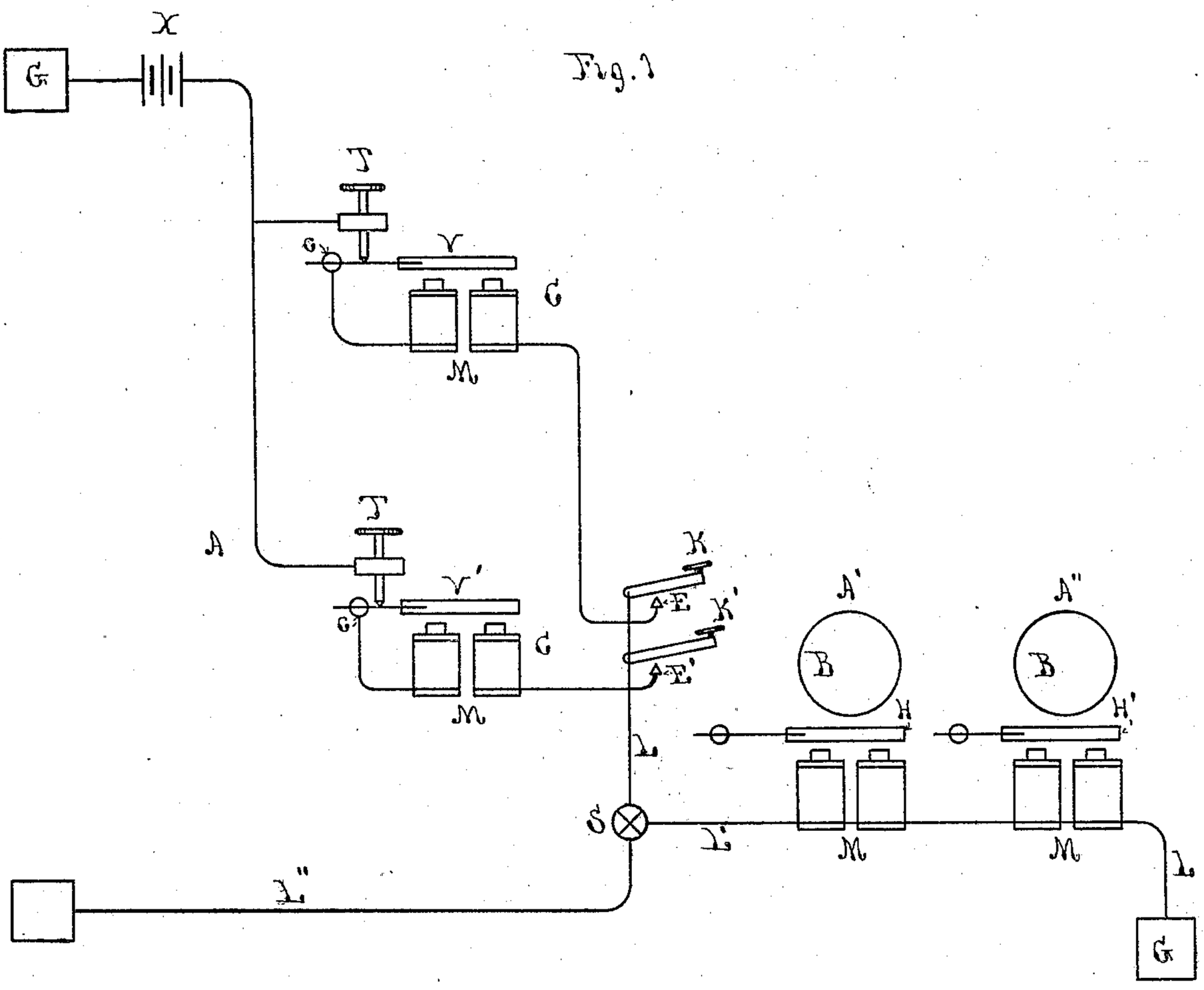
(No Model.) 2 Sheets—Sheet 1.

D. H. RICE.

ELECTRIC CALL.

No. 307,494. Patented Nov. 4, 1884.

Fig. 1



Witnesses

Wm. S. Brown

A. P. Ockington.

Inventor

David H. Rice

(No Model.) 2 Sheets—Sheet 2.

