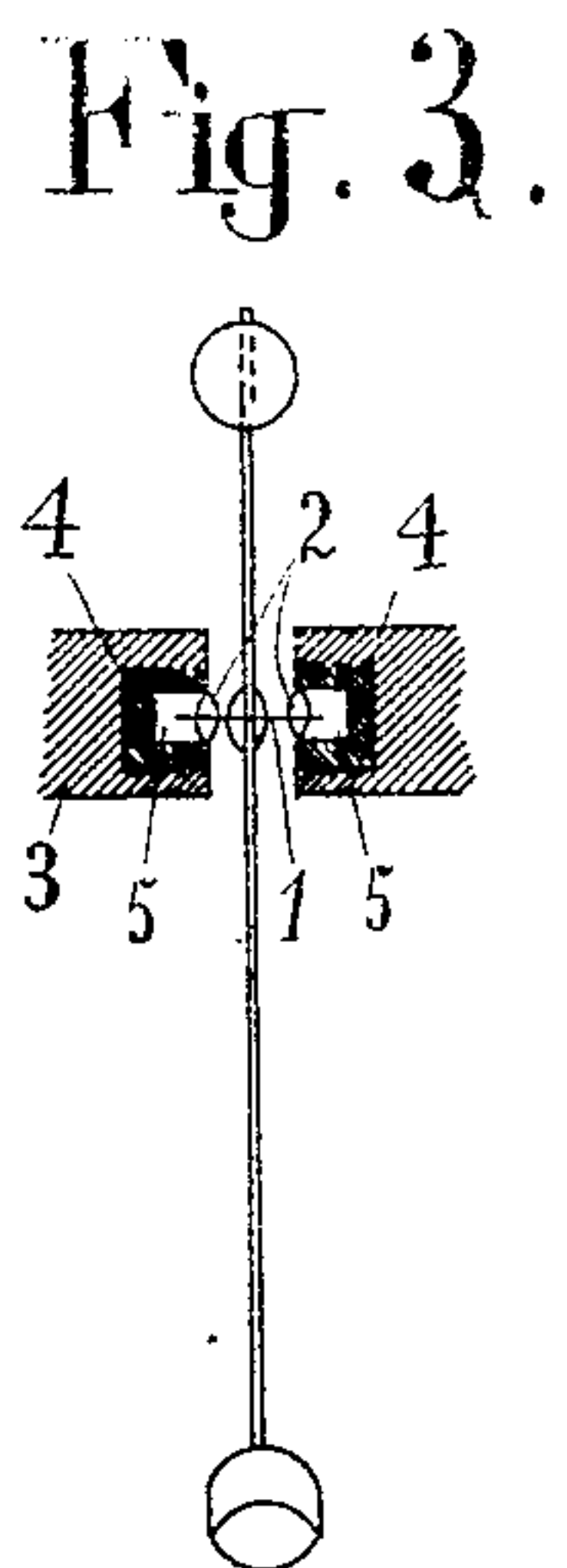
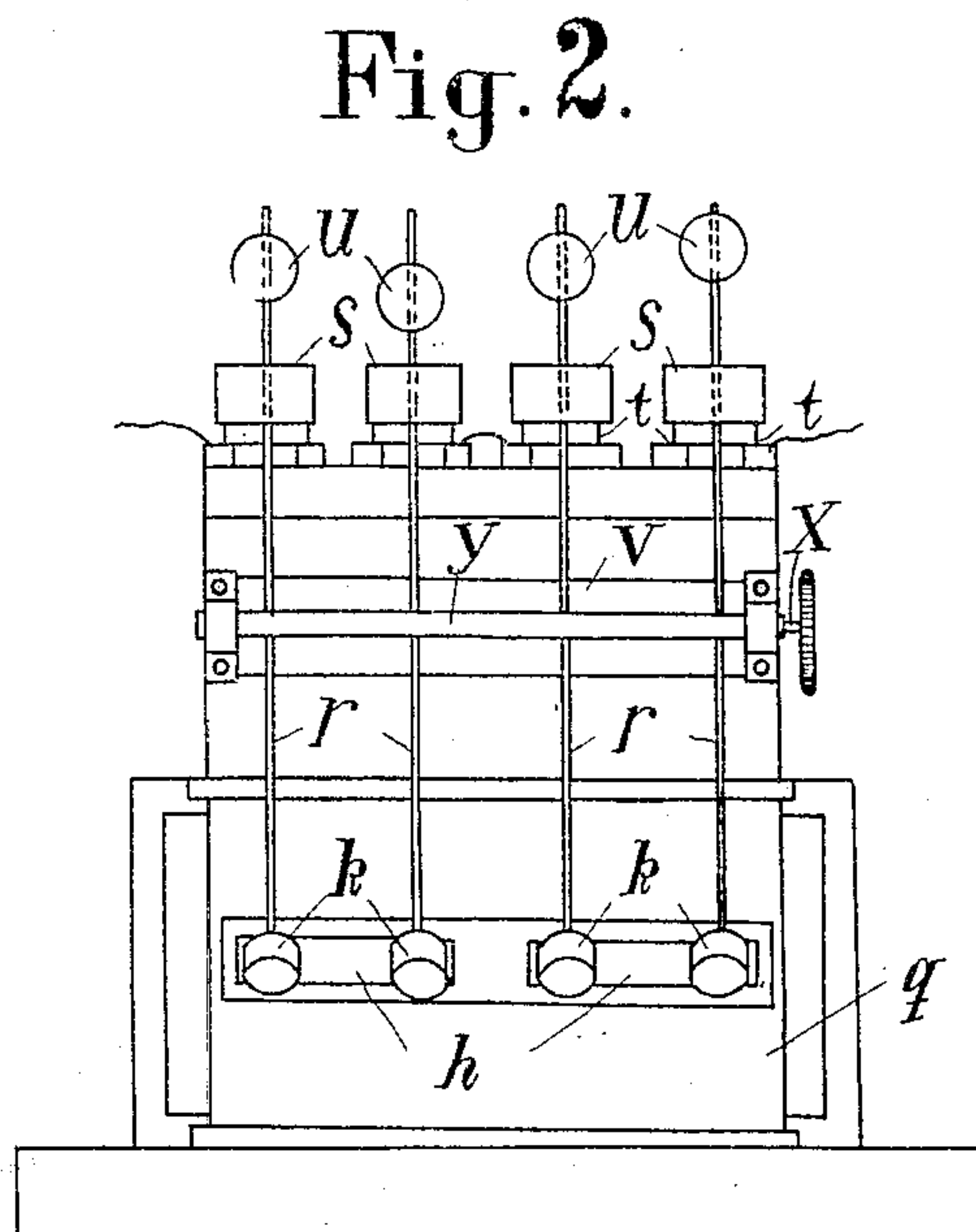
