

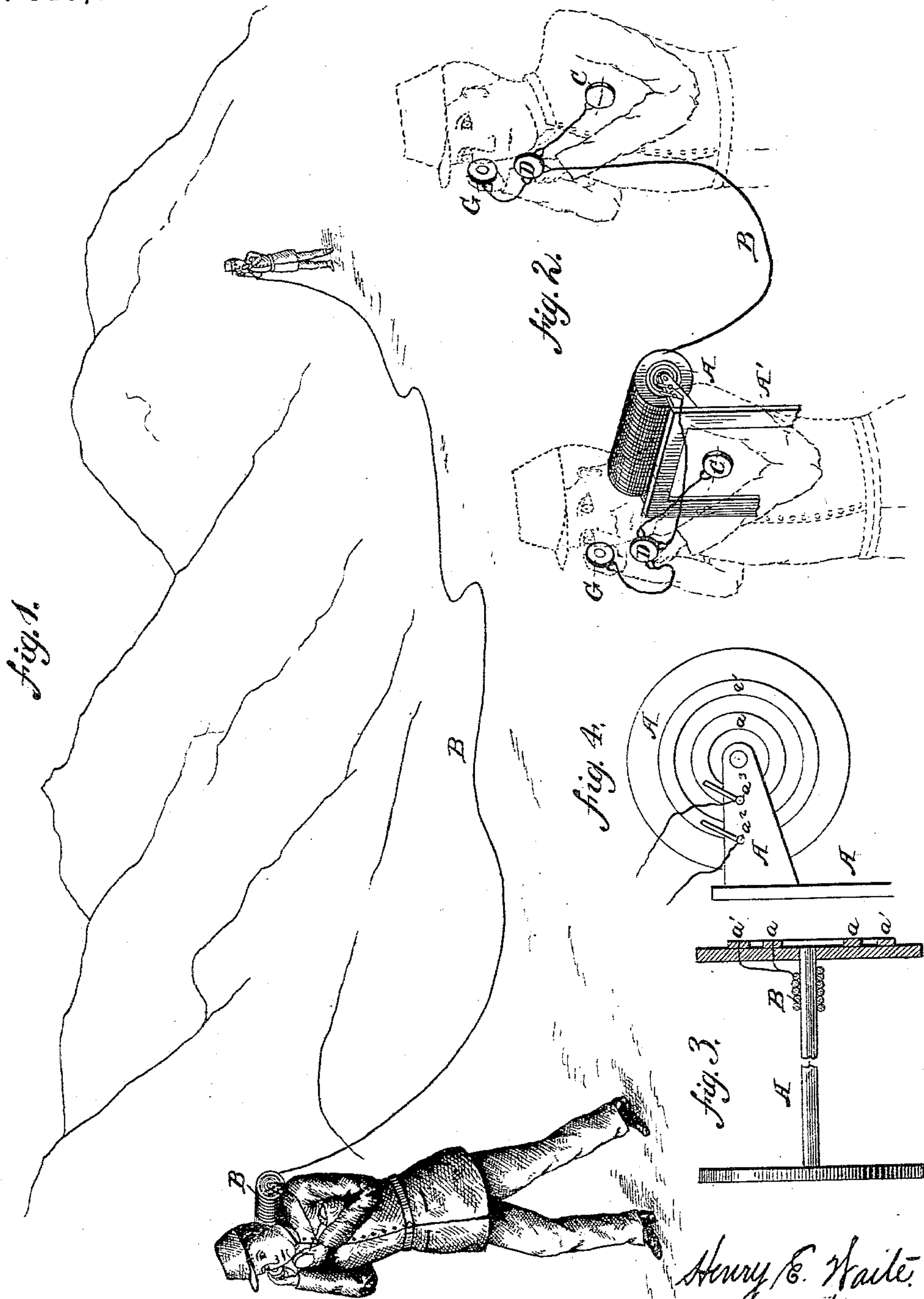
(No Model.)

2 Sheets—Sheet 1.

H. E. WAITE.  
TELEPHONE APPARATUS.

No. 319,043.

