patent has by proper references included the variable resistance method among those pointed out by him for use in transmitting sounds "by causing," etc., together with the evidence offered to show that he did make some experiments at one time with a stretched wire to ascertain whether a varying resistance to a current could be made to produce undulations in its force.

He asserted that no serious evidence existed in the case that Mr. Bell had ever before the date of his patent contemplated the production of undulations for the transmission of sounds by any other than the magneto-telephone method; and left the further consideration of the history of Mr. Bell's investigations and experiments to other counsel.]

*Mr. Lysander Hill* for the People's Telephone Company [Drawbaugh], and for the Overland Telephone Company. The briefs in these cases were signed by *Mr. Hill*, *Mr. George F. Edmunds*, *Mr. Don M. Dickinson*, *Mr. Charles P. Crosby*, *Mr. T. S. E. Dixon*, *Mr. Henry C. Andrews*, and *Mr. Melville Church*.

There are four or five different interests here; and each one wants to be heard by its own counsel. But, if your Honors please, some of us are substantially agreed in our general mode of presenting the case, and we shall not overlap each other. I shall take up the subject, for example, as nearly as I can, where Mr. Lowrey left it; and I shall endeavor not to walk over the ground which he has traversed, but rather to advance from the point where he stopped.

The order in which I shall take up the subjects which I shall discuss will be, as near as I can follow it, substantially this: I shall first discuss briefly the history of what Mr. Bell did, and what he did not do, endeavoring to give the court some idea of exactly what Mr. Bell did and what he did not do, what he sought to do, what his plans, his thoughts, his theories were, as obtained from his own testimony. And, I must say to the court that in all I shall say I shall be discussing the complainants', the appellees' testimony. I shall not have occasion to refer to the testimony of the appellants at

all. I get Mr. Bell's history from his own mouth, from his own documents and from complainants' documents, not from ours. And, after showing, if I can make a showing in the brief time that I have, what Mr. Bell did, and what he did not do, I shall then endeavor to take up his patents and consider the construction of his patent in view of his work. After which will follow the discussion of some questions relating to the validity of those patents.

Prior to the autumn of 1873 Bell had become impressed with the importance of discovering a means to enable telegraphic companies to transmit more than one message at the same time over the same wire. He had formed some theories of his own on the subject of multiple telegraphy (as we call that branch of telegraphy by which many messages may be transmitted over one wire at the same time) and his thoughts and theories led him to the subject of the harmonic telegraph; that is, to use a transmitter which should vibrate at certain specified rates per second, and, by means of electrical currents, cause the receiver to vibrate at the same number of rates per second; and then those receivers, acting through an old law, well known to musicians, would each pick out the number of vibrations, or the rate of vibrations, which was sent by the transmitter attuned to their own tune, and not attuned to any other. While thus occupied, he fell in with the Bourseul article. It taught him, as Mr. Lowrey has already explained, that if you make a sound upon a diaphragm, you set that diaphragm into vibration, and thereby cause it to interrupt a current of electricity, making and breaking the current, and you will obtain at the other end of the line vibrations which will correspond, at least in rate per second, or in pitch of the sound, to the vibrations of the transmitter, and of the sound actuating the transmitter. Bourseul had stated his belief that upon that principle an electric transmission of speech could be secured, although he had not secured it himself, as appears by the article. He no longer had to beat his own way for the discovery, or to think of the law; for Bourseul's article pointed out the law to him; and the great law, the foundation law of the whole science and art was simply this, that you must have

a transmitter at one end — a connecting line — and a receiver at the other end; that you must have your transmitter so arranged that it would vibrate in exact response to the vibration of the sound waves; and that you must connect your receiver to it by currents so operating that the receiver would vibrate in the same exact relation to the sound waves. Then you would produce the same vibrations in the receiver that your sound produced in the transmitting diaphragm. You must necessarily have precisely the same sounds. That was a statement of the law of the telephone.

Before the winter of 1874–5, certainly before February, 1875, he had become acquainted with Reis's inventions. From this source, also, he learned that you must primarily use a diaphragm, a vibrating disc or membrane, so arranged that it would take up and respond to all motions of the air, and he further learned: (1) That you must have a receiver which will execute vibrations identical with the air vibrations made at the transmitter: (2) That the mechanism must be arranged so as to produce both the rate of vibration, and the varying amplitude of it, in order to transmit speech: and (3) That Reis had endeavored to carry out these principles in the construction of his apparatus.

He further learned from Reis to represent this mathematically, by drawing curves representing the sounds. He found in the articles of Reis full mathematical curves representing the various vibrations. He found the different parts of the curves described. He found a zero line representing the air as still, and rises of the curve above that zero line representing the condensation, or the forward movement of the air particles, forcing them among each other, and then the descent of that curve line below the zero line representing the rarefaction of the air below its normal point, and so on. He also found that Reis had represented composite curves, made up of other curves, to show how various sounds could be made, and that they would all coalesce and form resultant curves, which can be represented in the same way or by algebraically adding those curves — adding both together when they are both plus, subtracting when some are minus, and adding when both are minus. Reis states this general principle very clearly thus:

Mr. Hill's Argument for People's and Overland Cos.

"First. Every sound and every combination of sounds, on striking our ear cause vibrations of the drum of the ear that may be represented by a curve.

"Second. The course of these vibrations simply gives us a conception (appréciation) of the sound, and every alternation changes the conception (appréciation).

"As soon, then, as it is possible to produce, anywhere and in any manner, vibrations whose curves shall be the same as those of any sounds or combination of sounds, we shall receive the same impression as that tone or combination of tones would have produced on us."

This was the general information which Bell had when he entered upon the study of the possible transmission of speech vibrations of sound. By these publications his vigorous and logical mind was directed to the very point to be investigated; the air vibrations, the motions of the particles of the air in the transmission of sound. Bourseul had not accomplished this transmission. The results achieved by Reis were defective. Consonantal sounds had been satisfactorily transmitted; vowel sounds not so well; words indistinctly.

Bell was well acquainted with the scientific theories on this subject. Sound created by vocal organs is caused by vibrating the organs. That vibration produces vibration of the air; that is, a back-and-forth movement. All sound consists primarily in the movement of air particles forward and back from the source of sound. Without this vibration there is no sound. The rate at which the air particles travel back and forth — that is, the number of movements per second — determine whether the sound is high or low. The upper notes of Patti, for instance, vibrate the air about fifteen hundred times per second; a heavy basso note about eighty times per second. One further characteristic, namely, the force or the distance through which the vibration occurred, distinguishes one sound from another. This difference in violence, in amplitude, determines the loudness of the sound.

