

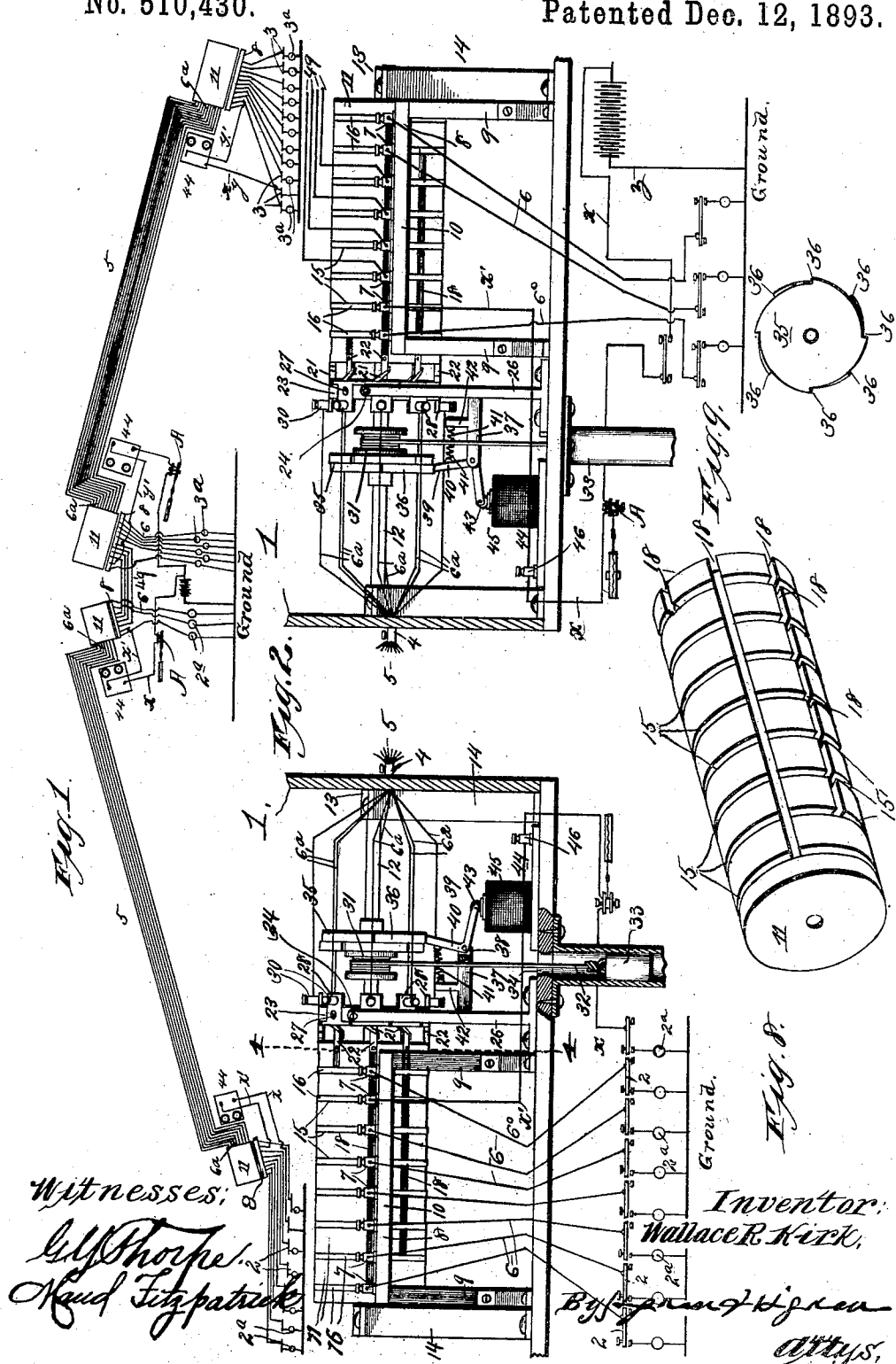
(No Model.)

2 Sheets—Sheet 1.

W. R. KIRK.
TELEGRAPH OR TELEPHONE SYSTEM.

No. 510,430.

