United States Patent [19]

Harrison, III et al.

[11] **3,723,803**

[45] **Mar. 27, 1973**

[54] GENERATION, DISPLAY AND ANIMATION OF TWO-DIMENSIONAL FIGURES

[75] Inventors: **Lee Harrison, III,** Englewood; **Frank David Wells; Francis J. Honey,** both of Denver, all of Colo.

[73] Assignee: **Computer Image Corporation,** Denver, Colo.

[22] Filed: **July 6, 1970**

[21] Appl. No.: **52,389**

[52] **U.S. Cl.**.....**315/22,** 315/18, 340/324 A

[51] **Int. Cl.**.....**H01j 29/70**

[58] **Field of Search**....315/18, 22, 26, 27; 340/324 A

[56] **References Cited**

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3,364,382	1/1968	Harrison	315/22
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Primary Examiner—Carl D. Quarforth
Assistant Examiner—J. M. Potenza
Attorney—Rogers, Ezell, Eilers & Robbins

[57] **ABSTRACT**

A system for automatically generating, displaying and animating two-dimensional figures comprising straight line segments, animations of the figures including gross size, gross position, shape and rotational animation sequences. Means are also provided for maintaining the figure closed through any animation sequence and establishing boundary conditions for the figure.

23 Claims, 12 Drawing Figures

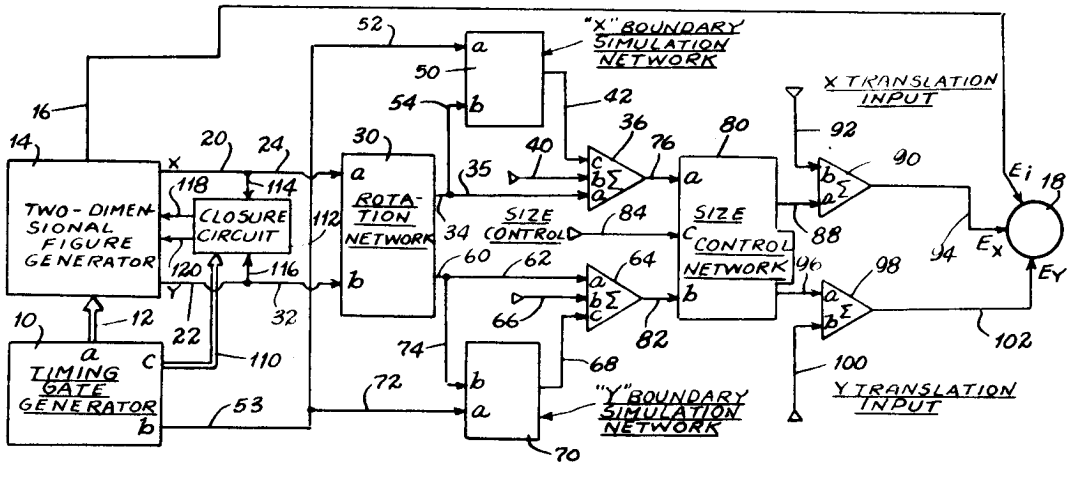

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Fig. 1.

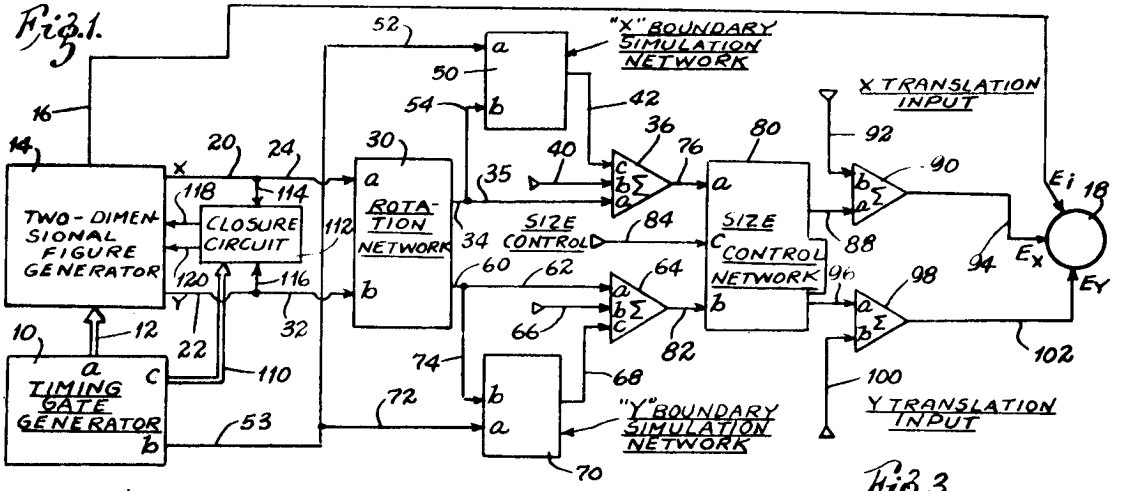

Fig. 2.

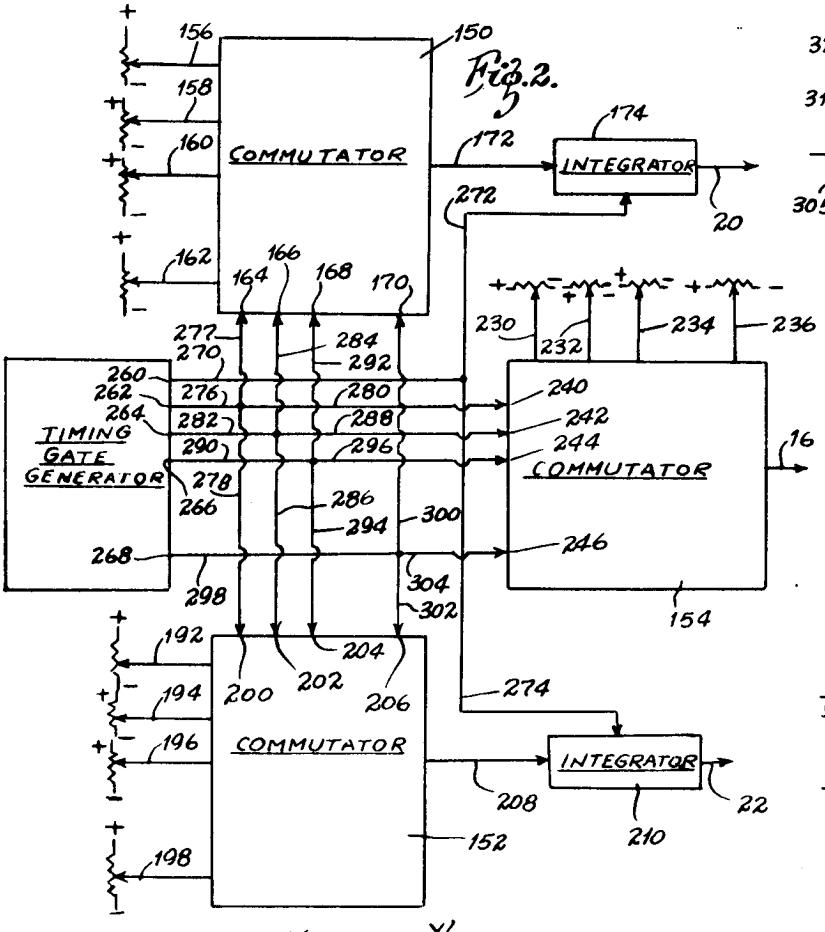

Fig. 3.

