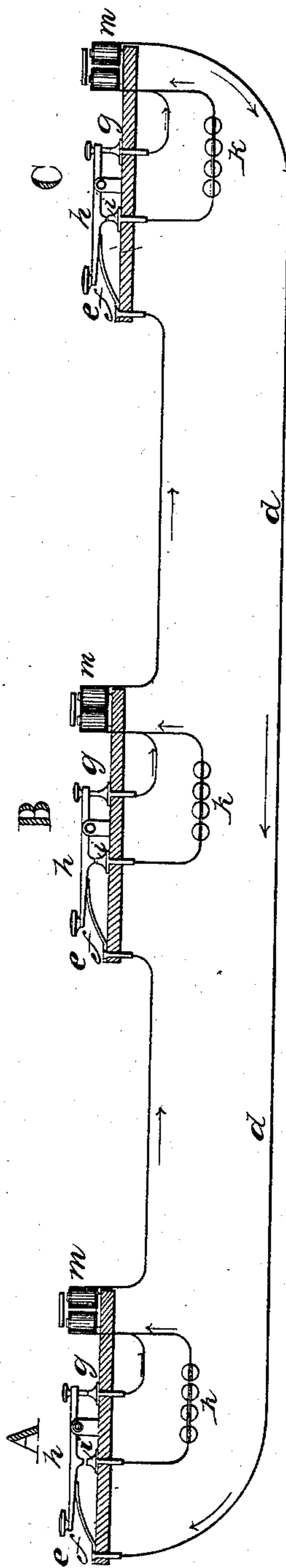


F. O. J. SMITH.
ELECTRIC TELEGRAPHING APPARATUS.

No. 26,625.

Patented Dec. 27, 1859.



UNITED STATES PATENT OFFICE.

FRANCIS O. J. SMITH, OF WESTBROOK, MAINE.

IMPROVEMENT IN ELECTRIC TELEGRAPHING APPARATUS.

Specification forming part of Letters Patent No. 26,625, dated December 27, 1859.

To all whom it may concern:

Be it known that I, FRANCIS O. J. SMITH, of Westbrook, in the county of Cumberland and State of Maine, have invented a new and Improved Mode of Constructing and Operating Electro-Magnetic and Electro-Chemical Telegraphs; and I do declare the following to be a full and exact description thereof.

First, I employ an entire metallic conducting-circuit, in combination with any known generator of galvanism, electricity, or electro-magnetism, and any known mode of breaking and closing such circuit at pleasure, and with or without electro-magnets, according as electro-magnetic or electro-chemical instruments or machines are desired to be operated for telegraphing purposes.

Second, one such generator is to be employed at every station for the main circuit from which intelligence is to be sent to any other station by means of said combination, and the same is to be adjusted to the circuit and to the other aforesaid known agencies in the manner hereinafter described, so as not to have such generator brought into action only when intelligence is being transmitted from such station, whether such station be territorially a terminal or intermediate station of such metallic circuit.

Third, I employ for such conducting-circuit any metallic rod, wire, or cord of sufficient conducting capacity to transmit the current so generated of the desired intensity and quantity, the conductor being extended from one pole of said generator to each station to be communicated with, and there adjusted to and combined with the required electro-magnetic or electro-chemical instruments or machines, as hereinafter described, and thence back to the other pole of such generator, such conductor being also extended on supports above ground or buried in the ground, or through any body of water that may intervene between such stations, and without any of the known or used modes of insulation in the hitherto constructed electro-galvanic or magnetic telegraphs, it being a peculiarity of my improvement and combination to wholly dispense with all denominations of artificial insulation of the conducting-circuit employed, hitherto deemed essential in the construction and working of electro-magnetic and electro-chemical telegraph-lines, in my improvement the ground and water being alike

incapable of use for any part of the conducting-circuit.

Fourth, any known instrument or machine or mode of recording, marking, or printing signs or letters, or of sounding or forming magnetic or electric signals of intelligence or of deflecting magnetic needles or bars at distant points or places from the operator, may be employed or used in the circuit aforesaid, adjusted or combined as herein described, and at each and every station that may be desired.

