No. 785,221. PATENTED MAR. 21, 1905.

A. KORN.

AUTOMATIC TELEGRAPHY.

APPLICATION FILED NOV. 9, 1903.

2 SHEETS—SHEET 1.

Fig. 1.

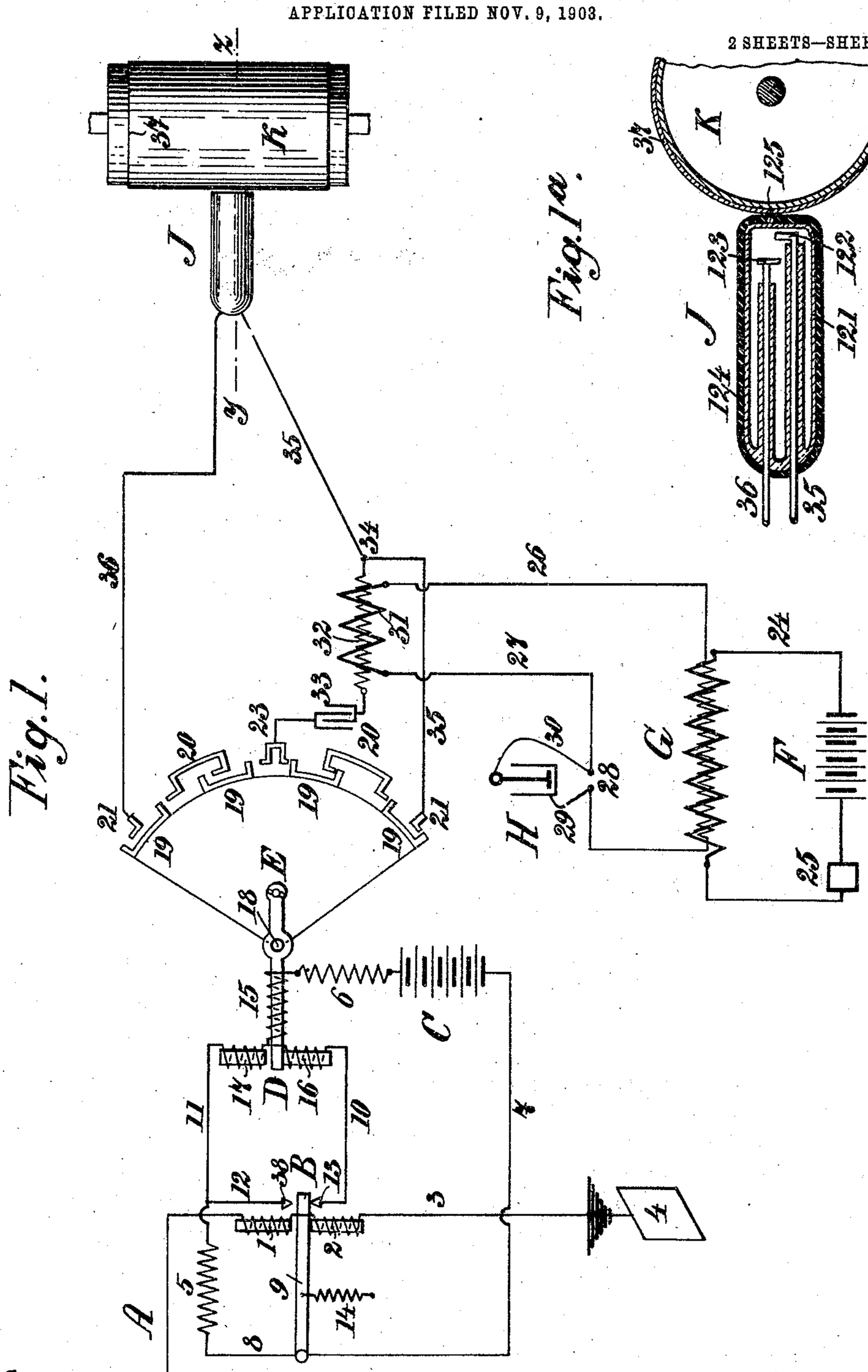

Fig. 1a.

