(No Model.)

M. OFFENBACHER.

MACHINE FOR GRINDING FLAT FACETS.

No. 497,334. Patented May 16, 1893.

Fig. 1

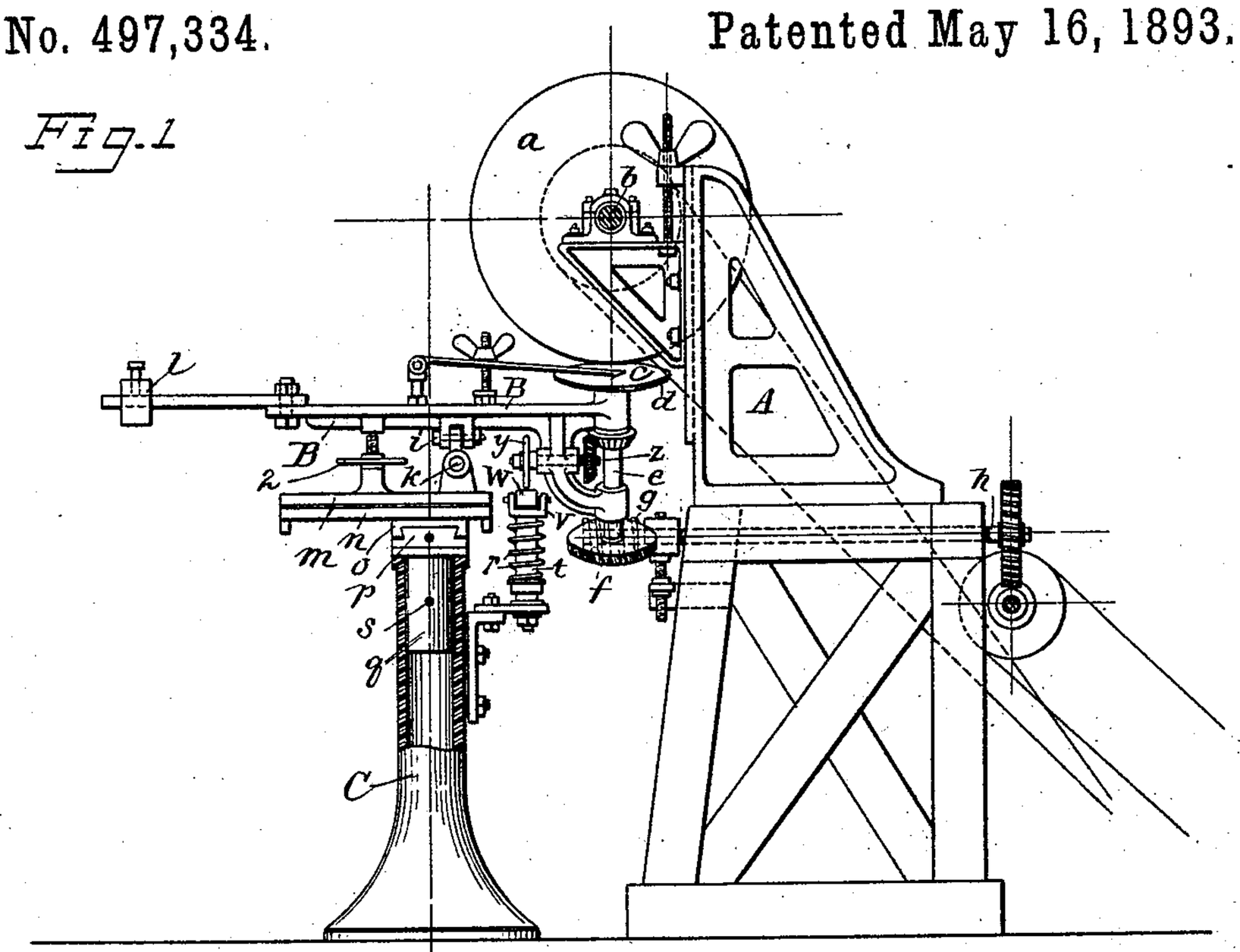


Fig. 3

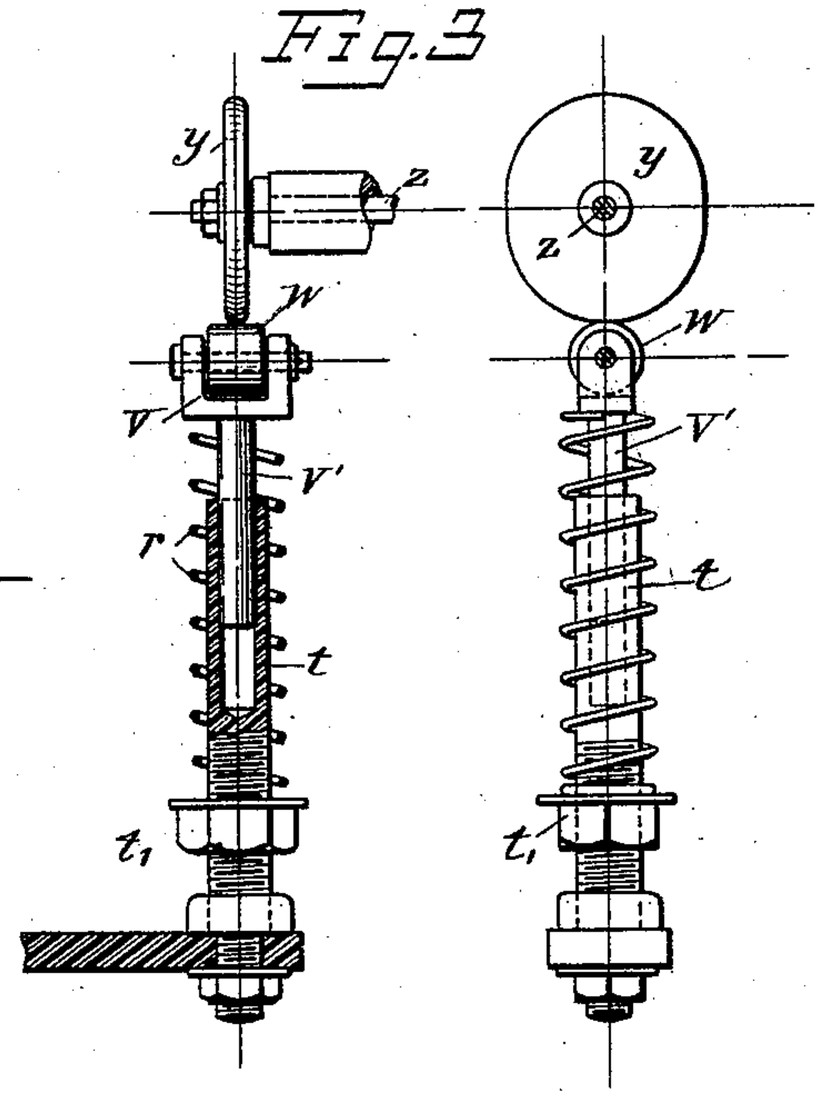
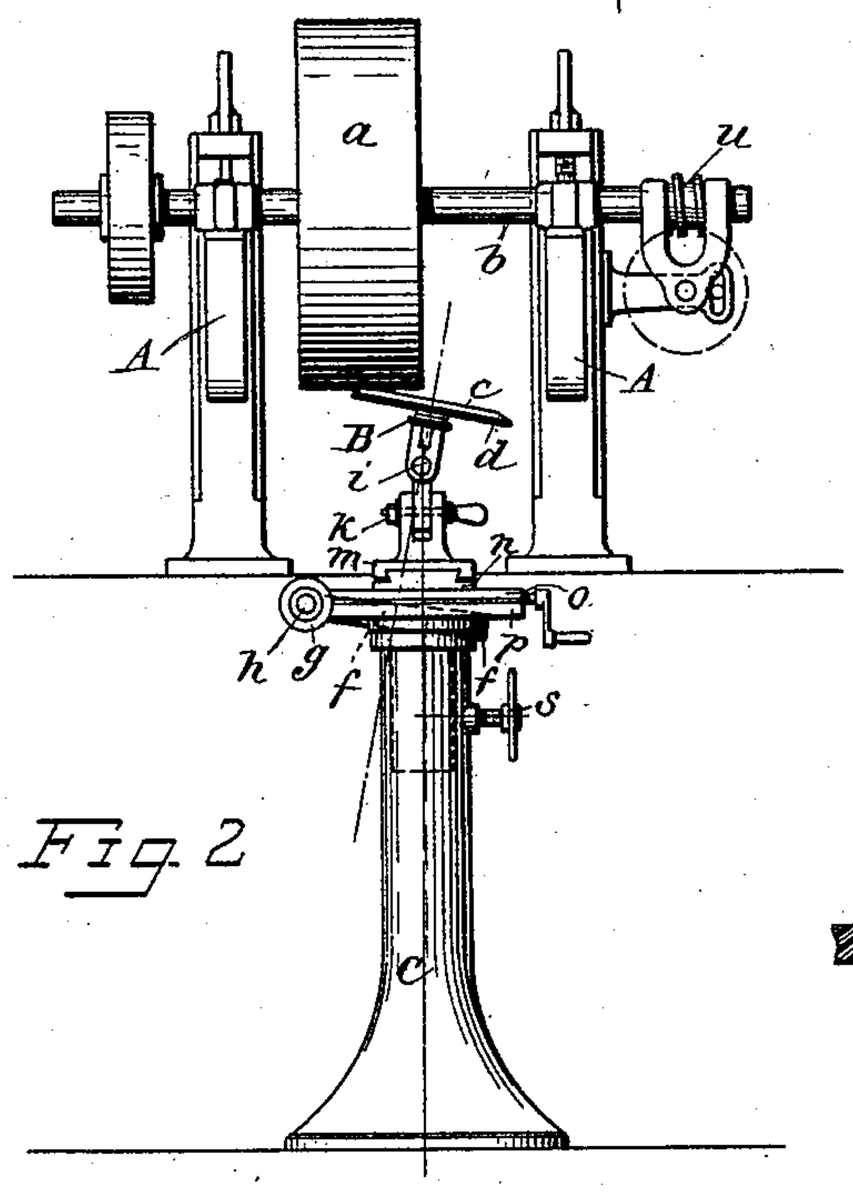


