OPINION

OF

THOMAS EWING,

ON THE

VALIDITY OF THE CLAIMS

OF THE

AMERICAN BELL TELEPHONE CO.,

Under the Patent, to A. G. BELL, of March 7, 1876.

NEW YORK:
FRANCIS & LOUTREL, STATIONERS AND PRINTERS,
45 Maiden Lane.
1883.

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Law Office of EWING & SOUTHARD,
155 & 157 Broadway,
NEW YORK CITY, Aug. 7th, 1883.

My opinion is asked on the following questions:

First. Do the patents owned by the American Bell Telephone Company, secure to it the right to a monopoly of the telephone business of the United States?

Second. Have there been such judicial determinations in favor of the broad claims made by that company under Bell's patent of 1876 as to justify a Court in assuming their validity on motion for preliminary injunction?

A monopoly of the telephone business in this country is claimed by the Bell Company solely on the strength of the patent issued to A. G. Bell, March 7, 1876, No. 174,465. Although that company owns many patents for ingenious and useful devices in telephony, this patent alone has the broad claims relied on to secure exclusive control of that business throughout the United States. By virtue of this patent the Bell Company claims:

(*1*). A monopoly of the devices therein described; and of all devices substantially the same.

(*2*). A monopoly of the process of transmitting speech by electricity therein described, and of all processes substantially the same.

(*3*). A monopoly of the use of electricity in transmitting speech.

(*4*). A monopoly of the use of undulatory currents of electricity in transmitting speech.

We will consider these claims in the order stated.

(*1*). *As to the devices.* The one illustrated in the specification of the patent of 1876, by Fig. 7, is the only one ever claimed to be applicable to the transmission of speech. Its parts are all old, and as a combination it is admitted to be impracticable and useless. So far as it relates to the specific devices, therefore, the patent is valueless.

(*2*). *As to the process.* It consists only in using an unbroken battery current, and in undulating it by a magneto current thrown upon it.

A glance at the history of the inventions described in the patent of 1876 will show that Bell's supposed great discovery was this mode of undulating a voltaic current by throwing a magneto current upon it, and his strong desire in applying for the patent was to secure a monopoly in telegraphy of this combination of the two currents.

He had been engaged for several years inventing and patenting a system of multiple harmonic telegraphy.

On the 6th of April, 1875, he obtained a patent in multiple telegraphy, and on the 25th of February, 1875, he filed an application for a patent for further inventions in the art. In this system he used electro magnets with steel spring armatures, each armature having a different fundamental tone and being kept in vibration by the action of a local battery,—the vibrations making and breaking the circuit and producing an intermittent current on the line wire. The receivers were electro magnets with like armatures,—each receiving armature responding only to the fundamental tone or rate of vibration of its counterpart transmitter. He found, that by this method, using an intermittent battery current, only a limited number of signals could be transmitted. He then conceived the idea of making his battery current continuous, thereby keeping the electro magnet always charged, and then, by means of the vibrating armature, throwing on the wire magneto currents also. In a letter to Mr. Hubbard explaining his new arrangement, July

7th, 1875, he says: "May not a pulsatory action be induced in *the voltaic current itself* by the motion of the reed? I can imagine the current alternately weakened and strengthened according to the distance of the armature from the pole underneath. In this case the pulsations would certainly be available for our purpose, by merely increasing the battery power sufficiently to overcome the resistance of the line." And in another letter to Mr. Hubbard, of Aug. 14, 1875, he says: "On glancing back over the line of electrical experiments, I recognize that the discovery of the 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 it is the key to still greater things. Don't you think it would be well to take out a *caveat* for the use of the magneto electric current?" (Dowd's Case, 1, 482-3).

In his patent of 1876 he thus summarily describes his invention: "My present invention consists in [1] the employment of a vibratory or undulatory current of electricity in contradistinction to a merely intermittent or pulsatory current; and [2] in a method of and apparatus for producing electrical undulations on the line wire." In his English provisional specification, executed Dec. 9th, 1876, he very clearly explains the operation of this method as follows: "When the permanent magnet is caused to vibrate in front of the pole of an electro magnet which is placed in circuit with a voltaic battery, the undulatory current induced by the vibration of the permanent magnet is *superposed upon the voltaic current*. When the induced impulse is of similar polarity to the voltaic current, it serves to strengthen the intensity of the latter, but when it is of opposite polarity, it tends to neutralize the voltaic current. In such an arrangement the resultant effect of the vibration of the permanent magnet is to throw the battery current into waves, by alternately increasing and diminishing the intensity of the current. Such increase and diminution in the intensity of the current does not take place with the suddenness characteristic of a pulsatory current but is proportionate to the increase and diminution of the intensity of the air during the vibration of the inducing body."

Dowd's Case, Vol. II, p. 93.

