No. 675,469. Patented June 4, 1901.

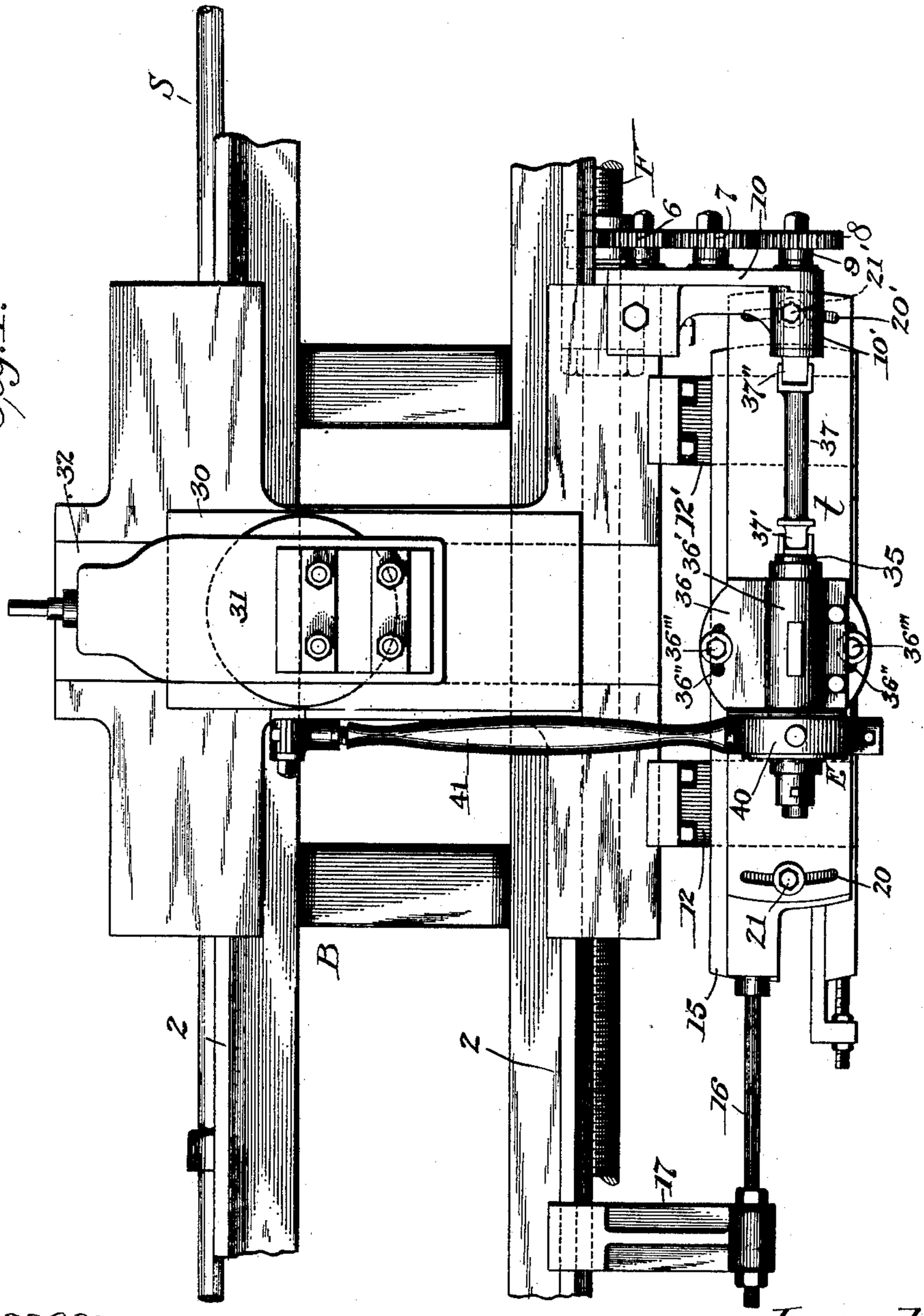
H. DERRER.

LATHE FOR TURNING IRREGULAR FORMS.

(Application filed July 12, 1900.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.



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3 Sheets—Sheet 2.

