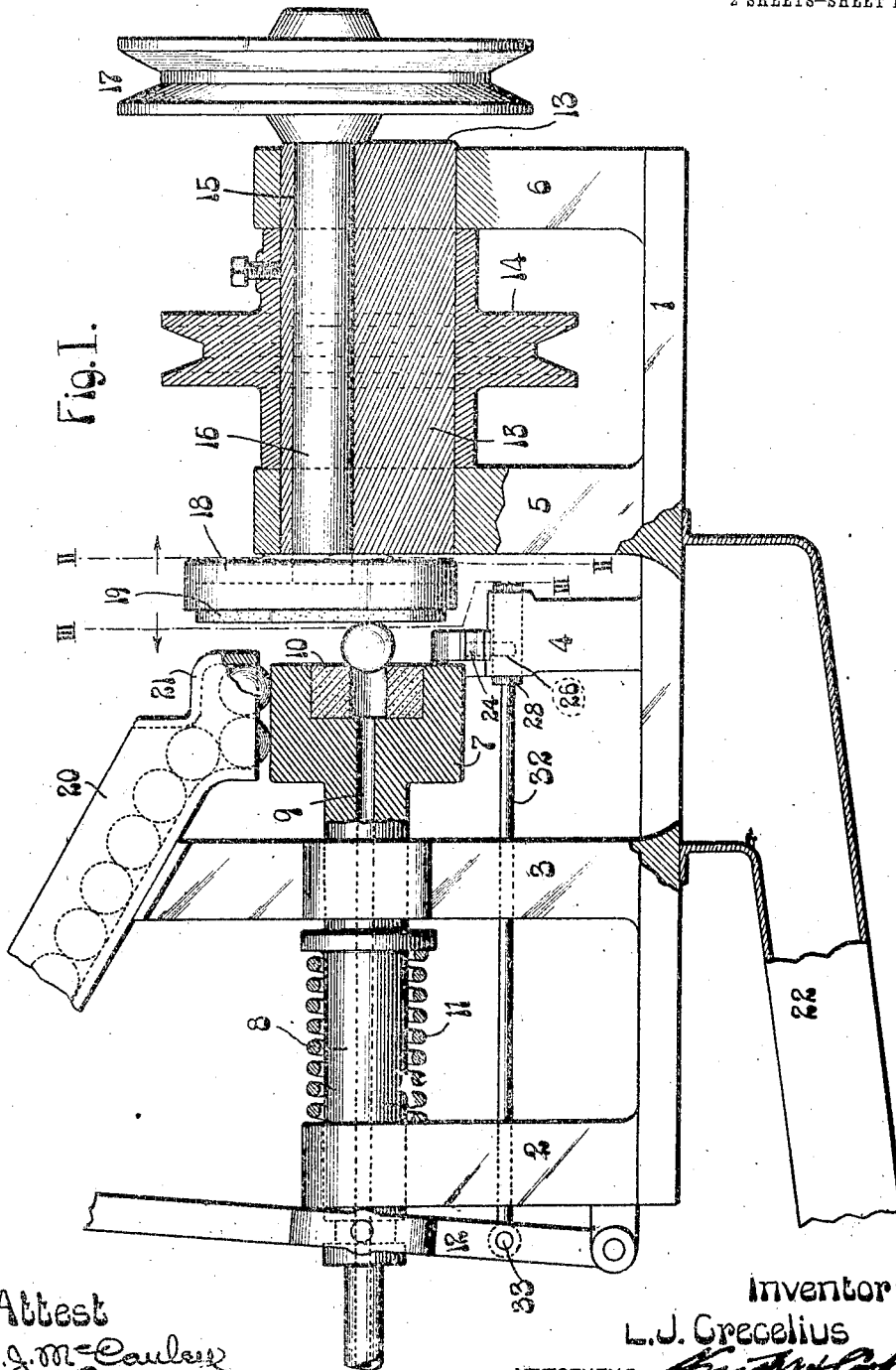


L. J. GRECELIUS.
MACHINE FOR GRINDING BALLS OR SPHERES.
APPLICATION FILED OCT. 24, 1910. RENEWED AUG. 17, 1911.

1,020,803.

