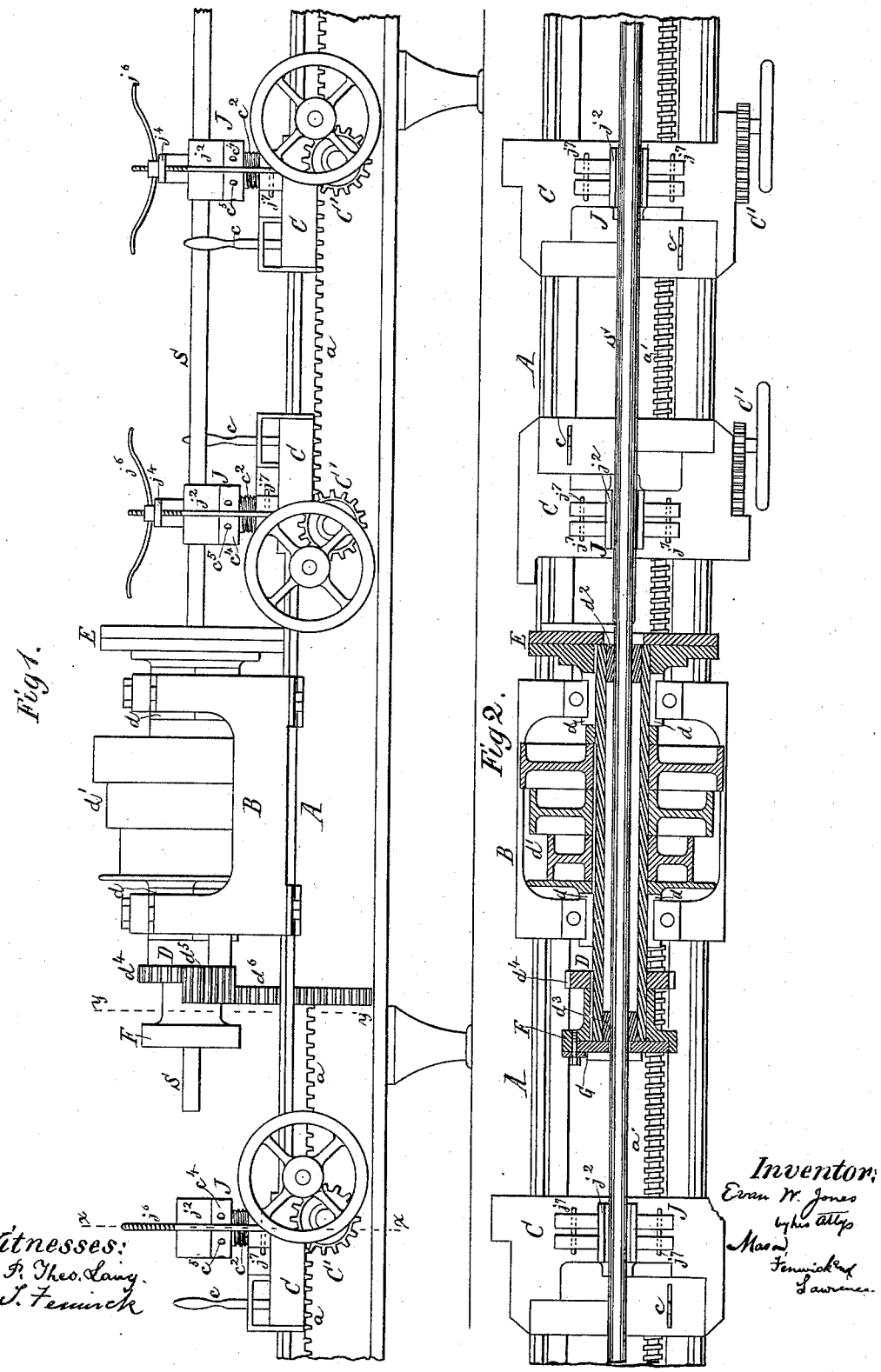
(No Model.)

3 Sheets—Sheet 1.

E. W. JONES.

LATHE FOR TURNING SHAFTS.

No. 448,764. Patented Mar. 24, 1891.



Witnesses:
J. F. Theo. Laing.
E. T. Fennick

Inventor:
Evan W. Jones
by his attys
Mason Fennick & Lawrence

(No Model.) 3 Sheets—Sheet 2.

E. W. JONES.

LATHE FOR TURNING SHAFTS.

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Fig5.

