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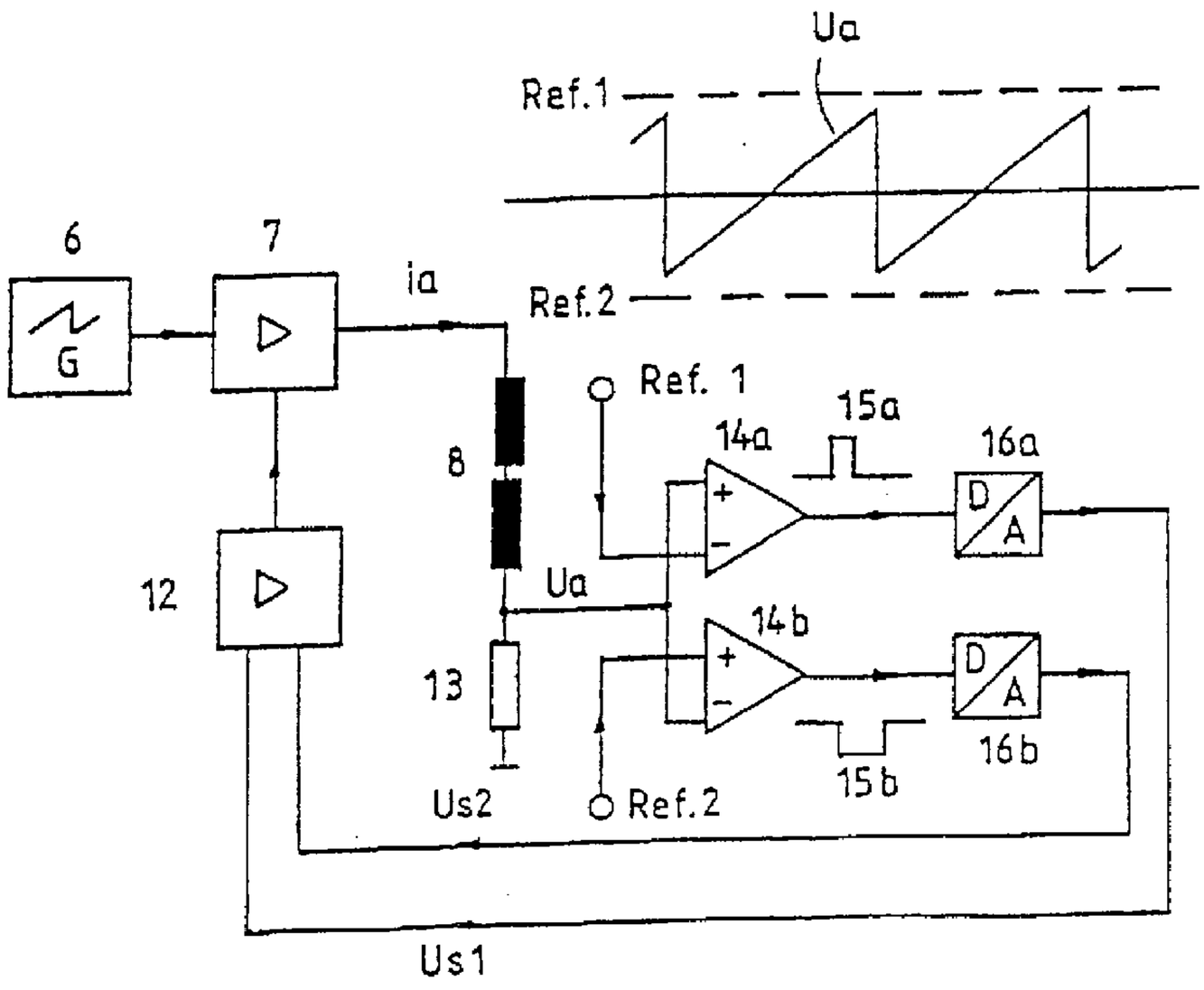
(54) **PROCEDE ET DISPOSITIF DE REGLAGE D'IMAGE**

(54) **PROCESS AND DEVICE FOR ADJUSTING PICTURES**



(57) Un dispositif de réglage de l'image permet de stabiliser la largeur, la hauteur et la position d'une image représentée sur la surface (1) de l'écran d'un poste de télévision. La stabilisation de l'amplitude de déviation en sens horizontal et/ou en sens vertical est assurée par le réglage d'une valeur de déviation sur des valeurs de référence qui peuvent être corrigées en fonction de signaux émis par des capteurs qui détectent la position de l'image. L'invention est applicable de préférence à des postes de télévision projetée.

(57) A device stabilizes the width, height and position of a picture displayed on a picture area (1) of a TV set. The amplitude of the deflection in the horizontal and/or vertical direction is stabilized by adjusting a deflection parameter to reference values which can be corrected in function of signals from sensors that detect the position of the picture. The invention is used preferably in projection TV sets.

