(No Model.)

H. ORFORD.

HEMOGLOBINOMETER.

No. 585,694. Patented July 6, 1897.

Fig. 1.

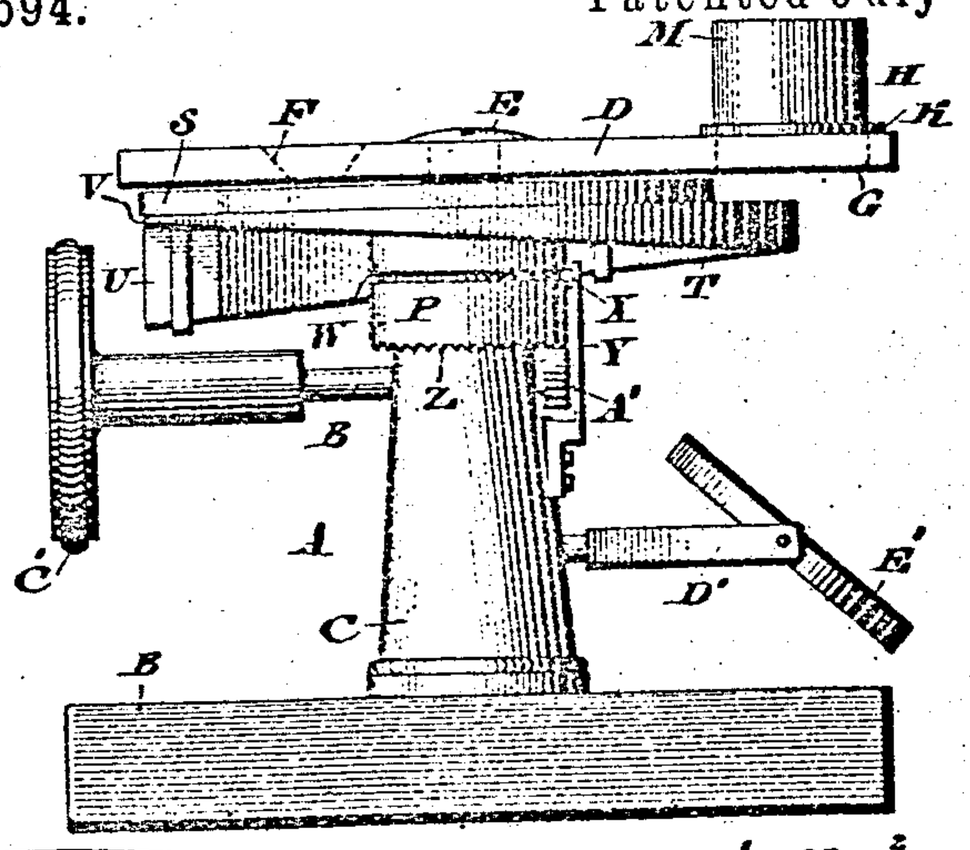


Fig. 4.

