(No Model.) 2 Sheets—Sheet 1.

F. H. RICHARDS.

CLOCK LATHE.

No. 484,673. Patented Oct. 18, 1892.

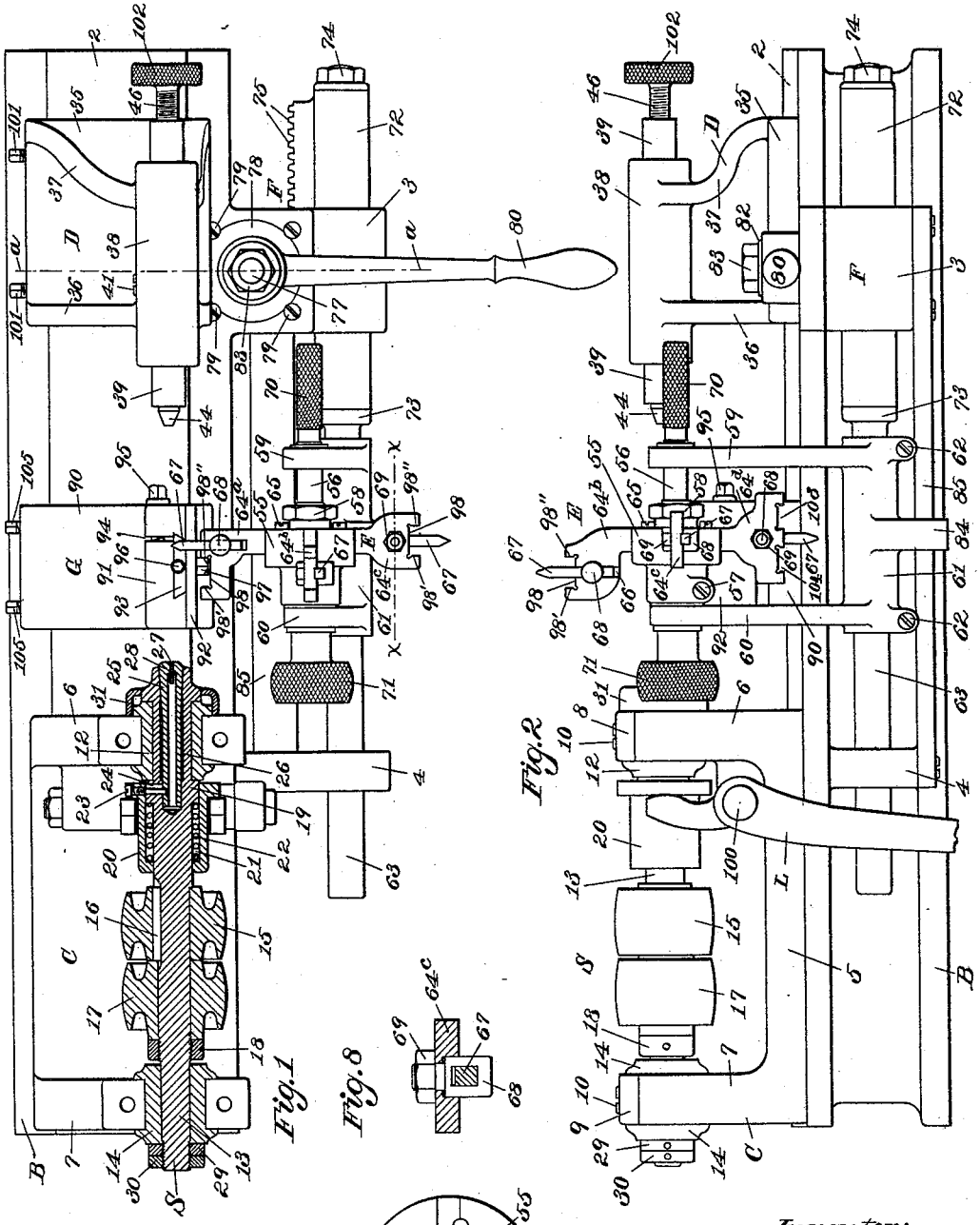

Fig. 1

Fig. 8

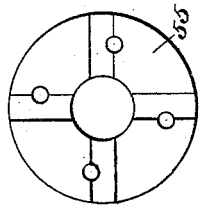

Fig. 7

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Inventor:
F. H. Richards

(No Model.) 2 Sheets—Sheet 2.

