No. 608,470. Patented Aug. 2, 1898.

# H. MELTZER.

## MACHINE FOR WORKING BALLS.

(Application filed Apr. 8, 1897.)

(No Model.)

Fig. 1.

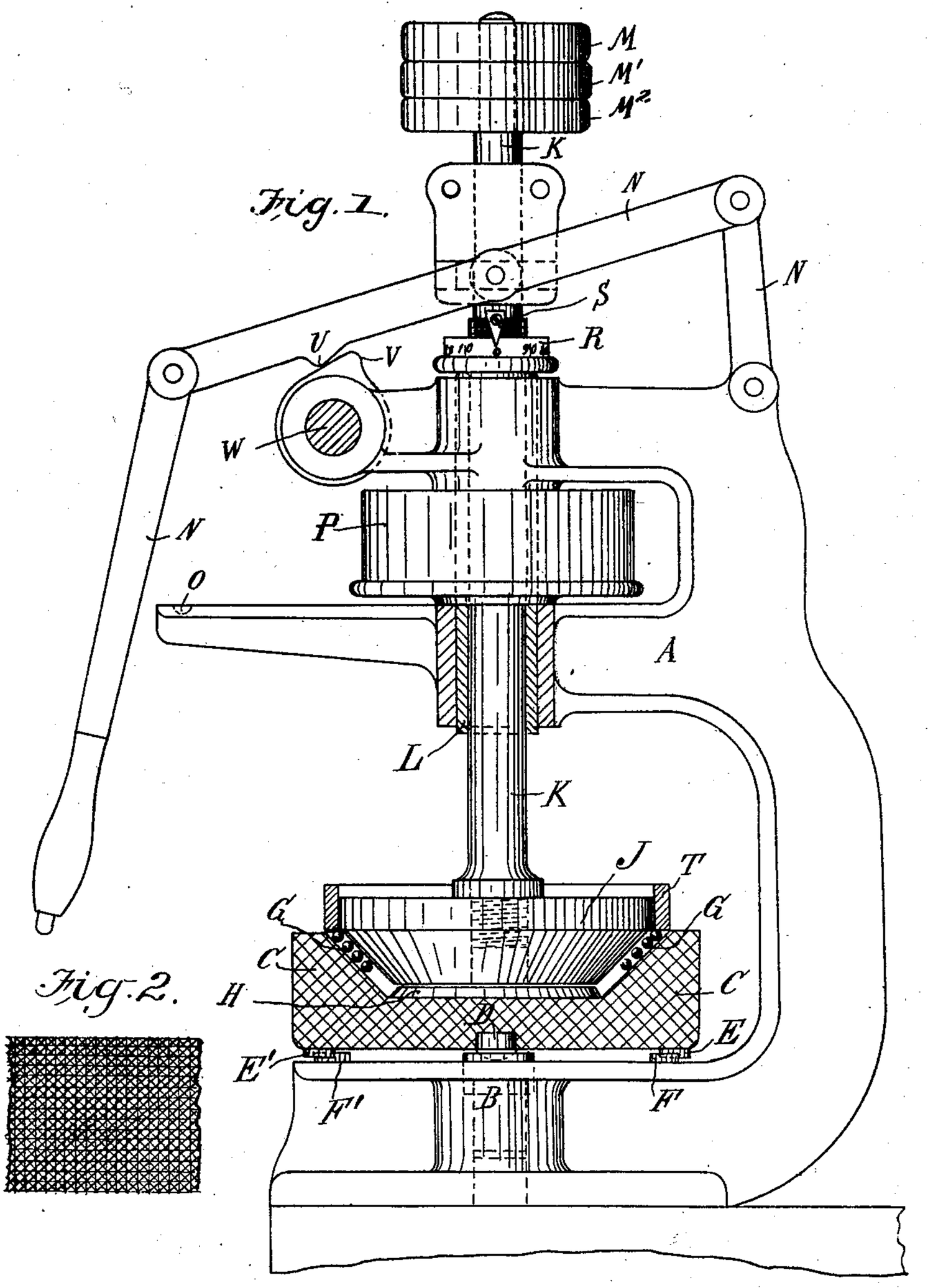


Fig. 2.




WITNESSES.
Julius Lutz.
Isaac B. Mudge.

INVENTOR:
H. Meltzer
BY Munn & Co
ATTORNEYS.

# UNITED STATES PATENT OFFICE.

HEINRICH MELTZER, OF RATIBOR, GERMANY.

## MACHINE FOR WORKING BALLS.

SPECIFICATION forming part of Letters Patent No. 608,470, dated August 2, 1898.

Application filed April 8, 1897. Serial No. 631,228. (No model.)

*To all whom it may concern:*

Be it known that I, HEINRICH MELTZER, a subject of the King of Prussia, Emperor of Germany, residing at Ratibor, in the Kingdom of Prussia, Germany, have invented new and useful Improvements in Machines for Working Balls, of which the following is a specification.

For working the roughly-prepared balls the latter were kept hitherto in circular grooves, and in describing always the same circular line they were worked either upon a flat grinding-disk or this working was effectuated by the walls of the guide-grooves provided with fine teeth, (file cut,) or in such a manner that the balls were ground between the smooth walls of the groove, say, in oil and emery. The rule was that the disks grooved themselves or the disks inclosing the grooved guide-plates were moved in opposite directions, and it was necessary that the grooves corresponded to the size of the ball.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in both the figures.