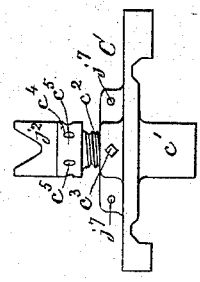


Fig6.

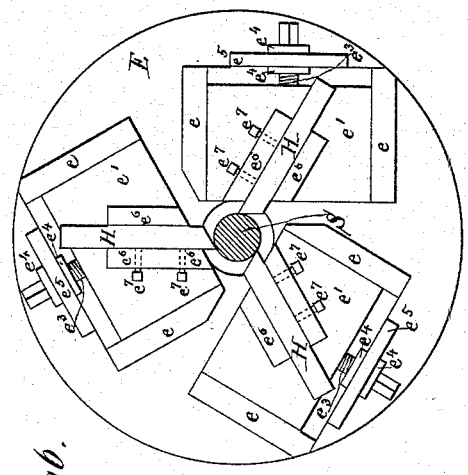


Fig 4.

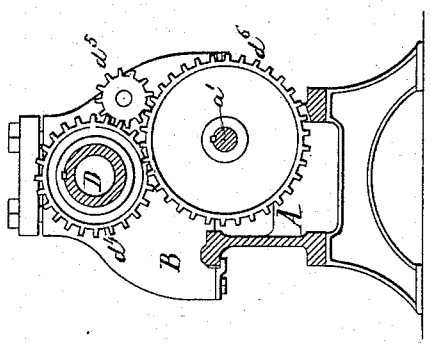


Fig7.

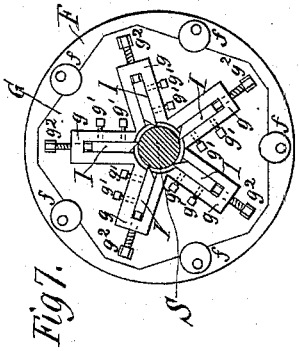
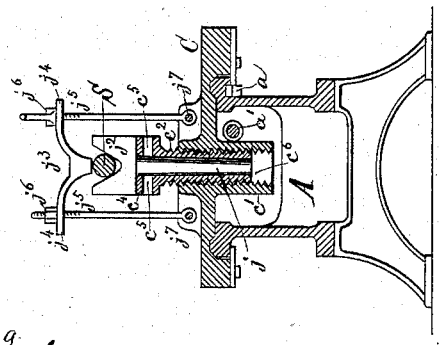


Fig3.



Witnesses:
J. F. Theo. Lang
E. J. Fenwick

Inventor:
Evan W. Jones
by his atty
Mason, Fenwick & Lawrence

(No Model.) 3 Sheets—Sheet 3.

E. W. JONES.

LATHE FOR TURNING SHAFTS.

No. 448,764. Patented Mar. 24, 1891.

Fig 8

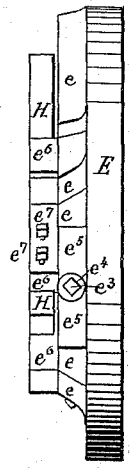


Fig 9.

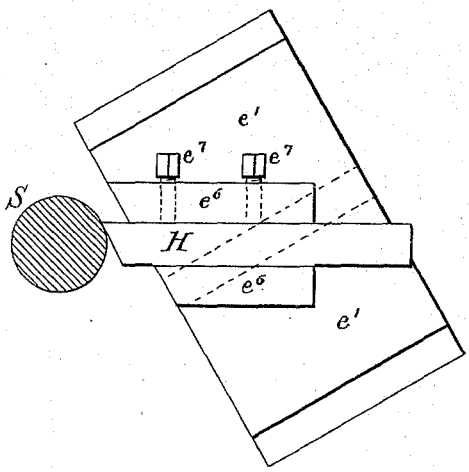
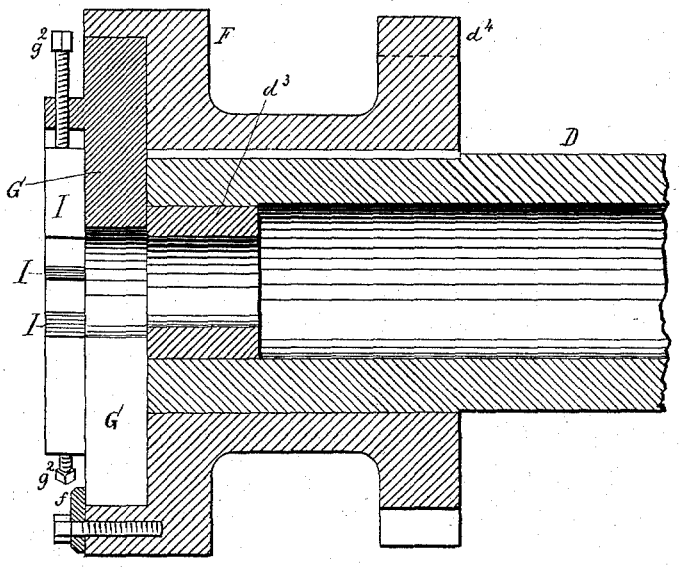


Fig 10.



