

A. BAIN.
ELECTRO ACOUSTIC TELEGRAPH.

No. 32,854.

Patented July 23, 1861.

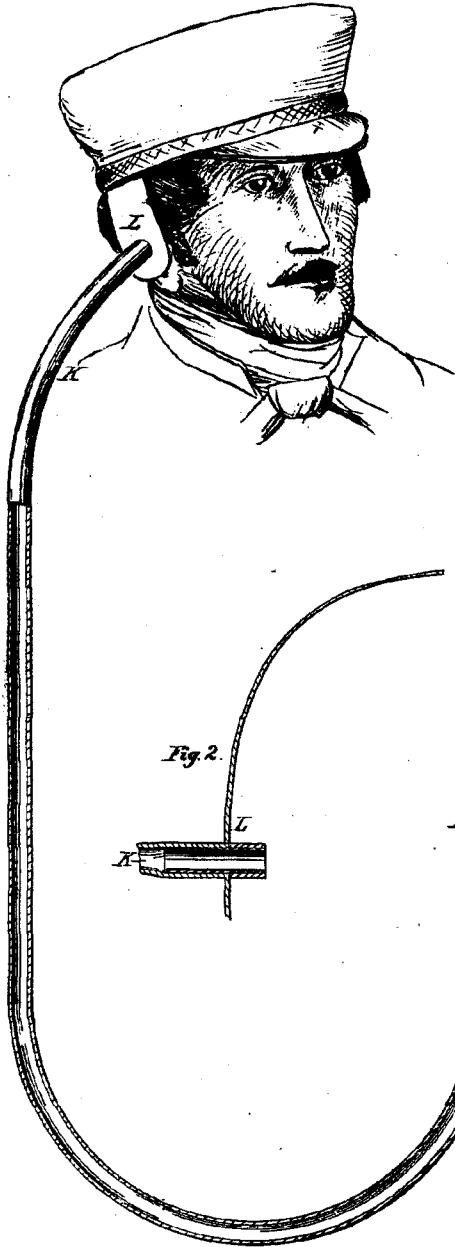


Fig. 2.

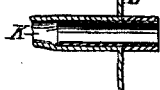


Fig. 4.

A	---	N	---	1	---
B	---	O	---	2	---
C	---	P	---	3	---
D	---	Q	---	4	---
E	---	R	---	5	---
F	---	S	---	6	---
G	---	T	---	7	---
H	---	U	---	8	---
I	---	V	---	9	---
J	---	W	---	0	---
K	---	X	---	Flies	---
L	---	Y	---		
M	---	Z	---		

Fig. 1.

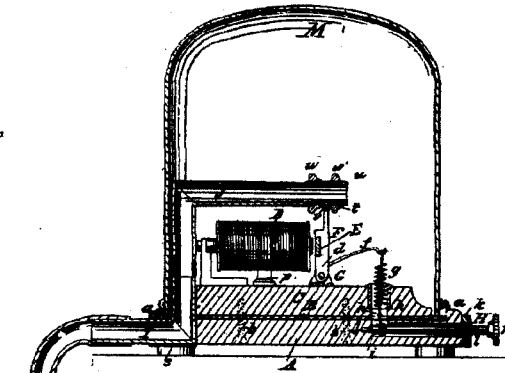
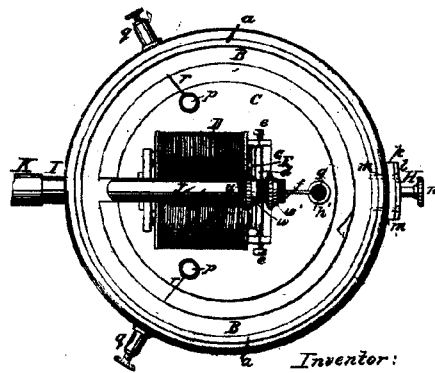


Fig. 3.



Witnesses:
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UNITED STATES PATENT OFFICE.

ALEXANDER BAIN, OF NEW YORK, N. Y.

IMPROVEMENT IN TELEGRAPHS.

Specification forming part of Letters Patent No. 32,854, dated July 23, 1861.

