Dec. 8, 1942. A. N. ANDREWS 2,304,229

FOUNTAIN PEN CONSTRUCTION

Filed June 28, 1941

Fig. 1.

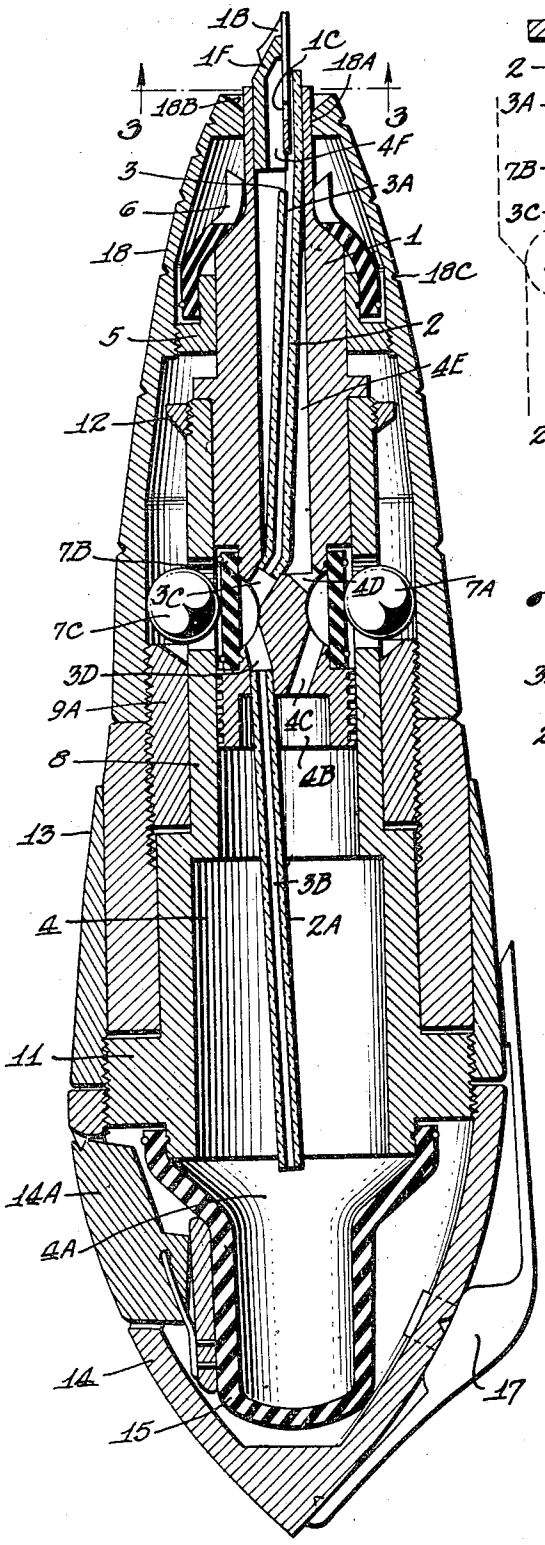


Fig. 2.

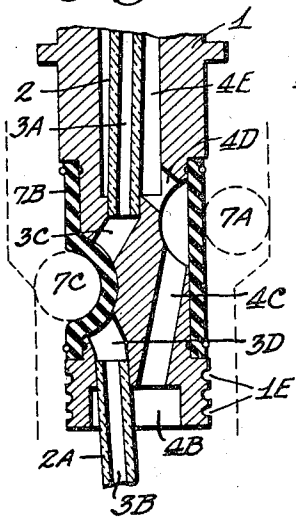


Fig. 3.

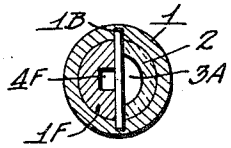


Fig. 4.

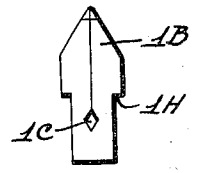


Fig. 5.

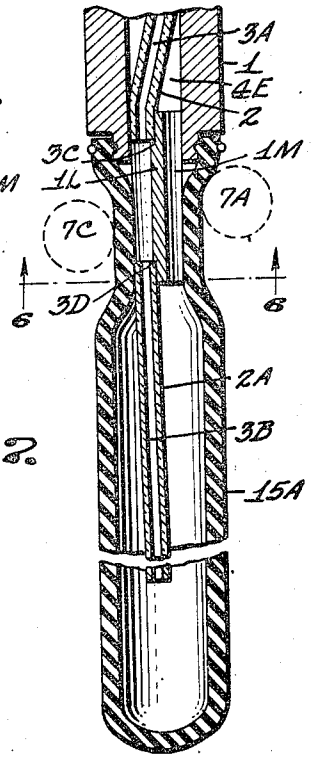


Fig. 6.

