(No Model.) 2 Sheets—Sheet 1.

O. KROMER.

LATHE FOR TURNING IRREGULAR FORMS.

No. 336,813. Patented Feb. 23, 1886.

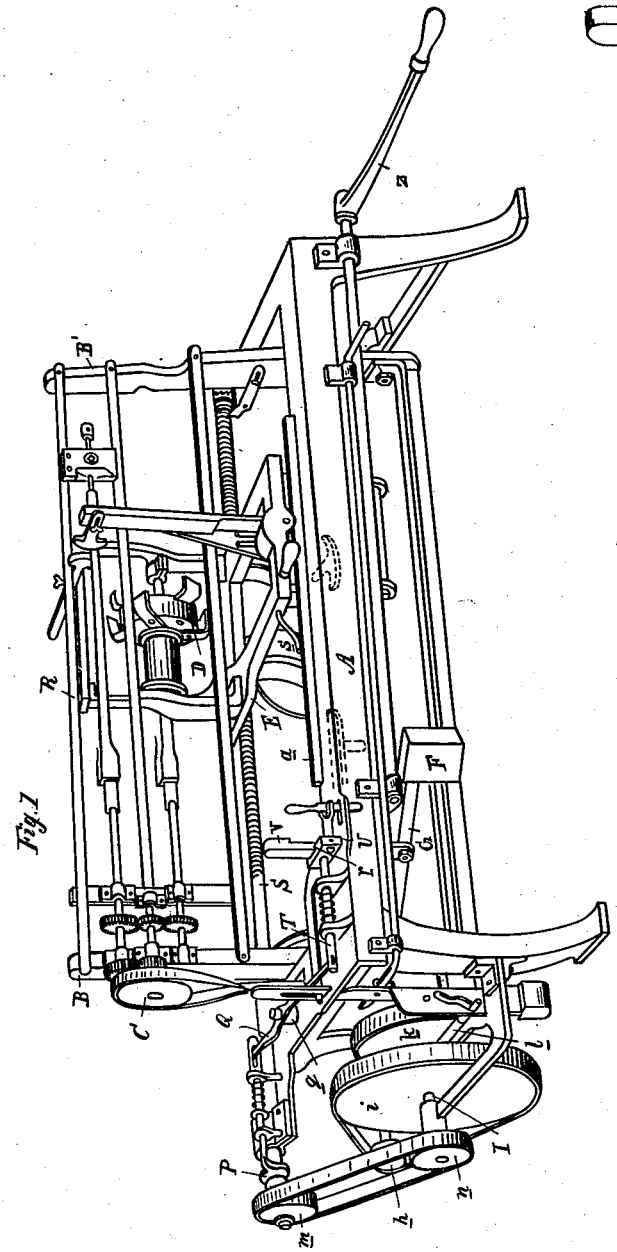

Fig. 1.

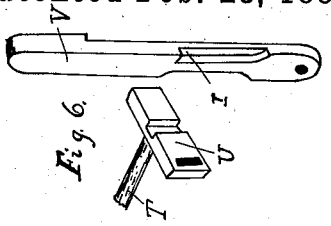

Fig. 6.

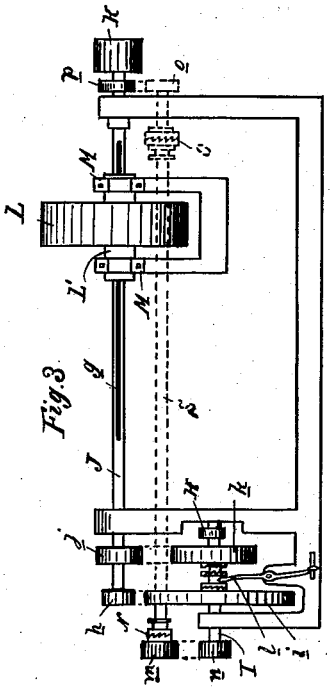

Fig. 3.

Attest:
John Scheuman.
M. D. Sprague

Inventor:
Otto Kromer.
by his Atty
Thos. S. Sprague

(No Model.) 2 Sheets—Sheet 2.

