

Sept. 24, 1946.

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2,408,050

METHOD OF AND MEANS FOR VISUALLY REPRODUCING SIGNALS

Filed Nov. 1, 1943

3 Sheets-Sheet 1

Fig. 1.

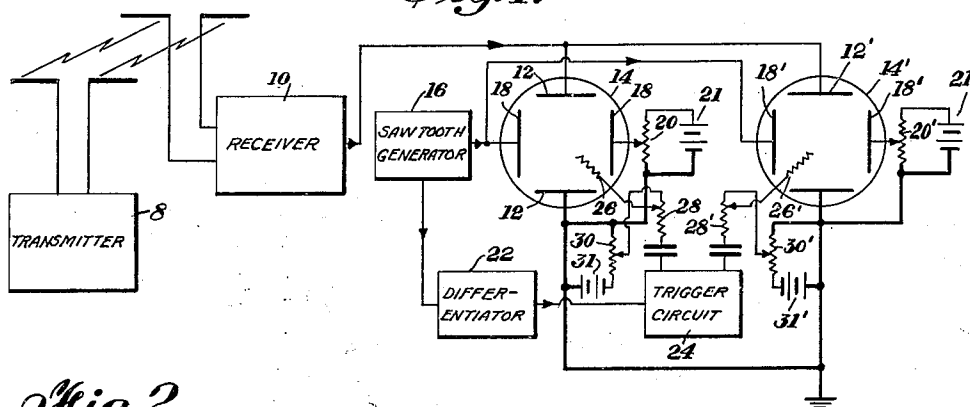


Fig. 2.

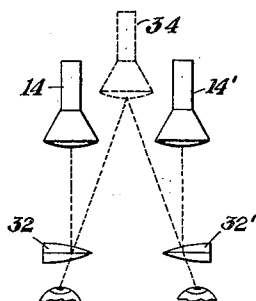
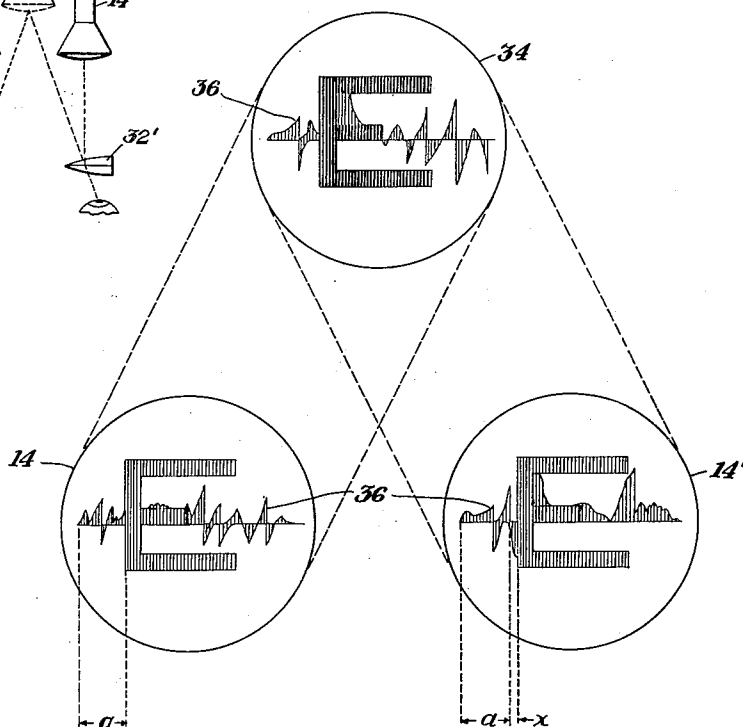


Fig. 3.

