E. BANCROFT & W. SELLERS.

LATHE.

No. 10,491. Patented Feb. 7, 1854.

Fig. 1

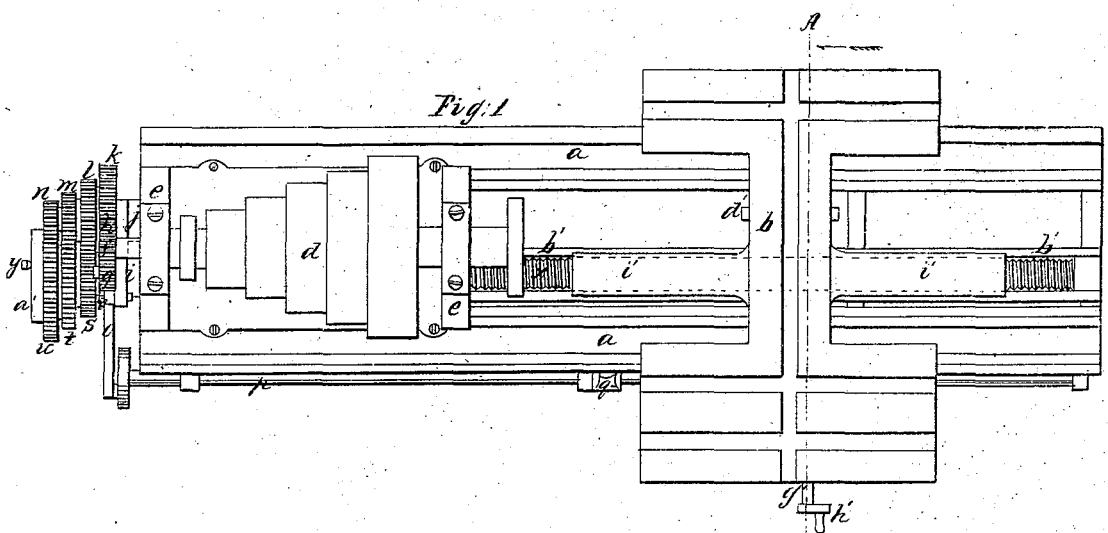


Fig. 3 A a

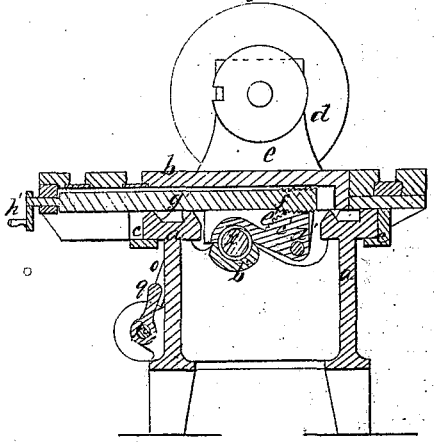


Fig. 2

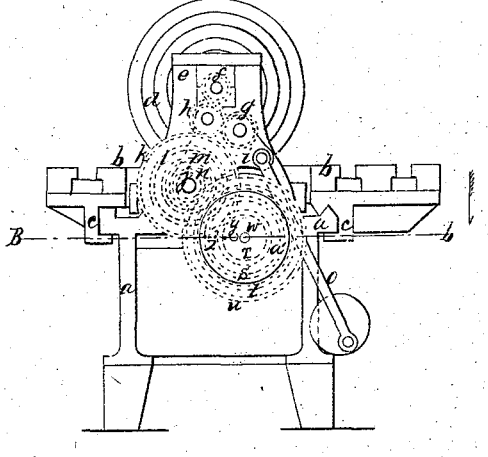
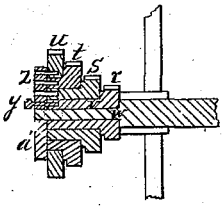


Fig. 4 B 1



UNITED STATES PATENT OFFICE.

EDWD. BANCROFT AND WM. SELLERS, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN TURNING-LATHES.

Specification forming part of Letters Patent No. 10,491, dated February 7, 1854.

To all whom it may concern:

Be it known that we, EDWARD BANCROFT and WILLIAM SELLERS, of Philadelphia, Pennsylvania, have invented certain new and useful Improvements in Lathes; and that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a plan; Fig. 2, an end elevation; Fig. 3, a cross vertical section taken at the line A *a* of Fig. 1; and Fig. 4, a section taken at the line B *b* of Fig. 2.

Same letters indicate like parts in all the figures.

The first part of our invention relates to the method of varying the speed of the screw which communicates motion to the carriage, relatively to the motion of the mandrel; and consists in the employment of a series of cog-wheels, connected and turning together, and receiving motion from the mandrel or from any other source, and imparting motion to the screw-shaft, each successive wheel in the series being of greater diameter, and the number of wheels in the series being equal to the number of changes required to be made, when this is combined with another and corresponding series of wheels, inverted, and all engaging the wheels of the first series, and each wheel of the second series being on a separate hollow arbor or sleeve, the sleeve of the first fitted to turn on the shaft of the screw, the sleeve of the second fitted to turn on the sleeve of the first, and so on throughout the series, and each sleeve or arbor being so formed as to receive a securing-pin, or its equivalent, connected with a disk or arm on the end of the screw-shaft, so that by simply shifting the pin or equivalent locking-instrument any one of the wheels in the series will be locked with the screw-shaft to communicate the required motion to it, while the others are left free to turn on their appropriate bearings.

