METHOD OF MOUNTING PIVOT-BEARINGS FOR TIMEPIECES.

UNITED STATES PATENT OFFICE.

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To all whom it may concern:

Be it known that I, OLOF OHLSON, a citizen of the United States, and a resident of Newton, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Methods of Mounting Pivot-Bearings for Timepieces, of which the following is a specification.

The present invention relates to a new and improved method of setting bearings for the train wheels of a watch movement in the plates and bridges of the movement frame.

The method herein described and claimed was originally set forth and claimed in an application for Letters Patent filed by me July 12, 1911, Serial No. 688,119, entitled Jeweled watch movement and method of producing the same, of which application the present application is a division.

The method, which forms the subject particularly of the present invention, has relation to the mode of setting jewels and other bearings for the staffs of movement wheels in the watch plates in a manner causing them to be firmly held and yet permitting their adjustment when necessary, and further to a mode of securing approximately the correct positions for the settings in the complemenial plates of the movement.

In the accompanying drawings, I have illustrated a watch movement frame having bearings for the staff pivots of the movement wheels and one of such wheels with its bearings and the complemenial plates of the watch greatly enlarged, together with views illustrating a suitable form of apparatus or means by which the method may be carried into effect.

In the drawings—Figure 1 represents a plan view of so much of a watch movement frame as is material to illustrate the invention. Fig. 2 is a section on an enlarged scale taken on line 2—2 of Fig. 1. Fig. 3 is a sectional view of a tool employed to set the bearing in the top plate. Fig. 4 is a similar view of a tool adapted to set the bearings in the bottom or pillar plate. Fig. 5 is a sectional view on an enlarged scale of the operating part of one of the dies or punches employed with the tool.

The same reference characters indicate the same parts in all the figures.

The bearings employed in high grade watch movements to hold the staff pivots of the train wheels are usually stones or jewels, and are commonly called jewels, hence in the following description I shall refer to such bearings by that name. It is to be understood, however, that this term is descriptive merely, and not intended as a limitation. The jewel is held in a metallic ring which is called the setting and is mounted in a plate of the movement frame.

In the accompanying drawings, a represents the bottom plate of the watch movement, which is also termed the pillar plate, and b represents one of the top plates.

c represents a jewel bearing or jewel, d represents the setting therefor, and e represents one of the train wheels of the watch movement.

The plates have alined holes f and g in which respectively two jewels are mounted so as to provide bearings for the pivots l on the ends of the staff i of the wheel. The holes f and g are plain holes, that is, they extend entirely through the plates a and b and are of uniform diameter throughout, without having the shoulder at one end, which has hitherto been found generally in watch movements. The jewel, instead of being retained in the plate by resting against such a shoulder at one end, and by a screw or a lip of the plate at the other end, is held by expansion of its setting into frictional engagement with the walls of the hole. Such expansion is produced by co-operation of opposed punches or dies j, one of which is shown in Fig. 5, which dies are of such diameter that they can enter the holes f and g, and each of which has on its end a sharp-edged rib k of which the inner face k' is straight, that is parallel to its axis, and the outer face k2 inclined. When two such tools are pressed against opposite faces of the jewel setting d, they form circular indentations l and m. The stock of the setting outside of these indentations or grooves is forced outwardly and crowded against the surrounding walls of the hole, into such close frictional engagement therewith that the jewel is held securely in place.

Owing to the described form of the pin k
the displacement of the stock of the setting
is wholly outward, so that as great pressure
may be applied by the punches j as is neces-
sary to secure the desired degree of fric-
tional contact without liability of crowd-
ing the setting against the jewel and crush-
ing the latter. The jewel is thus securely
mounted in the plate, and it may also be
shifted endwise to the extent necessary to
take up end shake of the wheel.

In mounting the jewels in the top plate or
plates, a tool such as shown in Fig. 3 is used.
This tool has a base n; the upper surface of
which supports the movement plate, and
is adjustable mounted in such base, so that it
projects above the supporting surface there-
of, is one of the punches or dies j. An over-
hanging head o has a guide in which a com-
plementary punch or die moves. The move-
ment frame, consisting of the top and bot-
tom plates secured together, is laid on the
supporting surface of the base with the bot-
tom plate downward. The lower die j then
projects through the hole f in the bottom
plate into the hole g of the top plate, the
distance being regulated by adjustment of
the die, so that the jewel will be mounted in
approximately the position required for the
particular wheel to be held thereby. The
upper punch is then pressed against the
jewel setting, with the result previously de-
scribed.

The tool used for mounting jewels in the
bottom plate is shown in Fig. 4. It has a
threaded annular flange p upon which is
screwed a gage plate q and in which are
mounted spring-elevated pins r, in addition
to the punches or dies j. The bottom plate,
from which the top plate has been removed
after the jewel has been set therein, is laid
in an inverted position within the flange p
and resting on the pins r, and so placed that
the hole in which the jewel is to be mounted
is over the punch j. The gage plate q which
had previously been removed is now applied
to the flange and screwed down until its gag-
ing surface bears against the edge of the
flange. Such gaging surface then bears
against the rim of the watch plate and
presses the latter down against the yielding
resistance of the spring-pressed pins r. Then
the upper punch is employed in the
manner just described to secure the jewel in
cooperation with the lower punch.