F. H. RICHARDS.

CLOCK LATHE.

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Fig. 3

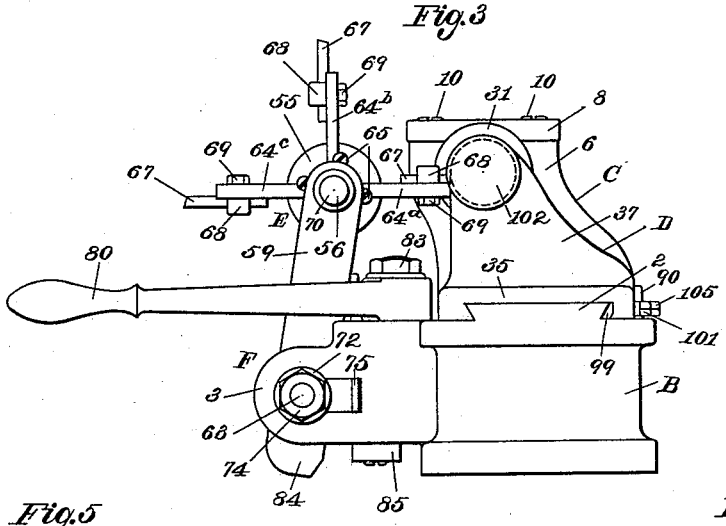


Fig. 5

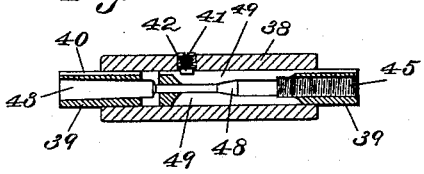


Fig. 6

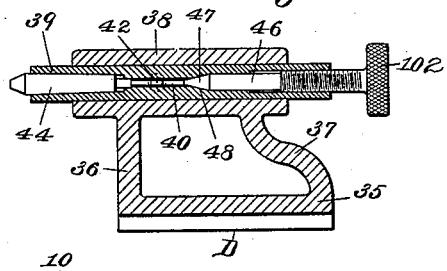


Fig. 4

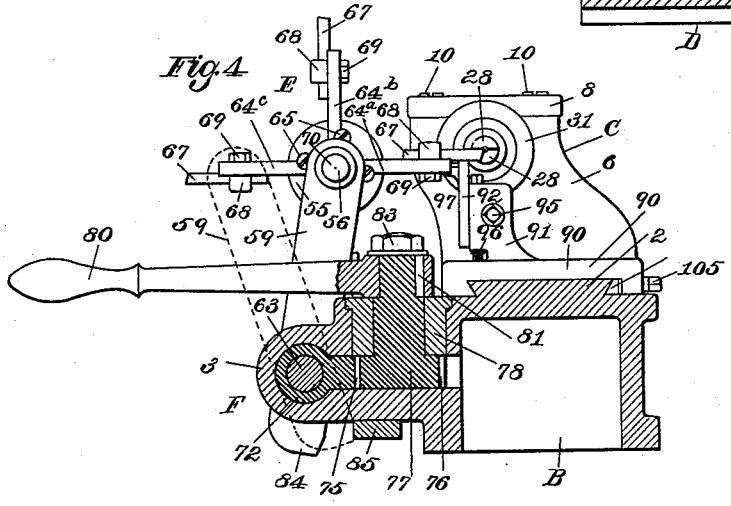
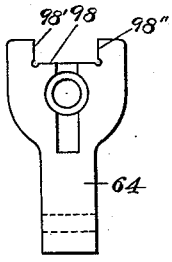


Fig. 9



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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

CLOCK-LATHE.