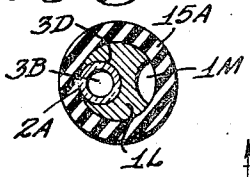
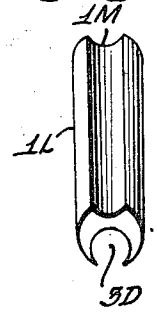


Fig. 7.



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UNITED STATES PATENT OFFICE

2,304,229

FOUNTAIN PEN CONSTRUCTION

Anatol N. Andrews, Los Angeles, Calif.

Application June 28, 1941, Serial No. 400,265

10 Claims. (Cl. 120—48)

This invention relates to a fountain pen construction and has special reference to a fountain pen construction wherein air access from the open end of the pen to the closed end of the pen ink container is facilitated when pen is in use, and sealed independently from the pen nib and separately from the pen ink duct when not in use.

More particularly, this invention relates to a fountain pen construction comprising a barrel enclosing an ink container and having an open end for receiving an ink feeding mechanism and a pen nib, the ink feeding mechanism having an ink duct extending longitudinally thereof and communicating between the ink container and the outer end or adjacent the pen nib, and having an air duct extending longitudinally thereof farther into the pen ink container than the ink duct and communicating between said farther section of the ink container and outside air, the air duct having an open end extended to face outside air adjacent the nib, and which end is not shielded from said air by the nib-length and is not dependent upon the nib pierce, if any, for its free communication with said air.

In fountain pen constructions heretofore known, aside from mine, there are either single ducts adapted for joint ink and air passage therethrough, or a plurality of ducts with separate ducts intended either for ink or air passage therewithin. Neither of those ducts extending adjacent the nib is openly exposed to communicate with outside air unshielded by the nib-length, and, in plurality, extended farther into the pen ink container than another duct in the same pen. It has been found, when a plurality of ducts are of the same extension relative the pen ink container, the ink and air often fail to choose the intended ducts,—their relative diameters notwithstanding. Thus, sometimes, all of those ducts fill up simultaneously with ink and air which intermixing therewithin create air pockets preventing the ink passage through either of the ducts.

In certain types of pens, especially with unusually long ink ducts, all aforesaid known constructions of feeding mechanisms failed either to provide satisfactory start, or steady ink flow, or easy filling, or a combination thereof due to difficulties in practical manufacture to balance delicate diameters of said ducts in their relationship with feeding and/or filling of pens of certain types. In making those pens it has been found that the air duct must be more practically and definitely safeguarded from becoming an ink duct and vice-versa to insure steady ink flow via the ink duct.

Further, it has been found by experiment that dependence for such safeguard upon maintenance of delicate balances based upon fractions of an inch in the ducts relative diameters is entirely impractical in manufacture and hard to maintain in actual use considering ink sediments which also vary dependent upon different makes of ink.

It is desirable to provide an air duct relatively independent in diameter from the ink duct without jeopardizing its adapted function, as for example, if the air duct communicates directly between outside air and a farther section of the pen ink container than the ink duct, such air duct, naturally, will retain its functional performance regardless of it is a fraction of an inch larger or smaller in diameter. It is also the teaching of this invention to simplify construction which checks and regulates the ink flow. For instance, the ink duct may be retarded by mounting a portion of a regular air pipe (adapted for a portion of the air duct) between tubular walls of relatively larger diameter and by adapting for a portion of the ink duct the distances between the inner walls of the larger diameter housing and the outer walls of the air pipe. The retardation will increase if said portion of the air pipe is mounted in relatively diagonal or crossing dependent position.

The ink may be regulated by allowing portion of the air duct to communicate with a portion of the ink duct. Said communication may be within a tubular housing under the pen nib, the length of the latter may be provided with an outstanding edge adapted to assume dependent position against the casing edge of the housing, for instance, when part of the nib is mounted therewithin between the ink and the air ducts and when the intercommunication between the ducts thereunder is dependent upon dependent position of the nib.

The facilitation of air flow in this invention may decrease danger of pen leaking at high altitudes by allowing the excess air pressure within the pen to escape therefrom without forcing out the ink from the pen ink container. However, under normal carrying conditions such facilitation increases the danger of leaking. Therefore more reliable sealing means should be provided than, for instance, a mere adjacency of the pen nib-length and walls of the ducts to seal the latter when pen is not in use.

