No. 684,594. Patented Oct. 15, 1901.

H. AUSTIN.

SCREWING HEAD IN WHICH THE DIES ARE OPENED AUTOMATICALLY.

(Application filed Oct. 3, 1900.)

(No Model.) 2 Sheets—Sheet 1.

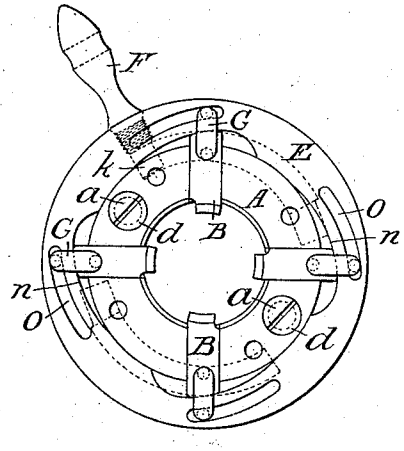


Fig. 1.

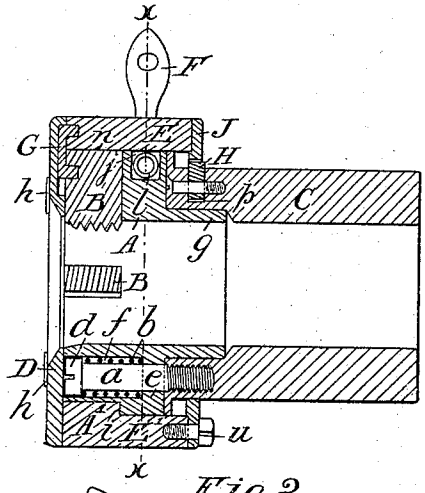


Fig. 2.

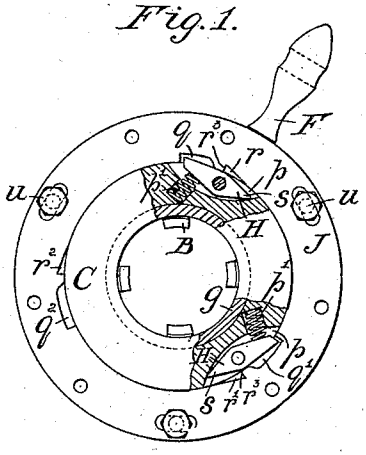


Fig. 3.

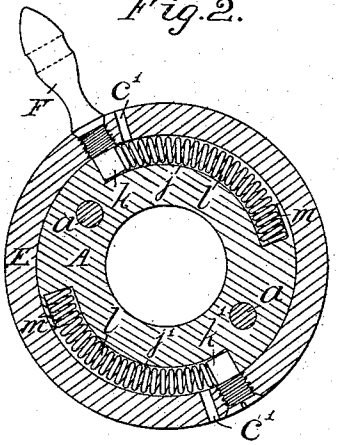
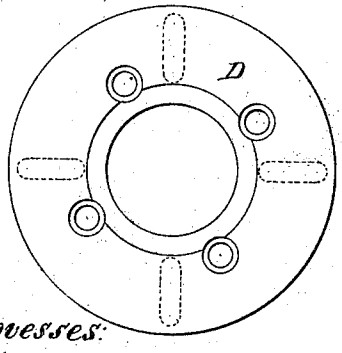


Fig. 4.



Witnesses:
F. Kl. Winn
Peter A. Ross.

Fig. 5.

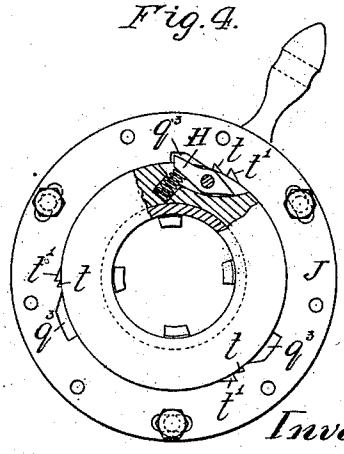


Fig. 6.

