

IMPROVEMENTS IN TELEGRAPH APPARATUS.

CHAPTER LII.

Kirchhof's, Farmer's, Hughes', Partridge's, Baker's, Coleman's, Channing's, Smith's, Clay's, Woodman's, Humaston's, and Wesson's patented improvements in telegraphing.

PATENTED TELEGRAPH IMPROVEMENTS.

Among the many improvements invented within the past few years, and patented in the United States, are the following. Some of them are in use, and others have never been successfully applied to any of the telegraphs. The engravings are but outline representations of the respective inventions, but they are sufficiently distinct to enable the telegrapher to comprehend the speciality of the patented improvement. In presenting the explanations of the engravings I have omitted much of the detail embraced in the letters patents on record at Washington. I have copied the special claims in the respective patents, with a view that other inventors may know to what state the art of telegraphing has attained in mechanical combinations.

I. IMPROVEMENT IN ELECTRIC TELEGRAPH.

Patented April 15, 1856, by Charles Kirchhof.

By the movement of the hand w the stud o'' is caused to slide the frame γ far enough to insert the arm d of the lever $d d'$ in the notch in the catch c' , whereby the arm d is caused to partake partially of the movement of the armature $\kappa \kappa'$, and to be withdrawn from contact with the ivory piece $w w'$, and to carry the knee-lever past the line of culmination of the axle d'' and the point u' , so that the power of the spring u may throw it against the block w or w' , and reverse the position of the shuttle and hold it fast. The index is stopped by means of a watcher h and waker l . The waker rotates with the spindle τ and index; and if the hook l' meets with any obstruction,

it is swung sidewise, and the semi-circular part i'' is thrown upward, and the collar m is thereby raised and caused to raise the fork i of the watcher-key h , and thus to break the circuit which passes through the watcher, the pin h'' , and the plate g .

The hook l' is obstructed by means of the elbow-levers v , v , which are connected with the knobs x x .

The inventor says: I do not claim any part or arrangement with the use and result thereof, as far as already well known and clearly specified.

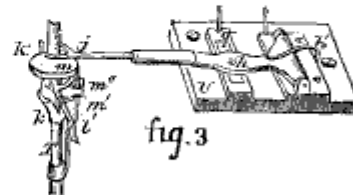
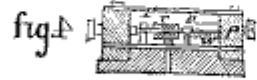
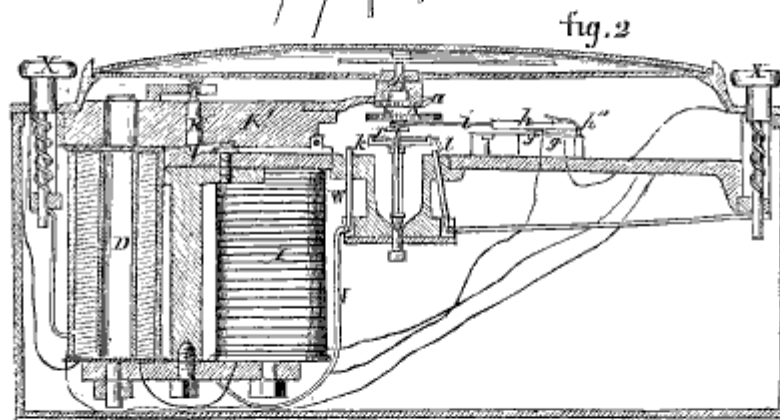
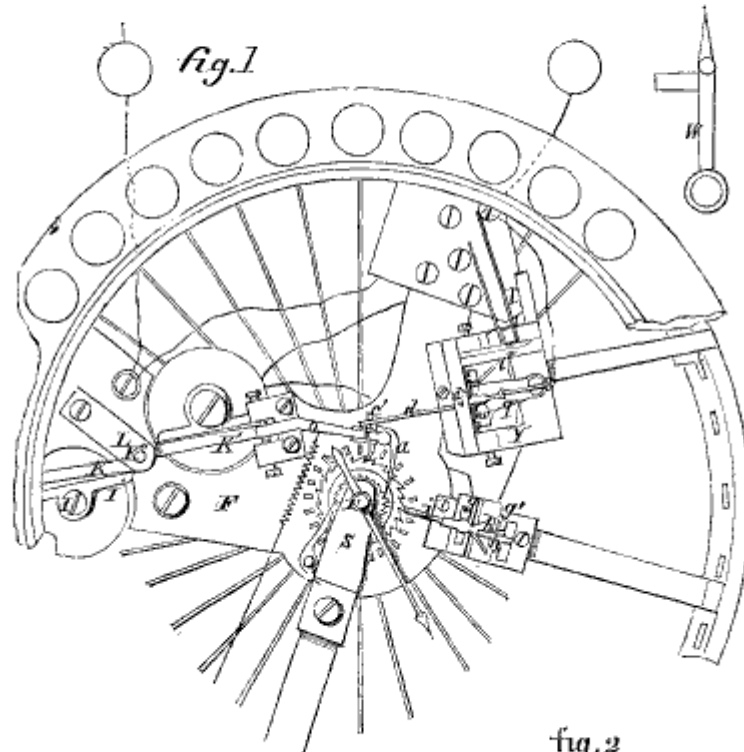
But I *claim*, 1st, the prevention of the too early intermission or restoration of the circuit in the use of self-intermission, through the method by which a key-shuttle q , or its equivalent, is not only stationary during the whole travel of the armature κ κ' , but also for a certain time afterward, so that the circuit, during that time, remains either permanently broken or closed; but afterward this shuttle is started and shoved by the indirect influence of the motion of the armature through some devices, till to the moment of breaking or restoring the circuit, and here stopped; and the armature, and by that all oscillating mechanical parts, are obliged to reverse immediately.

2d. The manner of stopping the index of all instruments of a circuit right opposite the desired letter, without disturbing or preventing the index, armature, or shuttle of any instrument to complete their adopted motion, by means of a "watcher" h and "waker" l , operated by the revolving hook l' and the key-lever v , or its equivalent, in the manner specified, so that the watcher will keep open; meanwhile the shuttle makes contact, whereby the indices stop until the key is relieved and the watcher closes again.

3d. The method to keep all instruments of a circuit in unison working, and without any mechanical means, through employment of "the induction current," by retarding the influence of the electro-magnetic power at a certain degree upon that instrument which intermits the circuit, and whereby the other instruments of the circuit not having their intermitters in activity, are governed by it, and insured to complete their motion before the circuit of the prime current is intermitted or restored again.

The said induction current in each instrument being used in connection with some suitable means for connecting and disconnecting the self-intermitter with the armature lever, and also with a means for closing and opening the induction circuit, and for the opening and closing of the accommodation course of the prime current, which act together at once, answering simultaneously their different purposes.

