

No. 644,251.

Patented Feb. 27, 1900.

C. G. O. H. VON KÖHLER.  
ELECTRIC CONTACT APPARATUS.

(Application filed Dec. 5, 1898.)

(No Model.)

Fig. 1.

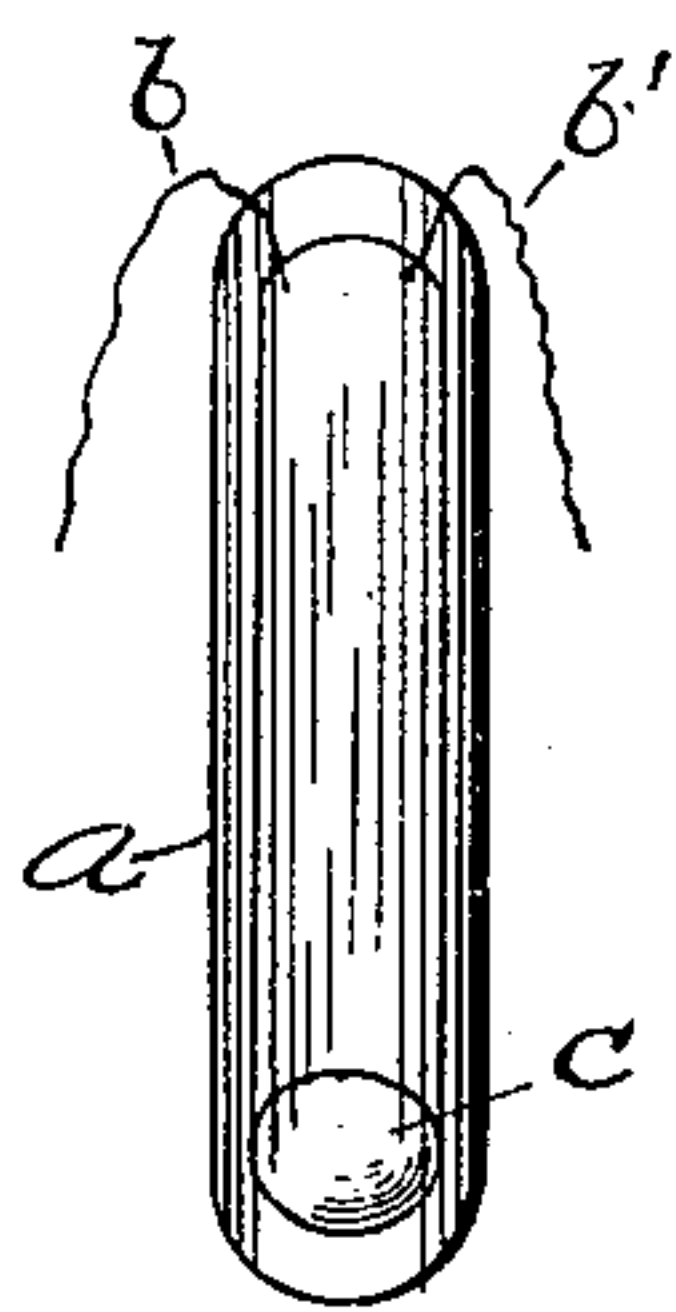


Fig. 2.

