(No Model.)

J. W. MacDONALD.

INK WELL.

No. 483,072. Patented Sept. 20, 1892.

Fig. 1.

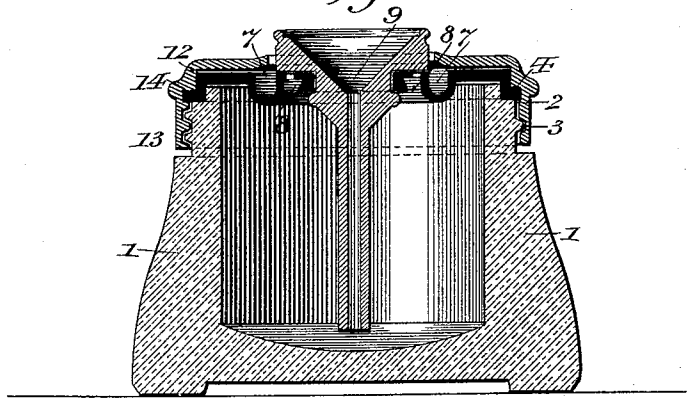


Fig. 2.

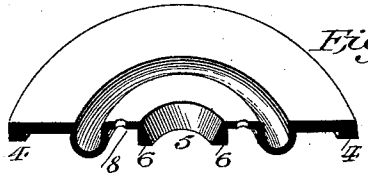


Fig. 4.

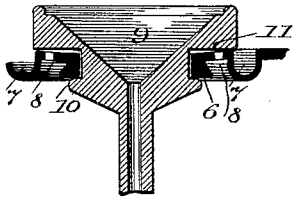


Fig. 5.

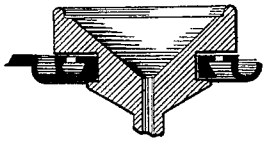
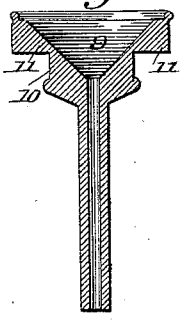


Fig. 3.



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UNITED STATES PATENT OFFICE.

JOHN W. MACDONALD, OF PITTSBURG, PENNSYLVANIA.

INK-WELL.

SPECIFICATION forming part of Letters Patent No. 483,072, dated September 20, 1892.

Application filed June 6, 1890. Serial No. 354,540. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. MACDONALD, a citizen of the United States, residing in the city of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in that class of Ink-Wells known as "Fountain Ink-Wells;" and I declare the following, taken in connection with the accompanying drawings, to be a full, clear, and exact description of the same.

The purpose of this invention is the production of an ink-well that will practically seal from the atmosphere the contents of the well, and thus prevent the evaporation thereof, overcome the annoying difficulty heretofore met with in ink-wells of this class of the ink rising in the supply-tube as the air within the well becomes expanded by a rise in the temperature until it overflows the same, and by forming it of few parts to simplify its construction, and thereby cheapen its cost to the public.

Referring to the accompanying drawings, Figure 1 is a central cross-sectional elevation of a completed ink-well, showing said improvement. Fig. 2 is a central cross-sectional view in perspective of rubber diaphragm used in said well but somewhat enlarged. Fig. 3 is a central cross-sectional view of supply-tube. Fig. 4 is a central cross-sectional view, somewhat enlarged, showing shape assumed by diaphragm after being expanded to position on neck of supply-tube. Fig. 5 is a central cross-sectional view showing relative position of central portion of diaphragm and supply-tube when filling bottle.