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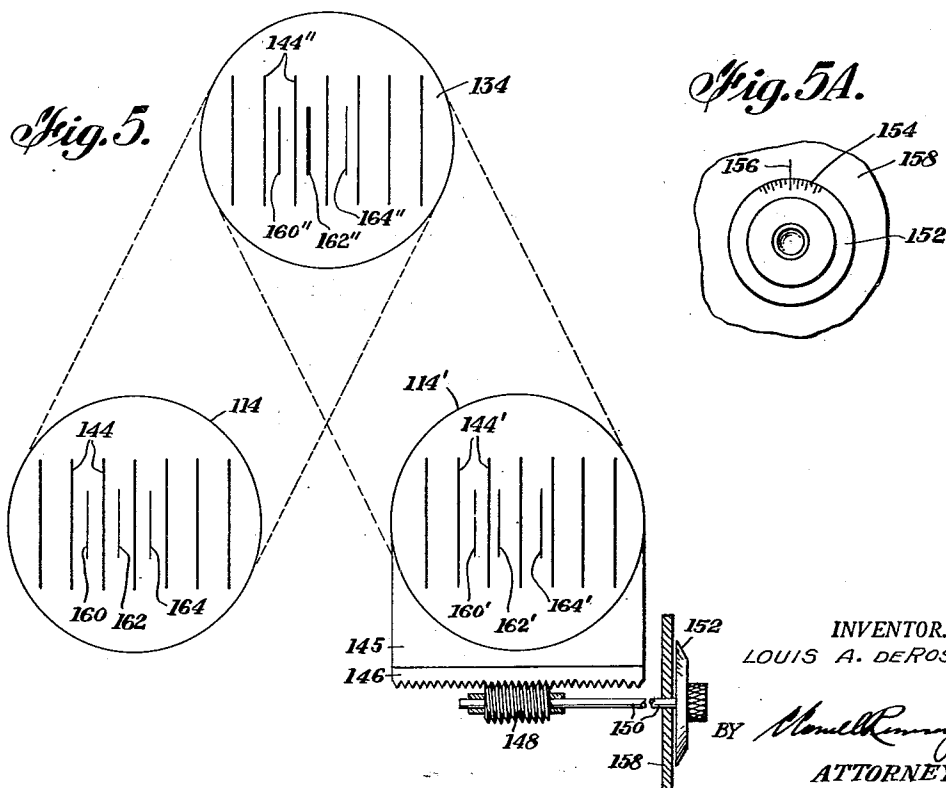
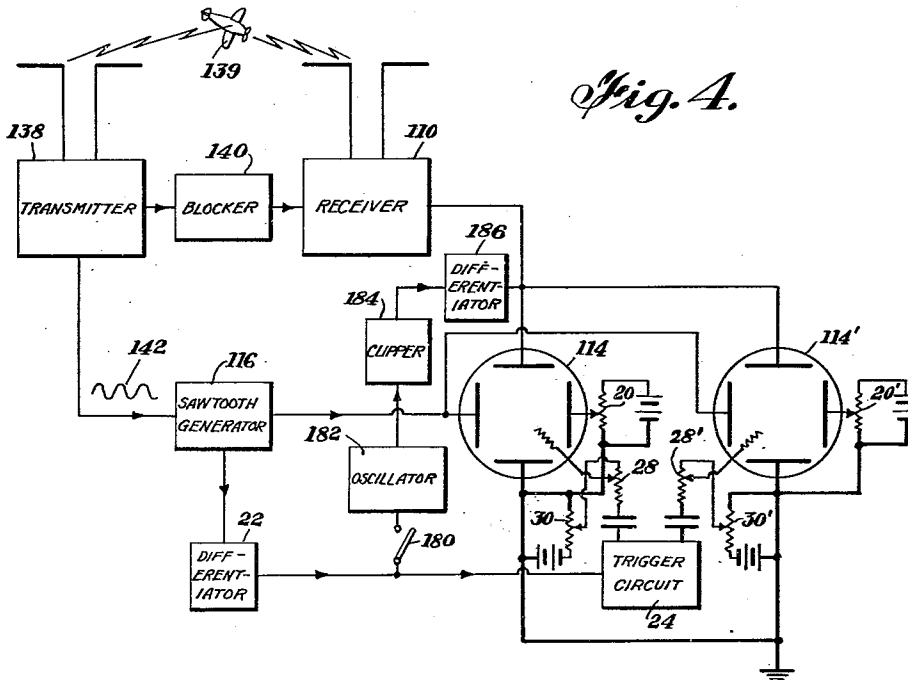


Fig. 5A.

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Fig. 6.

