(No Model.) 2 Sheets—Sheet 1.

F. B. HERZOG & S. S. WHEELER.

ELECTRIC SIGNALING APPARATUS.

No. 573,592. Patented Dec. 22, 1896.

Fig. 1.

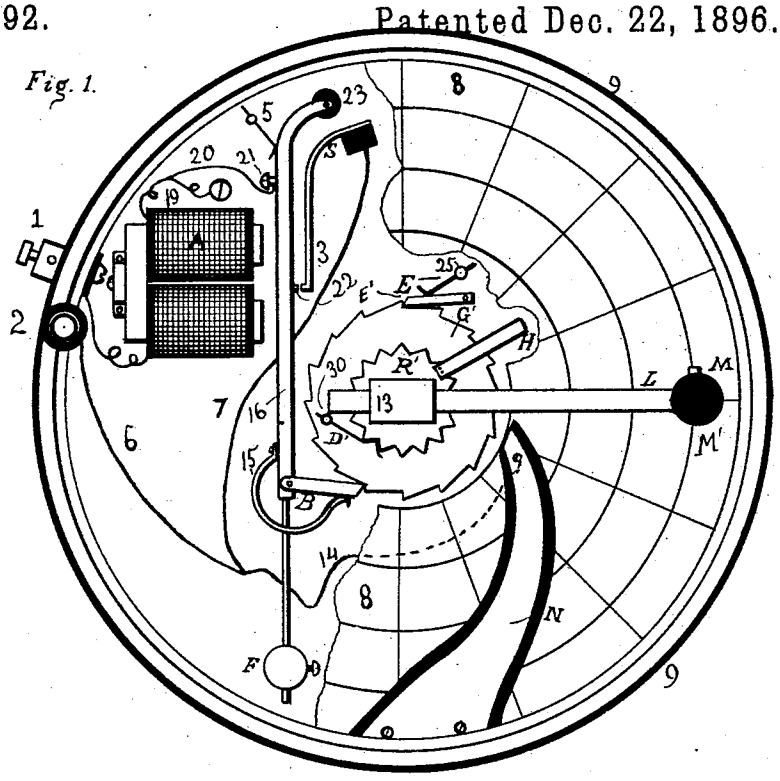
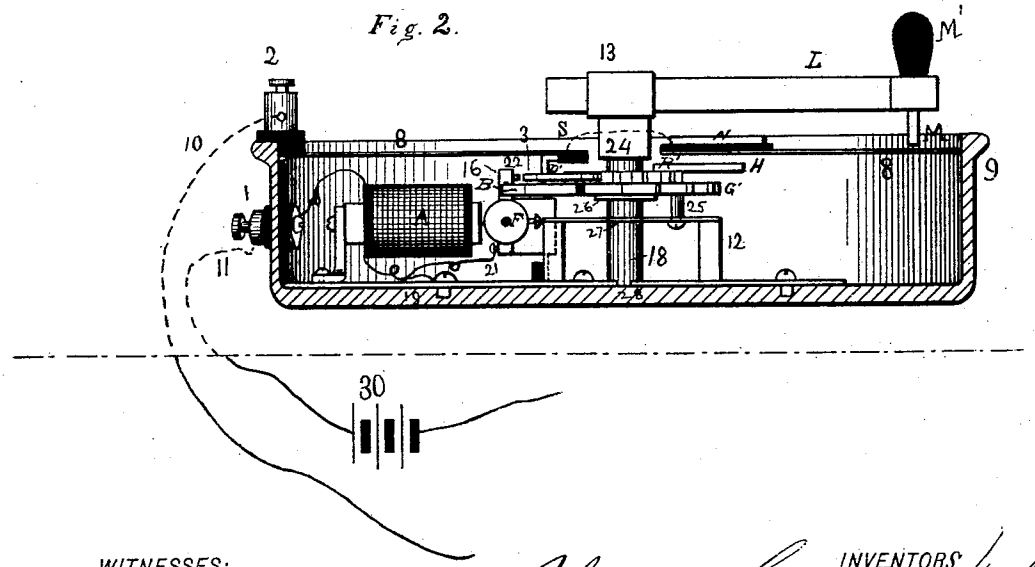