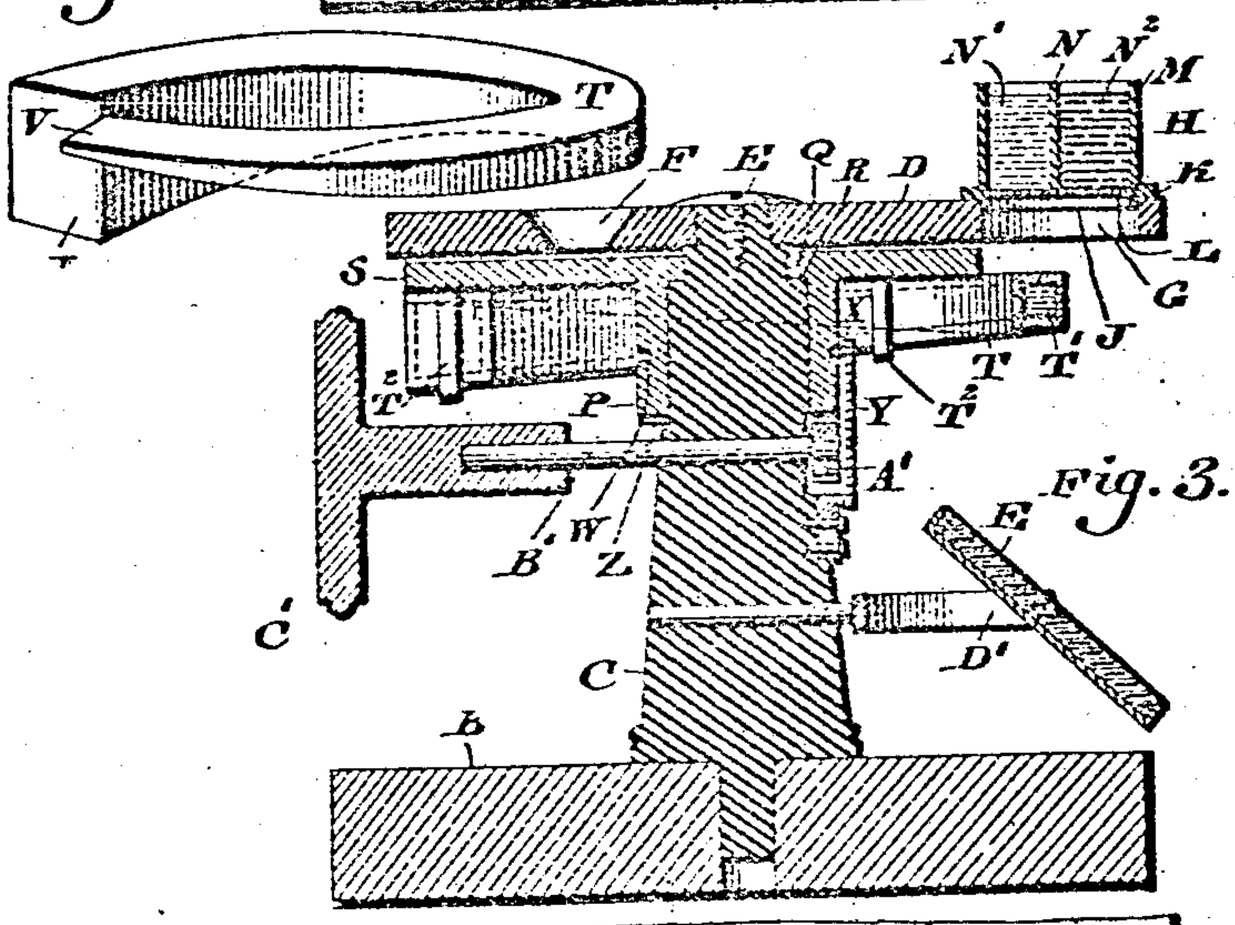
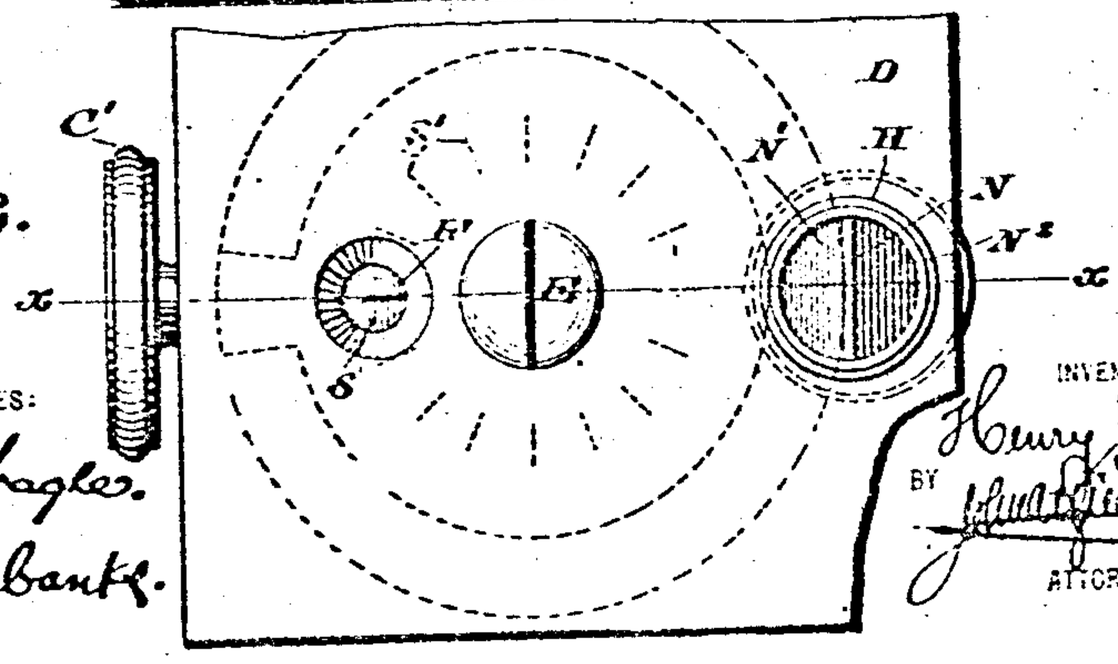