Patented June 2, 1885.



Witnesses:  
John G. Hinkel Jr.  
Jas. F. Jagers.

Henry E. Waite.  
Inventor:  
By J. Foster & Freeman  
attys.

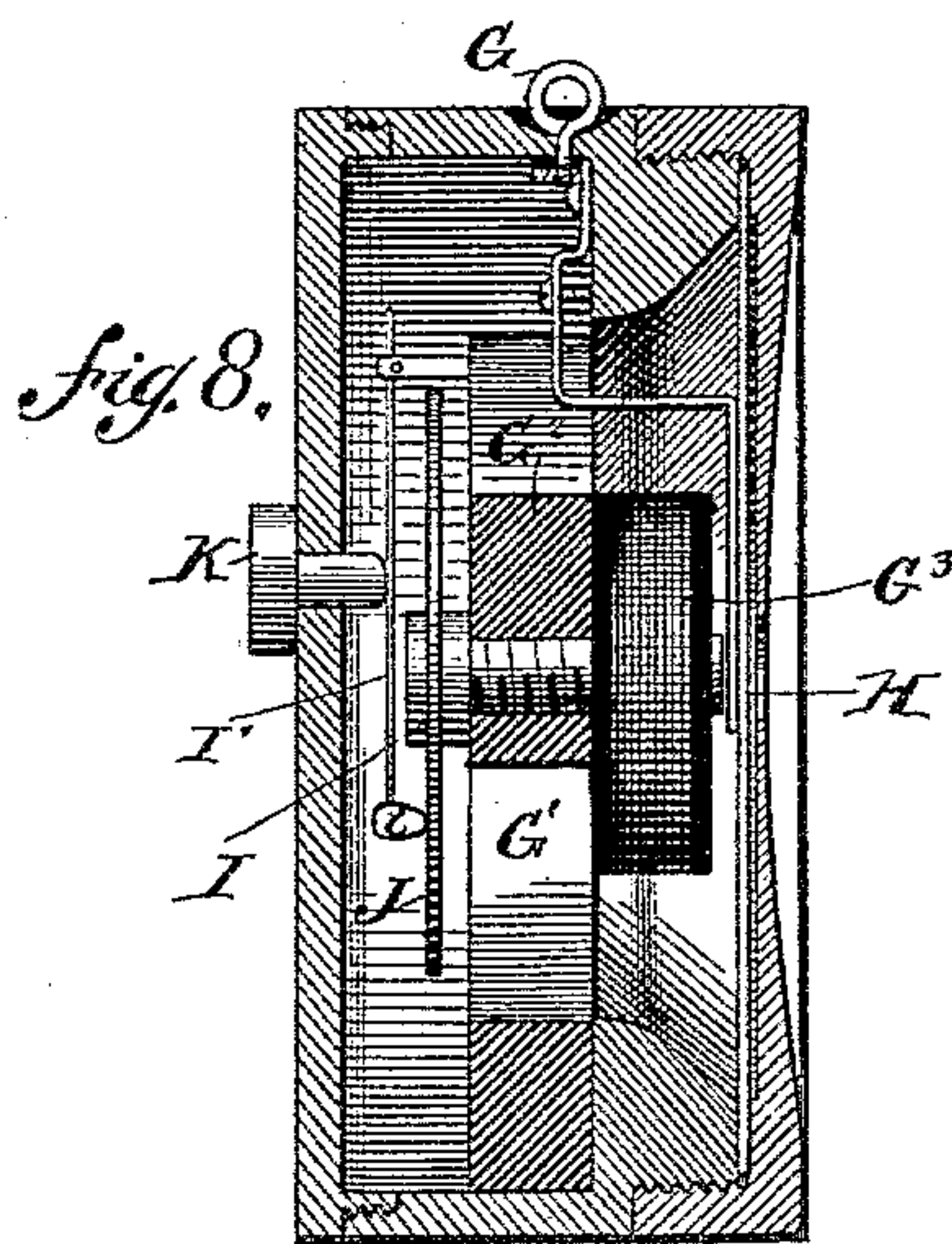
