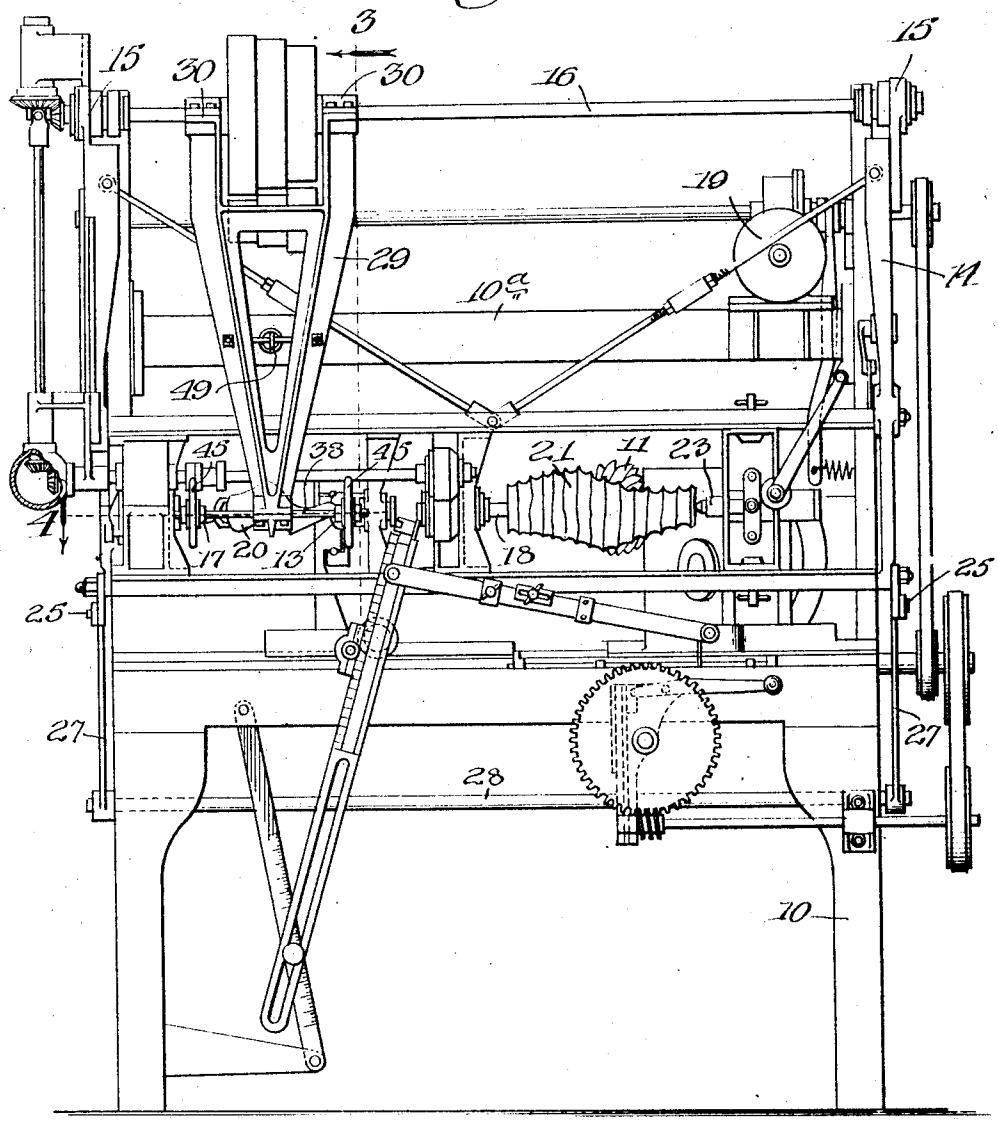
Sept. 10, 1929. G. F. RYAN 1,727,906

COPYING LATHE

Filed July 21, 1927 3 Sheets-Sheet 1

Fig. 1.



