

A. LATHAM.
MACHINE FOR FACING COUNTERBORES.

No. 350,141.

Patented Oct. 5, 1886.

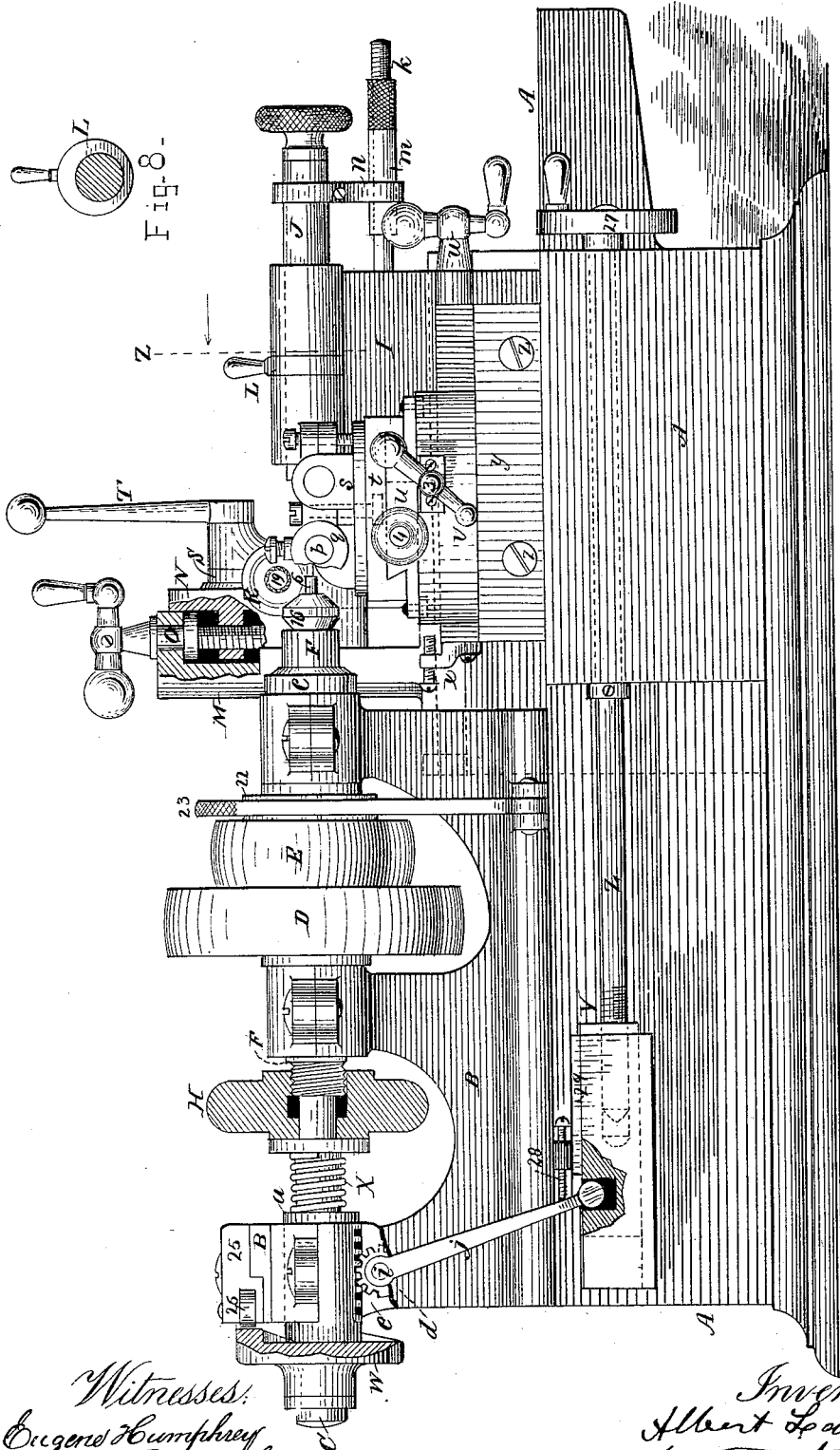


Fig. 1.

