(No Model.) 2 Sheets—Sheet 1.

W. C. JONES & W. S. ROGERS.

LATHE.

No. 379,313. Patented Mar. 13, 1888.

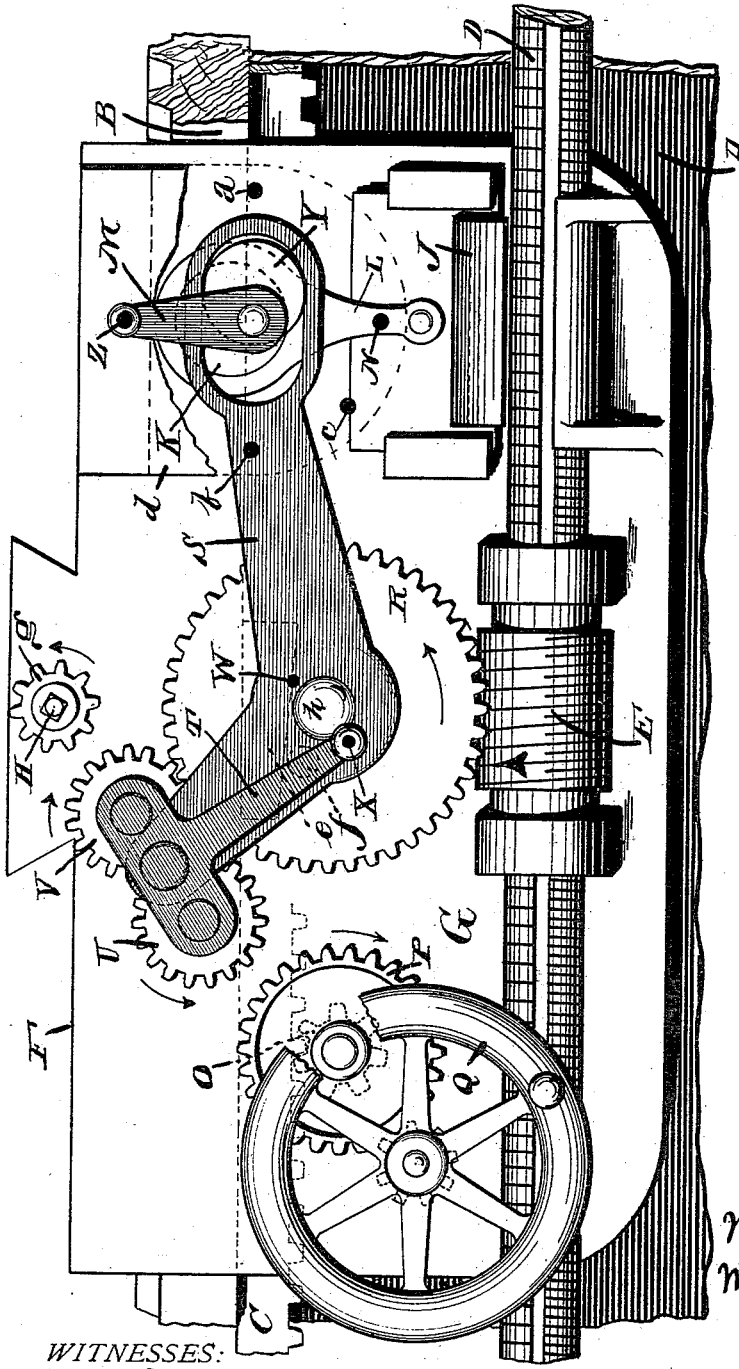

Fig. 1.

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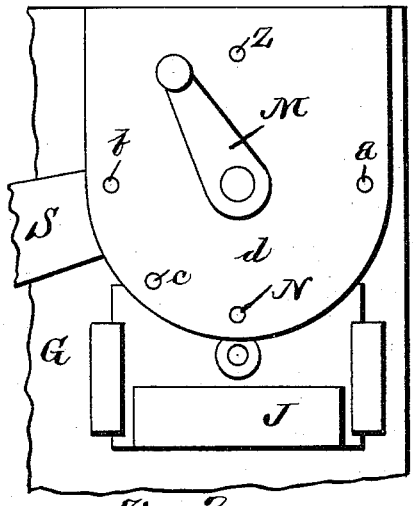

Fig. 2.

