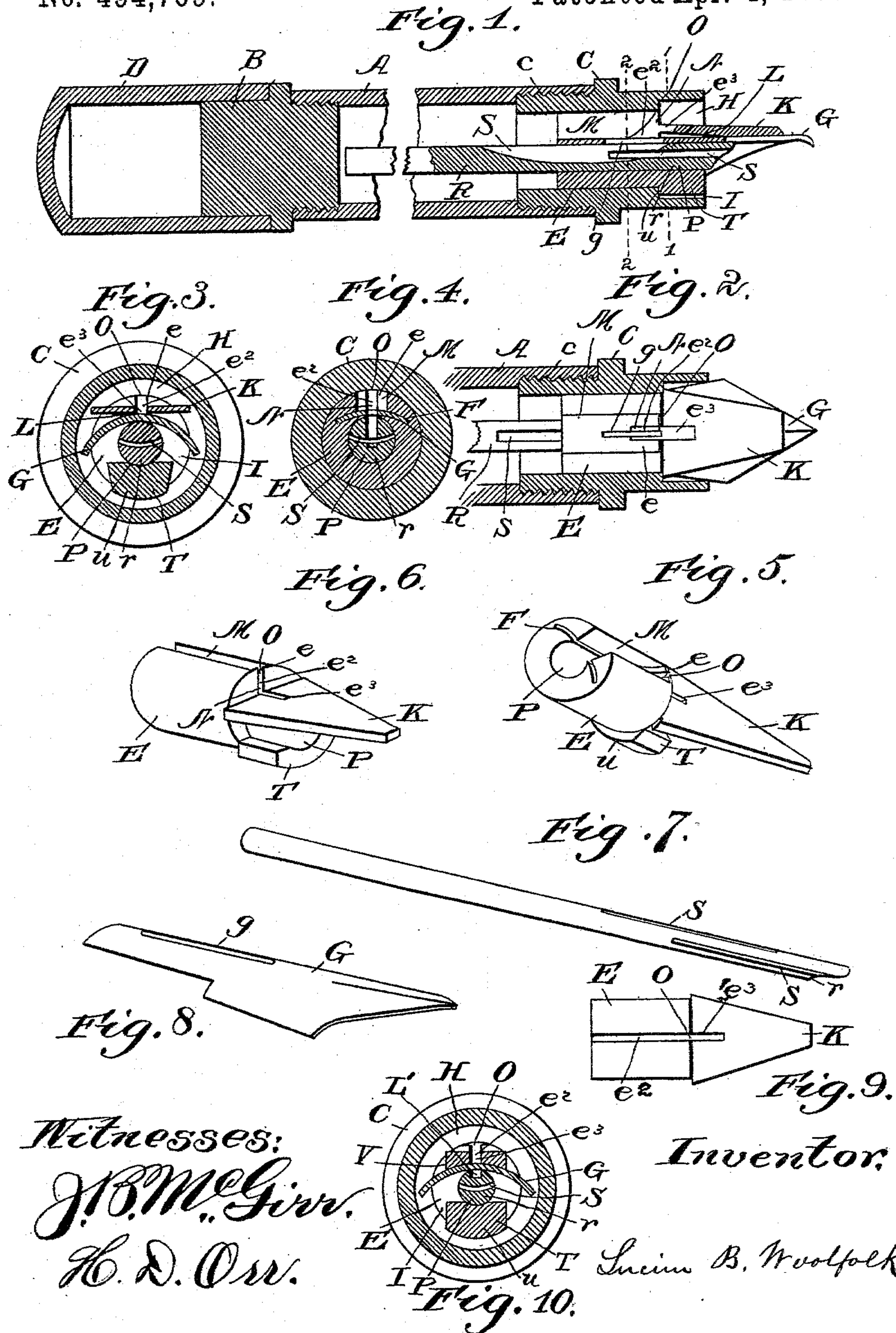


L. B. WOOLFOLK.  
FOUNTAIN PEN.

No. 494,769.

