AMERICAN BELL TELEPHONE CO. *v.* DOLBEAR AND OTHERS.

Circuit Court, D. Massachusetts. January 24, 1883.

1. PATENTS FOR INVENTIONS—WHAT NOT PATENTABLE—PROCESS PATENTABLE.

There can be no patent for a mere principle, nor can the discoverer of a natural force or a scientific fact obtain a patent therefor; but if he invents a process by which a certain effect of one of the forces of nature is made useful to mankind, and fully describes and claims that process, and describes a mode or apparatus by which it may be usefully applied, he is entitled to a patent for the process, and is not restricted to the particular form of mechanism or apparatus employed.

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2. SAME—TRANSMISSION OF SOUNDS BY ELECTRICITY.

Where a party discovered that articulate sounds could be transmitted by undulatory vibrations of electricity, and invented the art or process of transmitting such sounds by means of such vibration, the mere fact that such art or process is the only way by which speech can be transmitted by electricity does not lessen the merit of the invention, or the protection which the law will give to it.

3. SAME—PROCESS—MODE-AND APPARATUS—INFRINGEMENT.

Where a party avails himself of the prior discovery of a patentee, as well as of the process which he invented, and by which he reduced the discovery to practical use, and copies the mode and apparatus of the patentee, it is an infringement of the patent and should be restrained by injunction.

In Equity.

Chauncey Smith and *James J. Storrow,* for complainants.

Causten Browne and *James E. Maynadier,* for defendants.

Before GRAY and LOWELL, JJ.

GRAY, Justice. Few legal rules have been oftener misunderstood and misapplied than the maxim that you cannot patent a principle. But the confusion on this subject has been so effectually cleared up by the recent judgment of the supreme court, delivered by Mr. Justice BRADLEY, in *Tilghman* v. *Proctor,* 102 U. S. 707, that it will be sufficient for the purposes of this case to state the conclusions there announced. There can be no patent for a mere principle. The discoverer of a natural force or a scientific fact cannot have a patent for that. But if he invents for the first time a process by which a certain effect of one of the forces of nature is made useful to mankind, and fully describes and claims that process, and also describes a mode or apparatus by which it may be usefully applied, he is, within the meaning and the very words of the patent law, "a person who has invented or discovered any new and useful art;" and he is entitled to a patent for the process of which he is the first inventor, and is not restricted to the particular form of mechanism or apparatus by which he carries out that process. Another person, who afterwards invents an improved form of apparatus, embodying the same process, may indeed obtain a patent for his improvement, but he has no right to use process, in his own or any other form of apparatus, without the consent of the first inventor of the process.

It was decided by this court in *American Bell Telephone Co.* v. *Spencer,* 8 FED. REP. 509, and is not denied by the present defendant, that Bell is the first inventor of a speaking telephone. The only controversy is the extent of his patent. The draughtsman of the specifications has exhibited as clear and accurate a comprehension of 450 the rules of the patent law, as the inventor has of the force of nature with which he was dealing, and of the means by which he reduced that force to a practical use. The patent is clearly not intended to be limited to a form

of apparatus, but embraces a method or process. This is apparent upon the face of the specification. The inventor begins by saying:

"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."

After describing the advantages of an undulatory current, resulting from gradual changes of intensity, over a pulsatory current caused by sudden changes of intensity, line 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. 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."

Or, as he afterwards repeats in fuller language:

"Electrical undulations, induced by the vibration of a body capable of inductive action, 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; or, 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 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."

He further says:

"There are many ways of producing undulatory currents of electricity, dependent for effect upon the vibrations or motions of bodies capably of inductive action. A few of the methods that may be employed I shall here specify. When a wire, through which a continuous current of electricity is passing, is caused to vibrate in the neighborhood of another wire, an undulatory current of electricity is induced in the latter. When a cylinder, upon which are arranged bar magnets, is made to rotate in front of the pole of an electromagnet, an undulatory current of electricity is induced in the coils of the electro-magnet.

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"Undulations are caused in a continuous voltaic current by the vibration or motion of bodies capable of inductive action, or by the vibration of the conducting wire itself in the neighborhood of such bodies. 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 further 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 vibration 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.

