

Nov. 19, 1968

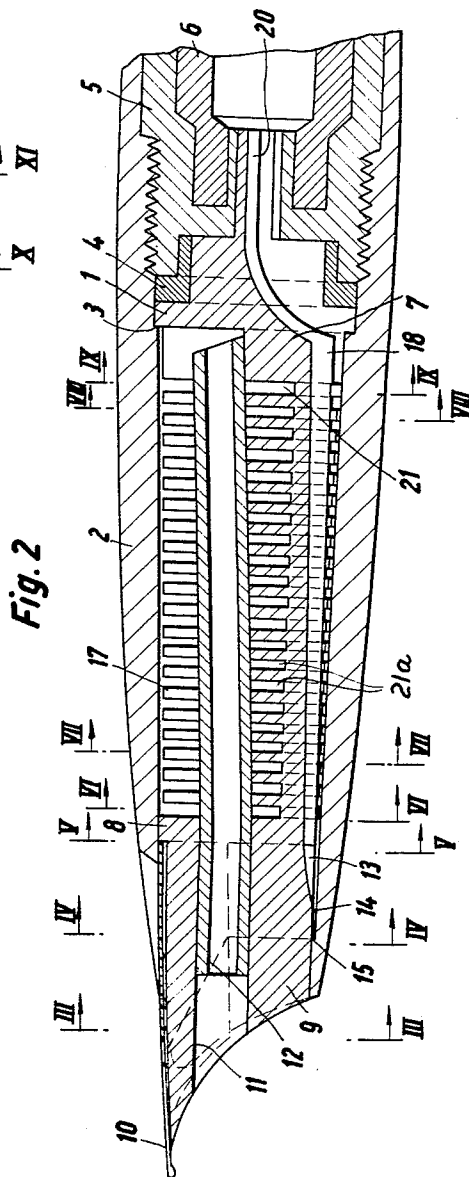
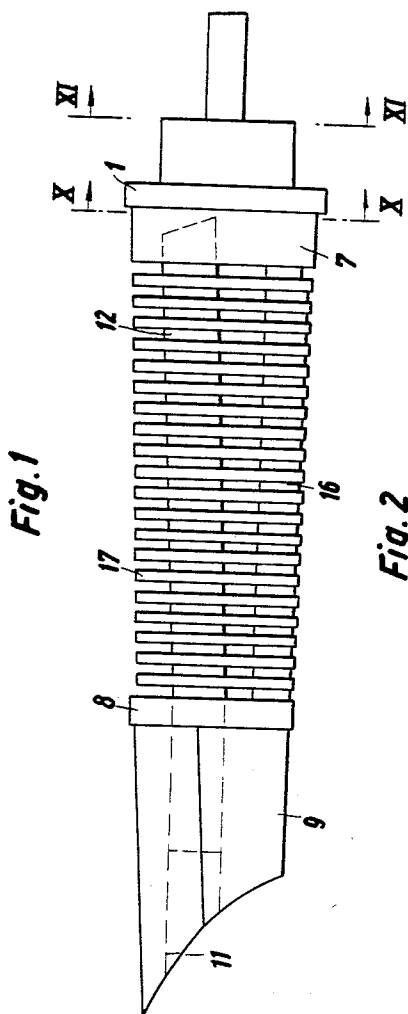
E. RÖSLER ET AL

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INK CONDUCTOR FOR FOUNTAIN PENS

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2 Sheets-Sheet 1



Inventors:  
Ernst Rösler  
Konrad Fressel  
By *Walter Bueky*

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E. RÖSLER ET AL

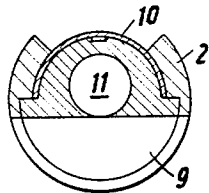
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INK CONDUCTOR FOR FOUNTAIN PENS

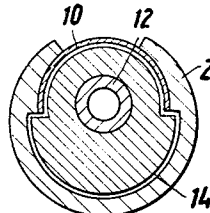
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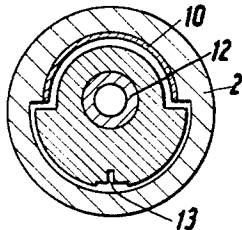
**Fig. 3**