Patented Mar. 19, 1912.

2 SHEETS—SHEET 1.



Attest
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L. J. CRECELIUS.

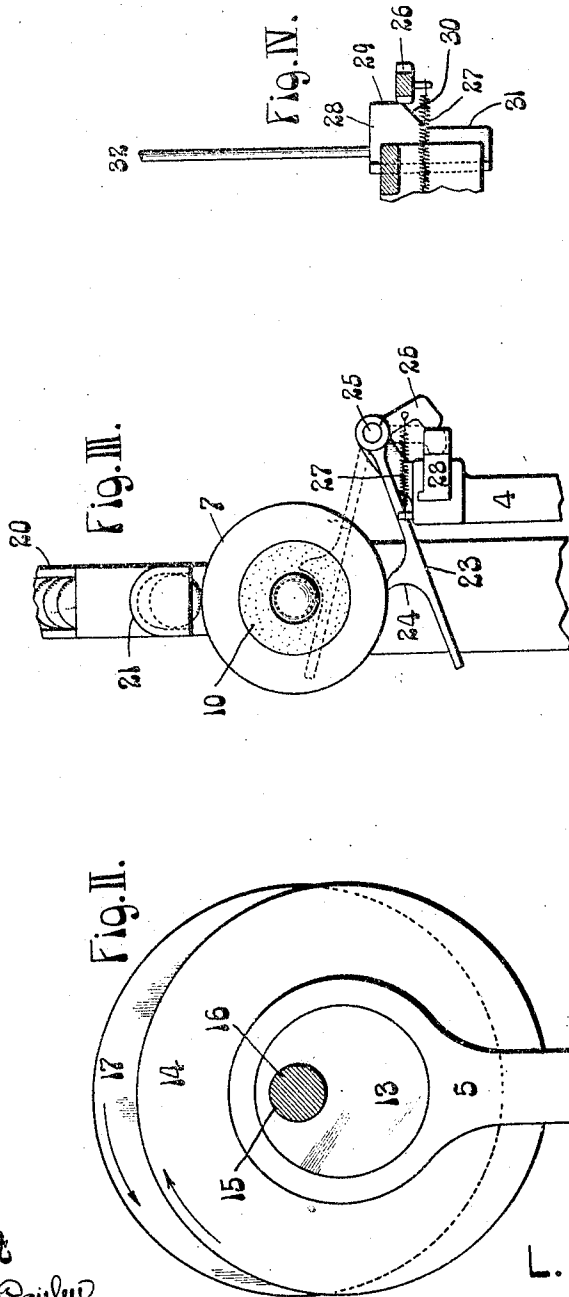
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Attest

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UNITED STATES PATENT OFFICE.

LOUIS J. CRECELIUS, OF ST. LOUIS, MISSOURI, ASSIGNOR TO CHARLES A. THOMPSON,
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MACHINE FOR GRINDING BALLS OR SPHERES.

1,020,803.

Specification of Letters Patent. Patented Mar. 19, 1912.

Application filed October 24, 1910, Serial No. 588,612. Renewed August 17, 1911. Serial No. 644,715.

To all whom it may concern:

Be it known that I, LOUIS J. CRECELIUS, a citizen of the United States of America, residing in the city of St. Louis and State of Missouri, have invented certain new and useful Improvements in Machines for Grinding Balls or Spheres, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to a machine for grinding balls and spheres, such for instance as those made of glass, porcelain, or analogous substance, and it has for its object the production of a machine of this description by which the spherical bodies may be rapidly ground from a rough condition into perfectly true spheres.

Figure I is a longitudinal section of my machine. Fig. II is a vertical section taken on line II—II, Fig. I. Fig. III is a vertical section taken on line III—III, Fig. I. Fig. IV is a view, partly in elevation and partly in horizontal longitudinal section.

In the accompanying drawings: 1 designates the base of my machine surmounted by posts 2, 3, 4, 5 and 6.

7 designates a grinder head supported by a shank 8 loosely mounted in the posts 2 and 3 so as to be capable of longitudinal movement therein. Extending longitudinally through this head and shank is a duct 9 through which liquid grinding material may flow. The grinder head has mounted in it at its end a grinding block 10 that is apertured in alinement with the duct 9 in the head and its shank. The grinder head and its shank are normally pressed in a forward direction by a spring 11.