His reason for thus combining a constant battery current and an intermittent magneto current is stated in his affidavit in the Pearce case (p. 18), thus: "Fearing at that time, [*i. e.*, before the patent of 1876 had been applied for], that the magneto currents generated by an instrument like the transmitter of Fig. 7 of my said patent No. 174, 465, (1876), would be too weak, I conceived that a proper way to obtain stronger currents and effects would be to use *the constant power of a strong battery*, and utilize the vibrations given to the transmitter by the voice to vary the resistance of the circuit through which the current from the battery passed."

This process or method necessarily involves the simultaneous use of:

(*a*). Both a battery current and a magneto current on the line wire.

(*b*). An electro magnet in both transmitter and receiver.

(*c*). Battery, transmitter and receiver all in the same, constantly closed circuit.

The central idea of the process proved a fallacy. Bell found on further experiment, and so states in his application for his patent of 1877, and in his lecture of Oct. 31, 1877, before the London Society of Telegraph Engineers, (Prescott, p. 51), that the voltaic current was not undulated by the magneto current at all, and that the battery produced no effect whatever except "to charge the electro magnet," and might, therefore, be dispensed with altogether, and permanent magnets and magneto currents only used. Thus the process patented in 1876 lost its supposed great and useful double-current characteristic, and sunk into a cumbrous mode of creating and using a magneto current only. Hence, in 1877, Bell patented the simpler process of a permanent magnet and a magneto current only. This process was adopted for a time in the then nascent art, to the exclusion of the process patented in 1876, which has never been used at all in practical telephony.

A question arises whether this patent of 1876 secures to Bell a magneto current generated by a *permanent* magnet for the uses expressed in the specification. I think it very clear that it does not, and that he is confined to a process employ-

ing both voltaic and magneto currents on the line wire as described. But I need not discuss this question, for the reason that in telephony the use of electro magnets at the receiver is old, and at the transmitter, obsolete; and magneto currents in the transmission of speech almost entirely superseded by battery currents.

Notwithstanding the devices and process of Bell's patent of 1876 are superseded, yet, if they ever accomplished the uses expressed in the specification, he does not necessarily lose all advantage of his invention. He can claim the exclusive right to use any and all devices and processes substantially the same *in principle* with those described in his patent, even though they be greatly superior *in operation* to his own—provided the principle was new with him. Are, then, the devices and processes now used in telephony, in principle substantially the same as those described in Bell's patent of 1876?

(*a*). *As to similarity of device.* All parts of device No. 7, which are useful, are old. The parchment diaphragm to catch the sound waves at transmitter and reproduce them at receiver is as old as the "lover's telegraph," and was in familiar use in electric telephony from Reis down. So with the electro magnet to actuate a vibrating armature at receiver, which was used in telephony by Reis, Yates, Laborde, Gray, and Goodrich long before 1876. As to generating at the transmitter a magneto current by the vibration of an armature attached to the diaphragm in front of a magnet, it is enough to say that the magneto current is not now employed at all at the transmitter in practical telephony. In short, no one can or does claim that there is anything new in device No. 7, which would be infringed by use of any of the approved transmitters or receivers of to-day.

(*b*). *As to similarity of process.* The explanation of the process of the patent of 1876, as given above by Bell, shows that its essential principle lay in the combination of the two currents *on the line*,—the battery current for power, the mag-

neto current to communicate to it the vibrations of the diaphragm.

It is enough that the processes in use to-day in practical telephony, are widely different in principle from the process of the Bell patent of 1876, and by no stretch of imagination can be regarded as substantially the same. See for example the differences in principle between Bell's process of creating undulations on the line wire by throwing a magneto current on a voltaic current, and the Reis and modern process which creates undulations on the line wire by variable contact. The Bell process employs two different kinds of currents on the line wire,—the Reis and modern process but one. Bell's process has the transmitter and receiver in one circuit and the induction coil can not be used with it,—while nearly all the modern transmitters have two circuits and find the induction coil useful if not indispensable By Bell's process the vibrations of the diaphragm generate magneto currents,—by the modern process the vibrations of the diaphragm do not generate any current, but *by mechanical action* undulate a voltaic current already flowing. It is impossible to conceive of two "methods of producing electrical undulations on the line wire" more different in principle than this double-current process patented by Bell in 1876, now obsolete, and the variable contact process of Reis, Yates, Blake, Rogers and Randall, now everywhere in use.

(3). *As to the broad claim to the exclusive use of electricity in transmitting speech.* This claim is founded on two errors,—one of law, the other of fact.

(*a*). The error of law is in the assumption that, if Bell was the first to discover and practically demonstrate that speech can be transmitted by electricity he could secure by patent the exclusive use of electricity for that purpose; and prevent others using it, even by devices and processes substantially different from those described in his patent.

