

No. 672,546.

Patented Apr. 23, 1901.

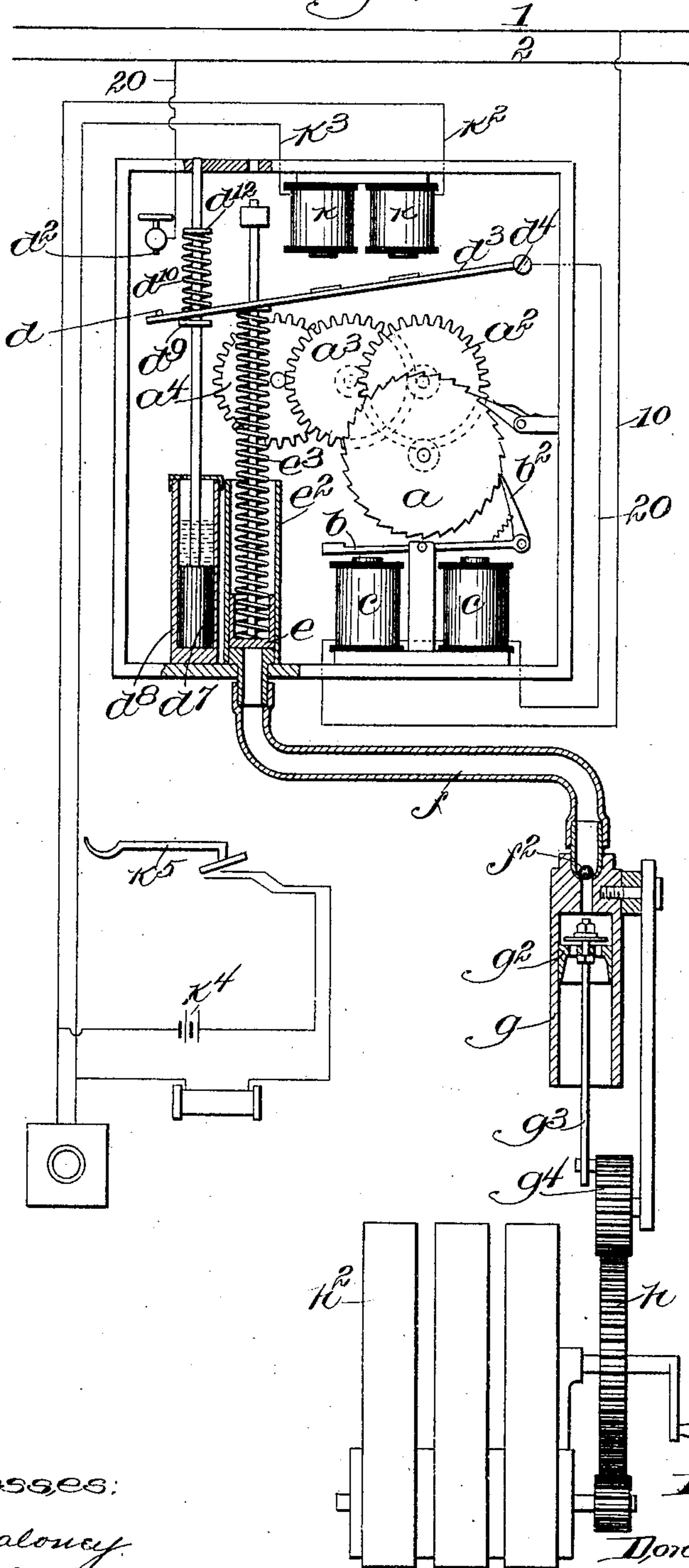
D. M. BLISS.
TELEPHONE METERING SYSTEM.

(Application filed Nov. 27, 1899.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.