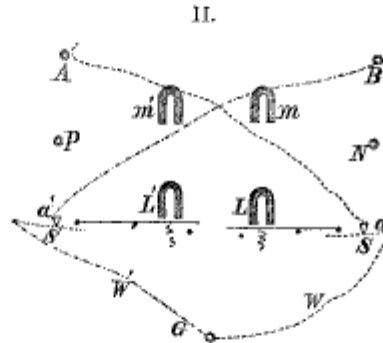
I.



II. IMPROVEMENT IN TELEGRAPHIC REGISTERS.

Patented January 29, 1856, by Moses G. Farmer.

The engraving shows the connection of the main circuits. *A* represents the screw-cup which receives one main wire; the course of the current is through the main circuit magnet *m'* to the anvil *a*, spring *s*, and by wire *w* to the screw-cup *a*, which is in connection with the ground. The cup *B* receives the other main wire, and its course is through the magnet *m* to the anvil *a'*, spring *s'*, by *w'*, to the ground *a*. The main circuit *B* will be opened by the movement of the armature lever of the local magnet *L'*; if *L'* is charged, its armatures will lift the spring *s'* from the anvil *a'*, and thus break the circuit *B* at that point. Similarly the circuit *A* can be broken at *a* by the motions of the armature lever of the local magnet *L*.



The inventor says: I am aware that a telegraphic register, operating upon the same general principle as mine, has been invented at an earlier date by Elisha Wilson, of New Haven, Connecticut. In his machine, however, the local circuits are both closed, while in mine the local circuits are similarly both open when the main circuits are both closed. The same work which in Wilson's machine is done by the closing of the local circuit, is done in mine by the opening of the local circuit, and *vice versa*. The general plan, therefore, in which my machine agrees with Wilson's I do not claim; neither do I claim simply substituting the breaking of the circuit for the closing to do the same work.

But what I do *claim* is, that modified combination of parts by which, in the self-acting telegraphic repeater, as described, the breaking instead of the closing of the local circuit is made to close the main circuit, and by which, throughout, the breaking of the local circuit is made a substitute for the closing.

III. IMPROVEMENTS IN PRINTING TELEGRAPHS.

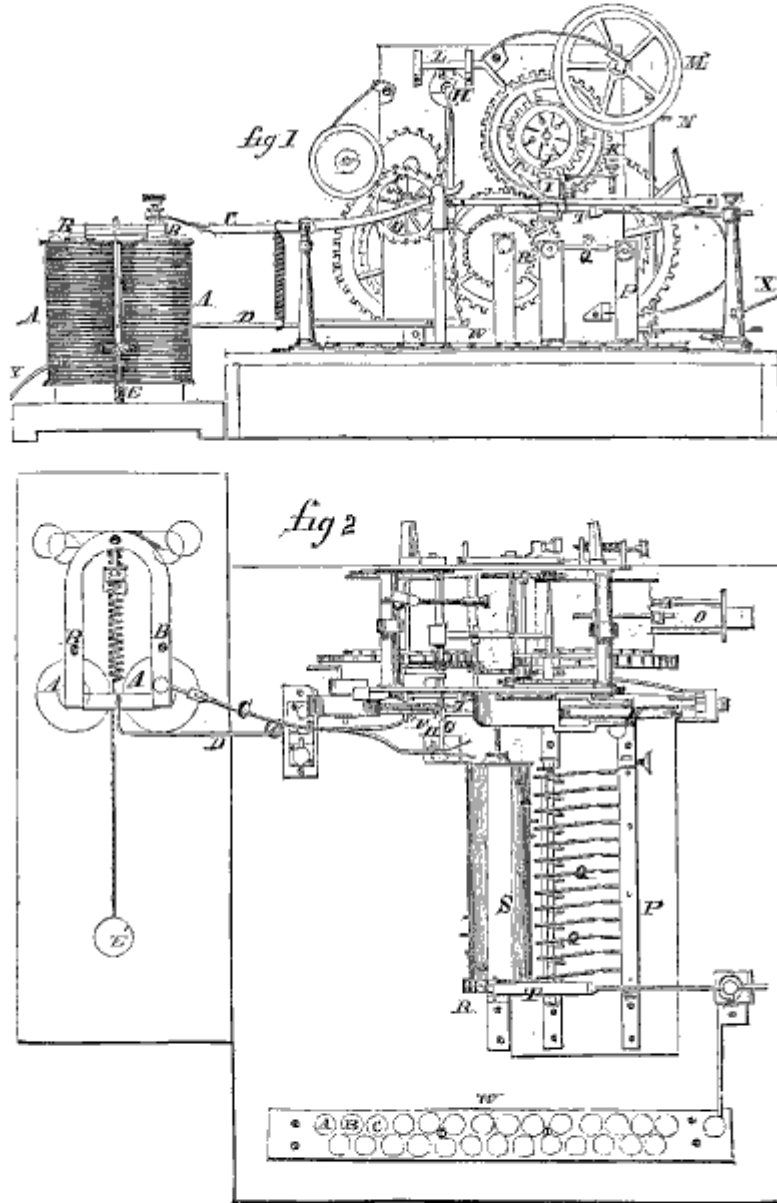
Patented May 20, 1856, by David E. Hughes.

The nature of this invention will be understood from the claims and the engravings.

The inventor says: I do not claim any feature of any exist-

ing printing or marking telegraph as any part of my invention, nor do I desire to interfere in the least with any heretofore invented.

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But I *claim*, 1st, the holding in place of the attractive power of electro or natural magnetism as applied to the telegraphic purposes, whether the same be applied in the manner herein described, or in any similar manner producing like results.

2. Particularly I claim combining with the permanent magnet *b* an adjustable spring almost sufficient to sever it from its contact with the soft iron of the electro-magnet *a*, and a lever *d*, or its equivalent, which, after the permanent magnet has been separated from the iron by the action of a current, shall bring it back again into renewed contact by the action of the power which has been called into action by the retreat of the magnet.

3d. I claim the employment of two cog-wheels or circuit-breakers *r s* at each station, so arranged that one shall be in connection with the electro-magnet at the same station, and the other in connection with the transmitting cylinder at that station, the whole being arranged so that the connection alternates at each station for every letter between the electro-magnet and the transmitting cylinder at that station, in such manner that the through connection is always simultaneously through the transmitting cylinder of one station and the electro-magnet of the other station, whereby the machine at each station can at the same time be transmitting a message and receiving a message; it being understood, however, that I do not claim, in general, the use of a single wire for the simultaneous transmission of different messages by means of rapid changes of connection, which is not new, but only the peculiar manner as above claimed, in which I have applied it in connection with my machine.

4th. So arranging a bolt *l* and operating the same by a cam, or its equivalent, that it shall act upon a wheel attached to the shaft of the type-wheel *j*, so as to preclude the intelligence from one station being communicated to any other station or stations on the circuit from which it is desired to withhold the communication.