"In illustration of the method, of creating electrical undulations, I shall Show and describe one form of apparatus for producing the effect. I prefer to employ for this purpose an electro-magnet, A, figure 5, having a coil upon only one of its legs, b. A steel-spring armature, c, is firmly clamped by one extremity to the uncovered leg, *d,* of the magnet, and its free end is allowed to project above the pole of the covered leg. The armature, *c,* can be set in vibration in a variety of ways, one of which is by wind, and, in vibrating, it produces a musical note of a certain definite pitch. When the instrument, A, is placed in a voltaic circuit, *g, b, e, f, g,"* (in which *b* represents the covered leg of the first electro-magnet; *f* represents the covered leg of another similar electro-magnet, I, whose uncovered leg is marked *h*; and *g* and *e* represent the two points of the voltaic circuit midway of the wire connecting the two magnets,) "the armature, *c,* becomes magnetic, and the polarity of its free end is opposed to that of the magnet underneath. So long as the armature, *c,* remains at rest, no effect is produced upon the voltaic current; but the moment it is set in vibration to produce its musical note, a powerful inductive action takes place, and electrical undulations traverse the circuit, *g, b, e, f, g.* The vibratory current passing through the coil of the electromagnet, *f,* causes vibration in its armature, ft, when the armatures, *c, h,* of the two instruments, A, I, are normally in unison with one another; but the armature, *h,* is unaffected by the passage of the undulatory current when the pitches of the two instruments are different."

Then, after showing how two or more telegraphic signals or messages may be sent simultaneously over the same circuit without interfering with one another, he adds:

"I desire here to remark that there are many other uses to which these instruments may 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. When the armature, *c,* figure 5, is set in vibration, the armature, *h,* responds not only in pitch but in loudness.

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Thus, when *c* vibrates with little amplitude, a very soft musical note proceeds from *h;* and when *c* vibrates forcibly, the amplitude of the vibration of *h* is considerably increased, and the resulting sound becomes louder."

He proceeds to say:

"One of the ways in which the armature, *e,* figure 5, may be set in vibration has been stated above to be by wind. Another mode is shown in figure 7, whereby motion can be imparted to the armature by the human voice or by means of a musical instrument. The armature, *c,* figure 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 center 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, and the armature, *e,* is forced to partake of the motion, and thus electrical undulations are created upon the circuit, E, *b, e, f, g.* These undulations are similar in form to the air-vibrations caused by the sound, that is, they are represented graphically by similar curves. The undulatory current passing through the electro-magnet, *f,* influences its armature, *h,* to copy the motion of the armature, *c.* A similar sound to that uttered into A is then heard to proceed from L."

The reference to figure 7 will be better understood by repeating, slightly amplified, Judge LOWELL'S

explanation in *Spencer's Case.* A cone of pasteboard or other suitable material, A, has a membrane, *a,* stretched over its smaller end; at a little distance is the armature, *c,* consisting of a piece of iron magnetized by the coil of the electromagnet, *b,* through which is passing a current of electricity. When sounds are made at the mouth of the cone, A, the membrane, *a,* vibrates like the drum of a human ear; and the armature, *c,* which is directly in front of the magnet, *b,* vibrates with this membrane, and its movements cause pulsations of electricity like those of the air which excited the membrane to pass over the wire, *e,* which stretches to another similar magnet, *f,* and cone, L, with its membrane, and its armature, *h.* The second armature and membrane take up the vibrations and make them audible by repeating them into the second cone, L, which translates them into vibrations of the air. In practice, a metallic diaphragm or disk is often substituted for each membrane.

The inventor adds this explanation:

"In this specification the three words 'oscillation,' 'vibration,' and 'undulation' are used synonymously, and in contradistinction to the terms 'intermittent' and 'pulsatory.' By the term 'body capable of inductive action,' I mean a body which, when in motion, produces dynamical electricity. I include in the category of bodies capable of inductive action, brass, copper, and other metals, as well as iron and steel."

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His fifth and final claim is of "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, substantially as set forth."

In this claim, as throughout the specification, the word "method" is evidently used, not as synonymous with "mode" or "apparatus," but as equivalent to

"process;" just as it was used by Chief Justice TANEY, delivering the judgment of the majority of the court, in *Morse* v. *O'Reilly,* 15 How. 62, 117, as well as by Mr. Justice GRIER (who dissented in *Morse* v. *O'Reilly)* in delivering the unanimous judgment in *Corning* v. *Burden,* 15 How. 252, 267. And the invention claimed is not merely the apparatus described, but also the general process or method, by which the wind, or a musical instrument, or the human voice, produces in a current of electricity a succession of electrical disturbances, not sudden and intermittent or pulsatory, but gradual, oscillatory, vibratory, or undulatory, so as to give out at the further end of the conducting wire sounds exactly corresponding in loudness, in pitch, and in tone, character or quality, to the sounds committed to it at the nearer end.

