April 12, 1932. S. S. CRAMER 1,853,665

MEANS FOR LOADING BALL RACES OR THE LIKE

Filed July 9, 1930

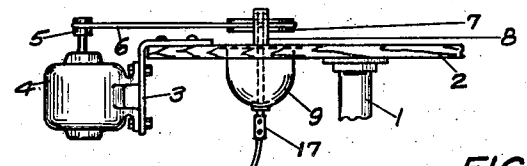


FIG. 1

FIG 4

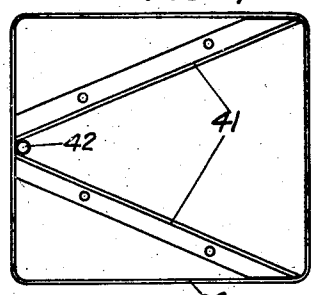
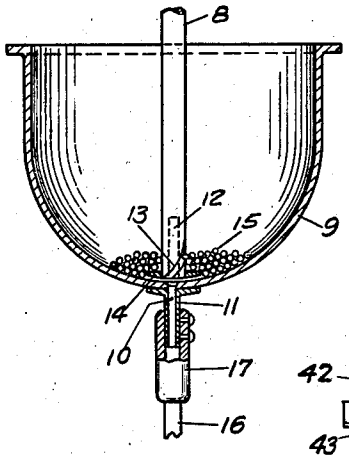


FIG. 2



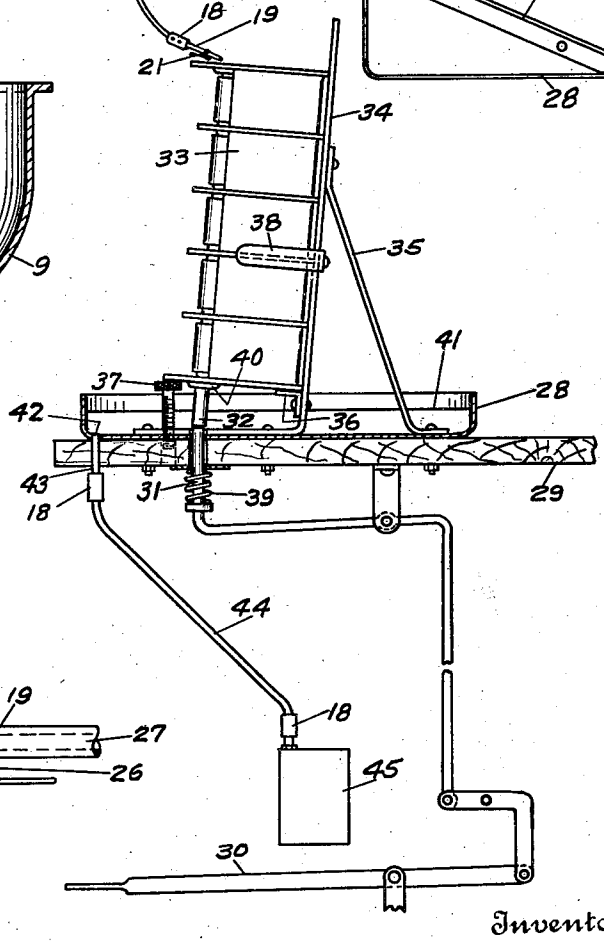
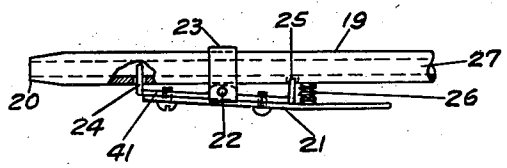


FIG. 3



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Patented Apr. 12, 1932 1,853,665

UNITED STATES PATENT OFFICE

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MEANS FOR LOADING BALL RACES OR THE LIKE

Application filed July 9, 1930. Serial No. 466,871.

This invention relates to means for filling the races of anti-friction or ball-bearings with the anti-friction or ball members.

