F. LAMBERT.

METHOD OF AND APPARATUS FOR FINISHING WATER METER DISKS.

APPLICATION FILED OCT. 1, 1919.

1,377,988.

Patented May 10, 1921.

FIG. 1

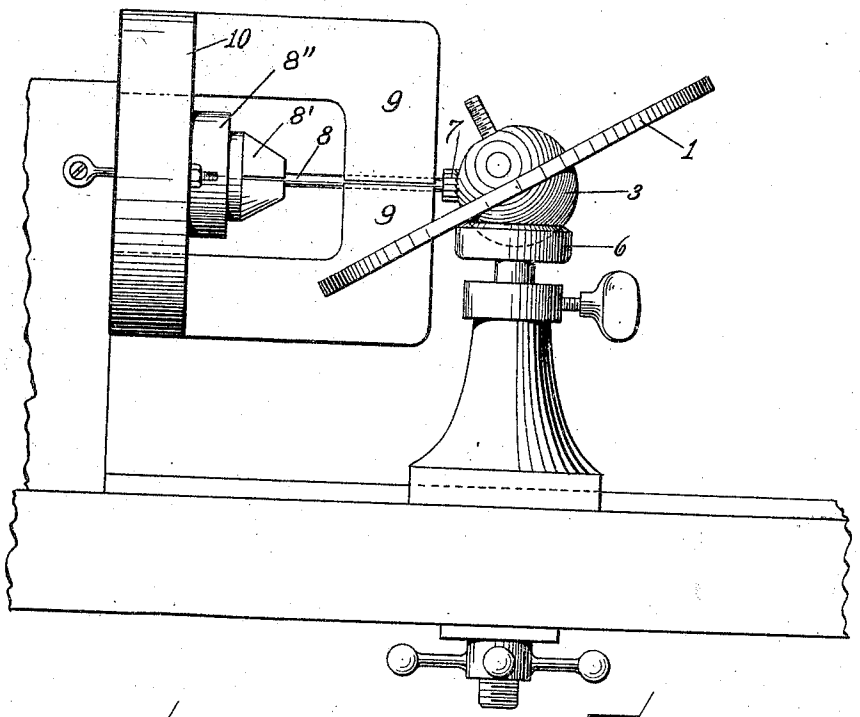


FIG. 2

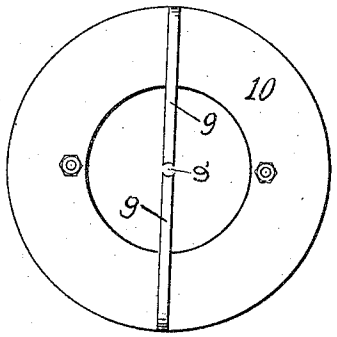


FIG. 3

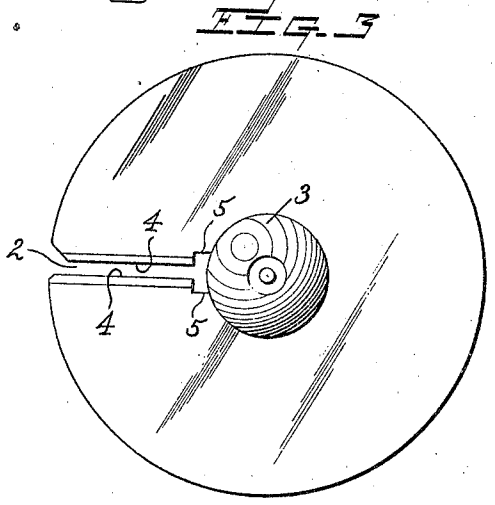
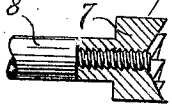


FIG. 4



INVENTOR.

Frank Lambert

BY

H. M. Marble

ATTORNEY.

UNITED STATES PATENT OFFICE.

FRANK LAMBERT, OF BROOKLYN, NEW YORK, ASSIGNOR TO THOMSON METER COMPANY, OF BROOKLYN, NEW YORK, A CORPORATION OF NEW JERSEY.

METHOD OF AND APPARATUS FOR FINISHING WATER-METER DISKS.

1,377,988. Specification of Letters Patent. Patented May 10, 1921.

Application filed October 1, 1919. Serial No. 327,655.

To all whom it may concern:

Be it known that I, FRANK LAMBERT, a citizen of the United States of America, and resident of the borough of Brooklyn, county of Kings, city and State of New York, have invented Methods of and Apparatus for Finishing Water-Meter Disks, of which the following is a specification.

My invention relates to a method of and apparatus for finishing the disk-pistons of nutating disk meters. Such disks (as shown, for example, in my Patent No. 1,155,667, dated October 5, 1915, though the disk type of meter is much older than said patent) are provided with a central spherical portion, also with a slot extending from one side of the disk to the central spherical portion. In practice the sides of this slot are beveled, (for in operation, a projecting wall or "diaphragm," as it is termed, lies within this slot, and remains stationary while the disk nutates;) this bevel-edged slot is customarily formed by making two oblique cuts with a large slitting saw, almost to the face of the central spherical portion. To prevent cramping action between the edge of the disk and the diaphragm, especially when the side of the slot begins to wear, it is found desirable to relieve the slot laterally near the central sphere of the disk; and to prevent leakage between the concave portion of the diaphragm and the bottom of the slot it is essential to finish accurately that portion of the sphere which forms the end of the slot; and in the past it has been thought necessary to do this work by hand, and mostly if not entirely by filing. By the present invention I provide a method of and means for doing this finishing work by machine work. My invention consists, therefore, in a method of and apparatus for enlarging or "relieving" the said slot, at its base, and also of finishing truly spherically the surface of the sphere or ball adjacent to and at the base of said slot.

