Jan. 11, 1949. A. BRENNER ET AL 2,458,676

APPARATUS FOR ELECTROPLATING

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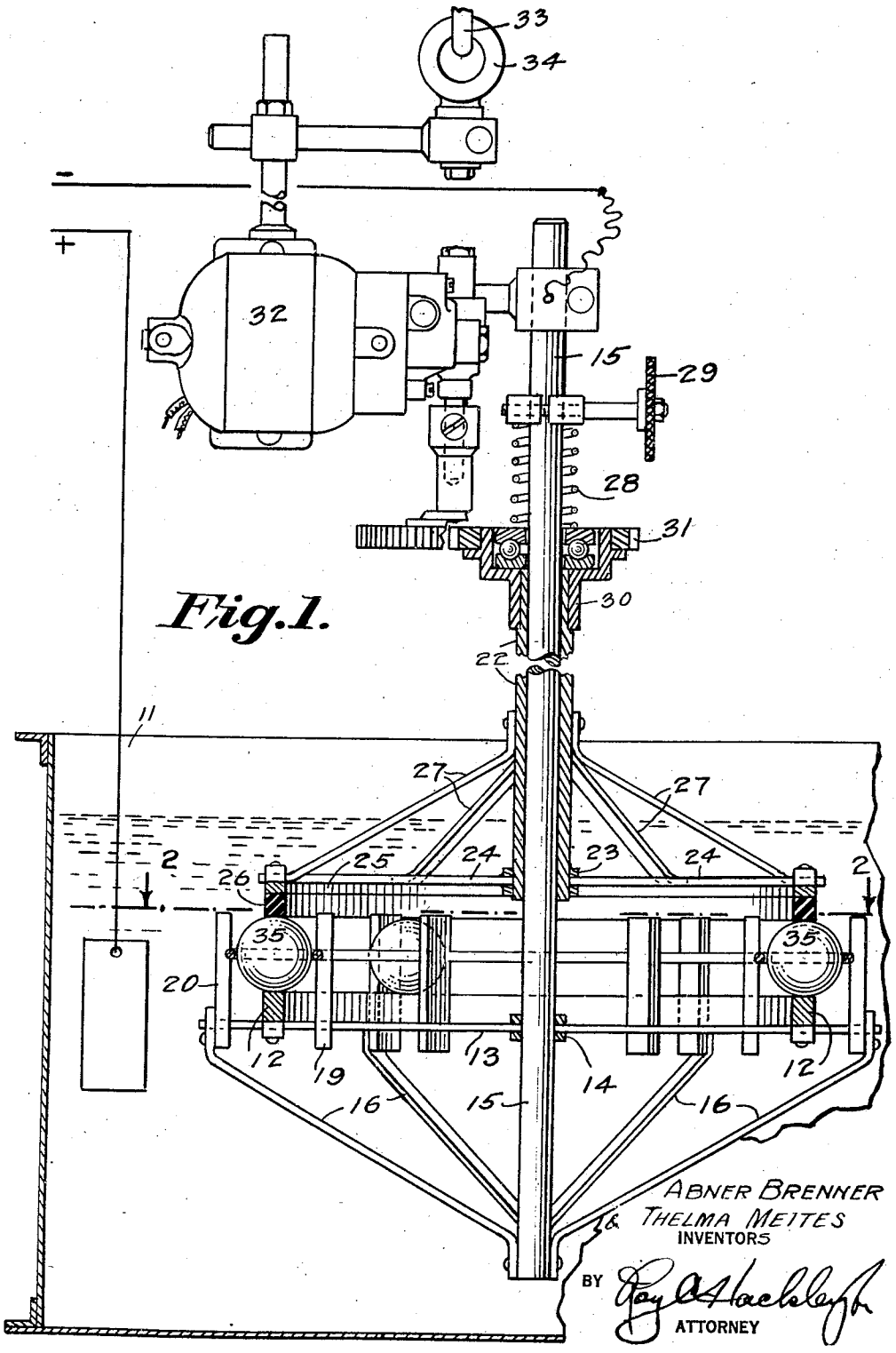


Fig. 1.

