(No Model.) 3 Sheets—Sheet 1.

B. ADRIANCE.

SCREW CUTTING LATHE.

No. 264,597. Patented Sept. 19, 1882.

Fig. 1.

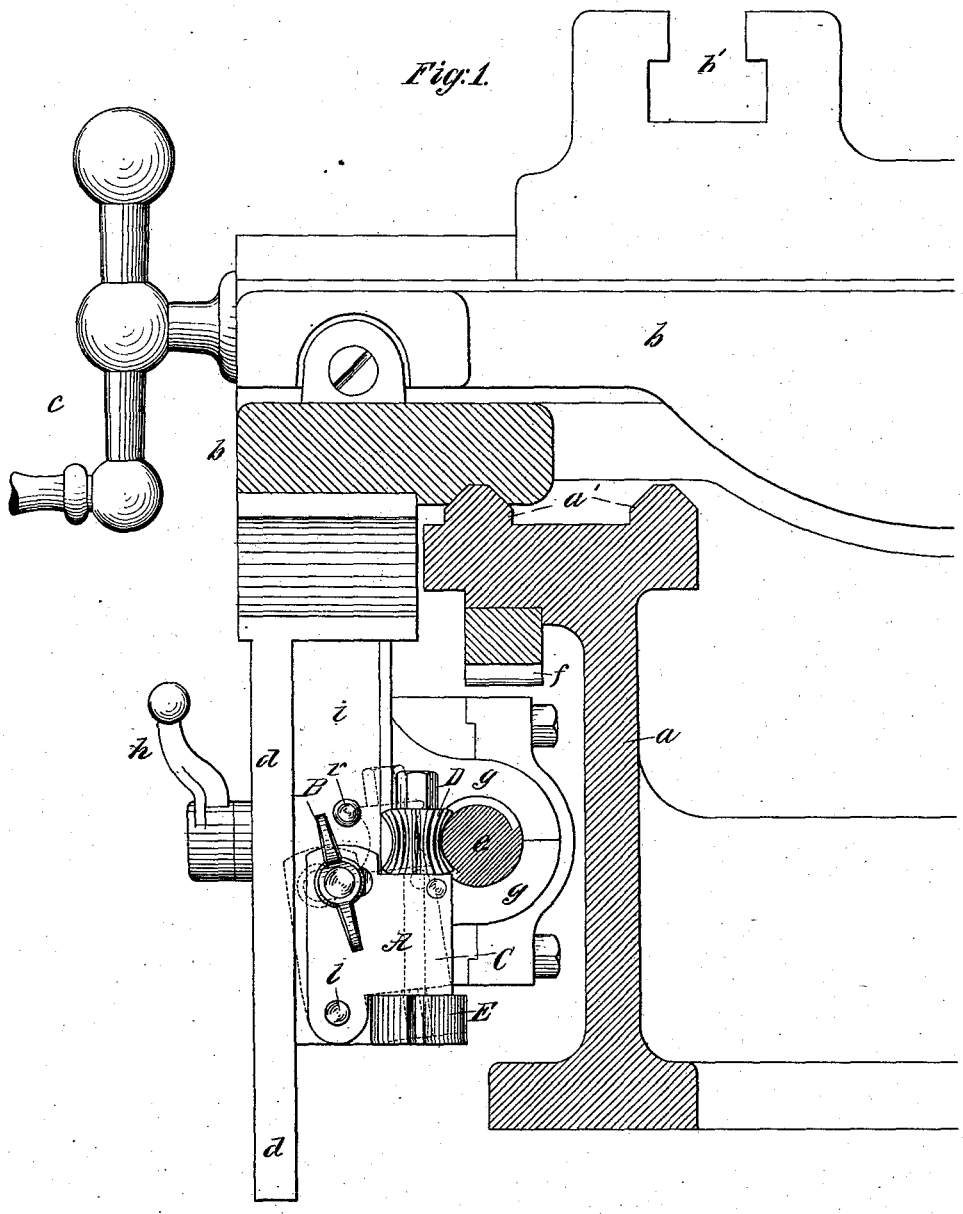

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Fig. 2.

