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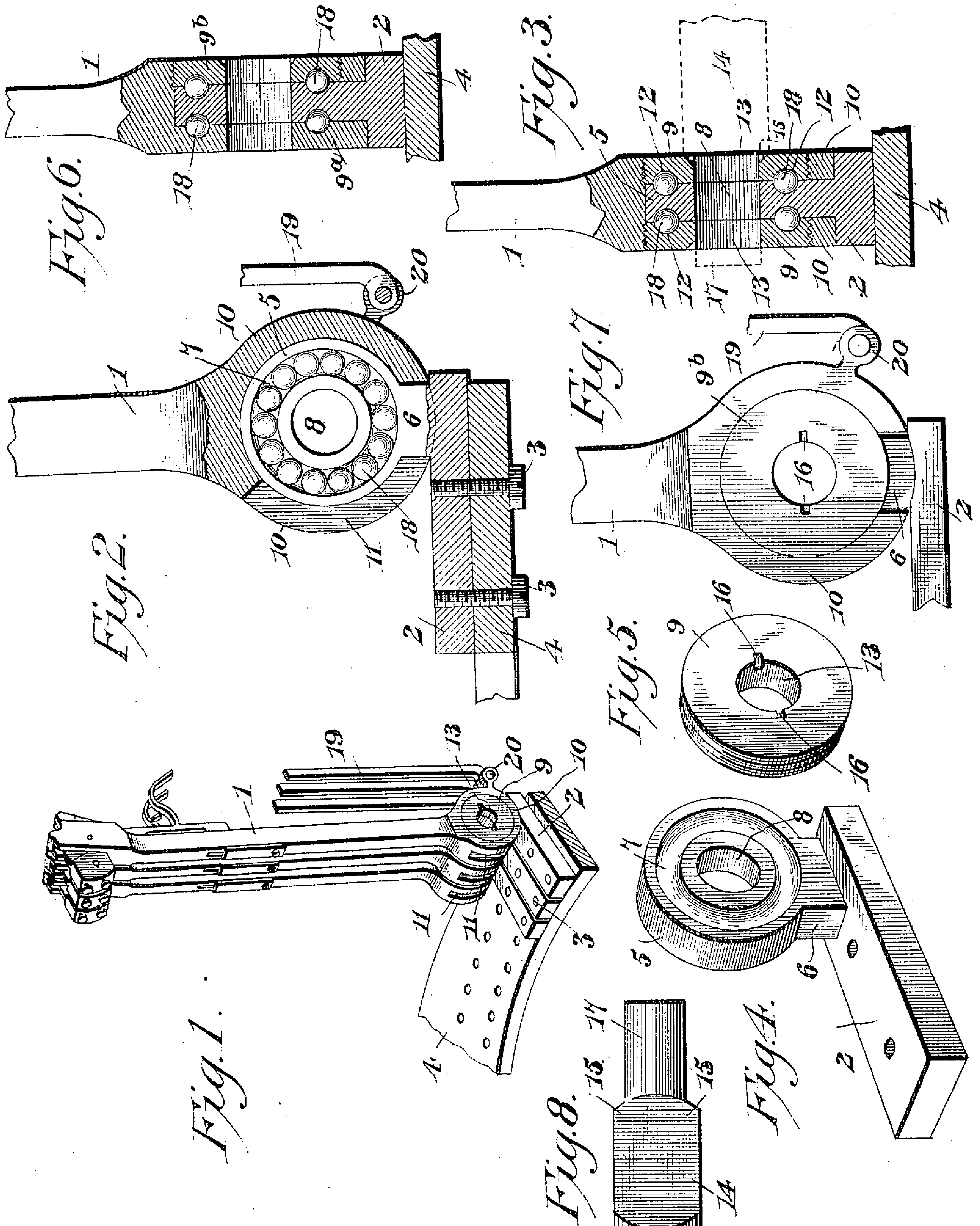
Patented Nov. 6, 1900.

R. J. FISHER.

TYPE ARM BEARING.

(Application filed Jan. 22, 1898.)

(No Model.)



Witnesses

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Robert J. Fisher, Inventor

By his Attorneys.

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UNITED STATES PATENT OFFICE.