Witnesses

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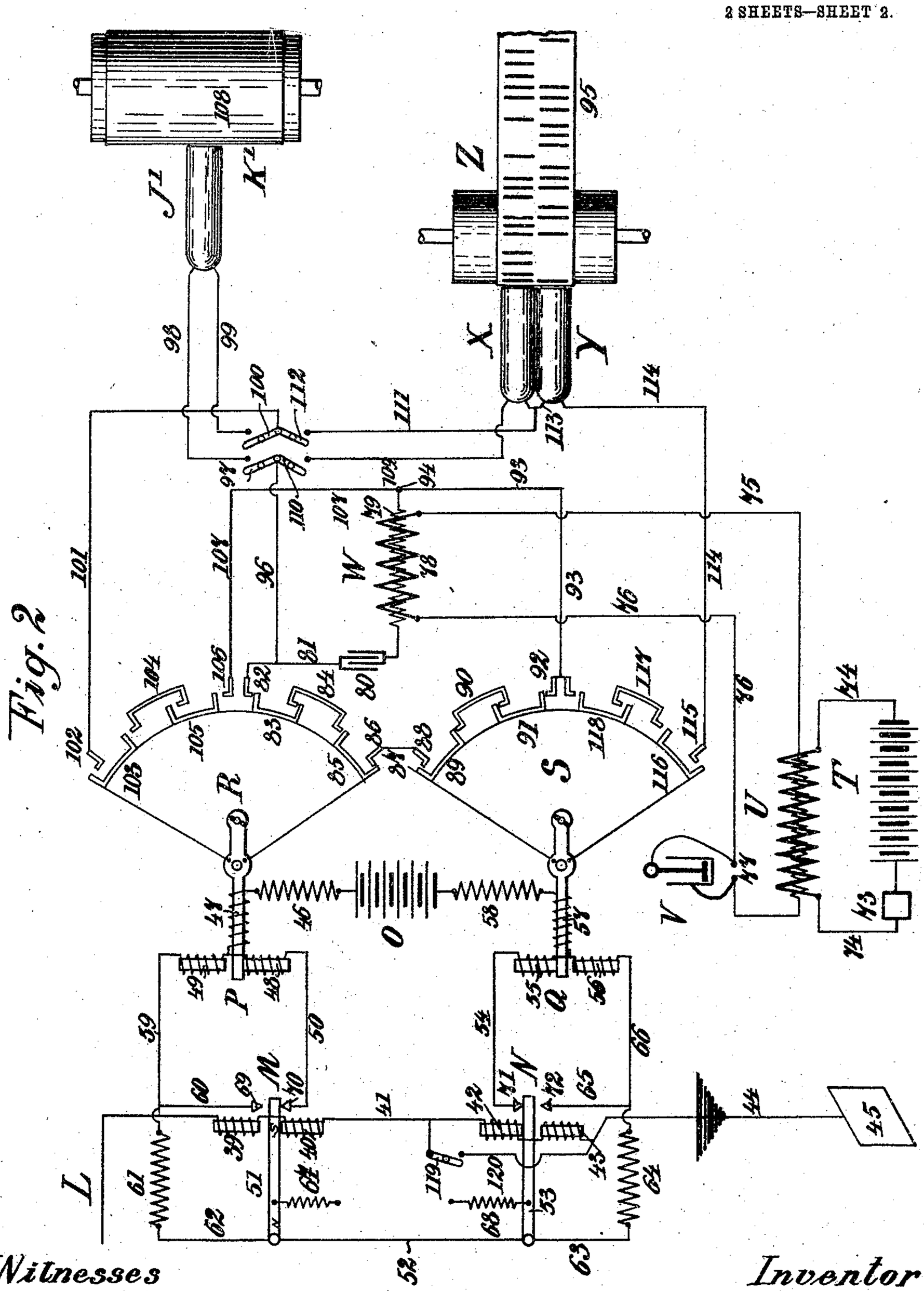
2 SHEETS—SHEET 2.

Fig. 2



Witnesses

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No. 785,221. Patented March 21, 1905.

UNITED STATES PATENT OFFICE.

ARTHUR KORN, OF MUNICH, GERMANY.

AUTOMATIC TELEGRAPHY.

SPECIFICATION forming part of Letters Patent No. 785,221, dated March 21, 1905.

Application filed November 9, 1903. Serial No. 180,424.

To all whom it may concern:

Be it known that I, ARTHUR KORN, a citizen of the Empire of Germany, residing at Munich, in the Empire of Germany, have invented a new and useful Improvement in Automatic Telegraphy, of which the following is a specification.