Bell knew this, and understood that in order to reproduce a sound at a distance he must reproduce the vibration and must have the power to vary and copy both its rate and its

amplitude. Those three characteristics, he said, constitute every sound; their difference represents the difference between one sound and another, and therefore I must reproduce those characteristics at the other end of the line.

This theory drove him to one particular kind of electric current — the induced magneto current. Reis had endeavored to copy those vibrational characteristics in his receiver, but had not thought of copying them in the current between the transmitter and the receiver. Bell saw that in order to copy them in the receiver, they must be got into the current which was the connecting medium. That led him to the magneto current, because that is the only form of current in which an electrical copy of the movement can be obtained. He saw that if he could take an armature, attach it to the diaphragm, and place it in front of an electro-magnet, and then speak to the diaphragm, that armature would be set in vibration, and the vibration would necessarily correspond to the sound waves, to the movement of the air particles back and forth, in every respect; and that, as it pushed the current, as long as it was moving in one way, and with violence proportioned to the violence of its movement in that way, and pulled it when it was moved back the other way, the current would necessarily be an exact copy, in electricity, of the aerial movement, and hence the receiver at the other end of the line would respond (being pulled by the current, or pushed by it) exactly, by copying the motions of the transmitting diaphragm, if the apparatus were properly constructed. As early as the autumn of 1874, as he tells us, he conceived, in a crude way, of the apparatus which he shows in Fig. 7 of his patent. But he thought that the movement of the armature by the infinitesimal changes of air in the sound waves would be so small that the inductive force created on the line would not amount to anything. He was so well satisfied of this that he did not take the trouble to find out how he should attach the armature or connect the diaphragm.

On the 2d of June, 1875, while experimenting with his multiple telegraph, he obtained an accidental result in the transmission of sound, which induced farther experiments in that

direction. Instruments substantially like those in Fig. 7 of the patent were constructed; and he suspended other work in order to see whether he could create a vibration which would be sufficient to reproduce the same motions at the other end of the line. The experiments continued through July, 1875, and resulted in failure. The experiment in which he produced for the first time distinctly audible effects through this apparatus was made in April, 1876, after the date of his patent. The whole history of his experimentation before the issue of the patent is condensed into the month of July, 1875; and if your Honors can determine what he did in that month, you will have determined exactly what he did prior to the date of his first patent.

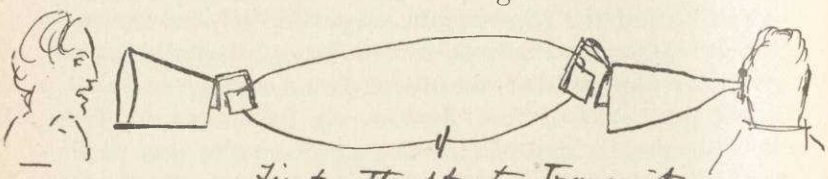
His letter to Hubbard of August 14, 1875, shows that he had abandoned the experiments, disgusted and disheartened. He says: "On glancing back over the line of electrical experiments, I recognize that the discovery of a magneto-electric current generated by the vibration of the armature of an electro-magnet in front of one of the poles, is the most important point yet reached. I believe that it is the key to still greater things. The effects produced, though slight in themselves, appear to me so great in proportion to their cause, that I feel sure that the future will discover means of utilizing currents obtained in this way on actual telegraph lines. So important does it seem to me to protect the idea that I think some steps should be taken immediately towards obtaining a caveat or patent." For what? "For the use of a magneto-electric current, whether obtained in the way stated above (by the vibration of permanent magnets, in front of electro-magnets) or in any other way. I should wish to protect it specially as a means of transmitting simultaneously musical notes differing in intensity as well as in pitch. I can see clearly that the magneto-electric current will not only permit of the actual copying of spoken utterance, but of the simultaneous transmission of any number of musical notes (hence messages) without confusion."

Then, further down, he says: "When we can create a pulsatory action of the current," — he had not then created it, —

"which is the exact equivalent of the aerial impulses, we shall certainly obtain exactly similar results."

Then he ends the letter with this: "Don't you think it would be well to take out a caveat for the use of the magneto-electric current? In its present undeveloped state, it might be unwise to let Gray know anything about it, unless, indeed, we could secure the principle of it in a patent." Thus he announced his purpose in advance to patent the principle without waiting to invent the mechanical means for its application.

In December, 1875, he went to Canada to induce Mr. George Brown of Toronto to take out in Europe patents for the invention which he was to patent here. Upon the 28th of December he gave Brown a memorandum on which he had made a sketch of which the following is a fac-simile.



First attempt to Transmit the human voice. The varying pitch of the voice could be discriminated but not the quality. A sort of muttering effect was perceived at the receiving End when a person talked very loudly at the other end.

Your Honors will see that the sketch is a copy of Fig. 7 of the patent. This is an admission that at that time he had not been able to obtain a word of articulate speech. He had heard nothing himself; his electrical assistant had been able to hear only faint sounds.

Now, we have got down to the point where Mr. Bell got a patent. We have found what he did and what he did not do, what he thought was the true plan or principle of a telephone and the only plan at the time of taking out that patent, and now we have got the patent. Let us see what that says.

This patent describes two inventions. It is entitled, "A patent for an improvement in telegraphy," and I think there is considerable force in the argument that the entire patent

may be construed as a patent for multiple telegraphy. But I shall assume the most favorable construction that I can possibly place upon the intention, the meaning of Mr. Bell, in procuring this patent, — a construction that is substantially the construction of his counsel, so far as the facts and the language of the patent are concerned, — and shall endeavor to show that upon that assumption it is limited to the magneto-electric current, and the magneto-electric apparatus described in it. The patent contains long statements as to undulatory currents, for the purpose of operating multiple telegraph instruments. Multiple telegraph instruments have nothing to do with the quality of sound, nothing to do with the form of the vibrations. It is sufficient for multiple telegraph purposes that there be a vibration at such a rate per second. That we all agree to. Hence so far as this patent discusses the form of the sound waves, or the form of the electric movements, that is distinct from multiple telegraphy.