One of the objects of the present invention is to provide a fountain pen construction wherein

air flow from outside of the pen to the closed end of the pen ink container is facilitated by the provision of an ink duct between the open end of said ink container and a point between the heart of the pen nib and the writing point thereof, and an air duct between a middle section of said ink container and outside air adjacent the pen nib and unshielded by the latter.

Another object of this invention is to provide a fountain pen construction in which outer walls of a portion of an air duct are surrounded by inner walls of a portion of an ink duct.

Another object of this invention is to provide a fountain pen construction where an ink duct and an air duct are relatively separate and in a relatively cross relationship.

Another object of this invention is to provide a fountain pen construction where a separate air duct communicates with the pen ink container, and a middle section of the ink duct, and outside air unshielded by the pen nib.

Still another object of this invention is to provide a fountain pen construction where a section of the pen nib is mounted in a sandwich-like relationship between plurality of separate ducts which are in communication with pen ink container.

It is one of the most important objects of this invention to provide a fountain pen construction which includes plurality of separate ducts and means to shut them off from the pen reservoir. It is also an important object of this invention to provide a fountain pen construction which includes plurality of separate ducts and means to shut them off independently from the pen nib-length.

Still another important object of this invention is to provide a fountain pen construction including means which automatically shut off a plurality of separate ducts in the pen when the pen nib is within the pen cover, and automatically release said ducts when a section of the nib is exposed for writing.

It is an important object of this invention to provide a fountain pen construction which includes plurality of separate ducts and means to shut off said ducts separately.

Another important object of this invention is to provide a fountain pen construction which includes plurality of ducts and means to shut them off simultaneously and independently from the pen nib-length.

Another very important object of this invention is to provide a fountain pen construction which includes a plurality of separate ducts and means to shut them off successively to allow slowing down of the ink flow to the nib by reducing the number of open ducts if required, for instance, at high altitudes.

Among other objects of this invention are to provide in fountain pen constructions a duct with no airline concaved in length co-ordinately with a convexity of a shut-off valve press button to avoid a valve seat misshaping a duct; to improve sealing means between separated valves and sacless ink containers; to provide a dissenting relationship between opposite walls in a pen as means to check penetration of excessive ink from one wall to another, to provide improved pen feeding constructions which are practical, easy to manufacture, and adaptable for a sacless or a sac type pen ink containers.

Further objects and advantages will hereinafter be more fully pointed out and for a more complete understanding of the nature, scope and characteristics of this invention, reference may now be had to the following description when taken together with the accompanying drawing, in which latter:

Figure 1 is a longitudinal sectional view of a fountain pen substantially similar to one described and shown in my now pending patent application filed with the U. S. Patent Office under Ser. #352,288, with exception that here it incorporates one form of this invention including my air and ink ducts and means to shut them off separately, simultaneously and independently from the nib.

Figure 2 is a longitudinal sectional view of one end of an elongated pen section, and incorporates another form of this invention including means to shut off plurality of ducts successively.

Figure 3 is a fragmentary cross section taken on line 3 of Figure 1.

Figure 4 is a front view of a pen nib incorporating certain features of this invention.

Figure 5 is a fragmentary sectional view of a fountain pen section with a rubber sac for the ink container and incorporates certain other features of this invention.

Figure 6 is a fragmentary cross section taken on line 6 of Figure 5.

Figure 7 is an elevational view of one end of a fountain pen feed incorporating certain features of this invention.

As shown in the drawing:

Pen parts 1B, 1C, 18A, 18, 6, 5, 8, 7A, 7B, 9A, 12, 13, 11, 14, 17 and 15 correspond numerationally, descriptively and functionally with similarly adapted pen parts shown and described in the patent application mentioned in reference to Figure 1.

In Figure 1, nut 12 is adapted for substantially the same purpose as projection 12 in my heretofore said patent application, except that its present relationship with barrel 8 simplifies pen assembling and taking the pen apart and allows more room within the pen for its ink container 4.

In Figure 1 the pen nib 1B is relatively small and its air hole 1C is under a cover of shovel-like end 3 of air pipe 2; this shovel-like end is adapted for several purposes of which one is to reinforce nib 1B which is further supported from the opposite side by a relatively short regular type feed 1F with its channel 4F adjacent the nib 1B. They are secured within one end of elongated tubular pen section 1 which has its lower end mounted into the upper end of pen barrel 8. A relatively short rubber sac 15 is secured over the lower open end of barrel 8. A sac compressor 14A is movably secured over sac 15 in an opening in the cap 14 and may be constructed, for instance, as shown within the scope of claim 4 of my U. S. Patent #2,217,884.

