J. BINGHAM.

MACHINE FOR ACCURATELY ALINING AND CLOSING ROLL HOLDING CAGES FOR ROLLER BEARINGS.

APPLICATION FILED SEPT. 28, 1917.

1,387,881. Patented Aug. 16, 1921.

2 SHEETS—SHEET 1.

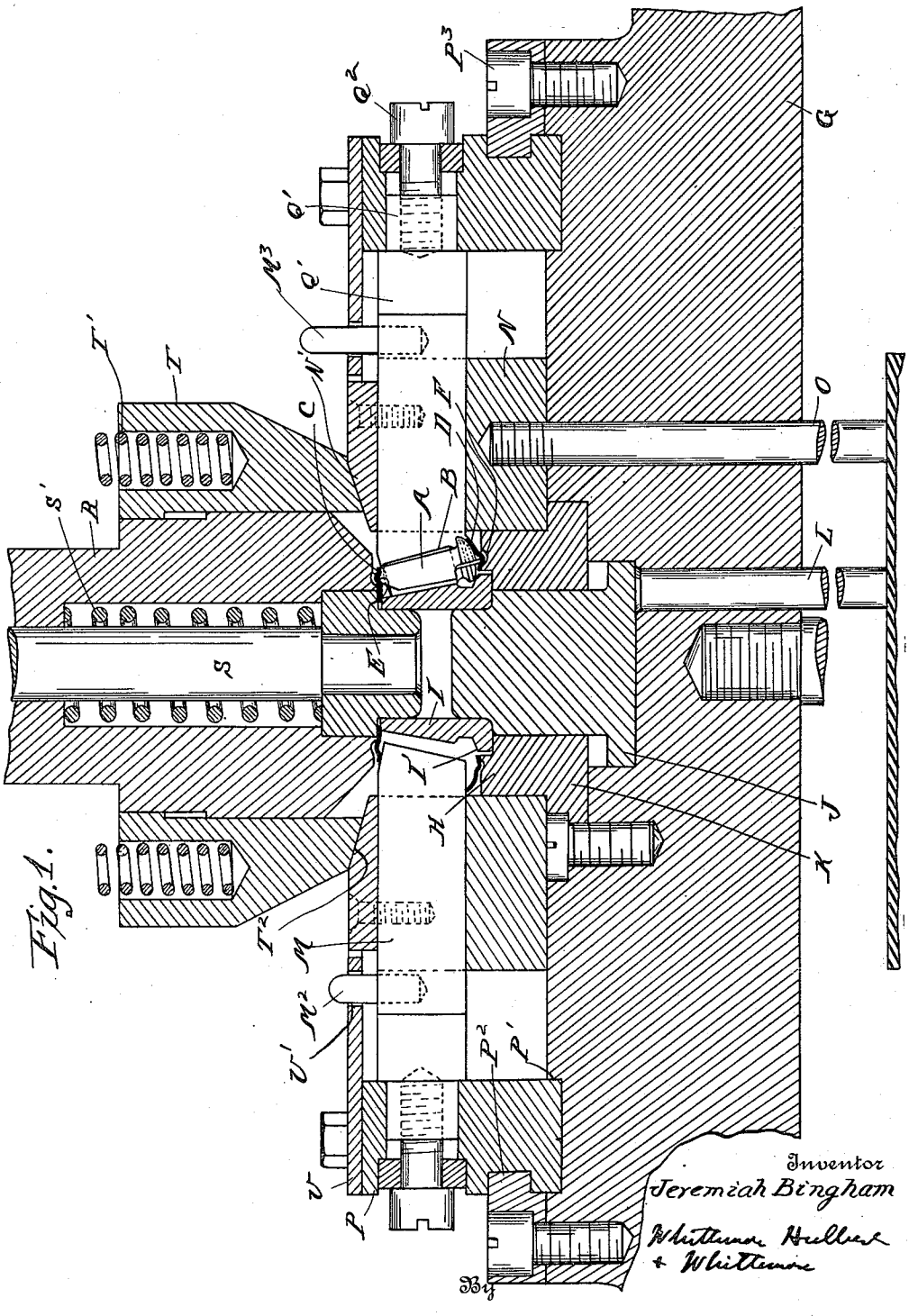


Fig. 1.

