

Opinion of the Court.

ELECTRIC RAILROAD SIGNAL COMPANY *v.* HALL
RAILWAY SIGNAL COMPANY.APPEAL FROM THE CIRCUIT COURT OF THE UNITED STATES FOR THE
DISTRICT OF CONNECTICUT.

Argued January 6, 7, 1885.—Decided March 30, 1885.

Patent, No. 140,536, granted July 1, 1873, to Frank L. Pope for an improvement in electric signalling apparatus for railroads, was for a combination of several previously known parts or elements, to be used together in effecting the desired result of signalling, among which parts so used, and essential to the combination, was an insulated section or insulated sections of the track of the railroad on which the device might be used.

In practical operation the device protected by that patent required independent devices to equalize the resistance in the different circuits.

The device patented to Thomas S. Hall and George H. Snow, by patent 165,170, granted July 13, 1875, for an improvement in operating electric signals, dispensed with the use of insulated sections of the track; and used instead thereof the earth for the return current to complete the circuit; and arranged its conductors with reference to the batteries and magnets so as to equalize the resistance in the circuits when the signals were operated by a single battery.

The device patented to Hall and Snow differs from that patented to Pope in the elements which form the combination, in the functions performed by them, in the arrangement of the parts, and in the principle of the combination; and the rights protected in the latter are not infringed by the use of the former.

This was a suit in equity to restrain an infringement of a patent for an improvement in electric signalling for railroads. The defence denied the priority of invention, and denied the infringement. The facts which make the case are fully stated in the opinion of the court.

Mr. George H. Christy and *Mr. Charles E. Perkins* for appellant.

Mr. Simeon E. Baldwin for appellee.

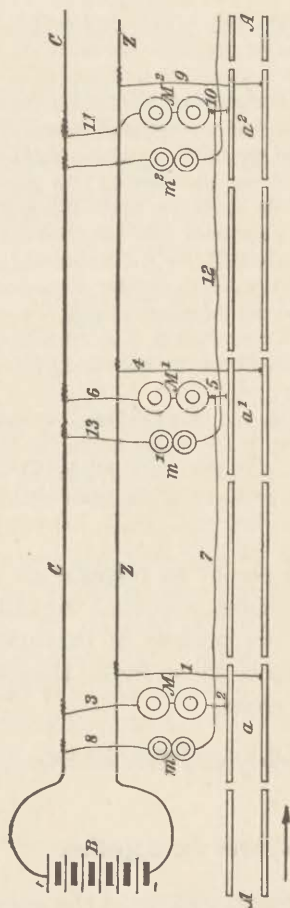
MR. JUSTICE MATTHEWS delivered the opinion of the court.

This is a bill in equity for an injunction to restrain the alleged infringement of letters patent No. 140,536 for an improvement in circuits for electric railroad signals, issued July

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1, 1873, to Frank L. Pope, of whom the appellants, who were complainants below, are assignees. On final hearing the bill was dismissed by a decree now brought here for review by this appeal.

The drawing which accompanies and illustrates the patent is as follows:



The following is the substantial part of the specification, together with the claims:

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“My invention consists in a peculiar arrangement of electric circuits, in combination with a battery, and with two or more circuit-closers operated by moving trains or otherwise, whereby a series of two or more visual or audible signals, situated at intervals along the line of a railroad, may be operated by currents of electricity derived from a single battery, thereby obviating the inconvenience and expense of employing, as heretofore, one or more separate batteries situated at or near each signal for the purpose of actuating the same.

“In the accompanying drawing, *AA* represents a portion of the track of a railroad. At intervals of, say, a mile, more or less, sections of the said track, *a*, *a*¹, *a*², are electrically insulated from the remainder in a manner well understood, and therefore requiring no detailed description. *B* is a galvanic battery, of any suitable construction, and placed in any convenient location near the line of the railroad. Two wires or other conductors, *C* and *Z*, are attached to the positive and negative poles, respectively, of the battery *B*, and extended to any required distance in a direction parallel or nearly so to the line of the railroad. The conductors *C* and *Z* may be placed on poles, and should be suitably insulated from each other and from the earth. The conductors *C* and *Z* are virtually prolongations of the positive and negative poles of the battery *B*. Each of the insulated sections of track, *a*, *a*¹, *a*², &c. is placed at some point at or near which it is desired to erect a signal, and any required number of these may be employed to meet the requirements of any particular case. *M*, *M*¹, and *M*² are the electro-magnets, which actuate or display the respective signals. The said signals may be of any suitable construction, and should be provided with some suitable means of retaining them in position or action after the circuit through the magnets *M*, *M*¹, or *M*² has been interrupted. *m*, *m*¹, *m*² are magnets so arranged as to release, reverse, or stop the action of said signals, which have previously been brought into action by the magnets *M*, *M*¹, and *M*².

