No. 775,258. PATENTED NOV. 15, 1904.

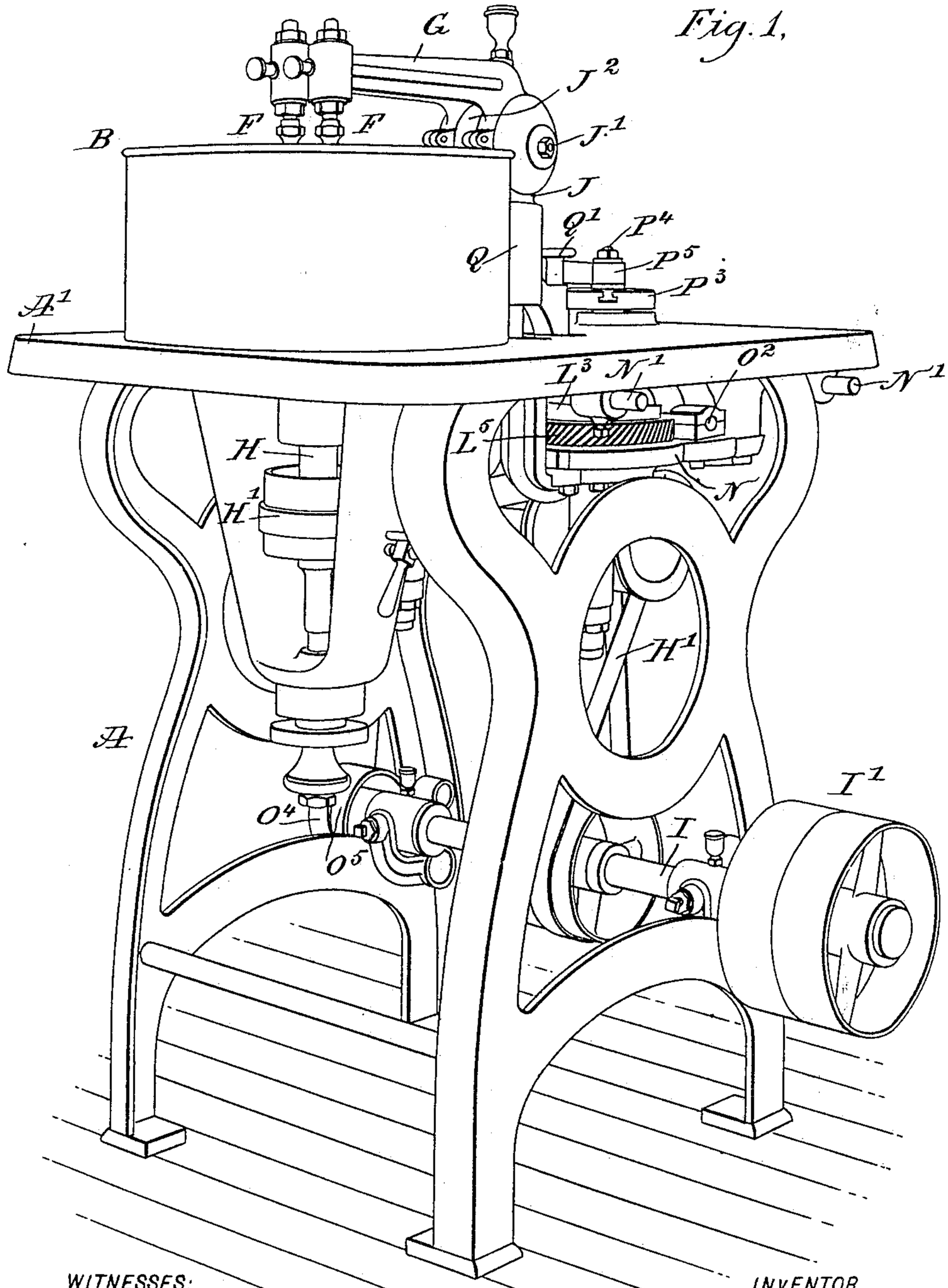
D. S. THOMPSON.

GRINDING MACHINE.

APPLICATION FILED JAN. 7, 1904.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.



