(No Model.) 2 Sheets—Sheet 1.

W. W. STEWART.

FOUNTAIN PEN.

No. 478,653. Patented July 12, 1892.

FIG. 1.

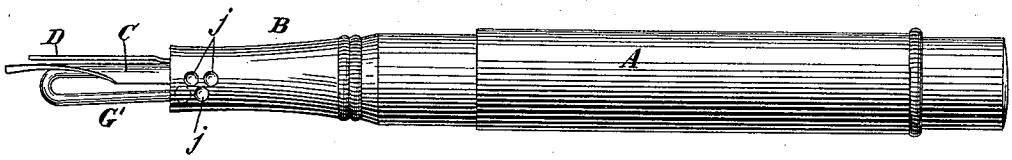


FIG. 2.

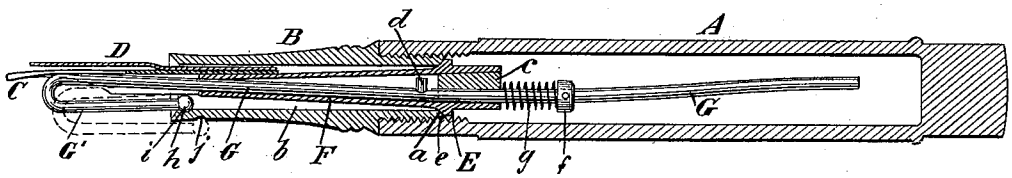
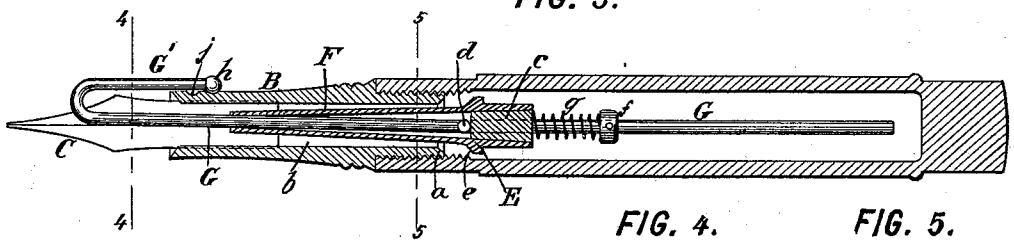


FIG. 3.



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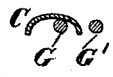


FIG. 5.

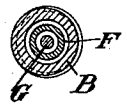


FIG. 7.

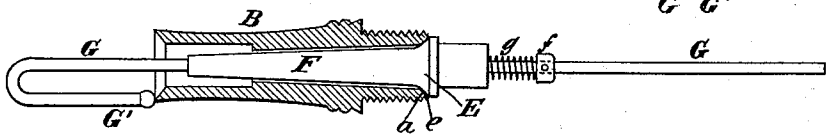
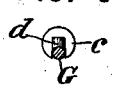


FIG. 6.



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(No Model.) 2 Sheets—Sheet 2.

W. W. STEWART.

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FIG. 8.

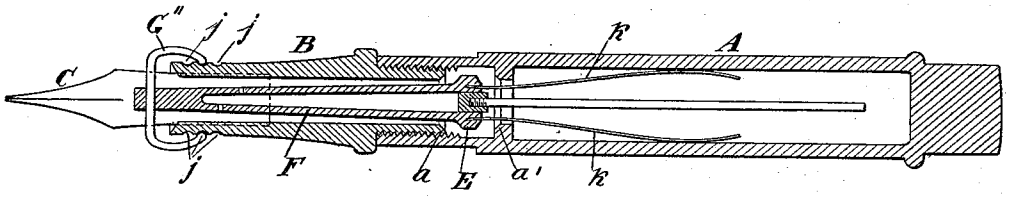
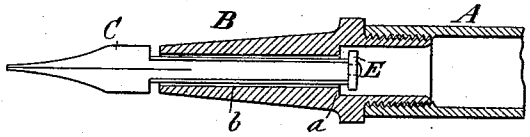


FIG. 9.



WITNESSES:
John Becker
Fred White

INVENTOR:
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UNITED STATES PATENT OFFICE.

WILLIAM W. STEWART, OF BROOKLYN, NEW YORK.

FOUNTAIN-PEN.

SPECIFICATION forming part of Letters Patent No. 478,653, dated July 12, 1892.

Application filed December 15, 1890. Serial No. 374,678. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM W. STEWART, a citizen of the United States, residing in Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Fountain-Pens, of which the following is a specification.

This invention relates to pens of that character wherein a supply of ink is held in a cavity or reservoir formed in the penholder, the ink being retained therein by the pressure of the atmosphere and fed therefrom to the pen in a regulated stream sufficient to keep the pen or pen-nib suitably charged with ink.

My present invention aims to improve the operation of pens of this class by providing means for enabling the user to more perfectly control the rate of flow than has been heretofore possible, while at the same time correctly governing the flow by subjecting the ink during its passage from the holder to the pen to the influence of capillary attraction and to the obstructing effect of minute bubbles or froth of moistened air ascending into the holder.