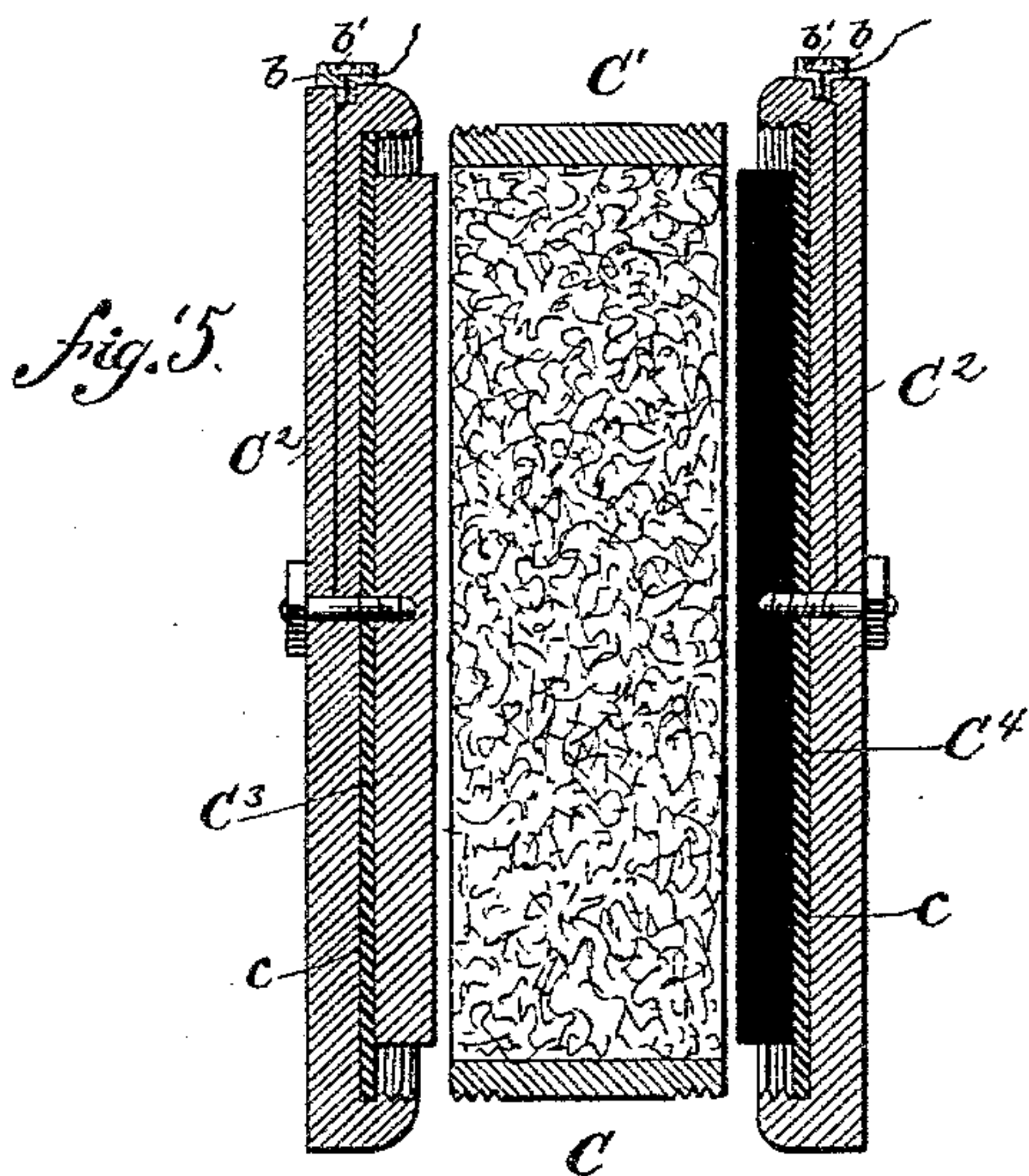
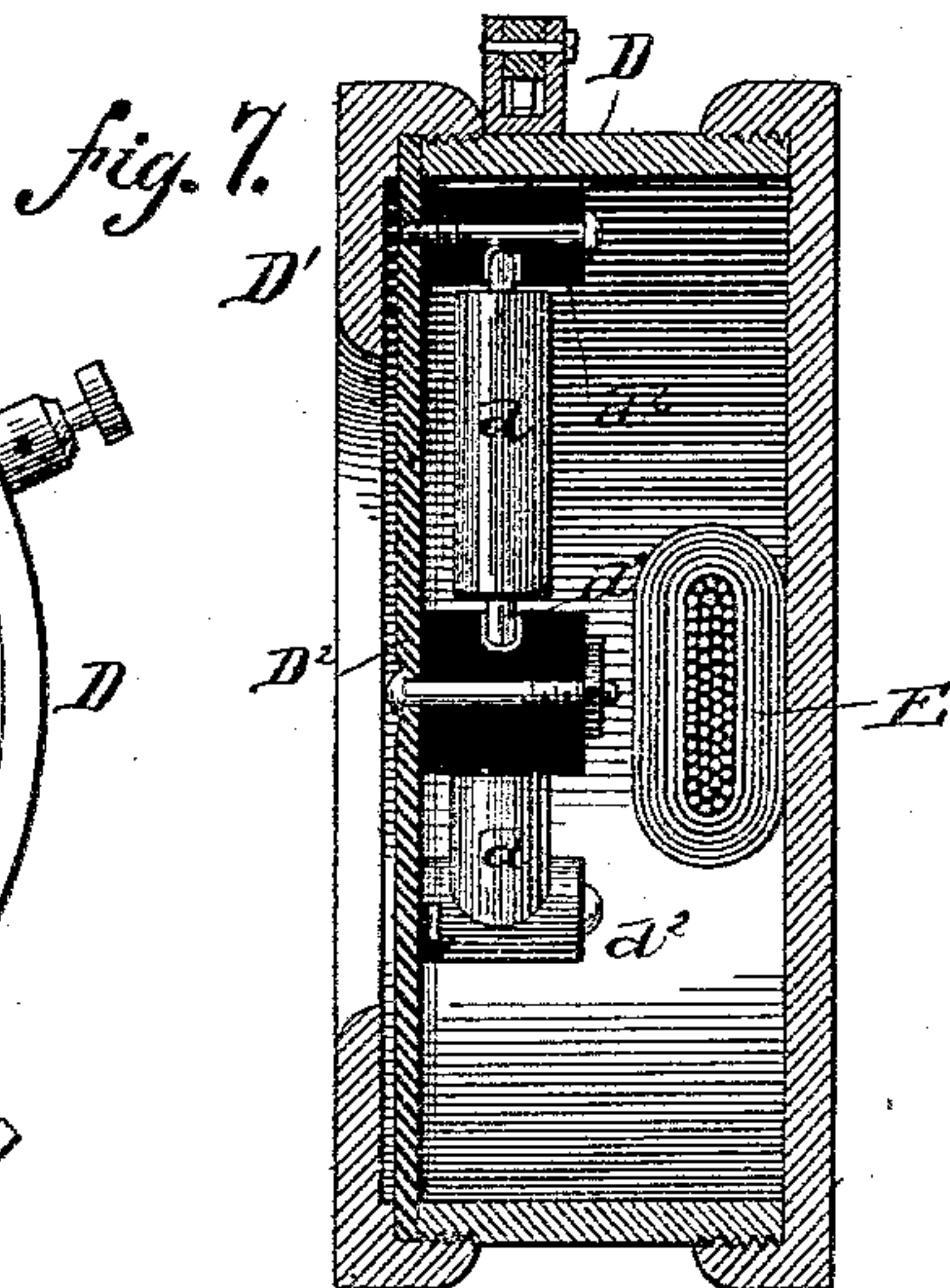
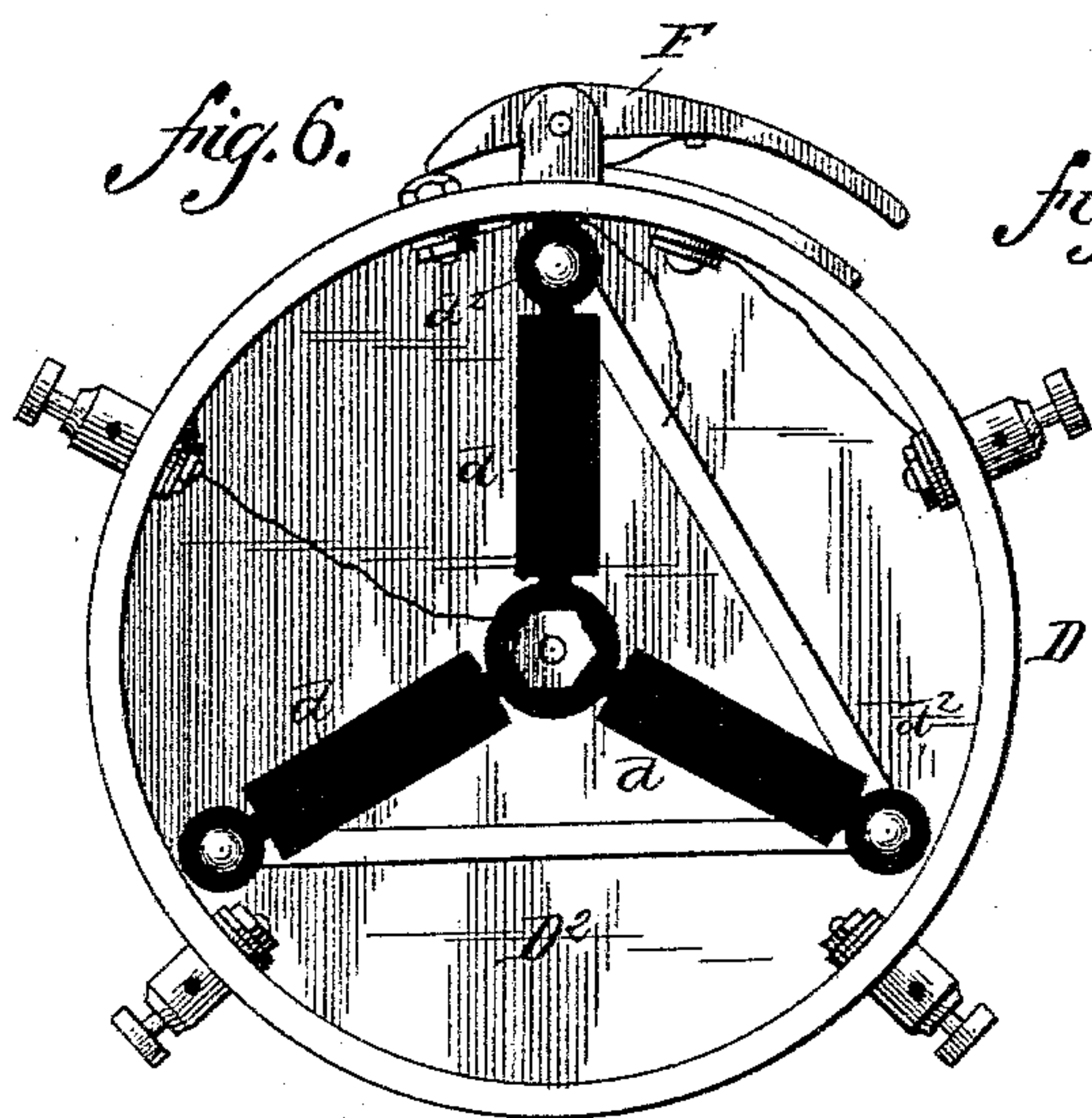
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# UNITED STATES PATENT OFFICE.