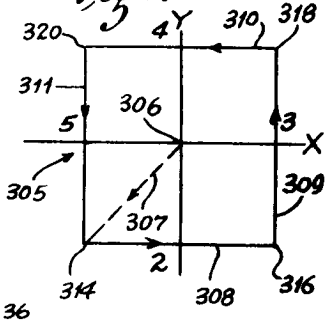

Fig. 5.

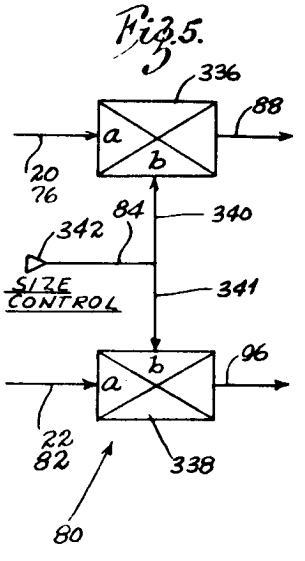

Fig. 6.

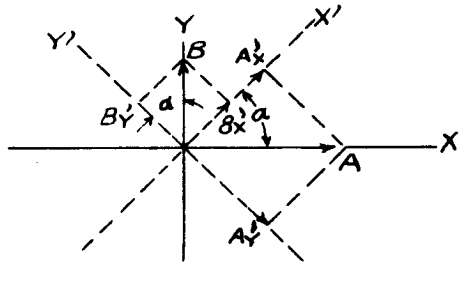

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Fig. 4

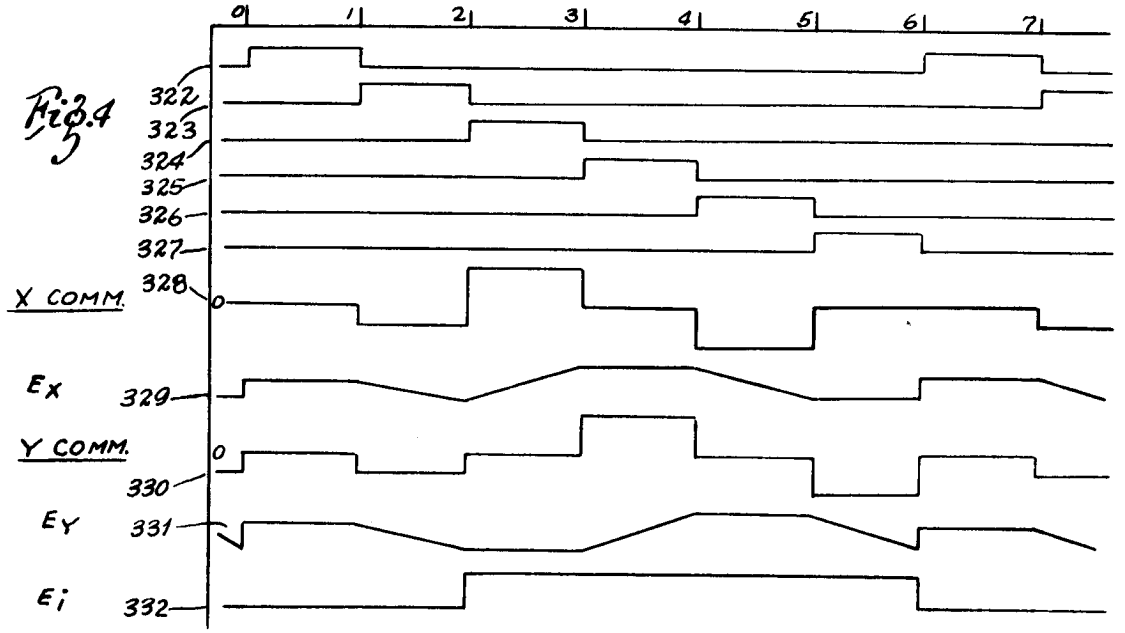

Fig. 7.

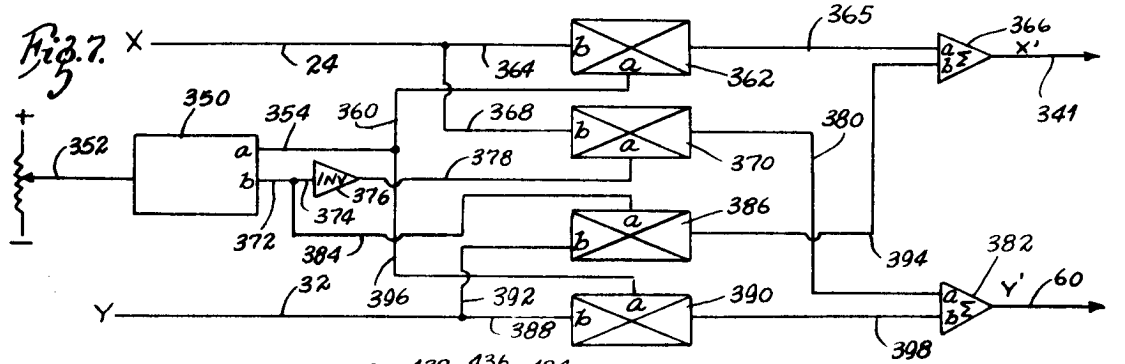

Fig. 8.

