No. 824,688. PATENTED JUNE 26, 1906.

W. I. FERRIS.

FOUNTAIN BRUSH.

APPLICATION FILED MAY 28, 1904.

Fig. 1

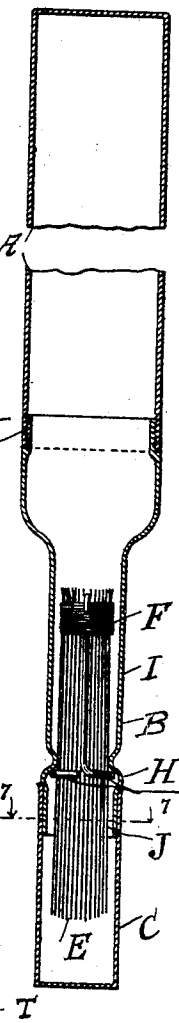


Fig. 9

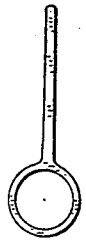


Fig. 2

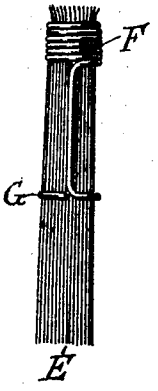


Fig. 3

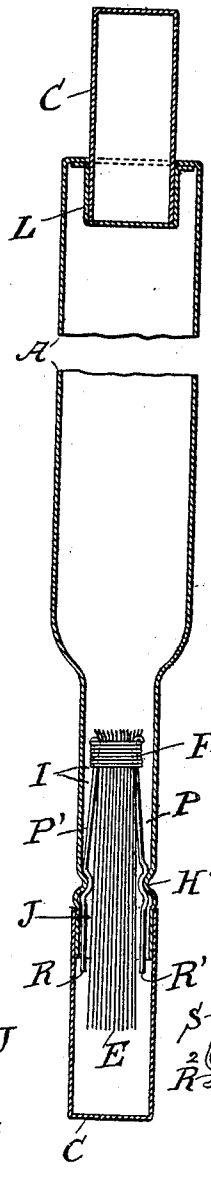


Fig. 10.

Fig. 8.

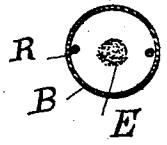


Fig. 7.

Fig. 5.

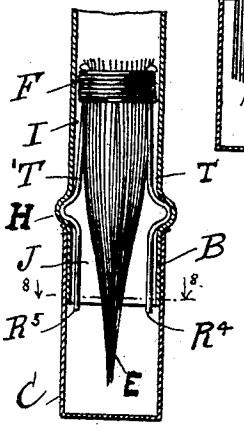


Fig. 6.

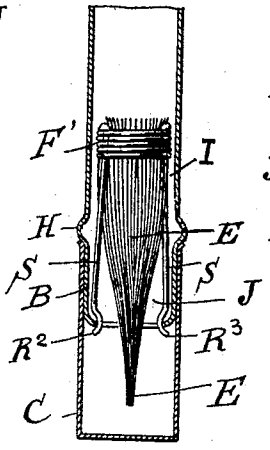
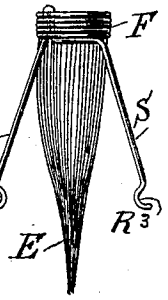


Fig. 4.



Witnesses

Frederick H. Sherman

Walter B. Raymond

William I. Ferris Inventor

By his Attorney Samuel J. Watson

UNITED STATES PATENT OFFICE.

WILLIAM I. FERRIS, OF STAMFORD, CONNECTICUT, ASSIGNOR TO L. E. WATERMAN COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

FOUNTAIN-BRUSH.

No. 824,688. Specification of Letters Patent. Patented June 26, 1906.

Application filed May 28, 1904. Serial No. 210,184.

To all whom it may concern:

Be it known that I, WILLIAM I. FERRIS, a citizen of the United States, residing in the city of Stamford, in the county of Fairfield and State of Connecticut, have invented a new and useful Improvement in Fountain-Brushes, of which the following is a full, clear, and exact specification.

The purposes and objects of my invention are to produce a fountain-brush which may be used for marking or making signs, tickets, or other marking or writing or for marking boxes, barrels, packages, or other articles and to construct such a fountain-brush in which the ink or other writing medium flowing from the reservoir to the brush-point is automatically regulated and automatically controlled so as to provide a certain and sufficient supply at the brush-point when required for use and in which this supply is automatically shut off when not required for use.

Another object and purpose of my invention is to construct a fountain-brush from the nozzle of which the brush may be readily and quickly attached and detached without unscrewing the nozzle from the reservoir or detaching any of the other parts of the brush. This permits a renewal or changing of the brush portion at any time and also furnishes easy means of cleansing the brush of any dirt or impurities.

