(No Model.) 3 Sheets—Sheet 1.

J. C. SMITH.

SCREW CUTTING LATHE.

No. 327,334. Patented Sept. 29, 1885.

Fig. 1.

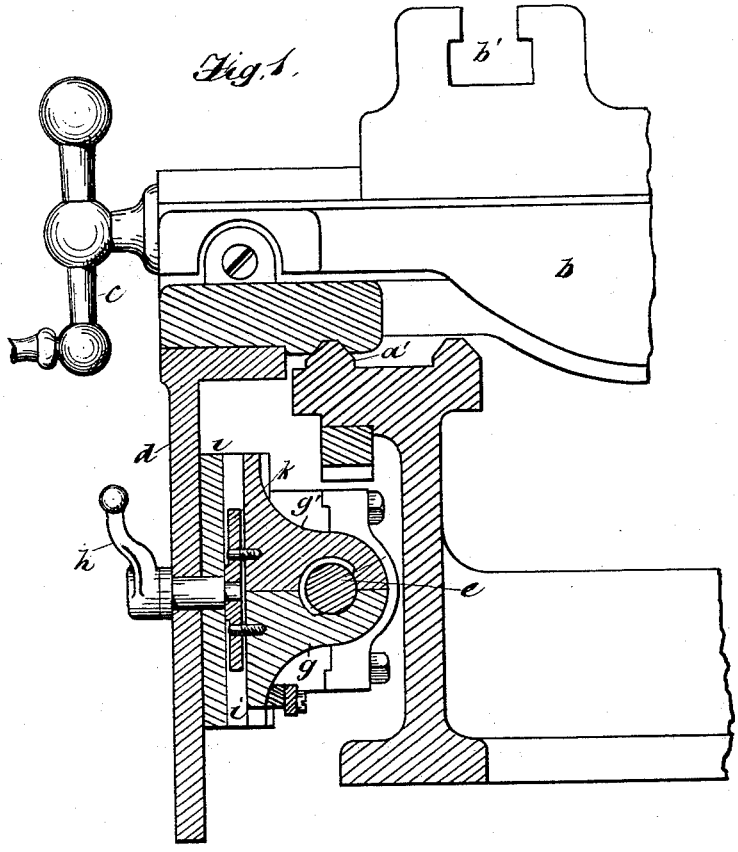


Fig 6

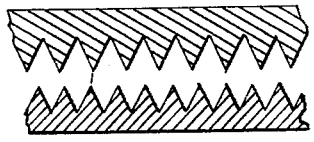
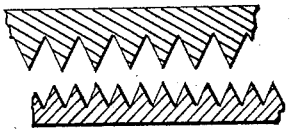


Fig. 7.



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(No Model.) 3 Sheets—Sheet 2.

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SCREW CUTTING LATHE.

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Fig. 2.

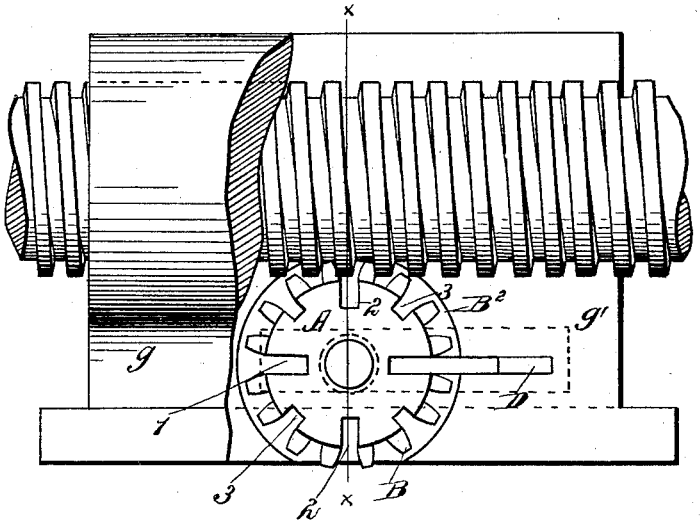
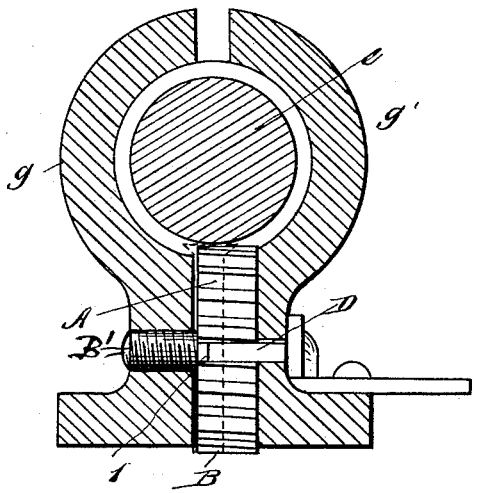


Fig. 3.



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(No Model.) 3 Sheets—Sheet 3.