Patented Dec. 12, 1893.



UNITED STATES PATENT OFFICE.

WALLACE R. KIRK, OF KANSAS CITY, MISSOURI.

TELEGRAPH OR TELEPHONE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 510,430, dated December 12, 1893.

Application filed November 3, 1892. Serial No. 450,805. (No model.)

To all whom it may concern:

Be it known that I, WALLACE R. KIRK, of Kansas City, Jackson county, Missouri, have invented certain new and useful Improvements in Telegraph or Telephone Systems, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to an improved telegraph or telephone system, and the object is to provide a secret service telegraph or telephone that will cause a message or conversation between two fixed and corresponding points to travel over changing intermediate conductors, which changes are automatically made at short intervals of time, so that communication over the same may not be intelligently intercepted.

To the above purpose, my invention consists in certain peculiar and novel features of construction and arrangement, as will be hereinafter more particularly described, and pointed out in the claims.

In order that my invention may be fully understood, I will proceed to describe it, reference being had to the accompanying drawings, in which—

Figure 1. is a diagrammatic plan view of the electrical connections arranged for use between a central point and two outer points or between two extreme or outer points. Fig. 2. is a side elevation of a pair of the instruments, one of which is located at each end of a system of electric wires or conductors, and which operate simultaneously, the casings being broken away. Fig. 3. is a top plan view of the electric and mechanical construction and arrangement of the terminals, located at an intermediate point, and provided with suitable battery and clock connections, of two systems of telegraph, the casing or housing of said terminals being shown in horizontal section. Fig. 4. is a section, taken on the line 4—4 of Fig. 2. Fig. 5. is a detail view in side elevation of the revolving cylinder, carrying varying or shifting connections or conductors. Fig. 6. is a face view of the stationary disk, located opposite the end of said cylinder. Fig. 7. is an end elevation of the cylinder, carrying a number of metallic brushes. Fig. 8. is a detail perspective view of the revolving cylinder. Fig. 9. is a face view of the escape-

ment wheel. Fig. 10. is a plan view, showing the mechanism by which a circuit is made and broken alternately, and Fig. 11. is a detached perspective view of the escapement drum or spool and weight adapted to operate said drum or spool.

Before entering upon a detailed description of the invention, I would state that a casing or receptacle is provided at each office, containing, preferably, the terminals of two systems, or it may contain the terminals of two or any number of pairs of systems desired; for example, the terminals ending at Buffalo, of Chicago and Buffalo, and New York and Buffalo systems, as shown, or it may contain, also, in a casing large enough for the purpose, the terminals of Kansas City and Buffalo, and Washington and Buffalo; or it may be a room, and contain the terminals of all pairs of systems leading into and out of Buffalo, and kept locked from outside interference, the wiring extending to the sending and receiving tables in an adjoining room, as will be readily understood.

In the drawings,—1 designates a casing, which is located in the office and contains the terminals at the end of each system, or which may contain the terminals of two or more systems, and which is kept locked and sealed from outside interference.

Located at opposite ends of each casing are a series of binding posts 4—4, corresponding in number to the wires or conductors 5, which are represented as broken away, which connect the binding posts 4 of the instrument in one station with the binding posts 4 of its companion instrument in a distant station. A corresponding number of binding posts 7 are located upon a suitable support 8, inside each casing.

Located in a convenient position without the casing, or in a separate room, are the telegraph keys 2 for the operators. Local wires 6, corresponding in number with the wires 5, connect each with one of these telegraph-keys and with the binding posts 7 of support 8. The supports shown in the drawings consist of two upright posts 9, connected at their upper ends by a bar 10, of any suitable insulating material.