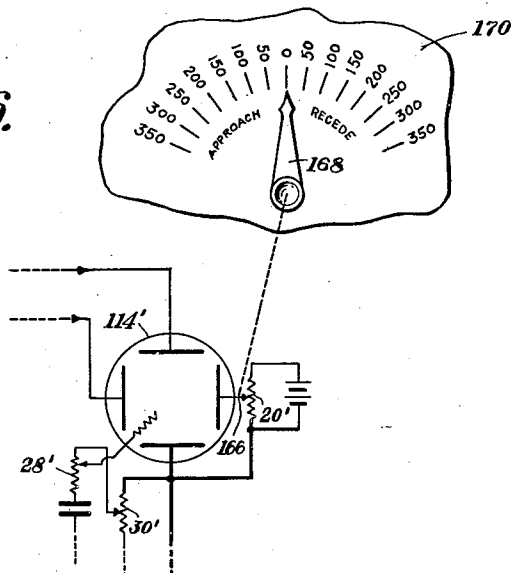
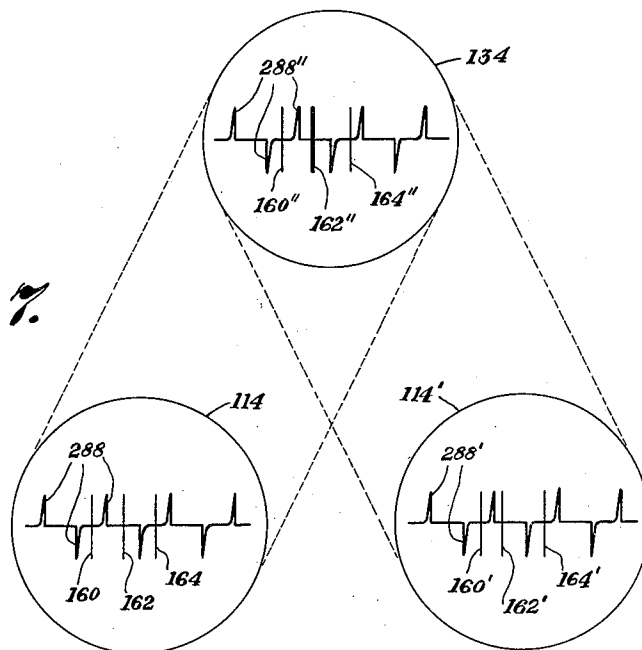


Fig. 7.



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Patented Sept. 24, 1946

2,408,050

UNITED STATES PATENT OFFICE

2,408,050

METHOD OF AND MEANS FOR VISUALLY
REPRODUCING SIGNALS

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Application November 1, 1943, Serial No. 508,596

18 Claims. (Cl. 178—6.5)

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This invention relates to improvements in methods of and means for visually reproducing signals, and more particularly to methods of and means for stereoscopically reproducing intelligence-indicating signals.

An object of this invention is to provide a method and means for improving the visual reproduction of signals.

Another object of this invention is to provide methods and means for clarifying the visual reproduction of facsimile signals.

A further object of this invention is to provide a facsimile transmission system wherein regularly repeated facsimile signals, when stereoscopically viewed, stand out in comparison with irregular or random noise signals.

Still another object of this invention is directed toward providing a radio locator system in which a signal corresponding to the object located is more clearly visualized, and from which signal the direction of movement and/or speed of the located object can be calculated.

More specifically, the invention contemplates the utilization of a pair of cathode ray oscilloscopes whose screens are stereoscopically viewed, and upon whose screens regularly repeated signals are laterally displaced so that when stereoscopically viewed they are more clearly distinguishable from irregular or random noise signals.

Other objects will become apparent from the following description taken in connection with the attached drawings showing several illustrative embodiments of the invention, and wherein:

Fig. 1 is a circuit diagram, partially in block form showing a general, preferred embodiment of the system according to the present invention;

Fig. 2 is a schematic plan view illustrating the optical system utilized in the present invention;

Fig. 3 is a plan view of the screens of a pair of cathode ray oscilloscopes, together with a plan view of the apparent stereoscopic image, showing a facsimile character on the screens;

Fig. 4 is a circuit diagram, partially in block form, illustrating the application of the present invention to radio locator apparatus;

Fig. 5 is a front plan view, partially in section, illustrating the screens of the two cathode ray oscilloscopes shown in Fig. 4, and also the apparent image of the two screens when stereoscopically viewed;

Fig. 5A is a side view of a detail of one of the cathode ray oscilloscopes shown in Fig. 5;

Fig. 6 is a partial circuit diagram together with a partial plan view of a detail of the apparatus illustrated in Fig. 4;

Fig. 7 is a plan view of the screen of the oscilloscopes illustrated in Fig. 4, together with a stereoscopic image of the two screens illustrating a modified form of indicia upon such screens.

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Fig. 1 represents a preferred, general embodiment of the present invention, and the manner in which the invention may be used with known apparatus. By way of example, the invention illustrated in Fig. 1 will be described in connection with a facsimile transmission system of the type in which the signals for forming each character are repeated at a regular rate a predetermined number of times. Facsimile systems of this type are well known in the art and the transmitter 8 represents any one of such systems radiating or otherwise transmitting facsimile characters, each of which are repeated several times for predetermined intervals. The receiver 10 may be of a type, also known in the art, adapted to receive and demodulate such signals for application to a visual reproducing device such as a cathode ray oscilloscope. In accordance with the present invention the output from the receiver 10 is applied to the vertical plates 12 and 12' of a pair of cathode ray oscilloscopes 14, 14', respectively. A sweep generator such as a saw-tooth generator 16 is connected across the horizontal plates 18 and 18' of the two oscilloscopes respectively. Synchronizing of the saw-tooth generator 16, if necessary, may be accomplished by any manner known to the art. For the purposes of the present invention I desire to control the lateral displacement of the sweep voltage upon each of the oscilloscopes, and for that purpose one of the plates 18 and 18' of the two oscilloscopes may be provided with a variable bias with respect to ground, as through the potentiometers 20 and 20', across which are respectively connected suitable voltage sources 21, 21'.

