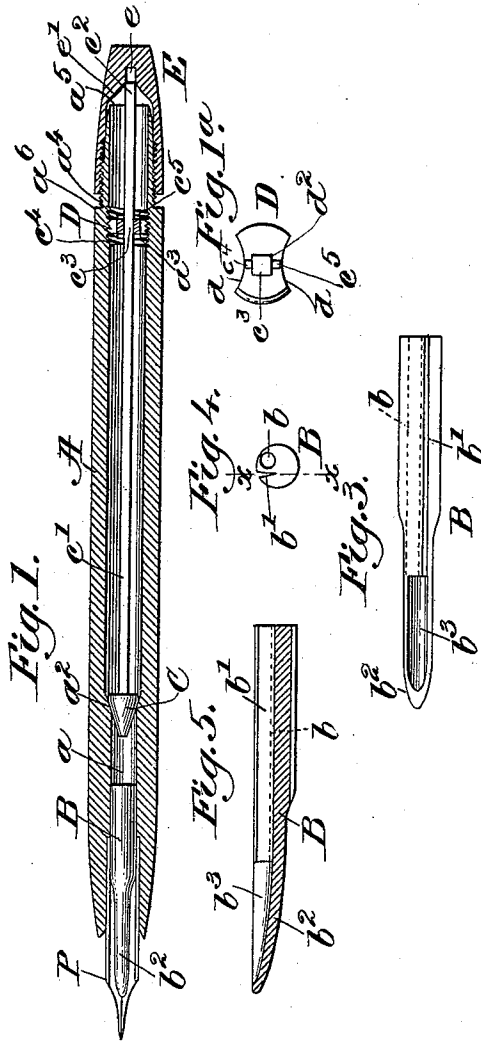
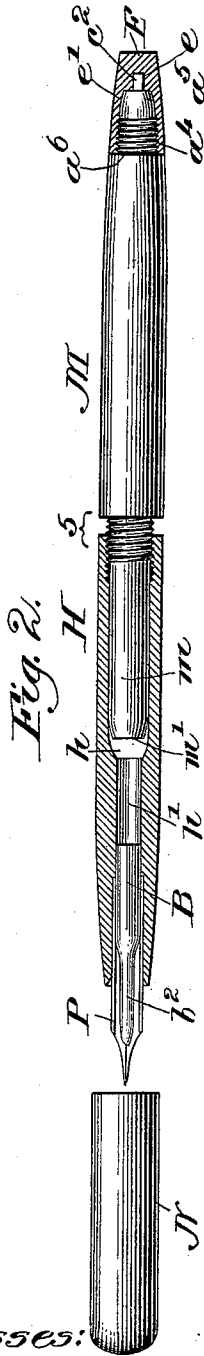


A. A. WATERMAN.
FOUNTAIN PEN.

(Application filed May 26, 1897.)

(No Model.)



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UNITED STATES PATENT OFFICE.

ARTHUR A. WATERMAN, OF ARLINGTON, MASSACHUSETTS, ASSIGNOR TO
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FOUNTAIN-PEN.

SPECIFICATION forming part of Letters Patent No. 619,702, dated February 14, 1899.

Application filed May 26, 1897. Serial No. 638,223. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR A. WATERMAN, of Arlington, county of Middlesex, State of Massachusetts, have invented an Improvement in Fountain-Pens, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention has for its object the production of a fountain-pen of improved construction, and the various features of novelty will be hereinafter fully illustrated and described in the drawings and specification, and set forth in the claims.

Figure 1 is a longitudinal sectional view of a fountain-pen having a novel filling apparatus, Fig. 1^a being an elevation, on an enlarged scale, of the parts within the barrel looking from right to left, Fig. 1. Fig. 2 is a longitudinal sectional view, partly in elevation, of a fountain-pen embodying certain features of my invention, the parts being shown ready for assemblage. Fig. 3 is an enlarged plan view of the ink-feeder shown in Figs. 1 and 2, Fig. 4 being a rear elevation thereof; and Fig. 5 is a longitudinal sectional view of the same on the line $x x$, Fig. 4.