To all whom it may concern:

Be it known that I, ALEXANDER BAIN, of the city, county, and State of New York, have invented a new and useful Improvement in Electric Telegraphs; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

The advantages sought to be obtained by this invention, which I denominate the "electro-acoustic telegraph," are, first, the inviolable secrecy of all important telegraphic communications, and, second, the saving of expense in the working of telegraph-lines.

It is a common practice in telegraph-offices to read and write down the messages from the sound or click of the magnets, and with the apparatus ordinarily used the sound can frequently be heard in all parts of an office, and even outside, with such distinctness that the messages may be understood not only by the confidential clerk whose duty it is to write them down and send them inviolate to the person or persons for whom they are intended, but by other persons of quick ear familiar with the telegraphic alphabet, who may be by accident or design in or near the same office or in or near other offices whose magnets are in the same circuit, and consequently are similarly acted upon to the magnet in the office for which the message was intended.

To obviate this objection my invention consists in so applying an acoustic tube, in combination with the lever carrying the armature of a magnet, or with any other instrument for producing sounds by electricity, that a person having the tube applied to his ear may hear the sound while it is inaudible to persons at a very short distance from the instrument.

It also consists in the employment, in combination with a so-called acoustic tube, of a cover of glass or other material inclosing the instrument for the purpose of preventing the sound escaping in any great degree except by the acoustic tube, and of aiding to convey the sound into the said tube. The saving of expense results from so little sound being required when all is conveyed to a point where alone it is wanted—viz., the ear of the operator—that the long-circuit magnets will serve

every purpose without the use of local magnets, circuits, or batteries, though these, of course, may be used, if desirable, to apply my invention in connection with any of the present modes of operating.

The accompanying drawings represent an instrument in what I consider the best form for applying my invention to use.

Figure 1 is a vertical section of the instrument, showing the application of the ear-tube. Fig. 2 is a section of the ear-tube. Fig. 3 is a plan of the instrument without the cover. Fig. 4 represents the alphabet of signs which I propose to employ.

Similar letters of reference indicate corresponding parts in the several figures.

A is a wooden stand, of circular or other convenient form, having a rim, *a a*, all round it, and having its upper surface within this rim covered with a circular sheet or disk, B, of elastic india-rubber.

C is a smaller wooden stand, of form corresponding with A, resting on the india-rubber B, and secured firmly to the stand A by screws *b b*, which keep the india-rubber firmly in place.

D D is an electro-magnet, secured in the usual way to the stand C.

E is the armature of the said magnet, attached firmly to a lever, F, which is secured to a small horizontal shaft, *d*, that is arranged to oscillate between two center screws, *e e*, screwing into lugs at opposite ends of a plate, G, which is secured firmly to the stand C. The said lever F has a hammer-like upper extremity, as shown at *v* in Fig. 1, and has attached rigidly to it a hooked arm, *f*, with which is connected the upper end of a spiral spring, *g*, the lower part of which is received in a pit, *h*, provided for it in the stands O and A. The lower extremity of this spring is attached to the upper end of a silk cord, *i*, the lower end of which is attached to a horizontal spindle, H, which crosses the lower part of the pit *h*, the said spindle being received in a hole bored through one side of the stand A to meet the pit *h*, and the inner bearing of the said spindle being in a hole, *j*, bored on one side of the pit *h*, and the outer bearing of the said spindle being in a piece of elastic india-rubber, *k*, which is secured by a plate of brass, *l*, and screws *m m* to the outside of stand A.

The outer end of the spindle H is furnished with a knob, *n*, by which to turn it to wind up or unwind the cord *i*, for the purpose of producing more or less tension on the spring *g*, which exerts a tendency to draw back the armature-lever F and pull the armature away from the poles of the magnet. The india-rubber *k* is so clamped around the spindle by the plate *l* that it produces sufficient friction thereon to retain it in any position to which it may be turned, and thus retain the tension of the spring.

p p are two binding-screws screwed into the stand C, and having soldered to each of them one of the two ends of the wire forming the helices of the electro-magnet. *q q* are two other binding-screws, screwed into the edge of the stand A to connect the wires of the telegraph-line, said screws being connected with *p p* by wires *r r*.

