

K. LIEGANDT.
MACHINE FOR GRINDING AND POLISHING LENSES.

968,246.

APPLICATION FILED AUG. 20, 1909.

Patented Aug. 23, 1910.

3 SHEETS—SHEET 1.

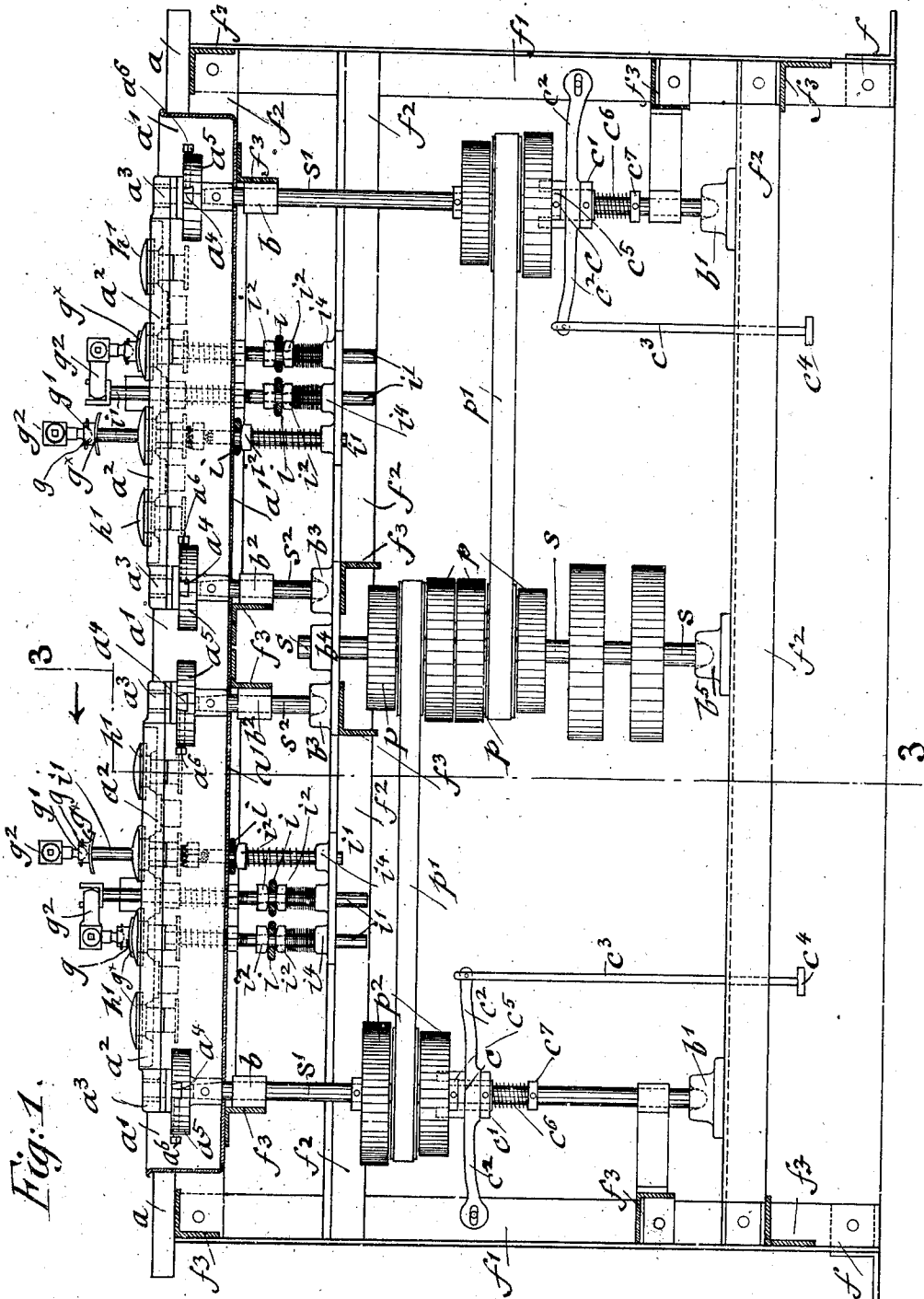


Fig. 1.