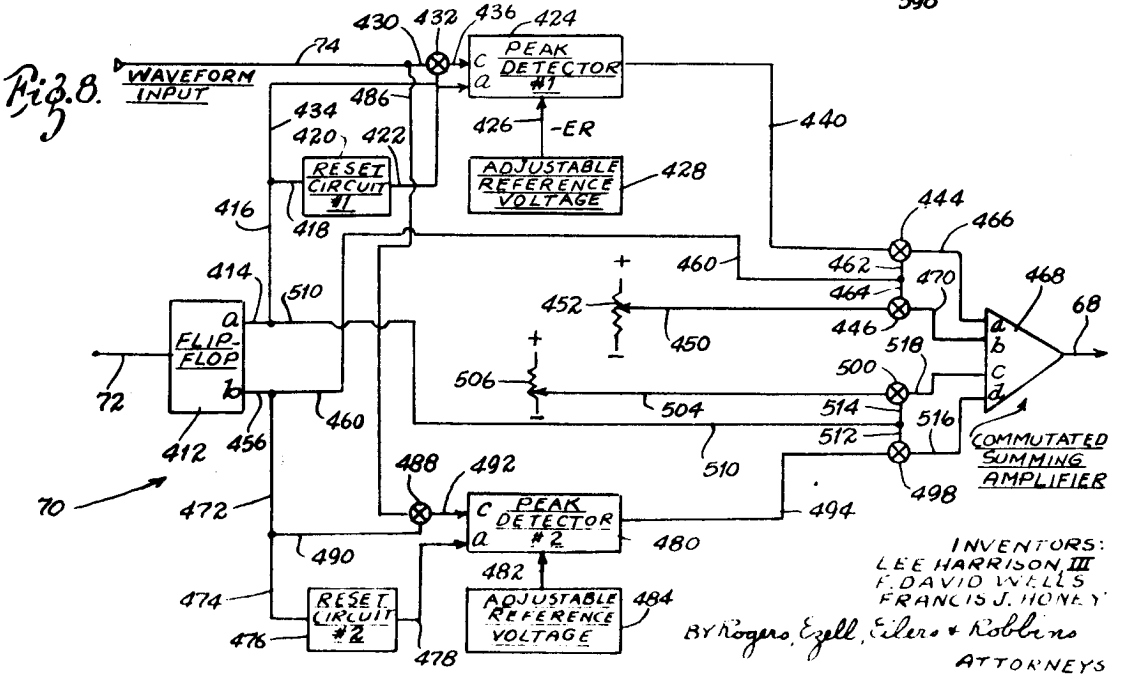

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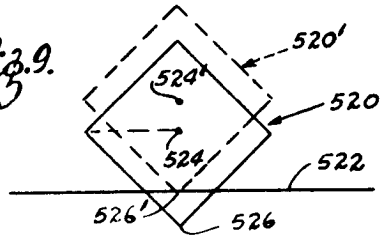
Fig. 9.



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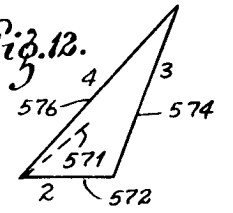


Fig. 10.

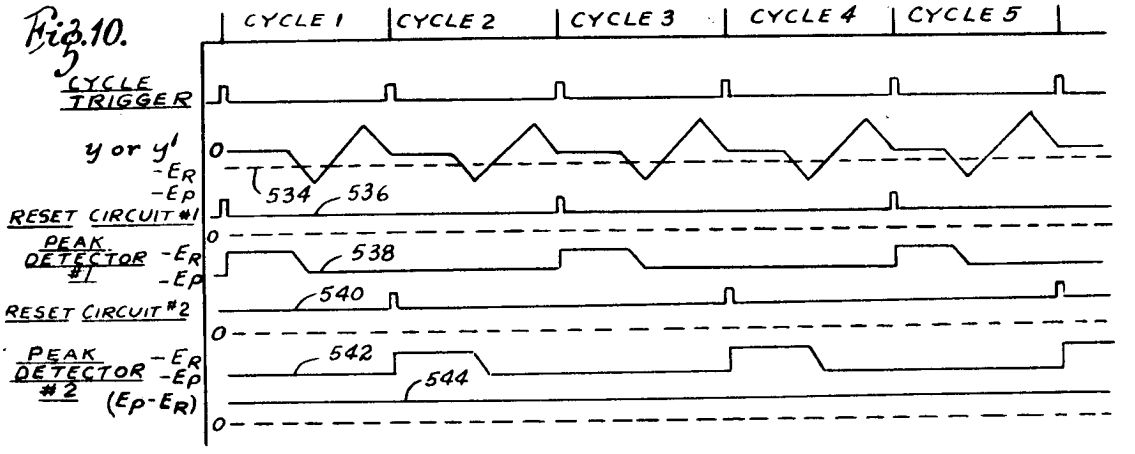
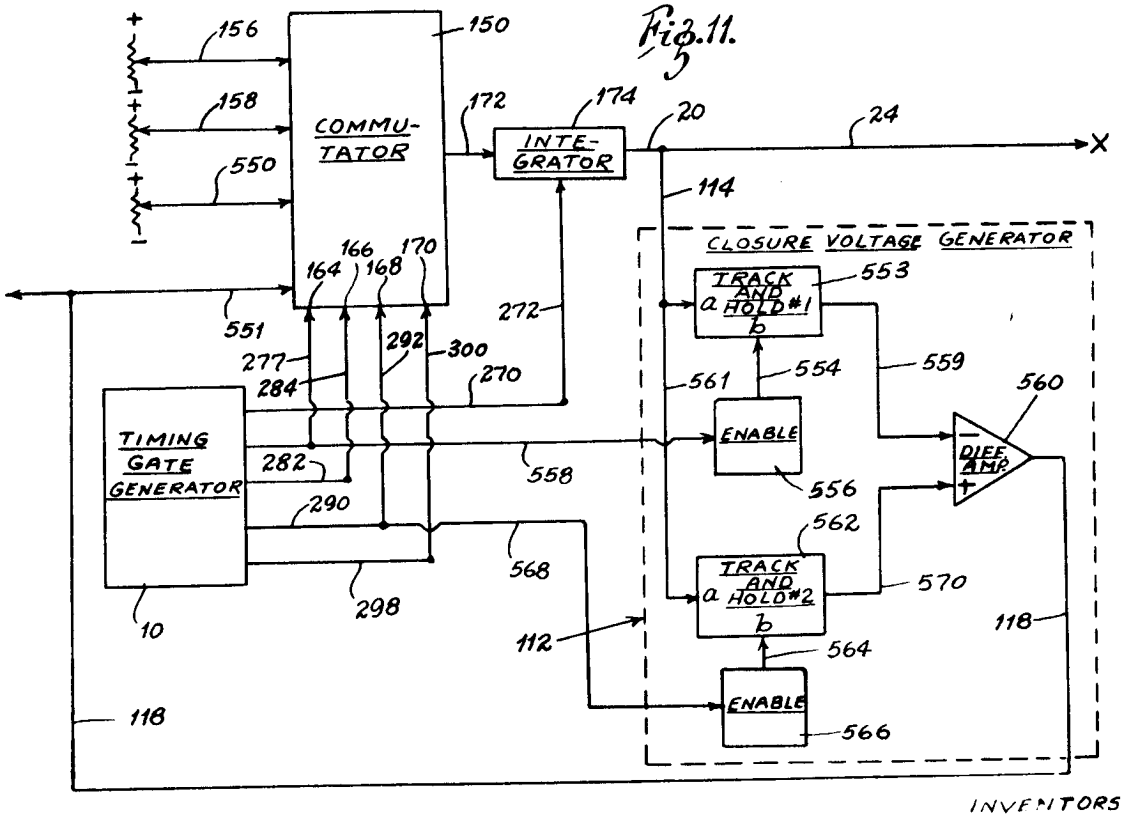


Fig. 11.



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United States Patent [19]

Tajchman et al.

[11] **3,723,907**

[45] **Mar. 27, 1973**

[54] SYNC OSCILLATOR

[75] Inventors: **Edwin J. Tajchman**, Denver; **James D. Brandt**, Lakewood, both of Colo.

[73] Assignee: **Computer Image Corporation**, Denver, Colo.