SPECIFICATION forming part of Letters Patent No. 484,673, dated October 18, 1892.

Application filed March 18, 1892. Serial No. 425,422. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Clock-Lathes, of which the following is a specification.

This invention relates to that class of turning-lathes usually designated as "clock-lathes," the object being to provide a clock-lathe with an improved "gage" or tool-holder movably supported in the machine and having means for imparting longitudinal movement thereto.

In the drawings accompanying and forming a part of this specification, Figure 1 is a plan view, partially in section, of a clock-lathe embodying my present improvements. Fig. 2 is a front elevation of the same. Fig. 3 is an end elevation of the lathe, as seen from the right hand in Figs. 1 and 2. Fig. 4 is a cross-section in line *a a* of Fig. 1 with the tail-stock removed. Fig. 5 is a horizontal section of the tail-stock through the dead-spindle. Fig. 6 is a central vertical section of the same. Fig. 7 is an enlarged end view of the hub of the tool-holding gage. Fig. 8 is a sectional view in line *x x*, Fig. 1, through the tool-clamping device. Fig. 9 is a plan view of the tool-carriers, which are removably fixed in the gage-hub.

Similar characters designate like parts in all the views.

The turning-machine to which my present improvements are applied has a bed or frame-work B, having thereon a guideway 2 for receiving the head-stock C and the tail-stock D. The head-stock is fitted with bearings for carrying the usual live-spindle S. It is also fitted to carry the stud 100 for supporting the lever L for operating the usual spindle-chuck and is (or may be) fixed in place on the bed B by set-screws (not herein shown) in the usual well-known manner. Said head-stock may, as in ordinary practice, consist of the base 5, the forward upright 6, and the rear upright 7, said uprights being furnished with the usual caps 8 and 9, respectively, (secured thereto by suitable screws, as 10,) for holding in place the usual front and rearward spindle-bearings 12 and 14, respectively. Said spindle S is fitted to revolve freely in its said bearings and is furnished with a fixed pulley 15, which may be secured thereto by a key 16 or otherwise, and with a loose pulley 17, fitted to rotate freely on said spindle. A nut 18 holds said loose pulley in place longitudinally of the spindle. A flange or collar 19 is formed in the spindle 13 adjacent to the bearing 12. A sleeve 20 is fitted to slide freely on the spindle and is chambered, as at 21, Fig. 1, to form a space for receiving the spring 22, which reacts against said spindle-collar for actuating said sleeve and normally holding this in the position shown in Fig. 1. A screw or stud 23 is removably fixed in the sleeve 20 and passes through a slot 24, formed in the aforesaid spindle-collar, to engage with the inner end of the usual split chuck 25. Said chuck is shown carried in the bore 26 in the forward end of the spindle, which bore is enlarged or tapered at its forward end to fit the correspondingly-formed forward end of the said chuck in the usual well-known manner. The spring 22, acting through the sleeve 20 and the screw or stud 23, operates to draw the chuck into the spindle-bore and thereby close the chuck-jaws 28 onto any piece of work placed therein. A nut 29 and check-nut 30 are shown on the spindle 13 for securing this against end-play. An oil cap or guard 31 is provided to prevent the throwing of oil from the forward bearing of the spindle and to protect the bearing from dust.

The tail-stock D is fitted to slide on the guideway 2 of the bed B of the machine and is preferably furnished with a gib 99, Fig. 3, and with set-screws 101 for fixing the stock in place on the bed by clamping the same to the guideway thereof. Said tail-stock may properly consist, as shown in the drawings, of the base 35, fitting the guideway of the bed, the forward and rearward uprights 36 and 37, respectively, and the spindle-bearing 38, carried on said uprights, these several portions of the tail-stock being preferably an integral casting.

