

(No Model.)

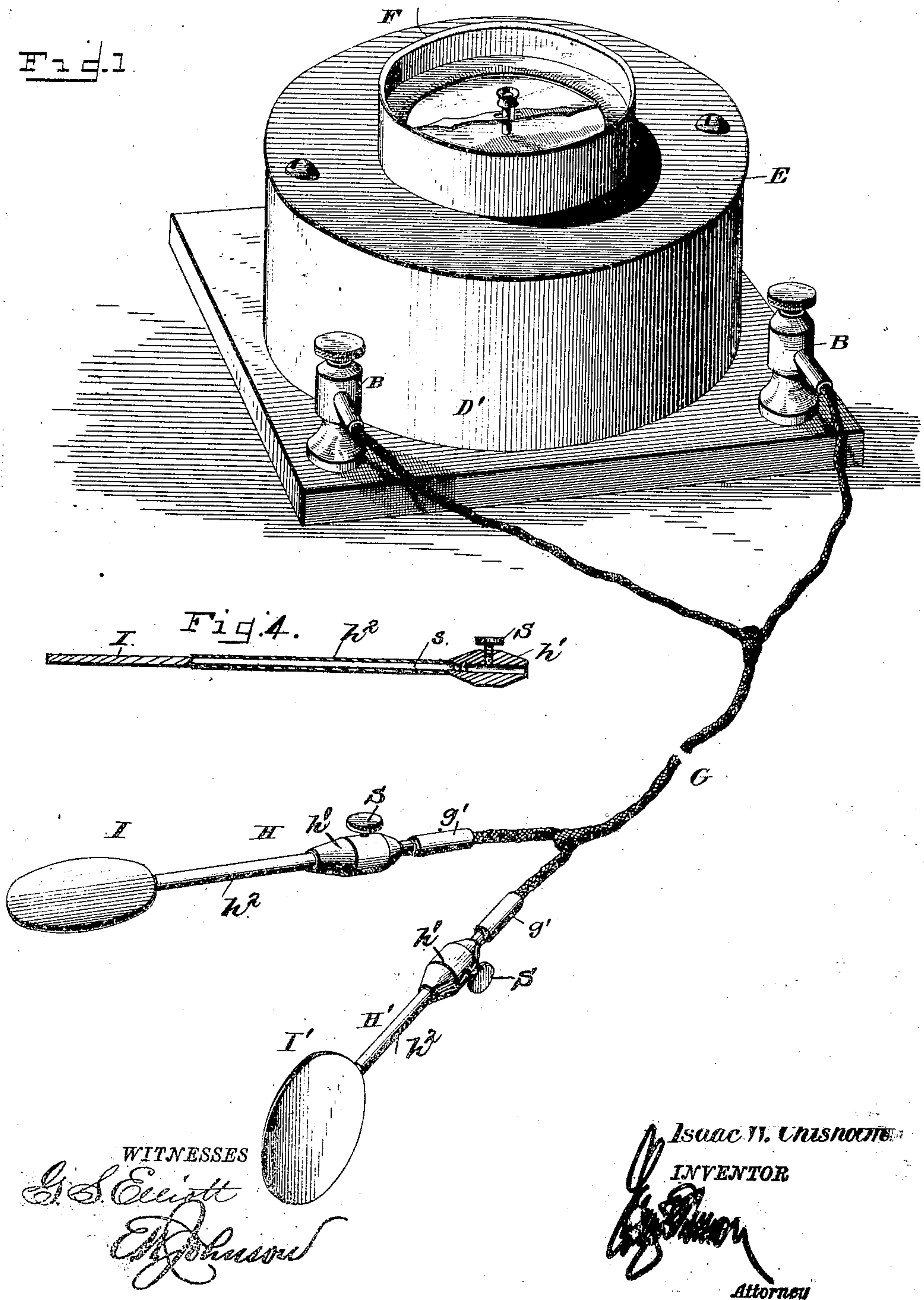
2 Sheets—Sheet 1.

I. W. CHISHOLM.

GALVANOMETER.

No. 390,067.

Patented Sept. 25, 1888.