Fig. 2



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MACHINE FOR GRINDING FLAT FACETS.

SPECIFICATION forming part of Letters Patent No. 497,334, dated May 16, 1893.

Application filed September 30, 1892. Serial No. 447,443. (No model.)

To all whom it may concern:

Be it known that I, MAX OFFENBACHER, a resident of Fürth, Bavaria, German Empire, have invented certain new and useful Improvements in Machines for Grinding Flat Facets, of which the following is a specification.

This invention relates to that class of facet-grinding or bevel-grinding machines in which plane facets or bevels are obtained by pressing the rotating object, to be ground, in an inclined position against the periphery of the grinding-cylinders or disks, and consists in the novel arrangement and combination of parts hereinafter described and pointed out in the claims.

The object of this invention is to construct machines of this character with means for regulating the degree of the bevel, whether the plate to be ground is oval, elliptical or round. For this purpose the working piece is arranged under the grinding disk, which position is more convenient for the attending workman, and affords him a better opportunity for watching the grinding process. The supporting frame is so constructed and joined to an upright stand, that it can be moved in many different directions, and at different angles, so as to move the object to be ground to and from the grinding disk, and placing it at different angles to the periphery thereof. Of especial importance, moreover, is the arrangement for regulating pressure to obtain facets or bevels of equal width. The facet-grinding machine working in the manner just mentioned is of the following nature, as may be better understood with reference to the drawings, in which—

Figure 1 is a side elevation of my improved machine, partly in section. Fig. 2 is a front view of the same; and Fig. 3 represents a front view and side view, partly in section, of the pressure device.

Like letters and figures represent corresponding parts.

The grinding disk *a*, which may be of any suitable material rests with its horizontal shaft *b* on the frame A, and is rotated in the usual manner at the same time being moved back and forth in the direction of the shaft by any suitable means, as shown at *u* in Fig. 2. Below this disk is placed the object, that is, the plate of glass, to be ground. This is inclined at a suitable angle to the horizontal shaft, which angle is regulated by the extent or angle of the bevel to be produced, and since this angle is generally very small, the plate occupies an almost horizontal position. When the plate, in this position, is pressed against the surface of the rotating disk, and is at the same time rotated on its own shaft, the consequence is that the object is provided with a bevel surrounding the entire plate, which bevel is ground at the angle at which the frame has been previously fixed. To attain this result the plate of glass *c* is fastened in any well-known manner upon a plate *d*, whose shaft *e* rests in a movable and adjustable frame B, and is provided at its lower end with a worm wheel *f* meshing into a worm *g* on the main driving shaft *h*, by means of which the shaft *e* is rotated. This worm-wheel mechanism is of importance for the grinding machine in question, in connection with the adjustability of the frame B mentioned in the beginning, as the moving of the rotating object to and away from the disk *a* by the lateral movement of the frame causes the engagement, and this engagement of the worm *g* and worm-wheel *f* is caused without necessitating a separate mechanism for throwing it in and out of gear.

In order to give the frame B holding the object to be ground movement in different angles the frame is attached to an upright stand C and can be moved on the knuckle-joint *i* at any angle to the periphery of the disk *a*. By means of the knuckle-joint *i* the change of the bevel-angle is effected, the movement of the frame B in each case being limited by the turning of a set screw 2. Moreover, the plate carrying end of the frame B can be moved up in contact or down and out of contact with the disk *a* by a second knuckle-joint *k*. The contact between the object and the disk *a* is produced automatically by an arm B′ lying on the side opposite to that of the knuckle-joint *k*, which arm is provided with a movable weight *l*. The weight in this case restores the equilibrium when the contact mentioned is made. The grinding pressure proper however is produced not by this weight, as is the usual method, but by a special mechanism, which will receive more detailed description farther on.