“The operation of the apparatus is as follows: Suppose a train moving along the track *AA* from left to right in a direction indicated by the arrow. Upon reaching the point *a*, the

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wheels and axles of the train will form an electrical connection between the opposite insulated rails, and a circuit will be formed between the conductor *C* and the conductor *Z*, traversing wires 1 and 2, magnet *M*, and wire 3, and the signal attached to *M* will consequently be displayed. Upon the arrival of the train at *a*¹ the same operation will be repeated, and another connection formed between *C* and *Z*, traversing the wires 4 and 5, magnet *M*¹, and wire 6, while at the same time a portion of the current will traverse the branch-wire 7, magnet *m*, and wire 8. Thus the signal attached to *M*¹ will be actuated, and simultaneously the action of the magnet *m* will release or reverse the action of the first mentioned signal. Upon reaching the point *a*² the closing of the circuit by the train will, in like manner, cause the signal attached to *M*² to be displayed, and the signal last displayed by *M*¹ to be withdrawn. In this manner any required number of such signals may be operated by means of a single battery.

“The respective resistances of the several circuits should be so adjusted that they will be as nearly as possible equal to each other, as a much more perfect action of the apparatus will be secured thereby.

“On a railroad having a double track two separate series of signals, one series for each track, may be connected with the conductors *C* and *Z* of a single battery, if required. If preferable they may be also operated by means of separate batteries and separate conductors.

“In cases where it is required to operate a large number of signals, extending along the road for a distance of many miles, the two conductors *C* and *Z* may be extended the entire distance, and a number of batteries attached at convenient intervals, say, for instance, from five to ten miles apart. The several batteries should all be placed with their positive poles in connection with the wire *C*, and their negative poles in connection with the wire *Z*, when they will virtually form one large battery, and the principle of operation will remain the same as that hereinbefore described.

“I do not desire to confine myself to the use of any particular form of visual or audible signals, nor to the particular devices

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herein described for closing the electric circuit at points from which a signal is to be operated. Instead of the circuit being closed automatically by the train itself, it may be closed by a signalman by means of a key or switch, or otherwise.

"I claim as my invention—

"1. The battery *B*, in combination with the positive and negative conductors *C* and *Z*, two or more electro-magnets, *M*, *M*¹, *M*², for actuating or causing to be actuated visual or audible signals, and two or more circuit-closers, *a*, *a*¹, *a*², placed at intervals along the line of a railroad, substantially as and for the purposes specified.

"2. The battery *B*, in combination with the positive and negative conductors *C* and *Z*, two or more electro-magnets, *m*, *m*¹, *m*², for releasing or reversing visual or audible signals, and two or more circuit-closers, *a*¹ *a*², placed at intervals along the line of a railroad, substantially as and for the purpose specified.

"3. The combination of the battery *B*, conductors *C* and *Z*, circuit-closer *a*, and electro-magnet *M*, for actuating a visual or audible signal, with the circuit-closer *a*¹, wires 5, 7, and 8, and electro-magnet *m*, for reversing, releasing, or stopping said signal, substantially as specified."