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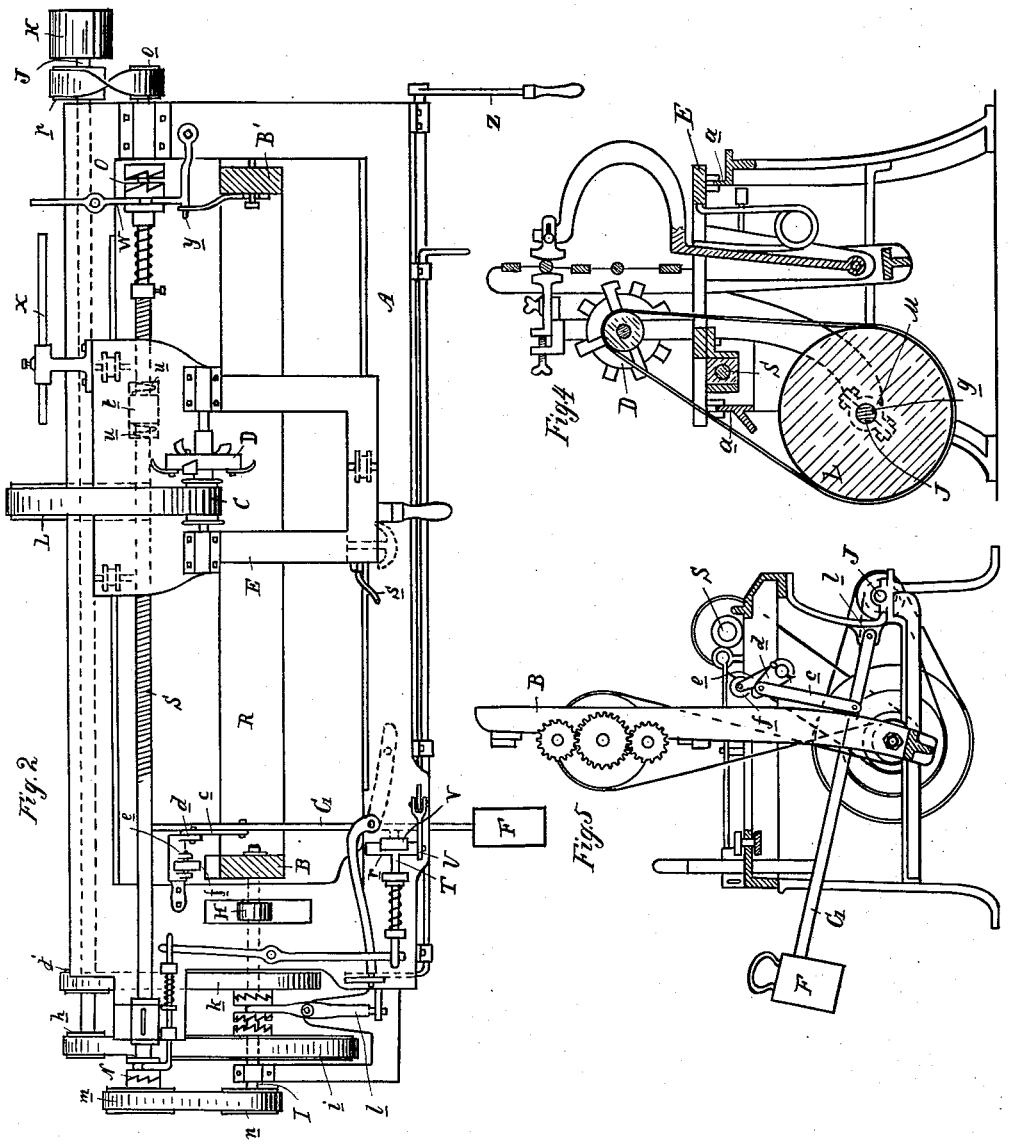

Fig. 2.

Fig. 4.

Fig. 3.

Attest:
John Schuman.
[illegible]

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UNITED STATES PATENT OFFICE.

OTTO KROMER, OF SANDUSKY, OHIO.

LATHE FOR TURNING IRREGULAR FORMS.