Patented Apr. 4, 1893.

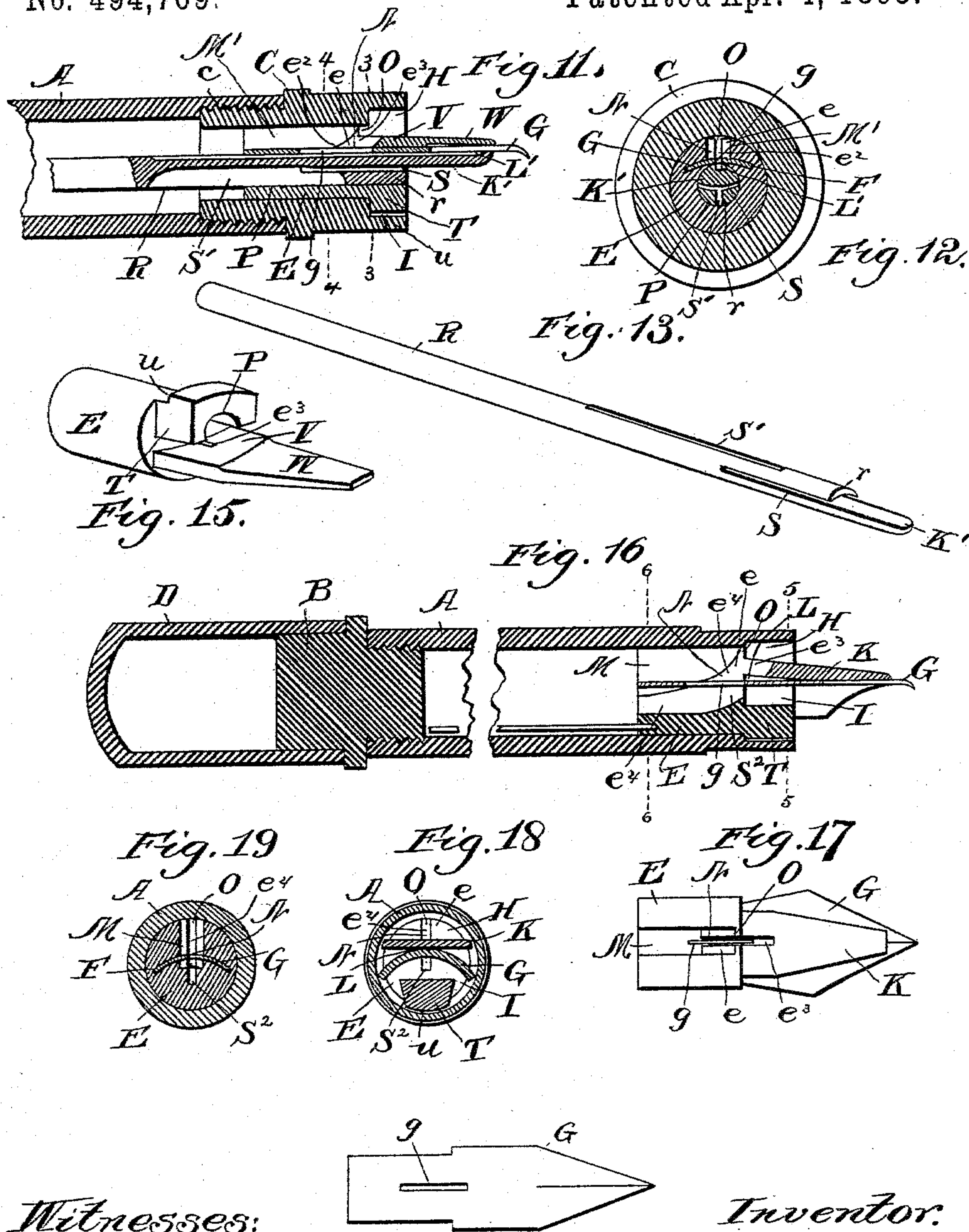




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Witnesses:

J. B. McGivver.  
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Fig. 14.

Inventor:

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# UNITED STATES PATENT OFFICE.

