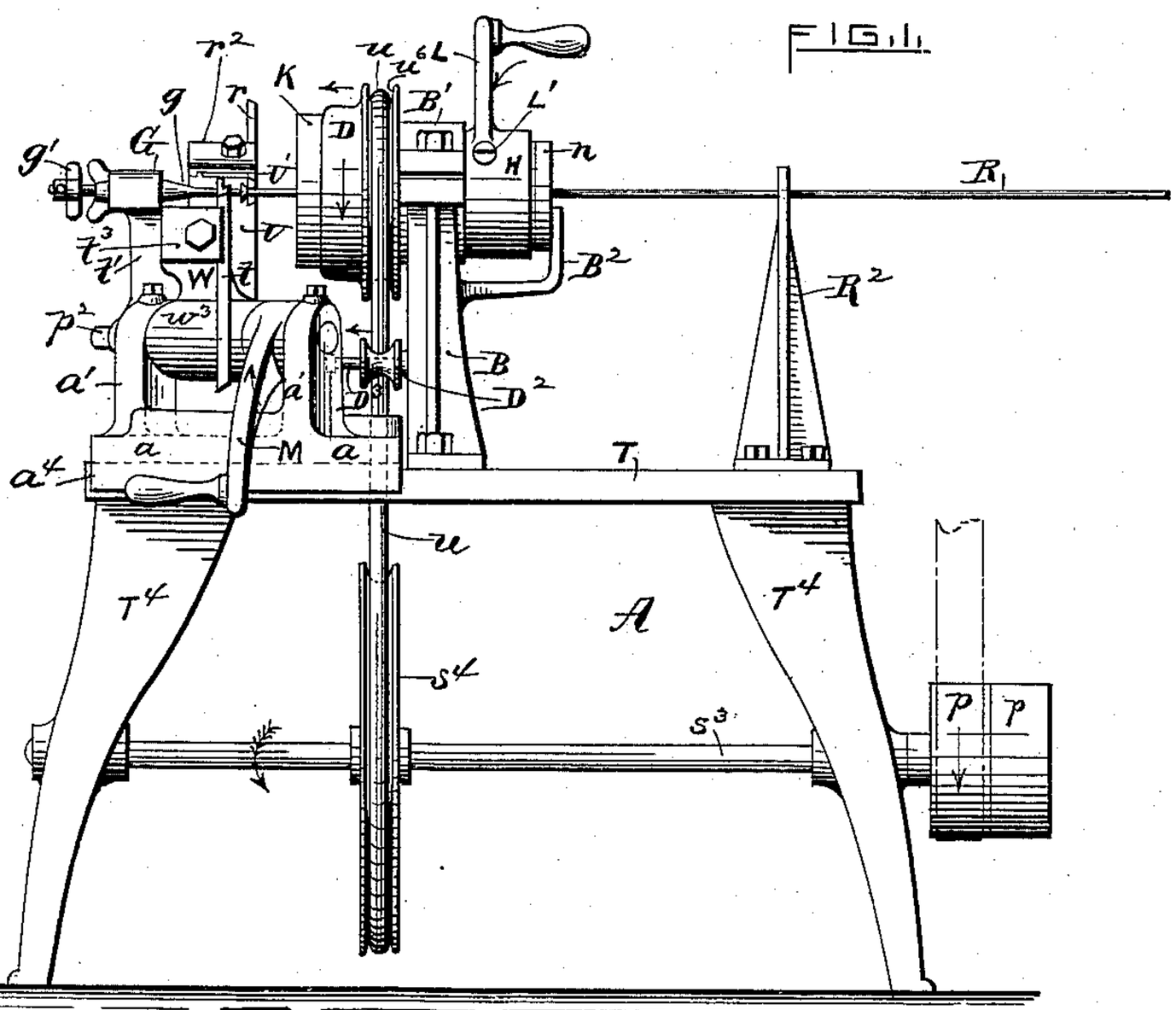
(No Model.) 3 Sheets—Sheet 1.

C. D. ROGERS.

MACHINE FOR FINISHING HEADS OF SCREW BOLTS.

No. 376,416. Patented Jan. 10, 1888.

FIG. 1.



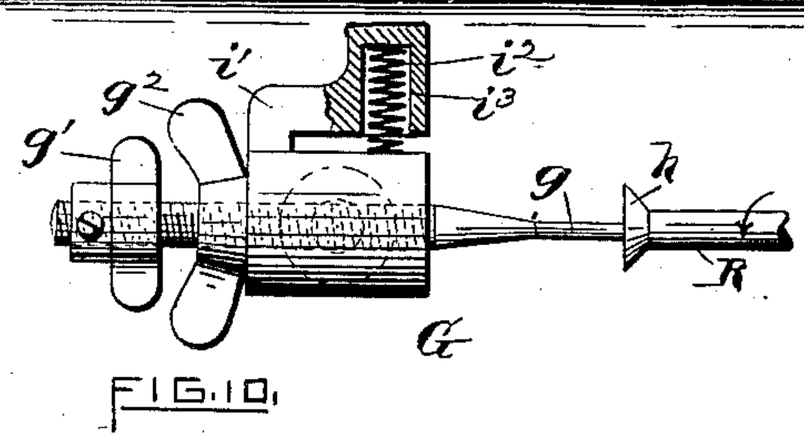


FIG. 10.

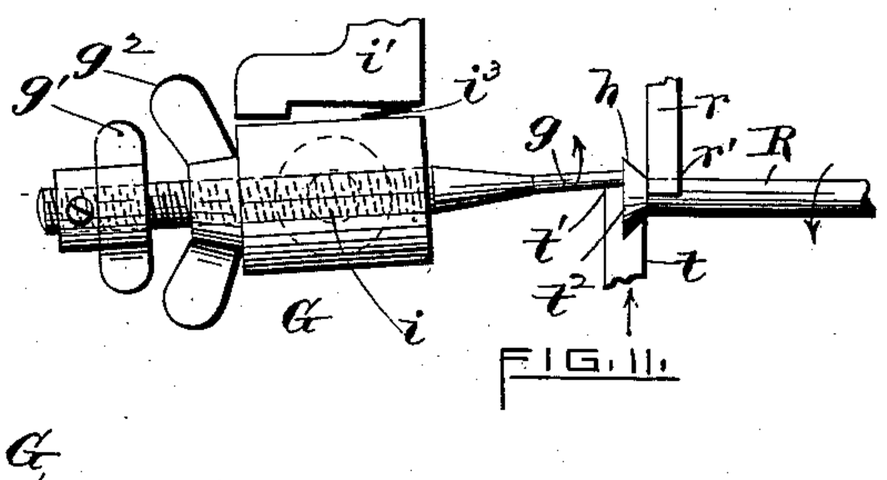


FIG. 11.