Witnesses:

J. F. Theo. Long

Edward F. Fennick

Inventor:

Evan W. Jones

by his Attys

Mason, Fennick & Lawrence

UNITED STATES PATENT OFFICE.

EVAN W. JONES, OF PORTLAND, OREGON.

LATHE FOR TURNING SHAFTS.

SPECIFICATION forming part of Letters Patent No. 448,764, dated March 24, 1891.

Application filed May 10, 1890. Serial No. 351,289. (No model.)

To all whom it may concern:

Be it known that I, EVAN W. JONES, a citizen of the United States, residing at Portland, in the county of Multnomah and State of Oregon, have invented certain new and useful Improvements in Lathes for Turning Shafts; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to that type of lathes which are adapted for turning shafts, and it consists in a lathe-head with a hollow spindle, to which is applied at one end a disk with a set of roughing-tools and at the other end a disk with a set of finishing-tools, which disks and tools revolve with the hollow spindle while the shaft is held rigid, and is longitudinally fed through the spindle by means of clamping-carriages moved upon the lathe-bed by the lead-screw of the lathe. It also consists in certain novel constructions, combinations, and arrangements of parts in the lathe, as will be hereinafter described and claimed.

The object of my invention is to save labor, such as centering the shafts and drilling the centers, and repeatedly straightening the shafts at intervals during the operation of turning, and to avoid numerous other matters of attention necessary with ordinary shaft-turning lathes; also, greatly simplify the construction and improve the operation of lathes of this type.

In the accompanying drawings, Figure 1 is a front elevation of my improved lathe. Fig. 2 is a top view of the same, showing the lathe-head, spindle, and adjuncts in horizontal section central with the spindle. Fig. 3 is a transverse section in the line $x\ x$ of Fig. 1. Fig. 4 is a transverse section in the line $y\ y$ of Fig. 1. Fig. 5 is a front view of one of the carriages of the lathe. Fig. 6 is an enlarged face view of the disk carrying the roughing-tools, and Fig. 7 is an enlarged view of the disk carrying the finishing-tools. Fig. 8 is an enlarged side elevation of the finishing-disk and its tools. Fig. 9 is a detail view of a slide with the roughing-tools as applied to the disk shown in Fig. 6. Fig. 10 is a detail longitudinal central vertical section of the finishing-disk and its tools and devices for fastening the same to the lathe-spindle.

The letter A in the drawings represents a lathe-bed of ordinary construction; B a lathe-head, and C carriages.

The lathe-bed A is provided with a carriage-rack a and a lead-screw a', the latter suitably hung thereto between the shears, as is common. The lathe-head B is attached in the ordinary manner to the lathe-bed, but is located about the middle of the length of the lathe. This head is of ordinary construction, and supports a hollow spindle D in suitable bearings d. The spindle D is provided with a stepped or cone pulley d', and with face plates or disks E F, and a gear-wheel d^4. The forward disk E is securely fastened to the hollow spindle D, and is provided with V-shaped guides e and slides e', which latter are moved in said guides by means of screws e^3, secured longitudinally by means of collars e^4 and intermediate rigid bearings e^5, and are screwed into the slides e', which are thereby moved in the said guides. The slides e' are provided with parallel shoulders e^6, arranged in pairs, and one of each pair of these shoulders is provided with set-screws e^7. Between these pairs of shoulders the roughing-tools H are inserted and fastened by the set-screws e^7. The shoulders e^6 and tools stand at an angle of about forty-five degrees to the guides e, and thus the tools H, when moved between the shoulders e^6, will touch the periphery of the shaft S at different angles.