Inventor;
George F. Ryan,
By Dyrenforth, Lee, Chritton & Wilks.
Attys.

Sept. 10, 1929. G. F. RYAN 1,727,906

COPYING LATHE

Filed July 21, 1927 3 Sheets-Sheet 2

Fig. 3.

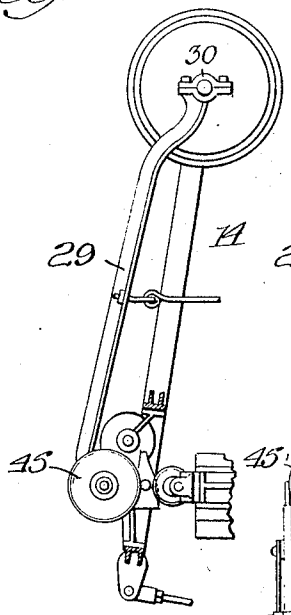
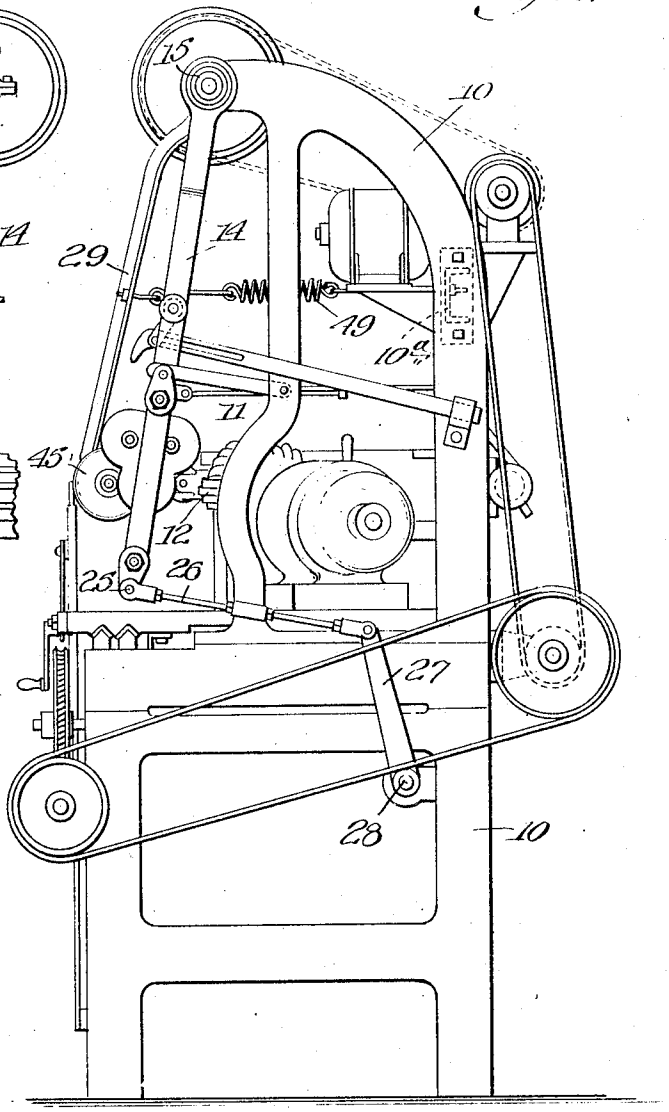


Fig. 2.



Inventor:
George F. Ryan,
By Dyrenforth, Lee, Chritton & Wiles.
Attys.

Sept. 10, 1929. G. F. RYAN 1,727,906

COPYING LATHE

Filed July 21, 1927 3 Sheets-Sheet 3

Fig. 4.

