagement with the work being operated upon. A screw-arm a^5 is secured to the lever-shaft a', the upper end of the arm bearing an adjusting-screw a^6, adapted to press against the end of the die-spindle a^3 and to push the latter toward the chuck I in a like movement of the lever-shaft a'. The die-spindle a^3 is rotatively mounted in its bearings and is provided with a stop-pin a^7, in engagement with the adjustable striking-plate a^8. A spring-actuated pawl a^9 is pivoted on the die-spindle stand a with its upper end engaging a lengthwise groove in the die-spindle a^3. The operation of this mechanism just described is as follows: At a certain predetermined time in the operation of the machine the lever-shaft a' is moved forward, actuated by the lever a^2 and cam b, this movement causing the die-spindle a^3, bearing a die for cutting a thread, to be brought up into contact with the rotating rod or blank. The lever-shaft a' is held in this position until such time as a thread shall have been started on the blank, the die-spindle a^3 then being drawn toward the chuck and onto the blank in the operation of cutting the thread. As soon as this operation is commenced the lever-shaft retreats, and the stop-pin a^7, resting against the striking-plate, prevents the rotation of the die-spindle and compels the cutting of the thread. This continues until the stop-pin a^7 is drawn off from the striking-plate, and this allows the die-spindle to turn with the work and prevents the further cutting of a thread on the blank. The mechanism is now caused to rotate the blank in the opposite direction, and this causes the spring-actuated pawl a^9 to come in engagement with the lengthwise groove on the die-spindle a^3 and prevents a rotation in this direction, and the rotating of the screw-threaded blank in the die causes the die to be turned off from the blank and the die-spindle a^3 to be thrown back into contact with the adjusting-screw a^6.

There is also secured to the frame a the slide-stand c, and on this slide-stand is mounted a slide c'. This slide has a lateral reciprocation, caused by the slide-levers c^2, pivoted in the frame of the machine and timely actuated by the slide-cam b'. This slide bears on one side or front of the machine a cutting-off tool c^3 and on the opposite side an evening-tool c^4. The operation of this part of the mechanism is as follows: As the blank in the chuck is being fed forward the evening-tool secured to the slide is caused to rest against the work and operates to remove any uneven surface. The blanks or rods from which the articles being formed to shape in the machine are made usually have a rough surface, and this tool is used to true up this rough surface and present to the forming-tool a smooth even surface to work upon. When the blank or rod has been fed forward the required distance, one of the slide-levers c^2 retreats and the other slide-lever advances, causing the slide to be moved to the opposite limit of its play and bringing the cutting-off tool into engagement with the work, cutting off the article that has been formed from the blank or rod of metal held in the chuck I. The slide-cam b' is suitably constructed to cause the described movement of the slide-levers c^2. A former-slide d is adjustably secured to the carriage G, and extends underneath the slide-stand and the die-spindle stand, being suitably supported on the frame. The former-bar d' is pivoted at the end of this former-slide, the opposite end of the bar bearing an adjusting-screw d^2. This former-bar acts as a pattern and determines the form or shape of the article being turned up in the machine. If such article is to be tapered, the former-bar is tapered and the degree of this taper is determined by the adjusting-screw at the end; but it is not necessary in order to produce a tapered article that this former-bar shall be tapered, as it may be so mounted in the former-slide that by means of the adjusting-screw a taper may be given to the article formed irrespective of the shape of the former-bar so long as it has a flat feeding-surface. If other shapes are desired to be given the article being turned, the former-bar is made to conform to such shape.

A taper pin e is supported at each end in the die-spindle stand a and in the slide-stand c, and on this taper pin is mounted a taper bar e'. A nut on the end of the taper pin prevents it from movement toward the slide-stand c, and adjusting-collars e^6 are located between each end of the taper bar and the die-spindle stand and die-stands, respectively, these collars being mounted on screw-threaded surfaces of the taper pin and used to take up any wear. A forming-tool e^2 is adjustably secured in the taper bar in such position as to be held in engagement with the work at the required times. There is also adjustably secured in this taper bar a taper-bar pin e^3, the lower end of this pin resting upon the upper surface of the former-bar d'. A spring is used to normally hold the tool borne by the taper bar out of engagement with the work. The operation of this part of the mechanism is as follows: The tool e^2 being suitably adjusted in the taper bar as the carriage G is moved forward the former-slide and former-