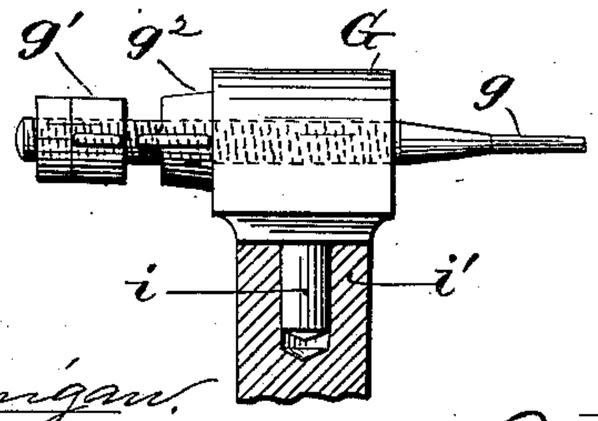


FIG. 12.

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(No Model.) 3 Sheets—Sheet 2.

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MACHINE FOR FINISHING HEADS OF SCREW BOLTS.

No. 376,416. Patented Jan. 10, 1888.

FIG. 2.

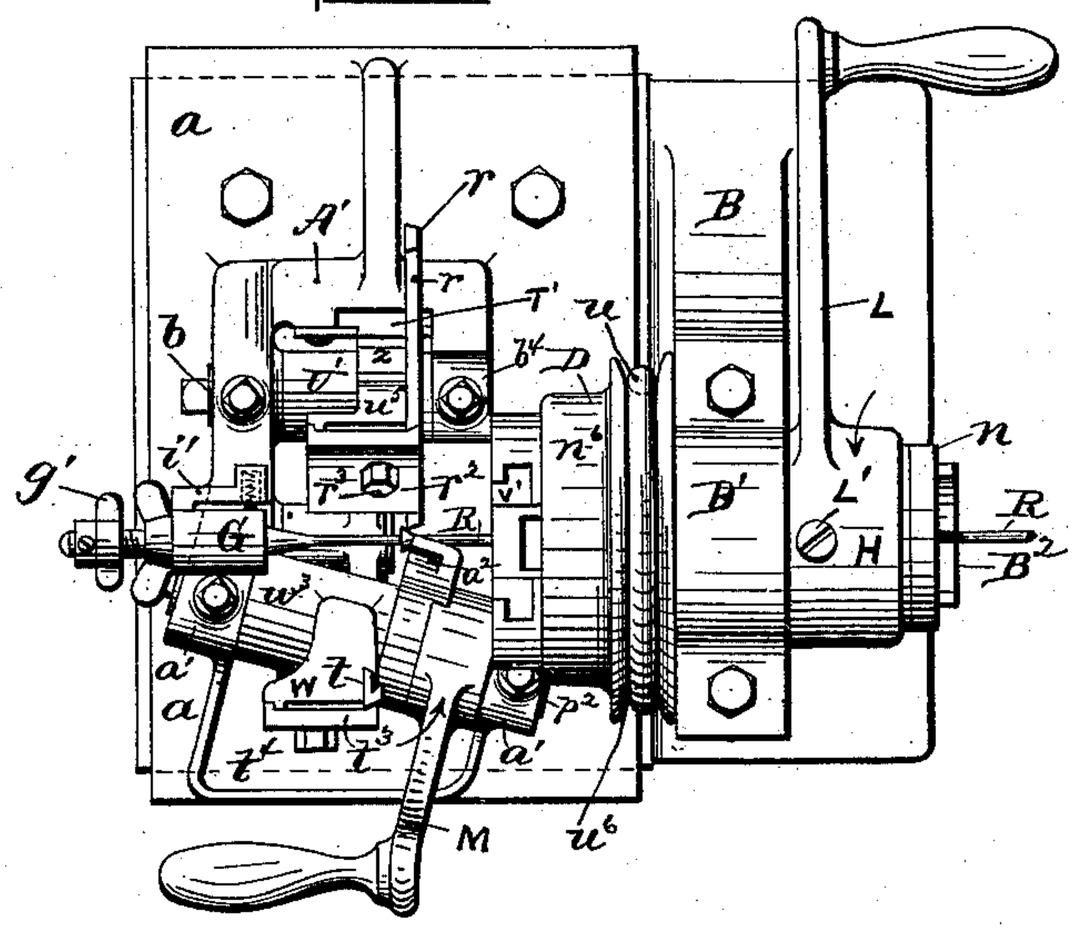


FIG. 14.

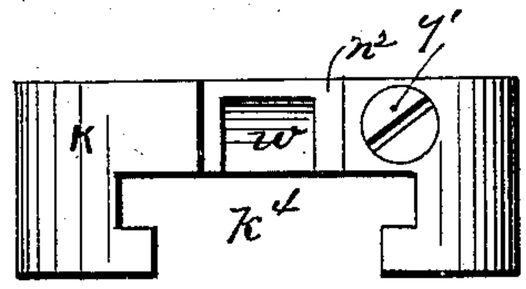
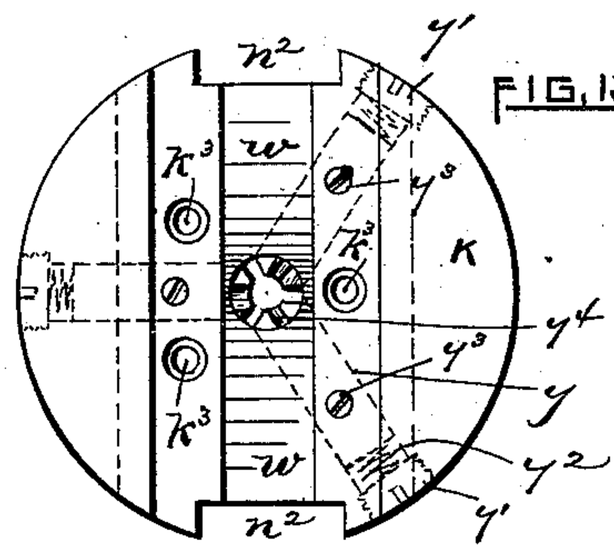


FIG. 13.