The patent describes or refers, first, to some prior inventions, for which he had filed applications for patents before. It then states the advantages, derivable from the undulatory current generally, advantages that belong to multiple telegraphy. It states five advantages, all five of them being multiple telegraph advantages, having nothing to do with the transmission of speech — but all having reference to his multiple telegraph; and I assume for the purposes of this discussion that he had sufficiently demonstrated his multiple telegraph to be able to patent that. Then he states certain electric facts and describes his multiple telegraph apparatus. He had exhibited it, particularly in Fig. 5 of the patent drawings. He had exhibited one of his multiple telegraph instruments separately. In Fig. 6 he had shown how he coupled them together on the line in pairs, so that they would send more than one message over the wire at the same time. He states here exactly the theory why they will do it: they will do it by undulatory currents represented by curved lines. In his prior applications he says his currents were simply make and break currents, which could not be represented by curved lines. They were represented by dots and dashes like the Morse alphabet. Now

he does not, even for his multiple telegraph purposes, propose to break the current, but he proposes to vary the force of it or strength of it for his multiple telegraph purposes. He proposes to undulate the current, cause it to vibrate, but make those vibrations continuous. In that way the movements will be represented by curved lines and the movements never will overlap or interfere with each other or suppress each other. There may be half a dozen of those movements, each represented by a curved line, and the united result of all of them on the line will be represented by a single curved line, which will be the resultant of the other curves. He explains that theory very fully, and then he describes his apparatus at Fig. 7, which he is apparently attempting to show as an apparatus for copying in electricity the movements of the air. I assume for the purposes of this discussion that Fig. 7 was an attempt to represent an apparatus, a diagram of the apparatus that he had tested the summer before, and was intended to illustrate his sound copying theory, and the patent states clearly his sound copying theory and claims that theory, that principle, as he had proposed to do in his letter to Hubbard.

He says, "It has long been known that when a permanent magnet is caused to approach the pole of an electro-magnet a current of electricity is induced in the coils of the latter, and that when it is made to recede a current of opposite polarity to the first appears upon the wire." The polarity means a current of an opposite direction appears on the line. "When, therefore, a permanent magnet is caused to vibrate in front of the pole of an electro-magnet, an undulatory current of electricity is induced in the coils of the electro-magnet, the undulations of which correspond, in rapidity of succession, to the vibrations of the magnet, in polarity to the direction of its motion, and in intensity to the amplitude of its vibration."

And further on he says, "Electrical undulations induced by the vibration of a body capable of inductive action" — inductive vibration — "can be represented graphically, without error, by the same sinusoidal curve which expresses the vibration of the inducing body itself, and the effect of its vibration upon the air; for, as above stated, the rate of oscillation in

the electrical current corresponds to the rate of vibration of the inducing body — that is, to the pitch of the sound produced. The intensity of the current varies with the amplitude of the vibration, that is, with the loudness of the sound; and the polarity of the current corresponds to the direction of the vibrating body — that is, to the condensations and rarefactions of air produced by the vibration. Hence," he says, for these three reasons, "the sinusoidal curve A or B, Fig. 4, represents graphically the electrical undulations induced in a circuit by the vibration of a body capable of inductive action.

"The horizontal line *a d e f*, etc., represent the zero of current. The elevations *b b b*, etc., indicate impulses of positive electricity," — electricity going in one direction on a line, — "the depressions *c c c*, etc., show impulses of negative electricity," — the current going the other way, — "the vertical distance *b d* or *c f* of any portion of the curve from the zero line expresses the intensity of the positive or negative impulse at the part observed, and the horizontal distance *a a* indicates the duration of the electrical oscillation."

Now, there could be no clearer statement than that, that this vibratory current, this undulatory current, is to have three characteristics. It necessarily has three characteristics when it is excited by the induction of a vibrating body of inductive metal. And further, that that current itself and that alone can be represented by curves which contain elements representing those three characteristics. No other currents in the world, no variable resistance current, no current such as comes from the Reis instrument, or from the Blake transmitter, or from a wire dipped in liquid, could possibly contain those three characteristics: because a variable resistance current does not flow back and forth on the line, does not change polarity; but simply moves in one direction, always on the line. The description which he gives of this undulatory current, with its three characteristics, is therefore necessarily limited to the one magneto-electric current, and cannot be applied to the variable resistance.

Having made those statements about the character of the current, he proceeds to describe the instrument, Figure 7,

which our friends tell us is a telephone instrument, and which I admit is a diagram placed there to illustrate this theory of his about these back and forth currents, the principle which he is trying to claim, as he said in his letter of August 14th. He says:

"The armature *c*, Fig. 7, is fastened loosely by one extremity to the uncovered leg *d*, of the electro-magnet *b*, and its other extremity is attached to the centre of a stretched membrane *a*. A cone, A, is used to converge sound vibrations upon the membrane. When a sound is uttered in the cone, the membrane *a* is set in vibration, the armature *c*" — you will see this is a magneto-electric device, it is an induction device, worked by an armature as a power — "the armature *c* is forced to partake of the motion, and thus electrical undulations are created upon the circuit E *b c f g*. These undulations are similar in form to the air vibrations caused by the sound" — there is a controlling and decisive statement in the patent bearing upon the construction of the patent. "These undulations are similar in form to the air vibrations caused by the sound — that is, they are represented graphically by similar curves" — that is the reason why he calls them similar in form.

There is no controversy here as to the first four claims. The fifth, which the other side says is a telephone claim, and which I regard as a claim for the use of the magneto-electric current, is as follows:

"The method of, and apparatus for, transmitting vocal or other sounds telegraphically, as herein described, by causing electrical undulations, similar in form to the vibrations of the air accompanying the said vocal or other sounds."

He could not claim in that claim all undulations. That would be equivalent to the eighth claim of Morse, which this court refused to sustain, for electric currents were known. He could not even claim that it was any particular kind of electric current. It must be defined. This court would never allow any man to claim an electric current produced by any apparatus, unless he defined that current specifically by its very characteristics, so that it could be distinguished from all other currents. Now, by what characteristics did Mr. Bell define

that current? He did define it. Why, he says, it is "by causing electrical undulations similar in form to the vibrations of the air accompanying the vocal sounds." That is the kind of current. This current, produced by substantially this apparatus, must be a current which is in undulation, and the undulations must be similar in form to the air movements. When is a current similar in form? "Similar in form" means that the electrical undulations vibrate forward and back on the line just as the air particles vibrate forward and back; that they vibrate forward and back at the same rate per second, and that they vibrate with varying amplitude, back and forth, just the same. When they do that they can be represented graphically by the same curve. When they do not, they cannot. When they do it they come within the terms of his claim; when they don't do it, they don't come within the terms of his claim. The claim is a claim for a current. The specification describes a current, describes that form of current having those three characteristics. It is that current, when created by that mechanism or its equivalents, as shown in Figure 7 — that inductive mechanism.

There is no difference between counsel as to the meaning of the terms employed by Bell to describe the currents. An intermittent current is normally constant on the line, flowing in one direction from a battery. If at some point you break that wire and then hold it in your hand or attach it to a key, so that you can change it and connect it, you will break the current, you will create current impulses which are separated by little intervals of non-current, and that is what he calls the intermittent. He distinguishes the pulsatory current thus. Suppose you take the same continuous current, and attach in some way another battery, or some other means of increasing the force of the current, by which means you increase it instantly, not gradually, so that, when you touch a key you throw on that current, which is already moving over the line, a sudden electrical impulse, and that continues until you raise the key, and then it instantly stops, that would be what he calls the pulsatory current. The intermittent is a broken current; the pulsatory a suddenly increased or decreased current

without change of direction; the undulatory current is a gradual change, represented by a curve.

