Description

The present invention relates to a high-speed video camera using a solid-state image pickup element.

In regard to means of high-speed image pickup for home video recorders and color video cameras employed widely for industrial purposes and using MOS-type or CCD-type solid-state image pickup elements, there is a system wherein high-speed scanning and sequential reading are conducted with increased horizontal and vertical drive frequencies There is also another system, in this regard, wherein an image is divided into a plurality of areas or blocks and parallel and simultaneous scanning of photoelectric conversion element rows in each block is conducted sequentially for each block, so as to attain a high speed reading.

In the known reading systems described above, the former system is similar to a standard television system, wherein reading is conducted by driving the solid-state image pickup elements at a high speed. When a practical number of pixels is supposed to be two hundred fifty thousand or above, the number of stages of MOS shift registers constituting a scanning circuit becomes large and a clock frequency increases in proportion to the speed of scanning. As a result, increase in the wiring capacitance of a clock circuit and a rise time of a clock pulse itself produce adverse effects and consequently the shift registers become unable to follow the scanning. Moreover, the MOS-type elements have a problem caused by the capacitances of horizontal and vertical signal lines, while the CCD-type ones have limitations to high-speed scanning, caused by the impairment of a transfer efficiency.

The above-mentioned latter system is one wherein an image is divided into a plurality of areas or blocks, all the photoelectric conversion element rows in one block are read in parallel and simultaneously and then the blocks in a plurality are read sequantially, as disclosed in US-A-4 322 752, equivalent to JP-A-56501704. However, this system necessitates a specific solid-state image pickup element provided with functions of scanning all the photoelectric conversion element rows in one block in parallel and simultaneously, a number of mechanisms for taking out all signals produced by scanning in parallel and simultaneously and circuits for amplification and processing thereof. Furthermore, an electronic means for recording the signals after reading them out is complicated and accompanied by difficulties in manufacture.

Accordingly, a scanning speed obtained by the above-mentioned former system of the prior art described above is at best two to three times higher than that of the standard television (the scanning speed of the standard television is 60 to 50 fields per second), and it is impossible to realize scanning of a higher speed than the above by using the solid-state image pickup element employed in the standard television. On the other side, the above-mentioned latter system has a shortcoming that it necessitates the specific solid-state image pickup element having mechanisms for delivering a plurality of pixel selecting pulses simultaneously from the same vertical shift register and for processing the obtained outputs simultaneously.

In EP-A-0251790 there is described a solid-state imaging system with a vertical and/or horizontal window function in which the vertical and/or horizontal scanning corresponding to an unnecessary portion of the camera subject is performed at high rate or omitted from the scan.

The present invention is aimed to furnish a high-speed video camera of a low cost which realizes high speed scanning being three times or more faster in speed than the standard television and solves the above-stated shortcomings by using the solid-state image pick-up element employed in the standard television.

The above object can be attained by a high-speed camera of the present invention in accordance with claims 1 or 3 appended hereto.

In the high-speed video camera of the present invention, a scene is projected equally onto the discrete solid-state image pickup elements, the photoelectric conversion element rows of these solid-state image pickup elements are scanned simultaneously by the scanning mechanisms corresponding to them, respectively, these scanned photoelectric conversion element rows of the discrete solid-state image pickup elements are set to be in arbitrary numbers not corresponding to each other, and one picture is formed by synthesizing the signals thus obtained.

The above object can also be attained by a high-speed color video camera of the present invention in accordance with claim 4 appended hereto.

In the high-speed color video camera of the present invention, a scene is projected equally onto the discrete solid-state image pickup elements, the photoelectric conversion element rows of these solid-state image pickup elements are scanned simultaneously by the scanning mechanisms corresponding to them, respectively, these scanned photoelectric conversion element rows of the discrete solid-state image pickup elements are set to be in arbitrary numbers not corresponding to each other, and one color picture is formed by synthesizing the signals thus obtained.

Other objects and features of the present invention will become apparent from the following description taken in conjunction with the accompanying drawings.

