(No Model.) 2 Sheets—Sheet 1.

S. GARDNER.

RATCHET DRILL.

No. 273,676. Patented Mar. 6, 1883.

Fig. 1.

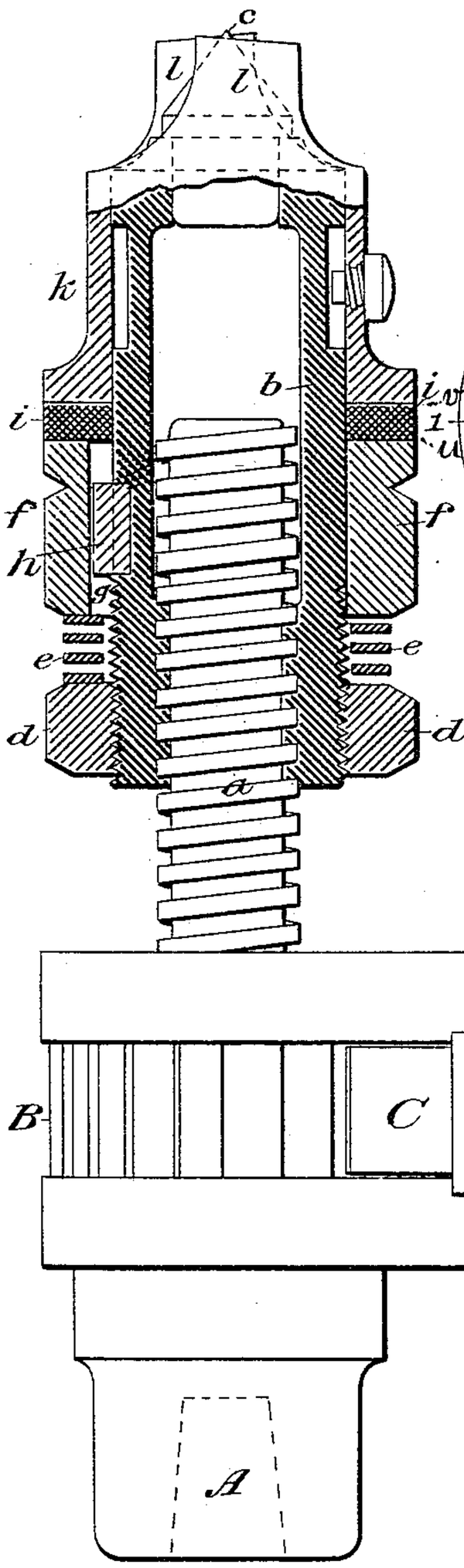
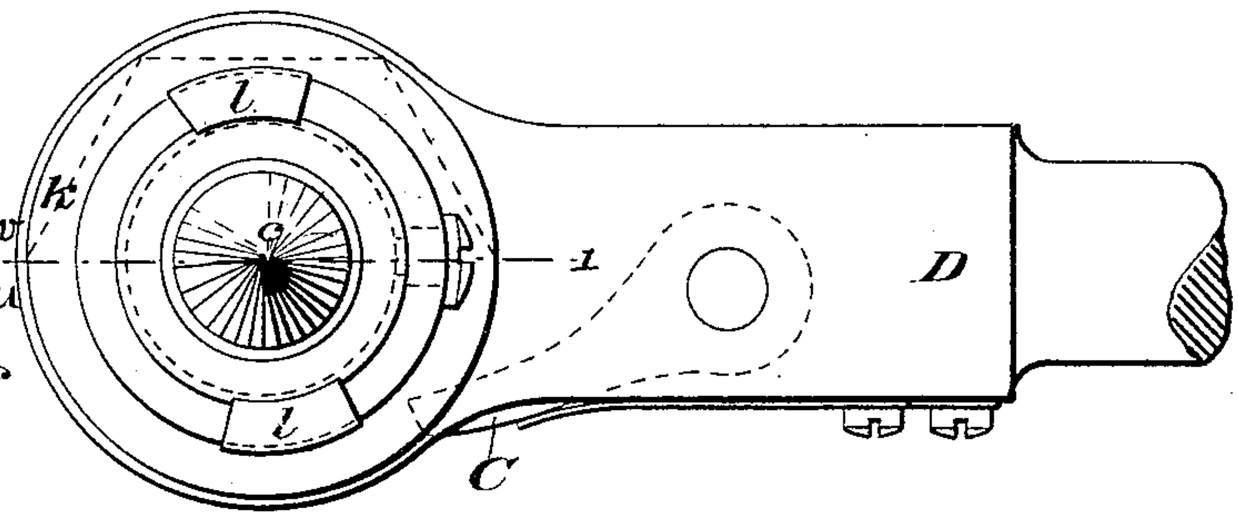


