

No. 663,536.

S. L. FOX & E. S. CLARE.
HEMOGLOBINOMETER.

Patented Dec. 11, 1900.

(Application filed Sept. 22, 1900.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

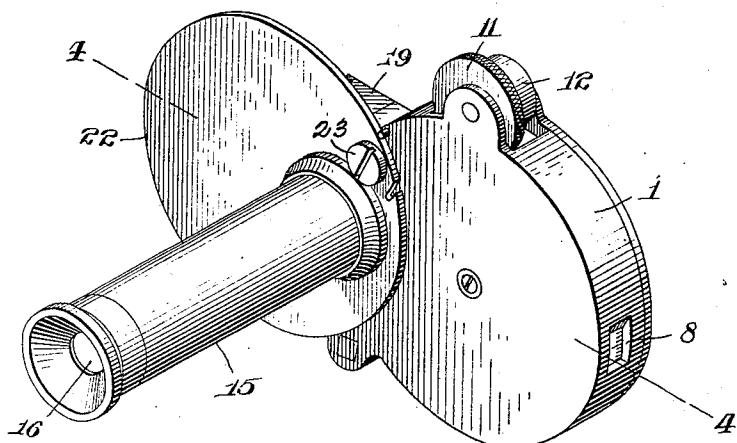
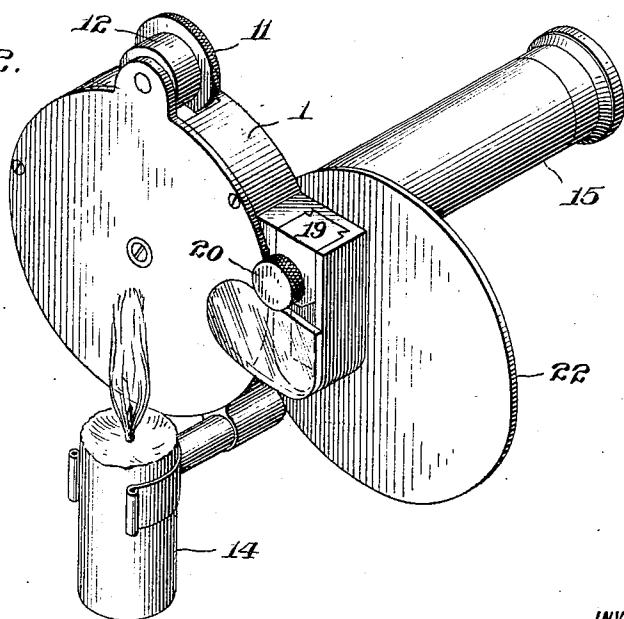


Fig. 2.



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2 Sheets—Sheet 2.

Fig. 4.

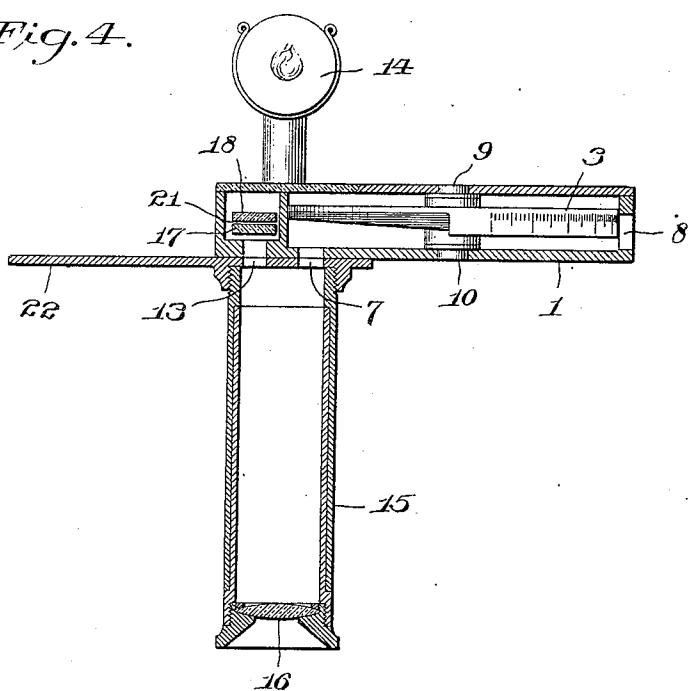


Fig. 5.

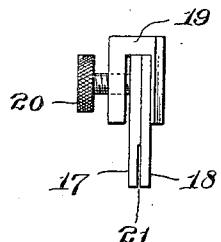
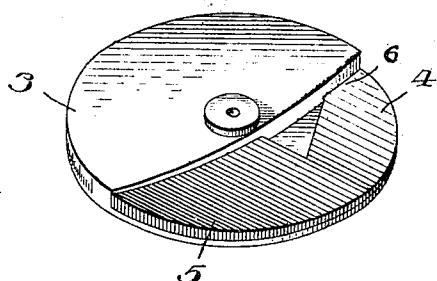


Fig. 3.