LUCIEN B. WOOLFOLK, OF NEWARK, NEW JERSEY.

## FOUNTAIN-PEN.

SPECIFICATION forming part of Letters Patent No. 494,769, dated April 4, 1893.

Application filed February 18, 1893. Serial No. 462,834. (No model.)

*To all whom it may concern:*

Be it known that I, LUCIEN B. WOOLFOLK, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Fountain-Pens; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention belongs to that class of fountain pens in which a stopper fitting in the lower end of an ink-holder carries a pen, and a feed-tongue to convey ink to the point of the pen. It is my aim to make a fountain pen which will flow readily, not "leak," be easily cleaned, and not liable to get out of order. This is effected by means of the construction set forth in this specification and the accompanying drawings.

The accompanying drawings are on an enlarged scale, the better to represent my invention.

Figures 1 to 8 inclusive represent the preferred form of my invention. Fig. 1 is a longitudinal section of a fountain pen representing my invention. Fig. 2 is a sectional plan of the lower part of the same, showing a horizontal section of the point section, and a plan of the feed apparatus. Fig. 3 is a cross section of the same through the line 1, 1, of Fig. 1, looking from the point of the pen. Fig. 4 is a cross section of the same through the line 2, 2, of Fig. 1, looking toward the point of the pen. Fig. 5 is a perspective view of the stopper. Fig. 6 is a perspective view of the stopper seen from another angle of observation. Fig. 7 is a perspective view of the ink-rod. Fig. 8 is a perspective view of the pen. Fig. 9 represents a modification of the stopper. It is a plan view of the same. Figs. 10 to 15 inclusive represent a modification of my invention. Fig. 11 (Sheet 2) is a longitudinal section of the lower part of a fountain pen representing my invention. Fig. 10 (Sheet 1) is a cross section of the same through the line 3, 3, of Fig. 11, looking from the point of the pen. Fig. 12 is a cross section of the same

through the line 4, 4, of Fig. 11, looking toward the point of the pen. Fig. 13 is a perspective view of the ink-rod and feed tongue as seen from beneath. Fig. 14 is a plan view of the pen which is straight in the wings thereof and not flared. Fig. 15 is a perspective view of the stopper as seen from beneath, showing the projection, the stop-check thereon, the longitudinal hole therein, the lip, the ink gatherer, and the slot in the lip. Figs. 16 to 19 inclusive represent another modification of my invention. Fig. 16 is a longitudinal section of a fountain pen showing my invention. Fig. 17 is a plan of the stopper and feed apparatus. Fig. 18 is a cross section of the same through the line 5, 5, of Fig. 16, looking from the point of the pen. Fig. 19 is a cross section of the same through the line 6, 6, of Fig. 16, looking toward the point of the pen.

Similar parts are designated by similar letters.

Referring especially to Figs. 1 to 8 inclusive, I will now describe my invention.

A designates the barrel of the ink-holder, closed at the upper end by the plug B.

C designates the tubular point section of the ink-holder joined to the barrel A by the screw joint c. The barrel A and the point section C together constitute the ink-holder; though the ink-holder may consist of a barrel only, closed at the upper end, and having a stopper fitting in the lower end thereof.

B designates the ordinary protecting cap, fitting on a cap-flange provided on the lower end of the ink-holder and on the upper end thereof.

E designates the stopper fitting in the point section. The stopper E is provided with the transverse slot F constructed entirely within the circumference thereof. In this transverse slot is held the pen G, which is provided with the ink aperture g in the heel thereof, which consists of a single slot, though it may have more than one slot or be a series of holes. The lower end of the point section is reamed out to provide therein the enlarged antechamber H back of the pen, and the enlarged ink cup I below the pen. The ink cup I comprises all the space beneath the pen below the lower end of the stopper. The antechamber H extends back of the pen from the lower



end of the stopper down to the end of the point section.