When the tools are adjusted at the desired angle, they will maintain it during the operation of the slides e' either forward or backward, and thus small or large shafts may be turned with the same advantage without changing the position of the tools H between the shoulders e^6, whatever may have been the extent of the adjustment of the tools from the center by movement of the slides e'. The rear disk F is provided with a depression in the shape of a pentagon having its corners terminated as shown, and into this depression is fitted a disk G of corresponding shape, snugly fitting said depression. The disk G is held in the disk F by means of eccentric buttons f, screwed into the disk F, which but-

tons by being turned partly around will stand out of the way and allow the disk to be removed or inserted. The disk G is provided with grooved guides g, having set-screws g' on one side, and each guide has a feed-screw g^2 at the end. Into the grooves of the said guides the finishing-tools I are placed and secured by means of the set-screws g', but not so as to prevent the same being moved by the feed-screws g^2. The finishing-tools I cut the shaft down to its proper diameter and give it the required finished appearance. They have but slight work or cutting to perform, and therefore can be left undisturbed during a long period of service, not requiring to be readjusted for every succeeding shaft of the same size, and as this is the case I make the disk G removable so that it can, with the finishing-tools attached thereto or undisturbed, be laid away until it is again required for use in turning shafting to which it is adapted, and when that occurs all that is necessary to be done is to simply insert it into the disk F and fasten it thereto by means of the buttons f, and this done it is ready for operation without further adjustment. For every size of shafting there will be provided a special disk G, having adjustable finishing-tools.

In order to prevent the shaft from yielding to the resistance of the roughing-tools and thus producing a surface-resistance which is not cylindrical, the spindle D is provided immediately behind said tools with a removable bushing d^2, having a bore equal to the diameter of the rough-turned portion of the shaft, and in order to secure steadiness to the shaft in the close proximity of the finishing-tools a bushing d^3, similar to bushing d^2, is inserted in the other end portion of the spindle. Several pairs of these bushings having bores of different diameters are provided for the hollow spindle, in order that shafts of different diameters may be centrally guided and truly centered within the spindle, and also, in conjunction with the traveling centering-clamps formed of two vertically-adjustable parts, such shafts may be held truly centered along their entire length, so as to be turned with a truly cylindrical surface from end to end.

The shaft is moved toward the roughing-tools and prevented from turning and yielding circumferentially to the force of the cutting-tools by means of clamps J, provided on the carriages C. The carriages are fitted and gibbed to the lathe-bed in the usual well-known way, and are provided with ordinary mechanism used for connecting or disconnecting the same with or from the lead-screw of the lathe, for which latter purpose operating hand-levers c are provided in the carriage-beds. About the centers of the carriages vertical tube formations c' with inner screw-threads are provided, into which screw-plugs c^2 are fitted. These plugs can be screwed up or down, as desired, and can be fastened at any elevation by means of set-screws c^3 in the tube formations c'. They are also provided with heads c^4, having radial pin-holes c^5 for the insertion of a pin-wrench to turn them. Vertical central tapered holes c^6 are provided in the plugs c^2, wherein the shanks j of the lower V-shaped clamp-jaws j^2 are placed. Upper clamping-jaws j^3, provided with arms j^4, are operated by pairs of bolts j^5, passed through the end portions of said arms and pairs of nuts j^6, said bolts being pivoted at j^7 to the carriages C. Each carriage has an ordinary hand propelling mechanism C′ gearing into the rack a of the lathe, whereby it can be quickly moved along the lathe-bed. The lathe-spindle D is connected with the lead-screw a' by means of gear-wheels d^4 d^5 d^6, thereby giving motion to the lead-screw.

I contemplate in some instances arranging the cutting-tools of disk E in the same manner as the tools in disk F are arranged, and therefore do not confine myself to roughing-tools arranged only as in Fig. 6, although this special arrangement is very important, and, I believe, novel.

A shaft to be turned is placed upon two V-shaped clamps which are adjusted by means of the plugs c^2 until the shaft is perfectly horizontal and also central with the lathe-spindle. The spindle D is now provided with two bushings d^2 d^3, of proper bore, and the upper clamp-jaw j^3 nearest the lathe-head is screwed down upon the shaft. The lathe is now started and the carriage nearest the lathe-head connected with the lead-screw. The farther carriage is then also connected with the lead-screw and its clamp mechanism J fastened upon the shaft. The shaft at this stage has been moved into the range of the roughing-tools, and by said tools it is turned down to a diameter answering the bore of the plugs d^2 d^3. The shaft is gradually moved through the plug d^2 and then through plug d^3, and upon leaving the latter passes between the finishing-tools, which give it the required size and finished appearance. As the shaft is moved on, its finished portion is caused to move into a clamp mechanism on the discharging side of the lathe-head, the carriage of which clamp mechanism is yet disconnected from the lead-screw and is standing still. As soon as the shaft has fully entered said clamp its carriage is connected with the lead screw, and it is fastened upon the shaft, as above described. When the clamps which hold the rough portions of the shaft are moved closely enough to the lathe-head, they are unfastened and their carriages disconnected from the lead-screw. By this method a shaft is delivered with absolute finish, no filing, nor polishing, nor straightening being necessary. The strain of resistance being sustained by the rough portion of the shaft and by the clamps in front of the roughening-tools, it is easily seen that the finished portion of the shaft is entirely free from torsional strain, while the strain of the finishing-tools upon the shaft is

insignificant, so that there is practically no chance for or liability of making an untrue or crooked shaft.