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ABSTRACT

A device stabilizes the width, height and position of a picture displayed on a picture area (1) of a TV set. The amplitude of the deflection in the horizontal and/or vertical direction is stabilized by adjusting a deflection parameter to reference values which can be corrected in function of signals from sensors that detect the position of the picture. The invention is used preferably in projection TV sets.

Patent Application

Method and device for picture adjustment

The invention is based on a method for picture adjustment according to the preamble of the main claim, as well as a preferred device, according to the preamble of the first device claim, suitable for executing the method of the invention. The term picture adjustment in this context is understood to be the stabilization of size and position of an image to be presented.

The system according to the invention, consisting of the invention-type method and the corresponding device, is used in conjuction with a television device. The term television device in this context is understood to be any electronic installation for reproduction of images which has at least one display unit actuated by deflection values. The television device can be triggered by a television

broadcast signal or may be constructed as a pure monitor and fed by an RGB signal, a CVBS signal or separately with the luminance signal and the color subcarrier.

The said display unit can be, for example, a kinescope (cathode ray tube - CRT) of a common television device or, however, several cathode ray tubes forming part of a projection television device. In these cases, deflection currents for the horizontal or, respectively, vertical deflection of corresponding electron beams serve as deflection values.

Further, it is also conceivable that the display unit is a laser beam system, whereby the laser beam deflection, for example, is carried out by reflecting or refractive means which are controlled accordingly.

Such laser beam systems are preferrably used for projection television devices.

Television devices of the said types are used to generate a complete picture on a corresponding display surface (screen or projection area).

If this complete picture is generated by a single kinescope, then an undesired alteration in the picture height, width or position leads to impairment for the viewer. This can, for example, occur if the television device serves as a monitor and is connected to differing image sources such as computers.

However, the said impairments are especially disturbing when the complete picture is generated through individual images formed by several display units whose height, width or position are altered undesirably. These individual images can, on the one hand, be shown on a common area like,

for example, monochromatic images of the primary colors red (R), green (G), blue (B) which, in this way, create a color picture. On the other hand however, it is also possible that the partial images are adjacent each other, i.e. shown on neighboring areas.

It goes without saying that appropriate combinations are also possible. Corresponding considerations are also valid for the said laser beam systems.

With projection television devices, the monochromatic images in the primary colors R, G, B are projected from three separate kinescopes onto a picture area considerably larger than the screen of the kinescope and superimposed there to create a color picture. In doing this, the individual images generated on the screens of the kinescopes are greatly enlarged. Instabilities in the projected picture can occur through this enlargement and through other alterations in the circuits and projection installations. These instabilities consist, in particular, of an undesired displacement of the image on the picture area in the horizontal and vertical direction, as well as alteration to the amplitude of the horizontal deflection or vertical deflection.

It is already known to regulate, with the help of photosensors, the size and position of individual images which produce a complete picture.

Thus, for example, a regulating system for the size and position of television pictures is presented in US 4 085 425 in which individual images, which produce a complete picture, are detected by means of photosensors and correspondingly corrected by suitable correction means.

The use of photosensors presented in the US patent specification cited has, in particular with a projection television device, the disadvantage that suitable connection lines must be provided between said sensors and a suitable electronic device.

It is the object of the invention to create a simple and stabilization of the image presented on the picture area which functions effectively.

This task is solved by the method specified in claim 1 or, respectively, by the device specified in the first device claim. Further advantageous developments of the invention are given in the subclaims.

The invention is based on the knowledge that deviations from the desired beam deflection are caused essentially by electronic components, and that, compared to these, negative influences caused by the corresponding beam optics are small.

This means that the relationship between a corresponding deflection value and the actual deflection in practice is not subject to any considerable fluctuations.

According to the invention, the deflection values for the horizontal and/or vertical deflection are detected within a time period for which their corresponding desired value is known.

By comparing the desired and the actual (feedback) values, corrections are performed so that the deviations in the horizontal and/or vertical direction do not exceed predetermined values.

If, in addition, photosensors, also called light sensors, are arranged, and if a line of the deflection screen (grid) tagged (marked) with a marker pulse is, using a light sensor, always precisely regulated onto a certain point of the picture area, then the deflection screen remains absolutely stable. As then, in the video signal, a tagged line always, compulsorily, lies at the same spatial point on the picture area, all influences on amplitude and position of the deflection screen in the horizontal and vertical direction like, for example, through temperature and ageing, are compensated.

With a projection television device in which an image to be projected is shown on a picture area, the said light sensors can be disposed in the vicinity of the same. Owing to the rather large distance from the device, even the smallest deviations produce usable light sensor signals according to the law of beams.