My invention relates to a method of registering quick consecutive electrical impulses or disturbances sent from a sender to a receiver through a line, whereby either pictures, manuscripts, sketches, and the like or telegrams in the Morse or any other alphabet are obtained.

According to my invention a high-tension current—for instance, Tesla currents—is circulated in a receiving-circuit at the receiving-station, and each of the telegraphic electrical impulses or disturbances coming from the line is caused to insert in this receiving-circuit, by means of one or two relay-armatures with a plurality of insulated metallic conductors, one or two windowed cathodic tubes, respectively, so that by the transmission of a radiation through the window of the one or each of the two tubes, respectively, an impression is produced on a moving sensitive film, paper, or the like, this impression being a point or a stroke in the case of pictures, manuscripts, sketches, and the like or one or two strokes in the case of telegrams in the Morse alphabet or the like.

I will now proceed to describe my invention with reference to the accompanying drawings, in which—

Figure 1 shows diagrammatically a system at the receiving-station which is arranged for the production of pictures, manuscripts, sketches, and the like. Fig. 1ª is a section, on an enlarged scale, through the line *y z* in Fig. 1, part of the roller K being broken away; and Fig. 2 shows diagrammatically a similar system arranged for the production either of pictures, manuscripts, sketches, and the like or of telegrams in the Morse or any other alphabet.

In the arrangement shown at Fig. 1, A denotes the line connecting the sender with the receiver. Parts 1 and 2 of it form the coils of the two electromagnets of a double relay B, while the remaining part 3 is connected with a ground-plate 4. Besides the double relay B the receiving-circuit comprises a local battery C, a double relay D for actuating the circuit-changing switch E, two resistances 5 and 6, the polarized armature 9, and the lines 7, 8, 10, 11, and 12. The polarized armature 9 of the double relay B can come in contact with the two contacts 13 and 38, but without touching the cores of the electromagnets, so as to prevent them from hardening. The armature 9 is normally pressed downward on the lower contact 13 by a spring 14, when the local current will circulate in the circuit C, 6, 10, 13, 9, and 7, so that the armature 15 of the double relay D is attracted downward by the lower electromagnet 16. As will be seen from Fig. 1, the resistance 6 is connected with a coil which surrounds the armature 15 and is connected with the coils of the two electromagnets 16 and 17. The armature 15 is rigidly connected with a swinging sector-like switch E and turns around the point 18. The switch E is made of insulating material and has fastened on it a series of (here four) segmental metal pieces 19 19. The latter are adapted for nearly touching either the lower stationary arc 20, the lower stationary piece 21, and the lower branch of the stationary central piece 23 or the upper stationary arc 20, the upper stationary piece 21, and the upper branch of the stationary central piece 23. The metal pieces 21 19 20 19 23 19 20 19 21 form parts of two circuits for currents of high tension of any kind—for instance, Tesla currents—which are to pass over between the approached ends of the metal pieces by means of sparks. It will be seen that by the described construction of the swinging sector-like switch E and the metal pieces several spark-gaps are provided in either circuit. This is of special advantage, since the motion of the switch E can thereby be reduced without impairing the safety with which the high-tension currents can be conducted in either circuit. The high-tension currents may be produced in any known manner. In Fig. 1 I have assumed the source to be a well-known Tesla's apparatus. A battery F produces in its circuit 24 a primary current, which is

quickly and automatically closed and opened by means of an interrupter 25 of any well-known construction, so that in the induction-coil G secondary currents of high tension are induced, which circulate in a secondary circuit 26 27, provided with sparking terminals 28, and are intensified by a Leyden jar H. As is indicated in Fig. 1, the outer and the inner coatings of the Leyden jar H are connected with the poles of the sparking terminals 28 by means of wires 29 and 30, respectively. In the secondary circuit 26 27 are inserted a few well-insulated windings 31, forming the primary coil of a second induction-coil I, the secondary coil 32 of which forms a part of the circuits for the high-tension currents and furnishes the Tesla currents. Between the one pole of the secondary coil 32 and the central piece 23 a condenser 33 is inserted, while the other pole, 34, is connected with the lower stationary metal piece 21 by a line 35 and with the upper stationary metal piece 21 by lines 35 and 36 and a cathodic tube J. Normally the circuit-changing switch E occupies the position shown at Fig. 1, when the Tesla current will pass from the condenser 33, through the central piece 23, the lower metal pieces 19 20 19 21, the line 35, and the other pole, 34, to the secondary coil 32 without producing any visible effect. As is shown at Fig. 1ª, the cathodic tube J is an evacuated glass tube 121, with the two electrodes 122 and 123 at the ends of the two wires 35 and 36. This glass tube 121 is inclosed in a mantle or cover 124 of ebonite or sealing-wax and provided on the end nearest to the roller K with a small window 125 in the cover 124. Only through this window 125 the radiations produced by the high-tension current can pass outward. The roller K is covered with a sensitive film 37 or paper or the like and is in any well-known manner put into a uniform rotation and longitudinal motion, so that a pin assumed to be secured on the window of the cathodic tube J would describe a spiral line on the film 37, paper, or the like.

