Jan. 14, 1958 H. G. CLAUSING 2,819,741

SHOE LAST TURNING LATHE

Filed Dec. 29, 1954 2 Sheets-Sheet 1

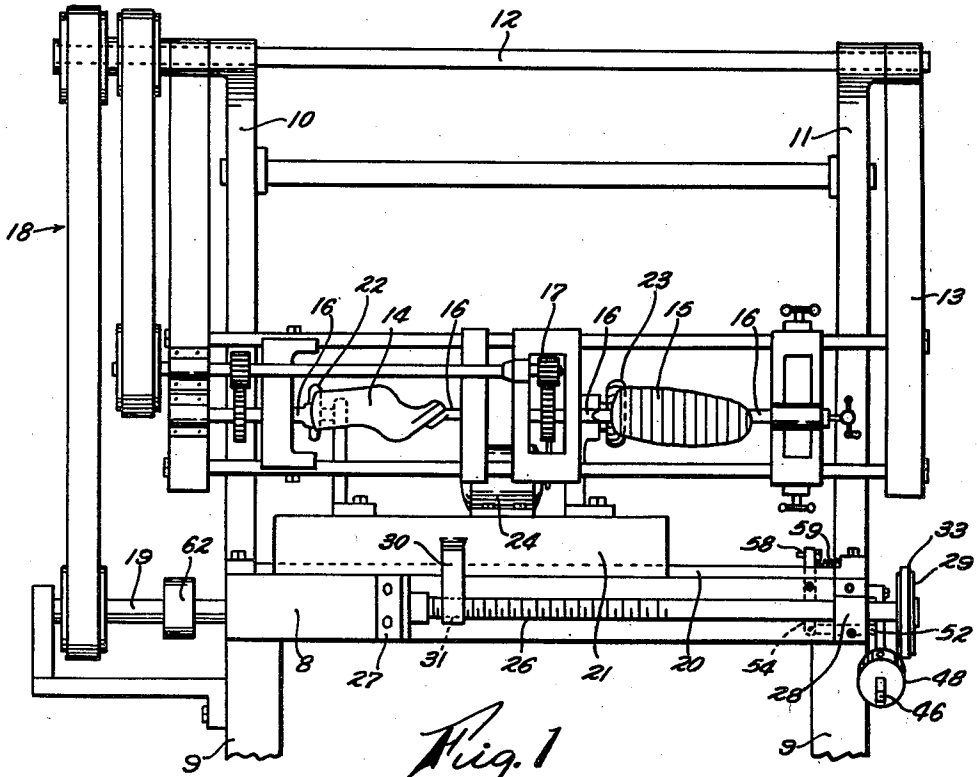


Fig. 1

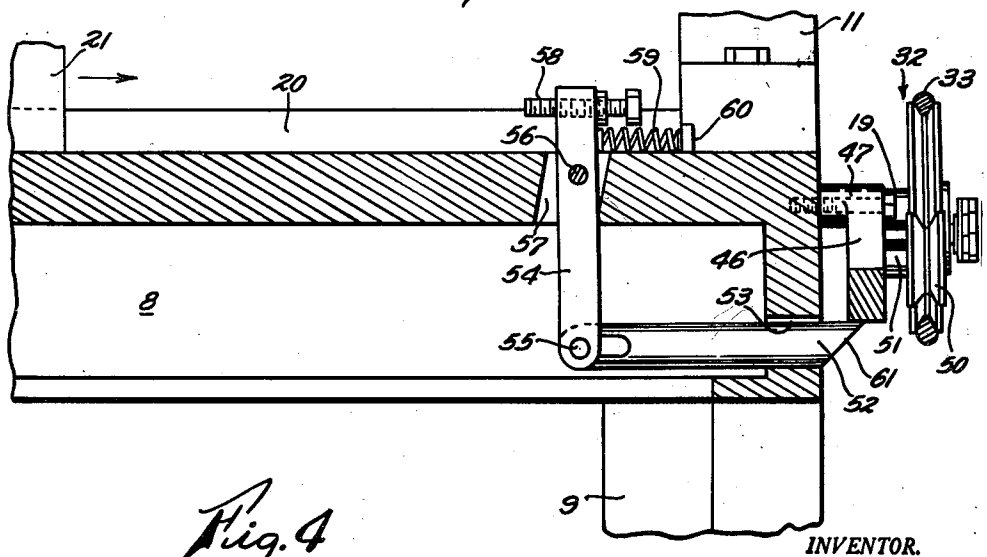


Fig. 4

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SHOE LAST TURNING LATHE

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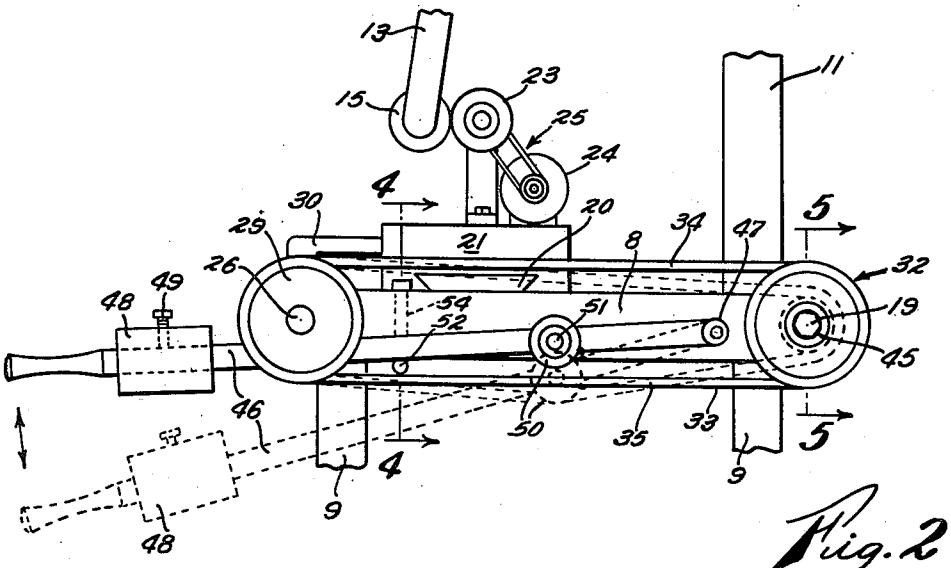


Fig. 2

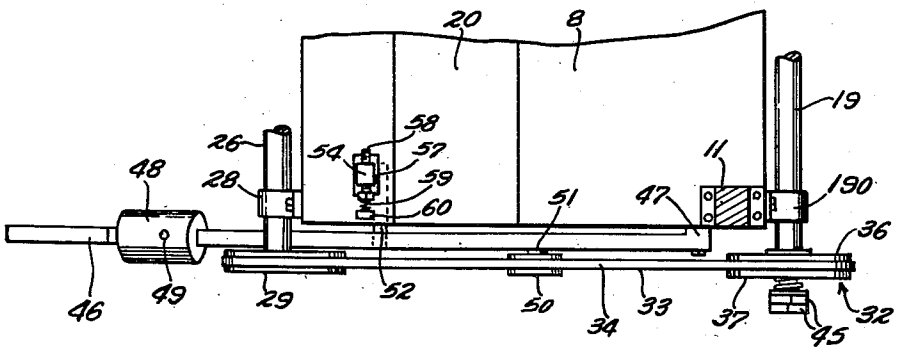


Fig. 3

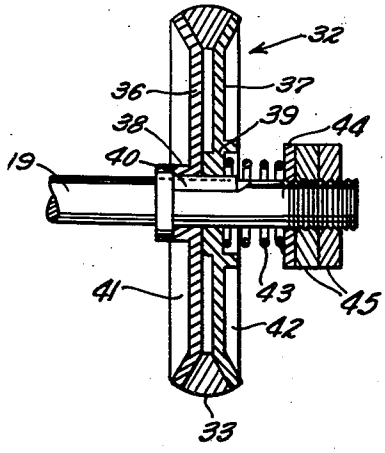


Fig. 5

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SHOE LAST TURNING LATHE

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5 Claims. (Cl. 142—7)

This invention relates to an improvement in copying lathes for making shoe lasts and is particularly directed to a lathe adapted to finish turn lasts completely over their toe portions.

