

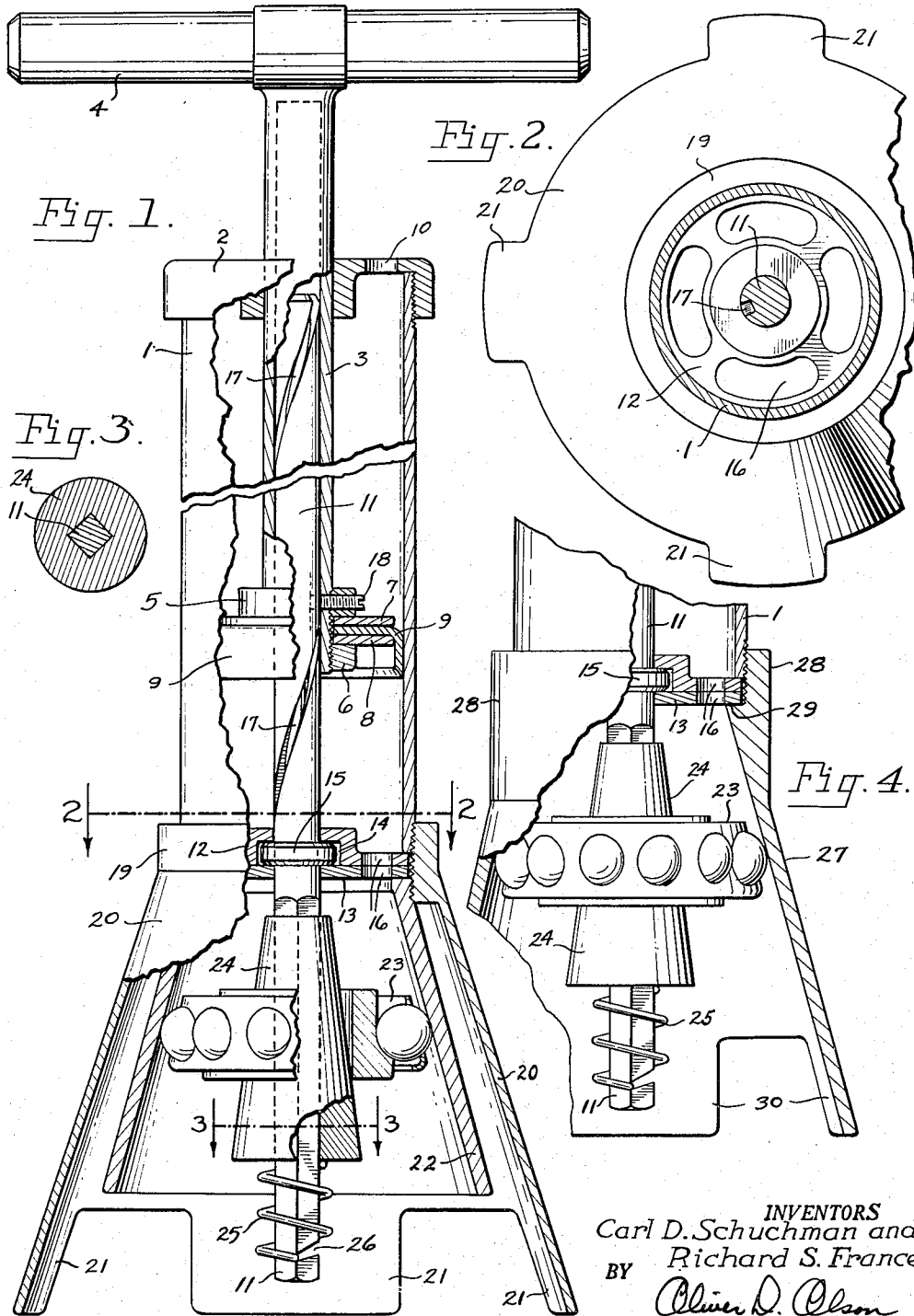
Sept. 22, 1953

C. D. SCHUCHMAN ET AL

2,652,843

BEARING CLEANER

Filed Nov. 16, 1949



INVENTORS
Carl D. Schuchman and
Richard S. France
BY
Oliver D. Olson
Their Agent

UNITED STATES PATENT OFFICE

2,652,843

BEARING CLEANER

Carl B. Schuchman, Vancouver, and Richard S. France, Ridgefield, Wash.

