(No Model.)

P. LOBBEN.

METAL TURNING LATHE.

No. 421,181. Patented Feb. 11, 1890.

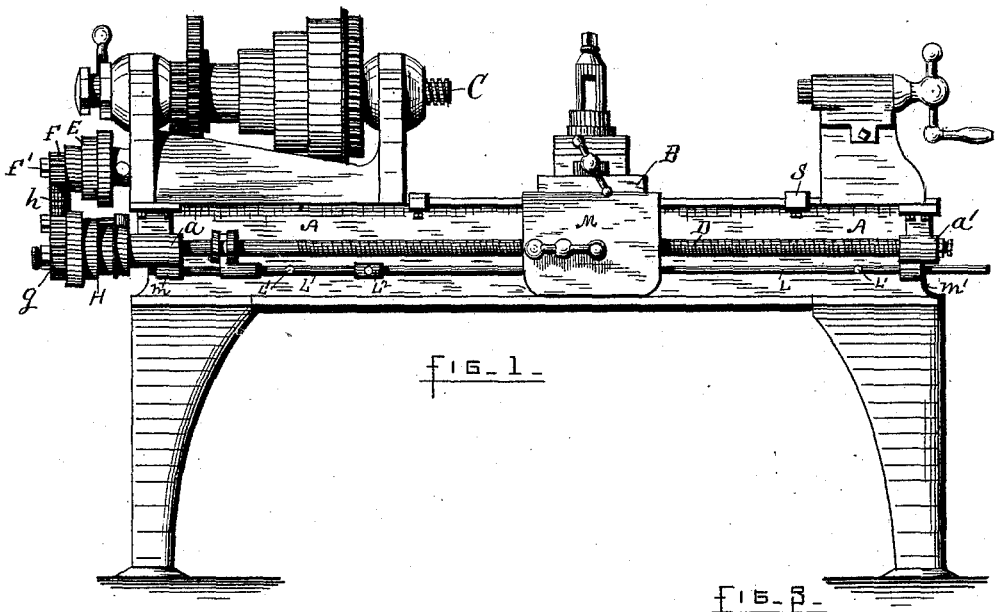

FIG. 1.

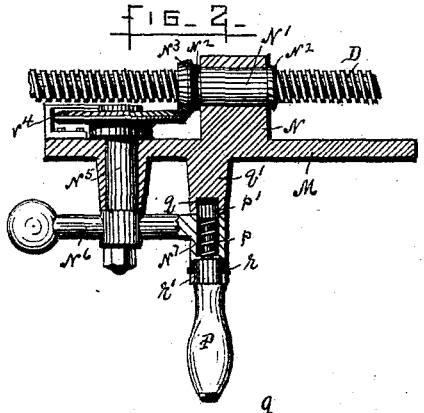

FIG. 2.

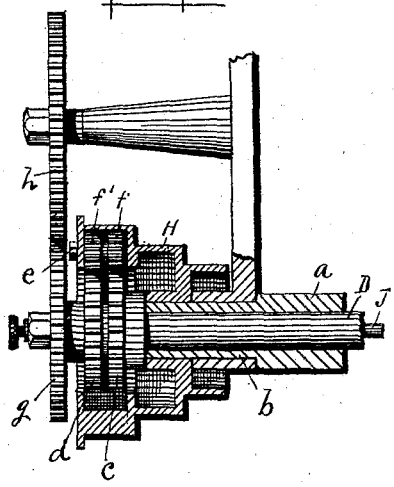

FIG. 3.

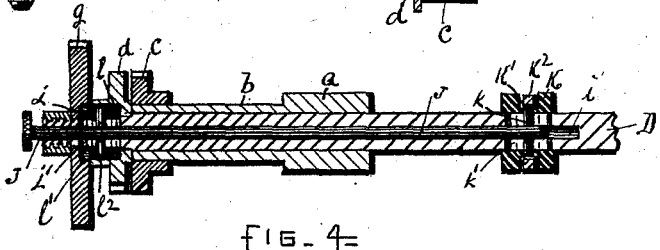

FIG. 4.

Witnesses.

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METAL-TURNING LATHE.

SPECIFICATION forming part of Letters Patent No. 421,181, dated February 11, 1890.

Application filed October 21, 1886. Serial No. 216,880. (No model.)