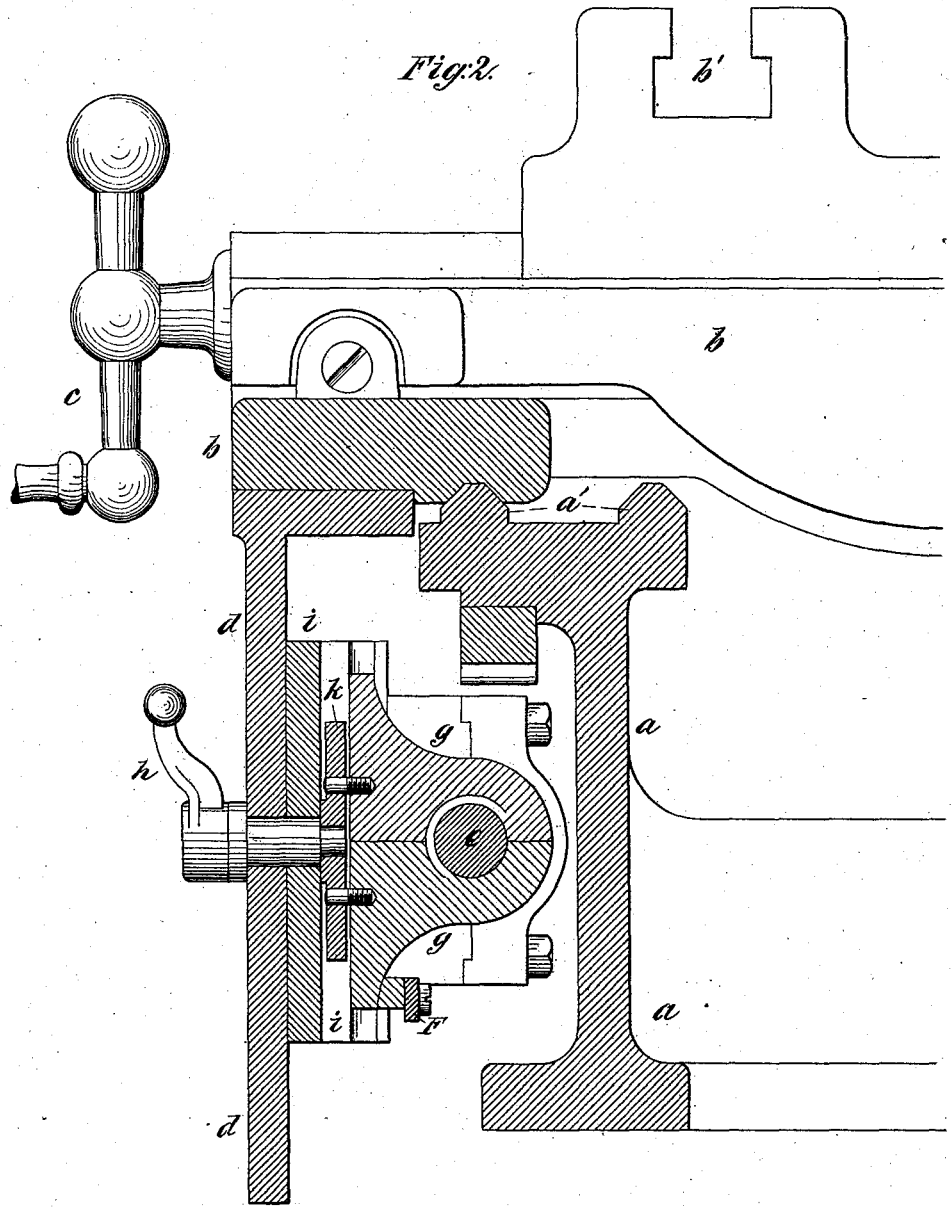

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Fig: 3.

