Feb. 3, 1953 M. J. REED 2,627,247

BALL POINT PEN WITH BALL-BEARING MOUNT

Filed Dec. 29, 1948

Fig. 1.

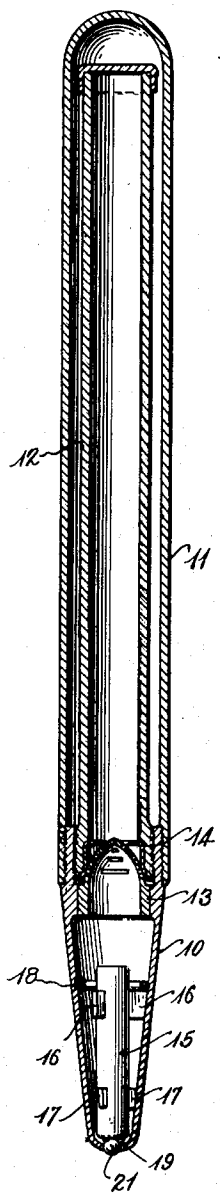


Fig. 2.

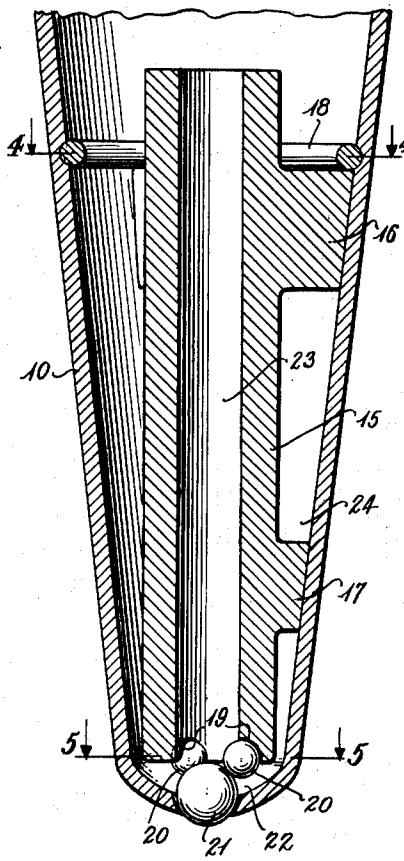


Fig. 3.

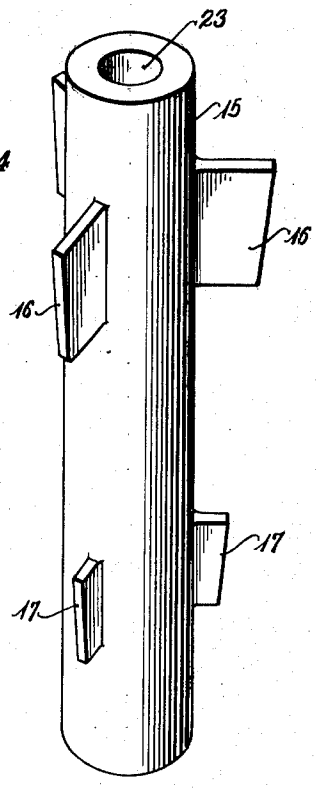


Fig. 4.

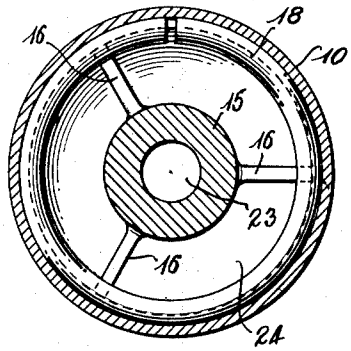
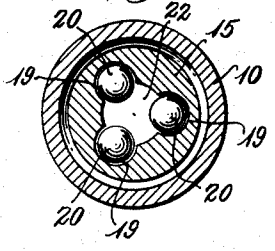


Fig. 5.