In the preferred embodiment of my invention selected for description and illustrated in Figs. 1 and 1^a, A is a barrel of suitable material provided at a with a bore to receive the ink-feeder B, which preferably terminates within the bore, the latter being shown as of smaller diameter than the reservoir portion a' of the barrel, the region of union therebetween being illustrated as formed into an inclined annular shoulder a^2 , adapted to serve as a seat for the valve C. This valve, illustrated as conical, may be of any suitable contour, provided it is properly surfaced to close the valve-aperture at times and permit passage of ink from the reservoir at others, and it may be of sufficient weight to seat itself unaided, though I prefer to provide means to positively move it into and out of closed position, the spindle c' serving this purpose satisfactorily. This spindle is extended at c^2 beyond the outer end of the barrel A and may be actuated either directly or automatically, as by the means illustrated, comprising

a disk D, fixed to the spindle and peripherally threaded to engage with a correspondingly-threaded portion a^3 of the inner wall of the barrel A. The disk D is cut away at d to permit passage of ink to fill the reservoir, and as a convenient means of attaching it to the spindle I have shown it as provided with a squared aperture d^2 to receive a slabbed or squared portion c^3 of the spindle, where it is held in place by suitable means, as the pins $c^4 c^5$.

Rotation of the disk D within the barrel will obviously be accompanied by longitudinal movement of the spindle, and the valve C will be seated or unseated according to the direction of rotation and the inclination of the screw-thread on disk and barrel. To effect this rotation in such a manner that the valve C will be seated during the filling operation, thus preventing leakage through the feeder and pen, and unseated automatically when the barrel is closed at its upper end and ready for writing, the hollow interior of the closure or cap E is reduced in diameter to form a squared recess e of suitable size to receive the squared end c^2 of the spindle c' snugly, so that when the cap E is screwed down into place upon the barrel the spindle is rotated, and through the action of the disk cooperating with the threaded portion of the barrel the valve C is raised, free longitudinal movement of the spindle within the recess e being permitted. Similarly when the closure E is unscrewed the operation is reversed and the valve seated, this being the position illustrated in Fig. 1, where the closure is shown as partially unscrewed and ready for removal to permit filling.

An important feature of my invention consists of the means I have devised to insure an ink-tight joint between the members of the reservoir, comprising in the form of pen shown in Fig. 1 the barrel A and its closure E. The material of the barrel-tube is longitudinally extended beyond the outer thread a^4 , as at a^5 , to enter the closure E and of suitable length to come into contact with the shoulder e' , formed in the inner surface of the closure, and in this instance inclined just before the closure reaches its seat against the outer shoulder a^6 of the barrel, and the

walls of this tubular extension are preferably reduced in thickness, so that they may yield readily to compression by the shoulder under the thrust of the screw, insuring an absolutely tight union, (best illustrated in Fig. 1,) eliminating any possibility for the escape of ink between barrel and closure to soil the fingers or clothes. A further and similar application of this improved union is illustrated in Fig. 2, where the barrel is shown as of modified form, consisting of two sections M H, connected by a screw-joint 5 in the intermediate portion of the barrel and sufficiently removed from the region of union with the cap N to avoid disturbance of the joint when the cap N is being removed and replaced. The section M has a tubular extension *m*, the walls whereof are preferably slightly reduced in thickness toward the end *m'* and preferably beveled to engage a contraction *h* in the walls of the section H adjacent the feeder-bore *h'*. This inner union has the same relation to the joint as that already described with reference to the closure at the head, so that as the parts H M are assembled the inner union is effected before the joint at 5 is completed, preventing all chance of leakage at the latter; nor is the reservoir capacity sacrificed, as will be readily seen from the extent of the portion *m*. By the use of these inner unions and the other novel features of construction set forth I am enabled to obviate the necessity for elaborate outside joints, shoulders, and roughenings and to provide a pen of uniformly smooth exterior the advantage of which will be readily apparent to users and those skilled in the art.

Having thus fully set forth the nature of my improvements in the barrel and its component parts, the construction of which may, however, be considerably varied without departing from the spirit of my invention, I will now describe the ink-feeder. (Shown in Figs. 1 and 2 and illustrated on an enlarged scale in Figs. 3, 4, and 5.) This consists, essentially, of a feed-bar B, in which are formed a plurality of longitudinal conduits differing in construction and function, one of these, *b*, being of relatively large area and preferably circular in cross-section, while another, *b'*, is of a design favorable to capillary action and preferably acutely V-shaped in cross-section. These conduits may be confined wholly or in part within the body of the feed-bar; but the capillary conduit is preferably open for the greater part of its length and has been illustrated as open throughout. The lower end *b*² of the feed-bar terminates at a suitable distance from the nib of the pen P and is interiorly excavated in the form of an elongated open chamber or sinus *b*³, of suitable cross-section, preferably V-shaped, and in communication at its inner end with the conduits *b b'*, which discharge thereinto.