ROBERT JOSEPH FISHER, OF ATHENS, TENNESSEE, ASSIGNOR TO THE FISHER TYPEWRITER COMPANY, OF TENNESSEE.

TYPE-ARM BEARING.

SPECIFICATION forming part of Letters Patent No. 661,212, dated November 6, 1900.

Application filed January 22, 1898. Serial No. 667,570. (No model.)

To all whom it may concern:

Be it known that I, ROBERT JOSEPH FISHER, a citizen of the United States, residing at Athens, in the county of McMinn and State of Tennessee, have invented a new and useful Type-Arm Bearing, of which the following is a specification.

My invention relates to type-writing machines, and particularly to type-arms, and has for its objects to provide an approximately frictionless bearing wherein the wear is minimized to avoid lost motion and at the same time avoid the necessity of frequent adjustment; to provide a rigid bearing wherein lateral vibration is prevented and wherein the vibration in the direction of movement of the type-arm and which is produced at the free end of the type-bar upon its impact with the impression-receiving surface does not extend appreciably into the bearing proper, and hence wherein the bearing-surfaces are relieved to a great extent of the strain and jar incident to the operation of the type-bars; to provide a bearing having extended bearing-surfaces or having bearing-surfaces of extended width or diameter while occupying small space laterally, whereby a given amount of play in the bearing will be multiplied but slightly at the extremity of the type-bar to avoid non-alinement of the type impressions; to provide a dust-proof bearing, and, furthermore, to provide a bearing in which the delicate adjustment of the bearing members or elements will not be affected or disturbed by the attachment of the hanger to the type-ring or other support employed for the type-bars.

It is desirable in the construction of a type-arm bearing not only to provide for swinging movement of the arm with the minimum friction, but to so brace the arm against lateral strain as to prevent deflection and straining of the parts, and thus preserve an accurate alinement of the type impressions, and also to provide such a relative arrangement of parts as to protect the bearing-surfaces from the accumulations of dust. It is also desirable in this connection to provide bearing-surfaces of diametrically-extended areas and axially-contracted measurements, the former to increase the extent of the bearing-surfaces, reduce rapidity of wear, and give lateral support and the latter to enable the type-arms to be arranged compactly upon a type-bar-supporting ring of the minimum extent. In type-writing machines it is desirable to provide for mounting the type-arms in axial alinement, whereby the type-arms may be made of a uniform length, the manufacture thereof may be cheapened, and the facility of assembling increased, and these advantages are of importance in connection with the ordinary forms of type-bar machines, as well as with machines of the class to which belong my former patents, No. 569,491, granted October 13, 1896; No. 569,625, granted October 20, 1896; No. 569,626, granted October 20, 1896; No. 569,627, granted October 20, 1896; No. 572,535, granted December 8, 1896, and No. 573,868, granted December 29, 1896.

These and other objects and advantages of my invention are attained in the construction set forth in the following description, and the novel features thereof are particularly pointed out in the appended claims.

In the drawings, Figure 1 is a perspective view of a plurality of type-arms having bearings constructed in accordance with my invention, the same being shown applied in the operative position to a portion of a type-bar-supporting ring. Fig. 2 is a vertical sectional view of the type-arm bearing, taken in a plane transverse to the axis of motion. Fig. 3 is a sectional view of the same, taken parallel with and in the plane of the axis of motion. Fig. 4 is a detail view in perspective of the hanger and that member of the bearing which is carried by the hanger. Fig. 5 is a similar view of one of the adjustable bearing-disks detached. Fig. 6 is a section parallel with the axis of a slightly-modified form of bearing. Fig. 7 is a side view of the modified construction. Fig. 8 is a detail view of a tool-blade adapted for adjusting the side disks of the bearing.

Similar reference characters indicate corresponding parts in all the figures of the drawings.