The law on this point was settled thirty years ago by the Supreme Court of the United States in the celebrated case of O'Reilly *vs.* Morse in rejecting as invalid the eighth claim in Morse's patent, which is identical in principle with the assumption under consideration. That claim was for "the use of the motive power of the electric current * * * for marking or printing intelligible characters, signs or letters at any distances." The decision and the reasoning on which it rests have been affirmed; and repeatedly re-affirmed, as settled law in the United States. Chief Justice Taney thus lucidly expounds the law applicable to that claim, and equally so to the extravagant assumption under consideration:

"Whoever," says the Chief Justice, "discovers that a certain useful result will be produced, in any art, machine, manufacture, or composition of matter, by the use of certain means, is entitled to a patent for it; provided he specifies the means he uses in a manner so full and exact, that any one skilled in the science to which it applies, can, by using the means he specifies, without any addition to, or subtraction from them, produce precisely the result he describes. And if this cannot be done by the means he describes, the patent is void. And if it can be done, then *the patent confers on him the exclusive right to use the means he specifies to produce the result or effect he describes, and nothing more.* * * * *He must describe the the manner and process as above mentioned, and the end it accomplishes. And any one may lawfully accomplish the same end without infringing the patent, if he uses means substantially different from those described.*"

(15 How. 120.)

(*b.*) The error of fact is in the assumption that Bell was, within the meaning of our patent law, the first to discover that electricity could be used to transmit speech, and to invent means of using it.

It has been conclusively shown that to the late Prof. Reis of Fredericksdorf, Germany, belongs that honor. For three years, (1861-4), he devoted himself to inventing and improving telephone instruments for the transmission of speech,—exhibiting their operation before philosophical societies, and publishing

detailed and complete descriptions of them in scientific papers. There is abundant and conclusive evidence that he transmitted speech with them at public exhibitions repeated through several years almost as successfully as is commonly done with the telephones of to-day. See especially Dr. Channing's article in Popular Science Monthly for August, 1883, reviewing Prof. Sylvanus P. Thompson's forthcoming work entitled, "A History of the Telephone of Johann Philipp Reis." This publication completely dissipates the extravagant claim to a monopoly of telephony founded on the assumption that Bell was the first to discover a process and invent a practical means of transmitting speech by electricity. It adds to the information heretofore current in this country as to the earlier attempts of Reis in 1861-2 the testimony of scientists who witnessed Reis' signally successfully exhibitions before scientific associations in 1863-4; and Yates' successful exhibition of the improved Reis telephone, before the Dublin Philosophical Society in 1865. The devices and method employed by Reis, and subsequently by Yates, were illustrated and fully described in numerous scientific publications from 1861 to 1865. The Reis instruments were manufactured and sold in considerable numbers; and Profs. Thompson and Dolbear attest that these same instruments will now transmit speech. The fact that Reis' invention did not soon become widely known and commercially successful, and that in fact for several years it sunk out of public notice—due no doubt to his poverty and early death—does not affect the question. On the incontestable evidence of this prior invention, and of the full and accurate descriptions thereof published in Europe, it is certain that Bell cannot be held to be, within the meaning of our law, the discoverer of the art, and first inventor of the means, of transmitting speech by electricity. If Reis had made only one set of instruments which would actually transmit speech, and the device and process had been only once described in a single publication in any foreign country, priority as a discoverer could not now be adjudged to Bell.

Rev. Stat. U. S., Sec 4920.

O'Reilly *vs.* Morse, 15 How. 110.

Evans *vs.* Eaton, 3 Wheaton 454,
Allen *vs.* Hunter, 6 McLean 303.
Webb *vs.* Quintard, 5 Fisher 226.
Reeves *vs.* Keystone Bridge Co., 5 Fisher 457.

(*4*). *As to the claim to the exclusive use of undulatory currents of electricity in transmitting speech.* This claim is founded on like errors of law and fact with those discussed above in considering the still broader claim:

(*a*). The exact point settled in O'Reilly *vs.* Morse, above cited, was that, although Morse was the first discoverer and inventor of the art of telegraphy, his patent was invalid to the extent of his claim to the exclusive use of electricity in "transmitting characters, signs or letters": the court holding that "any one may lawfully accomplish the same end if he uses means substantially different from those described." It follows that, admitting that Bell was the first to discover the use of undulatory currents of electricity in transmitting speech, and to invent practicable means for so using them, yet he cannot have the right to the exclusive use of such currents; and all others may freely use such currents for that purpose providing they employ devices and processes substantially different from those employed by Bell.

(*b*). Bell was not the first to discover and demonstrate that speech could be transmitted by *undulatory currents* of electricity.