Inventor
Jeremiah Bingham
By Whittemore Hulbert & Whittemore
Attorneys

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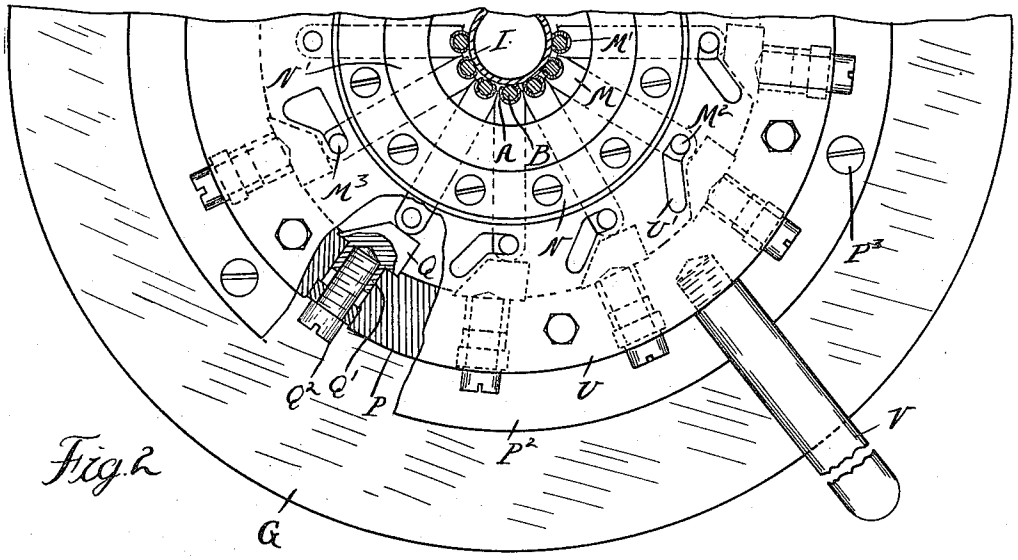


Fig. 2

Fig. 5.

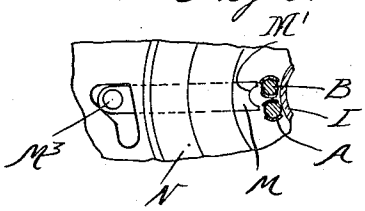


Fig. 3.

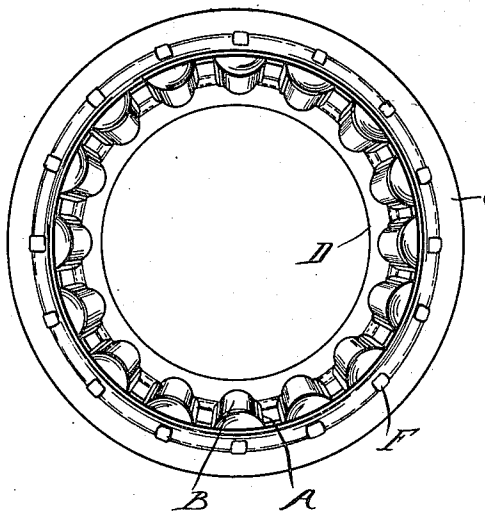
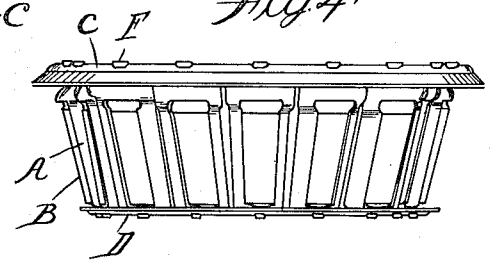


Fig. 4.



Inventor
Jeremiah Bingham

By Whittemore Hulbert & Whittemore

Attorneys

UNITED STATES PATENT OFFICE.

JEREMIAH BINGHAM, OF TOLEDO, OHIO, ASSIGNOR TO THE BOCK BEARING COMPANY, OF TOLEDO, OHIO, A CORPORATION OF OHIO.

MACHINE FOR ACCURATELY ALINING AND CLOSING ROLL-HOLDING CAGES FOR ROLLER-BEARINGS.

1,387,881. Specification of Letters Patent. Patented Aug. 16, 1921.

Application filed September 28, 1917. Serial No. 193,719.