[22] Filed: **Aug. 24, 1970**

[21] Appl. No.: **66,464**

[52] U.S. Cl. **331/143**, 307/228, 328/127, 328/181, 331/111

[51] **Int. Cl.**.....**H03k 3/02**

[58] **Field of Search** 331/111, 143; 328/127, 181; 307/228

[56] **References Cited**

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Primary Examiner—John Kominski

Attorney—Rogers, Ezell, Eilers & Robbins

[57] **ABSTRACT**

An oscillator for generating a triangular waveform by alternately switching positive and negative DC signals to the input of an integrator in response to output signals from a flip-flop, the flip-flop being responsive to selective peak values of the integrator output, and means for synchronizing the oscillator to begin oscillating in response to a sync pulse in any one of several phases.

11 Claims, 2 Drawing Figures

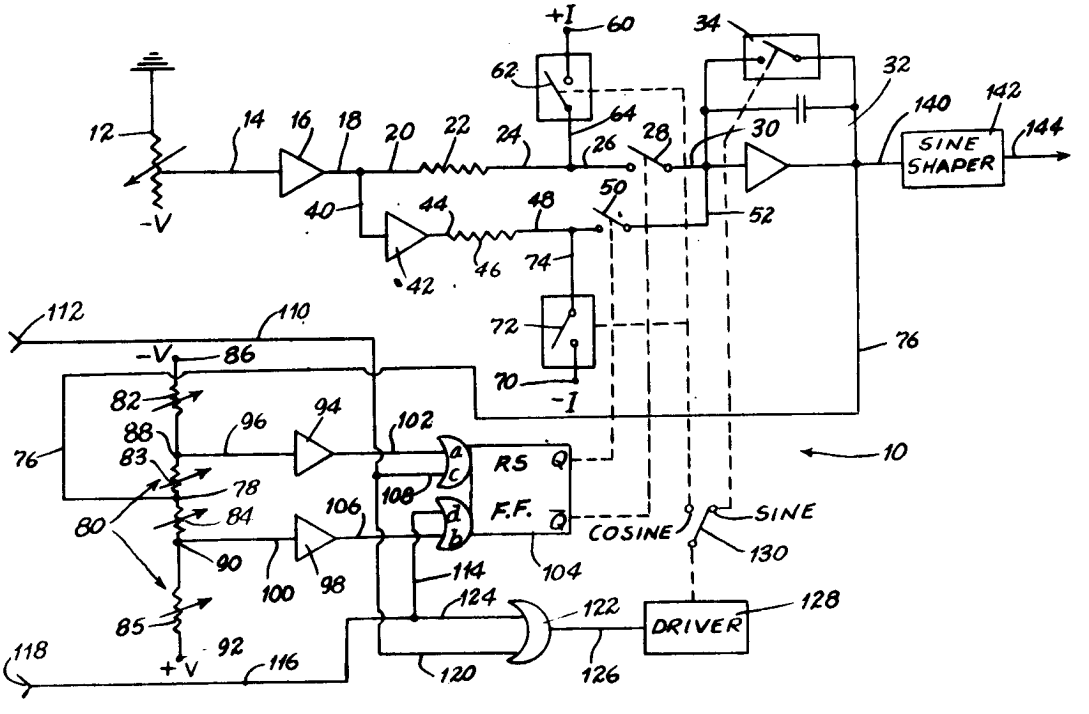
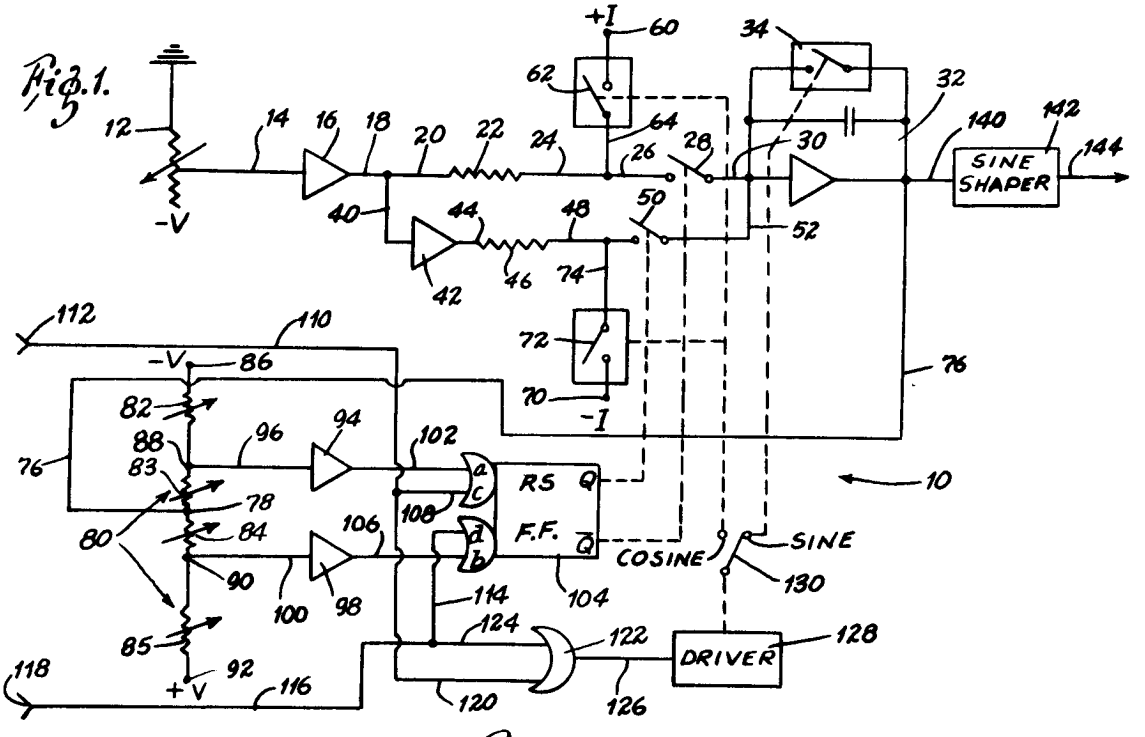


Fig. 1.



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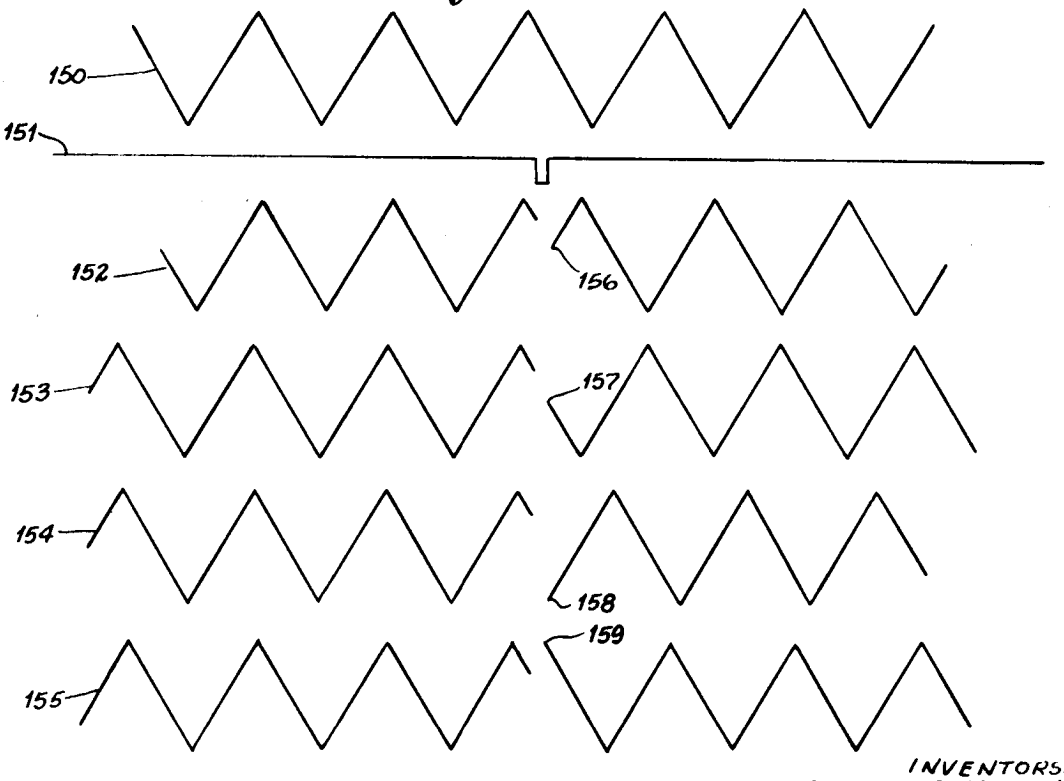