Dr. Channing, in his review of Prof. Thompson's forthcoming book on the Reis telephone, above referred to, says that it is there incontestably demonstrated by citations from Reis's lectures and papers on his telephone that he relied on continuous undulatory currents as indispensable to success in transmitting speech. He says: "The contact pieces of his transmitters, one or both, were mounted with adjustable springs, or held together by gravity, *so as to vary the current without completely breaking*

the contact, in the same way and for the same purpose as in the Berliner, Blake and other modern transmitters. Too loud shouting in either the Reis or Blake transmitters spoils the articulation by breaking the circuit. * * * If the Berliner and Blake transmitters by their current regulators determine undulatory currents in correspondence with the sound waves, the Reis transmitters, by the same mechanism, necessarily do the same. The identity of the mechanism of the current regulators in Reis transmitters with the mechanism in the modern transmitters is strikingly exhibited by Prof. Thompson in a comparative plate."—(Popular Science Monthly for August, 1883, p. 550).

It is doubtless true that these variable contact transmitters were not equal to the best modern transmitters constructed on the same principle. It is sufficient that they transmitted speech by undulatory currents,—that is, by varying the resistance in the circuit without intentionally breaking it. It is true that, when the Reis instrument was spoken to loudly, the electrodes would fly apart, and break the circuit, and thus interrupt speech. This was only a mechanical defect, however, which was remedied in 1865 by S. M. Yates, an instrument maker of Dublin, who successfully transmitted speech with the Reis telephone before the Dublin Philosophical Society,—and who placed a drop of water between the platinum points, thus preventing a rupture of contact, and making the currents both undulatory and continuous. Thus improved, the Reis instrument was apparently a more perfect *experimental* transmitter than the Blake transmitter now in general use, which improves on the original Reis only by supporting the contact of the electrodes by a following spring, thus lessening the frequency of the breaks but not wholly preventing them. But neither Yates' drop of water, nor Blake's following spring, changed the *principle* of the Reis transmitter; and in thus perfecting the Reis device they showed mechanical skill rather than inventive genius.

The honor of having first discovered the art, and invented the means, of successfully transmitting speech by electricity, and by undulatory currents of electricity, belongs therefore to Reis. Although Charles Boursel in 1854 described in general

terms the process of transmission almost as it exists to-day (Du Moncel "Telephone, Microphone and Phonograph," p. 13), yet Reis first put the thought in physical form, and talked by electricity. Not an important feature of the telephone of to-day was lacking in his system. The vocal chamber,—the vibrating diaphragm, carrying one electrode and the other supported in contact by a spring,—the electro magnet at receiver actuating a broad thin strip of iron, which repeated the vibrations of the transmitting diaphragm, and reproduced the spoken words. Prof. Sylvanus Thompson, who is an acknowledged authority in electrical science, says in his book on the Reis telephone above referred to: "There is not in the telephone exchanges of England to-day any single telephone in which the fundamental principles of Reis' telephone are not the essential and indispensable features" (Popular Science Monthly, August, 1883, p. 557).

(*c*). If the patent must be construed as claiming the exclusive right to use undulatory currents of electricity in transmitting speech, then it is void for uncertainty.

In his specification each patentee must state distinctly what parts of his devices or processes he claims as his invention, so that the public may distinguish the new from the old, and avoid infringements on the one hand, and undue concessions on the other. If the statement be ambiguous or obscure, so that the public cannot distinctly understand the exact extent of the inventor's claim, the patent will be declared void.

Lowell *vs.* Lewis, 1 Mas. 182, 188.
Barrett *vs.* Hall, 1 Mas. 447.
Hastings *vs.* Brown, 16 E. L. & Eq. 172.

This invention is described in the specification in these words:

"My present invention consists in the employment of a vibratory or undulatory current of electricity in contradistinction to a merely intermittent or pulsatory current; and of a method of and apparatus for producing electrical undulations upon the line-wire."

The inventor here as distinctly disclaims the pulsatory current, as he claims the undulatory. He makes his own definition of these terms, and by that definition we must be guided in interpreting the paper. In the fourth paragraph he defines the *pulsatory* current as one produced "by alternately increasing and diminishing the intensity of the current, without actually breaking the circuit." Now, this is a perfectly accurate description of the *undulatory* current as produced by almost every transmitter, and by the transmitter described in this patent itself. Hence, as he declares that he does not use the character of current which his device actually does use, it follows that the patent must either be construed as not in fact claiming as new the generation or use of any particular current, or be declared void because the description of the current claimed is ambiguous and uncertain.

In the fourth paragraph of the specification the inventor gives another and somewhat different definition of the pulsatory current, when defining it in connection with the undulatory current,—thus:

"The distinction between an undulatory and a pulsatory current will be understood by considering that electrical pulsations are caused by sudden or instantaneous changes of intensity, and that electrical undulations result from gradual changes of intensity."