And the second part of our invention relates to the method of sustaining the screw-shaft or leader and preventing it from being strained out of true—an object much desired in this class of lathes; and this part of our invention consists in combining with the screw-shaft or leader a metal trough, whose cross-section is a segment of a hollow cylinder, fitting the outer diameter of the thread, and so secured to the frame that the said screw or leader shall turn therein, and be supported by it to resist any lateral strain to which it may be exposed.

In the accompanying drawings, *a a* represent the usual shears of the lathe, formed with ways for the carriage *b* to slide on, the carriage being formed with projecting flanges *c c*, which extend under the projections of the ways to prevent the carriage from being lifted.

The mandrel *d* is mounted in the usual manner in heads or puppets *e e*, secured to the shears at one end, and the rear end of the mandrel is provided with a pinion, *f*, which engages either one of two pinions, *g h*, which turn on stud-pins on a lever, *i*, and meshing into each other. This lever turns on the stud-pin *j* of a series of cog-wheels, *k l m n*, so that, however the lever may be vibrated, the pinion *h* will always engage the cogs of the wheel *k*, the largest of the series. The lever is connected by a connecting-rod, *o*, with a rock-shaft, *p*, placed in front of the lathe, and provided with a handle, *q*, by means of which the lever can be shifted to put either of the pinions *g* or *h* in gear with the pinion on the end of the mandrel.

The wheels *k l m n* are each in succession of less diameter, and all fastened and turned together, and engage the cogs of a similar and corresponding series, *r s t u*, inverted, but adapted to turn each independently of the others.

The first and smallest of the series, *r*, is on a sleeve-arbor, *v*, fitted to turn freely, but accurately, on the end *w* of the screw-shaft or leader, *x*; the second, *s*, is also provided with a sleeve-arbor, fitted to turn on the sleeve of the first; the third, on the sleeve of the second; and the fourth, in like manner, on the sleeve of the third.

There is a longitudinal hole bored in the end of each sleeve-arbor to receive at pleasure a securing-pin or slide-bolt, *y*, which fits a series of holes, *z*, made in a plate, *a'*, secured to the outer end of the screw-shaft, these holes corresponding with the holes in the series of sleeve-arbors, so that when the securing pin or bolt *y* is inserted in the first of the series of holes *z* and the hole in the sleeve of the wheel *r* this wheel will be locked with the shaft of the screw or leader, and motion will be communicated from the mandrel, through the largest wheel, *k*, of the first series and the

smallest, *r*, of the second series, and hence the screw or leader will receive the quickest motion relatively to the mandrel, the other wheels of the second series turning freely; and if the pin or bolt be shifted to the last of the series of holes *z*, then the largest wheel, *u*, of the second series will be locked to the shaft of the screw or leader, and then the screw will receive the slowest motion relatively to the mandrel, and so on with the other wheels of the series.

The number and relative proportions of the wheels in the two series can be increased or diminished at pleasure, according to the intended capacity of the lathe and the different relative motions which it may be desired to give to the screw or leader; and the change can be made from the one to the other by simply shifting the pin or bolt from one to another of the series of holes, instead of shifting wheels, as heretofore practiced.

The shaft of the screw or leader is sustained in bearings at the end where it is not threaded, and the threaded part and the other end are entirely without journals, but rest and turn in a semicircular trough, *b'*, made of metal and firmly attached to the frame. The curvature of this trough should be such as to receive the screw and permit it to turn therein freely, but accurately, and to be supported thereby throughout its whole length against all lateral strain and its own weight.

The carriage is provided with a lever, *c'*, jointed at *d'*, the under face, near the forward end, being formed with a semicircular groove, threaded to fit the thread of the screw or leader, and the top of this lever is formed into a cogged sector, *e'*, which engages the thread of a worm, *f'*, on the end of an arbor, *g'*, provided at its outer end with a crank-handle, *h'*, by the turning of which the operator can connect the carriage with the screw or leader, or disconnect it. To the carriage is also attached a cap or cover, *i'*, whose under surface is grooved to fit and slide on the screw or leader and protect it, so that chips and other foreign substances shall not be permitted to fall onto the screw and lodge in the supporting-trough. This cap or cover is formed in two parts, one on each side of the lever-nut *c'*.

During the operation it will be seen that the screw or leader is thoroughly supported all around by the sustaining-trough and the cap or cover, so that it cannot be strained or bent.

We are aware that differential wheels have been employed, called sometimes "cone-wheels," with one series free to turn each independently on the shaft, which shaft is provided with a sliding spring-clutch, by sliding which any wheel of the series can be clutched to the shaft, leaving the others free to turn thereon; but such an arrangement is not applicable to a lathe, for the reason that the motion cannot be reversed, as the clutch must spring and must be beveled on one side to avoid catching and holding two wheels in the act of shifting, and thereby stripping off the cogs.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The method of varying the motions of the mandrel and screw or leader by means of the two series of wheels, each series consisting of wheels of different diameters, and all the wheels of one series being connected and turning together, and imparting motion to all the wheels of the second series, with different degrees of velocity, substantially as described, when this is combined with the method of locking any one of the wheels of the second series with the shaft of the screw or leader by having the wheels on separate sleeve-arbors, fitted to turn on each other, and adapted to receive a locking pin or bolt fitted to holes in a plate attached to the shaft of the screw, substantially as specified, or any arrangement effecting the same end by means substantially the same.

2. The manner of supporting and sustaining the screw or leader by combining therewith a trough, substantially as specified, having the outer end of the said screw or leader without a journal, as set forth.

EDWARD BANCROFT.
WILLIAM SELLERS.

Witnesses:
JOHN CLOUDS,
GEO. C. CLOUDS.