Fig. 3.

Fig. 2.



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HEMOGLOBINOMETER.

SPECIFICATION forming part of Letters Patent No. 585,694, dated July 6, 1897.

Application filed October 28, 1896. Serial No. 610,277. (No model.)

To all whom it may concern:

Be it known that I, HENRY ORFORD, a subject of the Queen of Great Britain, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Hemoglobinometers, which improvement is fully set forth in the following specification and accompanying drawings.

My invention consists of an improved construction of hemoglobinometer, by means of which I am enabled to readily ascertain the relative or quantitative portion of hemoglobin in blood.

It also consists of a novel construction of a transparent hollow wedge-shaped body, which is rotatably supported and adapted to be moved to any desired position relative to the blood to be tested.

It further consists of novel details of construction, all as will be hereinafter set forth, and specifically pointed out in the claims.

Figure 1 represents a side elevation of a hemoglobinometer or apparatus for ascertaining the quantitative proportion of hemoglobin in blood embodying by invention. Fig. 2 represents a plan view of the construction shown in Fig. 1. Fig. 3 represents a section on line *x x*, Fig. 2. Fig. 4 represents a perspective view of the transparent wedge employed.

Similar letters of reference indicate corresponding parts in the several figures.

Referring to the drawings, A designates a hemoglobinometer, the same consisting of the base B, upon which is supported a pillar or standard C.

D designates a stage or table which is rigidly secured to said standard by any suitable device, as a screw E, said stage having an opening F for the purpose of enabling the operator to read the markings on a scale, to be hereinafter referred to.

G designates an opening in the stage D, in which is located the receptacle H, the latter having a base I, which has a flange J, which is adapted to enter the opening G, said base being provided with a laterally-extending flange K, by means of which the receptacle is supported on said stage.

M designates the outer wall of the receptacle, which has the partition N therein, thereby dividing the same into two compartments N' and N^2, which are adapted to contain water and blood, respectively.

P designates a sleeve which is supported upon a suitable bearing near the upper portion of the standard C, said sleeve having an inwardly-projecting shoulder or flange Q, which is adapted to rest on the shoulder R near the upper portion of said standard.

S designates a laterally-extending plate which has on its upper portion the scale S', said plate being attached to the sleeve P and having the transparent wedge-shaped chamber T supported therefrom by means of the straps T^2, although it is of course evident that said receptacle may be supported by other convenient means.

The wedge-shaped chamber T is preferably constructed of glass or other transparent material and is filled with a suitable colored solution resembling hemoglobin.

The general contour of the chamber T will be evident from Fig. 4, the thickest end thereof being indicated by U and the thinnest extremity thereof being indicated by V.