5th. I claim the employment of a vibrating spring *o*, properly weighted at its extremity, if necessary, and so arranged by a series of mechanism as to govern and regulate the movement of the type-wheel *j*. This I claim also as a governor in other machinery, without limiting its use to its connection with electro-magnetism.

6th. I claim printing by electro-magnetism, by a continuously moving type-wheel, printing while in motion.

7th. I claim the arrangement of a cylinder *s*, with pins spirally arranged thereon, to operate by contact with metallic points

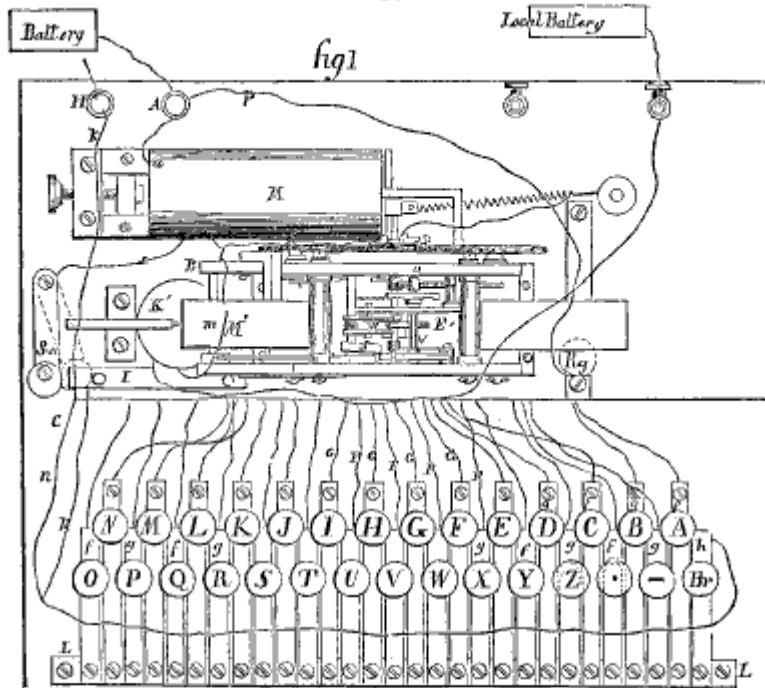
to close and break the circuit, when this is combined, for the purposes herein set forth, with the systems of keys *w*, &c., and catches, so arranged that any desired point may be thrown into a position where it will be retained until it is struck by its corresponding pin.

IV. IMPROVEMENT IN SELF-ACTING ELECTRIC TELEGRAPHS.

Patented July 12, 1856, by Moses G. Farmer.

When neither station is transmitting, the switch *s w* of each instrument is turned into the position represented in dotted lines in fig. 1. The current then passes from the screw-cup *A*,

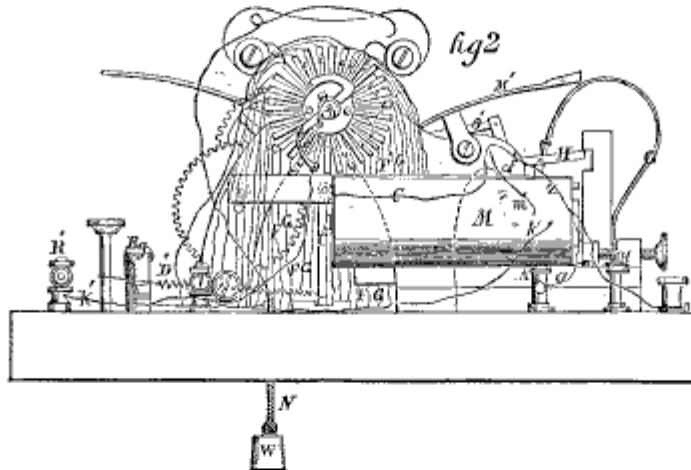
IV.



through the magnet *m*, by the wires *c* and *z*, to the switch *s w* and bar *r*, thence by the bar *L*, key *n r*, anvil *h*, and wire *k*, to the screw-cup *u*; the current not passing through the circuit-wheel is not broken, and the magnet remains permanently charged. When the operator at one end desires to transmit, he moves his switch *s w* into the position drawn in full in fig. 1, by which the current is thrown through the circuit-wheel of his machine; whereby the circuit is made and broken, and the armatures of both magnets are set in operation, and the circuit-

springs, letter-wheels, and printing-wheels of both instruments revolve together. The operator at the transmitting station then sends his message through the keys A B C etc., the current passing through the transmitting instrument as follows: from the

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screw-cup A, by M C B D d, segments *i* or *i*, wires r or G, to the bar L, and by the key B r and wire k to the screw-cup n. Through the receiving instrument it passes from the screw-cup A by the magnet M, thence by the wires c and z to the switch S w and bar l, and by the wire n to the bar L, back to the screw-cup n, as before.

The inventor says: I do not claim arresting the motion of the type-wheel by a positive stop upon the key which interrupts the motion of the wheel whenever a key is depressed and at a moment when the circuit is broken, as in the telegraph of Seimens and Halskie.

But I *claim* the method described of arresting the motion of the type-wheel by means of the alternately open and closed keys, in combination with the circuit-wheel, constructed and operating in the manner substantially as set forth.

2d. I claim the combination of a straight key-board with a circuit-wheel, when the two are connected together by means of the wires r and G, whereby the place of making and breaking the circuit may be transferred to the immediate vicinity of the key-board, for the purpose set forth.

3d. The method described of putting the two machines in correspondence with each other, the current being turned out of the operating magnet M of the receiving machine by means

of the regulating key κ , the arm b' , insulated spring c' , and their connections, operating in the manner set forth.

V. IMPROVEMENT IN ELECTRO-MAGNETIC PRINTING TELEGRAPHS.

Patented April 22, 1856, by Albert J. Partridge.

The branching of the circuit takes place between the pillar p and the pin p' . To the pillar p is pivoted a metal arm s .

