

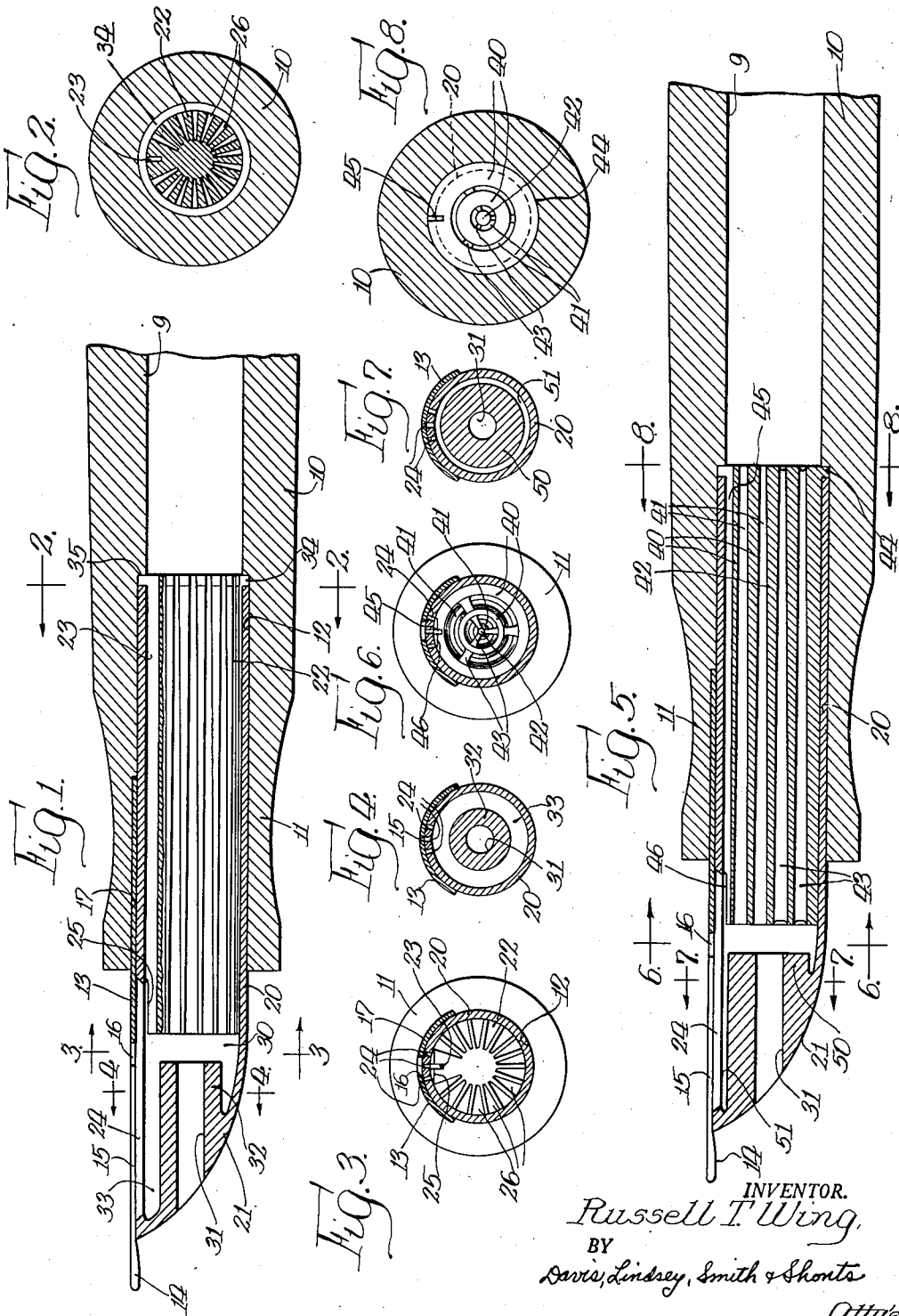
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FOUNTAIN PEN

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FOUNTAIN PEN

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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, and No. 2,282,840, issued May 12, 1942.

The general object of the invention is to provide a novel 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 with capillary ink storage spaces or cells, the governor being so constructed that the cells thereof may be formed in a simple and inexpensive manner to facilitate the manufacture thereof and thus provide a pen that may be produced at relatively low cost.