By my within-described invention the serious objection to having roughing and finishing cutters at the same end of the hollow spindle is avoided, such objection being that the roughing-tools require, necessarily, to be in front of and cover up the finishing-tools, thereby rendering it a difficult and slow process to get at the finishing-tools for the purpose of changing, grinding, and adjusting the same, and as the finishing-tools have to be changed, ground, and adjusted as occasion requires it is very important that they should be placed in a position which will admit of this being done easily and quickly without interfering with the roughing-tools. It also avoids another objection arising from placing both sets of tools at the same end of the spindle—viz., that of the metal chips from the roughing-tools being thrown upon the finishing-tools and thereby tending to clog and interfere with their cutting to the best advantage—and, furthermore, it avoids the objection of having all the strain brought to bear on one journal of the spindle, my arrangement dividing this strain between both journals, and thus enabling the lathe to do smoother and truer work with the advantage before stated arising from placing both sets of cutters in positions independent of each other. My feeding arrangement also possesses great advantages over other constructions which employ stationary grooved feeding-rolls, because when the bar of iron is rough, or before it is turned, it is neither round, parallel, nor straight, and consequently the inevitable result of feeding such a bar through such rolls is to duplicate every irregularity of the bar and turn it out when finished with these irregularities. To illustrate this further, imagine a bar of varying diameter being fed through stationary rolls, and it will be seen that the result would be that in some places the bar would be clamped so exceedingly tight that something must break, and in other places the bar would not be clamped tight enough to prevent its being revolved with the cutters, and every little kink in the rough iron would be reproduced in the finished bar. With my feeding device the rough bar is firmly clamped to a saddle or saddles which slide on truly-planed ways, true with the revolving spindle, and consequently any irregularities in the rough bar are not reproduced on the finished bar.

What I claim as my invention is—

1. In a shaft-turning lathe, in combination, an ordinary lathe-bed A, a lathe-head about midway of the length of said bed, a hollow spindle having a tool-holding disk at each end and being connected to the said head, and a number of shaft-feeding lathe-carriages having suitable clamps for holding the shaft, substantially as described.

2. In a shaft-turning lathe, the intermediate lathe-head, in combination with a hollow spindle D, bushings d^2 d^3, disk E, having adjustable roughing-tools H, disk F, having buttons f, removable disk G, having adjustable finishing-tools I, gear-wheels d^4 d^5 d^6, lead-screw a', and clamping-carriages C, substantially as described.

3. In a lathe for turning shafts, in combination, a revolving hollow tool-carrying and shaft-centering spindle, a longitudinally-moving lathe-carriage having attached to it a clamp adapted for clamping, and, in conjunction with said spindle, centering-shafts of different diameters, the same consisting of a lower vertically-adjustable saddle portion or jaw and an upper adjustable jaw, suitable means for adjusting the said clamping portion, and suitable mechanism for moving in a longitudinal direction the said carriage and the shaft clamped to it, substantially as described.

4. The combination of a longitudinally-moving lathe-carriage having a screw-threaded formation c', a vertically-adjustable centering and clamping lower saddle-like portion, a screw-plug c^2 of tubular form and having a perforated head c^4 and fitted in the screw-threaded formation c', a detachable shank j, having jaw j^2 and fitted tightly in the lower saddle-like portion, an upper vertically-adjustable centering and clamping portion, devices for adjusting said clamping portions above the lathe-carriage, and suitable means for moving the said carriage, substantially as described.

5. The shaft-clamp comprising lower screw-threaded tube formation c', elevating-plug c^2, set-screw c^3, removable V-shaped jaw j^2, clamp j^3, bolts j^5, nuts j^6, and pivots j^7, all applied upon a lathe-carriage C, substantially as described.

6. The combination of disk F, having a polygonal depression, removable tool-holding disk G, fitted into said depression, and the eccentric buttons f, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

EVAN W. JONES.

Witnesses:
C. M. IDLEMAN,
L. M. IDLEMAN.