To all whom it may concern:

Be it known that I, PEDER LOBBEN, a citizen of the Kingdom of Norway and Sweden, and a resident of Worcester, in the county of Worcester and State of Massachusetts, have invented an Improvement in Turning-Lathes, of which the following is a specification.

My invention relates to that portion of a lathe known as the "feeding mechanism;" and it consists in providing means for connecting the tool-carriage with a revolving "lead-screw," whereby the construction of the feeding mechanism is simplified, and by which the cutting-tool in the operation of screw-cutting may be withdrawn at each cut and moved back and again advanced to the work for a succeeding cut in true relation to the screw-thread to be cut; also, in providing improved means for connecting the lead-screw with the live-spindle, and, further, in providing means by which the feeding mechanism is connected or disconnected from the operating parts of the lathe.

The drawings hereunto annexed represent a turning-lathe embodying my invention, and in which—

Figure 1 is a front view of the lathe. Fig. 2 is a view of the mechanism by which the tool-carriage is connected with the lead-screw and shown partly in sectional view. Fig. 3 is a view, partly in section, of the mechanism by which rotary motion is imparted to the lead-screw; and Fig. 4 is a sectional view of a portion of the lead-screw and a part of its connected operating mechanism.

Like letters refer to like parts in the several figures.

Referring to the drawings, A denotes the bed of the lathe; B, the tool-carriage; C, the live-spindle; D, the lead-screw journaled in the bearings a a' upon the lathe-bed.

E is a cone-pulley, and F a pinion upon a shaft F′, driven by the live-spindle C in the manner usual in machines of this class.

H is a cone-pulley running loosely upon the fixed bearing b, formed by the extension of the box a.

To the bearing b, I attach a gear c, and running loosely on the lead-screw D is a gear d.

Turning upon a stud e, which is carried by the cone-pulley H, are the pinions f and f'. The pinion f is in gear with the gear-wheel c, and to the pinion f is attached the pinion f', in gear with the gear-wheel d. As the cone H is driven by a belt from the cone-pulley E the pinions f and f' are carried around the fixed gear-wheel c, causing the two pinions f and f' to make as many revolutions on the stud e at each revolution around the fixed gear c as the number of teeth in the pinion f is contained in the number of teeth in the fixed gear c, and at each revolution of the pinion f the pinion f' will impart a rotary motion to the gear d equal to the excess in size of the pinion f' over the pinion f. If the gear-wheel c have one hundred teeth and the pinion f twenty-five teeth, it will make four revolutions in turning once around the fixed gear c, and if the pinion f' have twenty-six teeth it will turn the gear-wheel d one tooth at each revolution, or four teeth at each revolution of the pinion f around the fixed gear-wheel c. I am thus enabled to impart a rapid motion to the cone-pulley H, rendering the driving-belt much less liable to slip and allowing a quicker speed to be given to the live-spindle with a very slow feeding motion to the tool-carriage, which is frequently desirable, especially in lathes to be driven by foot-power.

Running loosely upon the lead-screw D is a gear-wheel g, driven by the pinion F on the shaft F′ through an intermediate gear-wheel h, carried on a lever pivoted concentrically with the lead-screw D, as is common in screw-cutting lathes.

Sliding concentrically in a chamber i in the lead-screw D is a rod J, having pins j and k sliding in slots j' and k' in the lead-screw. The pin j projects beyond the screw D, so as to engage either the slot l in the gear d or the slot l' in the gear g as the sliding rod J is moved to the right or left, thereby connecting either one of the gear-wheels d or g with the lead-screw. When the pin j is midway between the two gears d and g, its projecting ends enter an annular chamber l^2 in the hub of the gear d, allowing both of the gears d and g to run loosely on the lead-screw. The ends of the pin k enter a collar K, having a groove K′, adapted to receive a fork K^2, mounted upon a sliding rod L, held in the bearings m m', attached to the

lathe-bed. The rod L has handles L′, by which the rod is conveniently moved by the operator.

A collar L^2 is adjustably attached to the rod L in proper position to be struck by the apron M of the tool-carriage when the cutting-tool has passed across the work, thereby moving the pin j out of the slot l in the gear-wheel d and into the annular chamber l^2, stopping the motion of the lead-screw and rendering the action of the feeding mechanism automatic. When the gear d is connected with the lead-screw by the pin j, the gear-wheel g will run loosely upon the screw, and when the gear g is connected for the purpose of cutting a screw the gear-wheel d will run loosely upon the lead-screw. Therefore the change can be made immediately from the ordinary feeding motion of the cutting-tool to that employed in screw-cutting, and vice versa, by simply sliding the rod J to the right or left without making any change in the driving mechanism, and the motion of the cutting-tool may also be stopped with equal facility by bringing the pin j into the annular chamber l^2. The gear-wheel g is held in place by a nut g', which permits the gear to be exchanged for any of the "change-gears" usually furnished with the lathe by which the speed of the lead-screw may be varied relatively to the speed of the work.