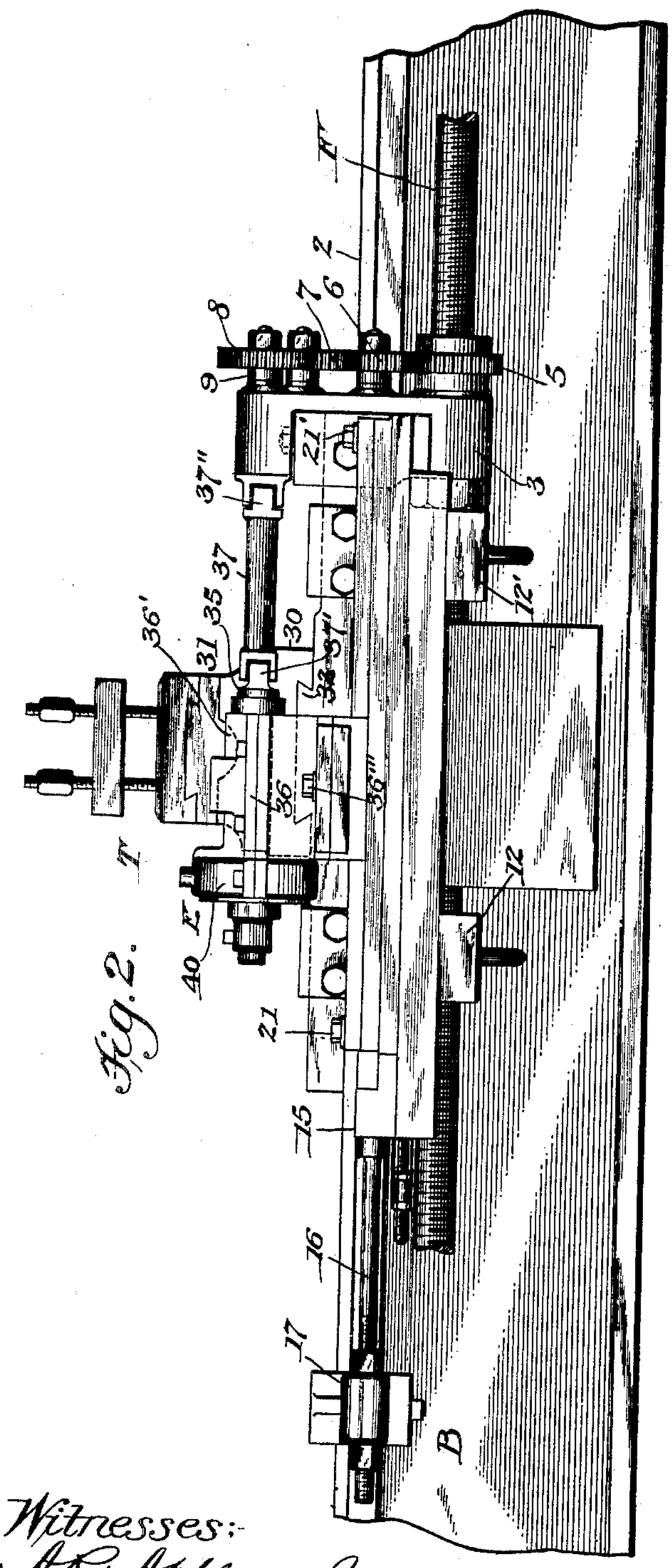


Fig. 2.

Fig. 8.

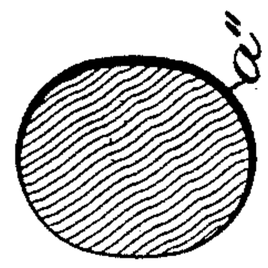


Fig. 7.

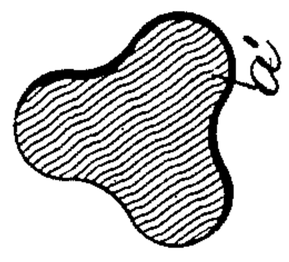


Fig. 6.

