

(No Model.)

S. D. FIELD.
CALL COUNTER FOR TELEPHONES.

No. 558,168.

Patented Apr. 14, 1896.

Fig. 1.

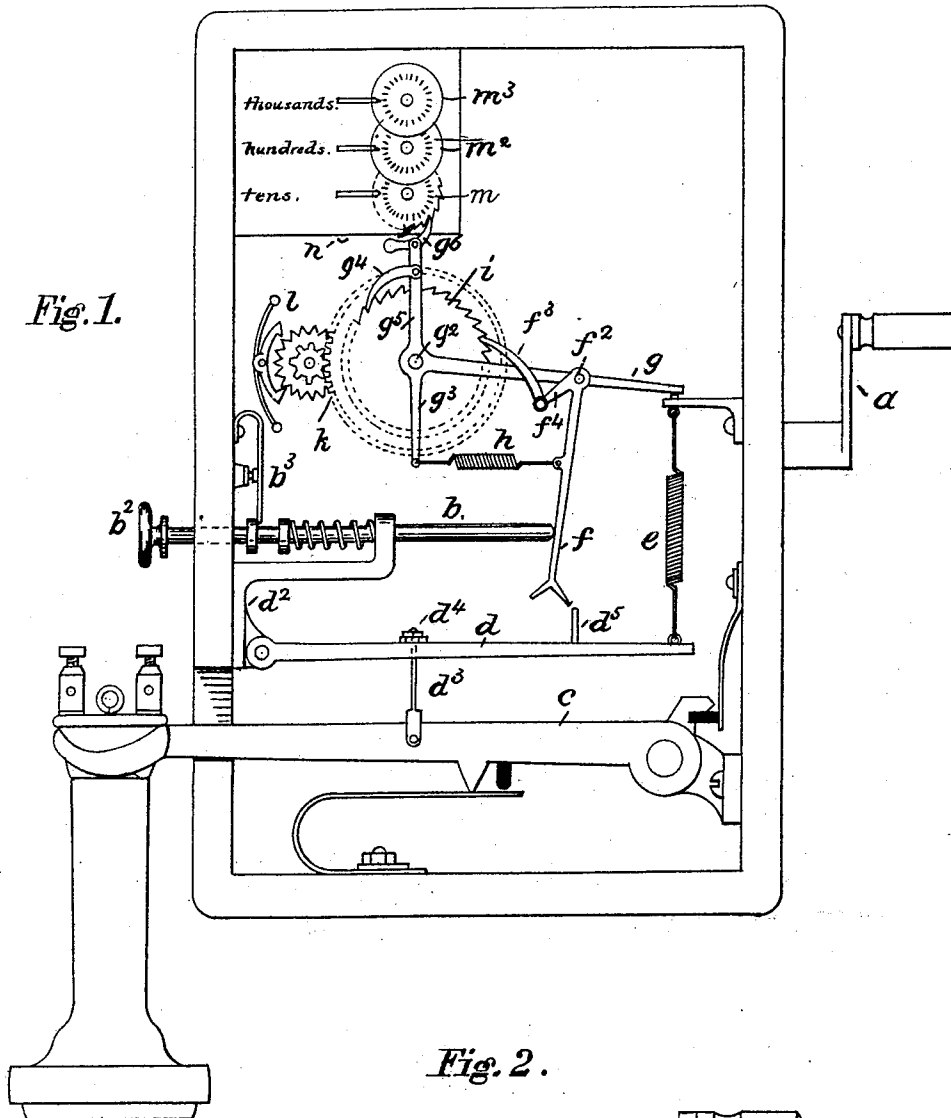
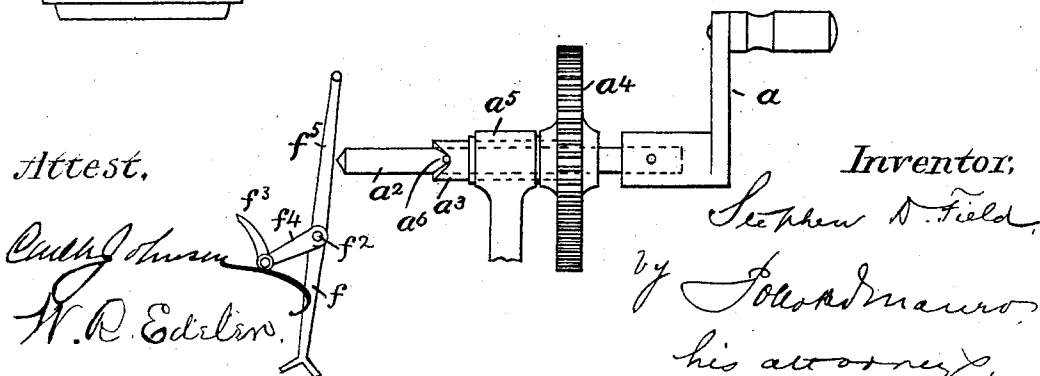