In my application, Serial No. 332,700, filed January 15, 1929, I have shown and described a plural unit ball-bearing electrical condenser particularly useful in radio receiving sets.

The production of such condensers runs into large numbers and in order to reduce the cost of construction and speed up the rate of production; or stated in another way, to get mass production at the lowest cost, I have found it necessary to find some means of eliminating the labor of picking up the individual balls and placing them in the respective races, two of these races being shown in the application above referred to.

It is therefore the principal object of my invention to provide a rapid method of filling these ball races, and while I have shown my invention in use with a special type of bearing, it is not necessarily so limited in its application, but the method may be used, if found advantageous, in the loading of other ball retainers or races for other types of bearings.

In the drawings:

Figure 1 is a somewhat schematic illustration of the method employed in filling the ball races of a five-gang condenser unit such as illustrated in my application previously referred to.

Figure 2 is a part-sectional and part-elevational view on a reduced scale of a container carrying a large supply of balls to be used for filling the races.

Figure 3 is a view of the selector for passing the balls to the races or retainers.

Figure 4 is a plan view of a pan used at the ball-race filling station.

In the drawings, 1 is a support carrying a member 2 to which is attached a bracket 3. Carried on the bracket 3 is a small electric motor 4 having a pulley 5 which is connected in any suitable manner by means of a circular belt 6 to a pulley 7 carried on a shaft 8. The shaft 8 extends downward to a point near the bottom of a container 9 which is fastened to the member 2. The lower part of the container 9 has an opening 10 leading therefrom, this opening 10 preferably being positioned in a hollow stem 11 fastened to the container 9 in any satisfactory manner.

The lower end of the shaft 8 is hollow, as indicated by 12, and is also provided with at least one spiral groove 13 which extends through the wall of the shaft into the hollow portion 12. On the inner end of the shaft 8, is carried a member 14 which I term an agitator and which acts, when the shaft 8 is turned by the motor 4, to move or agitate the balls 15 within the container 9 so that they will be continuously fed into the spiral groove 13 and into the hollow portion 12 of the shaft 8. The hollow part 12 of the shaft 8 is in alignment with the opening 10, so that the balls pass into the spiral groove and from there into a flexible tube 16 which is fastened to the stem 11 by any suitable fitting 17.

On the free end of the flexible tube 16, is attached a selector by means of a suitable fitting 18 somewhat similar to 17. The selector includes a tube 19 having a nozzle end 20 and a control lever 21. The lever 21 is pivoted at 22 to a bracket 23 carried on the tube 19. Carried by the lever 21 is a member 41 having a pair of fingers 24 and 25. A spring 26 acts to hold the lever 21 in the position shown in Figure 3, whereby the finger 24 obstructs the passageway 27 in the tube 19 so that the balls coming through the flexible tube 16 will not run out of the nozzle 20 promiscuously. The fingers 24 and 25 may be made an integral part of the lever 21.

As shown in Figures 1 and 4, a pan 28 is provided on a bench 29 and to the bench is attached a system of levers operated by a foot pedal 30. One end, or 31, of the levers extends through the bench 29 into the pan 28 and is adapted to be engaged by the end 32 of the operating shaft of the condenser, a five-unit gang being illustrated generally by the number 33. These gang condensers are mounted on a common framework and the frame of the condenser is adapted to rest against a bracket 34 held in position by a brace 35, the bottom part of the frame being supported on a shelf 36, and the outer edge of the lower portion of the frame rests on

an adjustable screw 37 which may be adjusted so as to bring the condenser into the position shown in Figure 1, whereby it is fully supported at the bottom and back, as well as having side supports by means of a U-shaped bracket 38 carried by the bracket 34. The system of levers previously referred to are normally held in what may be termed a non-loading position by a spring 39.

