W. RUNGE.

MICROMETER CUTTING GAGE OR STOP DEVICE FOR LATHES, &c.

APPLICATION FILED SEPT. 19, 1910.

995,726. **Patented June 20, 1911.**

2 SHEETS—SHEET 1.

Fig. 1.

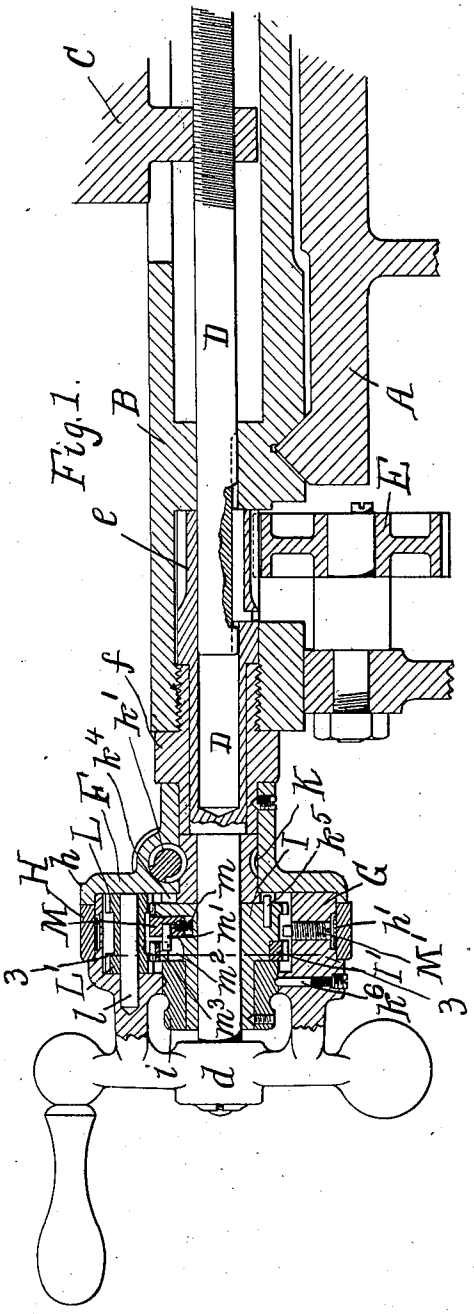


Fig. 3.

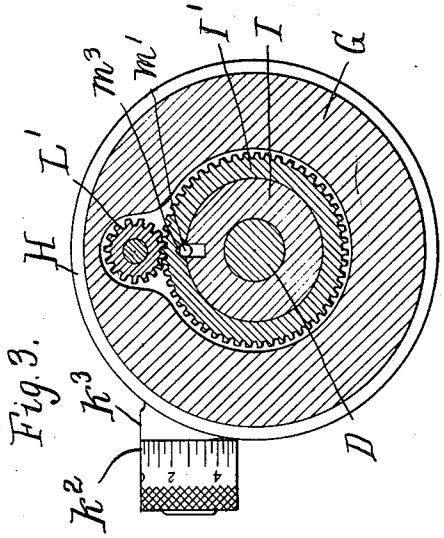
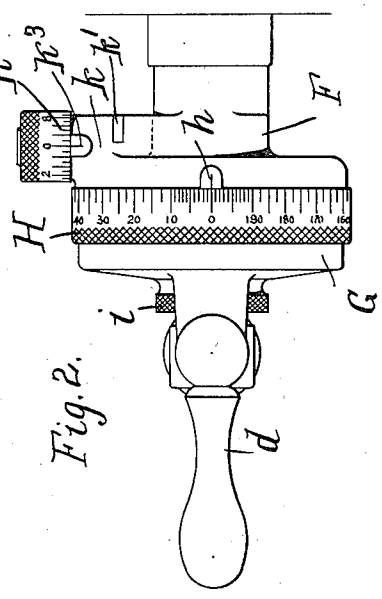


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 4.