Fig. 2.



Attest,

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UNITED STATES PATENT OFFICE.

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CALL-COUNTER FOR TELEPHONES.

SPECIFICATION forming part of Letters Patent No. 558,168, dated April 14, 1896.

Application filed August 21, 1895. Serial No. 560,033. (No model.)

To all whom it may concern:

Be it known that I, STEPHEN D. FIELD, residing at Stockbridge, in the county of Berkshire and State of Massachusetts, have invented certain Improvements in Call-Counters for Telephones, of which the following is a specification.

My invention is a call-counter for telephones, or a device for counting or registering the number of times the telephone is used. It is designed to register only the use of the telephone which initiates connections, and that only when the desired connections are actually obtained.

The mechanism of my invention is adapted to be actuated by the movement of the telephone-switch lever upon the removal of the telephone therefrom, but is constructed to register the use of the telephone only after the lapse of a predetermined time after such removal of the telephone, and it is arranged to be brought into action only by a manual operation incident to the initiation of a connection. The time during which the telephone may be in use without causing the instrument to register may be made sufficient to permit a call to be made and the required correspondent to be found, but insufficient for conversation between the correspondents. When so adjusted, the instrument will register only those uses of the telephone which have been preceded by the required manual operation and in which the telephone has been in operation longer than the predetermined time required for the establishment of connection with the line of the correspondent. Consequently the use of a telephone at a called substation does not bring about the operation of the registering or counting device.

Generally the invention comprises a driving-spring whose release is controlled by the lever of the telephone-switch or other part of the telephone apparatus whose position is altered during the use of the telephone, a retarded driven mechanism, and an intermediate member adapted to connect the driving-spring with the driven mechanism when actuated by a push which must be moved in transmitting a call-signal, a train of counting or

registering wheels receiving motion through a ratchet, and a pawl carried by the driven mechanism adapted to engage the ratchet when moved through a predetermined range.

In a particular practical and satisfactory form of the invention a spring-retracted lever sustains the weight of the telephone. Motion is communicated to the driven mechanism from this lever through the medium of a bar or link which is brought into engagement with the lever by the movement of the short-circuiting switch of the signaling-generator. This link is returned to its normal position by a retractive spring, but is connected with the retarded driven mechanism through a pawl and ratchet, so that its instant return after the operation of the generator is prevented. Motion is imparted from the link or bar to the train of counters by means of a pawl actuated by the bar and a ratchet-wheel in the train. This form of the invention is shown in the drawings herewith.

In the drawings, Figure 1 is a view of the entire mechanism, the bar or link being controlled by a push-button which normally closes a short circuit about the generator. Fig. 2 shows a device for controlling the same part automatically.

Referring to Fig. 1, the apparatus of this invention is shown mounted in the case of an ordinary magneto. The generator of this instrument is not shown, but the driving-crank *a* is represented at the side of the box. In practice the generator may be placed at the rear of the toll-counting mechanism. The push *b*, carrying the push-button *b*² and acting upon the switch-spring *b*³, is the ordinary device found in magnetos for opening the short circuit about the generator during the operation of the latter. The box is provided also with the usual telephone-switch and with its switch-spring.