In order to make the bore of the point section sufficiently large to hold the stopper E, the lower end of the barrel A is countersunk for the purpose of receiving the screw joint  $e$ , by which means the screw may be made larger and the point section may be provided with a larger bore, and, in order to secure a sufficiently large diameter in the lower end of the point section for reaming out therein the antechamber H and the ink cup I to a larger diameter than the bore of the point section, a novel construction is adopted:—  
 First the cap-flange of the point section on which the protecting cap D fits is enlarged to such an extent that the peripheral diameter of the protecting cap which fits thereon is greater than the peripheral diameter of the barrel A; and second the point-section is made so short that the reamed portion thereof containing the antechamber and the ink cup is within the said enlarged cap-flange, so that the heel of the pen is within the screw joint that joins the point section to the barrel. The reaming preferably extends up to the lower end of the stopper E; but, where preferred, it may stop short of that point. The object of the reaming is to so enlarge the ink cup as to give it sufficient capacity to hold overflows of ink, and to so enlarge the antechamber H as to allow the free passage of air through it to the air inlet O. The reaming should extend far enough in to accomplish these results.

The pen G is preferably flared in the wing thereof, so as to touch the reamed portion of the point section at the lower end thereof. But this flaring is not essential to the objects of my invention, and the pen may be constructed without any flare if preferred.

In this construction, a projection integral with the stopper extending down adjacent to the back of the pen, and cut away on the top side thereof constitutes the feed-tongue K. It is also flattened on the bottom side thereof, and at the upper end of the bottom side thereof it is cut away, so as to leave a small space between it and the pen.

L designates the ink conduit between the pen and the feed-tongue K.

M designates a wide longitudinal groove provided in the stopper back of the pen. The groove M as is here represented extends at the top thereof from the upper end of the stopper E down almost to the lower end of the same. The groove M may extend entirely to the lower end of the stopper at the top thereof or cut through the same. It is sufficient for the purpose of my invention that it shall extend at the top thereof down to about the lower end of the stopper.

In the lower end of the stopper below the longitudinal groove is a diaphragm  $e$ , which is not cut through by the longitudinal groove. This diaphragm prevents the ink in the groove M from gushing out at the lower end of the

stopper. The diaphragm  $e$  is cut through with a narrow slot  $e^2$ , which by its narrowness regulates the flow of ink and air passing through it. The bottom part of this narrow slot next the pen is designated the ink duct N; and the top thereof next the inner wall of the ink-holder is designated the air inlet O. The narrow slot  $e$  extends down into the feed-tongue K, where it is designated  $e^3$ . This slot  $e^3$  in the feed-tongue serves for the alternate passage of air into the barrel and the flow of ink to the pen. When the antechamber H contains ink, the ink therein passes to the point of the pen through the slot  $e^3$ ; and when air is passing into the ink-holder it passes through the slot  $e^3$  as well as through the air inlet O, so that the slot  $e^3$  serves thus upon occasion to enlarge the air inlet for the passage of air.

P designates a longitudinal hole provided in the stopper below the pen. In the longitudinal hole P is held the ink rod R; in which is provided the ink outlet S by cutting a groove into the ink rod from the top side thereof, and intersecting this groove by a transverse cut made from the lower end of the ink rod. These communicating cuts form a passage for ink from the ink aperture G and from the ink-holder down into the ink cup I, leading overflows of ink readily to the ink cup to be held therein. The ink rod I extends down to a point just below the slit in the pen; but it may stop short of that point, or may be extended as much farther down as may be desired. The purpose of the ink rod R and the ink outlet S therein is to convey overflows of ink to the ink cup I so readily as to prevent the pen from "leaking," while, at the same time, the outlet is so constructed as to prevent air from entering the ink-holder through the ink outlet. The form of the rod may be varied, and the ink outlet may be provided in any manner that will secure these objects. Integral with the bottom side of the ink-rod R is the finger or elongation  $r$ , extending down into the ink cup I.

