

[54] **AUTOMATIC FILLING RULING PEN WITH AUXILIARY CONTROL VALVE**

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[22] Filed: **Apr. 14, 1971**

[21] Appl. No.: **133,834**

[52] U.S. Cl. **401/151**

[51] Int. Cl. **B43k 5/10**

[58] Field of Search..... 401/151, 233, 172; 128/218 C, 218 M

[56] **References Cited**

UNITED STATES PATENTS

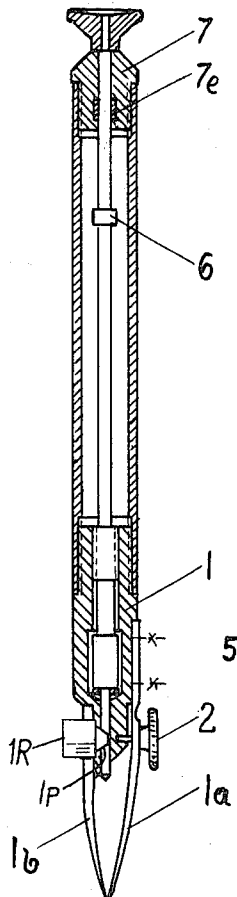
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[57] **ABSTRACT**

A ruling pen having a pair of relatively adjustable blades at one end of a pen barrel for drawing lines of variable width, a chamber above the blades, a capillary channel communicating between this chamber and the space between the blades for delivering ink thereto, and a stem extending axially through the barrel or handle for manipulation to control the ink flow to the blades. The stem carries a pair of axially spaced pistons which are receivable within a cylindrical passage axially extending over a distance greater than the spacing between the pistons and interposed between the aforementioned chamber having an ink reservoir. An auxiliary valve normally blocking the capillary channel is mechanically displaced by a needle carried by the stem below both pistons.

3 Claims, 12 Drawing Figures



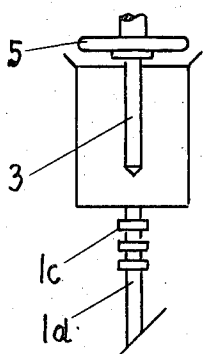


Fig. 1.

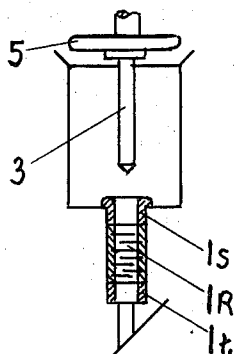


Fig. 2.

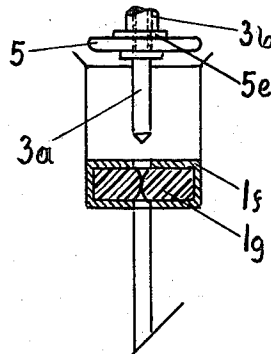


Fig. 3.

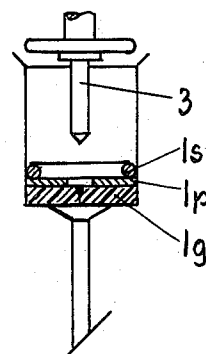


Fig. 4.

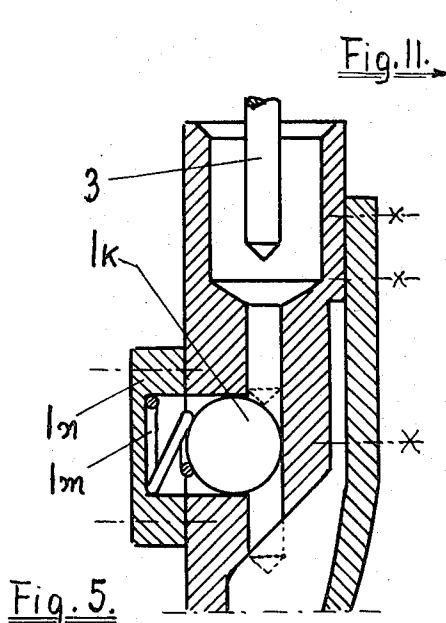


Fig. 5.