HENRY E. WAITE, OF NEW YORK, N. Y.

## TELEPHONE APPARATUS.

SPECIFICATION forming part of Letters Patent No. 319,043, dated June 2, 1885.

Application filed October 30, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY E. WAITE, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Telephone Apparatus, of which the following is a specification.

My invention relates to telephones, and more particularly to that class of telephones that are adapted to be used for military or other purposes where it is not convenient or expedient to build permanent lines; and it has for its object to improve the construction and arrangement of such instruments, whereby better service can be obtained at less expenditure of money and labor; and to these ends it consists in the construction and arrangement of devices, as more particularly pointed out hereinafter.

Referring to the accompanying drawings, forming part of this specification, Figure 1 is a perspective view showing the practical use of the system. Fig. 2 is an enlarged view showing the circuits. Figs. 3 and 4 are views of the reel and connections. Fig. 5 is a sectional view of the battery. Figs. 6 and 7 are sectional views of the transmitter, and Fig. 8 is a sectional view of the receiver.

In carrying out my invention the main object has been to produce a practical system that can be used with ease and accuracy, and that embodies the best principles and produces the best results with the least expenditure of money to construct or labor to transport and operate. It is generally necessary to employ a complete metallic circuit for the telephone-instruments, and this necessitates the use of a double wire or conductor. As this conductor must be carried upon the person of one of the operators, I construct it of as small wire as is practical that has the necessary strength and conductivity; and I have found phosphor-bronze wire to answer all these requirements to the best advantage, as it is exceedingly strong, light, and comparatively high conductivity, and the reel of it, which may be carried on the shoulders or other part of the operator, may contain a considerable length without being too great a burden. I also construct the instruments and battery of the lightest ma-

terial possible, so that the greatest proportion of the necessary weight of the accouterment of the operator will be composed of the line-wire, thereby enabling him to carry a line of greater length with comparative ease.

To more particularly describe my improvements, the reel A, containing the coil or roll of double wire to constitute the line B, may be of any desired construction that is adapted to be carried by the operator, that shown being provided with a frame, A', adapted to be secured to the back or shoulders. The inner terminal of the line-wire B is secured to the axis of the reel, and the ends of the double wire are each connected to a ring or strip,  $a a'$ , of conducting material on the end of the spool or reel, which is made of insulating material or has the rings insulated therefrom. The spool or reel is hung in suitable arms,  $A^2$ , upon which are secured two brushes,  $a^2 a^3$ , arranged to bear upon the conducting-rings provided with binding-posts or other suitable connectors, to which the conductors leading to the telephone-instruments are connected. The battery C, which is placed in the primary circuit of the transmitter, is made compact and portable, and is adapted to be carried in one of the pockets of the operator. Any suitable construction may be used that fulfills the requirements; but I have found that shown in Fig. 5 to be very convenient and satisfactory, its construction being cheap and simple, and at the same time its power is sufficient for the purpose. The battery consists of a short cylinder, C', having a cap, C<sup>2</sup>, at each end suitably secured thereto, as by a screw-thread or otherwise. To one of the caps is secured a block of zinc, C<sup>3</sup>, and to the other cap is secured a disk of carbon, C<sup>4</sup>, a lining of soft rubber,  $c c$ , being placed between them and the covers to protect the latter from the action of the chemicals and to serve as a cushion to protect the carbon disk. These plates are connected to suitable binding-posts, which may be of any desired form, that shown consisting of a socketed cup,  $b$ , having a disk,  $b'$ , provided with pin-holes for the reception of a peculiar-shaped screw-driver adapted to fit in the socket and confine the conductor between them. The body of the case may be



filled with cotton, felt, asbestos, or similar absorbent material, and an electrolytic fluid—such as chloride of silver or bisulphide of mercury—may be used. The plates, being of comparatively large surface, I have found, will furnish a current of sufficient strength for some hours work from a single filling or saturation of the packed battery, and it is only necessary to renew the fluid by adding a small quantity to extend the time.