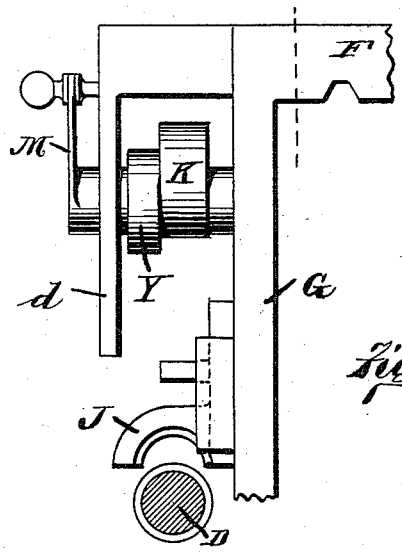

Fig. 3.

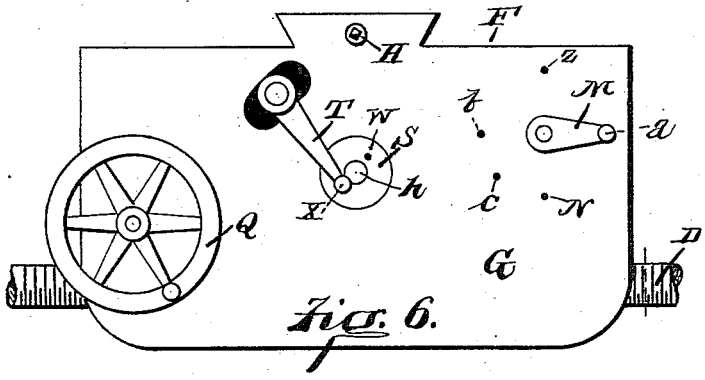

Fig. 6.

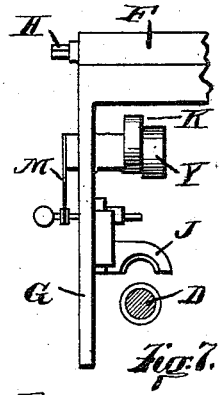

Fig. 7.

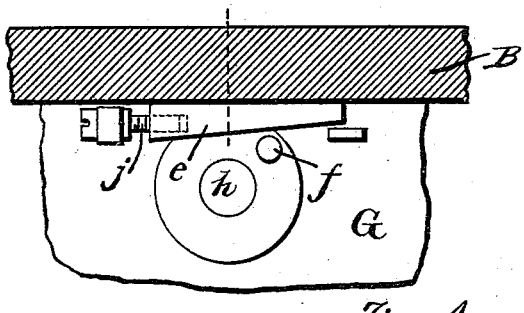

Fig. 4.

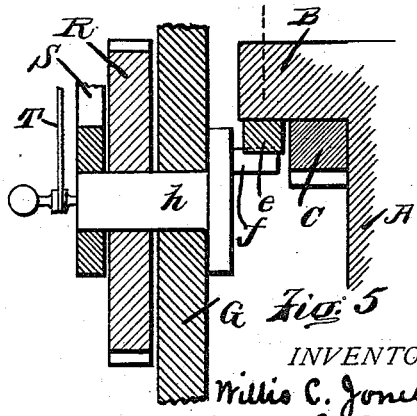

Fig. 5.

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UNITED STATES PATENT OFFICE.

WILLIS C. JONES AND WINFIELD S. ROGERS, OF CINCINNATI, OHIO.

LATHE.

SPECIFICATION forming part of Letters Patent No. 379,313, dated March 13, 1888.

Application filed October 14, 1887. Serial No. 252,302. (No model.)

To all whom it may concern:

Be it known that we, WILLIS C. JONES and WINFIELD S. ROGERS, of Cincinnati, Hamilton county, Ohio, have invented certain new and useful Improvements in Lathes, of which the following is a specification.

This invention pertains to improvements in engine-lathes, and relates to the construction of the apron mechanism.

In the construction of engine-lathes much of the feeding mechanism is supported by an apron at the front of the carriage, the office of the apron being to furnish bearings for various parts. In some constructions the apron is a hanging plate, behind which most of the mechanism is located and hidden, only those portions which are to be moved by hand appearing in front of the apron. In other constructions most or all of the mechanism appears in front of the apron. In other constructions the apron is not an apron in fact, but its office is fulfilled by a number of legs or hangers depending from the front edge of the carriage. The first-mentioned construction is that most in vogue.

In illustrating our invention it becomes rather difficult to delineate in one view the parts that would be behind the apron and in front of the apron so as to show their proper relationship, and we therefore choose for our main illustration the second construction referred to, in which all of the parts are located in front of the apron; but we also illustrate by other views our improvements embodied in an apron with only the hand-operated parts at its front.