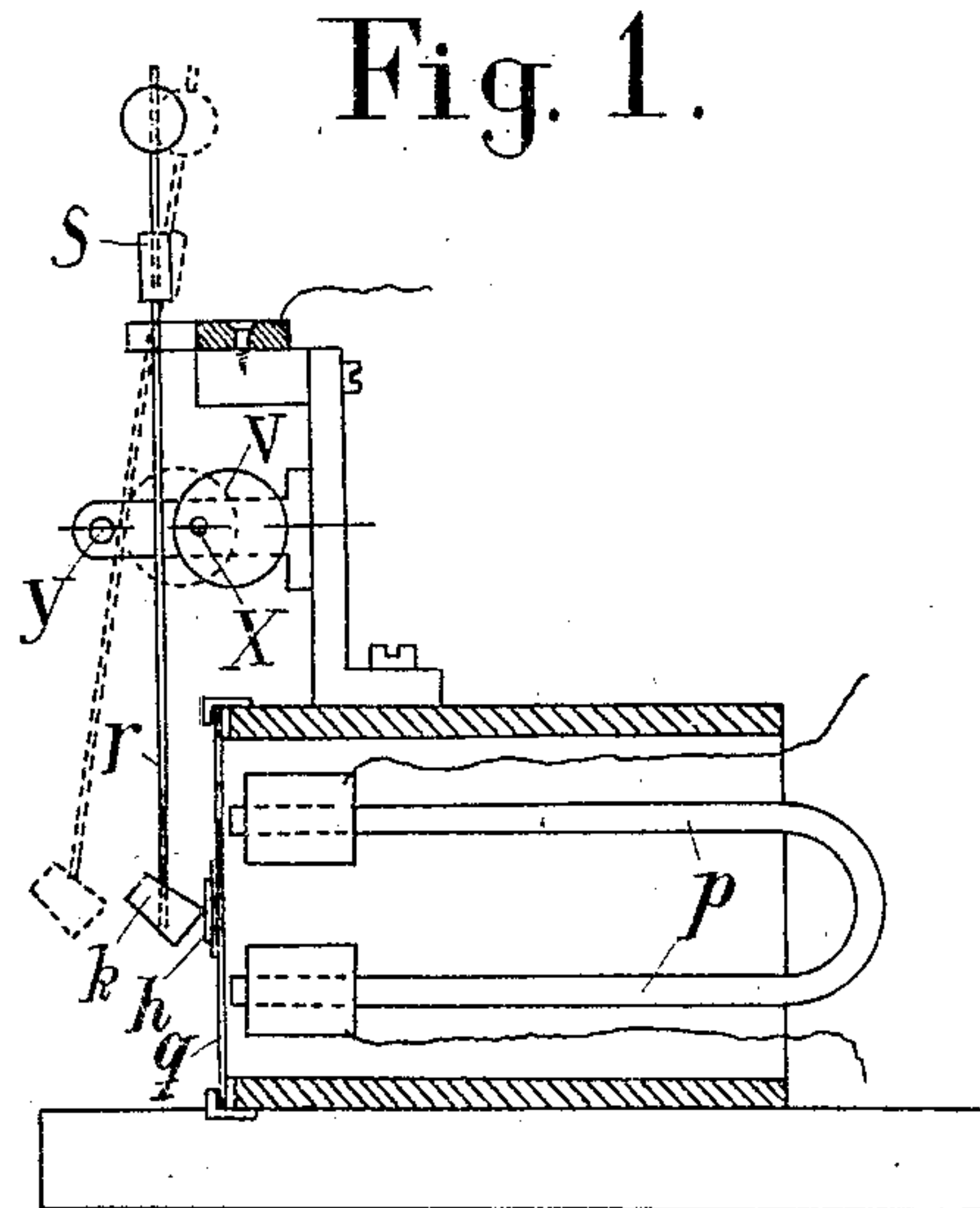