Fig. 2.



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Geo. Bowerson

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

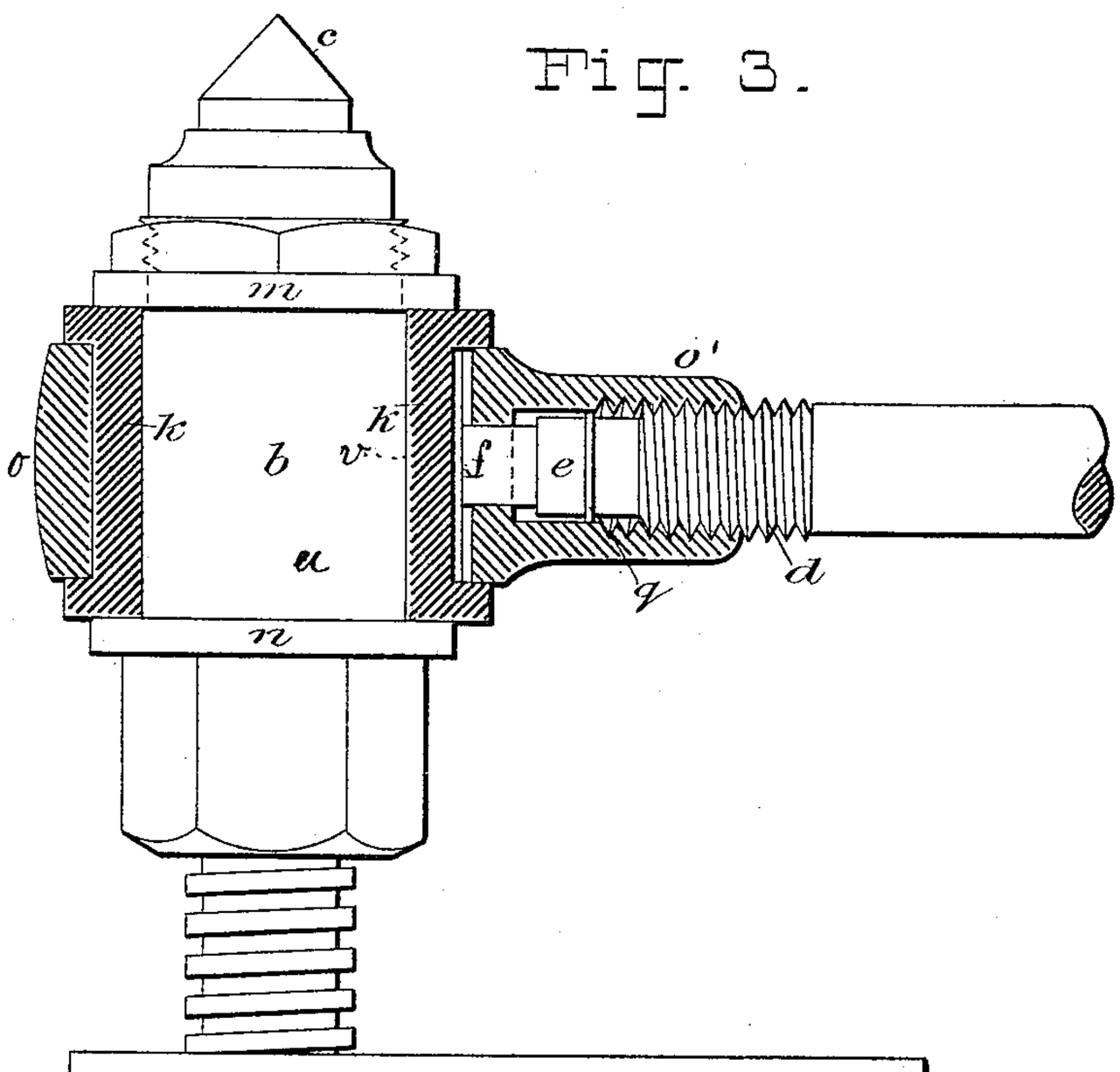
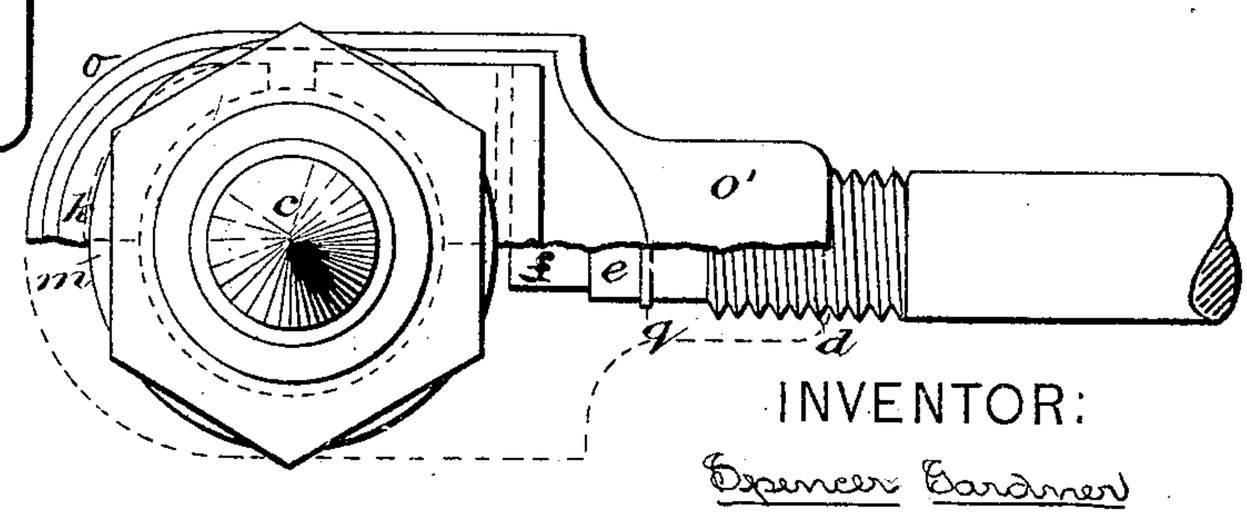


Fig. 4.



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UNITED STATES PATENT OFFICE.

SPENCER GARDNER, OF ADDERBURY, ENGLAND.

RATCHET-DRILL.

SPECIFICATION forming part of Letters Patent No. 273,676, dated March 6, 1883.

Application filed April 20, 1882. (No model.) Patented in England February 21, 1882, No. 839.

To all whom it may concern:

Be it known that I, SPENCER GARDNER, a subject of the Queen of Great Britain, and a resident of Adderbury, England, have invented certain Improvements in Boring-Machines, of which the following is a specification.