Undulatory currents may be of two kinds. They may gradually change without reversing the polarity, without changing their direction. For instance, a current that is an intermittent current, if you take off the intermitting apparatus, and simply apply something which would gradually change the amount of the current; for instance, suppose you passed it through a wire, dipped through a liquid, having a liquid in the circuit, then when you raise the wire, so that the current has to travel a long distance through the liquid, you get a good deal of resistance, the current would not go so freely through the liquid. If you gradually depress the wire, the current has a shorter distance to travel through the liquid, it goes through more freely, and it will increase the current. That would be gradually done; but it would be all in the same direction. On the other hand, if you take an electro-magneto apparatus, take a body of inductive material and vibrate it in front of the poles of an electro-magnet, when it is magnetized and in a circuit, then you get another form of undulatory current, not the variable resistance form, which is always going in one direction, and simply increasing and decreasing in quantity, so as to undulate in that sense — not that, but you get another form of undulatory current, to wit, a current that vibrates in direction as well as increases and decreases in electro-motive force; like the waves of the sea beating against a rock. There is an undulation and a constant propulsion and retraction of water against a rock, forward and backward. And while he describes in this patent that all forms of undulations may be used, it does not make any difference what kind of undulatory current it is, whether it is the variable resistance current or this magneto current, so far as multiple telegraph purposes are concerned, yet only one of those forms can be used for sound copying.

The effects of electrical currents closely resemble the effects of fluids in motion. The water in a waterpipe coming to a common washstand can be turned on or off, or the amount of its flow regulated by turning the spigot. No reversal of direc-

tion of the water in the pipe takes place. It flows in one direction from its source to its place of discharge. If I alternately turn it on and off, I produce an intermittent current. If I close it gradually and partially, and then open it in the same way, I make a current with a variable resistance. When I turn the valve around so that there is a straight hole through the valve, then the current runs through with its full force, there is nothing interposed in its way. When I turn the valve around so there is no hole at all to it, then the resistance is such as to shut the current off altogether; but when I turn it partially around, the fluid cannot get through, it is partially cut off. There is a resistance interposed. In the variable resistance transmitter, there is just such a gate. I might liken it to one of these doors which open here. A current of wind is flowing in the summer season through these doors and is refreshing us with its coolness. The servant stands by the door and opens that door and lets more of it flow, or closes it to let less of it flow. He varies the resistance to the current, but more or less flows through. Now, with the electrical conduit, where the wire represents the pipe or the doorway, and where something is interposed that represents the door or the cock in the pipe, we have precisely similar operations. Let us take the Blake transmitter as an illustration. In the Blake transmitter we have a wire coming up to the vibrating diaphragm, running over on the diaphragm to the centre or running through a spring which is operated by the diaphragm, to the centre of the diaphragm; there it has contact with a piece of carbon and from the other side of the carbon there goes off another wire that goes to the line. The current comes in from the line and comes around through the diaphragm to that piece of carbon, struggles through the carbon, because carbon is a resistance to it; carbon is not a good conductor, the current has difficulty in getting through, if the carbon was too thick it would have great difficulty; the carbon has to be proportioned so as not to offer too much resistance; but the current meets and struggles through that carbon and goes off the line. Now the nature of carbon is such that while it is true that in its normal condition and not under pressure, it offers a

very considerable resistance to the passage of the current, to the flow of that current, just as the valve would when half closed, yet if we press that carbon a little it brings an infinite number of molecules in such a relation to each other, that the current leaps through it more readily. The slightest pressure on it will enable the current to pass through more easily than it did before the door was open. The door is opened in the carbon telephone by pressure upon the carbon, and the current passes through without obstruction, and it is opened by the slightest movement upon the carbon.

[In response to a request from the bench, Mr. Hill here explained how it was that the Blake transmitter operated differently in principle from the original transmitter of Bell, and continued:]

Bell's counsel agree that he contemplated that the electrical movements would be an exact copy of the movements of the air particles. He worked out by a line of reasoning, that such must be the form of current. Though his experiments failed, he still remained of that opinion. Writing to Hubbard he said, "If we can get the exact equivalent of aerial impulses we shall certainly get exactly similar results; therefore we must patent or caveat this magneto-electrical current"—saying it five times over, limiting it every time by the "magneto-electric," no other form; then going to his patent and describing why it is limited to the magneto-electric; it must copy the form of the air vibrations, he says in his claim; and explaining on the page before that what he means by copying the form. It must copy the form when you can describe its movements by graphic descriptions which will be the same; going back four pages and stating when you can describe it in graphic curves which will be the same, to wit, when it moves back and forth, we have a clear statement in his patent that the 5th claim of the patent is limited to that specific form of current, the magneto-electric current. In other words, that the patent is and was for precisely the thing that he stated in his letter of August 14, 1875, that he was going to make it—a patent for the use of the magneto-electric current, and nothing else. Now does that patent cover

the defendants' instruments here, or any of them? The defendants' instruments are all variable resistance instruments; they are all carbon instruments, in which the current is varied in amount as it passes through the line, but not in direction. Are those instruments covered by this claim? How can they be? How can you read that patent, in view of its expressed terms, so as to make it cover a current which has not the three characteristics that are stated in the patent to be all equally essential? Suppose we take the current of the variable resistance and compare it for a moment with what Mr. Bell states of the current here. You have a current which moves straight along in one direction; a little more current is thrown on a line at one movement and a little less at another, but it is moving straight in one direction. Is there anywhere in this patent a statement that such a current as that can represent graphically by the same curve the motions of the air in the air movements of sound? Nowhere. The only statement in this patent that electric undulations are capable of being represented graphically by the same curve as the movements of the air particle, is made of the magneto current, confined to that; not only confined to that, but the reason is given why, and that reason applies only to that. That reason not only does not apply to the variable resistance current, but it excludes it. They can be represented graphically, because they have three characteristics, and the variable resistance current has not the three characteristics. Moreover, not only is the current different, but the *modus operandi* of the mechanism. The mechanism itself is structurally different, but its *modus operandi* is also different.

