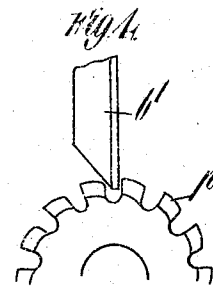
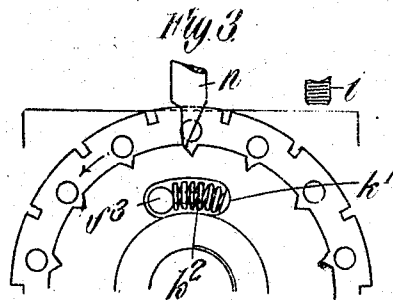
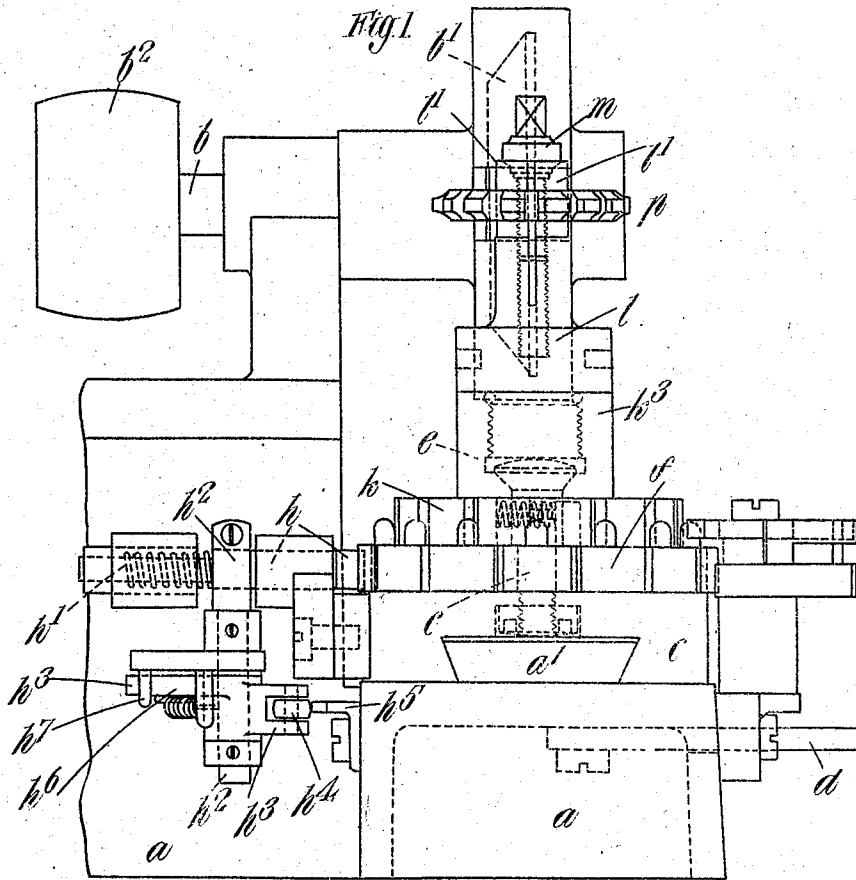


P. A. KUSTNER.
MACHINE FOR GRINDING MILLING CUTTERS OR SIMILAR TOOLS.
APPLICATION FILED JAN. 2, 1908.

936,915.

Patented Oct. 12, 1909.
2 SHEETS—SHEET 1.