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(No Model.)

4 Sheets—Sheet 2.

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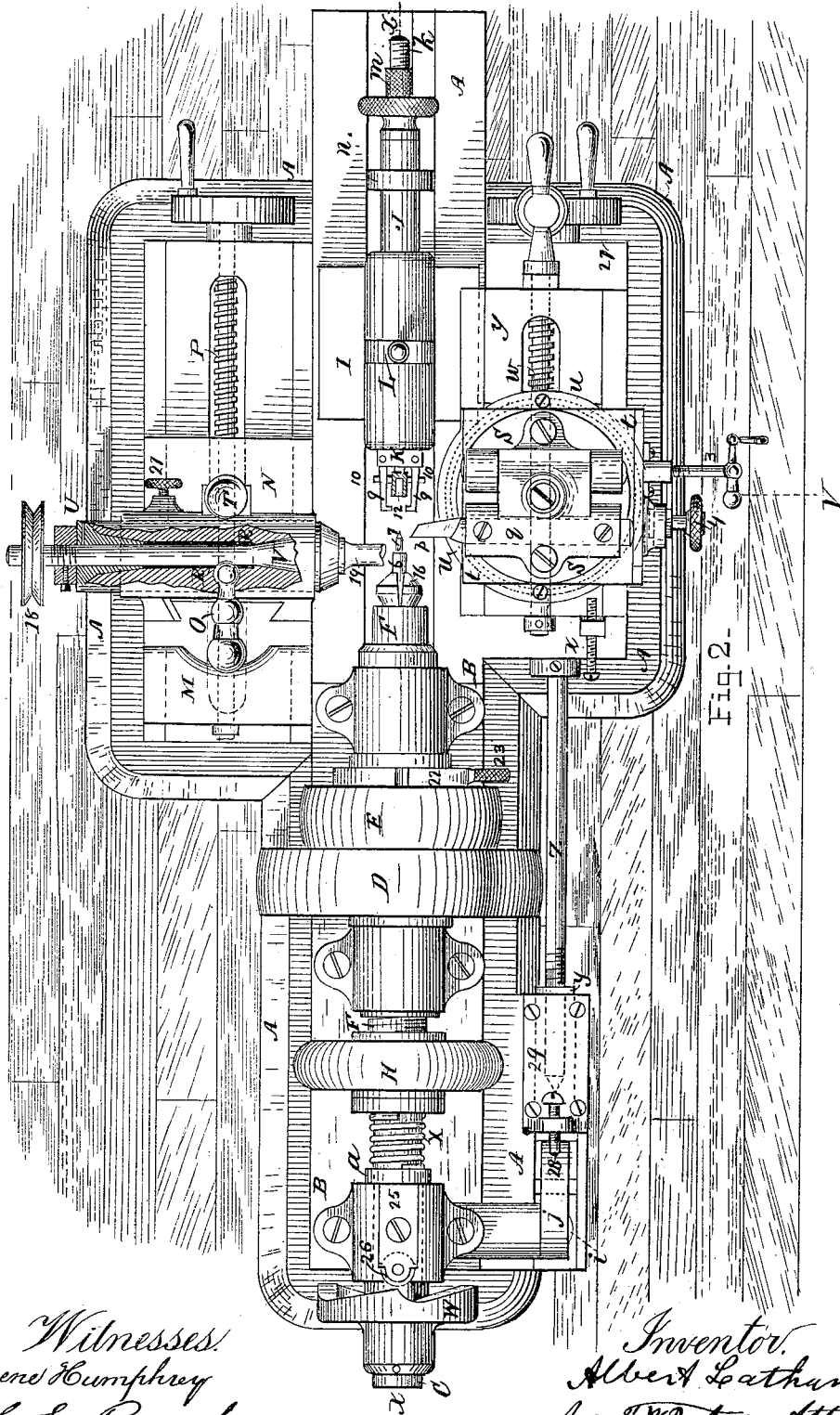


Fig. 2.