Witnesses:
E. Mueller
J. A. Cook

Inventor
Karl Liegandt
By his Attorneys
Saxton & Stepe

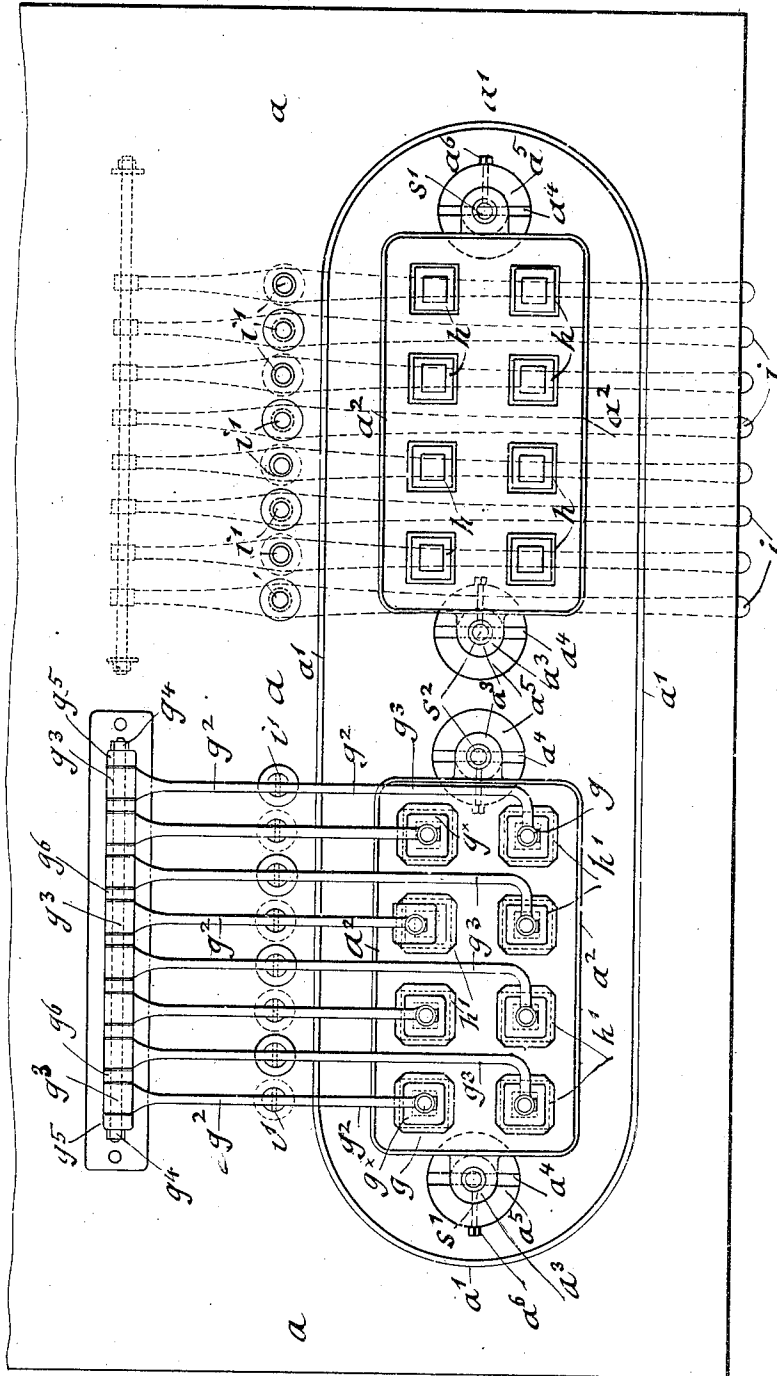
K. LIEGANDT.
MACHINE FOR GRINDING AND POLISHING LENSES.
APPLICATION FILED AUG. 20, 1909.

968,246.

Patented Aug. 23, 1910.

3 SHEETS—SHEET 2.

Fig. 2.

