Feb. 11, 1947. E. M. GASSERT 2,415,480

BLOOD COUNT EQUIPMENT

Filed April 2, 1945

Fig. 1.

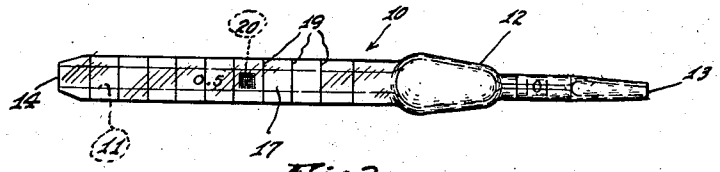


Fig. 2.

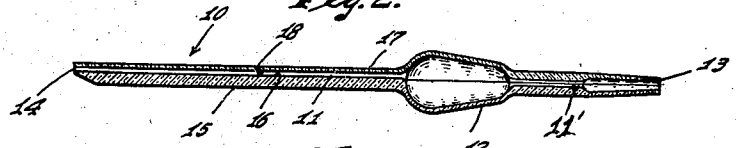


Fig. 3.

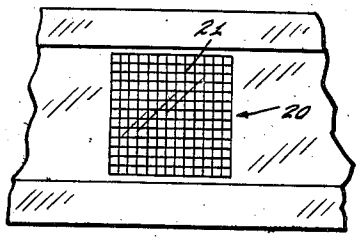


Fig. 4.

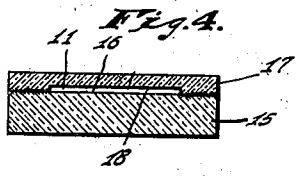


Fig. 5.

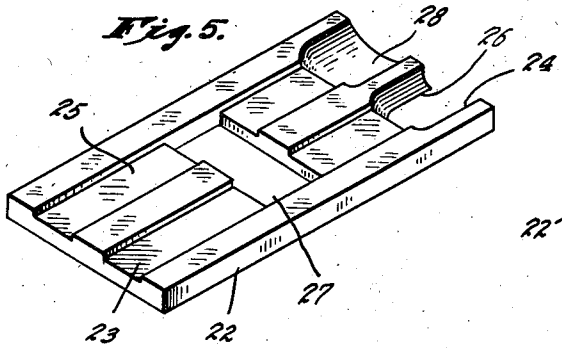
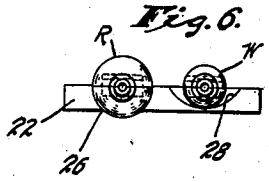


Fig. 6.



INVENTOR.
ETHEL M. GASSERT,

BY

Hood & Kahn

ATTORNEYS.

Patented Feb. 11, 1947

2,415,480

UNITED STATES PATENT OFFICE

2,415,480

BLOOD COUNT EQUIPMENT

Ethel M. Gassert, Indianapolis, Ind.

Application April 2, 1945, Serial No. 586,248

5 Claims. (Cl. 88—40)

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The hemacytometer, in its usual conception prior to my invention, is an aggregate of (*a*) a counting chamber (Levy type generally used); (*b*) a cover glass (Hausser type generally used); (*c*) a pipette for diluting the blood for the count of the red corpuscles; (*d*) and a pipette for diluting the blood for the count of the white corpuscles. A brief description of these parts and the method of their use follows:

(*a*) The Levy counting chamber is a heavy glass slide upon the middle third of which are cut three narrow parallel platforms extending vertically across the slide. The middle platform or "floor piece" is exactly 0.1 millimeter lower than the other two and is provided with capillary channels leading from either side of the slide to the respective counting chambers. This center platform is generally etched at two spaced points with the "Improved Neubauer" ruling which is a square 3 x 3 millimeters divided by double etched lines into nine equal squares 1 x 1 millimeter. The four corner squares are further divided by single etched lines into sixteen equal squares. The center square and those above and below it are etched vertically into twenty equal parts. Each fourth line of these divisions is double etched. The center square and those on either side are also divided horizontally into twenty equal parts each fourth line of which division is double etched.