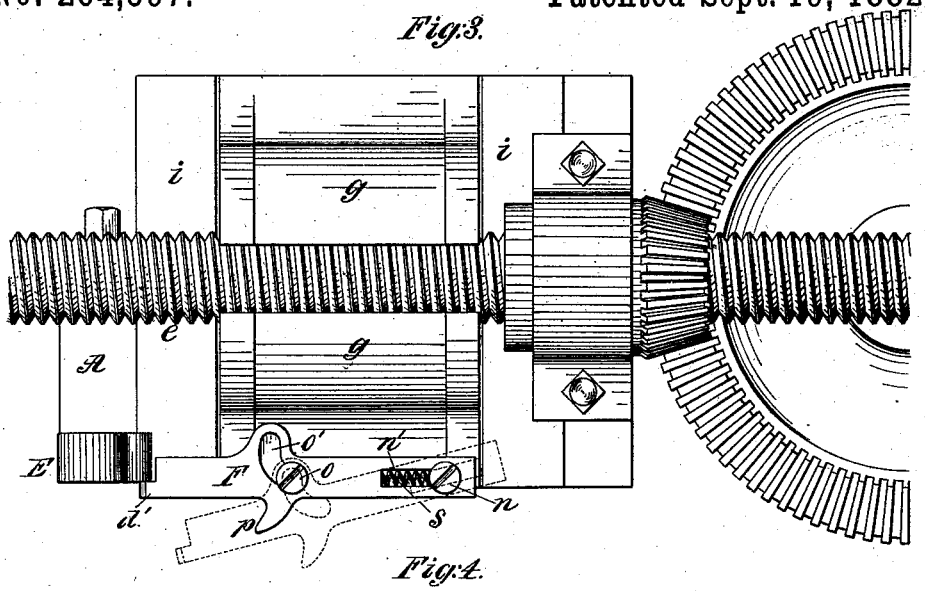

Fig: 4.

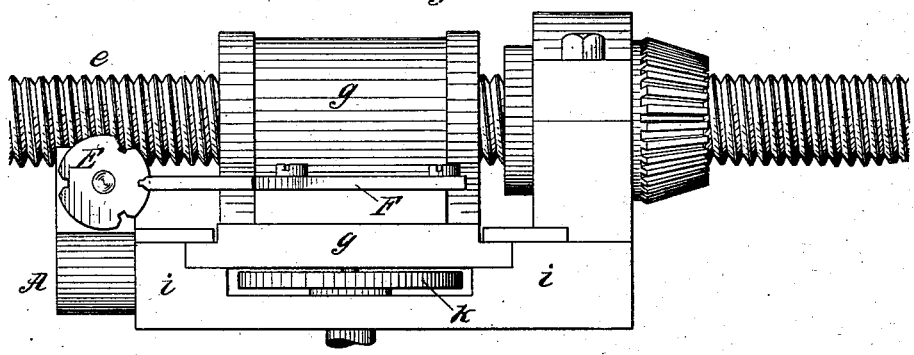

Fig: 5.

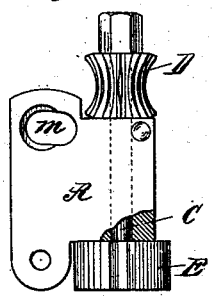

Fig: 6.

Fig: 7.

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UNITED STATES PATENT OFFICE.

BENJAMIN ADRIANCE, OF BROOKLYN, ASSIGNOR TO ELIPHALET W. BLISS, OF NEW YORK, N. Y.

SCREW-CUTTING LATHE.

SPECIFICATION forming part of Letters Patent No. 264,597, dated September 19, 1882.

Application filed November 18, 1881. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN ADRIANCE, of Brooklyn, Kings county, New York, have invented certain new and useful Improvements in Screw-Cutting Lathes, of which the following is a specification.

My invention consists in a simple attachment for ordinary screw-cutting lathes, whereby the lock-nut of the tool-carriage may be closed on the lead-screw always at the right point to have the tool match with the thread of the screw being cut, whether this thread be even or uneven with relation to the pitch of of lead-screw, as hereinafter fully set forth.

Figure 1 of the drawings annexed presents a fragmentary sectional view across the bed of the lathe, showing the lead-screw in cross-section and the end of the carriage containing my improved attachment in elevation. Fig. 2 is a view similar to Fig. 1, showing a section through the carriage, lock-nut, and lead-screw to illustrate the usual mechanism of these parts with which my attachment is connected. Fig. 3 is an elevation of the rear or inside of a portion of the mechanism on the depending apron of the tool-carriage, showing the lock-nut, lead-screw, &c., being the immediate parts with which my attachment co-operates. Fig. 4 is a plan view of Fig. 3. Fig. 5 is an elevation of my attachment removed. Figs. 6 and 7 are diagrams of even and odd threads for illustration.