SPECIFICATION forming part of Letters Patent No. 336,813, dated February 23, 1886.

Application filed July 23, 1885. Serial No. 172,413. (No model.)

To all whom it may concern:

Be it known that I, OTTO KROMER, of Sandusky, in the county of Erie and State of Ohio, have invented new and useful Improvements in Lathes; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to a new and useful improvement in lathes for turning irregular forms, commonly called a "spoke-lathe;" and the invention consists in an improved screw-feed, all as more fully hereinafter described.

In the drawings which accompany this specification, Figure 1 is a perspective view of a spoke-lathe provided with my improvement. Fig. 2 is a plan of the same. Fig. 3 is a diagram plan showing the main shaft, counter-shaft, and feed-screw with the belts, pulleys, and clutches. Figs. 4 and 5 are vertical cross-sections of the lathe. Fig. 6 is a detail more specifically referred to hereinafter.

The spoke-lathe shown in the drawings in connection with my improved feed is the one patented May 22, 1883, No. 278,025; but my improvement has no particular connection with this lathe further than to illustrate its operation, as it may be applied to any lathe of this class, from which the one shown in the drawings does not differ in any essential feature.

The letters in the different figures refer to the following parts:

A is the frame of the lathe.

B B' are the uprights which form the sides of the rocking frame R. They are pivotally secured at their lower ends, so as to allow the frame to swing or rock for the purpose of approaching the stick or blank to the revolving cutter-head or withdrawing it. The rocking frame carries the centers for the revolving pattern and for the revolving stick, and has a pulley, C, which receives motion from the pulley H on the counter-shaft I, and transmits it by means of intermediate gear to the live centers.

D is the revolving cutter-head. It is journaled upon the carriage E, which is drawn upon ways *a a* the whole length of the stick by means of a feed-screw, S.

F is a counter-weight secured to the free end of the lever G, which is pivotally secured at *b*, and is connected by a link, *c*, with a bell-crank, *d*, the arm *e* of which is provided with the anti-friction wheel *f*, the parts being so arranged that when the counter-weight F is allowed to act by its gravity, (which it does automatically in the operation of the lathe by means of devices hereinafter described,) the arm *e* of the bell-crank lever will push the upright B, and thereby rock the frame away from the cutter-head.

J is the main shaft, journaled at the rear side of the lathe. It has the drive-pulley K secured thereto at one end, and has the pulley L, that drives the cutter-head, sleeved upon it by means of a hollow hub, L', that is journaled in bearings M, one on each side of the pulley, and which bearings are secured to the carriage and form a part of it. The hollow hub of the pulley L has a feather, which engages into a groove, *g*, that runs the whole length, or nearly so, of the main shaft. The counter-shaft I receives motion from the main shaft by means of the belt-pulleys *h i* or *j k*, the former communicating the slow and the latter the fast motion to the counter-shaft I. The pulleys *i k* are loose upon the counter-shaft I, and each has secured to it one member of a clutch, the other member of which slides between them on a feather, and is carried by the free end of a vibrating lever, *l*, which is automatically operated by the movement of the carriage, so as to throw the sliding clutch from the fast onto the slow pulley while the foot of the spoke is being cut, and to stop the motion of the counter-shaft when the operation of cutting is finished by holding the sliding clutch disengaged from either pulley.

The parts hereinbefore described are all of known construction and operation, and I will now proceed to describe the parts which constitute my improvement. The feed-screw S, which draws the carriage back and forth, is provided at one end with the belt-pulley *m*, which receives motion from the counter-shaft I by means of the pulley *n*, and at the opposite end it is provided with a belt-pulley, *o*, which receives motion from the main shaft by means of the pulley *p*. Two clutches, N O, are arranged at the opposite ends of the feed-

screw to disconnect the latter from either one of its two sources of motion, the one from the counter-shaft I being arranged to feed the carriage forward, while the one from the main shaft, which is much faster, is arranged, by means of a crossed belt, to return the carriage.