The production of lasts has presented many problems to the last manufacturer, not the least of which was the finish turning of lasts in a lathe to produce accurately formed lasts that conformed in detail to the model especially at their toe portions. Heretofore lasts turned in a lathe had to be brought to a final form by a hand finishing operation that depended for its accuracy upon the skill of the last maker to sight the model and bring the same effect into the finished last. Thus each last differed slightly from other lasts turned from the same model last even when finished by the same skilled worker.

It is therefore an object of this invention to provide an improved copying lathe for making lasts which produces an accurately finished article by a single operation in that it feeds the work block past a laterally vibratile, high speed cutter with a longitudinal, heel-to-toe movement; said lathe having a change speed device made operative as the toe portion of the work approaches the cutter to effect a relatively slow translatory movement of the work relative to the cutter during formation of the toe which accurately reproduces and finishes the toe contour of the last.

Another object of the invention is to provide a two speed work block translating carriage which in cooperation with a model controlled high speed, vibratile cutter will finish turn, in one operation and in a minimum of time, a shoe last having relatively abrupt irregularities at the toe portion as compared with other portions of its profile.

Other objects of this invention are to provide a copying lathe of the character heretofore described that will eliminate the necessity for the hand finishing operation of lasts; which will produce a uniform toe; and which involves a relatively simple attachment that may be installed on present day lathes to convert them to the production of shoe lasts according to this invention.

The invention consists in the details of construction and in the combination and arrangement of the several parts of my improved copying lathe whereby the foregoing advantages are attained; as will be hereinafter more fully set forth.

In order that my invention may be clearly understood I will proceed to a description of the same with reference to the accompanying drawings which illustrate its preferred embodiment and wherein:

Fig. 1 is a fragmental, front elevational view of my copying lathe for producing shoe lasts, including the complete toe portion which eliminates hand finishing.

Fig. 2 is a fragmental, side elevational view of the lathe shown in Fig. 1.

Fig. 3 is a fragmental, top plan view of the lathe as shown in Fig. 2.

Fig. 4 is an enlarged section taken on line 4—4 of Fig. 2.

Fig. 5 is an enlarged section taken on line 5—5 of Fig. 2.

As shown in the drawings my improved lathe comprises a base 8 upon legs 9—9, said base supporting a pair of spaced columns 10 and 11 secured together at their upper ends by a shaft 12. The shaft pivotally supports a vibratile, laterally shiftable swing frame 13 that depends therefrom and holds a shoe last model 14 and a work block 15 mounted thereon in axial spaced relationship, suitable instrumentalities such as supporting centers or dogs 16 and cooperating driving means 17 being provided for the carriage to effect continuous and simultaneous rotation, at the same speed, of the model and the block as is usual in the art. It will be noted that the supporting center for the model last toe portion is of the underdog type in that it is connected to the sole portion of the model leaving the entire toe upper free to be reproduced on the work block.

Power is supplied the driving means 17 by pulley and belt arrangement 18 connected to a main power shaft 19 that is journalled in bearings 190 fixed to the rear of the lathe base 8. The base has a longitudinally extending dovetail feather 20 by which a carriage 21 is guided for translatory movement with respect to the swing frame 13, said carriage holding a model wheel 22 and a cutter 23, the latter being continuously rotated at high speed by a motor 24 fixed on the carriage and connected to the cutter spindle by a belt and pulley drive 25.