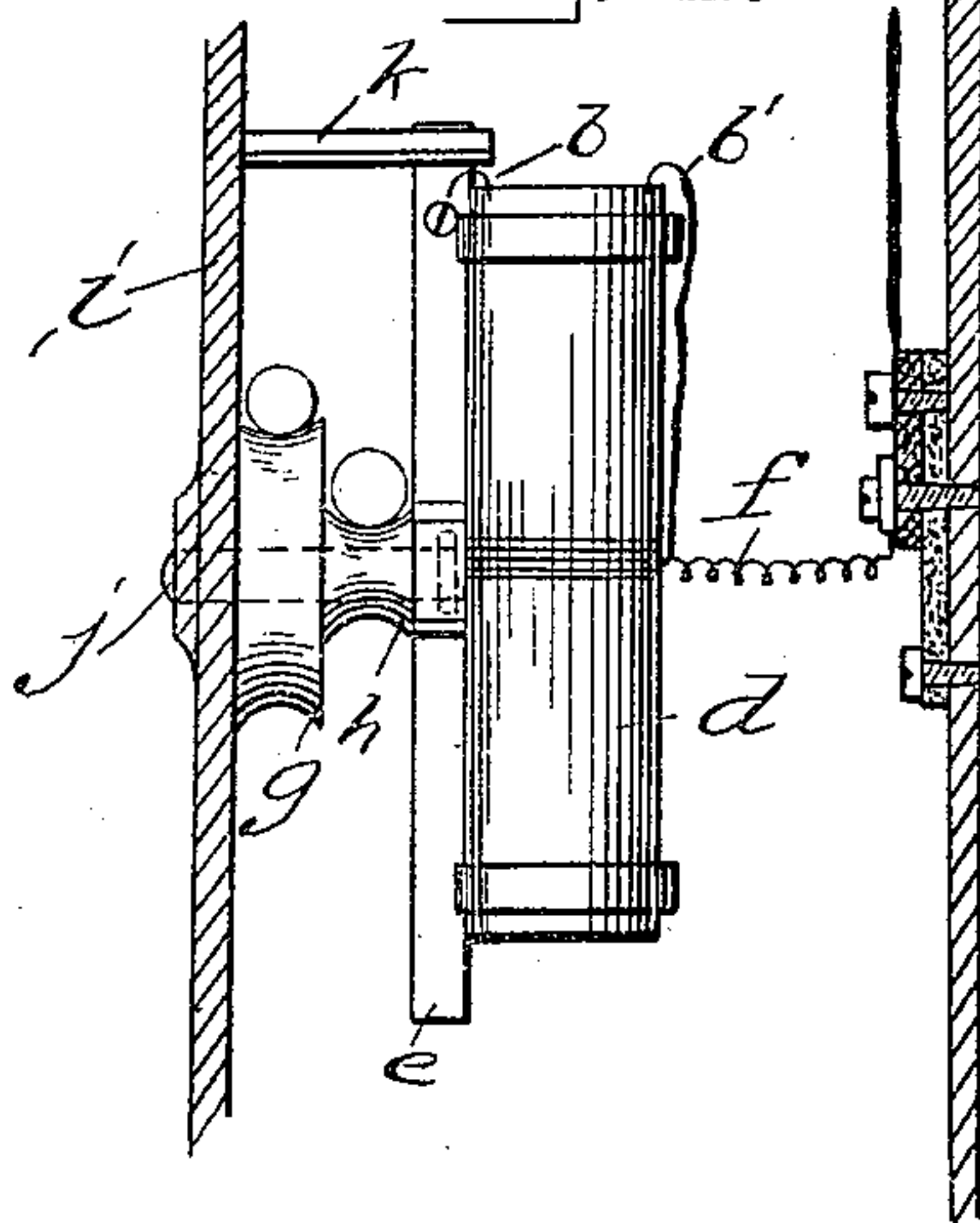
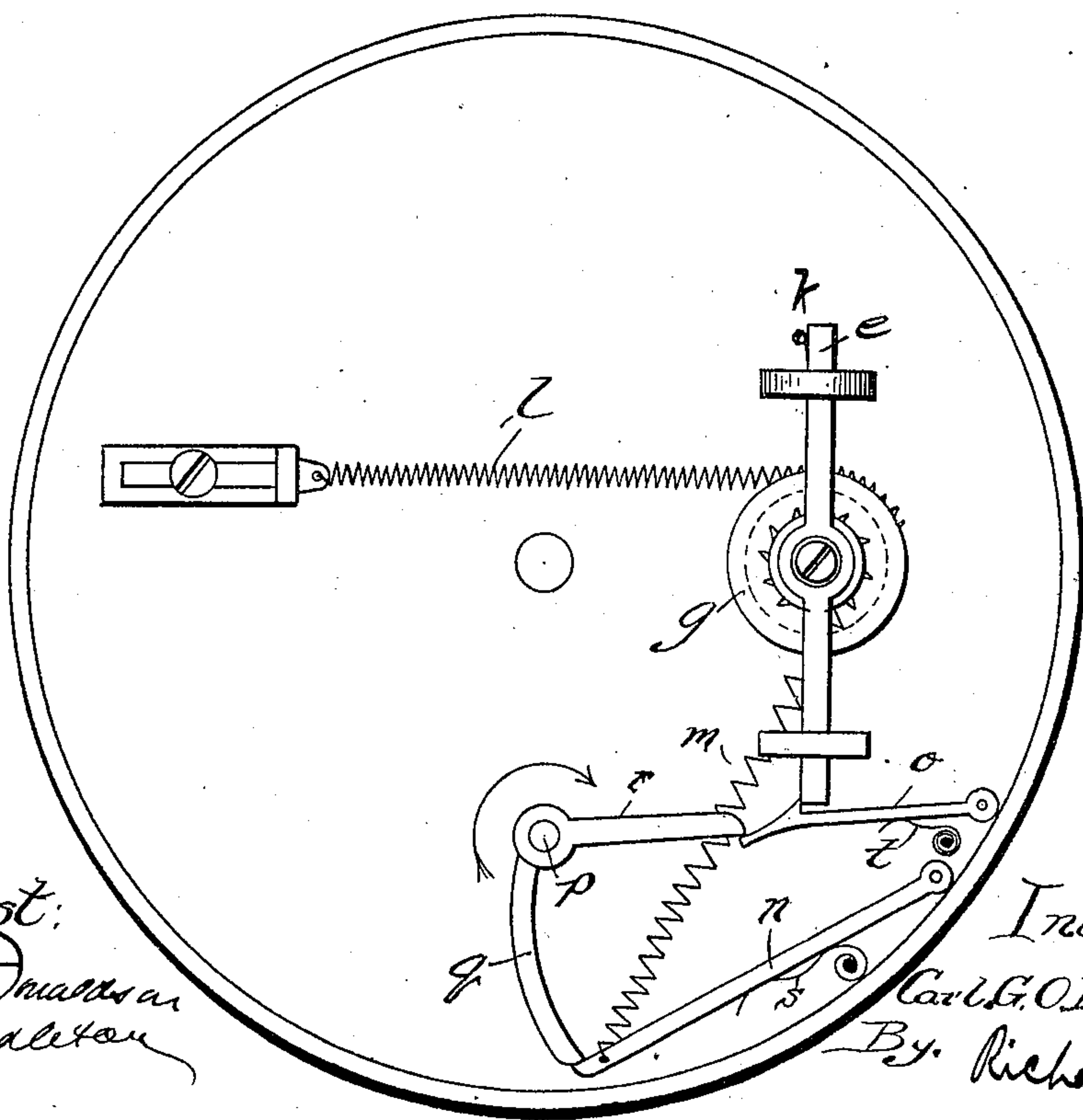


