(No Model.) 6 Sheets—Sheet 1.

H. K. JONES.

MACHINE FOR ROLLING SCREW THREADS.

No. 419,777. Patented Jan. 21, 1890.

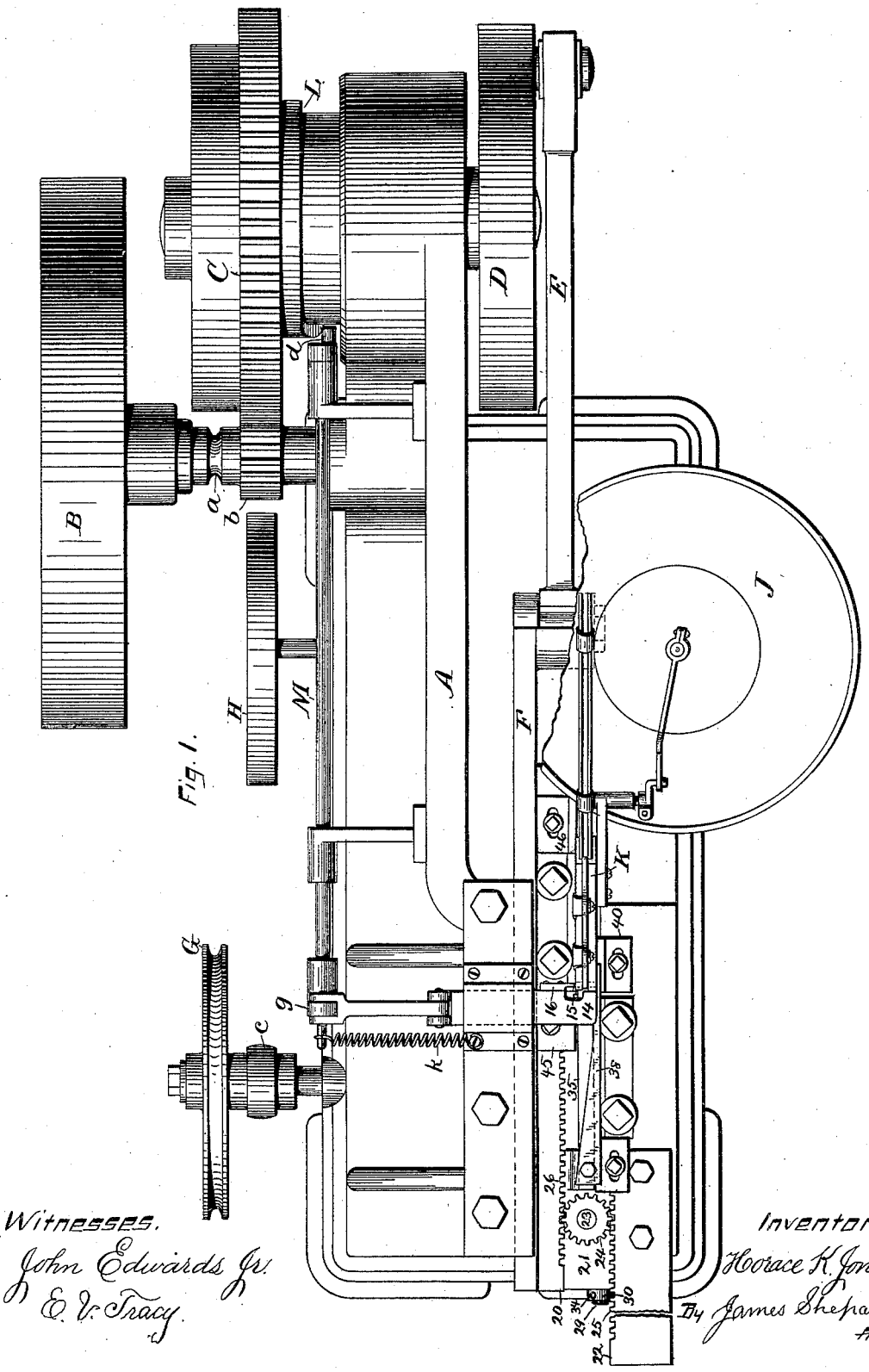

Fig. 1.

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(No Model.) 6 Sheets—Sheet 2.