In Mr. Storrow's argument, it is stated very clearly that with a magneto-electric apparatus, your current and your variations of current all depend on the motion of the apparatus; on the motion of the diaphragm, not on its position. Well, is that true of the variable resistance current? No; it is exactly untrue; precisely the reverse is true of the variable resistance current. There, the variations in the current, the amount of current flowing, depend upon the position of the diaphragm and not on its motion. I want to make that clear, because

that is a directly opposite mode of operation of the apparatus. You have an armature vibrating in front of the pole of an electro-magnet and it is the motion of the armature which creates the current.

In the Blake transmitter, the present telephone in use, we vary the resistance by pressing on the carbon. The diaphragm is arranged to press against the carbon, and as it presses it the current then can pass through the carbon freely. When the compression is removed and the carbon restored to its natural condition it will partially obstruct the current, so that the current has difficulty in getting through. Then as the diaphragm vibrates and varies the pressure it varies the amount of current passing through, because at times the current is resisted, and at other times the pressure of the diaphragm upon the carbon button takes away the resistance. Bell has got to have a metal diaphragm there and operate by induction, by the motion, and make the current. This diaphragm may be made of paper. I could use even this blotting paper for a diaphragm in this form of telephone. The material is of no consequence whatever. The mere pressure on that carbon button is the thing that does the whole work of varying the resistance of something that is already moving through that circuit. In the Bell telephone it is this movement that creates that something through the circuit. In the carbon telephone, the Blake transmitter that is in common use, that something is not created by the motion of the diaphragm; it is created by a battery down under that table. The diaphragm simply opens or shuts, more or less, the gate through which that something flows at this point. That is the difference. With the Bell telephone the position of the diaphragm is nothing; it is the motion of the diaphragm that does everything. When the motion is taking place the current variation is taking place; the current is being excited, just according to the motion. When the motion of the diaphragm stops the current stops; there is no current; that ends the current; it is done; it disappears. Now, how is it with the carbon transmitter — the variable resistance transmitter, I mean by the carbon transmitter. It is one form of variable resistance transmitter. How

is it with this? The motion of the diaphragm has nothing to do with it. It is the position of the diaphragm only that does the work; that controls the amount of current, not the motion of the diaphragm. Now you see that diametrically opposite is the principle of operation, mode of operation, in those machines. In the one the motion is everything. It is the moment of motion; it is the act of motion that does the work. In the other it is not the act of motion; it is the position of the diaphragm. Get that diaphragm into that position by any means whatever, whether by sound waves or by a screw or a lever or your hand, and hold it there, and the effect will go on as long as that battery lasts.

There is nothing in the motion of the diaphragm that is peculiar to Mr. Bell, or any invention of his. What Bell did was to find a particular way of getting his diaphragm to do that work and do it on a particular plan, describing it and limiting himself to it. His theory, as he describes it, consists in making it produce certain movements of the current which can be represented graphically by certain curved lines, and those graphic lines, graphical curves, will correspond exactly to the lines of the air vibration. That is true of his current, because he has, in the motion of his current, every motion of the air wave. But when you take the variable resistance current and undertake to represent it graphically by lines, you find that those parts of the curve which, with the Bell instrument, were beyond the zero line, are with the other instrument up above the zero line or down below the zero line at the farthest limit. In other words, you have not the same curve. Yet he has told you in this patent that you have got to judge of similarity or non-similarity of the electrical movement to his claim here by the graphic curves which represent it; if the curves are not the same the things are not the same.

I now come to another branch of the case. The following passage in the patent of 1876 does not appear to be in harmony with any of its surroundings. "Electrical undulations may also be caused by alternately increasing and diminishing the resistance of the circuit, or by alternately increasing and diminishing the power of the battery. The internal resistance

of a battery is diminished by bringing the voltaic elements nearer together, and increased by placing them farther apart. The reciprocal vibration of the elements of a battery, therefore, occasions an undulatory action in the voltaic current. The external resistance may also be varied. For instance, let mercury or some other liquid form part of a voltaic circuit, then the more deeply the conducting-wire is immersed in the mercury or other liquid, the less resistance does the liquid offer to the passage of the current. Hence, the vibration of the conducting-wire in mercury or other liquid included in the circuit occasions undulations in the current. The vertical vibrations of the elements of a battery in the liquid in which they are immersed produces an undulatory action in the current by alternately increasing and diminishing the power of the battery."

All that matter stands by itself in the patent. The fourth claim of the patent, which is based upon it, stands by itself, disconnected, as it were, from the other things; not the same theory running through it; not the same form of current. If it is not in harmony with its surroundings in the patent, let us look in the record to find, if possible, an explanation.

While Mr. Bell was preparing his specification for the American Patent Office, being very desirous of taking a patent in Europe, and especially in his own country, England, where he conceived the invention to be equally as valuable under a patent as here, he sought, in the autumn of 1875, to interest certain parties in Canada — Mr. George Brown, of Toronto, was one — to get him if possible to proceed to Europe and take out patents on these inventions, including his multiple telegraph, and his theory of sound transmission — sound copying. He saw Mr. Brown at first, or had communication with him in some way, along about October when he was first preparing his American specification; and the negotiations dragged; Mr. Brown did not seem to be in very much of a hurry about concluding them, and when Christmas came Mr. Bell, using his Christmas vacation (for he was a teacher), thought he would go to Canada and stir up Mr. Brown and see if he could not bring things to a crisis. He left Boston

about the 24th day of December, and arrived in Toronto about the 28th. On that evening he had an interview with Mr. Brown. On the 29th the negotiations were concluded, Brown agreeing to take an interest, and to go abroad and take out patents there, furnishing the money to pay all expenses. Bell returned and put the finishing touches to the specification between the 1st and 10th of January, 1876. On the 10th Hubbard took the rough draft to Bell's solicitor in Washington. On the 16th or 18th he wrote Bell that no changes were necessary, and on the 18th the solicitor sent Bell a fair copy engrossed for signature. Bell swore to it on the 20th, and returned it at once to be filed in the Patent Office. Brown arrived in New York about the 25th of January. Bell came there to meet him. Hubbard and Pollok, the solicitor, also came on to New York from Washington, the latter bringing with him the copy of the specification which had been prepared for filing in the Patent Office, and a fair copy of the same to be given to Mr. Brown. So that it appears from the evidence that on or about the 25th of January, Mr. Bell, Mr. Brown, Mr. Pollok and Mr. Hubbard were together in New York with the specification prepared for Mr. Brown to take to Europe, and the specification that Mr. Pollok had in his hands at Washington preparatory to filing it in the Patent Office.

[The copy which Mr. Brown had is set forth *supra*, pp. 88–96.]

All the evidence to which I shall refer in this connection is the complainants' evidence drawn out on cross examinations, and documents drawn from them or their counsel, put in at different times in the progress of the case, without either party seeing the connection of those documents with each other. I drew them out and put them in because I saw that some of them had some reference to these proceedings, and that they might prove to be important. But I did not appreciate the meaning of their contents when I put them in evidence, and I presume the same is true of the other side.