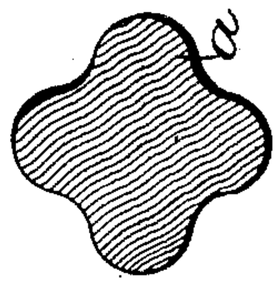
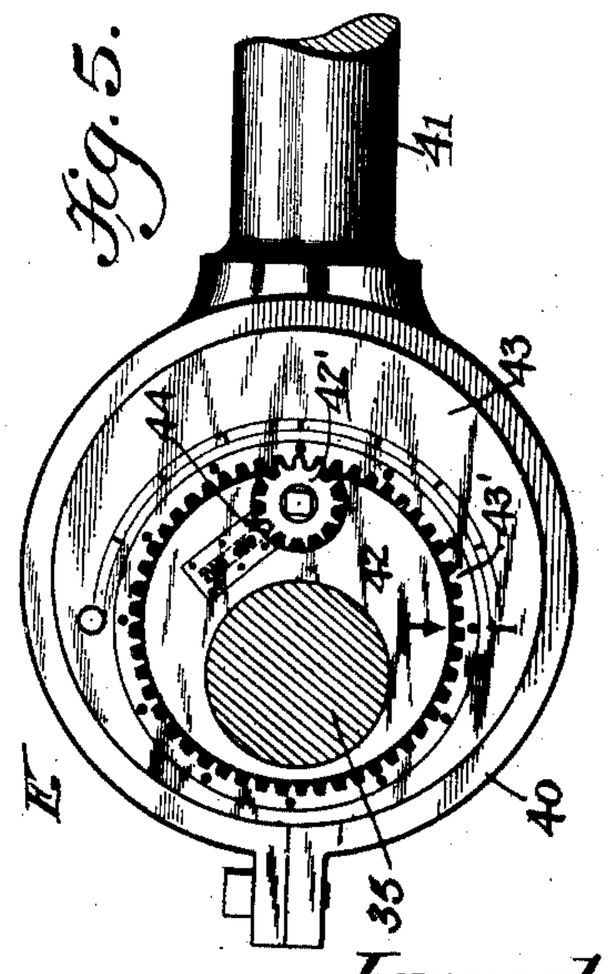


Fig. 5.



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LATHE FOR TURNING IRREGULAR FORMS.

(Application filed July 12, 1900.)

(No Model.) 3 Sheets—Sheet 3.

Fig. 3.