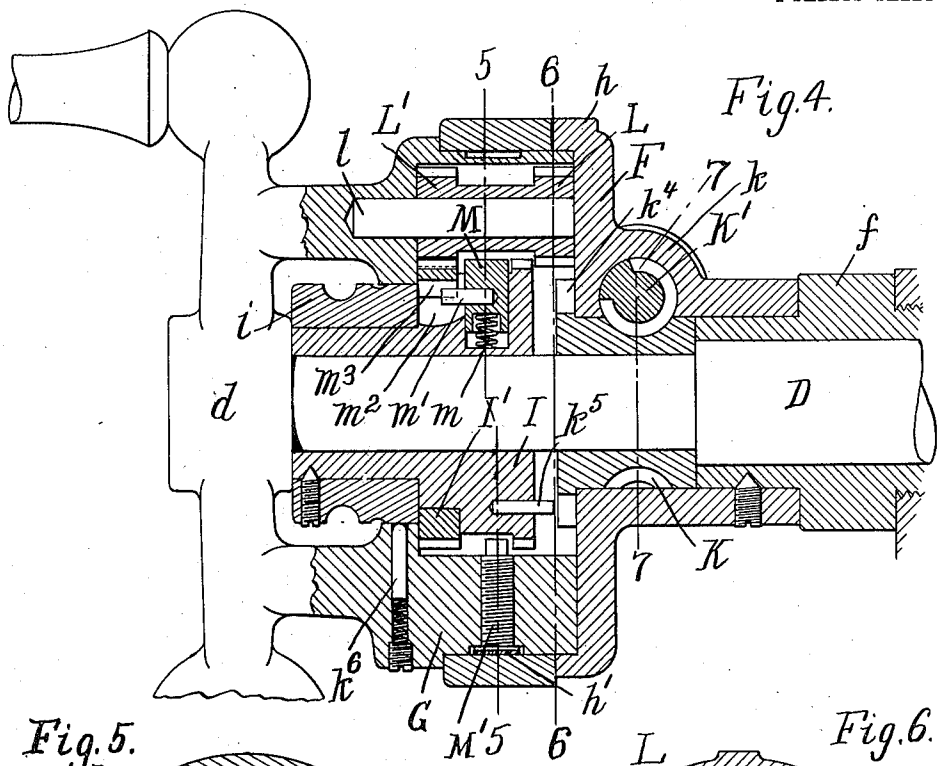


Fig. 5.

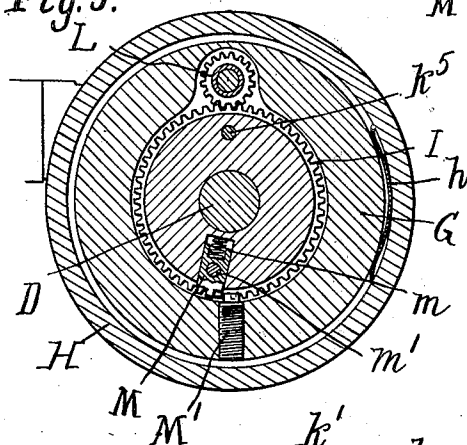


Fig. 6.

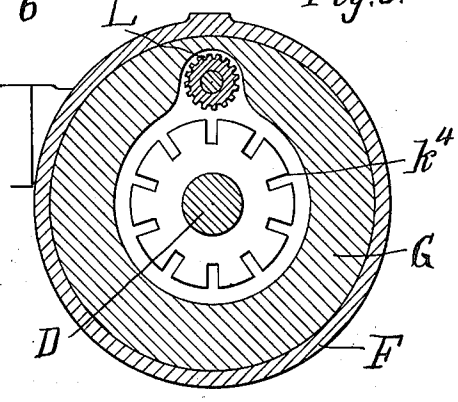
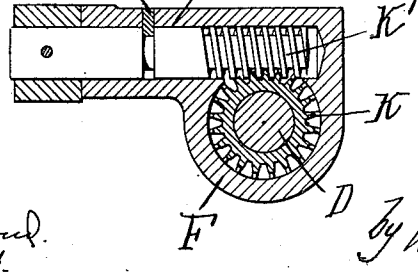


Fig. 7.