In applying my invention in connection with this apparatus a lever *d* is provided, pivoted at one extremity upon a bracket *d*² and normally retracted by a coiled spring *e*. This lever *d* is connected with the lever *c* of the telephone-switch by means of a link *d*³, pivoted to the switch-lever, passing through an opening in the lever *d* and engaging the lever

by means of nuts d^4 . This lever carries a stud d^5 . Above this stud hangs a lever or link f , pivoted at f^2 upon a lever g , which is itself carried upon a pivot g^2 , suitably fixed in the frame. The lever or link f lies in the path of an extension of the push b , so that when the push is operated for the purpose of opening the short circuit about the generator the lever f is brought into line with the stud d^5 on lever d . The free extremity of lever f is bifurcated or forked to insure its engagement with stud d^5 . One arm, g^3 , of lever g forms the point of fixture of a retractive spring h , whose other extremity is connected with link f , the operation of the spring being to retain the link in contact with the push b and out of the range of stud d^5 . Journaled on a standard coincident with the pivot g^2 is a ratchet-wheel i and a gear-wheel k . The ratchet-wheel is engaged by a pawl f^3 , which is carried on the extremity of the arm f^4 , projecting from the link f , and also by a dog g^4 , pivoted to the arm g^5 of lever g . The gear-wheel k meshes with the pinion of escapement l , of usual form, whose purpose is to retard the movement of the driven mechanism. Arm g^5 carries also a weighted pawl g^6 , which engages a ratchet-wheel controlling the train of counting-wheels. The ratchet-wheel itself may constitute one of these wheels, being geared to the wheel m^2 and thence to wheel m^3 . The ratchet-wheel m may have ten teeth and should be constructed in the usual manner to advance the wheel m^2 through one division in one revolution of wheel m . The wheel m will thus indicate single impulses delivered to it to the number of ten, the wheel m^2 will register tens of impulses to the number of one hundred, and the wheel m^3 hundreds of impulses to the number of one thousand.

A light flat spring n engages the tooth of ratchet m to the rear of pawl g^6 . This spring prevents the reverse movement of wheel m and also prevents the engagement of more than one tooth of the ratchet-wheel by pawl g^6 in each oscillation of the lever g .

The apparatus is represented in the drawings in its normal or inert position. If while the mechanism is in this position the telephone is removed from its switch-hook for use in response to a call, the lever d will be released from the weight of the telephone and will move upward, drawn by the spring e ; but since the link f lies out of the path of stud b^5 the counting mechanism will remain undisturbed. In the transmission of call-signals, however, the button b^2 must be pushed in during the revolution of the crank a , for the purpose of permitting the signaling-current to flow to line. The forked extremity of link f is thus thrust into position to engage the stud d^5 , and is retained in that position, after the release of the pressure on button b^2 , by the engagement of pawl f^3 with the ratchet-wheel i ; but motion imparted by the spring h to the link f is retarded by the escapement

to such an extent that in the ordinary process of obtaining connection the telephone must be removed from the switch-hook before the forked extremity of link f shall have passed out of the path of stud d^5 . Hence when the telephone is removed from its switch-hook the lever d , rising, engages the link f and through it communicates a rotary movement to the lever g about the pivot g^2 , this movement also being retarded by the escapement l . When this movement has taken place to a sufficient extent, the pawl g^6 passes over that tooth of ratchet-wheel m which is in engagement with spring n and rests upon the spring. The velocity of movement of the wheels should be so adjusted that sufficient time may elapse before the pawl g^6 comes into engagement with a new tooth of the ratchet-wheel to permit the subscriber to obtain the required connection or to ascertain that the correspondent cannot be found. In practice this time may amount to one-half minute or less.

When after the completion of the conversation the telephone is replaced upon the switch-hook, the lever d is brought to its normal position and the lever g is freed from the impelling force of spring e . Hence through its own weight and that of the parts connected therewith it falls into its normal position. During its return movement the pawl g^6 engages the tooth of ratchet-wheel m , which registers with spring n , and advances the ratchet-wheel through the space of one tooth, thus registering one use of the telephone.

The operation of the mechanism is thus that described in a general way earlier in this specification.