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SCREW CUTTING LATHE.

No. 327,334. Patented Sept. 29, 1885.

Fig 4.

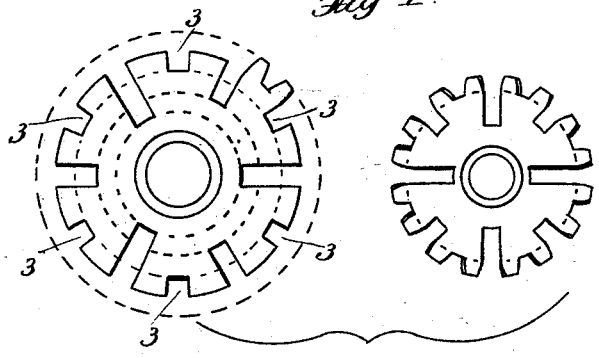
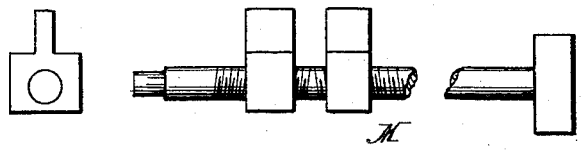


Fig. 5.



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UNITED STATES PATENT OFFICE.

JOHN C. SMITH, OF CLEVELAND, OHIO.

SCREW-CUTTING LATHE.

SPECIFICATION forming part of Letters Patent No. 327,334, dated September 29, 1885.

Application filed November 22, 1884. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. SMITH, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Screw-Cutting Lathes, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to screw-cutting lathes; and the novelty consists in the construction, arrangement, and adaptation of parts in an attachment for such lathes, as will be fully hereinafter described, and specifically pointed out in the claims.

The invention consists, essentially, 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 the lead-screw, and at a greater number of fractions, with the same mechanism by a simple adjustment, as will presently appear.

Figure 1 of the accompanying drawings is a part sectional view of an ordinary screw-cutting lathe, showing the lead-screw and lock-nut in cross-section. This figure and the description of the parts shown are used for convenience and to make the objects of my invention apparent. Fig. 2 is a detail illustrating my improvements and showing the lead-screw in elevation and one portion of the lock-nut broken away to show the worm-wheel, which has a journal-bearing in the other part of said lock-nut. Fig. 3 is a cross-section taken on the line *x x* of Fig. 2. Fig. 4 shows a modification of the worm-wheel. Fig. 5 shows a modification of means for operating the lock-nut. Figs. 6 and 7 are detail diagrams, Fig. 6 representing a lead-screw of four threads per inch with the work of five threads per inch corresponding at every one-half inch, and Fig. 7 a lead-screw of four threads per inch and work of six threads per inch corresponding at every inch.

Referring to Fig. 1, *a* indicates the bed of the lathe; *a'*, the ways thereof, and *b* the tool-carrier 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 which meshes with the rack-teeth on the bed *a*, as in the ordinary manner, and not illustrated herein. The apron also carries the lock-nut, which is capable of being closed or opened by operating the lever *h*, so as to engage with or be disengaged from the lead-screw. The lock-nut is in two halves, *g g'*, the bases of which are guided in suitable guides, *i i*, affixed to the inner side of the apron, and these halves are opened or closed relatively to each other by the partial rotation of disk *k*, connected with the handle *h*, which disk has cam-slots, (not shown,) which engage pins upon the lock-nut.

Now, it will be understood that when the lock nut *g g'* is closed on the lead-screw the carriage will become operatively engaged with said lead-screw, and will be moved forward on the bed of the lathe to feed the tool lengthwise along the work at proper rate to cut a screw of the desired pitch, according as the gears are proportioned. The lead-screw has some definite pitch, which is usually coarse—say four threads to the inch—as seen in the diagrams, Figs. 6 and 7, and by arranging the gears at the end of the lathe the rotation of the 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 uneven with relation to the lead-screw, as will be readily understood. In cutting an odd thread, however, the carriage and tool would have to be managed in a different way from that allowable in cutting an even thread. Thus, in cutting an even thread, whether of equal or multiple pitch to that of the lead-screw, 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 end of the lathe, so as to move the carriage back rapidly to the place of beginning. He then moves the tool up to the work and closes

the lock-nut, and the carriage will 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 will and take a second cut therefrom. When the tool arrives at the end of the screw, the same operation is repeated until the screw is fully cut. In cutting a thread which is uneven relatively to the lead-screw this operation of opening and closing the lock-nut to disengage and engage the lead-screw cannot be employed without series risk on account of the slight chance of catching the lock-nut with the lead screw at the right point to have the tool match exactly with the thread being cut, for in almost every case the tool would fail to register exactly with the thread first cut, and the slightest deviation would damage or destroy the work; hence in such case it is customary to leave the lock-nut closed and to reverse the motion of the lathe to carry the carriage back. This, however, calls for double driving-pulleys, reversing-clutch, belt-shippers, and in any event the slow return-feed is objectionable.