Now these imputed characteristics of the pulsatory current —abruptness and rapidity in changes of intensity—belong peculiarly to the magneto current, which changes both polarity and direction with each vibration of the diaphragm, passing instantaneously through a far wider range of fluctuation than does the voltaic current when undulated by varying the resistance of the circuit. Electrical science and art would strive in vain to cause swifter or abrupter changes of intensity in a continuous electric current than characterize the magneto current generated by a vibrating diaphragm. Hence the magneto current is pulsatory, as that current is defined in the patent; and is therefore disclaimed. But, according to Bell's own declarations, the process patented in 1876 employs *in transmission* magneto currents only,—as the voltaic current proved of

no effect whatever except to charge the magnets. (See Bell's patent of 1877, and his lecture, Prescott, p. 71.) It therefore appears that this process employs in transmission only the pulsatory current which he disclaims. Hence, again, it follows that the patent must be construed as not claiming as new the use of any kind of current, or that it is void for uncertainty.

Having discussed the claims of the Bell Company, under the patent of 1876, to the devices and the process therein described, and to the art of transmitting speech by electricity, and by undulatory currents of electricity, I have now to present reasons which lead me to the conclusion that *that patent has no valid relation whatever to the transmission of speech.*

(*1.*) Because the device relied on, (Fig. 7), would not transmit speech.

The law prescribes that no patent shall be issued for an invention in mechanics, unless it be so far complete as to be capable of being applied at once to practical use; and unless the inventor shall describe the mode of using it so fully and clearly as to enable any person of "reasonably competent skill in the art" to make and successfully operate it. The special purpose of this provision is to prevent an inventor securing a patent for the elements of an immature invention,—thus closing the door against other inventors without himself conferring a benefit on the public. If it be shown at any time after the patent has issued that, when it was applied for, the device described would not produce the effect intended, in the hands of men ordinarily skilled in the art, then the patent must be declared void.

Curtis on Patents, Secs. 253-4-5.
Gray vs. James, Peters, C. Ct. 394.
Teese vs. Phelps, 1 McAll. 48.
Wintermute vs. Redington, 1 Fisher 239.
Brooks vs. Bricknell, 3 McLean 250.

A complete history of the invention, construction and attempted operation of the devices described in the patent of 1876 is to be found in the voluminous evidence submitted to the Examiner of Interferences in the Patent Office at Washington, and is elaborately discussed in the recently published decision of that officer in the telephone interference cases, (pp. 263 to 319).

From this decision, and from the published evidence in the Dowd and Pearce cases now before me, it appears that device No. 7, described in the specification and illustrated in the drawings of the patent of 1876, was invented by Bell, and constructed under his supervision by Watson, June 2d to 5th, 1875, while Bell was prosecuting his experiments in, and perfecting his system of, multiple harmonic telegraphy. It is the only one of the devices of the patent of 1876 ever thought to be applicable to the transmis. ion of speech.

Early in June, 1875, Bell tried to transmit speech with this instrument as a transmitter in circuit with one of his harmonic receivers. In his evidence in the interferences cases he says he remembers nothing of these experiments "except that I was encouraged by them to reconstruct the instrument with a lighter armature." Mr. Watson says of this experiment: "I shouted into the membrane telephone. Mr. Bell listened at at the receiver; I think he heard nothing. We changed places. He shouted at the telephone, and I listened at the receiver. I could hear a faint sound." In a letter to Hubbard, July 1, 1875, Bell says of this instrument: "On *singing* this afternoon in front of a stretched membrane attached to the armature of an electro magnet, the varying *pitch* of the voice was plainly perceptible at the other end of the line. When the vibrations are received on another stretched membrane in place of a steel spring it is possible, nay it is probable, that the *timbre* of the sound will be perceived."

A second membrane telephone, a duplicate of the first, was made by Bell and Watson early in July, 1875, and the two were connected on the same line as receiver and transmitter, the devices being the same as Fig. 7, and they being operated exactly as the subsequently issued patent of 1876 prescribes.

Of this trial Bell says: "I do not remember with any great distinctness the details of the experiments, but I have a distinct recollection that, during the course of the experiments, Mr. Watson rushed up to the room at the top of the building where I was, and informed me that he could distinctly hear me speaking, although he could not quite make out what I said. He had satisfied himself that the sounds he heard had been produced by the membrane telephone to which he had been listening." Of this experiment Hubbard says he listened at the membrane receiver, and "could hear a sound, but could never distinguish any spoken words."

The Examiner, in his opinion, speaking of all the testimony submitted in the interference cases, including the voluminous evidence in Dowd's case, says: "This is the only experiment made with these or any similar instruments of which the results are made to appear."

On the 28th day of December, 1875, about six weeks before he applied at Washington for the patent under consideration, Prof. Bell prepared at Toronto, Canada, a description to be used in securing foreign patents for the same inventions. In this description is a diagram of device No. 7 with the following explanatory note: "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." (Examiner's Report, p. 301).

In his lecture of October 31, 1877, before the London Society of Telegraph Engineers (Prescott, pp. 70-71), Prof. Bell described the invention, construction and attempted operation of this device No. 7, and said: "The results, however, were unsatisfactory and discouraging. My friend, Mr. Thomas A. Watson, who assisted me in this first experiment, declared that he heard a faint sound proceed from the telephone at his end of the circuit, but I was unable to verify his assertion."