With one embodiment of the invention-type system, the light sensors are disposed in the vicinity of the projection television device, thereby requiring shorter connecting lines in comparison to an arrangement in which the light sensors are located near the picture area.

The invention will be explained using two preferred embodiment examples by means of the drawing. Therein is shown:

Fig. 1 the principles of the presentation of an image on a picture area,

Fig. 2 a pulse diagram for a marker pulse,

Fig. 3 a first embodiment example for the regulation of the amplitude of the deflection current,

Fig. 4 a second embodiment example for the stabilization with light sensors.

Before the embodiment example is more closely described, it should be pointed out that the blocks illustrated individually in the figures serve merely for a better understanding of the invention. Normally, single or several blocks are combined to form units. These can be realized in integrated or hybrid technology or as a program-controlled microcomputer or, respectively, as a part of a program suited to its control.

It should also be pointed out that, in the devices contained in the individual stages, elements can also be realized separately.

In Fig. 1, a picture 2, with vertical deflection amplitude or picture height V and horizontal deflection amplitude or picture width H, is shown through projection on the picture area 1. Light sensors S1 through S6 are located outside the picture 2 and these will be explained in more detail below.

Fig. 2 shows a video signal which is fed to a television device which is to be controlled and which has two marker pulses M1 and M2 impressed on it always during one line within the vertical blanking gap. These marker pulses M1, M2 cause predetermined values of a deflection current ia which serves for controlling the kinescopes being used.

A preferred embodiment example of the device according to the invention is illustrated in Fig. 3. A vertical deflection generator 6 feeds the deflection current ia, via an amplifier 7, to the vertical deflection coils 8 which are associated with a kinescope which is not illustrated. Three such kinescopes are normally provided in a projection television device and the monochromatic images in the

primary colors red, green, blue of said kinescopes are projected onto the picture area 1 (see Fig. 1) and superimposed there.

A resistor 13 is connected via its first terminal to the vertical deflection coils 8 and the second terminal of said resistor leads to ground. A voltage Ua proportional to the deflection current ia is caused by same at the first terminal and said voltage is compared in the differential amplifiers 14a and 14b with reference voltages Ref.1 and Ref.2. The differential amplifiers 14a and 14b supply pulse-shaped signals 15a and 15b upon deviation from the reference values and said signals are converted into analog signals in two digital-to-analog converters 16a and 16b. The analog and permanently available correction variables Us1 and Us2 obtained at the output of digital-to-analog converters 16a and 16b influence, via a driver 12, the deflection amplifier 7 so that Us1 stabilizes the positive values of the deflection current ia, i.e. the vertical amplitude towards the upper picture edge, and Us2 stabilizes the negative values of ia, i.e. the deflection amplitude towards the lower picture edge.

The circuit according to Fig. 3 can be used practically unchanged for the stabilization of the horizontal deflection amplitude in that the line deflection current is fed via resistor 13 and the correction variables gained influence the line output transformer for regulating the amplitude of the line deflection current.

Fig. 4 shows a preferred embodiment example which additionally regulates the size and the position of the picture 2 to be presented by means of the sensors S1 through S6 illustrated in Fig. 1.

The vertical deflection genrator 6 feeds a control element 17 which, besides the amplifier 7 shown in Fig. 3, also contains the means 13 through 16. The vertical deflection coils 8 are associated with a kinescope 9 which generates, preferably together with other kinescopes not illustrated here, a complete picture on the picture area 1.

The sensors S1 through S6 shown in Fig. 1 are preferably disposed outside the picture 2 and are struck by a light beam, output by the kinescope 9, outside the written picture 2.

The video signal modulating the light beam contains marker pulses within the deflection screen at certain times which, by regulating the deflection amplitude, are adjusted to the sensors S. Using sensors S1 and S2 or S4 and S6, the vertical deflection amplitude V can be stabilized in this way. Likewise, using sensors S1 and S4 or S3 and S5 or S2 and S6, the horizontal deflection amplitude H can be stabilized.

Generally, a total of six sensors is not required. It can also be adequate if only the sensors S1, S2, S4 and S6 are provided in the area of the corners of picture 2, or the sensors S1, S2, S3 are provided on one side of picture 2.

The picture area 1 contains the sensors S1, S2 shown in Fig. 1 which, according to Fig. 4, are each subdivided into two sensor fields S1a, S1b and S2a, S2b. In the desired position, a light beam 10, generated by kinescope 9 through a corresponding marker pulse impressed upon the video signal, strikes exactly in the middle between two sensor fields. The output voltages of the sensor fields are fed to always two differential amplifiers 11a and 11b which, via driver stages 12a and 12b, influence the gain control

amplifier (servo amplifier) in the sense of the described regulation.

