(No Model.)

E. CHILDS.

LATHE.

No. 490,426. Patented Jan. 24, 1893.

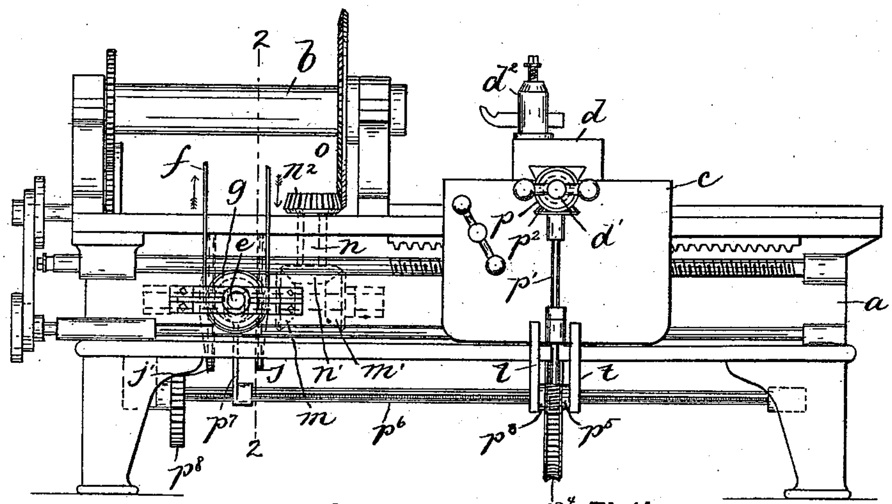

Fig.1.

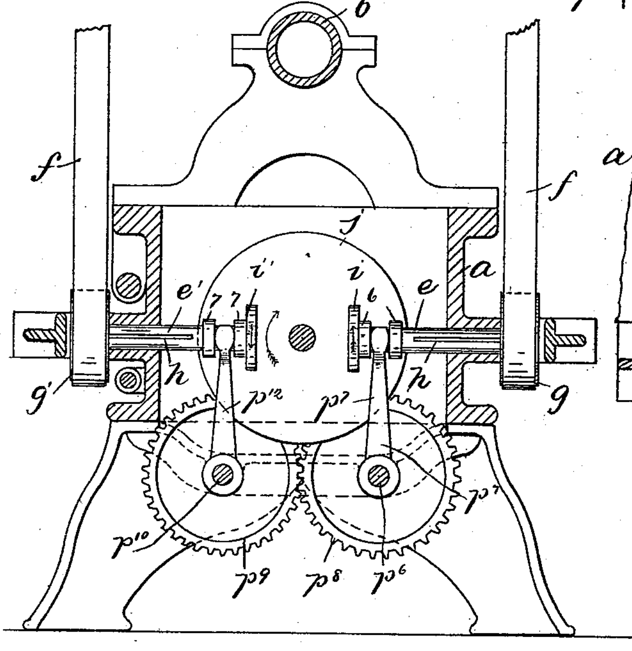

Fig.2.

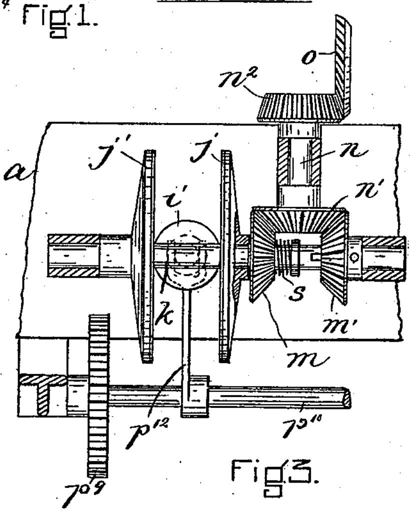

Fig.3.

WITNESSES.
A. D. Harrison.
A. N. Brown.

INVENTOR.
Eugene Childs
by Wright Brown & Crossley
Attys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

EUGENE CHILDS, OF REVERE, ASSIGNOR OF ONE HALF TO OSCAR L. NOBLE, OF BOSTON, MASSACHUSETTS.

LATHE.

REISSUED

SPECIFICATION forming part of Letters Patent No. 490,426, dated January 24, 1893.

Application filed February 1, 1892. Serial No. 419,857. (No model.)

To all whom it may concern:

Be it known that I, EUGENE CHILDS, of Revere, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Lathes, of which the following is a specification.