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2 Sheets—Sheet 2

Fig. 2,

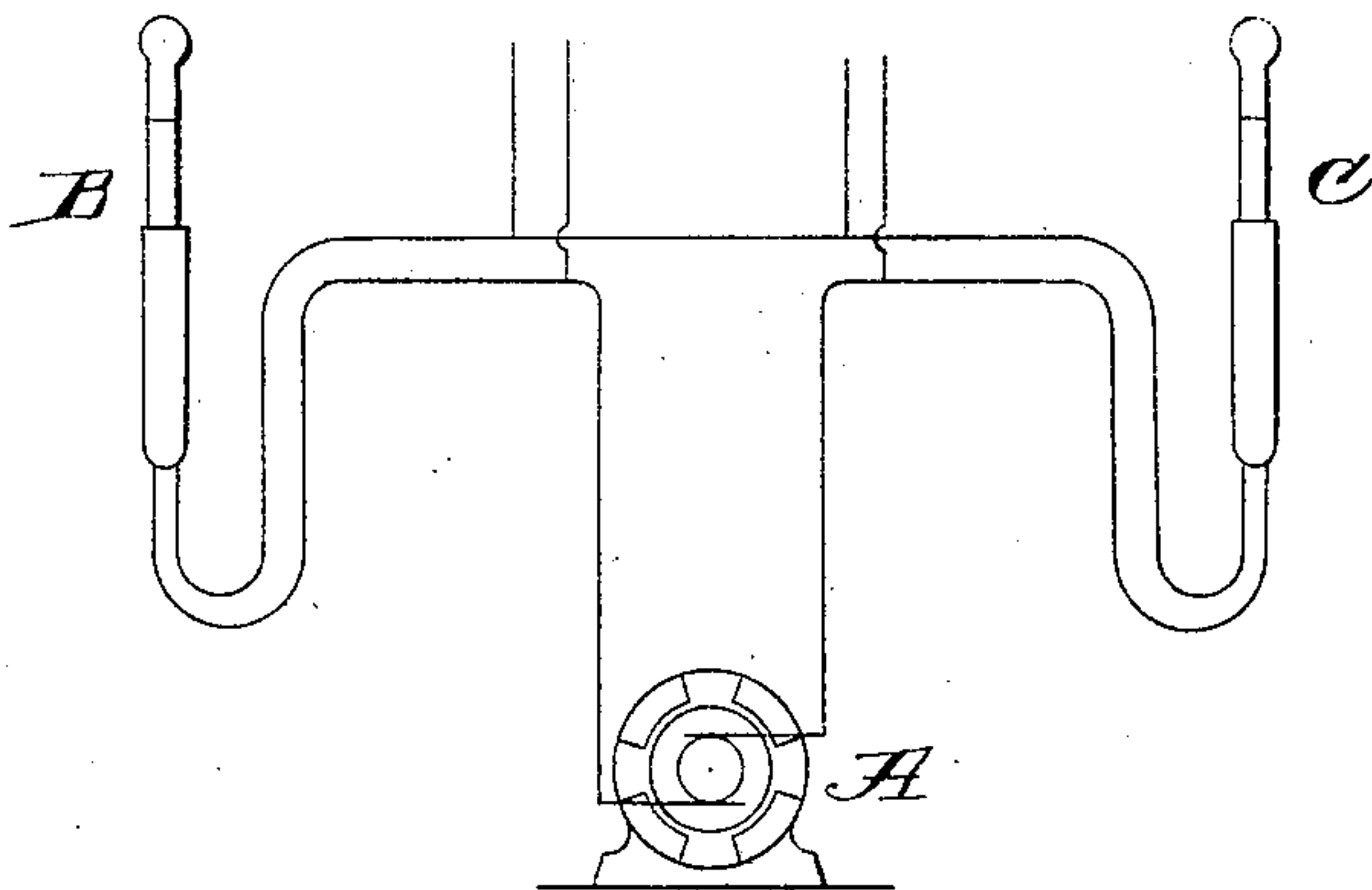
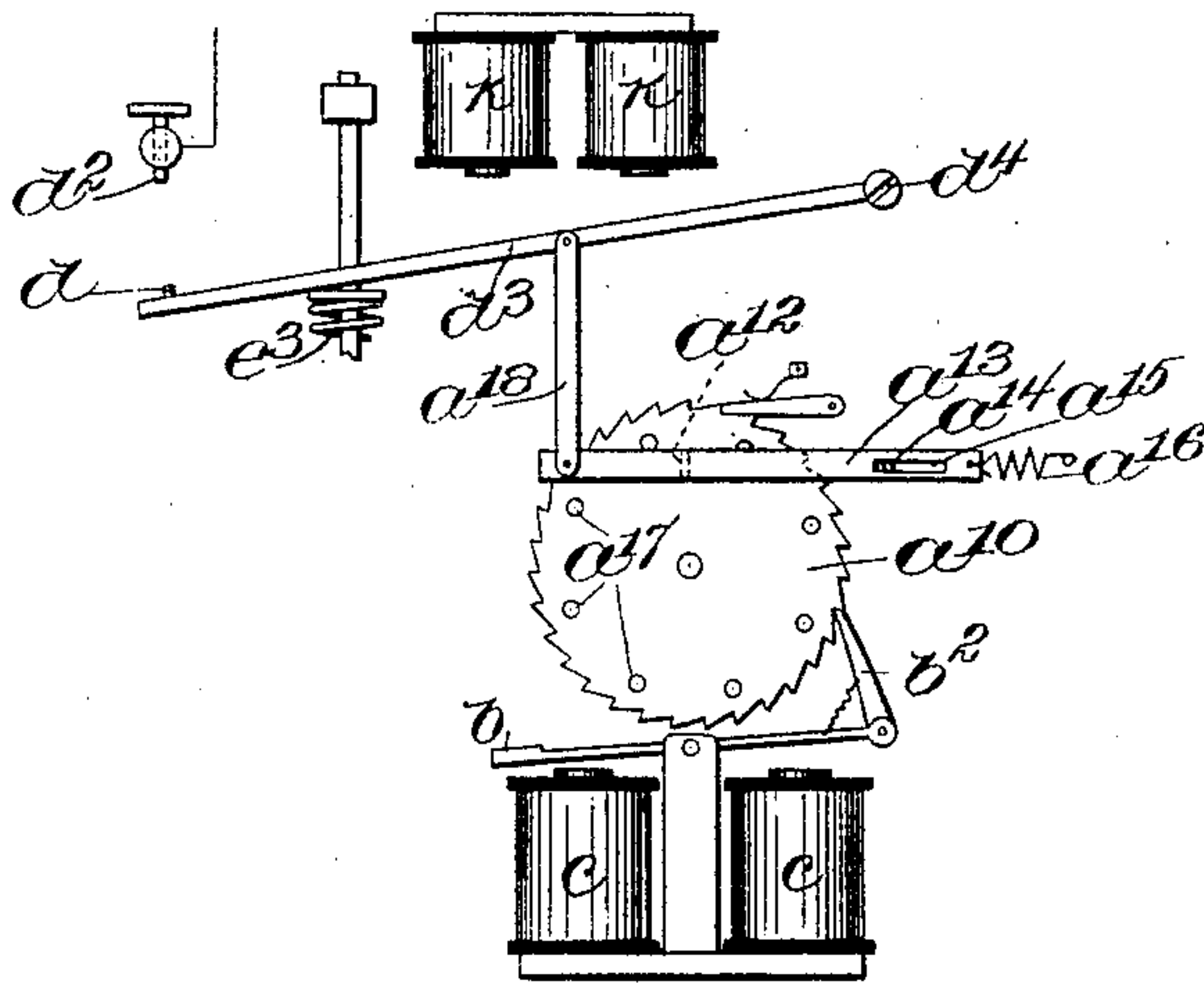


