

H. C. HECKENDORN.

Oval Lathe.

No. 222,901.

Patented Dec. 23, 1879.

Fig. 1

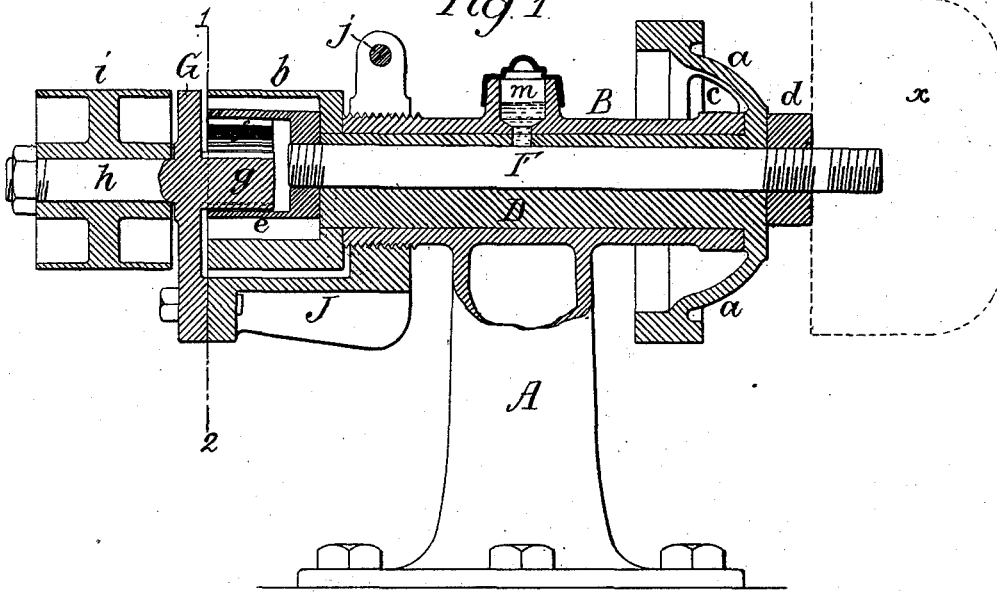


Fig. 2

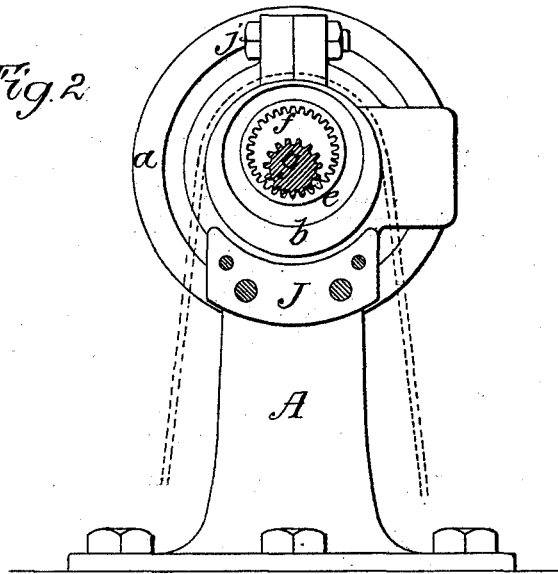
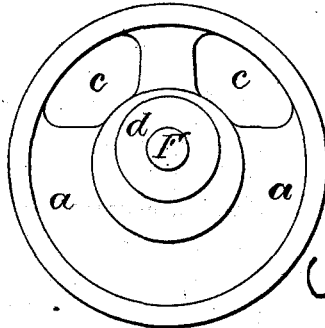