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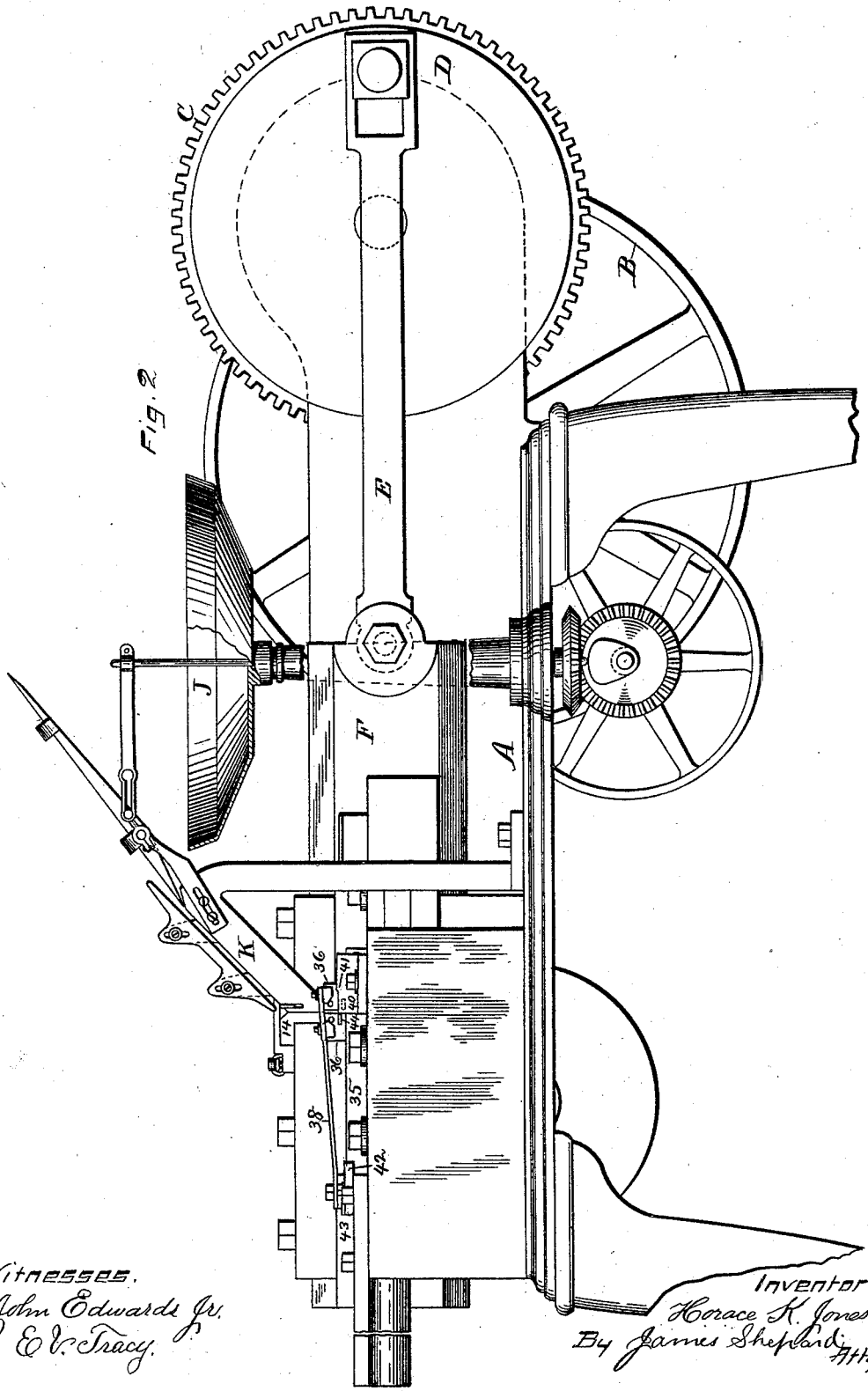
Fig. 2



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MACHINE FOR ROLLING SCREW THREADS.

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Fig. 3.

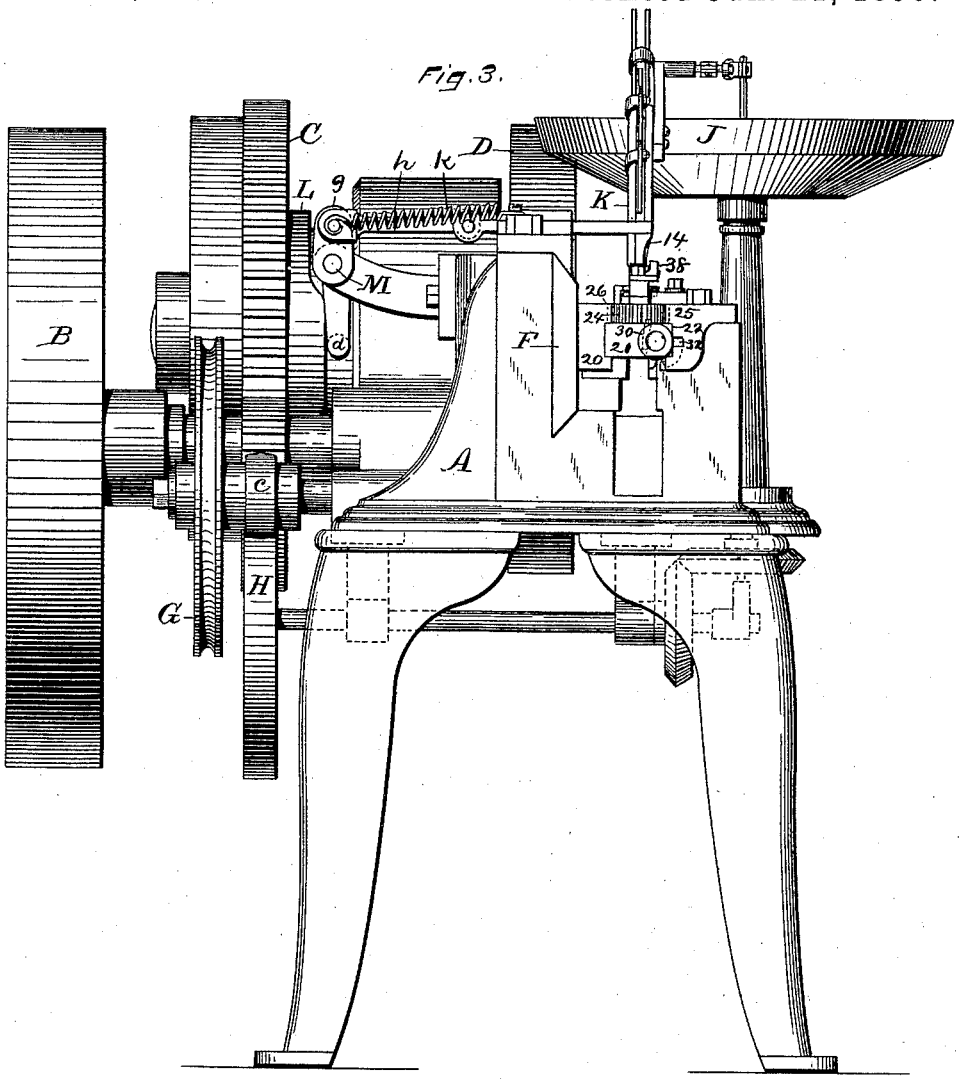
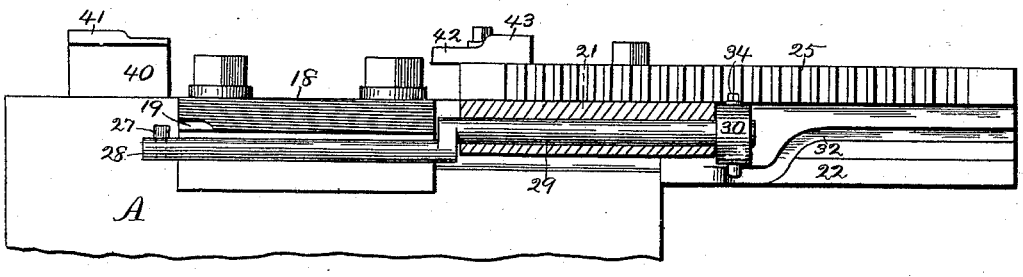