The bearing forming the subject-matter of my invention consists of coöperating members carried, respectively, by the type-arm 1

and a hanger 2, the latter consisting, essentially, of a securing-plate adapted to be attached by screws 3 or equivalent fastening devices to the type-bar-supporting ring 4 or equivalent means provided in a type-writing machine for that purpose. That member of the bearing which is preferably carried by the hanger consists of an intermediate or core disk 5, which may be integrally connected with the hanger by means of a neck 6, said disk in the construction illustrated being provided in its opposite or outwardly-facing sides with ball-races 7, arranged concentric with the axis of the bearing, the diameter of each race being greater than the thickness of the core-disk, and hence greater than the interval between the races. That member of the bearing which is preferably carried by the type-arm is centrally recessed parallel with its sides or is bifurcated to form spaced parallel side disks or cheeks 9 of a diameter approximately equal to the intermediate core-disk 5 and connected transversely by an annular band 10, of which the interior diameter is approximately equal to the diameter of the core-disk and which embraces the same, except throughout a distance sufficient to admit the core-disk, where it is cut away to form a slot 11 of a width approximately equal to the axial thickness of the core-disk. This slot not only serves to admit the core-disk, but to allow the movable member of the bearing to vibrate through an interval corresponding with the throw of the type-arm without contact with the neck 6, which extends through the slot.

The disks 9 are provided in their inner sides with ball-races 12, which face inward and register with the outwardly-facing ball-races 7 of the core-disk, said races being of equal diameters and having fitted therein the annular keys 18, consisting, preferably, of antifriction-balls, and I preferably thread the side disks 9 peripherally and screw them axially into the band 10 to vary the intervals between the inner faces of the side disks and the side faces of the interposed core-disk, and thus vary the adjustment to compensate for wear either of the ball-races or of the antifriction-balls which are fitted therein. I have found that it is possible to accomplish the desired adjustment of the members of the ball-races with great nicety by thus threading the spaced disks in the band forming the body portion of the movable bearing member, said band being preferably formed integral with the shank of the type-arm. It will be observed, furthermore, that by arranging the spaced or side disks or elements in a band carried by the type-arm, particularly when the type-arms strike downward to print, the slot 11 or cut-away portion of the band is arranged mainly at the under side of the movable bearing member, while the continuous portion of the band is uppermost, and hence in practice dust is excluded from the bearing-surfaces. This exclusion of the dust, however, is made more perfect by the fact that the core-disk or intermediate element 5 is approximately equal in thickness or axial width with the slot 11 and in diametrical width is approximately equal with the interior or bore of the band. It will be seen, therefore, that the core-inclosing member of the bearing constitutes a shell, of which the cylindrical wall peripherally embraces the core-disk, while the heads, of which one or both may be axially adjustable, cover the side surfaces of the core-disk, and while in the preferred construction of the device both of these heads, which consist of the disks 9, are axially adjustable it is obvious that, as shown in Figs. 6 and 7, one of the disks or heads 9^a may be formed integral with the band or body portion of the member, while the remaining head or disk 9^b is axially adjustable, as hereinbefore described. The adjustable or spaced disks take up lost motion, preferably by positive lateral contraction of the ball-races, and owing to the extent or circumference of these ball-races it is obvious that the wear thereon and also upon the balls will be slight, and therefore that infrequent adjustments only of the spaced disks will be necessary in order to avoid lateral play. In addition to their function of reducing friction the balls serve as keys to interlock with the surfaces of the parallel elements of the bearing members and prevent relative longitudinal or radial displacement, no pivot or equivalent thereof being necessary in connection with the improved construction. Also these annular keys formed by the series of antifriction-balls are replaceable when worn. Also the bearing of the side disks or elements upon the balls is wholly lateral or inward and outward in opposite directions parallel with the axis of motion of the type-arm, with no tendency to spread or contract the series, as when a coned adjusting element is employed, and hence swinging movement of the type-arm may be attained without lateral play.

From the above description it will be seen that the bearing embodying my invention consists, essentially, of two members, one of which is provided with two spaced inwardly-facing elements and the other with a single element interposed between said spaced elements, having duplicate outwardly-facing sides arranged parallel with the inwardly-facing sides of the spaced elements, together with two annular series of antifriction-balls interposed between the single element and the inwardly-facing sides of the spaced elements, said balls being seated in the adjacent faces and being adapted to traverse races which are concentric with the axis of movement of the type-arm, said registering races being arranged to face in opposite directions parallel with this axis of movement of the type-arm, whereby the pressure of the races upon the balls is in opposite directions parallel with the axis of movement. Thus the adjustment of the elements to take up lost

