E. POPE.

TELEGRAPH APPARATUS.

APPLICATION FILED JUNE 21, 1915.

1,309,960.

Patented July 15, 1919.

2 SHEETS—SHEET 1.

Fig. 1

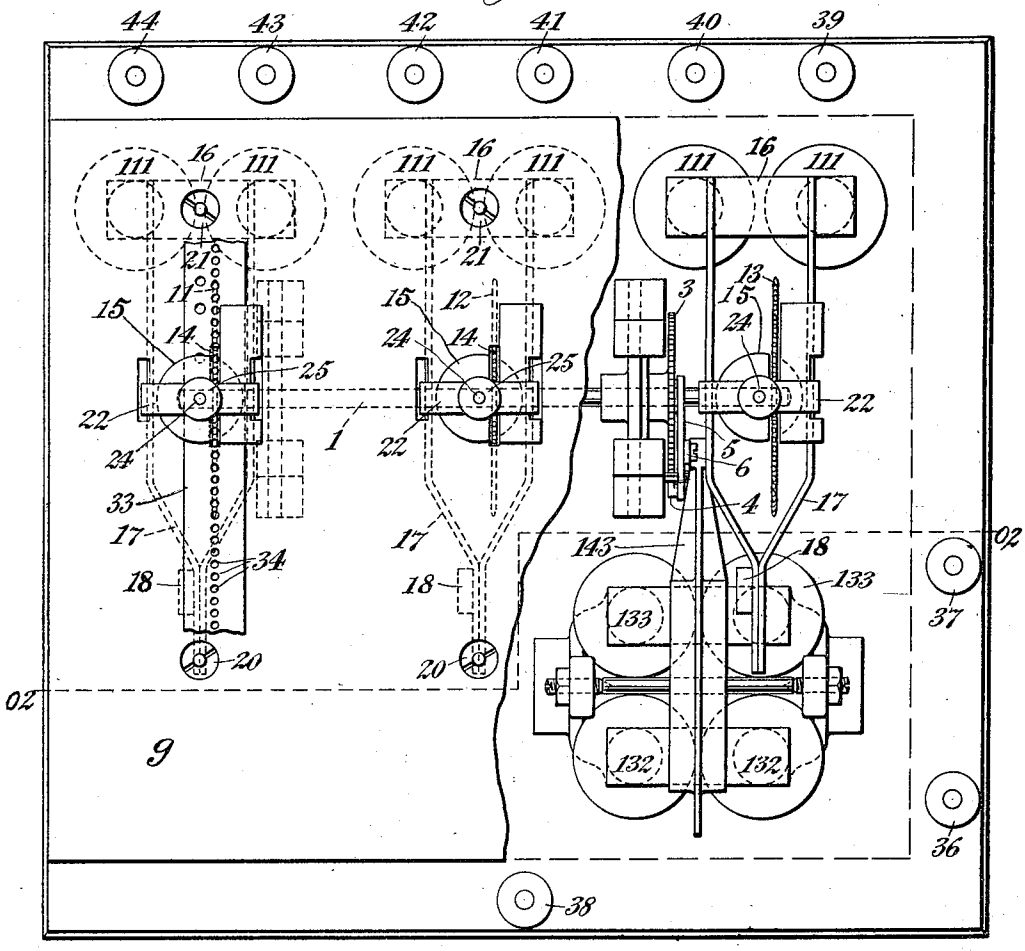
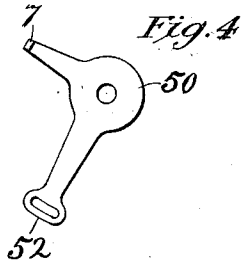


Fig. 4



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2 SHEETS—SHEET 2.

