Feb. 4, 1964 R. F. SCALO ETAL 3,120,215

RECORDER PEN

Filed March 15, 1961

Fig. 2.

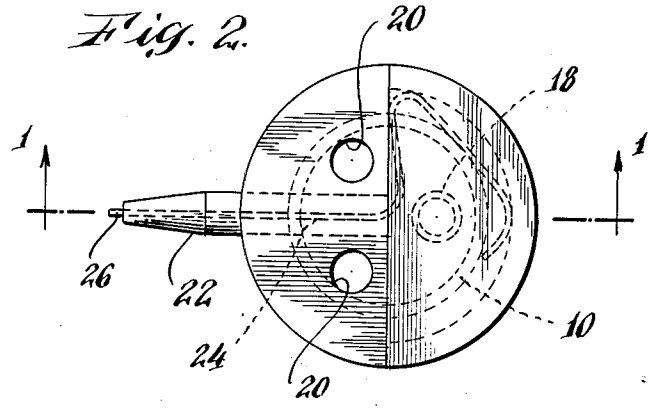
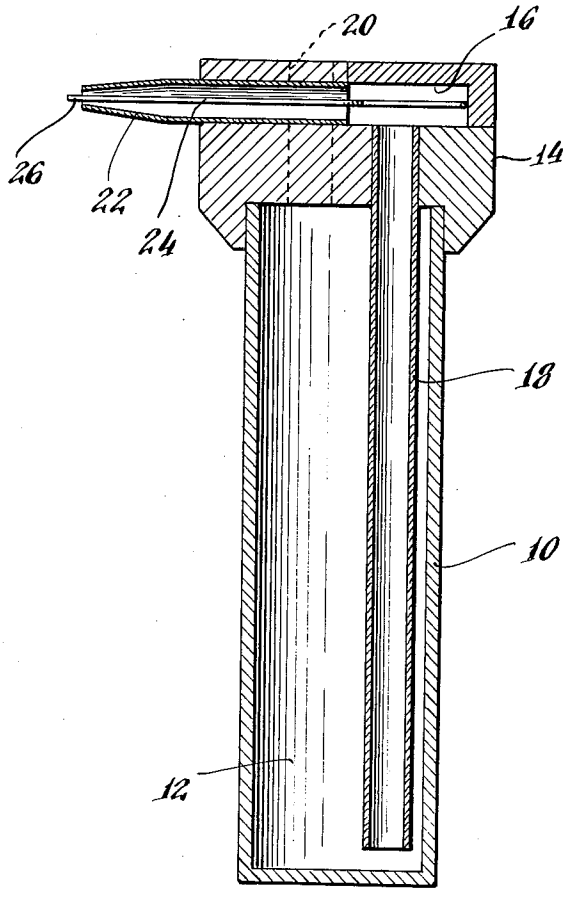


Fig. 1.



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RECORDER PEN

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This invention relates to new and useful improvements in recorder pens. The present application is a continuation-in-part of our co-pending application Serial No. 830,382 filed July 29, 1959, now abandoned.

Recorder pens presently used for the recording of instrument information have many disadvantages. For example, the pens become clogged, especially when removed from the paper and allowed to remain for a period, they require the use of thin slow-drying inks, and are often adversely affected by changes in position. Furthermore, such pens normally require either that the ink reservoir be located above the marking nib or that a relatively long capillary be employed with its obvious disadvantages, easy clogging, low feed rate, undesirable expense, and difficult maintenance.

It is, therefore, a primary object of the present invention to provide an improved recorder pen. Other objects are to provide such a pen which is substantially nonclogging, utilizes quick drying ink, is not overly sensitive to variations in position, is easily cleaned and maintained, may have its ink reservoir positioned above or below the marking nib, utilizes a relatively short capillary, and is relatively inexpensive to construct.

The above objects are attained by providing a pen which comprises a first liquid reservoir, a second liquid reservoir, and non-capillary fluid passage means connecting the two reservoirs. A capillary marking nib communicates with the second reservoir. A wire (or "quill") is contained in the marking nib which protrudes from the writing end when the nib is out of contact with the paper but is pushed essentially completely within the nib by the paper. The wire is longitudinally movable within the nib. Vent means are also provided communicating between the first reservoir and the atmosphere. By the term "nib" or "marking nib," I refer to the actual tube from which the ink flows onto the surface of the paper and not to the associated portions of the pen.

Pens known in the prior art have frequently made use of wires extending through a nib for the purpose of keeping the nib free of clogged ink and foreign substances. However, such devices have been limited in their use to pens which have a nib operating in the vertical position. Furthermore, many such devices have utilized the wire as the actual marking device. According to the present invention, a quill or wire is provided within a marking nib in combination with two reservoirs in a manner which enables the pen to be relatively insensitive to changes in position and allows a large reservoir to be positioned below the level of the marking nib.

