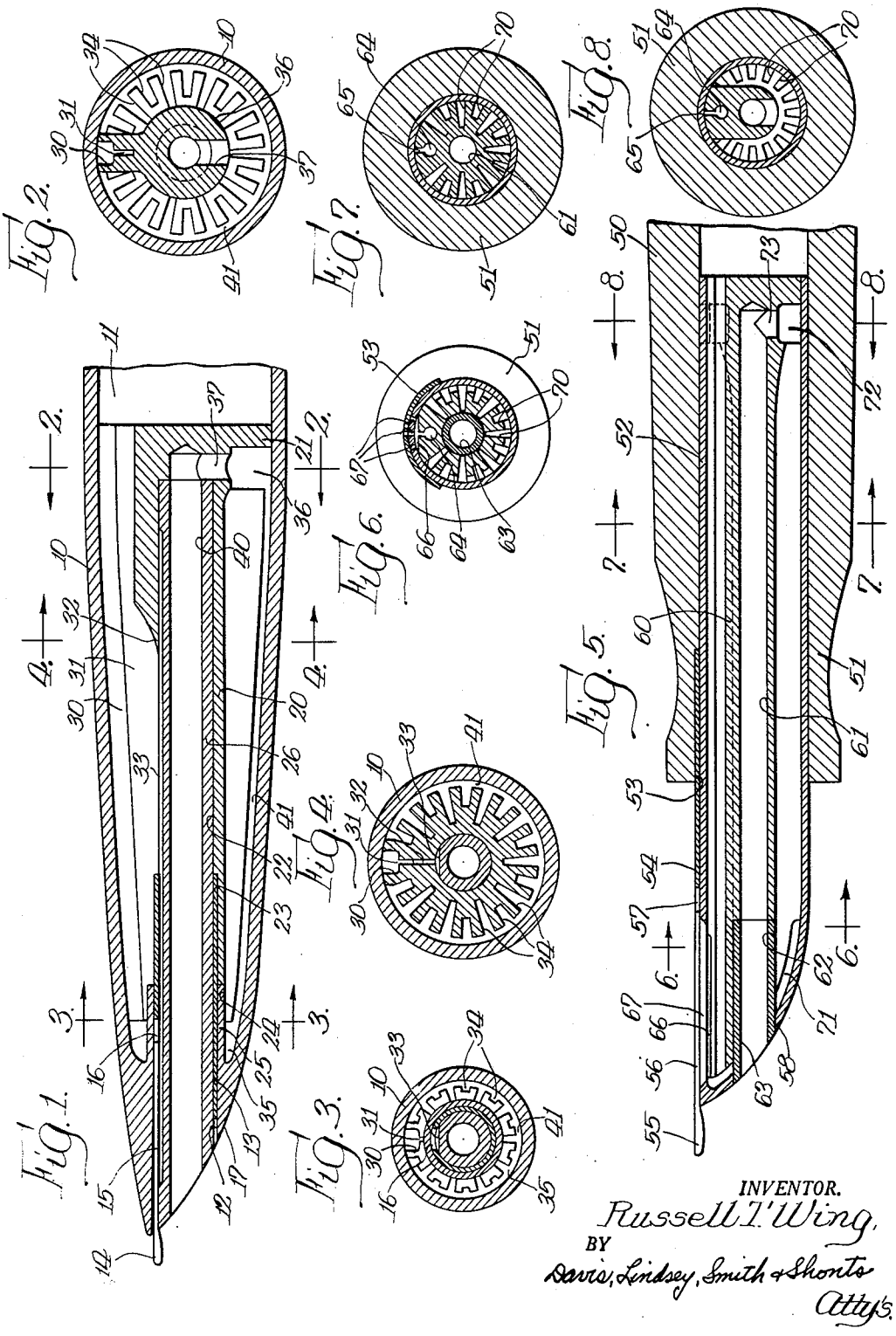
June 20, 1950 R. T. WING 2,512,004

FOUNTAIN PEN

Filed March 5, 1945



INVENTOR.
Russell T. Wing,
BY
Davis, Lindsey, Smith & Shontz
Atty's.