Fifth, I refer to the annexed diagram for further and more minute illustration of the combination and adjustment of the several parts of a telegraph-line constructed according to the improvement which I claim. This diagram represents three distinct stations distant from each other at A B C, and in like manner any number of stations may be included in a circuit. In this diagram *d d d d* represent the main conductor. *e* represents a well-known lever-key for breaking and closing the circuit at each of the stations. To one end of this key, which is metallic, and forms a section of the main conductor under all circumstances, is attached the main conductor, which at that point is formed into a spiral or other spring (see *f*) of sufficient strength to maintain the key, when not operated, in a position of contact at its opposite end with the metallic point beneath the same at *g*. Said key has a metal point at *h*, which, when the key is pressed downward by the operator, is brought in contact with a metallic point or anvil, *i*, and breaking the previous circuit at *g*. From the anvil *i* is extended a section of the metal conductor to one pole of the generator aforesaid, *k*. From the opposite pole of the generator *k* another section of the metal conductor is extended and joined to the conductor that leads to the current-coils of an electro-magnet, *m*, when one is desired to be employed in the combination for the purpose of working a local conducting circuit, or any magnetic instrument or machine for telegraphic purposes, or to the electro-chemical instrument or machine when such is employed for said purposes instead of an electro-magnetic instrument or machine. From the metallic point or anvil *g* another section of the main conductor is extended to and joined with the aforesaid section of conductor that connects the generator with said current-coils

or electro-chemical apparatus. From the opposite extremity of said current-coils or electro-chemical apparatus the main conductor *d* is continued to the next station B, where the same combination of key, sectional conductors, generator of galvanism, electricity, or electromagnetism and magnetic or electric instruments or machines is employed in and forms a part of the main conducting-circuit, as at A, and in like manner to and for as many more stations as may be required in the circuit.

Operation: From the above description it will be apparent that with the keys throughout the circuit at rest upon their respective anvils *g* the metallic circuit is complete without any generator in action, and that whenever the key of either station is pressed downward and the metallic points *h* and *i* are brought into contact the aforesaid metallic circuit is broken at *g* at that station only, and the circuit is reformed through the generator *k* of that station, and the sectional conductors connected with the opposite poles of that generator, and the current of electricity or galvanism acts throughout the entire circuit and brings into use each aforesaid instrument or machine combined therewith at each of the stations in the circuit, but leaves every other generator in the circuit out of action.

Sixth. Explanation of the law of my improvement in the construction of the conducting-circuit: The nearer the capacity of the wire forming the current-coils that may be used in the main circuit approaches an equality in conducting capacity with the main conductor, the more perfectly will the current be transmitted or maintained in equality of intensity and power throughout the circuit, as the reduced capacity of any section of the circuit, however short, either by lessening the size of it, or otherwise, reduces in a like degree the capacity of the entire circuit, and thereby establishes an affinity between it and interposed conductors of correspondingly inferior capacity, and creates through the latter a short circuit. So long as an equality or uniformity of the capacity of the conductors for the current is maintained no inferior conductor of a shorter circuit will divert the current so much as to interfere with the successful working of the telegraph-line constructed upon the improvement herein described, whatever may be the extent of its circuit. Hence the ability I claim for such a line to work for telegraphic purposes without any artificial insulation, under

the combination of apparatus above described, through any distance of air, earth, or water, the true law being that the current will not leave a superior conductor, whatever may be its length, for an inferior one of shorter length to an extent that will interrupt its use for telegraphic purposes. The only practicable mode, moreover, of working an uninsulated metallic circuit is by the above combination of an independent circuit, or its equivalent, by which the only generator of a current brought into action at any one time on the line is that immediately under the control (for breaking and closing its current-circuit) of the transmitting operator. As it is impracticable for him to break and close the entire current of a distant generator, for the reason that as soon as the metallic circuit of a distant generator is broken the portion of circuit intervening between the operator so breaking the circuit and the distant generator of electricity is reduced to the capacity of any conductor which is touched by such intervening portion of the circuit, and a short circuit is thereby immediately established for such distant generator, and the recording or telegraphic instrument, combined with the generator at such distant point, cannot, in consequence of such short circuit, be worked by such distant operator, he cannot break and close the shorter circuit which the distant generator under such circumstances seeks out, although it be of an inferior conducting capacity.

I disclaim the invention of each of the above-described apparatus, instruments, and machines in severalty, each having been long known. I also disclaim the particular combination for working telegraphs described in the Letters Patent granted to E. Cornell, dated December 20, 1845, wherein the ground forms a part of the circuit, and insulators of the wire are indispensable.

What I claim as my invention, and desire to secure by Letters Patent, is—

The above-described new and improved mode and combination of apparatus, instruments, and machines used conjointly in the manner and for the purposes above described, and dispensing therein with all artificial insulations of conducting-circuits for telegraphic purposes.

FRANCIS O. J. SMITH.

Witnesses:

FRANCIS B. SMITH,
ELIPHALET CASE,
CHAS. F. WOOD,
J. G. SPEED, Jr.