12 is a pull back lever by which the grinder head and its shank may be retracted against the action of the spring 11.

13 designates a shaft journaled in the posts 5 and 6 at the opposite end of the machine from that at which the posts 2 and 3 are located. This shaft is located in alinement with the grinder head 7 and is equipped with a pulley 14 by which it may be rotated. In the shaft 13, eccentric to its axis, is a bore 15, and it will be seen that, inasmuch as the shaft 13 is in alinement with the grinder head 7, said bore 15 by being eccentric to the axis of the shaft, is located out of alinement with the center of the

grinder head at which the grinder block 10 is located.

16 designates a shaft extending longitudinally through the shaft 13 in its bore 15 and adapted to rotate therein independently of the rotation of said shaft 13. The shaft 16 is provided at its outer end with a drive pulley 17 to which a belt may be applied for imparting movement thereto, preferably in a direction the reverse in which the shaft 13 is rotated when power is communicated thereto by a belt applied to its pulley 14. The shaft 16 has fixed to it at its forward end a head 18 that is arranged in opposition to the grinder head 7 and carries a presser disk 19, the disk being of any suitable pliable material, but preferably of soft rubber.

20 designates a delivery chute through which the balls to be ground in the use of my machine are delivered between the driver head 7 and the driver disk 19. The lower or outlet end of this chute terminates directly above a longitudinal movable grinder head 7, and is provided with an elongated enlargement 21 of sufficient length longitudinally of the machine to accommodate two balls that are to be delivered from the machine to be ground.

22 designates a trough located beneath the base of the machine below the grinder head and presser disk carrying head. This trough is adapted to receive the balls when they have been ground and are released from position between the grinding block 10 and the presser disk 19, as will hereinafter more fully appear.

23 designates a catcher arm pivoted at 25 to the post 4 and occupying a position between the grinder head 7 and the presser disk 19, this arm being designed to perform the service of catching each ball as it descends from the chute 20 into said space and position it between the grinding block 10 and the presser disk 19. The catcher arm is provided at its upper side with a finger 24 located intermediate of its ends that serves as a rest for the balls when they descend onto the catcher arm after it has been elevated from its normal position seen in full lines Fig. III to the position seen in dotted lines Fig. III. The catcher arm has connected to it at its rear end a heel 26 that is connected by a spring 27 to the post 4.

28 is a cam block slidably mounted in the

post 4 and movable longitudinal of the machine. This cam block is provided with a straight face 29 against which the heel of the catcher arm normally rests, an inclined face 30 onto which said heel rides when the cam block is shifted longitudinally, and a straight face 31 to which the heel passes after traversing the inclined face 30.

32 is a shifter rod connected to the cam block 28 and leading therefrom to the lever 12 to which it is pivoted at 33, thereby providing for movement of the cam block when the lever 12 is operated either by a rearward pull thereon to retract the grinder head 7, or a forward movement occasioned by the return of the grinder head and its shank to its normal position after it has been retracted.

In the practical use of my grinding machine, the operation is as follows: The balls, while in the rough, are deposited in the chute 20 and permitted to descend therein so that they will lie as seen in Fig. I. The operator to deposit a ball into position to be ground moves the operating lever 12 rearwardly thereby imparting a rearward movement to the shank of the grinder head and said head, with the result that the outermost ball in the enlarged outlet end of the chute 20 descends into the space between the grinder head and the opposing presser disk 19. Upon the operation of the hand lever, as stated, a pull is effected upon the rod 32 connected to said lever and the cam block 28 is moved rearwardly, permitting the spring 27 to draw the heel 26 of the catcher arm 23 in an advancing direction so that it first rides against the inclined cam face 30 of the cam block and then onto the straight face 29 adjacent to the inclined cam face. This movement of the heel of the catcher arm causes the catcher to be elevated from the position seen in full lines Fig. III to the position seen in dotted lines Fig. III, in which latter position it is so disposed as to catch the ball descending in the space between the grinder head and the presser disk and position it centrally of the grinding block 10. The operating lever is then released and the spring 11 moves the grinder head and its shank forwardly to cause it to hold the ball between the grinding block and the presser disk while the cam block 28 is returned to its normal position and acts to return the catcher arm 23 to the lowered position. A ball having been positioned, as stated, the shafts 13 and 16 are both placed in motion, one being preferably rotated in one direction and the other in the opposite direction, and grinding fluid is caused to flow through the grinder head and its shank to the ball, for the purpose of assisting in grinding operation effected thereon. It will be apparent that as the shaft 13 revolves, it carries with it the shaft 16 mounted therein