Fig. 1 is a fundamental block diagram of a high-speed image pickup camera of the present invention;

Figs. 2 and 3 are views for illustrating a scanning method of solid-state image pickup elements in one embodiment of the present invention;

Figs. 4 and 5 are views for illustrating a scanning method of solid-state image pickup elements in another embodiment of the present invention;

Figs. 6, 7 and 8 are views for illustrating a scanning method of solid-state image pickup elements in further embodiment of the present invention; and

Fig. 9 is a fundamental block diagram of a high-speed color image pickup camera of the present invention.

Fig. 1 is a fundamental block diagram of a high-speed image pickup camera of the present invention using two solid-state image pickup elements.

In Fig. 1, numeral 1 denotes a scene, 2a an optical device, e.g. a half-mirror, for separating incident light for two solid-state image pickup elements 3a and 3b, 2b a total reflection mirror, 4a and 4b circuits for reading out signals from the solid-state image pickup elements 3a and 3b, and amplify and process them, respectively, and 5 a synthesizing circuit having a function of synthesizing signals from said circuits 4a and 4b so as to form a frame.

Figs. 2 and 3 illustrate states of the solid-state black-and-white image pickup elements 3a and 3b in Fig. 1 being subjected to divided or partial scanning, respectively. As for an average solid-state image pickup element enabling execution of divided or partial scanning, a TSL (Transversal Signal Line) MOS-type image pickup element can be mentioned, for instance. Regarding this solid-state image pickup element, detailed description is made, for instance, in the article "TSL Image Pickup Element with Variable Electronic Shutter", the Report on Techniques of the Television Society, ED87-11, issued in 1987. In this image pickup element, a clock signal of a high frequency is supplied to a vertical shift register in order to read out signals from photoelectric conversion elements disposed in the shape of a matrix, respectively, and a time for scanning the lines not required to be read out can be made zero substantially.

The divided or partial scanning method will now be explained.

In Fig. 2, an upper area of an image pickup surface of the solid-state image pickup element 3a, i.e. the area of scanning lines 1 to 120, is scanned at a speed equivalent to a field scanning time in the ordinary NTSC system, for instance, by inputting vertical clock pulses to the vertical shift register. At the timing corresponding to a scanning line 121, said shift register is cleared and scanning is returned forcedly and momentarily to the line 1 by inputting a reset pulse to the vertical shift register. As a result, a lower area of the image pickup surface, i.e. the area of scanning lines 121 to 240 in a hatched part, is not scanned, and the scanning time for the solid-state image pickup element 3a is reduced naturally to 1/2 of that in the case when the whole image pickup surface is scanned at the scanning speed of the standard television.

In Fig. 3, in contrast, a hatched part of the solid-state image pickup element 3b, i.e. the area of scanning lines 1 to 120, is scanned at a high speed till the timing corresponding to the line 120, by inputting a horizontal clock pulse to the vertical shift register at the timing corresponding to the line 1. While the frequency of the vertical clock pulses is 15.75 KHz ordinarily, the frequency of the horizontal clock pulses is several MHz. Accordingly, a time required for the high-speed scanning by the horizontal clock pulses is momentary and can be neglected substantially. At the timing corresponding to the scanning line 121, subsequently, a vertical clock pulse is inputted to the vertical shift register so as to scan the lower area of the image pickup surface, i.e. the area of scanning lines 121 to 240, at the scanning speed of the standard television. As a result, the scanning time of the solid-state image pickup element 3b is reduced to 1/2 of that in the case when the whole image pickup surface is scanned at the scanning speed of the standard television, in the same way as in the case of the solid-state image pickup element 3a. Signals obtained by these two processes are processed to have proper signal levels by the amplifying-and-processing circuits 4a and 4b and synthesized in the synthesizing circuit 5 having a recording function for forming one frame.

The above is a detailed description on an embodiment wherein the solid-state image pickup elements 3a and 3b are divided in two areas, the upper and lower areas, respectively, and the respective scanning areas thereof are scanned so that they do not overlap each other. It is also possible, in this regard, to provide alternately a plurality of scanning areas and areas not requiring scanning (hatched parts) and to scan separately the corresponding areas of the solid-state image pickup elements 3a and 3b so that they do not overlap each other, as shown in Figs. 4 and 5. In this example, the scanning time for reading the areas not requiring scanning is made to be zero substantially by supplying the horizontal clock pulse to the vertical shift register as stated above and scanning of the scanning areas is made again at the scanning speed of the standard television. Thereby the whole image pickup surface can be read in e.g. 1/120 seconds, that is, at the high speed which is the double of that of the standard television.