Fig. 3



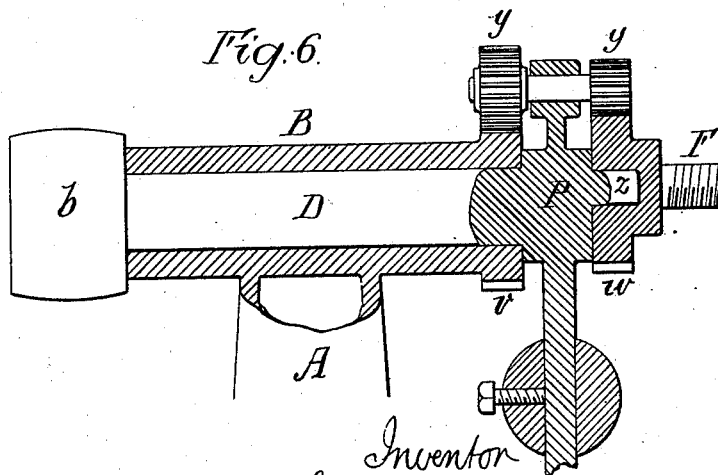
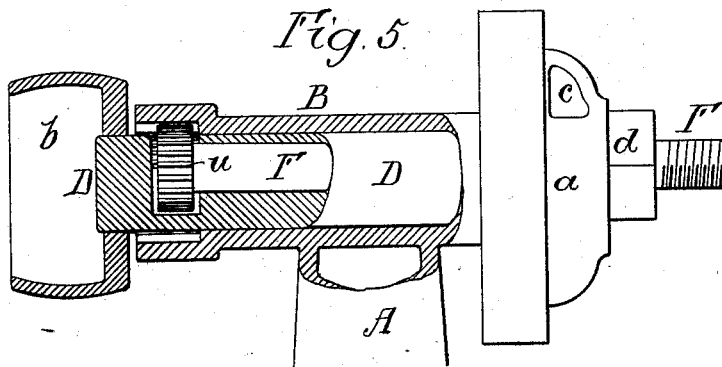
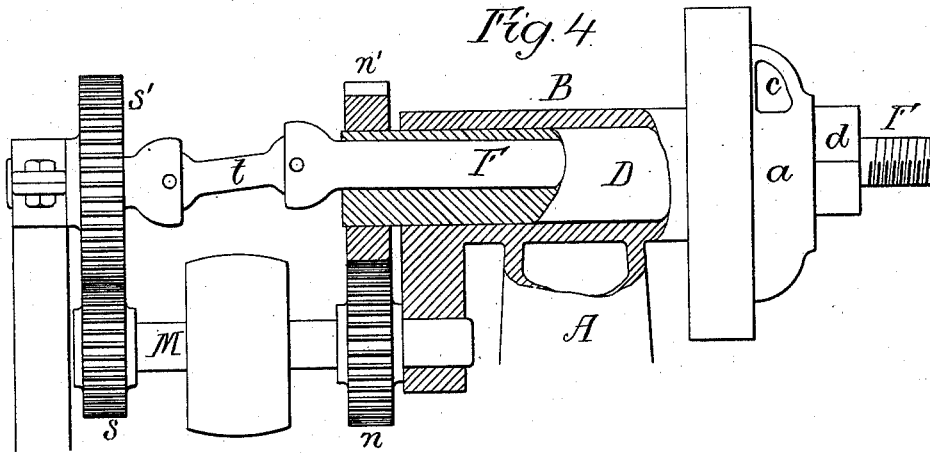
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# UNITED STATES PATENT OFFICE.

HENRY C. HECKENDORN, OF READING, PENNSYLVANIA, ASSIGNOR TO HIMSELF AND WILLIAM H. WILHELM, OF SAME PLACE.

## IMPROVEMENT IN OVAL-LATHES.

Specification forming part of Letters Patent No. 222,901, dated December 23, 1879; application filed October 2, 1879.

*To all whom it may concern:*

Be it known that I, HENRY C. HECKENDORN, of Reading, Pennsylvania, have invented a new and useful Improvement in Oval-Lathes, of which the following is a specification.

The object of my invention is to construct a cheap, compact, and smoothly-running oval-lathe; and this object I attain in the manner which I will now proceed to describe, reference being had to the accompanying drawings, in which—

Figure 1, Sheet 1, is a longitudinal section of my improved oval-lathe in the form which I prefer; Fig. 2, a transverse section on the line I 2; Fig. 3, a front view of part of the lathe; and Figs. 4, 5, and 6, Sheet 2, diagrams illustrating modifications of the driving devices.

Referring to Figs. 1, 2, and 3, A is a pedestal, bolted at the base to a suitable foundation or bed, and having at the upper end the tubular bearing B for a shaft, D, which carries at the front end the disk *a*, and at the rear end a driving-pulley, *b*.

A spindle, F, extends longitudinally through the shaft D, and is arranged eccentrically in respect to said shaft, as shown, the front end of the spindle being threaded for the reception of the confining-nut *d* and the block *x*, to which an oval form has to be imparted. (See dotted lines, Fig. 1.) The rear end of the spindle F carries a flanged ring, *e*, having an internal rack, *f*, and into the teeth of said rack gear the teeth of a fixed pinion, *g*, the latter forming part of a plate, G, which is bolted to a frame, J, hung to the rear end of the bearing B.

The plate G is provided with a projecting spindle, *h*, on which turns the loose pulley *i*, the latter receiving the driving-belt from the pulley *b* when it is desired to stop the lathe.

In order that the frame J may be accommodated to the direction from which the driving-belt is led, said frame is capable of turning on the bearing B, the frame being secured in position after adjustment. The securing of the frame to the bearing is effected by splitting the upper half of the frame longitudinally and adapting to said split portion a clamping-bolt,

*j*, on screwing up the nut on which the frame J is rigidly clamped to the bearing.

On rotating the shaft D the spindle F will, owing to its eccentricity in respect to said shaft, move in a circle around the axis of the same, and will at the same time rotate on its own axis in the same direction as the shaft D, owing to the planetary gearing at the rear end of the spindle. The rack *f* and pinion *g*, forming this planetary gearing, should be so proportioned in respect to each other that the spindle F will turn but once on its own axis while it is being carried twice around the axis of the shaft D. The result of this compound movement of the spindle F and its block *x* is such that a tool properly applied to the said block *x* will reduce the same to an oval form.