Inventor:
Hubert Austin
by Henry Connett
Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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(Application filed Oct. 3, 1900.)

(No Model.) 2 Sheets—Sheet 2.

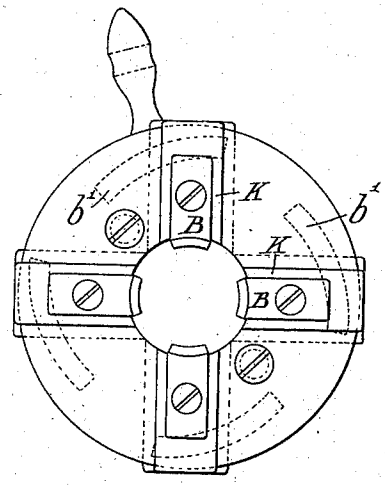


Fig. 7.

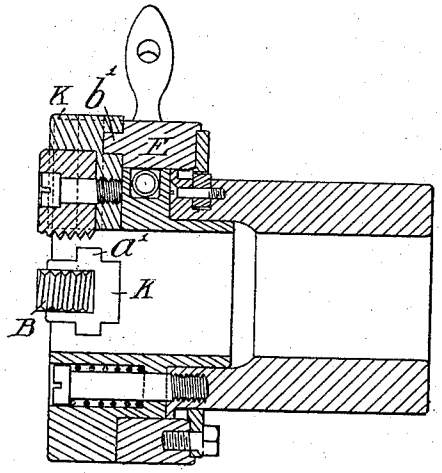


Fig. 8.

Witnesses.
F. H. Hinman
Peter A. Ross

Inventor.
Herbert Austin
by Munn & Co
Attys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

HERBERT AUSTIN, OF BIRMINGHAM, ENGLAND.

SCREWING-HEAD IN WHICH THE DIES ARE OPENED AUTOMATICALLY.

SPECIFICATION forming part of Letters Patent No. 684,594, dated October 15, 1901.

Application filed October 3, 1900. Serial No. 31,880. (No model.)

To all whom it may concern:

Be it known that I, HERBERT AUSTIN, engineer, a subject of the Queen of Great Britain, residing at Birmingham, England, have invented certain new and useful Improvements in Screwing-Heads in Which the Dies Are Opened Automatically, of which the following is a specification.

This invention has for its object to improve the construction of screwing-heads in which the dies are automatically opened, more especially with a view to enable the depth of a screw to be cut at two or more operations without risk of a thread being injured by the return of the tool after the second operation, and with a view to enable the same screwing-head to be used alternatively for cutting threads of different depths each at two or more operations.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a view of the front end of a screwing-head constructed according to this invention, but with the cap removed. Fig. 2 is a longitudinal section through the center of the head. The section is not a true one, as parts which would not appear therein are shown in the section for convenience of illustration. Fig. 3 is a back end elevation of the head, partly in section. Fig. 4 is a section of the head, taken on line x x of Fig. 2. Fig. 5 is a front view of the cap. Fig. 6 is a view corresponding to Fig. 3, but showing a modification of the mechanism. Fig. 7 is a front end view of a modification of the head in which no cap is required, and Fig. 8 is a longitudinal section through the head shown by Fig. 7. In this section also parts are brought in for convenience of illustration which would not show in a true section.

Referring first to the head illustrated by Figs. 1 to 5, inclusive, a block A, which carries the dies B, is mounted, by means of headed studs a, to the outer or forward end of the shank or neck C of the head. These studs a pass endwise through holes of the block A and are screwed into the face of the shank. Spiral springs b are placed around the studs a between the heads d of such studs and shoulders e of the block, and the block is thus capable of being moved outward in an endwise direction in relation to the shank by sliding it along the studs a against the pressure of the spiral springs b. The springs and the heads of the studs are contained within counterbored holes f, formed in from the outer face of the block. An annular projection g from the inner face of the block A is a sliding fit within the central opening of the shank and assists in maintaining the parts central with one another when the block moves endwise in relation to the shank; but its more immediate purpose is to prevent access of dirt to between the faces of the block and shank.