Patented June 20, 1950 2,512,004

UNITED STATES PATENT OFFICE

2,512,004

FOUNTAIN PEN

Russell T. Wing, Excelsior, Minn.

Application March 5, 1945, Serial No. 580,990

14 Claims. (Cl. 120—52)

1

The invention relates generally to fountain pens and more particularly to a fountain pen of the type shown in my Patents No. 2,187,528, issued January 16, 1940, No. 2,282,840, issued May 12, 1942, and No. 2,360,297, issued October 10, 1944.

The general object of the invention is to provide a fountain pen of the foregoing type in which the parts are so shaped as to simplify and facilitate the manufacture thereof.

Another object is to provide a fountain pen of the foregoing type, in which the collector or governor is so constructed that the capillary spaces or cells therein to take up excess flow ink may be readily formed.

A further object is to provide a fountain pen of the foregoing type, in which the capillary spaces of the collector or governor, for taking up excess flow of ink through the feed structure of the pen, have a relatively large capacity and are arranged to extend longitudinally of the pen.

Still another object is to provide a fountain pen of the foregoing type, in which the capillary spaces of the collector or governor extend longitudinally of the pen and are connected to the reservoir of the pen and the outside atmosphere at their ends to empty and fill in a progressive manner from end to end.

A still further object is to provide a fountain pen of the foregoing type, in which the capillary spaces or cells for taking up excess ink extend longitudinally of the pen and are connected to the outside atmosphere through an air passage in communication with the rear ends of the cells and to the reservoir of the pen through a duct in communication with the front ends of the cells whereby the cells fill gradually from front to rear, upon excess flow, and empty from the rear toward the front.

Another object is to provide a novel fountain pen of the foregoing type, which may have an outward appearance similar to that shown in the Baker Patent No. 2,223,541, issued December 3, 1941, or similar to that shown in my patent No. 2,282,840, issued May 12, 1942.

Other objects and advantages will become apparent from the following description, taken in connection with the accompanying drawings, in which:

Fig. 1 is an enlarged fragmentary longitudinal sectional view of a fountain pen embodying the features of the invention.

Fig. 2 is a transverse sectional view taken on the line 2—2 of Fig. 1.

Fig. 3 is a transverse sectional view taken on the line 3—3 of Fig. 1.

2

Fig. 4 is a transverse sectional view taken on the line 4—4 of Fig. 1.

Fig. 5 is a view similar to Fig. 1, but showing a modified form of construction.

Fig. 6 is a transverse sectional view taken on the line 6—6 of Fig. 5.

Fig. 7 is a transverse sectional view taken on the line 7—7 of Fig. 5.

Fig. 8 is a transverse sectional view taken on the line 8—8 of Fig. 5.

A pen embodying the features of the invention is of the type shown in my prior patents and includes a shell enclosing the feed structure of the pen. The feed structure includes a governor having a feed duct for conveying ink from the reservoir of the pen to the nib. The governor also has means for receiving and storing ink under conditions of excess flow, which means serves to control the flow of air to the reservoir as the ink is consumed at the writing tip of the pen.

In the present instance, the means for receiving and storing excess ink comprises a plurality of cells or spaces in the governor, and said means is so constructed as to facilitate the forming of said cells, thus simplifying the manufacturing problems involved in the pen. To this end, the governor is provided with a plurality of longitudinally extending radial slits which constitute such spaces and which may be readily formed in the governor. The feed duct for conveying the ink from the reservoir to the nib is also in the form of a longitudinally extending slit in the governor.

The slits in the governor constituting the means for storing excess ink have a relatively large capacity, thus definitely preventing leakage of ink at the writing tip of the pen, even when conditions cause a relatively large excess flow of ink from the reservoir. In the forms of construction shown in the present application, the storage cells or spaces have their front end connected to the reservoir through the ink feed duct, while their rear ends open into a manifold formed within the governor and connected to the outside atmosphere through a central passageway extending to the front end of the shell.

The preferred embodiment shown in Figs. 1 to 4, inclusive, comprises a shell member 10 adapted to be secured to a barrel (not shown). The interior of the barrel together with the rear portion of the shell member 10 constitutes a reservoir 11 adapted to receive and hold a supply of ink. While the reservoir, in the present instance, is shown as being provided by the barrel and shell member, the invention is not limited to such con-

struction but a well-known rubber sac construction may be used, if desired.