Thus far this description refers to the ordinary practice of the art, and to provide for thus cutting uneven threads and threads of greatly varying pitch by the same mechanism quickly and successfuly is the object of this invention. This object has been in a measure obtained by the construction of an attachment set forth in Patent No. 264,597, of 1882, in which a worm-wheel, held into engagement with the lead-screw, was connected with the lock-nut by a disk hung upon the same shaft with the worm-wheel and having peripheral recesses which engaged a spring-latch connected with said lock-nut in such manner that the lock-nut could not be closed upon the lead-screw until said latch was sprung into one of said recesses.

These recesses corresponded with every inch of the lead-screw only, and according to this patent half-threads could not be cut. In such construction the worm-wheel is located outside the lock-nut, and connected with said nut by a series of mechanisms which are liable to get out of order and which are difficult of certain and immediate coaction. I provide a worm-wheel housed within the nut and having a bearing in one of the halves thereof. The face of the worm-wheel has recesses which are engaged by a movable projection operating from the other half of the nut, and with these simple devices I provide for a great number of changes in the pitch.

In the patent mentioned the particular disk with its recesses governed the points at which the lock-nut could be closed. In my construction the object is to catch at fractions of inches or intermediate points—as one-fourth inch, one-half inch, one inch, and two inches for lead-screws of four threads per inch, and one-sixth inch, one-third inch, one-half inch, two-thirds inch, one inch, and two inches for a lead-screw of six threads per inch—with the same mechanism.

I form in one part, *g*, of my lock-nut a circular recess, in which is journaled the worm-wheel A. This worm-wheel A has teeth B, a hub, B′, and recesses in the face, which are lettered B^2.

The number of teeth are properly proportioned to the pitch of the lead-screw. The recesses are arranged in pairs or sets, radial from the center and of different lengths from the periphery. In Fig. 2 those marked 1 extend nearest to the center of the wheel and are opposite each other. Those marked 2 do not extend so far toward the center and are arranged at right angles to those marked 1, while those marked 3 are still shorter and are arranged midway between those marked 1 and 2.

In Fig. 4 three sets of three are similarly arranged. When the lock-nut is closed, the worm-wheel moves forward with the nut, and of course need not revolve upon its own axis; but when the lock-nut is open and is being run back the worm-wheel revolves idly.

The half *g′* of the lock-nut is provided with a slot, in which is operated a pin, D, the inner portion of which may be readily brought into contact with the face B^2 of the worm-wheel. This pin may be pivoted or otherwise secured to the half-nut *g′*, and has motion in said slot which will allow it to be forced inward against the worm-wheel nearer to or farther from the center thereof. It is obvious that if it be held against the face B^2 of the worm-wheel near the center it will engage only the recesses 1. If farther from the center it will engage the recesses 1 and 2, or twice as frequently, and so on. The nearer it approaches the periphery of the wheel the more quickly will it engage.

The pin D serves only when the parts of the nut *g g′* are brought together, and it is adjusted by the operator to correspond with the work being done. If one cut upon a blank has been made, and during that operation the pin D occupied a certain recess in the worm-wheel—say 1—it will find that recess when the nut is again brought together for a subsequent cut.

It will be understood that the lock-nut having been opened and forced back cannot be again engaged with the lead-screw, except at a definite point—the point at which the designated recess shall register with the pin or projection D—and it will therefore be evident that in cutting a screw, no matter what its pitch may be, whether "odd" or "even" relatively to the lead-screw, the lock-nut will always close on the lead-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. Not only is this a fact of the construction, but it is obvious that the engagement between the lock-nut and the lead-screw may be arranged to occur at fractions of an inch, as may be desired, by simply changing the engagement of the pin D with the worm-wheel.

In cutting multiple threads the pin or projection D may be thrown directly under the

teeth of the worm, or thrown out from the worm entirely, as it is not necessary to use it only to protect the thread of the nut.

In the modification shown in Fig. 5 a right and left hand screw, M, may be used to throw the parts of the lock-nut *g g'*.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In combination with a lead-screw and a lock-nut, as *g g'*, a worm-wheel housed and journaled within the lock-nut and the means for allowing the engagement of the lock-nut and lead-screw only at different designated predetermined and variable points, as set forth.

2. In a screw-cutting lathe, the combination, with a lead-screw and a lock-nut, as *g g'*, of the worm-wheel having different grades of recesses, substantially as described, and an engaging-pin or other device operated from one half-nut to engage the worm-wheel only when said pin registers with the proper recess, as set forth.

3. In a screw-cutting lathe, the combination, with the lead-screw and lock-nut *g g'*, of the worm-wheel A, journaled in the half-nut *g* and having recesses 1 2 3, as described, and the pin D, operated from the half-nut *g'*, as and for the purposes set forth.

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

JOHN C. SMITH.

Witnesses:

L. A. MYERS,

DAN MCAULIFFE.