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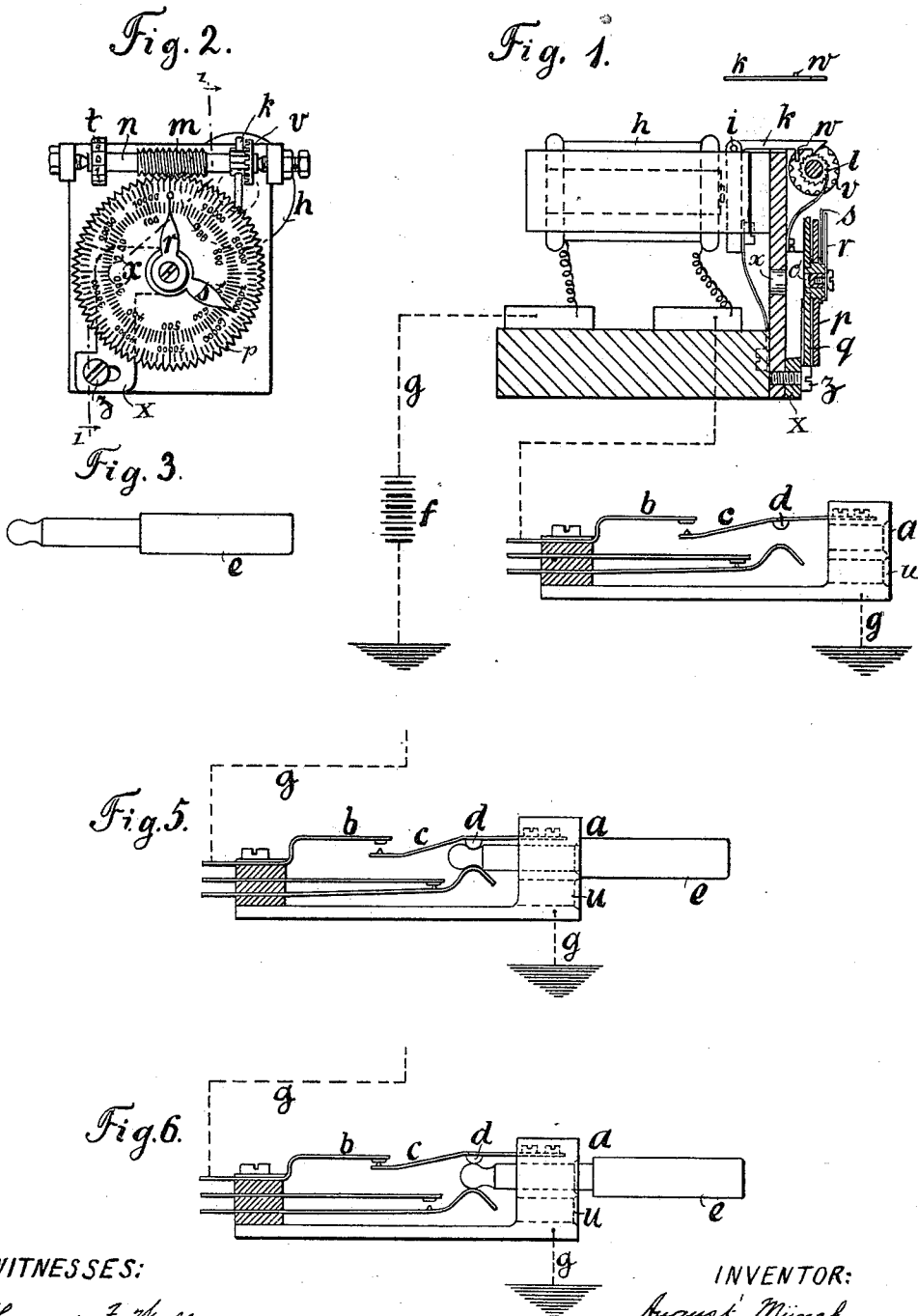
3 Sheets—Sheet 1.

A. MÜNCH.

APPARATUS FOR REGISTERING THE NUMBER OF TELEPHONIC
CONVERSATIONS.

No. 566,334.

Patented Aug. 25, 1896.



WITNESSES:

Thomas F. Wallace
Rene' Gruine

INVENTOR:

August Münch
By his Attorney
Arthur C. Fraser & Co.

