

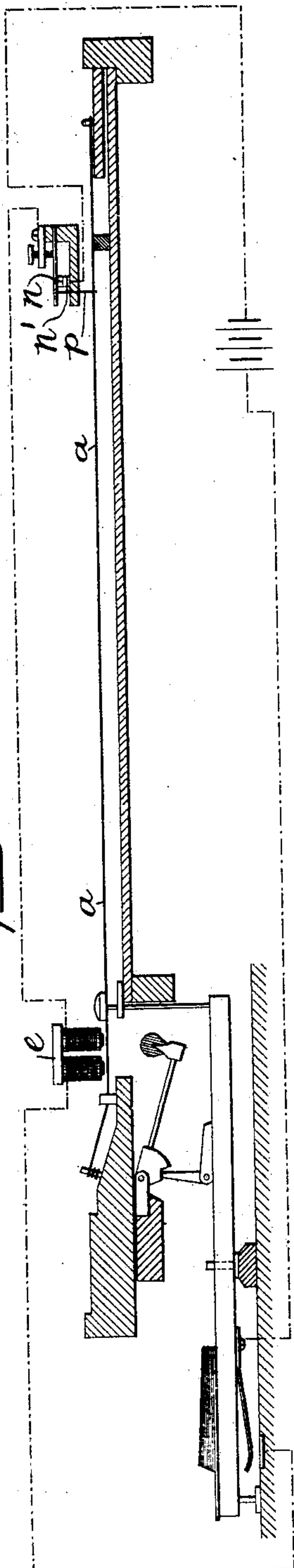
(No Model.)

P. E. SINGER.
ELECTRICAL MUSICAL INSTRUMENT.

No. 501,542.

Patented July 18, 1893.

Fig. 1.



Attest:
Geo. H. Botts,
Thomas F. Kahoe

Fig. 2.

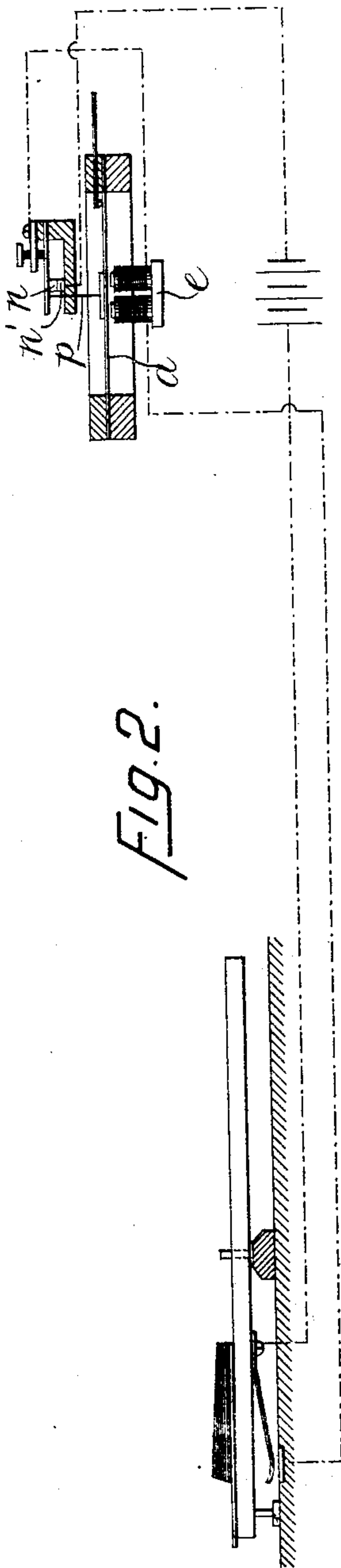
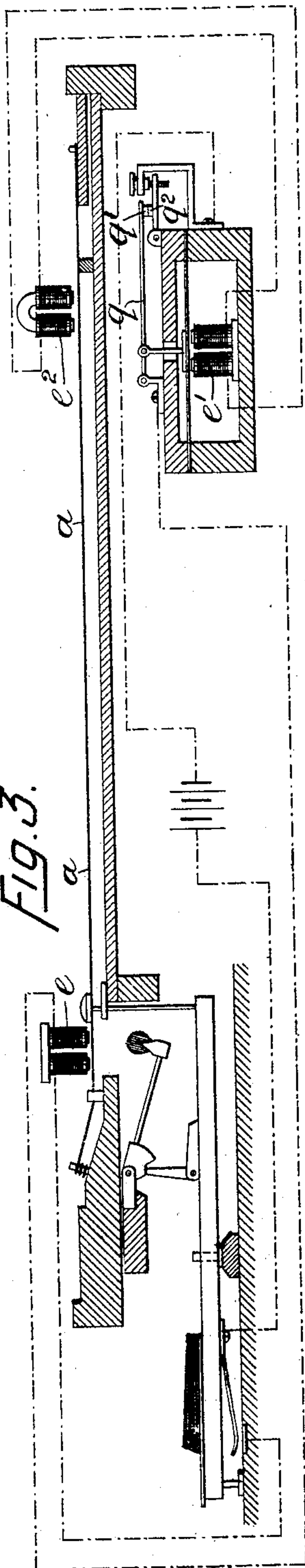


Fig. 3.



Inventor:
Paris Eugene Singer,
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UNITED STATES PATENT OFFICE.

PARIS E. SINGER, OF LONDON, ENGLAND.

ELECTRICAL MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 501,542, dated July 18, 1893.