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BALL-POINT PEN WITH BALL-BEARING MOUNT

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Application December 29, 1948, Serial No. 67,803

3 Claims. (Cl. 120—42.4)

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This invention relates to writing instruments, and is more particularly related to pens of the ball applicator type.

In prior applications of Maurice J. Reed, Serial Nos. 778,907, filed October 9, 1947, now Patent No. 2,557,563, and 26,460 filed May 11, 1948, there are disclosed pen constructions involving means defining a plurality of conduits leading to a common chamber contiguous to the ball applicator of a ball point pen. It is explained in these applications that the purpose of the plurality of conduits is to produce a manometer effect whereby air bubbles trapped in the ink supply line between the reservoir and the ball are quickly expelled to insure a continuous uninterrupted flow of ink to the writing sphere. These applications also disclose refillable reservoirs of both the replacement type and the permanent installation type.

It has been found that the use of a plurality of conduits leading to the chamber which feeds ink to the ball is productive of superior writing qualities in a new pen. However, as the pens get older, particularly after one or more refills, the quality of the lines producible by them deteriorates. An analysis of the reason for this deterioration has shown that it results from ball wear, the ball losing its spherical shape, resulting in uneven rotation and the production of lines which are pale and ill defined.

In an effort to overcome the foregoing disadvantage, some of the pen manufacturers are now providing for the replacement of the ball applicator at the same time that the ink refill is made so that the writing quality of the instrument is maintained. Obviously enough, this scheme is an expensive one, for it makes necessary a ball mounting arrangement in which the ball is readily accessible and requires the manufacture and use of quite a number of ball applicators during the life of each pen. Furthermore, readily removable ball mounts are not too well susceptible for use with a multileg feed line of the type disclosed in the applications mentioned in the second paragraph above.

In view of the foregoing, it is an object of this invention to provide a mount for ball applicators of such nature as to improve to a marked extent the wearing quality of the ball, whereby frequent replacement is avoided and the quality of the line produced by the ball is maintained at high quality through very long periods of use.

It is another object of this invention to provide a low friction mount for ball applicators correlated and constituting a part of a multi-leg feed channel extending between the chamber in which the applicator picks up the ink and a reservoir which may be of either the refillable or the replacement type.

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It is contemplated according to this invention to provide in the tip of a pen of the ball point type means dividing the interior of the tip into at least two chambers inter-communicating adjacent the ball and to provide the ball applicator with a ball-bearing mount, the accommodating sockets for which are defined by the means dividing the interior of the point into two intercommunicating zones.

Other objects and advantages of this invention will be apparent upon consideration of the following detailed description of the preferred embodiment in connection with the annexed drawings wherein:

Figure 1 is a vertical sectional view of a pen incorporating the ball mount and subdividing partition of the present invention;

Figure 2 is a vertical sectional view to an enlarged scale of the partition and ball mount of the assembly of Figure 1 showing the ball sockets and the placement of the bearings for the ball applicator.

Figure 3 is a perspective view of the partition and ball sockets shown in Figures 1 and 2;

Figure 4 is a view in horizontal section taken on the line 4—4 of Figure 2; and

Figure 5 is a view in horizontal section taken along the line 5—5 of Figure 2.

Referring now in greater detail to Figure 1, the pen comprises a hollow tip portion 10 which is internally and externally of generally frusto-conical configuration, a barrel or casing portion 11 and an ink reservoir of the cartridge replacement type designated by the reference numeral 12. The tip portion 10 is provided with an upper annular flange which is both internally and externally threaded. The externally threaded portion co-acts with the internally thread-free end of the casing portion 11 while the internally threaded portion of the annular flange co-acts with the externally threaded lower end of the replacement cartridge 12. Thus the cartridge or reservoir 12 is rigidly held from the tip. A perforated dome-shaped member 13 is mounted in the upper portion of the tip 10 and this dome co-acts with a frangible diaphragm 14 which seals the end of the reservoir cartridge 12 from the time it is filled until the time it is installed in the pen.