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Fig. 2

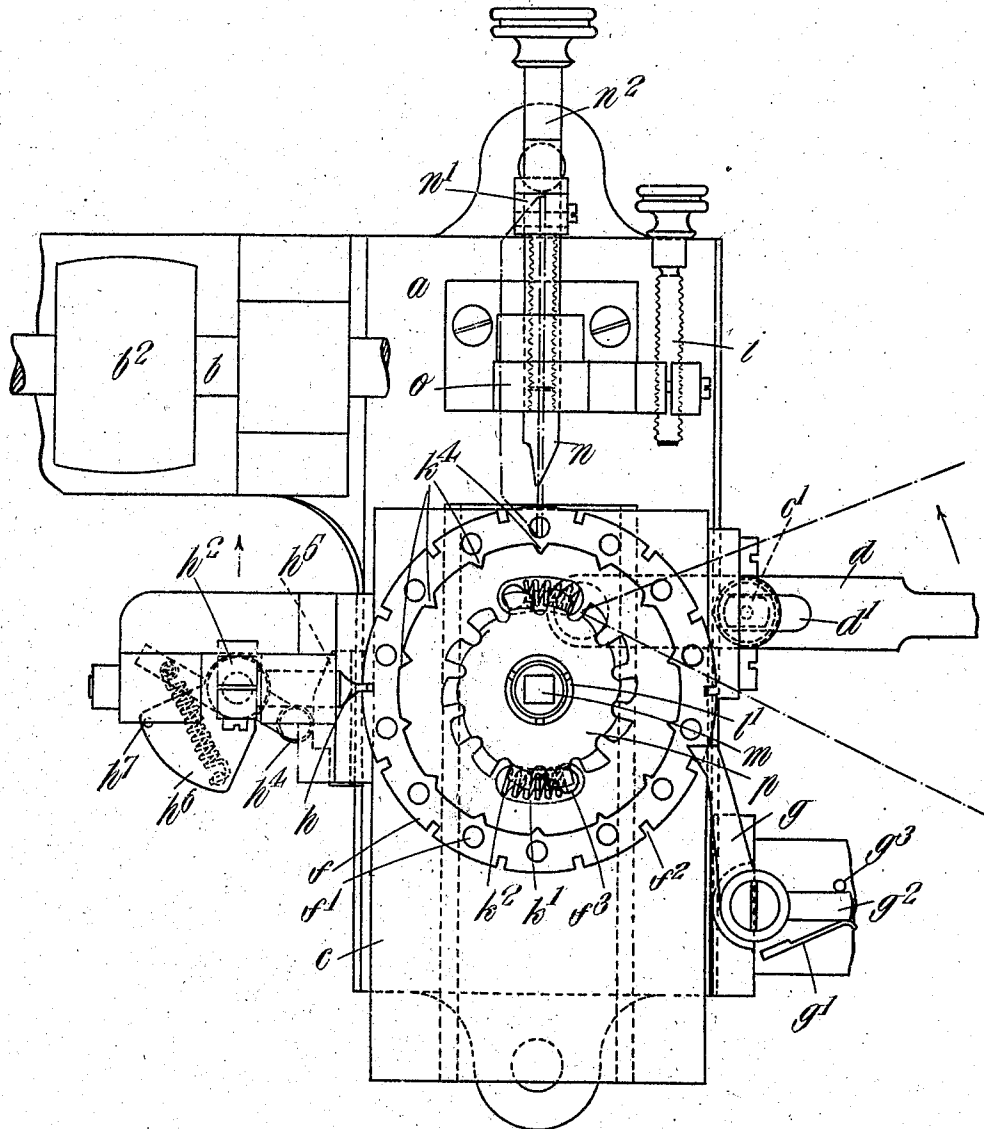
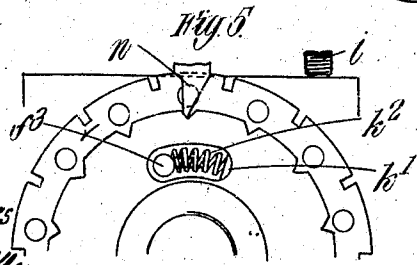


Fig. 5



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Fig. 6

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UNITED STATES PATENT OFFICE.

PIERRE ADRIEN KUSTNER, OF GENEVA, SWITZERLAND, ASSIGNOR OF ONE-HALF TO
GEORGE SONNENTHAL, OF LONDON, ENGLAND.

MACHINE FOR GRINDING MILLING-CUTTERS OR SIMILAR TOOLS.

936,915.

Specification of Letters Patent.

Patented Oct. 12, 1909.

Application filed January 2, 1908. Serial No. 408,933.