In most of the fountain-brushes previously invented or constructed the air is admitted into the reservoir to take the place of the writing fluid drawn off in use at their top end—that is, at the end opposite the marking end. Such brushes may be classed as "top-vented." Some of these attempt to avoid the many well-known objections to top-venting by inserting within the reservoir a tube, one end of which is connected with a vent or air-inlet, the other end extending down, or first upward and then down, to a greater or less extent into the body of the writing fluid. In some of these fountain-brushes this tube is constructed so it may be closed when the brush is not in use and opened or partially opened when in use. In some fountain-brushes the reservoir has flexible or compressible sides which when pressed by the fingers squeezes out or squirts out the ink from the reservoir, the air to take the place of the ink thus forced out entering the reservoir at its lower end intermittently between the squeezes or squirts. I do away with all methods of venting the brush at the top end and all methods of obtaining ink and air movement by pressing or squeezing flexible or compressible sides or parts of the fountain-brush.

The object of my invention is to provide a fountain-brush which is completely closed and air-tight except at its lower or marking end and in which air is admitted to the reservoir automatically with the emission of ink and only at, around, or through the brush and ink, and I attain this object by the construction and combination of parts now to be described in the specification with reference to the drawings and as pointed out in the claims.

Figure 1 is a longitudinal sectional view of my fountain-brush, showing in perspective the brush and the spring holding the brush in place. Fig. 2 is a perspective view of the brush and spring portion of my device as shown in Fig. 1. Fig. 3 is a longitudinal sectional view of a slightly-modified form of my device, showing in perspective the brush and spring which holds the brush in place within the reservoir. Fig. 5 and Fig. 6 are longitudinal sectional views of the nozzle or lower end of my device, showing in perspective slightly-modified forms of my brush and the spring which holds the brush in place within the nozzle. Fig. 4 is a perspective view of the spring shown in Fig. 6. Fig. 7 is a cross-sectional view of my brush on the line 7 7, Fig 1. Fig. 8 is a cross-sectional view of my brush on the line 8 8, Fig. 5. Fig. 9 is a plan view of a modified form of the spring for holding the brush within the holder, showing it in a form as it is cut from a thin sheet of metal. The part X, which incloses the brush is bent at Y, so as to be at right angles with the part V. The end *w* of the part V is so bent that it may be used to attach the spring to the brush at or about the collar which holds the bristles of the brush together. Fig. 10 shows the same form of spring as in Fig. 9, but bent and attached to the brush.

Similar letters refer to similar parts throughout the several views.

My fountain-brush consists of the usual reservoir A, in which the ink or writing fluid is contained. (Shown in the cylindrical form in the drawings.) This reservoir is provided

with a nozzle B, joined with the reservoir proper by the usual screw-joint N, at which joint the two parts may be detached for the purpose of filling the reservoir, or these parts may be all in one piece, as shown in Fig. 3, and the reservoir filled from the open end of the nozzle. The nozzle has a collar or ridge H, which forms a projection within the nozzle, as shown in Figs. 1 and 3, against which the spring G binds and holds the brush E in place within the nozzle. The means of binding or holding the brush E within the nozzle may be obtained by forming or constructing a ring, groove, or notch in the interior of the nozzle, as shown in Fig. 5, into which ring, groove, or notch projections on the springs R^4 and R^5 fit or bind.

The spring G, Fig. 1 and Fig. 2, is formed, preferably, by a piece of flexible metal or wire surrounding the brush, preferably at some point intermediate between its two ends and of such relative size that it will fit into and pass into and make a tight fit with the nozzle. The spring is secured in a convenient manner to the brush at or near its top end. Modified forms of the spring for holding the brush within the nozzle, consisting of flexible metal or wire secured at or near the top end of the brush and springing outward from the brush, are shown in Figs. 3, 4, 5, and 6. In these modified forms the points of the springs may be grasped by the fingers and the springs and brush removed from the nozzle. These spring-points are indicated by R, R′, R^2, R^3, R^4, and R^5. A cap or cover C is placed over the front or marking end of the brush when it is not in use. A modified form of the back or top end of the reservoir, with a space L, into which the cap C may be thrust for carrying it when the brush is in use, is shown in Fig. 3.

A free passage for ink and air from and to the reservoir is made by providing a space or channel between the interior of the nozzle and the brush—that is to say, the nozzle and brush are constructed of such size relative one to the other as to leave a passage I between the brush and the interior of the nozzle for free ink movement from the reservoir to the brush-point and for free air movement into the reservoir to take the place of the ink drawn out of the reservoir. This space or annular channel I is of sufficient size to allow free ink and air movement and is especially large relatively below the point where the bristles of the brush are bound together and at and near the open end of the nozzle, as shown at J, Figs. 5 and 6. This space at and near the open end of the nozzle, as shown at J, Fig. 3, is made capillary by the swelling of the brush or the spreading of the bristles as the spaces between the bristles become filled with ink. This space I J provides an annular capillary channel through which the ink is automatically drawn from the reservoir to the point of the brush as required by the act of marking and also provides a passage by which air may enter the reservoir to take the place of the ink thus drawn out. The lower and enlarged portion J, Fig. 3, of this annular passage and the interstice between the lower end of the bristles provide capillary spaces in which sufficient capillary action is set up, constituting a sufficient force to prevent the ink from running out of the reservoir and off the tip of the brush and at the same time holding and providing an ink-supply at or near the tip of the brush for immediate use in marking.