The shell member 10 tapers toward its front end and is there provided with a centrally located opening 12 in which a nib 13 is mounted. The nib 13, in the present instance, is of the tubular type and has a writing tip 14 extending a short distance beyond the shell member 10. The nib 13 is also provided with the usual slit 15 and pierce 16. The under side of the shell member 10 at the front end is curved upwardly, as at 17, toward the writing tip 14 of the nib to provide for adequate clearance from the writing surface when the pen is in use.

Mounted within the shell member 10 is a governor or collector member 20 provided with a flange 21 at its rear end fitting snugly within the shell member 10 to support the governor in centered relation thereto. The governor 20 is provided with a central bore 22 enlarged, as at 23, to receive the rear portion of the tubular nib 13, and further enlarged, as at 24, to receive an inwardly extending tubular portion 25 formed integrally with the front end of the shell member 10. The portion 25 thus supports the governor at its front end in centered relation to the shell member. In the bore 22 and within the tubular nib 13 and bore 12 of the shell member is an air tube 26, the front end of which is open to the outside atmosphere at the front end of the shell member.

To conduct ink from the reservoir 11 to the slit 15 in the nib and thus to the writing tip 14, the governor 20 is provided with a feed duct comprising an outer enlarged portion 30 and an inner narrower portion 31. The inner narrower portion 31 is cut through to the central bore 22 of the governor, as at 32, from a point spaced forwardly from the rear end of the governor and extending to the front end thereof. The air tube 26 is flattened as at 33 to provide a segmental passage extending from the part 32 of the narrow slot 31 forwardly to the nib slit 15. Thus, ink may flow through the feed duct into the segmental portion 33 and forwardly to the nib slit 15 to be fed to the writing tip 14 of the nib.

Under conditions of excess flow of ink which may occur, for example, when the heat of the hand causes the air in the reservoir to expand and thus permit ink to run therefrom, the governor 20 of my present construction is adapted to receive and store such excess ink, as in the case of the construction shown in my prior patents. However, in the present instance, the storage means extends longitudinally of the governor and may comprise a plurality of radial slots 34 extending through the major portion of the length of the governor 20. The slots 34 may be readily formed in the governor and thus facilitate the manufacture of this part of the pen. They also have a large capacity, which provides for sufficient storage space, even under extreme conditions of excess flow. In order to provide for the maximum storage space by these slots, the slots are alternately made deep and shallow, as shown in Figs. 2, 3 and 4. In the construction herein shown, the slots 34 are open at the front end of the governor but terminate short of the rear end and do not communicate directly with the reservoir 11. The flange 21 at the rear end of the governor thus provides a partition between the reservoir and the cells 34.

When the pressure relationship of the air within the reservoir changes to such an extent as to cause an excess flow therefrom, the excess ink, instead of passing through the segmental passage 33 to the nib, will flow through the front end of the feed duct into the annular space, indicated at 35, in the front end of the cell and surrounding the tubular extension 25. The annular space 35 is open to all of the cells 34 and thus serves as a manifold for the flow of excess ink into the cells 34. The rear ends of the cells 34 open into a manifold 36 provided by an arcuate circumferentially extending cut in the governor member immediately in front of its flange 21. Extending radially inward from the manifold 36 is a passage 37 opening into the interior 40 of the tube 26. The rear ends of the cells 34 therefore are in free communication with the outside atmosphere. Thus, when excess ink flow occurs, the front manifold 35 will be filled and the cellular spaces 34 will gradually fill, depending upon the extent of excess flow, the air in such cells being driven out through the manifold 36, the radial passage 37 and the interior 40 of the tube 26. Further storage space is provided by so dimensioning the governor as to be spaced from the adjacent wall of the shell member 10, as shown at 41.