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United States Patent [19]

Harrison, III et al.

[11] **3,747,087**

[45] **July 17, 1973**

[54] **DIGITALLY CONTROLLED COMPUTER ANIMATION GENERATING SYSTEM**

[75] Inventors: **Lee Harrison, III**, Camarillo, Calif.; **Francis J. Honey; Edwin J. Tajchman**, both of Denver, Colo.; **Marshall M. Parker**, Lakewood, Colo.

[73] Assignee: **Computer Image corporation**, Denver, Colo.

[22] Filed: **June 25, 1971**

[21] Appl. No.: **156,762**

[52] U.S. Cl. ..... **340/324 AD**, 178/6.8, 178/DIG. 6, 315/19

[51] Int. Cl. **G06f 3/14**

[58] Field of Search ..... 340/324 A, 324 AD; 315/19, 24; 178/6.8, DIG. 6, DIG. 35

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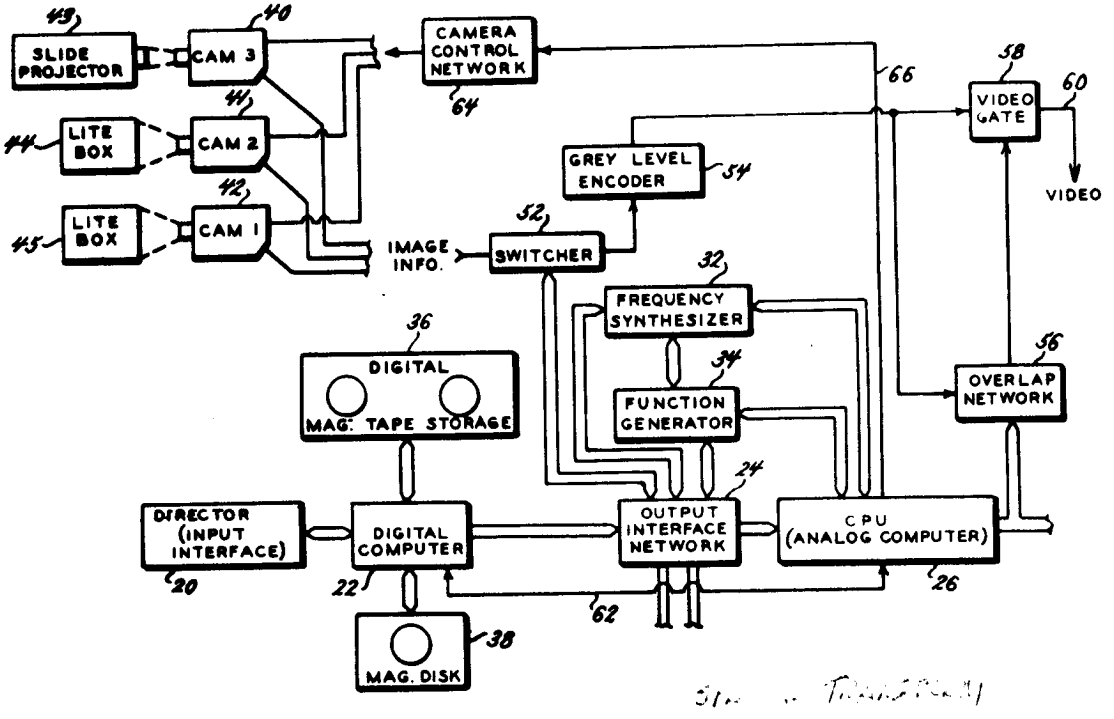
Primary Examiner—David L. Trafton
Attorney—Edmund C. Rogers et al.

[57] **ABSTRACT**

This invention relates to a system for automatically producing an animation sequence and includes an analog portion for generating output signals representing one or more sections of a raster on which images viewed by a video camera can be produced. Analog inputs to the analog portion define the parameters of the raster sections to effectively define the shape of each part of the viewed image produced thereon. The analog inputs to the analog portion are digitally controlled by signals from a digital computer portion which establishes these digital control signals from information fed to it from a director or a recording means.