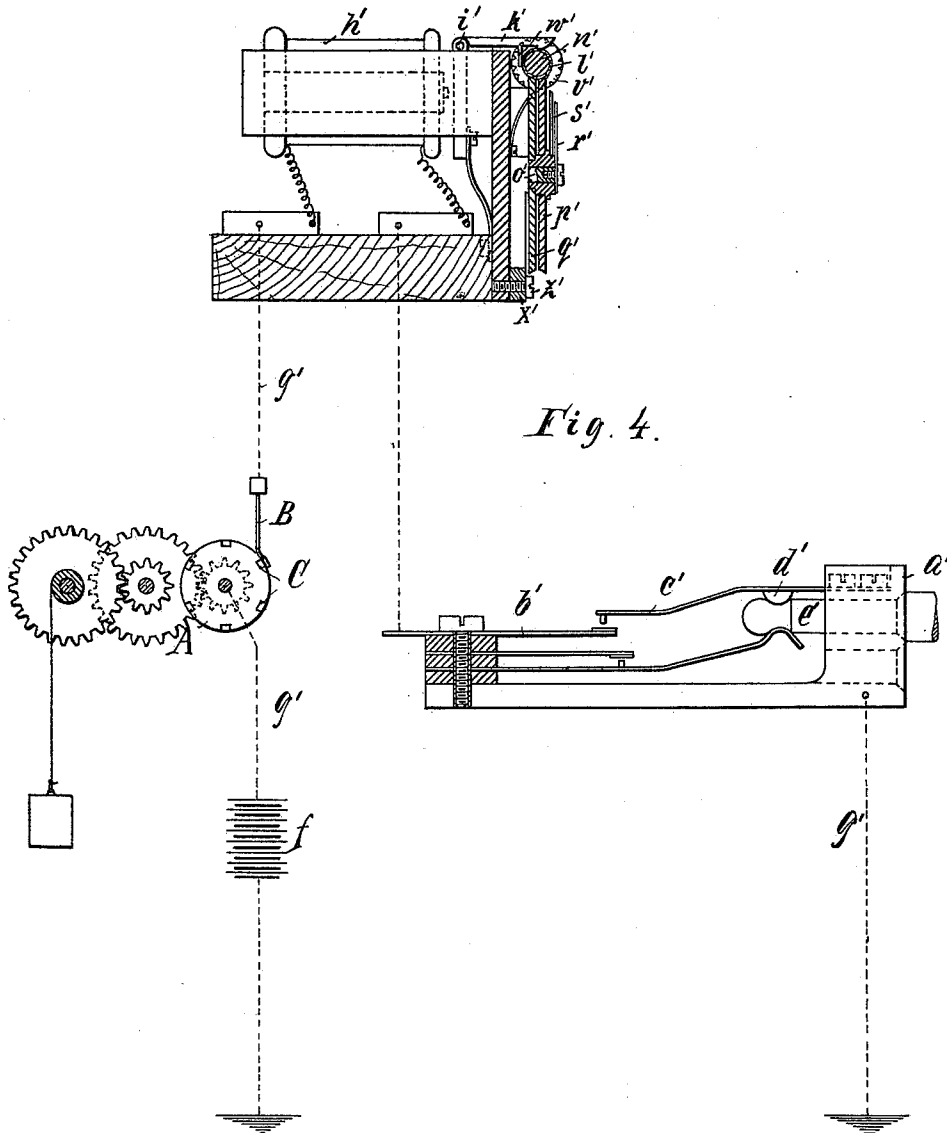
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A. MÜNCH.
APPARATUS FOR REGISTERING THE NUMBER OF TELEPHONIC
CONVERSATIONS.

No. 566,334.

Patented Aug. 25, 1896.



WITNESSES:

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(No Model.)

3 Sheets—Sheet 3.

A. MÜNCH.

APPARATUS FOR REGISTERING THE NUMBER OF TELEPHONIC
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Fig. 7.