Located opposite, and about the same length as the bar 10, is a cylinder 11, of hard rub-

ber or any other suitable insulating material, which is mounted upon a horizontally arranged and revoluble axle, or shaft 12, supported at its opposite ends in bearings 13, at the upper ends of bracket supports 14, which are preferably secured at their lower ends to the base or bottom board of the casing. The cylinder 11 is provided at intervals with annular grooves or recesses 15, corresponding in number with, and located directly opposite, the binding posts 7. Each groove 15 is provided with a ring or band 16 of brass or other suitable conducting material, and metallic brushes 17, projecting from the binding posts 7, contact continually and permanently against the periphery of the rings or bands 16. The cylinder 11 is further provided with the longitudinally extending grooves 18, which correspond in number with and are recessed deeper into the cylinder than the annular grooves 15. These grooves 18 are open at one end of the cylinder, and extend toward the opposite end thereof, each ending successively as the next annular groove 15 is reached. Metal strips or bars 19, of length corresponding, are slipped in the longitudinal grooves 18, and have one end provided with the outwardly projecting shoulder 20, which is permanently in contact with the inner surface of its corresponding ring or band 16, thus forming a longitudinal series of conductors, each in permanent contact at one end with its respective ring or band 16, and at its opposite end with a metallic brush 21, the handle or arm 22 of which rests in the ends of grooves 18, and are secured to the outer side of strips 19 by screws or other suitable means. The object in providing the outstanding shoulders 20 of metallic conductors 19 is to allow the intermediate portion of said strip to pass the intermediate rings 16 without contact therewith. Located opposite the end of cylinder 11 is a disk 23, which is supported by means of screws 24, or other suitable means, in the recess or bifurcation 25, in the upper end of a supporting bracket 26, which is suitably secured at its lower end to the flooring or base board of the casing. Secured in recesses or upon the periphery of the disk 23, which is of hard rubber or other insulating material, by means of screws 27, are the metallic conducting brackets 28, which are provided with the segment shaped arms or plates 29, arranged concentrically to the axis of the cylinder, and against the face of the disk, opposite and adjacent to the end of the cylinder 11, carrying the brushes 21. The radial edges of the plates or arms 29 of brackets 28 are in close proximity, but are not in contact with each other, the purpose of which will be hereinafter explained. The opposite ends of brackets 28 project beyond the outer face of the disk 23, and have secured thereto binding posts 30, which are connected to the binding posts 4 of the casing by local wires 6^a, these local wires thus forming a continuation of the main line conductors 5. The shaft

projects centrally through the disk 23, and has secured thereon between the said disk and its adjacent bearing 13, the drum 31, having a cord 32 secured thereto at one end, and a weight attached at its opposite end, and adapted to operate vertically, as the cord winds or unwinds upon the drum, in the guide sleeve 33, which is secured beneath an opening 34 in the base or flooring of the casing.

Cast integrally with or secured to the drum 31, is a double escapement wheel 35, which is provided with teeth 36, corresponding in length and number, preferably, with the concentrically arranged segment arms or plates 29 of conducting brackets 28.

Projecting centrally and horizontally from the faces of the supporting brackets 26, and a suitable distance below the escapement wheel 35, is an arm 37, the outer end of which is bifurcated at 38, and has the angle of a bell crank lever 39 pivoted therein, the upwardly extending arm 40 of which engages alternately the teeth 36 of the double escapement wheel 35, by means of the contracting spring 41 secured to the upper end thereof, and at its opposite end to the arm 42, extending upward from the arm 37 of supporting bracket 26.

Secured centrally to the opposite or lever arm 42 of the bell crank lever, is an armature bar 43 of soft iron, or other suitable metal, and which projects laterally at each side over the poles of an electro-magnet 44, which is attached to the base of the casing, as shown.

The construction and arrangement of the devices described may be duplicated in each casing, as shown in Fig. 3, to more conveniently arrange and connect up a battery, or other suitable source of electrical current supply, which may operate only one system, and have a separate battery for the other system, but which is preferably used to operate a pair of systems, as illustrated in Fig. 3. This special battery is connected at the negative pole to the ground by a wire x , and from the positive pole, a wire x , leads to and from a telegraph-key 2, and a clock mechanism (hereinafter described) to make and break the circuit alternately to the post 46 a terminal of the coils 45 of the electro-magnet 44 of the Buffalo terminal of the Chicago and Buffalo system; a wire x' connects the binding-post 47, the other terminal of the coils 45 of the aforesaid electro-magnet 44, with its binding post 7 of the corresponding support 8. A wire y , also leads from the positive pole of the special battery, to and from a telegraph-key 3, and a clock-mechanism to make and break the circuit alternately, to a post 46, a terminal of the coils 45 of the electro-magnet 44 of the Buffalo terminal of the New York and Buffalo system; a wire y' connects the binding-post 47 the other terminal of the coils 45 of the electro-magnet 44 of the New York and Buffalo system, with its binding-post 7 of the corresponding support 8, as illustrated in Fig. 3.