The frame B, movable in the two directions as described, with the parts attached thereto, is fastened to a support *m*. This support *m*

is movable in a direction at right angles to the shaft *b* of the disk *a*, and is supported on a guide *n*; *o* is a second movable support which is adapted to be moved at right angles to that of the first movable support *m*, or parallel to the direction of the shaft *b*, and is guided by *p* in a similar manner to that of the support *m*. By these means shaft *e*, according to the size of the piece of glass to be ground, is moved to or from the frame A so that thereby it is possible to work glasses of different diameters with the same machine, by all of which features I am enabled without otherwise changing its position to move the object to the ground along the cylindrical surface of the grinding cylinder or disk, and therefore, when one part of the cylinder is worn, another part, or even the whole length, can be used.

The last mentioned carriage guide *p* rests on a cylindrical support *q* that is fitted into the upper portion of the hollow stand C. By turning support *q* the whole frame just described is turned on its axis *x* and thereby, according to the direction of the rotation, the worm-wheel *f* is brought into or out of contact with the worm-gear *g*, and the object is moved in or out. The position in each case can be fixed by a set screw *s*.

In addition to the above mentioned varied movements regulation of the pressure necessary for the grinding is especially noteworthy in the case of the grinding machine in question.

As already mentioned, the weight *l* serves only to balance the frame B, and to bring the object near the cylinder with a certain minimum pressure. But the grinding pressure proper is exerted by a spiral spring *r*, which is so arranged and so influences frame B that the grinding pressure is regulated automatically corresponding to the shape of the piece of glass to be ground for the purpose of obtaining bevels of equal width. For this purpose I construct a pressure device which consists of a hollow standard *t*, properly supported by the main stand C, or otherwise. Over this standard is adapted to fit a coiled spring *r*, which spring is adjusted on the standard *t* by suitable means, as shown at *t'*. The upper end of the spring *r* acts upon a yoke *v* which, by means of its downwardly extending portion *v'* can be moved in the hollow portion of the standard *t* as shown in Fig. 3. The yoke *v* is provided with a roller *w* which, under influence of the spring *r*, is pressed against the periphery of a disk *y*, and thus causes the end of the frame, which holds to the plate to be ground, to be pressed up, or, in other words, the object *c* is thereby pressed against the grinding disk *a*. This disk *y* is mounted on a shaft *z* which rests in the frame B, and is connected and rotated through suitable bevel gear by shaft *e*. The regulation of the grinding pressure now is dependent upon the shape of disk *y* which corresponds to the shape of the glass to be ground. If the latter, for instance, be round, a round disk will be put upon the shaft *z*, and consequently a perfectly uniform pressure will be exerted upon the plate of glass. If, however, bevels on oval or other irregular forms of plates are to be ground, the pressure disk *y* used will be of a form corresponding to that of the plate of glass. While this oval or other formed disk is being rotated the spring *r* will be alternately compressed and extended, and will exert a correspondingly greater or smaller pressure. If now the disk *y*, which, like the plate of glass, is supposed to be oval, is so put upon the shaft *z* that spring *r* acts upon it in the direction of its greater axis, while the plate of glass is being ground in the direction of the smaller axis, the grinding pressure, in this position, will be at its greatest, and, while the grinding is done in the direction of the greater axis, the grinding pressure will be at its lowest.

The strength of the grinding pressure is automatically regulated in inverse ratio to the length of the axis at the place of grinding, and in this manner the production of bevels of uniform width is made possible.

In order to increase or diminish the grinding pressure in proportion to the toughness of the material, rod *t* is threaded at its lower portion, and the tension of spring *r* can be more or less regulated by a nut *t'*, or other suitable means as before described.

What I claim as my invention is—

1. The combination of the grinding disk *a*, frame B for carrying the object to be ground, knuckle joints *i*, *k* and swivel *q* for supporting said frame B, whereby the object to be ground can be moved parallel with and at right angles to the shaft of the grinding disk *a* and the degree of the angle of contact can be regulated, substantially as described.

2. The combination of the grinding disk *a*, frame B for carrying the object to be ground, knuckle joints *i*, *k*, and sliding supports *m*, *o*, all arranged so that the object to be ground can be moved in a horizontal and vertical plane, and the degree of the bevel to be made can be determined, as and for the purposes described.

3. The combination of the grinding disk *a*, frame B, rotating support *d*, for supporting the object to be ground, pattern disk *y* communicating therewith, coiled spring *r*, having means for bearing against the disk *y*, and for adjusting said spring so as to regulate the pressure to be applied to the object to be ground.

4. The combination of the grinding disk *a*, rotating support *d* for the material to be ground, and pattern disk *y*, whose shaft is at substantially right angles to the shaft of the support *d*, all arranged as and for the purposes specified.

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