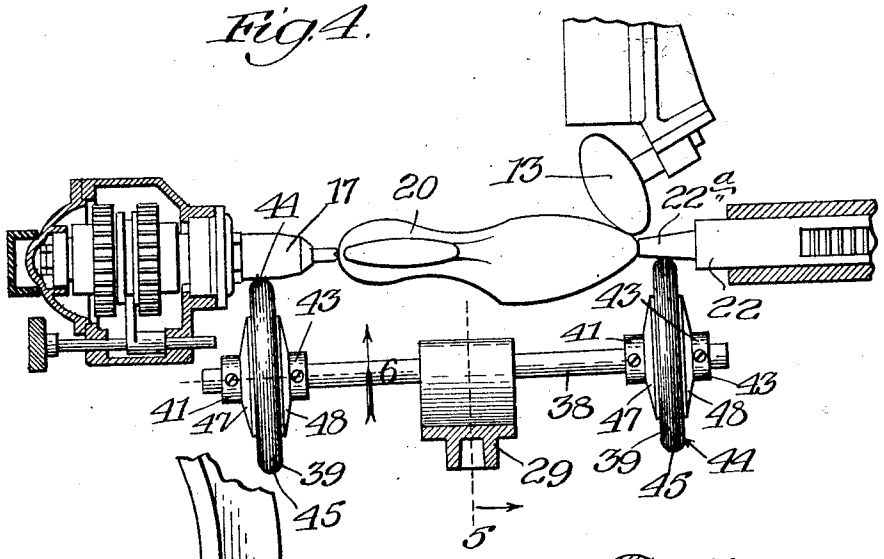


Fig. 5.

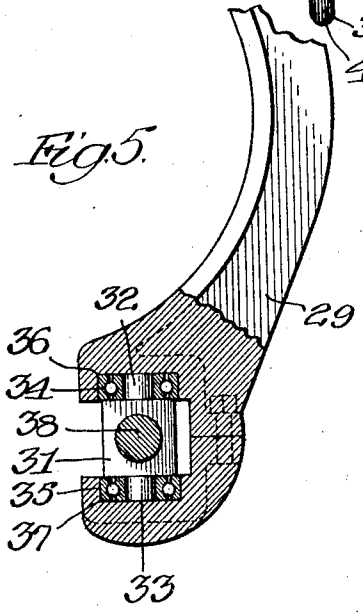
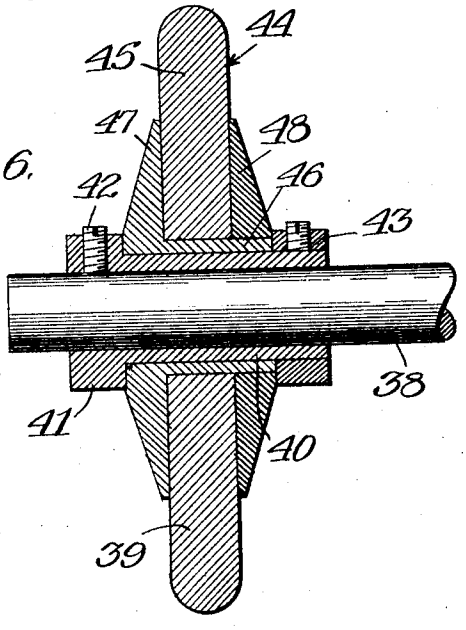


Fig. 6.



Inventor:
George F. Ryan,
By Lyon, Smith, Lee, Critton & Miles,
Attys.

Patented Sept. 10, 1929. 1,727,906

UNITED STATES PATENT OFFICE.

GEORGE F. RYAN, OF LYNN, MASSACHUSETTS, ASSIGNOR TO CHARLES E. REED & COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

COPYING LATHE.

Application filed July 21, 1927. Serial No. 207,447.

My invention relates, more particularly, to lathes provided for the manufacture of shoe lasts and more especially graded shoe lasts, of the type comprising, as an element, a swing-frame which, in lathes of this type as commonly provided, has revolubly mounted thereon the pattern and the work to cooperate with a pattern follower and cutting mechanism, respectively.

In the turning of irregularly shaped objects, as for example, and more particularly, some forms of shoe lasts, it is necessary, in order that the machine operate relatively fast in the production of work of the same shape as the pattern, where the pattern presents surfaces, as is common in some forms of shoe lasts, extending at a relatively small, acute angle to each other, to provide means to ensure the hugging of the follower by the pattern at all times thereby to avoid rebound of the pattern which results in inaccurate reproduction of the pattern.