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UNITED STATES PATENT OFFICE.

WILLIAM RUNGE, OF SENECA FALLS, NEW YORK, ASSIGNOR TO THE SENECA FALLS MANUFACTURING COMPANY, OF SENECA FALLS, NEW YORK.

MICROMETER CUTTING-GAGE OR STOP DEVICE FOR LATHES, &c.

995,726. Specification of Letters Patent. Patented June 20, 1911.

Application filed September 19, 1910. Serial No. 582,688.

To all whom it may concern:

Be it known that I, WILLIAM RUNGE, a citizen of the United States, residing at Seneca Falls, in the county of Seneca and State of New York, have invented a new and useful Improvement in Micrometer Cutting-Gages or Stop Devices for Lathes, &c., of which the following is a specification.

This invention relates more particularly to improvements in micrometer cutting gages or stop devices for lathes and other machine tools of the character disclosed in Letters Patent No. 863,097, granted August 13, 1907, to myself, assignor to The Seneca Falls Manufacturing Company. These devices are for the purpose of enabling the advance movements of the cutter or tool toward the work to be regulated so that only cuts of predetermined depths can be made, whereby the reduction of the work beyond the prescribed dimensions is prevented.

The object of the invention is to produce an efficient and practical cutting gage or stop device of simple and durable construction which can be quickly and easily set for positively limiting the advance movements of the tool or cutter in either direction, as required, with great precision; which permits the full travel of the cross slide, or tool-carrying slide, without disturbing the adjustment of the cutting gage or stop device; and which can be readily thrown out of action to allow the unrestricted feeding of the tool or cutter by hand or by its power driven feed mechanism.

In the accompanying drawings, consisting of two sheets: Figure 1 is a fragmentary cross-sectional elevation of a lathe provided with a cutting gage or stop device embodying the invention. Fig. 2 is a plan view of the cutting gage or stop device. Fig. 3 is a transverse section thereof on an enlarged scale, in line 3—3, Fig. 1. Fig. 4 is a longitudinal sectional elevation thereof on a still larger scale, showing a different position of the parts. Figs. 5 and 6 are transverse sectional elevations on the same scale as Fig. 3, in lines 5—5 and 6—6, respectively, Fig. 4. Fig. 7 is a sectional elevation on a reduced scale in line 7—7, Fig. 4.

Like reference characters refer to like parts in the several figures.

A B and C represent, respectively, portions of the bed, tool carriage and cross slide of a lathe, D the cross feed screw (hereinafter called the feed screw) for moving the cross slide to advance and retract the tool or cutter, which is carried by the cross slide, toward and from the work, and *d* the crank or handle at the outer end of the feed screw for turning it by hand.

E *e* represent two wheels of the power-driven gearing for operating the cross feed screw. The power-driven gearing is thrown out of action when the cross feed-screw is to be actuated by hand and does not interfere with the operation of the cutting gage or stop, which is used only when feeding by hand. These are all well known parts of the ordinary lathe and may be of the usual or any suitable construction.

F represents a hollow shell or part which surrounds the feed screw D and is stationarily secured on the tool carriage B in any suitable way, for instance, it is fastened on a fixed bushing *f* on the carriage in which the feed screw D is journaled, and G represents the hollow cylinder or barrel which is secured to the feed screw and fits loosely in the open outer end of the shell F so as to turn freely therein. The barrel G is preferably a portion of the crank or handle *d*. The shell F and barrel G together form the inclosing casing of the cutting gage or stop.

H represents a graduated ring or collar which turns with the feed screw and cooperates with an index or mark *h* on the stationary shell F to indicate in thousandths of an inch or other small units of measure the distance which the cross slide is moved by turning the feed screw. This graduated collar preferably surrounds the barrel G between a shoulder thereon and the outer end of the shell F and is caused to turn with the barrel by a friction spring *h'* or any other means which permit the collar to be adjusted rotatably to different positions on the barrel.