The apparatus described so far is operated as follows: From the sending-station by means of a special apparatus, which is not referred to here, electrical impulses or disturbances are sent through the line A, the coils 1 and 2, the line 3, and the ground-plate 4 to the earth. As the armature 9 is polarized and the impulses sent from the line A are of opposite polarity, it will be seen that each time when an electrical impulse is sent it will so energize the electromagnets of the double relay B that the armature 9 is moved upward, thus leaving the contact 13 and touching the opposite contact 38, when the local current will now circulate in the circuit C, 6, 11, 12, 38, 9, and 7. Then the electromagnet 16 of the double relay D will be without current, while the other electromagnet, 17, will be energized and attract the armature 15 upward, whereby the switch E is brought from the one position shown into the other position, so that the Tesla current will pass from the condenser 33 through the central piece 23, the upper metal pieces 19, 20, 19, and 21, the line 36, the cathodic tube J, and the line 35 and the other pole, 34, to the secondary coil 32. The radiation produced in the tube J will pass through its window 125 and act upon the sensitive film 37, paper, or the like to produce the respective effect. All the occurrences described take place in a single moment, whereupon the two armatures 9 and 15 are immediately returned to their normal positions. It depends upon the length of the impulse how long the several parts retain their momentary positions. It is evident that during the uninterrupted motion of the roller K the quick consecutive electrical impulses or disturbances will gradually produce on the sensitive film 37, paper, or the like the picture or manuscript, sketch, and the like. For producing a telegram, for instance, in the Morse alphabet preferably two cathodic tubes with narrow windows placed side by side are employed, so that a single stroke produced by the one tube on the sensitive film, paper, or the like corresponds to the point in the Morse alphabet and that two strokes simultaneously produced by both tubes correspond to the dash in the Morse alphabet. From the sending-station in any known manner positive and negative electrical impulses or disturbances are sent by the line A. In lieu of the signs of the Morse alphabet any other combinations of signs may be registered in the same manner.

In Fig. 2 I have shown a system capable of producing at pleasure either pictures, manuscripts, sketches, and the like or telegrams, and I shall later on point out how this system should be arranged if telegrams only are to be produced. The line L coming from the sending-station is connected with the coils of the electromagnets 39, 40, and 42, 43 of two double relays M and N, respectively, the lines 41 44, and the ground-plate 45. The two lines 41 and 44 can be connected directly at pleasure by means of a switch 119 and a line 120. Besides the two double relays M N the receiving-circuit comprises a local battery O, two double relays P and Q for actuating the two circuit-changing switches R and S, respectively, further, four resistances 46, 58, 61, and 64, the two oppositely-polarized armatures 51 and 53, and the lines 50, 52, 54, 59, 60, 62, 63, 65, and 66. The two armatures 51 and 53 can come in contact with the contacts 69 70 and 71 72, respectively, but do not touch the cores of the respective electromagnets. The polarized armature 51 of the double relay M is normally pressed downward by a spring 67 on the lower contact 70, and the oppositely-polarized armature 53 of the other double relay N is normally pressed upward against the upper contact 71 by a spring 68. Then the