This invention relates particularly to the class of machines known as lathes, cut-off machines, and screw machines, employing a cross-feed or tool-carriage, which moves the cutting tool in a plane at right angles to the central line of the lathe, and particularly to the type of lathe shown in Letters Patent granted October 13, 1891, No. 461,401, said patent showing an improved organization securing approximately uniform rotary speed of the material against the cutting tool as it passes through the material from its largest to its smallest diameter or vice versa.

The present invention has for its object to provide certain improvements whereby the result aimed to be secured by the invention set forth in said patent is secured in a more satisfactory manner and with less complication of mechanism. To these ends the invention consists in the improvements which I will now proceed to describe and claim.

Of the accompanying drawings, forming part of this specification: Figure 1 represents a side elevation of a lathe embodying my improvements, the tail-stock and other parts of the lathe not essential in illustrating my invention, being omitted. Fig. 2 represents a section on line 2—2, Fig. 1, looking toward the left. Fig. 3 represents a side view and partial section of the mechanism shown in Figs. 1 and 2.

The same letters and numerals of reference indicate the same parts in all the figures.

In the drawings: *a* represents the bed or frame of a lathe: *b* represents the head-stock spindle, mounted to rotate in bearings on said bed, as usual: and *c* represents a carriage, which is movable on the bed and supports the cross-feed slide *d*, the latter being operated by the cross-feed screw *d'* and carrying the tool-post d^2.

The parts above mentioned are constructed and relatively arranged as usual in machines of this class, and their operation is well-known, hence I do not here describe it in detail.

e e' represents shafts, which are journaled in bearings on the bed *a*, and are arranged in line with each other and substantially at right angles with the axial line of the spindle *b*. Said shafts are rotated by means of a driving-belt or belts *f*, running on pulleys *g g'*, mounted respectively on the shafts *e* and *e'*, said pulleys being rotatively engaged with the shafts in such manner as that the shafts are adapted to move lengthwise while being rotated by the pulleys, the connection between the pulleys and shafts being effected in any suitable way, as by splines or feathers on the pulleys, engaging grooves *h h* in the shafts.

To the inner ends of the shafts *e e'* are affixed friction wheels *i i'*, which are located between and are in frictional contact with two friction disks *j j'*, which are mounted upon a shaft *k*, journaled in fixed bearings on the bed and arranged substantially parallel with the spindle *b*. The disk *j* is mounted loosely upon the shaft *k*, while the disk *j'* is affixed rigidly to said shaft.

The driving belt *f* is arranged to rotate the pulley *g* and its shaft *e* and friction wheel *i* in one direction, and the pulley *g'*, its shaft *e'* and friction wheel *i'* in the opposite direction, as indicated by the arrows in Fig. 2; said belt, if only one belt is employed, being disposed over a suitable system of pulleys arranged to produce the described result. The friction wheels *i i'* are located at opposite sides of the shaft *k*, and equidistant therefrom, as shown in Fig. 2, hence their rotation in opposite directions causes the simultaneous rotation of the disks *j j'* in opposite directions. The disk *j* is mounted loosely upon the shaft *k*, and is rigidly affixed to a bevel gear *m*, said gear and the disk *j* rotating together in the same direction. The disk *j'* is rigidly affixed to the shaft *k*, and rotates with said shaft in the opposite direction.

m' represents a bevel gear, which is affixed to the shaft *k*, and is rotated thereby.

n represents a vertical shaft, journaled in a fixed bearing on the bed *a* and provided at its lower end with a bevel gear *n'*, meshing with the gears *m m'*, and at its upper end with a bevel gear n^2 meshing with a bevel gear o affixed to the head-stock spindle b. It will be seen, therefore, that the spindle b is rotated by power imparted from the belt f through the shafts e e', friction wheels i i', friction disks j j', gear m, shaft k, gear m', shaft n and gears n' n^2.

As already stated, the shafts e e' are movable longitudinally, their arrangement being such that each shaft, when so moved, approaches or recedes from the shaft k. It will be seen, therefore, that the rate of motion imparted to the spindle b may be varied by moving the shafts e e' simultaneously in opposite directions, the speed of the spindle being decreased by moving the shafts e e' outwardly or away from the shaft k; and increased by moving said shafts e e' inwardly or toward the shaft k.