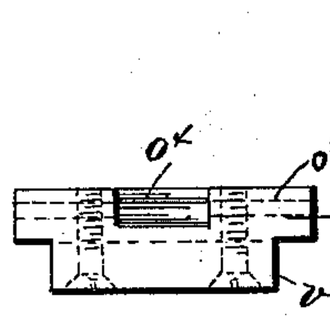


FIG. 17.

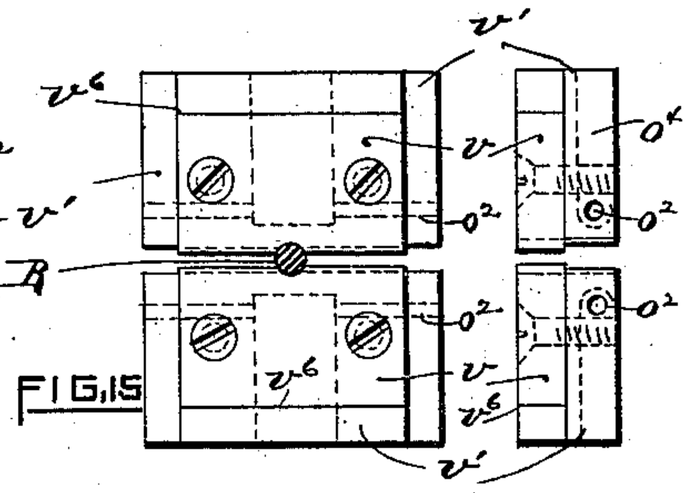


FIG. 15.

FIG. 16.

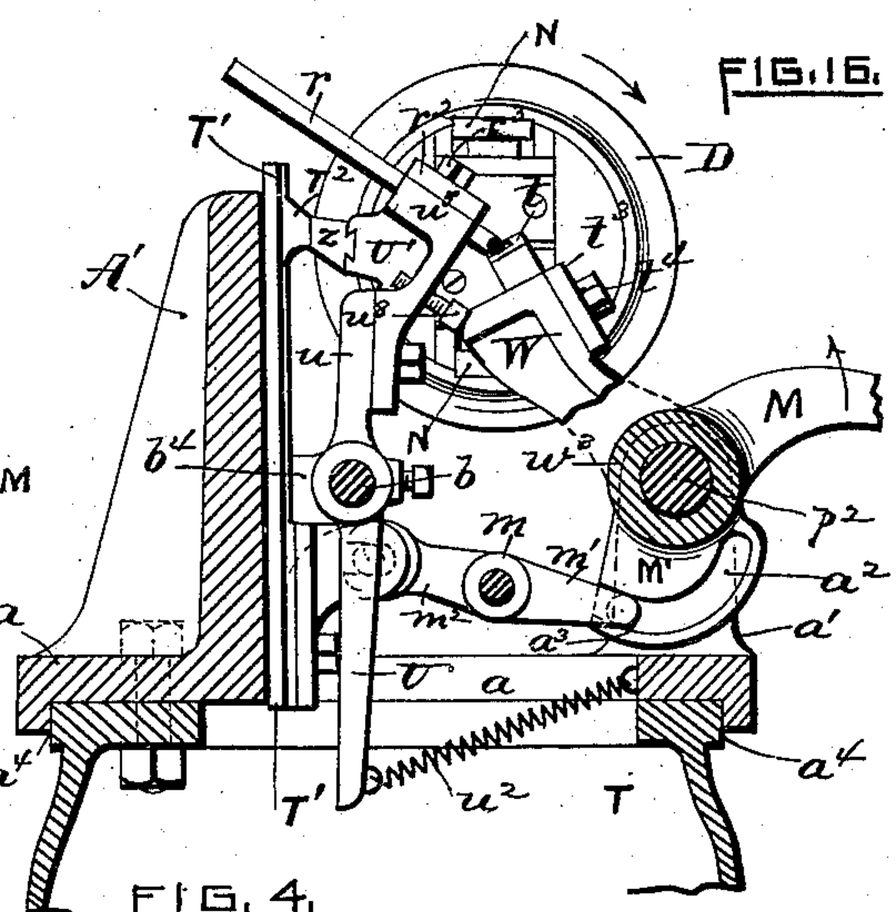


FIG. 4.