motion (either when first assembling the parts of the bearing or subsequently) is accomplished by the axial adjustment of those members or the movement thereof upon lines parallel with the axis of motion of the type-arm, and hence there is no tendency to increase the diameters of the keys formed by the annular series of balls. Furthermore, in order to produce the effect of an extended bearing or one of great width (to reduce to the minimum the lateral vibration of the type-arm in use) I construct the parallel ball-seats (each seat consisting of coöperating oppositely-facing ball-races) of a diameter which exceeds the interval measured transversely or parallel with the axis of motion between the planes of the ball-seats, and the diameter of these races may be varied or the radial distance between the axis of movement and the circles formed by the ball-races may be increased to produce a bearing-surface of the desired diameter, it being obvious that the effect of lateral play at the extremity or type-head end of the arm will be reduced in proportion to the radius of the ball-seats. Furthermore, I prefer to provide the type-arm or movable member with a bifurcated bearing member or with that member consisting of the laterally-spaced elements, for the reason that by so constructing the parts the type-arm is increased in width adjacent to the bearing to absorb any vibration due to the impact of the type-head with the impression-receiving surface, and thus prevent the communication of this vibration to the bearing-faces to increase the durability of the bearing and avoid the frequent adjustment of the elements thereof.

I have found in practice that the interval between the planes of the duplicate parallel ball-seats may be made very small, but that the transverse rigidity of the bearing constructed as described is equal to that of a bearing wherein the interval (measured parallel with the axis of movement of the type-arm) between the bearing-faces is equal to the diameter of the ball-races arranged as described. In other words, I have found that by extending the bearing-faces diametrically or radially I can obtain the same transverse rigidity with an axially narrow bearing as can be obtained by axially spreading the interval between the bearing-faces, with the further advantage that the axial reduction of the bearing enables me to compactly arrange the type-bars upon the type-bar-supporting ring. A further advantage of the extended ball-races resides in the fact that each ball during a movement of the type-arm from one limit of its movement to another makes a complete revolution or more, and therefore that each ball is worn uniformly throughout its surface, and the portions of the races traversed by adjacent balls overlap to insure the uniform wearing of the races. Thus elongation of the ball-races in one direction while the same remain practically unworn in other directions is avoided, and in addition to the increased durability, due to the uniform wearing of the surfaces of the balls and races, it is obvious that a more accurate subsequent adjustment of the bearing elements to take up lost motion can be accomplished.

It will be seen that in the construction of the bearing embodying my invention I have avoided the use of a bearing element in contact with the antifriction-balls which bears either toward or from the axis of movement of the type-arm, but, on the other hand, have arranged the bearing-faces to oppose each other axially or in directions parallel with the axis of movement and have employed duplicate series of balls arranged in parallel planes perpendicular to the axis of movement, the plurality of series of balls being preferable as enabling me to use a central fixed element which determines the plane of movement of the type-arm or toward and from which the type-arm may be adjusted axially by means of the spaced disks or heads 9 to position the type-arm as required.

The means illustrated in the drawings for communicating motion to the type-arm is of the ordinary construction, consisting of a draw-rod 19, connected to a projection or ear 20 on the band of the movable bearing member; but it is obvious that any equivalent device may be substituted therefor to suit the particular machine in connection with which the improved bearing is employed.

In the drawings the interplaced elements, consisting of the core-disk 5 and the parallel side disks or heads 9, are of registering centrally open or annular construction, the removal of the centers of the disks being possible by reason of the fact that the bearing which I have devised does not depend upon a pivot or upon any element located at or adjacent to the axis of movement of the type-arm, and although this central boring of the parallel elements is not indispensable I have found it to be of advantage as facilitating machine-work upon the elements in the construction thereof and have also utilized the opening thus formed to receive the centering nib or post 17 of a tool 14, which I employ for adjusting the disks 9, said tool being provided with blade edges 15 to engage diametrically opposite seats or notches 16 in the inner peripheries of the said disks. It will be obvious, however, that other forms of adjusting-tools may be employed, that the central recessing or boring of the elements may be omitted, and that various other changes in the form, proportion, and the minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having described my invention, what I claim is—

1. A type-arm and hanger having bearing members, one of which has an element interposed between spaced elements of the other,

the said spaced elements being carried by the type-arm, and annular keys having an interlocked engagement with the adjacent faces of said elements, substantially as specified.