In using the pen, ink will be fed forwardly from the reservoir 11 through the narrow portion 31 of the feed slot, then into the segmental passage 33 and finally into the slit 15 of the nib to be carried to the writing tip of the pen. All of these passages are, of course, of capillary size. Should excess flow occur, the enlarged portion 30 of the feed duct will become filled with ink and, eventually, the manifold space 35 in the front end of the shell. If the excess flow still continues, the ink will then start to fill the capillary spaces 34 as well as the space 41 between the governor and the shell, the filling taking place from the forward end of the governor progressively toward the rear end. During such filling, air will be driven out of the cellular spaces through the manifold 36, the radial passage 37 and the interior 40 of the central tube 26. The flange 21 of the governor, since it fits snugly within the shell member 10, prevents any direct communication between the cellular spaces and the reservoir. The air supply to the reservoir thus becomes closed when the cellular spaces fill with ink.

As ink is consumed at the writing tip, further ink cannot be withdrawn from the reservoir since no air can gain access thereto replace it. The ink supply at such time, therefore, is drawn from the manifold 35 into the feed duct and, in turn, is withdrawn from the cellular spaces. Since the rear ends of the cellular spaces are open to the atmosphere through the interior of the central tube 26, the cellular spaces will progressively empty from the rear toward the front. When the cellular spaces and the front manifold 35 are thereby emptied, the feed duct may then draw ink from the reservoir and air may pass through the cellular spaces into the front manifold 35 to bubble up into the reservoir through the enlarged portion 30 of the feed duct, the rear end of the portion 30 constituting a weir vent controlling the flow of air to the reservoir.

All the passages and spaces herein described, of course, must be properly related in size to provide a proper feed of ink. While the proportioning of these sizes is the essential point and the various spaces and passages are not limited to definite sizes, an example of such sizes may be given merely to illustrate the structure. Thus, the slit 15 in the nib may be from .0005 to .002

of an inch. The segmental passage 33 may have a maximum depth of .005 to .007 of an inch. The 566narrow portion 31 of the feed duct preferably has a dimension of .005 of an inch, while the wider portion 30 should have no dimension less than .010 of an inch. The cells 34 are preferably of uniform width throughout their length and may have a width of .010 to .015 of an inch. The front manifold 35 preferably has a minimum dimension of .010 of an inch to conform to the dimensions of the enlarged portion 30 of the feed duct and the cells 34. The rear manifold 36, radial passage 37 and the interior 40 of the central tube 26 are substantially larger than the cells 34. While the invention is not limited to the foregoing dimensions, such dimensions are found to be suitable.

In the modified construction shown in Figs. 5, 6, 7 and 8, I show a pen comprising a barrel 50 having a pen section 51 at the front end thereof. The pen section 51 is herein shown as integral with the barrel 50 but may, of course, be a separate part rigidly secured to the barrel. The pen section 51 is provided with a central bore of uniform diameter adapted to receive a shell member 52 of generally cylindrical form. Adjacent the front end of the pen section 51, the internal bore thereof is arcuately enlarged, as at 53, to receive the rear end of a nib 54 held in place by the shell 52. The nib and shell project beyond the end of the pen section with the nib overlying the shell and having its writing tip 55 projecting a short distance beyond the shell. The nib 54 is provided with the usual slit 56 and a pierce 57. The front end of the shell 52 is curved upwardly, as at 58, toward the nib.

Mounted within the shell and fitting snugly therein is a governor 60. The governor 60 is provided with a central bore 61 which is enlarged at its front end, as at 62, to receive an inwardly extending tubular portion 63 providing an opening to the outside atmosphere at the front end of the shell. The tubular portion 63 may be formed integrally with the shell or may be a tube cemented into an opening in the shell.

To feed ink to the nib from the reservoir, which in this instance is constituted by the interior of the barrel 50, a feed duct is provided in the governor 60. The feed duct extends throughout the length of the governor and comprises a drilled hole 64 and a radial slit 65 extending inwardly from the periphery of the governor to the drilled hole 64. The front end of the governor is flattened, as at 66, to provide a segmental passage connected with the feed duct and underlying the slitted portion of the nib. To provide communication between the segmental passage formed by the flattened portion 66 and the slit 56 in the nib, a plurality of parallel slots 67 are cut through the shell. Thus, ink may flow from the reservoir through the feed duct into the segmental passage 66, through the parallel slots 67 and into the nib slit 56 to be fed to the writing tip 55 of the nib.