Fig. 3.



Attest:  
Miller & Massey  
Attorneys

Inventor:  
Carl G. O. H. von Köhler  
By Richard L. Attus

# UNITED STATES PATENT OFFICE.

CARL GUSTAF OTTO HJALMAR VON KÖHLER, OF STOCKHOLM, SWEDEN,  
ASSIGNOR TO THE PATENTAKTIEBOLAGET SVEA, OF SAME PLACE.

## ELECTRIC-CONTACT APPARATUS.

SPECIFICATION forming part of Letters Patent No. 644,251, dated February 27, 1900.

Application filed December 5, 1898. Serial No. 698,386. (No model.)

*To all whom it may concern:*

Be it known that I, CARL GUSTAF OTTO HJALMAR VON KÖHLER, a subject of the King of Sweden and Norway, and a resident of Stockholm, Sweden, have invented an Improved Electric-Contact Apparatus, of which the following is a specification.

This invention relates to an electric-contact maker and breaker for weak currents, which can be used in any place where seawater, moisture, oil, ammonia or other gases, dust, or smoke would destroy an ordinary contact. It can thus be favorably used on board vessels, in mines, engine-rooms, stables, acid-factories, and so on, for log instruments, telephones, electric-time central stations, &c.

The contacts hitherto used are in most cases rubbing contacts, which may be all right if they are very often in use, but if not rust or oxidize even when they are covered with platinum. They are also liable to get out of order by dust accumulating on the contacts. In the contact invented by me, all parts used for making and breaking the contact are placed in an air-tight glass tube, so that no gases or dust can get in and spoil the cleanliness thereof. The contact arrangement is constructed as follows: A glass tube—say, three-sixteenths of an inch in diameter—is melted together at one end, and there are two platinum wires fused in near the bottom, one on each side, ending just inside the glass, so that they have a space of about one-eighth of an inch between them. Into the glass tube mercury is then poured until it forms a ball of about the same diameter as the tube. The tube is melted together about one inch from the bottom, where the platinum wires are fused in. To avoid oxidation of the mercury, the air is taken out by filling the tube before melting it together with carbonic acid. This tube is fastened to a certain mechanism, which turns the tube quickly upside down, when the mercury ball rolls down and makes a good contact between the platinum wires. The duration of the contact can be regulated by the mechanism. After the contact-making the tube is brought back again in upright position by the mechanism. This mechanism is moved in a ship's log by the log instrument, in a telephone by the automatic-switch