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UNITED STATES PATENT OFFICE.

SAMUEL L. FOX, OF HAVERFORD, AND EDMUND S. CLARE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO THE QUEEN & COMPANY, OF PENNSYLVANIA.

HEMOGLOBINOMETER.

SPECIFICATION forming part of Letters Patent No. 663,536, dated December 11, 1900.

Application filed September 22, 1900. Serial No. 30,768. (No model.)

To all whom it may concern:

Be it known that we, SAMUEL L. FOX, residing at Haverford, in the county of Montgomery, and EDMUND S. CLARE, residing at 5 2,139 South Hicks street, Philadelphia, State of Pennsylvania, citizens of the United States, have invented new and useful Improvements in Hemoglobinometers, of which the following is a specification.

10 Our invention relates to improvements in hemoglobinometers, our purpose being to afford improved means or a device for ascertaining the amount or proportion of hemoglobin by a comparison of the color of the 15 blood with a fixed standard color—for instance, of ruby glass of certain thickness. Our invention relates particularly to the making, disposing, and moving said piece or pieces of ruby glass of varying thickness, so that the 20 required shade may be brought into juxtaposition with the blood specimen to be compared therewith.

Referring to the drawings, Figure 1 is a 25 perspective view of our device in operative position with the eyepiece toward the observer. Fig. 2 is a similar view with the eyepiece away from the observer. Fig. 3 is a detail of the porcelain disk holding the prisms of ruby glass. Fig. 4 is a horizontal cross- 30 section on the line 4-4 of Fig. 2 with the exception of the disk holding the ruby glass, which is shown in elevation. Fig. 5 is a detail of the blood-containing device.

Similar characters refer to similar parts 35 throughout the several views.

The method of comparing a solution of blood with a plate of ruby glass varying in thickness is described in patent to Fleischl von Marxow, No. 353,098, dated November 40 23, 1886. The ruby glass in this device consists of a wedge-shaped plate *h*, supported by a transparent plate *i*, which is adapted to be shifted longitudinally backward and forward by the rotation of a pinion, which operates 45 upon a rod secured to the ruby glass and meshing with the pinion. A vessel *b* is provided with two compartments *b*² and *b*³, one adapted to superimpose the ruby glass and the other to clear it, the former to be filled 50 with clear water, while the latter is filled with blood diluted with water, and means are pro-

vided below for reflecting light through the two compartments, so that the wedge-shaped ruby glass may be moved forward or backward to make the color coincide with that 55 presented by the dilution. Now one objection to this device resides in the possible errors in dilution and also in the difficulty in getting the compartment holding said dilution always filled to the same exact height, 60 thus resulting in inaccuracy in reading. There is also more or less inconvenience in securing and transferring the exact amount of blood desired from the patient to the compartment.

It is among the objects of our invention to 65 overcome some of these disadvantages.

Fig. 3 indicates a circular disk, preferably of porcelain or similar translucent substance, partially cut away or recessed to receive the 70 prisms 4 and 5 of ruby glass, prism 4 beginning almost at a knife-edge at the point 6, gradually increasing in thickness to the line where it joins the prism marked 5, which latter begins at the same thickness as that at 75 which 4 ends and continues increasing in thickness to its other extremity. Of course it is not necessary that the device should be limited to two pieces of ruby glass nor that each piece should be a prism. These pieces 80 of ruby glass are so ground and disposed that the line of travel of aperture 7 over the said prisms as the disk is revolved will be approximately upon the line of uniform increase and decrease between its maximum and minimum 85 degrees of thickness. The periphery of that part of the disk 3 which is not recessed is provided with graduations to indicate the position of said ruby glass, said graduations being visible through the aperture 8 in the periphery of the casings, as shown in Fig. 2. Said disk is pivotally supported in the casing at 9 and 10 and is rotated by turning the thumb-button 11, which is provided with a rubber wheel 12, which impinges upon the periphery of said disk. The aperture 13, (see Fig. 4,) which is in close proximity with aperture 7, is adapted to superimpose the blood-container hereinafter to be described, which, together with the ruby glass, is illuminated 90 by the flame of the standard candle 14. These 100 two apertures are brought within the proper

vision of the eye by the telescoping tube 15, provided with a suitable lens in the eyepiece 16 thereof.

The blood-container is composed as follows: 5 Two plates 17 and 18, one preferably of porcelain and the other of glass, are secured in the block 19 by the thumb-screw 20, which is adapted to be secured to the casing 1 of our device and to hold the said plates 17 and 18 10 so that their lower ends will rest in front of the aperture 13. One of these plates—say 15 17—is recessed or ground away across its lower end, so that when the two plates are placed together a slight slit 21 will be provided between the two for holding the film of blood to be examined. This slit is filled with 20 the blood by simply touching said slotted end of the two plates to the drop of blood to be examined, and the same will be drawn in by 25 capillary attraction. This, it is obvious, furnishes a simple means for procuring the blood and always presenting a film or volume of a uniform dimension, and since the volume is so thin in cross-section it is possible to examine the same without any dilution thereof, thus eliminating that element of inaccuracy contained in previously-patented devices.