A further object is to provide a fountain pen of the foregoing type, including a governor provided with capillary ink spaces or cells connected at one end with the outside atmosphere and directly with the reservoir of the pen at their other end.

Still another object is to provide a fountain pen of the foregoing type, having air flow means connecting the reservoir with the outside atmosphere and independent of and separate from the ink flow means connecting the reservoir with the nib of the pen.

A still further object is to provide a fountain pen of the foregoing type, having air flow means connecting the reservoir with the outside atmosphere, which is independent of and separate from the ink flow means connecting the reservoir with the nib of the pen, and which constitutes storage space for receiving and storing ink under conditions of excess flow from the reservoir.

Another object is to provide a fountain pen of the foregoing type, having a governor provided with radial slits extending throughout the length of the governor and constituting storage spaces for excess ink flow, and also provided with a radial slit connecting the reservoir of the pen with the nib.

A further object is to provide a fountain pen of the foregoing type, having a governor comprising a plurality of concentrically arranged tubes of varying diameters, one within another, to provide a plurality of annular spaces of capillary size for receiving and storing ink under conditions of excess flow, the outer tube being provided with a feed fissure for feeding ink from the reservoir to the nib of the pen.

Another object is to provide a fountain pen of the foregoing type, including a shell underlying the nib of the pen and enclosing a governor hav-

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ing a capillary space for receiving and storing ink under conditions of excess flow and in direct communication with the reservoir, the shell also having a capillary ink space in front of the governor and in communication with the nib slit through a slit in the shell.

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

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

Fig. 2 is a transverse section 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.

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

Fig. 5 is a sectional 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 fountain pen embodying the features of the invention is of the type shown in my above-mentioned prior patents, and comprises generally a feed structure for feeding ink from the reservoir to the nib. The feed structure includes means for receiving and storing ink under conditions of excess flow, and also serving to control the flow of air to the reservoir as ink is used in writing. In the constructions herein shown, the means for receiving and storing ink under conditions of excess flow comprises a plurality of spaces which open directly into the reservoir, a feed duct being provided which connects the reservoir with the nib of the pen and which is separate from and independent of such spaces. These spaces may be either in the form of longitudinally extending slits or may be annular in form, the spaces being provided in a governor or collector member which also is provided with the above-mentioned feed duct. The governor is mounted within an enclosing shell which is provided with an air inlet adapted to admit air to the storage spaces. The shell is also preferably constructed to include a space in addition to the above-mentioned storage means, which additional space is adapted to receive ink and hold it close to the nib so that ink may be fed directly from such additional space to the nib rather than

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through the governor as in the case of the storage means.

In the preferred embodiment of the invention shown in Figs. 1 to 4, inclusive, I have shown a pen comprising a barrel 10, provided at its front end with a pen section 11. The latter may be a part separate from but connected to the barrel proper or may be integral therewith, as shown in the drawings. The interior of the barrel, in the present instance, constitutes a reservoir 9, but the invention is not limited in this respect and may be embodied in a pen having a sac type reservoir. The pen section 11 is provided with an internal bore 12 adapted to receive and support the feeding structure of the pen and a nib 13 which is provided with the usual writing tip 14 and is longitudinally slitted as at 15 with the slit extending to a pierce 16 of usual form. The rear end of the nib is arcuate in shape, as is clearly apparent in Fig. 3, and the bore 12 is provided with an arcuate enlargement 17 to receive the rear end portion of the nib as shown in Fig. 1.

The feed structure, in the present instance, comprises a shell 20 of cylindrical form adapted to fit snugly in the bore 12 of the pen section. The shell 20 underlies the nib 13 and holds it firmly in place in the arcuate enlargement 17 in the pen section. The front end of the shell is curved as at 21 to extend toward the nib 13 and support the latter with only the writing tip 14 projecting beyond the shell.