Fig. 3,



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UNITED STATES PATENT OFFICE.

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TELEPHONE METERING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 672,546, dated April 23, 1901.

Application filed November 27, 1899. Serial No. 738,470 (No model.)

To all whom it may concern:

Be it known that I, DONALD M. BLISS, of Lowell, county of Middlesex, and State of Massachusetts, have invented an Improvement in Telephone Metering Systems, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The present invention relates to a telephone metering system and is mainly embodied in a novel method of measuring or recording telephone usage automatically, the said method consisting in superimposing upon the line a slow pulsating or alternating current while the telephones are in use, the said current serving to operate a suitable recording instrument, but being incapable of affecting the telephone instrument, so that it will not interfere with the ordinary use thereof.

Figure 1 is mainly a diagram view, with parts shown in section and parts in elevation, of a telephone, including a recording instrument capable of operating in accordance with this invention. Fig. 2 is a diagram of the connecting-plugs employed at the central office, the operator's set, the calling-generator, and other parts which have no connection with the present invention being omitted; and Fig. 3 is a modification of the recording instrument, which will be hereinafter described.

In carrying out the invention each telephone is provided with a recording instrument which may be of any suitable or usual kind arranged to be electrically operated in response to the action of a pulsating or alternating current, and while two telephones are in use the said pulsating current is superimposed on the line, so as to operate one or both recording instruments then in circuit, it being usually desirable, however, to have only one of the said instruments operated, so that only the calling subscriber may have the call recorded.