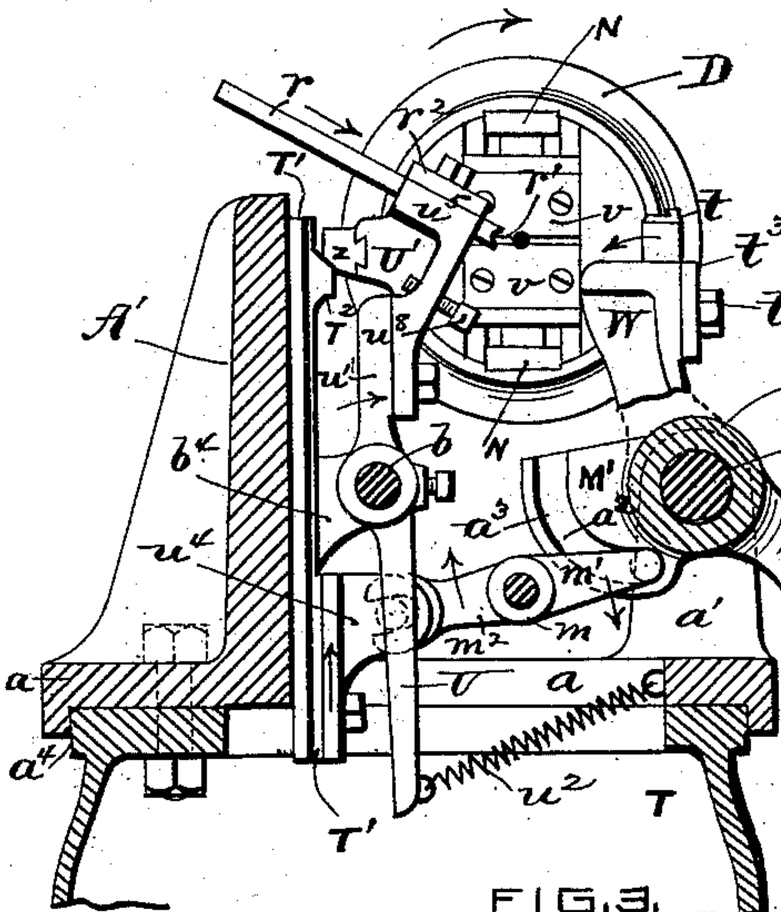


FIG. 3.

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(No Model.) 3 Sheets—Sheet 3.

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MACHINE FOR FINISHING HEADS OF SCREW BOLTS.

No. 376,416. Patented Jan. 10, 1888.

FIG. 19.

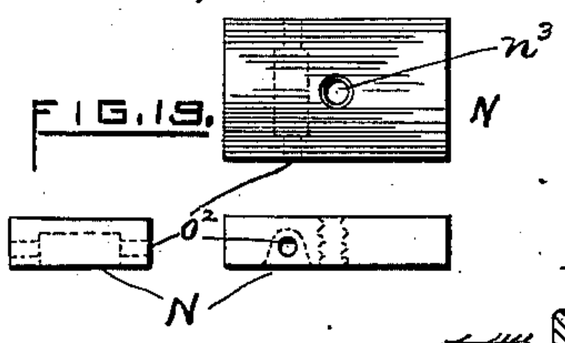


FIG. 18.

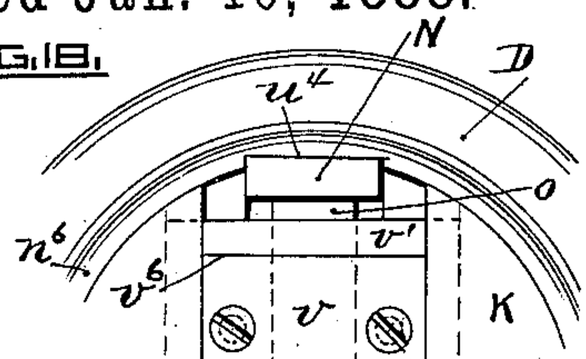


FIG. 5.

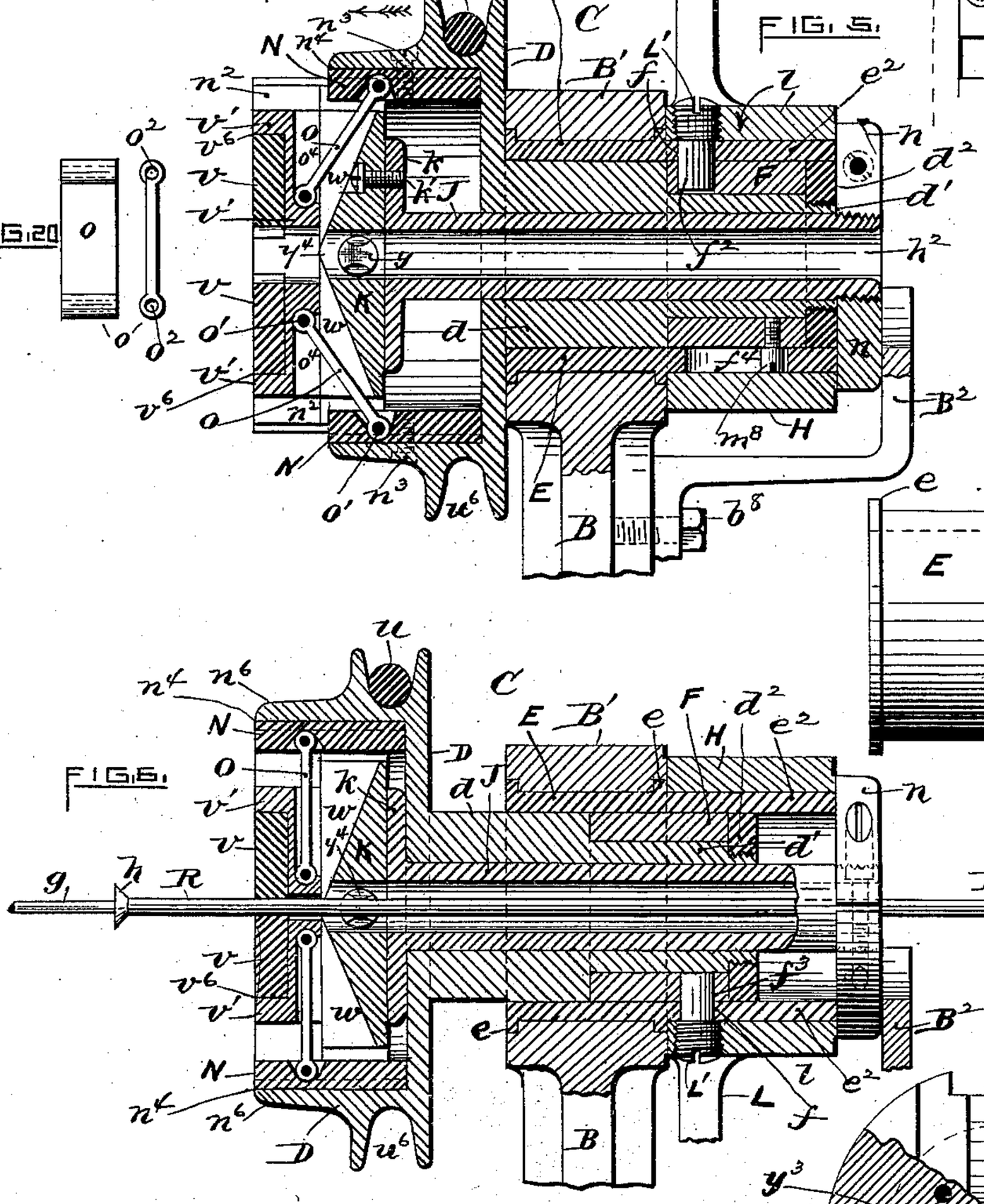


FIG. 20.