Within the shell 20 is a governor or collector member 22 of cylindrical form fitting snugly within the shell. Extending longitudinally of the governor from end to end thereof is a feed duct comprising, in the present instance, a radial slit 23 of capillary dimension and opening into the reservoir 9 at its rear end. The front end of the feed duct or slit 23 is adapted to be connected with the slit 15 in the nib. To this end, the shell in that portion underlying the nib is slitted, with the slits extending rearwardly to overlap and then connect with the feed duct 23. Preferably, I provide three slits 24 in the shell, which are spaced from and are parallel to each other, the purpose of providing three such slits being to insure having at least one open should any clogging occur. The slits 24 extend rearwardly to overlie the front end of the governor and the feed duct 23, and in order to distribute ink from the feed duct into all three of the slits 24, the front end of the governor is flattened as at 25 to provide a segmental space opening both into the feed duct 23 and the slits 24. Thus, I have provided means for feeding ink from the reservoir to the nib.

As mentioned above, the governor or collector member 22 is also provided with means for receiving and storing ink under conditions of excess flow. Thus, if the pen is in a relatively cool condition before being used, the heat of the hand in holding the pen during writing may cause expansion of the air within the reservoir and tend to force ink to flow from the reservoir. To receive and store such ink and thereby prevent leakage at the writing tip of the pen, the present storage means is so arranged that ink may flow directly thereto from the reservoir. For this purpose, I provide a plurality of spaces or cells formed in the governor 22 and extending from end to end thereof so that, at the rear end of the governor, they open directly into the reservoir. In the present instance, such spaces comprise radial slits 26 formed in the governor 22 independently of and separate from the feed duct or slit 23. The slits 26 also function to control the

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flow of air to the reservoir. For this purpose, the front ends of the slits 26 are connected with the outside atmosphere by being open to a space 30 within the front end of the shell 20 and in front of the governor, the space 30 being in communication with the outside atmosphere through the internal bore 31 of a tubular extension 32 projecting inwardly from the front end of the shell. The tubular extension 32 terminates at a distance from the front end of the governor to provide the space 30 whereby air may freely pass to all of the slits 26.

This form of pen is also provided with additional space for receiving ink under conditions of excess flow, which additional space, instead of being connected directly with the reservoir, is connected with the slit 15 in the nib through the slits 24 in the shell. Thus, as is clearly shown in Fig. 1, the tubular extension 32 is surrounded by an annular space 33 which is of capillary size and is directly connected to the shell slits 24. Any ink collecting in the annular space 33 will thus be drawn through the slits 24 into the nib slit 15 as the ink is consumed in writing.

The governor member 22, while fitting snugly within the shell 20, may be held in proper longitudinal relationship thereto by being provided with a flange 34 at its rear end adapted to engage the rear end of the shell 20 and to be clamped thereby against an internal shoulder 35 formed in the barrel 10.

All of the various ink feed passages as well as the means for receiving and storing excess ink, of course, must be of capillary dimension. Moreover, they are relatively proportioned so that the ink will feed properly from the reservoir to the nib and the ink will be received by the storage means when excess flow occurs and will be withdrawn when conditions of excess flow no longer exist. As an example of suitable dimensioning for the various parts, the slit 15 in the nib is preferably .0005 to .002 of an inch in width. The slits 24 in the shell are slightly larger than the slit 15 so that ink may be drawn into the latter. Thus, the slits 24 may be approximately .005 of an inch in width and, in some instances, it has been found preferable to make them of three different dimensions, such as .004, .005 and .006 of an inch. The segmental space on the governor underlying the shell slits 24 and formed by the flattened portion 25 is such as to provide a maximum depth for the space of not more than .007 of an inch. The width of the feed slot 23 in the governor is preferably .005 of an inch. The storage spaces or slits 26 in the governor may be of uniform dimension throughout their length but are preferably tapered in form with their larger widths at the front and narrower portions at the rear, so that in emptying ink the front portions will empty first and the ink will gradually recede therein from front to rear. Preferably, the slits 26 may be .030 of an inch at the front and .010 of an inch at the rear. The annular capillary space 33 surrounding the tubular extension 32 in the front end of the shell may be as large as approximately .035 of an inch.

In operation, assuming that the reservoir of the pen is filled with ink and that the storage spaces 26 are substantially empty, ink will feed through the feed duct 23 to the flattened portion 25 at the front end of the governor. At that point the ink will spread laterally over the flattened surface 25 to be distributed to the three slits 24 in the shell. The ink will pass along the slits 24 to the under side of the nib and will

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be fed therefrom to the nib slit 15 for use at the writing tip 14.

