G. B. SCOTT.

Elevated Wire Way.

No. 239,624. Patented April 5, 1881.

FIG. 5.

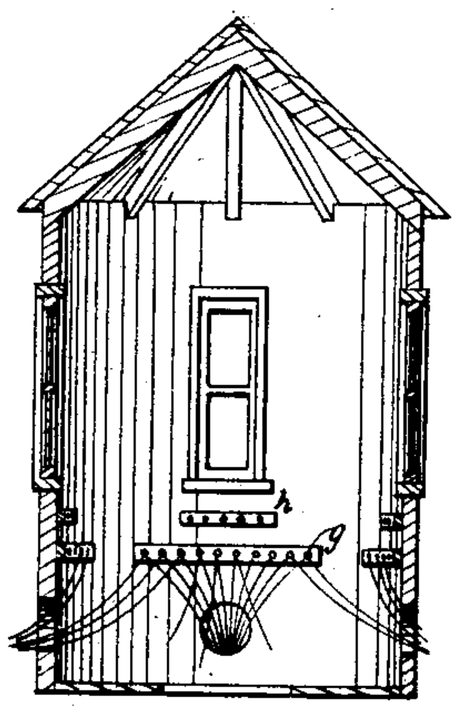


FIG. 1.

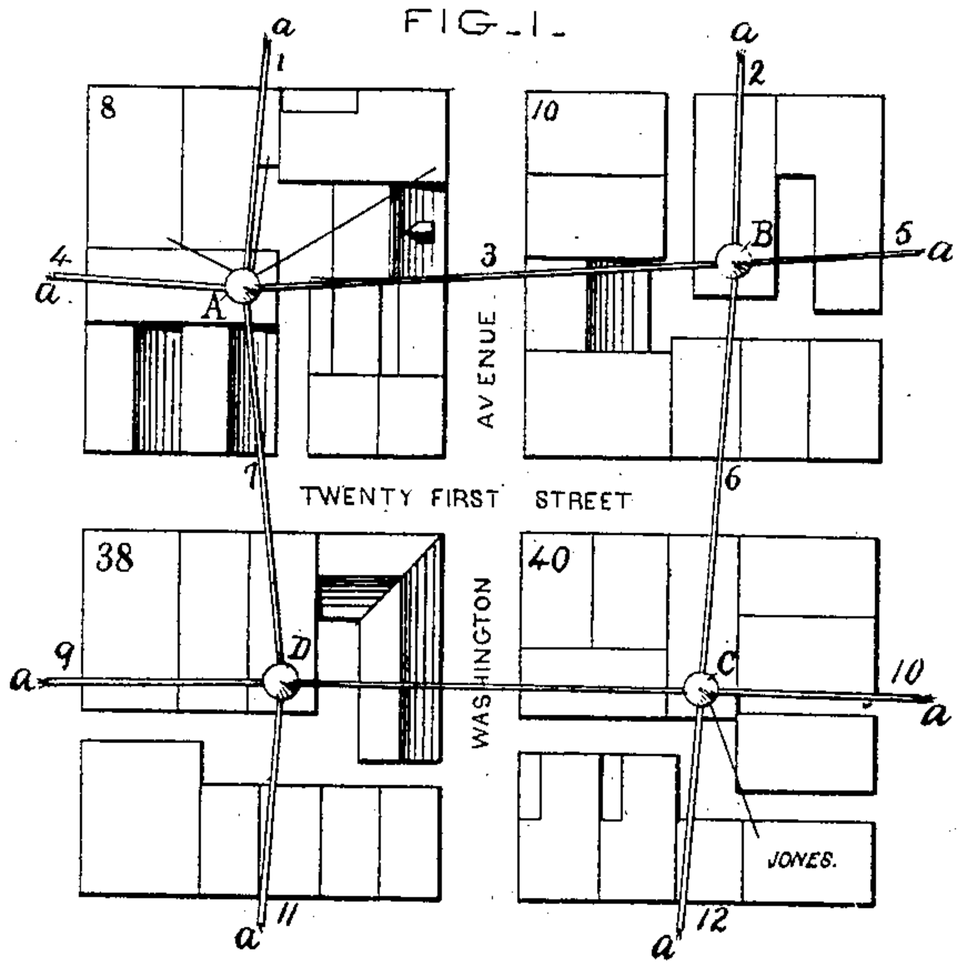


FIG. 6.