In accordance with the present invention, the output from the saw-tooth generator 16 is also passed through a differentiator 22, the differentiated pulses from which will control a trigger circuit 24 of known design. The two outputs from the trigger circuit are used to alternatively energize the grids 26, 26' of the two cathode ray oscilloscopes the timing of the blanking being further controlled, if desired, through potentiometers 28 and 28' respectively. The amount of illumination on the screen may be further adjusted by controlling the grid bias voltages through potentiometers 30 and 30' and suitable power sources such as batteries 31 and 31'.

As more clearly indicated in Fig. 2, it is proposed to stereoscopically view the two screens of the cathode ray oscilloscopes 14 and 14'. Known stereoscopic systems can be used and for this purpose the two oscilloscopes are laterally displaced a predetermined amount with their screens lying in a common plane. The two oscilloscopes are viewed through properly spaced lenticular lenses 32 and 32' so that when commonly viewed through the eyes of an observer a single image 34 of the two oscilloscopes will appear.

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As is well known in the art, a stereoscopic effect depends upon a displacement between the images of two simultaneously viewed pictures, this displacement being so dimensioned with respect to the dimensions of the stereoscopic system, as a whole, as to produce an image which has apparent depth. Such lateral displacement is provided by the system described above and shown in Fig. 1. Keeping in mind that signals corresponding to each character to be reproduced are repeated several times at predetermined intervals, the circuit 24 together with the differentiator 22 are so dimensioned as to alternatively energize the grids 26 and 26' of the two oscilloscopes at a rate which will be equal to the time displacement between repeated signals. In other words, a first signal while applied to both oscilloscopes will only appear on the oscilloscope 14 when its grid 26 is energized, while the next signal will only appear upon the oscilloscope 14' when the grid 26' is energized. Thus, the observer will actually see an image first on the oscilloscope 14 and next on the oscilloscope 14', although due to persistence of vision the signals will appear to be viewed simultaneously. By reason, furthermore, of the biasing controls 20 and 20' which may be used to relatively shift the applied sweep voltage, the image appearing on the oscilloscope 14' may be laterally displaced with respect to the image appearing upon the oscilloscope 14. Accordingly, the two images, one laterally displaced with respect to the other and appearing substantially simultaneously to the observer, will appear to stand out with a depth perspective when stereoscopically viewed.

If the aforescribed system is applied, for example, to a facsimile transmission system, the letters or characters regularly repeated will thus stand out more clearly than in ordinary facsimile systems heretofore proposed. For example, as seen in Fig. 3, the image of the letter "E" will appear on the screen 14 and a similar image formed by the next repetition of the signal will appear on the screen of the oscilloscope 14' but with a lateral displacement. For example, beginning from a common reference point, the letter "E" on the screen of oscilloscope 14 will appear at a distance a from the beginning of the sweep, while the same character on the oscilloscope 14' will appear at a distance a plus x from the same reference point. When stereoscopically viewed, the image 34 of the oscilloscope will form a bright character having the appearance of some depth which will be more clearly distinguishable than the image appearing on either oscilloscope alone. This is particularly advantageous when the oscilloscopes are subject to and will reproduce random noise such as indicated at 36. On the screens of both oscilloscopes 14 and 14' this random noise may be of such intensity as to substantially blur the formation of the characters. However, since this noise is random and is not repeated at the same regular repetition rate at which the character-forming signals are repeated, such random noise will not appear stereoscopically on the image 34 with the same intensity as the regularly repeated characters. Thus the character to be transmitted will more clearly stand out from background noise than has heretofore been possible by conventional facsimile reproducing systems.