Fig. 4.



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(No Model.) 6 Sheets—Sheet 4.

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Fig. 5.

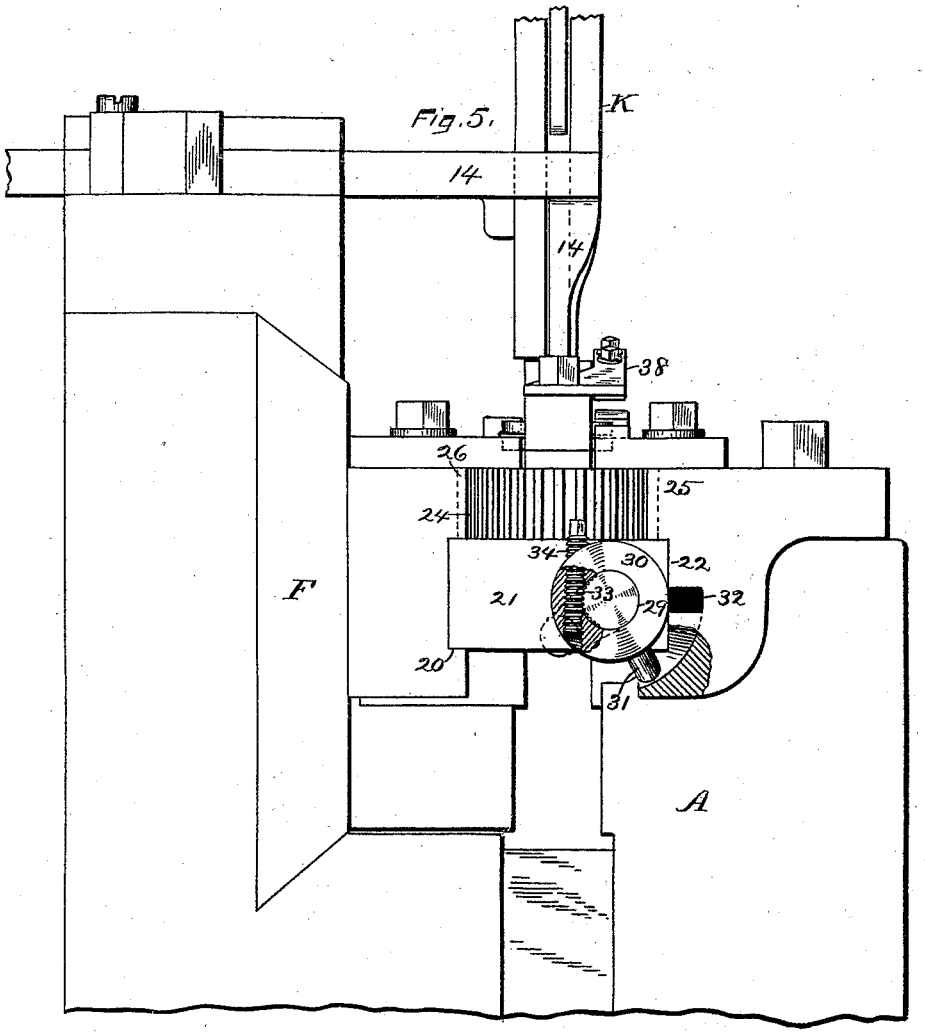


Fig. 12.

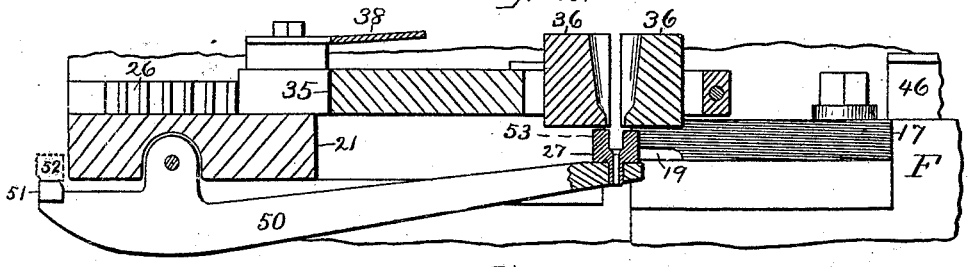
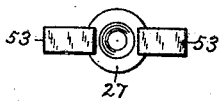


Fig. 13.