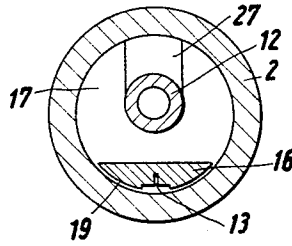
**Fig. 4**



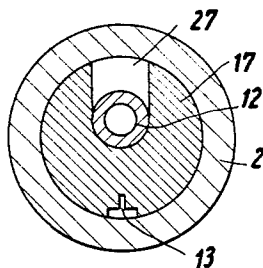
**Fig. 5**



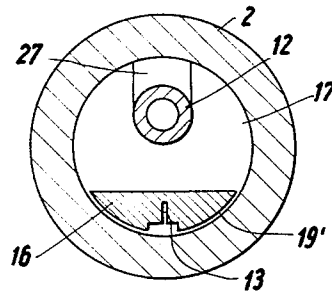
**Fig. 6**



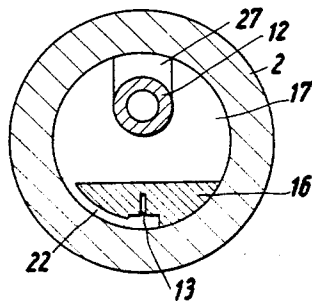
**Fig. 7**



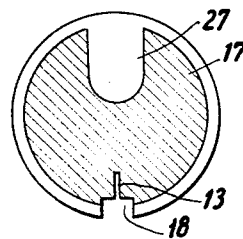
**Fig. 8**



**Fig. 9**



**Fig. 10**



**Fig. 11**



Inventors:  
Ernst Rösler  
Konrad Fressel  
By *Walter Buehler*

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**INK CONDUCTOR FOR FOUNTAIN PENS**

Ernst Rösler, Hamburg, and Konrad Kressel, Hamburg-Poppenbüttel, Germany, assignors to Montblanc-Simplo G.m.b.H., Hamburg, Germany

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M 65,069

6 Claims. (Cl. 401—227)

**ABSTRACT OF THE DISCLOSURE**

An ink conductor for fountain pens with a control passage leading to an ink container for passing ink and air in opposite direction, which is equipped with a longitudinal capillary connecting the control passage with the pen and also equipped with a plurality of pockets formed by capillary grooves and ribs communicating with the longitudinal capillary while a venting passage extends in the longitudinal direction through the pockets and has only its inner end in communication with the surrounding pockets, the longitudinal capillary being located at the bottom side of the ink conductor and having its front end ending diametrically opposite the pen and communicating with the inside surface of the latter through a capillary annular passage means.

The present invention relates to an ink conductor for fountain pens with a control path leading to an ink reservoir for passing ink and air in opposite directions. The said ink conductor is furthermore provided with a longitudinal capillary connecting the control path with the pen, and is also provided with an intercepting compartment system communicating with the longitudinal capillary and formed by capillary grooves and ribs. Finally, the ink conductor is provided with a ventilating conduit which extends in the longitudinal direction through the intercepting compartment system, said ventilating conduit having only its inner end in communication with the surrounding intercepting compartment system.

Ink conductors of the above mentioned type have the drawback that the ink is guided to the pen substantially over a substantially rectilinear path. With such a design, particularly when shaking the pen in axial direction, and also when an over-pressure prevails in the ink container, an undesired dispensing of ink resulting in blobs may occur due to the reduction in the atmospheric pressure of the air. These undesired properties cannot be overcome in a satisfactory manner by the provision of particularly large intercepting compartment systems.

It is, therefore, an object of the present invention to provide an improved ink conductor which will overcome the above mentioned drawbacks.

It is another object of this invention to provide an improved ink conductor which will have an increased safety against undue dispensing of ink at higher altitudes and will not be affected by shaking or the like.

It is still another object of the present invention to provide an ink conductor as set forth in the preceding paragraphs, which will be characterized by a particularly uniform dispensing of ink.

These and other objects and advantages of the invention will appear more clearly from the following specification in connection with the accompanying drawings, in which:

FIG. 1 is a side view of an ink conductor according to the present invention.

FIG. 2 illustrates an axial longitudinal section through the ink conductor of FIG. 1 built into the front part of a fountain pen.

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FIGS. 3 to 9 respectively illustrate cross sections along the lines III—III . . . IX—IX of FIG. 2.

FIGS. 10 and 11 are cross sections taken along the line X—X and XI—XI of FIG. 1 respectively.

An ink conductor according to the present invention is characterized primarily in that the longitudinal capillary ends at the bottom side of the ink conductor at a point located diametrically opposite to the pen and at said point communicates through the intervention of a capillary gap with the inner side of the pen. Preferably, the longitudinal capillary is arranged in a cross piece with ribs extending in a direction perpendicular to the longitudinal direction of said cross piece. The transverse grooves between said ribs communicate with the longitudinal capillary through arched capillary grooves. With this design, ink may at any point of the longitudinal capillary be discharged to the adjacent intercepting compartment system and may with the same ease be conveyed back if the tendency of the air pressure is in the opposite direction.