If the deflection amplitude becomes too large, then beam 10 strikes more on the sensor fields S1a and S2a, and less on sensor fields S1b and S2b. This deviation is registered in the differential amplifiers 11a and 11b. These regulate the deflection current ia to the effect that beam 10 assumes its desired position.

The control element 17 also contains suitable and means, which are known as such, which detect the value of the regulating current during the desired position and correct, or rather adapt the reference values Ref.1 and Ref.2 accordingly. It should be pointed out here that marker pulses M1 and M2, whose corresponding values for the deflection current ia are compared with the reference values Ref.1 or Ref.2 respectively, are not necessarily identical with the marker pulses which generate the light beam 10. However, it is possible to convert the appropriate deflection current values.

In Fig. 3 and Fig. 4, the correction voltages are obtained only for a short time, namely, when the deflection current reaches its maximum positive or negative value respectively, or if the light beam 10 strikes one of the sensors S.

As the correction itself must be permanently effective, it is necessary to convert the respective correction voltage only briefly obtained into a correction voltage which is permanently present. This can be carried out using a low pass or a holding circuit in which the respective correction voltage obtained is maintained using a capacitor. A digital circuit can be used for this in an advantageous way, for example, a microprocessor, a digital-to-analog converter, or

similar. In Fig. 3, the digital-to-analog converters 16a, 16b serve the purpose of converting the only briefly appearing signals 15a and 15b into permanently available analog signals. Signals 15a and 15b serve in this case as a digital signal with one bit which generates a corresponding analog signal always at the output of converters 16a and 16b. The ability of such converters to maintain an analog output signal generated from a binary signal for any length of time is advantageously exploited for the conversion of the pulse-shaped correction voltage into an analog correction voltage which is permanently available. Such a circuit with digital-to-analog converters or equally capable digital components can also be applied in Fig. 4 in order to generate the only briefly created correction voltage at the output of the sensors into the required permanently available analog correction voltage for controlling amplifier 17.

In Fig. 3 and Fig. 4 therefore, the upper half of the picture and the lower half of the picture are always stabilized separately from each other, whereby the zero line, i.e. the horizontal line in the center, is not affected. Through separate stabilization of the deflection amplitude in the positive and negative direction, a combination of an alteration to the total deflection amplitude with an alteration in the position of the picture can arise in the general case. The same relationships are also valid for stabilizing the horizontal deflection amplitude H.

The regulation of the deflection amplitude described can also be applied to different operating modes with various deflection amplitudes, for example, if the vertical deflection amplitude exceeds the height of the picture shown in Fig. 1 in the sense of an overwriting. The deflection amplitude may be changed by altering the temporal position

of the marker pulses within the deflection screen. If in Fig. 2, for example, the marker pulse M1 is positioned later in time and marker pulse M2 earlier, then a line which lies later in the deflection screen is regulated onto sensor S1 and, correspondingly, at the end of the picture, a correspondingly earlier line is regulated onto sensor S2. The effective deflection amplitude is then enlarged. The correction current for stabilizing the deflection amplitude need not necessarily be fed to the deflection coils themselves. The correction current can, for example, also be fed to the additional deflection coils provided for the convergence correction because these can influence the deflection amplitude in the same way.

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New Claim 1

1. Projection television device with three reproduction tubes fed with deflection currents (ia), the pictures of said tubes being projected via optical means onto a projection surface (1) and made congruent there, whereby means for adjusting the correct size and position of the picture (2) on the projection surface (1) are provided, **c h a r a c t e r i z e d i n t h a t** a voltage (Ua) proportional to the deflection current (ia) is applied to the non-inverting input of a first differential amplifier (14a) and to the inverting input of a second differential amplifier (14b), that two different reference voltages (Ref.1, Ref.2) are applied to the inverting input of the first differential amplifier (14a) and to the non-inverting input of the second differential amplifier (14b), and that the digital output signals (15a, 15b) of the amplifiers (14a, 14b) are applied to the inputs of two digital-to-analog converters (16a, 16b) whose analog output voltages (Us1, Us2) are applied to the inputs of an adder stage (12), the analog output voltage of which serve as correction variable for the amplification of a deflection amplifier (7).

2. Method according to claim 1, **characterized in that** the times at which a desired value for the deflection variable lies within predetermined limits are determined by marker pulses (M1, M2) impressed onto the video signal.

3. Method according to one of the claims 1 or 2, **characterized in that** the said display unit is a kinescope and the said deflection variable is a deflection current which is impressed on deflection coils associated with the kinescope.

4. Method according to one of the claims 1 through 3, **characterized in that** the light intensity of a displayed picture or, respectively, of corresponding partial pictures is detected at

predetermined points, whereby a signal is obtained from which the size and/or position of said picture or partial picture can be deduced, and that the said signal is taken into account upon determining the desired value in the sense of a correction or adaptation respectively.