It seems incredible, but is the fixed and stubborn fact, that this is all the evidence which the Bell Company has been able and willing to offer on the supremely vital question whether device No. 7 was a practical speaking telephone at the date of the

patent of 1876. Perhaps there were no two men in the United States, or the world, more thoroughly skilled in the construction and practical use of all known processes and devices for transmitting sounds by electricity than were Bell and Watson. One was the inventor of several ingenious devices, comprising a system of transmission of telegraphic signs and musical sounds by electricity; the other his trained and intelligent assistant. With ample time, the highest skill, and "all appliances and means to boot,"—following exactly the construction and process described in the patent,—they utterly failed, after repeated efforts, to transmit a sentence, a word, or a syllable of speech. This proves incontestably that the device No. 7 was not a practical speaking telephone within the requirements of the law; and therefore the patent of 1876 can confer no exclusive right in articulate telephony.

Although Bell and Watson repeatedly tried and utterly failed to transmit speech with this device in 1875, and although up to Oct. 31, 1877, it had never uttered a word so far as the inventor knew,—for in the lecture of that date he speaks of it as a dead failure as an articulating telephone,—yet Messrs. Cross and Henck testified in Dowd's case that they constructed instruments conforming to the specification and the drawings of device No. 7; and, on the 5th of June, 1879, did transmit speech with them. On the other hand, Messrs. Frank L. Pope, E. S. Renwick, and William S. Goodrich, all eminent in electrical science, testified that in Feb., 1879, they made instruments exactly conforming to the description of device No. 7, and, after two-and-a-half days trial, utterly failed to get a word. (Dowd's case, vol. I.) But, if Cross and Henck did succeed in doing what Bell, Watson, Pope, Renwick and Goodrich utterly failed to accomplish, it is obvious either that the device was not such, or that it was not so described in the patent, that any man ordinarily skilled in the art could make and successfully operate it.

If the public is forced to *experiment* in order to produce a working instrument—as even Cross testified it must do with this device as vaguely described in the patent—(Dowd case, 1, 410)—the patent is void. (King *vs.* Arkwright, Webster's Patent Cases, 66). (Morgan *vs.* Seaward, Webster's Patent Cases, 170). (Curtis on Patents, sec. 253-9).

But the validity of the patent is to be judged by the ability of electricians to construct and operate the instrument in 1876—not 1879. The question is whether, on the 14th of February, 1876, speech could have been transmitted by instruments constructed and operated according to the specification, by persons fairly skilled in the art as *then* developed and understood. The inventor himself and his assistant Mr. Watson, after earnest and repeated efforts extending through several months in 1875, conclusively demonstrated that it could not.

(2). Because the patentee did not claim in his specification that his invention was *intended* to transmit speech. The only expressed object was an improvement in multiple and harmonic telegraphy, that is, the transmission of different signs and sounds over the same wire at the same time. The law requires the inventor to tell the public clearly and unequivocally the use or uses to which his invention is applicable, and his monopoly is confined to such use or uses.

Detwold *vs.* Reeves, Am. 4, Law J. N. S. 189.

The purpose of the law is to enable the patent office to determine whether the ends be useful and the means adapted to them, and to enable the public to apply the invention to all its intended uses when the patent shall have expired.

There are but two expressions in the elaborate specifications which could possibly be claimed as even *hinting* at the transmission of speech. One is in the paragraph where, after stating the special use of his invention to be the sending of two or more telegraphic signals or messages over the same wire at the same time, without interfering with each other, he adds: "there are many other uses to which this instrument can be put, such as the simultaneous transmission of musical notes, differing in loudness as well as in pitch, and the *telegraphic transmission of noises or sounds of any kind.*" It will be observed that this statement occurs in the midst of the description of devices 5 and 6, the construction of which as given in the

drawings precludes the possibility that they could have been intended to transmit speech. The other expression is in the 5th claim where the invention is described as intended for the transmission of "*vocal* or other sounds." These italicised expressions are too vague to be construed as notice to the public that one of the uses of this invention in multiple harmonic telegraphy was to transmit speech by electricity—a thing then unknown in the United States to have ever been attempted or accomplished, save to the very few who kept themselves informed as to the achievements of modern science.

If it be doubtful whether the specification claims the transmission of speech, then it cannot be construed to include it.

Barret *vs*, Hall, 1 Mas. 447.
Hastings *vs*. Brown, 16 Eng. L. & E. 172 S. C.
Curtis on Patents, Sec. 229.