The dies B are shown to be carried in guides formed as grooves or recesses cut in from the outer face of the block A, and the dies are kept within these guides by means of a cap or outer plate D, which is fixed by set-screws h to the block.

A ring E surrounds the block A, being just an easy-turning fit therearound. The outer portion or end A′ of the block is somewhat smaller in diameter than the portion to the rear thereof, and the ring E is formed with a portion E′, which fits around the portion A′ of the block A and is just an easy-turning fit between the rear face of the cap D and the shoulder i at the end of the portion A′ of the block. A handle F is screwed into the ring E, and the ring may be turned upon the block by means of this handle. Grooves j j' are formed in the outer circumference of the portion of larger diameter of the block A and extend each for some distance therearound, and projections k k' extend from the ring E into corresponding ends of these grooves, the projection k consisting conveniently of a portion of the handle which extends beyond the inner end of the screw thereof. A spiral spring l is inserted within each groove between the projection k or k' therein and the opposite end of the groove, and thus the ring may be turned in one direction in relation to the block against the pressure of the spiral springs and be turned back again in relation to the block by the reaction of the springs when the handle is released. The hinder end of each spring is preferably carried within a pocket m at the inner end of each groove. A single groove and spring will of course answer the purpose; but two grooves and springs are preferred. The projections k k' or either

of them coming against the adjacent ends of the grooves or the adjacent end of the groove form a stop in one direction to the turning movement of the ring. Portions of the interior of the part E′ of the ring are formed as cam-faces *n*, which as the ring is turned by means of the handle press against the outer ends of the dies B and force them inward. Each die is connected, by means of a link G, with an eccentric slot *o*, formed in the outer face of the ring E, and each link is guided in a radial groove formed in the inner face of the cap D, whereby each die is drawn outward again as the ring is turned back by the reaction of the springs *l*.

Spring ratchet-pawls H are pivoted within recesses *p* in the shank C and are each normally pressed out by its spring *p′* into a recess *q* or *q′*, notched into the inner edge of a supplementary ring J, which is fixed to the back of the ring E and projects inward beyond the ring toward the center of the head, as clearly shown by Fig. 2. In connection with each pawl there is formed in the inner edge of the ring J a ratchet-notch *r* or *r′*, somewhat to the rear of the corresponding notch *q* or *q′*, and the notch *r* is in such position in the ring J that when the ring E has been turned by the handle F the necessary distance to cause the dies B to be moved inward to give a primary or roughing cut of the required depth the corresponding pawl H will be pressed by its spring into engagement with the notch and prevent the return of the ring E, and thus insure that the dies will be held in the position into which they have been moved inward, and the other notch *r′* is in such position in the ring J that when the ring E has been turned by the handle F a distance sufficient to cause the dies to be moved inward to give a secondary or finishing cut of the required depth the corresponding pawl will engage with the notch and prevent the ring from returning, thus maintaining the dies in their inward position for deep cutting.

When the dies have been set inward either for the rough or finishing cut, the operation of cutting a thread upon the article to be screwed causes the screwing-head to be moved outward, as is usual with ordinary screwing-heads; but when the endwise movement of the carriage or saddle which carries the screwing-head is stopped in the usual or any convenient manner after any given length of thread has been formed the further operation of the dies causes the block A, and with it the ring E, to be moved outward in an endwise direction from the shank C against the pressure of the springs *b* around the studs *a*, with the result that the ring J is drawn sidewise from off the ratchet-pawl, which at the time engages with a notch, and immediately the ring J is clear of the pawls it, together with the ring E, is free to turn back again, and these rings are together moved back into their original position by the reaction of the springs *l*, thus moving the dies B outward again into their original position. Immediately the dies are clear of the metal which they have been screwing the block, and with it the ring E, is free to be pressed back again by the springs *b* into its normal position in relation to the shank C, and as it is thus pressed back the notches *q q′* of the ring J pass over the portions of the ratchet-pawls which project from the shank C. The rear end *s* of each pawl coming against the bottom of the corresponding recess in the shank, within which the pawl is mounted, prevents the pawl being pressed out too far to prevent the notch *q* or *q′* passing thereover as the ring J is moved back by the reaction of the springs *b;* but each pawl is normally pressed out by its spring immediately a notch *r* or *r′* has been withdrawn sidewise therefrom sufficiently far to insure that the notch *r* cannot be pressed back sidewise over the corresponding pawl by the reaction of the springs *b* as the ring E is turned back by the reaction of the springs *l*.