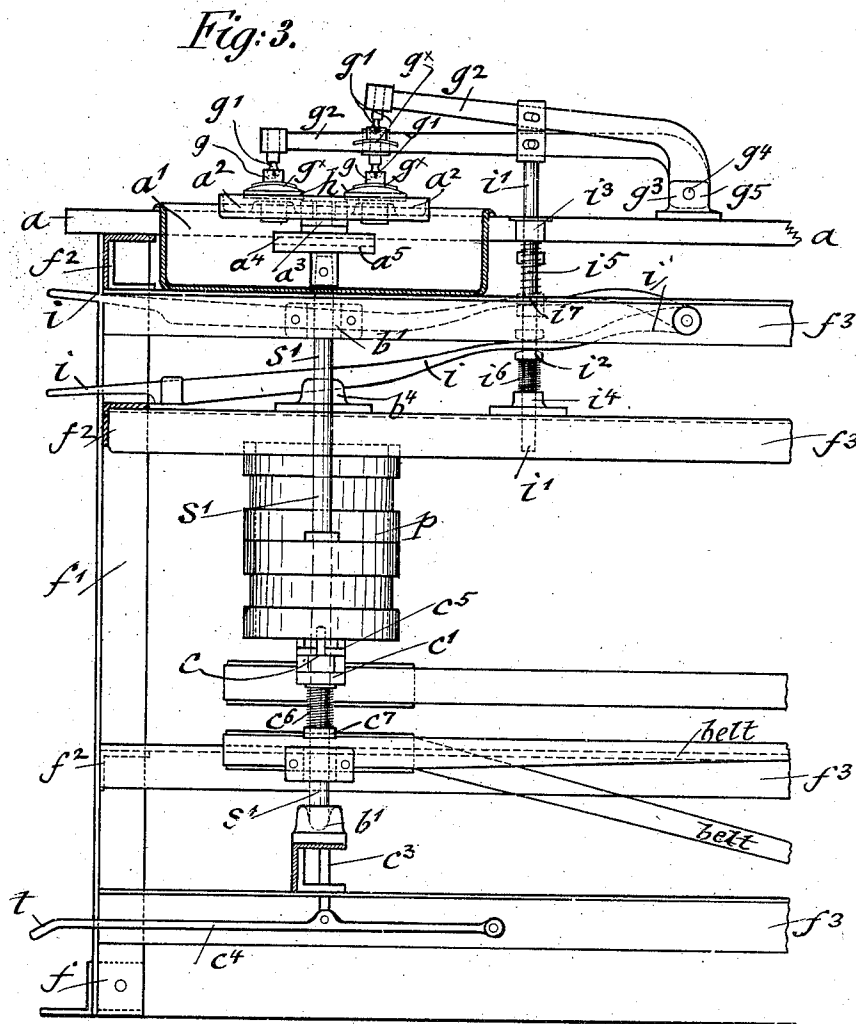


Witnesses:
S. Reuter
J. M. Cook

Inventor:
Karl Liegandt
By his Attorney,
J. M. Cook

968,246.

3 SHEETS—SHEET 3.



Witnesses:
S. Drucker
J. A. Cook

Inventor
Karl Liegnant
By his Attorneys,
Francis Cooper.

UNITED STATES PATENT OFFICE.

KARL LIEGANDT, OF NEW YORK, N. Y.

MACHINE FOR GRINDING AND POLISHING LENSES.

968,246.

Specification of Letters Patent. Patented Aug. 23, 1910.

Application filed August 20, 1909. Serial No. 513,733.

To all whom it may concern:

Be it known that I, KARL LIEGANDT, a subject of the Czar of Russia, residing in New York, in the borough of Manhattan, county and State of New York, have invented certain new and useful Improvements in Machines for Grinding and Polishing Lenses, of which the following is a specification.

This invention relates to certain improvements in machines for grinding and polishing lenses for optical purposes in such a manner that a plurality of lens-blanks are ground to the proper shape at the same time in a reliable and effective manner; and for this purpose the invention consists of a machine for grinding and polishing lenses which comprises a plurality of grinders, a frame for said grinders, means for imparting a rotary motion to the grinder-holding frame, a plurality of lens holders, pivoted lever-arms for supporting the lens-holders, a universal joint connection between the lever-arms and lens holders and spring-cushioned hand-levers for raising or lowering the lens holders as required.

The invention consists further of certain details of construction which will be fully described hereinafter and finally pointed out in the claims.

In the accompanying drawings, Figure 1 represents a front-elevation, partly in vertical longitudinal section, of my improved machine for grinding and polishing lenses, Fig. 2 is a plan-view of the same, one-half of the machine being shown with the grinders in position for use, while the other half shows the grinding devices removed for showing the lens-holders and their supporting frame, and Fig. 3 is a vertical transverse section on line 3, 3, Fig. 1.

Similar letters of reference indicate corresponding parts throughout the figures.