5. Device for picture adjustment in a television device to which a video signal is fed and which has at least one display unit (9) controlled by deflection variables (ia), c h a r a c t e r i z e d i n t h a t means are provided which

- (6) determine times at which a desired value for the deflection variable (ia) lies within predetermined limits (Ref.1, Ref.2);
- (13, 14) detect the value of the deflection variable (ia) at said times, whereby actual values (Ua) are obtained;
- (14, 16) determine correction variables (Us1, Us2) on the basis of deviations of desired and actual values, whereby the deflection variable (ia) is corrected in the sense of a regulation loop.

6. Device according to claim 5, c h a r a c t e r - i z e d i n t h a t the means (6), which determines the times at which a desired value for the deflection variable lies within predetermined limits, is constructed as a video deflection generator (6) which impresses marker pulses (M1, M2) onto the video signal.

7. Device according to one of the claims 5 or 6, c h a r a c t e r i z e d i n t h a t the said display unit is a kinescope (9) and the said deflection variable is a deflection current (ia) which is

impressed on deflection coils (8) associated with the kinescope (9).

8. Device according to one of the claims 5 through 7, characterized in that sensors (S1 through S6) are provided which detect the light intensity of an displayed picture (2) or, respectively, of corresponding partial pictures (R, G, B) at predetermined points and supply signals from which the size and/or position of said picture (2) or partial picture (R, G, B) can be deduced, and that a control element (17) is provided which takes into account said signal upon determining the desired value in the sense of a correction or adaptation respectively.

9. Device according to claim 8, characterized in that for stabilizing the picture height one sensor (S1, S2) each is disposed at the upper and lower picture regions.

10. Device according to one of the claims 8 or 9, characterized in that for stabilizing the picture width one sensor (S3, S5) each is disposed at the right and left picture regions.

11. Device according to one of the claims 8 through 10, characterized in that the sensors (S1 through S6) lie outside the visibly displayed picture (2).

12. Device according to one of the claims 6 through 11, characterized in that the marker pulse (M) is inserted into the video signal during a blanking time in which no picture reproduction takes place.

13. Device according to one of the claims 6 through 12, **characterized in that** the temporal position of the marker pulse (M) within the deflection screen can be altered for different deflection amplitudes.

14. Device according to one of the claims 5 through 13, **characterized in that** a digital circuit (16) is provided for converting the regulating voltage, generated only briefly by the deflection current (ia) or the light sensor (S), into an analog regulating voltage which is permanently available.

15. Device according to one of the claims 5 through 14, **characterized in that** the digital circuit is formed by a digital-to-analog converter (16a, 16b) at whose input the only briefly generated regulating voltage (15a, 15b) is applied.

16. Device according to one of the claims 5 through 15, **characterized in that** a voltage (Ua) proportional to the deflection current (ia) is applied to two differential amplifiers (14a, 14b) at whose other inputs two differing reference voltages (Ref.1, Ref.2) are applied, and that the output signals (15a, 15b) of the amplifiers (14a, 14b) are applied via two digital-to-analog converters (16a, 16b) to an adder stage (17), the output voltage of which serves as a correction variable (Us) for the amplification of a deflection amplifier (7).

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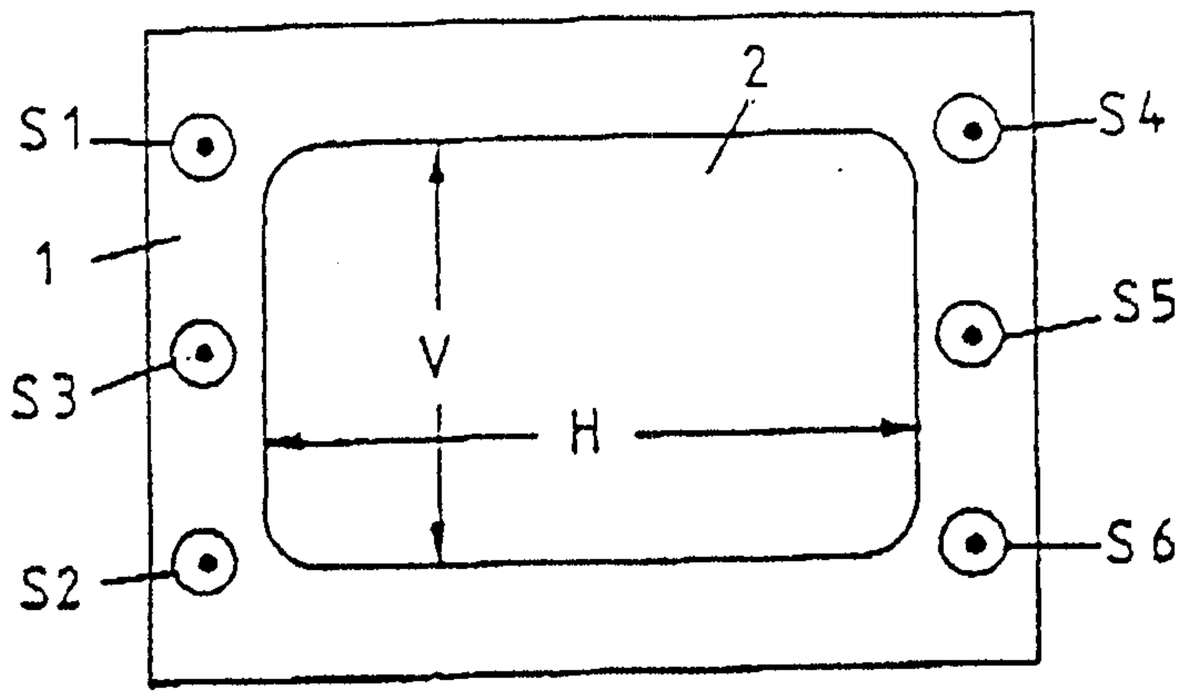


