(No Model.)

V. F. PRENTICE.

METAL TURNING LATHE.

No. 418,382. Patented Dec. 31, 1889.

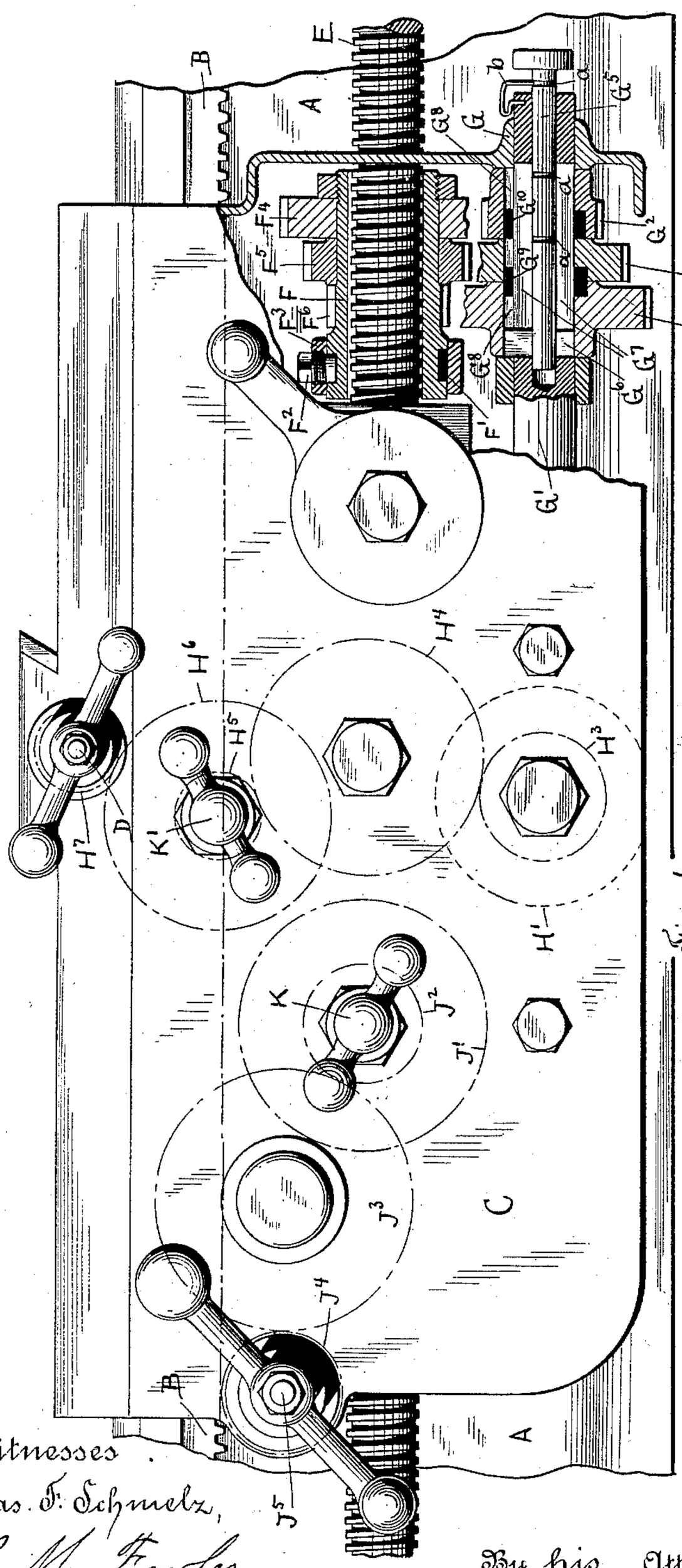

Fig. 1.