The method embodying the invention will be more readily understood in connection with a description of the apparatus herein shown, which comprises, essentially, a recording instrument at each telephone, indicated in Fig. 1 as a train of wheels a , a^2 , a^3 , and a^4 ,

of which a is the driving-wheel, adapted to be actuated by means of a pawl b^2 , carried by a vibrating armature b , the said pawl being adapted to coöperate with ratchet-teeth on the said wheel a . The said armature b is arranged to be acted upon by an electromagnet c , adapted to be connected by a circuit 10 20 with the line-wires 1 2 of the main telephone-circuit, so that when the telephone is in use and the pulsating current in operation the said pulsating current will pass over the main line 1 2 through the coils of the magnet c , causing the armature b , which is polarized, to vibrate and rotate the wheel a . The source of pulsating current, which may be of any suitable nature, such as a slowly-traveling alternator, is indicated at A, Fig. 2, and is shown as connected in series with the operator's plugs B and C, so that when connection between two subscribers is made at the central office the inaudible current will pass over the line to operate the meter, as above described.

As thus far described, it is obvious that each meter might be continually connected with the main-line circuit, so as to record the length of time each instrument is used when two instruments are connected together at the central office, or, if desired, a record might be kept of each time a telephone was used, even to communicate with the operator at the central office. It is at present customary, however, to charge telephone service only to the calling subscriber—in other words, to charge each subscriber for the number of times he has called for and obtained a talking connection with another subscriber. To this end a further feature of the present invention consists in the construction and arrangement of certain devices for causing the meter-actuating current to be placed in circuit with one only of the recording instruments—viz., the instrument at the telephone of the subscriber who has first called central office.

As shown in Fig. 1, the circuit 10 20 is normally broken and adapted to be closed at the contacts d d^2 , one of the said contacts being formed on a movable member or arm d^3 , pivoted at d^4 and arranged to be moved toward the other contact in response to the operation

of the magneto h^2 . As herein shown, the said arm d^3 is arranged to be moved in the proper direction to carry the contact d toward the contact d^2 by means of a plunger e in the cylinder e^2 , which communicates, by means of a duct f , with a pump-plunger g^2 in a pump-cylinder g . The said pump-plunger g^2 , as shown, is connected, by means of an arm g^3 , with a gear-wheel g^4 , meshing with the wheel h , which is rotated by the actuating-handle for the magneto h^2 . When, therefore, a subscriber calls central office, the pump-plunger g^2 will be actuated, causing compressed air to pass through the duct f into the cylinder e^2 , driving the plunger e outward and moving the arm d^3 until the contact d engages the contact d^2 , thus closing the meter-actuating circuit. The meter at the telephone of the calling subscriber is thus placed in operative condition ready to respond to the action of the pulsating current when connection has been made at the central office, the meter at the telephone of the called subscriber, however, being inoperative, because the said called subscriber has not used his magneto. Since the magneto is only momentarily used, however, it is necessary to provide the device with means for maintaining the meter-circuit closed after the operation of the magneto has ceased. This may be accomplished, as herein shown, by utilizing the local-battery current of the telephone, the circuit of which is controlled by the gravity-hook and only closed when the receiver is in use.

As herein shown, the arm d^3 is arranged to constitute the armature of an electromagnet k , which is connected by conductors k^2 and k^3 with the local battery k^4 , the circuit of which is controlled in the usual way by the gravity-hook k^5 . As soon, therefore, as the receiver is removed from the gravity-hook, as it naturally is as soon as the magneto has been operated, the circuit k^2 and k^3 will be closed and the magnet k will become energized, attracting the arm d^3 and preventing the same from moving, so as to separate the contacts d and d^2 . So long, therefore, as the telephone is in use the meter-actuating circuit will be closed and the meter operated in response to the action of the pulsating current. The arm d^3 is normally out of the magnetic field of the magnets k , so that unless it is initially moved in response to the operation of the magneto it will not be attracted by the said magnet k , the operation of the meter depending, therefore, upon the initial operation of the magneto.

The duct f is controlled by a loosely-seated ball-valve f^2 , which permits the air to leak out of the cylinder e^2 after a short interval of time, so that as soon as the conversation is completed and the receiver hung up, thus breaking the circuit through the magnet k , the arm d^3 will return to its normal position, the plunger e having receded.