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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 2,

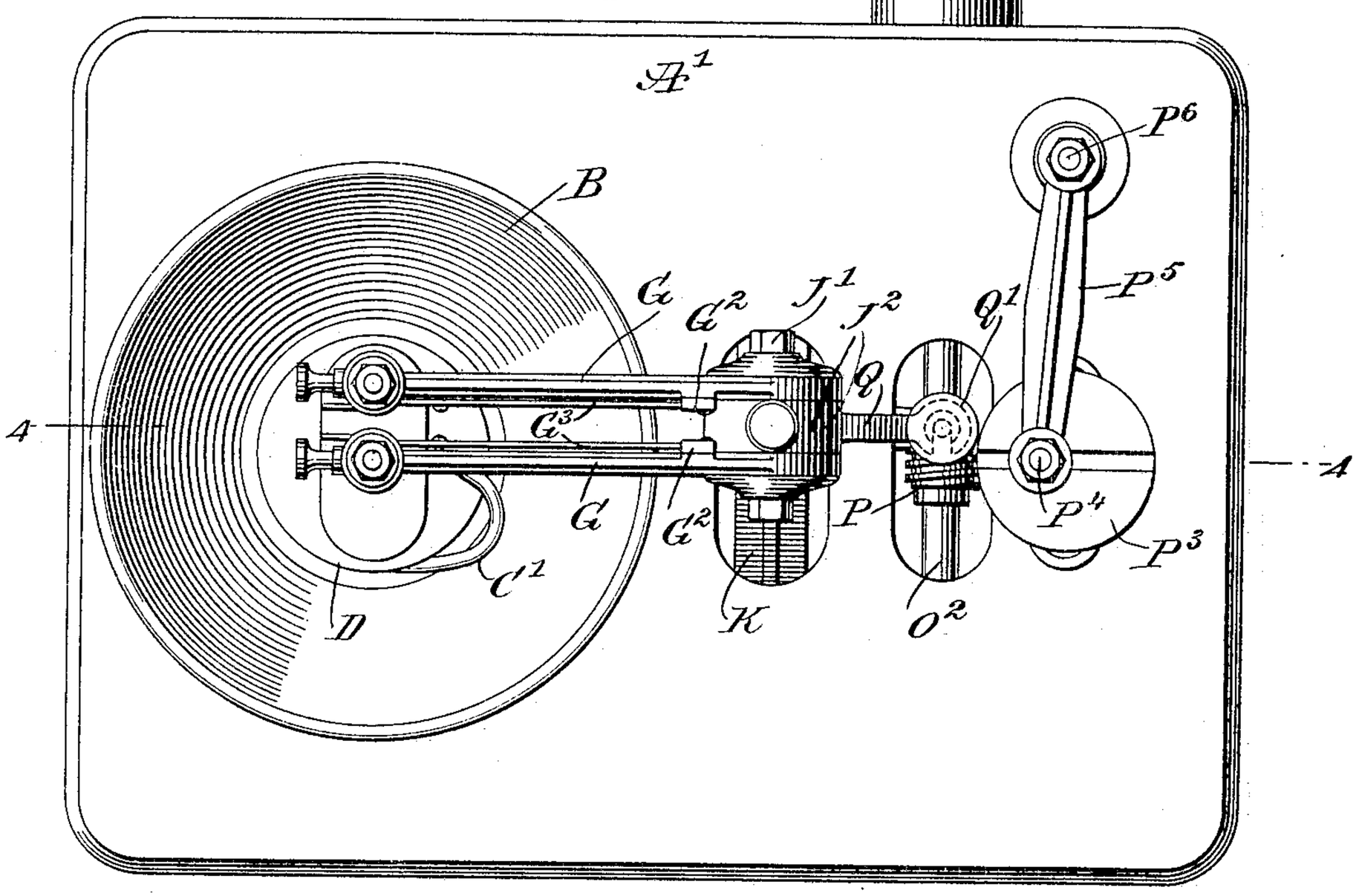

Fig. 3,

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NO MODEL. 3 SHEETS—SHEET 3.