(*b*) The Hausser cover glass, is a rectangular plate 20 x 26 millimeters with a thickness between 0.4 and 0.6 millimeters. It must be perfectly plane on both sides.

(*c*) and (*d*) Blood diluting pipettes consist of a stem provided with a capillary passage and a bulb interposed between the ends of said passage. The volumes of said passage and bulb are accurately calibrated. The stem is divided into ten equal parts and calibrated at 0.5 and 1.0. The bulb is of capacity to give an accurate dilution of the blood and diluent. Generally a dilution of 1:100 is used for red corpuscles and a dilution of 1:20 for the white corpuscles.

In making a blood count the blood is drawn into the pipette to the 0.5 mark, the excess blood is wiped off and the pipette is filled with diluent to a mark located above the bulb. Then the pipette is shaken to mix the contents thoroughly. At least one-third of the diluted blood is expelled from the pipette and discarded. The cover glass is placed over the platforms and each counting chamber is filled with the diluted blood by capillary action through one of the channels above described. The mixture is allowed to stand for a few seconds for the corpuscles to settle, and then the slide is placed under a microscope and the counting is begun.

The difficulties and disadvantages of this procedure are numerous. All of the equipment must

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be thoroughly and chemically clean, thoroughly dry and completely free from lint or dust of any kind. The well of the counting chamber must be very accurately filled with the diluted blood and the solution in the counting chamber must be entirely free of air bubbles. The count must be made immediately, before evaporation starts. Scratches of any kind on the counting chamber or cover glass render them unsatisfactory.

The primary object of the present invention is to overcome all of these difficulties, and disadvantages, thereby greatly improving the accuracy of the technician, and to save time in the enumeration of the corpuscles of the blood. According to the present invention, the stem of the pipette will be so constructed that a corpuscle count in the diluted blood in the pipette can be made directly from the calibrated area in the stem.

To the accomplishment of the above and related objects, my invention may be embodied in the forms illustrated in the accompanying drawing, attention being called to the fact, however, that the drawing is illustrative only, and that change may be made in the specific constructions illustrated and described, so long as the scope of the appended claims is not violated.

Fig. 1 is a plan view of a pipette constructed in accordance with the present invention;

Fig. 2 is a longitudinal section thereof;

Fig. 3 is a plan view, upon an enlarged scale, of that section of the pipette stem which constitutes the counting chamber;

Fig. 4 is a transverse section, upon an enlarged scale, through the stem of the pipette;

Fig. 5 is a plan view of a holder for pipettes constructed in accordance with the present invention; and

Fig. 6 is an end elevation of such holder with two pipettes supported thereon.

Referring more particularly to the drawing, it will be seen that I have illustrated a pipette, indicated generally by the reference numeral 10, and formed to provide a capillary passage 11. Said passage opens at one end into an enlarged mixing chamber 12, and a continuation 11' of said passage leads through one end 13 of the pipette designed for attachment of a rubber tube and mouth-piece; while the mouth 14 of the passage 11 opens through the opposite end of the pipette stem.

In order that the objects of the present invention may be accomplished, it is desirable, if not essential, that the passage 11 shall be of rectangular cross section, and that at least that portion of the pipette stem adjacent the counting chamber shall be transparent. It is my present opinion that the best way to produce these desirable features will be to make the pipette of glass, or one of the highly transparent, relatively

non-refractive, non-corrosive plastics, and to form it of two originally separate elements. Thus, the pipette may consist of a lower element 15 the stem of which is formed with a perfectly plane upper surface 16, and an upper element 17 having a surface, intended to mate with the surface 16 and formed with a rectangular channel, or trough, 18, the inside upper surface of which is also perfectly plane. If the pipette is formed of fusible material, such as glass, the two elements 15 and 17 may be brought into contacting relation and fused together in the manner indicated in Fig. 4, whereby the trough 18 will cooperate with the plane surface 16 to produce a rectangular passage 11. If the pipette is formed of non-fusible material, the mating surfaces of the elements 15 and 17 will preferably be secured together by some suitable adhesive, the requirement being that such adhesive be leak-proof to the various chemicals used and be non-corrosive.