In constructing said ink-well a body 1, Fig. 1, is formed of glass with a central cylindrical reservoir and provided with a shoulder 2 around and near the top thereof and having a screw-thread 3 in its peripheral face immediately below said shoulder. From elastic rubber a circular diaphragm, Fig. 2, is formed, provided with a flange 4, the inner diameter of which flange is such as to permit of its fitting neatly over the neck of the body 1, Fig. 1, and of such depth as to leave a small space between its lower edge and the shoulder 2, for the purpose hereinafter stated. The central part of said diaphragm is thickened or reinforced, and through said thickened part a central tapered aperture 5 is formed, leaving upon the under side of said diaphragm and around said opening the flange 6, the greatest diameter of said aperture being slightly smaller than that of the neck of a supply-tube to be fitted therein. Between said central aperture and the circumference of the diaphragm the diaphragm is shaped to form an annular channel 7, preferably of the size and shape shown in Fig. 2. Between channel 7 and the central aperture one or more perforations 8 or air-passages are made in said diaphragm, which latter, it is to be noted, should be made thinner in that part forming the channel 7 and extending inward to the edge of the central aperture 5 than is that part outside said channel and next the circumference of the diaphragm, for the purpose hereinafter stated.

From some suitable material a supply-tube, Fig. 3, is formed, having an enlarged or funnel-shaped mouth 9 and externally shaped to form a neck 10 and an annular projection 11. A cap or cover 12 is formed of suitable material and centrally apertured to permit of the free movement within it of the upper extremity of the supply-tube, Fig. 3. A circular flange 13 extends downward from the outer edge of said cap-piece and is provided upon its inner face with a screw-thread to fit the thread 3 upon the body 1, Fig. 1. Upon the under side of cap 12 and next the inner face of the flange 13 an annular collar 14 is formed of such size as to fit loosely over the neck 10 of body 1, Fig. 1.

To put said improvement into operation, the supply-tube, Fig. 3, is forced through the tapered aperture 5 in the diaphragm, Fig. 2, until it meets the projection 11, Fig. 3. The neck 10 of said tube, being somewhat larger than the greatest diameter of the aperture 5 and much larger than its smallest diameter, will cause the diaphragm to expand against its elasticity, and this expansion, being greatest in the flange 6, tends to force the upper surface of said diaphragm between the channel 7 and neck 10 up against the projection 11 of the tube, Fig. 3, as shown somewhat enlarged in Fig. 4, thereby closing the perforations or air-passages 8. The diaphragm with supply-tube, which is of a length to reach to near the bottom of the reservoir, being placed in position upon the neck 13 of the body 1, the cap

is screwed down until the collar 14 comes against the top of the diaphragm. The flange 4 of the diaphragm will not now touch the shoulder 2, Fig. 1; but if the cap be further screwed down it will cause all that part of the diaphragm outside the channel 7 to be slightly expanded and at the same time seal the joint by the flange 4 pressing upon the shoulder 2, Fig. 1.

To fill the reservoir, the supply-tube is grasped about its upper extremity and slightly raised, Fig. 5, which movement will uncover the air-passages 8, when the ink may be poured through the tube to the interior of the well, after which, upon being released, the supply-tube, by the elastic action of the rubber of the diaphragm, will resume its former position, and in so doing close the air-passages 8 and again seal the contents of the reservoir from the open atmosphere. If the supply-tube be now depressed, by thrusting a pen into the funnel-mouth thereof the air-openings 8, already closed, will be made still tighter by the resistance offered by the elastic diaphragm, which, being also depressed, causes the ink to rise to the pen, only to return to the reservoir when the pen is withdrawn from the supply-tube.