Within section 1 are the hollowed and elongated tubular space 4E and the relatively short tubular space 4B, both of relatively larger diameter than air pipes 2 and 2A, and separated by the middle portion of the section. In said middle portion there are two separate valve seats, one under press button 7C, and the other under button 7A. A relatively short rubber band 7B is mounted ring-like around that middle portion of section 1 and the valve seats and is secured in the illustrated band seat provided in the section 1, and said band separates and seals each valve seat from the other and both from each and all of the press buttons.

Valve seat under button 7C is connected with space 4E by a relatively narrow passage 3C within

walls of section 1, and with space 4B by a similar passage 3D.

Valve seat under button 7A is similarly connected with space 4E by a separate passage 4D, and with space 4B by passage 4C. One end of air pipe 2A is secured in the passage 3D, and the other end faces space 4A walled by sac 15.

Lower end of air pipe 2 is mounted into passage 3C and faces valve seat under button 7C. Thus when said valve seat is unlocked as shown a continuous and longitudinally relatively separated duct 3B, 3D, 3C and 3A is formed throughout relatively entire length of the pen having access at one end thereof to the outside air adjacent nib 1B via the open and unshielded end of the shovel-like end 3 of pipe 2, and at the other end extended farther into the pen ink container 4 than any other duct in the pen, and faces the air compartment 4A formed naturally within the pen when the latter is held in writing position. This duct regardless of its relative diameter naturally will become the air duct because air travels via easiest resistance to least resisting section of the ink container and it is evident that when pen is held in writing position the air from outside will travel exclusively via described duct to the air compartment 4A as long as there is any ink left in container 4. The ink from container 4 thus freed from incoming air resistance and with capillary action weakened by described air duct will flow freely to the nib 1B via margin space in 4B, passage 4C, unlocked valve seat under button 7A, passage 4D, margin space in 4E and feed channel 4F, thus forming an exclusive ink duct separated from and related to the air duct as explained and illustrated.

When upper end of pen section 1 is projected through opening 18A in the slidable cap 18 (as shown in Figure 1) the funnel-like formation 18B in the casing of opening 18A may be provided to form a dissenting relationship between the outer walls of said end and the inner walls of said casing to allow certain distance between the upper edges thereof without general enlargement of opening 18A. Said distance is adapted to keep ink from getting to the upper edges of cap 18 from over the end of section 1 where ink may accumulate while the pen is held in writing position.

The aforesaid dissenting relationship, of course, may be achieved through other means, for instance, by tapering the outer walls of the upper end of section 1, which, however, not always may be advisable, especially if said walls are relatively thin. To retard the ink duct and regulate further the functions of my feeding mechanism without jeopardizing other important advantages and objects of this invention the outer walls of portion 3A of the air duct are surrounded by inner walls of section 1 which are also the walls of portion 4E of the ink duct. Relatively diagonal position of air pipe 2 increases said retardation of the ink duct by forming shown cross relationship of the ducts. Portion 3A of the air duct communicates with portion 4E of the ink duct under the feed 1F and latter's duct 4F which is the continuation of the ink duct.

Pen nib 1B (Fig. 4) may be provided with extending edges 1H adapted to assume dependent position against wall edges of the end of section 1 (Fig. 3) to hold nib 1B in dependent position shown in Figure 1. Security of nib 1B and feed 1F in their shown dependent positions allows the aforesaid intercommunication of ducts thereunder to remain stationary when the nib 1B is under writing pressure.

To lock the separate ducts when the pen is not in use I provide a shut-off mechanism adapted to shut off said separate ducts separately and independently from the nib. To illustrate this original idea I again refer to Figure 1 where such mechanism includes press buttons 7A and 7B. These buttons are movably held in openings in barrel 8. The openings, specifically their casings, wall thickness and the walls of section 1 restrict mobility of the buttons to perpendicular in relation to barrel 8.

When slidable cap 18 is pulled forward cylinder 9A secured thereto and projected to barrel 8 will follow the cap movement and thus will depress buttons 7C and 7A into their respective valve seats. Depressed button 7C will shut off then the air duct and depressed button 7A will shut off the ink duct.

Simultaneous shutting off of both ducts may be achieved, for instance, as illustrated in Figure 1 where the respective valve seats of each duct are relatively opposite. To shut off the ducts successively the relative location of valve seats may be changed, for instance, as illustrated in Figure 2. In the latter button 7C is shown depressed by the edge of cylinder 9A indicated by punctured lines, while button 7A and the valve seat thereunder are not depressed because their relative location is such that the indicated edge of cylinder 9A is still removed there from while it is already over the button 7C.