IV.

fig 1

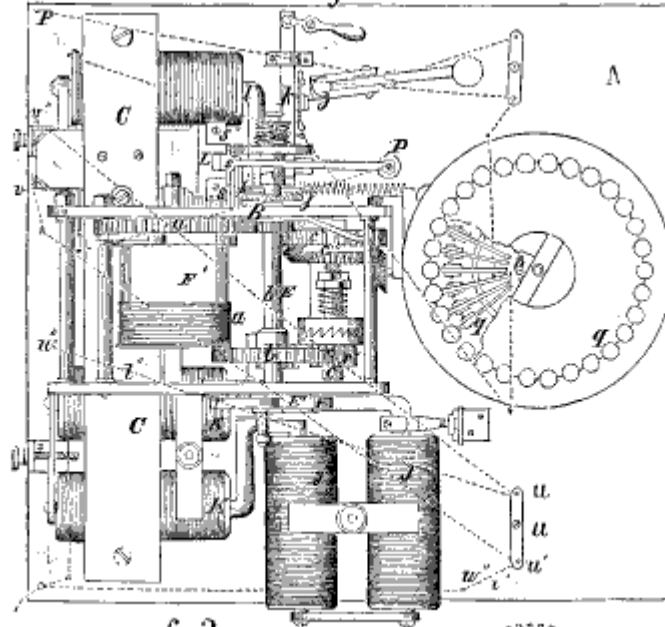


fig 2

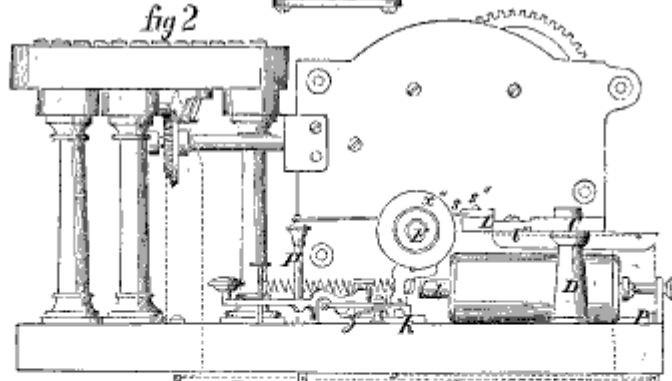


fig 3



which has a τ shaped extremity, which is capable, by a slight vibrating movement, of entering a slit in either of the two small brass blocks $s' s''$, which are secured to a slab L of ivory. To the block s' is connected a wire t' , which leads along one side of the slab L and down through a hole i' in the base A and then to a pin u' , and thence up through a hole w' to the helix of the magnet $J J$. To the block s'' is connected a wire t'' which passes through a hole v'' in the base, and then across to a pin u'' and thence up through a hole w'' , to connect with the helix of the magnet $K K$.

While the revolution of the type-wheel E' continues, there is no perceptible movement of the loose piece x of the clutch along the shaft, and the spring x'' holding the said piece x closely engaged with the piece x' causes the circuit-changer s to remain in contact with the block s' ; but when the type-wheel shaft is suddenly arrested by the depression of a key-bar lever, the loose part x by the inertia of the fly-wheel x'' moves far enough along the shaft to move the circuit-changer into the slit in the block s'' ; thus, without breaking the circuit, the circuit is transferred from the magnet $J J$ to the magnet $K K$, and the printing and feeding movement of the paper effected. But this change of circuit is only momentary; for as soon as the momentum of the fly-wheel x'' is spent, the spring x'' forces back the part x , and returns the circuit changer to the block s' .

The operator, by depressing the knob of either of the key-levers $q q$, throws up the inner end of that lever (as shown in fig. 3) to such a position that the revolution of the circuit-breaker c will bring the projection e in contact with it, and thus cause the circuit-breaker to be arrested. The arrest of the circuit breaker of the sending instrument stops the operation of the whole of that instrument, and also prevents the action of the escapement of the receiving instrument, and consequently stops that instrument also, and thus causes the change of circuit to take place in the manner before described through the momentum of the wheel x'' acting on the clutch.

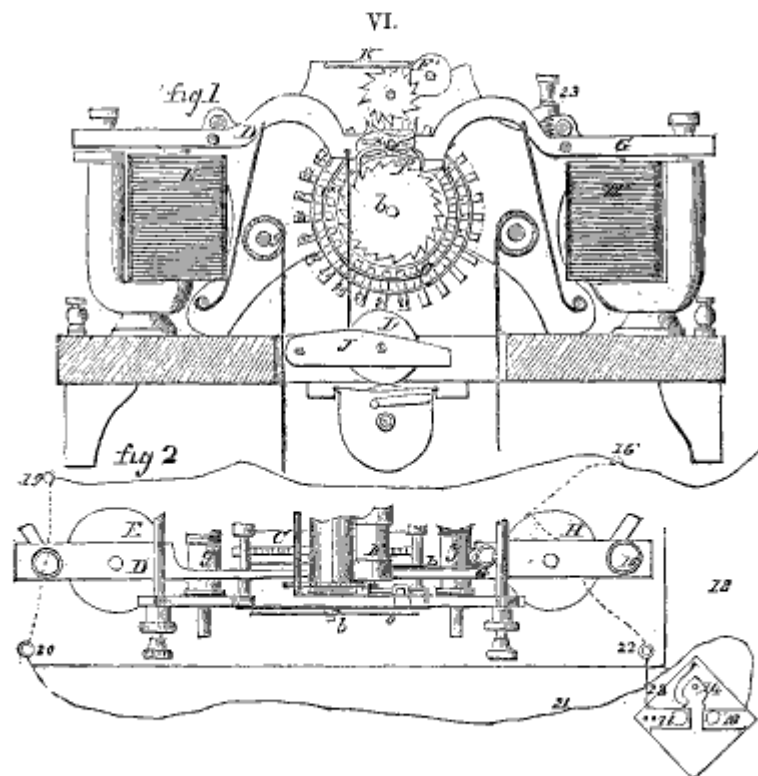
Claim.—The mode of operating the circuit-changer s to change the circuit by means of the clutch $x x$, and fly-wheel x'' attached to the loose part thereof.

VI. IMPROVEMENT IN ELECTRO-MAGNETIC PRINTING TELEGRAPHS.

Patented April 29, 1856, by Henry N. Baker.

The wire 13 connects with the metal plate 14, which is provided with two spring keys 16 and 17. The wire 12 passes

from 15 to 19, to which and to the screw 20 the helix of the magnet ϵ is connected, and from 20 a wire 21 goes to the key 16. The ends of the helix of the magnet η connect with 15,



22, and 17. By depressing the key 16 the circuit is caused to pass through the helix of magnet ϵ , and the type-wheel c may be brought to such a position as to present any desired letter opposite the roller f . Then by allowing the finger-key 16 to rise, and depressing the key 17, the circuit passes from 17 to 15 and the printing magnet η , causing the paper to move along and the type opposite the roller f to be lifted by the curved tongue p , and pressed against the paper under the said roller to produce the impression. To repeat two letters in the same word, the key 17 must be depressed twice without closing the key 16. To make the spaces between the words, the key 16 is first depressed, and before the finger is taken off to allow the circuit to break, the key 17 is depressed to close the circuit through the printing magnet η . The circuit through the type-

wheel magnet not having been opened when the movement of the lever *c* takes place, and the type-wheel consequently only having moved half the distance necessary to bring a new type between the tongue *p* of the lever and the roller *r*, causes the tongue to fall into a space between two types and thus renders it inoperative, but yet allows the movement of the roller *r* to take place to feed the paper. By keeping the key 16 closed, and closing and opening the key, a space of any desired length may be produced; but for the spaces to separate the words, the key 16 needs only to be kept closed during one closing and opening movement of the key 17, after which it may be played as before to move the type-wheel.