Application filed June 17, 1892. Serial No. 437,052. (No model.)

To all whom it may concern:

Be it known that I, PARIS EUGENE SINGER, of 6 Victoria Road, Kensington, London, in the county of Middlesex, England, have invented certain new and useful Improvements in Keyed Musical Instruments Actuated by Electricity, of which the following is a specification.

This invention relates to improvements in keyed musical instruments in which electro-magnetism is used for vibrating, and sustaining the vibrations of, the sonorous bodies employed in the production of musical notes, as set forth in two concurrent applications for United States of America patents, Serial Nos. 436,908 and 436,907. In the first of these applications is described the use of a rotating commutator, and in the last named application there is described a vibrating tongue or reed for making and breaking the electric circuits a given number of times in a second for each note required to be sounded, the vibrations required for each note being determined by its own commutator.

Now the object of the present invention is to make the string or other sounding body, when set in vibration, control its own movements. This I do by causing an intermittent current to pass through the coils of an electro-magnet fixed near the string or body to be vibrated.

The manner of carrying out my invention is illustrated in the accompanying drawings, wherein—

Figure 1 shows, in diagram, the adaptation of a sounding string to act as a commutator. Fig. 2 shows, in diagram, the adaptation of a sounding disk to act as a commutator; and Fig. 3 shows an arrangement in which the sounding string creates an induced current for energizing an electro-magnet, which sets in vibration a disk that makes and breaks the battery-circuit.

In diagram Fig. 1, *a*. represents the string or sounding body, and *e*. an electromagnet for operating the same, such magnet being situated near that part of the string which usually receives the blow of the hammer, and placed in an electric circuit controlled by the key which represents the note intended to be sounded. The circuit, which includes the electro magnet *e*, also includes two platinum

or carbon conductors *n. n'*, one of which, *n*, rests lightly on the other, it being in part supported by an insulated spring. The conductor *n*. is connected by a thread *p*. to the vibrating string *a*. When a current is passed through the coils of the magnet *e*. by the closing of the circuit on the depression of a key, the conductors *n*. and *n'*. naturally tend to separate. Simultaneously with this action, the string receives an impulse from its electro-magnet *e*, the joint effect of which two actions will be the cessation or diminution of the current, which neutralizes or lessens the strength of the electro-magnet, allowing the string, by virtue of its elasticity, to recede from the poles of the magnet. This recession of the string, owing to its connection, through the thread *p*, with the conductor *n*, tends to complete the circuit, and strengthen the electro-magnet, when another cycle immediately commences.

Fig. 2 shows the invention adapted to a disk which takes the place of the vibrating string of Fig. 1, and, when set in action, produces the like result.

Another mode whereby the vibrations of the sounding body are utilized to regulate the impulses of the electro-magnet *e*, is shown in Fig. 3, where *e²*. is a permanent magnet, surrounded with coils of wire, and placed over a magnetized string *a*. When this string is set in vibration, induced currents are set up in the magnet *e'*. underlying a metal disk, as in Fig. 2. Connected with the center of this disk, is a rock lever *q*, the longer limb of which carries, on its under side, a contact plate *q'*, which overlies an adjustably fixed contact plate *q²*, forming one terminal of the circuit connected electrically with one pole of a battery or other source of electricity; the other pole of the battery connects with the coils of the electro-magnet *e*, which coils also connect electrically with the disk. When, therefore, an induced current is set up in the coils of the magnet *e'*. by the vibrations of the string *a*, they will energize the magnet *e²*, and cause the disk to vibrate synchronously with the string, and, through its connections with the rock lever *q*. (which, with the contact plates *q'*. and *q²*, constitute a relay), alternately make and break the circuit in which the electro-

magnet *e*. is situate. By this means, the impulses of the electro-magnet *e'*, imparted to the sounding string or other sounding body, will be synchronous with the vibrations of the latter.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a keyed musical instrument in which the strings or other sounding bodies are sounded, or their sound is maintained by the direct action of electro-magnets, the connection of such string or sounding body with an elastic contact maker in the battery circuit, whereby the vibrating string or sounding body, when in action, is caused to vibrate the contact maker, and the contact maker is caused to control the vibrations of the string or sounding body, substantially as described.

2. In a keyed musical instrument the combination with a string or other sounding body, of an electric circuit, a circuit closer therefor, a magnet in said circuit for attracting the string or other body, an elastic contact maker controlling the circuit through the magnet and through it the vibrations of the string or other body, and connections between the string or other body and said circuit maker for vibrating the latter as the string or other body vibrates, substantially as described.

3. In a keyed musical instrument the combination with a string or other sounding body, of an electric circuit, a circuit closer therefor, a magnet in said circuit for attracting the string or other body, an elastic contact maker controlling the circuit through the magnet and through it the vibrations of the string or other body, and mechanical connections between the string or other body and said circuit maker and breaker for vibrating the latter as the string or other body vibrates, substantially as described.

4. In a keyed musical instrument the combination with a string or other sounding body, of an electric circuit, a circuit closer therefor, an electro-magnet in said circuit for attracting the string or other body, a contact maker controlling the circuit through the electro-magnet, a disk for actuating said contact maker, an electro magnet for actuating said disk, a permanent magnet with which the string or other sounding body contacts in vibrating, and circuit connections between said permanent magnet and electro magnet for energizing the latter when such contact is made to actuate the disk and break the circuit, substantially as described.

PARIS E. SINGER.

Witnesses:

H. K. WHITE,
A. W. SPACKMAN.