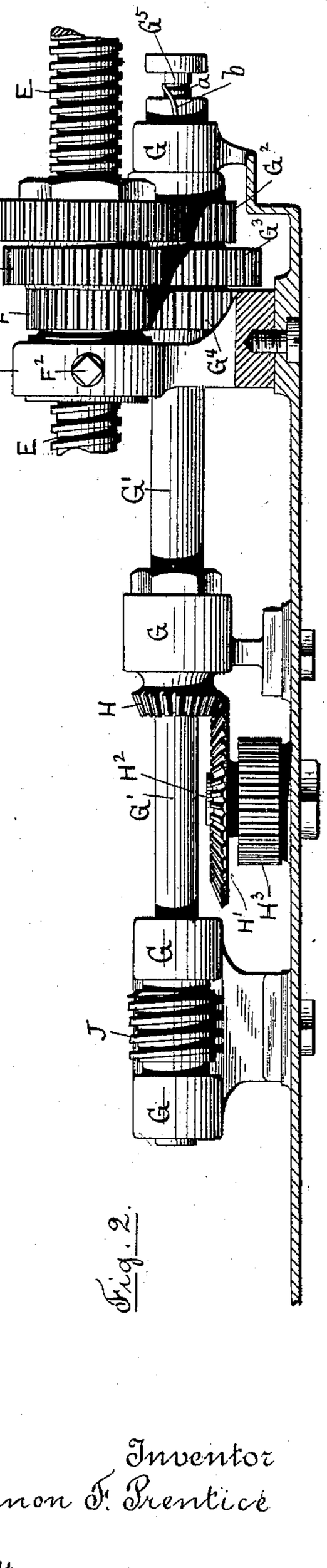

Fig. 2.

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METAL-TURNING LATHE.

SPECIFICATION forming part of Letters Patent No. 418,382, dated December 31, 1889.

Application filed April 20, 1889. Serial No. 308,016. (No model.)

To all whom it may concern:

Be it known that I, VERNON F. PRENTICE, a citizen of the United States, and a resident of Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Metal-Turning Lathes, of which the following is a specification, accompanied by drawings which form a part of the same, and in which I have represented such portion of a metal-turning lathe as embodies my invention.

Figure 1 represents a front view of the apron of a lathe with a portion broken away to disclose that portion of the mechanism by which the tool-carriage is made to traverse along the ways of the lathe embodying my invention, and which is shown in sectional view. Fig. 2 represents a top view of a portion of the leading-screw and change-gears, by which motion is imparted from the lead-screw to the feeding mechanism beneath the apron.

Similar letters refer to similar parts in both views.

My invention relates to that part of the mechanism by which the feeding motion is imparted to the cutting-tool; and it consists in the employment, as a component part of the feeding mechanism contained in the apron of the lathe, of a cone gear moved along the lead-screw or, in some cases, the "feed-rod" by the traversing motion of the carriage along the ways of the lathe, but having a spline-connection with the lead-screw or feed-rod, and a series of gears varying in size to correspond with the steps of the cone gear and connected with the feeding mechanism placed beneath the apron of the lathe.

The object sought to be accomplished by my invention is to enable the operator to change the speed of the feeding mechanism at the apron in lieu of the change-gears at the end of the lathe, as is the usual method of changing the feed of the cutting-tool.

In the accompanying drawings I have shown a portion only of the lathe-bed and the apron, with the train of gearing beneath the apron, by which the feeding motion is imparted to the cutting-tool, indicated by broken lines, this portion of the feeding mechanism being of the usual and well-known construction and well understood by all who are conversant with this class of machines. One train of gearing is employed to cause the apron to traverse along the ways of the lathe, and the other train of gearing serves to actuate a screw journaled transversely to the bed of the lathe, and producing what is termed the "cross-feed" of the cutting-tool. These trains of gearing in the lathe forming the subject of the drawings, as in lathes in general, are actuated by the rotation of a longitudinal shaft journaled at the side of the lathe-bed and termed a "feed-rod," or, if provided with a screw-thread, a "lead-screw."

Referring to the drawings, A A denote a portion of the lathe-bed; B, a rack attached thereto; C, the apron; D, the transverse screw for effecting the cross-feed of the cutting-tool, and E denotes the lead-screw or screw-threaded shaft, which is journaled at the side of the lathe-bed.