It will therefore be understood that the laterally shiftable swing frame 12 and the translatory carriage 21 provide cooperating means, longitudinally displaceable to one another, for moving the model controlled cutter 23 from heel-to-toe with respect to the work block to the end that the heel and the adjacent portion of the toe may be first turned on the work block and the terminal portion of the toe formed on the last as the final phase of the turning operation. A means for effecting translatory movement of the carriage in a last heel-to-toe direction takes the form of a lead screw 26 journalled against axial movement on the front of the base 8 by bearings 27 and 28. One end of the screw extends beyond a side of the base and has a pulley 29 keyed, or otherwise fixed to it, whilst a follower 30 projects from the carriage and has an internally threaded bore 31 formed therethrough for cooperatively receiving the screw 26. As best shown in Fig. 2 the lead screw pulley 29 is driven from the main shaft 19 by a two-speed power transmission comprising a split pulley 32 fixed on said shaft and an endless V-belt 33 running over both of said pulleys and normally having a pair of parallel reaches 34 and 35 extending therebetween.

There will now be described the preferred control for automatically diminishing the translating speed of the carriage as the cutter approaches and passes through the toe portion to be formed on the work block. With particular reference to Figs. 3 and 5 it will be noted that the split pulley 32 comprises two opposed, circular sections 36 and 37 formed with concentric hubs 38 and 39, respectively, for slidably receiving the main power shaft 19; the hubs being secured against rotation on the

shaft by a key 40, and against inward movement by a shoulder integral on the shaft. The sections 36 and 37 each have an outwardly flaring peripheral flange 41 and 42, respectively, which normally engage the inwardly convergent faces of the V-belt 33 to provide the high speed translatory movement for the carriage 21. The normal operative positions of the pulley sections is maintained by means of an expansile spring 43 encircling the power shaft and bearing at one end against the hub 39 of section 37 and engaging a washer 44 adjustably secured on the shaft by a pair of lock nuts 45 threaded to said shaft end.

A change speed arm 46 is pivotally mounted on the base 8 by a pivotal connection 47, the outer end of said arm carrying a weight 48 longitudinally slidable thereon and fixed in adjusted positions by a set screw 49. An idler wheel 50 is rotatably mounted on an intermediate portion of the arm 46 by a journal bearing 51, said wheel being normally held out of engagement with the reach 35 of the V-belt 33 by a detent latch 52 projecting from the base 8 and releasably supporting the arm 46 in the normal position indicated in Figs. 1 and 2. As best shown in Figs. 1 and 4 the detent latch is slidably secured in an aperture 53 formed through the base 8, its position being controlled by a crank 54 having a pivotal connection 55 with the detent. This crank is rockably mounted at 56 to the base and has its upper end projecting through an opening 57 in the base and into the path of the leading end of the carriage 21. The upper extremity of the crank has an adjustable carriage engaging stop in the form of a set screw 58, the crank being urged toward normal operative position by an expansile spring 59 bearing at one end against the upper end of the crank and at its other end against a lug 60 formed on the base. With reference to Fig. 4 it will be noted that the underside of the projecting end of the latch detent 52 is tapered at 61 for engagement with the arm 46 when the latter is raised to depress the detent latch against the action of the spring urged crank 54 and allow return of the arm to its supported operative position upon the detent.

