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A. WEAVER

METHOD AND APPARATUS FOR PICTURE TRANSMISSION

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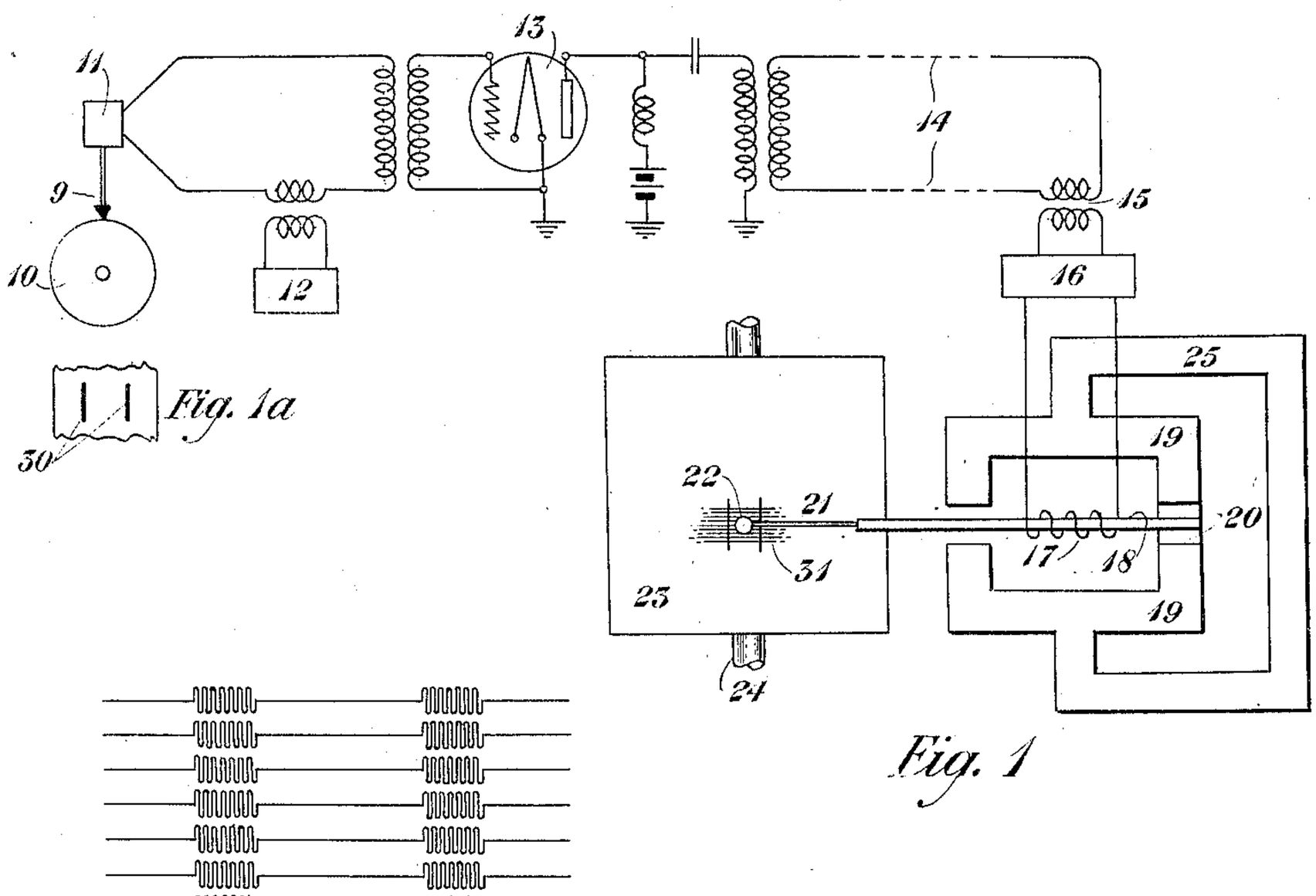