local current will circulate in the circuit O, 46, 50, 70, 51, 52, 53, 71, 54, and 58, so that the armature 47 of the double relay P is attracted downward by the lower electromagnet 48, and the armature 57 of the double relay Q is attracted upward by the upper electromagnet 55. Therefore the two circuit-changing switches R and S, made of insulating material and constructed in a similar manner as the one, E, described before with reference to Fig. 1 and rigidly connected with the two armatures 47 and 57, respectively, will occupy the positions shown. The currents of high tension, for which the two switches R and S are adapted, are here again assumed to be Tesla currents, produced by a Tesla apparatus similar to the one described before. The battery T furnishes the primary current which circulates in the circuit 74 and is quickly and automatically closed and opened by an interrupter 73, so that in the induction-coil U secondary currents are produced which circulate in the circuit 75 76, provided with sparking-terminals 77, and are intensified by a Leyden jar V. In the circuit 75 76 again a few well-insulated windings 78 are inserted, which form the primary coil of a second induction-coil W. In the positions shown of the two switches R and S the Tesla current produced passes from the condenser 80 through the line 81, the metal pieces 82 83 84 85 86, the line 87, the metal pieces 88 89 90 91 92, the line 93, and the other pole, 94, to the secondary coil 79. The cathodic tube J′ and the roller K′ are arranged and constructed in a similar manner as the cathodic tube J and the roller K in Fig. 1. The lines 98 99, leading to and from the tube J′, can be connected at pleasure with the lines 96 and 101 by means of the switches 97 and 100, respectively. The two cathodic tubes X and Y are of a similar construction as the cathodic tube J and are each provided on the ends nearest to the roller Z with a narrow window, so that the radiation passing through the same and acting upon the film 95, paper, or the like produces a stroke, as shown. The roller Z is put into uniform rotation in any known manner by a suitable clockwork or mechanism and the sensitive film 95, paper, or the like passes around the roller Z and receives the strokes shown. The line 109, leading to the cathodic tube X, can be connected at pleasure with the line 96 by means of the switch 110. The two tubes X and Y are connected by a line 113, and the line 111, connected therewith, can be connected at pleasure with the line 101 by means of the switch 112. The cathodic tube Y is connected with the lower stationary metal piece 115 by the line 114.

The arrangement described so far is operated as follows: When it is desired to produce a picture, manuscript, sketch, and the like on the film 108 of the roller K′, the cathodic tube J′ is connected with the lines 96 and 101 by means of the switches 97 and 100 and the double relay N is disengaged by connecting the two lines 41 and 44 by means of the switch 119. Each time when an electrical impulse of proper polarity is sent through the line L to the ground-plate 45 it will so energize the two electromagnets 39 and 40 of the double relay M that the armature 51 is moved upward, thus leaving the contact 70 and touching the opposite contact 69, when the local current will now circulate in the circuit O, 46, 59, 60, 69, 51, 52, 53, 71, 54, and 58. Then the lower electromagnet 48 of the relay P will be without current, while the upper electromagnet 49 will be energized and attract the armature 47 upward, whereby the switch R is brought from the position shown into the other position, so that the Tesla current will pass from the condenser 80 through the lines 81 96, the switch 97, the line 98, the tube J′, the line 99, the switch 100, the line 101, the metal pieces 102 103 104 105 106, the line 107, and the other pole, 94, to the coil 79. The radiation thereby caused in the tube J′ will then act upon the sensitive film 108, paper, or the like to produce the desired effect. As already stated above, all the occurrences described take place in a single moment, whereupon the two armatures 51 and 47 are immediately returned to their normal positions. When it is desired to produce a telegram, the cathodic tube J′ is disengaged by turning off the switches 97 and 100, while the two tubes X and Y are engaged by connecting the lines 109 and 96 by means of the switch 110 and by connecting the lines 111 and 101 by means of the switch 112, and at the same time the switch 119 is turned off to place the double relay N into operative condition. At the sending-station the transmitter adapted to produce at pleasure positive and negative electrical impulses is operated. When by the line L an electrical impulse of the one polarity (opposite to that of the armature 51) is sent, it will so energize the electromagnets of the two double relays M and N that the upper polarized armature 51 is moved upward, thus leaving the contact 70 and touching the opposed contact 69, while the lower armature 53, however, remains idle in its upper position. Then in a similar manner as before the local current will circulate in the circuit O, 46, 59, 60, 69, 51, 52, 53, 71, 54, and 58, so that the upper electromagnets 49 and 55 of the two double relays P and Q are energized. The result of this is that only the armature 47 is moved upward, while the other armature, 57, remains idle, so that the switch R alone is brought from its position shown into the other position. The Tesla current will now pass from the condenser 80 through the lines 81 96, the switch 110, the line 109, the tube X, the lines 113 111, the switch 112, the line 101, the metal pieces 102 103 104 105 106, the line 107, and the other