Referring to the drawings, f represents the supporting frame of my improved machine for grinding and polishing lenses. The frame is made of oblong shape, and provided with upright corner-standards f^1 which are braced by longitudinal and transverse angle-irons f^2, f^3 . On the upper portion of the frame f is arranged a table a which carries a water-collecting pan a^1 having rounded-off ends. In the pan a^1 are arranged two grinder-holding frames a^2 of oblong shape, which are pivoted at opposite ends by means of perforated ears a^3 to dove-tailed bars a^4 that are guided in correspond-

ingly, shaped grooves provided in crank-disks a^5 at the upper ends of upright shafts s^1, s^2 , of which the shafts s^1 are supported by neck and step bearings b, b^1 and driven by pulley and belt transmissions from an upright driving-shaft s , while the shorter shafts s^2 are supported by neck and step bearings b^2, b^3 , the neck-bearings of both shafts s^1, s^2 being supported on the longitudinal and transverse angle-irons f^2, f^3 of the frame f ; while the step-bearings b^4, b^5 of the driving-shaft s are supported on the longitudinal angle-irons f^2 of the supporting frame f , as shown in Fig. 1.

The driving-shaft s is located at the center of the supporting frame, between the lens-holding frames a^2 , and rotated continuously by means of a belt and pulley transmission from a suitable power-belt, while the shafts s^1 , by which the grinder holding frames are actuated, are located near the ends of the supporting frame f and driven by step-shaped pulleys p^2 and transmitting belts p^1 from step-shaped pulleys p on the driving-shaft s , as shown clearly in Fig. 1.

The motion of the intermediate shaft s^1 can be instantly arrested by means of a clutch mechanism c which is composed of a spring-cushioned clutch member c^1 sliding on the shaft s^1 and connected with a lever c^2 that is pivoted at one end to an upright f^1 of the frame f , and at the other end connected by a pivot-rod c^3 with a lever c^4 which carries a treadle t at its front-end and which is pivoted at its rear-end to a transverse angle-iron f^3 at the lower part of the frame f . The clutch member c^1 interlocks with a fixed transverse clutch member c^5 on the shaft s , so that the latter is not rotated when the clutch member c^5 is released from the sliding and spring-cushioned member c^1 by the depression of the treadle t , but rotated as soon as the treadle is released and the sliding clutch member returned into engagement with the fixed transverse member c^5 on the shaft s . The cushioning spring c^6 of the sliding clutch member c^1 is interposed between the clutch-lever c^2 and a fixed collar c^7 on the lower portion of the shaft s . As soon as one of the treadles is lowered, the sliding and spring-cushioned clutch member c^1 is withdrawn from the transverse clutch member c^5 and moved out of engagement therewith so as to produce the instant interruption of the motion of the grinder holding frame a^2

connected with the shaft s^1 . In each lens-holding frame a^2 is arranged a plurality of holders h for the grinders h' . In the drawing eight grinders are shown.

5 The grinders h' are made of steel or other suitable material and are of convex or other shape, according to the shape to be given to the lenses g^x . The lens-holders g are connected by universal joints g^1 with the front-ends of lever-arms g^2 that are arranged parallel with each other, and pivoted at their rear-ends by means of eyes g^3 to a transverse rod g^4 which is supported in perforated ears g^5 on the table a of the machine. The eyes d^3 are separated by means of washers g^6 so as to be held in their proper position on the pivot-rod g^4 . One set of lever-arms g^2 which holds the lens-holders for the rear-row of lens-blanks is made straight, while the intermediate set of lever-arms which holds the lens-holders for the front-row of lens-blanks is curved at right angles at the outer ends so as not to interfere with the adjacent set of levers g^2 . 25 The grinders and their levers are held in proper position by means of a number of manually operated levers i , which are located below the pan a^1 , said levers being connected by means of vertical rods i^1 and rounded-off screw-nuts i^2 , one below and the other above each lever i , with the lever arms g^2 , said vertical connecting rods being guided in suitable thimbles i^3 secured into corresponding holes in the table a and 35 guided at their lower ends in stationary sleeves i^4 attached to one of the longitudinal angle-irons f^2 , as shown clearly in Figs. 1 and 3. On each vertical rod i^1 are arranged two helical springs i^5 , i^6 , one between the thimble i^3 and a collar i^7 on the rod i^1 , and the other between the lower screw-nut i^2 and the stationary sleeve i^4 on the angle-iron f^2 , so that when one of the levers i is placed into raised position, as shown in dotted lines in Fig. 3, the lens-holder and its supporting arm are raised and the upper spring i^5 set to tension, while the tension of the lower spring is released. On the other hand, when the lever i is lowered so as to move the lever arms g^2 and the lens-holder into its lowered position, the tension of the upper spring is released and the lower spring compressed, the upper spring assisting in the lowering and the lower spring assisting in the raising of the lever i , lever arm g^2 and lens-holder g . The vertical rods i^1 are connected at their upper ends by means of transverse pivots i^8 with slots i^9 in the lever arms g^2 so as to permit thereby the free raising and lowering of the same by the hand-levers i when they are placed in raised or lowered position.