To all whom it may concern:

Be it known that I, JEREMIAH BINGHAM, a citizen of the United States of America, residing at Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Machines for Accurately Alining and Closing Roll-Holding Cages for Roller-Bearings, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to the manufacture of roller bearing cages of that type in which the rollers are housed in individual cells, said cells being secured to connectors which hold the same in predetermined relation. It is the object of the present invention to secure accurate alinement of the individual cells when rigidly attached to their connector, so that in the subsequent operation the rolls in said cells will be accurately alined. To this end the invention comprises the novel construction as hereinafter set forth.

In the drawings:

Figure 1 is a central longitudinal section through the machine;

Fig. 2 is a plan view thereof;

Figs. 3 and 4 are respectively a plan view and side elevation of the cage which is closed and alined by the machine;

Fig. 5 is a detail plan view showing the clamping member in a different position of adjustment.

The cage which is to be closed and alined by the machine comprises a series of individual roller holding cells A, each containing a roller B having a conical body and enlarged head. C and D are connector rings at opposite ends of the rolls and cells, said rings being grooved to engage end flanges E on the individual cells and being apertured for engagement with tongues F on said flanges, which are clenched over said rings.

With the construction as thus far described, it will be impossible to secure such accuracy of workmanship as to hold all of the cells in proper alinement when attached to the connector. It is therefore essential that the cells should be first individually alined and clamped, and the connector then secured thereto, this being accomplished as follows:

G is a bed plate upon which is supported an annular die member H for engaging the lower connector ring of the cage. I is a conical inner bearing member arranged concentric to the die member H and yieldably supported thereabove. This yieldable support is formed by a slidable member J having a guide bearing K in the bed and being itself supported by a rod L passing through the bed and resting upon a resilient yieldable support, such as a rubber pad. Surrounding the central bearing J is a series of radially-arranged clamping members M, said members being mounted in an annular radially-slotted member N arranged concentric with the members H and I. The member N is yieldably supported upon rods O which pass through the bed and also engage the resilient yieldable pad. Each of the clamping members M is fashioned at its inner end with a concave bearing M′ for engaging an individual roller-holding cell, said bearings being inclined to corresopnd to the taper of the cell and the roll contained therein. P is an annular member mounted upon the bed so as to be rotatively adjustable thereon concentric with the axis of the members H and I. This member P is preferably secured by a shouldered engagement P′ with the bed and a securing ring member P^2 which engages a peripheral groove in the member P and is itself secured to the bed by clamping screws P^3. Thus by the bearings P′ and P^2 the ring P may be held accurately centered with the members H and I. Q are cam members secured to the ring member P, preferably by being provided with shanks Q′ engaging radial apertures in the ring and secured by clamping screws Q^2 engaging said shanks. This arrangement permits of adjusting the cams to compensate for wear by the use of shims. R is a movable die member concentric with the members H and I and fashioned to engage the upper connector ring. S is a clamping member arranged concentrically within the die member R and yieldably pressed by a spring S′. T is an outer clamping ring member surrounding the die R and yieldably pressed by springs T′. The member T has a tapering lower face T^2 for engaging a tapering opposed bearing N, on the member N so as to maintain the accurate alinement of these two members.

With the construction as described in operation, the die member R is normally with-

drawn and the radial clamping members N are also adjusted radially outward so as to provide clearance for the placing of the roller-holding cage in engagement with the central bearing I. The cage is first loosely assembled by the engagement of the tongues F of the individual roller-holding cells with their connector rings C and D, and the bending over of said tongues a sufficient distance to prevent disengagement. The engagement is not, however, one which will hold the cells from a limited adjustment in relation to the connector rings.

When the cage is placed upon the bearing I, the rolls in the individual housings will rest with their end-thrust bearing surfaces against an annular shoulder I′ on said bearing and their tapering portions in line contact with the conical bearing I. The alinement of the rolls will not, however, be accurate when thus initially placed in position and to obtain accurate alinement the members M must be moved into engagement therewith. Also these members M must be placed in registration with their respective roll-holders. Registration is effected by permitting the initial movement of one of the jaw-members M into engagement with its individual cell, which will automatically cause a proper rotative adjustment of all of the jaw-members to produce registration. To this end and also for the purpose of withdrawing the clamps at the completion of the operation the member P is provided with an inwardly-extending flange U having cam slots U′ therein for engaging pins M^2 on the clamping members M. One of these pins, M^3, is longer than the others and may be used as a handle for actuating the one clamp which is to effect the registration.