FIG. 8.

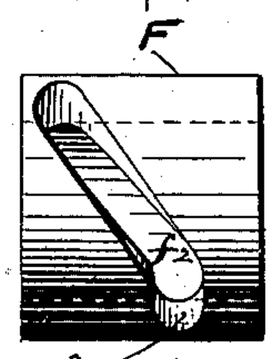


FIG. 9.

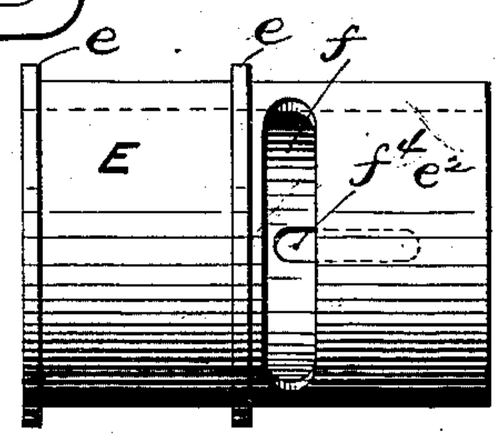
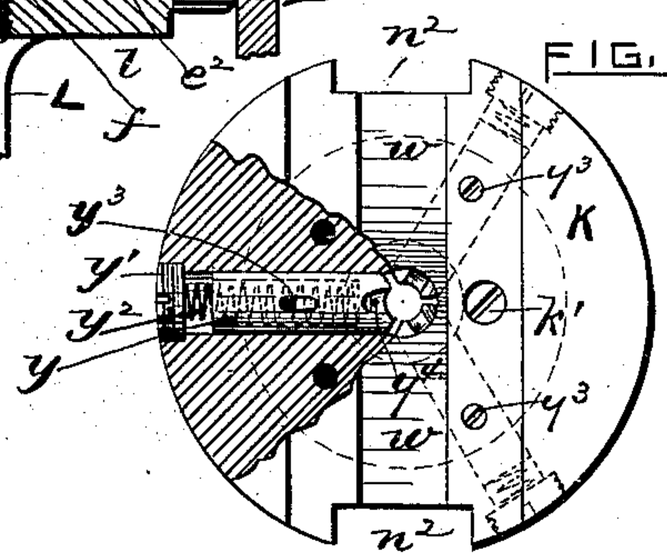


FIG. 6.

FIG. 7.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR FINISHING HEADS OF SCREW-BOLTS.

SPECIFICATION forming part of Letters Patent No. 376,416, dated January 10, 1888.

Application filed December 24, 1886. Serial No. 222,519. (No model.)

To all whom it may concern:

Be it known that I, CHARLES D. ROGERS, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Machines for Finishing Screw and Bolt Heads; and I do 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 appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to machines for shaving or turning the heads of screws; and it consists, essentially, of a machine provided with means for automatically centering and retaining the rod or wire on which the head is formed, combined with a gage of novel construction and mechanism for operating a shaving-tool and back-rest, all as will be hereinafter fully set forth and claimed.

The object of this invention is to produce a machine more especially adapted to finish the rough head upset on the end of a comparatively long rod—as, for example, stove bolts or screws—said machine being so constructed that the attendant, by simply manipulating two levers or crank-arms, is enabled to center the rod and shave the head in a more expeditious and perfect manner than heretofore.

In the annnexed three sheets of drawings, illustrating my invention, Figure 1 represents a side elevation of the machine complete as in use, the rough-headed rod having been passed through the revolving hollow chuck and into engagement with the gage, the chuck, however, as well as the cutter and back-rest, being in their normal position. Fig. 2, Sheet 2, is a plan view of the improved operating mechanism enlarged, the same corresponding to the normal position of the parts shown in Fig. 1. Fig. 3 is a vertical transverse sectional view thereof. Fig. 4 is a similar sectional view showing the several parts advanced and in the working position. Fig. 5, Sheet 3, is an enlarged longitudinal central sectional view of the hollow chuck, the several parts being in the normal position. Fig. 6 is a similar view of the same, showing a rod retained therein by means of the endwise movement of the pulley-sleeve. Fig. 7 is a front end view of the hollow chuck, a portion thereof being broken away to show the self-centering device for the rod. Fig. 8 is a detached view of the inner sleeve having a cam-slot formed therein. Fig. 9 is a similar view of the outer sleeve adapted to receive the inner sleeve. Fig. 10 is a plan view of the pivoted gage, in its normal position resting against the rough head of the rod. Fig. 11 is a view of the same, showing the head finished, and also showing the relative position of the back-rest and cutting-tool thereto. Fig. 12 is a side elevation of the gage. Fig. 13 is an end view of the jaw-holding portion of the chuck enlarged. Fig. 14 is a top view of the same. Fig. 15 is an end view of the holding-jaws. Figs. 16 and 17 represent, respectively, side and top views of the same. Fig. 18 is a partial end view of the chuck. Fig. 19 represents detached views of the link-holding block, and Fig. 20 is a detached view of one of the links.

The following is a detailed description of the machine, including the manner of its operation:

A, referring to the drawings, designates the machine as a whole, T indicating the bed thereof, which is supported by the legs T^4. S^3 indicates the driving-shaft, suitably mounted in the said legs.

p p are fast and loose pulleys mounted on the driving-shaft, as usual.

S^4 indicates a score-pulley secured to the shaft S^3, the latter pulley serving, in connection with the round belt *u*, to continuously revolve the hollow spindle and chuck, about to be described.