My invention relates to an automatic feed-regulator for a boring-machine, whereby the bit or drill is permitted to feed forward as fast as it cuts away the substance being drilled, and no faster. This regulator is capable of being adjusted so that the bit or drill will take a deep or a shallow cut—that is, feed faster or slower—as desired. I accomplish the desired regulation of the feed by screw-threading the shank of the bit stock or holder and mounting on it a tubular nut provided with the center-point, which has a bearing on the resisting-bar of the brace. If this nut be prevented from rotating and the bit-stock be turned, it is obvious that the bit will be fed forward at one revolution a distance equal to the pitch of the screw on the shank, and if the nut be allowed to turn with the stock the bit will not be fed forward at all; but if the rotation of the nut with the stock be retarded by a braking friction with a non-rotating part, the bit will be fed forward proportionately to the retardation caused by the friction-brake. Now, if this friction-brake be applied with an elastic pressure, and means be provided for increasing and decreasing the elastic tension, it is obvious that the bit may be made to feed faster or take a deeper cut by increasing the elastic tension and feed slower or take a lighter cut by decreasing said tension. The elastic tension will, however, be adjusted once for all to suit the material to be bored and the size and kind of bit or drill employed.

In the drawings which serve to illustrate my invention, I have shown two modes of applying the elastic friction-brake to the feed-regulating nut of a ratchet-brace, one in which the frictional surfaces are arranged in a plane at right angles to the axis of the bit-stock, as represented in Figures 1 and 2, and one in which the frictional surfaces are arranged in a plane parallel with the axis of the bit-stock, as in Figs. 3 and 4. The position of these surfaces is not very material.

Fig. 1 is a sectional elevation, and Fig. 2 is a plan, of my improved machine in its most approved form. Fig. 3 is a sectional elevation, and Fig. 4 is a mutilated plan, of the modification referred to above.

A is the bit or drill-stock, and *a* is the screw-threaded shank of the same. B is a ratchet-wheel fixed on the stock. C is a pawl, which is arranged to engage said ratchet, and which is mounted on the operating-handle D. All of these parts are constructed and arranged as in ordinary ratchet braces or drills.

b is a tubular or hollow feed-regulating nut, which is internally screw-threaded to fit and engage the screw on shank *a*, and which is also provided with a center-point, *c*. This regulating-nut *b* is provided with a sleeve or collar, *f*, which embraces nut *b* and may be moved on it longitudinally, but which is compelled to turn with said nut by reason of a spline, *h*. The regulating-nut is also provided with an adjusting-nut, *d*, and a spring, *e*, which latter is arranged between the collar *f* and nut *d*. The collar *f*, nut *d*, and spring *e* form in substance a part of the nut *b*, and rotate with it. They are employed to give the nut *b* an elastic yielding surface where it comes into frictional contact with or is pressed upon by a non-rotative brake, *k*. This brake is cylindrical and slips over the upper part of the nut *b*, its upper end being provided with a cylindrical cutter, *l*, the function of which will be hereinafter described. Between the frictional face *v* of the brake *k* and the corresponding face, *u*, of the yielding intermediate part, *f*, of nut *b*, I interpose a ring or washer, *i*, of leather or other suitable material, to take the wear and increase the friction. This washer, however, is only an adjunct, and it may be considered as forming a part of either the brake *k* or the nut *b*. It may rotate with the nut or remain stationary with the brake.

In employing my improved brace it is set in the usual manner, the tip of the drill or bit being seated firmly on the object to be bored and the center-point *c* seated firmly on the resisting-bar of the drill. The brake *k* is now moved upward by screwing up the nut *d* (which lifts *e*, *f*, and *k*) until the cutter *l* is so firmly seated in the drill-bar that it cannot turn and will keep the brake *k* stationary during the operation of the brace. The tension of the spring *e*, which governs the frictional contact between the rotating nut *b* and the

non-rotating brake *k*, may now be adjusted by the nut *d*, which forms the support and backing for the spring *e*, until the required braking friction on the regulating-nut to suit the work in hand is obtained. It will then be found that on rotating the drill or bit and its stock in the usual way the friction between the parts *b* and *k*, through the intermediate parts, *f* and *i*, will retard the rotation of *b* to a degree directly proportionate to difference between the friction between the screw-threads on *a* and *b* and the friction between *b* and *k*. If the friction between *b* and *k* be sufficiently great, then *b* will cease to rotate and the feed will be equal to the pitch of the screw on *a* for each revolution of the bit. If the nut *d* be run down until the cutter *l* falls below the tip of center-point *c* and out of contact with the drill-bar, then the brace may be employed in the ordinary way without the automatic feed-regulator—that is to say, the nut *b* may be grasped by the hand and permitted to rotate as rapidly or as slowly as the exigencies may demand.