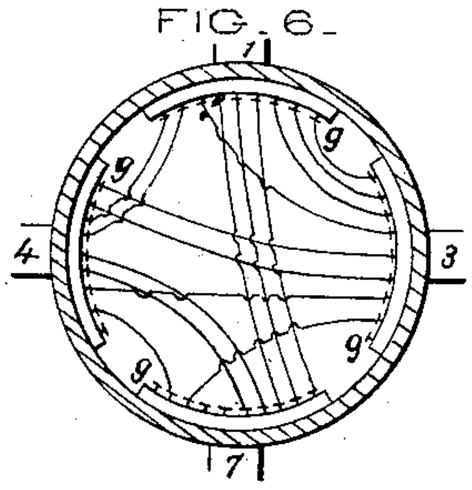


FIG. 2.

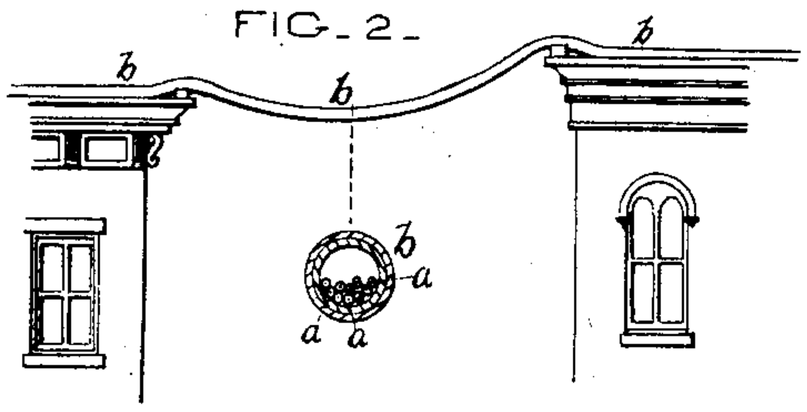


FIG. 3.

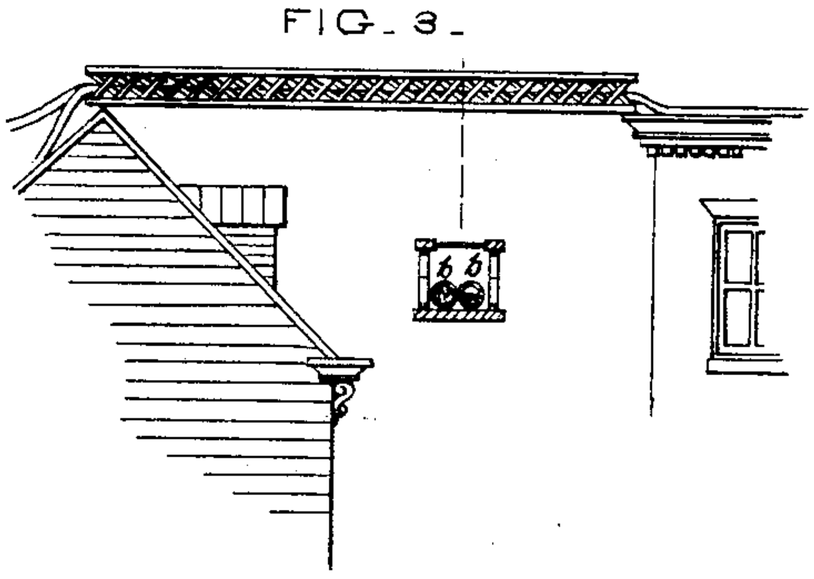
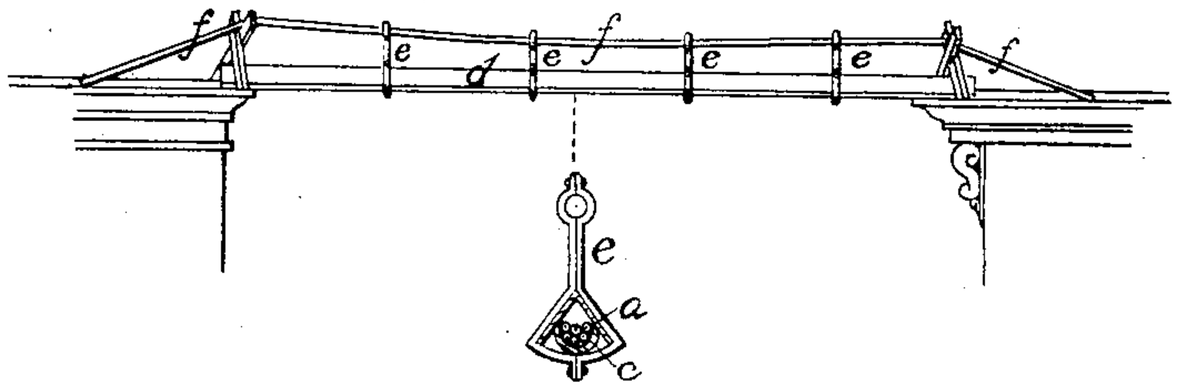


FIG. 4.