My primary object is to provide in a machine of the swing-frame type, novel, simple and positively functioning means for causing the pattern to hug the follower at all times, even when the machine is operating at a relatively great speed, thereby to greatly increase the output of the machine.

While my improvements are applicable to quite a wide range of types of machines, I have chosen to illustrate them in a machine of the general type shown in the pending application of Charles E. Reed for U. S. Letters Patent on lathes, Ser. No. 650,194, filed July 7, 1923 now Patent #1,684,072, issued Sept. 11, 1928, wherein the swing frame referred to is pivotally supported at its upper end and in the operation of forming a last swings to one side only of the vertical plane in which the pivot for this frame is located.

Referring to the accompanying drawings:—

Figure 1 is a front view of a copying lathe embodying my improvements. Figure 2 is a view in end elevation of one end of the machine. Figure 3 is a fragmentary sectional view taken at the line 3 on Fig. 1 and viewed in the direction of the arrow. Figure 4 is an enlarged plan sectional view taken at the line 4 on Fig. 1 and viewed in the direction of the arrow. Figure 5 is a broken sectional view taken at the line 5 on Fig. 4 and viewed in the direction of the arrow; and Fig. 6, an enlarged broken sectional view taken at the line 6 on Fig. 4 and viewed in the direction of the arrow.

Inasmuch as the machine shown is of the same general construction as that disclosed in the Reed application above referred to, except for the omission of certain parts and the addition of certain mechanisms to cause the machine to embody my present invention, detailed showing and description of the machine appears to be unnecessary.

In explanation of the machine shown it may be stated that the machine comprises a frame 10 equipped at one end with cutting mechanism comprising a roughing cutter 11 and finishing cutters one only of which is shown at 12 which are rapidly rotated in the operation of the machine. At the other end of the frame is the usual pattern follower 13 arranged in spaced relation to the cutting mechanism in a direction lengthwise of the machine as shown, the cutting mechanism and follower device, in the operation of the machine being fed simultaneously either at the same speed, or at differential speeds, along the frame 10 in the direction of its length.

The machine also comprises a main swing frame 14 which is pivotally supported at opposite ends thereof, at its upper portion, generally as shown at 15, on a shaft 16 journalled in the upper end of the frame 10. The frame 14 has rotatably mounted thereon rotatable head-stock spindle devices 17 and 18 which operate, through mechanism driven from the motor represented at 19, to rotate the pattern 20 and the work 21, the pattern 20 being supported by the head-stock spindle 17 and a revoluble tail-stock spindle 22, and the work 21 by the head-stock spindle 18 and a revoluble tail stock spindle 23. In the operation of turning a last the rotating pattern 20 and the rotating work 21 are forced against the pattern follower 13 and the cutters, respectively, the follower and cutting mechanism being fed to the left in Fig. 1 in

a direction lengthwise of the work and pattern.

In the particular arrangement shown the swing frame 14 at its ends has pivotal connection at 25 with the forward ends of links 26 the rear ends of which connect with the upper ends of arms 27 rigidly secured to the ends of an equalizer shaft 28 journalled in the frame 10, whereby distortion of the frame at either extremity thereof is prevented.