If, during writing, there are no conditions existing to cause expansion of the air in the reservoir, then, as ink is withdrawn therefrom, air will pass through the internal bore 31 of the tubular extension 32 in the shell and will be distributed to the various storage slits 26. As ink is withdrawn at the writing tip of the pen, such air will tend to bubble up through any ink remaining in the storage spaces 26 into the reservoir to maintain a balanced pressure relationship. The rear ends of the slits 26 thus act as weir vents controlling the flow of air into the reservoir. By having all of the spaces 26 opening directly into the reservoir, should the rear end of any one or more of them become clogged, the remainder will still serve to admit air to the reservoir and thus permit an even feed.

Should some condition occur to cause an expansion of the air within the reservoir, the excess ink caused to flow therefrom will enter the spaces 26 and thus shut off the supply of air to the reservoir. Should the flow of excess ink be greater than the capacity of the spaces 26, the space 33 in the front end of the shell will fill, thus providing a capillary space close to the writing tip of the pen to prevent any leakage therefrom. When the pen is used in writing under such conditions, ink will be withdrawn from the space 33 by the smaller capillary slits 24 in the nib to supply the writing tip. After the space 33 is emptied, ink will be drawn from the reservoir through the feed duct 23 to supply the writing tip. However, because the spaces 26 are filled with ink, no air can enter the reservoir to replace the ink so withdrawn. The ink in the spaces 26 will, therefore, be withdrawn rearwardly into the reservoir to the extent necessary to reestablish the necessary pressure relationship until substantially all the ink in the spaces 26 is withdrawn. Thereafter, air may work up through the spaces 26 to bubble into the reservoir through the weir vents provided by the rear ends of the spaces 26.

In the modified form shown in Figs. 5 to 8, inclusive, the barrel, pen section, nib and shell are constructed in substantially the same manner as shown in Figs. 1 to 4, inclusive. The governor shown in Figs. 5 to 8 differs, however, in construction. In this form, the governor or collector member comprises a plurality of concentric sleeves 40, telescoped one within another, to provide a plurality of annular spaces 41 for receiving and storing ink under conditions of excess flow. In the present instance, two sleeves 40 are shown with a rod 42 of round cross section positioned within the inner tube. The tubes 40 are provided with longitudinal spacers 43, three in the present instance, to hold the tubes 40 and rod 42 in spaced relation and thus provide the annular spaces 41. The spacers 43 may be only lugs formed at the respective ends of the sleeves 40 but, preferably, are in the form of ribs, as shown in the drawing, extending throughout the length of the sleeves 40 to facilitate forming the sleeves 40 by molding. In order to position the sleeves 40 in proper longitudinal relation to the shell 22, the outer sleeve may, at its rear end, be provided with a flange 44 abutting the rear end of the shell. The outer sleeve 40 is also provided with a feed duct 45 in the form of a longitudinally extending slit, and the front end of the outer sleeve is flattened, as

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at 46, to connect the feed duct 45 with the slits 24 in the shell.

The shell 20, in this instance, differs in one respect from the shell shown in the first form, namely, in having an inwardly extending tubular portion 50 which is of somewhat larger diameter than that shown in Fig. 1, so that the surrounding annular space 51 is of smaller capillary dimension. In this instance, the annular capillary space 51 is preferably of substantially the same size as the slits 24 in the shell and, for example, may be .006 of an inch in its radial dimension.

The modified form of pen functions in substantially the same manner as the pen shown in Fig. 1, except that the annular space 51 at the front end of the shell will remain filled with ink substantially throughout the operation of the pen, since it has about the same capillarity as the slits 24 in the shell. The function of the capillary space 51 is to provide an ample supply of ink closely adjacent the nib. The space 51 thus maintains ink which may be immediately available for writing when the pen is put in use.

I claim:

1. A fountain pen comprising a reservoir, a nib, and a feed structure comprising a shell, and a governor within the shell having a longitudinally extending capillary ink storage space tapering in wall-to-wall dimension from front to rear, said space being connected at its front end with the outside atmosphere and opening at its rear end directly into said reservoir, and a capillary ink feed passage separate throughout its length from and of greater capillarity than said ink storage space and directly connected at its rear end to said reservoir and in communication with the nib at its front end for connecting said reservoir to said nib independently of said ink storage space.