Figs. 6 to 8 illustrate another embodiment using three solid-state image pickup elements, respectively. In this embodiment, each solid-state image pickup element is divided into three areas or blocks, i.e., scanning lines 1 to 80, 81 to 160 and 161 to 240, and is scanned. It is understood with ease that the speed being three times as high as the scanning speed of the standard television can be obtained after synthe-

sis, when each area is scanned at this scanning speed, and that a speed six times as high as the scanning speed can be obtained after the synthesis, when each area is scanned at a scanning speed two times higher than that of the standard television.

The present invention can be applied also to the case when four or more solid-state image pickup elements are employed and the photoelectric conversion element rows thereof are divided into four or more areas or blocks. When the number of the elements is increased too much, however, the cost thereof rises and, in addition, hardware therefor turns complicated.

According to these embodiments of the present invention, elements for the standard television can be used as the solid-state image pickup elements and a high-speed video camera can be obtained without using any specific solid-state image pickup element as used in the prior-art apparatus.

Fig. 9 shows a fundamental block diagram of a high-speed color image pickup camera of the present invention using two solid-state black-and-white image pickup elements and two solid-state color image pickup elements.

In this embodiment, an incident light from a scene 1 is applied to two optical paths for black-and-white and color through optical devices, e.g. a half-mirror 1a and a total reflection mirror 1b, respectively, and then applied to two solid-state black-and-white image pickup elements 3a and 3b, and two solid-state color image pickup elements 3c and 3d through optical devices, e.g. half-mirrors 2a and 2c, and total reflection mirrors 3b and 3d, respectively.

Signals from the solid state image pickup elements 3a, 3b, 3c and 3d are read out through amplifying-and-processing circuits 4a, 4b, 4c and 4d, respectively, and synthesized by synthesizing circuits 5 to form a black-and-white frame and a color frame, respectively.

A luminance signal component obtained from said black-and-white frame and a color signal component obtained from said color frame are synthesized by a synthesizing circuit 6 to form a color image.

In the other embodiment of the present invention, three or more solid-state black-and-white and color image pickup elements may be used.

While elements for the standard television can be used as the solid-state image pickup elements in the embodiments of the present invention and a high-speed color video camera can be obtained without using any specific solid-state image pickup element as used in the prior-art apparatus; in this embodiment of the present invention, there are produced such advantages that a sufficiently large luminance signal component of a color video signal can be obtained since the luminance signal component is designed to be obtained from the solid-state black-and-white image pickup elements 3a and 3b, and that a color signal component can be increased by reducing the band width of the color signal to e.g. 1/10 of that in conventional cases, since it is unnecessary to obtain the luminance signal component from solid-state color image pickup elements 3c and 3d.

Claims

1. A high-speed video camera comprising:
first and second solid-state image pick-up elements (3a,3b) each having a predetermined number of photoelectric conversion sub-element rows; and
a mechanism (2a,2b) for projecting a scene (1) equally onto said first and second solid-state image pick-up elements (3a,3b);
characterized by:
a first scanning mechanism for scanning a first selection of said rows in said first solid-state image pick-up element (3a);
a second scanning mechanism for scanning a second selection of said rows in said second solid-state image pick-up element (3b), said second selection of rows being different from said first selection of rows and said second scanning mechanism being synchronized in operation with said first scanning mechanism; and
a mechanism (5) for synthesizing signals obtained from said first and second scanning mechanisms in an image.

2. The high-speed video camera according to claim 1 wherein each of said scanning mechanisms is moved immediately after said respective first and second selections of rows have been scanned to scan rows which are different from said respective first and second selections of rows.