The apparatus of this invention will be more fully understood by reference to the two figures of the attached drawing wherein FIG. 1 is a cross-sectional, elevational view of a pen of the type described herein taken along line 1—1 of FIG. 2 and FIG. 2 is a plan view of the same pen.

By reference to FIG. 1, it will be seen that a tubular cylindrical body 10 is provided which defines a first ink storage reservoir 12. A substantially disc-shaped head 14 esncloses the open end of body 10 and contains a smaller ink chamber 16. A small tube 18 which is larger than capillary size etxends between chamber 16 and reservoir 12. Vent holes 20 are provided which extend through

the head 14 into reservoir 12 for the purpose of maintaining atmospheric pressure therein. A marking nib 22 protrudes from the head 14 and communicates with chamber 16. The nib contains a wire 24 which protrudes from the writing point when the nib is out of contact with the paper and is suitably bent as illustrated in FIG. 2 to fit chamber 16. The internal diameter of nib 22 and the diameter of wire 24 are selected to define a capillary passage from chamber 16 to the surface of the paper. By bending the wire, as shown in FIG. 2, a springing action is created which forces the end 26 of wire 24 outwardly against the recorder paper. As the pen moves along the surface of the paper, wire 24 is caused to vibrate-longitudinally within the nib. This vibratory motion prevents the clogging of the nib 22 and allows the free and unobstructed flow of ink therethrough. This construction has been found to be satisfactory even when used with the quick-drying India inks and, in fact, it is recommended that such inks be used with the pen of the invention.

As ink flows by capillary action from marking nib 22 onto the paper, a partial vacuum is created in chamber 16. Atmospheric pressure, acting through vents 20, then forces ink from reservoir 12 through tube 18 and into chamber 16. A continual flow is thus maintained and excellent results are obtained from the recorder pen. The pen of the invention is easily maintained and may be removed from the chart paper for considerable periods without becoming inoperable due to clogging of ink. Even after extended periods, the writing qualities of the pen may normally be restored by the simple expedient of moistening the marking nib and tapping it lightly on a piece of paper. It will, therefore, be seen that the pen of the present invention overcomes the disadvantages of prior art recording pens.

As an example of the present invention, a pen was constructed having a main body 10 and a head 14 of styrene. The reservoir in body 10 was .24 inch in diameter and 1.85 inch in length. The chamber 16 contained in head 14 had the shape of a semicircular disc .05 inch thick and .34 inch in diameter. Connecting tube 18 was .03 inch internal diameter and 1.84 inch in length. Two vent holes 20, each .03 inch in diameter, extended through the solid portion of head 14 into main body reservoir 12. Marking nib 22 was a tapered metal tube having an internal diameter of .013 inch at the marking end and .039 inch maximum internal diameter at the opposite end. Wire 24, .006 inch in diameter, extended .01 inch from the nib end and well into the head chamber. When used with standard India ink, this pen proved capable of excellent performance without clogging or blurring. The pen was easily filled by use of a rubber tip in conjunction with a dropper to force ink through the nib.

As another example of this invention, a pen was constructed similar in all respects to the foregoing but with an enlarged connecting tube 18 having a clearly noncapillary internal diameter of .08 inch. This pen was also filled with standard India ink and operated with the reservoir below the marking nib and with the nib horizontal against the paper. The pen operated successfully in an-off service on a spectrophotometer without clogging, until the ink in reservoir 12 was depleted.

Although the pen of this invention has been specifically described as to construction and operation for the case wherein the reservoir 12 is below nib 22 and the nib is horizontal, the device is not in fact so limited. The only critical requirement in this regard is that the open end of tube 18 must be below the level of the ink. Thus, the illustrated pen will actually operate in any position meeting this requirement—for example, with the

pen tilted from this upright position and even with body 10 horizontal and nib 22 vertically upwards.

Further, this invention is not limited to a connecting tube of any particular size, configuration, or length. This disclosure is illustrative only and is not to be construed in a limiting sense. The invention is limited only by the scope of the following claims.

We claim:

1. A recorder pen which comprises a first body portion defining a first ink storage chamber; a second body portion defining a second ink storage chamber, each of said first and second chambers being of greater than capillary size; tubular ink conducting means having an internal diameter of greater than capillary size in connecting relationship between said first and second chambers to provide fluid flow therebetween; elongated tubular marking nib means communicating with said second ink storage chamber; elongated wire-like means contained in said pen

nib means, having one end protruding therefrom, and resiliently longitudinally movable therein whereby the protruding end is entirely depressed into the nib by the surface to be marked, the outer surface of said wire-like means and the inner surface of said pen nib means defining an annular capillary ink passage; and atmospheric vent means communicating between said second ink storage chamber and the atmosphere.

2. The apparatus of claim 1 wherein said first and second body portions are integral.

References Cited in the file of this patent

UNITED STATES PATENTS

1,630,297	Heesch	May 31, 1927
1,720,226	Lovejoy	July 9, 1929
2,678,633	Holden et al.	May 18, 1954
2,915,041	Gigli	Dec. 1, 1959