H. B. LAYMAN.

METHOD OF PROVIDING TUBULAR BEARINGS WITH ANTIFRICTION LININGS.

APPLICATION FILED AUG. 6, 1915.

1,176,303.

Patented Mar. 21, 1916.

2 SHEETS—SHEET 1.

FIG. 1.

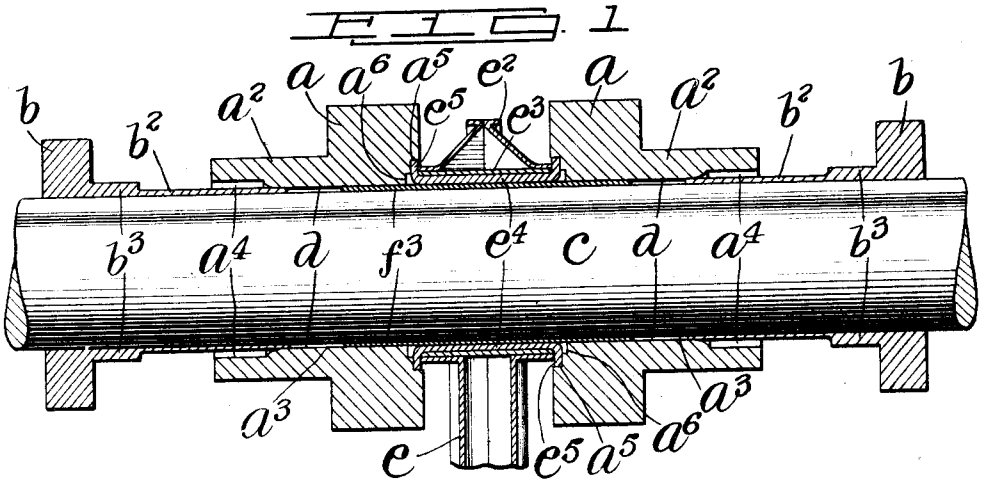


FIG. 2.

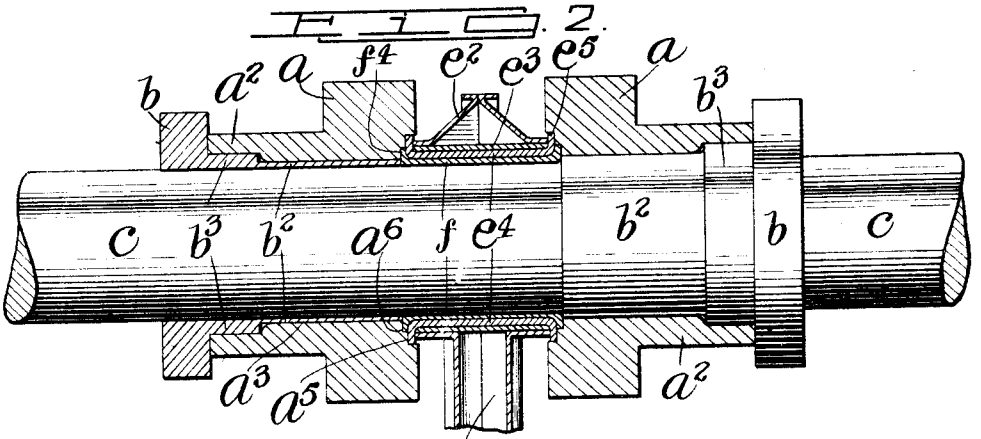


FIG. 3.

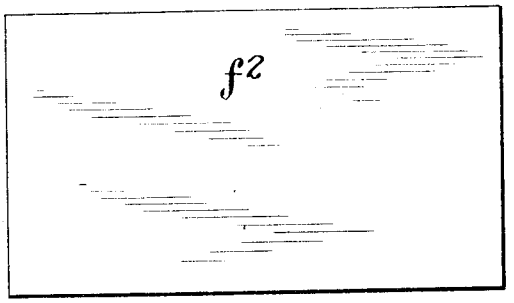
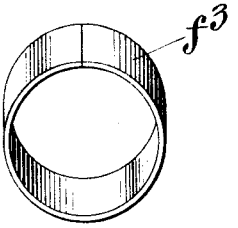


FIG. 4.