The element 17 will be provided with equally longitudinally spaced graduations 19, whereby the volume of liquid drawn into the passage 11 may be measured.

Etched into the surface 16 of the element 15 is the "Improved Neubauer" ruling, or one of equal accuracy, 21, defining a square area 20. Following the established practice, the area 20 will be exactly 3.0 millimeters square, and the depth of the trough 18 will be exactly 0.1 millimeter. Thus the width of the channel 18 must be at least 3.0 millimeters; and preferably it will be somewhat greater. If the width of said channel is only 3.0 millimeters, its lateral edges may cause refraction or reflection which may interfere with microscopic examination of the contents of the counting chamber.

A holder should preferably be provided to keep the pipette in place on the floor of the microscope while counting. A suitable form of holder is illustrated in Fig. 5 and comprises a plate 22, which may be made of transparent or non-transparent material, and which is formed with a groove 23 to receive the stem of a pipette, and with a socket 24 adapted to receive the bulb thereof. A rectangular opening 27 is formed in the center of the holder to register with the area 20 to permit the passage of light through that area of the pipette during the counting of the corpuscles.

Preferably, but not necessarily, the plate 22 is likewise formed with a second groove 25 parallel with the groove 23, and traversed by the opening 27, for the reception of a second pipette, so that red corpuscles in one pipette and white corpuscles in another pipette can be counted with one mounting operation. In Fig. 6, I have included a pipette R for counting red corpuscles and a pipette W for counting white corpuscles lying together on the holder 22. The bulb 12 of the pipette R is larger than the bulb of the pipette W, because of the greater dilution necessitated by the fact that the red corpuscles are normally present in greater numbers than white corpuscles, and therefore the inlet 24 is cut out, as shown at 26, while the socket 28 is not, in order to bring the stems of the two pipettes into a common plane.

In the use of the pipette of the present invention, a measured quantity of blood to be examined will be drawn into the passage 11, and so into chamber 12, a measured quantity of diluent will then be drawn into chamber 12, and the blood and diluent will be mixed by shaking. Now the mixture is permitted to flow from the chamber 12 into the passage 11 and a part of the mixture is discarded. Now, placing the pipette itself in the special holder and then on the floor of the microscope the count of the corpuscles can be made in relation to the lines 21 of the area 20. Thus it becomes unnecessary to use other items of equipment, such as the separate counting chamber and the cover glass mentioned at the beginning of the present specification.

I claim as my invention:

1. A pipette for use in making blood counts, said pipette being formed to provide an elongated passage of substantially rectangular cross section opening into an enlarged mixing chamber, one pair of opposite walls of said passage having registering transparent sections, and one of said sections being provided with accurately spaced intersecting graduations.

2. A pipette for use in making blood counts, said pipette being formed to provide an elongated passage of substantially rectangular cross section opening into an enlarged mixing chamber, the minor dimension of a portion of said passage being exactly 0.1 mm. and the major dimension thereof being at least 3.0 mm., the major walls of said portion being transparent and one of said major walls being provided with accurately spaced intersecting graduations.

3. A pipette for use in making blood counts, comprising a stem having an elongated flat surface provided intermediate its ends with a transparent calibrated area, and a mating element formed in one surface with an elongated, substantially rectangular trough, said element being associated with said stem with its trough in leak-proof relation to said flat surface, and the portion of said element registering with said calibrated area being transparent.

4. A pipette for use in making blood counts, comprising a stem of transparent material having an elongated flat surface provided intermediate its ends with a calibrated area, and a mating transparent element formed in one surface with an elongated, substantially rectangular trough, said element being associated with said stem with its trough in leak-proof relation to said flat surface.

5. The combination with a transparent pipette having a rectangular elongated passage opening into an enlarged mixing chamber and having a section intermediate the ends of said passage marked off into a plurality of accurately dimensioned squares, of a support therefor comprising a slide formed with a trough having an enlargement for accommodating said chamber and having a port therethrough registering with said section when said chamber is received in said trough enlargement.

ETHEL M. GASSERT.

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The following references are of record in the file of this patent:

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