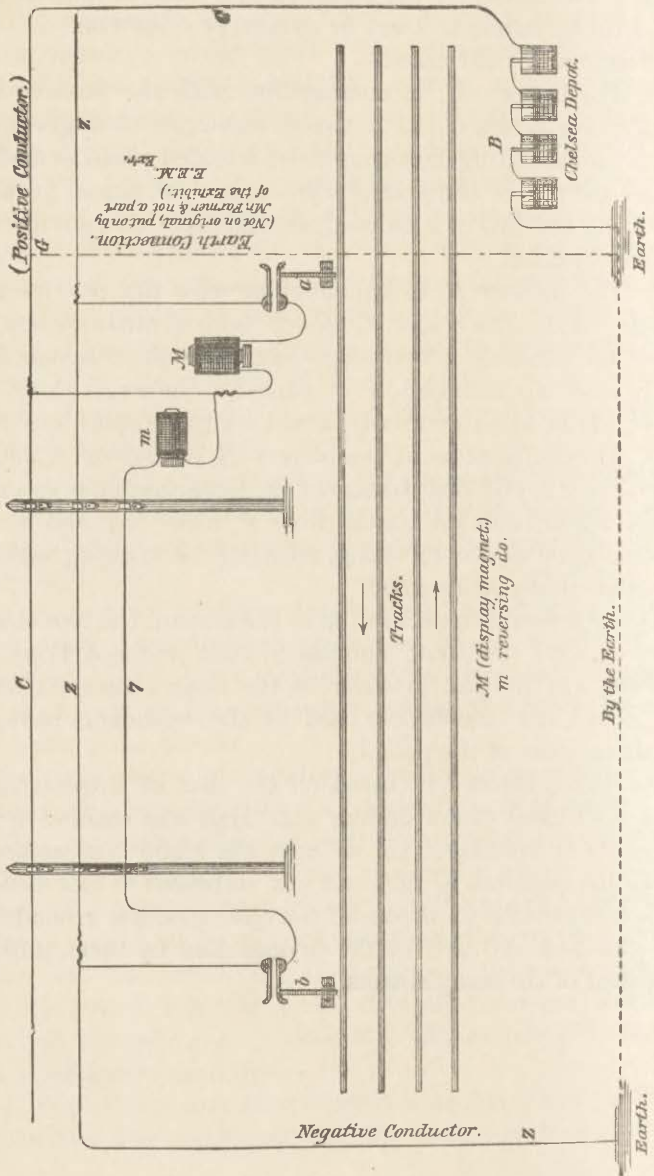
Among several defences set up in the answer, the two chiefly relied on were, first, that Thomas S. Hall, and not Pope, the patentee, was the first inventor of the improvement claimed, and, second, that the devices used by the defendants were not an infringement of the patent.

The decree below was based on the first of these defences alone, the Circuit Court finding that Hall was entitled in law to priority of invention; but we have not found it necessary to discuss the questions of fact and law embraced in this issue, as we have concluded to dispose of the case upon the ground that the defendants did not, by the devices used by them, infringe the patent of the complainants.

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These devices are illustrated by a drawing, of which the following is a copy :

EXHIBIT C.



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This diagram represents the plan of electric railroad signals, placed and put in practical operation, by the defendants, on the line of the Eastern Railroad near Boston, prior to the bringing of this suit. In comparing it with the drawing annexed to the patent, it is to be remembered that the latter represents a series of double signals in succession on the line of a railroad track, divided into blocks, while Exhibit C represents but one pair of such signals in one such block. To make it correspond with the other, as a representation, it should be imagined as being repeated in several successive blocks, constituting portions of one circuit, closed at fixed points by circuit-closers for that purpose.

Mr. Pope, the patentee, drew this diagram, and, as a witness on behalf of the complainants, explains it, in comparison with the plan described in the patent, with a view to establish their identity. He says :

“ I have made a diagram which exhibits the apparatus which I examined, or so much of it as is material to this case, which I annex, and is marked Exhibit C.

“ A battery of perhaps one hundred cells is placed in the station building at Chelsea. One pole of this battery—I think the negative pole—is connected to the earth.

“ A conductor is attached to the other or positive pole of the battery, consisting of an insulated wire extending along parallel with the track upon poles. This wire which I examined extended toward Boston, the end remote from Chelsea being disconnected, or, as it is termed, open. A second conductor, consisting of another similar wire insulated and attached to the same poles, was arranged parallel to the first one. The second wire was open at Chelsea, and connected with the earth at its remote end.