To provide means for receiving and storing ink under conditions of excess flow, the governor has a plurality of radial slits 70 extending from the front end of the governor rearwardly and terminating short of the rear end of the governor so that they do not communicate directly with the reservoir of the pen. The front end of the governor is spaced from the adjacent wall of the shell 52 to provide a manifold space 71 connecting the front ends of all the storage cells 70 with the feed duct, and particularly with the enlarged or drilled portion 64 thereof. Adjacent the rear end of the governor is a rear manifold 72 formed by an arcuate circumferentially extending cut in the governor, and an inwardly directed radial passage 73 provides communication between the rear manifold 72 and the internal bore 61 of the governor. The cells 70 thus communicate at one end with the reservoir through the front manifold 71 in the feed duct and communicate with the outside atmosphere at their rear end through the rear manifold 72, the radial passage 73 and the central bore 61 of the governor.

Operation of this modified form of construction is similar to the operation of the structure shown in Fig. 1. Thus, when excess ink flows from the reservoir, it is carried through the feed duct to the front manifold 71 and then progressively fills the cells 70 from the front toward the rear, air being forced out of the cells through the rear manifold 72, the radial passage 73 and the internal bore 61 of the governor. By filling the cells and the front manifold 71 with ink, no air can reach the reservoir. Thus, further consumption of ink at the writing tip 55 must draw such ink from that contained in the cells and front manifold, thereby emptying them from their rear ends toward their front ends. When the cells 70 and front manifold 71 are entirely emptied, further writing will draw ink from the reservoir, and air may pass through the cells from the rear manifold, then through the front manifold 71 to bubble back through the large portion 64 of the feed duct into the reservoir. The rear end of the feed duct, and particularly the rear end of the enlarged portion 64, thus constitutes a weir vent controlling the admission of air to the reservoir.

As an example of suitable dimensions for the various passages and cells in this construction, the nib slit, as in the previous form, is preferably .0005 to .002 of an inch in width. The parallel slits 67 in the shell member may, respectively, be .004, .005 and .006 of an inch in width, to insure the passage of ink in case the smaller one becomes clogged, or each may be approximately .005 of an inch in width. The flattened portion 66 on the front end of the governor provides a segmental passage having a maximum depth of .005 to .007 of an inch. The narrow slitted portion 65 of the feed duct is preferably .005 of an inch, while the drilled portion 64 thereof is preferably .010 of an inch in diameter. The storage spaces, which are preferably of uniform width throughout their length, may have a width of .010 of an inch. The front manifold 71 may also have a minimum dimension of .010 of an inch to conform to the width of the cells 70 and the drilled portion 64 of the feed duct. The invention, of course, as stated above, is not limited to these particular dimensions, but such dimensions are merely given as an example of suitable sizes.

I claim:

1. A fountain pen comprising a reservoir, a nib, and feed structure for controlling the flow of ink from the reservoir to the nib including a shell, and a governor within said shell having a first radial slit extending throughout the length thereof and constituting an ink feed duct and an air inlet passage connected to said reservoir, and a plurality of other longitudinally extending radial slits, said plurality of other slits being of capillary size but of less capillarity than said ink feed duct for receiving ink under conditions

of excess flow and connected at one end to said first radial slit and at the other end to atmosphere to control the flow of air to said reservoir.

2. A fountain pen comprising a reservoir, a nib, and feed structure for controlling the flow of ink from the reservoir to the nib comprising an ink feed duct, and a governor for receiving ink under conditions of excess flow and having air admission means, a passage extending rearwardly from said air admission means, a manifold space at the rear end of said passage, a plurality of longitudinally extending capillary ink spaces of less capillarity than said feed duct, adapted to receive excess ink, and opening at their rear ends into said manifold space, said spaces being interconnected at their front ends, and another capillary space of lesser capillarity than said feed duct connected directly to said reservoir and said feed duct and connected to the front ends of said other spaces said capillary spaces being adapted to control the flow of air to said reservoir.