T designates a projection below the pen integral with the bottom side of the stopper E, extending down into the ink cup I, and which by partially filling up the ink cup, reducing its capacity and increasing its surface, thereby causes it to hold ink by capillary attraction. The stop-check  $u$  upon the projection T limits the entrance of the stopper into the ink-holder.

In practical operation in this construction, ink flows to the pen through the longitudinal groove M, the ink duct N, and the ink conduit L; and also through the ink outlet S, and the ink aperture  $g$  in the pen, and on through the ink duct N toward the point of the pen. Air enters the ink-holder through the antechamber H, the air inlet O, and along the top of the longitudinal groove M. Overflows of ink pass freely into the ink cup, and are held therein till gradually fed to the point of the pen. A portion of the ink in the ink



cup is fed to the pen by the ink-rod R. Another portion will pass by capillary attraction around the edge of the stopper E to the top side of the pen, where it is fed to the pen through the ink conduit L.

My construction presents a number of important advantages:—

First. The longitudinal groove M extending down about to the lower end of the stopper carries ink in a full flow down to its lower end, and thus makes the stopper for the passage of air and ink practically a disk or diaphragm, making the ink duct very short, and reducing the air inlet O to a mere line at the top thereof. This shortening of the ink duct and air inlet prevents them from drying out and stopping the flow of ink, as long passages do, and thus prevents all failure of ink flow and all "skipping." But with this construction ink would gush out through the narrow slot  $e^2$  were it not prevented: first, by the narrowness of the slot  $e^2$ , which both limits the outflow of ink and the inflow of air; second, by the antechamber H which catches and holds out-gushing ink and seals up the air inlet as a water seal, thereby stopping the outflow of ink out of the ink-holder, by preventing the inflow of air, as well as by catching the ink.

Second. Another advantage of my construction, is while the construction of the broad longitudinal groove M gives the stopper all the advantage of a disk or diaphragm for the ready passage of air and ink, the length of the stopper affords a firm and secure bearing for the pen and the ink-rod, holding them both firmly.

Third. Another advantage of my invention is the construction by which overflows of ink are readily led to the enlarged ink cup I, and held therein till gradually fed therefrom to the pen.

Fourth. Another advantage of my construction is the enlargement of the ink cup to a capacity sufficient to hold overflows of ink, and thereby prevent "leaking."

Fifth. Another advantage of my construction is partially filling the ink cup by the projection T, and thus causing it to hold ink by capillary attraction, for the ink cup would be too large to hold ink without its dripping therefrom, if it were not partially filled up by the projection T. The projection T here extends to the lower end of the ink cup, though it may stop short of it if preferred, and it may also be constructed in any suitable shape that may be desired.

Sixth. Another advantage of my construction is the forming of the antechamber H, and enlarging it by reaming out the lower end of the point section so that it gives free passage of air to the air inlet O. The antechamber H serves the double purpose of allowing the passage of air through it as aforesaid, and of catching and holding overflows of ink and sealing up the air inlet. If the antechamber were not enlarged by reaming out the lower

end of the point section, the space back of the feed-tongue K would constantly be filled with ink held therein by capillary attraction, preventing the admission of air to the air inlet. To prevent this, it is necessary to ream out the antechamber to such a diameter that ink will not be held therein by capillary attraction.

Seventh. A special advantage of my construction is enlarging the cap-flange of the point section, and so shortening the point section that the reamed portion thereof comes within the enlarged cap-flange; so that it is capable of being reamed sufficiently to enlarge the ink cup and the antechamber to the size necessary for their proper and efficient action. Without enlarging the point section, and so shortening it that the reaming comes within the enlarged cap-flange, the lower end of the point section could not be reamed out sufficiently to enlarge the ink cup and the antechamber so as to make them adequate to the performance of their function. My invention does not consist merely in reaming out the lower end of the point section, but especially in so constructing the point section, by enlarging and shortening it, that it is capable of being adequately reamed out.

Various modifications may be made both of the form of my fountain pen and also in point of structural detail without departing from the principle of my invention.