If the omission to claim the transmission of speech had been obviously an oversight, there would be a plausible excuse for the attempt to wrest this invention from its declared purposes, and make it the foundation of a great telephone monopoly. But it is perfectly certain from Bell's own acts and declarations that, when he applied for his patent of 1876, he had no intention whatever of claiming the transmission of speech. His time and means had been engrossed for years in making inventions in multiple and harmonic telegraphy, and in securing them by caveats and patents. In his processes he had theretofore used only intermittent battery currents, having tuned reeds for transmitters and receivers. He says in his application for the patent of 1876: "My present invention *consists* in the employment of a vibratory or undulatory current of electricity in contradistinction to a merely intermittent or pulsatory current, and of a method of and apparatus for producing electrical undulations upon the line wire." He then enumerates the advantages he claims from the use of an undulatory, in place of an intermittent, current,—first and chief of which is that "a very much larger *number of signals*" can be transmitted at the same instant over the same wire—and in this enumeration there is not the slightest

allusion to an advantage or adaptibility of the undulatory current in transmitting speech.

It may be asked why device No. 7 was described in the application for the patent of 1876, if it was not in illustration of a method of transmitting speech. It appears to have been shown as a device for transmitting vocal or instrumental music; while his other devices obviously would only transmit a few fundamental tones to serve as signals in telegraphy. Bell's idea seemingly was that many more musical tones could be transmitted by this instrument, because of its diaphragm vibrating to all the sound waves, than could he transmitted by a small number of tuned reeds, each responding to only one fundamental tone. In his patent of 1877 he recites the purpose of each one of his previous patents, and says of this patent only this: "In letters patent granted me March 7, 1876, I have shown a method of, and apparatus for, producing *musical tones* by the action of undulatory currents of electricity."

Whether device No. 7 was in fact operative in transmitting vocal or instrumental music, or *any* sounds, does not appear. All that appears in the evidence as to it, from its construction, June 2–5, 1875, down to the application for the patent Feb. 14, 1876, is that Bell had satisfied himself beyond a doubt that it would *not transmit speech.* He undoubtedly had too much principle to have attempted a fraud on the government by inserting device No. 7 in his patent of 1876 as a practical articulating telephone when he was thoroughly convinced that it was not. Otherwise, he certainly would have had too much sense to have himself exposed the fraud and placed his patent in jeopardy, by declaring in a published lecture that he had demonstrated, before applying for the patent, that the device would not transmit speech.

Judge Lowell, in his opinion in the Spencer case, says it is sufficient that the instrument will do the work, "whether the inventor knew it or not." I suppose this means that, although Bell patented this device for applying his double-current process to multiple harmonic telegraphy without declaring in

the specification that it would transmit speech, and believing that it would not, yet, if it subsequently proved adapted to the transmission of speech, he would be entitled to a monopoly of the devices and the process for that use also. Whether this be the meaning of Judge Lowell's dictum, it is not the law. The monopoly of the patent is limited to the uses named. Here were two distinct uses expressly named, *i. e.*, the transmission of different telegraphic signals and the transmission of different musical notes over the same wire at the same time. If there were a third use, of such transcendent interest as the transmission of speech,—so different in its character, and in the method of its attainment from the other two,—the omission to name it is fatal to the monopoly for that use,—and it makes no difference whether the omission was accidental, or the result of ignorance of the adaptability of the invention to the unnamed use.

Curtis on Patents, Sec. 235a.
Blake *vs.* Stafford, 3 Fisher's Pat. Cas. 294.

The American public has been grossly misled by the assumption that the device for which Bell applied for a patent Feb. 14, 1876, was the same in effect as that with which, on the 25th June, 1876, he actually transmitted speech at the Centennial. Hospitallier in his "Modern Applications of Electricity," and Maier in his English edition of that work, (p. 307), and other writers in this country and in Europe have fallen into and propagated this error. The fact is that the two devices are essentially different. In the Lecture of Oct. 31, 1877, above referred to, (Prescott, pp. 71 and 72), Bell shows the two instruments side by side, and tells the history of each,—how the invention described in his patent of 1876, utterly failed to transmit speech, and how success was first achieved several months after the date of that patent only by the invention of the differently constructed instruments exhibited at the Centennial, on the 25th of June, of that year.

The difference was this: In the device patented March 7th, 1876, one end of an iron bar is "fastened loosely to the uncovered leg of a magnet," while the other end is firmly "*attached* to the centre of a stretched membrane," on which the sound vibrations are conveyed. The vibrations of the membrane were expected to vibrate the iron bar so as to create a magneto current in the helix strong enough to "*undulate*" the continuous battery current; and through these undulations to vary the strength of the electro magnet of the receiver, and thus vibrate a corresponding iron bar and membrane in it The device was complex, clumsy and impracticable, and all experiments with it for the transmission of speech ended in total failure in July, 1875,—six months before the patent of 1876 was applied for. (Examiner's Report, pp. 314, 315, and depositions therein referred to). Then, "early in the summer of 1876," (Examiner's Report, p. 316), Bell and his assistants made a new transmitter. For the iron bar they substituted a thin iron diaphragm glued to the centre of the stretched membrane, and entirely unconnected with the magnet. They also made a receiver which still more strikingly differs from device No. 7. It dispenses entirely with the stretched membrane, and has not a feature in common with that device, except an electro magnet. (See description of new transmitter in Bell's Lecture, and of the receiver in report of Sir Wm. Thompson and others, Prescott, p. 71, et. seq.).