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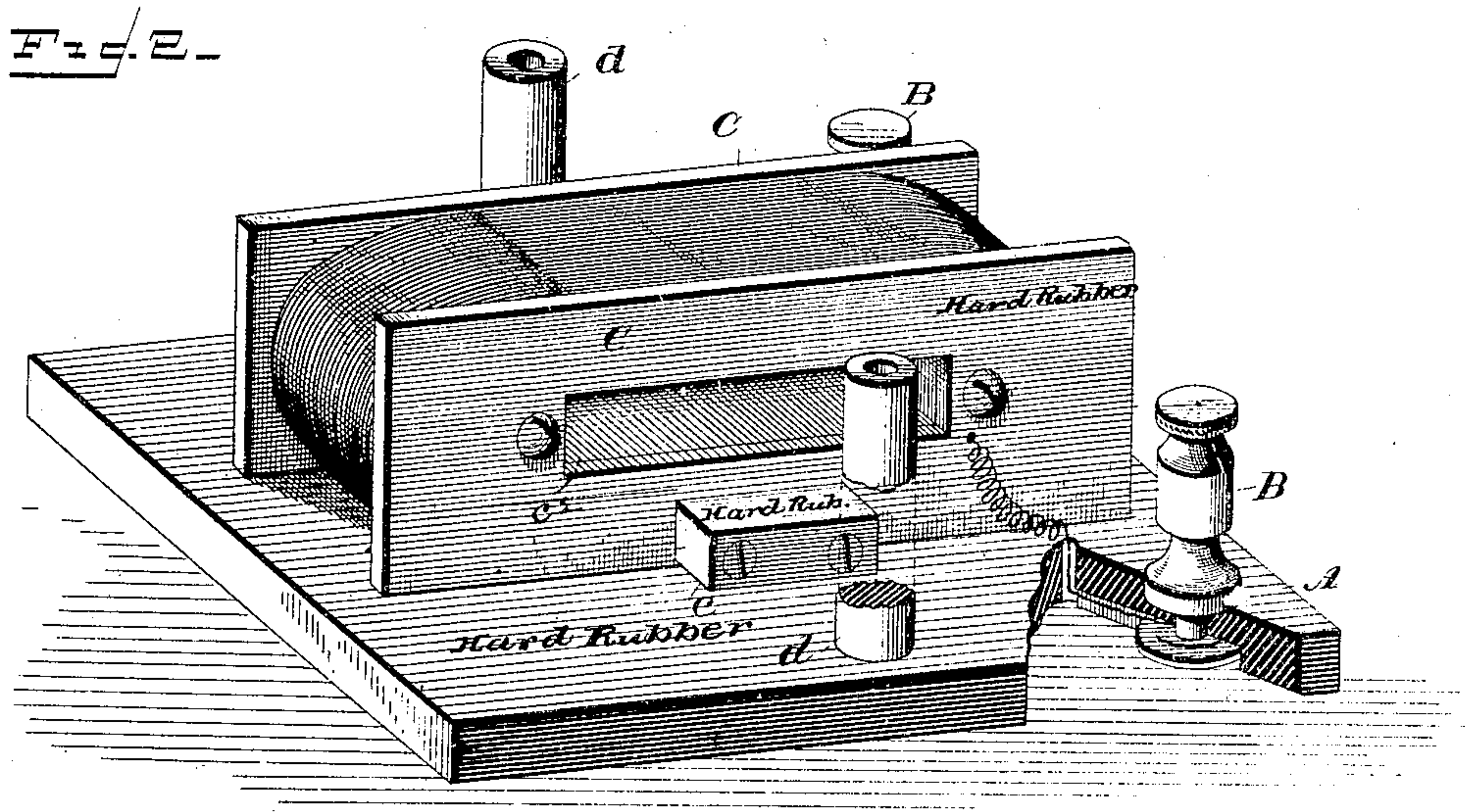
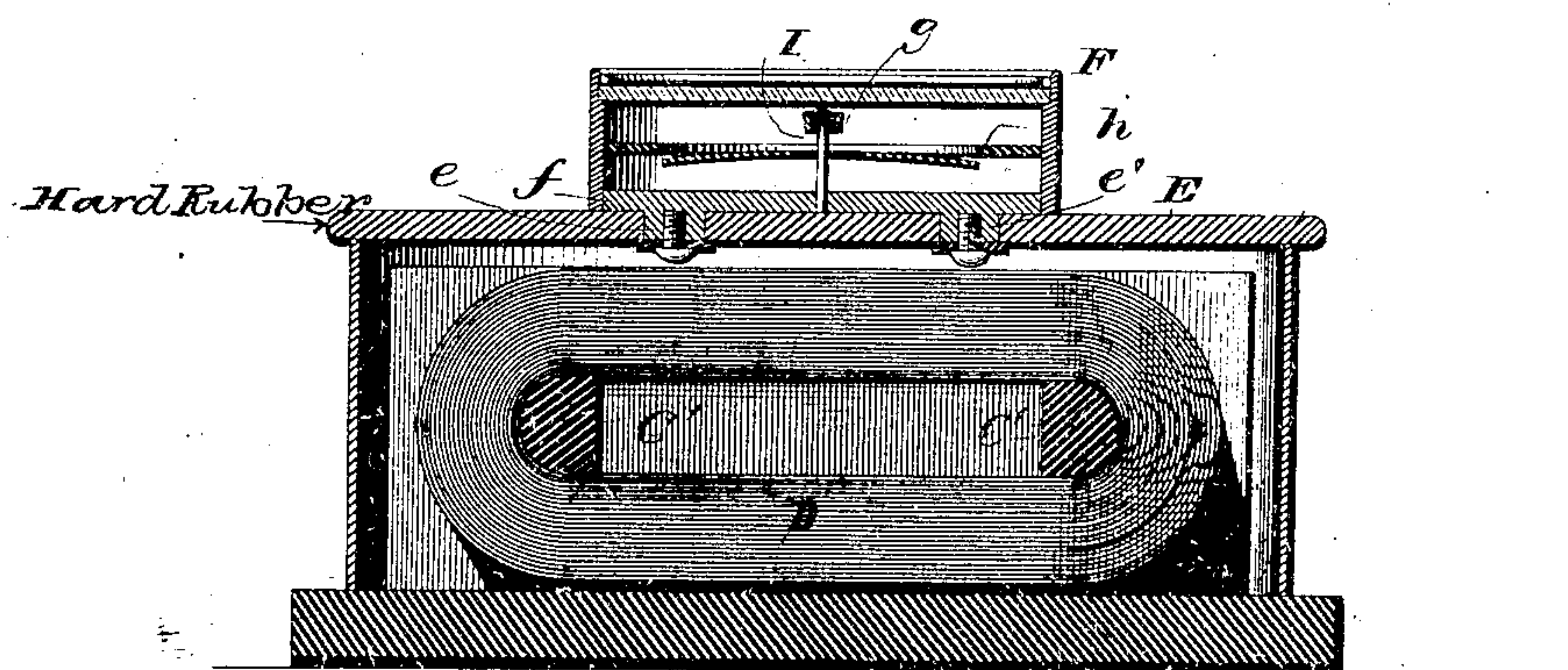