Those skilled in the construction of engine-lathes will readily appreciate the applicability of our improvements to either of the three systems of apron construction referred to.

Our improvements will be readily understood from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a front elevation of a lathe carriage and apron illustrating our improvements, a portion of the detent-shield being broken away to exhibit details to the rear of it; Fig. 2, a front elevation of a portion of the apron, showing this shield restored; Fig. 3, an end elevation of a portion of the apron with the shield in place; Fig. 4, a rear elevation of the upper central portion of the apron, exhibiting the clamp which serves to lock the carriage to the lathe-bed automatically when the cross-feed is thrown into gear, the front flange, B, of the lathe-bed appearing in vertical longitudinal section; Fig. 5, a vertical transverse section of the apron, lathe-bed, &c., at the clamp referred to; Fig. 6, a front elevation of the apron, similar to Fig. 1, but of a construction in which most of the parts are hidden behind the apron, only those parts requiring to be manipulated being located in front of the apron; and Fig. 7, an end elevation of the apron as illustrated in Fig. 6, a few only of the accessory details being exhibited.

In the drawings all of the figures have reference to a construction in which the general parts are located in front of the apron, except Figs. 6 and 7, in which many of the parts are behind the apron.

The preliminary description immediately following will not have reference to Figs. 6 and 7, these figures being referred to later.

In the drawings, omitting for the present all reference to Figs. 6 and 7, A indicates a portion of the front of an ordinary lathe-bed; B, the usual forwardly-projecting top flange thereof; C, the usual rack secured thereto; D, the usual lead-screw, shown in the illustration as being splined, so as to form also the feed-screw; E, the usual feed-worm, splined upon the screw and held between lugs on the apron; F, the lathe-carriage; G, the apron hanging down from the front of the carriage and serving for the support of various parts of the mechanism; H, the usual cross-feed screw; J, the usual open-and-shut nut, carried in guides on the apron, and serving as a means by which the carriage engages the lead-screw when screw-cutting is to be done; K, an eccentric-rod engaging the eccentric-nut and serving as a means through which the partial turning of the eccentric effects the opening and closing of the nut; M, a hand-lever attached to this eccentric and serving as the means by which the eccentric is turned, this hand-lever being formed with a detent, by which it is held in definite angular position; N, the position of a detent-notch to be thus engaged when the lever M is in a position corresponding to the

closed position of the nut, this detent-notch being in the face of the shield just to the rear of the lever M, the shield being broken away in Fig. 1, so as to exhibit the parts to the rear of it, the detent-notch N and other of its kind, hereinafter referred to, being in that view indicated by position only—in other words, the detent-notch N appears in Fig. 1 as being in the eccentric-rod L, while in fact it is to be in the shield lying in front of the eccentric-rod; O, the usual pinion engaging the rack C; P, the usual spur-gear on the shaft of this pinion; Q, the usual hand-wheel for giving quick longitudinal motion to the lathe-carriage, this hand-wheel being provided with a pinion engaging the spur-gear P in the usual manner; R, a spur-gear loosely supported by the apron and arranged to receive motion from the lead-screw through the intermediacy of the worm E, the effect of the rotation of the screw being to give a continuous rotary motion in one direction to this gear; S, a pivoted main tumbler whose pivot-axis corresponds with the axis of the gear R; T, a secondary pivoted tumbler whose pivot is journaled in an arm of the main tumbler and located between the spur-gear P and the cross-feed screw H, this tumbler having an adjusting detent-lever projecting toward and to the pivot of the main tumbler, the secondary tumbler thus having the form of a T; U, a pinion supported by one of the arms of the secondary tumbler, and adapted, as the secondary tumbler is adjusted in its two positions, to either be free from or engaged with the spur-gear R, and also adapted, as the main tumbler is adjusted, to be free from or engaged with the spur-gear P; V, a similar pinion similarly supported by the other arm of the secondary tumbler, this pinion at all times engaging the pinion U, and being capable, as the secondary tumbler is adjusted, of being free from or engaging the spur-gear R, and being also capable, as the main tumbler is adjusted, of being free from or engaging the pinion upon the cross-feed screw; W, a detent-notch in the main tumbler, adapted to be engaged by the detent of the secondary tumbler and hold that tumbler in such position that the pinion U will engage the spur-gear R, X indicating in position only a similar detent-notch in the main tumbler, serving to hold the secondary tumbler in a position insuring the engagement of the pinion V with the spur-gear R, this being the position in which the parts are shown in Fig. 1; Y, an eccentric upon the same spindle with eccentric K and hand-lever M, this eccentric being engaged by a slot in a projecting arm of the main tumbler, both eccentrics K and Y moving together as the hand-lever M is operated, one eccentric being in advance of the other, so that while both eccentrics move together their times of operative effect vary; Z, a detent-notch to be engaged by the detent of the lever M, this notch corresponding with the open position of the nut J and with the neutral position of the main tumbler; *a*, another of these detent-notches, corresponding to such position of the eccentrics as represents the lowest position of the slotted end of the main tumbler and a slight descent of the nut J, but not sufficient descent to cause it to engage the lead-screw; *b*, another of these detent-notches, corresponding with such position of the eccentrics as represents the highest position of the slotted end of the main tumbler and a slight descent of the nut J, but not sufficient descent to cause the nut to engage the lead-screw; *c*, another of these detent-notches, corresponding with such position of the eccentrics that the nut J, while neither at its highest or lowest position, will not engage the lead-screw, and the main tumbler, while not in its central neutral position, will not cause engagement of its pinions with either the spur-gear P or the pinion on the cross-feed screw; *d*, a shield just to the rear of the lever M, the office of this shield being to contain the detent-notches to be engaged by the hand-lever M; *e*, a wedge-shaped clamp lying behind the apron and up against the under surface of the flange B of the lathe-bed; *f*, a pin, which may be provided, if desired, with a roller projecting eccentrically and rearwardly from the rotating central pivot of the main tumbler, this pin being so located as to forcibly engage the under side of the clamp *e* when the main tumbler is in that position in which the pinion V engages the pinion of the cross-feed screw, the hand-lever M then engaging the detent-notch *a*; *g*, the usual pinion, fast on the cross-feed shaft; *h*, the central pivot of the main tumbler, the main tumbler being assumed as fast upon this pivot, the pin *f* projecting rearwardly from this pivot; and *j*, (see Fig. 4,) an adjusting-screw journaled in a lug projecting rearwardly from the apron, the thread of the screw engaging the clamp *e*, this screw serving as a means by which the clamp may be adjusted endwise.