The clutches N O are operated automatically in the following manner:

Q is a vibrating lever pivotally secured at *q* at the top of the frame, and P and T are two spring bolts or latches provided with slots in one end, into which the free ends of the lever Q respectively engage. The spring-latch P has a forked end, which embraces the movable part of the clutch N, and the spring-latch T is provided with the cross-head U. V is a vertical bar passing through a slot in the top of the frame and pivotally secured at its lower end to the arm G of the counter-weight F.

The bar V has a shoulder, *r*, which engages upon the top of the cross-head U, and thereby prevents the counter-weight F from operating by its gravity, except when the cross-head U is pushed out of engagement, which happens in the operation of the lathe whenever the carriage at the end of its forward travel impinges with the arm *s* against the cross head U. The movable part of the clutch O is embraced by the forked end of a vibrating lever, W, the free end of which extends into the path of the arm X, which is adjustably secured at the rear of the carriage.

Y is a latch or arm adapted to engage with the movable part of the clutch O and hold it open, as shown in Fig. 2. This latch is carried or operated by the upright B′ and rocks with it, so that whenever the rocking frame swings forward the latch or arm releases the clutch. The feed-screw engages with the carriage by means of a nut, *t*, which, instead of being rigidly secured to the carriage, has a limited end-play in a recess formed within the carriage or within a bracket secured to the under side of the carriage, as shown in Fig. 2, and between the ends of this nut and the walls of the recess springs *u* are interposed, the object of the arrangement being to start, stop, or reverse the carriage in a less violent manner than would otherwise be the case, and to provide a limited end-play to allow the clutches to fully engage before starting; otherwise they would soon break.

In practice my improved screw-feed operates in the following manner: When the machine is started to operate upon a stick, the feed-screw which draws the carriage with the cutter-head derives its motion from the counter-shaft I by means of the belt-pulleys *m n*, the clutch O at the opposite end of the feed-screw being meanwhile disengaged by the latch Y, which is engaged into the neck of the movable part of the clutch and prevents it from closing. As soon, however, as the carriage arrives at the end of its forward travel, the arm or detent *s* strikes the cross-head U and pushes it back. This accomplishes two results—one being to vibrate the lever Q, so as to disengage the clutch N, and the other to free the bar V, so as to allow the weight F to operate by its gravity and rock the frame R forward. As soon as the frame R rocks forward, the locking-latch Y releases the movable member of the clutch O, which instantly closes, and a reverse motion is now communicated to the feed-screw by means of the belt-pulleys *p o*. This motion quickly returns the carriage to its starting position, where it stops as soon as the arm X, by impinging against the free end of the lever W, has vibrated the latter sufficiently to part the clutch O. Now, the feed-screw has no motion at all until the operator begins the operation on a new stick by swinging his rocking frame back into position, which he does by lifting up the counter-weight F either directly or by means of the hand-lever Z, which is arranged for that purpose.

The operation of swinging back the frame R restores the bar V and allows the cross-head U to resume its former position, which permits the clutch N to close again as soon as its two members are in the proper relative position to each other to do so, the slot in the spring-latch P being made long enough to allow the lever Q enough play to swing into its original position irrespective of the action of the spring-latch P. The swinging back of the frame R at the same time engages the latch Y with the movable part of the clutch O, and thus relieves the lever W of this duty, which it would be unable to continue, as the feed-screw now again begins to draw the carriage forward by the motion derived from the counter-shaft I.

I am aware that it is not new in itself to return the carriage by reversing the feed-screw automatically at the end of its forward travel; but the manner in which I do it and the devices by which it is accomplished I claim as novel.

In all other constructions of lathe of this kind in which the carriage is operated by a feed-screw both the feeding and reversing are done at one end of the screw by motion transmitted from the counter-shaft I, while in my improved machine the reversing of the feed-screw is accomplished by motion which may be applied to the rear end of the screw and transmitted from the main shaft. This has the advantage of doing away with the complication resulting from assembling all the devices for operating the feed screw at one end thereof, and also permits of getting faster motion for reversing, as the main shaft runs faster.

My devices for operating the feed-screw I also consider a great improvement over the ones in present use, which operate the feed-screw by means of fast and loose pulleys and by loose belts and tightening-pulleys, which make the lathe complicated, and are a constant source of trouble by the belts giving out or requiring frequent adjustment under the hard use to which they are subjected.