As before explained, each casing 1 prefer-

ably contains one of the terminals of each pair of systems, which systems may be entirely separate, or which may be connected by certain through wires 49, extending from Chicago through the Buffalo office without interception to New York, as shown in Figs. 1 and 3. The remaining wires 5 lead each to a telegraph-key 2 of the Chicago system, thence through operator's batteries 2^a and to the ground, while the wires 5 of the New York system, lead to the telegraph-keys 3 of the New York system, in the Buffalo office, thence to operator's batteries 3^a and to ground, with one exception, said wire, after leading to a telegraph-key 3^a, continuing to the special battery. At the opposite, or Chicago and New York, ends of each system, all the wires lead, respectively, to the telegraph-keys of the Buffalo and Chicago and Buffalo and New York systems, as illustrated in Fig. 1 of the drawings, thence lead to operator's batteries 2^a and 3^a, respectively, and are then grounded.

Referring to Fig. 3, it will be seen that eight wires or conductors, only, are shown, with a corresponding number of connections, but it will be understood that any desired number of wires, with corresponding conductors, may be used, as illustrated in the diagrammatic view, Fig. 1, where eight wires start from Chicago. Four of these wires 49 continue through to New York, while four lead to the Chicago and Buffalo telegraph-keys 2; and one of which continues to the special battery. The posts 7 of Chicago casing form the terminals of the system of stationary wires or conductors 6^a, 5 and 6^a in Chicago, and the corresponding posts 7 of Buffalo casing form the other or Buffalo terminal of the Chicago and Buffalo system of stationary wires, extending from Chicago to Buffalo. The Chicago terminal posts 7 connect with the Chicago and Buffalo telegraph-keys 2, through local wires 6, thence through operator's batteries 2^a, to ground in the usual manner, while the Buffalo terminal posts 7 of the same system connect with the Chicago and Buffalo telegraph-keys 2 in Buffalo, through similar local wires 6, and thence with the exception of through wires to New York, and one wire *x*, which continues to the special battery, as described through operator's batteries 2^a, and to ground. As will be seen from the drawings, one battery or dynamo located in the casing 1 at the intermediate point, Buffalo, causes two complete circuits; one passing over wire *x*, through a telegraph-key and through the clock mechanism, to make and break the circuit alternately, as will be hereinafter referred to, through magnet wire *x'* to a binding post 7 of the support 8, thence through certain shifting connections, to a binding post 30, thence through connecting wires 6^a—6^a and intermediate wires 5 to binding posts 30 on stationary disk in Chicago casing; through certain shifting connections to post 7, through magnet and through telegraph-keys, and then to the

ground. The opposite pole of the battery being also connected to the ground by wire *z*, the circuit is completed. The wire *y* of New York and Buffalo system leads through a telegraph-key, a clock operated mechanism to make and break the circuit alternately, through magnet and wire *y'* to binding post 7 of the support 8, thence through certain shifting connections to a binding post 30 of stationary disk 23, thence through wires 6—6 and intermediate wires 5 to binding post 30 of New York casing, through certain shifting connections to post 7, through a telegraph-key, and thence to the ground, thus completing the second circuit from the same battery. A separate battery may be used, as stated, with each system, if desired.