Assume the parts as they appear in Fig. 1, and with the lead-screw revolving in the direction indicated by the arrow on the worm. It is obvious that the spur-gear R will be continuously revolved in the direction of its arrow, and that the two pinions U and V will revolve in opposite directions, as indicated, and that the lead-screw nut is disengaged from the lead-screw. It is obvious that the lathe-carriage is, under these conditions, free from the influence of any feeding mechanism. If the lever M be thrown to the notch *b*, the pinion U will be thrown into engagement with the spur-gear P. This will cause a longitudinal movement of the carriage to the left. The position of the nut J has been slightly but not materially affected. It will thus be seen that the longitudinal feed of the carriage toward the left may be started by throwing the lever M from notch Z to notch *b*, and stopped by throwing the lever back to notch Z. It will be noticed that under the conditions assumed the motion from the spur-gear R to the spur-gear P was transmitted through both pinions

V U. If, now, the secondary tumbler be thrown to detent-notch W, the motion from the spur-gear R to the spur-gear P will be transmitted through pinion U alone, that pinion by this means being brought into direct engagement with spur-gear R, the pinion V revolving idly. Under the new conditions the pinion U will turn in a direction opposite to that in which it turned under the previous conditions, and as a consequence it will cause the spur-gear P to revolve in an opposite direction and cause the feed motion of the carriage to be to the right. It will thus be seen that the direction of the longitudinal feed motion may be changed by throwing the secondary tumbler from notch X to notch W, and that the longitudinal feed motion, regardless of its direction, may be stopped or started by throwing the lever M from one to the other of the notches Z and *b*.

Whatever may be thus capable of accomplishment with reference to the longitudinal feed is capable of accomplishment with reference to the cross-feed by substituting the detent-notch *a* for the notch *b*—that is to say, the direction of rotation of the cross-feed is controlled by the position of the secondary tumbler on the main tumbler, and the stopping and starting of the cross-feed are effected by throwing the lever M from one to the other of the notches Z *a*.

Normally the clamp *e* lies loosely below the front flange of the lathe-bed. When the main tumbler is thrown to that position corresponding with the engaged position of the cross-feed, the pin *f* will be brought forcibly against the clamp *e*, and by this means, when the cross-feed is thrown into action, the carriage will become fairly clamped to the lathe-bed. The clamp *e* being in the form of a wedge and capable of endwise adjustment by means of the screws *j* permits of the time of proper pinching on the part of the clamp being brought into accurate coincidence with the time of proper meshing of pinion V with pinion *g*, or, what is the same thing, with the time of engagement of the hand-lever M with notch *a*. In thus throwing the lever M through the half-circle from notch *b* to notch *a* in the various operations of the feeds, a certain rotation has of course been given to eccentric K and the nut J has been somewhat shifted; but this movement of the eccentric K represents its least effective movements, and consequently the nut J has been practically unaffected.