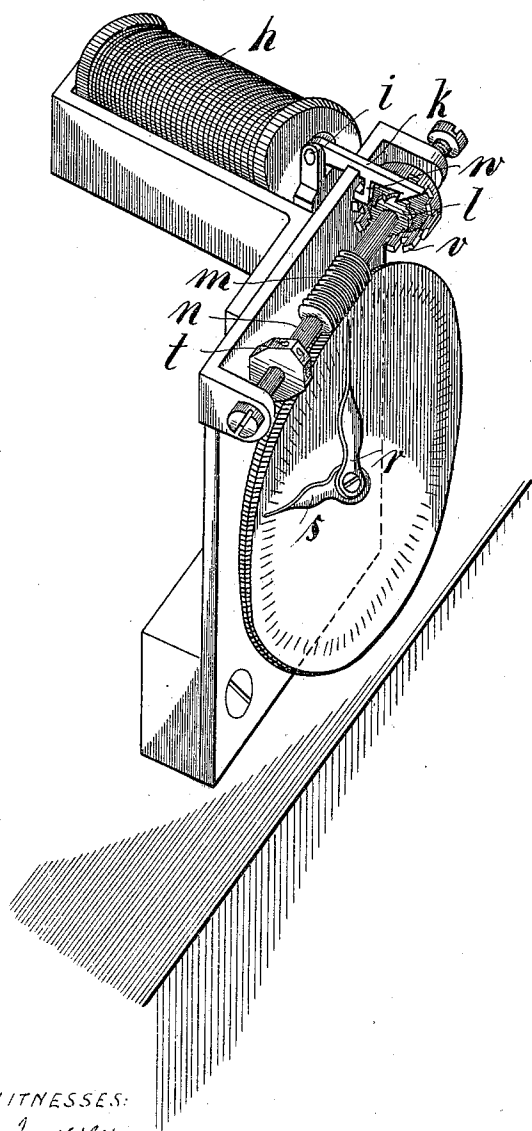
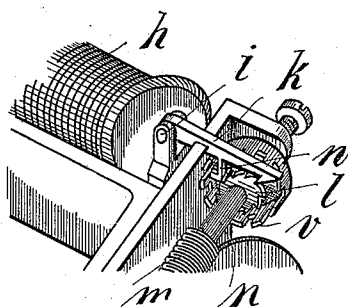


Fig. 8.



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UNITED STATES PATENT OFFICE.

AUGUST MÜNCH, OF CHARLOTTENBURG, GERMANY.

APPARATUS FOR REGISTERING THE NUMBER OF TELEPHONIC CONVERSATIONS.

SPECIFICATION forming part of Letters Patent No. 566,334, dated August 25, 1896.

Application filed October 25, 1894. Serial No. 526,917. (No model.)

To all whom it may concern:

Be it known that I, AUGUST MÜNCH, a subject of the German Emperor, residing in Charlottenburg, Germany, have invented certain new and useful Improvements in Apparatus for Registering the Number or Duration of Telephonic Conversations, of which the following is a specification.

This invention relates to apparatus for registering the number of times telephonic apparatus is used for conversation and, if desired, the duration of such conversations.

The employment of counting apparatus for effecting the registration of the number or the duration of the conversations carried on by telephone-subscribers is attended with very great difficulties in practice, and partly by reason of the peculiarity of the mode of action and the means used to bring about that action. Moreover, both for the registration of the number and of the duration of conversations it is essential that any apparatus which is to be regarded as satisfactory should be easily and cheaply applicable to the means and methods of working and to the arrangements already in use.

The apparatus constructed according to this invention records automatically and reliably the number or the duration of the conversations carried on, the operation of the registering mechanism being effected by electricity by means of single impulsions of the current which excite an electromagnet which serves to move the registering mechanism. This electromagnet is so connected with the switch mechanism of the central exchange that when the plug is used at the central exchange for the purpose of connecting or separating two subscribers' instruments circuit-closing devices are automatically brought together or separated, for instance, by the action of the plug upon a plate, the circuit of the electromagnet being by this means either closed or opened, so that it acts upon the registering mechanism. This arrangement is suitable for single or multiple switchboards alike of whatever system, and possesses the advantage that the registering apparatus may be set up as required at the central exchange, and allows the usual switches to remain unaltered as regards the main details of their arrangements. The apparatus under descrip-

tion has also the special advantage that it does not require a special manipulation of the officer for operating the registering mechanism. From this it necessarily follows that, given a suitable construction of the registering mechanism, the record of the connections made is an absolutely accurate one.