Fig. 3

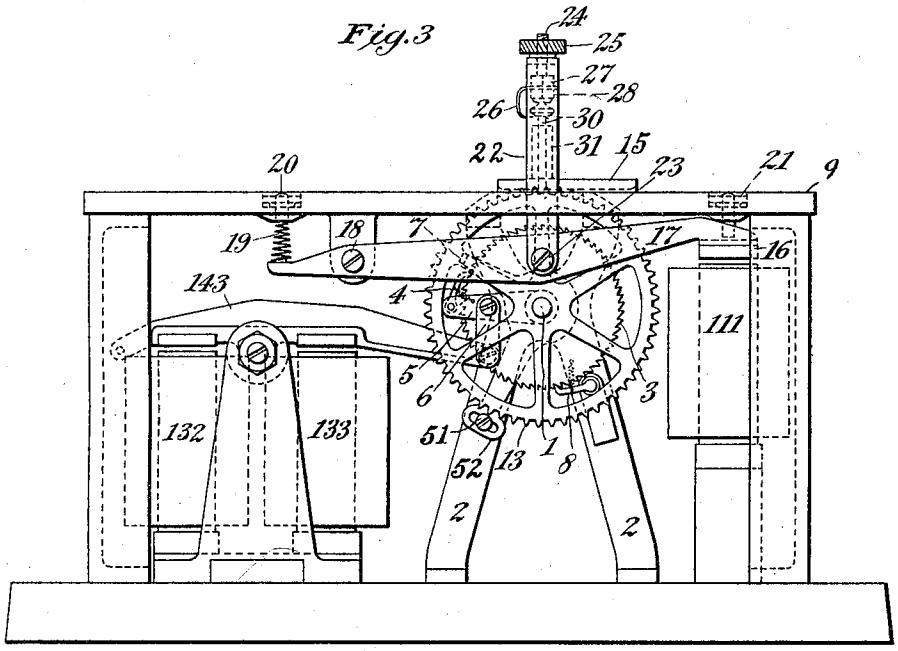
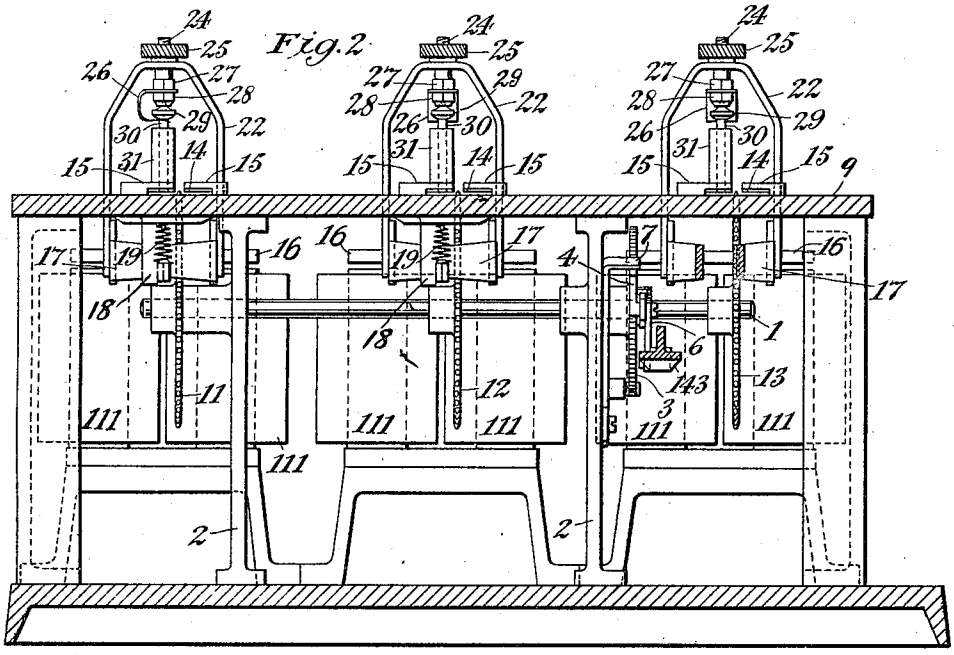


Fig. 2



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UNITED STATES PATENT OFFICE.

EDWIN POPE, OF QUEBEC, QUEBEC, CANADA.

TELEGRAPH APPARATUS.

1,309,960. Specification of Letters Patent. Patented July 15, 1919.

Application filed June 21, 1915. Serial No. 35,203.