Referring now to the construction of the clock-operated mechanism to make and break the circuit alternately, A designates a drum or spool, which is revolubly mounted upon a shaft 3, supported upon standards C. A cord D is secured to said drum or spool, and is wound thereon, and carries at its free end a pendent weight E, which rotates the drum at certain periods, as hereinafter explained. Each disk-end of said drum or spool has a projection or tooth F, which projects from the peripheries of said disk-ends at diametrically opposite points; the object of these projections or teeth will be hereinafter explained. Upon the outer face of one of the disk ends of the drum or spool A are the diametrically opposite lugs G and H. A contact-brush I, bears continually against the face of said disk-end and inward of said lugs, and is connected at its opposite end to the wire *x*. A contact-brush J which is connected to the continuation of the wire *x* which leads to one of the telegraph-keys, is located adjacent to and is adapted to be successively contacted by the lugs G and H as the drum or spool revolves, to complete the circuit at intervals. Pivoted upon the upper end of a standard K to move horizontally is a lever L the rear end of which engages a zigzag and annular groove M in the periphery of a wheel N, which is actuated through a clock-mechanism O, the whole of which it is unnecessary to illustrate, being of any suitable construction preferred. The operation of the clock mechanism causes the revolution of the wheel N, and the zigzag groove M thereof, engaging the end of the lever causes said lever to operate laterally from side to side. This movement, causes the front end of the lever to alternately occupy a position adjacent to the periphery of each disk-end of the drum or spool, and form a stop upon which the projections or teeth of the disk-ends are adapted to successively bear, the arrangement being such that as the lever moves laterally from beneath the tooth or projection of one disk-end, into the path of the other, the weight E causes the drum or spool to make a half revolution, when the second tooth or projection comes in contact with the free end of the le-

ver, and the revoluble movement of the drum or spool is arrested. This movement continually takes place, and with each complete revolution of the drum or spool, two pulsations are sent over the line, by reason of the two lugs G and H, each contacting with the brush J, during every revolution of the drum or spool.

The operation of the device is as follows:—
 10 As the current from the special battery, which is entirely independent of the operator's batteries, flows through wire *x* or *y* the circuit is made and broken alternately by means of the clock-actuated mechanism described, the electro-magnets attract their respective arma-
 15 tures, and withdraw the upper arm of the bell crank lever from its position in advance of the shoulder of one of the teeth of the escapement wheel, allowing the weight to revolve
 20 said escapement wheel, until the next succeeding and alternately arranged tooth comes in contact with the upper end of the arm of the lever; the circuit is now broken by the clock, and the spring 41 causes the elevation
 25 of the armature from the coils, and the upper arm of the lever to assume its former position, when the weight descends until the next succeeding tooth comes in contact with the upper end of the arm 40 of the lever. This
 30 operation continually goes on, and with every descent of the weight the escapement wheel, secured to the shaft and cylinder 11, with its several connections, move revolubly together and with the shaft, the distance of one tooth.
 35 To clearly illustrate the progress of a message from Buffalo to Chicago, I will designate a particular local wire 6° fixed or located permanently at each end of the Chicago and Buffalo system. The message, passing from
 40 the operator's telegraph-key 2 in Buffalo casing, through local wire 6°, through the post 7, and the brush connected thereto, the ring or annulus always in contact with the brush, the metal strip always in contact with the ring or
 45 annulus, and the brush secured to the opposite end of the metal strip, to the post 30 of the bracket 28, which happens to be contacted by the brush at the time, and thence through the local wires 6°, 5 and 6° to the post 30 of
 50 Chicago terminal; from post 30 of Chicago casing, through bracket 28, to the receiving brush which contacts with said bracket at the same instant that the delivering brush con-
 55 tacts with the corresponding bracket in the Buffalo casing at the opposite end of the system, then through the metal strip connected to said receiving brush, the annulus or ring always in contact with the metal strip, and through the brush in permanent contact
 60 therewith to the terminal post 7 of the Chicago casing, through the local receiving wire 6° (corresponding to the local receiving wire 6° in the Buffalo casing) to the telegraph-key 2. Throughout the interval of time concurrent
 65 in the foregoing description, the device or machine is in a state of absolute rest; thus presenting an unbroken conductor or closed