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H. K. JONES.

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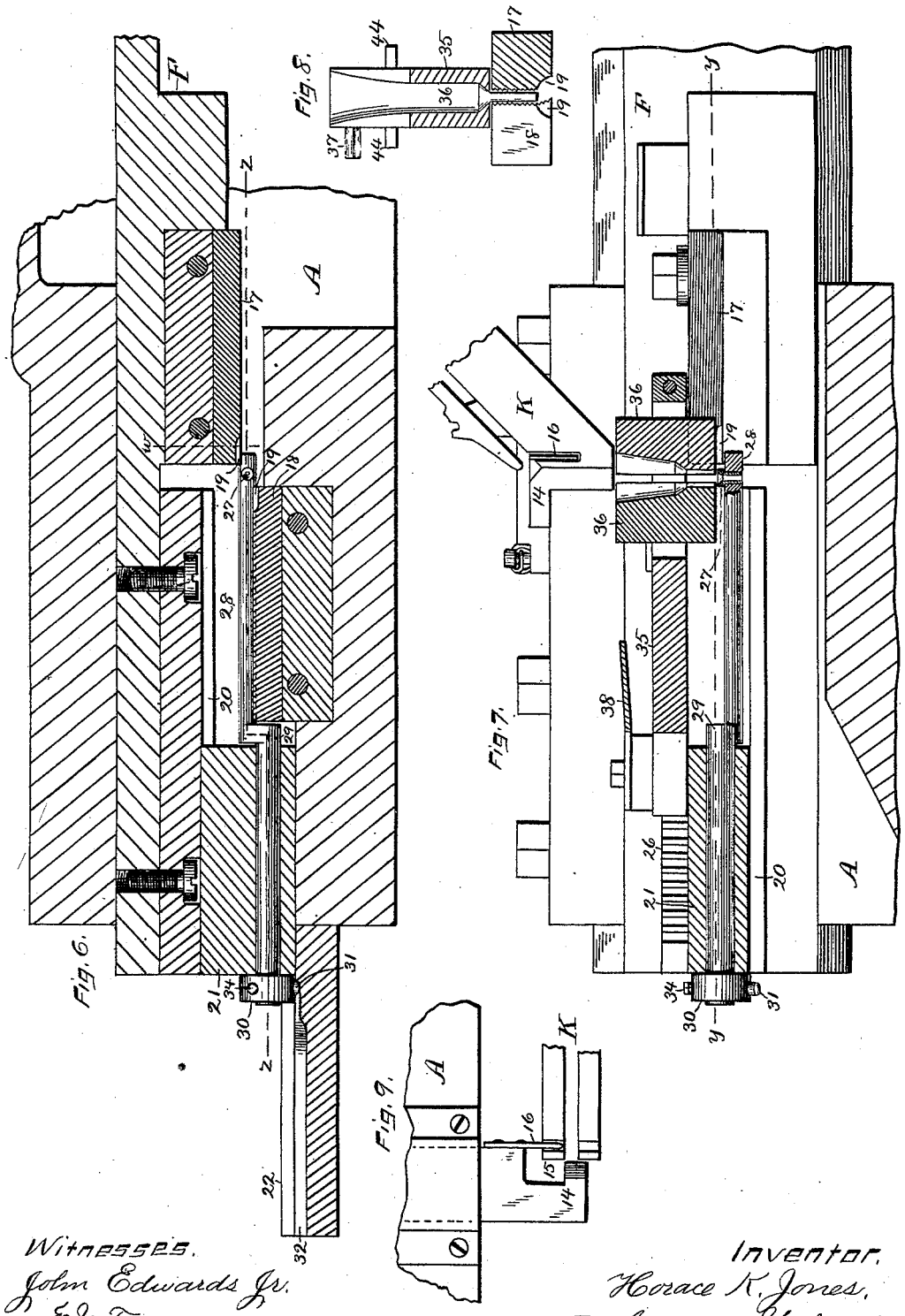

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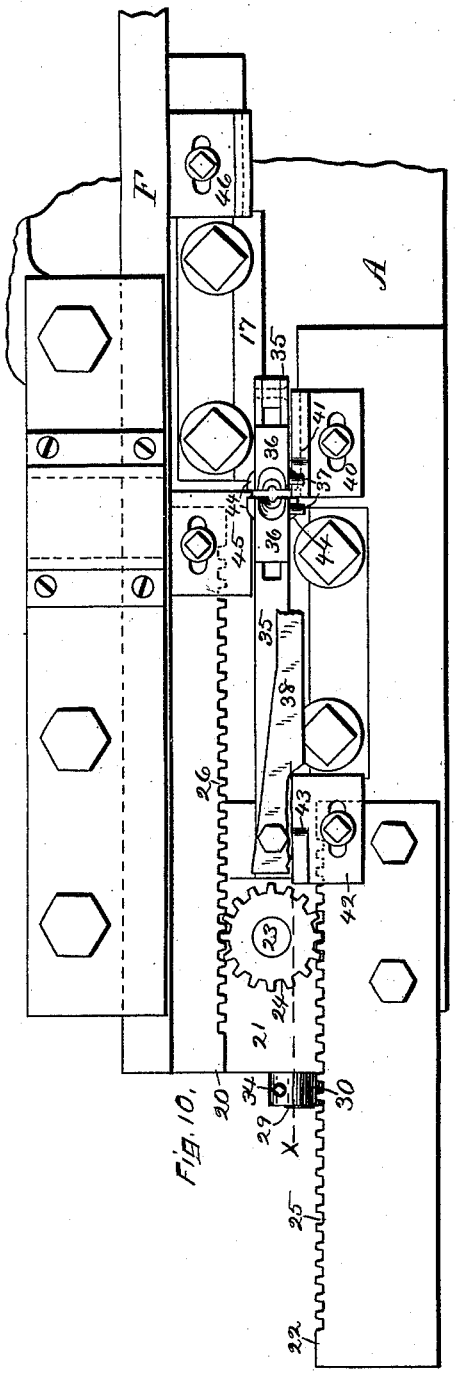