To all whom it may concern:

Be it known that I, EDWIN POPE, a subject of the King of Great Britain, residing in Quebec, in the Province of Quebec and Dominion of Canada, have invented certain new and useful Improvements in Telegraph Apparatus, of which the following is a specification.

My invention relates to improvements in the means for receiving and recording telegraphic messages or signals, and is particularly intended for use in connection with a telegraphic system wherein a continuous stream of electrical impulses of opposed polarities is transmitted through a main line and is modified in various ways so as to convey a plurality of systems of signals simultaneously over the same main line. An illustration of the system having the general characteristics mentioned will be found in my Letters Patent of the United States No. 1052513, dated February 11th, 1913. But my improved apparatus may also be used in connection with modifications in such a system as is shown in my aforesaid patent.

Such a modified and improved system in which this apparatus is particularly adapted to be embodied is shown in a separate application filed by me, Serial No. 33229 of 1915, to which further reference may be made for illustrations of the application of my improved receiving and recording mechanism.

In putting in practice the system of my aforesaid patent, I preferably employed mechanism, one type of which was illustrated in my Letters Patent No. 1,043,865 of November 12, 1912, wherein each modification, which was impressed upon the stream of alternations by the immediate manual intervention of an operator, was received and recorded in type form upon paper carried by a suitable platen, each recording mechanism being actuated independently. In my present invention all the receiving machines operating upon the same side of the telegraph system may be connected so as to be moved forward by common mechanical means, preferably, feeding a previously prepared record strip past each of the mechanisms, which register the variations in the electrical reversals constituting the systems of signals, registering the longitudinal positions of the signals in each system, preferably, in the form of punctures in the paper strip, which may afterward be translated, mechanically or otherwise, into their corresponding letter symbols.

In the drawings Figure 1 is a plan view of my improved apparatus, the top being partially broken away to better show the mechanism; Fig. 2 is a front view, partly in section, taken on the line 02—02 of Fig. 1; and Fig. 3 is an end view looking to the left on Fig. 1; and Fig. 4 is a detail view. Corresponding reference numerals are applied to similar parts in all the figures.

In the mechanism illustrated 132, 133 are two pairs of electromagnets adapted to be energized alternately by the impulses sent into the main line, thereby rocking their armature bar 143 which is mounted above them in suitable standards fastened upon the bed of the machine. A shaft 1 is also mounted to rotate in standards 2, 2, and it carries a toothed wheel 3, driven step by step through a spring-pressed pawl 4, carried by an arm 5 journaled on the shaft 1 and raised and lowered through a link 6 carried by the end of the armature 143. A set screw 51 controls the end 52 of the member 50, pivoted on shaft 1 so that the end 7 limits the forward movement of the pawl 4. A spring-pressed detent 8 holds the toothed wheel 3 against retrograde movement.

The rocking of the armature bar 143 through magnets 132, 133, therefore, turns the toothed wheel 3 step by step, one tooth at a time, the forward step being made under the impulse of the magnets 132 and the recovery movement under the influence of magnets 133.

On the shaft 1 are mounted three toothed wheels 11, 12 and 13, the teeth of which project up through the bottoms of guide slots 14 running under suitable guides 15 adjusted upon the top 9 of the machine.

A pair of punching magnets 111, 111 is associated with each of the feed wheels 11, 12 and 13, each pair of these magnets being adapted to be energized by a separate system of the modifications of the continuous stream of alternations which is sent into the main line. And, when energized, these magnets attract their armatures 16, rocking down the forked armature bars 17 which are hung upon pivots carried by suitable brackets 18 below the top of the machine. The other end of each armature bar 17 is