The aforescribed manner of stereoscopically producing and visualizing regularly repeated signals may be utilized in a novel manner in connection with radio locator apparatus. Such a

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system is generally indicated in Fig. 4 in connection with radio locator apparatus of standard design which may consist, for example, of a transmitter 138 sending out regularly repeated pulses for the purpose of locating an object such as an airplane 139, from which reflected pulses are received, demodulated, amplified, etc., by a suitable receiver 110. In accordance with known systems, means indicated at 140 may be used to block the receiver 110 when the transmitter 138 is operated. The output from the receiver 110 is applied to the vertical plates of cathode ray oscilloscopes 114 and 114', while sweep voltage may be supplied by a saw-tooth generator 116 synchronized by a sine wave output 142 from the transmitter 138. The remaining portion of the circuit is substantially identical with that described in connection with the general system illustrated in Fig. 1, part of the saw-tooth generator output being applied to a differentiator 22 through a trigger circuit 24 for alternatively energizing the grids of the two oscilloscopes. Biasing controls 20 and 20' are used to control the relative lateral shift of the sweep voltage between the two oscilloscopes, while further grid control may be provided by the potentiometers 28, 28', 30 and 30'.

It will now be clear that if signals are received on the receiver 110 at a regular repetition rate, these signals being the reflected signals from the transmitter 138, such signals will be laterally displaced by the screen of one cathode ray oscilloscope with respect to the other to give a signal image having apparent depth when stereoscopically viewed. However, if the object located is approaching the radio locator apparatus, the repetition rate between succeeding signals will be diminished, whereas if the object is receding from the apparatus, the time between signals received will increase. Advantage of this phenomena can be taken, for example, if the screens of both cathode ray oscilloscopes are provided with indicia giving an image, when stereoscopically viewed, of the same depth as the image of regularly repeated signals. This is shown in more detail, for example in Fig. 5, in which the screen of the cathode ray oscilloscope 114 is provided with a plurality of spaced lines 144, while the screen of the oscilloscope 114' is provided with a set of similarly spaced lines 144' laterally displaced from the lines 144 with a spacing x similarly to the lateral displacement of the facsimile characters and caused by the adjusting of the potentiometers 20, 20'. Thus, a signal reflected from a stationary object will appear on the screen of an oscilloscope 114 at 160, while it will appear laterally displaced on the oscilloscope 114' at 160'. When stereoscopically viewed the image of the signal 160'' will have a predetermined depth which will give the appearance of being in the same plane as the resultant indicia 144''. However, if the object located is moving toward the station, while the first signal will appear, for example, on the screen of oscilloscope 114 at 162, the next signal 162' on the screen of oscilloscope 114' will have moved laterally toward or even to the left of the signal 162 despite the original lateral displacement caused by the setting of the potentiometers 20 and 20'. This displacement will make the image of this signal 162'' have the appearance of being in front of the indicia lines 144'' so that the operator immediately knows that the object located is approaching. On the other hand, if the object located is receding from the station, the second signal 164' appearing on the

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oscilloscope 114' will be even more laterally displaced toward the right from the signal 164 on oscilloscope 114 than the normal lateral displacement caused by the position of the potentiometers 20 and 20'. This will give a fainter image 164'' when stereoscopically viewed, and the impression that the image of this signal lies behind the indicia lines 144''. Thus the operator immediately knows that the object located is receding from the station.

If the object located is approaching or receding at a relatively fixed rate, the time displacement between reflected received signals will be constant even though different from the time rate between signals received from a stationary object. Thus, if the lateral displacement of the sweep voltage is adjusted to a value equal to the new time displacement of the approaching or receding object, the resultant image of this signal as stereoscopically viewed may be adjusted to appear in the plane of the stereoscopically viewed indicia having a predetermined lateral displacement. For example, in Fig. 6 I have indicated that the potentiometer 20' may be adjusted to compensate for the different lateral displacement of the signals caused when the located object is receding or approaching, such compensation being made sufficiently to bring the image of the signal into the same plane as the stereoscopically viewed indicia. By proper calibration, moreover, the amount of such adjustment can be calculated in terms of speed of the moving object relatively to the locator station. Thus, as indicated further in Fig. 6, the moving arm 166 of the potentiometer 20' may be provided with a pointer 168 cooperating with a scale on a panel 170 calibrated in terms of the speed at which the object is approaching or receding from the station, depending upon which direction compensation in lateral shift is necessary to bring about a resultant lateral shift equal to that between two sets of indicia lines on the screens of the two oscilloscopes. The normal position of the potentiometer 20' providing the normal desired displacement will correspond to zero relative speed as when a stationary, or for example, a circling object is located, whereas compensation in either direction will be a measure of relative speed.

It will thus be seen that the foregoing system will not only clarify regularly repeated signals reflected from an object to be located, and distinguish them from random noise signals in the manner described in connection with the facsimile system of Fig. 1, but additionally, the actual relative speed of a moving object can also be determined.