3. A high-speed video camera comprising:
first, second and third solid-state image pick-up elements (3a,3b) each having a predetermined number of photoelectric conversion sub-element rows; and
a mechanism (2a,2b) for projecting a scene (1) equally onto said first, second and third solid-state image pick-up elements (3a,3b);
characterized by:
a first scanning mechanism for scanning a first selection of said rows in said first solid-state image pick-up element (3a);
a second scanning mechanism for scanning a second selection of said rows in said second solid-state image pick-up element (3b);
a third scanning mechanism for scanning a third selection of said rows in said third solid-state image pick-up element, said second selection of rows being different from said first selec-

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sis, when each area is scanned at this scanning speed, and that a speed six times as high as the scanning speed can be obtained after the synthesis, when each area is scanned at a scanning speed two times higher than that of the standard television.

The present invention can be applied also to the case when four or more solid-state image pickup elements are employed and the photoelectric conversion element rows thereof are divided into four or more areas or blocks. When the number of the elements is increased too much, however, the cost thereof rises and, in addition, hardware therefor turns complicated.

According to these embodiments of the present invention, elements for the standard television can be used as the solid-state image pickup elements and a high-speed video camera can be obtained without using any specific solid-state image pickup element as used in the prior-art apparatus.

Fig. 9 shows a fundamental block diagram of a high-speed color image pickup camera of the present invention using two solid-state black-and-white image pickup elements and two solid-state color image pickup elements.

In this embodiment, an incident light from a scene 1 is applied to two optical paths for black-and-white and color through optical devices, e.g. a half-mirror 1a and a total reflection mirror 1b, respectively, and then applied to two solid-state black-and-white image pickup elements 3a and 3b, and two solid-state color image pickup elements 3c and 3d through optical devices, e.g. half-mirrors 2a and 2c, and total reflection mirrors 3b and 3d, respectively.

Signals from the solid state image pickup elements 3a, 3b, 3c and 3d are read out through amplifying-and-processing circuits 4a, 4b, 4c and 4d, respectively, and synthesized by synthesizing circuits 5 to form a black-and-white frame and a color frame, respectively.

A luminance signal component obtained from said black-and-white frame and a color signal component obtained from said color frame are synthesized by a synthesizing circuit 6 to form a color image.

In the other embodiment of the present invention, three or more solid-state black-and-white and color image pickup elements may be used.

While elements for the standard television can be used as the solid-state image pickup elements in the embodiments of the present invention and a high-speed color video camera can be obtained without using any specific solid-state image pickup element as used in the prior-art apparatus; in this embodiment of the present invention, there are produced such advantages that a sufficiently large luminance signal component of a color video signal can be obtained since the luminance signal component is designed to be obtained from the solid-state black-and-white image pickup elements 3a and 3b, and that a color signal component can be increased by reducing the band width of the color signal to e.g. 1/10 of that in conventional cases, since it is unnecessary to obtain the luminance signal component from solid-state color image pickup elements 3c and 3d.

Claims

1. A high-speed video camera comprising:
   first and second solid-state image pick-up elements (3a,3b) each having a predetermined number of photoelectric conversion sub-element rows; and
   a mechanism (2a,2b) for projecting a scene (1) equally onto said first and second solid-state image pick-up elements (3a,3b);
   characterized by:
   a first scanning mechanism for scanning a first selection of said rows in said first solid-state image pick-up element (3a);
   a second scanning mechanism for scanning a second selection of said rows in said second solid-state image pick-up element (3b), said second selection of rows being different from said first selection of rows and said second scanning mechanism being synchronized in operation with said first scanning mechanism; and
   a mechanism (5) for synthesizing signals obtained from said first and second scanning mechanisms in an image.

2. The high-speed video camera according to claim 1 wherein each of said scanning mechanisms is moved immediately after said respective first and second selections of rows have been scanned to scan rows which are different from said respective first and second selections of rows.

3. A high-speed video camera comprising:
   first, second and third solid-state image pick-up elements (3a,3b) each having a predetermined number of photoelectric conversion sub-element rows; and
   a mechanism (2a,2b) for projecting a scene (1) equally onto said first, second and third solid-state image pick-up elements (3a,3b);
   characterized by:
   a first scanning mechanism for scanning a first selection of said rows in said first solid-state image pick-up element (3a);
   a second scanning mechanism for scanning a second selection of said rows in said second solid-state image pick-up element (3b);
   a third scanning mechanism for scanning a third selection of said rows in said third solid-state image pick-up element, said second selection of rows being different from said first selec-

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tion of rows and said third selection of rows being different from said first and said second selections of rows, and said first, second and third scanning mechanisms being synchronized in operation with one another; and

a mechanism (5) for synthesizing signals obtained from said first and second scanning mechanisms in an image.