The position of the shafts e e' and friction wheels i i' relatively to the shaft k is determined by the position of the feed-screw d', said screw being connected with the shafts e e' through suitable intermediate mechanism adapted to move the shafts e e' inwardly toward the shaft k when the feed-screw d' is rotated to carry the cutting tool toward the axial line of the spindle b, so that the speed of the spindle is automatically increased as the tool approaches the center of the work. The said cutting mechanism, as here shown, is as follows:

p represents a bevel gear, affixed to the feed-screw d'.

p' represents a vertical shaft, journaled in a bearing on the carriage c, said shaft having at its upper end a bevel gear p^2, meshing with the bevel gear p, and at its lower end a worm p^3 meshing with the worm gear p^4, the hub p^5 of which is rotatively engaged with and adapted to move lengthwise upon a shaft p^6, which is journaled in fixed bearings on the bed a, said hub and shaft being engaged by any suitable means such as by a spline or feather on one of said parts and a groove in the other part receiving said spline.

p^7 represents an arm, rigidly affixed to the shaft p^6. The upper end of said arm is forked and engaged with two shoulders or collars 6 6 on the shaft e.

p^8 represents a gear, affixed to the shaft p^6 and meshing with a gear p^9 affixed to a shaft p^{10} which is arranged parallel with the shaft p^6 and is also journaled in bearings affixed to the bed a. The shaft p^{10} has an arm p^{12}, the forked upper end of which is engaged with two collars or shoulders 7 7 on the shaft e'.

It will be seen from the foregoing that the rotation of the feed-screw d', which adjusts the tool-carriage d and moves the tool toward and from the center of the work rotated by the spindle b, is accompanied by corresponding movements of the friction wheels i i' toward and from the shaft k, the arrangement being such that when the feed-screw is rotated in the direction required to move the tool toward the axis of rotation of the work, the friction wheels i and i' will be moved simultaneously toward the axis of the shaft k; when the feed-screw is rotated to more the tool away from the axis of the work, the friction wheels i i' are moved simultaneously away from the axis of the shaft k.

From the foregoing, it will be seen that the distance between the cutting tool and the axis of rotation of the work always corresponds to the distance between the friction wheels i i' and the axis of the shaft k rotated by said wheels. Hence, when the tool is working at or near the periphery of a comparatively large piece of work, the friction wheels i i' are considerably removed from the shaft k; and, as the tool approaches the center of the work, said friction wheels approach the shaft k at a corresponding rate. I thus directly proportion the speed and power imparted to the spindle b to the distance of the cutting tool from the axis of rotation of the work, the speed and power being greatest when the tool is at the minimum distance from the axis of the work, and decreasing at a definite rate as the tool recedes from said axis.

In the construction shown in the patent above mentioned, the friction disks are mounted on a shaft arranged at right angles with the spindle, and the friction wheel which rotates in contact with the surfaces of said disks is arranged so that when the cutting tool is at the maximum distance from the axis of the work said friction wheel is at the minimum distance from the axis of rotation of said disks. Hence, although the speed of the spindle is varied and has the same relation to the position of the tool as in the present case, the power is less when the tool is cutting on a large diameter than when cutting on a small diameter, the power increasing as the tool approaches the axis of the work, this being a disadvantage which my present improvement entirely overcomes. In said former patent, the power is first imparted to the friction disks and from said disks to the friction wheels, while in the present case the reverse is true, the power being imparted to the friction wheels and from thence to the friction disks. By this change, I am enabled to greatly simplify the construction of the machine, as will be readily seen.

The loose friction disk j is shown in Fig. 3 as movable lengthwise upon the shaft k, and pressed by a spring s in the direction indicated by the arrow in Fig. 3, so that a suitable frictional connection is at all times maintained between the disks j j' and the friction wheels i i'. The worm gear p^4 on the shaft p^3 is caused to move with the carriage c by means of arms or projections t t on the carriage, bearing on opposite ends of the hub p^5 of said worm gear.

In case my invention is applied to a cutting-off machine in which there is no necessity for a carriage movable independently on the lathe-bed, the worm gear p^4 will not necessarily be movable lengthwise upon the shaft p^6.

I claim:—

In a lathe, the combination with the head-stock spindle b having gear o and cross-feed screw d' having bevel gear p, of the longitudinally movable shafts e e' in line with each other and at a right angle to spindle b and carrying friction wheels i i', means for rotating said shafts in opposite directions, the friction disks j j' in contact with said wheels i i' and geared together and to the bevel gear o substantially as shown, the shafts p^6 p^{10} geared together and having arms engaging the shafts e e', the worm gear p^4 splined to the shaft p^6, and the vertical shaft p' journaled in bearings on the lathe carriage and having bevel gear p^2 meshing with the gear p and the worm p^3 meshing with the gear p^4, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 14th day of January, A. D. 1892.

EUGENE CHILDS.

Witnesses:
C. F. BROWN,
GEO. G. FROST.