A modification of the stopper is represented in Fig. 9. This modification consists in dispensing with the broad longitudinal groove M, and extending a narrow slot like  $e^2$ , constituting the air inlet and ink duct, up to the upper end of the stopper. In all other respects this stopper is substantially similar to the preferred form.

The modification represented in Figs. 10 to 15 inclusive is, in all its general features, similar to the preferred form. It has the stopper E; the longitudinal groove M'; the diaphragm  $e$ ; the narrow slot  $e^2$  containing the ink duct N and the air inlet O, and the slot  $e^3$ ; the antechamber H back of the pen, and the ink cup I beneath the pen, both enlarged by reaming out the lower end of the point section; it has also the longitudinal hole P; the projection T; and the stop-check  $u$ . This modification also has the lower end of the barrel countersunk to receive the screw joint  $c$ ; and the point section is enlarged and shortened to admit of the adequate reaming out of the lower end thereof. But it differs from the preferred form in a number of particulars:—

First. The broad longitudinal groove slightly cuts through the top of the stopper at the lower end thereof, thus somewhat enlarging the air inlet O by a lateral extension. This form, I find by practical experiment, will not cause the pen to "leak," provided the cut is not too deep into the diaphragm  $e$ .

Second. The ink rod R is held in the longitudinal hole P below the pen, and the feed-tongue K' is integral with the top side of the



ink rod, and the finger *r* is integral with the bottom side thereof. The ink conduit *L'* is a groove in the top side of the feed-tongue and ink rod. The ink outlet *S'* is formed by cutting a groove in the bottom side of the ink rod which communicates with the transverse cut in the lower end of the ink rod.

Third. Ink is conducted to the pen by the feed-tongue *K'* beneath the pen.

Fourth. Back of the pen is a projection integral with the stopper cut away on the top side thereof. The upper part of said projection, extending down almost to the slit in the pen, is designated the lip *V*, which fits close upon the back of the pen, so as to prevent the passage of ink and air between them; the pen in this modification being straight the wings thereof not being flared. The lip is cut away on top for the purpose of forming the antechamber *H*, as in the preferred form, so as to allow the passage of air through it to the air inlet. The lower part of said projection integral with the lip *V* is the ink gatherer *W*, which is cut away on the bottom side thereof and flattened, and which is not intended to conduct ink from the ink holder to the pen, but to gather upon the back of the pen the ink brought by the feed-tongue *K'* below the pen.

Fifth. The lower end of the point section is reamed out as in the preferred form. But the reaming does not extend entirely up to the lower end of the stopper. It extends, however, high enough to sufficiently enlarge the ink cup *I* to hold overflows of ink; and it extends high enough to cause the enlarged antechamber *H* to allow air to pass through it readily to the air inlet *O*; which are the only points essential in its construction.

In other particulars, this modification is substantially similar to the preferred form.

The mode of operation in this modification is readily perceived by a glance at the drawings. Ink is conducted to the pen by the longitudinal groove *M'*, the ink duct *N*, the ink aperture *g* through the pen, and the feed-tongue *K'* below the pen; and air enters the air inlet through the antechamber *H* and passes on into the barrel.

The modification represented in Figs. 16 to 19 inclusive is similar in most respects to the preferred form as regards the feed apparatus.

First. The chief special difference in the feed apparatus is below the pen, where the longitudinal hole *P* and the ink rod *R* are dispensed with, and the ink outlet *S*<sup>2</sup> is provided by extending the narrow slot *e*<sup>4</sup> below the pen. It is not necessary for the longitudinal groove to extend below the pen for this purpose; but as it is formed with a circular saw it is more conveniently formed by extending it below the pen. The narrow slot *e*<sup>4</sup> constitutes the ink outlet below the pen. It cuts through the lower end of the stopper below the pen, so as to communicate with the ink cup *I*, and conducts ink from the ink aperture *g*, and from the ink-holder to the ink cup *I*. It works

very well, as I find by practical experiment; its only inferiority to the preferred form being a slowness in returning ink from the ink cup to the ink-holder when the pen is reversed.