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2 SHEETS—SHEET 2.

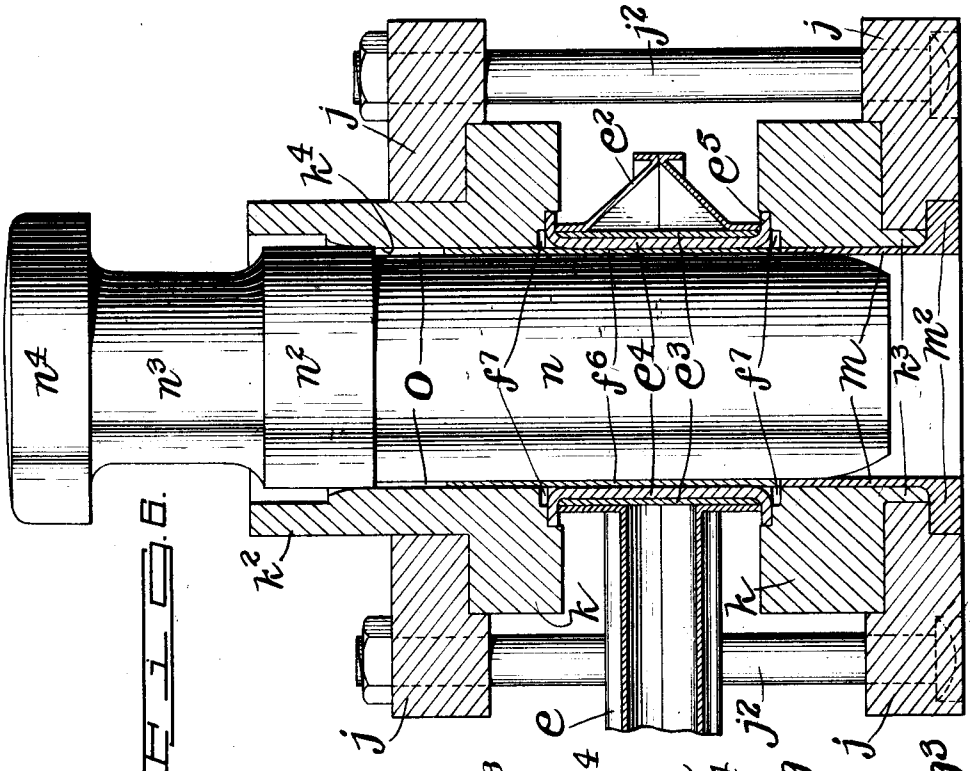

FIG. 5.

FIG. 6.

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UNITED STATES PATENT OFFICE.

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METHOD OF PROVIDING TUBULAR BEARINGS WITH ANTIFRICTION-LININGS.

1,176,303. Specification of Letters Patent. Patented Mar. 21, 1916.

Application filed August 6, 1915. Serial No. 43,939.

To all whom it may concern:

Be it known that I, HEBRON B. LAYMAN, a citizen of the United States, and residing at New York, in the county of New York and State of New York, have invented a certain new and useful Improved Method of Providing Tubular Bearings with Antifriction-Linings, of which the following is a specification, such as will enable those skilled in the art to which it appertains to make and use the same.

This invention relates to anti-friction linings for tubular bearings of any class and particularly to the bearings at the larger end of connecting rods through which the cranks of crank shafts pass; and the object of the invention is to provide an improved method of providing such bearings with anti-friction linings of Babbitt metal or similar metal; and with this and other objects in view the invention consists in the method hereinafter described for the purpose set out.