2. A type-arm and hanger having bearing members, one of which has an element interposed between spaced elements of the other, the said spaced elements being carried by the type-arm, and annular antifriction-keys having an interlocked engagement with the adjacent faces of said elements, substantially as specified.

3. A type-arm and hanger having bearing members, one of which has an element interposed between spaced elements of the other, the said spaced elements being carried by the type-arm, and duplicate annular series of antifriction-balls interposed between and seated at their opposite sides in the adjacent faces of said elements to provide an interlocked engagement with said faces, substantially as specified.

4. A type-arm and hanger having bearing members, one of which has an element interposed between spaced elements of the other, the said spaced elements being carried by the type-arm, and duplicate coaxial annular keys having an interlocked engagement with the adjacent faces of said elements, substantially as specified.

5. A type-arm and hanger having bearing members, one of which has an element interposed between spaced elements of the other, an annular series of antifriction-balls interposed between, and seated in ball-races formed in, the facing surfaces of said elements, the diameter of each ball-race being greater than the interval between the planes of the races, substantially as specified.

6. A type-arm and hanger having bearing members, of which that carried by the type-arm comprises spaced side elements, and that carried by the hanger consists of a single element interposed between those of the type-arm member, and antifriction-balls arranged in races formed in the adjacent facing surfaces of said elements concentric with the axis of movement of the type-arm to provide an interlocked engagement with said surfaces, substantially as specified.

7. A type-arm and hanger having bearing members, of which one has a single element interposed between duplicate spaced elements of the other, the said spaced elements being carried by the type-arm, the first-named elements having outwardly-facing ball-races concentric with the axis of movement of the type-arm, and the spaced elements having inwardly-facing ball-races registering with those of the first-named element, and duplicate series of antifriction-balls seated in said registering races to provide an interlocked engagement with the elements, substantially as specified.

8. A type-arm and hanger having bearing members, one of which has an element interposed between spaced elements of the other, the said spaced elements being carried by the type-arm, said elements being provided with registering ball-races concentric with the axis of movement of the type-arm, and facing in opposite directions parallel with said axis, and duplicate series of antifriction-balls seated in said races to provide an interlocked engagement with said elements, substantially as specified.

9. A type-arm and hanger having bearing members, one of which has an element interposed between spaced elements of the other, and annular keys, interposed between and having interlocked engagement with the adjacent faces of said elements, the spaced elements of one of the members being connected by a band which is slotted for the reception of the element of the other member, substantially as specified.

10. A type-arm and hanger, one of which has a core-disk and the other a band concentric with the axis of movement of the type-arm and inclosing the core-disk, and side cheeks carried by said band in planes parallel with and at opposite sides of the core-disk, said band being slotted in a plane between said cheeks to receive a stem of the core-disk, and annular keys interposed between and engaging the adjacent surfaces of said core-disk and cheeks, substantially as specified.

11. A type-arm and hanger, one of which has a core-disk and the other a band concentric with the axis of movement of the type-arm and inclosing the core-disk, and side cheeks carried by said band in planes parallel with and at opposite sides of the core-disk, said band being slotted in a plane between said cheeks to receive a stem of the core-disk, one of said cheeks being axially adjustable, and annular keys interposed between and engaging the adjacent surfaces of said core-disk and cheeks, substantially as specified.

12. A type-arm and hanger having bearing members, one of which has a single element and the other duplicate-spaced elements between which the single element is interposed, a band encircling said spaced elements, and having a slot, in a plane between said elements, to receive the single element, and annular keys interposed between the single element and the spaced elements and having an interlocked engagement therewith, substantially as specified.

13. A type-arm and hanger having bearing members, one of which is provided with a single element, and the other with parallel-spaced elements between which said single element is interposed, a band encircling and connecting said spaced elements, and one of them being threaded in the band for axial adjustment, said band being cut away between the spaced elements to provide for the insertion of the single element, and annular keys interposed between and engaging the adjacent faces of said spaced and interposed elements and having an interlocked engagement therewith, substantially as specified.

14. A ball-bearing pivotless type-arm for type-writing machines, in which the ball-bearing includes duplicate axially-spaced annular series of balls, the diameter of each series being greater than the interval between the series, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

ROBERT JOSEPH FISHER.

Witnesses:
CHARLES F. LAGANHE,
HIRAM J. HALLE.