The object of my invention is to cheapen and render more accurate the work of finishing water-meter disks such as referred to.

I will now proceed to describe my invention with reference to the accompanying drawings, in which one form of apparatus embodying the apparatus portion of my invention and adapted to carry out the method portion of my invention is illustrated, and will then point out the novel features in claims. In the said drawings:

Figure 1 shows a side elevation of the said apparatus, the view also showing a meter disk in place as when it is being acted upon by the cutter. Fig. 2 shows a front view of the arbor-support and disk-guide, and Fig. 3 a top view of the completed meter disk. Fig. 4 shows, on a larger scale than the previous views, a central axial section of the milling cutter used.

In the drawings, 1 designates the meter disk, which has, as shown, a spherical or ball-shaped central portion 3, and a slot 2 extending to said ball-shaped center. The sides 4 of this slot 2 are beveled, and at the base of the slot the latter is widened, or "relieved," as indicated at 5, 5.

6 designates an adjustable rest for the ball 3, upon which rest the disk may be held and oscillated while the cutter is acting upon it. This rest should be so adjusted that the disk, when held on it, will have its center of oscillation in line with the axis of rotation of the cutter. 7 designates the said cutter mounted upon the rotatable arbor 8. The end of the cutter is concave, as shown. This arbor is held in a chuck 8', mounted on the rotatable spindle of the machine 8'', and said chuck may be considered as representing means for rotating as well as holding the arbor. Since the arbor 8 must pass freely through the slot 2 of the disk, and therefore must be somewhat long and of quite small diameter in proportion to its length, it requires support near its outer end, and therefore I provide a support and rest for the arbor, which serves to hold it very exactly in line, and consists of two closely-approaching jaw members 9, projecting from a ring-base 10 secured to a fixed portion of the machine. These jaw-members 9 also must pass freely through the slot 2 of the meter disk, and hence must be quite narrow; likewise, they serve as guides for the disk during the milling operation and hence their sides are flat. They are of considerable height, however, and so are amply stiff for their purpose. The members 9 are in effect a plate having a bore or hole 9' running in the direction of the plane of the plate for receiving and steadying the arbor 8. Obviously, if the arbor 8 is reduced in diameter, the hole 9' will not cut through

the sides of the members 9, in which case the members 9 would be united and form a single guiding plate.

In finishing the disk, the said disk, slotted nearly to the surface of the ball 3, but not quite thereto, the slot not yet being widened as indicated at 5, 5, is placed on the support 6, one of the jaws 9 being then within the slot; and then, while the cutter 7 is rotated, the disk is rocked a couple of times up and down slowly about the geometrical center of its ball 3 (the cup shape and adjustment of the support 6 permitting this) and thereby the teeth of the end portion of the cutter are caused to continue the cutting of the slot 2 to the very face of the ball and to finish accurately the surface of the ball in and adjacent to the said slot; while at the same time the teeth on the side of the cutter enlarge or relieve said slot, as indicated at 5, 5. During this operation, the disk is guided and held steady by the arbor support 9. In this way hand work on the disk, such as was considered necessary previously, is avoided, and an accurately finished disk is produced.

What I claim is:

1. The herein-described method of finishing the slots of slotted meter disks having spherical central portions, which consists in oscillating the spherical portion of the disk in working contact with a rotating concave-faced cutter.

2. The herein-described method of finishing the slots of slotted meter disks having spherical central portions, which consists in holding the spherical portion of the disk on a support which permits oscillation of the disk about a fixed center, and oscillating said spherical portion in working contact with a rotating concave-faced cutter.

3. Apparatus for finishing the slots of slotted meter-disks having spherical central portions, comprising a rotatable arbor, a milling cutter carried by said arbor and adapted to finish the slot at its inner end, a plate having an opening running in the plane thereof to support and guide said arbor, and a support for holding the meter disk against said cutter and permitting oscillation of the disk, said plate being adapted to enter the slot of the disk and guide the same in its oscillating movements.

4. Apparatus for finishing the slots of slotted meter-disks having spherical central portions, comprising a rotatable arbor carrying a milling cutter adapted to finish the slot at its inner end, a steady-rest for the arbor adapted to enter the slot of the disk and to act as a guide for the disk in its oscillating motion, and means for rotating said arbor.

5. Apparatus for finishing the inner end of the slot of slotted meter disks having spherical central portions, comprising a rotatable arbor carrying a milling-cutter adapted to finish the slot at its inner end, a steady-rest for the arbor, means for rotating said arbor, and a support for receiving the spherical central portion of said disk and permitting oscillation thereof, the center of oscillation of the disk being substantially in line with the axis of rotation of the cutter.

6. Apparatus for finishing slotted meter-disks having spherical central portions, comprising a rotatable arbor adapted to carry a cutting tool, and steady-rest jaws embracing said arbor near the cutter-carrying portion thereof and adapted to support and steady the same.

7. Apparatus for finishing slotted meter-disks having spherical central portions, comprising means for holding and rotating an arbor adapted to carry a cutter, and steady-bearing jaws having a fixed support and arranged to embrace near its outer end, and to steady, an arbor so held and rotated.

8. Apparatus for finishing slotted meter-disks having spherical central portions, comprising means for holding and rotating an arbor adapted to carry a cutter, a disk-support in operative proximity to said arbor-holding means and arranged to permit oscillation about a fixed center of a disk being acted upon by said cutter, and steady-bearing jaws for such an arbor, said jaws having flat sides adapting them to form guides for the disk.

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

FRANK LAMBERT.

Witnesses:
SETH D. HIGLEY,
THOS. E. IRWIN.