“ The first mentioned wire I have shown in the diagram, and marked ‘ positive conductor ; ’ the second wire is marked ‘ negative conductor.’ At a short distance from the station a semaphoric signal is placed, consisting of a red disk balanced upon a lever. This was placed in the cupola of a small building at the side of the track. An electro-magnet was arranged with its armature attached to said lever, so that when brought into action the red disk on the other end of the lever would be

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moved into a position to render it visible through an opening in the cupola. A latch or detent was placed in a position to fasten the lever after the action of the magnet had ceased, and thus continue the exhibition of the signal. A circuit-closer was placed upon the track at a point near the signal, which consisted of a lever so placed as to be depressed by the wheels of a passing train, which movement caused the circuit to be closed by pressing two springs together. When the circuit was thus closed by a passing train a connection was formed between the positive and negative conductors, and the electric current, in passing from one to the other, passed through and operated the magnet by which the signal was displayed. At a point, perhaps a mile distant, another signal was arranged in precisely the same manner in connection with a second circuit-closer, and the same positive and negative conductors. An additional circuit-closer, placed upon the track in the vicinity of this last-named signal was arranged to form a connection from the positive to the negative conductor by the way of a third wire running upon the poles back to the signal first mentioned, where it passed through and operated a second magnet, which lifted the latch or detent, and allowed the disk to return to a position concealing it from view. I examined two of these signals, and saw many others along the line of the road.

“I find in this arrangement thus described the combination claimed in the first claim of said patent, consisting of a battery in combination with positive and negative conductors, two or more electro-magnets for operating visual signals and two or more circuit-closers placed at intervals along the line of the railroad. Also the combination claimed in the second claim of the patent, consisting of a battery in combination with positive and negative conductors, two or more electro-magnets for reversing visual signals, and two or more circuit-closers placed at intervals along the line of the railway. I also find the combination claimed in the third claim, of a battery, positive and negative conductors, a circuit-closer and electro-magnet for actuating a signal, with a second circuit-closer, wires, and a magnet for reversing said signal.”

Mr. Moses G. Farmer, an expert witness on behalf of the

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complainant, makes the same comparison, with the result, according to his opinion, of establishing that the defendants' system is essentially the invention described in the patent.

On the other hand, Prof. Henry Morton, an expert witness on behalf of the defendants, points out two particulars, in which the plan, as practised by the defendants and shown in Exhibit C, differs from that of the Pope patent, so materially that they cannot be considered substantially the same.

The first of these is, that in the patent, insulated sections of the railroad track, used when covered by a locomotive or cars as a circuit-closer, are made essential to the combinations claimed, while they are dispensed with in the Hall system, other and independant circuit-closers being employed.

The second is thus described by Prof. Morton in his testimony:

"I also find a difference between the plan described in the patent and that shown in Exhibit C in another regard ; in the plan of the patent the conductors *C* and *Z* are connected respectively with the positive and negative poles of the battery, or, as the patent itself states, 'are virtually prolongations of the positive and negative poles of the battery.'

"In the plan shown in Exhibit C, however, the conductor *C*, or positive conductor only, is connected with the battery, the other conductor, *Z*, or, as it is called, negative conductor, having no connection with the battery. In consequence of this difference of arrangement in the system of the patent, the positive conductor *C* carries the positive current in one direction away from the battery ; and the other, or negative conductor *Z*, brings the positive current in the opposite direction, or back to the battery, and thereby involves the production of circuits of different resistance for each station. In the system represented in Exhibit C, on the other hand, both the conductor *C* and *Z* serve to carry the positive current in the same direction away from the battery, and should, therefore, properly be both called positive conductors. As a result of this arrangement the current always passes through the same or equal circuits, no matter at which station the connection is made, simply changing from one to the other of these equal parallel wires at the station where the contact is effected.

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“It is for this reason that in this system no equalization of resistance, in the sense involved in the description of the patent, is required.”

It is upon these two points that the question of infringement depends.

In considering them, it is important to bear in mind, that the patent is for a combination merely, in which all the elements were known and open to public use. No one of them is claimed to be the invention of the patentee. He does not claim them himself as separate inventions. It is simply a new combination of old and well-known devices, for the accomplishment of a new and useful result, that is claimed to be the invention secured by the patent. And the well-settled principles of law, heretofore applied to the construction of patents for combinations merely, must apply and govern in the present case.