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Fig. 2

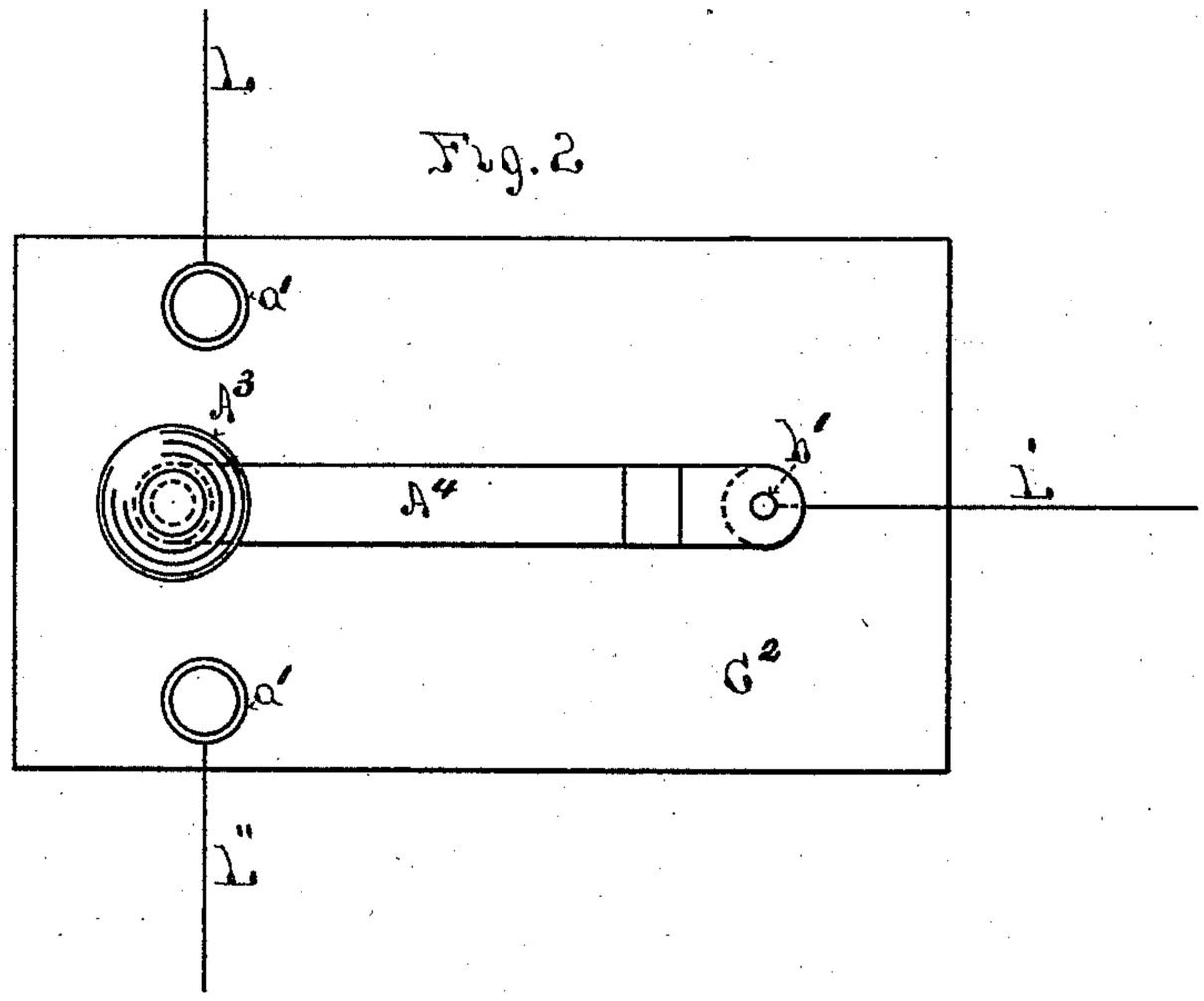
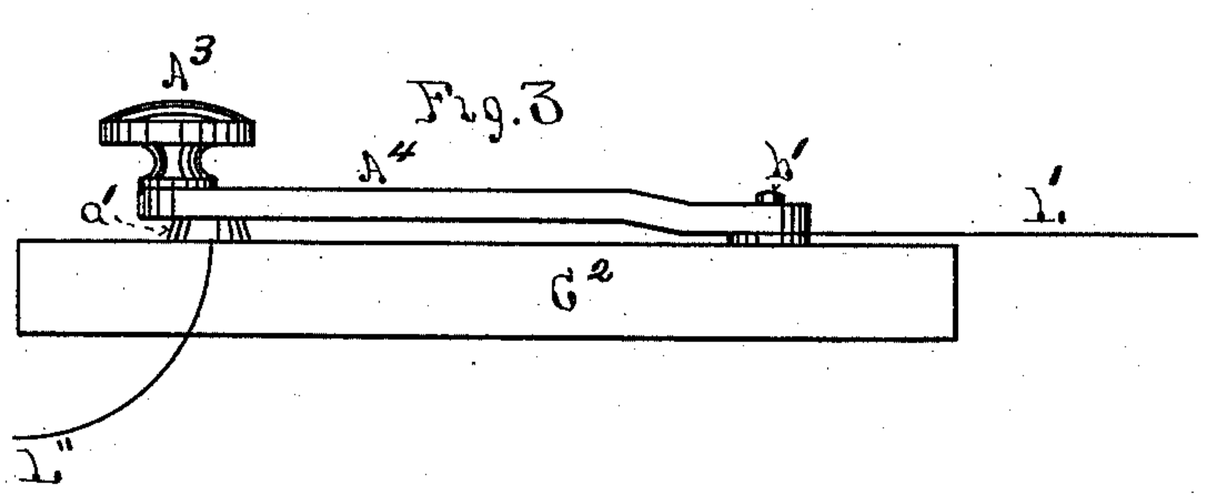