If it is not desired to employ a speed-reducing mechanism, the pin j may be used, or some equivalent clutching device, between the gear g and the gear d, or a belt-pulley instead of the gear d, to which rotary motion may be given directly.

Journaled in a projection N on the apron M is a nut N′, through which the lead-screw passes. The projection N is inclosed by the collars N^2, by which the apron M and connected tool-carriage are moved along the ways of the lathe by the action of the lead-screw D in the nut N′.

To the nut N′, I attach a beveled pinion N^3, in gear with a beveled gear-wheel N^4, journaled in the apron M, by a spindle N^5, to which is attached the balanced arm N^6, with a handle P, having a sliding motion in the arm N^6. A spiral spring p is applied to the sliding handle to hold it in the socket N^7 of the arm N^6, and with the end p' projecting from the arm N^6 to enter the chamber q in the stud q', projecting from the apron M. The sliding handle P is provided with a pin r, which enters the slot r' in the arm N^6. When the pin r is withdrawn from the slot r', the handle is partially turned to keep the pin from re-entering the slot and hold the end p' flush with the under side of the arm N^6 in order to allow the arm to be rotated without the end p' coming in contact with the stud q'.

The ratio of the gear N^4 to the pinion N^3 is made to correspond with the pitch of the lead-screw. In the lathe illustrated in the drawings the gears are two to one, so a single revolution of the gear N^4 will produce two revolutions of the pinion N^3, and the pitch of the screw D is two threads to the inch, so one revolution of the arm N^6 and gear N^4 will revolve the pinion equal to a motion of one inch on the lead-screw. If the pitch of the screw were three threads to the inch, the gears should be in the ratio of one to three, and such a corresponding ratio should be observed between the gears and the pitch of the screw as shall cause a single complete revolution of the gear N^4 to move the lead-screw D a distance equal to the pitch of a single complete thread or a multiple thereof.

To the bed of the lathe I attach by a set-screw the stop S, so it may be adjusted along the bed to correspond with the position of the work.

In cutting a screw the carriage is moved back until the apron is brought against the stop S, placed in proper position. The arm N^6 is turned in the direction opposite to that which would be caused by the action of the screw on the nut N′ until the handle P is made to coincide with the chamber in the stud q', when the handle is turned in its socket, allowing the pin r to enter the slot r' and the spiral spring p to force the projecting end p' of the handle into the chamber q. The handle is thus held in position while the tool is advanced to the work of cutting a screw-thread. At the end of the cut the tool is withdrawn and the carriage B is moved back against the stop S, and the handle P, which had been withdrawn from the stud q' in order to move the carriage back, is again brought to coincide with the stud q' by being turned against the action of the screw D to counteract the action of the screw and hold the carriage against the stop S, thus securing the same relative position of the cutting-tool at the commencement of each cut. The carriage in the process of turning may be moved along the bed of the lathe by turning the arm N^6 and rotating the nut N′ on the screw D, thereby avoiding the use of the rack and pinion commonly used in turning-lathes of this class and greatly simplifying the construction of this part of the feeding mechanism.

If desired, the driving-power may be disconnected from the screw D and the cutting-tool fed by hand by rotating the nut N′ on the lead-screw.

It will be obvious that instead of a lead-screw, as described, a feed-shaft may be employed without a screw-thread, so far as relates to that portion of my invention concerned in reducing the speed of the lead-screw or of connecting or disconnecting it from the driving-power.

I am aware that a cone-pulley employed to drive a feed-shaft has been used, journaled on a fixed bearing and concentrically with the feed-shaft. Such I do not claim, broadly.

I am also aware that lathes have been known in which the carriage has been moved by a screw working in a rotatable nut journaled

in the carriage and provided with locking mechanism by which the nut is held from rotation and released at will. Such I do not herein claim, as such a construction was shown in the Letters Patent to Spencer, No. 356,509, January 25, 1887, and to Latham, No. 344,283, June 22, 1886.