The invention is fully disclosed in the following specification, of which the accompanying drawing forms a part, in which the separate parts of my improvement are designated by suitable reference characters in each of the views, and in which:—

Figure 1 is a longitudinal sectional side view through an apparatus which I employ for carrying my improved method into effect; Fig. 2 is a similar view but showing the parts in a different position; Fig. 3 is a plan view of a sheet of Babbitt metal which I employ; Fig. 4 a perspective view of a sleeve lining made from said sheet; Fig. 5 a sectional view of a modified form of apparatus; and, Fig. 6 a view similar to Fig. 5 but showing another modification.

In the practice of my invention, as shown in Figs. 1 to 4 inclusive, I provide two similar block members a having, in the form of construction shown, oppositely directed sleeve extensions a^2, and these block members may be connected and supported in any desired manner but, in practice, said block members are made movable toward and from each other, or one of block members is made movable toward and from the other. The block members a with their sleeve extensions a^2 are provided with central axial bores a^3, and I also provide two similar plunger devices b having sleeves b^2 which closely fit and are movable in the bores a^3 of the block members a, and said sleeves are provided, in the form of construction shown, with annular thickened portions b^3, and the bores a^3 of the block members a are enlarged at the outer ends of the sleeves a^2 as shown at a^4 to receive the annular enlargements b^3 of the sleeves b^2. I also provide a mandrel c which passes through and closely fits the bores of the plunger devices b, and the sleeves b^2 thereof, and also through the block members a, and the diameter of the mandrel c is slightly less than that of the bores of the block members a and sleeves a^2 thereof so as to form an annular space d between said mandrel and said block members and their sleeves. I have also shown at e the shank of a connecting rod made from sheet metal, as shown and described in a prior application for Letters Patent of the United States filed by me April 28, 1915, Serial No. 24,481 together with the larger head or end e^2 thereof, with which in the use of said rod, the crank or crank shaft is connected. The larger end or head e^2 of the rod e is provided with a tubular bearing consisting, in the form of construction shown, of a main outer member e^3 and a supplemental inner member e^4 both of which are preferably composed of sheet metal and the inner member e^4 is provided with end flanges e^5 which overlap the ends of the head e^2 of the rod, and the block members a are provided in their adjacent faces with rabbet grooves a^5 to receive said flanges and with supplemental grooves a^6 to receive corresponding flanges at the ends of my improved anti-friction linings as hereinafter described.

The above named anti-friction lining is shown at f in Fig. 2, and this lining is formed from a sheet f^2 of Babbitt or other suitable metal shown in Fig. 3, which is rolled into a sleeve f^3 shown in Fig. 4, and which is mounted on the mandrel c as shown in Fig. 1.

In the use of the apparatus herein shown and described, the block members a are separated so as to permit of the insertion of the head e^2 of the connecting rod between said members and are afterward brought together so as to bind and securely hold the head a^2 there-between, after which the sleeve f^3 is inserted, one of the plunger devices b being moved outwardly far enough to permit of this operation, after which the mandrel c is passed through the plunger devices

b and through the block members a and the sleeve f^3. The sleeve f^3 is of a predetermined length greater than the distance between the block members a, and when the parts have been assembled in the manner described, or in any other suitable manner, the plunger devices b are moved inwardly into the position shown in Fig. 2, and in this operation the sleeve portions b^2 of the plunger devices b bear on the ends of the sleeve f^3 and compress said sleeve longitudinally and expand it so as to form the supplemental anti-friction bearing or lining f, as shown in said figure, and in this operation said supplemental anti-friction bearing f is provided with end flanges f^4 formed by the expansion of the ends of the sleeve f^3 into the grooves a^6.

The manipulation of the parts a and b in the above described operation may be effected in any preferred manner, or by any desired means, and the plungers b may be operated by hydraulic pressure or by compressed air, or in any other way, and the mandrel c may be moved longitudinally and rotated, if desired, and in this operation the supplemental anti-friction lining or sleeve f is firmly compressed and also expanded into firm contact or connection with the tubular bearing of the head e^2, consisting, in the form of construction shown, of the parts e^3 and e^4, and by means of the above described operation the anti-friction lining or sleeve f will be given a highly polished interior surface and the compression of the material of the sleeve f^3 in forming the anti-friction lining f increases the resistance of said lining to friction and also provides the inner face thereof with a more durable and smoother surface.