Steadiness and easy running of the lathe are effected partly by the extended bearings which are afforded for the shaft D and spindle F, and partly by an unequal distribution of the weight in the disk *a* and pulley *b*. This will be understood in reference to Figs. 2 and 3, in which it will be seen that the web of the disk *a* is cut away, so as to form openings *c* on one side of the center, the web being unbroken on the other side, while the rim of the pulley *b* is thicker at one part than at another. The unbroken web of the disk *a* and the thickened portion of the pulley *b* are on that side of the center of the shaft D opposite the one on which the spindle F is arranged, so that any irregularity of movement which might otherwise arise from the eccentricity of said spindle is effectually overcome by the counter-balances thus provided.

It will be observed on reference to Fig. 1 that the spindle F is not parallel longitudinally with the shaft D, but is inclined slightly in respect to the axis of the same, the eccentricity of the spindle at the front end of the shaft being somewhat less than it is at the rear end. This feature is important in cases where the difference between the long and short diameter of the desired oval is but slight, for in such cases but little eccentricity of the spindle F is demanded, so that if said spindle were parallel longitudinally with the shaft D the pinion *g* would necessarily have to be so small in diameter as to lack the requisite

strength. This objection is effectually overcome by the arrangement of the spindle at an angle in respect to the shaft.

Another advantage arising from this arrangement is, that the block produced is rounder or less oval in shape at the top than at the base—a shape preferred by hat-makers.

The teeth of the pinion *g* and internal rack *f* should be slightly beveled, in order to gear properly onto each other when the spindle F is inclined.

The shaft D has an opening in line with the oil-cup *m* on the bearing B, so that the oil from said cup lubricates both the shaft D and the spindle F. The parts to which oil are applied are protected, so that the access of dust and dirt to said parts is prevented and the latter kept in proper running order.

Although I have shown the system of planetary gearing comprising the internal rack *f* and fixed pinion *g* as the means for effecting the rotation of the spindle F, and although I prefer this arrangement on account of its compactness and simplicity, various plans may be adopted for effecting the desired movement of the spindle. Thus in Sheet 2 of the drawings I have shown three different systems of gearing, all of which accomplish the desired result.

In Fig. 4 the shaft D is driven from a counter-shaft, M, through the medium of cog-wheels *n n'*, and the spindle F is likewise driven from said shaft M through the medium of cog-wheels *s s'* and a connecting-rod, *t*, the latter being coupled to the spindle F and to the shaft of the cog-wheel *s'* by universal joints, so as to permit the movement of the spindle around the axis of the shaft D without interfering with the proper driving of the same.

In Fig. 5 the eccentric spindle F carries a pinion, *u*, the teeth of which, as the spindle is carried round by the shaft, engage with the teeth of an internal rack formed in a tubular extension of the bearing B, the result of this arrangement being to turn the spindle F on its axis in a direction the reverse of that in which the shaft D turns. In a lathe of this character the arrangement of the spindle F at an angle enables me to reduce the size of the pinion *u* and of the recess which must be formed in the shaft D for the reception of said pinion.

The oval produced by this lathe has straight sides or sides slightly indented.

In Fig. 6 the eccentric spindle running through the shaft has been dispensed with, the spindle in this case forming part of a cog-wheel, *w*, which is hung to an eccentric pin, *z*, projecting from an enlarged head, P, formed on the shaft D. The head P has an arm forming a

bearing for a shaft which carries at each end a pinion, *y*, one of said pinions gearing into the cog-wheel *w*, and the other into a fixed rack, *v*, formed on the end of the bearing B. The effect of this arrangement is to turn the spindle F in the same direction as the shaft D.

Of course it will be understood that in all of the modifications just described the gearing is so proportioned that the spindle F will be caused to turn but once on its axis for every two revolutions of the shaft D; otherwise the work produced will not be oval in form, but will have an irregular shape, governed by the ratio of the speed of the spindle in respect to that of the shaft.

In Fig. 6 an adjustable counter-balance is shown on the head P, this counter-balance bearing the relation to the spindle F as described above in reference to the disk *a* and pulley *b*.

I claim as my invention—

1. The combination, in an oval-lathe, of a bearing, B, a shaft, D, a work-holding spindle carried by but arranged eccentrically in respect to said shaft, and gearing whereby the said spindle is caused to turn once on its own axis while it is being carried twice round the axis of the shaft D, all substantially as set forth.

2. The combination of the bearing B, the shaft D, adapted thereto, the eccentric work-holding spindle F, extending longitudinally through the said shaft, and devices, substantially as described, whereby the within-described differential rotation of the shaft and spindle is effected, all substantially as set forth.

3. The bearing B, the shaft D, and the eccentric spindle F, arranged at an angle in respect to the longitudinal axis of the shaft, in combination with gearing for operating the shaft and spindle, as specified.

4. The combination, in an oval-lathe, of a work-operating spindle, a rotary counterbalance-weight, and mechanism whereby the said weight is caused to make two revolutions for each revolution of said work-operating spindle, all substantially as specified.

5. The combination of the bearing B, the shaft D and its pulley *b*, the plate G, and the parts carried thereby with the frame J, capable of turning on the bearing B, and provided with means whereby it may be secured to the said bearing, all substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

H. C. HECKENDORN.

Witnesses:

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HARRY SMITH.