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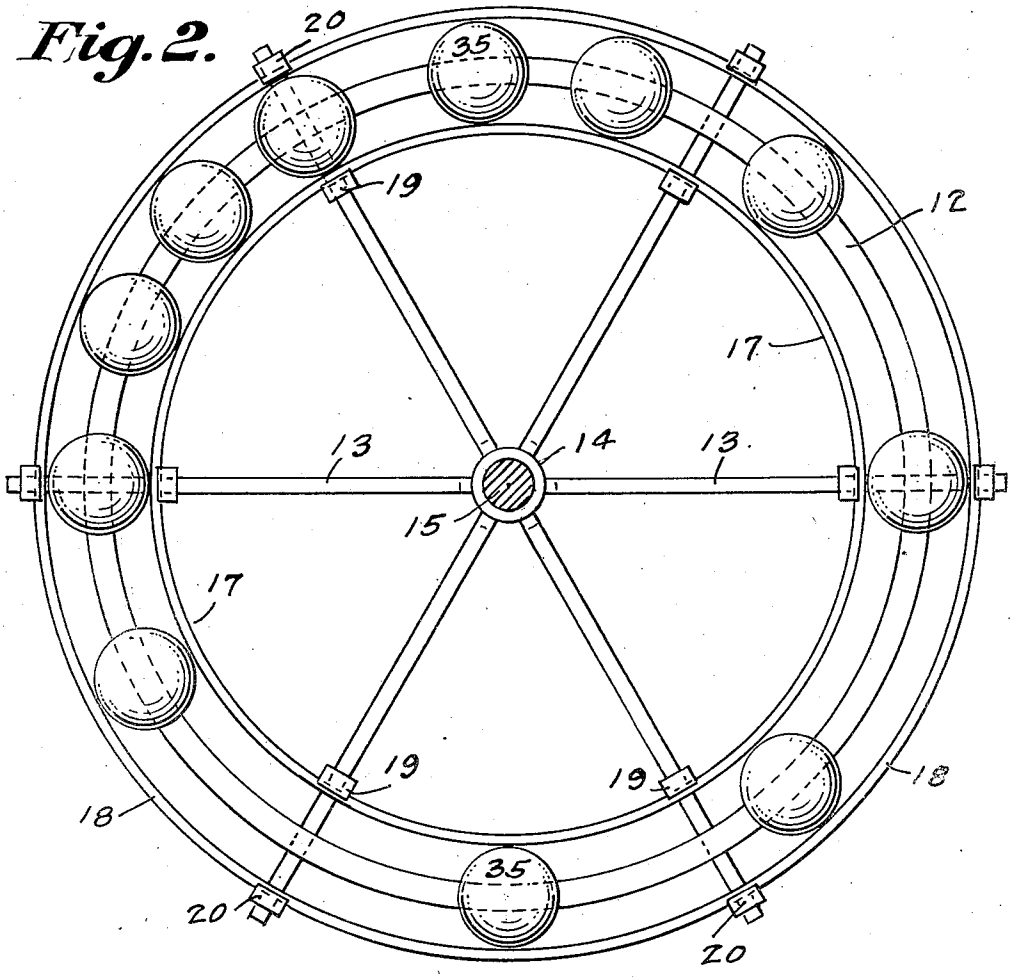
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Fig. 2.



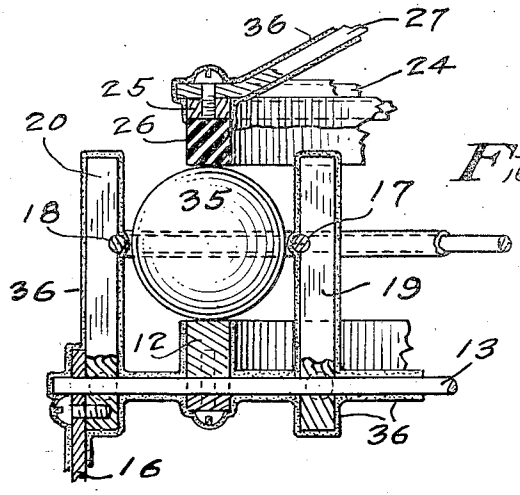


Fig. 3.

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UNITED STATES PATENT OFFICE

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APPARATUS FOR ELECTROPLATING

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Application July 22, 1947, Serial No. 762,782

3 Claims. (Cl. 204—201)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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The invention described herein may be manufactured and used by or for the Government of the United States for governmental purposes without the payment to us of any royalty thereon in accordance with the provisions of the act of April 30, 1928 (ch. 460, 45 Stat. L. 467).

Our invention relates to the electroplating of ball bearings and particularly to the deposition of hard abrasion resistant coatings, such for example, as chromium.

Our apparatus is designed with particular regard to the deposition of chromium in a uniformly thick layer on each ball as well as a uniform thickness of plating on each of a plurality of balls simultaneously receiving an electroplating of chromium.

In the accompanying drawings which illustrate one embodiment of our invention:

Figure 1 is a side elevation partly in section.

Figure 2 is a plan view on the line 2—2 of Figure 1.

Figure 3 is an enlarged detail showing one ball, a portion of a ring form of current terminal and a friction ring.

In these drawings, 11 indicates a receptacle for retaining a plating bath.