circuit from sending to receiving table; but when the predetermined time has elapsed the cylinders will automatically revolve or move
 70 synchronously at each end of the system, and cause certain conducting brushes to move from contact with one intermediate electric line conductor into contact with another or second intermediate electric line conductor,
 75 thus presenting a new channel or intermediate conductor with each movement of the brush carrying cylinders, and the conditions belonging to the brushes described are true
 80 also of all the corresponding brushes carried by the cylinders, at each end of the system, and the current passing through wire *x*, operating clock to make and break the circuit, the electro-magnet of the Chicago and Buffalo terminal, whose armature it attracts, and
 85 wire *x'* to a certain binding post 7 of the Chicago and Buffalo support 8, travels simultaneously with the first part of the message through the corresponding brush, annulus or
 90 ring, the corresponding metal strip or bar, and brush, to the first post 30, and conductors or wires 6°, 5 and 6°, succeeding posts and their respective conductors, engaged by the traveling brush, and arrives in Chicago
 95 and passes through the receiving brush, metal strip, annulus or ring, brush and post 7, which correspond to the delivering brush and its connections and post 7 at the Buffalo end of the system, through the electro-magnet lo-
 100 cated at the Chicago end of the system, and then through the telegraph-key to the ground, attracting the armature of the Chicago magnet simultaneously with the armature of the
 105 Buffalo magnet, and the weight revolves the escapement wheels and cylinder simultaneously at each end of the system, thus causing the succeeding fragments of the mes-
 110 sage arriving in Chicago to pass through a receiving brush and its connections and local wire 6° to telegraph-key, corresponding to the delivering brush and its corresponding connections, and local wire 6° in the Buffalo
 115 end of the system, while the message, passing over changing and different intermediate line conductors, begins and ends over corresponding local wires located respectively in the Chicago and Buffalo offices. The succeeding
 120 fragments of the message follow in regular order, and the completed message, as it begins, also ends completely on one wire, though passing over different and separate interme-
 125 diate conductors or wires. Owing to the close arrangement of the radial edges of segment plates 29 of stationary disk 23, the brush, upon leaving one segment, is instantly in contact with the next succeeding segment, thus attaining practically a continuous and unbroken current.

Instead of using the double escapement as shown in the drawings, with number of teeth
 130 corresponding to the number of wires employed, a similar escapement may be used with the number of teeth double the number of wires, so that two movements of the

cylinder 11 will be necessary to shift or change the connections, thus having the wire used to operate the device practically free for other purposes. The electro-magnet that attracts the armature to allow the weight to operate the escapement and cylinder 11 is preferably of different resistance from the electro-magnets of the ordinary telegraphic circuit, in which case the battery must be of different strength from those of the ordinary telegraphic circuit, thus allowing the local wire at each end of the system through which the current passes to cause the simultaneous and intermittent movement of the cylinders located at each end of the system, and to be used for signal purposes also. It is to be understood that the cord connecting the weight and drum is to be rewound at necessary intervals by hand or by any other suitable means desired.

It is also desirable to use my improvement in connection with telephones, located, preferably, in different cities, and allowing a conversation, with possibly slight interruptions made by the making and breaking of the circuit, and which would not be noticed in conversation at all, to be carried on, strictly private, and with no danger of being overheard by outside parties desiring to hear such communications.

It will be understood from this description that the principal idea in this invention is to cause each particular message to pass over different line conductors in its passage between certain points, but always beginning and ending on corresponding conductors, thus passing in an unbroken succession from sender to receiver. Consequently any one having connections with the intermediate conductors would get only confused fragments of any given message.

It will readily be seen that the operation of this device may be accomplished directly, as shown, or through the medium of the telegraphic relay, the principle and operation of which are so well known and understood that it is not deemed necessary to illustrate the same in this connection.

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

1. In an improved telegraph or telephone system, a series of line conductors, a progressive circuit closing connection at each end of said series of line conductors, and means for simultaneously moving said connections to successively connect with both ends of each line conductor synchronously, substantially as set forth.

2. In an improved telegraph or telephone system, a series of line conductors, a progressive circuit closing connection at each end of said series of line conductors, and means for intermittently rotating said progressive circuit closing connections simultaneously from the opposite ends of one line conductor to the opposite ends of the next line conductor in

the order of progression, substantially as set forth.