Evidently further forward movement of indicated cylinder 9A would bring said cylinder eventually into contact and over button 7A depressing the latter too into the valve seat thereunder and thus completing the shutting off of both ducts. Circular groove 18C repeated along the length of the outer walls of the pen may be provided for better grip in handling a pen especially with a slidable cap. Said grooves, of course, may be of different shapes and relative arrangements, for instance, as shown in Figure 1, or as shown in my U. S. Design Patent #D-112,401.

Circularly concaved grooves 1E in the outer wall of the lower end of section 1 (Figures 2 and 1) may be provided to improve the sealing of valve buttons 7A and 7C (Fig. 1) from ink in container 4. To increase their ink penetrating resistance said grooves may be filled either with air or a waxy or greasy substance.

Rubber sac 15A (Figure 5) may be adapted as direct ink container.

Section's 1 lower end may be shortened as shown. Upper end of a plug (a feed) 1L may be mounted therein. Since there is no need for air lines in the feed duct, there is no absolute necessity for walls thereof to be of one shape and a valve seat therein of another shape. Therefore feed duct 1M in the plug 1L has no air line and concaved in length co-ordinately with the convexity of indicated press button 7A thus allowing any section of said duct to serve as a valve seat for said button and making the duct unit adaptable for pens with a simultaneous or a successive shut-off for separate air and ink feed ducts. Sac 15A may be mounted as shown over lower end of section 1. The co-ordinated shape of duct 1M is further illustrated in Figures 6 and 7.

While specific embodiments of this invention are herein shown and described, it is and will be clearly understood, of course, that broad variations within the scope of accompanying claims may be resorted to without jeopardizing this pat-

ent protection, and that the various details of constructions may be varied through a wide range without departing from the principles of this invention as described in one or more of following claims, and it is therefore not the purpose to limit the patent granted hereon otherwise than necessitated by the said scope of the appended claims.

I claim as my invention:

1. A fountain pen comprising a barrel, a slidable cap, a pen section with ink duct and air tube in longitudinal relationship therewithin, the ink duct and air tube having separate valve seats sealed under relatively flexible and relatively resilient material nonengageable against each other, separate press buttons movably held over each valve seat respectively and engageable thereagainst by the slidable cap.

2. The same as in claim 1 and one press button nearer to the pen writing end than the other press button.

3. The same as in claim 1 and one valve seat nearer to the writing end of the pen than the other valve seat.

4. A fountain pen comprising in combination an elongated tubular housing with a plurality of separate tubular and elongated ink containers therewithin which are longitudinally successive and are walled from each other, and the wall which separates said successive ink containers having a plurality of separate ducts longitudinally therethrough.

5. The same as in claim 4 and a shut-off valve engageable against a duct in the wall which separates two successive ink containers.

6. The same as in claim 4 and a shut-off mechanism engageable against plurality of ducts in the wall which separates two successive ink containers.

7. The same as in claim 4 and a duct in said wall adapted as an air duct and extended longitudinally relatively far into adjacent ink container by means of relatively narrow and relatively long tubular housing adapted as an air pipe.

8. The same as in claim 4 and a plurality of air tubes mounted successively and longitudinally within the respective and separate ink containers and communicative with each other by means of a duct through the wall which separates said ink containers, and said duct adapted as an air duct, and another duct through said wall adapted as an ink duct.

9. In a fountain pen a continuous liquid valve adapted to ease the start of ink flow and comprising an air tube extended from outside and over the pen nib and into the pen ink container, which tube has a side section thereof removed under the inner end of the nib within the pen to allow said tube therein to communicate via ink duct thereunder with the pen ink container to cause ink therefrom to enter the tube and shut-off its thorough air-duct function when, because of the latter, the flow of ink becomes excessive, and to cause the ink from the tube to flow back into the ink duct before said ink reaches the nib and when said liquid shut-off in the tube becomes gradually released through medium of writing motions.

10. In a fountain pen with a slidable cap and a sideway extending shut off valve, a removable pen feed of relatively hard material with a non-tubular and fully exposed feed channel when the feed is removed from a tubular casing, and a relatively extended length of said channel shaped coordinately with the side of a shut off press button which faces said length when the button is set in the pen stationary casing, and one end of the feed is removably mounted into a tubular pen section which is stationary set in one end of the pen barrel when the pen is assembled, and the other end of the feed with the coordinated channel is extended below the inner end of the pen section and is insulated from the press button thereabove by a tubular housing of relatively soft, flexible and resilient material which is mounted over the inner end of the section and the extended length of the feed, and the coordinated extended length of the feed channel is adapted as an extended valve seat to allow any part of said extended length to form a valve seat when it is under the pressure of the press button effected by the slidable cap.

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