Fig. 4,

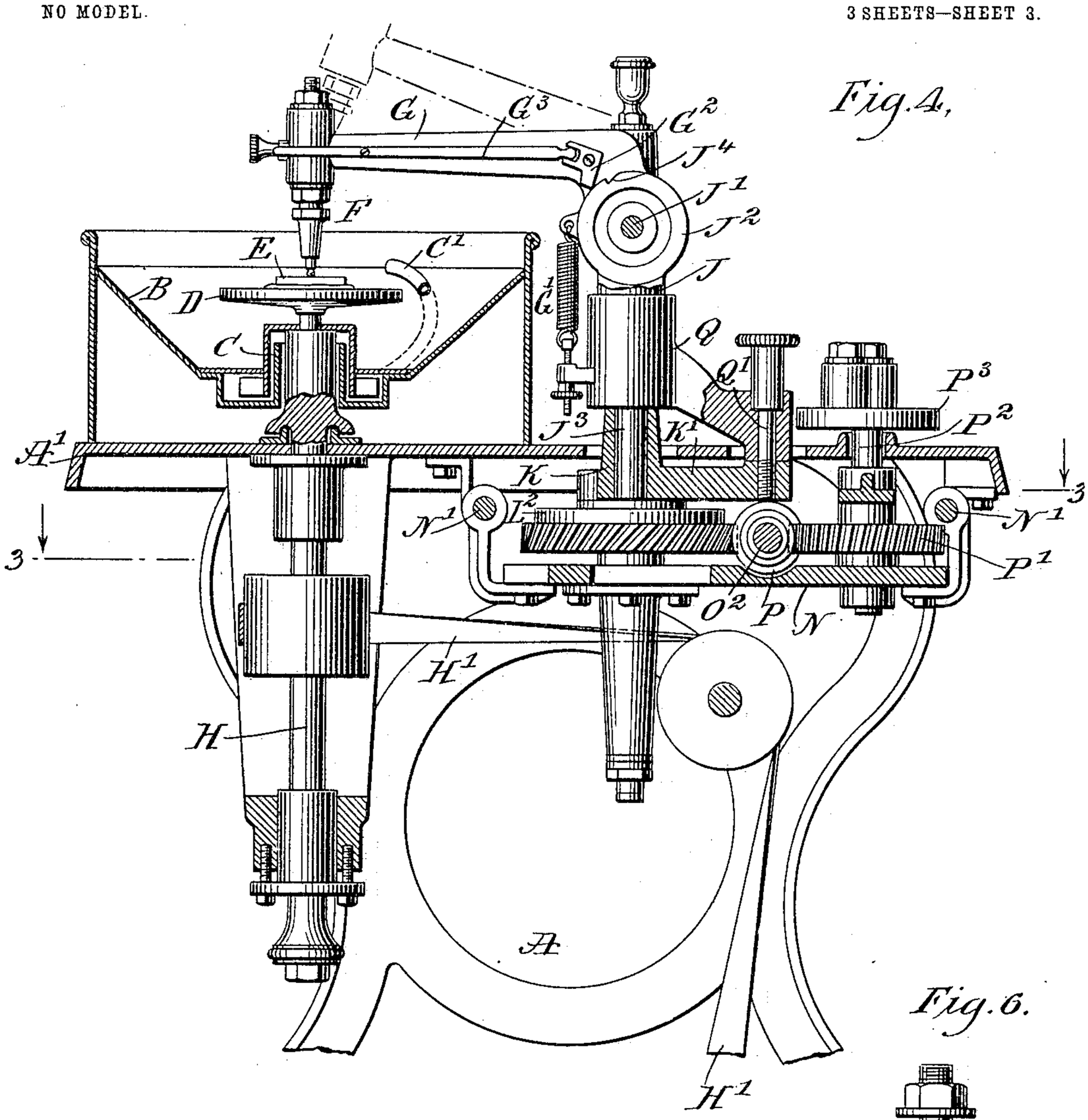


Fig. 6.