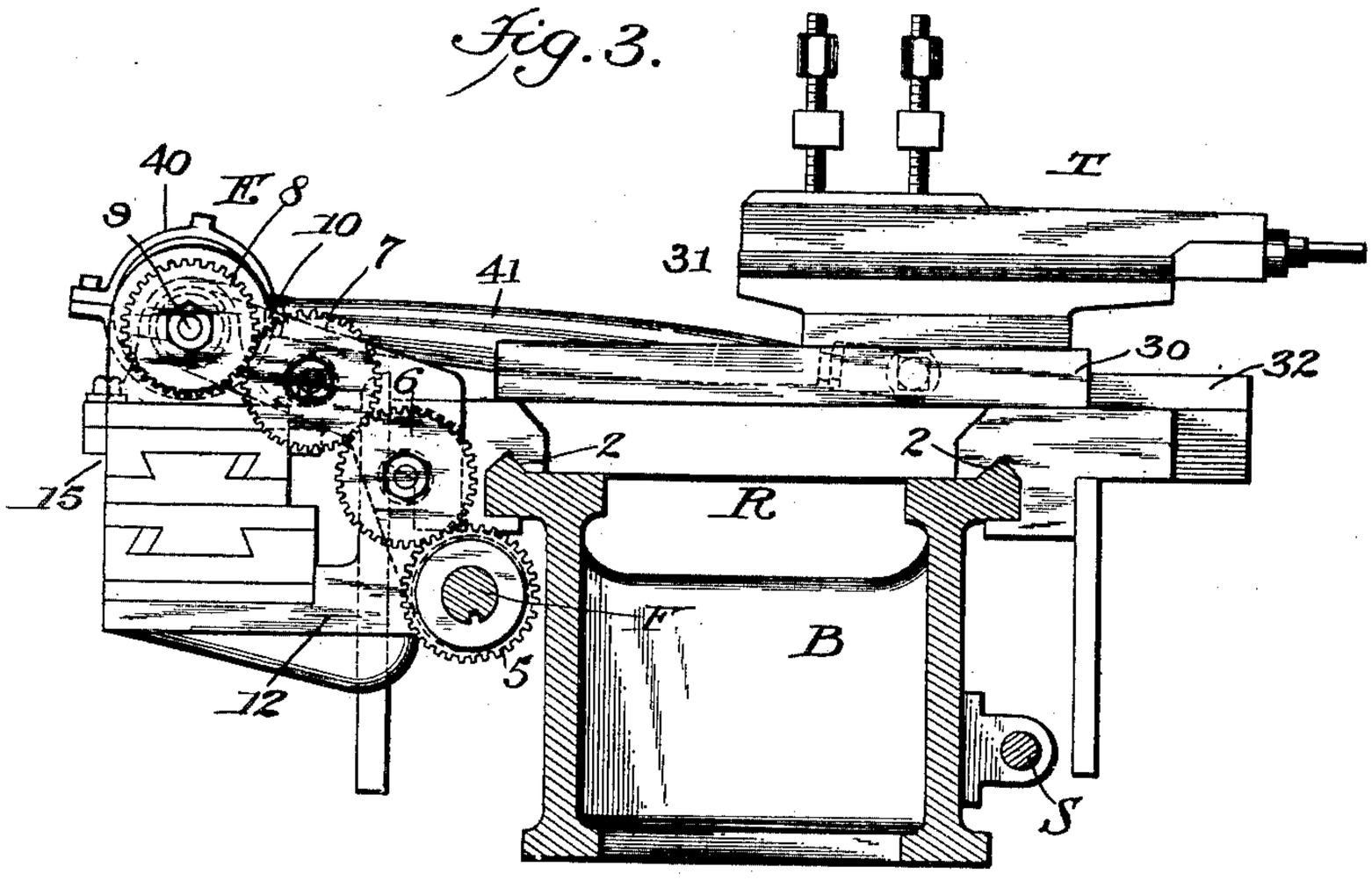
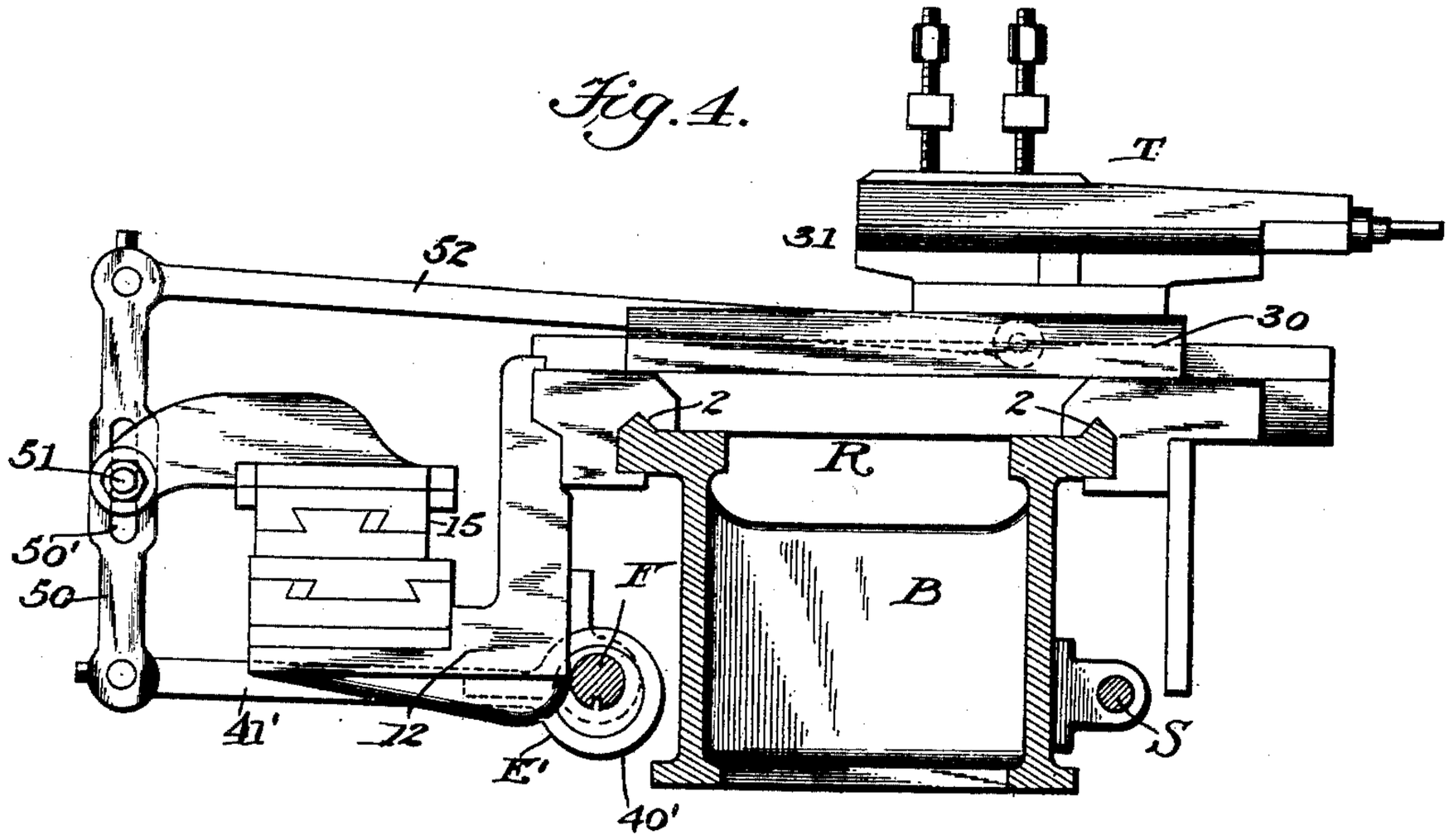