With these instruments, thus radically different from the patented device of 1876, Bell successfully transmitted speech on the 25th of June, at the Centennial. (See Prescott, pp. 71-93). Subsequently, he slightly changed these devices and patented them Jan. 30, 1877,—the first patent in which he claims to transmit speech.

Giving this patent of 1876 all the force and effect which can be reasonably claimed for it in view of the established facts, and of the rules of law applicable thereto, the conclusion is inevitable that it confers no right of any kind in the art of

transmitting speech; and that whatever right is conferred by it relates only to the uses clearly expressed in the specifications, to wit: multiple and harmonic telegraphy.

It is to be borne in mind, in considering the questions I have discussed, that the patent of 1876 alone is relied on to secure an absolute monopoly of the telephone business. With that patent the monopoly stands or falls. Its force or effect cannot be enlarged by subsequent inventions or patents, whether made by Bell or any other inventor. All that followed that invention,—Bell's successful devices shown at the Centennial, as improved and patented in 1877,—his success in introducing his telephone to the world as a new means of social and business intercourse,—and the honors and emoluments earned and won by him;—all these have no place in a discussion of the legal effect of the patent of 1876. That patent is to be construed by itself, by the state of the art when it was issued, and by all that led up to it; but is not to be stretched to cover subsequent inventions and successes, even though it may have lighted the way to them.

Immediately on its organization, the American Bell Telephone Company met with such swift and astonishing success that it began to search for a pretext on which to monopolize the telephone business of the country. Bell's patent of 1877 covered only specific devices, and therefore would not answer the purpose: but his patent of 1876 covered his new and ingenious but worthless, (because fallacious), theory of undulating a voltaic current by throwing a magneto current on it; and, above all, it had claims which were sufficiently vague and elastic to cover the very elements of telephony. Hence, by an audacious afterthought, this patent was made the foundation of a monopoly of the entire art of the electrical transmission of speech,—to which art it does not allude, and for which its devices had been repeatedly demonstrated and proclaimed by the inventor to be utterly inapplicable.

The audacity of the assumption is no more surprising than the skill with which, through collusion and feigned issues, the

impression has been propagated that the broad claims of the Bell monopoly have been judicially established beyond further controversy. It is oracularly given out that if any person or corporation were to dare engage in the business of telephony in any judicial district or circuit in the United States without the consent of the Bell Company, it would be stopped by preliminary injunction without even a hearing. The fact is, however, as I am advised, that in not one of the litigations of the Bell Company, has the validity of its broad claims under the patent of 1876 been tried at all in a court of law, or contested to final decree in equity; and that the several final decrees heretofore rendered, have either followed compromises, as in the Dowd and Dolbear cases, or been preceded by admissions which in effect surrendered the controversy, as in the case of Spencer.

Hence I am of opinion that the claims of the Bell Company to a monopoly of the telephone business of the United States, founded as it is on the patent to A. G. Bell of March 7, 1876, cannot be sustained;

I. Because that patent has no valid relation to the art of transmitting speech, for two reasons:

(*a.*) It is not claimed in the specification that one of the uses of the invention is to transmit speech.

(*b.*) The specification does not so describe any device that an artisan fairly skilled in transmitting sounds by electricity could, at that time, have made such device, and transmitted speech with it.

II. Because if the patent were otherwise valid as applied to the transmission of speech, the broad claim made under it to a monopoly of the use of electricity, or of undulatory currents of electricity, in transmitting speech, is invalid, for the following reasons:

(*a.*) Bell was not the first to discover the art or invent the means of transmitting speech by electricity, or by undulatory currents of electricity, within the definitions and requirements of the patent laws.

(*b.*) The claim is too broad—falling directly within the condemnation of the eighth claim of the Morse patent by the Supreme Court of the United States in the case of O'Reilly *vs.* Morse.

(*c.*) The claim to the exclusive use of undulatory currents of electricity in transmitting speech involves the specification in contradiction and ambiguity which vitiate the patent.

III. Because *the process* of transmitting speech described in the patent of 1876 is false in theory and obsolete in practice; and all that is new in *the device* is utterly worthless. No process or device at all similar in principle is now used anywhere in telephony.

And, finally, I am of opinion that there have not been such judicial determinations favorable to the broad claims made under this patent as to justify a court in assuming their validity on motion for preliminary injunction, if the defendants set out the defences above indicated, and are prepared to sustain them by such *ex parte* testimony as is readily accessible.

THOMAS EWING.