Application November 16, 1949, Serial No. 127,586

13 Claims. (Cl. 134-116)

1

This invention pertains to devices for cleaning bearings, and relates particularly to a bearing cleaner constructed in such manner as to cause rotation of the bearing while the latter are being subjected to the action of cleaning fluid.

It is a principal object of the present invention to provide a bearing cleaner in which the reciprocal movement of a single rod is employed to cause cleaning fluid to be washed through the bearing and simultaneously to rotate the latter, whereby to afford effective and thorough cleaning.

Another important object of this invention is the provision of a bearing cleaner which accommodates bearings of various types and sizes.

A further object is to provide a bearing cleaner of simple but sturdy construction and which accommodates the installation and removal of bearings with rapidity and ease.

These and other objects and advantages of the present invention will appear from the following detailed description taken in connection with the accompanying drawing, in which:

Figure 1 is a foreshortened elevation of a bearing cleaner embodying the features of the present invention, parts of said structure being broken away to disclose details of construction;

Figure 2 is a fragmentary sectional view taken along the line 2-2 in Figure 1;

Figure 3 is a sectional view taken along the line 3-3 in Figure 1; and

Figure 4 is a fragmentary elevation showing a modified form of bearing race for use with the bearing cleaner of the present invention, parts thereof being broken away to disclose details of construction.

Referring particularly to Figure 1 of the drawing, the bearing cleaner comprises an elongated cylinder 1 open at one end and closed at the opposite end by a removable cap 2. A central hole in said cap receives a hollow tube 3 slidably therein for reciprocal movement longitudinally of said cylinder. A handle 4 is formed at the exposed end of the tube 3 to facilitate manipulation of the latter. The opposite, or inner, end of said tube is threaded externally to receive a pair of nuts 5, 6 between which a pair of retainer washers 7, 8 are secured. The washers in turn secure a leather piston 9 therebetween. The hollow tube thus functions as a piston rod by which piston 9 is reciprocated within the cylinder 1. The peripheral edge of the piston engages the inner bore of the cylinder 1, whereby to function as a pump when reciprocated therein, in the manner of a conventional tire pump. The usual opening 10 is provided in the cap 2 to permit the passage of air therethrough.

2

Extending slidably within the bore of tube 3 is a drive shaft 11. Said drive shaft is secured intermediate its ends against longitudinal movement relative to the cylinder 1, but is free to rotate axially therein. The shaft-securing means shown in Figure 1 of the drawing includes a pair of cooperating centrally apertured discs 12, 13. Disc 12 is offset centrally in such manner that, when arranged in abutting relation with disc 13, a central bearing 14 is formed. Collar 15, secured intermediate the ends of the drive shaft 11, is proportioned and arranged to be received in the bearing 14, whereby to permit axial rotation of the shaft 11 and to prevent longitudinal displacement of the latter. The discs 12, 13 are secured detachably at the open end of cylinder 1, as explained in detail hereinafter. Elongated complementary slots 16 formed circumferentially in the discs 12, 13 provide openings into the cylinder 1.

The drive shaft 11 is provided with a groove 17 extending spirally from the collar 15 to the end which extends into the bore of tube 3. A threaded pin 18 extends through the piston-securing nut 5 and tube 3 into the groove 17 wherein said pin may travel as the tube 3 is reciprocated in the cylinder 1. Inasmuch as longitudinal movement of the drive shaft 11 is restricted by collar 15, the former is caused to rotate axially as the pin 18 travels along the groove 17.

The open end of cylinder 1 is threaded externally to receive the internally threaded end 19 of shield 20. The latter is formed in the shape of a truncated cone which diverges from the threaded end 19. The base of the shield extends slightly beyond the lowermost end of the drive shaft 11 and is notched circumferentially to provide depending legs 21 upon which the cleaner device may stand in vertical position during storage or while in operation, as explained in detail hereinafter.