I represents a gear wheel (hereinafter called the stop wheel) which is adapted to turn and also to slide endwise on the feed screw in the casing, and I' is a gear wheel which is adapted to turn independently of the stop wheel I. As shown, the gear wheel I' is journaled on a reduced portion of the stop wheel I, being retained in place thereon by a sleeve or knob *i* which is secured on the outer end of the hub of the stop wheel. The knob *i* projects out of the casing through an opening in the outer end of the barrel G

so that it can be grasped for shifting the stop wheel on the feed screw.

K represents a worm wheel which is journaled in the shell F to turn freely about the feed screw, and K′ is a micrometer screw or worm which meshes with the worm wheel K for turning it about the feed screw and holding it in different adjustments. As shown, the micrometer screw is journaled in a bearing k on the shell F, in which it is held from endwise movement by a key k', and is provided at its outer end with a knurled head or other suitable handle for turning it, said head bearing graduations k^2 coöperating with an index mark k^3 on the bearing to indicate in thousandths of an inch, or other small units of measure, the adjustments of the worm wheel K and the stop device which is controlled thereby, as hereinafter explained. The worm wheel is provided at the end thereof adjacent to the stop wheel I with a flange having a series of notches k^4, and the stop wheel I is provided with a pin k^5 which is adapted to be engaged in one of said notches by sliding the stop inwardly on the feed screw for coupling the stop wheel to the worm wheel. When the stop wheel is coupled to the worm wheel it can be turned to any desired position by turning the micrometer screw and it will be held stationary in such position by the worm wheel and micrometer screw. The worm wheel and micrometer screw thus constitute a fine adjustment device for adjusting and holding the stop wheel in different desired positions. Fine adjusting means of other suitable construction adapted to be releasably coupled to the stop wheel by any other suitable device can be employed.

k^6 represents a spring-actuated plunger or detent adapted to engage in a circumferential groove in the knob i for releasably holding the stop wheel in its inner position in which it is coupled to the worm wheel K. Any other suitable means can be employed for this purpose.

L L′ represent two pinions which are journaled on a pin l secured in the barrel G or are journaled in any other suitable manner in the barrel parallel with the feed screw and are adapted to mesh respectively with the stop wheel I and the gear wheel I′, the pinions L L′ being formed integrally with each other or otherwise connected to turn together. By pushing the knob i inwardly, the stop wheel I is moved into mesh with its companion pinion L and is also coupled to the worm wheel K whereby it is held from turning, whereas by pulling the knob i outwardly the stop wheel is disengaged from the worm wheel K and pinion L and can be turned freely on the feed screw by means of the knob i. The wheels I and I′ have a different number of teeth, for instance, the former has fifty-two teeth and the latter fifty-one teeth, so that if the feed screw and the barrel G are turned by the crank d when the stop wheel I is coupled to and held by the worm wheel K, the pinion L will roll around on the stop wheel and the pinion L′, turning with the pinion L, will advance the gear wheel I′ relative to the stop wheel K a distance equal to the width of one of its teeth for each revolution of the feed screw and barrel.

M represents a movable stop device or plunger which is movable in a pocket in the stop wheel I into and out of position to engage a coöperating stop device M′ which projects inwardly from the barrel G between the teeth of the wheels I and I′. The movable stop device is pressed outwardly by a suitable spring m but is normally held in its inward position, in which it will clear the coöperating stop device M′, by a lateral pin or portion m' thereof which projects into a slot m^2 in the hub of the stop wheel and bears against the inner periphery of the gear wheel I′. The gear wheel I′ has a V-shaped notch m^3 in its inner periphery and when this notch is brought opposite to the lateral projection m' of the stop device M the latter is moved outwardly by its spring to a position in which it is adapted to engage the coöperating stop device M′ on the barrel. The latter stop device M′ preferably consists of a screw screwed into a threaded hole in the barrel and having a smooth inner end whereby this stop can be readily adjusted in or out into proper relation with the coöperating stop M.