[Here a discussion ensued upon the propriety of this line of argument, and Mr. Hill being questioned as to the point he was seeking to establish said:]

Mr. Bell has testified over and over again that there was no change made in the specification which he filed in the Patent Office, from the time the document went into Mr. Pollok's hands on the 10th of January, 1876, until the time of its filing February 14th. It was sworn to on the 20th of January, 1876, and after that date, as was held in the Tanner car-brake case, after the date of its filing in the Patent Office, it could not be changed lawfully without a new filing, a new case, a new oath, and a new application. After the 20th January it could not be changed so as to introduce a new invention without a new oath. The evidence, as we contend, is that a change was made after that time. I shall endeavor to show that it must have been done after the 20th of January, after the oath of the American specification was taken. Mr. Bell has further stated that the specification which he swore to on the 20th of January, was the same specification without any change of phraseology, that he had sent to Pollok on the 10th of January, and of which Mr. Pollok had made a fair copy and returned it to him on the 18th to be sworn to. I will give you the history as briefly as I can.

I am not impeaching this patent for fraud, by way of setting up fraud as a defence in the answer. If we had set up in our answer in this case that the patent was obtained by fraud, that answer would be demurrable. There is no doubt about that. If we had attempted to introduce evidence on the part of the defendants to prove that fraud, that evidence would have been objectionable and would have been stricken out. The government alone can bring such a suit. But that is not the point. We stand upon another point, and if it is not correctly taken I have nothing further to say. It is for your Honors to decide. We have not raised that question in the answer. The complainants have come into a court of equity, producing a title deed, producing their evidence showing how that deed was obtained, how that deed was made, what it stated, what it was for, what it intended to convey; and in their evidence in support of their own title they have proved, as we submit, the fraudulent character of that title deed. If they come in here with that title deed and show by their own evidence that the

deed is fraudulent, then I apprehend that in a court of equity they have not the standing which would entitle them to protection.

[One of the Justices having expressed a desire to hear the counsel on the line of argument he had marked out for himself, he was directed to proceed, and he continued:]

It appears, upon examination of the George Brown specification, that it had been carefully compared with the American application, and in many matters changed, in order to make it correspond. [Mr. Hill here reviewed the changes, which appear in the copy printed *supra*, pages 88 to 96.] Now when we come to compare the document which Mr. Bell sent to Europe cotemporaneously with his sending the document to Washington to obtain a patent upon this invention, we find that in this document which departed from New York in the last week in January, and which, therefore, was not accessible to Mr. Bell to change after that date, which was not accessible for interpolation after that date, there is not one word about a variable resistance current, a liquid transmitter, or any other method whatever except the induction telephone, the magneto telephone, with its back and forth current. But in the document which remained in this country, which went to the Patent Office and became accessible to Mr. Bell's attorneys at Washington, and remained accessible to them, there appears another and second invention of equal importance with the magneto telephone invention, to wit, the invention of a variable resistance telephone. The question is, how did that get in there; when did that get in there; where did it come from? As I remarked once before, if we look at the history of Mr. Bell's operations, we fail to find it. Up to that point not a word, not a thought can be discovered in Mr. Bell's history, with the severest lights that can be thrown upon it, of the idea of any of these mechanisms that are specified in that patent — a wire dipping in liquid, the vibrations of a wire, the vibrations of the elements of the battery to and fro, up and down in the current, or anything of that kind. They suddenly appear full blown in the American specification. But there is more than that. That is not all. In the paper

sent to Europe there was an express and positive declaration to the effect that the variable resistance current could not be employed for this purpose — not in those words, but in equivalent words.

And further, there is an important statement in the Brown specification which is not in the American application. The original statement in the George Brown paper was this: "Undulatory currents of electricity may be produced in many other ways than that described above, but all the methods depend for effect upon the vibration or motion of bodies capable of inductive action." At some time that expression was stricken out from the Brown copy, and the following substituted for it: "There are many other ways of producing undulatory currents of electricity, but all of them depend for effect upon the vibration or motion of bodies capable of inductive action."

This is the same statement in different terms. In the American specification the word "dependent" is substituted for "but all of them depend for." That substitution means this. With this statement in the George Brown copy it would be an impossibility to proceed to set forth immediately afterwards that this effect could be produced by a current that was not induced by the vibration or motion of the body. The statement is here that all the ways depended, every way known to Mr. Bell when he wrote that statement, depended for effect upon the vibration or motion of bodies capable of inductive action. He knew of no other way. Now he toned that down to this statement: That there are many ways dependent upon the vibration or motion of bodies capable of inductive action; but there are, he proceeds to describe, many other ways not dependent upon it. It is not inconsistent with the immediate description following in the next line, if you please, of other ways not dependent. There are many ways dependent; there may be many ways not dependent. But in the George Brown specification the statement was emphatically and positively that there were many other ways, but all of them dependent. There was no room, then, for the description of any other way of doing it. That is one of the

significant changes between the George Brown specification, which was sent to Europe after the American specification was sworn to; a change from an expression which excluded by its terms a variable resistance current, and made it improbable that it could have been thought of, to the flexible statement in the American application.

If this variable resistance description was not in the American specification on the 25th of January, when that copy was sent to Europe by Brown, then, according to his own testimony, it was not in the American specification when it was filed. If it was in the American specification on the 25th of January, when he was about to send to Europe and obtain a patent there, it is absolutely inconceivable that a copy could have been handed to Brown, and that Brown could have been allowed to depart for Europe and patent one-half of the invention there without the other half, and with that explicit statement that the other half was not patentable.

Now how could Bell learn of this? Where did this knowledge come from? Is there any source from which he could have derived this information prior to the issue of the patent, and been able to interpolate those words?