B designates the head of the machine, in which the spindle is mounted and revolves, B′ indicating the cap of the bearing. Said head is secured to the bed T, as shown in Fig. 1, and is provided on its front side with the studs D^3, (one being back of the other,) on each of which an idler-pulley, D^2, is loosely mounted, the studs D^3 being elongated for the purpose of permitting the idler-pulleys (carrying the belt *u*) to move endwise thereon when the chuck-pulley is advanced in the arrow direction by the angular movement of the hand-lever L.

The construction of the hollow chuck C, Figs. 5, 6, &c., is as follows:

E indicates a stationary sleeve having raised ribs *e* extending around the periphery thereof, the same being adjustably secured in the head B and clamped in position by the cap B′, just described. The rear portion, e^2, of said sleeve is provided near its front end with an opening, *f*, extending about half-way around its circumference, an elongated longitudinal slot, f^4, being formed in the opposite side of the rear portion of the sleeve, all as clearly shown in Fig. 9, &c. The hub H of the hand-lever L is bored out to loosely receive the rear portion, e^2, of said sleeve, the same being connected therewith by means of the screw-threaded pin L′, the lower portion of the pin being reduced in diameter to fit the opening *f* laterally.

F indicates a bushing fitted to the bore of the sleeve E, said bushing being in turn bored out to fit over the end portion, *d′*, of the chuck-pulley D. A cam-shaped opening, f^2, is cut through the shell of the bushing F, terminating at one end in the recess f^3, as clearly represented in Fig. 8. The width of the opening f^2 is substantially the same as the said opening *f*, the shank of the pin L′ extending through both the sleeve and bushing. (See Fig. 5.)

D designates the chuck-pulley, the head portion of the same being enlarged and provided with the well-rounded circumferential groove u^6, in which runs the round belt *u*. The rear or hub portion of said pulley adjoining the head is somewhat enlarged, as at *d*, to loosely fit the bore of the forward portion of the sleeve E, the hub being further reduced at *d′*, and terminates in the reduced and screw-threaded end, on which is fitted the annular nut d^2, whose outer diameter is the same as the bore of the sleeve E. Between the inner face of said nut and the rear end of the hub *d* is fitted the cam-bushing F. The combined length of the hub *d*, bushing F, and nut d^2 corresponds to the length of the sleeve E, as clearly shown.

It is obvious that by moving the lever L forward in the arrow direction the end of the pin L′, by following the inclined opening f^2, will thereby force the pulley D endwise within the sleeve E (by reason of the cam bushing being retained between the nut d^2 and hub *d*) a distance equal to the "throw" of the cam-groove, the end of the pin L′ at the forward limit of motion then resting in the recess f^3. The head of a small pin, m^8, (tapped into the lower side of the bushing F,) working in the longitudinal slot f^4, Fig. 5, serves as a guide to the cam-bushing.

The front portion of the chuck-pulley D is extended to form the overhanging rim n^6, the same being cut away on opposite sides at n^4 to receive the stationary link-blocks N, which are secured to the rim n^6 by screws n^3. The said blocks N are each drilled at o^2 to receive the pin *o′*, the block being further recessed on its under side to receive the upper end of a link, *o*.

v′ v′ designate oppositely-arranged sliding blocks or jaws, which are connected with the lower ends of said links *o* by means of pins *o′*. (See Figs. 5, 15, 16, 17, &c.) To the face of each block is secured a holder or "gripper," *v*, the upper end of each resting against the overhanging lip of the block *v′* and forming the joint v^6. The holders *v* are cut away on the adjacent edges to receive and hold the rough stem of the rod or bolt R, as clearly shown.

K, Figs. 13, 14, &c., indicates the chuck-head, having a central opening therein, the chuck being turned to fit the bore of the rim n^6, before described. A T-shaped slot, k^4, is formed across the face thereof, in which the jaw-blocks *v′* are fitted to radially move. A longitudinal recess, n^2, is also cut into the peripheral surface of the head K contiguous to the outer ends of the slot k^4, in which the link-blocks N are adapted to freely slide. A portion, *w*, of the bottom surface of the slot k^4 is cut away in opposite directions from the center for the purpose of permitting the free movement of the links *o*. (See Figs. 5, 6, &c.)

Within the chuck-head K is arranged the self-centering device for the bolts or rods R, the same consisting of three radially-placed hollow cylindrical plugs, *y*, each loosely fitting a hole drilled in the rear portion of the chuck-head, the outer portion of the hole being tapped to receive a screw-threaded plug, *y′*, a small spiral spring, y^2, bearing against the under side of the plug *y′*, and the bottom of the plug-chamber serving to press the latter plug, *y′*, against the rod R, thus automatically centralizing the work while in the chuck. The inner ends of the plugs *y* are each beveled or rounded off on opposite sides, as at y^4, for the purpose of facilitating the entrance and withdrawal of the head *h* of the bolt. A stationary pin, y^3, engaging an elongated slot formed in the shell of the plug *y*, prevents the latter from rotary movement, the slot at the same time, however, permitting a free endwise movement.

J indicates the hollow spindle, through the bore h^2 of which the bolts are passed to the cutters to be finished and thereafter withdrawn. The front end of the spindle is enlarged to form the flange *k*, which, by means of screws *k′*, passing through the screw-holes k^3, secures the spindle to and revolves with the chuck-head. The rear end of the spindle is screw-threaded to receive the annular nut *n*, the diameter of the latter being somewhat larger than that of the sleeve E, said nut also serving as a check by means of the slit extending across one side and a small screw tapped therein, as shown in Figs. 5 and 6. A bent arm, B^2, secured to the head B, in connection with the nut *n*, prevents the hollow spindle J from endwise movement, although at the same time permitting it to revolve freely.