bar secured thereto are also moved forward, and the taper-bar pin resting upon the upper surface of the former-bar d' causes the taper bar to be rotated and the tool e^2 to be raised or lowered as the surface of the former-bar shall compel, this movement of the taper bar causing the surface of the work being turned to conform in shape exactly to the upper surface of the former-bar. A suitable back-rest f is adjustably secured to the slide-stand in such position as to rest against the work being turned up and oppose the thrust of the forming-tool in the taper bar. A main cam-stud g is secured to the under side of the carriage G and is supplied with a bushing, rotatively mounted thereon, adapted to make contact with the main cam b^2, secured to the main shaft B. This cam is so shaped as to give to the carriage and reverse motion the required movements forward and back in the operation of shaping the blank to the required form. A stop h is adjustably secured on the frame A to limit the backward movement of the carriage G and thus determine the length of the article being formed in the machine. A stop-bracket g' is secured to a downward-projecting part from the rear end of the carriage G, and is offset, as shown, and in this offset portion is borne an adjusting-screw g^2, the head of which is adapted, in certain positions of the carriage, to engage the main cam b^2. A cut-off bolt i is mounted in slide-ways in the frame of the machine and bears a stud i^2, provided with a suitable bushing adapted to engage the cut-off-bolt cam b^3, secured to the shaft B. This cut-off bolt i is given a vertical reciprocation by means of the cam b^3, and in its upper position is adapted to lie back of the offset portion of the stop-bracket g', and thus prevent a backward movement of the carriage G. A spring may be used, if desired, to insure a downward movement of the bolt i on the retreat of the cam. The object of this device is to hold the carriage G out of engagement with the main cam b^2 during the operation of the cutting-off tool to separate the article formed from the main rod or blank. The main cam b^2 is suitably formed to recede from the main-cam stud just after the bolt i has been thrust upward back of the offset portion of the stop-bracket g'. The adjusting-screw g^2 is adapted to engage the back surface of the main cam b^2 to insure the pressure of the stop-bracket g' against the bolt i. The carriage is held out of engagement with the main cam b^2 during the operation of the cutting-off tool, for the reason that it is practically impossible to provide a firm and steady support against the cam, it being difficult to provide a perfectly-true surface on the latter. Should such true surface be provided it would very soon become uneven in wear, and the use of the cut-off bolt i, against which the carriage is forced and rests during the operation of the cutting-off tool, provides a steady and sure support. A sliding shaft k is secured to the downward-projecting part from the carriage G, this shaft passing through a bearing at the rear end of the frame, and to this end of the shaft is secured a flexible cord or strap k', passing over a pulley k^2, the opposite end of this strap bearing a weight k^3. The sliding shaft has a lengthwise reciprocation in the bearing at the rear end of the frame. A chucking-cam pulley l is rotatively mounted on the sliding shaft k, and bears on its surface cams l', adapted to engage a stud m' on the chucking-slide m. This chucking-slide is in operative engagement with a wedge m^2, so mounted on the reverse motion that by its reciprocation the chuck I is caused to grasp or release the blank or rod of metal borne therein. This wedge, just described, forms a part of a mechanism well known, and the operation of this wedge by the chucking-slide and connecting mechanism forms no part of the present invention. In order, however, that a clear understanding of this mechanism, in connection with the stop mechanism, may be had, a brief description of the device is given as follows: The spindle 1 is mounted in bearings on the frame of the machine, and within this bearing a feed-plunger 2 is borne, this plunger having a lengthwise movement in the spindle, imparted by means of the levers 3 in contact with the wedge m^2. The opposite end of this plunger thrusts against the jaws 4, located in the chuck I. As the plunger is thrust forward, the jaws 4 are forced inward by coming in contact with the beveled inner edge of the cap 5, the jaws being forced against the blank. A web-gear m^3 is secured to the hub of the chucking-cam pulley l and is in engagement with the chucking-gear b^4, secured to the shaft B. This gear b^4 is of a width equal to the greatest extent of reciprocation of the carriage G, so that the web-gear m^3 shall constantly remain in engagement with the gear b^4. A feed-plunger n extends through the reverse motion H and is so constructed as to constantly retain a frictional hold on the blank or rod of metal borne therein, and to the rear end of this feed-plunger is secured a grooved disk n'. These parts are common to the reverse motion illustrated herein, and a further description is deemed unnecessary, further than to say that the object of this feed-plunger is to retain the rod of metal being operated upon in a fixed position, while the reverse motion and the chuck, which at this time has been released from its hold upon the rod, is moving backward. A stop-motion bolt o is borne in sideways in the frame of the machine with its upper end adapted to engage the groove in the disk n', and to the lower end of this stop-motion bolt is secured a connecting-rod o', the lower end of which bears a stud o^2 in engagement with the stop-motion cam b^5, secured to the main shaft B. This construction causes the stop-motion bolt to be withdrawn from engagement with the grooved disk n' at each revolution of the main shaft B. A spring n^2 is so connected with the feed-plunger n as to tend to throw it