To enable my invention to be fully understood, I will describe how it can be carried into practice by reference to the accompanying drawings, in which—

Figure 1 is a longitudinal section of a suitable arrangement of apparatus for registering the number of telephonic conversations according to one form of my invention as used in connection with a multiple switchboard worked with contact-plugs, the register being cut on the line 1 1 in Fig. 2. Fig. 2 is a front elevation of the registering mechanism. Fig. 3 is an elevation of the switchboard contact-plug, and Fig. 4 is a diagrammatic view showing the apparatus adapted to record the time or duration of telephonic conversations. Fig. 5 is a diagrammatic view showing the switch in the open position, and Fig. 6 a similar view showing it in the closed position. Fig. 7 is a perspective view of the registering mechanism in the locked position, and Fig. 8 is a fragmentary perspective view thereof in the unlocked position.

I will first describe my invention by reference to Figs. 1 and 3.

To the earth connection *a* of a subscriber's circuit, and which also serves as the earth connection of a local battery-circuit *g*, which includes the electromagnet *h* of the registering mechanism, are arranged two circuit-closing plates *b* and *c*, which when in their normal position do not touch. One of these plates, *c*, has on its lower surface a boss or projection *d*, which is in the path of the head of the plug *e* and is moved laterally by this head in passing and drops into the recess behind this head when the latter has passed the projection *d*. The location of the projection is opposite the normal position of the recess in rear of the head of the plug, so that the plate *c* is only moved when the plug is inserted and when withdrawn. The lateral displacement of the projection *d* is sufficient to move the plate *c* into contact with the plate *b*. When the switchboard-plug *e*, Fig. 3, is

inserted or withdrawn, its head moves the projection d and through it causes the said plate c to be moved into momentary contact with the other plate, b , whereby the electric circuit g from the local battery f through the electromagnet h of the registering mechanism is closed, the armature i of the said magnet being thereby attracted and by means of a pawl k caused to operate a ratchet-wheel l , carried by an axle n , furnished with a worm m . This worm engages with two numbered disks p and q , which are able to rotate independently of each other on a stud o and one of which has, as in an ordinary Krafft's revolution-counter, one hundred teeth and the other one hundred and one teeth. In connection with these disks are two pointers, one of which, r , stands constantly at zero, while the other, s , turns with the disk q , the extent to which the latter has turned, as compared with the disk p , being thereby indicated. The ratchet-wheel l has, advantageously, twenty teeth, so that the armature must be operated twenty times to effect one complete rotation of the said ratchet-wheel. Two closures of the circuit are required for the registration of a conversation in correspondence with the working of the switchboard. A small numbered disk t on the axle n allows of numbering the units of conversations made. With the construction described this has ten numerals, one for every two teeth of the ratchet-wheel.

The mode of action of the apparatus is as follows: When a call is received from a subscriber, the attendant at the central station draws the corresponding plug out of the earth connection a to see whether the desired circuit be free. As the plug is withdrawn the two contact-plates b and c are pressed into contact with each other, so that the armature i of the electromagnet is attracted and the ratchet-wheel l is turned to the extent of one tooth and the worm-axle n through one-twentieth of a revolution. The small numbered disk t will thus be moved half the distance it is to be moved for a conversation. If the attendant finds the desired circuit free, he will put the plug e in the corresponding aperture u of the switchboard, and when the conversation is concluded he will replace the plug in the earth connection a , whereupon the armature i will be again attracted and move the worm-axle n another twentieth of a revolution, the two partial revolutions moving the registering-disk sufficiently to make the desired record. If the attendant finds the desired circuit engaged, (as will frequently happen in practice,) he then places the plug not in the earth connection a again, but in an independent aperture which may be either a dummy or provided with a contact-plate. The condition of the circuit may then be investigated by the attendant from time to time, and when it is finally found to be disengaged the connection is made. When the conversation is concluded, the plug is re-

placed in the earth connection and the registration by the counting mechanism is completed.

The attraction of the armature is more or less forcible according to the strength of the current in the local circuit g , so that it is necessary to provide an arrangement by means of which the worm-axle n is prevented from turning through more than one-twentieth of a revolution for a single movement of the armature. For this purpose a crown-wheel v , with, say, twenty teeth, is placed upon the worm-axle n , and in the intervals between these teeth a catch w on the pawl k engages at the moment when the ratchet-wheel l has turned to the extent of exactly one tooth, and thus locks the apparatus against movement until the magnet has been deenergized.