Claim.—The arrangement of the type-wheel *c*, the escapement wheel *i* attached thereto, the arrangement of the crutch or detent *j j*, acting upon the said escapement wheel relatively to the armature of the type-wheel magnet *E*, and the arrangement of the whole relatively to the tongue *p*, by which the types are lifted up into contact with the paper—all in such a manner that when the circuit is closed through the type-wheel magnet the tongue *p* will be opposite a space between two letters, and when, during the closing of said circuit, the circuit by which the said tongue and the feed-rollers are acted upon is closed, the tongue will be inoperative, and the feed-rollers allowed to act without any impression being given, thereby producing a space between the printed letters or words, substantially as herein set forth.

VII. IMPROVEMENT IN RECEIVING MAGNETS FOR TELEGRAPHS.

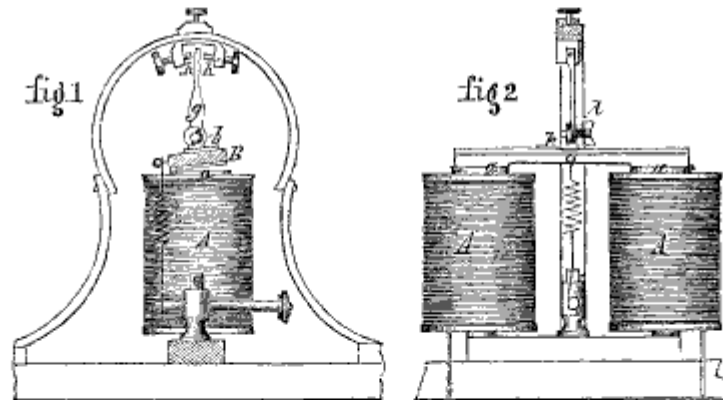
Patented April 22, 1856, by Andrew Coleman.

The curved form of the faces *a a* of the poles of the magnet *A* and of the armature *B* allows the armature to rock or roll, and hence to be converted into a lever with a changeable fulcrum. The finger *g*, which, playing between *h* and *h'*, opens and closes the circuit, is pivoted to a small stand *k* secured to the top of the armature, and sufficient friction is produced between the stand and the finger by means of a screw and nut on the pivot, and a small spring *l*, to overcome the inertia of the finger and cause it to move with the armature until it is arrested by either of the screws *h h'*, after which it allows the armature to move independently of it.

Claim.—So constructing or arranging the armature *B* and applying the spring *e*, or its equivalent, that the armature constitutes the whole or part of a variable lever, which causes the effective force of the spring, or its equivalent, to increase or

diminish as the magnetic force becomes greater or less ; when this is combined with the so applying the finger *g*, by which the local circuit is opened and closed, that the said finger is caused to move with the armature by friction only, or its

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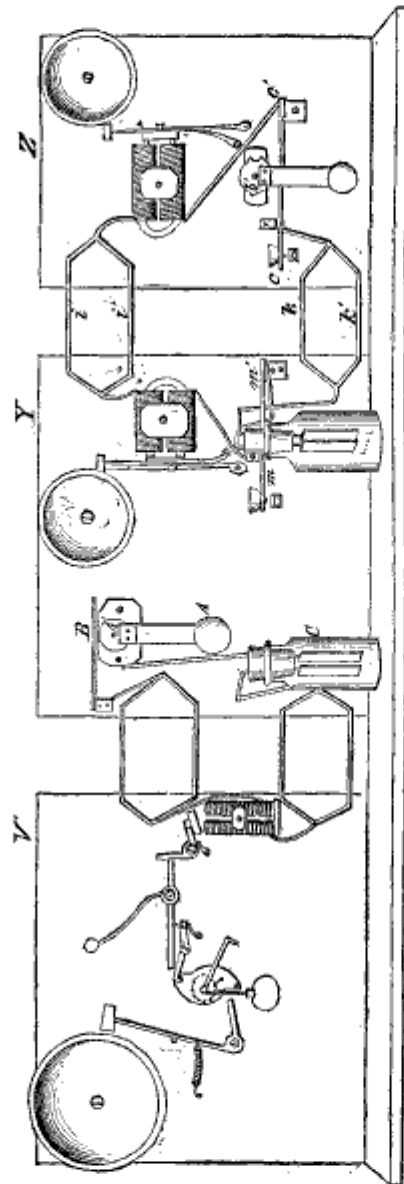
equivalent, and, after having moved the slight distance necessary to open or close the circuit, leaves the armature free to move as far as necessary independently of it, thereby obviating the necessity of manual adjustment of the armature to compensate for variations of magnetic force.

VIII. IMPROVEMENT IN FIRE-ALARM TELEGRAPH.

Patented May 19, 1857, by William F. Channing and Moses G. Farmer.

If a fire is discovered in the vicinity of a signal station *z*, an authorized person opens the signal box, and turns crank *a'* a number of times ; the teeth *b' b''*, on the circuit wheel, depressing the key *c' c''*, and in this manner break and restore the circuit at definite intervals, the key returning by its own elasticity ; this operation causes the electro-magnet and armature of the central station *v*, by repeated strokes on *r*, to indicate the number of the district and station whence the alarm designates. The operator at the central station *v*, by turning crank *λ*, operates the transmitting apparatus, *A B*, causing the bells at the alarm station *v*, to give the alarm, and, by tapping on key *m' m''*, the number of the signal station originating the alarm may be transmitted to any of the signal stations, *z*.

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Claim.—1st. The signal system described, consisting of a series of signal stations scattered at intervals through a whole city or town, or any part thereof, and telegraphically connected with a common centre or point, or with each other, by one or more signal circuits, by which means a constant communication may be established and maintained, between all parts of a city or town, however extended; and with the centre or centres, at which the signal circuit or circuits converge or meet, so that the moment the fire occurs, its existence and locality may at once be known at the centre of the system, and efforts for subduing it properly directed.

2d. The alarm system described, consisting of a series of alarm stations, suitably distributed throughout a whole city or town, or any part thereof, and telegraphically connected with a central station, by one or more alarm circuits, by which means a public alarm of the existence and locality of a fire, may be given at different points.

3d. In combination with the alarm system, for striking the number of the district upon the alarm bells, the signal system for communicating the number of the station at which the fire occurs to all the signal stations, as well as for communicating an alarm to the central station.

IX. IMPROVEMENT IN TELEGRAPHIC REPEATERS.

Patented August 18, 1857, by John E. Smith.