Fig. 3



Witnesses

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Inventor

David Hall Rice

UNITED STATES PATENT OFFICE.

DAVID HALL RICE, OF LOWELL, MASSACHUSETTS, ASSIGNOR TO THE CURRIER TELEPHONE BELL COMPANY, OF MASSACHUSETTS.

ELECTRIC CALL.

SPECIFICATION forming part of Letters Patent No. 307,494, dated November 4, 1884.

Application filed November 16, 1881. (No model.)

To all whom it may concern:

Be it known that I, DAVID HALL RICE, of Lowell, in the county of Middlesex and State of Massachusetts, have made a new and useful Improvement in Electric Calls, of which the following is a specification.

My invention relates to the system of calling devices invented by Carl Reinhold Maron, and shown in his German Patent No. 1,944, dated December 5, A. D. 1877, and also invented and patented to Jacob B. Currier, of Lowell, Massachusetts, in Patent No. 246,374, dated August 30, 1881.

It consists in applying to such a system of electric calls an automatic calling device operated by the electric current as hereinafter described, so that by the mere pressure on a key or change of a switch the calling device is set in operation, and in turn sets in operation the bell at the desired station, and continues to operate the same while the key is pressed or the switch remains so changed. In the devices of Maron and Currier they employ a vibrating spring circuit-breaker set in motion by the hand to make and break the circuit in the time required to ring the desired bell at any distant station. This spring only vibrates for a limited period of time, and must then be set in motion again, and the more frequently as the circuit-breaking spring is shortened. Practically the use of a spring bell-hammer vibrating above two thousand times per minute is debarred by its structure, because its vibrating spring circuit-breaker becomes so short as to vibrate too short a time and require too frequent putting in motion again at these high speeds. Even as the limit indicated is approached this is the case. It must be understood that a vibrating circuit-breaker such as they use cannot be set going a second time while the bell-hammer is striking and effectively continue its blows, because it usually catches the hammer going in the opposite direction from the pull of the electric current which brings the hammer to a state of rest, and is detrimental instead of advantageous. On the other hand, bells with their hammers vibrating from one thousand to three thousand times per minute are the best to use in practice, because their hammers, being provided with shorter or stiffer springs, are less affected by the vibrating electric current used to ring bells nearest to them in vibration of hammer, and they give an alarm which can be heard much farther in proportion to the increase in rapidity of stroke. These bells can, therefore, be set much nearer together in difference of length of spring-hammer, and the relative distance of their hammers varies less from their magnets, to give them an effective repetition of blows on the bell, thus causing them, with the same battery-power, to ring nearer alike. My improvement not only enables me to make use of these bells in the most efficient manner, but also is of advantage upon any bell of this character, saving time and trouble in the telephone-office, and giving greater certainty of calling the station wanted.

In the drawings, Figure 1 shows a circuit provided with my improvement. Fig. 2 represents a top view of the switch and its mode of connection with the several circuits which it is used with, as hereinafter stated. Fig. 3 represents a side view of the switch.