The threaded end 19 of the shield extends beyond the open end of cylinder 1, as shown in Figure 1 of the drawing. A bearing race 22, of truncated conical shape, is threaded externally at its smaller end to engage the threads extending from the end 19 of said shield. In this manner the race 22 is rendered detachable from the cleaner device without removing the shield 20. Bearing races of various sizes to accommodate bearings of diverse types and sizes may thus be substituted quickly and easily.

The bearing race is proportioned and arranged to conform substantially to the outer taper of the bearing 23 to be cleaned. A plug 24, preferably formed in the shape of a truncated cone,

3

is provided with a central longitudinal bore whereby said plug may be installed removably upon the portion of drive shaft 11 extending through the bearing race 22. The plug is proportioned and arranged to fit closely about the drive shaft 11 in such manner that rotation of the latter causes simultaneous rotation of the plug. This is accomplished in the structure shown in Figure 1 by providing a square shaft 11 and a complementary square hole in the plug 24. Other means for accomplishing this purpose will be apparent to those skilled in the art.

The plug is proportioned and arranged to extend through the central opening of the bearing 23 to be cleaned and to hold the latter in engagement with the race 22. As shown in Figure 1 of the drawing, the plug 24 engages the inner removable race of the ball bearing 23. Sufficient frictional contact between the plug and inner race is produced to cause said inner race to rotate with the plug as the drive shaft 11 is turned. Similar action is obtained when a roller-type bearing is installed for cleaning. When the detachable inner race of a ball bearing is removed, a larger plug is used to engage the balls. Rotation of the plug thereby causes the several balls to turn in their sockets.

Means is also provided to insure against retraction of the plug during the cleaning operation. Many methods and devices for accomplishing this function will be apparent to those skilled in the art, and therefore the means illustrated in the drawing is to be considered as merely exemplary. Said holding means comprises a coil spring 25 which slidably encircles the exposed end of the squared shaft 11. One end of said spring abuts against the base of the plug 24, while the opposite end of the spring engages a notch 26 formed adjacent the end of the shaft 11. In this manner the spring continually urges the plug into firm contact with the bearing 23 to be cleaned.

The modification shown in Figure 4 of the drawing represents an alternative form of the bearing race 22 described hereinbefore. In the modification, the bearing race 27 is formed in the shape of a truncated cone but is longer than the race 22 previously described. The smaller end 28 of the race is threaded internally for removable attachment to the end of cylinder 1. Shoulder 29, formed at the base of said internal threads, and the adjacent end of cylinder 1 secures the discs 12, 13 therebetween. The race 27 extends beyond the end of drive shaft 11 and is notched about its larger end to provide legs 30, in manner similar to that of legs 21 provided on the shield 20. In this manner the former shield is eliminated and the structure is thereby simplified.

The operation of the device embodying the present invention is as follows: Assuming, for purposes of this description, that the bearing 23 shown in Figures 1 and 4 of the drawing has just been cleaned and is to be removed. The spring 25 is disengaged from the notch 26 and is removed from the end of drive shaft 11. Plug 24 is then pulled or allowed to drop from the shaft, whereupon the bearing 23 is also removed. Another bearing 23 to be cleaned is then placed in the race 22 or 27, as shown, and the plug 24 and spring 25 installed in the manner explained hereinbefore.

The device is then placed vertically within an open container of cleaning fluid, sufficient liquid being available to cover the openings formed be-

4

tween the legs 21 or 30. The operator grasps the handle 4 and moves it and the attached piston rod 3 up and down. On the upward stroke, piston 9 pushes air outwardly through opening 10 in cap 2 and pulls cleaning fluid upwardly between the race 22 or 27 and the plug 24, through the slots 16 of the discs 12, 13 and into the cylinder 1 below the piston 9. The fluid is thereby caused to pass around each ball or roller of the bearing being cleaned.

Simultaneously with the drawing of cleaning fluid upwardly through the bearing 23, the upward movement of piston rod 3 causes the pin 18 secured therein to travel upwardly along the spiral groove 17 formed in the drive shaft 11. The latter is thus caused to rotate axially, whereby corresponding rotation of the plug 24 effects a turning of the balls or rollers of the bearing being cleaned. Rotation of said balls or rollers during washing by the cleaning fluid expedites the cleaning operation and results in more thorough cleansing. The downward stroke of piston 9 causes the cleaning fluid to be pushed downwardly through the bearing into the container and reverses the direction of rotation of drive shaft 11.