backward when not held by other forces. A catch p is pivoted on the frame of the machine and is adapted to engage a pin on the trigger p', also pivoted on the frame of the machine. The upper end of this trigger p' is placed in the path of movement of the grooved disk n', located on the feed-plunger n. A cord p^2 is secured to the catch p, the upper end of the cord being suitably connected to a spring-operated belt-shifting device. Any old and well-known form of spring-operated belt-shifting device may be used in this connection. The operation of this mechanism is as follows: A rod or blank of metal being held by frictional grasp within the plunger n and the stop-motion bolt in engagement with the grooved disk n', the chucking mechanism is at this moment operated to release the chuck-jaws from their grasp upon the rod of metal, and at the same time the carriage and reverse motion bearing the chuck is caused to move backward. The chuck is now caused to again grasp the rod, and it is drawn through the feed-plunger n, the friction-grasp of the plunger upon the rod being such as to allow this. At this time the mechanism is caused to withdraw the stop-motion bolt o, but the feed-plunger n is held in position by its frictional grasp upon the rod of metal. When the rod of metal has become so short as to be drawn out of the feed-plunger as the stop-motion bolt o is withdrawn in each complete operation of the machine, the feed-plunger is caused to fly backward under the impulse of the spring n^2, and the grooved disk n', borne on the plunger, coming in contact with the upper end of the trigger p', releases the catch p, that is thrown downward, releasing the tripping device on the spring-operated belt-shifting mechanism, and causes the machine to be stopped.

The former-slide d is provided with a flange d^3 on that end in contact with the carriage G, these parts being so connected that a limited play of the former-slide is allowed independent of the carriage G, the extent of this movement being governed by means of an adjusting-screw d^4. The former-bar is abruptly cut away, as shown at d^5 in Figs. 2 and 4 of the drawings, and the former-slide d is beveled laterally. A former-slide lever q is pivoted to the frame of the machine, its upper end bearing a beveled surface oppositely arranged to that of the laterally-beveled surface on the former-slide, so that as the upper end of this lever is forced inward against the beveled surface on the slide the latter is caused to be thrown forward, causing the former-bar pin to slide down the incline d^5 and throwing the forming-tool e^2 out of engagement with the blank during the operation of the cutting-tool in separating it from the main body of the blank. The object of this construction is to prevent the forming-tool from marking the finished article as it is being cut off. A former-slide cam b^6 is secured to the main shaft B and is in engagement with the former-slide lever q, and is suitably formed to cause the required movements at the proper time.

In a single operation of the machine the movements of the several mechanisms are as follows: The carriage G and reverse motion being at the backward limit of its play, the chucking-slide m in a position to allow the grasp of the chuck upon the rod of metal, the former-bar pin resting at the outer end of the former-bar and the tool in engagement with the blank or rod, the slide c in a position to cause the evening-tool c^4 to be in engagement with the rod or blank, the cut-off bolt i at the lower limit of its play, and the stop-motion bolt o in engagement with the grooved disk n', the reverse motion is driven from any suitable source of power and the shaft B rotated by mechanism described. The main cam b^2 causes the carriage G to be fed forward, carrying with it the blank or rod of metal that is formed to the required shape by the tool as the former-bar pin moves along the former-bar. When the carriage G has reached the limit of its forwad movement, the former-slide lever q, under the impulse of the former-slide cam b^6, causes the former-slide to be thrown backward a slight distance and the former-bar pin to pass down the incline d^5, throwing the forming-tool e^2 out of engagement with the work. At this time the cut-off bolt i is thrown upward under the impulse of the cut-off-bolt cam b^3 until it lies in the path of movement of the stop-bracket g', that is at this time thrust backward a slight distance by the contact of the adjusting-screw g^2 with the main cam b^2, causing the stop-bracket g' to rest against the cut-off bolt i, thus supporting the carriage in this position and holding it against any backward movement. The main cam b^2 is so formed at this point in its periphery that it recedes from the main-cam stud g and remains out of contact for a limited time. At this point the slide c' is caused to move backward, carrying with it the cutting-off tool, this movement being accomplished by means of the slide-lever c^2, actuated by the slide-cam b'. A rise in the main cam b^2 now causes it to again engage the main-cam stud g and throw the carriage G slightly forward to release its thrust against the cut-off bolt i, that is now moved downward in the retreat of the cut-off-bolt cam b^3. The chucking mechanism is now caused to operate by the chucking-cam pulley l and the cams l' borne thereon to release the hold of the chuck upon the rod of metal, and as soon as this hold is released a fall in the main cam b^2 causes the carriage G to be thrown backward to its full extent of movement, and when it has reached this position the chucking mechanism is again operated through the chucking-cam pulley l to cause the chuck to again grasp the rod of metal. At this point in the operation of the machine the stop-motion bolt o is drawn downward under the impulse of the stop-motion cam b^5 and again immediately returned to place. In this latter operation, if the blank of metal has been drawn out from