4. A high-speed video camera comprising:

at least first and second solid-state black-and-white image pick-up elements (3a,3b) each having a plurality of photoelectric conversion sub-element rows; and

at least first and second solid-state colour image pick-up elements (3c,3d) each having a plurality of photoelectric conversion sub-element rows;

characterised by

a mechanism (1a,1b,2a,2b,2c,2d) for projecting a scene (1) equally onto said first and second solid-state black-and-white image pick-up elements (3a,3b) and said first and second solid-state colour image pick-up elements (3c,3d);

a first scanning mechanism for scanning a first selection of said rows in said first black-and-white and said first colour image pick-up elements (3a,3c);

a second scanning mechanism for scanning a second selection of said rows in said second black-and-white and said second colour image pick-up elements (3b,3d), said second selection of rows being different from said first selection of rows, said second scanning mechanism being synchronized in operation with said first scanning mechanism;

a mechanism (5) for synthesizing signals obtained from said first and second scanning mechanisms for said first and second solid-state black-and-white image pick-up elements (3a,3b) in one frame to form a luminance signal component;

a mechanism (5) for synthesizing signals obtained from said first and second scanning mechanisms for said first and second solid-state colour image pick-up elements (3c,3d) in one frame to form a colour signal component; and

a mechanism (6) for synthesizing the luminance signal component and the colour signal component in a colour image.

5. The high-speed video camera according to claim 4 wherein each of said scanning mechanisms is moved immediately after said respective first and second selections of rows have been scanned to scan rows which are different from said respective first and second selections of rows.

Patentansprüche

1. Hochgeschwindigkeits-Videokamera, welche folgendes umfaßt:
erste und zweite Festkörper-Bildaufnahmeelemente (3a, 3b), von denen jedes eine vorgegebene Anzahl photoelektrischer Wandler-Unterelementzeilen hat; und einen Mechanismus (2a, 2b) zur gleichmäßigen Projizierung einer Szene (1) auf die ersten und zweiten Festkörper-Bildaufnahmeelemente (3a, 3b);
gekennzeichnet durch:
einen ersten Abtastmechanismus zur Abtastung einer ersten Auswahl von Zeilen des ersten Festkörper-Bildaufnahmeelementes (3a);
einen zweiten Abtastmechanismus zur Abtastung einer zweiten Auswahl von Zeilen des zweiten Festkörper-Bildaufnahmeelementes (3b), wobei die zweite Auswahl von Zeilen verschieden ist von der ersten Auswahl von Zeilen und der zweite Abtastmechanismus im Betrieb mit dem ersten Abtastmechanismus synchronisiert ist; und
einen Mechanismus (5) zur Synthetisierung der von dem ersten und zweiten Abtastmechanismus erhaltenen Signale in einem Bild.

2. Hochgeschwindigkeits-Videokamera gemäß Anspruch 1, in der jeder der Abtastmechanismen unmittelbar nachdem die erste und zweite Auswahl der Zeilen abgetastet worden sind, verfahren wird, um Zeilen abzutasten, die von der ersten und zweiten Auswahl von Zeilen verschieden sind.

3. Hochgeschwindigkeits-Videokamera, welche folgendes umfaßt:
erste, zweite und dritte Festkörper-Bildaufnahmeelemente (3a, 3b), von denen jedes eine vorgegebene Anzahl photoelektrischer Wandler-Unterelementzeilen hat; und
einen Mechanismus (2a, 2b) zur gleichmäßigen Projizierung einer Szene (1) auf die ersten, zweiten und dritten Festkörper-Bildaufnahmeelemente (3a, 3b);
gekennzeichnet durch:
einen ersten Abtastmechanismus zur Abtastung einer ersten Auswahl von Zeilen des ersten Festkörper-Bildaufnahmeelementes (3a);
einen zweiten Abtastmechanismus zur Abtastung einer zweiten Auswahl von Zeilen des zweiten Festkörper-Bildaufnahmeelementes (3b);
einen dritten Abtastmechanismus zur Abtastung einer dritten Auswahl von Zeilen des dritten Festkörper-Bildaufnahmeelementes, wobei die zweite Auswahl von Zeilen verschieden ist von der ersten Auswahl von Zeilen und die dritte Auswahl von Zeilen verschieden ist von der ersten und

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zweiten Auswahl von Zeilen, und wobei der erste, zweite und dritte Abtastmechanismus im Betrieb aufeinander synchronisiert sind; und
einen Mechanismus (5) zur Synthetisierung der von dem ersten und zweiten Abtastmechanismus erhaltenen Signale in einem Bild.