The most effective transmitter I have found is shown in Figs. 6 and 7, and consists of a cylindrical case, D, having the usual mouth-piece, D', behind which is a diaphragm, D<sup>2</sup>, of wood, cork, or equivalent material, to the rear side of which is attached a series of electrodes consisting of cylinders of hard carbon, d, supported by spindles or bearings d' in standards d<sup>2</sup>, suitably connected to the battery-circuit. An induction-coil, E, the primary of which includes the electrodes of the transmitter and the secondary of which goes to line, is also included in the box of the transmitter, and this is made in an oval or flattened shape to economize room. A circuit-breaker key, F, is placed on the outside of the transmitter-case, by which telegraphic signals may be sent over the line, making use of the induced current. The receiver G also consists of a cylindrical case having a cylindrical magnet, G', one pole, G<sup>2</sup>, of which is turned inward, and to this is secured the coil G<sup>3</sup>. A spring of some magnetic material extends over the core of the coil and bears upon the diaphragm H, which may be of wood or similar material, and which may form the end of the cylinder. Upon the opposite side of the magnet the core is extended slightly to form a knob or projection, I, and a disk, J, of metal is secured to the knob, so as to leave its edges free. Attached to the magnet at about its neutral point is a spring-arm, I', of magnetic material, having a ball or hammer, i, upon its end. When the magnetism of the core is varied by the current flowing through the coil, the spring-arm, which has been polarized by induction, is caused to approach and recede from the core, and by this means a series of blows are struck upon the disk J, which will give out a ringing or bell-like sound, and will serve to attract the attention of the operator. A push-button or screw, K, is placed in the case, so that the motion of the hammer may be arrested when it is desired to converse. This gong or sounder may be used in connection with the circuit-breaker to transmit signals according to any desired code, or the signals may be heard from the diaphragm of the receiver when placed to the ear.

Such being the preferred construction of the instruments, I wish it understood that my invention is not limited to the exact forms, as others may be substituted; but it will be observed that they are all of about the same size and shape, and are light, convenient to handle, and effective, and can be carried in the pockets of the operator or in a satchel or other

receptacle provided for the purpose. They are all connected together by flexible conductors, preferably consisting of two wires insulated from each other and formed into a single cord, except at the end which is separated to be attached to the binding-posts of the several instruments, which latter may be connected up in any proper or usual manner well understood by any electrician and unnecessary to be described specifically.

The instruments being attached or connected to the extremities of the line-wire, there is always the same amount of resistance, whether the operators are close together or at the extent of the line from each other; consequently the instruments will require no adjustment when once properly connected up in circuit.

I do not herein claim the specific construction of the battery above described, reserving all rights to claim the same in a separate application.

I claim—

1. The combination of a battery inclosed in a short cylindrical sealed case and adapted to be carried in the pocket of the operator, an independent portable telephone-transmitter flexibly connected to the battery, and an independent portable telephone-receiver, also flexibly connected, and a reel or coil of line-wire in electrical connection with the operating-instruments, the battery and telephone-instruments being inclosed in short cylindrical cases, and all adapted to be carried upon the operator, substantially as described.

2. In a military signaling system, the combination, with the portable battery inclosed in a short cylindrical case, of a transmitter consisting of a short cylindrical case, and having a series of electrodes supported upon the diaphragm and a circuit-breaking key upon the outside of the case, whereby both may be easily carried in the pocket and telephonic and telegraphic signals may be sent, substantially as described.

3. In a military signaling system, the combination, with a portable battery line and transmitter, of a magneto-receiver provided with a metal disk or gong and a hammer adapted to impinge upon said gong and operated by the receiver-magnet, substantially as described.

4. In a system of military signaling apparatus, the combination, with a portable battery and line, of a transmitter having electrodes and a circuit-breaker, a receiver having the usual diaphragm, and a gong and operating-hammer, whereby various kinds of signals may be sent to line, substantially as described.

5. In a system of military signaling apparatus, a line-reel having two conducting-rings upon one end connected to the terminals of the line-wire and brushes upon the frame of the reel in electrical contact with the rings, substantially as described.



6. In a military signaling apparatus, and  
in combination with a portable battery and  
receiver, a portable transmitter consisting of  
a diaphragm supporting a series of electrodes,  
5 and a flattened induction-coil inclosed in the  
case, substantially as described.

In testimony whereof I have signed my name

to this specification in the presence of two sub-  
scribing witnesses.

HENRY E. WAITE.

Witnesses:

CHARLES E. FOSTER,  
W. C. DUVALL.