My improved devices also have the advan-

tage of operating more positively, and are quicker in starting and stopping.

The spirit of my invention is to operate the feed-screw by suitable connection at its forward end with the counter-shaft which drives the centers, and reverse it by connection with the main shaft of the lathe, each connection having a device for throwing it alternately and automatically out of gear by the movement of the carriage at the end of its respective travel, and alternately into gear by the rocking of the frame which carries the pattern and the stick. The specific devices which I preferably use for this purpose are two sets of belt-pulleys, one set transmitting motion for feeding from the counter-shaft to the forward end of the feed-screw, and the other transmitting motion for reversing from the main shaft to the rear end of the feed screw, one pulley of each set being connected to its shaft by means of a clutch, the movable member of which is automatically operated by a vibrating lever and a detent on the carriage.

In the drawings, the clutch of each set of pulleys is applied to the pulley on the feed-screw; but it will readily be seen that this is optional, as it would make no difference if one or both clutches would be applied to the other pulley of each set. The only change required would be one of mere form and location of the devices for automatically operating the clutches. The function of the bar V and latch Y is to keep one clutch open while the other is closed, and, as one is thrown into action while the other is thrown out of action by the same motion of the rocking frame, the alternating motion of the feed-screw is thereby absolutely controlled. The continuity of the two motions of the feed-screw is automatically brought about by the bar V, which has the additional function of controlling the weight F, which rocks the frame. This latter use of the bar V, I have, however, claimed heretofore in the above-mentioned Letters Patent—

What I claim as my invention is—

1. In a lathe of the kind described, a feed-screw connected for feeding the carriage, with the counter-shaft which drives the centers, and connected for reversing the carriage with the main shaft of the lathe, substantially as described.

2. In a lathe of the kind described, the combination of a feed-screw, of two drive-connections, one for transmitting motion for feeding from the counter-shaft which drives the centers, and the other for transmitting motion for reversing from the main shaft of the lathe, of two clutches or analogous devices, one for each drive-gear, for throwing them in and out of motion, and of mechanical devices for alternately tripping the clutches by the movement of the carriage, all arranged substantially as described.

3. The combination of the feed-screw S, connected with the carriage, of the clutches N O, one upon each end of said screw, and provided with automatically-operated tripping devices, substantially as described, of the vertical bar V, connected to the weight F, and having the shoulder *r*, operating in connection with the cross-head U, and of the latch Y, operated by the rocking frame, all combined and operating substantially as set forth.

4. The combination of the feed-screw S, clutch N, spring-latch P, engaging with the movable part of the clutch, the vibrating lever Q, operating said spring-latch, the spring-latch T operating the vibrating lever Q, and having cross-head U, of the vertical bar V, having shoulder *r*, and of the weight F, having arm G, all combined and operating substantially as described.

5. The combination of the carriage E, feed-screw S, connected therewith, arm X, secured to the carriage, clutch O, arranged at one end of said feed-screw, for connecting and disconnecting the reversing motion of the feed-screw, vibrating lever W, and the clutch Y, operated by the rocking frame, all arranged and combined substantially as set forth.

6. In combination with the feed screw S, having two drive-connections, one for feeding and one for reversing, as described, the carriage E, having nut *t*, secured in a recess of the carriage, and having buffer-springs *u*, interposed between the ends of the nut and the walls of the recess, substantially as described.

7. In a lathe of the kind described, the combination of the feed-screw, of two drive-connections, one for feeding and one for reversing the screw, of a clutch or analogous device in each drive-connection for throwing in and out of gear, and of an automatically-tripping device alternately actuated for throwing out of gear by the movement of the carriage, and for throwing into gear by the rocking of the vibrating frame, substantially as described.

8. The combination of the feed-screw having two drive connections, one for feeding and one for reversing, and clutches for throwing these connections alternately in and out of gear, and the nut *t*, located in a recess in the carriage, and having a lost motion or end-play within said recess to permit the clutches to fully close when thrown into gear, substantially as described.

OTTO KROMER.

Witnesses:
JACOB DIETZ,
HERMAN FREY.