My construction produces a complete counterbalancing of ink and air movements. The downward pressure of ink seeking to escape from the reservoir is automatically balanced and controlled by the upward pressure of the air seeking to enter the reservoir to take the place of the ink seeking to escape. At the same time I am able to draw ink from the reservoir to the brush-point by capillary action when and only when and only in such quantities as are required for use in marking. This is accomplished by placing a brush in the passage between the reservoir and the lower end of the nozzle or brush-holder of such size and shape relative to the size and shape of the nozzle as to partially obstruct or nearly close this passage, yet leave it sufficiently open to allow free air movement and free capillary ink movement—that is, the brush is made of such size as to fit within the nozzle or holder loosely, leaving considerable space between the nozzle and the brush, especially at and near the lower end of the nozzle and below the point where the bristles are bound together. This permits of the wide separation or spreading of the bristles within the nozzle and below the collar F, which binds them together, and secures the full capillary action of the hairs or bristles of the brush within the nozzle at and near its open end. The bristles and ink thus held by capillary attraction fill the space below the collar F within the nozzle at and near its open end and form an automatic liquid-stopper which controls the air movement into the reservoir. By the act of marking ink is transferred from the brush-tip to the marking-surface, and as a fresh supply of ink is required for use it is automatically drawn by capillary action from the reservoir to the tip end of the brush. As the liquid-stopper is removed or partially removed by the using up of the ink in the act of writing air automatically is allowed to pass into the reservoir through the annular passage J I to take the place of the ink drawn off. When not required for use, the ink is retained within the reservoir and nozzle and prevented from running off the tip end of the brush by the capillary action set up within the nozzle at and near its open end between the bristles of the brush and between the

brush and the interior of the nozzle. The capillary action set up within the space J is also sufficiently strong to prevent ink from being forced off the end of the brush or over onto the outside of the nozzle when the heat of the hand quickly expands the air within the reservoir. At such occasion the ink is held within the nozzle and reservoir and the bubble of air passes through it and escapes, thus relieving the pressure of the air within the reservoir.

The operation of my device is simple and automatic. The contact of the brush with the marking-surface draws the ink by capillary attraction first from the brush and then from the overflow-supply in and around the brush and between the brush and the interior of the nozzle and then from the reservoir by capillary action between the bristles and the interior sides of the nozzle. As the space I J becomes empty or partially empty ink is drawn down by capillary action from the reservoir to the brush and air passes up to fill the place of the ink drawn off, and thus a constant and uniform flow of ink is obtained. By constructing the nozzle of such size relative to the size of the brush as described I attain the reciprocal counterbalancing or automatic control of the ink and air and provide all the necessary means to obtain, to facilitate, and to force the requisite movements of the ink and air in, into, and out of the reservoir.

I have described my device with special reference to its use as a fountain marking-brush; but the same construction is adapted for feeding other fluids—such as mucilage, paste, paints, varnish, &c.—from a reservoir or fountain by the same method of operation and use.

I have described herein a preferred form of reducing my invention to practice. It will be obvious, however, that many alterations in form and construction may be made without departing from the spirit of my invention.

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

1. In a fountain-brush, the combination of a reservoir closed except at one end, a nozzle extension of such open end, and a brush secured within such nozzle of such size and form relative to the size and form of the interior of said nozzle as to provide an air-passage and a capillary ink-passage between said brush and the interior of said nozzle, substantially as shown and described.

2. In a fountain-brush, the combination of a reservoir closed except at one end, a nozzle extension of such open end, and a brush secured within such nozzle at some point removed from its open end, said brush being of such size and form relative to the size and form of the interior of said nozzle as to provide an air-passage and a capillary ink-passage between said brush and the interior of said nozzle, substantially as shown and described.

3. In a fountain-brush, the combination of a reservoir closed except at one end, a nozzle extension of such open end, and a brush secured within such nozzle at some point removed from its open end, said brush being of such size and form relative to the size and form of the interior of said nozzle as to provide an air-passage and a capillary ink-passage between said brush and the interior of said nozzle and provide a capillary overflow-space within the nozzle at and near its open end, substantially as shown and described.

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

WILLIAM I. FERRIS.

Witnesses:

WILLIAM H. KERNAN,

EDWARD J. KASTNER.