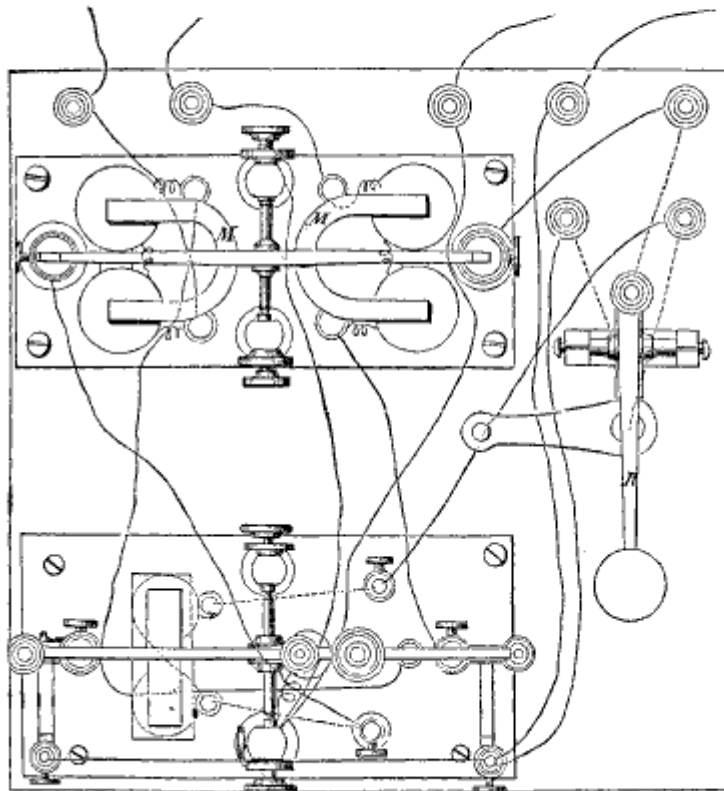
A detailed description of this invention would take up too much space to be given here; the principal features thereof will be understood by reference to the claims and engravings.

The inventor says: I do not claim the opening and closing of the local circuit by magnetism produced by the opening and closing of the main circuit.

But I *claim* the connection of a battery at each station with the line wire, and with two local cross connections, in such manner that, by means of the key and relay lever, the cross connections through the register magnet, and the other cross connections, are alternately broken, and the battery thrown upon the main line, and its current caused to operate the relays on the line wire, like a main current, till shut from the line by the relay lever, as described, whereby each battery is made to perform the duty of an ordinary local battery, while not wanted on the line wire, and to perform the duty of a main battery while not wanted as a local.

2d. The key placed in the local circuit and constructed, as described, to open and close the said circuit in two branches, to give two directions to the current over the line wire, substantially as and for the purpose set forth.

IX.



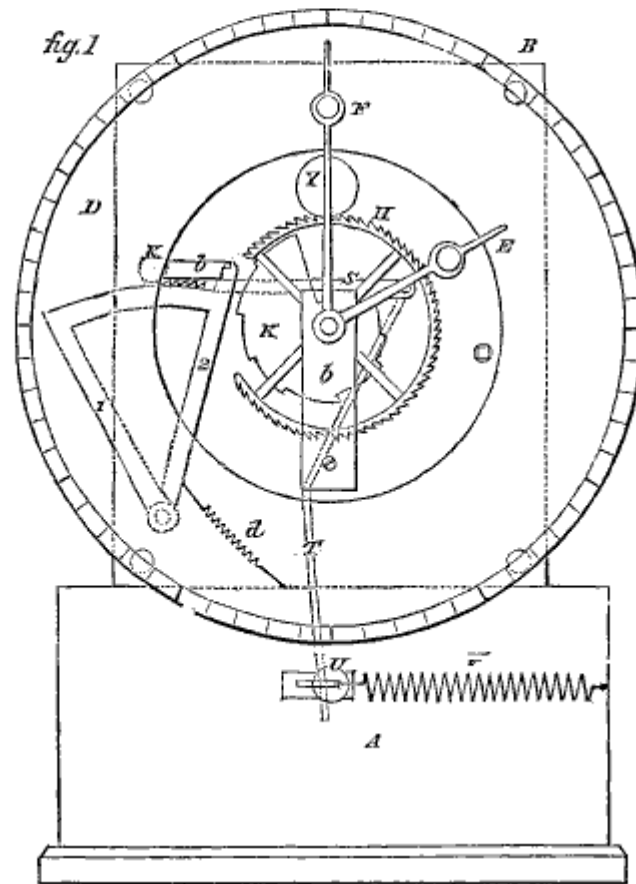
X. IMPROVED DEVICE IN TELEGRAPHIC FIRE-ALARM APPARATUS.

Patented November 17, 1857, by Edward C. Clay.

In operating this invention, the operator at the central station, having received the alarm from one of the minor stations, sets the hand *r*, at 60, and the hand *v*, at the number of the district in which the fire may be (say at 2) this places the snail *κ*, in the position shown in the engraving, when the pin *e* will strike against the second step, on the periphery of the snail *κ*, and allow the escapement *i* to be drawn over by its springs *d*, in the direction of the arrow, just so far, that it will require to be fed up two notches by the shaft *m*, before the pin *e* is again brought into the path of the arm, *l*; when this occurs, the revolutions of the shaft are arrested.

Having thus arranged the hands, the operator moves the key

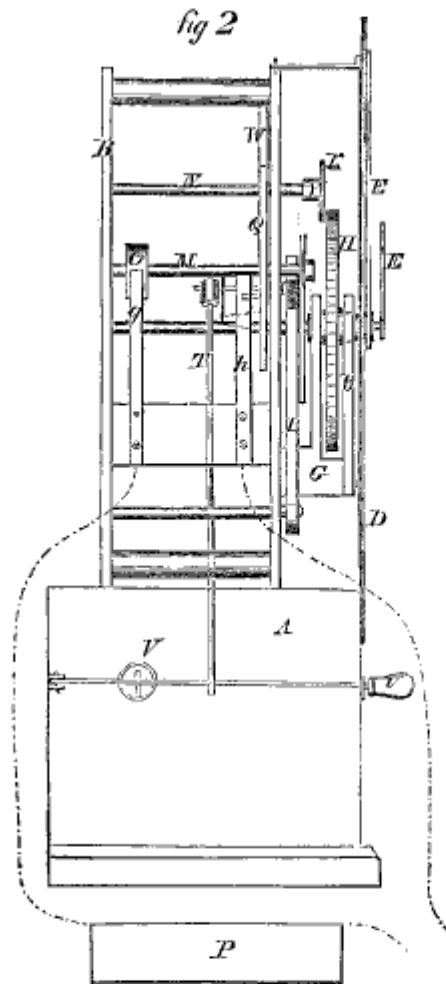
X.



u, against the resistance of spring v; this moves the long bent rod r, and vibrates the lever s, and lifts the pin n, clear of the segment f, when the spring d, immediately draws near the escapement i, until the pin e rests against the snail κ. As soon as the pin n has been lifted, and the escapement i, has vibrated, the key u is released by the operator, and the pin n falls again into the segment f, and acts as a retaining pawl. When the pin e is drawn out of the way of the arm l, the shaft m revolves. Each movement of the shaft causes the bells to

strike once, moves forward the index hand one mark, and feeds up the segment *f* one notch; now, as the position of the seg-

X.



ment *f* is repeated by the index hand, the number of the district will be struck and counted, when the pin *e* will again be

brought into the path of the arm *l*, and the operation be stopped.