41 Claims, 13 Drawing Figures



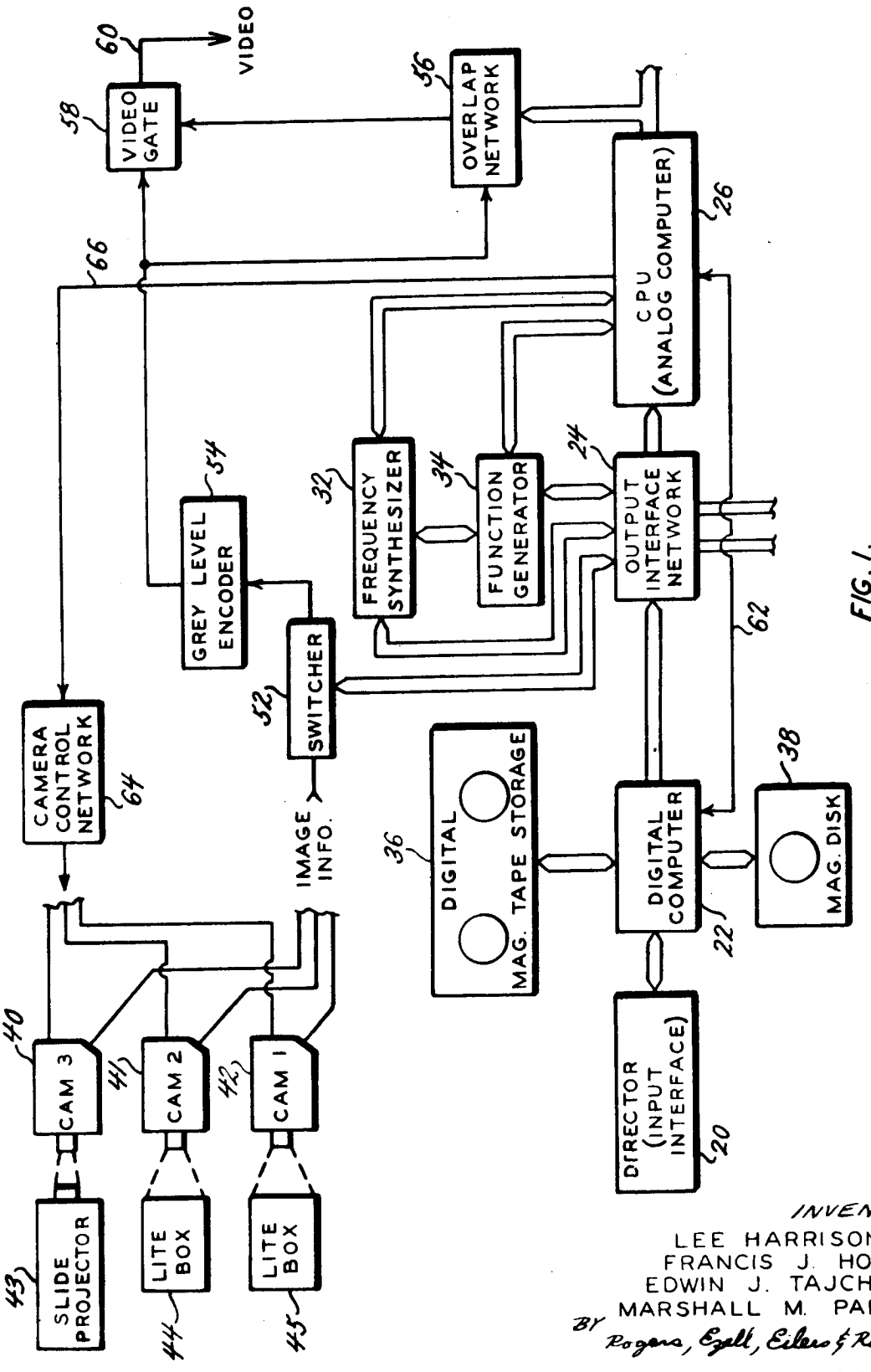


FIG. 1.

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FIG. 2.

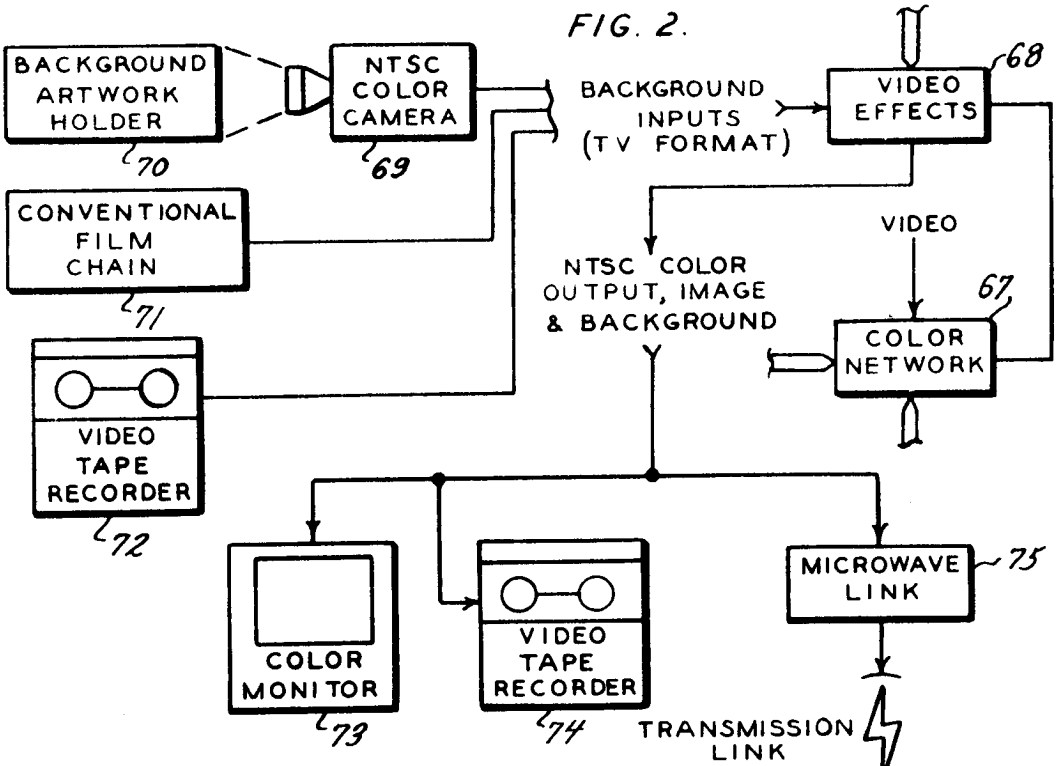
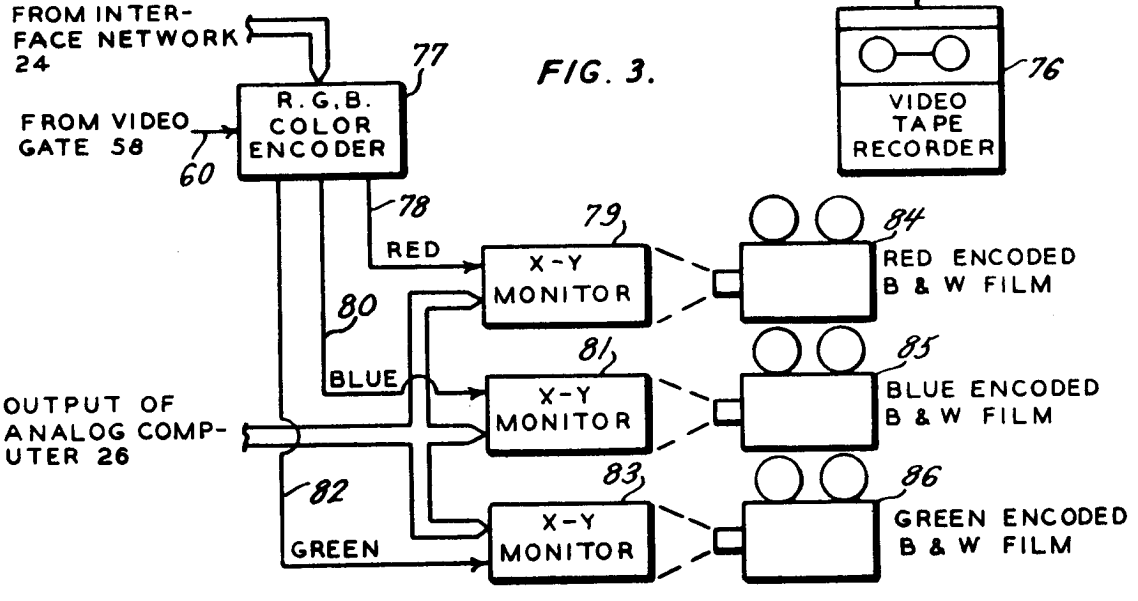


FIG. 3.