It has been common heretofore in this class of ink-wells for the ink to rise in the supply-tube with an expansion of the air in the reservoir of the well until the same overflowed. In the device here shown, while an expansion of the air in the reservoir of the well will cause the ink to rise in the supply-tube to a certain height it will not rise high enough to overflow the tube, for the reason that as the expansive pressure of the air comes against the inside of the diaphragm the same, together with the supply-tube, will be slightly raised, thereby uncovering the air-passages 8 and allowing of an equalization of the pressure within the well with that of the open atmosphere, thus permitting the ink forced up into the tube to drop back into the well. The supply-tube will then resume its former position, closing the air-passages 8 and again sealing the ink from the open atmosphere. By making the central part of the diaphragm much thinner than that part of greater diameter and extending to the edge of the diaphragm and forming between said parts of different thickness the annular channel 7, Fig. 2, the slight depression of the tube caused by thrusting a pen into its funnel-shaped mouth will cause only that part of the diaphragm within the circle formed by the channel 7 to be depressed. The area of piston-surface will be thus greatly reduced. A slight depression of this small piston-surface will, however, cause the ink to rise to the mouth of the supply-tube, and while a diaphragm so constructed will be sufficiently sensitive the depression of so small an area of the diaphragm will prevent the ink being so rapidly forced through the supply-tube as to cause it to spout from the top thereof, as has been the case heretofore in fountain ink-wells of this class where the whole surface of the diaphragm is depressed by slightly depressing the supply-tube.

Having thus described said invention, what is claimed, and desired to be secured by Letters Patent, is—

1. In a fountain ink-well, a flexible rubber diaphragm centrally apertured and provided with an annular channel formed in the face thereof, as and for the purpose set forth.

2. In a fountain ink-well, a flexible diaphragm having a tapered central aperture and provided upon its inner face with a flange surrounding said aperture and forming part of the walls thereof, said flange being thicker at the base thereof than at the top, as shown and described, and for the purpose set forth.

3. In a fountain ink-well, a centrally-apertured diaphragm formed of flexible rubber, the body thereof immediately surrounding said central aperture being thinner than that part of the diaphragm of greater diameter and next the circumference thereof, the said parts of different thickness being joined by the rubber of the diaphragm, forming an annular channel in the face thereof, as shown and described, and for the purpose set forth.

4. In a fountain ink-well, a flexible rubber diaphragm provided with one or more perforations for the passage of air to and from the reservoir of said well, said perforations being externally closed by an enlargement in the upper extremity of a vertical supply-tube passing centrally through said diaphragm, as and for the purpose shown and described.

5. In a fountain ink-well, a valve for automatically regulating the pressure of air within the reservoir of said well, having for its seat the surface of an elastic diaphragm and for its cap an externally-enlarged part of a supply-tube passing through said diaphragm, each so arranged with relation to the other that said valve will automatically open and close with the upward and downward movement of said diaphragm, as and for the purpose set forth and described.

6. In a fountain ink-well, the combination of a supply-tube having a neck in its upper extremity and an elastic rubber diaphragm fitting around said neck, the supply-tube being provided with an enlargement above said neck covering one or more perforations in said diaphragm, as shown and described, and for the purpose set forth.

7. In a fountain ink-well, the combination of a supply-tube, a flexible rubber diaphragm having the body thereof provided with an annular depending flange around its circumference, said flange fitting around an annular shoulder formed on the neck of the well, and a threaded cap-piece screwing onto the well and provided with an annular shoulder formed on the under side of the top of said cap, pressing on the top of the diaphragm around its outer edge and acting to force down said an-

nular flange and expand the diaphragm, as shown and described, and for the purpose set forth.

8. The combination of a body provided with a spirally-formed thread in its upper extremity to receive a flanged cap, having upon its under side and next said flange an annular collar, a flexible rubber diaphragm provided with an annular channel formed in the face thereof, and a supply-tube held to position by the elastic rubber forming the thickened or reinforced part of said diaphragm, as shown and described.

9. In a fountain ink-well, a body forming the reservoir thereof, a cap or cover formed to fit over the top of said body, a rubber diaphragm provided with a depending flange around the circumference thereof, a supply-tube passing centrally through said diaphragm, and a means for automatically regulating the pressure of air within said well, consisting in enlarging the upper extremity of said supply-tube to cover the perforations in said diaphragm when the latter is at rest and be lifted therefrom as the diaphragm is raised by the expansion of air within the well, as shown and described.

In testimony witness my hand and seal, June 5, 1890.

JNO. W. MACDONALD. [L. S.]

Witnesses:
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