Fig. 1a

Fig. 1




Fig. 2

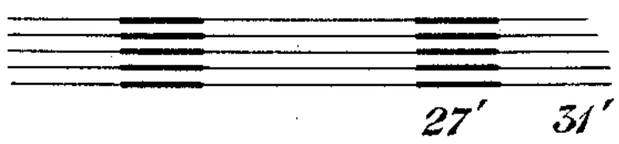


Fig. 4

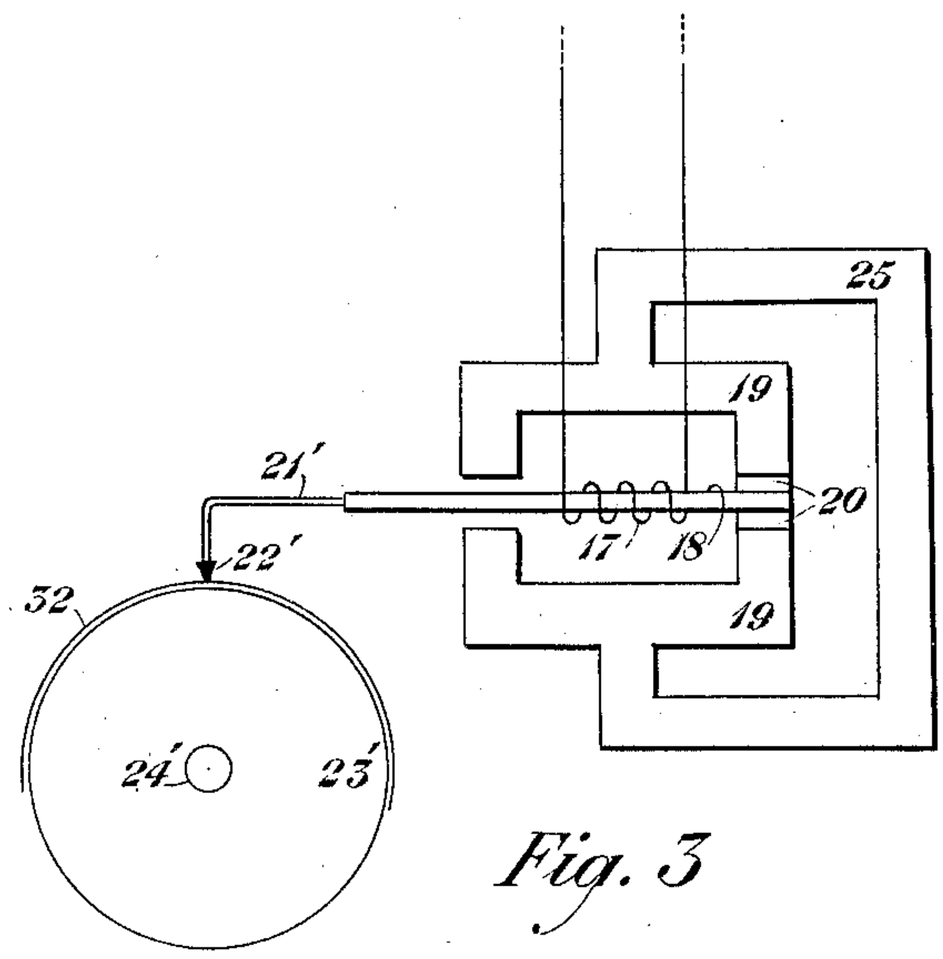


Fig. 3

INVENTOR
A. Weaver

BY

ATTORNEY

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ALLAN WEAVER, OF BROOKLYN, NEW YORK, ASSIGNOR TO AMERICAN TELEPHONE AND TELEGRAPH COMPANY, A CORPORATION OF NEW YORK.