Fig. 10.

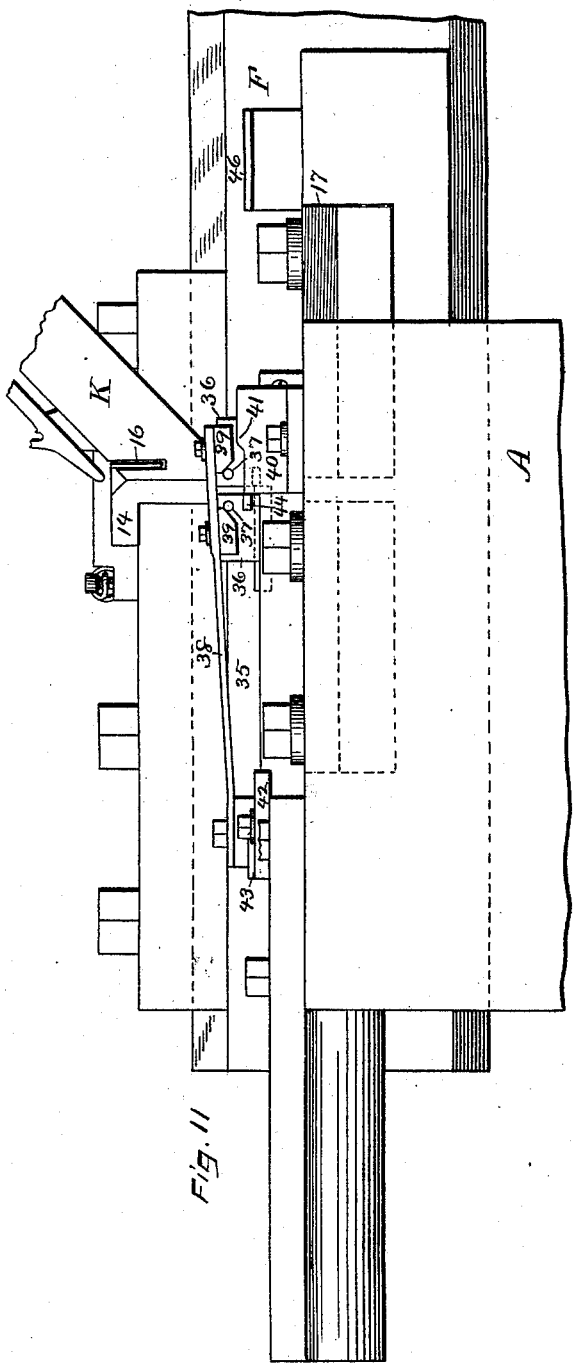

Fig. 11

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UNITED STATES PATENT OFFICE.

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MACHINE FOR ROLLING SCREW-THREADS.

SPECIFICATION forming part of Letters Patent No. 419,777, dated January 21, 1890.

Application filed September 6, 1889. Serial No. 323,116. (No model.)

To all whom it may concern:

Be it known that I, HORACE K. JONES, 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 Machines for Rolling Screw-Threads, of which the following is a specification.

My invention relates to improvements in machines for rolling screw-threads; and the general object of my improvements is to improve the efficiency of the machine, particularly with reference to the construction and operation of several of the parts.

In the accompanying drawings, Figure 1 is a plan view of my machine. Fig. 2 is a front elevation thereof. Fig. 3 is a side elevation looking to the right. Fig. 4 is an enlarged vertical section of the carrier-block on the line *x*, Fig. 10, looking toward the front, together with other detached parts in elevation. Fig. 5 is a side elevation of a portion of the machine enlarged from Fig. 3 and with parts broken away. Fig. 6 is an enlarged horizontal section of certain parts on the line *y y* of Fig. 7. Fig. 7 is an enlarged vertical section of the same parts on the line *z z* of Fig. 6. Fig. 8 is an enlarged transverse vertical section of the carrier and dies on a line between the holding-jaws. Fig. 9 is an enlarged detached plan view showing the end of the chute and let-off. Fig. 10 is an enlarged plan view of detached parts, including the holder and dies. Fig. 11 is an enlarged front elevation of the same parts, together with the lower end of the chute and the let-off. Fig. 12 is a view corresponding with Fig. 7, showing a modification in the holder-jaws and the stop-gage; and Fig. 13 is a plan view of said gage.