3. A fountain pen comprising a reservoir, a nib and feed structure for controlling the flow of ink from the reservoir to the nib comprising a shell having a central air opening in its front end; and a governor within the shell having a radial slit extending throughout the length of the governor and comprising an ink feed duct from the reservoir to the nib, a plurality of peripherally arranged, longitudinally extending radial slits terminating short of the rear end of the governor, a manifold space within the governor open to the rear end of said plurality of slits and closed at its rear end, and a central passage in the governor connecting said manifold space with said air opening, said shell having a manifold space in front of said governor connecting the front end of said plurality of slits with said ink feed duct.

4. A fountain pen comprising a reservoir, a nib, and feed structure for controlling the flow of ink from the reservoir to the nib comprising a shell having an internal tubular portion open at the front end of the shell, and a governor having a combined ink and air flow passage at one side thereof and constituting the sole connection to said reservoir, a plurality of longitudinally extending capillary ink storage spaces arranged around the periphery thereof, and a central passage connecting said tubular portion with the rear ends of said storage spaces, said shell having a capillary space in the front end thereof surrounding said tubular portion and connecting the front ends of said storage spaces with said combined ink and air flow passage.

5. A fountain pen comprising a barrel, a shell secured to the front end of the barrel and having an opening in its front end, a nib mounted in said opening, a tube mounted in said opening and extending rearwardly therefrom, said tube underlying said nib, and a governor having a central bore telescoped over said tube, and an ink feed duct communicating with the interior of said barrel and extending throughout the length of said governor and opening into said central bore, said tube having a flattened side underlying said nib and extending rearwardly to connect said duct with the nib, said governor also having a plurality of longitudinally extending capillary ink storage spaces for receiving and storing ink under conditions of excess flow, said spaces being connected at their rear ends with said tube and at their front ends with said duct and by said duct to said reservoir.

6. A fountain pen comprising a reservoir, a nib, and feed structure comprising a shell having an inwardly extending tubular portion supporting said nib, and a governor mounted within said shell and having an ink feed duct and a plurality of longitudinally extending spaces for receiving and storing ink under conditions of excess flow, said governor at its rear end fitting snugly within said shell and being supported at its front end by telescoping over said tubular portion.

7. A fountain pen comprising a barrel, a nib mounted in said barrel, a shell mounted in said barrel and underlying said nib, said shell having an opening in its front end and a capillary slit under the nib, and a governor mounted within the shell and having a feed duct extending throughout the length of the governor and connected with said capillary slit, said feed duct comprising an inner air flow portion and an outer ink feed portion of capillary size, said governor also having a central bore connected at its front end with said opening and a plurality of longitudinally extending ink storage spaces connected at their rear end with said central bore, and partition means blocking direct communication between the rear ends of said spaces and said reservoir, said shell providing space connecting the front end of said storage spaces with said air flow portion of said feed duct.

8. A fountain pen comprising a reservoir, a nib, and feed structure for controlling the flow of ink from the reservoir to the nib comprising an ink feed, an air flow duct, and means for receiving ink under conditions of excess flow from the reservoir, said means having a plurality of elongate capillary cells of less capillarity than a portion of said feed duct, extending lengthwise of the pen and connected in parallel, one end of said means being connected to said duct and the other end connected to the atmosphere, whereby said means is operative, when cleared of ink, to admit air to said reservoir through said duct and is operative otherwise to block the flow of air to said reservoir.

9. A fountain pen comprising a barrel having an ink reservoir therein, a shell member at the front end of said barrel, an ink flow control governor mounted in said shell member and forming therewith at the forward end thereof a capillary manifold chamber, a pen nib mounted in the front end of said shell member and having an ink feed slit in its writing end portion, said governor having a longitudinally extending capillary ink feed duct connecting the reservoir with the ink feed duct in said nib, a plurality of longitudinally extending, circumferentially spaced capillary overflow spaces in said governor all connected with said manifold chamber with one only of said spaces connected directly to the reservoir, all said overflow spaces being of lesser capillarity than said feed duct and said one space being also directly connected to said ink feed duct, and means providing an air channel directly connecting the rear ends of all of said overflow spaces to the atmosphere excepting the overflow space which is directly connected to the reservoir which latter overflow space, and in turn the reservoir, is indirectly connected to the atmosphere by way of said air channel, manifold chamber and reservoir connected overflow space.