2. A fountain pen comprising a reservoir, a nib, and a feed structure comprising a governor having a pair of mutually separate conducting means, one being connected to atmosphere and directly to said reservoir and tapering in wall-to-wall dimension from the end which is connected to atmosphere toward the end which is connected to said reservoir, whereby they are adapted to conduct air to the reservoir, and to receive ink solely from said reservoir and to store ink under conditions of excess flow from said reservoir and to prevent the flow of air to the reservoir when so storing ink, and the other connected to the nib and directly to the reservoir for connecting the reservoir and nib independently of the air conducting means.

3. A fountain pen comprising a reservoir, a shell, a slitted nib overlying said shell, said shell having a capillary slit underlying the slit in the nib, and a governor having a longitudinal capillary duct in communication at one end with the slit in the shell and connected at its other end to the reservoir, and a plurality of capillary air flow passages each separate from and of less capillarity than said capillary duct and opening directly and independently into said reservoir and adapted to receive ink solely from said reservoir and to store ink under conditions of excess flow from said reservoir, said capillary air flow passages tapering in wall-to-wall dimension from the end connected with said slit to the end connected with said reservoir.

4. A fountain pen comprising a reservoir, a nib, a shell, and a governor mounted within said shell, said governor having a plurality of mutually sep-

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grate radial slits of capillary dimension and extending from end to end of said governor, one of said slits being smaller than the others and constituting an ink feed duct, the other slits tapering in width from front to rear and being directly connected to said reservoir independently of each other and of said one slit and adapted to receive ink solely from said reservoir and to store ink under conditions of excess flow from the reservoir and to control the flow of air to the reservoir.

5. A fountain pen comprising a reservoir, a nib, a shell, and a governor mounted within said shell, said governor having an ink feed duct and a plurality of radial slits of capillary width extending from end to end of the governor and tapering lengthwise with their smaller end at the rear and their larger end at the front, said slits being connected at their rear ends directly to said reservoir and communicating at their forward ends with the atmosphere to receive ink solely from said reservoir and to store ink under conditions of excess flow from the reservoir and to control the flow of air to the reservoir.

6. A fountain pen comprising a reservoir, a nib, and feed structure comprising a shell, and a governor within the shell and comprising a plurality of concentric sleeves telescoped one within another and held in radially spaced relation to provide a plurality of annular capillary spaces adapted to receive and store ink under conditions of excess flow, the outer sleeve having an ink feed duct connecting the reservoir with the nib independently of said annular spaces.

7. A fountain pen comprising a reservoir, a nib, and feed structure comprising a shell, and a governor within the shell and comprising a plurality of concentric sleeves telescoped one within another and held in radially spaced relation to provide a plurality of annular capillary spaces adapted to receive and store ink under conditions of excess flow, said annular spaces opening at their rear end into said reservoir, and said shell having a non-capillary opening for admitting air to the front end of said spaces, the outer sleeve having a capillary ink feed duct connecting the reservoir with the nib independently of said annular spaces.

8. A fountain pen comprising a reservoir, a nib, and feed structure comprising a shell, and a governor within the shell and comprising a plurality of concentric sleeves telescoped one within another

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other and held in radially spaced relation to provide annular capillary spaces adapted to receive and store ink under conditions of excess flow, each sleeve having a tapering wall thickness whereby the annular spaces are of smaller radial dimension at their rear end than at their front, the outer sleeve having an ink feed duct connecting the reservoir with the nib independently of said annular spaces.

9. A fountain pen comprising a reservoir, a nib, and feed structure comprising a shell, and a governor within the shell comprising a plurality of concentric sleeves telescoped one within another and having longitudinally extending ribs holding the sleeves in radially spaced relation to provide substantially annular capillary spaces adapted to receive and store ink under conditions of excess flow, the outer sleeve having an ink feed duct connecting the reservoir with the nib independently of said annular spaces.

10. A fountain pen comprising a reservoir, a nib, and feed structure comprising a shell, and a governor within the shell comprising a plurality of concentric sleeves telescoped one within another and held in radially spaced relation to provide a plurality of annular capillary spaces adapted to receive and store ink under conditions of excess flow, the outer sleeve having a flange at its rear end abutting the rear end of the shell to position the governor within the shell, said outer sleeve also having an ink feed duct connecting the reservoir with the nib independently of said annular spaces.

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