In the drawings, *a* indicates the bed of the lathe, *a'* the ways thereof, and *b* the tool-carriage, mounted thereon.

b' indicates the socket for the tool-post on the carriage, and *c* the handle controlling the cross-feed.

d indicates the "apron" of the carriage, which depends in front of the lead-screw *e*. This apron, as usual, carries on its inner side the gearing, shown partly in Figs. 3 and 4, which mesh with the rack-teeth *f* on the bed *a*, and is operated by the usual crank-handle (not shown) to move the carriage back or forth on the bed by hand. The apron also carries the lock-nut *g*, which is capable of being closed or opened by operating the lever or crank handle *h*, so as to engage with or be disengaged from the lead-screw. The lock-nut is made, as usual, in two halves, *g g*, the bases of which are guided in suitable guides, *i i*, affixed to the inner side of the apron, as seen in Figs. 2, 3, and 4, and these halves are opened apart or closed together by the partial rotation of a disk, *k*, connected with the handle *h*, (see Figs. 2 and 4,) which disk has two spiral slots, which engage pins on each half of the nut in the usual manner, as seen best in Fig. 2. Now, when the lock-nut *g g* is closed on the lead-screw the carriage will then become operatively engaged therewith, and will thus be moved forward on the bed of the lathe to feed the tool lengthwise along the work at the proper rate to cut a screw of the desired pitch, in the usual manner, according as the gears at the end of the lathe are proportioned, as will be understood. Now, the lead-screw has of course some definite pitch, which is usually coarse—say five threads to the inch—and by arranging the gears at the end of the lathe the rotation of the lathe-spindle may be so proportioned to the rotation of the lead-screw, and consequently to the motion of the carriage and tool, as to cut a thread of any desired pitch, either the same as the lead-screw, or a pitch of any desired fineness, whether even or odd, with relation to the lead-screw, as will be readily understood. It is to be noted, however, that in cutting an odd thread the carriage and tool, would have to be managed in a different way from that allowable with an even thread. Thus, in cutting an even thread—that is, even relative to the lead-screw, whether of equal or multiple pitch, such as ten to the inch, &c.—the lead-screw being five, as shown in Fig. 6, when the tool arrives at the end of the screw the operator moves the cross-feed sufficiently to withdraw the point of the cutter from the work, and simultaneously opens the lock-nut, and then turns the feed-handle on the apron of the lathe, so as to move the carriage back rapidly to the point of beginning. He then moves the tool up to the work and closes the lock-nut, and the carriage will now be automatically fed forward at the correct rate and the point of the tool will surely match with the thread of the screw being formed, and will take a second cut therefrom. When the tool arrives at the end of the screw the same oper-

ation is repeated to produce the return-feed, and so on till the screw is fully cut.

In cutting a thread of a pitch which is uneven relatively to the lead-screw—say nine to the inch, the lead-screw being five, as represented in Fig. 7—this operation of opening and closing the lock-nut to engage or disengage the lead-screw cannot be employed without serious risk, on account of the slight chance of catching the lock-nut with the lead-screw at the right thread to have the point of the tool match with the thread being cut, (see Fig. 7,) for in most all cases the tool would at the second cut fail to match with the thread of the first cut, thus destroying the work. Hence in such cases the lock-nut is left constantly closed, and the back feed is produced by reversing the motion of the lathe, the operator moving a belt-shipping or clutch-shipping lever at each end of the work to perform the forward and return feeds without opening the lock-nut. This, however, is objectionable on account of the slow return-feed, and the inconvenience of operating the shipping-lever, as well as the expense of double driving-pulleys, reversing clutch and belts, &c., which objections it is my aim to overcome. Now, by my invention I provide a simple addition or attachment to the lathe whereby the lock-nut may be opened and the carriage moved back rapidly by hand for the return-feed, and the nut again closed to feed the carriage automatically forward to the cut in such manner that the nut is always sure to mesh with the lead-screw at the right point to have the tool match with the thread being cut, whether this thread be even or uneven relatively to the feed-screw, and without requiring any attention on the part of the operator to produce this coincidence, thus obtaining most desirable advantages.