To permit a particular low price injection molding of the ink conductor, the ribs of the intercepting compartment system are provided at their top with a U-shaped recess so that a ventilating tube can be inserted into the latter. The said tube is insertable with a snug fit into the front part of the ink conductor which part is free of ribs and has a continuous longitudinal bore.

In order to assure that in each position of the fountain pen a fast and safe air pressure equalization will be effected to the ink container, according to a further feature of the present invention, the last transverse groove which is adjacent to the inner end of the ventilating conduit communicates with the conduit leading from the longitudinal capillary to the ink container through the intervention of an arched one-arm capillary with enlarged cross section.

Referring now to the drawings in detail, the ink conductor shown in FIG. 1 has its rear end provided with an annular collar 1 which serves for clamping the ink conductor into the front end of sleeve or casing 2. Collar 1 rests on a stepped surface 3 in sleeve 2. In order to assure a firm and hermetic closure, there is provided a correspondingly profiled sealing ring 4 which is pressed against the rear side of collar 1 by means of a central support 5 which is adapted to be screwed in. The clamping part of the ink conductor which contains the annular collar 1 may, as illustrated in FIG. 2, be so designed as to permit the insertion of an ink cartridge 6 or, if desired, may also be designed for connection with a plunger system.

An ink conductor tongue 7 extends from collar 1 forwardly and continues at the front end thereof and on the other side of the front annular collar 8 in the form of a hollow cylindrical front part 9 the upper side of which carries the pen 10. The front part 9 of the ink conductor is channeled or chamfered and slanted in order to permit the customary holding of the pen in writing position. The axial bore 11 provided in the front part 9 is open to the external air and at its rear end accommodates a ventilating tube 12 which is inserted with a snug fit and extends to a point in the vicinity of the rear collar 1. The ventilating tube 12, as is evident from FIG. 2, is also open at its rear end and is cut obliquely.

As will be seen from FIGS. 2 and 3, the front end of the fountain pen is completely sealed off with the exception of the ventilating conduit 11. Casing or sleeve 2 surrounds the front portion 9 of the ink conductor with a tight fit and also holds pen 10 in its correct position. The ink is conveyed to pen 10 by a longitudinal capillary 13 which within the zone of front portion 9 of the ink conductor terminates in an annular gap 14. According to the embodi-

ment illustrated in the drawings, gap 14 is produced by giving the bore in casing 2 within the zone of gap 14 a slightly larger diameter than that part of the ink conductor which is adjacent thereto. The front delimitation of gap 14 is formed by an annular step 15 in casing 2.

In the central portion of the ink conductor there is provided a supporting part in the form of a web or cross piece 16 which has transverse ribs 17 perpendicular to the longitudinal axis of said web 16. Between said transverse ribs 17 are formed pockets or intercepting compartments for receiving excess ink. To permit the manufacture of the ink conductor by injection molding, the individual ribs 17 have a U-shaped recess (FIG. 2) adapted to receive a venting pipe 12. The U-shaped recesses 27 decrease in depth toward the rear end of the ink conductor so that the venting pipe 12 will slightly ascent toward the rear. The main path for the ink in the ink conductor is formed by the longitudinal capillary 13 formed at the bottom side of web 16. As will be seen from FIGS. 6 and 8, the said longitudinal capillary 13 communicates with the individual intercepting compartments or pockets between ribs 17 through the intervention of arc-shaped capillary passages 19, 19'. These passages 19, 19' are arranged symmetrically on both sides of the longitudinal capillary 13. The base of the longitudinal capillary 13 has a somewhat larger cross section.

The longitudinal capillary 13 leads toward the rear through the web or cross piece 16 of the ink conductor shank and furthermore leads to a curved groove 20 which in its turn establishes communication to the ink chamber of the ink cartridge or the mechanical plunger system of the fountain pen, with whatever the pen may be equipped. At the end of the longitudinal capillary 13 within section 18 and in the curved groove 20 there is controlled the entry of air into the ink chamber and the flow of ink to the longitudinal groove 13. The communication between venting pipe 12 and section 18 is established by the rear-most intercepting compartment 21 of the ink conductor which compartment communicates with the longitudinal capillary 13 within the range of the control passage through the intervention of a curved passage 22 (FIG. 9) of larger cross section. This only unilaterally provided curved groove 20 establishes direct communication to the atmosphere.