Fig. 3.



WITNESSES

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# UNITED STATES PATENT OFFICE.

ISAAC W. CHISHOLM, OF NEW CONCORD, OHIO.

## GALVANOMETER.

SPECIFICATION forming part of Letters Patent No. 390,067, dated September 25, 1888.

Application filed May 21, 1886. Serial No. 202,917. (No model.)

*To all whom it may concern:*

Be it known that I, ISAAC W. CHISHOLM, a citizen of the United States of America, residing at New Concord, in the county of Muskingum and State of Ohio, have invented certain new and useful Improvements in Galvanometers; 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, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

My invention relates to certain new and useful improvements in galvanometers; and it consists in the use of a specially-constructed galvanometer, in combination with two detachable electrode-arms respectively carrying plates of metal of different electrical inherent properties, preferably zinc and copper, to be placed within the mouth and acted upon by the acids and alkalis of the human saliva, thereby causing a molecular excitation of said plates and a generation of an electric current, the tension of which will be registered and indicated by the needle of the galvanometer moving relatively in connection with a predetermined scale.

The primary object of my invention is to provide an apparatus for ascertaining the intensity of an electric current in the human body, or, in other words, what tension of current the acids and alkalis carried by the human saliva will generate in different individuals.

The secondary object of my invention is to provide an apparatus for the purpose set forth, wherein a galvanometer of preferred form of construction is used in combination with detachable electrode-arms carrying flat plates of metal, preferably of zinc and copper, at their outer ends, having electrical connections with the galvanometer at their inner ends, whereby plates of various sizes and arms of different lengths may be substituted at the will of the operator for different purposes.

In the accompanying drawings I have illustrated my improved form of construction, the similar parts thereof uniformly lettered, and are as follows:

Figure 1 is a perspective view of my improvement. Fig. 2 is a similar view of the

coils and connections of the galvanometer, the casing being removed. Fig. 3 is a sectional view through the coil. Fig. 4 is a longitudinal vertical sectional view of one of the detachable electrode-arms.

A refers to a base of non-conducting material, preferably hard rubber, to which binding-posts B B are secured and extend through the same. This base has hard-rubber blocks c rigidly secured thereto, through which screws pass and into vertically-arranged hard-rubber rectangular side pieces, C, having central openings, c', which serve as supports for the hard-rubber transverse bars C', around which the fine insulated wire of the coil D is wound. The terminals of the coil extend through the side pieces, C, and are attached to the bases of the binding-posts B.

Hard-rubber vertical supports d are secured to the base A and form a supporting connection for the rubber top plate, E. In the top plate and base a circular metallic band, D', is located, which completely covers the coil and protects the same from injury.

The top plate, E, is provided adjacent to its center with perforations e, within which lie metallic projections e', formed with a metallic plate, f, which supports the pivot-pin of the needle g. These projections on the plate f are internally screw-threaded to secure the same to the plate E by suitable screws and washers. The pocket F, within which is placed the magnetic needle g, is provided with an inwardly-projecting annular scale-plate, h, and the needle g registers therewith in the usual manner.

G indicates the cords inclosing the electrical conductors, attached at their inner ends to the binding-posts B, and at their outer ends carrying metallic contacts g', of ordinary form of construction.

Electrode-arms H H' are provided and have sockets h' formed on their inner ends, with which set-screws S engage to detachably secure the said contacts to the arms g', and consequently to a galvanometer. The sockets h' are connected to outer metallic disks I and I', by means of wires s, which are screw threaded and secured to the said sockets, as shown, and over said wires s, between the sockets h' and the said plates I I', a hard-rubber cylinder, h'', is mounted, to be held by the fingers and thereby form a non-conducting support. When the



plates I I' are within the mouth, the lips will bear upon said cylinders  $h^2$ , for purposes which will be readily understood. One of said disk-plates is preferably made of zinc and the other of copper, silver, or nickel, as may be desired. The arms are made detachable for the purpose of making the device convenient to substitute various sizes of electrode-arms and wires  $s$ , carrying different forms and kinds of metallic disks.

Having thus described my invention, I claim—

1. In a galvanometer, the combination, substantially as described, of the base A, having the uprights  $b$  and binding-posts B, secured thereto, the blocks  $c$ , secured to the said base, the vertically-disposed side pieces, C, secured to and supported by said blocks  $c$ , the transverse bars C', around which the wire of the coil is wound, supported by said side pieces, C, adjacent to the ends thereof, said parts, with the exception of the binding-posts B, all being constructed of a non-conducting material, preferably hard rubber, and the casing, needle, and electrical connections, substantially as described.

2. The combination, with the galvanometer

herein described, of the electrode-arms having sockets  $h'$ , set-screws passing into said sockets for detachably securing said arms to the metallic contacts on the ends of the terminals of the galvanometer, the said sockets having wires  $s$ , detachably connecting the same with flat disks I I', of metals having different inherent electrical properties, and a hard-rubber cylinder,  $h^2$ , placed over said wires  $s$  between the sockets  $h'$  and the outer disk-plates, I I', substantially as described.

3. The combination, with the base A, of the block  $c$  and the vertically-arranged oppositely-situated rectangular side pieces, C, inclosing and securely supporting the transverse bars C', around which and between the side pieces, C, the insulated wire forming the coil D is wound, the said parts A,  $c$ , C, and C' all being constructed of hard rubber, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ISAAC W. CHISHOLM.

Witnesses:

JAMES D. ARNSPOKER,  
JAS. H. ATKIN.