My improved attachment is shown in Figs. 1, 3, 4, and 5, but more fully in Figs. 1 and 5, to which attention may now be directed. It consists of a simple block, A, pivoted at its lower and forward corner on the stud *l* to the end of the guides *i* of the lock-nut, between the apron *d* and the lead-screw *e*, as clearly shown in Fig. 1. Through the upper and front corner of the block is a slot, *m*, through which projects a short screw fixed in the guide *i*, and on this turns the thumb-nut B, which bears upon the block, so that the block may be tilted into either of two positions—viz., away from the lead-screw, as shown by dotted lines in Fig. 1, which throws the attachment out of action, or toward the lead-screw, as indicated by full lines, which throws the attachment into action. Now, extending vertically through a nicely fitting bore near the inner edge of the block is arranged a small freely-rotable spindle, C, on the upper end of which is affixed a small worm-wheel or pinion, D, which is adapted to mesh with the threads of the lead-screw, while on its lower end is affixed a small disk, E, having a number of notches in its periphery, as shown well in Figs. 1, 3, 4, and 5. Now, when the block is inclined inwardly, as shown by full lines in Fig. 1, the worm-wheel D will mesh or gear with the threads of the lead-screw, and when thus thrown into gear the hub of the thumb-nut B will enter a countersink on the front end of the slot *m*, and the nut, being now tightened up, will hold the attachment in gear in a positive manner. Hence when the worm is so meshed with the screw, if the carriage be now moved along the latter when the lock-nut is open, the worm-wheel will be revolved as it is moved along the lead-screw just as if the latter were a rack; but as soon as the lock-nut is closed the worm will now cease to revolve, as the carriage will now be propelled by the screw, and hence the worm-wheel will move bodily along the screw at the same rate as the pitch of the screw, and hence will have no tendency to be revolved by the screw.

The teeth of the worm-wheel D must of course match the threads of the lead-screw, and, besides this, the number of these teeth should be some multiple of the threads of the lead-screw, or contain preferably, say, three times the number of teeth as there are threads to the inch on the lead-screw—that is, fifteen teeth if the lead-screw is five to the inch. To correspond with this multiple the number of notches in the disk E must be equal to its divisor—viz., three, as shown best in Fig. 4. Now, on one-half of the lock-nut, as seen best in Figs. 3 and 4, is attached a latch or bolt, F, which is so arranged that it may be swung down out of action, as indicated by dotted lines in Fig. 3, or moved up into its active position, as indicated by full lines. When in this active position a finger or tooth, *d'*, on the point of the bolt approaches the under side of the notched disk in the path of the notches, as will be understood from Figs. 3 and 4. It will therefore be now understood that if the lock-nut is opened and the carriage moved forward by hand that the worm-wheel and disk D E will be revolved by engaging with the screw, as before described. If, now, the handle *h* be moved to close the lock-nut on the screw, then the bolt F, which of course moves with the lock-nut, will have its point or tooth *d'* pressed against the under side of the disk, which will of course prevent the lock-nut becoming closed till one of the notches of the disk arrives into coincidence therewith, when the bolt will immediately move into the notch of the disk and the lock-nut will simultaneously close on the screw, and at this same instant the rotation of the worm-wheel and disk ceases, as before noted, the carriage becoming thus engaged with the lead-screw.

It will hence be seen that by my improved attachment the lock-nut can be engaged with the lead-screw only at some definite point on every inch of its length—viz., the points at

which the notches of the disk coincide with the bolt F—and it will therefore be evident, on consideration without further explanation that in cutting a screw, no matter what its pitch may be, whether even or odd relatively to the lead-screw, the lock-nut will always close on the screw at each subsequent cut at identically the same point as at the first cut. Hence the tool at the subsequent cuts will always match with the previous cuts, and thus avoid all possibility of injuring the work, and at the same time obviate all close attention or anxiety on the part of the operator to bring about this coincidence. In addition to this the use of double belts and reversible clutches on the counter-shaft will be also obviated, thus saving considerable expense, while rendering the execution of the work more certain, rapid, and easy.