The object of the patented combination was the accomplishment of a particular result, that is, to work electric signals on what was known as the “block” system, by means of circuits, operated by a single battery, instead of many. But this result or idea is not monopolized by the patent. The thing patented is the particular means devised by the inventor by which that result is attained, leaving it open to any other inventor to accomplish the same result by other means. To constitute identity of invention, and therefore infringement, not only must the result attained be the same, but in case the means used for its attainment is a combination of known elements, the elements combined in both cases must be the same, and combined in the same way, so that each element shall perform the same function, provided, however, that the differences alleged are not merely colorable, according to the rule forbidding the use of known equivalents.

The first question we have to consider upon the issue as to infringement, is, whether insulated sections of the rails, as circuit-closers, constitute an essential element in the combinations described in the patent. And that question we are constrained to answer in the affirmative.

These insulated sections of track are shown and marked on

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the drawing which accompanies the specification, and in its descriptive part they are referred to as parts of the arrangement. It says: "At intervals of, say, a mile, more or less, sections of the said track, a , a^1 , a^2 , are electrically insulated from the remainder in a manner well understood, and therefore requiring no detailed description." And again: "Each of the insulated sections of track, a , a^1 , a^2 , &c., is placed at some point at or near which it is desired to erect a signal, and any required number of these may be employed to meet the requirements of any particular case." And in describing the operation of the apparatus, it further says: "Upon reaching the point a , the wheels and axles of the train will form an electrical connection between the opposite insulated rails," &c. "Upon reaching the point a^2 , the closing of the circuit by the train will in like manner cause the signal attached to M^2 to be displayed, and the signal last displayed by M^1 to be withdrawn." It is true that the patentee also says, in the specification: "I do not desire to confine myself to the use of any particular form of visual or audible signals, nor to the particular devices herein described for closing the electric circuit at points from which a signal is to be operated;" but that he does not thereby indicate any intention of dispensing with insulated sections of the track, as a necessary part of the mode of forming and closing the circuit, appears from what immediately follows: "Instead of the circuit being closed automatically by the train itself, it may be closed by a signalman by means of a key, or switch, or otherwise." This language evidently implies that the insulated sections of the track are constant factors in the plan, the only alternatives proposed having reference not to a substitute for them, but merely to another mode of using them in closing the circuit. So in each of the three claims, the circuit-closers a , a^1 , a^2 , or one or more of them, are expressly named as part of the combination claimed as the invention of the patentee. The use of insulated sections of the railroad track thus repeatedly appears in every part of the specifications as an unchangeable and characteristic feature of the invention, and there is nothing in the state of the art at that date, as disclosed in the evidence, to show that the patentee would have

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been justified in applying, or that, if he had applied, an application would have been sanctioned by a grant of a patent for a combination as large and undefined as that now claimed by implication and construction, so as to cover every form of a circuit-closer then known or thereafter invented. For that employed by the defendants as part of the Hall system, was not only not known and in use at the date of the patent, but was a device invented by Hall himself or one by Snow, for which the latter obtained a patent dated October 21, 1873. It dispenses altogether with the use of insulated sections of the track, and employs instead a separate instrument placed near the track, and worked by means of a lever connected with the track, so that the wheels of locomotives and cars passing on the track depress the outer end, the lever being raised again and held up after the train has passed by means of a spring, which holds it in place.

Upon this point, the case seems to fall clearly within the rule declared in *Prouty v. Ruggles*, 16 Pet. 336; *Silsby v. Foote*, 14 How. 218; *McCormick v. Talcott*, 20 How. 402; *Vance v. Campbell*, 1 Black, 427; *Eames v. Godfrey*, 1 Wall. 78; *Dunbar v. Myers*, 94 U. S. 187; *Fuller v. Yentzer*, 94 U. S. 288; *Imhauser v. Buerk*, 101 U. S. 647; *Gage v. Herring*, 107 U. S. 640; *Seymour v. Osborne*, 11 Wall. 516; *Gould v. Rees*, 15 Wall. 187; *Gill v. Wells*, 22 Wall. 1; *McMurray v. Mallory*, 111 U. S. 97; *Fay v. Cordesman*, 109 U. S. 408.