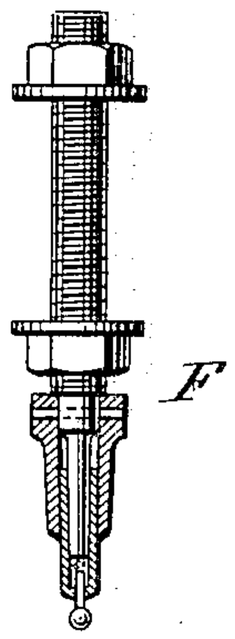
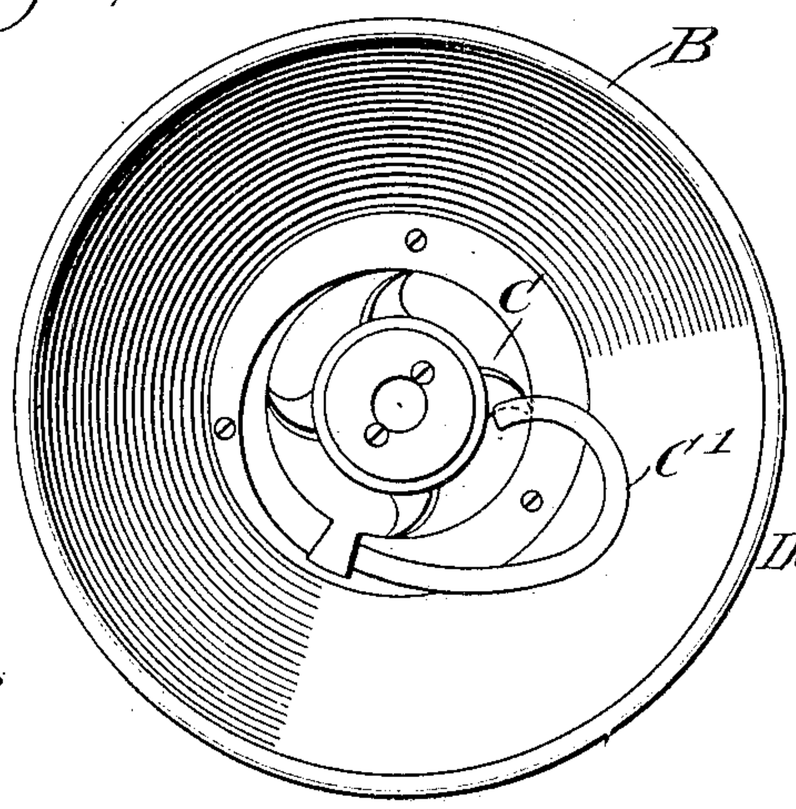


Fig. 5,



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No. 775,258. Patented November 15, 1904.

UNITED STATES PATENT OFFICE.

DAVILLA STURTEVANT THOMPSON, OF LIVERMORE FALLS, MAINE.

GRINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 775,258, dated November 15, 1904.

Application filed January 7, 1904. Serial No. 188,050. (No model.)

To all whom it may concern:

Be it known that I, DAVILLA STURTEVANT THOMPSON, a citizen of the United States, and a resident of Livermore Falls, in the county of Androscoggin and State of Maine, have invented a new and Improved Grinding-Machine, of which the following is a full, clear, and exact description.

The invention relates to grinding-machines such as shown and described in the Letters Patent of the United States No. 621,181, granted to me March 14, 1899.

The object of the invention is to provide a new and improved grinding-machine more especially designed for the use of manufacturing opticians to permit of grinding cylindrical, toric, and other lenses with the greatest accuracy and producing exceedingly fine surfaces without requiring skilled labor and without giving much attention to the machine during the grinding process.

The invention consists of novel features and parts and combinations of the same, as will be more fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a perspective view of the improvement. Fig. 2 is a plan view of the same. Fig. 3 is a sectional plan view of the same on the line 3 3 of Fig. 4. Fig. 4 is a sectional side elevation of the same on the line 4 4 of Fig. 2. Fig. 5 is a plan view of the pan for holding the abrading material, and Fig. 6 is an enlarged sectional side elevation of the object-carrier.

The improved grinding-machine is mounted on suitable standards A, supporting a table A′, on which is held a pan B for containing the grit or other grinding substance forced by a centrifugal pump C through an outlet-pipe C′ onto a revolving disk D between the surface of the latter and the object E to be ground and moved laterally on the disk by carriers F, preferably two in number and each mounted on an arm G, adapted to swing up and down and sidewise.

The disk D and the centrifugal pump C rotate with a shaft H, driven by a belt H′ from the main shaft I, extending transversely and journaled in suitable bearings in the standards A, the said shaft I having fast and loose pulleys I′ connected by a belt with other machinery for imparting a rotary motion to the said main shaft I and the shaft H.

The construction above outlined is substantially the same as shown and described in the patent referred to, so that further detailed description thereof is not deemed necessary.

The arms G are fulcrumed on a transverse pivot J′, carried in the eye J^2 of a spindle J, disposed vertically and having its lower end J^3 mounted to turn in a suitable bearing on a yoke K, extending transversely and engaging with its ends wrist-pins L and L′ on the upper faces of horizontally-disposed crank-disks L^2 and L^3, mounted to turn in suitable bearings arranged on a slide N, mounted to move transversely on suitable guideways N′, attached to the under side of the table A′.