If screw-cutting is to be done, it will be seen that the nut J may be opened and closed by throwing the lever M from one to the other of the notches Z and N, the latter corresponding to the closed position of the nut; but in doing this the lever M will have to pass the notch *b*, which represents the engaged position of the longitudinal feed. This defect is avoided when screw-cutting is to be done by throwing the lever M from notch Z to notch *c*. In the latter notch the eccentrics will both occupy neutral positions—that is to say, while the nut J will have been moved downwardly it will not engage the lead-screw, and while the tumbler S has been moved from its central position it will not cause engagement of either of the feeds. The nut J may now be opened and closed at will without causing engagement of either feed by throwing the lever M from one to the other of notches N and *c*.

It should be understood that the relative arrangement of the two tumblers, the spur-gear R, and the two pinions U and V permits of transmitting motion in either of two directions to either of the two gears P and *g*. This result is accomplished by means of five gears and two tumblers—a result, so far as we know, never before attained without one or more additional gears.

By inspecting Figs. 6 and 7 it will be understood that those parts not needing direct manipulation may be placed behind the apron. It will be seen in Fig. 6 that the detent-notches to be engaged by the lever M are placed directly in the face of the apron instead of the frontal shield, the two eccentrics and the parts operated by them being located to the rear of the apron.

The hand-lever portion of the secondary tumbler T presents itself in front of the apron, where also projects sufficient of the central portion of the main tumbler to carry the detent-notches to be engaged by the secondary tumbler.

In illustrating our improvements we have chosen to show the spur-gear R as receiving its motion from a worm revolved by the lead-screw. Motion may be given to this gear by means of any of the devices usually employed for the purpose in lathes, it being common in lathes in which such a main spur-gear upon the apron is employed to give it motion by the worm engaging it directly, or by the worm engaging a worm-wheel alongside of the spur-gear, and it is also common to employ a system of bevel-gearing to transmit motion from the lead-screw to this main spur-wheel. It is also common in lathes to take the motion for this main spur-gear either from a separate splined rod or from the lead-screw splined to perform the office of the rod.

In Figs. 1, 4, and 5, in which that system of apron construction having most of the parts in front of the apron is exemplified, it will be seen that the main tumbler S is fast upon one end of the tumbler-pivot *h*, and that the pin *f* is carried by the inner end of that pivot or by an enlargement of its inner end. It is obvious that in cases where the tumbler is located behind the apron the pin *f* will project from the tumbler directly instead of from an inwardly-reaching part made fast to the tumbler.

We claim as our invention—

1. The combination, with gears P and *g*, to be alternatively rotated and alternatively in either of two directions, of the two tumblers S T and the three gears R V U, substantially as and for the purpose set forth.

2. In a lathe, the combination, substantially as set forth, with gear P, pinion *g*, and spur-gear R, of tumblers S and T and pinions U and V.

3. In a lathe, a lathe-carriage, a cross-feed screw, a clamp adapted to lock the carriage to the lathe-bed, mechanism for giving feeding motion to the cross feed screw, a handle to serve in stopping and starting the cross-feeding motion, and means, substantially as set forth, connecting said clamp with the cross-feeding mechanism, combined substantially as set forth, whereby when the cross-feed is started the clamp is automatically applied and when the cross-feed is stopped the clamp is loosened.

4. In a lathe, the combination, with a tumbler for stopping and starting the feed, a lead-screw, an open-and-shut nut for the lead-screw, a pair of connected eccentrics arranged to actuate the tumbler and nut, respectively, a hand-lever arranged to rotate the two eccentrics simultaneously and provided with a detent, and notches to be engaged by the detent, substantially as and for the purpose set forth.

5. In a lathe, the combination of gear R, tumbler S, lead-screw D, nut J, eccentrics K and Y and handle M, pinions U V, and secondary tumbler T, bearing said pinions and pivoted to the first tumbler, and having a hand-lever with a detent engaging near the center of the first tumbler, substantially as and for the purpose set forth.

6. In a lathe, the combination, with tumbler S, of pin *f*, wedge-shaped clamp *e*, fitted to be pressed by said pin, and screw *j*, fitted for the endwise adjustment of the clamp, substantially as and for the purpose set forth.

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