The opinion in *Spencer's Case* clearly points out that "Bell discovered a new art—that of transmitting speech by electricity—and has a right to hold the broadest claim for it which can be permitted in any case," and "the invention is nothing less than the transfer to a wire of electrical vibrations like those which a sound has produced in the air;" and that his patent, while not covering the abstract principle, without regard to means, of transmitting speech by electricity, yet is not limited to a particular form of apparatus, but includes the process or method, (using the two words as equivalent,) the essential elements of which are "the production of what the patent calls undulatory vibrations of electricity to correspond with those of the air, and transmitting them to a receiving instrument capable of echoing them."

The evidence in this case clearly shows that Bell discovered that articulate sounds could be transmitted by undulatory vibrations of electricity, and invented the art or process of transmitting such sounds by means of such vibrations. If that art or process is (as the witnesses called by the defendants say it is)

the only way by which speech can be transmitted by electricity, that fact does not lessen the merit of his invention, or the protection which the law will give to it. The mode or apparatus by which Bell effects his 454 purpose is by using an electro-magnet in the transmitter, and another electro-magnet in the receiver. But the essence of his invention consists not merely in the form of apparatus which he uses, but in the general process or method of which that apparatus is the embodiment. Dolbear likewise uses an electro-magnet in the transmitter; and both his method and his apparatus, as is admitted in his own affidavit, are substantially like Bell's, until he comes to the receiver. For the magneto-receiver, Dolbear substitutes a condenser-receiver, consisting of two thin metal diaphragms or disks, of about the size and thickness of those used in an ordinary Bell telephone, separated by a very thin air space, one or both disks connected with the conducting wire, and the speaking disk, if not so connected, otherwise charged with electricity; so that, as the varying currents flow into and out of this condenser, the two disks attract one another more or less strongly, and thereby vibrations are set up which correspond to the vibrations of the original sound,

The main difference on which the defendants rely is that Bell uses what is called dynamic electricity, producing by its motion an electric current; while Dolbear, in his receiver, uses what is called static electricity, producing, while at rest, electrical attraction. And the learned counsel for the defendants illustrate the distinction thus:

"It was known long before Bell's method that electricity had two properties, very much as water has two properties; namely, first, pressure or head or that property which tends to make it flow, and which can exist by itself only in the case of an insulated and charged body, or a reservoir of water; and, secondly,

that dynamic property arising from its motion, and which can never exist by itself, but depends upon the quantity in motion and the rate of motion. This is not an absolutely exact way of expressing it, for the reason that electricity is not a fluid; but, were it a fluid, the statement would be entirely exact."

It does not appear to us to be important to determine whether, in scientific exactness, the varying influences of static electricity may properly be called currents; or whether the two properties of electricity differ in kind and in substance, or only in degree, or in the form of manifestation and application; or whether the force of the property which tends to make a fluid, when stationary, change its place and flow, is different in kind from that which it exerts when changing its place and flowing; in short, whether the power of the pressure of water in a reservoir is different in kind from water-power in a stream or current. Whatever name may be given to the property, or the manifestation, of the electricity in the defendants' receiver, 455 the facts remain that they avail themselves of Bell's discovery that undulatory vibrations of electricity can intelligibly and accurately transmit articulate speech, as well as of the process which Bell invented, and by which he reduced his discovery to practical use; that they also copy the mode and apparatus by which he creates and transmits the undulatory electrical vibrations, corresponding to those of the air; and that in the plate charged with electricity, which they have substituted for the magnetic coil in the receiver, the charge constantly varies in accordance with the principle which Bell discovered, and by means of the undulatory current caused by the process, and in the mode which he invented and patented.

The defendants have therefore infringed Bell's patent by using his general process or method, and should be restrained by injunction from continuing to do so; and it is unnecessary, for the purposes

of this decision, to consider whether the defendants' apparatus is a substantial equivalent of the plaintiff's, or whether it is an improvement for which Dolbear might himself be entitled to a patent. Temporary injunction ordered.