Rotary motion is imparted to the grinder-holding frames a^2 by the rotation of the crank-disks a^5 and their pivot connection

with the ears of the frames a^2 . A greater or smaller extent of motion or "stroke" is imparted to the frames a^2 by setting the pivot connection with the crank-disks a^5 at some distance to one side or the other of the center of the disks. This is accomplished by shifting the dovetailed bars of the crank-disks in the dovetailed grooves of the same to one side or the other. When the ears and dovetailed bars are placed in line with the axis of the driving-shafts, no motion is imparted to the grinder-holding frames; but when the dovetailed bars are adjusted to one side or the other of the driving crank-disks, motion is imparted to the supporting frames, all the parts describing a circle the radius of which is equal to twice the distance of the center of the crank-disks from the longitudinal center-line of the frame. The greater this distance or eccentricity of the center of the perforated ears from the center of the crank-disks, the greater is the circle described by every part of the grinder-holding frames and the holders therein. The degree of circular motion to be imparted to the holders depends on the size of the lenses and the degree of concavity or convexity to be imparted to the lenses. When the dovetailed bars are set to the proper position in the driving crank-disks, set-screws a^6 , which pass horizontally through the same, are turned inwardly toward the dovetailed bars and the latter thereby locked rigidly in position. When a different adjustment is necessary, the set-screws have to be loosened so as to permit the shifting of the dovetailed bars in the grooves of the driving crank-disks a^5 .

By arranging a plurality of grinder-holding frames and holders, one attendant can supervise the grinding of eight, or multiples of eight, lenses at a time. The construction shown in the drawings is arranged as a double grinding machine, and provides for the grinding of sixteen lenses at the same time; but it is obvious that the size of the frame and table can be doubled and another set of sixteen grinders be arranged thereon, which are driven from another driving-shaft, and so on, or only one set of eight grinder-holders may be used, in which case the output is correspondingly diminished. As the grinders act with a uniform degree of pressure on the lenses, a uniform grinding action is exerted on the same. When one side of the lens-blanks is completed, they are turned around and again cemented into their dops and then finished on the opposite side. After the grinding action is completed, the polishing of both surfaces is accomplished by the addition of a suitable polishing powder to the water in the frames, so that perfectly smooth surfaces are obtained. As one man can easily attend to a machine with sixteen grinders and supervise

the progress of the work by lifting from time to time the lenses by means of the hand-levers from the front-end of the machine, the grinding and polishing of lenses of all kinds can be accomplished at a considerable saving of time and labor.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

- 10 1. In a machine for grinding and polishing lenses, the combination of a grinder-holding frame, means for imparting circumferential motion to the holding-frame and holding its axis parallel to a fixed line in its plane of movement, grinder-holders supported in said frame, lens-holders above said grinder-holders, pivoted lever-arms, and spring-cushioned means for raising or lowering said lever-arms and lens-holders.
- 20 2. In a machine for grinding and polishing lenses the combination of a supporting frame, a pair of separated parallel rotary shafts supported on said frame, a holding frame mounted at separate points eccen-

trically on said shafts respectively, holders on said holding frame and additional holders coöperating with the first-named holders.

3. In a machine for grinding and polishing lenses, the combination of a supporting frame, a grinder-holding frame, means for imparting rotary motion to the same, grinders supported in said frame, of lens-holders above the grinders, pivoted lever-arms, universal joints between said lens-holders and the lever-arms, hand-levers pivoted at their rear-ends, upright connecting rods pivoted to the lever-arms and hand-levers, and cushioning springs placed above and below the connecting rods between fixed points on the rods and stationary points on the supporting frame.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

KARL LIEGANDT.

Witnesses:

PAUL GOEPEL,
J. A. COOK.