Fig. 4.



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UNITED STATES PATENT OFFICE.

HENRY DERRER, OF SAULT STE. MARIE, CANADA.

LATHE FOR TURNING IRREGULAR FORMS.

SPECIFICATION forming part of Letters Patent No. 675,469, dated June 4, 1901.

Application filed July 12, 1900. Serial No. 23,414. (No model.)

To all whom it may concern:

Be it known that I, HENRY DERRER, a subject of the Queen of Great Britain, residing in Sault Ste. Marie, Ontario, Canada, have invented certain new and useful Improvements in Lathes for Turning Irregular Forms, of which the following is a specification.

This invention relates to lathes for turning irregular forms; and it has for its main object a lathe attachment by means of which forms of irregular and varying cross-section may be turned readily and with precision.

An important feature of this invention is the driving mechanism by means of which the tool-slide receives its cross-feed movement toward and from the work to be turned, this driving mechanism being in the present case operated directly from the driver which controls the movement of the slide-rest, said driver serving in this case through suitable driving connections to operate an eccentric by means of which the desired cross-feed movements will be imparted to the tool-slide.

Other important features of the invention will appear hereinafter in the specification and are clearly illustrated in the accompanying drawings, in which—

Figure 1 is a plan of a portion of a lathe, illustrating my improvements applied thereto. Fig. 2 is a front elevation of the same. Fig. 3 is a sectional end elevation of the same. Fig. 4 is a corresponding sectional end elevation of a modification of the driving mechanism. Fig. 5 is an enlarged sectional detail of the eccentric for operating the tool-slide, and Figs. 6, 7, and 8 are transverse sections of irregular forms which may be turned by the machine.

Similar characters designate like parts in the different figures of the drawings.

My present improvements may be applied to a turning-lathe of any well-known construction, and in the present case, therefore, I have illustrated only those portions of a lathe to which my present improvements are directly applied. Here I have illustrated at B the bed of the lathe, which is substantially of the usual type and has the usual longitudinal ways or shears 2 2, and on these ways the slide-rest (which is designated in a general way by R) is mounted for traveling movement. The feed-screw is shown at F and may be operated in any suitable manner, preferably from the main shaft S through suitable gearing. (Not shown.) This feed-screw may be passed in the usual manner through a fixed nut, such as 3, on the under side of the slide-rest, and thus serve to impart to the latter its usual traversing movements.

As before stated, the mechanism by means of which the tool-slide is fed toward and from the work may be operated directly from the driver or feed-screw, and in the preferred construction (illustrated in Figs. 1, 2, and 3) I have shown gearing for transmitting the movements of said feed-screw to a shaft controlling the operation of an eccentric by means of which the tool-slide is moved toward and away from the work the desired number of times for each rotation of the work. In this preferred construction movement is transmitted from the feed-screw F by means of a gear-train, the first member 5 of which is splined on said feed-screw and meshes with a second gear-wheel 6, driving a gear 7, in mesh with a driven gear 8.

The gears 6 and 7 are mounted for rotation on fixed studs or pins projecting from an outwardly-extending arm 10, rising from the slide-rest, while the gear 8 is secured to a short shaft 9, journaled in a bearing 10′ at the upper end of said arm 10, the movement of this shaft 9 being transmitted in a manner which will be hereinafter described to the tool-slide. It will be evident that by substituting the proper change-gears for those just described any desired contour may be given to the work to be turned—that is to say, if the ratio is such as to advance the tool-slide toward and withdraw it from the work four times during one rotation of the work with the live-spindle (not shown) the work may be turned in the manner shown at *a* in Fig. 6, while if said tool advances three times during a single rotation of such live-spindle the cross-section of the turned piece will be as illustrated at *a′* in Fig. 7, and if the ratio is two to one the piece turned will have substantially the appearance illustrated at *a″* in Fig. 8.