If desired, the apparatus may be provided with means for adjustably shifting the indicia on one oscilloscope relatively to the other for the purpose of synchronizing the receiver apparatus with the repetition rate of the transmitter and the delay effected by the differentiator and trigger circuits. In such a case the screen of one oscilloscope may be mounted, by way of example, on a slidable bracket 145 to which is attached a rack 146 engaged by a worm 148. The latter may be rotated by a shaft 150 and a dial 152 which, as is more clearly seen in Fig. 5A may be provided with indicia 154 cooperating with a guide 156 on a panel 158. In this manner minor adjustments caused by changes in the constants of the differentiator or trigger circuits, or a change in the repetition rate of the transmitted signals may be compensated for by proper calibration of the apparatus.

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Instead of forming a stereoscopically-viewed base indicia by means of screens on or in front of the oscilloscopes, such base indicia may be traced upon the screens of the oscilloscopes in addition to the tracing of the signals. In this case no marked screens will be used and the indicia-forming signals may be locally generated, being keyed for the purposes of synchronization with the sweep generator 116. As shown in Fig. 4, if the switch 180 is closed, part of the output of the differentiator 22 will be applied to a local synchronous oscillator 182 having a higher frequency than the sweep generator. The oscilloscope being keyed by the differentiator 22 produces a wave which may be clipped by clipper 184 and then differentiated by the differentiator 186 and applied to the vertical plates of the two cathode ray oscilloscopes. The resulting signal will appear as shown in Fig. 7. On the screen of oscilloscope 114, spaced positive and negative pulses 288 will give a series of indicia across the screen of this tube, while the next series of pulses, timed by the oscillator 182 to have the same repetition rate as the pulses transmitted from the transmitter 138, will appear as indicia 288' laterally spaced from the pulses 288. The lateral spacing will be such as to give a stereoscopic indicia image 288'' as seen in the image 134 of the screens of the two oscilloscopes. A comparison of pulses 160'' from a stationary object, 162'' from an approaching object, and 164'' from a receding object, with the applied indicia pulses 288'' may be made similarly as with the lines 144' as shown in Fig. 5. However, in this case, the pulses from the receding or approaching objects may not be laterally displaced for comparison and speed-reading purposes in the manner heretofore described, since a shifting of potentiometer 20' for this purpose would laterally shift the portion of the applied indicia pulses, as well as the received pulses, as both are applied to the same plates of the oscilloscope. For mere comparison purposes and for the purpose of improving the visual location of an object with respect to images caused by random noise, this system will have the same advantages of those described above.

In connection with the application of my stereoscopic visual reproduction of signals for radio locator apparatus, it will be apparent to those skilled in this art that while I have confined the description of my invention to the invention itself, the principles thereof may be utilized in combination with apparatus which will give distance measurements, including those employing vernier scales. Such types of apparatus are already known in the art and may be used supplementarily to or in conjunction with the improved visual indicating means of the present invention. Accordingly, while I have described above the principles of my invention in connection with a specific apparatus and particular modifications thereof, it is to be clearly understood that this description is made only by way of example and not as a limitation on the scope of my invention as set forth in the objects and the accompanying claims.

I claim:

1. Stereoscopic receiving system comprising, in combination, a pair of cathode ray oscilloscopes spaced apart with their screens lying in a common plane, common stereoscopic means for simultaneously viewing the two screens, each of said cathode ray oscilloscopes having two pairs of deflecting plates, one pair positioned at right angles to the other and a control grid, a receiver,

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means impressing signals from said receiver simultaneously across one pair of plates of each cathode ray oscilloscope, a sweep generator, means for simultaneously impressing the output of said sweep generator across the other pair of plates of each cathode ray oscilloscope, a trigger circuit having a pair of alternatively energizable outputs, means connecting the grid of one cathode ray oscilloscope to one of said outputs and the grid of the other cathode ray oscilloscope to the other of said outputs, differentiating means connected between the output of said sweep generator and the input of said trigger circuit for applying to the latter spaced pulses of opposite polarity, whereby said grids will be alternatively energized in accordance with the spacing between said pulses, and means for laterally displacing the signal on the screen of one oscilloscope relatively to the other to such an extent as to produce a stereoscopic image when seen through said common viewing means.

2. The method of visually reproducing intelligence, which includes the steps of rendering doubly visible in rapid alternation regularly repeated received intelligence signifying signals, said two renditions being spaced one from the other, in uniplanar space laterally displacing the received signals in one of said renditions with respect to the other, and stereoscopically viewing said two renditions.