The portion of the pen heretofore described does not constitute a part of this invention, but

is shown in application Serial No. 26,460, filed May 11, 1948. As described in that application, replacement cartridges such as 12 already filled with ink, can be furnished to the user who in installing them, first unscrews the barrel or casing 11 then unscrews the old cartridge 12, then discards it, then threads in the new cartridge causing the dome 13 to rupture the diaphragm 14 to release the ink to the interior of the tip and finally applies the barrel 11.

The hollow interior of the tip 10 of the pen of the present invention is provided with a hollow cylindrical partition 15 having radially extending therefrom three centering lugs located 120° apart in each of two axially spaced groups 16 and 17. The hollow cylinder 15 is held in position by an interrupted spring annulus 18 which seats in an annular groove milled on an inner face of the tip 10 at a plane just above the plane of the centering lugs 16. This spring acting on the centering lugs 16 holds the hollow cylinder 15 against axial displacement upwardly as the apparatus is viewed in the drawings. As can be seen, in Figure 5 the lower end of the cylinder 15 is provided with three sockets 19 spaced 120° apart, each conforming to a portion of the surface of the sphere. These sockets receive ball-bearings 20 which tangentially contact and bear upon the ball applicator 21. Thus axial displacement of the sleeve 15 in one is prevented by the spring annulus 18 and in another direction by the axial mounting of the ball applicator 21. It is apparent that some space must be left so that ink can get from the chamber 22 or to the surface of the ball to be carried thereby for application to the surface on which the line is to be applied.

By the arrangement shown, it is apparent that the wear on the ball is reduced to a marked extent due to the fact that the entire bearing assembly is lubricated by the ink and the contact of the ball with any surface is tangential. Not only does this improve the wearing qualities of the ball, but it has been found to result in a smoother writing action at all stages of operation.

The advantages of the manometer effect discussed in the prior applications mentioned above is not at all lost since the tip is subdivided into two zones designated in Figure 2 as 23 within the cylinder 15 and 24 defined between the cylinder 15 and the tip portion 10. These zones intercommunicate at 22 between the several balls 20. Furthermore, the same structure which subdivides the tip into two concentric annular zones also serves as a ball retainer for the balls 20.

What is claimed is:

1. A writing instrument comprising a generally spherical writing ball applicator, a hollow tip portion providing an aperture through which said applicator partially projects, a reservoir for supplying writing fluid to a hollow interior of said tip portion, a hollow cylindrical partition subdividing the hollow interior of said portion into two concentric writing fluid conduits terminating adjacent but spaced from the ball applicator, the end of said partition adjacent the aperture in the tip portion through which the ball applicator projects having sockets therein and balls in said sockets bearing tangentially on said ball applicator.

2. A writing instrument comprising a generally spherical writing ball applicator, a frusto-conical hollow tip portion providing an aperture through which said ball applicator partially projects, a reservoir for supplying writing fluid to the hollow interior of said tip portion, a hollow cylindrical element contained within said tip portion and extending axially thereof for a major portion of the length of said tip portion, a plurality of lugs projecting radially from said cylindrical element to center said cylindrical element within said tip portion, one end of said cylindrical element having sockets therein, and balls in said sockets bearing tangentially on said ball applicator, said cylindrical element subdividing the hollow interior of said tip portion into a central conduit and an annular conduit for writing fluid, said conduits terminating adjacent said ball applicator but spaced therefrom by said balls in said sockets and said conduits intercommunicating at both ends of said cylindrical element whereby the hollow interior of said tip portion is subdivided into two zones which intercommunicate at both ends of said tip portion to produce a manometer effect to quickly expel air bubbles trapped between said reservoir and said ball applicator.

3. A writing instrument as defined in claim 2 wherein the inner wall of said tip portion defines an annular groove adjacent the end of said cylindrical element remote from said ball applicator and a spring annulus is seated in said groove and bears against the end of said cylindrical element to hold it against axial displacement.

MAURICE J. REED.

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