The machine is of the class in which the screw-threads are formed by rolling the blank between a pair of dies having ribbed and grooved faces, said dies moving relatively to each other. Prior machines of this class have been made with both of the dies moving, while the blank between them revolves at a fixed point, and for the purposes of some features of my invention such an arrangement of the dies is an equivalent for the corresponding parts of my machine, in which one die is stationary, the other moving, while the blank and its holder travel at half the speed of the moving die.

A designates the frame of the machine; B, the driving-pulley carrying a grooved pulley *a* and gear-wheel or pinion *b*, which engages and drives gear-wheel C and crank-disk D on the same shaft as said wheel C. A pitman E is connected by one end to the crank-pin of the crank-disk D and by the other end to the reciprocating carriage F. A round band is to be placed upon the grooved pulley *a* for driving the larger grooved pulley G, the hub of which carries a pulley *c*, from which a belt runs to the pulley H for driving the revolving hopper J, in connection with which may be any ordinary feeding devices for taking blanks from the hopper and feeding them to the chute K, all substantially as in well-known prior machines of this class.

The mechanism for reciprocating the carriage and the manner of and means for supplying the blanks to the chute are not essential to my invention.

The chute K is inclined, so that when a blank at its lower end is released the blank will fall down out of the chute. At the lower end of the chute K is the reciprocating let-off 14, having an opening 15, Figs. 1 and 9, in rear of its front end and of a size that will permit the head of a screw-blank to fall vertically through it. Said let-off is also provided with a cut-off 16, formed on or rigidly secured to said let-off, so as to move therewith, which cut-off works within a slot near the lower end of the chute, and at a distance from the extreme lower end about equal to the diameter of one blank. The blanks are headed and hang by their heads within the chute, as in other machines. The let-off, as before stated, has a reciprocating movement across the lower end of the chute, and this should be so limited as to stop the let-off on its rearward stroke with the solid front end directly opposite the open lower end of the chute, as shown in Fig. 9, and with the end of the cut-off drawn into the rear wall of the

chute far enough to permit the passage of a blank. The let-off must move forward far enough to bring the opening 15 directly opposite the end of the chute, so that the blank below the cut-off may fall into said opening. I impart the rearward movement to said let-off by means of the cam L, crank *d*, rock-shaft M, crank-arm *g*, and pitman *h*, and it is moved in the reverse direction by means of a spring *k*. The particular means for reciprocating said let-off is not essential to my invention.

To the carriage F, I secure one of the dies 17, and to a part of the stationary frame A, I secure the companion die 18. The faces of these dies are grooved and ribbed substantially in a longitudinal direction, but inclined according to the thread to be produced, as in ordinary dies of this class. My dies, being designed for threading gimlet-pointed screws, have their faces formed to correspond with the profile of such screws, as shown by the end view of the die 18 in Fig. 8. This feature of itself is old; but I cut away the portion for threading the gimlet-point at the lower corners of the dies on the ends that first engage the blank, as at 19, Figs. 4, 6, and 8, so that only that part of the dies which thread the cylindrical portion of the screws first engage the blank, thereby permitting the employment of a stop-gage at the pointed end of the blank in starting the thread, said gage retreating from between the dies when the gimlet-pointed portion is threaded. The die 17 in Fig. 8 is in section on the line *w*, Fig. 6.

At the left-hand end of the die 17 on the front side of the carriage F, I form ways 20 for one edge of the carrier-block 21, and upon the confronting part of the frame A, or a part secured to said frame, I form the ways 22 for the opposite edge of said carrier-block. On the top of this carrier-block there is a post 23, on which turns the gear-wheel 24, the teeth of which on one side engage a stationary rack 25, secured to the frame of the machine, and on the other side the moving rack 26, that is secured to and moves with the carriage F. One result of this combination is, that the carriage and moving die 17 move forward and backward in front of the stationary die 18, while the carrier-block 21, which carries the blank to be threaded, travels half the distance and with half the speed of that of said moving die. The relative movement of the parts for the purpose of rolling a thread is the same as in the prior machines before referred to, in which both dies move and the blank revolves at a stationary point.

27 designates a retractible stop-gage, which, when the moving die 17 is at the right-hand end of its stroke, is elevated to a higher plane than that portion of the dies that thread the extreme point of the screw and above the lower part of the cut-away portion 19 of the dies, so that the pointed end of a blank resting in the axial opening in said stop-gage will be held at the proper height for being operated upon by the dies. This stop-gage 27 is mounted on an eccentric arm 28 of the shaft 29, that extends longitudinally through the carrier-block 21 and takes its bearing therein. One end of said shaft 29 is provided with a circumferentially-adjustable head 30, bearing a stud or pin 31, that works in a cam-groove 32, formed in a stationary part on the frame A at the front edge of the carrier-block. This cam-groove has a short straight portion at its right-hand end, then an intermediate inclined portion, and then a longer straight portion at its left-hand end. When the carrier-block is at the right, the pin 31 and cam-groove 32 act to turn the shaft into position to force and hold the eccentric arm and stop-gage in their most elevated position and within the path of that portion of the moving die 17 that threads the gimlet-point of the screw. As the carrier-block and pin 31 move over the inclined portion of the cam-groove the shaft 29, eccentric arm 28, and stop-gage 27 are moved in the direction to swing said gage down out of the way of the dies, where it is held as the pin traverses the longer straight portion of the cam-groove. In order to make the stop-gage 27 adjustable in height, I adjust the position of the head 30 on the end of the shaft 29. Various means may be employed for so doing; but I prefer to form teeth 33 on a portion of the periphery of said shaft inside the head 30 and to pass an adjusting-screw 34 through a threaded hole in said head, with the thread of said screw 34 engaging the teeth 33 on said shaft, as shown in Fig. 5. By turning the adjusting-screw 34, the head being stationary, the shaft 29 may be turned within said head, so as to throw the eccentric arm and attached stop-gage up or down, as may be desired. I also attach to the carrier-block 21 the carrier 35, said carrier being provided with holding-jaws 36 36, that slide loosely within the slotted end of said carrier, as most clearly shown in Fig. 7. The shape of these jaws in side view is shown in Fig. 8, in which it will be seen that the extreme lower portion thereof is thin enough to go in between the dies, and must therefore be of less thickness than the diameter of the screw to be threaded. Each jaw is provided on its front side with a pin 37, Figs. 10 and 11. These pins are also shown in Fig. 2, but on too small a scale to have the figures of reference placed thereon. A spring-latch 38 is also secured to the carrier with two holding and cam blocks 39 on its under side arranged for engaging said pins. Said spring-latch has a constant tendency to bear downwardly toward said pins, and when it is free to do so the cam corners of the blocks 39 by engaging said pins 37 force the holding-jaws together, not hard enough to pinch the blank therein, but firmly enough to govern its position and properly present it to the