In Figs. 1 and 2 of the accompanying drawing, I have shown the apparatus for carrying my improved method or process into effect mounted in a horizontal position, but in Figs. 5 and 6 I have shown a modified form of apparatus mounted in a vertical position.

The apparatus shown in Fig. 5 involves two block members g connected by bolts g^2 having nuts g^3 and adapted to be moved toward and from each other and provided in the inner faces with corresponding grooves g^4 adapted to receive a tubular bearing h of any kind or class, or designed for use for any purpose, and the top block member g is provided with a tubular extension or sleeve g^5, and a mandrel i is passed downwardly through the parts g. The bottom block member g is provided with a central bore g^6 which the mandrel i closely fits, while the top block member g and its sleeve g^5 is provided with a central bore g^7 which is larger than the bore g^6, and the mandrel i is provided with an annular enlargement i^2 which closely fits the bore g^7 and forms an annular shoulder i^3, and said enlargement i^2 is also provided, in the form of construction shown, with an annular groove i^4. The enlarged part i^2 of the mandrel i is provided with a reduced neck i^5 having an enlarged head i^6, and in addition to the grooves g^4 the block members g are provided at the ends of the grooves g^4 with supplemental annular grooves g^8. In the use of this form of apparatus, the mandrel i is vertically movable and the sleeve f^3 shown in Fig. 2 is mounted on said mandrel, or said sleeve is passed downwardly through or into the parts g, after which the mandrel i is forced downwardly through said parts and through said sleeves, and said sleeve is compressed to form the anti-friction lining f^5 with the flanges f^6 at the ends thereof in substantially the same manner and with the same results, as hereinbefore set out in the description of the operation of the apparatus shown in Figs. 1 and 2.

It will be understood that the mandrel i may be moved longitudinally in any desired manner, or by any preferred means, and may also be rotated, if desired, and while I have shown the block members g as connected by the bolt members g^2, my invention is not limited to this method of connection, and said block members may be connected in any desired manner, the only essential feature in this connection being that they may be movable toward or from each other, or that one be movable toward and from the other.

The apparatus shown in Fig. 6 is somewhat similar to that shown in Fig. 5 and involves supplemental frame supporting members j detachably connected by bolts j^2 and in connection with which are employed top and bottom block members k. The top block member k is provided with a sleeve k^2 which passes upwardly through the frame member j, while the bottom block member k is provided with a sleeve k^3 which passes downwardly into the bottom frame member j and a plunger sleeve m is mounted in the bottom block member k and provided with an annular head m^2 which fits in a corresponding annular groove in the bottom block member. In this form of construction, a mandrel n is employed similar to the mandrel i and provided with an enlarged upper end portion n^2 above which is a reduced neck n^3 having an enlarged head n^4. The body of the mandrel n is of less dimensions than the central bore k^4 of the top block member k, but said mandrel closely fits the plunger sleeve m. In this form of construction, I have also shown the connecting rod e with its crank shaft end or head e^2, and its tubular bearing members e^3 and e^4 and between the block members k and sleeve member k^2 and the mandrel e, and between the head e^3 of the connecting rod when said head is inserted between the block members k and said

mandrel, is an annular space o in which, in the use of this apparatus, the sleeve f^3 is inserted, and when the mandrel n is forced downwardly, said sleeve will be compressed to form the supplemental inner anti-friction lining f^6 for the tubular bearing members of the head e^2 of the connecting rod. This form of apparatus may be used with the plunger sleeve m stationary in the position shown, or said plunger sleeve m may be operated in the same manner, as the plunger devices b, shown in Figs. 1 and 2, and when operated in the last named manner the packing sleeve in the space o will be compresed from both ends to form the anti-friction lining f^6, but when the mandrel n only is operated said sleeve will be compressed only from one end. In either event the result will be the same, said sleeve being compressed to form the anti-friction lining f^6 with its end flanges f^7, the inner faces of the block members k being grooved, in this form of construction, in the same manner as the inner faces of the block members a in Figs. 1 and 2 to receive the end flanges e^5 of the outer part e^4 of the coupling rod head and the end flanges f^7 of the anti-friction sleeve f^6.