When it is desired to use the cutting gage or stop device for arresting the inward movement of the cross slide, the knob i is drawn out, thus uncoupling the stop wheel I from the worm wheel K and also disengaging it from its companion pinion L. The knob and the stop wheel to which it is fixed are then turned a fraction of a revolution to the left. When the lateral projection m' of the movable stop is brought opposite to the V-shaped notch m^3 in the gear wheel I′ the stop is permitted to be projected outwardly by its spring far enough to strike and stop against the coöperating stop M′ on the barrel G. The stop wheel I is then in a position to be easily engaged with the pinion L and the knob i is shoved inwardly again placing the stop wheel in mesh with said pinion and coupling it to the worm wheel K whereby it is held from rotation. The engagement of the stops M and M′ prevent the crank handle d from being turned to the right, *i. e.*, in a direction to feed the cutter inwardly toward the work, but the crank can be turned to the left or in a direction to retract the cutter from the work. As the gear wheel I′ has fewer teeth than the stop wheel I it is advanced somewhat relative to the stop wheel by the

pinions L L′ when the crank handle is turned, and the inclined edge of the notch m^3 acting on the lateral projection m' forces the stop M inwardly so that it will pass the coöperating stop M′. The crank handle and feed screw to which it is fastened can therefore be turned to the left a number of turns until, by its successive advance movements, the gear wheel I′ makes nearly a complete revolution and brings the notch m^3 again opposite to the projection m' of the stop so that the latter can move outwardly into position to strike the stop M′. The gear wheel I′ is advanced only a short distance, for instance a distance equal to the width of one tooth for each revolution of the feed screw, and consequently the feed screw can be turned to the left a number of revolutions, say forty-nine, sufficient to move the cross slide far enough to back the tool to any required position away from the work. The crank and feed screw can, however, only be turned to the right until the tool is moved inwardly to the position it occupied when the cutting gage was set, when the stops M and M′ will engage and prevent further inward movement of the tool. The tool can be advanced from this position in thousandths of an inch or other micrometer distances represented by the graduations on the micrometer screw K′ by turning this screw K′, which turns the worm wheel K and retracts the stop M from the stop M′, thereby allowing the crank to be turned to the right until arrested by the stop M′ striking the stop M. Thus the tool can be advanced short distances to make successive cuts of any predetermined depth by successive appropriate adjustments of the micrometer screw K′.

When it is desired to limit the outward movement of the cross slide, as, for instance, when using an internal tool or cutter, the knob *i* is drawn outwardly as before, to disengage the stop wheel I from the worm wheel K and from its companion pinion L and is turned to the right until the lateral projection m' of the stop M enters the V-shaped notch m^3 and the stop M strikes the coöperating stop M′, after which the knob is shoved inwardly to again engage the stop wheel with the worm wheel and with the pinion L. The crank and feed screw cannot then be turned to the left beyond this position to feed the tool outwardly, but they can be turned to the right as many turns as necessary to back the tool inwardly to the required position away from the work. The micrometer screw can also be used in the same manner as before, except that it is turned in the opposite direction, for advancing the tool to make one or more cuts of predetermined depth. When the stop wheel I is disengaged from the worm wheel and pinion L, by drawing the knob *i* outwardly, the feed screw is left free to be turned in either direction without restriction either by hand or by the power-driven feed gearing.

While the cutting gage or stop device is illustrated and above described as applied to the cross feed screw of a lathe for limiting the movements of the cross slide, it will be manifest that the device is equally adapted for limiting the movement of a rotatable shaft or part for any purpose

I claim as my invention:

1. The combination of a rotatable shaft, a stop which turns with said shaft, a coöperating shiftable stop which is rotatable relative to said shaft and is adapted to engage said first stop, means for holding said shiftable stop from rotation whereby it limits the rotation of said shaft in one direction, and means actuated by the rotation of said shaft in the opposite direction for shifting said shiftable stop to clear said other stop, substantially as set forth.