On the crank-disks L^2 and L^3 are secured or formed spiral gears L^4 and L^5, in mesh with spirals O and O′, secured on a transversely-extending shaft O^2, journaled in suitable bearings on the slide N, and on the rear end of the said shaft O^2 is secured a pulley O^3, over which passes a belt O^4, also passing around a pulley O^5 on the main shaft I, (see Fig. 1,) so that when the latter is rotated a rotary motion is given to the shaft O^2, which by the spirals O and O′ and the spiral gears L^4 and L^5 imparts rotary motion to the crank-disks L^2 and L^3, so as to give a bodily circular motion to the yoke K, spindle J, and arms G for the work-holding devices on the said arms to carry the work bodily around in a circle. At the same time that this motion is given to the work-holding devices a bodily transverse traveling motion is given to the work-holding devices, and for this purpose the shaft O^2 is provided with a worm P, in mesh with a worm-wheel P′, secured on a vertically-disposed shaft P^2, journaled in suitable bearings carried by the slide N, and on the upper end of the said shaft P^2 is secured a crank-disk P^3, having its wrist-pin P^4 connected with one end of a link P^5, fulcrumed at its other end

at P^6 to the top of the table A′, as plainly illustrated in Fig. 2. Now when the shaft O^2 is rotated, as previously mentioned, then a rotary motion is given to the shaft P^2 by the worm P and worm-wheel P′, and the rotary motion of the shaft P^2 causes a like motion of the crank-disk P^3, connected with the link P^5, fulcrumed on the table A′, so that a transverse sliding motion is given to the slide N, as the shaft P^2 is journaled in bearings fixed on the said slide, and the latter is moved to slide transversely on the guideways N′.

As the mechanism previously described for imparting a bodily circular motion to the work-carrier is mounted on the slide N, it is evident that both a bodily circular motion and a bodily transverse sliding motion is given to the work-holding device simultaneously.

The gearing for imparting lateral sliding motion to the work-holding devices is in the proportion of twenty-nine to two, while the gearing for imparting a circular motion is in the proportion of one to three, so that the proportion of the circular motion to the lateral motion is as twenty-nine to six—that is, instead of the work-holding devices returning to the same point at the end of each lateral motion it takes six lateral (that is, three complete forward and back) and twenty-nine circular motions to bring the work-holding devices back to the same point to complete the cycle. By this travel of the work-holding devices undesirable scratches and the like on the object are completely prevented, as the path of the work-holding devices is constantly varying, and the danger of running in the same road and causing scratches is entirely prevented.

It is understood that I do not limit myself to the proportion of the gearing above mentioned, as the same may be varied without departing from the spirit of my invention. It is, however, desirable that a similar proportion between the gearing for the circular motion and the gearing for the transverse sliding motion be maintained, so as to produce the best results.

The spindle J is normally held against turning in its bearings in the yoke K, and for this purpose an arm Q is fixed to the spindle and is provided in its free end with a screw-rod Q′, screwing into an arm K′, extending from the yoke K, as plainly illustrated in Figs. 3 and 4. When it is desired to swing the arms G to one side of the work, then the screw-rod Q′ is screwed upward sufficiently to allow the arm Q to disengage the screw-rod, and thereby permit the arm to turn the spindle J, so as to swing the arms G to one side. The arms G are adapted to be swung into an uppermost inclined position, as indicated in dotted lines in Fig. 4; but the said arms are normally pressed downward, so as to hold the carrier F in engagement with the work E by the action of a spring G′, connecting the arm G with the arm Q. In order to hold the other arm G in an inactive position, a catch G^2 is provided, pivoted to the arm and adapted to engage a notch J^4 on the peripheral surface of the eye J^2 of the spindle J, the said catch being engaged and controlled by the inner end of a hand-lever G^3, fulcrumed on the inside of the corresponding arm G. When the other arm G is swung upward, the catch G^2 drops into the notch to support the arm in an inactive position, and when the operator presses the forward end of the hand-lever G^3 then the catch G^2 swings out of engagement with the notch J^4, and the arm G can now be swung downward for the carrier F to engage the disk D or the work E.

The wrist-pin P^4 is preferably held adjustable on the crank-disk P^3 to allow of varying the lateral throw of the slide N and parts carried thereby. The pulley O^3 is of sufficient length to allow transverse movement thereof with the slide N without disconnection of the belt O^4 from the pulley O^3, as will be readily understood by reference to Fig. 3.

It is understood that the table A′ is slotted to permit the transverse movement of the shaft P^2, the free end of the arm Q and the yoke portion forming the bearing for the end of the spindle J. (See Figs. 2 and 4.)