The upper part 38 of the tail-stock D is bored to receive the sliding spindle 39, usually designated the "dead-spindle," which spindle is fitted to slide closely yet freely within the bearing 38. Said spindle 39 is furnished with the usual dead-center 44 and may be prevented from rotation in its bear-

ing by a screw 41, fixed in said bearing and having its points 42 working in a groove 40, formed on one side of said spindle. The rearward end of the slide 39 is bored and threaded, preferably as shown at 45, to receive the threaded portion of an expander or wedge-spindle 46, which expander is formed conical or wedge-shaped at its forward end 47 to engage the correspondingly-tapered portion 48 of the bore of the dead-spindle, which spindle is split in one or more places, as at 49, to permit of its being expanded within the part 38 by means of said wedge-point 47. When it is desired to move the sliding spindle 39 forward or backward in its stock, the operator seizes the handle or knob 102 of the stem 46, and by unscrewing the same withdraws the wedge 47 from the spindle, thereby releasing this from its frictional engagement with the stock. Having set the dead-spindle in any desired position, the operator is enabled to secure it in said position by screwing in the stem 46 until the point 47 thereof has been forced into the taper 48 sufficiently to expand the dead-spindle firmly into engagement with the stock. By means of this device the operator has full control of the spindle and may slide it and fasten or unfasten it by the use of only one hand and only a single handle.

The revoluble gage or tool-holder is designated in a general way by E and comprises a shaft and a hub provided with gage-arms carrying the cutting-tools and mounted on a gage-shaft movably supported in the machine. The gage-hub 55 is bored to fit the gage-shaft 56 and is shown removably fixed thereon by means of a clamp-screw 57, which passes through two ears separated by a split in the hub, whereby this may be clamped and unclamped after a well-known method. The nut 58 serves to hold the hub in place longitudinally of the shaft and to take up any end-play of the shaft in its bearings. Said gage-shaft is journaled in bearings formed in the upper ends of the arms 59 60, which are (or may be) formed integral with a hub or sleeve 61, that is adjustably fixed by means of suitable clamp-screws, as 62, to the sliding feed-shaft 63. Said shaft 63 is carried at its left-hand end in a bearing 4, which projects from the bed B of the machine, and at its right-hand end is carried in the tubular slide 72 of the feed mechanism, this mechanism being designated in a general way by F. The shaft 63 is held in place longitudinally in the rack-slide 72 by means of the collar 73, formed on said shaft at one end of said slide, and the nut 74 on said shaft at the other end of said slide. Said rack slide or sleeve is fitted to slide in the bearing 3, which projects from the bed B of the machine and carries, also, the slide-actuating devices. For the purpose of actuating the shaft 72 this is provided with a rack 75, which serves, also, as a key or spline for preventing the rotation of the slide 72 in its bearings 3, as will be understood by comparison of Figs. 1, 3, and 4. The teeth of said rack 75 mesh with the teeth 76 of a gear formed on the lower end of a shaft or stud 77, to the upper end of which is fixed by means of the nut 83 and key 81 the hand-lever 80 for operating the slide 72 and shaft 63 by hand. For the purpose of assembling and disassembling the mechanism the shaft 77 is journaled in a bushing 78 and movably fixed in the upper part of the projection 3, as will be understood from the sectional view, Fig. 4. Said bushing or sleeve 78 is shown in Fig. 1 held in place by the screws 79 in a well-known manner.

When it is required to impart to the gage E a movement longitudinal of the machine, the operator has only to grasp the handle 80 and move this in the direction of the required gage-movement. In order that these movements shall correspond, the shaft 77, is shown located rearward of the slide 72. This arrangement and the resulting mode of operation due thereto will be understood by comparison of the several figures of drawings.

The movement of the gage laterally of the machine is illustrated in Fig. 4, wherein it is shown in solid lines in its working position and wherein the gage-carrying arm 59 is shown in dotted lines in the forward position thereof. For limiting this movement of the gage the sleeve 61 is shown furnished with a stop-arm 84, which engages on the outward or forward movement of the gage with a stop-bar 85, that is fixed at the ends thereof to the aforesaid projections 3 and 4, respectively, as will be understood by comparison of Figs. 1, 2, 3, and 4.