The use of the telephone in response to a signal does not actuate the registering mechanism, but its use is registered only after the transmission of a call-signal, and then only when a predetermined time has elapsed between the transmission of the signal and the replacement of the telephone upon its switch-hook, sufficient time being allowed to permit the completion of the required connection.

In Fig. 2 is shown a device for permitting the actuation of link f by the usual mechanism for automatically opening the short circuit about the generator. In this automatic device, which is well known in the art, the crank a is carried upon a longitudinally-movable shaft a^2 , passing through a sleeve a^3 , which carries the driving-wheel a^4 of the generator. The sleeve a^3 is journaled in a suitable bearing a^5 . In the extremity of sleeve a^3 is a V-shaped slot or notch, which receives a pin a^6 in the spindle a^2 . The rotation of crank a will result in a longitudinal movement of the shaft a^2 , this movement being limited by the space between sleeve a^3 and the hub of the crank. Suitable switch-contacts are operated by this shaft in its movement. In adapting my invention to this automatic contrivance the link f may be prolonged into an arm f^5 , lying in the path of

spindle a^2 . Thus the inward movement of the spindle will rock the link f on its pivot f^2 in the same manner that the pressure of the push-button b would act and will perform the same function.

It is possible to make numerous modifications of the mechanism of my device, such as will readily occur to those skilled in the art. Hence I do not desire to limit myself in the appended claims to the specific apparatus shown.

In another application of even date herewith, Serial No. 560,032, I have claimed, broadly, the described mechanism brought into operation by the sending of a signal with registering or recording mechanism generally, the present application relating more particularly to devices whereby a record is taken of the number of times the telephone is used, and to specific features of construction and combinations not disclosed in the application above referred to.

I claim as new—

1. In a telephone-service register, the combination with recording mechanism and means for actuating the same set into operation by a movement of the telephone apparatus, an interposed link, normally in a non-operative position, for connecting said recording mechanism with its actuating means, and means for retarding the movement of said link from its operative to its inoperative or normal position, substantially as described.

2. The combination with a lever controlled by a telephone-switch of a retractive spring acting thereon, retarded driven mechanism and a train of counter-wheels actuated by the driven mechanism, a key controlling the circuit of a calling-generator, and link mechanism actuated by the key to connect the said lever with the said driven mechanism, as described.

3. The combination with a telephone-switch, of a lever moving therewith, and a retractive spring for the lever, a link normally out of engagement with the lever, a key controlling the circuit of the calling-generator adapted when moved to bring the said link into engagement with the lever, means for retarding the return movement of the link, and registering mechanism adapted to be impelled by

the said retractive spring through the medium of the said link, as described.

4. The combination with a telephone-switch, of an associated lever, a retractive spring for the lever, a key controlling the circuit of the calling-generator, a spring-retracted link adapted to be brought into engagement with said lever by the movement of the key, an escapement-controlled ratchet-wheel, a pawl carried by the link adapted to engage the ratchet-wheel in the return movement of the link, and registering mechanism adapted to be impelled by said retractive spring through the medium of the link, as described.

5. The combination with a lever whose position is changed during the use of the telephone, of registering mechanism, link mechanism controlled by the said lever adapted to impart motion to the registering mechanism at the end of a predetermined travel, and means for retarding the movement of the link mechanism, as described.

6. The combination with a telephone-switch lever of registering-wheels, link mechanism controlled by said lever adapted to impart motion to the registering-wheels at the end of a predetermined travel, a key controlling the signaling-circuit, adapted when moved to bring said link mechanism into operative relation to the said lever, and means for retarding the movement of the link mechanism, as described.

7. In combination, the lever controlled by the telephone-switch, the retractive spring acting thereon, counting-wheels and driving ratchet-wheel thereof, the lever carrying a pawl adapted to engage the ratchet-wheel, the link pivoted on the pawl-carrying lever, the key adapted to cause said link to engage the switch-controlled lever, and means for retarding the movement of the pawl-carrying lever, as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 17th day of August, 1895.

STEPHEN D. FIELD.

Witnesses:

WILLIAM B. CLARKE,
JOHN CALLENDER.