Coming now to the operation of my apparatus and and assuming that the motor 4 is running and that the container 9 is full of balls, the flexible tube 16 and selector will also be full down to the finger 24. Pressure on the foot pedal 30 by the operator allows the end of the lever 31 to raise the condenser shaft sufficiently so that the race therein is exposed to receive the balls. The operator then presses on the free end of the lever 21, causing the finger 25 to trap the balls between the fingers 24 and 25 and to stop any more from coming out of the flexible tube 16. The finger 24 is removed from the passageway 27 and the selected number of balls between the fingers 24 and 25 are allowed to pass into the ball race 40, it being understood that this is the one to be filled first.

It is also to be understood that the fingers 24 and 25 are spaced longitudinally from each other so as to provide the exact number of balls to fill the race, and that the selector may be made to suit the type of race and size of balls required.

Immediately that the race 40 is filled, the operator releases the pressure on the foot pedal 30 and the shaft drops back in place and the top race, which is usually constructed so that it may be filled without raising the shaft, may be then filled and the condenser removed and passed to another operator for applying the ball-retaining plate to the framework of the condenser.

The pan 28 is preferably placed at a slight angle on the bench and may be provided with guide members 41 in the form of small angle irons placed somewhat as shown in Figure 4. A hole 42 is located at the apex of the members 41 and a passageway 44 is provided between a receptacle 45 and the pipe 43 leading to opening 42. The passageway 44 may be in the form of a pipe connected by couplings 18, the same as previously referred to. The pan 28, pipe 44, and receptacle 45 are used to catch and collect any balls which may be spilled by the operator during the filling operation.

By the apparatus and method herein described, I have provided a very expeditious manner of filling ball races, and while I have shown a method which is a practical operation for filling ball races of condensers, I do not wish to be unduly limited by the specification or the scope of the appended claims.

Having thus described my invention, what I claim is:

1. Apparatus for filling the ball races of the rotor bearings of an electrical condenser including a manually operable lever at a race filling station, means for supporting the condenser frame so one end of the rotor shaft is closely opposite one end of said lever whereby when the lever is operated, the rotor shaft may be moved longitudinally to expose at least one of said races, a container carrying a quantity of balls, a tube leading from the container to the condenser race filling station, means within the container to feed the balls therein to said tube, means for operating said just previously mentioned means, and a selector positioned at the free end of said tube to select a definite number of balls and to then pass them at the will of the operator into the condenser rotor bearing race.

2. Apparatus for filling the ball races of the rotor bearings of an electrical condenser including; a race filling station consisting of a pan having supports to receive said condenser frame within the confines of the pan, a member passing through the bottom of the pan at a point to engage the end of the condenser rotor shaft when the condenser frame is in position on said supports, means for operating said member to move the rotor shaft longitudinally of the condenser frame to expose at least one of said races, a container carrying a quantity of balls, a tube leading from the container for conveying balls therefrom to said station, and a selector at the free end of the tube at the station to select a definite number of balls and to then pass them, at the will of the operator, to the rotor bearing race desired to be filled.

3. Apparatus for loading ball races including; a race filling station consisting of a pan having supports to receive members carrying said races mounted within the confines of the pan, a container for carrying a quantity of balls, a tube leading from the container for conveying balls therefrom to said station, means within the container for insuring a steady flow of balls through the tube, a ball selector on the station end of the tube.

4. Apparatus for filling the ball races of the rotor bearings of an electrical condenser including; a race filling station consisting of a pan set at an angle and having supports within the confines of the pan for receiving the condenser frame, a member passing through the bottom of the pan at a point to engage the end of the condenser rotor shaft when the condenser frame is in position on said supports, manually operable means for actuating said member to move the rotor shaft longitudinally of the condenser frame to expose at least one of said races, a container for carrying a quantity of balls, a tube leading from the container for conveying balls therefrom to said station, means within

the container for insuring a steady flow of balls through the tube, a ball selector at the station end of the tube, said pan having an outlet at its lowest point, whereby balls that may accidentally fall into the pan during the filling operation, will pass to said outlet, and means for catching the balls coming from said outlet.

In testimony whereof, I affix my signature.

STANLEY S. CRAMER.