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PIVOT BEARING FOR PRECISION INSTRUMENTS

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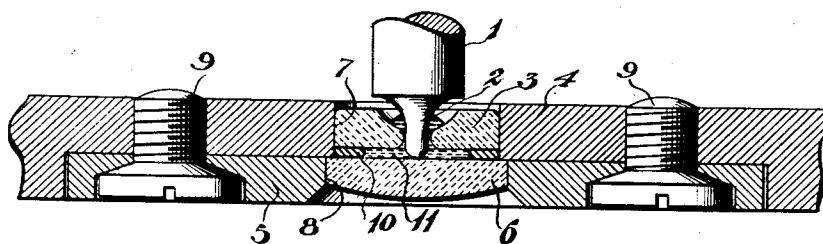


Fig. 1

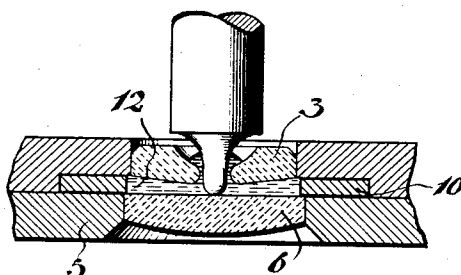


Fig. 2

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PIVOT BEARING FOR PRECISION
INSTRUMENTS

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1 Claim. (Cl. 58—140)

This invention relates to jewelled bearings for use in watches and similar precision instruments. The present improvement is directed generally to a hermetically sealed oil reservoir within the bearing to supply the bearing with lubricant for an extended period of time.

These bearings, known in the trade as jewels, play an important part in watch movements, especially in the escapement gear train and balance wheel pivots, where much of the action takes place. The jewels not only lengthen the life of the watch by resisting wear, but also reduce the friction, and are instrumental in maintaining the accuracy of the watch. The jewels are also used extensively in clocks and various other instruments, and are disclosed in conjunction with a watch movement merely by way of example.

Briefly described, the conventional jewel usually comprises a cap stone and a pivot stone. When applied in a watch, the stones are, of course, minute in size. The pivot or balance stones are perforated to provide bearings for the staff journals or pivots. The cap or end stones form closures or end bearings for the staff, the pivots at the opposite ends bearing loosely against the cap stones. The pivot stones are set in the bridge of the watch and the cap stones are set in separate plates to facilitate assembly and removal for cleaning the jewels. In some instances, these stones are held in place in the respective mountings by friction, and in others by the use of an adhesive such as shellac. The two stones comprising the bearing are disposed in spaced relationship and thus provide a cavity which in the present construction is utilized as an oil reservoir.

Ordinarily the oil is applied in minute quantities in this cavity and adheres by capillary attraction, in the form of a tiny globule about the pivot. It is impossible, however, to utilize the entire cavity as an oil reservoir because the oil is very light and would penetrate the joint between the plate and the bridge and quickly disperse by capillary attraction. It will be readily apparent that the application of oil to the bearing is a tedious operation inasmuch as the oil must be applied in just the right quantity. If too much oil is put into the cavity, it will disperse by capillary attraction; and if the amount is insufficient, it will be used up with comparative rapidity.

Due to its natural properties and to evaporation, after a time the oil thickens and finally disappears, leaving a gummy residue in the bear-

ing. Since the accuracy of the watch depends to a great extent upon proper lubrication of the jewels, it is customary to clean and oil the jewels periodically. It is usually recommended by the manufacturer that this be done yearly. The cleaning and oiling operation is rather expensive, and inconvenient since the watch must be left at a repairing establishment and disassembled for this service. Therefore the proper care of the watch is often neglected by the owner, with the result that after a few years, the watch does not perform with a proper degree of accuracy.

It is an objective of the present invention to provide a jewelled bearing incorporating a sealed oil reservoir of relatively large capacity for a supply of oil sufficient to lubricate the bearing for a long period of time. The reservoir substantially prevents evaporation of the oil, and seals it against penetration into the joint between the bridge and plate of the jewel setting, or from seeping past the stones to the surface of the plate or bridge. By means of this arrangement the entire reservoir may be filled with oil at the time of assembling the bearing, to insure adequate lubrication for a number of years, thereby materially increasing the accuracy and useful life of the instrument.