4. Hochgeschwindigkeits-Videokamera, welche folgendes umfaßt:
mindestens erste und zweite Festkörper-Schwarzweiß-Bildaufnahmeelemente (3a, 3b), von denen jedes eine vorgegebene Anzahl photoelektrischer Wandler-Unterelementzeilen hat; und
mindestens erste und zweite Festkörper-Farbbildaufnahmeelemente (3c, 3d), von denen jedes eine vorgegebene Anzahl photoelektrischer Wandler-Unterelementzeilen hat;
gekennzeichnet durch:
einen Mechanismus (1a, 1b, 2a, 2b, 2c, 2d) zur gleichmäßigen Projizierung einer Szene (1) auf die ersten und zweiten Festkörper-Schwarzweiß-Bildaufnahmeelemente (3a, 3b) und auf die ersten und zweiten Festkörper-Farbbildaufnahmeelemente (3c, 3d);
einen ersten Abtastmechanismus zur Abtastung einer ersten Auswahl von Zeilen der ersten Schwarzweiß- und der ersten Farbbildaufnahmeelemente (3a, 3c);
einen zweiten Abtastmechanismus zur Abtastung einer zweiten Auswahl von Zeilen der zweiten Schwarzweiß- und der zweiten Farbbildaufnahmeelementes (3b, 3d), wobei die zweite Auswahl von Zeilen verschieden ist von der ersten Auswahl von Zeilen und der zweite Abtastmechanismus im Betrieb mit dem ersten Abtastmechanismus synchronisiert ist;
einen Mechanismus (5) zur Synthetisierung der von dem ersten und zweiten Abtastmechanismus für die ersten und zweiten Festkörper-Schwarzweiß-Bildaufnahmeelemente (3a, 3b) erhaltenen Signale in einem Rahmen zur Bildung einer Leuchtdichte-Signalkomponente;
einen Mechanismus (5) zur Synthetisierung der von dem ersten und zweiten Abtastmechanismus für die ersten und zweiten Festkörper-Farbbildaufnahmeelemente (3c, 3d) erhaltenen Signale in einem Rahmen zur Bildung einer Farbsignalkomponente; und
einen Mechanismus (6) zur Synthetisierung der Leuchtdichte-Signalkomponente und der Farbsignalkomponente in einem Farbbild.

5. Hochgeschwindigkeits-Videokamera gemäß Anspruch 4, in der jeder der Abtastmechanismen unmittelbar nachdem die erste und zweite Auswahl der Zeilen abgetastet worden sind, verfahren wird, um Zeilen abzutasten, die von der ersten und zweiten Auswahl von Zeilen verschieden sind.

Revendications

1. Caméra vidéo à haute vitesse comprenant :
des premier et deuxième éléments capteurs d'image à semiconducteurs (3a, 3b) comportant chacun un nombre prédéterminé de rangées de sous-éléments de conversion photoélectrique ; et,
un mécanisme (2a, 2b) pour projeter uniformément une scène (1) sur lesdits premier et deuxième éléments capteurs d'image à semiconducteurs (3a, 3b) ;
caractérisée par :
un premier mécanisme de balayage pour balayer une première sélection desdites rangées dans ledit premier élément capteur d'image à semiconducteurs (3a) ;
un deuxième mécanisme de balayage pour balayer une deuxième sélection desdites rangées dans ledit deuxième élément capteur d'image à semiconducteurs (3b), ladite deuxième sélection de rangées étant différente de ladite première sélection de rangées et ledit deuxième mécanisme de balayage étant synchronisé en fonctionnement avec ledit premier mécanisme de balayage ; et,
un mécanisme (5) pour synthétiser les signaux obtenus desdits premier et deuxième mécanismes de balayage en une image.