The gage-hub 55 is radially grooved at one end thereof to receive the inner ends of the several gage-arms, which are removably fixed in said hub by means of binding-screws 65. Said gage-arms are separately designated by 64^a, 64^b, 64^c, and 64^d, there being in the present instance four gage-arms in the series. On the outer end of each gage-arm there are formed suitable gage-surfaces for limiting the movement of the gage toward the axis of the lathe and for limiting, also, the longitudinal movement of the gage. The nature of said gage-surfaces will be fully understood from a comparison of the several views of the gage-arms in the drawings. The gage-arm 64^b, for instance, has the gage-surface 98 for limiting the movement of the gage toward the lathe-axis and the two surfaces 98′ and 98″ for limiting the longitudinal movements of the gage. In the gage-arm 64^d (see Fig. 2) there are shown two sets of gage-faces 103 and 104, each set of faces being for controlling the movement of the tool for a separate cut.

The turning-tools 67 of the particular shape required for making any desired cuts in the work are carried on the gage-arms by means of suitable tool-posts, as 68, which, as shown in the present instance, (see Fig. 8,) may consist of a clamp-bolt having therein a mortise for the tool and extending through a hole in the gage-arm, the nut 69 being fixed thereon

for clamping the tool in place. It will be understood, however, that any of the well-known forms of tool-holding devices which are adapted to removably hold the cutting-tools in place may be substituted for the particular tool-holding device herein shown and described.

For the purpose of limiting, as hereinbefore described, the movements of the gage, a tool-rest is provided which is adapted for supporting the tool and for properly engaging with the gage-faces of the tool-arm. This tool-rest is designated in a general way by G and consists of a suitable base, as 90, having means—as, for instance, the screws 105—for clamping the same upon the ways of the bed of the machine and having an upright 91 for carrying the rest-bar and gage-arm stop. Said rest-bar 92 is in the form of a bar or plate which is vertically adjustable on the base 90 by means of the elevating-screw 96 and is firmly clamped in place after being adjusted to the proper height by means of the clamp-screw 95, which acts to clamp the two parts of the upright 91 (which is divided by the slot 94) firmly against the guide or V 93 of said rest-bar. By means of this elevating device the rest-bar may be adjusted to bring the cutting-tool 67 when this rests on said bar, as in Fig. 4, into the exact required relation with the axis of the lathe-spindles. The gage-arm stop 97 projects from the forward side of the rest-bar and is adapted to bear against the gage-faces 98 98′ 98″, as will be understood by comparison of Figs. 1 and 4, for limiting the movements of the gage in the machine.

It will be observed that in the preferred form of the mechanism just described the cutting-tool when in use bears directly on the rest-bar without any pieces being intermediate thereto, so that the utmost firmness is secured; also, the movements of any tool longitudinally of the lathe-axis are limited by the gage-arm carrying that tool, thus eliminating, so far as the movements of the tool are concerned, any play which there may be in the gage mechanism.

As a means for operating the gage, the gage-shaft 56 is shown furnished with two handles 70 and 71 at the right-hand and left-hand ends thereof, respectively. The handle 71 is shown of the form of a knurled head, so that by grasping this the operator may at once hold the gage toward the tool-rest and also give to the gage-shaft a rotative stress for holding the cutting-tool firmly down upon the rest-bar 92 during the making of a cut. This operation is performed by the operator by means of the left hand, while the right hand is employed to move the hand-lever 80, and through this and the feed mechanism described impart the required longitudinal movements to the gage and cutting-tool. In some cases, however, where it is unnecessary to use the feed mechanism as described, the operator, using the left hand, as before, seizes the handle 70 by the right hand and operates the gage mechanism wholly by hand. Having finished a cut, the operator next draws forward the gage to the position indicated by the dotted lines at 59, Fig. 4, and by means of the handles 70 or 71 turns the gage in its bearings to bring into working position (shown at 64^a, Fig. 4) the gage-arm and cutting-tool next required for use.