dies. After the cam corners pass the pins 37 the straight portion of the blocks above said corners drop down by the sides of the pins and positively lock the jaws against being opened until the latch is lifted. These cam-blocks 39 may be adjustably secured to the under side of the spring-latch by any ordinary devices—as, for instance, by a screw-and-slot connection, which is too well known to be described. The tops of the jaws 36 are in a plane that will pass under the lower end of the chute K and let-off 14, hereinbefore described. A stationary block 40, having a cam 41, is secured to the frame A at a point within the path of the outer one of the cam-blocks 39 of the spring-latch 38 when near the right-hand end of its stroke, whereby said latch is lifted sufficiently to release the pins 37 of the holding-jaws from between the straight inner faces of said cam-blocks, as shown in Fig. 11. Another block 42, having a cam 43, is also secured to the frame A within the path of the other cam-block at the opposite end of the stroke of said latch for the same purpose. Both of the holding-jaws are also provided on each side with laterally-projecting lugs 44, and the carrier F has secured to it two hammer-blocks 45 and 46. The lugs 44 of the left-hand holding-jaw are in a higher horizontal plane than the lugs of the right-hand holding-jaw, so that the engaging portions of the blocks 40 and 46 are in the plane of the lugs of the left-hand jaw, while those of the blocks 42 and 45 are in the plane of the right-hand jaw. When the carrier-latch and jaws are near the extreme right-hand end of their stroke, the lug 44 of the right-hand jaw is engaged by the hammer-block 45, which, being secured to the carrier F, moves faster than the carrier 35, thereby forcing said jaw to the right. At the same time the lug 44 on the left-hand jaw engages the side of the block 40, so that said jaw is stopped, while the carrier moves still farther on, thereby opening the jaws at the end of their stroke as they come in under the chute and let-off to receive a blank therefrom. In like manner the lug 44 of the left-hand jaw and the block 46 on the carrier engage each other at the left-hand end of the stroke, also the stationary cam-block 42 and lug 44 of the right-hand jaw, whereby the jaws are again opened to discharge the threaded screw, this time being opened to a greater extent than at the other end of their stroke. The several blocks 40, 42, 45, and 46 should be adjustable to regulate the extent of opening of the jaws. The chute being supplied with screw-blanks and motion being imparted to the driving-pulley B, the carriage F moves and carries with it the moving die 17 and rack 26. The gear-wheel 24, engaging said rack on the one side and the stationary rack on the other, also moves the carrier-block and connected parts. The holding-jaws and stop-gage are brought into position under the chute and let-off and the jaws opened, as before described. The let-off 14, when in the position shown in Fig. 9, with its cut-off 16 withdrawn, permits the lowermost blank to fall to the end of the chute, where it is stopped by the solid part of said let-off. The let-off then moves forward to bring the cut-off 16 under the bottom blank but one, and at the same time to bring the opening 15 directly opposite the exit of the chute, so that the blank falls into said opening and then drops endwise down through said opening into the open jaws 36, the opening 15 being large enough to let the head of the blank fall through. The cut-off meanwhile prevents other blanks from falling down the chute until after said cut-off is withdrawn and the solid part of the let-off brought into the position before described to stop the falling blanks. The blank as it drops down between the holding-jaws 36 falls upon the stop-gage 27, with the taper point resting in the hole in said gage. The movement of the parts brings the dies one in front of the other, with the blank between them, the first engagement of the dies and blank being at the ends having the cut-away portion 19. Prior to the engagement of the dies and blank the spring-latch has its cam-block withdrawn from off the cam 41, when the corners of the cam-blocks, acting on the pins 37, close the jaws. The dies at first act upon only the cylindrical portion of the blank, and when they have well started the thread and get a firm hold on the blank the pin 31 and incline of the cam-groove 32 operate to withdraw the stop-gage from the plane of that portion of the dies which threads the point, so that said dies may operate to complete the thread. As the moving die passes to the left of the stationary die the jaws 36 are opened, in the manner before described, to discharge the blank therefrom.