On the second branch of the issue as to infringement, we think the case is quite as clearly for the defendants. In the patent, the entire circuit operated by the single battery, and which is closed at intermediate points for the purpose of displaying and concealing the signals, is described as formed by means of two wires or other conductors, *C* and *Z*, attached to the positive and negative poles of the battery, extended to any required distance in a direction parallel, or nearly so, to the line of the railroad. These wires may be placed on poles, it is said, and should be suitably insulated from each other and from the earth, and they are declared to be virtually prolongations of the positive and negative poles of the battery.

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Throughout, the two conductors are designated as metallic, and insulated from the earth, and they are embraced under that description in each of the claims. On the other hand, the defendants' plan does not include a metallic circuit, composed of two conductors, as thus described, but uses a circuit composed in part of the earth itself. The material difference in the principle or mode of operation of the two plans, as distinguished in this particular, is indicated by Prof. Morton in the extract from his testimony already quoted. It will become more apparent on further explanation.

The object proposed by the plan of the patent is, to operate with one battery instead of several, along the line of a railroad, an electric circuit of considerable length, divisible into a number of subsidiary circuits, for the display of signals at many stations, by means of circuit-closers operated automatically by passing trains in definite and predetermined succession. It is obvious that the battery must have sufficient power, being placed at one end of the entire circuit, to operate efficiently at the other extremity. The force necessary for that purpose would be much greater than would be needed for the subsidiary circuits, all of which, it will be observed, are different in length; and this difference of force in the battery might be so great, owing to the required length of the whole circuit, as, when expended upon a shorter intermediate circuit, to destroy its capacity for working the signals by overheating. It becomes, therefore, a matter of importance, in some way, to equalize the resistance of these varying circuits. The patent itself contemplates this necessity, and undertakes to make provision for it. It is said in the specification that "the respective resistances of the several circuits should be so adjusted that they will be as nearly as possible equal to each other, as a much more perfect action of the apparatus will be secured thereby." The specification does not point out any particular methods for that purpose, but it is stated in the evidence of experts that such means were well known at the time and in common use; such as by varying the dimensions of the wire on the magnets, or the introduction of resistance coils into the nearer circuits. These devices would be independent of the apparatus described

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in the patent, and would have to be adjusted to the peculiar situation of each line of signals in practical use.

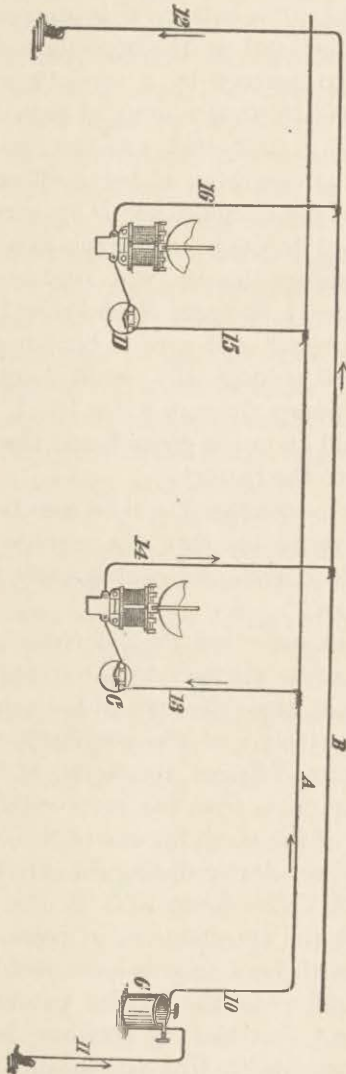
In the Hall system, as used by the defendants, no such necessity exists. According to that plan, there is no necessity of equalizing the resistance of the several sub-circuits, for they are all exactly equal by their construction, as the electric fluid in working the signal at any point, when a sub-circuit has been formed by a circuit-closer, nevertheless traverses the whole extent of the large circuit, and returns by means of the connection formed by the earth to the battery. So that, in effect, the Hall plan forms its apparatus, counting the connection through the earth, as though it were a continuous wire, as it might be, by means of three lines of conductors, of which two are combined by connecting wires with the magnets which operate the signals, at points where the circuit is closed for that purpose, carrying the positive electricity throughout the whole distance to the extreme point of the entire circuit, and then returning it by the third line, which is the connection by means of the earth. And, inasmuch as a wire might be used for this purpose, instead of the earth, it would then show three metallic conductors; and Mr. Farmer, the complainants' expert, is quite right in saying, as he does, that the equalization of the resistances in the several sub-circuits, accomplished in the plan of Hall, "is due to the arrangement of the wires wholly, and not at all to the fact that the earth is used as a portion of the conductor."