In the lathe illustrated in the accompanying drawings the nut is locked by a pin carried by the crank-arm and forming the crank-handle, which is made to enter a chamber *q* in the outer face of the carriage, and by which the operator is enabled to judge of the position of the nut by means of the position of the handle P relative to the chamber *q*. I also employ in connection with the nut-locking device an adjustable stop attached to the bed or other rigid portion of the lathe, which enables the longitudinal movement of the carriage in its reverse motion to be determined. If in the operation of screw-cutting the lead-screw D makes ten complete revolutions, it is obvious that in order to reverse the carriage and bring the tool in exactly the same relation to the work by a reverse motion of the nut N′ ten revolutions it will be necessary to hold the work and lead-screw at absolute rest, whereas by the employment of the stop S, I turn the nut N′, bringing the carriage against the stop S and determining the longitudinal movement of the carriage upon the bed. The rotation of the screw D and corresponding rotation of the work will bring the handle P in position to enter the chamber *q* in the carriage, thus insuring not only the position of the carriage on the bed, but also the proper position of the work to the cutting-tool. This cannot be accomplished without the use of the stop S or its equivalent in order to determine the position of the carriage, unless the screw D is held at rest during the reverse motion of the carriage.

What I claim, and desire to secure by Letters Patent, is—

1. In a turning-lathe, the combination, with a rotating feed-shaft journaled in bearings on the bed of the lathe and suitably connected with the tool-carriage, of mechanism for rotating said feed-shaft, and consisting of a pulley journaled on a fixed bearing concentric with the feed-shaft, a gear-wheel attached to the bearing of said pulley, two pinions of different sizes and attached to each other and turning on a stud carried by said pulley around said fixed gear, which is in mesh with the smaller of said pinions, and a gear concentric with said feed-shaft and capable of being connected therewith, said gear being in mesh with the larger of said pinions, as and for the purpose set forth.

2. In a turning-lathe, the combination, with a feed-shaft provided with a screw-thread and suitably connected with the tool-carriage, of two revolving gears running loosely on said feed-shaft and connected with the live-spindle, substantially as described, and a sliding clutching device by which rotary motion is imparted to said feed-shaft, said clutching device being placed between said revolving gears, so either of them may be connected or disconnected with said feed-shaft, as and for the purpose set forth.

3. The combination, with the feed-shaft of a turning-lathe and a revolving wheel running loosely on said shaft and driven by the live-spindle, of a sliding rod held concentrically in said shaft and carrying clutching devices, substantially as described, for engaging said revolving wheel, and a sliding rod parallel with the feed-shaft and sliding in bearings on the bed of the lathe, said sliding rod being connected with the rod held in the feed-shaft, so their motion will be simultaneous, substantially as described.

4. In a turning-lathe, the combination, with the feed-shaft and a gear running loosely on said shaft, driven by the live-spindle, of a sliding rod held concentrically in said feed-shaft and carrying clutching devices, substantially as described, whereby the feed-shaft is connected or disconnected with said gear, a sliding rod held in bearings parallel with said feed-shaft and connected with the rod held in the feed-shaft, and an adjustable stop on said parallel sliding rod, substantially as described.

5. In a turning-lathe, the combination, with a lead-screw journaled in bearings on the bed of the lathe and a screw-threaded nut journaled in a bearing on the tool-carriage and having collars inclosing said bearing, of a beveled pinion attached to said nut, a beveled gear held on a spindle journaled in the tool-carriage, a crank-arm on said spindle, and a sliding pin carried by said arm and arranged to engage a hole in the tool-carriage, whereby the screw-threaded nut is held from turning in its bearing, substantially as described.

6. In a turning-lathe, the combination, with a lead-screw journaled in bearings on the bed of the lathe and a screw-threaded nut journaled in a bearing on the tool-carriage, of a crank-arm journaled in the tool-carriage and connected with said nut, substantially as described, a locking device whereby the crank-arm is held in a fixed position, substantially as described, and an adjustable stop attached to the rigid portion of the lathe, whereby the longitudinal reverse movement of the carriage is determined, said screw-threaded nut and said crank-arm being so connected that the rotation of the crank-arm shall have a ratio to the rotation of the nut corresponding to the pitch of the lead-screw, substantially as described.

PEDER LOBBEN.

Witnesses:
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IVER JOHNSON.