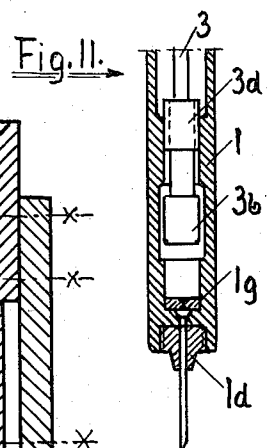


Fig. 11.

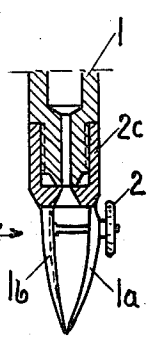


Fig. 10.

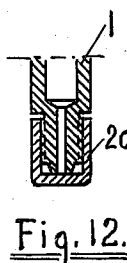
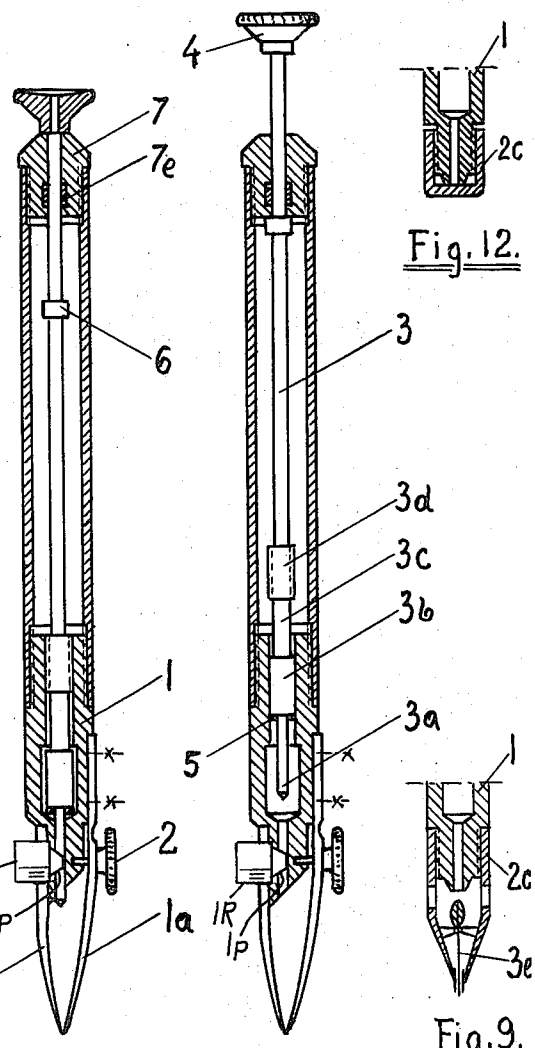


Fig. 12.

Fig. 7.

Fig. 8.

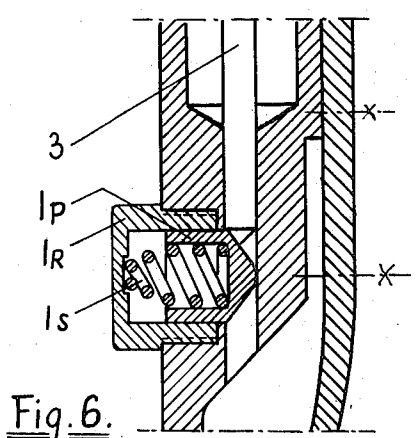


Fig. 6.

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AUTOMATIC FILLING RULING PEN WITH AUXILIARY CONTROL VALVE

CROSS REFERENCE TO RELATED APPLICATION

The present application is related to my copending application Ser. No. 714,238 filed Mar. 19, 1968.

FIELD OF THE INVENTION

My invention relates to a ruling pen of the type in which ink may automatically be delivered to a pair of nibs having adjustable spacing. More particularly, the invention relates to an automatic ink-feed device for such ruling pens and represents an improvement over the apparatus described in the copending application mentioned above.

