A. A. FREEMAN.

ACID AND ALKALI TESTING AND INDICATING DEVICE

APPLICATION FILED DEC. 9, 1915.

1,238,123. Patented Aug. 28, 1917.

Fig. 1

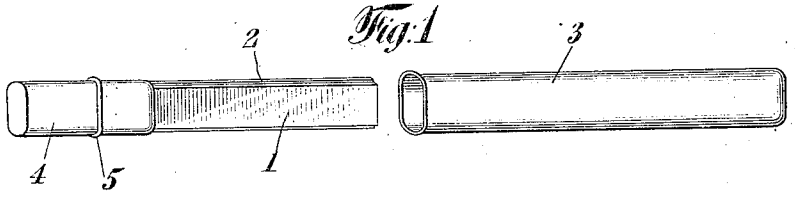


Fig. 2

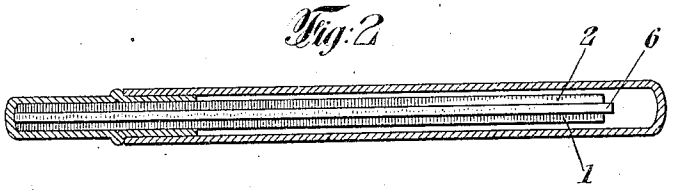


Fig. 3

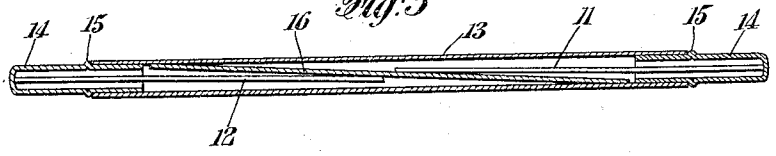
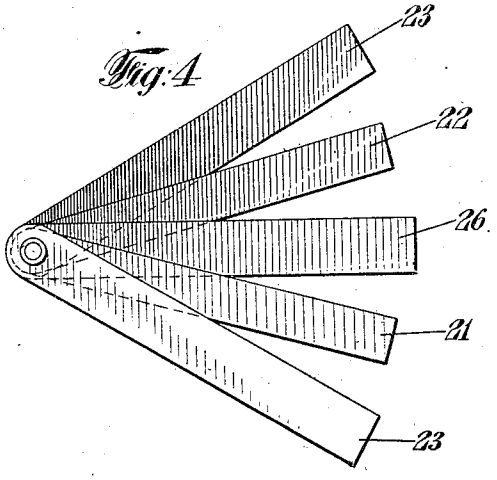


Fig. 4



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ACID AND ALKALI TESTING AND INDICATING DEVICE.

1,238,123. Specification of Letters Patent. Patented Aug. 28, 1917.

Application filed December 9, 1915. Serial No. 66,025.

To all whom it may concern:

Be it known that I, ALLAN A. FREEMAN, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Acid and Alkali Testing and Indicating Devices; and I do hereby 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.

My invention consists in the novel features hereinafter pointed out reference being had to the accompanying drawing which shows several forms in which I have contemplated embodying my invention, selected by me for purposes of illustration, and said invention is fully disclosed in the following description and claims.

In the accompanying drawing:

Figure 1 represents a perspective view of one embodiment of my invention adapted to be carried in the pocket showing the removable cap or closure drawn out from the container together with the testing and indicating papers secured thereto.

Fig. 2 is a sectional view of the device illustrated in Fig. 1 showing the parts in closed relation.

Fig. 3 is a similar sectional view illustrating a slight modification of my invention, also designed to be carried in the pocket.

Fig. 4 represents another embodiment of my invention especially adapted for use at the desk or in the laboratory.

It is of great importance to physicians, chemists, and to a considerable proportion of the general public that they be provided with ready and convenient means for testing liquids for the purpose of ascertaining the presence of acid and alkali, and for the purpose in many cases of ascertaining the percentage of acid or alkali in the solution under examination.