On the 14th of February, 1876, Mr. Elisha Gray filed a caveat in the Patent Office. See *supra*, pages 77–88. That caveat described the variable resistance current. The transmitting apparatus is what is called a liquid transmitter. Your Honors will find in the drawing in the lower right-hand corner a picture of the transmitter. It consists of a cone or box to speak into, closed at the lower end by a flexible diaphragm, which would take up the vibrations of the air, and a wire extending down from that diaphragm into a cup of liquid below. That wire and diaphragm of the transmitter were in the circuit, so that the current came in through the side of the transmitting box and ran down that wire into the liquid. The current comes in through the wire to the side of the transmitting cone. You will notice a screw binding-post, as electricians call it (a little screw that runs into a post, called a binding-post, because it binds the circuit wire to the instrument), at the left-hand side of the transmitting instrument. The wire

comes in and is attached to the binding-post making the electrical connection. I think you will see dotted lines running down to show how the circuit of wire is made. The connection is with a little wire at the centre of the diaphragm that extends down into the liquid, so that the current coming into the line would enter the binding-post, run across to the central wire, and down the central wire to the liquid. Then at the bottom of the cup you will notice another binding-post, through which the line goes off. The current coming to the transmitter passes through the binding-post, down the centre line into the liquid, passes through the liquid, goes to the lower binding-post and there passes off the line, and goes to the receiver at the left hand of the drawing, the upper figure. A wire goes to the receiver, and runs down to the ground to a ground plate. The circuit is completed through the ground, and goes back to the ground plate at the right end of the drawing. Then it runs up on its way to the transmitting instrument; it passes through the apparatus that is represented by little parallel plates, some of them longer and some of them shorter. They indicate the battery. That is the conventional method adopted by electricians to indicate a battery. The variable resistance is produced by the fluid, and takes place in this way, and I ask your Honors' particular attention here. The liquid which Mr. Gray describes I ask your attention to, because it has some bearing on the question. That liquid was water. Water is a conductor of electricity. Electricity will pass through it. It will not interrupt a current of electricity. The current will pass through it, but it gives a certain resistance to the circuit. The current does not pass through it readily, as it does in the case of a copper or iron wire. Electricity will travel very easily over an iron or copper wire. It seems to pass through it as water would pass through an open tube. Hence, the current coming through this line over the copper or iron wire, and coming to the transmitting instrument and passing down through the wire at the bottom of the diaphragm into the liquid, passes freely and easily until it gets to the liquid, and then it has to pass through the liquid. But the liquid is something that it cannot get through so easily.

The liquid obstructs it. It has had an open field, but now it has got into the underbrush, so to speak. It has to force its way through the brambles, and it has to exert more force as it meets with more opposition. The theory of this liquid transmitter is this: That by attaching that little wire which dips down into the liquid to a diaphragm, then the sound spoken to the diaphragm will vibrate the diaphragm, causing the wire to rise and fall in the liquid. As the wire drops down it brings the good conductor nearer to the lower wire, and makes a shorter path of liquid for it to travel through. As the diaphragm rises up it pulls the wire up and makes a longer path of liquid for the current to travel through. Hence the current travels more easily through that liquid when the wire is depressed and when the diaphragm is vibrating down, because it has less distance to travel through the bad conductor; and it travels with more difficulty through the liquid when the wire is up, because it has a greater distance to travel through the bad conductor. But it travels all the time just the same. It is only a question how much of it will go through when the wire is up; some of the current will go through and go off the line all the time, and when the wire is down more of the current will go through. It does not change the direction of the current. The current is going in one way all the time. It simply changes the quantity that goes in that one way. The vibration of the diaphragm makes the wire go up and down in the liquid, but it does not vary the direction of the current at all. It simply varies the quantity.

Allow me here to call attention to the fact that there are three ways by which a vibrating diaphragm influences the character of the current on the line. The first way is that of Bourseul, published in 1854, by which the vibrating diaphragm comes in contact with the end of the circuit wire and breaks the contact. When it comes in contact the current coming through the diaphragm goes to the wire and passes along it. When it breaks the contact the current cannot get across and it remains on this side. That mode of vibrating the diaphragm into and out of contact with the end of the circuit wire makes a broken, a make and break current, an intermittent

current, if you please; but it is the vibrating diaphragm which does it in that case. That is one of the currents made by vibrating the diaphragm. In Mr. Bell's patent the vibrating diaphragm is provided with an armature of inductive material. That was Mr. Bell's thought. That armature of inductive material must be placed in front of an electro-magnet or its equivalent, which is a necessity with that form of instrument. Now, when you vibrate the electro-magnet, the motion of the armature, the inductive material forces a current one way and draws it back the other as it vibrates. That is the second way by which a vibrating diaphragm can control the current on the line. There is a third way, and that is the way of Gray's caveat. There is no inductive material about the diaphragm. There is no electro-magnet present. It is not needed. You do not depend upon induction. You depart from the principle altogether, just as Bourseul had suggested in 1854. You simply extend the circuit wire from the diaphragm down into that bad conductor, the liquid, and vibrate it up and down in that poor conductor, changing the quantity of current, but not changing the current, nor reversing or alternating it. That was the third way. Those are the three ways of controlling the current by the vibrations of the diaphragm, and each differs in principle from the others.

The Bourseul way involves one principle; the Bell way another; the Gray way a third. There are three independent ways of doing it, involving different mechanism, different modes of operation, and producing different current effects on the line. In the Bourseul case it is a broken current; in the Bell case a back and forth current; and in the Gray case a current going in one direction all the time, simply changing in quantity from time to time.

Now how could Gray's caveat, which was a secret document in the Patent Office, become known to Bell before the interference on the 19th of February? The variable resistance passage was in his application on the 19th of February. If it was not there on the 14th, and was there on the 19th, how could he have known about the Gray caveat between those dates?

The complainants' evidence on another subject furnishes some light on this one. On the 19th of January, 1875, Gray filed two applications for multiple telegraphy, and on the 23d of February, 1875, he filed a third application. On the 5th of March, 1875, Bell wrote a letter to his parents in which he said: "In regard to the patents, my lawyers found on examination at the Patent Office that I had developed the idea so much further than Gray had done that they have applied for three distinct patents, in only one of which I come into collision with Gray. The first patent covers the principle of multiple telegraphy, basing my claim upon the instruments exhibited. The second patent covers the principle of using an induced current so as to permit a single wire to be employed. The third patent is for a vibratory circuit-breaker for the purpose of converting the vibratory motion of my receiving instrument into a permanent make or break of a local circuit."

He describes how this can be arranged so as to make an "autograph" telegraph. Then he says:

"My lawyers were at first doubtful whether the examiners would declare an interference between me and Gray, as Gray's apparatus had been there for so long a time. They feared I had but a poor chance, and my spirits at once fell to zero. They said it would be difficult to convince them that I had not copied. When, however, they saw the 'autograph' telegraph developed from the idea of that of multiple telegraphy, they at once said that was a good proof of independent invention, as Gray had no such idea. It further turned out that an examiner in the Patent Office (not, however, of electrical inventions) is a deaf mute, and knows me personally and by reputation, and could surely vouch for the fact of my being incapable of copying Gray."