arrangement, in an electric clock by the clock-work, and so on. The tube must be reversed very quickly, for instance, in a ship's log, where if moved slowly the rolling of the ship might allow the mercury when the tube has come half-way—i. e., horizontal—to roll over to the contact end of the tube and back again several times before the closing of the circuit is wanted, and thus give many contacts instead of one.

In the accompanying drawings, Figure 1 is a view of the glass tube for holding the ball of mercury. Fig. 2 is a side view of the same with its operating means and circuit connections, parts of the support being shown in section. Fig. 3 is a front view of the mechanism for operating the tube, said tube being omitted.

The glass tube *a* is shown in Fig. 1 in the position as when the current is broken with the wires *b* and *b'* fused in.

*c* is the mercury ball.

The tube is inserted in an ebonite tube *d*, fastened to a metal arm *e* of the moving mechanism, to which arm one of the wires *b* is conductibly fastened. The other wire runs alongside the tube to its center and is there through a fine spiral or coil *f* connected with one end of the circuit, the other connection being through the arm *e*, the metal, and so on. In very particular cases of course both wires may be led alongside the tube and connected at *b'*.

*g* and *h* are pulleys for moving the arm *e*.

*i* is the bottom on which the mechanism is on a bolt *j* movably fastened.

*k* is a peg for stopping the arm *e* and the tube.

In Fig. 3, *l* is a spring fastened to the largest pulley *g* to hold the tube upright against the peg *k*. *m* is another spring working on the smaller pulley and fastened to a lever *n*. *o* is a catch holding the arm *e* in position, and *p* is the driver, provided with two arms *q* and *r*, so placed that *q* works on the lever *n* and *r* on the catch. The whole works as follows: *p* turns slowly around in the direction of the arrow. The arm *q* presses the lever *n* down, when the driver turns, thus stretching the spring *m*, which would turn the arm *e* if the catch *o* did not hold it back. When the spring *m* is thus stretched, as shown in the



figure, the arm *r* moves down the catch, and the arm *e*, then free, turns quickly till its lower end comes up on the other side of the peg *k*. The mercury then connects the wires  
 5 *b* and *b'*. The weak spring *l* is during this operation strained, and the lever *n* is, free from the pressure of the arm *g*, lifted by the spring *s*. The spring *l* turns the pulley back and the arm *e* comes in its first position. The  
 10 mercury is then in the non-connecting part of the tube, and the catch *o*, relieved from the arm *r*, is lifted by the spring *t*, and the whole is in the same position as in the beginning.

This mechanism can be operated in a ship-  
 15 log by the one-fourth-mile axis or any axis making one revolution each mile and in a central clock for electric time by the axis of the seconds-hand or any axis making one revolution per minute, in the former case giving  
 20 one contact for each mile and in the latter for each minute.

The contact apparatus can be used in fire-alarm boxes, railroad-signals, and all places where damp air, dust, or gases would make  
 25 other contacts unreliable.

Having now particularly described and ascertained the nature of this invention and in

what manner the same is to be performed, I declare that what I claim is—

1. In combination, the air-tight tube having 30 the terminals exposed in its interior, a body of mercury in said tube to contact with said terminals, means for turning the tube comprising the weak and strong springs, the pulleys to which they are attached, the catch 35 for holding the tube in one upright position, the lever for stretching the stronger spring and means for operating the lever and catch consisting of the rotary shaft and the arms thereon to engage the catch and lever respec- 40 tively, substantially as described.

2. In combination the tube, air-tight and containing mercury and electric contacts and means for oscillating said tube comprising the strong and the weak springs acting in op- 45 position, catch mechanism and means for controlling the same, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

CARL GUSTAF OTTO HJALMAR VON KÖHLER.

Witnesses:

H. WIZOFF,

J. JONSSON.