3. In an improved telegraph or telephone system, a series of line conductors, and a corresponding series of local conductors at each end of the line conductors, operator's instruments and source of electric supply connected to the local conductors, and a progressive circuit closing connection interposed between the ends of the line conductors and the local conductors, and means for intermittently revolving the progressive circuit closing connections to contact synchronously with the opposite ends of the line conductors successively, substantially as set forth.

4. In an improved telegraph or telephone system, the combination with a series of line conductors, and a local conductor at each end of the line conductor, operator's instruments and source of electric current supply connected to the local conductors, and a progressive circuit closing connection at each end of the line conductors, and connected to the local conductors, and mechanism to revolve said progressive circuit closing connection, of a circuit and source of electric supply, an electro-magnet located in said circuit and clock mechanism to alternately make and break the circuit to allow the progressive circuit closing connections to be synchronously revolved to contact with the opposite ends of each line conductor successively, substantially as set forth.

5. In an improved telegraph or telephone system, a series of line conductors, a shaft carrying a progressive circuit closing connection at each end of the line conductors, a toothed escapement wheel carrying a drum mounted upon each shaft, and a cord secured to said drum and a weight attached to said cord, a lever arm engaging each toothed escapement wheel, and means for tripping said lever arm at intervals to allow the weights to descend and cause the intermittent and synchronous revolution of the progressive circuit closing connections, at both ends of each line conductor successively, substantially as set forth.

6. In an improved telegraph or telephone system, a series of line conductors, and corresponding local conductors, a progressive circuit closing connection interposed between each end of the line conductors and the local conductors, comprising a cylinder mounted upon a revoluble shaft, a toothed escapement wheel and drum mounted upon said shaft, and a cord and weight attached to said drum, in combination with a battery grounded at one pole, a wire or conductor from the opposite pole connecting with the progressive circuit closing connection, operator's instruments and electro-magnet located on said conductor, a support and a spring contracted bell crank lever pivotally carried by said support and engaging the toothed escapement wheel, an armature secured to said lever, and a clock mechanism to alternately make and

break the circuit, and located on the conductor between the battery and the electro magnet, and adapted to allow the weight to intermittently rotate the progressive circuit closing connections synchronously at each end of the line conductors, substantially as set forth.

7. An improved telegraph or telephone system, comprising a sealed casing, a series of line conductors interposed and connecting said casings, a shaft journaled in suitable supports in each casing, a circuit closing cylinder mounted upon each shaft, a series of local conductors connecting the cylinders with the series of line conductors, a toothed escapement wheel and a drum mounted upon each shaft and a weight for operating the same, a stationary disk suitably supported around each shaft and interposed between the escapement wheel and cylinder, a series of conducting plates arranged on the disk and connecting corresponding line conductors, and adapted to be successively connected to the operator's instruments and batteries, as the progressive revoluble movement of the circuit closing cylinder takes place, substantially as set forth.

8. An improved telegraph or telephone system, comprising a series of line conductors, a sealed casing connected with each end of said line conductors, a revoluble shaft journaled in suitable supports in said casing, a circuit closing cylinder of insulating material having a series of conductors, and correspond-

ing series of brushes, binding posts and local wires or conductors connecting the series of line conductors with the conductors of the cylinder, a toothed escapement wheel and a drum secured upon the revoluble shaft, a weight and a cord connecting said weight with the drum, a stationary insulator disk, conducting plates secured to said disk and having segmental arms or plates arranged concentrically to the axis of the cylinder, a series of binding posts secured to said conducting plates, and a circuit comprising a battery grounded at one pole and a wire connecting the opposite pole with the circuit closing cylinder, through a fixed post, a wire also connected to the circuit closing cylinder at the opposite end of the line, through a corresponding fixed post and with the ground, an electro magnet located upon each wire and interposed between the ground and the cylinder, operator's instruments also mounted upon each wire, and a clock mechanism in the circuit to make and break the circuit alternately to allow the weight to intermittently move the progressive circuit closing cylinder, substantially as set forth.

In testimony whereof I affix my signature in the presence of two witnesses.

WALLACE R. KIRK.

Witnesses:

MAUD FITZPATRICK,
MARTIN P. SMITH.