pressed down by a coiled spring 19 interposed between it and the top of the machine, and adapted to be compressed by a suitable screw 20 to the desired degree of tension, so as to normally throw up the armature end of the bar 17 away from the magnets 111, the play of the armature being restricted by the adjustable screw 21. A yoke 22 is pivoted at 23 to each armature bar 17 so as to rise and fall with it, traveling in suitable guides through the top of the machine. The yoke has a rod 24 passing through its top and held securely by a thumb nut 25. A spring 26 is fastened to the rod 24 by nuts 27—28, the lower end of the spring being forked and engaging below the head 29 of a punch 30, the upper side of the head of which engages against the lock nut 28. The punch 30 slides in a guide 31 on the top of the machine. The channel in this guide 31 is continued through the top of the guide 15 and the top of the machine, passing to one side of the vertical slot through which the wheel 11, 12 or 13 travels. And the adjustment of the parts is such that when the yoke 22 is raised by the armature bar 17 it will lift the punch 30 above the top of the machine; and when the yoke 22 is lowered by the armature bar 17 being drawn down by the magnets 111, 111, the end of the punch 30 will be pushed down below the bottom of the slot 14.

The spring connection between the punch 30 and the yoke 22 permits the punch to be unaffected by any lateral movement of the yoke as it slides vertically through the top of the machine.

A strip of paper 33, having a uniform series of perforations 34, 34, is passed through the slot or channel 14 under the guides 15, 15 and over each of the wheels 11, 12 and 13, the series of perforations registering with the teeth in these wheels, so that as the wheels are turned step by step by the action of the magnets 132, 133 each strip of paper will be fed forward by its wheel at a uniform rate through its slot 14, the paper moving forward a step each time the armature 143 is attracted to the magnets 132, 132, and remaining stationary while the armature 143 is swung back by the magnets 133, 133. And if, while the paper is stationary, the magnets 111 are energized, the punch 30 will be driven down through the strip of paper making a hole in it at one side of the series of feed perforations.

Letters and other characters may be represented by various combinations made by the feed holes and the signal holes, thus, the letter A may be represented by a series of four feed holes with a signal hole opposite the second and fourth feed holes; and the letter B may be represented by a series of eight feed holes with a signal hole opposite the fourth and eighth feed holes. The hole symbols of A and B would appear upon the tape substantially as follows:

O O O O
OOOOOOOOOOOO

The functions of the three pairs of magnets 111, 111, are to register three different systems of signals caused by modifications in three different ways of a stream of electrical impulses of opposed polarity passing over a main line.

One pair of these magnets 111, 111, is arranged so as to be energized when a stronger than normal negative impulse passes over the main line, thereby pulling down its armature 16 and causing its punch 30 to register through its corresponding tape; the second pair of the magnets 111, 111, is arranged so as to be energized, and to similarly operate its punch, when a neutral interval is interposed before a negative impulse and after a positive impulse passing over the main line; and the third pair of magnets 111, 111, is arranged to be energized and to similarly operate its punch when a negative impulse in the main line is lengthened or prolonged. Suitable connections for the circuits for energizing the first pair of magnets are indicated by 39 and 40; for the second pair of magnets by 41 and 42, and for the third pair by 43 and 44.

The pairs of magnets 132, 132 and 133, 133 are connected with the main line (not shown) through suitable connections, as 36, 37 and 38, so that the pair of magnets 132, 132, will be energized by a positive impulse and the pair 133, 133, by a negative impulse; with the result that the alternating energizing and deënergizing of these pairs of magnets will cause them to alternately pull down and release the armature 143, rocking it, and causing it to feed forward the paper one step for each positive impulse which passes over the main line.

My Letters Patent 1,052,513 of February 11, 1913, show a system wherein the first two systems of signals just mentioned are employed, and one pair of my present magnets 111, 111, might be taken as corresponding to the magnet 28 in part three of Fig. 1 of that patent; another pair of magnets 111, 111, as corresponding to the magnet 26 in the same figure; while the third pair represents a modification of my earlier system whereby a third magnet would function similarly to 28 and 26 under the influence of a prolonged negative impulse, in the main line. The present pairs of magnets 132, 132 and 133, 133, respectively, correspond to the magnets 30 and 31 associated with the magnet 28 of my aforesaid patent. All of this will be readily understood by one skilled in the art. And when thus arranged the apparatus will feed the registering paper forward uniformly past each of the punches

under the influence of a positive alternation, while the individual modifications of each system, in or immediately preceding negative impulses, will be registered by its magnets 111 actuating the punches 30 to perforate the strips 33 with their selected signals.