Figs. 3 and 4 illustrate a modification wherein the same principles are applied—that is to say, a non-rotative brake is arranged to be applied to the regulating-nut by elastic pressure, which pressure may be regulated at will. In the construction illustrated in Figs. 1 and 2 the spring and its adjusting-nut are mounted on and form a part of the nut *b*, the brake being plain or of one piece. In the modification this arrangement of the parts is reversed, the spring and its backing and adjusting screw forming a part of the brake and the nut *b* being plain. In the former case the movable part *f* of the nut *b* is interposed between the spring and the brake. In latter case the brake is in direct contact with *b*, the brake proper being movable with respect to its holder and other parts.

Referring now to Figs. 3 and 4, the regulating-nut *b* is provided with collars *m* and *n*, and between these the cylindrical body of *b* is embraced by the brake proper, *k*, which in this case is in the form of a journal-box, being in two halves or parts, made of lignum vitæ or other suitable material. The two sections of the brake proper are embraced by a strap, *o*, which has a socket, *o'*, hollowed to receive the spring *e* and internally screw-threaded to receive a backing and adjusting screw, *d*. The spring *e* in this case is a block of india-rubber, and between it and *k* is arranged an intermediate part, *f*. The parts *d* and *f* in Figs. 3 and 4 perform substantially the same functions as the parts lettered *d* and *f* in Figs. 1 and 2. The tension of the spring *e* is adjusted by screwing in or out the screw *d*, and between the screw *d* and the spring a washer, *q*, is inserted to take the wear. In using the drill the prolonged extremity of the screw *d* serves as a convenient means of rendering the brake non-rotative. It may be held by the hand or be prevented from rotating in any way most convenient. The collar *m* is made removable.

Having thus described my invention, I claim—

1. The combination, with a ratchet-brace provided with a bit-stock having a screw-threaded shank, and a feed-regulating nut bearing the center-point mounted on said screw-threaded shank, of a non-rotative brake mounted on the feed-regulating nut, substantially as described, and arranged to press on some part of said nut with elastic pressure, whereby the rotation of the nut will be retarded automatically, as set forth.

2. The combination, with a ratchet-brace provided with a bit-stock having a screw-threaded shank, and a feed-regulating nut bearing the center-point mounted on said screw-threaded shank, of a non-rotative brake mounted on the feed-regulating nut, and arranged to press on some part thereof with elastic pressure, and means, substantially as described, for increasing and diminishing the said elastic pressure, whereby the rotation of the feed-regulating nut with the bit-stock is retarded proportionately to the pressure of the brake, as set forth.

3. The combination, with a ratchet-brace provided with a bit-stock having a screw-threaded shank, *a*, of the nut *b*, provided with a center-point, *c*, a splined sleeve, *f*, spring *e*, and a support for said spring, and the non-rotative brake *k*, mounted on the nut *b* and provided with a cutter, *l*, all constructed and arranged to operate substantially as set forth.

4. The combination, with a ratchet-brace provided with a bit-stock having a screw-threaded shank, *a*, of the nut *b*, provided with a center-point, *c*, a splined sleeve, *f*, adjusting-nut *d*, and spring *e*, and the non-rotative brake *k*, mounted on the nut *b*, and provided with a cutter, *l*, substantially as and for the purposes set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

SPENCER GARDNER.

Witnesses:
BENJAMIN TODD,
RICHARD GARDNER.