To this end my invention provides a novel construction of valve for regulating the flow of ink through the throat of the holder communicating between the ink-reservoir and the pen. Fountain-pens have heretofore been provided with valves for this purpose; but such valves have always been operated from the upper end of the holder and have been independent of the means for automatically regulating the flow of ink to the pen after passing the valve.

In my improved fountain-pen the valve is provided at the junction of the reservoir with the throat or duct leading thence to the pen and is constructed with a stem extending downwardly through said throat or duct and terminating in an operating handle, knob, or other provision by which the user of the pen can move the stem and thereby adjust the valve to vary the area of its opening. The stem is adapted to the throat or duct in such manner that it partially fills the latter and its external surface comes into capillary proximity to the interior surface of the throat, forming between these surfaces a capillary space or duct down which the ink may flow while under capillary control, so that the dropping or rolling of ink from the holder can be avoided. The capillary space or duct thus provided is tubular or annular in cross-section and affords the only passage through which the ink may descend, and minute bubbles or film of moistened air may ascend on its passage into the reservoir to take the place of the ink which is fed down therefrom. This stem is preferably made conical or tapering, so that as it is moved upwardly to open the valve it enlarges the area of the capillary space and affords a freer flow of ink. The flow of ink is governed automatically, as in previous fountain-pens of my invention, by the forces of capillary attraction, atmospheric suction, and the clogging of the ink-duct by the entering bubbles of moistened or saturated air; but the rate of flow is under the control of the user of the pen, in order that the flow may be scanty if he prefers to use a stiff or finely-pointed pen, or that the flow may be ample in case he uses a flexible or coarser-pointed pen which shades heavily and demands a considerable quantity of ink, or so that the user may adjust the rate of flow between these two extremes to suit his own taste or needs.

Figure 1 of the accompanying drawings is an elevation of a fountain-pen constructed according to my invention, the body of the holder being somewhat shortened proportionally. Fig. 2 is a longitudinal mid-section thereof, showing the valve closed. Fig. 3 is a longitudinal mid-section thereof in a plane at right angles to that of Fig. 2, showing the valve open. Fig. 4 is a transverse section on the line 4 4 in Fig. 3. Fig. 5 is a transverse section on the line 5 5 in Fig. 3. Fig. 6 is a detail of the valve, looking endwise of the penholder. Fig. 7 is an elevation of the valve and a longitudinal mid-section of the nozzle, showing the valve closed.

The penholder is made, as usual, of two parts—a tubular holder A, constituting the ink-reservoir, and a tubular nozzle B, screwing into the open end of the holder, and into which fits the pen or pen-nib C. The nozzle B has a hole or passage *b* through it, herein designated the "throat." The shank of the pen-nib is thrust into this passage so that it wedges tightly therein, and on top of the pen

a key or bar D is slipped into the throat, serving either to lock the pen in place or as an additional capillary duct to carry down ink on top of the pen, or it may serve both functions. The upper end of the nozzle B, where it screws into the tubular holder, is formed with a valve-seat *a*, preferably conical, against which seats the valve E, which is formed, preferably, with a correspondingly-conical front face *e*. The valve E is provided with a shank or stem F, preferably formed integral with it, and which extends downwardly from the valve within or through the throat *b*. This stem is preferably conical or tapering on its exterior, as shown, and is preferably tubular, so as to form an ink duct or passage through it, as well as an annular capillary passage around it between its exterior surface and the interior surface of the throat. The throat may be made cylindrical, as shown in Figs. 2 and 3, or tapering, as shown in Fig. 7, or of any other suitable shape. An operating rod or stem G is provided, consisting, preferably, of a wire passing through the tubular stem F and projecting at both ends thereof. The lower end is looped or bent backwardly upon itself, as shown at G′, to form an operating-handle, while the upper end projects up into the holder, and, being somewhat elastic, serves as an agitator or irritant for stirring the ink in the holder and keeping the air therein moistened or saturated by contact with the ink. The valve E is provided with a plug *c*, through which this rod G passes, and which is shown separately in Fig. 6. The rod G is movable back and forth through the hole in this plug until a shoulder or stop *d* formed on it strikes the front end of the plug. This shoulder or stop is best formed as a short pin inserted transversely into the wire G. A collar *f* is fixed on the wire behind the valve, and a light spring *g* is arranged between the collar and valve tending to press the valve downwardly. The bent arm or operating-handle G′ is extended backward far enough so that its end may pass above the lower end of the nozzle. When it is turned down so that its end comes against the nozzle, as shown in Fig. 7, the valve E is seated and the spring *g* is compressed, holding it to its seat.