One new feature of my invention is the combination, with the relatively-moving swaging-dies, of a retractible stop against which the pointed end of the blank is gaged to hold it at the proper height between the dies at the beginning of their work and then retracts therefrom. It is not essential to this combination that the specific construction of the stop-gage first described shall be employed, as after disclosing the combination various devices for operating said gage can be devised by ordinary mechanics. In Fig. 12 I have shown as a companion view to Fig. 7 a lever 50 for carrying the stop-gage 27. This lever is pivoted to the under side of the carrier-block 21 and bears at its heel end a cross-arm 51, that extends forward to some stationary part of the frame, where a block or cam, as indicated by the broken lines at 52, is placed in its path at that portion of the stroke that brings said stop-gage under the holding-jaws 36. The cross-arm 51, by engaging said block or cam, is depressed, thereby elevating the stop-gage to its work, as

shown. At the return-stroke said arm and block or cam remain in engagement to hold the stop-gage up until the dies are well hold of the cylindrical portion of the blank, after which they disengage and the stop-gage falls down out of the way of the remaining portion of the dies. It may, if desired, be depressed by a spring.

In Figs. 12 and 13 I have also represented the holding-dies 36 as made shorter at their lower ends than in the construction first described, so that they extend down only a small portion of the cylindrical part of the blank, which part I hold, in starting the thread, by means of holding-wings 53 on the top of the stop-gage 27, between which wings the lower end of the cylindrical part of the blank enters as the blank falls upon the stop-gage. These holding-wings are withdrawn with the retraction of the stop-gage, for after the dies are firmly hold of the blank it is not necessary to hold it by other means. While I have shown these wings only in Figs. 12 and 13, it is evident that they may be applied to the stop-gage of the other figures of the drawings by merely cutting off the lower end of the holding-jaws.

I claim as my invention—

1. The combination of the chute with the reciprocating let-off 14, having a solid front portion for closing the lower end of said chute, the cut-away portion 15 in rear of said solid portion, and the cut-off 16, for entering the chute a little above its extreme lower end, substantially as described, and for the purpose specified.

2. The dies 17 and 18, shaped in end view to correspond with the profile of a gimlet-pointed screw and having the cut-away portions 19 at the ends of the dies, which first engage the blank and in the plane of the portion that threads the pointed end of the screw, substantially as described, and for the purpose specified.

3. The combination of a pair of threading-dies, having portions for threading the screw-point and moving relatively to each other, with the retractible stop-gage adapted to gage the blank by its pointed portion, and mechanism for operating said gage, substantially as described, and for the purpose specified.

4. The combination of the dies 17 and 18, moving relatively to each other and having the cut-away portions 19, the stop-gage 27, and mechanism for moving said gage up into position opposite said cut-away portions when the dies first meet and retracting it out of the way of the parts of the dies lying in the plane of said cut-away portion as the dies continue their work, substantially as described, and for the purpose specified.

5. The combination of the carrier-block 21, shaft 29, having the eccentric arm 28 and projection or pin 31, the stop-gage 27, mounted on said eccentric arm, the cam-groove 32, and mechanism for moving the carrier-block and attached parts along said cam-groove, substantially as described, and for the purpose specified.

6. The combination of the carrier-block 21, shaft 29, having eccentric arm 28 and projection or pin 31, the stop-gage 27, mounted on said eccentric arm, the cam-groove 32, with which said pin engages, the head 30 on said shaft 29, and the adjusting-screw 34, having its thread engaged with teeth on the periphery of said shaft, substantially as described, and for the purpose specified.

7. The combination of the carrier-block 21, shaft 29, having eccentric arm 28 and projection or pin 31, the stop-gage 27, mounted on said eccentric arm, the cam-groove 32, with which said pin engages, the head 30 on said shaft 29, and mechanism for adjusting said head circumferentially on said shaft, substantially as described, and for the purpose specified.

8. The combination of the stationary die 18, stationary rack 25, the reciprocating carriage F, having the die 17 and rack 26 mounted thereon, the carrier-block 21, fitted to slide in ways between said carriage and the frame of the machine, the pinion 24, mounted on said carrier-block and engaging both of said racks, and the carrier secured to said carrier-block, substantially as described, and for the purpose specified.

9. The combination of the carrier 35, the holding-jaws 36, mounted to slide thereon and having the side lugs 44, the blocks 40, 42, 45, and 46, for engagement with said lugs, and mechanism for imparting a relative movement to said blocks and carrier, substantially as described, and for the purpose specified.

10. The combination of the carrier, the holding-jaws mounted to slide thereon and having the side pins 37, the spring-latch 38, having cam-blocks 39, the cams 41 and 43, for lifting said spring-latch, mechanism for imparting a relative movement to said carrier and cams 41 and 43, and devices for opening said holding-jaws, substantially as described, and for the purpose specified.

11. The combination of threading-dies moving relatively to each other, the retractible stop-gage 27, and holding-wings 53, mounted on said stop-gage and adapted to hold the lower end of the cylindrical portion of the blank in starting the thread, substantially as described, and for the purpose specified.

12. The combination of the carrier, the holding-jaws mounted to slide thereon and having the side pins 37 and lugs 44, the spring-latch 38, having the cam-blocks 39, the blocks 40 42, having engaging portions for contact with said lugs 44, and having also cams 41 and 43, the hammer-blocks 45 46, and mechanism for imparting a relative move-

ment to said carrier and the blocks 40, 42, 45, and 46, substantially as described, and for the purpose specified.

13. The combination of the carrier provided with holding-jaws, devices for opening and closing said jaws, the threading-dies moving relatively to said carrier and to each other, the stop-gage adapted to gage the blank from its pointed end, and mechanism for moving said gage into and out of position between said dies, substantially as described, and for the purpose specified.

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