The reservoir having been filled and the conduits once moistened, the feeding action is maintained as follows, viz: By the capil-

lary property of the conduit *b'* an ink-directing path of high ink conductivity is constantly present between the sinus *b*³ and the ink above the feed-bar, so that the least withdrawal of ink from the sinus by way of the pen in the act of writing is accompanied by a flow through *b'*, induced by capillarity and aided by gravity.

The capillarity of the conduit *b* may be relatively low, but its capacity is large, and under the influence of the vacuum created in the reservoir by the slight withdrawal of ink therefrom through conduit *b'* air will rush in through *b*, the larger and hence more available path, with a consequent descent of ink to augment the supply in the sinus, this descent being much greater in volume than the flow in *b'*, and by a constant repetition of this action during writing sufficient ink is supplied to the sinus to insure the ability of the latter to feed the pen continuously under all conditions of heavy and light draft. The number and contour of these conduits may be varied as desired without departing from the spirit of this feature of my invention, which lies in the provision of separate conduits, one at least of relatively high capillarity to insure the presence at all times of an ink-directing path of high ink conductivity, and another conduit of sufficient size to permit the passage of a copious supply of ink in one direction toward the pen, and at the same time presenting an easy passage for air to fill the vacuum formed in the reservoir by the withdrawal of ink therefrom through either or both conduits.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a fountain-pen, a continuous reservoir-chamber having at one end a discharge-aperture, and at the other end a filling-aperture and means contained wholly within the reservoir-chamber to close the inner end of the discharge-aperture when the filling-aperture is open, substantially as described.

2. In a fountain-pen, a reservoir having at one end a discharge-aperture and at the other a filling-aperture and means controllable from the filling end of the reservoir to close the inner end of the discharge-aperture at times, said means being contained wholly within said reservoir and removable through said filling-aperture, substantially as described.

3. In a fountain-pen, a reservoir having a discharge-aperture and a filling-aperture, a valve for the inner end of said discharge-aperture and means to automatically close said valve when the filling-aperture is opened and to open said valve when the filling-aperture is closed, substantially as described.

4. In a fountain-pen, the reservoir-chamber having a valve-controlled discharge, a closure, and means intermediate said valve and closure to enable said closure to shut said valve positively and automatically upon removal of said closure.

5. In a fountain-pen, the reservoir having

a discharge-aperture, a valve for the inner end thereof, a closure, and means adapted to be engaged and operated by said closure, and arranged to close the valve upon removal of the closure, and to open the valve upon replacement of the closure, substantially as described.

6. In a fountain-pen, a discharge-aperture, a valve therefor having a stem, a removable closure recessed to receive said stem, and means to cause longitudinal movement of the stem by and in a direction opposite to that of the closure, substantially as described.

7. In a fountain-pen, a plurality of members adapted to be assembled end to end and connected when so assembled, one of said members having a recess with inclined walls, and the other being provided with a reduced extension to enter said recess to engage and be compressed by said inclined walls, to form therewith a union independent of the outer connection, substantially as described.

8. In a fountain-pen, a plurality of tubular members adapted to be assembled end to end and connected by an outer joint, said members being respectively provided with means cooperating to form an inner union independent of the outer joint and before the latter is completed, substantially as described.

9. In a fountain-pen, a barrel open at one end, a closure therefor, and a tubular member intermediate said barrel and closure to cooperate with, and effect union of the same

upon, and prior to complete emplacement of, the closure, substantially as described. 35

10. An ink-feeder for fountain-pens, consisting of a bar having a longitudinal duct substantially V-shaped in cross-section, a separate longitudinal duct substantially circular in cross-section, and an open chamber or sinus in the forward portion of the bar, adjacent the nib of the pen, and in communication with the ducts, substantially as described. 40

11. In a fountain-pen, a plurality of members adapted to be telescopically assembled and thereby detachably connected, one of said members having an inner shoulder and the other member having an extension to enter within the other member to engage and be compressed by the shoulder, substantially as described. 45 50

12. In a fountain-pen, the reservoir-chamber having a valve-controlled discharge, a closure, means intermediate said valve and closure to enable said closure to shut said valve positively and automatically upon removal of said closure, and means to keep said valve shut after said removal. 55

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses. 60

ARTHUR A. WATERMAN.

Witnesses:

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AUGUSTA E. DEAN.