It will be obvious that in lieu of the ring J a segment answering the same purpose may be fixed to the ring E.

To facilitate inserting the projections *k k′* between the ends of the springs *l* and the ends of the grooves *j*, small holes *c′* may be drilled through the ring E, through which pins may be temporarily passed to hold back the ends of the springs.

In order to adapt the screwing-head already described for use in cutting screws of different depth, (to suit screws which differ materially in pitch,) an extra notch q^2 and an extra notch r^2, corresponding, respectively, to the notches *q* or *q′* and *r* or *r′*, already described, are formed in the edge of the ring J, and the notch r^2 is in such position therein that if the ring J is removed from the ring E and is turned the third of a revolution and then refixed thereto the ratchet-pawl which was formerly engaged with the notch *r* will then be capable of being engaged with the notch *r′* and the ratchet-pawl which was formerly engaged with the notch *r′* will then be capable of being engaged with the notch r^2. Thus when the pawls are arranged for engagement, respectively, with the notches *r* and *r′* the screwing-head may be used first to give a roughing cut for a screw of, say, one inch diameter and then a finishing cut to the screw, and when the pawls are in position for being engaged, respectively, with the notches *r′* and r^2 the head may be used first to give a roughing cut to a screw of, say, one and three-eighths inches diameter and afterward a finishing cut to the same screw. Of course the dies have to be altered for the different screws.

It is not really essential for the position of the ring J in relation to the ring E to be altered for each different pitch of screw, because when the head is set for cutting, say, a one and three-eighths inch thread it may be used also without resetting (except, of

course, for changing the dies) to cut one and one-fourth inch and one and one-half inch threads, as these threads may without material inconvenience be cut to the same depth each at two operations.

The holes through the ring J, through which the pins *u* pass by which this ring is fixed to the ring E, are slotted, as shown, to enable any desired adjustment to be given in the relative positions of the pawls and notches.

It will be obvious that a single head may be adapted to be used for cutting complete threads of three or more different depths each at two or more operations by increasing the number of points at which notches are arranged in the edge of the ring J.

According to the modification of the invention shown by Fig. 6 a single ratchet-pawl H only is used, and to the rear of the notch q^3, which passes over the nose of the pawl when the ring E is returned by the reaction of the springs *b*, are formed two notches *t t'*. For the roughing cut the ring E is turned sufficiently only to engage the notch *t* with the pawl, and for the finishing cut the ring is turned farther to engage the pawl with the notch *t'*. In this case also either notch with which the pawl engages is drawn sidewise therefrom in the manner above described to disengage it from the pawl. The notch *t'* is made deeper than the notch *t* to avoid any risk of the notch *t* sliding over the pawl as the ring E is moved back by the reaction of the springs *l*. If it is decided to adapt this modification for cutting threads of different depths each at two operations, two or more sets of notches q^3 and *t t'* are formed in the ring J, as shown, and either set may be brought into position to operate with the pawl by altering the position of the ring J in relation to the ring E.

It will be obvious that either modification of the invention above illustrated may be adapted for cutting a thread at three or more operations by the use of three or more pawls or of three or more notches with which a single pawl can engage in succession.