Second. In this modification the ink-holder consists of a barrel without a point section. The cap-flange on the lower end of the barrel is made as large as practicable, so that the periphery of the protecting cap has a greater diameter than the periphery of the barrel. By this means the point section is capable of being reamed out at the lower end to a certain extent; but the reaming cannot be so deep as where a point section is used.

In other particulars, this modification is substantially similar to the preferred form.

I have received a patent for improvements in fountain pens No. 457,470, issued August 11, 1891, in which are some points of similarity to my present invention; but that patent has no longitudinal hole *P*, and it has neither the ink rod *R*, the ink outlet *S*, the ink cup *I*, the projection *T*, nor the antechamber *H*. Nor does the longitudinal groove *M* in that patent extend to the lower end of the stopper. Nor has it the sides of the heel of the pen grooved in the transverse slot *F* above the diaphragm *e*. Nor does the ink aperture *g* perform the office in that patent of passing ink to the point of the pen and to the ink cup, but it only serves to return ink to the barrel. I have also had a patent No. 481,090, issued August 16, 1892, in which are some points of similarity to my present invention. But that patent has not the features peculiar to my present invention,—the feed-tongue back of the pen integral with the stopper—the longitudinal groove *M* extending to the lower end of the stopper—the stop-check *u* constructed upon the projection *T*—the ink rod *R*—the enlarged ink cup *I*—the antechamber *H*—nor the lower end of the ink-holder reamed out to enlarge the ink cup and the antechamber.

I do not wish to claim anything set forth in those patents, but only those features which are new and peculiar to my present invention.

What I claim is—

1. In a fountain pen, the combination with a tubular ink-holder reamed out at its lower end to form an enlarged ink cup, of a stopper having a feed-tongue adjacent to the pen, a transverse slot entirely within the circumference thereof, a pen held in the transverse slot, an air inlet back of the pen, an ink duct whereby ink may flow to the pen, and an ink rod having a passage through it whereby ink may be conveyed to the ink cup, all substantially as described.

2. In a fountain pen, the combination with an ink holder closed at the upper end, of a stopper held in the lower end of the ink-holder, a pen held in the stopper, a feed-tongue adjacent to the pen, a narrow slot in the stopper back of the pen containing an air



inlet in the outer portion thereof next the ink-holder, and an ink duct in the inner portion thereof next the pen, an antechamber formed within the ink-holder by boring out the lower end thereof to a larger diameter than the bore in which the stopper is held, through which air passes to the air inlet, and which catches ink and seals up the air inlet in out gushes of ink, and ducts and passages whereby ink may flow out of the ink-holder to the point of the pen, and air may enter the ink-holder.

3. In a fountain pen, the combination with an ink holder closed at the upper end, of a stopper held in the lower end of the ink-holder, a pen provided with an ink aperture in the heel thereof held in the stopper, a feed-tongue adjacent to the pen—said stopper provided with a longitudinal groove back of the pen, and also with a longitudinal hole therein below the pen, a rod held in the longitudinal hole provided with an ink outlet therein, an ink cup below the stopper beneath the pen enlarged by reaming out the lower end of the ink-holder to a larger diameter than the bore in which the stopper is held, and ducts and passages whereby ink may flow out of the ink-holder to the point of the pen, and air may enter the ink-holder.

4. In a fountain pen, the combination with an ink-holder closed at the upper end, of a stopper held in the lower end of the ink-holder, a pen held in the stopper, a feed-tongue back of the pen integral with the stopper, an ink cup beneath the pen below the lower end of the stopper enlarged by reaming out the lower end of the ink holder, an ink outlet below the pen through which ink may flow to the ink cup, and ducts and passages whereby ink may flow out of the ink-holder to the point of the pen, and air may enter the ink-holder.