In grinding toric and cylindrical lenses the grinding-disk D, of peculiar shape, does not turn, but is held stationary on a chuck attached to the table A′, the shaft H, centrifugal pump C, and the gearing for driving the shaft H from the main shaft I being dispensed with. If desired, the chuck may be attached to the shaft and the latter fastened in position against turning, with the belt H′ removed.

In grinding a pair of cylindrical lenses the lenses are mounted on a block engaged by the carriers F of the two arms G to move the lenses singly over the stationary grinding-face of the disk D.

When grinding spherical lenses, the latter are cemented or otherwise attached to the convex under side of a disk engaged on its top by a carrier F, secured to both arms G. The lenses move in contact with and over the upper concave face of the disk D, which revolves, as explained.

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

1. A grinding-machine provided with a work engaging and holding device, and means for imparting bodily circular and bodily transverse motion to the said device, at different speeds, as set forth.

2. A grinding-machine provided with an arm having a work engaging and holding device mounted at the free end of said arm, means for carrying the arm bodily around in a circle, and means for simultaneously moving the arm transversely, as set forth.

3. A grinding-machine provided with an arm having a work engaging and holding de-

vice mounted at the free end thereof, means for carrying the arm bodily around in a circle, and means for simultaneously moving the arm transversely in a straight line and in both directions, as set forth.

4. A grinding-machine provided with an arm having a work engaging and holding device, means for carrying the arm bodily around in a circle, and means for simultaneously moving the arm transversely, and at a different rate of speed to the circular motion, as set forth.

5. A grinding-machine provided with an arm having a work engaging and holding device, means for carrying the arm bodily around in a circle, and means for simultaneously moving the arm transversely in a straight line and in both directions, and at a different rate of speed to the circular motion, as set forth.

6. A grinding-machine provided with a work-holding device, a yoke on which the device is mounted, mechanism for imparting bodily a circular motion to the said yoke, a slide carrying the said mechanism, mechanism for imparting a transverse travel to the said slide, and means connected with said mechanisms to actuate both simultaneously, as set forth.

7. A grinding-machine provided with a work-holding device, a yoke on which the device is mounted, means for imparting bodily a circular motion to the said yoke, a slide carrying the said means, mechanism for imparting a transverse travel to the said slide, and a driven shaft connected with the said means and the said mechanism, to actuate both simultaneously, as set forth.

8. A grinding-machine provided with a work-holding device, a yoke on which the said device is mounted, crank-disks connected with the said yoke, and means for rotating the crank-disks simultaneously, as set forth.

9. A grinding-machine provided with a yoke for supporting the work-holder, crank-disks engaging the said yoke, a slide mounted to move transversely, a driven shaft journaled on the slide, a gearing for driving the said crank-disks in unison from the said shaft, and means, connected with the shaft, for imparting a sliding motion to the slide, as set forth.

10. A grinding-machine provided with a yoke for supporting a work-holder, crank-disks engaging the said yoke, a slide mounted to move transversely, a driven shaft journaled on the slide, a gearing for driving the said crank-disks in unison from the said shaft, and means, connected with the shaft, for imparting a sliding motion to the slide, the said means comprising a crank-disk geared with the said shaft and journaled on the slide and a link fulcrumed on a fixed part and pivotally connected with the said crank-disk, as set forth.

11. A grinding-machine provided with arms, a work-holding device comprising carriers mounted on the arms, a vertically-disposed spindle carrying a transverse pivot at its upper end on which the arms are fulcrumed to swing up and down, a yoke in which the lower end of the spindle is mounted, means for imparting a bodily circular motion to the yoke, spindle and arms, a slide carrying the said means, and mechanism for moving the said slide as set forth.

12. In a grinding-machine, the combination with the grinding-disk, of a work-carrier for moving the object to be ground on the disk, and means for imparting bodily circular motion and bodily motion in a straight line to the carrier at different speeds, as set forth.

13. A grinding-machine provided with a work engaging and holding device, a yoke on which the device is mounted, crank-disks having their wrist-pins engaging the yoke, a slide carrying bearings in which the crank-disks are mounted to turn, a transversely-extending driven shaft journaled on the slide, spiral gears on the crank-disks in mesh with spirals on the said shaft, a worm on the said shaft, a vertically-disposed shaft journaled in bearings on the slide and provided with a worm-wheel in mesh with the said worm, a crank-disk carried by the vertically-disposed shaft, and a link fulcrumed on a fixed support and pivotally connected with the wrist-pin of said crank-disk, as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

DAVILLA STURTEVANT THOMPSON.

Witnesses:
D. E. PLAISTED,
E. L. VINING.