When the pen is not in use, the arm G′ will ordinarily be sprung inside the nozzle, as shown in Fig. 2, where its rounded end *h* will enter a notch *i* and thereby be retained in place. In this position the valve is closed and the spring *g* slightly compressed, so that it holds it closed. When it is desired to use the pen, the user will pull down the arm G′ first to the position shown in Fig. 7, and then moving it outside of the nozzle he will press it up to a greater or less extent, whereupon the stop *d* strikes the plug *c* and forcibly opens the valve in the manner shown in Fig. 3. One, two, or more depressions *j j* are provided in the exterior of the nozzle B, as shown in Figs. 1 and 3, into either of which the rounded end *h* of the operating-arm may enter. In Fig. 3 it is shown in the upper of these depressions, the valve E being opened widely to admit an ample flow of ink. The arm G′ is rendered sufficiently elastic to be movable either inside or outside the nozzle. When it is outside the nozzle, it may turned either downward, as shown in dotted lines in Fig. 2, or sidewise, as shown in Fig. 3. The latter is the preferable position. In this position the two arms of the U-shaped wire extend on opposite sides of the turned-down edge or rim along one side of the pen-nib. They consequently form capillary passages adjacent to said rim, as most clearly shown in cross-section in Fig. 4. This position also brings the operating-arm to one side and entirely out of the way of the paper.

The user of the pen, in order to regulate the rate of flow of the ink, has only to push the handle G′ up or draw it down, entering its rounded end into whichever of the notches *j* he finds gives the rate of flow that is preferable for his use.

Fig. 8 shows a modified construction wherein the valve E works between two valve-seats *a a′*, the latter being formed as an internal rib in the reservoir. By adjusting the valve to its uppermost position it seats against the upper seat. When slightly opened from this seat, it affords a restricted flow with a large area of capillary duct by reason of the upper position of the conical stem F. Flexible wires *k k* are attached to the valve and extend up within the holder, pressing against the inner walls thereof to generate sufficient friction to hold the valve in any position to which it is adjusted. The lower end of the stem F projects beyond the lower end of the nozzle and an operating-handle G″ is applied to it. This handle consists of a wire inserted transversely in the end of the stem and with its ends bent upwardly and pressing elastically against the exterior of the nozzle, so as to enter notches *j j* therein.

Fig. 9 shows a simple form of my invention, in which the valve E consists of a disk mounted on the end of the shank of the pen, the pen-shank serving as the valve-stem and the pen-nib as the valve-handle. In this instance the pen is preferably mounted to slide frictionally in the holder in order to prevent accidental displacement of the valve.

I claim as my invention the following-defined novel features or improvements, substantially as hereinbefore specified, namely:

1. In a fountain-pen, the combination, with a reservoir-holder having a throat or passage communicating with the pen, of a valve for controlling communication through said throat, and a stem for operating said valve, passing through the throat, with its exterior surface in capillary proximity to the interior surface of the throat, whereby a capillary duct is formed for the flow of ink and the valve may be adjusted from the exterior of the holder.

2. In a fountain-pen, the combination, with

a reservoir-holder having a throat or passage communicating with the pen, of a valve for controlling communication through said throat, having a tapering stem passing through the throat and emerging from the lower end of the holder, where it is accessible for operating the valve and with the exterior surface of said stem in capillary proximity to the interior surface of the throat to form a capillary duct, and the valve constructed to open by an upward movement, whereby as the valve is opened the movement of the tapering stem increases the capacity of said capillary duct.

3. In a fountain-pen, the combination, with a reservoir-holder having a throat or passage communicating with the pen, of a valve for controlling communication through said throat, and a stem for operating said valve, extending through the throat and terminating in an operating-handle at the lower end of the penholder, and the nozzle of the holder formed with provisions adapted to engage said handle and hold it in different positions.

4. In a fountain-pen, the combination, with a reservoir-holder having a throat or passage communicating with the pen, of a valve for controlling communication through said throat, a stem for operating it passing through the throat and having its lower end bent upwardly and adapted to pass outside of the nozzle, and the nozzle formed with provisions to engage said upturned end to hold the stem in different positions.

5. In a fountain-pen, the combination, with a reservoir-holder having a throat, of a valve for controlling communication therewith, and a stem for operating said valve, passing through the throat and having its lower end bent laterally and upwardly and adapted to pass outside of the nozzle, whereby the downward and upward branches of said stem pass on opposite sides of one edge or rim of the pen-nib.

6. In a fountain-pen, the combination, with a reservoir-holder having a throat, of a valve for controlling communication therewith, an operating-stem movable relatively to said valve, extending through the throat and terminating in an operating-handle formed with a stop adapted, when pushed upwardly, to encounter and unseat the valve, and a spring pressing downwardly against the valve, adapted to press the valve to its seat when the stem is lowered.

7. In a fountain-pen, the combination, with a reservoir-holder having a throat, of a valve for controlling communication therewith, and a stem for operating said valve, passing through the throat and having its lower end turned upwardly to form an operating-handle and said stem constructed to admit of its handle being entered within the lower end of the nozzle when drawn down to close said valve and moved exterior to said nozzle when elevated to open the valve.

8. In a fountain-pen, the combination, with a reservoir-holder having a throat, of a valve for controlling communication therewith, having a tubular stem passing through the throat, with its exterior surface in capillary proximity to the interior surface of the throat, and an operating-stem passing through said tubular stem and having an operating-handle at the lower end of the penholder.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

WILLIAM W. STEWART.

Witnesses:
EDSON C. EASTMAN,
W. P. FISKE.