Figure 1 is a side elevation of the machine, partly in section; and Fig. 2 is a plan view of a hereinafter-described detail.

In my new machine for working balls (shown in side elevation, partially in section, in the accompanying drawings) the standard A carries the movable bowl C, playing with its hardened and ground steel trunnion D, the lower end of which is hemispherically-shaped, in the correspondingly-hollowed steel support B, the circular movement of the said bowl C being limited by its tappets E E′ and by the tappets F F′ of the standard-plate. Into the hollow space of the bowl C descends the stamp J until their surfaces, sloping both at an angle of forty-five degrees, are approached toward each other nearly entirely or to such an extent that large or small balls may be worked by the same machine. When the stamp is raised, the balls to be worked are introduced into the intermediate space formed, and a bottom plate H, the thickness of which varies according to the size of the balls, or a ring prevents the balls from entering between the horizontal bottom surfaces of the bowl C and the stamp J. There is left, however, under all circumstances air between the stamp J and the plate H, so that any friction between these parts is quite excluded.

The parts C and J may be made of hardened steel having file cuts or otherwise roughened and inclined faces, or they may consist of cast-iron or entirely of bound emery, according to the kind of balls to be worked. Fig. 2 shows one example of the several possible constructions. The stamp J is secured to the working spindle K. The latter is suspended vertically movable in the spindle-box L, and for obtaining the required working pressure it is weighted by means of weights M M′ $M^2$, which may be exchangeable, and it can be raised by means of the lever N, the handle of which is supported on the point O of the standard A. The spindle K is actuated by means of the pulley P, secured to the spindle-box L. The descent of the spindle is limited by a nut R, the circumference of which is divided, say, into one hundred parts, so that the intended reduction of the diameter of the balls to be worked can exactly be determined up to the exactness of a one one-hundredth millimeter by adjusting the nut R with respect to the pointer S after the stamp has been lowered upon the non-worked balls. The adjusting-nut R is supported in its lowest position by the projecting upper edge of the revolving spindle-box L.

The balls introduced into the machine are rapidly distributed uniformly around the revolving stamp J, and it is not necessary to place them, as formerly, in a circumferential manner into the grooves, and toward two sides they have a free play between the large working surfaces of C and J, so that not only one single row, but several rows of balls are worked simultaneously.

By this machine an exact spherical form and other advantageous results are obtained, owing to the following circumstances: first, the horizontally-acting rotary motion of the stamp; second, the vertically-acting load of the spindle; third, the difference in the length of the path of the ball running between the working surfaces of unequal circumference, which difference produces the milling rotary motion of the ball; fourth, the centrifugal

force propelling the balls in the oblique clefts outward until they touch the ring T, pushed over the stamp J; fifth, the friction of the balls against each other, which is of the greatest importance in particular for the milling effect; sixth, the multiplying of the variety of these effects by means of two cams U and V, the latter being carried by a common shaft W, by which also more machines may be actuated, and the cam U being arranged on the lever-arm N, by means of which cams the working spindle and with it the stamp J are raised from time to time, so that the risen balls fall always back again for recommencing their circular motion, the speed of the balls continuously increasing when between the bowl C and the stamps J they move upward. Finally, it may still be remarked that the unevennesses of the oblique working surfaces produced by wearing, &c., are compensated as much as possible by the permanent close-clinging of the bowl freely playing in its hemispherical bearing.

The balls are milled or worked between the parts C and J. The parts C and J having roughened surfaces mill the balls and by this operation produce the desired effect.

I claim—

1. The combination of a bowl, a stamp revoluble therein, an axially-movable spindle to which the stamp is attached, a lever in connection with the spindle, and a cam coacting with the lever.

2. The combination with a frame, of a bowl, a stamp coacting therewith, a spindle attached to the stamp, the spindle being slidable and revoluble, a lever in connection with the spindle, a cam engaging the lever, and an arm pivoted to the lever and capable of holding the lever raised out of engagement with the cam.

3. The combination of a bowl, a stamp coacting therewith, continuously-operative means for continuously revolving the stamp within the bowl and continuously-operative means for periodically lifting and dropping the stamp.

4. The combination with a frame, of a bowl capable of partial revolution on a vertical axis, and a revoluble stamp coacting with the bowl to work balls between the two.

5. The combination of a bowl, a stamp revoluble within the bowl, the stamp and bowl being arranged to receive balls between their adjacent faces, and a ring capable of bearing down on the balls to prevent the expulsion of the balls from the bowl.

6. The combination of a bowl having outwardly-flaring walls, a revoluble stamp working in the bowl and conforming therewith whereby balls received between the stamp and bowl will be thrown upward and outward, and a ring capable of bearing down on the balls to hold them in place.

7. The combination of a bowl, a continuously-revoluble stamp working therein, a continuously-revoluble shaft, and means including a cam, such means being driven by the shaft and serving periodically to lift and drop the stamp toward and from the bowl.

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

HEINRICH MELTZER.

Witnesses:
EDUARD PEITZ,
G. HÜLSMANN.