From the foregoing description it will be seen that my improved method consists in the insertion of a sleeve made of anti-friction metal into a tubular bearing of any kind or for any purpose, and the compression of said sleeve longitudinally and its expansion radially so as to form in said bearing an anti-friction sleeve lining in which operation the said lining is given a smooth and polished inner surface, and while I have shown and described different forms of apparatus for carrying my improved method into effect, my invention is not limited to the different forms of apparatus herein shown and described, and various changes therein and modifications thereof, may be made, within the scope of the appended claims, without departing from the spirit of my invention or sacrificing its advantages. In this case, the sleeve f^3 is preferably first heated before it is put into the apparatus, to a degree well below the melting point, in order to facilitate the operation of the apparatus, and the mandrel is also preferably heated in order to prevent the too quick radiation of heat from the sleeve, and the mandrel may be heated in any of the well known ways, and for this purpose, the mandrel may be made hollow, and a heating coil passed therethrough.

It will be understood that it is not necessary for the anti-friction sleeve or sleeves employed herein to be cut from a sheet of material and rolled into shape, and said sleeve or sleeves may be made or produced in any preferred manner, and any suitable means may be provided to prevent said sleeve or sleeves from turning in the tubular bearing or bearings when in use, and for this purpose splines, grooves or keyways may be provided in the tubular bearing or in any connection with the connecting rod, or the connecting rod or the tubular bearing may be tinned before the anti-friction sleeve or sleeves are applied or compressed or forced into position.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. The method herein described of providing a tubular bearing with an anti-friction lining which consists in placing a sleeve of anti-friction metal in said bearing, passing a mandrel through said sleeve confining said sleeve outside the bearing and compressing said sleeve longitudinally to form an inner lining for said bearing.

2. The method herein described of providing a tubular bearing with an anti-friction lining which consists in passing a sleeve of anti-friction metal through said bearing, said sleeve being longer than said bearing, and compressing said sleeve longitudinally and expanding it radially in said bearing while confining said sleeve outside the bearing.

3. The method herein described of providing a tubular bearing with an anti-friction lining which consists in securing the bearing between suitable supports having bores in axial line with said bearing, passing a sleeve of greater length than said bearing into said bearing and into said supports and compressing said sleeve longitudinally and expanding it radially to form a lining which closely fits said bearing.

4. The method herein described of providing a tubular bearing with an anti-friction lining which consists of mounting said bearing between suitable supports having bores in axial line with said bearing, passing a sleeve of greater length than said bearing therethrough, passing a mandrel through said sleeve and compressing said sleeve longitudinally and expanding it laterally to form a lining for said bearing.

5. The herein described method of providing a tubular bearing with an anti-friction lining which consists of passing a sleeve of anti-friction metal and longer than said bearing therethrough confining said sleeve outside the bearing and compressing said sleeve longitudinally and expanding it radially so as to form a lining for said bearing and having end flanges which overlap the ends thereof.

6. The method herein described of providing a tubular bearing with an anti-friction lining, which consists in providing a sleeve of anti-friction metal, heating said sleeve, passing a mandrel through said sleeve, passing said mandrel and said sleeve

into said tubular bearing, and compressing said sleeve longitudinally, and expanding it radially in said bearing while confining said sleeve outside the bearing.

7. The method herein described of providing a tubular bearing with an anti-friction lining which consists in mounting said bearing between suitable supports, placing the sleeve of anti-friction metal in said bearings, passing a mandrel through said sleeve, confining said sleeve outside the bearing and compressing said sleeve longitudinally to form an inner lining for said bearing.

In testimony that I claim the foregoing as my invention I have signed my name in presence of the subscribing witnesses this 4th day of August 1915.

HEBRON B. LAYMAN

Witnesses:
M. BOCKELMAN.
H. E. THOMPSON.