3. Stereoscopic receiving system comprising, in combination, a pair of cathode ray oscilloscopes spaced apart with their screens lying in a common plane, common stereoscopic means for simultaneously viewing the two screens, each of said cathode ray oscilloscopes having two pairs of deflecting plates, one pair positioned at right angles to the other and a control grid, a receiver, means impressing signals from said receiver simultaneously across one pair of plates of each cathode ray oscilloscope, a sweep generator, means for simultaneously impressing the output of said sweep generator on one plate of each other pair of cathode ray oscilloscope deflecting plates, a trigger circuit having a pair of alternatively energizable outputs, means connecting the grid of one cathode ray oscilloscope to one of said outputs and the grid of the other cathode ray oscilloscope to the other of said outputs, differentiating means connected between the output of said sweep generator and the input of said trigger circuit for applying to the latter spaced pulses of opposite polarity, whereby said grids will be alternatively energized in accordance with the spacing between said pulses, and variable means for biasing the other plate of one of said other pair of cathode ray oscilloscope deflecting plates relatively to ground for shifting the lateral sweep voltage on that cathode ray oscilloscope.

4. The method of visually reproducing intelligence, which includes the steps of transmitting signals, each signal at a regular repetition rate, rendering a double alternating sequential tracing of the repeated received signals at a rate of alternation equal to the rate of repetition of said signals, laterally displacing the received signals in one of said two tracings with respect to the other, and stereoscopically viewing said two tracings.

5. Transmission system including, in combination, means for transmitting signals, each signal being repeated at a predetermined rate, a receiver for said signals, and means for visually reproducing said signals, comprising a pair of cathode ray oscilloscopes each having a screen,

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two pairs of deflecting plates, one pair positioned at right angles to the other and a grid, means connecting the output of said receiver across one pair of plates of each cathode ray oscilloscope, a sweep generator, means connecting the output of said sweep generator across the other pair of plates of each cathode ray oscilloscope, grid control means alternatively energizing said grids at a repetition rate equal to that of the received signals, means laterally displacing the image of the signals on the screen of one oscilloscope with respect to the other, and means for stereoscopically viewing the two screens.

6. The combination according to claim 5, in which said grid control means comprises a trigger circuit having a pair of alternatively energizable outputs, means connecting the grid of one cathode ray oscilloscope to one of said outputs and the grid of the other cathode ray oscilloscope to the other of said outputs, differentiating means connected between the output of said sweep generator and the input of said trigger circuit for applying to the latter spaced pulses of opposite polarity, the constants of said differentiating means and said trigger circuit being so dimensioned that said grids will be alternatively energized at the repetition rate of the received signals.

7. A method of facsimile reproduction which includes the steps of receiving character signifying signals occurring at a regular predetermined repetition rate, rendering a double alternating tracing of the repeated received signals at a rate of alternation equal to the rate of repetition of said signals, laterally displacing the received signals in one of said two tracings with respect to the other, and stereoscopically viewing said two tracings.

8. Stereoscopic receiving system comprising, in combination, a pair of cathode ray oscilloscopes spaced apart with their screens lying in a common plane, common stereoscopic means for simultaneously viewing the two screens, each of said cathode ray oscilloscopes having two pairs of deflecting plates, one pair positioned at right angles to the other, and a control grid, a receiver, means impressing signals from said receiver simultaneously across one pair of plates of each cathode ray oscilloscope, a sweep generator, means for simultaneously impressing the output of said sweep generator across the other pair of plates of each cathode ray oscilloscope, a trigger circuit having a pair of alternatively energizable outputs, means connecting the grid of one cathode ray oscilloscope to one of said outputs, and the grid of the other cathode ray oscilloscope to the other of said outputs, differentiating means connected between the output of said sweep generator and the input of said trigger circuit for applying to the latter spaced pulses of opposite polarity, whereby said grids will be alternatively energized in accordance with the spacing between said pulses, means for laterally displacing the signal on the screen of one oscilloscope relatively to the other to such an extent as to produce a stereoscopic image when seen through said common viewing means, and means on the screen of each oscilloscope forming one or more base indicia, the said means on one tube being laterally spaced from the said means on the other tube to present a single base indicia of predetermined depth when stereoscopically viewed, whereby the apparent depth of the stereoscopically viewed signals can be compared with the depth of the stereoscopically viewed base indicia.