J. H. CHRISTENSEN.
RELAY FOR REINFORCING SOUND.
APPLICATION FILED MAR. 30, 1905.

903,811.

Patented Nov. 10, 1908



Witnesses

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JENS HERMAN CHRISTENSEN, OF SÖVEJEN, SÖLLERÖD, DENMARK.

RELAY FOR REINFORCING SOUND.

No. 903,811.

Specification of Letters Patent.

Patented Nov. 10, 1908.

Application filed March 30, 1905. Serial No. 252,815.

To all whom it may concern:

Be it known that I, JENS HERMAN CHRISTENSEN, civil engineer, resident of Sövejen, Sölleröd, Denmark, have invented a new and useful Relay for Reinforcing Sound, which is fully set forth in the following specification.

My invention relates to a relay for reinforcing sound, particularly in connection with the ordinary receiving circuit of a telephone, or a telegraphphone.

The principal object of the invention is to provide a form of relay, or re-transmitting device, which shall amplify the ordinary vibrations, without destroying their purity, so that the sound may be finally reproduced and delivered with sufficient intensity to be heard even at a long distance from the apparatus.

A further object of the invention is to provide a loud speaking telephone of the above character, adapted either for local use to reproduce the sound so it may be readily heard, or for repeating the sound into a second telephone circuit, forming a telephone relay, so that the sound may be re-transmitted to a distant point.

With these and other objects in view, my invention consists in the construction, combination, in the location and arrangement of parts, as hereinafter set forth and shown, and finally particularly pointed out in the appended claims.

In the drawings, Figure 1 is a sectional view of a telephone relay embodying the principles of my invention; Fig. 2 is a front view thereof; Fig. 3 is a detail view showing the journal bearings which I employ.