Inclosing the lead-screw E is a sleeve F, provided with an annular groove F′, which receives the end of a screw F^2, held in a bracket F^3 projecting from the apron C, by means of which the sleeve is made to traverse the lead-screw by the movement of the apron C, and at the same time it is caused to rotate with the lead-screw by means of a spline-connection with the screw. (Not shown in the drawings.) Upon the sleeve F are attached the gears F^4 and F^5, while the smaller gear F^6 is preferably formed integral with the sleeve F. The three gears F^4, F^5, and F^6 are of different sizes and form the steps of a cone gear, which is rotated by the lead-screw E and traversed along the screw by the traversing motion of the apron C through the connection of the sleeve F with the bracket F^3.

Journaled in bearings G, attached to the apron C, is the intermediate shaft G′, upon which rotate the three gears G^2, G^3, and G^4, of different sizes, corresponding with the sizes of the gears forming the steps of the cone gear by which the gears G^2, G^3, and G^4 are engaged and driven. The end of the intermediate shaft G′ is hollow and contains the concentric sliding spindle G^5, carrying a key G^6, passing through a mortise in the spindle and placed transversely to the shaft G′ and sliding in a slot G^7 in the shaft. One end of

the key G^6 extends beyond the shaft G′ and enters a slot or groove G^8 in the gears G^2 G^3 G^4 as the key is moved along the slot G^7. Either of the gears G^2 G^3 G^4 are thus made to impart their rotary motion to the shaft G′, and as the gears G^2 G^3 G^4 rotate at different speeds the intermediate shaft G′ is made to vary in its speed according to the variation of the gears G^2 G^3 G^4 by sliding the spindle G^5 and key G^6.

The adjacent sides of the gears G^2 G^3 G^4 are chambered to form the annular chambers G^9 and G^{10}, into either of which the projecting end of the key G^6 may be brought in order to entirely disconnect the intermediate shaft G′ from the gears G^2 G^3 G^4. The rotary motion of the intermediate shaft G′ is imparted through a bevel-gear H to a bevel-gear H′, running loosely upon a stud H^2, held in the apron C and having attached thereto a pinion H^3, in mesh with and driving the first gear in a train indicated by the broken lines H^4, H^5, H^6, and H^7, the latter being attached to a screw D, by whose rotation the cross-feed of the cutting-tool is effected in the usual and well-known manner. The intermediate shaft G′ is also provided with a worm J, which engages and drives the first in a train of gearing indicated by the broken lines J′, J^2, J^3, and J^4, the latter being attached to a shaft J^5, which carries a pinion (not shown) engaging the rack B upon the lathe-bed and causing the apron and tool-carriage to traverse along the lathe-bed in the usual and well-known manner.

The connecting mechanisms intermediate between the shaft G′ and the transverse screw D and rack B comprise a clutching device actuated by the handles K K′, by which the feeding mechanism can be disconnected at will from either the screw D or rack B, and the rotating lead-screw E rendered inoperative to effect the feeding motion of the cutting-tool.

As my present invention is confined to the employment of an intermediate shaft with a series of gears driven at different rates of speed by a cone gear from the longitudinal feed-rod or lead-screw journaled at the side of the lathe-bed, I have not deemed it necessary to illustrate or describe in detail the connected operating parts of the feeding mechanism by which the rotation of the intermediate shaft is made to effect the feeding motion of the cutting-tool, except so far as to indicate their several positions and relations to each other, as that portion of the mechanism is substantially the same as that in common use, and therefore well understood by those conversant with this class of machines.

The sliding spindle G^5 is provided with the annular grooves *a a a*, to receive the ends of a spring-latch *b*, attached to the apron, and having its free end pressing against the spindle G^5, the grooves *a a a* being arranged to receive the end of the spring and retain the spindle in position, so the key G^6 will be held in engagement with one of the gears G^2 G^3 G^4. As the key G^6 is moved from its engagement with one of the gears into engagement with another of the gears it is entirely disconnected as it passes one of the annular chambers G^9 G^{10}, which serves to cause the entire disengagement of the key with its engaged gear before it effects an engagement with the next adjacent gear.