As herein shown, a spring e^3 is interposed between the arm d^3 and the plunger e , so that

the plunger may compress the said spring to a certain extent after the contacts d and d^2 are in engagement with each other, there being, therefore, a certain amount of reserve force to hold the said contacts together, or at least to keep the arm d^3 in the magnetic field of the magnet k during the interval which may elapse between the operation of the magneto and the removal of the receiver from the gravity-hook. It is also desirable that the movement of the arm d^3 away from the magnets k should be retarded, even after the pump-plunger e has settled back to its normal position, for the reason that the person using the telephone may move the gravity-hook accidentally or otherwise, thereby temporarily breaking the local-battery circuit. For this reason the arm d^3 is also shown as arranged to be influenced by the plunger d^7 of a dash-pot d^8 , the stem of said plunger being shown as provided with a shoulder d^9 , engaging the arm d^3 . Since the dash-pot plunger, if actually connected with the arm d^3 , would unduly retard the upward movement of said arm, which should be as prompt as possible, the spring d^{10} is shown as interposed between said arm and the shoulder d^{12} on the plunger-stem, the said spring yielding in the first upward movement of the plunger-stem and permitting the contacts d and d^2 to come together promptly, the plunger following as the spring exercises its influence.

As shown in Fig. 1, the meter or recording device is arranged to operate continuously during conversation, so as to record the actual length of time during which the telephone is in use. It is, however, immaterial what kind of a recording device is used, and in practice a device to record merely the number of calls would probably be employed. The essential parts of a recording device arranged for the latter purpose are shown in Fig. 3, the actuating-wheel a^{10} being operated by a vibrating armature and pawl, as before, but being additionally controlled in its movement by a stop a^{12} , arranged to permit the wheel a^{10} to move only a predetermined distance at each operation. As herein shown, the said stop a^{12} is formed on an arm a^{13} , pivotally supported at a^{14} and having a slot a^{15} and spring a^{16} to permit a certain amount of longitudinal movement when the stop a^{12} is in contact with one of a number of equally-spaced stops or pins a^{17} , carried by the wheel a^{10} . The arm a^{13} is normally positioned, as shown, so that the stop a^{12} is out of the path of the pins a^{17} , and the said arm is connected, as by a link a^{18} , with the contact-arm d^3 , so that when the said contact-arm is moved in response to the operation of the magneto, as hereinbefore described, the stop a^{12} will be moved into the path of one of the pins a^{17} . As soon as connection is made at the central office the vibrating armature will begin to operate, as before, and to rotate the wheel a^{10} until one of the stops a^{17} comes in contact with the stop a^{12} , the spring a^{16} then yielding

and permitting a longitudinal movement of the arm a^{13} until the pivot a^{14} is engaged by the end of the slot a^{15} . The wheel will then be stopped, this amount of movement serving to move the recording device one step in any suitable or usual way. The current impulses in the magnet-coils will not produce any further movement of the wheel a^{10} , since the stops will resist the pull of the magnet and prevent the vibrations of the armature. As soon as the subscriber finishes using his telephone, however, the arm d^3 will fall back to its normal position, as before, disengaging the stops, after which the spring a^{16} will act to produce a longitudinal movement of the arm a^{13} , so that the next time the arm d^3 is moved the stop a^{12} will come up behind the pin with which it was last in engagement, ready to be engaged by the next pin to stop the wheel after the desired movement.

I do not herein claim, broadly, the means for controlling the operation of the meter at the telephone or the relation of said meter to the call-signaling device, my invention, so far as relates to this part of the apparatus, residing only in the specific construction and arrangement of the apparatus shown and described. The operation of the meter by an

inaudible current, however, I believe to be broadly new, and in this respect I do not intend to limit the invention to the specific arrangement of instrumentalities herein shown as capable of effectually carrying out the invention.

I claim—

1. That improvement in the art or method of measuring or recording telephone usage which consists in superimposing on the line an inaudible pulsating or alternating current adapted to operate a recording instrument while conversation is being carried on.

2. That improvement in the art or method of measuring or recording telephone usage which consists in superimposing on the line when two telephones are connected, for the purpose of communication, an inaudible pulsating or alternating current adapted to operate a recording instrument.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

DONALD M. BLISS.

Witnesses:

LAWRENCE BOND,
JAS. J. MALONEY.