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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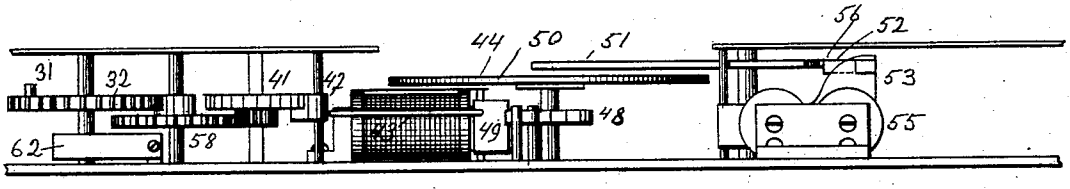
Fig. 3



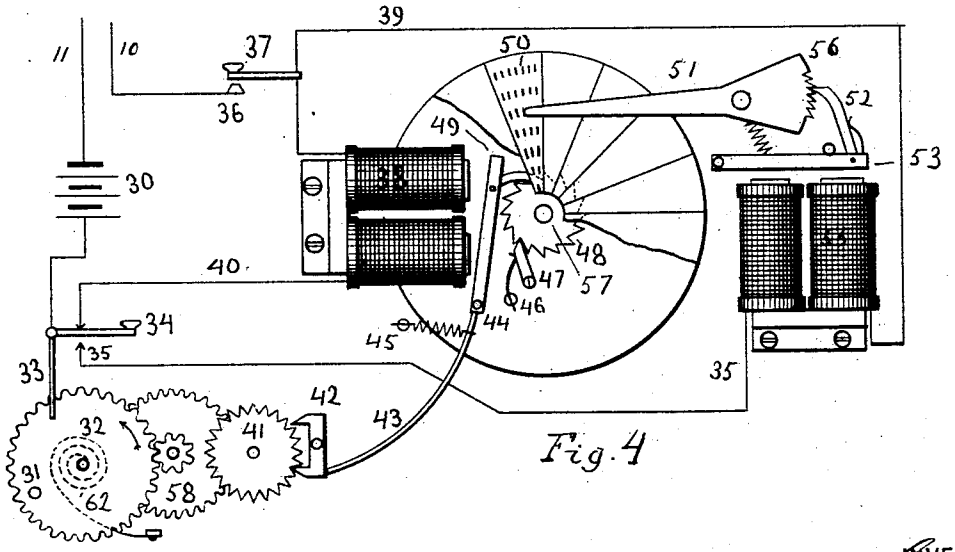


Fig. 4

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FELIX BENEDICT HERZOG AND SCHUYLER SKAATS WHEELER, OF NEW YORK, N. Y.; SAID WHEELER ASSIGNOR TO SAID HERZOG.

ELECTRIC SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 573,592, dated December 22, 1896.

Application filed January 29, 1886. Serial No. 190,175. (No model.)

To all whom it may concern:

Be it known that we, FELIX BENEDICT HERZOG and SCHUYLER SKAATS WHEELER, citizens of the United States, and residents of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Electric Signaling Apparatus, (Case No. 30,) of which the following is a specification.

This invention relates to electrical signaling generally, and more particularly to the cooperation of apparatus at a receiving-station which is controlled from a sending-station by a transmitter adapted to transmit two or more separately variable signals at each transmission.

In the drawings, to which reference is hereby made, Figure 1 is a plan, and Fig. 2 an elevation, partly in section, of a type of transmitter adapted to the coöperation described. Fig. 3 is a plan, and Fig. 4 an elevation, of a type of the controlled apparatus at the receiving-station.

It is to be understood that although a single distant station is shown any number may be connected with one receiving-station, either in series or multiple or in combinations of these arrangements.