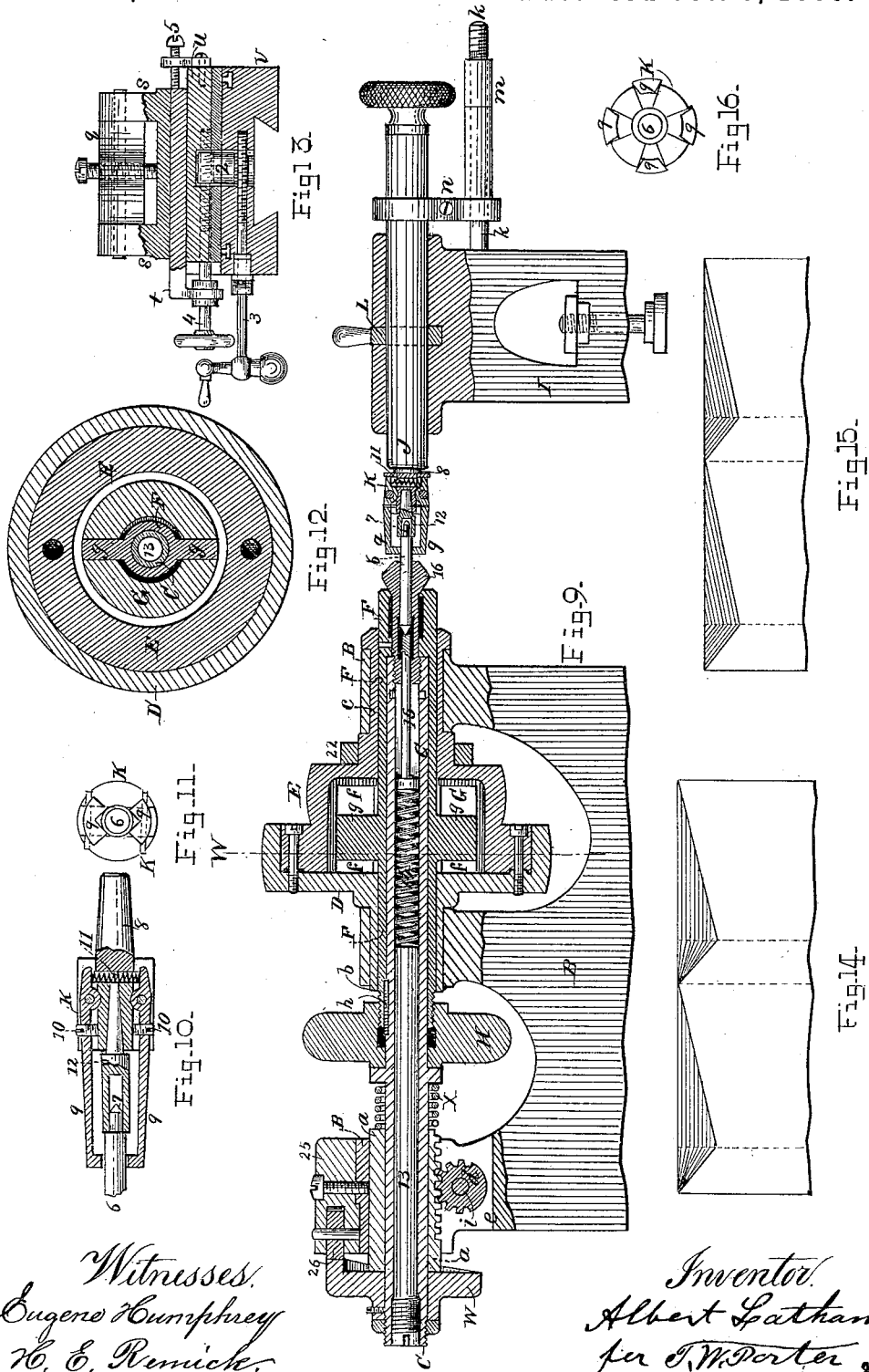
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UNITED STATES PATENT OFFICE.