It will be apparent to those skilled in the art that many changes may be made in the construction of the bearing cleaner described hereinbefore without departing from the scope and spirit of the present invention. For example, various arrangements equivalent to the hollow piston rod tube 3 and drive shaft 11 may be substituted for the structure shown in the drawing. The tube 3 may be grooved internally in spiral manner and engaged by a pin projecting from the drive shaft 11. Alternatively, the drive shaft may be formed of a flat rod twisted longitudinally in spiral manner and engaged between detents formed in the hollow tube 3.

The leather piston 9 may be replaced by a ring-type piston or other means by which the action described hereinbefore may be obtained. Mechanical means may be substituted for the hand operation if portability of the device is not required. The apertured discs 12, 13 may be secured to the cylinder 1 and the collar 15 rendered detachable from the drive shaft by means of a set screw. Other methods of securing the drive shaft against longitudinal movement will be apparent to those skilled in the art.

The legs 21 or 30 may be omitted from the shield 20 or race 27, respectively, if other means is provided for holding the latter above the bottom of the cleaner fluid container during operation of the device. Inasmuch as the primary function of the spaced legs 21 or 30 is to provide openings for the passage of cleaning fluid to and from the bearing cleaner, it is apparent that means other than said legs may be employed. For example, the shield 20 or race 27 may be provided with apertures adjacent their respective bases. Alternatively, the base of said shield or race may be fluted or scalloped circumferentially in order to provide the desired openings. It is intended, therefore, that the term apertured as used in this regard in the appended claims be construed to include the openings formed by the spaced legs, the apertures adjacent the bases, the scalloped or fluted bases and any other construction capable of providing the function described hereinbefore.

As stated hereinbefore, means other than the coil spring 25 may be employed to hold the plug 24 releasably in engagement with the bearing

5

being cleaned and to hold said bearing in contact with the race 22 or 27. The squared shaft 11 upon which the plug is mounted may be of circular or other cross sectional shape, it being necessary only to provide means for insuring releasable attachment of the plug in such manner that rotation of the drive shaft causes simultaneous rotation of the plug. If desired, the cylinder 1 and bearing race 27 may be formed as an integral unit. These and other modifications may be made in the structure described hereinbefore without departing from the scope and spirit of the present invention.

Having thus described our invention and the manner in which the same may be used, what we claim as new and desire to secure by Letters Patent is:

1. A bearing cleaner comprising, in combination, a cylinder, a flared conical race on one end of said cylinder, a piston movable longitudinally in said cylinder, a piston rod for reciprocating the piston within said cylinder, a drive shaft mounted for axial rotation within said cylinder and terminating at one end adjacent the race, interengaging means on the cylinder and drive shaft for restricting their relative longitudinal displacement, spiral means slidably connecting said piston rod and said drive shaft, whereby longitudinal movement of the piston rod causes axial rotation of said drive shaft, and bearing-engaging means mounted on the end of the drive shaft adjacent the race for rotation with said drive shaft, said bearing-engaging means extending into the race and being adapted to hold a bearing in contact with the conical race.

2. A portable bearing cleaner comprising, in combination, a cylinder, a flared conical race on one end of said cylinder, a piston movable longitudinally in said cylinder, a piston rod, handle means on said piston rod for reciprocating the piston within said cylinder, a drive shaft mounted for axial rotation within said cylinder and terminating at one end adjacent the race, interengaging means on the cylinder and drive shaft for restricting their relative longitudinal displacement, spiral means slidably connecting said piston rod and said drive shaft, whereby longitudinal movement of the piston rod causes axial rotation of said drive shaft, and bearing-engaging means mounted on the end of the drive shaft adjacent the race for rotation with said drive shaft, said bearing-engaging means extending into the race and being adapted to hold a bearing in contact with the conical race.