2. The combination of a rotatable shaft, a stop which turns with said shaft, a stop wheel which is rotatable relative to said shaft, means for holding said stop wheel from rotation, a shiftable stop carried by said stop wheel and adapted in one position to engage said first stop to limit the rotation of said shaft in one direction, and means actuated by the rotation of said shaft in the opposite direction for shifting said shiftable stop to clear said other stop, substantially as set forth.

3. The combination of a rotatable shaft, a stop wheel which is rotatable relative to said shaft, means for holding said stop wheel from rotation, a shiftable stop carried by said stop wheel, a coöperating stop which turns with said shaft, a wheel which is rotatable relative to said stop wheel for causing said shiftable stop to engage or clear said other stop, and means actuated by the rotation of said shaft for producing a relative motion between said stop wheel and said other wheel, substantially as set forth.

4. The combination of a rotatable shaft, a stop wheel which is rotatable relative to said shaft, means for holding said stop wheel from rotation, a shiftable stop carried by said stop wheel, a coöperating stop which turns with said shaft, a wheel which is rotatable relative to said stop wheel for causing said shiftable stop to engage or clear said other stop, and gears carried by said shaft and operating upon the rotation of said shaft to produce a relative motion between said stop wheel and said other wheel, substantially as set forth.

5. The combination of a rotatable shaft, a toothed stop wheel which is rotatable relative to said shaft, releasable means for holding said stop wheel from rotation, a spring-operated stop carried by said stop

wheel, a coöperating stop which turns with said shaft, a gear wheel which is rotatable relative to said stop wheel and has a different number of teeth from said stop wheel, said gear wheel having a notch adapted to receive a part on said spring-operated stop, and connected pinions which are carried by said shaft and mesh with said stop wheel and gear wheel, substantially as set forth.

6. The combination of a rotatable shaft, a stop which turns with said shaft, a stop wheel which is rotatable relative to said shaft, means for adjusting said stop wheel and holding it from rotation in different positions, a shiftable stop carried by said stop wheel and adapted in one position to engage said first stop to limit the rotation of said shaft in one direction, and means actuated by the rotation of said shaft in the opposite direction for shifting said shiftable stop to clear said other stop, substantially as set forth.

7. The combination of a rotatable shaft, a stop which turns with said shaft, a stop wheel which is rotatable relative to said shaft, means for holding said stop wheel from rotation, said stop wheel being also movable to couple it to and release it from said holding means, a shiftable stop carried by said stop wheel and adapted in one position to engage said first stop to limit the rotation of said shaft in one direction, and means actuated by the rotation of said shaft in the opposite direction for shifting said shiftable stop to clear said other stop, substantially as set forth.

8. The combination of a rotatable shaft, a stop wheel which is rotatable and slidable on said shaft, a holding wheel with which said stop wheel is adapted to be engaged by sliding the latter on said shaft, means for rotatably adjusting and holding said holding wheel, a shiftable stop carried by said stop wheel, a coöperating stop which turns with said shaft, a wheel which is rotatable relative to said stop wheel for causing said shiftable stop to engage or clear said other stop, and gears actuated by the rotation of said shaft for producing a relative motion between said stop wheel and said other wheel, substantially as set forth.

9. The combination of a rotatable shaft, a barrel which is secured to said shaft, a toothed stop wheel which is rotatable and slidable on said shaft, a knob secured to said stop wheel and projecting out of said barrel for operating the stop wheel, a holding wheel with which said stop wheel is adapted to be engaged by sliding the latter on said shaft, means for rotatably adjusting and holding said holding wheel, a shiftable stop carried by said stop wheel, a coöperating stop carried by said barrel, a gear wheel which is rotatable relative to said stop wheel for causing said shiftable stop to engage and clear said other stop, and connected pinions which are journaled in said barrel and mesh with said stop wheel and gear wheel, substantially as set forth.

Witness my hand, this 13th day of September, 1910.

WILLIAM RUNGE.

Witnesses:
PAUL B. KENDIG,
J. C. DAVIS.