pole, 94, to the coil 79. Therefore in the tube X alone a radiation will be produced which passes through its window and acts upon the sensitive film 95, paper, or the like, whereby a stroke is made which corresponds to the point in the Morse alphabet or to a certain sign in any other alphabet. Immediately after the impulse is sent the movable parts 51, 47, and R are returned to their initial positions. When by the line L an electrical impulse or disturbance of the other polarity is sent, it will so energize the electromagnets of the two double relays M and N that the lower armature 53 is moved downward, thus leaving the contact 71 and touching the opposite contact 72, while the upper armature 51 remains idle. In consequence of this the local current will circulate in the circuit O, 46, 50, 70, 51, 52, 53, 72, 65, 66, and 58, so that the armature 57 of the double relay Q will be moved downward, while that, 47, of the other double relay P remains idle. The upper switch R occupies its position shown; but the lower switch S will be brought from its position shown into the other position, when the Tesla current now passes from the condenser 80 through the lines 81 96, the switch 110, the line 109, the two tubes X and Y, the line 114, the metal pieces 115 116 117 118 92, the line 93, and the other pole, 94, to the coil 79. Therefore in both tubes X and Y radiations will be produced which pass through the windows and act upon the sensitive film 95, paper, or the like to produce two strokes which correspond to the dash in the Morse alphabet or to a second sign of any other alphabet. All the occurrences described again take place in a single moment, and immediately afterward the two armatures 53 and 57 and the switch S are returned to their initial positions. When it is desired to produce only telegrams, the cathodic tube J′, the roller K′, the lines 98 and 99, and the switches 97 100 110 112 are omitted, while the lines 96 and 109, also 101 and 111, are directly connected. At the same time the switch 119 and the lines 120 are omitted. Otherwise the system remains as described and shown.

The high-tension currents for producing radiations in the tube J of Fig. 1 or in the tubes J′ X Y of Fig. 2 may be produced in any other known manner. It will be seen that in all cases the high-tension current—for instance, Tesla currents—constantly circulates in a circuit, from which the one cathodic tube (J in Fig. 1 and J′ in Fig. 2) or the two cathodic tubes (X and Y in Fig. 2) are normally switched off, and that each of the several consecutive telegraphic electrical impulses or disturbances coming from the line A or L is caused to insert the respective cathodic tube or tubes in the circuit for producing the desired effect on the sensitive film, paper, or the like.

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

1. The method of registering telegraphic electrical impulses or disturbances, which consists in circulating a high-tension current, for instance Tesla currents, in a receiving-circuit, and causing each of the telegraphic electrical impulses or disturbances coming from the line to insert in said receiving-circuit a windowed cathodic tube, so that by the transmission of a radiation through the window of this tube an impression is produced on a moving sensitive film, paper or the like.

2. The method of registering telegraphic electrical impulses or disturbances, which consists in circulating a high-tension current, for instance Tesla currents, in a receiving-circuit, and causing each of the telegraphic electrical impulses or disturbances coming from the line to insert in said receiving-circuit either one or two windowed cathodic tubes according to the impulses or disturbances being of the one or opposite polarity, so that by the transmission of a radiation through the window of either or each of these tubes an impression is produced on a moving sensitive film, paper or the like.

3. The method of registering telegraphic electrical impulses or disturbances, which consists in circulating a high-tension current, for instance Tesla currents, in a receiving-circuit, and causing each of the telegraphic electrical impulses or disturbances coming from the line to insert in said receiving-circuit a windowed cathodic tube by means of a relay-armature with a plurality of insulated metallic conductors, so that by the transmission of a radiation through the window of the cathodic tube an impression is produced on a moving sensitive film, paper or the like.

4. The method of registering telegraphic electrical impulses or disturbances, which consists in circulating a high-tension current, for instance Tesla currents, in a receiving-circuit, and causing each of the telegraphic electrical impulses or disturbances coming from the line to insert in said receiving-circuit by means of either of two relay-armatures with a plurality of insulated metallic conductors either one or two windowed cathodic tubes according to the impulses or disturbances being of the one or the opposite polarity, so that by the transmission of a radiation through the window of either or each of the cathodic tubes an impression is produced on a moving sensitive film, paper or the like.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ARTHUR KORN.

Witnesses:
HENRY HASPER,
WOLDEMAR HAUPT.