BACKGROUND OF THE INVENTION

Ruling pens generally comprise a barrel or handle, at one end of which are provided a pair of nibs or blades which converge toward one another away from the handle and are spring biased apart so that, when a screw or other means is adjusted, the points of the nibs can be brought together or spread further apart to adjust the width of a line to be ruled by the pen. In most systems of this type, India ink is supplied to the drawing point as defined by the nibs by introducing one or more drops of ink laterally with a dropper, scoop or other member associated with the ink bottle or a filling apparatus. It has also been proposed to provide plunger-actuated filling systems in which the barrel or handle forms an ink reservoir, a channel leads from this reservoir to a point above the space between the nibs or blades, and a plunger is manually displaceable in the barrel to release ink and enable it to flow through the channel and descend between the blades. A structure of this type, with certain improvements over the art, is disclosed in the aforementioned copending application.

OBJECTS OF THE INVENTION

It is the principal object of the present invention to provide an improved fountain-type ruling pen of the character described which represents an advance over the systems described in my copending application mentioned earlier and which enables greater control over the metering of ink to the penpoint.

SUMMARY OF THE INVENTION

These objects and others which will become apparent hereinafter, are attained in accordance with the present invention by providing an auxiliary closure for the capillary channel between an ink-supply chamber and a space above the drawing nib, the valve being mechanically opened by the needle which is carried by a double-piston stem shiftable axially in the handle and having a pair of pistons defining an ink-metering chamber between them.

The stem, according to the invention, is axially shiftable in the handle which forms an ink reservoir above a cylindrical passage between the reservoir and the ink-feed chamber which cooperates with the pistons to permit only a metered quantity of ink to be displaced through this passage with each axial stroke of the stem. The stem, however, has an axial stroke greater than the aforementioned spacing between the pistons to enable

the uppermost piston to clear the passage in an upper position of the stem and the lowermost piston to clear the passage in the lowermost position of the stem.

DESCRIPTION OF THE DRAWING

The above and other objects, features and advantages of the present invention will become more readily apparent from the following description, reference being made to the accompanying drawing in which:

FIGS. 1 through 4 represent diagrammatical cross-section detail views of auxiliary valve arrangements embodying the present invention;

FIGS. 5 and 6 are axial cross-sectional views of auxiliary valve arrangements of the lateral-closure type;

FIGS. 7 and 8 are diagrammatical vertical cross-sectional views of the overall pen which may be provided with one of the auxiliary valves of FIGS. 1 through 6, showing the stem in two difference operative positions;

FIG. 9 is an axial cross-sectional view representing a detail of a lettering-pen nib interchangeable with the ruling-pen nibs of FIGS. 7 and 8;

FIG. 10 is a view similar to FIG. 9 but showing another ruling pen nib interchangeable with a lettering-nib;

FIG. 11 is a detail view, in axial cross-section, of an end of a medical liquid dispensing instrument utilizing the principles of the present invention; and

FIG. 12 is a view of this instrument with the outlet blocked by a cap.

SPECIFIC DESCRIPTION

The overall pen structure, best seen in FIGS. 7 and 8, comprises a pen handle or barrel 1, the lower end of which is provided with a pair of downwardly converging ruling blades or nibs 1a and 1b, the former being anchored for resilient bias away from the latter. The screw 2 is provided to urge the two nibs toward one another for adjustment of the width of a line ruled by the pen.

Within the barrel or handle, there is provided an axially extending stem 3 carrying a stop 6 engageable with the block 7 at the upper end of the barrel, the block forming a bearing and seal or packing 7e to prevent leakage around the stem. A handle 4 is carried by the end of the stem projecting above the barrel of the instrument.

At its lower end, the stem 3 carries a pair of pistons or plungers 3b and 3d, spaced apart axially by a length 3c of smaller diameter. The pistons 3b and 3d are received in a passage extending axially between the ink reservoir above this passage and a chamber therebelow, the pistons being receivable in both the reservoir and the chamber with clearance as illustrated in FIGS. 7 and 8. The piston 3d is threaded onto the stem 3 and, when the piston is received in the passage, the stem may be rotated while the piston is frictionally retarded to adjust the axial position of the pistons and hence the spacing between them which determines the volume of ink to be metered during each stroke. A washer 5 is provided at the lower end of piston 3b and may be as wide as the passage for cleaning it. The stem also forms a needle 3a below the piston 3b, the needle entering a capillary channel which is obstructed in the absence of this needle by one of the auxiliary valve devices of FIGS. 1 through 6.