Claim.—The snail *κ*, or its equivalent, and dial plate, combination with the single key *v*.

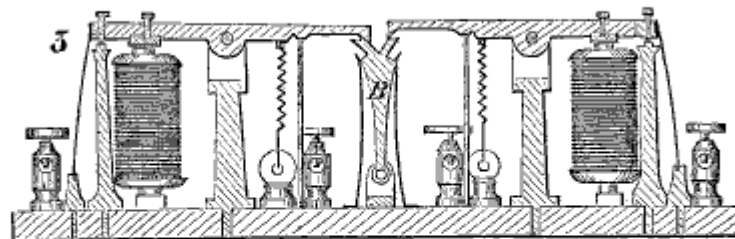
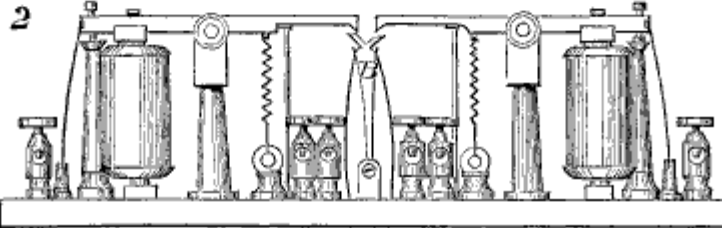
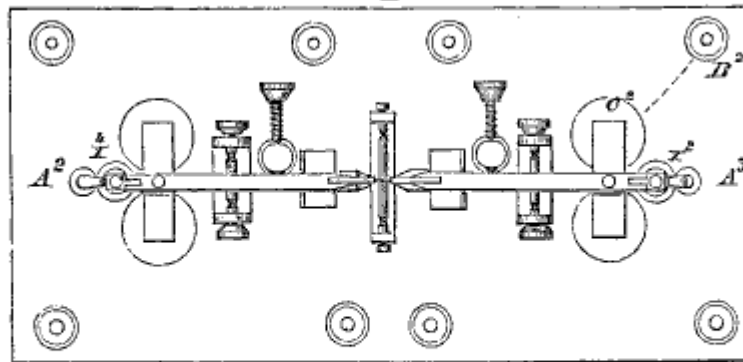
XI. IMPROVEMENT IN TELEGRAPHIC REPEATERS.

Patented March 17, 1857, by Moses G. Farmer and Asa F. Woodman.

In engraving, fig. 1, *A'' A'''*, two distant stations, this invention being supposed to be placed at an intermediate one. If the independent circuit be broken by an operator at *A''*, the re-

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1



lay magnet at B'' will be discharged, and this will discharge the local magnet at c'' , and break the dependent circuit at x'' . This will cause the lever b to be tipped, and thereby prevent the independent circuit being broken at the instrument, or at x''' . From this it will be seen that the main circuit, which is first broken (which may be called the independent circuit), determines which way the beam b shall incline, and that this inclination, while it allows the instrument to break the dependent circuit, prevents it from breaking the independent circuit.

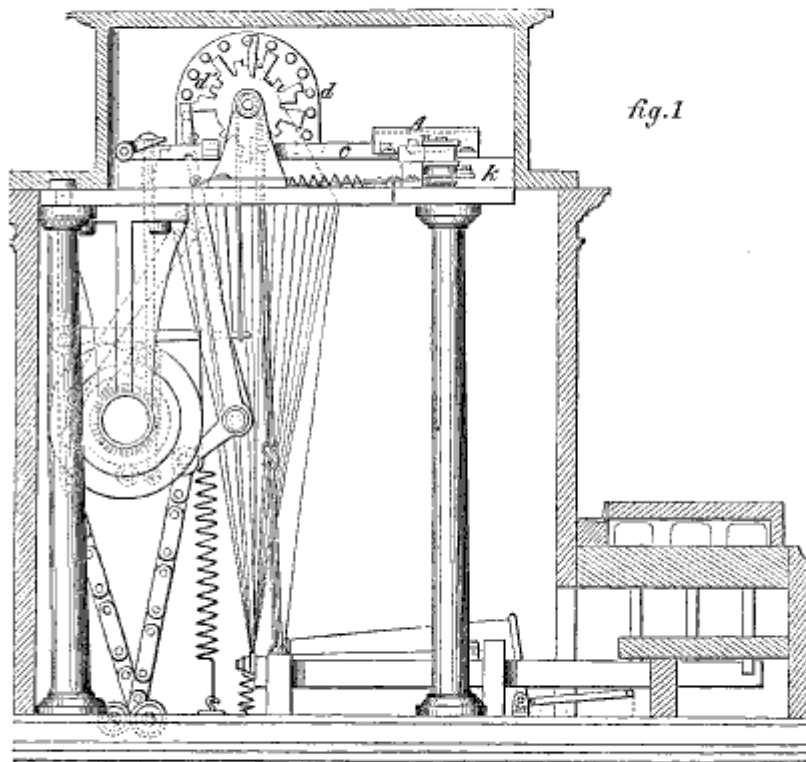
Claim.—The use of a mechanical obstacle, essentially in the manner asset forth, whereby, when the independent circuit has broken the dependent circuit at the instrument, the dependent circuit is prevented from breaking the independent circuit.

XII. PUNCHING PAPER FILLETS FOR TELEGRAPHIC SIGNALS.

Patented September 8, 1857, by John P. Humaston.

This invention will be understood by reference to the following :

XII.

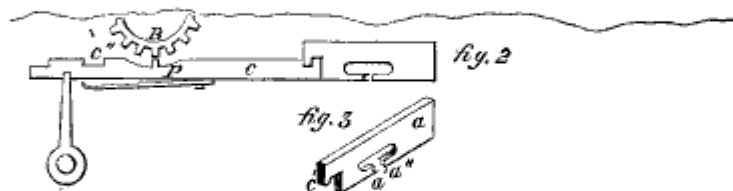


Claim.—First. The manner of operating the punches for perforating the characters in the paper, consisting of the revolving type-wheel, or other equivalent means of indicating characters, in combination with the punches, as described.

Second. The method of regulating the feed of paper, consisting of the graduated stop-wheel, or equivalent series of stops in combination with the type-wheel, and with the means for propelling the paper filets past the punches, as described.