This switch is so well known that no detailed description of it is necessary. It is placed at S in the circuits, and by swinging the metal switch A^4 over from the contact-point a' of one circuit to the contact a' of another upon its pivot b' the circuit L′ is grounded through L or L″ at pleasure.

A^3 is the thumb-button. b' is the metal pivot on which the switch A^4 turns. a' a' are metal contact-points of switch, to which lines L L″ are connected. C^2 is the wooden base-board of the switch. A is the central office. A′ A″ are two subscribers' stations on the circuit L′, provided with magnets M, hammers H H′, and bells B of the Currier construction, which need not be further described than to say that they are adjusted to ring at different known rates of vibration by a broken or vibrative current sent from the central office in the manner described in said Currier patent. G G are ground-connections of the circuit.

At S in the central office a switch of any well-known construction is used to shunt in either the line L″, on which the magneto drop-

buttons and telephone may be placed in any usual and well-known manner, or the line L, on which is the grounded calling mechanism and battery X, at pleasure. When the switch at S connects one of these lines, the other is disconnected from the main circuit. From the battery I run the line L by short branches, as shown, to the screws T T, which are in electrical contact at their points with the springs of the vibrating armatures V V′. It will be observed that in this arrangement of the contact-points of the screws T T with the elastic springs of the armatures V V′, these points are so placed that the armature moves while its spring is in contact with it around the screw contact-point as a center, by which means the synchronosity of its rate of vibration is preserved within practicable limits, and, what is more important, their contact is maintained when the magnet pulls the armature toward it, in the first instance, long enough to give the magnet strength to start the armature in vibration as well by the amplitude of the first movement given to it as by the certainty of breaking the circuit before the tension of the spring has neutralized the pull of the magnet and thus prevented the circuit being broken. It is upon these two effects of amplitude of the initial vibration of the armature and certainty of breaking the circuit before such initial vibration ceases that the ability to practically use the main electric current to set in motion the circuit-breaker depends.

As I have before stated, while the use of the point of the screw T as a center of vibration accomplishes this it accomplishes the third equally important result of allowing the synchronosity of vibration of the armature to be maintained, I thus dispense with all other mechanism—such as hand-levers, local circuits, or clock-work—to operate the armatures V V′, as described. These armatures are set in posts *c c* at the ends of their elastic parts. The posts *c c* are connected by a wire to one pole of the magnets M M, while the other pole is connected to the contact-points E E′ of the keys K K′. These keys have their axes connected to the line L, and are made of metal. The armature V is adjusted to vibrate in the same time as the hammer H of the bell at station A′, and the armature V′ is adjusted in like manner to the time of the hammer H′ at station A″.

The operation is as follows: Suppose it be desired to ring the bell at station A′. The key K is depressed into contact with E. The first impulse of the electric current through its magnet depresses the armature V and breaks the circuit at the point of screw T, releasing the armature, when it flies back, makes contact at the point of T, and is again drawn toward the magnet, repeating the operation as long as key K is depressed. The broken electric current thus made, being in the time of the hammer H, sets it to vibrating, and it continues to strike the bell as long as the current continues by pressing on key K. By pressing key K′ down to its contact-point E′, the bell at station A″ is rung in like manner. The stations A′ A″ may be any distance apart on the circuit, and any convenient number of stations may be placed on it by providing a corresponding number of automatic callers having armatures synchronously adjusted to the vibration of the different bell-hammers.

Instead of a complete make and break, the armatures V V′ may only vibrate sufficiently to vary the pressure on their screws T, so as to create undulatory currents, if desired.

Instead of keys K K′, pins may be used, or any other well-known devices, to complete the circuit. The hammers or strikers H H′ may be made to close a local circuit, or set off an alarm, or switch the electric current upon a branch circuit in the manner described in the Patent No. 240,010, granted to Currier and Rice, April 12, 1881. In short, my automatic circuit-breakers may be used in a variety of ways to ring any desired bell at different stations by the broken or vibratory nature they impart to the current from its own action in the same manner as the inventions of Maron and Currier, referred to.

What I claim as new and of my invention is—

1. In combination with a striker, H, and its magnet adapted to be operated by a broken or undulatory current sent from a distant station, an automatic circuit-breaker operated by the electric current, substantially as described.

2. In combination with the circuit L and keys K K′, the circuit-breakers operated by the electric current and connected to the same battery and ground, substantially as described.

DAVID HALL RICE.

Witnesses:
GEO. H. WHITE,
N. P. OCKINGTON.