Another objective has been to simplify the operation of oiling the bearing by the provision of sealing means, permitting the entire cavity between the stones to be filled with oil without danger of dispersion between the plate and bridge of the setting by capillary attraction.

Still another objective has been to provide a jewelled bearing having a spacer for accurately determining the proper clearance between the stones.

Briefly it is the concept of this invention to apply a gasket between the cap and pivot of a jewelled bearing stone to form a hermetically sealed oil reservoir therebetween. The gasket is formed, preferably of ductile metal such as silver, and acts as a spacer between the cap stone and the pivot stone effective to seal the stones against the escape of oil. The lubricant is fed from the reservoir to the bearing perforation by capillary attraction, the pivot of the staff being constantly immersed in the oil to insure proper lubrication as long as any oil remains in the reservoir. It will be evident that the loss of oil by evaporation is substantially eliminated, since the staff pivot seals the perforated stone against the entrance of air.

Further objects and advantages of the inven-

tion will be more fully set forth in the specification with reference to the accompanying drawing in which:

Figure 1 is an enlarged cross-sectional view of a bearing incorporating the improved oil reservoir of this invention.

Figure 2 is a view similar to Figure 1 illustrating a modified form of gasket arrangement.

For purposes of illustration, the improved bearing is disclosed in a watch movement and in this instance exemplifies the pivot mounting of a watch balance wheel.

Referring specifically to Figure 1, the balance staff indicated at 1 is provided with a pivot journal 2, engaged in the pivot stone 3. The pivot stone in this instance is frictionally set in the bridge 4 of the watch. The bridge is provided with a recess into which is fitted the plate 5 carrying the cap stone 6. The cap stone may be set in the plate frictionally in the same manner as the pivot stone. In each instance the stones are forced into the respective bores 7 and 8 by pressure. The plate 5 may be held in place in the bridge frictionally or, as illustrated in Figure 1, by means of the screws 9 traversing the plate and screw-threaded into the bridge.

The gasket 10 is disposed between the two stones and acts as a spacer to form an interstice or reservoir indicated at 11. The gasket is in the form of a ring fitted into the bore 7 of the bridge. In assembling the bearing the gasket is placed in between the stones which are forced together under pressure, thus slightly compressing the gasket to form an oil-tight seal. The gasket, upon being compressed, expands slightly in the bore 7 of the bridge, not only along the line of contact with the stones, but also circumferentially with respect to the bore, so that escape of oil is impossible.

The modification illustrated in Figure 2 affords a reservoir of somewhat larger capacity. In this example the gasket is applied between the plate and the bridge in a recess 12 formed for this purpose. The gasket is placed in the recess and the plate carrying the cap stone is applied over the gasket. The gasket should be slightly greater

in thickness than the depth of the recess, in order to provide a slight degree of compression. It will be noted that in this instance the gasket is compressed between the bridge and the plate rather than between the two stones as in the former embodiment. The arrangement is somewhat preferable for use with adhesive-set jewels as distinguished from friction-set jewels, since the adhesive-set jewels may be fixed permanently in the mountings, and the gasket ring applied when the end stone mounting plate is screwed in place. It will be apparent that this arrangement is somewhat more efficient as the oil capacity of the reservoir is increased and the sealing area of the gasket is greater than that shown in Figure 1. However in either instance the reservoir renders unnecessary the yearly cleaning and replacement of oil, and also, the bearing will be effectively lubricated for a period several times as great as has heretofore been possible.

The bearing as disclosed can be readily applied to instruments other than watches without alteration except possibly as to the size of the gasket to accommodate the jewels of larger instruments. It will be evident to those skilled in the art that various other modifications in the arrangement of the elements may be made without departing from the spirit of the invention.

Having described my invention, I claim:

A pivot bearing for a precision instrument such as a watch comprising a pair of plates having opposed circular recesses therein, one of said recesses being of slightly larger diameter than the other, a cap stone positioned in the larger recess and having its upper surface flush with the upper surface of the plate, a spacer ring positioned in the smaller recess and resting on the cap stone, and a perforated pivot stone likewise positioned in the smaller recess and spaced from the cap stone by the spacer ring; said spacer ring being compressible by external pressure against the stones to form an oil tight chamber between the surfaces of the stone and the ring.

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