An important feature of my present invention is the provision, in connection with the driving mechanism for advancing the tool-slide toward the work any determined number of times during each rotation of the work,

of a taper attachment for turning the work tapering, and I have illustrated herein a taper attachment which moves with the slide-rest and coöperates positively with the driving mechanism and with the tool-slide to control the movements of the latter. In this case the slide-rest may have projecting from that side thereof opposite the tool-slide suitable supports for the taper attachment, these supports being in the present case brackets, such as 12 and 12′. On these brackets will be mounted suitable slides, one of which will be a taper slide for the purpose of causing that member of the driving mechanism which imparts movement to the tool-slide to traverse a path which is inclined to the axis of the work, and thus turn down the stock tapering of varying cross-sections as well as of irregular form. One of the slides, which is illustrated herein by 15, is in the nature of a fixed slide—that is to say, it is secured to the bed in some suitable manner, so as to permit the slide-rest to move thereover. In this case said slide is secured by an adjustable connecting-rod, such as 16, to a bracket 17, projecting from and secured to one of the ways of the lathe, said rod 16 when properly adjusted serving to locate said slide 15 in any desired position.

On the slide 15, which may be either a simple or compound one, I may mount an adjustable slide, such as *t*, this slide being in the present case, as will be evident, a taper slide adjustable to different angles in accordance with the the taper which it is desired to impart to the piece being turned. This slide has at its opposite ends slots 20 and 20′, in which may work the usual pins for locating the taper slide, suitable clamping-nuts being shown at 21 and 21′ for locking the taper slide in any desired adjusted angular position. Said taper slide is also intended to carry thereon in the preferred construction the eccentric, by means of which movement will be imparted to the tool-slide. This tool-slide is designated in a general way by T and may be of any suitable construction, it being preferably in two parts, such as 30 and 31, the lower member 30 of which is guided by suitable transverse ways 32 on the slide-rest, while the upper member 31 may be mounted to turn relatively to the lower to maintain the tool (not shown) in its proper position with respect to the work.

The eccentric to which I have just referred is designated herein in a general way by E and is carried in this case by a shaft, such as 35, mounted in a bearing 36′, formed in the present case on a plate 36, forming the upper portion of a slide mounted on and movable along the upper side of the taper slide *t* and having adjusting-slots 36″ and clamping devices 36‴ for permitting said plate 36 to be maintained in a predetermined position, with the axis of the journal-bearing 36′ parallel with the axis of the work, regardless of the angular position of the lower half of the slide carrying said plate 36, it being understood that after the taper slide has been adjusted said plate 36 will be clamped firmly to the lower half of its slide.

The short shaft 35, on which the eccentric is carried, is driven in the construction shown herein, by a universal connection between it and the short shaft 9, said connection comprising in this instance a connecting-shaft 37, connected by gimbal-joints 37′ and 37″ with the shafts 35 and 9, respectively. By means of this universal connection the movements of the shaft 35 and the eccentric E may be controlled perfectly in all positions thereof as they travel along the taper slide *t* and are moved toward or from the work by the tapered guide-walls of said slide.

The movement of the eccentric will of course be transmitted to the tool-slide in some suitable manner—as, for example, by means of the eccentric-strap 40, having the eccentric-rod 41 extending therefrom and pivoted to the lower member 30 of the cross-feed slide or tool-slide.

For the purpose of varying the throw of the eccentric-rod 41, and hence the movement of the tool-slide, and thus regulating the cut to be made by the tool, I prefer to employ a changeable-throw eccentric substantially of the type illustrated in Fig. 5. Here the eccentric is in two parts, it comprising an inner member 42, secured to the shaft 35, and an outer eccentric member 43, mounted to turn on the inner member 42. These members preferably carry coacting gears or gear-teeth, the outer member 43 of the eccentric having in this case a gear 43′ fixed thereto, while the inner member 42 of the eccentric has a pinion 42′, rotatable thereon, for the purpose of shifting the circumferential position of the outer member 43 of the eccentric, and thus adjusting the throw of the latter.