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ELEVATED WIREWAY.

SPECIFICATION forming part of Letters Patent No. 239,624, dated April 5, 1881.

Application filed February 17, 1880.

To all whom it may concern:

Be it known that I, GEORGE B. SCOTT, of the city of Brooklyn, in the county of Kings and State of New York, have invented a certain new and useful Elevated Wireway for Electric Communication in Cities, Towns, &c.; and I do hereby declare that the following specification, taken in connection with the drawings furnished and forming a part thereof, is a clear, true, and complete description of my invention.

For many years the ordinary system of mounting and arranging electric conducting-wires in cities and towns has been open to serious objections, and these are now daily increasing even more rapidly than the extraordinary increase of business capable of being conducted in connection with and requiring what may be termed "electric distributive systems." As an illustrative instance, if ten separate elevated wires be employed so as to cross each other at any one point, the liability to loss incident to delays from derangement will be much more than twice the liability incident to a group of five wires occupying the same relative positions. The chances of a single wire breaking would be double in ten as compared to five wires; but in one case an overlapping wire might throw nine wires out of service, and in the other case but four, and equal or greater differences would occur under many other conditions of almost daily experience in large cities. Again, fires in cities frequently result in damage to electric communication which involves great loss and much delay, even when the most approved temporary arrangements are made for as prompt resumption of business as is now possible. Again, the employment of poles in streets is widely objected to, and for many unanswerable reasons too numerous to herein set forth. The practically hap-hazard system of mounting wires here and there on house-tops is also a frequent source of delay and annoyance, not only to householders, but to line-men called out of usual hours to correct faults on an important line of communication, and so on almost indefinitely.

The only well-directed method, so far as I know, which has been heretofore devised for obviating many of these difficulties is that known as the "underground" system; but in attempting to avoid certain of the objections named many others have therein been encountered, which have, thus far at least, operated as effective barriers to its general adoption. The acknowledged objections incident to the underground system are in part stated as follows: The electric conductors must be not only thoroughly insulated, but protected against mechanical injury from the tools of workmen engaged in laying the wires, and subsequently against those employed on water, gas, and building service, all of which necessarily involves great expenditure in the manufacture and planting of the conductors. Again, in the event of a break such as is liable from the settling of earth, blind washouts of sewers, undermining of rats and their direct attacks on the covering of the conductors, &c., it is troublesome and expensive to find the point of injury and to repair it. Again, to add one or more conductors to any series of conductors is practically impossible even when pipes are employed which are not already filled, and it is wholly impossible when said pipes are filled, rendering it imperative to then wait for a demand for enough new wires to warrant the laying of a new underground group; and if a larger plant of wire be laid at the outset than is then required, with a view to prospective requirements, a heavy outlay is involved, because an entire underground system should be simultaneously laid if economy in the end be a controlling incentive.

It has heretofore been proposed, as set forth in English Letters Patent No. 2,462 of A. D. 1860, to provide for "over-house" telegraph-lines by cabling the wires or conductors within ropes, so as not to subject the conductors to stretching tension, and stretching such cables between supports placed at suitable intervals, said cables or ropes being arranged over a town in a species of triangulation, by which several of said cables abut on each straining-post, and extend from one post to the other without having one cable crossing another; and in the same connection it was proposed to employ between the straining-posts additional supporting-posts provided

with connecting-disks for supplying branches or for testing purposes; and it was therein further proposed to suspend the rope or cable over streets by means of transverse rods or wires fixed to opposite houses, or, in lieu thereof, to employ within the cable a strong iron or steel wire to bear the strain between one support and another.

It is to be understood that I make no claim to aerial cables, except said cables be employed in my system within accessible housings, enabling said cables to be wholly protected from the weather and relieved from such tensile strains as in practice soon result in the exposure of the conductors to defective insulation. Said accessible housings also enable me to use cabled conductors of such a light and inexpensive character as would be wholly unfit for use as proposed in said English Letters Patent. Nor do I broadly claim such an arrangement as will admit of the intermediate testing or branching of conductors, as suggested in said English Letters Patent, that being but one of the many advantages attendant upon my invention, accompanied with a capacity to remove any single defective conductor and replace it with a perfect one, which would not be possible in the system as proposed in said English Letters Patent.

The objects of my invention are to attain as nearly as possible all of the desirable qualities and capacities of an underground system of electric communication without any of the grave objections incident thereto, and also to obviate most of the objections to the elevated system now almost exclusively employed.