In carrying out my invention I make use of a diaphragm which is vibrated in any way, as, for example, under the impulses of a telephone circuit. I employ in connection with this diaphragm a resistance varying means having carbon contacts included in the local circuit. I arrange the carbon contacts in such a way that they are capable of varying the resistance of the repeating circuit through a wide range without dampening to any appreciable extent the vibrations of the primary diaphragm. The manner in which this is accomplished constitutes an important part of the invention.

A form of construction is illustrated in which the inertia of the carbon blocks can be made any desired amount, and their pres-

sure against the primary diaphragm can be independently regulated. For this purpose, the various carbon blocks, shown at k , are fastened at the lower ends of slender rods or pendulums r and have a sharp edge in contact with the diaphragm. q denotes the diaphragm and h the carbon plate glued or fastened thereto and forming a part thereof. In this case the diaphragm is disposed in a vertical plane, and is acted upon by a magnet p in the usual telephone or telegraphphone circuit. The various pendulums r are journaled at s , so as to bear lightly against the face of the carbon block or blocks h on the diaphragm q by the force of gravity. In practice I prefer to make use of jewel bearings 2, which receive the spindle 1 of the pendulums. The jewel bearings are supported in cups 4, of the terminal members 3, said cups 4 having cavities 5 therein, which contain mercury, by which a good electrical circuit is made to the pendulums therefrom.

Each of the various pendulum rods r has a weight u slidably supported upon its upper end and adjustable into any desired relation. The weight is normally so distributed so that the center of gravity of each pendulum is a little below and almost in a vertical line with its pivotal point. In this way the pressure of the blocks h against the carbon plates k is always exceedingly small, and may be regulated to any desired extent. At the same time the nature of this suspension for the carbon blocks insures absolute permanence of the adjustment when it has been made, the pressure continuing at a definite value regardless of temperature expansion or contractions, or other similar influences. It is desirable however to cover the instrument with a felt-lined case and suspend it from a fixed point by rubber cords or ropes.

In operation the apparatus is connected up so that the contacts lie in circuit with the repeating or retransmitting circuit in which there is preferably a battery of fairly high potential, for example, eight or ten volts. The resistance of the several contacts is quite high, amounting to 100 or 200 ohms, so that the receiver of the repeating circuit should be wound with a resistance correspondingly high. Under these circumstances, the vibrations of the diaphragm d , no matter how feeble, give considerable variations in the resistance of the various car-

bon contacts. The sound is accordingly retransmitted with an intensity considerably increased over its original value.

If it is desired to move the instrument or put it out of use temporarily, this can be readily accomplished by the cams *v* on the shaft *X*, which are disposed to be moved into the path of the various pendulums. *y* indicates a limiting stop against which the pendulums are pressed in such action.

After the appliance has been in use for a certain length of time it is found that a fine carbon dust or powder collects at the various contacts, and this powder should not be brushed away or removed. Its presence is found to render the apparatus more efficient and less dependent on sensitive and delicate adjustments than otherwise.

What I claim, is:—

1. A telephone relay comprising a diaphragm, a pendulum depending unrestrainedly adjacent thereto and having a sharp-edged carbon block in contact with said diaphragm, the center of gravity of the pendulum being almost in a vertical line with its support and the carbon block bearing against the diaphragm entirely by gravity, whereby there will be a very slight pressure between the carbon block and the diaphragm, and the pendulum will swing very freely.

2. A telephone relay comprising a dia-

phragm, a pendulum depending adjacent thereto and having a contact bearing against said diaphragm, said pendulum being supported by jewel bearings comprising a mercury contact for conducting current through the pendulum.

3. A telephone relay comprising a pendulum, and bearings therefor consisting of a pair of oppositely disposed cups containing mercury, said cups being closed by jewels 2 through which the axis of the pendulum extends into the mercury.

4. A telephone relay comprising a pendulum, and bearings therefor consisting of a pair of oppositely disposed cups containing mercury, said cups being closed by supporting members 2 through which the axis of the pendulum extends into the mercury.

5. A telephone relay comprising a diaphragm, a pendulum depending adjacent to said diaphragm and bearing lightly thereagainst, a horizontal rod adjacent said pendulum, and a cam or eccentric carried thereby for engaging said pendulum and holding it away from said diaphragm.

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

JENS HERMAN CHRISTENSEN.

Witnesses:

VIGGO BLOM,
F. A. USSING.