I is a tube, of brass or other metal, made with an elbow, passing through holes in the stands A C and india-rubber B, and firmly secured to the stand A by a metal strap, *s*, or by any other suitable means. The hole provided in the india-rubber B for the tube to pass through is smaller than the tube before the insertion of the latter, for the purpose of preventing the ingress or egress of air through the stand C. The portion of the tube I above the stand C is upright, and has fitted tightly into it the lower end of the upright portion of a tube, J, which is also of elbow form. The horizontal portion of this tube stands over the space between the two helices of the electro-magnet and parallel with the axes of said helices, and it is made with a slot, *t*, in its under side and a screw-thread, *u*, upon its exterior, both commencing at its mouth and extending back some distance therefrom, the said slot being for the reception of the hammer-like head *v* of the armature-lever F, which is free to oscillate within it without touching its sides, and the screw-thread being for the reception of two internally-screwed collars, *w w'*, which are placed on the exterior of the tube, one in front and the other behind the lever. These collars serve to limit the oscillating movement of the lever produced by opening and closing the circuit in which the magnet is placed, and it is by the hammer-like head of the armature-lever striking against these collars that the sounds by which the message is to be read are produced.

K is a flexible tube, of india-rubber or other material, attached at one end to the portion of the tube I that is outside of the stand A, and furnished at the other end with an ear-piece, L, of hard india-rubber or other material. This ear-piece is represented as of suitable form to fit the side and top of the head in such manner as to be secured in place by a hat or cap worn by the operator, as shown in Fig. 1. The tubes I J K combined constitute the acoustic

tube, whose combination with the magnet or other sounding device is the principal feature of my invention.

M, Fig. 1, is the cover inclosing the magnet, the armature-lever, and the tube I, for the purpose of preventing as far as practicable the escape of sound otherwise than by the acoustic tube. This cover may be of various materials and variously applied; but the simplest and most convenient thing that can be used is the glass shade represented. The lower edges of this shade fit within the rim *a* of the stand A and rest on the india-rubber B, which makes a nearly air-tight joint.

When the instrument is placed in the telegraph-circuit, by making the connections of the line-wires with the screws it is in condition for operation. When the circuit is closed the magnet attracts the armature and causes the hammer-like head *v* of the armature-lever to strike the inner collar, *w*, of the tube J, and when the circuit is opened the spring draws the lever back and causes it to strike the outer collar, *w'*, and so produce a series of clicking sounds, and the different lengths of time which the currents are allowed to flow determines the signs. When the flow is but for an instant it may be represented in an alphabet by a dot, (*.*) and when for a little longer time—say a quarter of a second—by a dash, (*—*) and an alphabet may be formed by suitable combinations of these signs. The alphabet in most common use or any other may be used; but I propose to use that represented in Fig. 4 of the drawing.

The adjustment of the collars *w w'* may be such that the sound produced by the lever striking them will be so feeble that it cannot be heard by a person very near the instrument, even with the cover M removed, and yet will be heard by the operator with the acoustic tube applied to his ear. When the cover is applied and the communication prevented between the air immediately surrounding the instrument and the air outside of the cover, the adjustment is not required to be so delicate, as the sound will be shut in from bystanders and all conveyed into the tube.

Instead of using a tube to convey the sound to the ear, the instrument may be placed in a box of convenient height, with an orifice, against which the operator may place his ear and hear almost, if not quite, as well as through a tube. Such a box I consider the equivalent of the acoustic tube.

I do not confine myself to the use of any particular instrument or device for obtaining the sounds which are to constitute or denote the signs or signals employed; but

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The employment of an acoustic tube or its equivalent, combined with the armature-

lever of an electro-magnet, or with any equivalent instrument for producing sounds by electricity, to operate substantially as and for the purpose herein set forth.

2. The employment, as stops for the armature-lever or other device by whose movement the sound is produced, of collars or their equivalents *w w'*, adjustable upon the acoustic tube itself, substantially as herein specified.

3. The employment of a cover inclosing the instrument for producing the sounds and the mouth of the acoustic tube, substantially as and for the purpose herein specified.

ALEXANDER BAIN.

Witnesses :

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