2. Caméra vidéo à haute vitesse selon la revendication 1, dans laquelle chacun desdits mécanismes de balayage est déplacé juste après que lesdites première et deuxième sélections de rangées aient été balayées pour balayer les rangées qui sont différentes desdites première et deuxième sélections de rangées respectives.

3. Caméra vidéo à haute vitesse comprenant :
des premier, deuxième et troisième éléments capteurs d'image à semiconducteurs (3a, 3b) comportant chacun un nombre prédéterminé de rangées de sous-éléments de conversion photoélectrique ; et,
un mécanisme (2a, 2b) pour projeter uniformément une scène (1) sur lesdits premier, deuxième et troisième éléments capteurs d'image à semiconducteurs (3a, 3b) ;
caractérisée par :
un premier mécanisme de balayage pour balayer une première sélection desdites rangées dans ledit premier élément capteur d'image à semiconducteurs (3a) ;
un deuxième mécanisme de balayage

pour balayer une deuxième sélection desdites rangées dans ledit deuxième élément capteur d'image à semiconducteurs (3b) ;

un troisième mécanisme de balayage pour balayer une troisième sélection desdites rangées dans ledit troisième élément capteur d'image à semiconducteurs, ladite deuxième sélection de rangées étant différente de ladite première sélection de rangées et ladite troisième sélection de rangées étant différente desdites première et deuxième sélections de rangées, et lesdits premier, deuxième et troisième mécanismes de balayage étant synchronisés en fonctionnement les uns avec les autres ; et,

un mécanisme (5) pour synthétiser les signaux obtenus desdits premier et deuxième mécanismes de balayage en une image.

4. Caméra vidéo à haute vitesse comprenant :

au moins des premier et deuxième éléments capteurs d'image en noir et blanc à semiconducteurs (3a, 3b) comportant chacun une pluralité de rangées de sous-éléments de conversion photoélectrique ; et,

au moins des premier et deuxième éléments capteurs d'image en couleur à semiconducteurs (3c, 3d) comportant chacun une pluralité de rangées de sous-éléments de conversion photoélectrique ;

caractérisée par

un mécanisme (1a, 1b, 2a, 2b, 2c, 2d) pour projeter uniformément une scène (1) sur lesdits premier et deuxième éléments capteurs d'image en noir et blanc à semiconducteurs (3a, 3b) et sur lesdits premier et deuxième éléments capteurs d'image en couleur à semiconducteurs (3c, 3d) ;

un premier mécanisme de balayage pour balayer une première sélection desdites rangées dans ledit premier élément capteur d'image en noir et blanc et ledit premier élément capteur d'image en couleur (3a, 3c) ;

un deuxième mécanisme de balayage pour balayer une deuxième sélection desdites rangées dans ledit deuxième élément capteur d'image en noir et blanc et ledit deuxième élément capteur d'image en couleur (3b, 3d), ladite deuxième sélection de rangées étant différente de ladite première sélection de rangées, ledit deuxième mécanisme de balayage ayant son fonctionnement synchronisé avec celui dudit premier mécanisme de balayage ;

un mécanisme (5) pour synthétiser les signaux obtenus desdits premier et deuxième mécanismes de balayage pour lesdits premier et deuxième éléments capteurs d'image en noir et blanc à semiconducteurs (3a, 3b) en une trame pour former une composante de luminance du signal ;

un mécanisme (5) pour synthétiser les signaux obtenus desdits premier et deuxième mécanismes de balayage pour lesdits premier et deuxième éléments capteurs d'image en couleur à semiconducteurs (3c, 3d) en une trame pour former une composante de chrominance du signal ; et,

un mécanisme (6) pour synthétiser la composante de luminance du signal et la composante de chrominance du signal en une image en couleur.

5. Caméra vidéo à haute vitesse selon la revendication 4, dans laquelle chacun desdits mécanismes de balayage est déplacé juste après que lesdites première et deuxième sélections de rangées respectives aient été balayées pour balayer des rangées qui sont différentes desdites première et deuxième sélections de rangées respectives.