The ink conductor according to the invention operates as follows. To the extent to which the ink is used up in a writing operation, the capillary groove 13 draws ink from the ink chamber through section 18 and curved groove 20. The slight under-pressure thus created in the ink chamber is balanced or compensated for by the air which enters through the venting pipe 12 and which through curved passage 22 reaches section 18 and passes in counter flow through curved groove 20 into the ink chamber. It will be evident that the paths for ink and air up to the control passage 18 are completely separate from each other. On the other side of section 18, the air and the ink are again separated because the lower portion of the curved groove 20 (FIG. 11) widens out in order better to be able to receive the back flowing air bubbles. The upper portion of curved groove 20 forms a capillary and is filled only by the ink. When an over-pressure builds up in the ink container, for instance in view of temperature influences or at high altitudes, the ink presses forwardly through the longitudinal capillary 13. However, at this point the ink cannot flow back as is the case with heretofore known fountain pens under particularly unfavorable conditions, but is slowed down at gap 14 and forced through the curved capillary slots 19, 19' to flow into the intercepting compartments 21 between the ribs 17. The air displaced by the ink from the intercepting compartments escapes through venting pipe 12 into the atmosphere. When during a writing process ink is withdrawn, the ink is first withdrawn from the intercepting compartments if the same hold ink, each of said intercepting compartments being by itself in communication with the longi-

tudinal capillary 13. Only when all intercepting compartments are empty, will the longitudinal capillary 13 feed ink from the ink container. The control passage 18 will become active and will supply as much air into the container as ink is withdrawn therefrom.

The ink conductor and, more specifically, its intercepting compartments have an unusually large volume. When all intercepting compartments are filled with ink in view of a prevailing over-pressure, the ink can still fill the venting pipe 12 before an undesired dripping of the ink will occur. When the intercepting compartments of the ink conductor are filled with ink, the ink will in any random position of the fountain pen be drawn back into the ink container as soon as the air pressure is being reduced, for instance by cooling. Furthermore, in any random position of the fountain pen, the ink can move back and forth in said intercepting compartments of the ink conductor and can also do so in the ink chamber when the air pressure changes.

When the fountain pen is carried upright in a pocket, between the ink conductor and the remaining ink in the container above the ink level there will prevail an air cushion, and if this air cushion is warmed up further, for instance by the body temperature, and will expand, the path for this air will be through the control passage 18 and the venting pipe.

The assembly of the ink conductor is extremely simple. Due to the sole clamping of the annular collar 1 and also due to the fact that the ink conductor is guided in the casing 2 solely at the front end thereof, tears due to tension cannot appear in the front portion of the fountain pen.

It is, of course, to be understood that the present invention is, by no means, limited to the particular design shown in the drawings but also comprises any modifications within the scope of the appended claims.

What we claim is:

1. An ink conductor for a fountain pen which comprises: a longitudinal body adapted to be inserted into the housing of a fountain pen and having a front end and a rear end and also having a top side and a bottom side, a pen supported by said bottom side at the front end of said body, said top side being provided with capillary passage means extending in the longitudinal direction of said body and ending short of the front end thereof diametrically opposite to said pen, annular passage means connecting the front portion of said capillary passage means near said front end to that side of said pen which faces said body, the rear end of said body being provided with a control passage for communication with an ink reservoir and with said capillary passage means, said longitudinal body also comprising a plurality of ink intercepting compartments arranged between said front end and said rear end of said body, and a ventilating conduit extending in the longitudinal direction of said body through said compartments and having one end portion adjacent said front end in communication with the atmosphere and having its other end portion in communication with said control passage, said other end portion only communicating with the adjacent ink intercepting compartments.

2. An ink conductor according to claim 1, in which said ink intercepting compartments are formed by web means forming a part of said body and extending in the longitudinal direction between said front and said rear end and provided with partitions spaced from each other in the longitudinal direction of said body and extending in a direction transverse to the longitudinal direction of said web means, those portions of said web means which are located between adjacent transverse partitions defining arc-shaped capillary grooves communicating with said capillary passage means.

3. An ink conductor according to claim 1, in which said partitions are provided with a substantially U-shaped recess open toward the top side and accommodating said ventilating conduit.

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4. An ink conductor according to claim 1, in which said front portion of said longitudinal body is free from intercepting compartments forming partitions and has a bore extending in the longitudinal direction of said body and accommodating with snug fit said one end of said ventilating conduit.

5. An ink conductor according to claim 1, which includes arc-shaped capillary means arranged in said rear end of said body and located unilaterally of said capillary passage means while establishing communication between the latter and that intercepting compartment which is directly adjacent said other end of said ventilating conduit.

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6. An ink conductor according to claim 1, in which the rear end of said longitudinal body is provided with a collar for clamping insertion into a fountain pen housing.

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LAWRENCE CHARLES, *Primary Examiner.*