ALBERT LATHAM, OF WALTHAM, MASSACHUSETTS.

MACHINE FOR FACING COUNTERBORES.

SPECIFICATION forming part of Letters Patent No. 350,141, dated October 5, 1886.

Application filed June 21, 1886. Serial No. 205,779. (No model.)

To all whom it may concern:

Be it known that I, ALBERT LATHAM, of Waltham, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Machines for Facing Counterbores, which will, in connection with the accompanying drawings, be hereinafter fully described, and specifically defined in the appended claims.

Figure 1 is a front elevation of a machine embodying my invention. Fig. 2 is a top plan view of the machine shown in Fig. 1. Fig. 3 is an end elevation, viewed as from the right in Figs. 1 and 2. Fig. 4 is a detached view showing the relative positions of the counterbore, the groove-forming milling-cutter, and the facing-cutter. Fig. 5 is a detached view taken as at the left of Fig. 4, and with the facing-cutter omitted. Fig. 6 is a detached view of the index devices, taken as viewed from the right in Figs. 1 and 2. Fig. 7 is a detached view showing devices by which the facing-tool is adjusted. Fig. 8 is a detached vertical section taken on line Z, Fig. 1, and viewed as from the right in that figure. Fig. 9 is a longitudinal vertical central section taken on line X, Figs. 2 and 3, the lower portion of the machine being omitted. Fig. 10 is an enlarged sectional elevation of the blank-adjusting chuck. Fig. 11 is an elevation taken at the left hand of Fig. 10. Fig. 12 is a detached section taken on line W, Fig. 9. Fig. 13 is a detached section on line V, Fig. 2, looking to the left therein. Figs. 14 and 15 are "projections" showing the "lines of cut" in facing the counterbores. Fig. 16 is an elevation like Fig. 11, but showing a chuck with four instead of two jaws.

My invention relates to machines adapted to cut the spiral end face or clearance upon the respective lips of counterbores; and it consists in features of novelty hereinafter fully described, and pointed out in the claims.

Referring, again, to the drawings, A represents the bed of the machine, which will be of such size, form, and proportion as to best adapt it to the various other parts of the machine.

B represents the head-stock, in which is supported the arbor or "live" hollow spindle C, constructed and arranged in manner as follows, to wit: At the rear or outer portion of

the head-stock a sleeve, *a*, is closely fitted to slide lineally, and is actuated by means of pinion *d*, which engages the rack-like teeth cut in the sleeve, as shown, said pinion being arranged in a slot, *e*, in the stock, and being mounted on an arbor or stud, *i*, on which latter is secured lever *j*, by which the pinion is actuated in the manner to be described. A portion or "speed," D, of the pulley is formed with a sleeve, *b*, which is fitted to revolve in the central portion of stock B, and a lesser speed, E, of the pulley is bolted to D, as shown, and is formed with a sleeve, *c*, which is fitted in the front portion of stock B, as shown. Within said sleeves *b c* is the sleeve F, formed with wings *g*, which interlock in slot *f* in hub G of speed D, and allow a free sliding movement of the sleeve F. Said sleeve F and hollow arbor C are interlocked by spline *h*, to insure the coincident rotation of the arbor when the sleeve is rotated by means of the pulley. The utility of this construction and arrangement of the arbor, as also that of certain other devices carried by the arbor, will be hereinafter described. A tail-stock, I, is adjustably mounted on bed A, as shown, and in the stock is mounted the sliding or "dead spindle" J, which carries the removable chuck K, to be described, said spindle J being locked in position by means of the eccentric ring-binder L, (shown in side elevation in Fig. 8,) and which is rotated by its handle to lock or release the spindle.