To all whom it may concern:

Be it known that I, PIERRE ADRIEN KUSTNER, a citizen of the Republic of Switzerland, residing at Geneva, in the Republic of Switzerland, have invented a certain new and useful Improved Machine for Grinding Milling-Cutters or Similar Tools, of which the following is a specification.

This invention relates to an improved machine for grinding milling cutters or similar tools, the object being to provide a machine particularly applicable for grinding milling cutters or other tools having cutting surfaces regularly spaced on a circle.

The accompanying drawing illustrates by way of example a machine in accordance with the invention.

Figure 1 is a side elevation of the machine. Fig. 2 a plan. Figs. 3 to 6 are detail views of the machine during the process of operation.

In the drawing, *a* is a stand which supports a spindle *b* which carries an emery wheel *b*¹ (not shown in Fig. 2) and a pulley *b*² which receives a belt for revolving the emery wheel. The stand *a* is also fitted with a projection *a*¹ on which a slide *c* moves. This slide may be traversed along the projection *a*¹ by means of a lever *d* placed on the stand, and provided with a handle not shown on the drawing. The traverse of the slide *c* by the lever *d* is effected by a sliding block *c*¹ carried by the slide *c* and working in the slot *d*¹ of the lever *d*. On the slide *c* a rotary circular table *f* swivels on a pivot *e*. The table *f* is provided with stops *f*¹ placed at equal distances apart, which catch the end of a pawl *g*, pivoted on the stand *a*. This pawl is kept in its normal position of rest, as shown in Fig. 2 by a spring *g*¹, acting on an arm *g*² of the pawl, which it tends to keep pressed against a fixed stop *g*³. On the edge of the table are cut a number of notches *f*² at equal distances apart, into which can be inserted the end of a stop rod *h*, which slides in a support carried by the slide *c*. The rod *h* is subjected to the action of a spring *h*¹, tending to push its end against the edge of the table *f*, and carries a bracket *h*² upon which is placed a lever *h*³. The lever *h*³ has at one end a roller *h*⁴ which rolls on a fixed guide *h*⁵ carried by the stand *a*. The lever *h*³ has at its other end a spring *h*⁶ which tends to bring its second arm in contact with a stop *h*⁷ carried

by the bracket *h*². The slide is shown on the drawing in the middle of its travel, the lever *d* moving in the direction of the arrow shown in Fig. 2. If the lever *d* is kept moving in the direction of the arrow, the slide *c* continues its motion until it strikes against the stop screw *i* shown in a bracket fixed to the stand *a*. During this motion the roller *h*⁴ reaches a tapered portion of the guide *h*⁵, which allows the spring *h*⁶ to bring the free end of the lever *h*³ to rest against the stop *h*⁷. The lever *d* being then moved in the opposite direction, the roller *h*⁴ strikes against the guide *h*⁵ and causes the withdrawal of the rod *h*, the extremity of which leaves the notch *f*² in which it rested. The end of the pawl *g*, acting on one of the stops *f*¹, revolves the table *f* until the roller *h*⁴ is clear of the guide *h*⁵, when the rod *h*, after resting against the edge of the table *f*, falls into the next notch *f*² to that which it has just left. The rod *h* then fixes the table *f* in position and the pawl *g* stops the travel of the slide *c* which is ready for another forward motion.

On the table *f* is fitted a rotary rest *k* swiveling on the same pivot *e* as the table *f*. The rest *k* is connected to the table *f* by an elastic coupling consisting of pins *k*¹ fitted in the table *f* and working in slots *k*² of the rest *k*, in which are placed springs *k*³. The upper part of the rest *k* is formed as a socket having an internal thread, into which is screwed a tool-holder *l*. The upper part of the holder is cylindrical, for receiving the milling cutter or other tool to be ground, and is hollow and split like a spring mandrel to form several parallel blades *l*¹. A screw *m* is placed on the end of the tool-holder and has a conical neck fitting in a hollow of corresponding shape in the tool holder. By tightening up the screw *m* proper adjustment is given to the blades *l*¹ and at the same time the milling cutter is tightened on the tool-holder.