## METHOD AND APPARATUS FOR PICTURE TRANSMISSION.

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The principal object of my invention is to provide a new and improved method and appropriate apparatus for electro-mechanically producing images and particularly for transmitting pictures over long distances. Another object of my invention is to provide a picture or image transmitting system having a new and improved means for producing the image at the receiving end. Another object of my invention involves determining the degrees of light and shade in the received picture or image by the amplitude of vibration of a receiving element or stylus. These and various objects of my invention will become more readily apparent on consideration of a limited number of specific examples which I have chosen to illustrate in the accompanying drawings and describe in the following specification. It will be understood that the invention is defined in the appended claims and that the following disclosure relates to these particular examples of the invention.

Referring to the drawings, Figure 1 is a diagram illustrating an embodiment of my invention; Fig. 1[a] is a detail of Fig. 1 looking at the transmitting drum at a right angle to its axis instead of along its axis as in Fig. 1; Fig. 2 is an enlarged detail which will be referred to in explaining the operation of the recording stylus; Fig. 3 is a detail modification; and Fig. 4 is a detail showing the character of the record made when the modification of Fig. 3 is employed.

The picture to be transmitted is assumed to be put in the form of a relief film which is wrapped on the drum 10. This drum 10 is rotated uniformly and advanced relatively slowly along its axis meanwhile, so that the stylus 9 in engagement therewith traces a helical path of small pitch on the film.

Due to the varying relief of the film, the stylus 9 is vibrated and actuates the microphone transmitter 11 to modulate the alternating current from the oscillator 12. This current is amplified by the amplifier 13 and put on the line 14.

At the receiving end the received current goes through a transformer 15 to an amplifier 16 and thence to the winding 17 about the magnetic reed 18 between the forked poles 19 of the magnet 25. The members 20 are of non-magnetic material.

It will be understood that the current transmitted and received is a carrier current of frequency determined by the oscillator 12 and of amplitude corresponding to the lights and shades of the picture as determined by the microphone 11. The reed 18 is designed to be aperiodic, and accordingly it is vibrated with a frequency the same as the carrier frequency and with an amplitude corresponding to the amplitude of the transmitted current.

A place of high relief in the film on the drum 10 causes high pressure and reduced resistance in the microphone 11. This means that the current applied to the amplifier 13 is of high amplitude, and the result at the receiving end is that the armature 18 vibrates with wide amplitude. High relief in the film at the transmitting end corresponds to a wide amplitude of the vibrating armature 18, and vice versa.

At the receiving end the shaft 24 carries a drum 23 which is rotated and traversed in synchronism with the drum 10 at the transmitting end. One method by which the drums may be synchronized is disclosed in British Patent 242,694, granted February 4, 1926. The armature 18 carries an extension 21 with a stylus 22 which is adapted to mark on a suitable picture receiving member wrapped on the drum 23.

Suppose that there are two short parallel lines in the picture to be transmitted which are represented by the two ridges 30 in the relief film at the sending end, and suppose that the adjoining part of the picture is of light shade, that is, with low relief in the transmitting film. For the parts of light shade or low relief, the amplitude of the transmitted current will be small, and the stylus 21 will vibrate with such a small amplitude as to record lines 31 which appear to be merely straight lines. But as the transmitting stylus passes over the relief ridges 30, the amplitude of the transmitted current will be greatly increased, and the receiving stylus will then vibrate widely as at 27 in

Fig. 2. It will readily be seen from Fig. 2, that the vibrating stylus will mark a region of much deeper shade on the receiving surface, and it will be understood that in this way the whole picture with its lights and shades will be faithfully reproduced.

In Fig. 3 I have shown a modification in which a sheet of carbon manifold paper 32 is employed between the receiving stylus and the picture receiving surface. In this case the vibration of the receiving stylus is in a direction perpendicular to the surface of the receiving platen instead of along that surface as in Fig. 1. When the amplitude of the vibration of the receiving stylus is narrow, light lines are traced as at 31′ in Fig. 4, but when the amplitude of vibration is wide the carbon copying paper is pressed down more, and a darker shade is obtained as at 27′ in Fig. 4.