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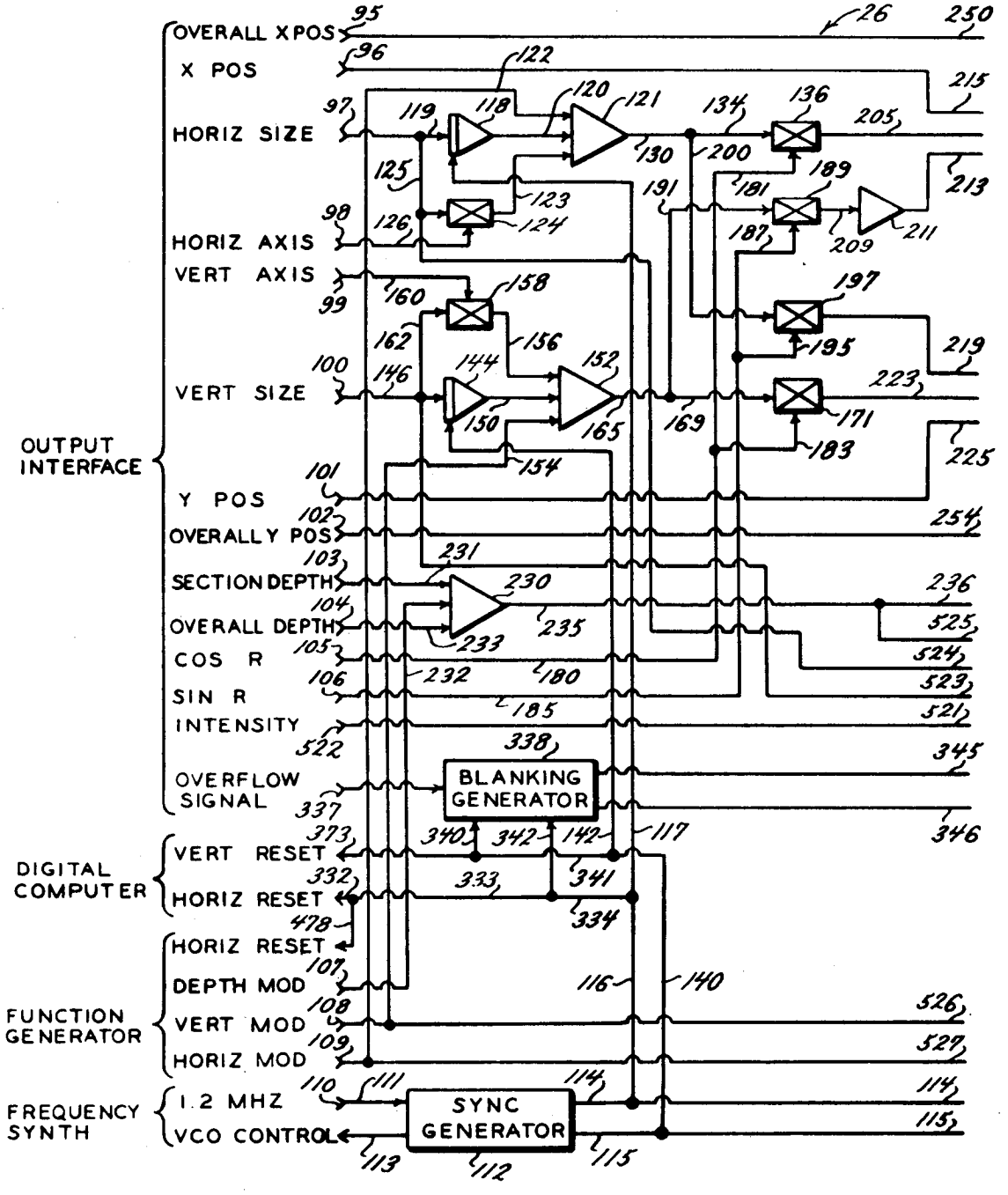

FIG. 4.

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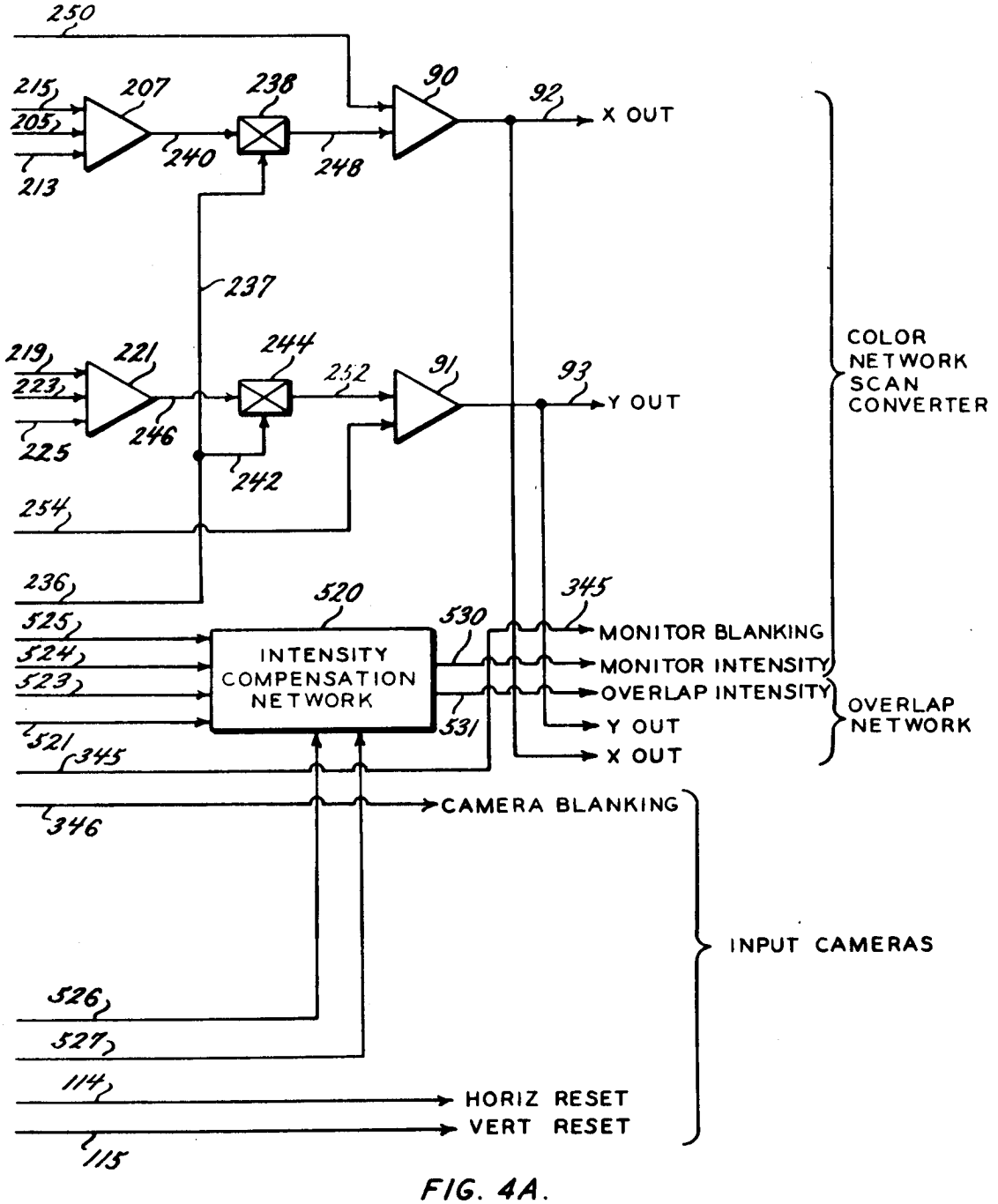

FIG. 4A.