eccentric to its axis, so that the head 18 and the presser disk 19 carried by the shaft 16 gyrate around a fixed center of the grinder head and the grinding block therein. The shaft 16 being in motion imparts rotary motion to the presser disk 19 and said presser disk, by its contact with the ball to be ground, turns said ball with a universal movement while it bears against the grinding block 10. It will be plainly understood that the movement of the ball provided for by the action of the presser disk against it, which is subject to the movement of both of the shafts 13 and 16, is one involving a multitude of turnings thereof in every direction, and such movement is consequently herein designated as a universal movement.

I claim:

1. In a ball grinding machine, a grinding member, and means whereby a ball to be ground has a universal movement automatically imparted to it while held in contact at a fixed point with said grinding member.
2. In a ball grinding machine, a stationary grinding member, and rotatable means whereby a ball to be ground has a universal movement automatically imparted to it while held in contact at a fixed point with said grinding member.
3. In a ball grinding machine, a grinding member, and means for holding a ball to be ground against said grinding member at a fixed point and automatically imparting a universal movement to the ball while it is so held.
4. In a ball grinding machine, a grinding member on which a ball to be ground is held, and a presser member for holding the ball at a fixed point relative to the face of said grinding member; said presser member being rotatably mounted to provide for a gyratory movement thereof relative to the point at which the ball is held.
5. In a ball grinding machine, a grinding member adapted to hold a ball to be ground, a rotatable presser member opposing said grinding member and adapted to engage said ball, means for rotating said presser member, and means for moving said presser member whereby its axis may be moved around the point at which the ball is supported.
6. In a ball grinding machine, a grinding member, a rotatable shaft in alignment with said grinding member, a shaft revolubly mounted in said first mentioned shaft eccentric to its axis, and a presser member carried by said second shaft opposing said grinding member and adapted to impart a universal movement to the ball to be ground during rotation of said shafts.
7. In a ball grinding machine, a grinding member, a presser member for holding a ball to be ground to the face of said grinding member and imparting a universal

movement to it while so held, means for delivering a ball to the space between said grinding member and presser member, and means for catching a ball when it is deposited between said members.

8. In a ball grinding machine, a grinding member, a presser member for holding a ball to be ground to the face of said grinding member and imparting a universal movement to it while so held, means for delivering a ball to the space between said grinding member and presser member, and means for catching a ball when it is deposited between said members; said last named means comprising a catcher arm and a cam device for actuating said catcher arm.

9. In a ball grinding machine, a grinding member, a presser member for holding a ball to be ground to the face of said grinding member and imparting a universal movement to it while so held, means for delivering a ball to the space between said grinding member and presser member, and means for catching a ball when it is deposited between said members; said last named means comprising a spring controlled catcher arm and a cam device for operating said catcher arm.

10. In a ball grinding machine, a longitudinally movable spring pressed grinding device, a rotatable presser member for holding the ball to be ground presented to said grinding device and imparting a universal movement to said ball, a grinding device retracting lever, means for delivering balls to the space between said grinding device and presser member, a catcher arm adapted to be elevated into the space between said members to receive the balls entering thereinto, and a cam device connected to said operating lever for actuating said catcher arm.

11. In a ball grinding machine, a grinding member adapted to engage a ball to be ground, a rotatable presser member opposing said grinding member and adapted to engage said ball, means for rotating said presser member, and means for moving said presser member whereby its axis is caused to travel in a circular path.

In testimony whereof, I have hereunto set my hand, this 15th day of October 1910.

LOUIS J. CRECELIUS.

In the presence of—

A. J. McCAULEY,

E. B. LINN.