This arrangement is altogether unlike that of the patent. It introduces into the plan of the defendants new elements, a new combination, and a new result. The two wire conductors are not the same, for, in the patent, one conducts positive electricity, the other returns the current and completes the circuit, while, in the other, both the metallic conductors carry the current forward while the earth returns it, and in this mode the desideratum is obtained of securing equality of resistance by making all the circuits equal in size.

The device cannot be regarded as a substitute or an equivalent for anything contained in the complainants' patent. It is of itself an independent invention, and, as such, forms the sole subject of a patent granted to Hall and Snow, July 13,

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1875. To explain more satisfactorily the mode of its operation, so as to show that it differs substantially from the arrangement of the complainants, the descriptive parts of the Hall and Snow patent, and the attached drawings, are here given :



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“In the drawing, the letters *A B* designate two wires, which extend along the line of a railroad track, or, in other words, form the line-wires of a telegraph line. The wire *A* connects by a wire, 10, with one—say, the positive—pole of a galvanic battery, *G*, and the other pole of this battery connects by a wire, 11, with the ground. The battery *G* is supposed to be situated at one end of the line, and at the opposite end of said line the wire *B* is made to connect by a wire, 12, with the ground. Along the line are distributed a series of keys or circuit-closers, *C D*, each of which is connected with the line-wires, *A B*, the connection of the circuit-closer *C* being effected by wires 13 and 14, and that of the circuit-closer *D* by wires 15 and 16. If the circuit is closed through the circuit-closer *C*, the current passes from the battery through wire 10, line-wire *A*, wire 13, circuit-closer *C*, wire 14, line-wire *B*, and wire 12 to the ground, and through the ground and wire 11 back to the battery. If the circuit is closed through the circuit-closer *D*, the current from the battery passes through wires 10, *A*, 15, circuit-closer *D*, wires 16, *B*, and 12 to the ground, and through the ground and wire 11 back to the battery.

“From these two examples it will be seen that whenever the circuit is closed along the line the electric current has to traverse the whole circuit, and consequently the resistance is the same in all cases.”

It thus clearly appears that the difference in this particular between the invention claimed by the complainants, and the alleged infringement, is a difference in the arrangement of the parts and in the principle of the combination, with different elements performing different functions; and that the difference is something more than the mere substitution of a connection by means of the earth for one of the conducting wires. The case is, therefore, clearly distinguishable from that of *The Electric Telegraph Co. v. Brett*, 10 C. B. 838, cited and relied on by counsel for the appellants as in point, where the substitution of the earth for a wire as a conductor, being the sole difference, was held, under the English patent laws, not to be sufficient to destroy that identity between the two competing devices, which constituted in that case the infringement alleged,

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although the patent itself called only for metallic conductors. Were that the only difference between the two plans under examination in the present case, there might still be question, in view of our own patent laws, whether the patentee had not made a wholly metallic circuit a necessary part of his combination, to be determined by considerations which we have not thought it necessary to bring into view as bearing upon that point. For, as we have seen, the difference on which we ground our conclusion that the defendants are shown not to have infringed the complainants' patent, in this particular, is, not merely that they have used the earth for the return of the current that completes the circuit, instead of a metallic conductor, but that they have arranged their conductors, in reference to the battery, the magnets, the rails, and the earth, upon such a system, and with such relations and connections, that, in operating their signals by a single battery, the circuits are equalized as to resistance; while in that of the plaintiffs the circuits are of unequal size and resistance, requiring for successful practical use the equalization of the resistances thus created by means of independent and additional devices. One plan proceeds upon the idea of unequal circuits, to be afterwards equalized; the other adopts and embodies the idea of avoiding the necessity of subsequent rectification by an original adjustment of equal resistances. The difference is inherent in the two combinations and is substantial.

On the ground that, in the two points mentioned, the defendants' system of signalling is not shown to be an infringement of that described in the patent of the appellants, the decree of the Circuit Court dismissing the bill is

Affirmed.