Third. The manner of forming the cutting ends of the punches—that is to say, having its advancing end formed into two cutting edges, by means of the V-shaped recess, in combination with a second pair of cutting edges opposite to them, formed in like manner and upon the same plate, but in position at a right angle to the first pair, thus making the other half of the shear, in conjunction with an adjoining punch substantially in the manner set forth.

XII.



XIII. IMPROVEMENT IN ELECTRIC TELEGRAPHS.

Patented February 17, 1857, by William D. Wesson.

A are posts along the whole road. The metal elbows *D D* are insulated from the brackets *C B*, to which they are pivoted at *a*. The elbows are only allowed to play slightly between jams *b c*, which are also insulated. Each elbow is connected with the nearest elbow on the next post *A*, by conducting wires *E*. The wires *E* are fringed with fine iron wires *f*, which hang down and vibrate freely. The pendulum *I* is swung forward by the circuit-breaker *L* on the vehicle *V*, (as the latter passes along,) and thus caused to turn the shaft *G* far enough for the crank *g* to raise the moveable conductor or circuit-closer *H* out of contact with the elbows *D D*, and thus break the circuit in the line of wires *E*. The circuit-receivers upon the vehicle consist of horse-shoe electro-magnet *J J*, having iron plates *k k* attached to its poles; these plates are in constant contact with the wires *f*. The circuit receivers are connected by a conducting wire *Y*, having a telegraphing apparatus in its circuit.

Claim.—Constructing the stationary telegraph line of a series of immovable and interposed moveable conductors, and

XIII.

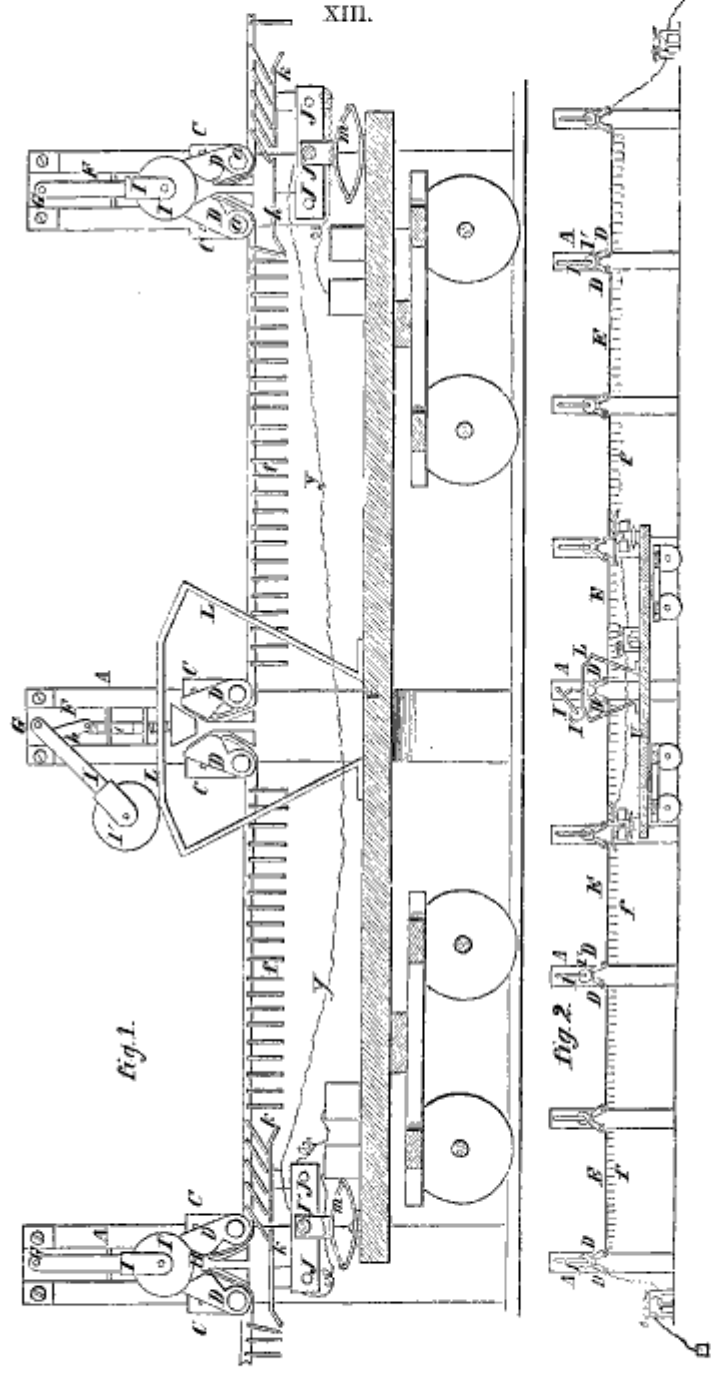
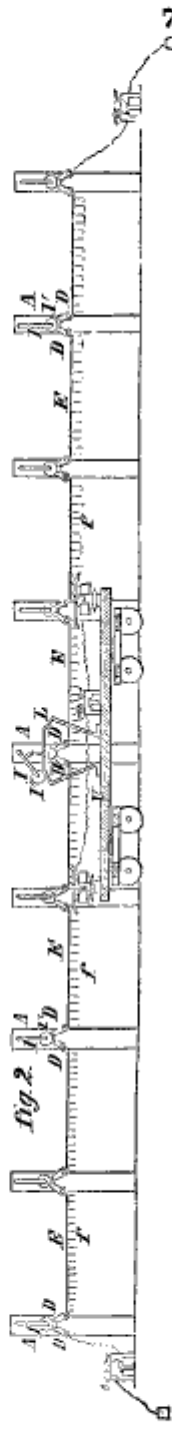
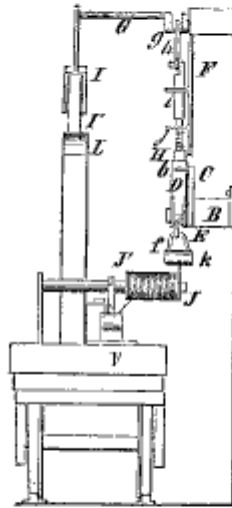


Fig. 1.

Fig. 2.





furnishing the vehicle with a circuit-breaker, circuit receivers and conductors, arranged to operate substantially as set forth, for the purpose of breaking the circuit through the main line at a point or points where the vehicle is passing, and completing the circle through, so that by suitable telegraphing instruments or apparatus carried by the said vehicle, communications may be transmitted and received by the vehicle to and from other vehicles, and to and from stations at a distance, either while the vehicle or vehicles are stationary or in motion, as set forth.

XIV. IMPROVED ELECTRO-MAGNET.

By Charles T. and J. N. Chester, New-York.

This improvement consists in the adjustment of the horse-shoe core and the spools of wire, so that they can be moved to and from the armature by the screw *r* seen in the figure.