Some suitable means should be employed for locking the rotatable gear or pinion 42′ in its adjusting position, and for this purpose I have shown herein a spring-pressed pinion-locking device or detent 44, carried by the inner member 42 of the eccentric, which it will be obvious will prevent the rotation of the pinion after the members of the eccentric have been properly adjusted.

In Fig. 4 I have illustrated a modification of my invention in which the eccentric is splined on and travels along while rotating with the feed-screw F, this eccentric being indicated herein by E′. Said eccentric in this modification has an eccentric-strap 40′, connected to an eccentric-rod 41′, which in turn is pivoted to a lever 50, having a shiftable pivot, said lever having therein in this case a slot 50′ for permitting adjustment of the lengths of the two arms of the lever with respect to the fulcrum or pivot 51 thereof. At the upper end thereof the lever 50 is pivoted to a cannecting-rod, such as 52, the other end of which is in turn pivoted to the lower member 30 of the cross-feed slide or tool-slide,

all of the other parts of the attachment shown in Fig. 4 being substantially similar to those hereinbefore described with reference to Figs. 1 to 3, inclusive.

My invention is not limited to its application to the particular type of lathe herein shown and described, but may be applied to other types, such as grinding-lathes, and also to boring-machines and analogous machine-tools.

Having described my invention, I claim—

1. In a machine of the class specified, the combination, with a slide-rest and with a tool-slide carried thereon, of a taper slide; a driver for feeding said slide-rest; and tool-slide-actuating mechanism embodying an eccentric supported for movement with said slide-rest and controlling the transverse movements of said tool-slide, and also embodying a slide supported for movement with said slide-rest and mounted on, and movable along, said taper slide.

2. In a machine of the class specified, the combination, with a slide-rest and with a tool-slide carried thereon, of a feed-screw for feeding said slide-rest; a taper slide; a slide supported for movement with said slide-rest and mounted on, and movable along, said taper slide; an eccentric supported for movement on said slide and controlling the transverse movements of said tool-slide; and gearing operable by said feed-screw and controlling the movements of said eccentric.

3. In a machine of the class specified, the combination, with a slide-rest and with a tool-slide carried thereon, of a feed-screw for feeding said slide-rest; a taper slide; a slide supported for movement with said slide-rest and mounted on, and movable along, said taper slide; an eccentric supported for movement on said slide and controlling the transverse movements of said tool-slide; and gearing carried by said slide-rest and operable by said feed-screw and controlling the movements of said eccentric.

4. In a machine of the class specified, the combination, with a slide-rest and with a tool-slide carried thereon, of a taper slide; an eccentric mounted on, and movable along, the taper slide and controlling the transverse movements of the tool-slide; and means for driving the eccentric.

5. In a machine of the class specified, the combination, with a slide-rest and with a tool-slide carried thereon, of a taper slide; an eccentric supported for movement with the slide-rest and mounted on, and movble along, the taper slide and controlling the transverse movements of the tool-slide; driving means for said eccentric; and a universal connection between said driving means and the eccentric.

6. In a machine of the class specified, the combination, with a slide-rest and with a tool-slide carried thereon, of a taper slide; an eccentric-shaft supported for movement with the slide-rest and mounted on, and movable along, the taper slide and controlling the transverse movements of the tool-slide; an eccentric on said shaft; driving means carried by the slide-rest; and a universal connection embodying a shaft connected by gimbal-joints to said eccentric-shaft and to said driving means.

7. In a machine of the class specified, the combination, with a slide-rest and with a tool-slide carried thereon, of a taper slide; an eccentric-shaft supported for movement with the slide-rest and mounted on, and movable along, the taper slide; and controlling the transverse movements of the tool-slide; an eccentric on said shaft; a feed-screw for feeding said slide-rest; gearing on said slide-rest and operable by said feed-screw; and a universal connection between said gearing and the eccentric-shaft.

8. In a machine of the class specified, the combination, with a slide-rest and with a tool-slide carried thereon, of a taper slide; a changeable-throw eccentric supported for movement with the slide-rest and mounted on, and movable along, the taper slide and controlling the transverse movements of the tool-slide; driving means for said eccentric; and a universal connection between said driving means and the eccentric.

9. In a machine of the class specified, the combination, with a slide-rest and with a tool-slide carried thereon, of a taper slide; an eccentric supported for movement with the slide-rest and mounted on, and movable along, the taper slide; driving means for said eccentric; a universal connection between said driving means and the eccentric; and an eccentric-rod controlled by said eccentric and connected with said tool-slide.

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