Instead of lineally adjusting spindle J by means of a screw, in the usual manner, it slides freely in its bearing when not locked by ring L, and it is adjusted in proper lineal position by means of its swinging hook *n*, which may be engaged with stud *k*, secured in stock I, a nut, *m*, being threaded and adjustable on said stud, as shown; and by moving spindle J so that hook *n* bears against the end face of nut *m* the spindle may thus be placed in its desired lineal position, and then be locked by ring L; and when the ring is rotated to release the spindle hook *n* may then be instantly swung clear of stud *k*, when spindle J may be moved as desired.

The counterbore-facing tool is shown at *p*, Figs. 1, 2, and is mounted and held in its stock or holder *q*, which is pivotally mounted in the

eared plate *s*, which is mounted upon plate *t*, to be revolved for adjustment of cutter *p* in a horizontal plane, said plate *t* being mounted upon a plate, *u*, and susceptible of adjustment transversely to bed A, and having a gaging or stop screw, 5. Plate *u* is mounted and arranged to rotated upon plate *v*, which latter is mounted upon a bed, *y*, and is adjusted thereon in the direction of the length of bed A by means of screw *w*, said bed *y* being locked in position by screws *z z*. Said plate *u* is pivoted upon stud 2, seated in plate *v*, this stud being formed at top and bottom with teeth, engaged, respectively, with screws 3 4, and by actuating screw 3 plate *v* and the parts thereby supported are rotated around stud 2, while by actuating screw 4 plate *t* and the parts thereby supported may be moved in and out or transversely to bed A; hence by these movements and the movement of plate *v* by means of screw *w* the cutter *p* may be adjusted as desired, the height of said cutter being adjusted by means of the vertical rocking movement of its holder *g*; but as all the devices for holding and adjusting cutter *p* are described and claimed in United States Patent No. 344,283, June 22, 1886, I believe the foregoing description thereof to be sufficient. The counterbore-blank is shown at 6 as with the grooves formed and its stem portion 7 previously reduced. This blank is adjusted in the machine and held by the following-described means: A chuck, K, has a stem or body, 8, to be seated in spindle J in the well-known manner of "lathe-centers." Upon opposite sides of body 8 are pivoted the jaws 9, provided with the gage-screws 10, while a spring, 11, tends constantly to force together the outer ends of the jaws upon blank 6, as shown in Fig. 10. A center, 12, is seated in body 8, and has an axial hole in its outer end to receive the stem 7 of blank 6, as shown.

In the hollow live-spindle C is secured a rod, 13, against which is abutted a helical spring, 14, which tends constantly to thrust outwardly the headed rod 15, arranged to slide freely in spindle C, as shown in Fig. 9. A self-expanding chuck, 16, is also secured in said spindle C to revolve therewith, said chuck being closed by the compressive action of sleeve F, which is forced outward by actuating hand-wheel H, which is threaded on said sleeve and bears against a collar on spindle C, as shown.

In practical use the tail-stock I is placed and secured in proper position, and nut *m* on stud *k* is properly adjusted, so that when hook *n* on spindle J is engaged with stud *k* said spindle will be thereby properly positioned; then to adjust a counterbore-blank in chuck 16 the hook *n* is swung upward away from stud *k*, after the ring-binder L is slackened and spindle J is moved to the rear, and a counterbore-blank is inserted between jaws 9 of chuck K, the shoulder of the blank next its stem 7 being in contact with the end face of hollow center, 12, which thus serves as a