Fig. 1

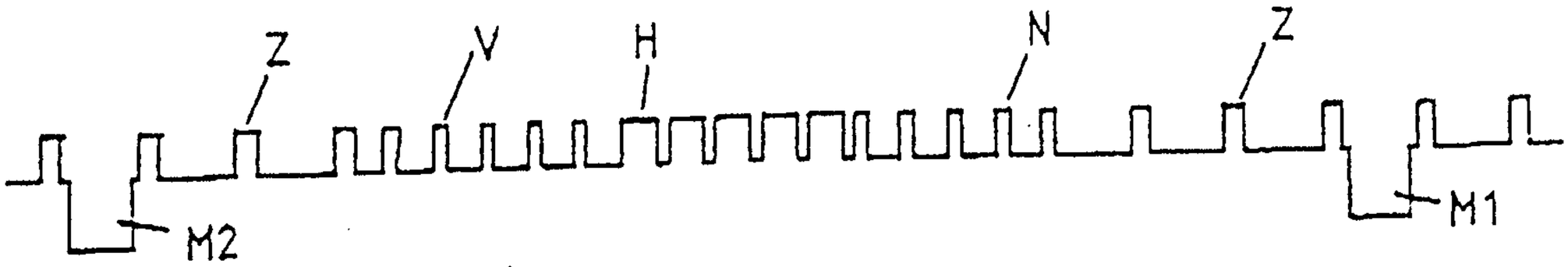
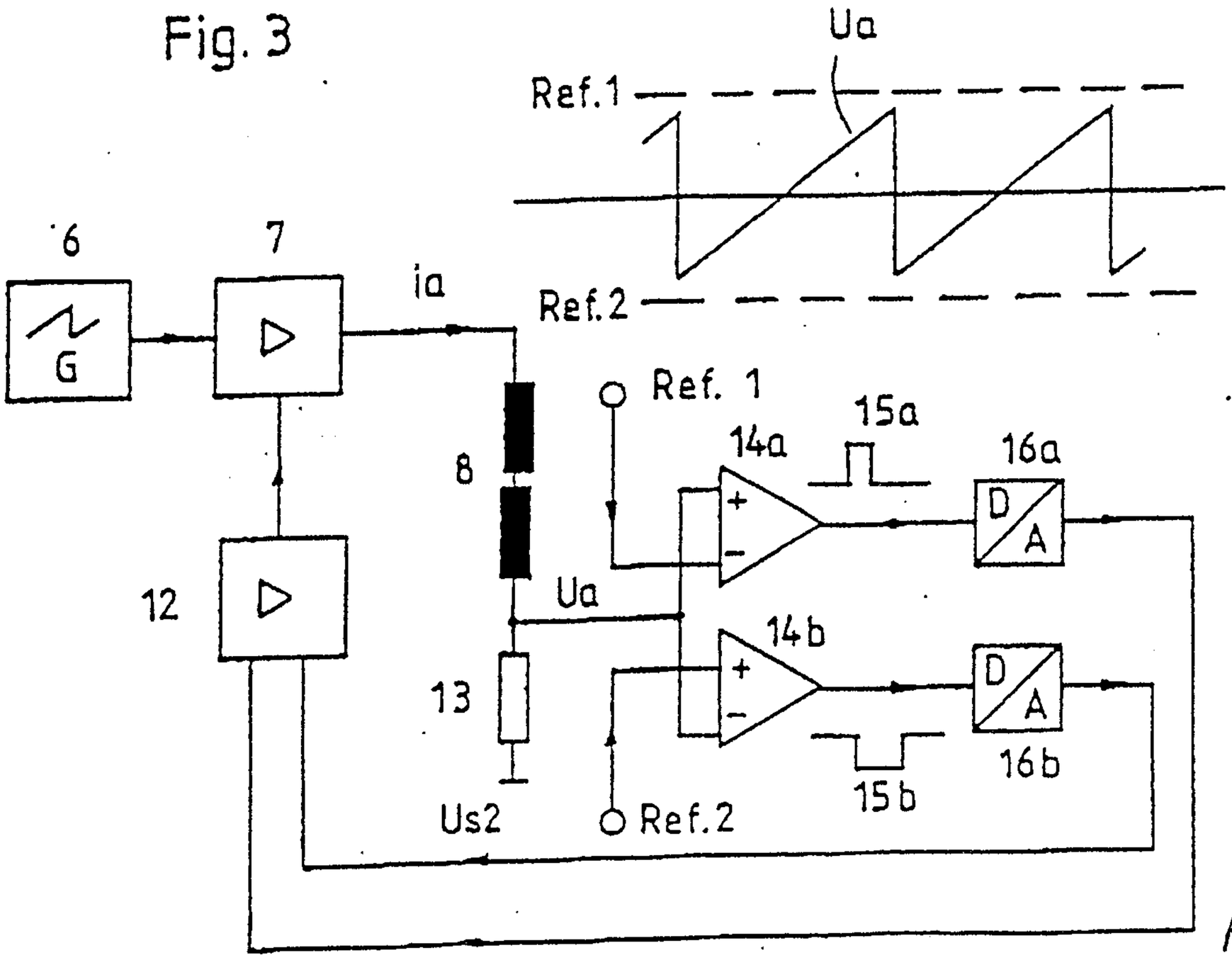