Referring now to the particular illustrated embodiment of my improvement, the machine is provided with an auxiliary swing frame member 29 shown as of general yoke shape and pivotally supported at the upper extremities of its yoke arms 30 on the shaft 16. The lower end of the frame 29 is provided with a block 31 shown as provided with upper and lower journalling studs 32 and 33 at which this block is pivotally supported on the frame 29 to swing on a substantially vertical axis, ball-bearings 34 and 35 being preferably interposed between these journalling studs and the recessed portions 36 and 37 of the frame 29 in which these studs are journalled. Mounted in the block 31 to extend substantially horizontally and project at its opposite ends beyond this block, is a shaft 38 carrying rotary pressure-applying devices 39 each adapted to be adjusted into different positions along this shaft and secured to the latter in any desired adjusted position. Each of the devices 39, in the particular arrangement shown comprises a sleeve-member 40 encircling, and longitudinally movable along the shaft 38 and provided at its outer end with a head 41 carrying a set-screw 42 by means of which this sleeve may be rigidly secured to the shaft 38 in any desired position of adjustment lengthwise thereon. Surrounding the sleeve 40 and rotatably confined thereon between the head 41 and a collar 43 secured to the inner end of the sleeve 40, is a rotary pressure-applying device 44 formed of a disk 45 mounted on a sleeve 46 journalled on the sleeve portion 40 and having a head 47 on one end between which and a collar 48 on its opposite end the disk 44 is confined.

The auxiliary swing-frame structure is provided for the purpose of holding the pattern against the follower at all times, and thus prevent rebounding of the pattern in the rotation of the pattern against the follower, and to this end this auxiliary swing frame structure is so arranged that it, in effect, forms a backing adjacent the follower ensuring the close hugging of the follower by the pattern at all times. This backing-up force, which is preferably exerted at spaced apart points, namely, at the rotary pressure-applying disk-devices 45, may be applied as desired, in view of the adaptability of these pressure-applying devices for adjustment along the shaft 38 into different positions thereon. In the arrangement shown these pressure-applying devices are adjusted to engage the spindle device 17 and a tapering non-circular portion 22^a of the spindle device 22, though it will be understood that these pressure-applying devices may apply the backing-up pressure at other points and even, if desired, may apply such pressure directly against the pattern, the pivotal supporting of the block 31 adapting this block for oscillation on an axis crosswise of the longitudinal axis of the pattern, whereby the pressure-applying devices may be caused to properly function irrespective of the shape of the rotating parts against which they press, and each device 43 to apply a substantially equal backing-up pressure.

The amount of backing-up pressure applied by the auxiliary swing-frame structure may be effected in any desirable way. In the arrangement shown the auxiliary frame 29 being normally displaced outwardly, as shown in Figs. 2 and 3, the weight of this frame will cause pressure to be exerted by the devices 45 for forcing the pattern against the follower. However, this pressure is preferably augmented by any suitable mechanism tending to swing the frame 29 toward the pattern, the particular means shown for this purpose comprising a coil spring device 49 connected at its forward end with the auxiliary frame 29 at its rear end with a stationary part of the frame 10, as for example the cross bar 10^a thereof, this spring thus operating, in conjunction with the tendency of both frames 14 and 29, to swing toward the follower, to press the pattern at all times firmly against the follower and to produce the desired hugging action even when the machine operates at high speed.

The provision of an auxiliary swing frame as the means of applying the backing-up pressure referred to, particularly when this frame is mounted to swing upon an axis coincident with that on which the main swing frame swings, is of especial importance as the pressure-applying device between which and the follower the pattern extends, is caused to move in a path substantially concentric with the path traversed by the pattern in the swinging movements of the main swing frame.

While I have illustrated and described a particular embodiment of my invention, I do not wish to be understood as intending it to be limited thereto, as the same may be variously modified and altered without departing from the spirit of my invention.

What I claim as new, and desire to secure by Letters Patent, is:

1. A copying lathe, comprising, in combination, cutting mechanism and a pattern-follower, a swing-frame for the pattern and work, and means for pressing the pattern against said follower comprising spaced-

apart pressure-applying portions, said portions being adapted to swing about an axis transverse to the longitudinal axis of said pattern.

2. A copying lathe, comprising, in combination, cutting mechanism and a pattern-follower, a swing-frame for the pattern and work, and means for pressing said pattern against said follower and comprising a support adapted to swing about an axis transverse to the longitudinal axis of said pattern and pressure-applying portions on said support at opposite sides of said axis of said support.

GEORGE F. RYAN.