The screw-head-shaving portion of the machine A consists of an adjustably-secured base, *a*, lipped over the sides of the bed T in front

of the chuck just described, and provided with uprights a' a', carrying the stationary shaft p^2, the upright frame A′, carrying the pivoted rest and mechanism for operating the same, and, finally, a standard in which the swivel stop or gage is mounted, as represented in Figs. 1 to 4. The said shaft p^2 is mounted in the ears a', the same being located on the front side of the machine and at an angle with the axis of the revolving chuck. An arm, W, connected with the operating-lever M and hub w^3, is loosely mounted upon the shaft p^2. The upper end of the arm W is adapted to receive the shaving-tool t, a cap, t^3, and bolt t^4 serving to adjustably retain the tool in position. A short arm or extension, M′, is formed on the under side of the hub w^3 opposite the operating-lever M, said extension having a cam-groove, a^2, in its face, in which the front end, m', of the pivoted two-arm horizontal lever m is mounted. By means of this construction the angular movement back and forth of the operating-lever produces an irregular vibratory or up-and-down motion to the said lever m, which is communicated to a vertical rod, T′, by means of the forked arm m^2 of the lever m, connected to a bracket, u^4, secured to said rod T′, the latter rod in turn being mounted in the upright frame A′.

Extending from the front face of the frame A′ are formed short brackets or ears b^4, carrying a stationary pin, b. Loosely mounted upon said pin a vertical arm, U, is adapted to vibrate, the lower portion of the arm being connected to the bed a by a spiral spring, u^2. The upper end of the arm has the head U′ secured thereto, which in turn is enlarged at u^5 and provided with a clamping-cap, r^2, and bolt r^3 for adjustably retaining the back-rest r in position, the front end, r', of which is recessed to receive and support the shank of the bolt R. To the rear of the head portion U′ is fitted a thrust-block, z, having its under side beveled off to engage a like surface formed on the top side of the inwardly-projecting lug T^2 at the upper end of the vertically-guided rod T′, before referred to. It is obvious, now, (see Fig. 3,) that by moving the lever M in the arrow direction the front end, m', of the lever m will, by reason of its engagement with the cam-groove a^2, move downwardly, thereby forcing the rod T′ upward, which latter movement thrusts the back-rest lever U forward to engage the rear side of the bolt's shank, the several parts then being in the position shown in Fig. 4. A stop, u^8, serves to limit the upper rearward angular movement of the operating-lever, the shape of the cam-groove a^2 being such that the rest r is made stationary and locked in position, as in Fig. 4, prior to the action of the shaving-tool upon the bolt head.

Referring, now, more particularly to Sheet 2 of the drawings and to Fig. 2 thereof, G designates the adjustable and swiveled stop or gage as a whole, mounted in a socket formed in the upper end of the standard i', the rear side of which is extended and drilled at i^2 to receive a small spiral spring, i^3, as clearly shown in Figs. 2 and 10. The head portion of the stop has a round stem, i, formed on its under side, loosely fitting the socket above referred to. Said head is drilled and tapped in line with the axis of the bolt R to receive the screw-threaded spindle g, the latter being provided with the nut and check g^2 g'. The rear end adjacent to the bolt-head h is considerably reduced in diameter, as represented.

R^2, Fig. 1, indicates a support or rest for the rear portion of the rod or bolt R, in which the latter revolves while having its head shaved or turned.

The operation is substantially as follows: The rough head end h of the bolt or screw is first inserted into the hollow spindle J of the chuck, and, coming in contact with the centering-plugs y, readily separates them in a radial direction against the tension of the springs y^2, said springs automatically returning the plugs after the head has passed against the rod R, thereby forming a preliminary center support therefor. The rod is further advanced to its limit, the head then touching the end of the adjustably-mounted gage-spindle g, the chuck-pulley D being now revolving, as usual, and the several parts being in the position represented in Figs. 1, 2, 3, and 5. The lever L is then grasped by the right hand of the operator and turned in the arrow direction to its limit, which movement causes the pin L′ to travel in the slot f of the stationary sleeve E, and at the same time, by means of its engagement with the cam slot f^2, forces the cam-bushing F ahead, (said bushing being restrained from rotary movement by the pin m^8, which slides along the slot f^4, formed in the stationary sleeve E.) This movement of the bushing F also produces a corresponding end movement to the chuck-pulley D and its attached parts, during which time the link-blocks N slide along the recesses n^2 of the chuck-head K, the links o being then vertical, or nearly so, and the jaws or grippers v v firmly retaining the bolt, as represented in Fig. 6. In order to effect a better working of the belt u during the end movement of the chuck-pulley, the small guide-pulleys D^2, Fig. 1, automatically slide along and revolve upon the studs D^3. The bolt is thus fully centered in the revolving chuck, the head thereof touching the spindle g, as shown in Fig. 10, &c. The next step in the operation is to bring the back-rest r and cutting tool t in working position. This is effected by the operator grasping the hand-lever M in his left hand and moving it upward in the arrow direction, Fig. 3. The first part of this movement forces the front end, m', of the lever m (by means of its engagement with the cam-groove a^2) downwardly, the opposite end, m^2, at the same time moving upwardly and carrying with it the attached rod T′, the lug T^2 of the latter, also, at the same time forcing itself in the rear of the block z of the lever U and swinging the back-rest r forward against the screw-rod

R adjacent to its head. A further forward movement of the back-rest is prevented by the concentric portion a^3 of the cam-groove. During the movement of the lever *m*, &c., just described, the tool-carrying arm W swings on the pin p^2 in unison with the lever M. The final movement brings the V-shaped cutting-edge t^2 of the tool *t* in contact with the rough head *h* of the bolt, thereby shaving both the top and under surfaces thereof. (See Figs. 4 and 11.)

The point *t'* of the tool is slightly elongated, so that as the latter finishes the head the advancing point *t'* gradually forces the spindle-gage *g* slightly toward the rear (see arrow direction in Fig. 11) against the tension of the spring i^3.

While the tool *t* is cutting away the stock the revolving bolt R is supported in the recess *r'* of the back-rest *r*. An adjustable stop, u^8, Fig. 4, serves to limit the upward angular movement of the lever M. The thrust or pressure of the tool in cutting is borne by the rest *r*, backed by the thrust-blocks T^2 *z*, as clearly shown in said Fig. 4. After finishing the bolt-head the lever M is moved in the opposite or downward direction to its normal limit, (see Fig. 3,) thereby withdrawing the tool and the vertical rod T. At the same time, also, the back-rest-operating lever U is retracted by means of the spiral spring u^2, and the spindle *g* automatically swings back to its normal position (see Fig. 10) by the force of the spring i^3. Finally the lever L is moved rearwardly, thereby opening the jaws *v v* of the chuck (see Fig. 5) and permitting the finished screw R to be readily withdrawn back past the self-acting centering-plugs *y* and out of the hollow chuck.