Fig. 2

Fig. 3



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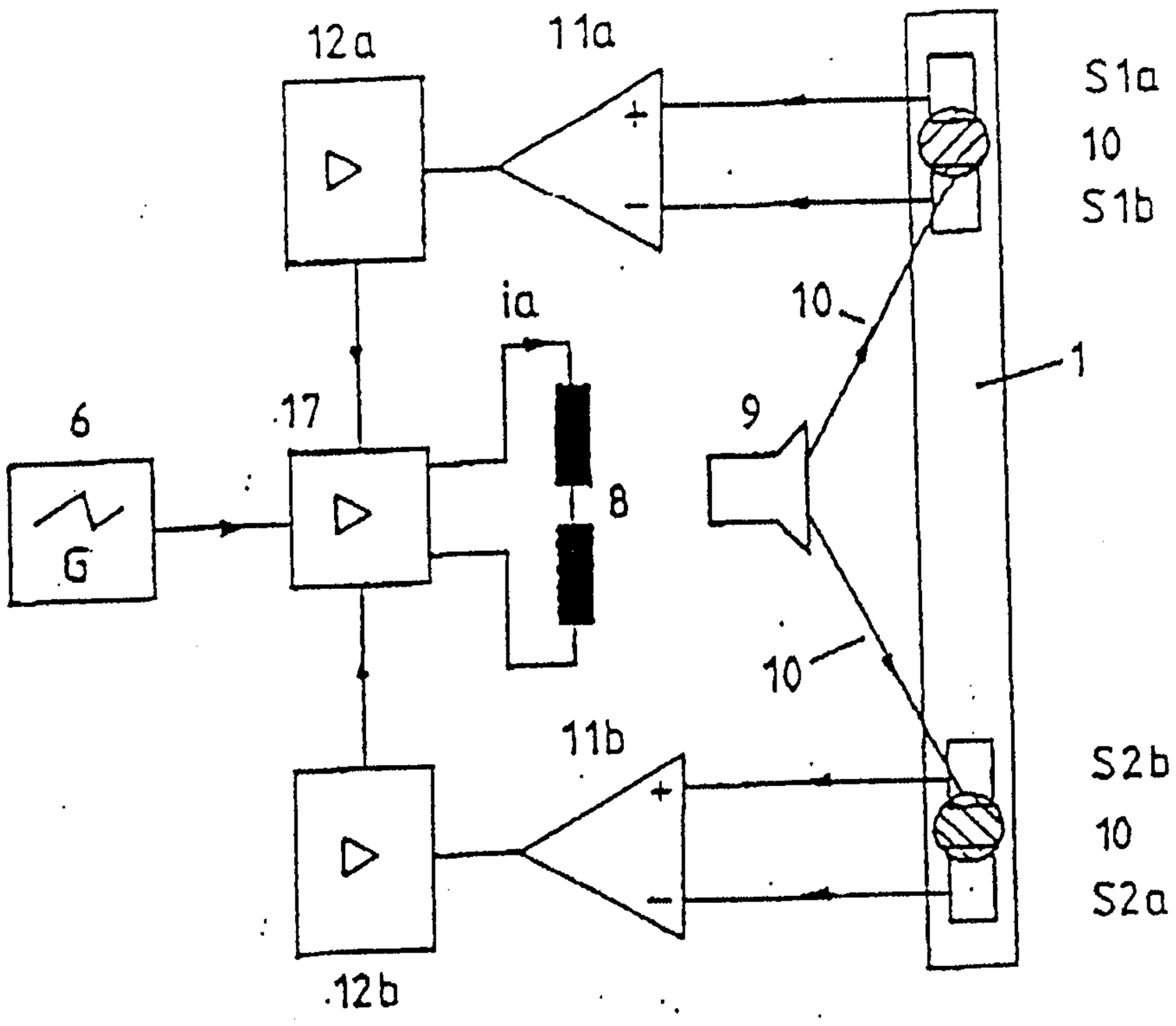