gage. After the blank is thus correctly positioned in chuck K spindle J is moved forward till hook *n* is engaged with stud *k*, and so that the hook bears against the end face of nut *m*, when the spindle J is locked by ring L. When spindle J is thus advanced, the thrust action of spring 14 upon rod 15 tends to hold the shoulder of the blank against the end face of center 12; and while thus held hand-wheel H is actuated to force outward sleeve F, and thus secure the blank firmly in chuck 16 without lineal displacement of the blank relatively to its adjusting or gage center 12. When chuck 16 is thus closed upon the blank, ring L is released, hook *n* is raised from stud *k*, and spindle J is moved outward, in readiness to repeat the operation when the blank thus transferred to chuck 16 shall be finished. When the blank 6 is thus placed in chuck K and then transferred to chuck 16, its shoulder next stem 7 has always a fixed and determined position in the machine, regardless of the length of its body or portion of greater diameter, or of the length of its stem 7; and as said shoulder is to constitute the highest point of the spiral faces of the lips, such adjustment is of the highest importance.

It is preferable, especially in the smaller sizes of counterbores, to mill the grooves therein while in place in the machine in which the facing or backing off of the lips is to be performed; and to accomplish this I form bed A with an offset upon the rear side, as shown in Fig. 2, and on this I mount the stock M, to be moved in guideways by means of screw P, in a well-known manner, and upon a dovetail way of stock M is mounted the tool-carrying head N, arranged to be vertically adjusted by screw O, in a manner also well known.

In head N is mounted the sleeve R, which upon its upper side has rack-like teeth engaged by pinion S, actuated by lever T, by means of which the sleeve may be advanced toward the axial center of the lathe to the extent permitted by stop-screw 20, carried by the sleeve, and which arrests the latter by contact with head N, as shown in Fig. 3. In said sleeve is journaled the conical-ended arbor V, which at its rear end carries the conical bushing U, as shown, said arbor being driven by a belt acting on its pulley 18, the milling-tool 19 being secured in the front end of said arbor, as shown in Figs. 2, 3. Thus when the counterbore-blank has been secured in chuck 16, as already described, the milling-tool is advanced by means of lever T to the desired position over blank 6, as shown in Figs. 4, 5, the same being determined by set-screw 20, and sleeve R is then locked by set-screw 21, when by actuating screws O P the required depth and length of cut to form the desired grooves in the blank is obtained, the blank being adjusted and locked in the desired positions for forming the requisite number of grooves by means of the indented index-ring 22, secured on spindle C, and its catch-arm 23, engaged and actuated by spring-

pin 24, (shown in Figs. 1, 2, 3, and 6,) said ring being indented to correspond with the desired number of grooves in the counterbore. After the blank is thus grooved set-screw 21 is retracted and the milling-tool is moved to the rear by means of lever T, as already described, when, if it is desired to give a finishing cut to stem 7 of the blank—a preferable method—cutter *p* will be duly positioned, by the means already described, to give such cut, and when once so positioned is not again in that behalf disturbed until rendered requisite in order to resharpen it. The cutter is moved along the stem to give such cut by means of screw *w*, which moves plate *v*, on which the tool *p* is mediately mounted, a stop-screw, *x*, secured to plate *y* serving to check the advance of the tool when it arrives at the shoulder of the blank.

To impart to the end faces of the several lands or lips of the counterbore the requisite spirality, termed "freeing," "clearance," or "backing off," after the blank has been grooved, the following devices are employed:

1. A block, 25, secured on head-stock B, has a truck, 26, pivoted therein, and a cam, W, having as many "throws" as there are lips in the counterbore, is secured on spindle C, while a spring, X, is arranged on said spindle, between its collar and sleeve *a*, so as to tend constantly to hold said cam in contact with the truck 26. The lower end of lever *j* is engaged in block Y, which is arranged in a "way" upon bed A, and is moved lineally by means of rod Z, which is threaded in Y, and is actuated by the crank-wheel 27, secured upon its opposite end. A check or stop screw, 28, is arranged in cap 29, to arrest the movement of slide Y and lever *j* when the cam W has been moved out of contact with truck 26, as shown in Figs. 1 and 2. When spindle C is held by lever *j* in the position shown in Figs. 1, 2, 9—that is, so that cam W may revolve without engaging truck 26—the facing-tool *p* may, if desired, be moved to take a fine finishing cut from the end faces of the lips of the counterbore before commencing the oblique facing thereof; or said cutter may be moved close to the end faces of the lips and thus left, when by actuating slide Y through rod Z the end faces of the counterbore will be gradually brought into contact with cutter *p*, and by the coaction of cam W the cuts will be continued, as indicated in Fig. 14, till a spiral end face is formed upon the lips coincident with the long and flat oblique lines of cam W, the short and steep oblique lines thereon serving, while the counterbore revolves the space between the lips, to move the counterbore to the rear, so that the cutter shall not engage the angle at the intersection of the end face and the cutting or radial line of the longitudinal groove. The stop-screw *x* in such case is so adjusted that plate *v*, when moved against it, will so position facing-tool *p* that when cam W runs free against truck 26 the lips of the counterbore will have received their true spiral facing to give the clearance or freeing therefor.

Instead of operating the machine as just described, block Y may be so placed that cam W will run in full constant contact with truck 26, thus imparting the full constant reciprocating motion to arbor C, while cutter *p* will, by the action of screw *w*, be slowly advanced toward the end faces of the lips of the counterbore, so as to take at each revolution thereof the required thickness of chip, in manner as indicated in Fig. 15, such movement of the cutter continuing till slide *c* is in contact with stop *x*, at which point the perfected spiral or freeing will have been imparted to the lips of the counterbore.

In Fig. 16 the chuck K is shown as formed with four jaws to engage the several lips of a four-lip counterbore, such as is shown in Fig. 4.

I claim as my invention—

1. In combination with spindle J and tail-stock I, formed with a suitable transverse seat therein, the eccentric ring L, having an actuating-handle, and formed to receive said spindle and to fit in the seat in stock I, substantially as specified.

2. In combination with a counterbore-facing machine, a gaging-chuck formed with center 8, the jaws 9, thereto pivoted, their actuating-spring 11 and gaging-screws 10, and a hollow center, 12, seated in center 8, to receive the stem of the counterbore, all substantially as specified.

3. The combination, with a gaging-chuck in the dead-spindle J, of the hollow spindle C, its rods 13 15, with the interposed spring 14, chuck 16, secured in said spindle, and sleeve F, arranged to close said chuck, and provided with an actuating hand-wheel, H, by which to force it against said chuck, all substantially as specified.

4. The combination, with spindle C, provided with means for end adjustment, of sleeve F, having wings *g*, and interlocked with said spindle, pulley D, mounted on sleeve F, and having hub G, with slots *f*, to receive wings *g*, whereby the rotation of pulley D imparts a corresponding motion to said spindle and sleeve, and allows a linear movement thereof, substantially as specified.

5. The combination, with sliding spindle J, of its hook *n*, a stud, *k*, secured in stock I, and nut *m*, threaded on said stud to adjust the shoulder to receive said hook, all substantially as specified.

6. The combination, with sliding spindle C, of toothed sleeve *a*, arranged between a solid abutment on said spindle, on the one hand, and a resisting-spring having a solid abutment on said spindle, on the other hand, and a pinion engaging the teeth of said sleeve and provided with means, substantially as described, whereby it may be rotated to lineally move said sleeve, substantially as specified.

7. In combination with spindle C, provided with a chuck for holding the counterbore, and means for rotating it, the cam W, roll 26, toothed sleeve *a*, the thrust-spring X, pinion *d*, engaging said sleeve, and devices, substan-

tially as specified, for rotating said pinion, to thereby actuate the sleeve, substantially as specified.

5 8. In a counterbore-facing machine, the combination of a facing-tool, supporting and adjusting mechanism, a rotary and lineally-reciprocating spindle, a counterbore supporting and securing chuck carried by said spindle, and a duly-formed cam arranged to lineally

actuate the spindle in accordance with the lips of the counterbore and the requisite spirality or clearance thereof, substantially as specified.

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