No ready means for accomplishing this result is available and recourse is ordinarily had to strips of red and blue litmus paper which merely indicate the presence of alkali and acid respectively without indicating the percentage, which can only be ascertained by a quantitive analysis in the laboratory. Litmus paper is extremely perishable as it is injuriously affected by exposure to the atmosphere and it is extremely inconvenient to carry about the person and under all conditions it must be protected from the atmosphere. It is also destroyed by using, and large quantities of it are wasted in taking out the thin sheets or strips from bottles or other air tight receptacles containing the same, and in which it is ordinarily kept.

The object of my invention is to provide a simple, compact and convenient device which may be carried in the pocket or kept on the desk or in the laboratory for immediate use at all times which will not only indicate instantly the presence of acid or alkali in the solution, but may also be used to ascertain the approximate percentage of acid or alkali present in the solution and which is not affected by atmospheric conditions.

In the accompanying drawing I have illustrated several forms or embodiments of my invention selected by me for purposes of illustration. Thus in Figs. 1 and 2 I have illustrated a convenient form or embodiment of the invention for use by physicians chemists and others and which can be carried in the pocket.

In this device I employ a sheet or preferably two sheets, or more, of testing and indicating material preferably in the form of paper not affected by atmosphere and readily responsive to the action of acid and alkali. For the sensitive sheet or sheets I prefer to use a sheet or strip of paper which has been made sensitive to acids and alkalies by dyeing it with a dye of the triphenylmethane group, which has the peculiar property of discharging its color on treatment with an alkali solution and of regaining its color when the alkaline solution is neutralized by an acid. For example, I have used advantageously a paper treated with a dye stuff composed of malachite green crystals which when subjected to alkali discharges its color leaving the paper white or its natural color.

This testing and indicating paper is not affected by the atmosphere and may be used over and over again, as, if it is treated by either acid or alkali, it may be restored to its original condition by neutralizing the effect of the acid or alkali applied to it for test purposes. This paper can also be used to determine the strength of the solution tested in acid or alkali. For example, if one drop of a solution under examination applied to the sensitive paper either discharges or restores the color, the presence of either acid or alkali, as the case may be, would be indi-

cated. The user can then by taking a standard solution of known strength, say one per cent. solution of acid or alkali as required, to neutralize the effect of the drop of the test liquid and by applying the standard solution drop by drop until the effect produced by the test drop has been completely neutralized, determine the approximate percentage of acid or alkali in the tested solution. The test paper herein referred to is not specifically claimed herein as it forms the subject of a separate application for Letters Patent of the United States filed by me on December 9th, 1915, and given Serial #66,024.

In its simplest form my present invention comprises one or more sheets, preferably two, of paper sensitive to acid and alkali combined with an exterior protector and preferably with means for separating or holding in separated relation the sheet or sheets used for testing acid solutions and the sheet or sheets used for testing alkali solutions. Thus in Figs. 1 and 2 I have shown two strips or sheets, 1 and 2, of my improved testing and indicating paper, one of which is intended for use in testing acid solution, and the other for testing alkaline solutions. 3 represents a flattened tubular container which may be closed at one end, as shown, and open at the other, the open end being provided with a closure, 4, which is preferably provided with means for holding the sheets or strips, 1 and 2, at all times so that when the closure is removed from the container the strips will be drawn out from the container with it as indicated in Fig. 1, thus enabling the strips to be handled without touching them and preventing them from falling out upon the desk, or table, or upon the floor, where they might come in contact with foreign matter.