Now on the day that that letter was written, Gray had no patent on multiple telegraphy. The things which were examined in the Patent Office were his applications, which were required by law to be kept secret. Thus it is clear that at that time Bell's solicitors had access to the secret archives of the Patent Office, learned exactly what Gray had done, and were able to compare what Gray had done, as shown by those

papers, with what Bell claimed to have done. Not only did they find that they could compare Bell's papers with Gray's in the Patent Office, and find out just how much further Bell had gone than Gray claimed to have gone, but they directed Bell at once to file three applications in consequence of that information. They found, he says, that he had developed the idea so much further than Gray had done that they had applied for three distinct patents, using the information to direct and control Mr. Bell's operations in multiple telegraphy matters. That was the use they made of it. Now, it appears from Mr. Bell's statement in evidence that he did file three applications. The first of those three applications was filed on the 25th of February, 1875, two days after Gray's application was filed. How instantaneous was the knowledge which they obtained of Gray's papers! Gray's last application, the most important one, filed the 23d of February, and Mr. Bell, in the Patent Office for the purpose of interfering with that application on the 25th of February; and with the admission here that in the interval the attorneys had obtained the knowledge from Gray's papers and had caused him to file these applications to meet them. He describes various inventions, and then down at the bottom of the page he makes a further statement to show that he knew from those papers what Gray had done.

"When, however, they saw the autograph telegraph developed from the idea of that of multiple telegraphy, they at once said that was a good proof of independent invention, as Gray had no such idea."

How did they know? They could not tell; they could not know it without an examination of Gray's papers. But they did not have even to go to the Patent Office to get information, for in the same letter Bell says:

"Another fortunate circumstance was this. That the very examiner into whose hands this will come happened to be in Mr. Pollok's office one day when I called, so that I had a long interview with him, in which I explained everything to him, and I can't help thinking that he must have been convinced of my independent conception of the whole thing."

Mr. Hill's Argument for People's and Overland Cos.

After the issue of his patents Bell endeavored to mislead Gray about the proceedings at the Patent Office. In a subsequent correspondence between them, Gray wrote Bell about his caveat. Bell replied: "I do not know the nature of the application for a caveat to which you have referred as having been filed two hours after my application for a patent, excepting that it had something to do with the vibration of a wire in water, and therefore conflicted with my patent. My specification had been prepared months before it was filed, and a copy had been taken to England by a friend." There is an admission that the copy given to Brown was a copy of the application on file in the Patent Office.

The subject matter in controversy between Bell and Gray was this variable resistance, and the only subject matter in controversy. Mr. Bell writes to Mr. Gray trying to convince him that that subject matter belonged to him, Bell, and he makes this statement: "I did not know anything about your caveat, except that it had something to do with the vibration of a wire dipping in water. My specification had been prepared months before it was filed" — months before the 14th of February, 1876 —"and a copy had been taken to Europe by a friend." What is the intimation to Mr. Gray? The intimation is, "It is of no use for you to contend about this variable resistance. It is in my patent. I can prove that I had it months and months before my application was filed, because I can prove that my application was made, written, months before it was filed, and I can prove it by the copy taken to Europe." But he could not prove it by the copy taken to Europe. That copy did not contain the subject matter in controversy between Mr. Gray and Mr. Bell. The copy had not a word in it about variable resistance. What was the assertion that Mr. Bell was making to Mr. Gray as a matter of fact? Was it true or was it false? If this statement was true, then it is true, that the paper taken to Europe by George Brown was a copy of the paper filed, and the specification as filed did not contain the variable resistance. If that be not a fact, then the letter is to all intents and purposes, as well as in terms, a falsehood, stated to Mr. Gray to mislead him. There is no

escape from that alternative. When Mr. Bell said that he had prepared it months before it was filed, and a copy had been taken to England by a friend in order to mislead Mr. Gray and induce Mr. Gray to abandon his claims to it; then it is either true that the copy which was taken to England by a friend was a copy or it was not a copy. If it was a copy of the specification (we know what it was) the specification as filed did not contain the variable resistance. If it was not a copy this statement to Gray was false, for the purpose of deceiving him, and inducing him to abandon his claims.

But it may be said, if this was interpolated in the application of Bell, how could it have been interpolated? Why, the application on file was composed of a number of sheets fastened together by paper fasteners in the usual way. All you have to do, is to straighten up those paper fasteners, pick out the sheets, remove them, and substitute other sheets, or any material you want to put in. If you have access to the Patent Office, as these parties had with the Examiner there, it is a matter of a few minutes' work to go in there any evening after the clerks have gone, take any papers out and substitute any other papers in their place. Could they do it? Were they in a situation to do it? Why, this original copy is proved by Mr. Bell to have been made by his solicitors (the copy that was filed in the Patent Office), prepared at their office, written by one of their clerks; and thirty days afterwards it was just as easy for them to have taken that application and have other sheets written by the same clerk and substituted in it, as it was to put the original in. So that the road was open, the means were all there; the parties, as we know by the transactions of the year before in reference to Gray's pending application, were the very parties to carry out such projects.

[Mr. Hill closed by reviewing evidence in the record which he contended showed the subsequent conduct of Mr. Bell to be consistent with this theory:]

Mr. Justice Bradley: Your point I understand to be this: That the true construction of Bell's patent, so far as you deem it valid, and not claiming a mere principle, is a patent for a process, and that he is confined to the process which he

describes, and that you use another process, a different process?

*Mr. Hill:* Yes, your Honor, if it be called a process.

Mr. Justice Bradley: There may be some dispute about words.

*Mr. Hill:* He called it a current. He sought to patent the magneto-electric current; and if we call that a process, then it is a process.

Mr. Justice Bradley: Then in regard to this last point, your position is that that portion of this patent which describes a varying resistance — a mode of obtaining variable resistance — and which claims it in the fourth claim, was not his invention, but was the invention of Mr. Gray and clandestinely obtained by him and inserted in his patent. That is your position on that?

*Mr. Hill:* That is my position on that.

Mr. Justice Bradley: You do not allege it as a ground for making void the whole patent and avoiding it, but as a matter of clandestine appropriation of another man's invention?

*Mr. Hill:* I think, your Honor, that we are entitled to use it to that extent. Whether it would go to the other extent or not is for the court to determine.

*Mr. James J. Storrow* for the American Bell Telephone Company. *Mr. E. N. Dickerson* and *Mr. Chauncey Smith*[1] were with him on the brief.

*The charges of fraud in the Patent Office.*—The Overland and Drawbaugh companies have made an elaborate argument, charging that the Patent Office files have been three times violated and three forgeries committed on them, and that these forgeries consist in writing into the Bell specification matter which they allege was learned by a dishonestly acquired knowledge of Elisha Gray's caveat. One defence pleaded is, that Bell unjustly and surreptitiously obtained his patent for that which

[1] It was arranged that Mr. Smith should take part in the oral argument. He fell ill during the progress of the hearing, and the part of the case which he intended to present was spoken to by his associates.