According to the modification of the invention illustrated by Figs. 7 and 8 the cap D (shown in Figs. 1 and 2) is dispensed with and each die B is carried in a die-holder K, which slides within a guide notched in from the face of the head and which has radial channels *a'* to receive corresponding wings of the die-holder, and the die-holders are moved inward and outward as the ring E is turned by means of cam-pieces *b'*, which project from the forward face of the ring into notches formed in the back faces of the die-holders. No novelty is claimed, however, in respect of this method of mounting the dies or of operating them from the ring E, and otherwise the head is constructed according to either of the forms of the invention above described.

Having thus described my invention, I claim—

1. In a screwing-head, the combination of a shank, a block slidingly mounted at the outer end thereof, an elastic medium by which the block is pressed against the shank, means for maintaining the parallelism between the shank and block and preventing the block from turning in relation to the shank, screwing-dies carried by the block, a ring which is capable of turning around the block and by means of which the dies are operated, an elastic medium for giving an axial turn to the ring, a ratchet device carried by the shank and ring to prevent the ring from turning back after it has been moved axially to move in the dies, the engagement of the pawl with the notch being such that the outward movement of the block in relation to the shank will withdraw the notch from the pawl in a direction endwise of the longitudinal axis of the screwing-head, substantially as set forth.

2. In a screwing-head, the combination of a shank, with a turning ring around the axis of the shank, an elastic medium for giving an axial turn to the ring, a block around the axis of the shank slidingly mounted in relation to the shank, an elastic medium by which the block is pressed in an endwise direction, and ratchet mechanism by means of which the ring may be held in different positions into which it may have been moved axially, to enable a screw to be cut by successive operations, the disengagement of engaged portions of the ratchet mechanism being effected by the relative movement of the block in relation to the shank, substantially as set forth.

3. In a screwing-head, the combination of a shank, with a turning ring around the axis of the shank, an elastic medium for giving an axial turn to the ring, a block around the axis of the shank slidingly mounted in relation to the shank, an elastic medium by which the block is pressed in an endwise direction, and ratchet mechanism by means of which the ring may be held in different positions into which it may have been moved axially, to enable a screw to be cut by successive operations, the disengagement of engaged portions of the ratchet mechanism being effected by the relative movement of the block in relation to the shank, and means by which the ratchet mechanism is prevented from reëngaging as the ring turns back into its normal position, substantially as set forth.

4. In a screwing-head, the combination of a shank, with a turning ring around the axis of the shank, an elastic medium for giving an axial turn to the ring, a block around the axis of the shank slidingly mounted in relation to the shank, an elastic medium by which the block is pressed in an endwise direction, ratchet mechanism by means of which the ring may be held from turning backward after it has been partially turned, and means by which the ratchet mechanism may be altered to adapt the head to cut a finished thread of a different depth at two or more operations, substantially as set forth.

5. In a screwing-head, the combination of a

shank, with a turning ring around the axis of the shank, an elastic medium for giving an axial turn to the ring, a block around the axis of the shank slidingly mounted in relation to the shank, an elastic medium by which the block is pressed in an endwise direction, and a notched supplementary ring detachably fixed to the said ring, and which constitutes one portion of ratchet mechanism by means of which the ring may be held from turning backward after it has been partially turned axially, substantially as set forth.

6. In a screwing-head, the combination of a shank, with a turning ring around the axis of the shank, an elastic medium for giving an axial turn to the ring a block around the axis of the shank slidingly mounted in relation to the shank, an elastic medium by which the block is pressed in an endwise direction, a notched supplementary ring detachably fixed to the said ring, and which constitutes one portion of ratchet mechanism by means of which the ring may be held from turning backward after it has been partially turned axially, said supplementary ring being notched in a manner which enables the same screwing-head to be adapted for screwing different depths of finished thread, by altering the position of the supplementary ring in relation to the ring, in addition to changing the screwing-dies, substantially as set forth.

In witness whereof I have hereunto signed my name, this 22d day of September, 1900, in the presence of two subscribing witnesses.

HERBERT AUSTIN.

Witnesses:

STEPHEN WATKINS,

ROBERT G. GROVES.