The positions of the jewels in both plates
are gaged with reference to the same edge
of the bottom plate, that is, the dial edge, for
when mounting a jewel in the top plate, the
movement frame rests with this dial edge on
the base n and in setting a jewel in the bot-
tom plate the latter is held with the dial
edge against the gage plate q. In the one
case the die is adjusted to project a
specified distance above the supporting sur-
face of the base, and in the other case the
corresponding die is adjusted at the required
distance below the face of the gage plate q
when the latter is screwed against the flange
p. These adjustments are so made that the
aligned jewels in the top and bottom plates
are at exactly the correct distance apart to
accommodate the standard staff to be ap-
plied thereto. In practice the distance be-
tween these jewels is designed to be about
three thousandths of a centimeter greater
than the length of the staff between the
pivot shoulders to give the necessary free-
dom of movement.

After the jewels have been mounted, the
wheels are put in place and tested for end
shake. In case any of the staffs should vary
from the standard length, an adjustment of
one or the other jewels to give the correct
amount of end shake may be readily made
by simply moving the jewel the necessary
distance in either direction in its hole. The
frictional engagement between the jewel set-
ting and walls of the hole is not too great to
permit of such adjustment, while it is at the
same time sufficient to retain the jewel with
the necessary degree of security after the ad-
justment has been made.

By this invention the assembling and fin-
ishing of watch movements may be more
easily and quickly effected, and the cost of
the same diminished. This is due princi-
pally to the following facts: first, that the
jewels need not be removed from the plates
after they have once been mounted; second,
which is a corollary to the first, that there is
no danger of confusing the jewels and re-
mounting them in the wrong holes; third,
that the jewels and their settings can be com-
pleted and given their final finish in quanti-
ties instead of individually when used, at re-
duced expense; fourth, that end shake ad-
justments of the jewels may be made with-
out either cutting the jewel settings or dan-
ger of injuring any part thereof, or of the
plates; and fifth, that the final finish, such
as stoning and ornamental damaskeening,
may be given to the top plates before the jew-
els are mounted.

It is to be understood that this invention
applies to mounting bearings of all kinds for
time pieces, whether such bearings are jen-
eels held in metallic settings, or consist en-
tirely of metal bushings or rings.
I claim:

1. The method of setting a pivot bearing in the movement frame of a time piece, which consists in forming the bearing to fit loosely in a hole in the frame, placing the bearing in such hole, and expanding the peripheral portion of the bearing outwardly into contact with the walls of the hole.

2. The method of setting a pivot bearing in the movement frame of a time piece, which consists in forming the bearing to fit loosely in a hole in the frame, placing the
bearing in such hole, and expanding the peripheral portion of the bearing outwardly into contact with the walls of the hole, leaving the central part of the bearing free from distortion.

3. The method of setting a pivot bearing in the movement frame of a time piece, which consists in forming the bearing to fit loosely in a hole in the frame, placing the bearing in such hole, and pressing simultaneously against opposite ends of the bearing at points between the axis and rim only of the bearing in directions outwardly from the points of application of such pressure, thereby expanding the rim into contact with the walls of the hole.

4. A method of mounting a jeweled bearing in a time piece, which consists in placing the bearing in a hole in the movement frame of the time piece and forcing the metal of the jewel setting between the rim and the walls of the hole, leaving the metal of the setting adjacent to the jewel in substantially its original condition.

5. A method of mounting a jeweled bearing in a time piece, which consists in placing the bearing in a hole in the movement frame of the time piece, and indenting the opposite end faces of the jewel setting simultaneously at points near the periphery of such setting by means of indenting tools having indenting portions beveled on their outer faces and substantially parallel with the axis of the bearing on their inner faces, such indenting portions being located near the rim of the setting, whereby the material of the setting near the rim is forced outwardly and that adjacent to the jewel is left substantially undisturbed and undistorted.

6. The method of mounting a movement wheel bearing with a watch movement plate, which consists in placing the bearing in a hole in such plate and pressing upon the opposite faces of the bearing near the periphery thereof by oppositely arranged tools which are adapted to enter the ends of such hole.

7. The method of crowding the periphery of a movement wheel bearing into frictional engagement with the walls of a hole in the movement plate of a time piece, which consists in pressing against the opposite ends of the setting by means of tools having annular sharpened ribs upon their ends, the inner walls of which ribs are cylindrical and the outer walls of which are beveled, thereby crowding the stock of the bearing between the periphery of the bearing and such ribs outwardly in all directions, and leaving the stock within the space bounded by the ribs substantially undistorted.

8. The method of mounting a movement wheel bearing in the movement plate of a time piece, which consists in holding the movement plate in a predetermined position, placing the bearing in a hole in such plate in which the bearing is adapted to enter freely, and applying pressure to the peripheral portions of the bearing at opposite ends of the bearing simultaneously in directions perpendicular to the plane in which the plate is held, such pressure being applied evenly at all points of contact with the pressing means, whereby the peripheral portion of the bearing is expanded into contact with the walls of the hole, and the entire bearing is made parallel with the plane of the plate.

9. The method of setting complemental bearings in the top and bottom plates of a watch movement at a specified distance apart, which consists in providing such plates with holes to receive the bearings, securing the plates together with such holes in alinement, laying the connected plates upon a supporting surface with the bottom plate in contact with said surfaces, arranging a punch or die to project through the hole in the bottom plate a specified distance from such surface, placing a bearing in the hole in the top plate, pressing upon said bearing with a complemental punch or die, whereby the bearing is compressed between the punches or dies and expanded into contact with the walls of the hole in the top plate, removing the top plate, holding the bottom plate in contact with a gaging surface, arranging a punch or die with its end at a specified distance from the plane of such surface, and in alinement with a hole in the bottom plate, placing a bearing in such hole in contact with said punch or die and forcing the complemental punch or die against the bearing.

In testimony whereof I have affixed my signature, in presence of two witnesses.

OLOF OHILSON.

Witnesses:
ARTHUR H. BROWN,
P. W. PEZZETT.