After the registration of the clamps with the roller-holding cells, the ring member P is rotated by means of an operating handle V, which will cause all of the cams Q to simultaneously press inward all of the radial clamping members M. The concave bearings upon these clamping members will force the cells and rolls into accurate alinement and will also clamp the parts in this position against accidental displacement. The closing movement for rigid attachment of the connector rings with the housings is effected by the depression of the member R, this being secured to the plunger of a suitable press. During the downward movement, the member S will first be pressed by the spring S′ against the connector ring C, holding the same in position, while the die member R is pressed thereagainst and against the tongues F. This will rigidly connect these parts, and as they are held during the operation in absolutely true alinement, such alinement will be subsequently maintained. At the completion of the clenching operation for the upper connector ring C, a further downward movement of the die member R will carry with it the members I, M and N, these being yieldably supported by the rods L and O upon the resilient yieldable cushion. During this final movement the tongues F, engaging the lower connector ring D, will be clenched, the alinement of the rollers and cells being still maintained. After the upward movement of the plunger the handle V may be operated to release all of the clamps M, after which the closed cage may be removed and the machine used for another operation.

What I claim as my invention is:

1. The combination with means for holding a loosely-assembled series of individual roller holding cells and a connector therefor, of means for accurately alining said cells, and means for rigidly attaching said cells and connector while thus alined.

2. The combination with means for holding a loosely-assembled series of individual roller holding cells and a connector therefor, of means for clamping the individual cells in accurate alinement, and dies for pressing said connector and cells to rigidly attach the same and maintain such alinement.

3. The combination with means for holding a loosely-assembled series of individual roller holding cells and a connector therefor, of means for limiting the radial movement of said cells to aline the same circumferentially, radially adjustable means for engaging the individual cells to aline the same longitudinally, and dies for pressing the cells and connector to rigidly secure the same in accurate alinement.

4. The combination of a conical bearing for receiving a loosely-assembled series of individual roller holding cells with rolls therein and a connector for said cells, means adjustable radially to engage and clamp said cells individually with the rollers in contact with said conical bearing and held in accurate alinement, and a die for engaging said cells and connector to rigidly secure the same while thus clamped in accurate alinement.

5. A device for alining roller holding cages having a series of individual roller holding cells and ring connectors at opposite end thereof, said device comprising a conical bearing having an end thrust shoulder for engaging the sides and ends of said rolls, a series of radially-adjustable clamping members for engaging the individual cells and rolls and holding the same against said conical member and in accurate alinement, means for pressing the connector at one end of said cage against said cells to rigidly secure the same in accurate alinement, means permitting the yielding of said conical bearing and radial clamping means

under the further pressure of said pressing means, and a stationary die against which said opposite connector is pressed to rigidly secure the same to said sides.

6. A device for the purpose described, comprising a central bearing and radially adjustable clamping members for initially alining the individual roller holding cells, a yieldable support for said bearing and clamping means, a die for pressing against one end of the cells to rigidly attach a connector thereto against the resistance of said yieldable support, and a die for rigidly securing the connector at the opposite end of said cells upon the yielding of said bearing and radial clamping means.

7. An alining clamp for roller holding cages, comprising a central conical bearing, a series of radially movable clamping members arranged around said bearing, each having a concave inner end for engaging and alining an individual roller holding cell, means for adjusting one of said radial clamping members to register and engage the same with one of the individual cells, and means for simultaneously adjusting the remaining clamping members to clamp all of the cells in accurate alinement.

8. An alining clamp for roller holding cages, comprising a central conical bearing, a series of radially arranged clamping members surrounding said bearing, guiding means for said clamping members, circumferentially adjustable means for simultaneously operating all of said radial clamping members, and means for initially operating one of said clamping members individually to register the same with the roll to be clamped.

9. The combination with a bed, of an annular die member rigidly mounted thereon, a clamping member yieldably supported above said bed, comprising a central conical bearing, a series of radially-arranged clamping members, and guides for holding said members in accurate relation to said central bearing, a circumferentially adjustable member on said bed, cams on said circumferentially-adjustable member for simultaneously actuating all of said radial clamping bearings, and a movable annular die member on the opposite side of said clamping means from said stationary annular die member, whereby the initial movement of said annular die member will be relative to said clamping means and a further movement will carry said clamping means therewith relative to said stationary die member.

In testimony whereof I affix my signature.

JEREMIAH BINGHAM.