The operation of our device is as follows: The telescoping tubes 15 are secured to a 30 shade or lid 22, which is pivoted at 23 to the main casing of our device, so that the same when ready to be operated will swing around and bring the telescoping tube into range with the two apertures 7 and 13. The standard 35 candle is suitably supported on the opposite side of said apertures. The blood-container (shown in Fig. 5) is then filled with the blood to be examined and slipped into the position in front of the aperture 13. The eye is then 40 directed through the telescoping tube to the two apertures 7 and 13, and the thumb-wheel 11 is rotated until the candle-light shows through the ruby glass and the aperture 7 clearly with the same shade of color as it shows 45 through the blood and aperture 13. When this has been accomplished, the graduations showing through the aperture 8 in casing 1 may be read and the amount of hemoglobin ascertained.

50 What we claim is—

1. In a hemoglobinometer the combination with a suitable casing of a recessed translucent disk, rotatably supported within the casing and provided with a prism or plate of ruby 55 glass having its line of approximately uniform increase and decrease between its maximum and minimum thickness approximately concentric with the lines of rotation of the disk, substantially as described.

60 2. In a hemoglobinometer the combination of a casing, a translucent disk rotatably supported therein with a plurality of pieces of ruby glass attached thereto having an approximately uniform increase and decrease 65 in thickness along lines concentric with the disk rotation, substantially as described.

3. In a hemoglobinometer the combination

of a casing, a translucent disk pivotally supported therein, pieces of ruby glass supported on said disk having an approximately uniform 70 increase and decrease in thickness upon lines concentric with the disk rotation, a receptacle for holding a film of fresh blood in juxtaposition with said ruby glass and two apertures in the casing close together, one adapted to superimpose the ruby glass, the other the film of blood, with means for illuminating said glass and blood upon the opposite side, substantially as described.

4. In a hemoglobinometer the combination 80 of an apertured casing with a pivoted disk therein carrying sections of ruby glass having an approximately uniform increase in thickness along their lines of travel past the aperture in the disk, with means for displaying 85 a film of blood in juxtaposition with said aperture, said means consisting of two translucent plates, part of one being ground away to leave a thin space between the two for sucking the blood therein by capillary attraction, 90 substantially as described.

5. In a hemoglobinometer the combination with a suitable casing of a recessed translucent disk, rotatably supported within the casing and provided with a prism of ruby glass 95 having its line of uniform increase and decrease between its maximum and minimum thickness approximately concentric with the lines of rotation of the disk and a knurled thumb-wheel frictionally connected with the 100 disk as manually-operative means for rotating the disk, substantially as described.

6. In a hemoglobinometer the combination 105 of a casing, a translucent disk pivotally supported therein, pieces of ruby glass supported on said disk having a uniform increase and decrease in thickness upon lines approximately concentric with the disk rotation, a receptacle for holding a film of fresh blood in juxtaposition with said ruby glass and two 110 apertures in the casing close together, one adapted to superimpose the ruby glass, the other the film of blood, with means for illuminating said glass and blood upon the opposite side, and telescopic means detachably 115 connected with the casing for concentrating the vision upon the said two apertures, substantially as described.

7. In a hemoglobinometer the combination 120 of a casing, a translucent disk pivotally supported therein, pieces of ruby glass supported on said disk having a uniform increase and decrease in thickness upon lines approximately concentric with the disk rotation, a receptacle for holding a film of fresh blood 125 in juxtaposition with said ruby glass and two apertures in the casing close together, one adapted to superimpose the ruby glass, the other the film of blood, with means for illuminating said glass and blood upon the opposite side, telescopic means connected with the casing for concentrating the vision upon the said two apertures and a folding shield 130 pivotally secured to the casing adapted to

carry the telescope and eyepiece into range with the apertures showing the blood and ruby glass, and at the same time to shade the observer from the light, substantially as described.

8. In a hemoglobinometer the combination of a casing, a translucent disk pivotally supported therein, pieces of ruby glass supported on said disk having a uniform increase and decrease in thickness upon lines approximately concentric with the disk rotation, a receptacle for holding a film of fresh blood in juxtaposition with said ruby glass and two

apertures in the casing close together, one adapted to superimpose the ruby glass, the other the film of blood, with means for illuminating said glass and blood upon the opposite side, said disk provided with graduations upon a portion of its periphery with an aperture in the periphery of the casing to disclose the same, substantially as described.

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Witnesses:

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