By the above-described mechanism the feeding motion imparted to the cutting-tool can be changed by the attendant in his position at the apron within the limits allowed by the steps of the driving cone gear, and these limits can be enlarged by the addition of other gears, increasing the number of steps and also the corresponding gears upon the intermediate shaft G′; and the difference in the diameters of the gears can be varied as the character of the work to be done may determine.

In the lathe to which my invention is shown as applied in the accompanying drawings the lead-screw performs the joint office of lead-screw and feed-rod; but in those lathes in which two separate shafts are employed for these purposes the cone gear would be applied to the independent feed-rod.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a metal-turning lathe, the combination of an apron forming a part of the tool-supporting carriage, a longitudinal shaft journaled in bearings and parallel with the lathe-bed, a cone-gear having a spline-connection with said shaft and connected with said apron, whereby it is made to traverse on said shaft as the apron is moved along the lathe-bed, an intermediate shaft journaled in bearings in said apron, a series of gears of different diameters corresponding with and driven by the steps of said cone gear and placed on said intermediate shaft, but capable of being connected with or disconnected from said shaft at will, whereby a change of speed is effected in the rotation of the intermediate shaft and connected operative mechanism, substantially as described, whereby the rotation of the intermediate shaft is made to impart a feeding motion to the cutting-tool, substantially as described.

2. In a metal-turning lathe, the combination of an apron forming a part of the tool-supporting carriage, an intermediate shaft journaled in bearings in the apron, connected mechanism, substantially as described, whereby the rotation of said intermediate shaft is made to impart a feeding motion to the cutting-tool, a longitudinal shaft journaled in bearings parallel with the lathe-bed, and connecting mechanism, substantially as described, by which said intermediate shaft is driven from said longitudinal shaft with a varying speed, substantially as described.

3. In a metal-turning lathe, the combination, with an apron forming a part of the tool-

supporting carriage, of an intermediate shaft journaled in bearings in said apron, connected mechanism, substantially as described, whereby the rotation of the intermediate shaft is made to impart a feeding motion to the cutting-tool, a longitudinal shaft journaled in bearings parallel with the lathe-bed, and connecting mechanism, substantially as described, by which the intermediate shaft is driven from said longitudinal shaft, said connecting mechanism comprising a clutching device, substantially as described, whereby the intermediate shaft is connected with or disconnected from said longitudinal shaft at will, substantially as described.

4. In a metal-turning lathe, the combination, with a longitudinal shaft journaled in bearings parallel with the lathe-bed, of a cone gear comprising a series of steps of different diameters, said cone gear having a spline-connection with said shaft, but capable of sliding thereon, and connected mechanism, substantially as described, actuated by the several steps of said cone gear at will, whereby the rotation of the longitudinal shaft is made to impart a feeding motion to the cutting-tool, substantially as described.

5. In a metal-turning lathe, the combination, with an apron forming a part of the tool-supporting carriage, and a longitudinal shaft journaled in bearings parallel with the lathe-bed, of a cone gear comprising steps of different diameters placed on said shaft and having a spline-connection therewith, but held in said apron, substantially as described, whereby it is traversed on said shaft as the apron is moved along the lathe-bed, an intermediate shaft journaled in bearings in said apron, a concentric spindle held in said shaft and capable of sliding therein, a key held in said spindle and placed in a slot transversely to said shaft with an end projecting beyond the shaft, gears placed on said intermediate shaft and provided with grooves to receive the projecting end of said key, and connected operative mechanism by which the rotation of said intermediate shaft is made to impart a feeding motion to the cutting-tool, substantially as described.

6. In a metal-turning lathe, the combination, with a longitudinal shaft journaled in bearings parallel with the lathe-bed, and an apron forming a part of the tool-supporting carriage, of a sleeve placed on said shaft and having a spline-connection therewith and provided with an annular groove, gears attached to or integral with said sleeve and forming the steps of a cone gear, a bracket attached to said apron and forming a journal-bearing for said sleeve, a screw held in said bracket and entering the annular groove in the sleeve, whereby the sleeve is made to traverse the longitudinal shaft as the apron is moved along the lathe-bed, and connected operative mechanism driven by said cone gear, substantially as described, by which the rotation of the cone gear is made to impart a feeding motion to the cutting-tool, substantially as described.

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