Fig.4

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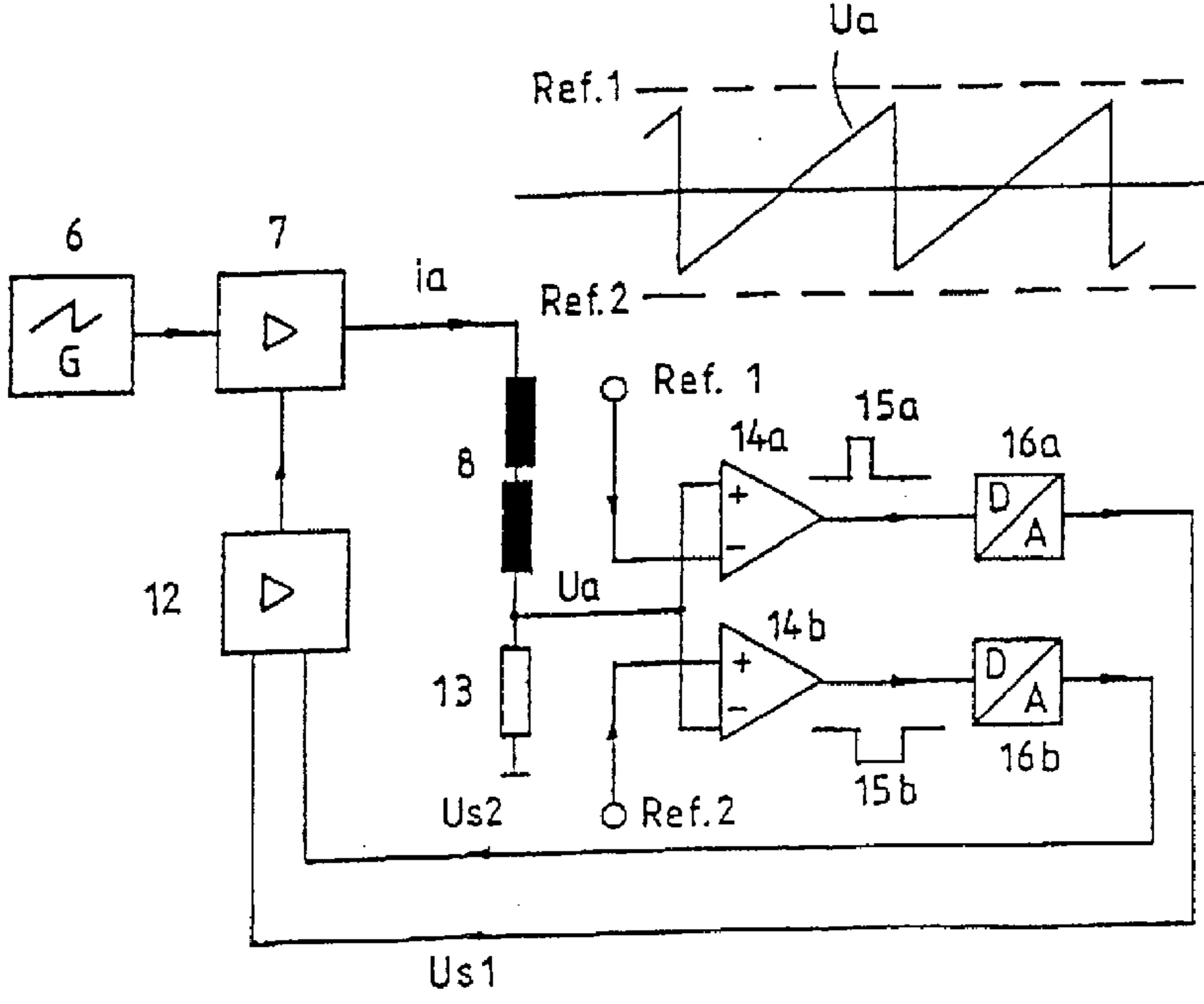
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12
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Us2
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