The transmitter may be of any suitable variety, the one described being typical only, and comprising the following elements, (shown in Figs. 1 and 2:) A shaft 18, suitably mounted in bearings 27 and 28, carries a head 24, ending in sleeve 13, within which a rod-arm L may be pushed in and out. This arm ends in a spring-point M, of sufficient length to touch raised plate N, which is insulated from the dial. Rigidly fixed to the shaft 18 is the star-wheel R′, carrying extension H and engaging with spring-click D′, mounted on pin 30, fixed to ratchet-wheel G′. This wheel is loose upon the bushing 26, which is fixed to the shaft. The ratchet G′ coöperates with click B and spring 15 on armature 16 and with engaging pawl E′ and its spring E, mounted on stud 25, and the coöperation of the parts is such that the rotation of the arm may take place in either direction by hand by means of knob M′, and when rotated in one direction the wheel G′ will be held by the clicks, so that it does not move with the shaft, whereas when the wheel is rotated step by step by the armature the arm is carried along. The dial is marked off in columns of spaces or suitable indications. Magnet A attracts armature 16, pivoted on insulated post 23, and by gravity of knob F or stress of spring 5 the armature normally causes its contact 22 to touch contact 3, mounted on a spring fixed to insulated stud S. The parts are inclosed in case 9, and the line connections are by way of insulated posts 1 and 2 to lines 10 and 11.

The operation of the transmitter is as follows: The pointer having been set over some indication and the circuit at any point in the line being closed to a distant station, the current enters by post 1 to magnet A, branch 20, armature-screw 21, armature-contact 22, spring 3, line 7, branch 6, binding-post 2, and out to line again. While flowing the attraction of the magnet breaks the contact at 3 and 22, and a break is registered at the distant station, and as the armature falls back the click B causes wheel G′, and hence the pointer, to move one step, and the circuit will also be again completed at 3 and 22. This operation continues until the extension H on wheel R′ has been rotated enough to cause it to touch spring 3, after which a closed-circuit pause will occur, because, although 22 has been carried away from the normal position of contact with spring 3, this spring has followed the armature-contact 22, being pushed by the extension H. This condition continues until a break occurs elsewhere. In the organization of receiver as here typified this break will be caused at the receiving-station, whereupon the armature will fall back and in its usual manner will impel the wheel G′ one step, and thus free the spring 3 as extension H passes beyond it. The relative adjustments of the retractile spring and of the spring 3 are such that the former will cause the wheel driven by it to overcome the pressure of the latter when acting through the wheel and its extension H. It is of course important that the adjustment of these parts shall be such that the forces tending to continue the rotation of the wheel shall not be neutralized by a tendency of the extension H to block this rotation. The parts are easily so adjusted that the arc traversed by the op-

erative end of extension H during each step of the wheel will be large enough to cause its position of rest at the end of the step which brings it into contact with the terminal 3 to be such that the arm will have passed beyond the point at which it can neutralize this backward motion of the armature. The resultant of the forces tending to retract the armature if expressed by a line indicating their direction may be opposed by the extension H, so that unless this were compressible it would block the armature retraction, or the axis of resistance of this extension may make a smaller or a larger angle with that line, according to the relative adjustments and centers of motion of the extension and of the armature and of the yielding spring-support to the contact 3. In practice it is very simple to get the relative adjustments of the degrees of motion and of power and resistance of the various parts, so that a very slight retractile force will suffice to cause the motion of the wheel to continue after the break has been produced at the sending-station. Thus the step-by-step motion will continue until in the course of the further rotation the pin M on the pointer will have been carried into contact with the plate N, which is insulated everywhere excepting at its connection to branch 14, and thus to the outgoing circuit by line 6.

The incoming circuit, after leaving the magnet, is connected by branch 19 with a metal of the movement-frame, and through this with pointer M, and hence when this contacts with M the circuit is as follows: magnet A, branch 19, movement-arm L, pointer-contact M, plate N, branch 14 6, post 2, and out to line, and this condition continues and in the type of transmitter shown marks the end of a signal transmission.

The plate M is so shaped and placed with reference to the indications in each column of the dial that, taking any column as zero or normal, an additional column (and hence step of the wheel, there being as many steps as columns or multiples of the same) will have to be passed over for each indication from the top of the column. For instance, the pointer is shown at the topmost indication in a column. Then if after the pause due to interference of H and 3 four steps would have been required to bring the pointer in contact with the outer end of N it would take seven steps to bring it in contact with the inner end of N if the pointer had been at rest on a fourth indication in its column instead of on the first.