9. Stereoscopic receiving system comprising, in

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combination, a pair of cathode ray oscilloscopes spaced apart with their screens lying in a common plane, common stereoscopic means for simultaneously viewing the two screens, each of said cathode ray oscilloscopes having two pairs of deflecting plates, one pair positioned at right angles to the other, and a control grid, a receiver, means impressing signals from said receiver simultaneously across one pair of plates of each cathode ray oscilloscope, a sweep generator, means for simultaneously impressing the output of said sweep generator across the other pair of plates of each cathode ray oscilloscope, a trigger circuit having a pair of alternatively energizable outputs, means connecting the grid of one cathode ray oscilloscope to one of said outputs and the grid of the other cathode ray oscilloscope to the other of said outputs, differentiating means connected between the output of said sweep generator and the input of said trigger circuit for applying to the latter spaced pulses of opposite polarity, whereby said grids will be alternatively energized in accordance with the spacing between said pulses, means for laterally displacing the signal on the screen of one oscilloscope relatively to the other to such an extent as to produce a stereoscopic image when seen through said common viewing means, means on the screen of each tube forming one or more base indicia, the said means on the screen of one tube being laterally spaced from the said means on the screen of the other tube with a spacing equal to the lateral displacement between received viewed signals in accordance with said lateral signal displacing means, whereby the apparent depth of such signals and of said base indicia means when stereoscopically viewed will be equal, but will be unequal if said signals are spaced otherwise than by the dimensions of the lateral signal displacing means, and means varying the lateral signal displacing means.

10. The combination according to claim 9, in which said last means includes means for biasing the voltage on one plate of one cathode ray oscilloscope, to which the scanning voltage is applied.

11. Radio locating apparatus comprising, means for transmitting pulses at a regular repetition rate, means for receiving reflected pulses, a pair of cathode ray tubes each having a screen lying in a common plane and spaced apart from one another, means for stereoscopically viewing said screens, indicia on each of said screens, the indicia on one screen being laterally spaced from the indicia on the other screen to such an extent as to produce an indicia of predetermined depth when stereoscopically viewed, means for producing images of the received, reflected pulses on the screens of the two cathode ray oscilloscopes, means for laterally displacing said images relatively to one another a distance equal to the lateral displacement between indicia, whereby when stereoscopically viewed, the resulting image will appear to have the same depth as said indicia, and whereby if said images are otherwise laterally displaced, the resulting image will appear to lie either behind or in front of said indicia, and means for compensating for any such otherwise lateral displacement.

12. The combination according to claim 8, in which said base indicia means comprises one or more lines applied to the screen of each oscillo-

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scope, in combination with means for laterally shifting the lines on the screen of one oscilloscope relatively to the lines on the screen of the other oscilloscope for varying the apparent depth of the base indicia.

13. The method of determining the speed at which a moving object is travelling away from or toward a given point, which comprises the steps of receiving regularly repeated signals from said moving object, rendering dual reproductions of the received signals, said two reproductions being spaced from one another in time and in a single visual plane, visually forming indicia in said plane and at the location of said signal reproductions with a relative lateral displacement of a predetermined amount, laterally displacing the received signals in one of said two reproductions with respect to those of the other by a like amount, viewing said reproductions stereoscopically, whereby a signal received from a relatively stationary object, will appear to lie in the same plane as said indicia, whereas if the object is receding, the signal image will appear to lie behind that plane and if approaching will appear to lie in front of that plane, laterally shifting the displacement of any received signal by an additional amount until its image lies in the plane of the indicia, and calibrating the amount of additional shift in terms of speed.

14. The combination according to claim 8, in which said base indicia means comprises means for locally generating regularly repeated indicia signals, and means for impressing said signals on the plates of both cathode ray oscilloscopes to which the received intelligence signals will appear.

15. The combination according to claim 1, in combination with an oscillator having a higher frequency output than the frequency of said sweep generator, synchronized by said differentiating means, means for clipping the output of said oscillator, second differentiating means actuated by said clipping means and means impressing the output of said second differentiating means upon the one pair of plates of both oscilloscopes.

16. The combination according to claim 11, in which said indicia comprises locally generated regularly repeated signals applied to the screen of the cathode ray oscilloscopes.

17. In a receiver for receiving signals repeated at a predetermined rate, image producing means for visually rendering a successive alternating double reproduction of the signals received, means for controlling the alternate reproduction of said image producing means at a repetition rate equal to that of the received signals, means for controlling the lateral displacement of one with respect to the other of the two alternating signal images thus produced, and means for stereoscopically viewing the images produced.

18. In a receiver for receiving signals, repeated at a predetermined rate, dual image producing means for visually rendering a double reproduction of the signals received, means for alternately controlling the two portions of said dual means at a repetition rate equal to that of the received signals means for controlling the lateral displacement of one with respect to the other for the two signal images thus produced, and means for stereoscopically viewing the images produced.

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