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PRINTING TELEGRAPH APPARATUS

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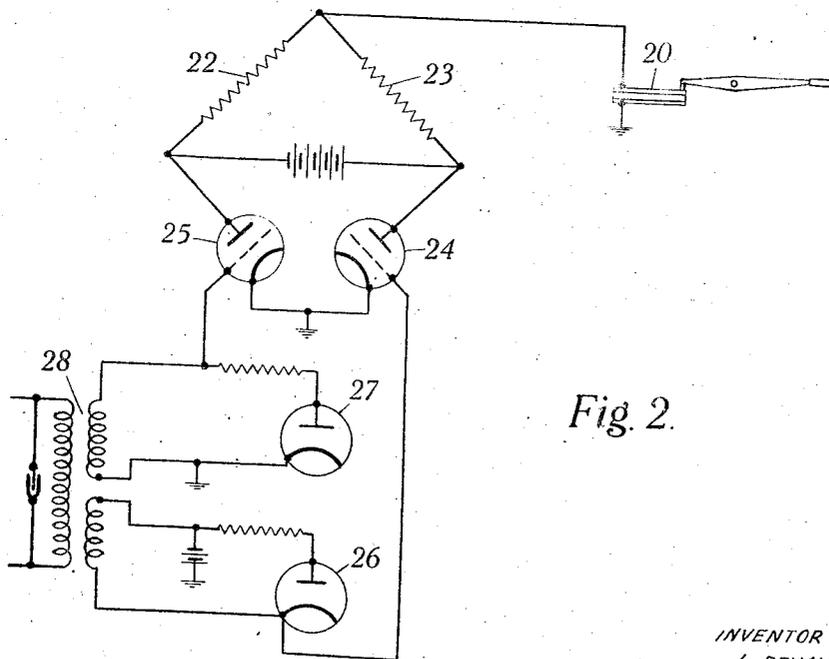
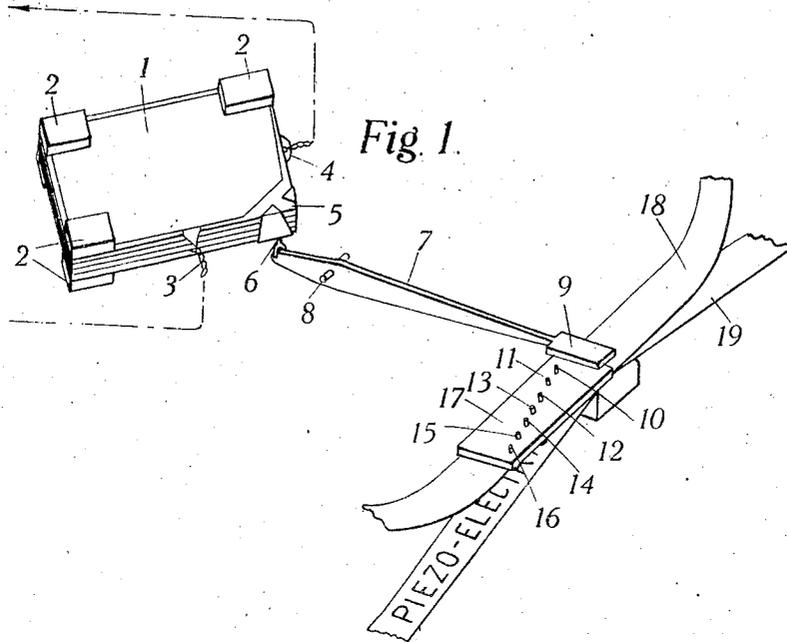


Fig. 2.

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PRINTING TELEGRAPH APPARATUS

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6 Claims. (Cl. 178—5)

In a large number of telegraph receivers known at the present time, particularly in receivers which reproduce letters and signs by dots close together, it is necessary to obtain a very rapid movement of the member producing the impression. For this purpose electro-magnetic systems are employed whose movable portion is very light and which receive rather intense current in order to obtain a rapid movement of the armature.

The present invention provides the control of the printing member by a device employing the properties of piezo-electric crystals. It is known that by cutting laminations after having provided them with armatures, bi-laminar or multi-laminar units are obtained, which bend when differences of potential are applied between the armatures, the direction of distortion depending on the difference of potential. Rochelle salt (a double tartrate of potassium and sodium) is particularly suitable for this application because, for the same difference of potential it undergoes far greater distortions than other crystals which have been tested.

Such a device may be adapted to actuate either a printing stylus, which presses carbon paper on the registering tape or a knife which lifts the paper tape to apply it to a carbon paper or the like whose other side is resting on a moving point, either a small plate which controls moving styluses, or any other member acting in a similar manner. Any such member may be called a printing hammer. The advantage of this system is that it is easy to obtain a rapid movement following with precision the rhythm of the transmission, and the device does not require permanent current; it is sufficient to maintain the difference of potential without output, in order to maintain the pressure.

