

## Letter from Alexander Graham Bell to Alexander Melville Bell, Eliza Symonds Bell, Carrie Bell, November 23, 1874, with transcript

155612 A Box 4, Alexander Graham Bell Family Papers, MD, LC. Salem to Boston  
Monday Nov. 23 '74 Dear P. M. & C.

Mr. Hubbard on going down to Washington found that Mr. E. Gray instead of filing a caveat had applied for a patent on his invention — so that a caveat would not protect me from him.

A caveat only protects from those taking a patent after I file the caveat.

Under these circumstances Mr. Hubbard decided not to file mine as it might injure our case by exposing our dates — to Mr. Gray.

He says the only course is to complete our instruments as rapidly as possible and apply for a patent when an interference will be raised between Mr. Gray & myself and then one who can prove priority will obtain the patent.

There is thus no present need of my becoming an American Citizen.

It is a neck and neck race between Mr. Gray and myself who shall / complete our apparatus first. He has the advantage over me in being a practical electrician — but I have reason to believe that I am better acquainted with the phenomenon of sound than he is — so that I have an advantage there and I have at hand Prof. Lovering and Mr. Farmer as advisor in every electrical difficulty.

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The very opposition seems to nerve me to work and I feel that with the facilities I have now I may succeed.

Portions of my apparatus will be ready for trial tomorrow. However we shall see.

I feel that I shall be seriously ill should I fail in this now I am so thoroughly wrought up.

An idea that I have scarce dared to breathe to anybody for fear of being thought insane I ventured cautiously to open to Mr. Farmer.

To my delight he said the theory was all right but that the difficulties of practically working the idea were such that it would take years to solve the problem practically. He advised me to publish the idea in the Philosophical Magazine after I had protected my telegraphic scheme. The idea to which I allude is a instrument by which the human voice might be telegraphed without the use of a battery at all .

Since the principle of the idea is all right I hope to be able to apply it practically to the telegraphic scheme at once so as to send messages without a battery — substituting instead a permanent magnet.

I shall describe the idea here which led me to think of the plan.

Although the plan has been in my head for a year or so, I never spoke of it so far as I remember as I was uncertain of the fundamental principle. Now that the principle is acknowledged correct I have no doubt the publication of the idea will lead to such an instrument as that I have described.

If you take a permanent magnet and place one of its poles near the pole of an electro — magnet a current of electricity is induced in the coils of the latter. When the permanent magnet is removed from the electro-magnet another current of electricity (of opposite kind to the first) is induced in the coils of the electro-magnet.

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These facts have been known for years but the deduction which I have made from them is new. It is this.

If a permanent magnet is is (sic) made to vibrate in front of the poles of an electro-magnet — an induced oscillating current will be produced in the coils of the electro-magnet. The oscillations of the electrical current will correspond in number and amplitude with the vibrations of the permanent magnet. Hence if we have a harp of steel bars made permanently magnetical arranged over an electro magnet; and if we have the bars tuned to minute intervals of pitch every if we talk into one harp certain rods will vibrate with certain amplitudes. Their vibrations will create an electrical vibration in the live wire and will force into vibration the corresponding rods of the other harp.

This is the theory. I can never hope to work it out myself.

Mr. Farmer & Dr. Blake both pronounce it feasible.

Please keep this paper as a record of the conception of the idea in case any one else should at a future time discover that the vibrations of a permanent magnet will induce a vibrating current of electricity in the coils of an electro-magnet.

Fond love (signed) Aleck Prof. A.M. Bell