Our apparatus comprises a lower ring shaped metallic track 12 which is preferably composed of steel and has a spider comprising radial spokes 13 and a central hub 14. This hub 14 is mounted upon a central electrically conductive post 15, the hub 14 being secured thereto in any well-known manner as by a drive fit. The outer ends of the spokes 13 are also connected to the post 15 by a plurality of inclined braces 16. Two wire guides 17 and 18 are arranged concentrically with the post 15 and ring 12 and are supported from the post 15 by a plurality of pairs of posts 19, 20, each pair being secured to one of the radial spokes 13.

On the post 15 above the hub 14 there is mounted a concentric sleeve 22 on which there is fitted a hub 23 with radial spokes 24 to the outer ends of which are secured a friction ring 25 preferably faced with rubber 26. A plurality of inclined braces 27, corresponding to the braces 16, connect the ring 25 with the sleeve 22.

The sleeve 22 is resiliently held down by a concentric compression spring 28 and is locked by means of a manually operated hand wheel 29. The sleeve 22 has an expanded portion 30 rigidly connected to a toothed gear 31 which rotates ring 25 at about 20 R. P. M. through a train of gearing from a suitable electric motor 32, which in turn

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may be adjustably supported from a suitable support 33 by a hanger eyelet 34.

The parts are assembled as shown in Figure 1 with a plurality of balls 35, of steel or other suitable metal, in spaced relation on the lower track ring 12.

By manipulating the locking hand wheel 29 the upper track ring 25 is lowered into contact with the assembled balls and locked. Thereafter contact with these balls is maintained by spring pressure and by gravity which supply resilient pressure to maintain good electrical contact of the track ring 12 with the balls 35. The rings 12 and 25 must be parallel and the wearing face of 12 must be free from unevennesses, which parallelism and smoothness is attained by grinding with a suitable abrasive. All parts of our immersed apparatus, except the facing surface of the track ring 12, are coated with an insulating stop-off varnish 36 (Fig. 3) but for the sake of clearness, the insulating varnish is not indicated on Figs. 1 and 2. In Fig. 3, the section is taken along the face of the posts 19, 20, in order to indicate in section the insulating varnish 36.

The operation of our rack involves both a continuous and a random motion of the balls 35 between the opposed track ring 12 and friction ring 25, the former of which serves as one terminal of an electroplating current of a density about fifty percent higher than used in ordinary plating in order to allow for the loss of current due to the unusual form of our current terminal. The balls 35 are retained between our track rings 12 and 25 by our wire guards 17 and 18 and receive a rolling motion due to frictional contact with the upper friction ring 25, which continuous rolling motion is modified by a random motion introduced by the balls 35 making intermittent contact with the wire guards 17 and 18.

With the use of our apparatus steel ball bearings may be given an electroplated coating of abrasion resistant chromium, or the like, of uniform thickness over each ball as well as over each ball of a series which are simultaneously coated. Such ball bearings are of particular value in bearings of machinery which is intermittently used and is also exposed to the weather such for example as the bearings of gun mounts, and such coatings are not produced by using racks which remain stationary while balls are receiving an electroplated coating of chromium, nor are such coatings as ours produced by tumbling in a plating barrel.

It should be understood that the present disclosure is for the purpose of illustration only, and

that the invention includes all modifications and equivalents which fall within the scope of the appended claims.

What we claim is:

1. In an electroplating device provided with an electroplating current supply and a suitable receptacle for a plating bath, the improvement which comprises a portable ball retaining device having a ring shaped cathode, a cathode supporting spider, two ball confining guide rings mounted on said spider, a friction ring of a diameter substantially the same as said ring cathode, a second spider for said friction ring, means for rotating said friction ring with respect to said cathode and resilient means for axially pressing a plurality of balls to be electroplated between said cathode and said friction ring.

2. A portable electroplating rack adapted to be suspended in suitable baths, comprising conducting means for supplying electroplating current, a ring shaped cathode, an electrically conductive cathode supporting spider, a conductive post rigidly connected to said spider, an annular ball confining guide concentric with and of greater diameter than said cathode also supported by said spider, a second concentric guide in the plane of said first guide and of lesser diameter than said cathode and also supported by said spider, a sleeve rotatively mounted on said post, a second spider rigidly connected to said sleeve, a friction ring carried by said second spider of a width and diameter corresponding with those of said cathode ring, resilient means pressing said friction ring toward said cathode and power driven means for rotating said friction ring with respect to said cathode, said device being adapted to receive a plurality of metal balls between said cathode and said friction ring and to confine such balls between said ring shaped guides while immersed in said baths.

3. A portable electroplating rack comprising a ring shaped cathode, an electrically conductive cathode supporting spider, a second ring of a diameter substantially equal to that of said first ring and having an axis common with said cathode, an annular resilient friction pad secured to said second ring, two concentric ball confining rings mounted on said spider, a second spider for said second ring, resilient means for moving axially toward each other said second ring with respect to said cathode ring and means for rotating one of said last mentioned rings.

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