The invention made by me is a novel system of electric wireway, which consists in massing or grouping insulated electric line-wires, extending said masses or groups over streets and house-tops, within accessible housings, from block to block, and connecting these masses or groups to cupolas on said blocks, for continuous connection therein with line-wires of other masses or groups, or for local distribution to wires terminating within the limits of any of said blocks.

As it is important that the cost of each insulated line-wire be reduced to a minimum, not only as regards weight of wire metal, but also insulating methods and materials employed therein, I have devised means whereby said wires will be little, if any, taxed as to their self-supporting capacities or tensile strength, and also whereby comparatively inexpensive insulation may be safely relied upon; and, still further, whereby the individual wires will be practically accessible.

Stated in other words, my invention consists in the combination, with a series of cupolas located at intervals in a town or city, of a series of accessible elevated housings connecting said cupolas and a series of massed or grouped insulated wires within said accessible housings. Said accessible housings protect the wires from rain and snow and admit of the ready introduction and removal of wires from time to time.

To more particularly describe my invention, I will refer to the accompanying drawings, in which—

Figure 1 represents a bird's-eye view of several city-blocks with my wireway system applied thereto. Fig. 2 represents, in side view and cross-section, a self-supporting housed group of wires as arranged for crossing streets or spanning spaces between high buildings on any block. Fig. 3 represents, in side view and cross-section, a street-crossing wireway constructed on the ordinary truss-bridge plan. Fig. 4 represents, in side view and in cross-section, a wireway-span constructed on the suspension-bridge plan.

Inasmuch as the line-wires *a*, as used in accordance with my invention, require comparatively little tensile strength, I prefer to employ copper conductors, thus attaining good conductivity with minimum bulk and weight. The character of wire and insulation preferred by me for ordinary service is that embodied in the higher grades of the well-known "Phillips office wires," No. 16, Brown & Sharpe gage.

I will first describe the particular method of massing the wires illustrated in Fig. 2. The wires *a* are loosely contained in a strong flexible tubular structure or housing, *b*, constructed in suitable lengths and provided with couplings, whereby the several lengths may be united not only with reference to exclusion of dampness, but also to tensile strength. I prefer that this form of housing be composed in part of a spiral-wire foundation, said wire being cheaply covered prior to spiraling, and insulated otherwise, if need be. Over this foundation is a coarsely-woven fabric of requisite tensile strength, re-enforced by one or more longitudinal iron wires. This housing is then coated with any reliable protecting substance—as, for instance, mineral paint. Such a housing can be economically constructed, and for ordinary spans it can be safely relied on, and for house-top service it can be generally used. In running or laying such a housing I proceed as follows: The several wires *a*, of the desired number and of the length required, are first loosely massed, coiled on a drum, and located at the starting-point on a house-top, and the outer ends of all the wires are firmly secured to a cylindrical head, to which a draw-line is attached, whereby the wires are drawn through, say, a fifty-foot section of housing, carrying with them a small draw-cord for the future insertion of additional wires. The home end of the housing is securely held during this operation, the main draw-line working over a portable windlass, the drum of which is capable of being lifted from its bearings at one end, so that the draft on the line encircling the windlass-drum may be effected while the free end thereof may meantime be inserted into and through another section of housing. The detachment of the

draft-line from the windlass after each section has been filled is readily effected by lifting the end of the windlass-shaft from its bearing. The second or empty section of housing is then moved up the draw-line to the first section and coupled thereto, whereupon the windlass, being readjusted, is again brought into action, moving it from house-top to house-top until a street-span, for instance, is reached. The windlass is then transferred across the street with a length of housing on the draw-line, which is coupled to the last section, and so on until the wires are wholly housed throughout their length. Wherever the housing passes over a parapet or party-wall a curved wooden saddle is provided, to afford an easy seat for the housing and avoid sharp angles liable to injure it.

With a view to rendering the housings proof against spreading fire from a burning building, the textile matter may be thoroughly saturated in silicates or other solutions prior to the application of the mineral paint. The usually inflammable nature of the insulating matter may be practically offset by calking the two ends of the housing with any suitable fire-proof matter, thus preventing the circulation of atmospheric oxygen to within the housing. In any event the housing and wires can be readily cut away at any point should occasion demand it. On long stretches of comparatively even house-top surface the housing can be composed of galvanized sheet-iron, each section provided with couplings, as with the flexible housing. For unusually long spans I prefer the suspension plan illustrated in Fig. 4, with which either the flexible housing or the iron pipes may be employed, or the housing as shown in said figure, the same being a trough, *c*, of iron, open at the top and housed by inverted-V-shaped plates *d*, well overlapped at the ends and provided with water-shedding joints, the whole being suspended by means of stirrups *e* from the bridge-cable *f*, provided near each end with suitable tripods, and with good anchorage upon the roof of the building.