W designates an annular groove located in the sleeve P, the walls of which groove are adapted to be engaged by the nose X of the spring Y, the latter being secured in any suitable manner to the standard C, the function of the spring and its nose being to hold the sleeve P temporarily in any desired position and steady the chamber T.

Z designates teeth which are located in the present instance on the lower periphery of the sleeve P, thereby forming an annular rack which is engaged by the teeth of the pinion A', which latter is mounted on the shaft B', which has its bearings in the standard C, said shaft B' being readily rotated by means of the wheel C', which may of course be milled or knurled, if desired.

D' designates a bracket or similar support in which a mirror or reflector E' is pivotally mounted, so that light can be deflected or concentrated in the direction of the receptacle H when desired.

The operation is as follows: The chamber N' is filled with water and the chamber N^2 with the blood solution to be tested. The chamber T is next revolved by means of the

wheel C' under the chamber N', and the reflector E' is adjusted so as to properly reflect light upwardly, the chamber containing the colored solution being slowly turned until the two chambers N' and N² are of the same color, the result then being read off through the opening in the stage D by means of the opening F, through which the characters on the scale S' are readily visible, it being of course understood that the same may be graduated to any desired scale or unit of measurement.

I desire to call especial attention to the simplicity and effectiveness of my apparatus, since the number of parts and the liability of their derangement are reduced to a minimum, and there is in addition no necessity for the employment of an intricate system of graduation and a graduated ruby-glass plate, as has been heretofore employed.

The wedge-shaped chamber is employed because of its varying thickness, whereby the color of the standard fluid employed therein becomes more intense when viewed at the thickest end of the chamber and less intense when viewed at the thinnest end. This intensity of color is regular in its increase from the thin to the thick end of the chamber on account of the uniform pitch of the chamber itself.

By the use of the liquid I am enabled to obtain a standard of exactly the same value for different instruments. This is obvious, as one solution of the same composition may be used for all. This feature is an improvement over the old instrument insomuch as it is impossible to obtain the different wedges of solid glass (used in the old form) of the same tint in each case. This then necessitates the use of a different quantity of blood for a test with each individual instrument. Insomuch as this quantity of blood must be measured with great precision a calibrated glass pipette is furnished, holding exactly the quantity which when diluted will give the proper reading on the scale when compared with the glass wedge. The loss and breakage, and consequent difficulty of replacement of these pipettes, causes much inconvenience to the use of the previously-invented form of hemoglobinometer.

As will readily be seen from above explanation of my instrument, the same quantity of blood may be used with each individual instrument, and the pipettes being all made of the same capacity are interchangeable, thus avoiding the objectionable feature of supplying a particular pipette with each individual apparatus.

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

1. In a hemoglobinometer, an annular wedge-shaped chamber adapted to contain a standard fluid, whose intensity is increased from the thin to the thick end of said chamber.

2. In a hemoglobinometer, a standard, a stage thereon with an opening therein, a two-part receptacle held in said opening, a plate rotatable on said standard, a wedge-shaped chamber secured to said plate and adapted to pass beneath one of the parts of said receptacle, and a mirror below and in line with said chamber and receptacle.

3. In a hemoglobinometer, a standard with a stage secured thereon, a two-part receptacle secured to said stage, a plate connected with a collar mounted on said standard, an annular wedge-shaped chamber secured to said plate, mechanism for rotating said plate and thereby said chamber, a mirror in line with said chamber and receptacle, and a scale on said plate seen through an opening in said stage.

4. In a hemoglobinometer, a standard having a stage rigidly supported thereupon, an opening in said stage, a receptacle adapted to contain blood and water located over said opening, a second opening in said stage, a plate located underneath the latter, a sleeve rotatably supported on which said plate is mounted, a hollow annular transparent wedge-shaped chamber suitably supported, means for rotating said sleeve, a spring bearing on the latter and adapted to hold the same temporarily in position, and a reflector.

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