the frictional grasp of the feed-plunger n the plunger is forced backward under the impulse of the spring n^2, causing the tripping mechanism to be operated and the machine stopped.

I claim as my invention—

1. In combination with a reciprocating carriage supporting a blank holding spindle, the blank holding spindle, a taper bar bearing a cutting tool in operative relation to the spindle, and a former having a patterned surface in operative engagement with the taper bar and connecting devices whereby the former is adapted to be automatically reciprocated by the movement of the carriage, all substantially as described.

2. In a screw machine, a reciprocating carriage supporting a blank holding spindle, the blank holding spindle, a taper bar bearing a cutting tool in operative relation to the spindle, a former slide operatively connected to the carriage, and a former bar pivoted on the slide with its patterned surface in engagement with the taper bar, all substantially as described.

3. In a screw machine, a reciprocating carriage supporting a blank holding spindle, the blank holding spindle, a taper bar bearing a cutting tool in operative relation to the spindle, and a former bar loosely connected with the carriage whereby the latter has a limited movement independent of the former bar, and with the patterned surface on said former bar in contact with the taper bar, all substantially as described.

4. In combination with a reciprocating carriage supporting a blank holding spindle, the blank holding spindle, a rocking taper bar bearing a cutting tool in operative relation to the spindle, a former bar pin adjustably secured to the taper bar, and a former having a patterned surface in operative engagement with the taper bar and connecting devices whereby the former is adapted to be automatically reciprocated by the movement of the carriage, all substantially as described.

5. In combination with a reciprocating carriage supporting a blank holding spindle, the blank holding spindle, a rocking taper bar bearing a cutting tool in operative relation to the spindle, a former having a patterned surface in operative engagement with the taper bar and adapted to be reciprocated by the movement of the carriage, and a reciprocating die spindle borne in operative relation to the blank holding spindle, all substantially as described.

6. In combination with a reciprocating carriage supporting a blank holding spindle, the blank holding spindle, a rocking taper bar bearing a cutting tool in operative relation to the spindle, a former having a patterned surface in operative engagement with the taper bar and adapted to be reciprocated by the movement of the carriage, a reciprocating die spindle located in operative relation to the blank holding spindle, and means for allowing the rotation of the die spindle during a portion of its lengthwise movement, all substantially as described.

7. In combination with a reciprocating carriage supporting a blank holding spindle, the blank holding spindle, a rocking taper bar bearing a cutting tool in operative relation to the spindle, a former having a patterned surface in operative engagement with the taper bar and adapted to be reciprocated by the movement of the carriage, a lengthwise reciprocating die spindle borne in operative relation to the blank holding spindle, a stop located in the die spindle and preventing its rotation during a portion of its reciprocating movement, a spring tending to hold the die spindle in a normal position away from the blank holding spindle, a lever shaft bearing an adjusting screw in engagement with the end of the die spindle, the adjusting screw, and means for reciprocating the lever shaft, all substantially as described.

8. In combination with a reciprocating carriage supporting a blank holding spindle, the blank holding spindle, a cam in engagement with the carriage to cause its movement in one direction, means for moving the carriage in the opposite direction, and means for holding the carriage at rest out of engagement with the cam, all substantially as described.