I claim:

1. A member having a picture receiving surface, a stylus in engagement therewith, means to traverse the said member relatively to the stylus, means to produce a sustained alternating carrier current, means to modulate said carrier current with respect to its amplitude, means to transmit said carrier current modulated corresponding to a picture to be transmitted, and means to apply the received modulated carrier current to vibrate the stylus in correspondence with the received carrier current.

2. A member having a picture receiving surface, a stylus in engagement therewith, means to traverse the said member relatively to the stylus, means to produce an alternating carrier current of a definite frequency, means to modulate said carrier current means to transmit said carrier current modulated corresponding to a picture to be transmitted, and means to apply the received current to vibrate the stylus at the frequency of and with an amplitude corresponding to the received carrier current whereby a heavier record is made with increased amplitude of vibration thus reproducing the lights and shades of the picture to be transmitted.

3. The method of transmitting and receiving a picture which involves producing a carrier current of a definite frequency, modulating said carrier current according to picture characteristics, vibrating a receiving stylus at the frequency of and with an amplitude corresponding to said carrier current modulated according to the picture characteristics and causing said stylus by its engagement with a picture receiving surface to reproduce the lights and shades of the picture in accordance with the amplitude of vibration.

4. The method of receiving a modulated picture transmitting carrier current of a definite frequency which consists in applying said current to vibrate a stylus in proportion to the amplitude of the said carrier current, and traversing a picture receiving member under said stylus whereby the light shades will cause the stylus to record thin lines and the dark shades will cause it to vibrate widely and make the recorded lines effectively heavier.

5. The method of receiving a modulated picture transmitting carrier current of a definite frequency which consists in applying said current to vibrate a stylus in proportion to the amplitude of the said carrier current and at the frequency of said carrier current, and passing a picture receiving member under said stylus in successive parallel traverses transverse to the direction of vibration of the stylus, so that the stylus will trace lines of degree of shade corresponding to the amplitude of vibration.

6. In combination, a picture receiving member, a stylus in engagement therewith, and means to vibrate said stylus at the same rate as a received carrier current whose amplitude is modulated in accordance with the characteristics of the picture to be received.

7. In combination, a picture receiving member, a drum carrying said member and rotating on its axis and traversing slowly lengthwise, a stylus engaging said member, and means to vibrate said stylus parallel to the drum axis in accordance with a received picture transmitting carrier current the amplitude of which is modulated in accordance with the characteristics of the picture to be received.

8. In a picture transmission system, a line, a member having a picture receiving surface, a stylus in engagement therewith, means for moving said member transversely with regard to the stylus, means for generating carrier current, means for modulating the amplitude of said carrier current in accordance with the picture characteristics, means for applying the modulated current to the line, means for receiving the modulated current, and means for applying the received modulated carrier current to vibrate the stylus in accordance with the picture characteristics.

9. In an electromechanical image producing system, a stylus in engagement with the surface on which the image is to be recorded, means for transmitting a sustained carrier current the amplitude of the pulsations of which is continuously varied in accordance with tone values of successive elemental areas of the picture or object an image of which is to be produced, and means for applying said continuously varied carrier current to vibrate said stylus thereby producing said image.

10. Means for producing an image of an object the tone values of the elemental areas of which lie at different points within a wide range of tone values, comprising means at the transmitter for modulating a carrier current, and image producing means at the receiver to translate said currents into uniform

undulatory lines which, viewed at a distance, appear as tone values corresponding to those of elemental areas of the object.

11. An electromechanical image producing system comprising means for recording a fixed number of lines per unit area of the image, and means for causing variations in the direction of said lines in accordance with tone values of elemental areas of the picture or object an image of which is to be produced.

In testimony whereof, I have signed my name to this specification this 13th day of December 1923.

ALLAN WEAVER.