The amplitude of the movement of a piezo-electric crystal is generally too low for it to be possible to control the printing member directly, but the pressures obtained being great it is possible to amplify the movement by mechanical means, such as a lever or by other arrangements such as pneumatic devices.

An embodiment of the invention is shown by way of example in the accompanying drawing, in which

Fig. 1 illustrates schematically an arrangement in accordance with the invention, and

Fig. 2 illustrates a form of control circuit in accordance with the invention.

Fig. 1 of the accompanying drawing shows

schematically the embodiment of a printing arrangement in a telegraph receiver. The piezo-electric receiving unit 1 is formed of several superposed strips; it is square in shape and supported at three of its corners by means of elastic plates, 2, such as rubber. The plates are cut in such a way that in applying a difference of potential between the armatures 3 and 4 the strips bend in such a way that the free corner 5 is displaced along a line perpendicular to the plane of the strips. This corner is assembled with a small rod 6 which actuates a lever 7 pivoting round an axis 8. The other end of the lever is provided with the member serving for printing.

In the case of the drawing, a small hammer 9 strikes on the styluses 10, 11, 12, 13, 14, 15, 16 carried by a carriage 17, and serves to press an inked ribbon 18 on a paper band 19. The carriage 17 is moved by an alternative movement which is synchronised with the transmission in such a way that the styluses 10-16 pass through parallel lines, and according to the action of the hammer 9 trace dots or dashes whose arrangement forms the letters. For example the carriage 17 may be reciprocated by means of a cam on a shaft released for one rotation at the commencement of receipt of impulses representing a character.

The movement of the lever may be doubled without increasing the constraint of the crystal. For this purpose the receiving circuit may be arranged so that in the normal condition the crystal is polarised in one direction and that the reception of the signals produces a polarisation of opposite sign and of the same value. An example of such a circuit is given in Fig. 2 of the accompanying drawing.

The piezo-electric crystal 20 is connected in the diagonal of a Wheatstone bridge two branches of which are formed by two equal resistances 22 and 23, and the two other branches of which are formed by two electron tubes 24 and 25. The grid of tube 24 is normally strongly polarised so that the resistance of the tube is considerable, and on the other hand the grid of tube 25 is neutral and the resistance of the tube 25 is low.

The crystal is thus polarised in one direction. Included in the grid circuits of tubes 24 and 25 are diodes 26 and 27 respectively, and these circuits are connected to the last tuned circuit 28 of the receiving station in such a way that a received impulse makes the grid of tube 24 become negative.

The bridge is thus unbalanced in the inverse

direction and the polarisation of the piezo-electric elements is reversed.

It is clear that the invention is not limited to the embodiment which has just been described, but that on the contrary it is capable of general applications. It is thus that instead of a single piezo-electric element it is possible to use one such element in each of several channels each controlling a separate printing hammer, in the case in which impulses representing a character are sent over several channels.

What is claimed is:

1. A printing telegraph receiver adapted to record signals by marks representing the various characters in accordance with received signal impulses, comprising a plate built up of a plurality of laminations each cut from a crystal piezo-electric material, means for applying received signal impulses to opposite sides of said plate to cause said plate to deform, and a printing hammer cooperating with said plate actuatable in response to the deformation of said plate for recording said received signals.

2. A printing telegraph receiver adapted to record signals by marks representing the various characters in accordance with received signal impulses, comprising a plate of piezo electric material, means for applying received signal impulses to opposite sides of said plate to cause said plate to deform, a printing hammer cooperating with said plate actuatable in response to the deformation of said plate for recording said received signals, a carriage mounted for cooperation with said printing hammer, and a plurality of styluses mounted in said carriage for selective positioning with respect to said hammer, whereby operation of said printing hammer in accordance

with received signal impulses serves to build up representation of said characters through operation of said styluses.

3. A printing telegraph receiver in accordance with claim 1, in which the means for actuating said printing hammer comprises a lever, one end of said lever being in contact with a corner of said piezo-electric plate, and the other end of said lever carrying said printing hammer.

4. A printing telegraph receiver in accordance with claim 1, further comprising means for normally polarizing said plate in one direction, in which said received impulses produce polarization of said plate in the opposite direction.

5. A printing telegraph receiver comprising a Wheatstone bridge arrangement, thermionic tubes in adjacent arms of said Wheatstone bridge arrangement, resistance elements in the other arms of said bridge, means for normally biasing said thermionic tubes so that one of said tubes presents a low resistance and the other of said tubes represents a high resistance, a plate of piezo-electric material bridged across one diagonal of said Wheatstone bridge circuit, a telegraph signal recording means cooperating with said plate, and a receiving circuit connected with said thermionic tubes for reversing the biasing effect on said tubes in response to received signal impulses.

6. A printing telegraph receiver according to claim 1 for comprising elastic members for supporting said built-up plate at three of its corners whereby a fourth corner is capable of vibrating along a line substantially perpendicular to the plane of the plates, and a lever having one end in engagement with said fourth corner and the other end provided with said printing hammer.

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