In operation the stem is withdrawn to the limit of its stroke (FIG. 8) to withdraw the piston 3d from the passage accomodating it and permit ink to flow from the reservoir above this passage around the neck 3c between the pistons. The needle 3a is withdrawn from the capillary channel and the auxiliary valve device main- tains the latter closed.

As the stem is now advanced, ink is drawn into the passage behind the piston 3b until the passage entrance is closed by the piston 3d (FIG. 7), whereupon the piston 3b emerges into the chamber below this passage and the needle opens the auxiliary valve to permit the ink discharged into the feed chamber between the pas- sage and the capillary channel, to flow to the point.

In FIG. 1, we show an auxiliary valve arrangement in which rings 1c are provided at the bore to hug the needle 3 which is here shown to carry a washer 5 capable of cleaning the wall of the feed chamber directly above the capillary channel 1d. In FIG. 2 the obstruction is formed by deflectable hairs 1R in a tube held by the support rings 1s and 1t respectively. In FIG. 3, a ring 1g is received within a cylinder 1f but can be spread by the needle 3a which carries a washer 5 as held in place by a ring 5e. Another arrangement of this general type is provided in FIG. 4 where the constricted ring 1g is held in place by a washer 1p and a spring ring 1s. FIGS. 5 and 6 represent auxiliary valves with laterally deflectable members. Thus the deflectable member in FIG. 5 is a ball 1k urged to the right by a spring 1m in a cap 1n. The pointed end of the needle deflects the ball to the left to open the channel. In FIG. 6 the obstructing member or closure 1p is a cone biased to the right by a spring 1s received in a casing 1R.

FIG. 9 show that nibs 1a and 1b of the pen of FIGS. 7 and 8 can be replaced by a lettering point 2c having a weighted pin 3e to clear its passage. The pen of FIG. 10, which may be substituted for the lettering point, includes the cylindrical threaded thimble 2c and a pair of nibs 1a, 1b which may be drawn together by a threaded nut 2 engaging a screw passing through the nib 1a.

The invention is also applicable to a medical dispensing device (FIGS. 11 and 12) in which the pen is replaced by a removable hypodermic-type needle 1d which, upon removal, can enable a cap 2c (FIG. 12) to be mounted in place.

I claim:

1. A ruling pen comprising:

an elongated handle forming an ink-receiving reser- voir;

a ruling point mounted on a lower end of said handle and having an ink-receiving space;

means forming an ink-supply chamber between said reservoir and said space, an axially extending chan- nel communicating between said chamber and said space, and an axially extending piston-receiving passage aligned with said channel and communi- cating between said reservoir and said space;

a stem received in said barrel and projecting axially therefrom at an end of said barrel opposite said point for manual manipulation of said stem, said stem being formed with a pair of axially spaced pis- tons of the same diameter receivable in said pas- sage and separated by a reduced-diameter neck and defining within said passage a completely closed ink-metering compartment, and a needle projecting axially from said pistons and receivable in said channel, said pistons being spaced apart by a distance less than the axial length of said passage, said chamber receiving one of said pistons proximal to said needle with all-around clearance, said stem having an axial stroke sufficient to shift one of said pistons fully into said chamber in one position of said stem to shift the other of said pistons fully into said reservoir out of said passage in an- other extreme position of said stem;

an auxiliary valve at said channel mechanically shift- able by said needle at said one position of said stem for enabling ink to flow from said chamber through said channel into said space, said valve blocking said channel in the absence of engagement by said needle, said auxiliary valve including a valve mem- ber projecting laterally into said channel, spring means biasing said valve members laterally into said channel, and means for retaining said spring means, one of said pistons being mounted on said stem for axial displacement relative to said pistons; and

means for relatively axially displacing said pistons.

2. The pen defined in claim 1 wherein said valve member is a ball.

3. The pen defined in claim 1 wherein said valve member is a cone.

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