10. A fountain pen comprising a barrel having an ink reservoir therein, a shell member carried by the forward end of said barrel and providing an extension of the latter, a governor mounted

within said shell for ink feed and overflow control, a pen nib having an ink feed slit therein and mounted in the forward end of said shell, said governor having a longitudinally extending capillary ink feed duct therein in communication at its rear end with the reservoir and at its forward end with the feed slit of said pen nib, the forward end of said governor providing with the internal wall of said shell a capillary manifold chamber, said governor being provided with a plurality of longitudinally extending and circumferentially spaced capillary overflow spaces each of lesser capillarity than said ink feed passages and all communicating at their forward ends with said manifold chamber, one of said capillary overflow spaces being directly connected with said ink feed duct and with the ink reservoir and, in turn, connecting all said other overflow spaces with the ink reservoir for reception of ink therefrom during conditions of overflow in excess of that required for writing purposes, and means providing an air channel leading from the forward end of said shell member and connected to the rear ends of all said other capillary spaces excepting the overflow space which is directly connected with the reservoir, thereby permitting the flow of air to the ink reservoir by way of said other capillary spaces, manifold chamber and reservoir-connected overflow space under conditions of no excess flow and blocking such flow of air during conditions of excess flow when said overflow spaces are filled with ink.

11. A fountain pen comprising a reservoir, a nib, and feed structure for controlling the flow of ink from the reservoir to the nib including a shell having an air opening and a space communicating with said opening and a governor mounted within the shell and having an ink feed duct and a plurality of longitudinally extending radial slits opening into said space within said shell at the forward end of said governor, one only of which slits opens at its rear end into said reservoir and is connected with said feed duct, said slits being of capillary width but of less capillary width than said feed duct and connected thereto for receiving ink under conditions of excess flow, said air opening, said slits and said space comprising air admission means for controlling the flow of air to said reservoir.

12. A fountain pen comprising a reservoir, a nib, and feed structure for controlling the flow of ink from the reservoir to the nib comprising an ink feed duct, and a governor for receiving ink under conditions of excess flow and having air admission means, a plurality of longitudinally extending capillary spaces of less capillarity than said feed duct, one of which spaces is connected at one end directly to said reservoir and throughout a substantial portion of its length directly to said feed duct, means connecting said other spaces at one end to said one space, and means connecting the other ends of said other spaces with said air admission means, said spaces being adapted to control the flow of air to said reservoir.

13. A fountain pen comprising a reservoir, a nib, and feed structure for controlling the flow of ink from the reservoir to the nib comprising a shell having an air opening in its front end, and a governor within said shell having an ink feed duct connected to said reservoir and to said nib, a plurality of longitudinally extending capillary ink spaces of less capillarity than said feed duct adapted to receive ink under conditions of excess flow, a manifold in its rear end connected to all said spaces, and a longitudinally extending passage connecting said manifold with said air opening, said shell having a capillary manifold space adjacent the front end of said governor connecting said capillary spaces with said ink feed duct, and said governor having a further capillary ink space of less capillarity than said feed duct connecting said capillary manifold and said reservoir, said capillary spaces being adapted to control the flow of air to said reservoir.

14. A fountain pen comprising a barrel, a tapering shell secured to the front end thereof, and having an opening in its front end, a nib mounted in said opening with only its writing tip projecting beyond the shell, a governor of tapering form within said shell and having a capillary feed duct for feeding ink from said barrel to said nib, a plurality of capillary ink storage spaces in said governor of less capillarity than said feed duct for receiving and storing ink under conditions of excess flow, said storage spaces extending longitudinally of said governor for substantially the full length thereof and being in communication at one end with said opening and interconnected at the other end, and an additional ink storage space connected at one end to the interconnected ends of said other storage spaces and at the other end to said reservoir and connected to said feed duct throughout a substantial portion of the length thereof and providing with said feed duct the sole connection between said other spaces and said reservoir to control the flow of air to the barrel.

RUSSELL T. WING.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,633,111	Kovacs	June 21, 1927
2,176,661	Ashmore	Oct. 17, 1939
2,187,528	Wing	Jan. 16, 1940
2,282,840	Wing	May 12, 1942
2,360,297	Wing	Oct. 10, 1944