For the purpose of illustration it will be assumed that a last corresponding to the model 14 is to be formed from the work block 15 and that said model and block are supported for rotation on the vibratile frame 12. To this end a suitable model 14 is supported by underdog 16 in the frame in a well known manner. It will also be assumed that suitable tension has been placed on the spring 43 to just hold the sections 36 and 37 of the split pulley 32 together for normally driving the carriage translating pulley 29 through its V-belt connection therewith. Further the proper position of the adjustable carriage engaging set screw 58 is determined so that the detent will be tripped as the cutter 23 approaches its toe end portion forming position with respect to the work block 15. With the carriage 27 in the position indicated in Fig. 1 the lathe is put in operation by starting the motor 24 to continuously operate the cutter 23 and by connecting a pulley 62 on the main shaft 19 with a source of power (not shown). Rotation of the main shaft 19 will cause simultaneous rotation of the last model 14 and work block 15 and also translatory movement of the carriage 21 by rotating the lead screw through the pulleys 32 and 29 that are operatively connected by the V-belt 33. This drive connection for translating the carriage is referred to as the high speed connection by reason of the fact that the belt engages in the peripheral groove of the split pulley 32 formed by the flared ends of the closely spaced apart pulley sections. As the cutter 23 approaches to and passes through the end of the toe forming step in the turning process the carriage 21 engages with the set bolt 58 thus rocking the lever 55 on the pivot 56 against the operation of the spring 59 and withdrawing the detent latch 52 from beneath the arm 46 allowing the arm to fall by gravity. This action engages idler wheel 50 upon the reach 35 of the V-belt 33 and as the force of the weight 48 exerted on the reach through the pulley 50 will overcome the tension of spring 43 on the split pulley 32, the pulley sections 36 and 37 spread apart so that the belt will seek and take up a smaller effective radius on the split pulley as indicated in dotted lines in Fig. 2. This action will reduce the speed of the pulley 29 and hence the translatory movement of the carriage to permit a very fine turning pitch for the lathe cutter relative to the work as the terminal end of the toe of the last is being formed from the work block. It will be noted that during lathe operation on the toe portion under relatively slow translatory speed of the carriage, the cutter, the work and the model rotating speeds remain the same as when the lathe operation was progressing at the high carriage translatory speed thus providing a finished surface on the toe portion which requires no further hand finishing operation. After the last turning operation is completed the carriage is returned to the initial position shown in Fig. 1, it being necessary to raise the arm 46 past the detent 52 to again return it to the normal operative position shown in Fig. 2.

What is claimed is:

1. In a machine for copying shoe lasts the combination of a laterally shiftable means for holding a model and a work block, a longitudinally shiftable means for holding a model wheel and cutter, said two means being longitudinally displaceable to one another in a direction such that the cutter moves from heel-to-toe with respect to the work block, a translating device for effecting said longitudinal displacement, power actuated drive means for the device, a change speed element interposed between the drive means and the device, and a control in the path of the longitudinally shiftable means for holding the model and work block, said control being connected to the change speed element and made operative as the cutter approaches the toe portion of the work block for actuating the change speed element.

2. In a shoe last turning lathe the combination of a model wheel and cutter carriage, a model and work block carriage including constantly rotating instrumentalities therefor, traversing means for providing relative movement between the carriages that is displaceable in a heel-to-toe direction of the work block with respect to the cutter, power actuated drive means for the traversing means, a change speed device interposed in the drive means, a control in the path of one of the carriages, and means for operatively connecting the control to the change speed device, said control being made operative as the cutter approaches the toe portion of the work block for actuating the change speed device.

3. In a shoe last turning lathe the combination of a first means holding a model and work block for rotary movement, a second means for holding a model wheel and a continuously operated cutter, said two means being longitudinally displaceable to one another in a direction such that the cutter moves from heel-to-toe with respect to the work block, a translating device for effecting said longitudinal displacement, power means for driving the model and block and the translating device in unison, a change speed element interposed between the power means and the translating device, a control connected to the change speed element, and means for mounting the control in the path of the said second means and actuated thereby when the cutter approaches and forms the terminal portion of the last toe for actuating the change speed element.

4. In a shoe last turning lathe the combination of a first means for holding a model last and a work block including constantly rotating instrumentalities therefor, a second means for holding a model wheel and a continuously rotated cutter, said two means being longitudinally displaceable to one another in a direction such that the cutter moves from heel-to-toe with respect to the work block, a rotatable translating device for effecting said longitudinal

displacement, a main power shaft, a drive connection between the main shaft and the instrumentalities, a two-speed power transmission connecting the main shaft to the translating device, and a normally inoperative two-position control connected to the two-speed power transmission, said control being interposed in the path of the second means and actuated thereby when the cutter approaches and forms the terminal portion of the last toe.

5. A shoe last turning lathe as set forth in claim 4 characterized by the fact that the two-position control supports a weight in one position and releases said weight

in its other position and that the transmission includes a belt driven pulley having a pair of belt engaging sections spring urged together and separable when a predetermined tension is applied by release of the weight upon the belt to reduce the effective drive radius of said pulley with respect to the belt.

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