Another machine, similar to the one just described, will be provided for the other side, that is the positive side of the telegraph system, wherein the systems of signals are produced by modifications in or immediately preceding positive impulses in the main line circuit, the position of its magnets 132, 133 being reversed, the paper then being fed forward under the influence of negative impulses, and the distinctive signal systems being transmitted and recorded through the magnets 111 by modifications of the positive alternations.

In practice as many of the toothed tape-feeding wheels with their associated punches may be used as there are systems of signals on each side of the telegraph system. The essential thing is that the paper shall be accurately fed definite distances, step by step, and shall graphically show the action of each punch in relation to those steps.

But, for convenience in relaying messages and in translating them, I find it desirable to use the system of feed holes and signal holes which I have mentioned. And I do not desire to limit myself to the form of feeding mechanism which I have shown to illustrate the application of my invention; as the substitution of equivalents and of such modifications as would be well understood in the art might be made without departing from the spirit of my invention.

Having thus described my invention what I claim and desire to secure by Letters Patent of the United States is:—

1. The combination, in a telegraph receiver, of a plurality of electromagnets severally adapted to be energized by different systems of signals formed by different systems of modifications in a common system of electrical alternations, mechanism registering the action of each of said systems, measuring mechanism, and common means for actuating the same step by step alternately with the registering mechanism.

2. The combination, in a telegraph receiver, of a plurality of mechanisms severally adapted to respond to the electrical impulses of signal systems formed by different systems of modifications in a common system of electrical alternations, separate means for mechanically registering the signals of each system, step by step measuring mechanism, and common means for operating the same intermediate of the actions of the signal mechanisms.

3. The combination, in a telegraph receiver, of a plurality of electromagnets severally adapted to respond to different systems of signals each formed by a different system of modifications, in a common system of electrical alternations, a registering means actuated by the magnet of each system of signals, a measuring mechanism associated with each of said registering means, and common means actuated by said common system of alternations for advancing the measuring mechanisms step by step intermediate of the actions of the registering mechanisms.

4. The combination, in a telegraph receiver, of a plurality of electromagnets severally adapted to respond to different systems of signals, a registering means embracing an armature bar coacting with a punch and actuated by the magnet of each system of signals, a measuring mechanism associated with each of said registering means, and common means for advancing the measuring mechanisms step by step intermediate of the actions of the registering mechanisms.

5. The combination, in a telegraph receiver, of a plurality of electromagnets severally adapted to respond to different systems of signals, a registering means actuated by the magnet of each system of signals, a measuring mechanism, embracing a toothed wheel, associated with each of said registering means, and common means for advancing the measuring mechanisms step by step intermediate of the actions of the registering mechanisms.

6. The combination, in a telegraph receiver, of a plurality of electromagnets severally adapted to respond to different systems of signals each formed by a different system of modifications in a common system of electrical alternations, a registering means actuated by the magnet of each system of signals, a measuring mechanism associated with each of said registering means, and common means, embracing a shaft, a ratchet wheel, an armature and a pair of electromagnets actuated by said common system of electrical alternations, for advancing the measuring mechanisms step by step intermediate of the actions of the registering mechanisms.

7. The combination, in a telegraph receiver, of a plurality of mechanisms severally translating signals of separate systems into mechanical movements, measuring mechanism advancing step by step and determining the values of the several mechanical movements by their distances traveled, and common means for advancing said measuring means.

8. The combination, in a telegraph receiver, of a plurality of mechanisms severally translating signals of separate systems into mechanical movements and each embracing an electromagnet, an armature and a punch, measuring mechanism advancing

measuring means step by step and determining the values of the several mechanical movements by the distances the measuring means travel and embracing toothed wheels, connecting mechanism, an armature and a pair of electromagnets, and common means for advancing said measuring means.

9. The combination, in a telegraph receiver, of means registering a plurality of systems of arbitrarily selected signals based on a common system of electrical alternations, measuring means, and means for moving the measuring means uniformly in relation to all the registering means to determine the value of the signals of each system by the intervening distance traveled by the measuring means.

EDWIN POPE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."