As shown the closure, 4, is hollow so that the ends of the strips, 1 and 2, can be inserted in and frictionally retained therein, a bead or shoulder, 5, being provided, for example, to prevent the closure from being inserted in the container beyond a certain point. In order to separate the sheets, 1 and 2, from each other, the closure is preferably provided with a stationary blade or partition, 6, which is secured to the closure and projects therefrom, preferably farther than the length of the paper strips, as indicated in Fig. 2, so that the test papers are kept out of contact with each other throughout their entire length. This partition or blade may be of any suitable material as metal, celluloid, card-board, etc. In preparing the strips, 1 and 2, they may be dyed with a dye stuff hereinbefore mentioned and one of them have the color discharged by using an alkali while the other may be left as originally dyed, in which case the colored strip may be used in testing for alkalies and the white strip for acids, but I do not limit myself to the particular sensitive strips which may be used in the device.

In Fig. 3 I have illustrated a modification of the device in which the container, here indicated at 13, is open at both ends and is provided at each end with a closure, 14, to which one or more strips of sensitive paper not affected by the atmosphere, indicated at 11 and 12, are connected in the manner hereinbefore described, the strip or strips at one end being intended for testing acid solutions and the strip or strips at the other end being intended for testing alkaline solutions. The container, 13, may in some instances be provided with a partition, 16, which may conveniently be placed therein in a diagonal position so as to facilitate the insertion and removal of the closure and attached strip or strips while keeping the several strips, connected with the opposite closures, separated. If the strips are sufficiently short so that they will not meet within the closure the partition, 16, might be omitted as will be obvious, and the separation between the several strips used for testing acids and alkalies will be affected by the container itself, the shoulders, 15, on the closures preventing the strips from being pushed in beyond a certain point.

In Fig. 4 I have shown a simple embodiment of my invention which may be more conveniently used at the desk or in the laboratory, but would not be so suitable for carrying in the pocket. In this embodiment of my invention, 21 and 22 represent sheets or strips of the sensitive testing and indicating paper hereinbefore referred to which are associated with exterior protecting strips, 23—23, which may be of celluloid, metal, wood, card-board, or other suitable material, the strips, 21 and 22, being separated by an intermediate partition strip, 26, and all of said strips being preferably united at one end, for example, by an eyelet, rivet, or other hinge-like or pivotal connection, so that they may be opened out fan-wise to give access to either of the strips for testing and indicating purposes.

As these testing and indicating strips are not affected by the atmosphere and may also be restored to their original condition after use by simply neutralizing the effect of the test drop, the device, in whichever of the forms above described it may exist, becomes a permanent testing and indicating device.

It is, therefore, unnecessary to have more than two sheets of the sensitive paper or material, although several sheets or strips for testing acid solutions and several sheets or strips for testing alkaline solutions may be furnished with the device if desired.

What I claim and desire to secure by Letters Patent is:

1. As a new article of manufacture, an

acid and alkali testing and indicating device comprising among its members strips of permanent testing and indicating material of the kind described sensitive to alkaline and acid solutions, and not affected by atmospheric conditions, a tubular container, a closure for said container connected to a strip or strips so as to remove the same when the closure is removed, and means for holding the acid testing strips separated from the alkali testing strips.

2. As a new article of manufacture, an acid and alkali testing and indicating device comprising among its members strips of permanent testing and indicating material of the kind described sensitive to alkaline and acid solutions, and not affected by atmospheric conditions, a tubular container open at one end, a closure for the open end of the container provided with means for holding the said strips in fixed relation thereto, said closure being provided with a blade or partition interposed between the strip or strips for testing acid solutions and the strip or strips for testing alkaline solutions.

3. As a new article of manufacture, an acid and alkali testing and indicating device comprising among its members strips of permanent testing and indicating material of the kind described sensitive to alkaline and acid solutions, and not affected by atmospheric conditions, a tubular container open at one end, a hollow closure for the open end of said container and a partition or blade secured to said closure and projecting therefrom, said closure being provided on opposite sides of said blade or partition with spaces to frictionally retain the end portions of the sensitive strips, whereby said strips will be drawn out of the container with the closure and will at all times remain separated by said blade or partition.

In testimony whereof I affix my signature.

ALLAN A. FREEMAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."