5. In a fountain pen, the combination with an ink-holder closed at the upper end, of a stopper held in the lower end of the ink-holder, provided with a longitudinal projection integral with the bottom side of the stopper, a pen held in the stopper, a feed-tongue back of the pen, an ink cup beneath the pen and below the lower end of the stopper—said projection extending down into the ink cup, and ducts and passages whereby ink may flow out of the ink-holder to the point of the pen, and air may enter the ink-holder.

6. In a fountain pen, the combination with an ink-holder closed at the upper end, of a stopper held in the lower end of the ink-holder, a pen held in the stopper provided with an ink aperture in the heel thereof, an ink cup below the pen, an ink outlet below the pen communicating with the ink aperture in the pen through which ink may flow to the ink cup, and ducts and passages whereby air may enter the ink holder, and ink may flow out of the ink-holder to the point of the pen.

7. In a fountain pen, the combination with an ink-holder closed at the upper end, of a

stopper held in the lower end of the ink-holder provided with a transverse slot therein for holding the pen, a pen held in the transverse slot, a feed-tongue back of the pen, an ink cup below the pen enlarged by reaming out the lower end of the ink-holder, said pen provided with an ink aperture in the heel thereof for passing ink toward the point of the pen, and toward the ink cup, substantially as described.

8. In a fountain pen, the combination with an ink holder, of a stopper held in the lower end of the ink-holder, provided with a transverse slot for holding a pen extending entirely within the circumference thereof, a feed-tongue back of the transverse slot, a longitudinal groove back of the pen longer on the top side than the bottom side thereof, a diaphragm in the stopper below the longitudinal groove, a pen held in said transverse slot passing through the diaphragm, and, above the diaphragm, having the sides of its heel grooved in the transverse slot, substantially as described.

9. A fountain pen having an ink-holder closed at the upper end, a stopper in the lower end of the ink-holder provided with a transverse slot constructed entirely within the circumference thereof for holding a pen, and also provided with a longitudinal groove back of the pen slot, a diaphragm in the lower end of the stopper below the longitudinal groove, and an air inlet back of the pen cut through the diaphragm—said ink-holder provided with an enlarged antechamber in the lower end thereof back of the pen formed by reaming out the lower end thereof—all substantially as described.

10. A fountain pen having an ink holder closed at the upper end, a stopper in the lower end thereof provided with a transverse slot for holding a pen, a longitudinal groove back of the pen slot, a diaphragm closing the lower end of the longitudinal groove, a narrow slot cut through the diaphragm and extending down below the stopper into a projection located back of the pen—said ink-holder provided with an enlarged antechamber back of the pen formed by reaming out the lower end thereof—all substantially as described.

11. A fountain pen, having the ink-holder reamed out at its lower end, a stopper having a projection extending through the reamed out portion of the ink-holder leaving an antechamber between the top side of the reamed out portion of the ink-holder and said projection, a pen located beneath the projection, an ink passage extending through said stopper back of the pen, and an air inlet in the stopper back of the projection, the air inlet communicating with the ink passage and the ante chamber, substantially as described.

12. In a fountain pen, a stopper having a transverse pen slot extending entirely within the circumference thereof, a longitudinal groove back of the pen longer at the top side than at the bottom side thereof, an air inlet



O, and an ink duct N, communicating with the longitudinal groove, substantially as described.

13. In a fountain pen, a stopper having a  
5 transverse slot for holding a pen extending entirely within its circumference, a longitudinal hole below the transverse slot, an integral projection on the under side of its lower end, an integral projection back of the pen cut  
10 away on its top side, an air inlet, and an ink passage in the top side thereof, substantially as described.

14. In a fountain pen, the combination of a point section having its upper end screw

threaded, and reamed out at its lower end, 15 with a stopper having a transverse pen holding slot extending entirely through the same from end to end, a pen located in said slot and having its heel extending within the screw threaded portion of the point section, 20 and suitable ink ducts and air passages, all substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

LUCIEN B. WOOLFOLK.

Witnesses:

LAURA B. HOLDERBY,  
J. A. ADAMS.