The transmitter just described thus transmits two series of current differentiations, and these may be used to control apparatus at another station, and one form of such apparatus will now be described. This consists of two progressive movements, herein shown as step-by-step wheels, the first of which comprises wheel 48 on shaft 57, and, cooperating in a well-known way with parts 47 46 and the pawl carried by armature 49 and retracted by spring 45 and moving around pivot 44, causes the wheel to rotate, and with it the dial 50, indications of which are arranged in columns and in general would be so placed as to indicate corresponding indications to the transmitter, it being understood that the dial may be arranged to indicate in the same or in a reverse direction. The parts being in their normal position of rest, then if the transmitter has been set at some arbitrary signal and the circuit is closed by key 37 at the receiving-station then for every impulse before the closure (in the transmitter) between H and 3 a corresponding impulse will be given by magnet 38 of the receiving-station. It will be remembered that after the closure between H and 3 the transmitter remains at rest until a break occurs somewhere in line, and this break will be given by the operator manually by means of key 37 or 34, or, according to the ultimate object of the mechanism, it may be given automatically as follows: The first attraction by magnet 38 freed verge 42 of the spring-impelled clock-train 32 58 41, and this train is so timed that, either uninterruptedly or interrupted at each retraction of the armature extension, it will run a length of time at least as great as that required to transmit the maximum number of impulses in the first part of the transmission, and then the wheel 32 will bring its pin 31 in position to rock arm 33, so that the switch-key 34 will leave the contact of the first branch 40 and will also close the contact of second branch 35, and this switching will bring magnet 55 in circuit, and then the second step-by-step movement will be operated as many steps as the transmitter produces between the pause due to contact of H and 3 and the final pause due to contact between M and N.

It will be seen that by the organization described the first movement at the receiving-station is directly controlled by the first part of the signal transmitted, while the second part of the signal operates the second movement of the receiving apparatus. As herein shown, the only local effect of these progressive movements was that the first one rotated the dial in such fashion as to bring its columns successively into a given position, and the second movement moved a pointer 51, so that the proper one of the several indications in the selected column can be designated by the pointer of the second movement, but we do not intend to confine ourselves to merely such visual indications, but wish to cover, broadly, the apparatus when adapted and organized as suggested, no matter what its ultimate function, whether it be a finality, such as the indication of a signal directly, or an intermediate step, such as causing the signal to be printed or indicated on some other recording apparatus, or for any other purpose.

We claim—

1. At a sending-station, a transmitter organized to transmit two separate variable sig-

nals at one transmission, and at a receiving-station an apparatus comprising two progressively-moving elements, each controlled by a magnet the first magnet being controlled by the first part of the transmission, and the second magnet by the second part.

2. At a sending-station, a transmitter organized to transmit two separate variable signals at one transmission and at a receiving-station an apparatus comprising two progressively-moving elements each controlled by a magnet, the first magnet being controlled by the first part of the transmission and the second magnet by the second part, together with a time-movement, acting to control the second element.

3. At a sending-station, a transmitter organized to transmit two separate variable signals at one transmission and at a receiving-station an apparatus comprising two step-by-step wheels, each controlled by a magnet, the first magnet being controlled by the first part of the transmission and the second by the second part.

4. At a sending-station, a transmitter organized to transmit more than one series of impulses at each transmission, and at a receiving-station apparatus comprising a separate moving part and a separate magnet for each of the parts of the signal transmitted.

5. A receiving-station apparatus comprising two wheels each controlled by its magnet, the magnets being in branches of a main circuit, together with a time-switch controlling two of these branches.

6. At one station, means for producing two groups of impulses, together with a controlled device as a magnet, and at a second station a mechanism controlled by the first group and controlling the device at the first station at the termination of the first group of impulses.

7. A signal-transmitter comprising means for setting it to transmit two sets of signals, a magnet controlling the second set, means controlling a pause after the transmission of the first set, and at a second station, a switch controlling the subsequent energization of the magnet and the delivery of the second set.

8. At one station means for producing two groups of impulses together with a magnet controlling the production of the second group and at another station mechanism arranged to be separately controlled by each group and itself controlling the magnet at the first station, at the termination of the first group of impulses.

Signed at New York, in the county of New York and State of New York, this 27th day January, A. D. 1886.

F. BENEDICT HERZOG.
SCHUYLER SKAATS WHEELER.

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