The truss-span, Fig. 3, is well suited to support several separate housings and their wires. It is obvious that the housings and the spanning devices may be largely varied in construction, according to circumstances in each particular case.

I will now describe the cupolas which are shown in Figs. 5 and 6. Preferably those structures will be made of light galvanized sheet-iron and a suitably heavy frame, also of iron, and of any preferred form; but if circular, as shown, they will be comparatively inexpensive, and present a favorable area to resist the force of high winds. These cupolas should be located on the highest buildings of a block, the company erecting the cupola being tenants of the premises so far as relates to the cupola, and having access to the building by main entrance as freely as other tenants of the same premises. If there are open interior spaces on a block, a suitable skeletonized tower therein may in some cases be preferred. The massed and housed wires enter the cupola at one or more points, and each wire is preferably secured to a screw-post, *g*, adjacent to the entrance of each group. These posts are then connected, as occasion may require, by wires, *g'*, or splice-joints may be made from wire to wire. Another series of posts, *h*, is provided, for connection with short wires leading from the cupola, for local stations on the same block. Each of the housings is internally accessible at each end for the introduction and withdrawal of wires, and also at each of its couplings; and this accessibility may be still further increased, if desired, by the use of the open trough and its roofing illustrated in Fig. 4.

In Fig. 1 my system is illustrated as covering four blocks and beyond. In practice each housed section will bear and be known by its number, and those shown are respectively numbered from 1 to 12. Each cupola will also bear a designative mark, as A, B, C, &c. A complete series of maps of the entire system in possession of the line-engineers will show the location of each cupola, the groups of wires connected therewith, and the number of wires in each group, these latter being also numbered and marked at each cupola either by number of its post or a tag securely fastened thereto. A record of connections to each terminus may be kept. Thus, for instance, to cupola A, housing 1, wire 3 to D; housing 7, wire 9 to C; housing 8, wire 4 to Jones, block 40. When air-lines of considerable length are required, wires of the same number, splice-jointed at the cupolas, extend to the point desired, an office registry being kept thereof. Should a long line become defective, tests from point to point are readily made, and when the break is found a transfer of connection at the proper cupolas of that housing can be made with a perfect wire, and the imperfect one may be drawn into that cupola, bringing in a fresh one secured to it at the cupola at the other end of the housing; or sometimes such imperfect wire may be utilized for local purposes. Should a fire occur, causing a break in any one section or group, the requisite connections for resuming communication may be readily made in a short time *via* the spare wires in the several housings leading to the right and left to cupolas adjacent, and thence to the cupola next beyond the break.

For emergencies small groups of conductors in small light tubular housings, kept on hand for the purpose, may be promptly placed in position, connecting cupolas separated by a break for enabling temporary service pending the replacing or repairing of a broken permanent housing and its wires.

Although I have shown a cupola on each of the four blocks, illustrated in Fig. 1, it is not to be understood that I limit my invention to housed groups or masses of conductors reaching from one block to the next adjacent blocks, for, while in the busiest portions of

large cities a cupola will be required on every block, at other portions of the same city the cupolas would necessarily be more widely separated, and in some cases long air-lines of housed conductors should be extended continuously from one cupola to another many blocks away; but these will preferably pass near to each of the several cupolas located on the intervening blocks.

It will be seen that my novel wireway system may be readily introduced into any city wherein the present elevated wire system is in use, commencing at a main office and gradually radiating therefrom in all directions, as far as then existing requirements warrant, the outer cupola in each direction having the outlying single pole and house-top wires branching therefrom.

The addition of groups or masses of wires from one cupola to another can readily be made without affecting the proper working of those already laid, and, if the street-span bridging be properly proportioned at the outset, each bridge may be utilized for supporting many housings subsequently laid, thereby involving no cost outside of the housings and conductors and placing them in position, whereas in the underground system each added group of wires involves a cost in digging and planting equal to the cost of the first group laid. So far as relates to induction liable to grouped wires, there is no more tendency in that direction in my system than would exist in an underground system, and induction may be practically obviated by using two wires twisted together for each circuit in either system; but this could be much more economically done in my system than in the underground system.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

The novel system of electric wireway, substantially as hereinbefore described, consisting of insulated electric wires, grouped or massed, extended over streets and house-tops, within accessible housings, from block to block, and connected with cupolas on said blocks, for interior connection with the wires of other similar groups, and for local distribution to wires terminating at points adjacent to said cupolas.

GEO. B. SCOTT.

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