It is obvious that various forms of screw-heads are adapted to be shaved by my improved machine by simply substituting a correspondingly-shaped cutting-tool in lieu of the one (*t*) shown.

I claim as my invention—

1. The bolt-head-shaving machine hereinbefore described, consisting of an adjustably-mounted hollow chuck having means for clamping the bolt therein while running, an adjustable stop or gage for limiting the endwise movement of the bolt, an adjustably-mounted back-rest adapted to be automatically locked in position, a shaving-tool adjustably mounted in a pivoted arm opposite said back-rest, and means for driving said chuck, all constructed, combined, and operating substantially as hereinbefore set forth.

2. In a bolt-head-shaving machine, the combination, with the adjustably-mounted shaving tool, back-rest, and gage, of the adjustably-mounted hollow chuck, consisting of the stationary sleeve having both a circumferential and a longitudinal slot therein, a bushing fitting the interior of said sleeve, having a cam-shaped slot therein contiguous to said circumferential slot, and also having a pin engaging said longitudinal slot to prevent the bushing from rotary movement, a hollow chuck-pulley having its hub passing through and revolving in said sleeve and bushing, a bolt centering and retaining chuck-head having a hollow spindle restrained from endwise movement secured thereto and fitting the interior of said pulley-hub, holding-jaws mounted in said chuck-head, link-blocks adapted to slide in the chuck-head secured to the rim of the chuck-pulley, links connecting said blocks and holding-jaws, and an operating-lever loosely fitting the exterior rear portion of the stationary sleeve, having a pin secured thereto extending through the hub of the lever and engaging both the sleeve and bushing, substantially as shown, and for the purpose hereinbefore set forth.

3. In a bolt-head-shaving machine, the adjustably-mounted slotted sleeve E, the bushing F, having a cam-shaped slot therein, the pulley D, having its hub *d d'* adapted to revolve in said sleeve and bushing, and an operating-lever, L, mounted on the sleeve E, having a pin, L', engaging said cam slot, in combination with the hollow chuck-head K, having holding-jaws mounted therein, links *o o*, connecting said jaws and pulley D, a hollow spindle, J, secured to the chuck-head, extending through the hub of said pulley, and the retaining nut *n*, adapted to revolve between the stationary thrust-arm B^2 and the rear faces of the lever and sleeve, substantially as shown and hereinbefore described.

4. The combination, with the head of a hollow chuck having means for holding a rod therein, of the automatic or self centering device radially mounted in said head, consisting of spring closing-plugs having beveled inner ends and means for restraining the plugs from rotary movement, substantially as shown and set forth.

5. In a machine for shaving bolt-heads, the combination, with a hollow shaft, J, restrained from endwise movement, the chuck-head K, secured thereto, having holding-jaws *v v'*, and the automatic centering-plugs *y*, mounted therein, of the chuck-pulley D, loosely mounted on said hollow shaft, a cam-bushing, F, restrained from rotary movement, an adjustably-mounted sleeve E, having elongated openings *f* f^4 therein, links *o*, and blocks N, connecting said pulley and jaws, and the operating-lever L, having a pin, L', engaging the bushing F and sleeve E, substantially as and for the purpose hereinbefore described.

6. In a bolt or screw head shaving machine, the combination, with the shaving-tool and means for centering and supporting the screw, of a pivoted head, G, a gage-spindle, *g*, adjustably mounted therein, and a spring, i^3, for automatically returning the spindle-head to its normal position, substantially as shown and hereinbefore set forth.

7. In a screw-head-shaving-machine, the combination, with a suitably mounted and operated hollow chuck having means for centering and holding a rod or bolt placed therein,

of a pivoted arm or holder, W, carrying an adjustably-mounted tool, *t*, a cam-lever, M′, adapted to move in unison with said holder, a pivoted spring-connected vertical lever, U, having a back-rest, *r*, adjustably mounted therein, a vertically-guided rod, T′, having a projection, T², at its upper end for locking the said lever U in position, and a two-arm pivoted lever, *m*, engaging the cam-lever M′ and the rod T′, whereby the action of swinging the cutting-tool into engagement with the bolt causes the back-rest to be forced against said bolt and locks the back-rest in position, substantially as shown and hereinbefore set forth.

8. In a screw or bolt head shaving machine, the combination, with the tool-carrying arm W, an operating-lever, M, and a lever, M′, having a cam-groove, a^2, terminating in the concentric groove a^3 formed therein, of the pivoted lever U, carrying an adjustably-mounted back-rest, *r*, a vertically-guided rod, T′, having its upper end adapted to engage the said lever U, and a pivoted lever, *m*, engaging said cam-groove and vertical rod T′, substantially as shown, and for the purpose hereinbefore set forth.

9. In a screw-head-shaving machine, the combination, with the tool-carrying arm, back-rest-carrying lever, and vertically-guided rod adapted to lock the said back-rest lever in working position, of a cam, M′, a lever connecting the said cam and vertically-guided rod, and an operating-lever, M, all constructed, arranged, and operating whereby the movement of the operating-lever (as in cutting) first produces a simultaneous movement to the several parts, followed by the automatic locking of the back-rest in a stationary position against the revolving screw blank or rod prior to the engagement of the cutting-tool therewith.

10. The combination, with the continuously-revolving hollow chuck C, adapted to have a headed rod passed longitudinally through its center and having means for automatically centering and holding the rod in position, of the pivoted stop-gage G, the tool-carrying arm W, the cam M′, the back-rest-carrying lever U U′, a vertically-guided rod, T′, and a pivoted lever, *m*, connecting said cam and rod T′, all arranged, operating, and mounted on a suitably-supported bed, T, substantially as shown and hereinbefore described.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES D. ROGERS.

Witnesses:

CHARLES HANNIGAN,

WM. R. DUTEMPLE.