3. A bearing cleaner comprising, in combination, a cylinder, a flared conical race secured detachably on one end of said cylinder, a piston movable longitudinally in said cylinder, a piston rod for reciprocating the piston within said cylinder, a drive shaft mounted removably for axial rotation within said cylinder and terminating at one end adjacent the race, interengaging means on the cylinder and drive shaft for restricting their relative longitudinal displacement, spiral means slidably connecting said piston rod and said drive shaft, whereby longitudinal movement of the piston rod causes axial rotation of said drive shaft, and bearing-engaging means mounted on the end of the drive shaft adjacent the race for rotation with said drive shaft, said bearing-engaging means extending into the race and being adapted to hold a bearing in contact with the conical race.

4. A bearing cleaner comprising, in combination, a cylinder, a flared conical race on one

6

end of said cylinder, a piston movable longitudinally in said cylinder, a piston rod for reciprocating the piston within said cylinder, a drive shaft mounted for axial rotation within said cylinder and race, interengaging means on the cylinder and drive shaft for restricting their relative longitudinal displacement, spiral means slidably connecting said piston rod and said drive shaft, whereby longitudinal movement of the piston rod causes axial rotation of said drive shaft, and a tapered plug mounted on the end of the drive shaft adjacent the race for rotation with said drive shaft, said plug extending into the race and being adapted to engage the central bore of a bearing to be cleaned and to hold said bearing in contact with the conical race.

5. A bearing cleaner comprising, in combination, a cylinder, a flared conical race on one end of said cylinder, a piston movable longitudinally in said cylinder, a tubular piston rod extending from said piston through the end of the cylinder opposite said race, a drive shaft mounted for axial rotation within said cylinder and terminating at one end adjacent the race, interengaging means on the cylinder and drive shaft for restricting their relative longitudinal displacement, a portion of said drive shaft slidably engaging the bore of said tubular piston rod, spiral means slidably connecting said piston rod and said drive shaft, whereby longitudinal movement of the piston rod causes axial rotation of said drive shaft, and bearing-engaging means mounted on the end of the drive shaft adjacent the race for rotation with said drive shaft, said bearing-engaging means extending into the race and being adapted to hold a bearing in contact with the conical race.

6. A bearing cleaner comprising, in combination, a cylinder, a flared conical race on one end of said cylinder, a piston movable longitudinally in said cylinder, a piston rod for reciprocating the piston within said cylinder, a drive shaft mounted for axial rotation within said cylinder and terminating at one end adjacent the race, interengaging means on the cylinder and drive shaft for restricting their relative longitudinal displacement, a portion of said drive shaft having spiral means thereon, guide means slidably connecting said piston rod and the spiral portion of said drive shaft, whereby longitudinal movement of the piston rod causes axial rotation of said drive shaft, and bearing-engaging means mounted on the end of the drive shaft adjacent the race for rotation with said drive shaft, said bearing-engaging means extending into the race and being adapted to hold a bearing in contact with the conical race.

7. A bearing cleaner comprising, in combination, a cylinder, a flared conical race secured detachably on one end of said cylinder, a piston movable longitudinally in said cylinder, a tubular piston rod for reciprocating the piston within said cylinder, a drive shaft mounted for axial rotation within said cylinder and terminating at one end adjacent the race, interengaging means on the cylinder and drive shaft for restricting their relative longitudinal displacement, a portion of said drive shaft slidably engaging the bore of said tubular piston rod and having spiral means thereon, guide means slidably connecting said piston rod and the spiral portion of said drive shaft, whereby longitudinal movement of the piston rod causes axial rotation of said drive shaft, and bearing-engaging means mounted on

7

the end of the drive shaft adjacent the race for rotation with said drive shaft, said bearing-engaging means extending into the race and being adapted to hold a bearing in contact with the conical race.

8. A bearing cleaner comprising, in combination, a cylinder, a flared conical race on one end of said cylinder, a piston movable longitudinally in said cylinder, a piston rod for reciprocating the piston within said cylinder, a drive shaft mounted for axial rotation within said cylinder and terminating at one end adjacent the race, interengaging means on the cylinder and drive shaft for restricting their relative longitudinal displacement, spiral means slidably connecting said piston rod and said drive shaft, whereby longitudinal movement of the piston rod causes axial rotation of said drive shaft, and bearing-engaging means mounted on the end of the drive shaft adjacent the race for rotation with said drive shaft, said bearing-engaging means extending into the race and being adapted to hold a bearing in contact with the conical race, said race being apertured to permit the passage of cleaning fluid therethrough.