9. In combination with a reciprocating carriage supporting a blank holding spindle, the blank holding spindle, a cam in engagement with the carriage to cause its movement in one direction and a weight connected to the carriage to hold it normally in engagement with the cam and cause its movement in the opposite direction, and a bolt adapted to be thrust into the path of movement of the carriage and hold the latter at rest during a fall on the cam away from the carriage, all substantially as described.

10. In combination with a reciprocating carriage supporting a blank holding spindle, the blank holding spindle, a cam in engagement with the carriage to cause its movement in one direction and a weight connected to the carriage to hold it normally in engagement with the cam and cause its movement in the opposite direction, a vertically movable bolt adapted to be thrust into the path of movement of the carriage, and a cam in engagement with the bolt to cause vertical movement thereto, all substantially as described.

11. In combination with a reciprocating carriage supporting a blank holding spindle, the blank holding spindle, a cam in engagement with the carriage to cause its forward movement and a weight connected to the carriage to hold it normally in engagement with the cam and cause its backward movement, a vertically movable bolt adapted to be thrust into the path of movement of the carriage, a cam in engagement with the bolt to cause vertical movement thereto and an adjusting screw located on the carriage in the path of movement

of the bolt and adapted to engage the main cam to force the adjusting screw against the bolt, all substantially as described.

12. In combination with a reciprocating carriage supporting a blank holding spindle, a feed plunger extending through the spindle and having frictional grasping points, a chuck secured to the spindle to grasp a blank held therein, and an adjustable stop secured in the path of movement of the carriage to limit its backward movement whereby the length of stock to be cut from the blank may be predetermined, all substantially as described.

13. In combination with a reciprocating carriage supporting a blank holding spindle, the blank holding spindle, a chuck secured to the spindle, a reciprocating wedge borne on the spindle and adapted to operate the chuck, a reciprocating chucking slide in engagement with the wedge, a chucking cam pulley rotatively mounted on the carriage to reciprocate therewith and adapted to operate the chucking slide, and means for rotating the chucking cam pulley, all substantially as described.

14. In combination in a screw machine, a reciprocating carriage supporting a blank holding spindle, the blank holding spindle, a chuck secured to the spindle, a reciprocating wedge borne on the spindle and adapted to operate the chuck, a reciprocating chucking slide in engagement with the wedge, a chucking cam pulley rotatively mounted on the carriage to reciprocate therewith and adapted to operate the chucking slide, a web gear secured to the chucking cam pulley, a chucking gear secured to the main shaft and in mesh with the web gear, and means for driving the main shaft, all substantially as described.

15. In combination with the frictional feed plunger of a screw machine, a spring plunger thrusting against the feed plunger, a bolt, normally in engagement with said feed plunger but adapted to be withdrawn at certain intervals, means for withdrawing the bolt, and a trip located in the path of movement of the feed plunger when released from the rod of metal and adapted to operate to stop the machine, all substantially as described.

16. In combination with the frictional feed plunger of a screw machine, a grooved disk secured to the feed plunger, a spring plunger thrusting against the feed plunger, a bolt normally in engagement with said feed plunger, a connecting rod secured to the bolt and in engagement with a cam on the main shaft of the machine, the cam, means for driving the main shaft, a trigger located in the path of movement of the feed plunger, a catch adapted to be released on the movement of the trigger, a connection between the catch and the trip of a stop motion, and said trip, all substantially as described.

17. In combination with the frictional feed plunger of a screw machine, a grooved disk secured to the feed plunger, a spring plunger thrusting against the feed plunger, a bolt normally in engagement with the feed plunger, a connecting rod secured to the bolt and in engagement with a cam on the main shaft of the machine, a handle operatively connected to the bolt, the cam, means for driving the main shaft, a trigger located in the path of movement of the feed plunger, a catch adapted to be released on the movement of the trigger, a connection between the catch and the trip of a stop motion, and said trip, all substantially as described.

18. In combination with a feed plunger adapted to exert a frictional hold upon a blank of metal, a chuck adapted to intermittently grasp the blank, means for forcing the feed plunger backward, means for holding the feed plunger when the chuck is opened, and a trip adapted to be operated by the backward movement of the feed plunger, all substantially as described.

19. In combination with a feed plunger adapted to exert a frictional hold on a blank of metal, means for forcing the plunger backward, means for holding the plunger and blank against backward movement, and a trip adapted to be operated by the backward movement of the plunger, all substantially as described.

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