On the edge of the rotary rest *k* are cut a series of notches *k*⁴ at equal distances apart, the flanks of which are inclined and which correspond to the number of the notches *f*² and of the stops *f*¹. These notches cooperate with a stop *n*, against which their inclined flanks strike at the end of the travel of the slide *c*. The stop *n* is formed by the end of a rod sliding in the bracket *o* fixed on the stand *a*. This rod is connected by a

flange n^1 to a screw n^2 fastened in the bracket o and ending with a knob by means of which the stop n is fed forward or withdrawn as required. The position of the latter is more-over arranged so as to give, during the lat-
 5 ter part of the motion, in front of the slide c , a rotary motion to the rest k in the same direction as the rotary motion given to this table f , by acting on one of the faces of the notches k^4 .

A milling cutter p having the same number of teeth as there are stops f^1 and notches f^2 and k^4 , being fixed on the tool holder in position as shown in the drawing, the way to
 15 proceed is as follows, viz:—The lever d being moved in the direction of the arrow, the slide c advances. Just before it finishes its travel, the end of the stop n comes in contact with the edge of the left inclined flank of the notch k^4 opposite the stop, as shown in Fig.
 20 3. Fig. 4 shows the corresponding position of the milling cutter p with respect to the emery wheel b^1 . During the end of the travel of the slide c the end of the stop n acting on the flank of the notch k^4 revolves the rest k by compressing the springs k^2 . The face of the milling cutter to be ground is thus brought in contact with the emery
 25 wheel, which works on the face of the cutter until the slide c reaches the end of its travel, as shown in Fig. 5. Fig. 6 shows the proper position of the milling cutter with respect to the emery wheel. When the lever d is pulled
 30 back, the cutter on which the emery wheel has been working commences to move from the latter owing to the slight backward motion given by the springs k^2 to the rest k , the slide c then makes its return motion while
 35 the table f , the rest k and the cutter receive a forward motion as explained above. The machine is now ready for grinding the face of the next tooth of the cutter. By means
 40 of the screw n^2 , the action of the wheel on the cutter can be regulated with the utmost precision; moreover the face of the cutter to be ground being brought in contact with the emery wheel farther away from the cutter
 45 in a direction almost perpendicular to the working surface of the emery wheel, through the rotary movements of the rest k , the face of the cutter is ground much better and the cutting edges are made much sharper than
 50 if the cutter were moved to and fro by the movement of the slide c .

55 By changing the position of screws l and n the machine can be arranged for grinding cutters of different diameters.

The tool-holder l being simply screwed in the socket k^3 , it can be easily replaced. The table f and the rest k can also be readily replaced for grinding cutters or similar tools having a different number of teeth.

What I claim and desire to secure by Letters Patent of the United States is:—

1. In a machine for grinding milling cutters or similar tools the combination with a reciprocating slide of a spring controlled rotary rest having notches provided with inclined flanks, and an adjustable stop acting on said flanks.

2. In a machine for grinding milling cutters or similar tools, the combination of a reciprocating slide, a spring controlled rotary rest, an adjustable stop, a table, and means for imparting rotary motion to said table at each return of said reciprocating slide.

3. In a machine for grinding milling cutters or similar tools, the combination of a reciprocating slide, a spring controlled rotary rest having notches provided with inclined flanks, an adjustable stop acting on said flanks, a table, and means for imparting a predetermined rotary motion to said table at each return of said reciprocating slide.

4. In a machine for grinding milling cutters or similar tools, the combination of a reciprocating slide, a spring controlled rotary rest having notches provided with inclined flanks, an adjustable stop acting on said flanks, a table, means for imparting a predetermined rotary motion to said table at each return of said reciprocating slide, and a spring-like expandible tool holder.

5. In a machine for grinding milling cutters or similar tools, the combination of a reciprocating slide, a spring controlled rotary rest having notches provided with inclined flanks, an adjustable stop acting on said flanks, a table, means for imparting a predetermined rotary motion to said table at each return of said reciprocating slide, and a spring like tool holder having a hollow cylindrical portion which is split and provided with means for effecting its expansion and the tightening of the tool thereon.

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

PIERRE ADRIEN KUSTNER.

Witnesses:

L. H. MUNIER,
 R. DE WURSTENBERGER.