9. A bearing cleaner comprising, in combination, a cylinder, a flared conical race secured detachably on one end of said cylinder, a piston movable longitudinally in said cylinder, a piston rod for reciprocating the piston within said cylinder, a drive shaft mounted removably for axial rotation within said cylinder and race, interengaging means on the cylinder and drive shaft for restricting their relative longitudinal displacement, spiral means slidably connecting said piston rod and said drive shaft, whereby longitudinal movement of the piston rod causes axial rotation of said drive shaft, and a tapered plug mounted detachably on the end of the drive shaft adjacent the race for rotation with said drive shaft, said plug extending into the race and being adapted to engage a bearing to be cleaned and to hold said bearing in contact with the conical race, said race being apertured to permit the passage of cleaning fluid therethrough.

10. A bearing cleaner comprising, in combination, a cylinder, a flared conical race on one end of said cylinder, a piston movable longitudinally in said cylinder, a piston rod for reciprocating the piston within said cylinder, a drive shaft mounted for axial rotation within said cylinder and terminating at one end adjacent the race, interengaging means on the cylinder and drive shaft for restricting their relative longitudinal displacement, spiral means slidably connecting said piston rod and said drive shaft, whereby longitudinal movement of the piston rod causes axial rotation of said drive shaft, bearing-engaging means mounted on the end of the drive shaft adjacent the race for rotation with said drive shaft, said bearing-engaging means extending into the race and being adapted to hold a bearing in contact with the conical race, and a shield surrounding and extending beyond the base of said conical race, said shield being apertured to permit the passage of cleaning fluid therethrough.

11. A bearing cleaner comprising, in combina-

8

tion, a cylinder, a flared conical race on one end of said cylinder, piston means movable longitudinally in said cylinder, a drive shaft mounted for axial rotation within said cylinder and terminating at one end adjacent the race, interengaging means on the cylinder and drive shaft for restricting their relative longitudinal displacement, means slidably connecting said piston means and drive shaft in such manner that longitudinal movement of the piston means causes axial rotation of said drive shaft, and bearing-engaging means mounted on the end of the drive shaft adjacent the race for rotation with said drive shaft, the bearing-engaging means extending into the race and adapted to hold a bearing in contact with the conical race.

12. A bearing cleaner comprising, in combination, a cylinder, a flared conical race on one end of said cylinder, a drive shaft mounted for axial rotation within said cylinder and terminating at one end adjacent the race, interengaging means on the cylinder and drive shaft for restricting their relative longitudinal displacement, bearing-engaging means mounted on the end of the drive shaft adjacent the race for rotation with said drive shaft, the bearing-engaging means extending into the race and adapted to hold a bearing in contact with the conical race, pump means for forcing cleaning fluid into and out of the cylinder past the bearing to be cleaned, and means interconnecting the pump means and drive shaft, in such manner that the drive shaft is rotated by actuation of the pump means.

13. A bearing cleaner comprising, in combination, reciprocating fluid pump means open at one end for passage of cleaning fluid to and from said pump, a flared conical race on the pump means surrounding the said opening, a drive shaft mounted in fixed longitudinal relation with the conical race for axial rotation on the axis of the conical race and terminating at one end adjacent the race, bearing-engaging means mounted on the end of the drive shaft adjacent the race for rotation with the drive shaft, the bearing-engaging means extending into the race and being adapted to hold a bearing in contact with the race, and means interconnecting the pump means and drive shaft for rotating the drive shaft by actuation of the pump means.

CARL D. SCHUCHMAN.
RICHARD S. FRANCE.

References Cited in the file of this patent UNITED STATES PATENTS

Number	Name	Date
136,423	Dick	Mar. 4, 1873
422,049	Carter	Feb. 25, 1890
1,082,313	Freiborg	Dec. 23, 1913
1,335,912	Olson	Apr. 6, 1920
1,477,068	Magann	Dec. 11, 1923
1,814,592	Geiger	July 14, 1931
1,963,563	Slepicka	June 19, 1934
2,027,116	Oubridge	Jan. 7, 1936
2,137,660	Welke	Nov. 22, 1938
2,369,498	Steuber	Feb. 13, 1945