While the gage shown in the drawings is furnished with only four gage-arms and cutting-tools, any required number of said arms and tools may be carried by the gage-hub, this being suitably constructed therefor. In this connection it should be understood that the gage-arms may in some cases be constructed integral with the gage-hub and in other cases may be formed separately therefrom and removably attached thereto by any well-known arm-attaching means—as, for instance, the well-known form of clamp usually employed for holding the shanks of tools in the turrets of turret-lathes.

The shaft 56, together with the hub and tool-carrying arms supported on said shaft, constitutes an improvement on the somewhat similar gage now commonly used on clock-lathes. The old forms of clock-lathe gage, however, are difficult to use, requiring expert operators or "turners" for that purpose.

According to my present invention, my improved clock-lathe gage is mounted by its shaft in bearings, as hereinbefore described, and has its gage-arms provided with the required cutting-tools and the corresponding gage-surfaces for controlling the action of those tools.

Having thus described my invention, I claim—

1. In a lathe, the combination, with the spindles and with a tool-rest having a stop, of a revoluble gage, substantially as described, supported for lateral and longitudinal movements and having one or more tool-provided gage-arms constructed with gage-faces adapted to bear against said stop while the tool on said arm bears upon the rest-bar, substantially as described.

2. In a lathe, the combination, with the spindles and with a revoluble gage, substantially as described, supported for lateral and longitudinal movements and having one or more tool-provided gage-arms constructed with gage-faces for limiting the movements of the tool, of a tool-rest having a vertically-adjustable rest-bar and a stop for engaging the gage-faces of the gage-arm, substantially as described.

3. In a lathe, the combination, with the spindles and with the revoluble gage supported, substantially as described, for lateral and longitudinal movements, of the tool-rest base adjustably fixed in the lathe, the vertically-adjustable rest-bar, means for elevating and clamping said bar, and the gage-stop on said bar, substantially as described.

4. In a lathe, the combination, with the spindles and with a tool-rest provided with a gage-stop, of the feed-shaft having bearing-arms

for the gage, and a gage, substantially as described, revolubly supported in said bearing-arms and having a series of gage-arms constructed to engage said stop, substantially as described.

5. In a lathe, the combination, with the laterally-movable gage-carrying bearing-arms, of the gage-shaft journaled in said arms, the gage-hub on said shaft, and a series of gage-arms removably fixed in said hub and adapted to carry cutting-tools, substantially as described.

6. In a lathe, the combination, with the spindles and with a tool-rest, substantially as described, having a gage-stop, of a revoluble gage, substantially as described, supported for lateral and longitudinal movements in the machine and having a series of tool-provided arms having gage-faces adapted to engage the sides of said stop for limiting said longitudinal movements, substantially as described.

7. In a lathe, the combination, with the stock bored to receive the sliding spindle, of the sliding spindle 39, having the slot 49 extending longitudinally of the same and having within it a conical seat for the spindle-expander and the spindle-expander stem 46, having a screw-thread to mesh in a threaded portion of said spindle and having a conical point 47 bearing on said conical expander-seat, means for preventing rotation of the sliding spindle, and means for turning the threaded expander 46, whereby the spindle may be clamped and unclamped and longitudinal movements imparted thereto, substantially as described.

8. In a lathe, the combination, with the spindles, the tool-rest and its stop, and the slide 72, of the oscillating shaft journaled in said slide and provided with gage-carrying bearings, a gage, substantially as described, carried in said bearings and adapted to engage said stop, and means for imparting longitudinal movements to said slide 72, substantially as shown and described.

9. In a lathe of the class specified, the combination, with the bed B, having the bearing 3, of the slide 72, the shaft 63, furnished for carrying the gage of the lathe, the hand-lever 80, and connecting-shaft and gearing intermediate to said lever and said slide for actuating the gage, substantially as described.

10. In a lathe of the class specified, the combination, with the bed having the bearings 3 and 4, of the slide 72, means for imparting longitudinal movements to said slide, the shaft 63, journaled in said slide and in the bearing 4, the bearing-arms fixed to the shaft 63 for carrying the gage of the lathe, a stop-arm fixed on said shaft, and a stop-bar limiting the swinging movement of said gage-bearings through said stop-arm, substantially as described.

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