It will be noted that the bolt F is pressed forward by a spring, *s*, and that the notches in the disk are of V or beveled shape, as seen in Fig. 4, and that the point of the bolt is similarly formed, so that the two will engage or disengage in a more gradual and elastic manner, and a slightly-yielding connection between the two is thereby allowed, which prevents any tendency to overstrain or break the parts, which might occur if the engagement were too rigid or abrupt.

In lieu of notches on the disk E, projections might be used to correspond with a recess on the end of the bolt F or any equivalent points of engagement, as will be understood.

When it is not desired to use the attachment it may be thrown out of action by inclining the block A forwardly, as indicated by dotted lines in Fig. 1, which will withdraw the worm-wheel from the lead-screw, and at the same time force it against a stop-stud, *r*, having a beveled rim, which engages with the worm-teeth, and thus prevents the turning of the same while out of gear. By tightening the thumb-nut B the block may be securely held in its inactive position, as will be understood.

The bolt F may also be thrown out of action when desired, as indicated by dotted lines in Fig. 3. This bolt, as will be noted, is attached at one end to the lock-nut by the screw *n*, which passes through a straight slot, *n'*, in the bolt, and in this slot is arranged a spring, *s*, which bears at one end on the screw *n* and at the opposite end upon the bolt, thus tending to constantly press the point of the bolt forward toward the disk. The bolt is also attached to the lock-nut at about its middle by a second screw, *o*, which passes through an upwardly-curved slot, *o'*, in the bolt, and below this slot an operating thumb-piece, *p*, projects downwardly therefrom. Hence by seizing this thumb-piece the bolt may be easily swung down out of action, as indicated by dotted lines in Fig. 3, or moved up into action, as indicated by full lines.

When the attachment is swung out of action, as before described, it will be observed by reference to Fig. 3, that the lock-nut cannot be unintentionally closed by any casual pressure against the handle *h*, for the position of the point of the bolt F under the now stationary disk E will absolutely prevent this, thereby rendering the management of the lathe-carriage perfectly safe under all circumstances.

I do not of course confine myself to the precise details of construction shown and described, as these may be varied somewhat without departing from my claim.

I do not claim broadly the principle of the device herein set forth—that is, the combination, with a screw-cutting lathe, of worm or gear wheel meshing with the lead-screw and having a disk or hub rotating therewith, provided with certain points of engagement arranged to coincide with a point or connection between that and the lock-nut, whereby the lock-nut is allowed to close on the lead-screw only at certain definite points corresponding to the points of engagement on the rotary worm-disk, as I am aware that this is not new with me.

What I claim is—

1. The combination, with the carriage, lock-nut, and lead-screw of a lathe, of a worm or gear wheel mounted on the carriage in a movable support, movable to and from the lead-screw, with a fastening device to hold the said movable wheel in mesh or out of mesh with the lead-screw, and with a hub or disk rotating with the said wheel having certain engaging points or recesses, together with a coinciding bolt or connection affixed to one section of the lock-nut and arranged to engage with said points or recesses to permit the closing of the nut in definite positions, substantially as herein shown and described.

2. The combination of the pivoted or movable block A and the worm-wheel D and disk E with the carriage, lock-nut, and lead-screw of a lathe and a fastening device to hold the block and worm-wheel either into or out of gear with the lead-screw, substantially as and for the purpose set forth.

3. The combination, with the carriage, lock-nut, and lead-screw of a lathe, of a worm or gear wheel mounted on the carriage and meshing with the lead-screw, with a hub or disk rotating therewith, and provided with a certain engaging points or recesses, in combination with a movable bolt, F, affixed to one section of the lock-nut, and arranged, when moved into one position, to engage the said disk and permit the closing of the lock-nut in definite position, and when thrown in the other position to become free of said disk and render the combination inactive, substantially as herein set forth.

4. The combination, with the carriage, lock-nut, and lead-screw of a lathe, of the worm-wheel D and its engaging-disk E with the

movable spring-bolt F, formed with the curved holding-slot *o'*, arranged and operating substantially as and for the purpose set forth.

5. The combination, in a screw-cutting lathe, of the worm-wheel D and its engaging-disk E with the pivoted and movable supporting-block A, formed with a slot, *m*, to receive a clamp screw or nut, B, with a recess at one end of such slot to admit the hub of said nut, and thus lock the block in one position, substantially as herein shown and described.

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