In order to effect the disengagement of the worm m from the indicating-disks p and q when it is desired to bring these to the zero-point, these disks are carried by a bent arm X , which rotates upon a pin x , this arm being capable of being clamped in position by means of a screw z or other suitable means.

If it be desired to record not the number but the time or duration of the conversations, a clock-train or a circuit-breaker operated thereby is, as illustrated in Fig. 4, interposed in the local circuit g' , by means of which the time at which the circuit is opened and closed is exactly indicated, and the circuit-closing plates b' and c' are further so arranged that they come into contact when the plug e is removed. This clock-train sets in rotation at a regular rate of speed a disk A , having a number of circuit-closing pieces C , (six being shown in the drawings,) each of which comes into contact with a spring B as the disk rotates. If the disk A makes a complete revolution in one minute, then at every ten seconds the current passes through the local circuit g' as long as the contact-plates b' c' are touching each other, as is the case when the plug e' is removed from the earth connection a' to be inserted into another circuit. As long, therefore, as the conversation is proceeding the armature i' is attracted every ten seconds, and at each attraction it causes the registering mechanism to rotate one tooth. When at the conclusion of the conversation the plug e' is again placed in the earth connection, its end, which acts upon the projection d' , pushes the circuit-closing plate c' so that the circuit is interrupted, and the electromagnet is no longer excited. Thus instead of the number of conversations their duration is registered. The circuit-closing disk with its connected parts may serve for any desired number of subscribers, the registering electromagnets h' of each of which is in connection with the said spring.

It will be seen that my invention provides an improved register for recording the operations of a telephone, and it will be understood that the invention is not limited to the particular details of construction or arrange-

ment hereinbefore set forth, as these may be modified as circumstances or the judgment of those skilled in the art may dictate without departing from the spirit of the invention.

5 The counter-disks *p* and *q* constitute properly the registering mechanism, the ratchet *l* and worm *m* driving mechanism, the pawl *k*, magnet *h*, and armature *i* means controlling this mechanism, and the contact-plates
10 *b* and *c* an automatic circuit controller or switch, while the clock-train disk *A* and contact *B* constitute a periodical circuit-breaker, and it will be understood that any suitable equivalent of the constructions known in the
15 art may be substituted for the particular constructions set forth for performing the functions of the parts named.

What I claim is—

1. In apparatus for registering the opera-
20 tions of telephones, a telephone-circuit, its switchboard having a socket, a switchboard-plug moving into said socket in a predetermined path and having a head at its inner end and a recess outwardly of said head, a
25 registering mechanism, an electromagnet controlling operation thereof, and an electric circuit for said magnet, in combination with a switch for said last-mentioned circuit consisting of contact-pieces, the one having a
30 projection extending laterally of and into the path of movement of the head of said plug, located outwardly of the head of and opposite the recess of said plug when the latter is
35 the plug by the head thereof when the plug is moved toward or from its home position,

and when so moved operating said switch, and moving into said recess when the plug is home, whereby the operation of said switch is only momentary during the movement of said
40 plug, substantially as and for the purpose set forth.

2. In apparatus for registering the operation of telephones and for other purposes, a registering mechanism having a rotary
45 ratchet-wheel, a pawl operating said wheel tooth by tooth and having a locking projection, a locking-disk connected to said ratchet-wheel and limiting its movement, and having
50 stopping-faces engaging the locking-face of said pawl at predetermined positions of the pawl and ratchet and thereby arresting movement of the latter, substantially as and for the purpose set forth.

3. In apparatus for registering the operation of telephones and for other purposes, a registering apparatus having a shaft *n* carrying a ratchet *l*, and a disk *v* having projecting
55 teeth, in combination with an operating-pawl *k* having a tooth engaging and operating said ratchet, and a projection *w* moving
60 into and out of the path of movement of the teeth of said disk *v*, and means for operating said pawl, substantially as and for the purpose set forth.
65

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

AUGUST MÜNCH.

Witnesses:

RICHARD SCHMIDT,
W. HAUPT.