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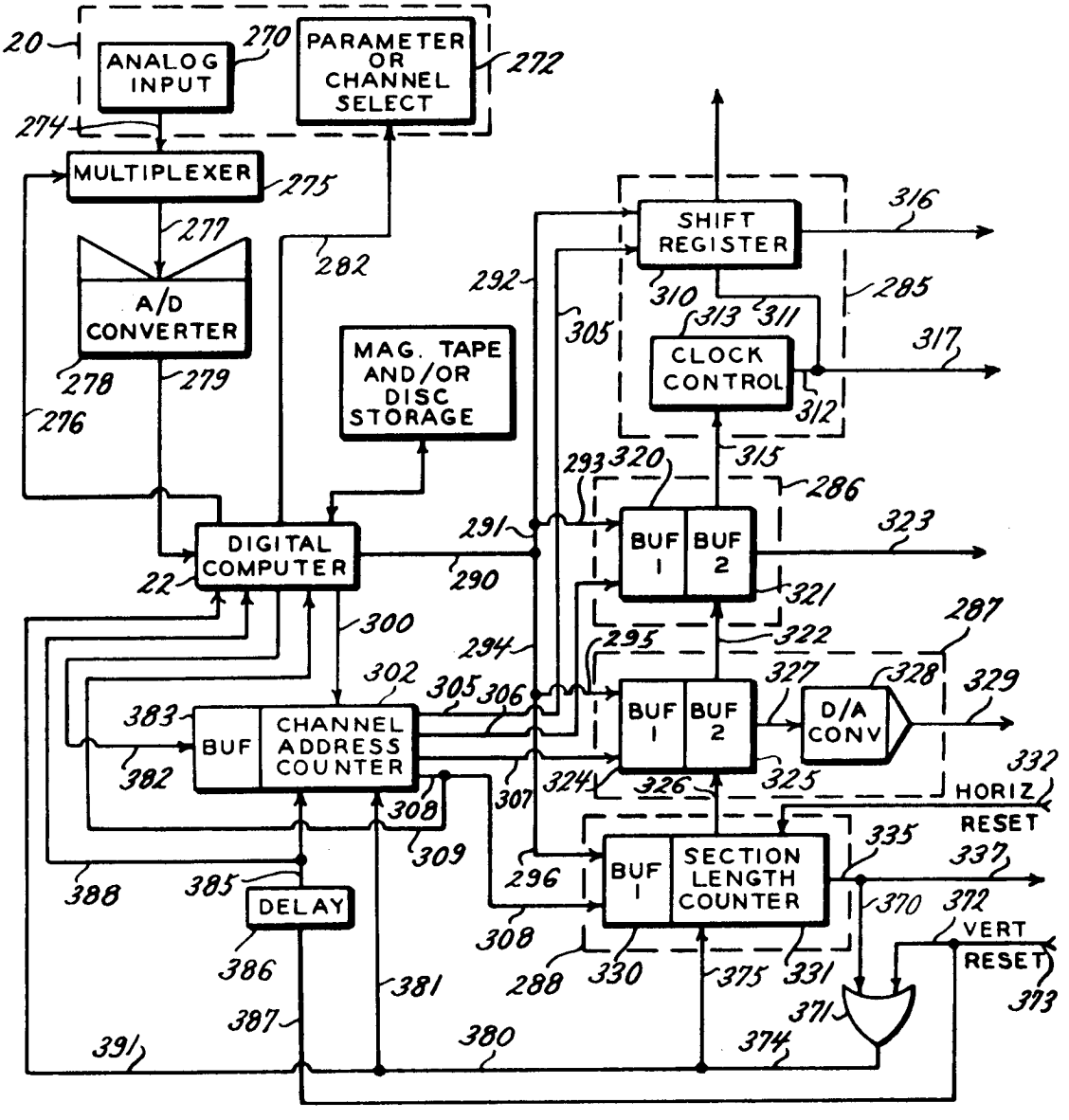

FIG. 5.

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FIG. 6.

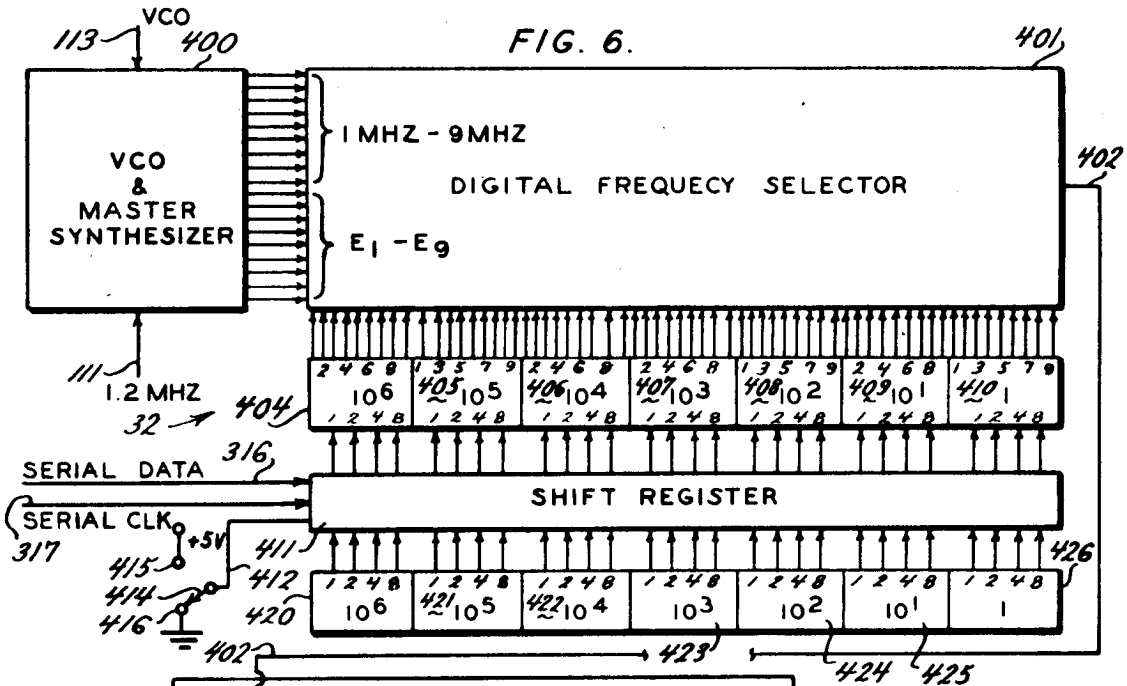
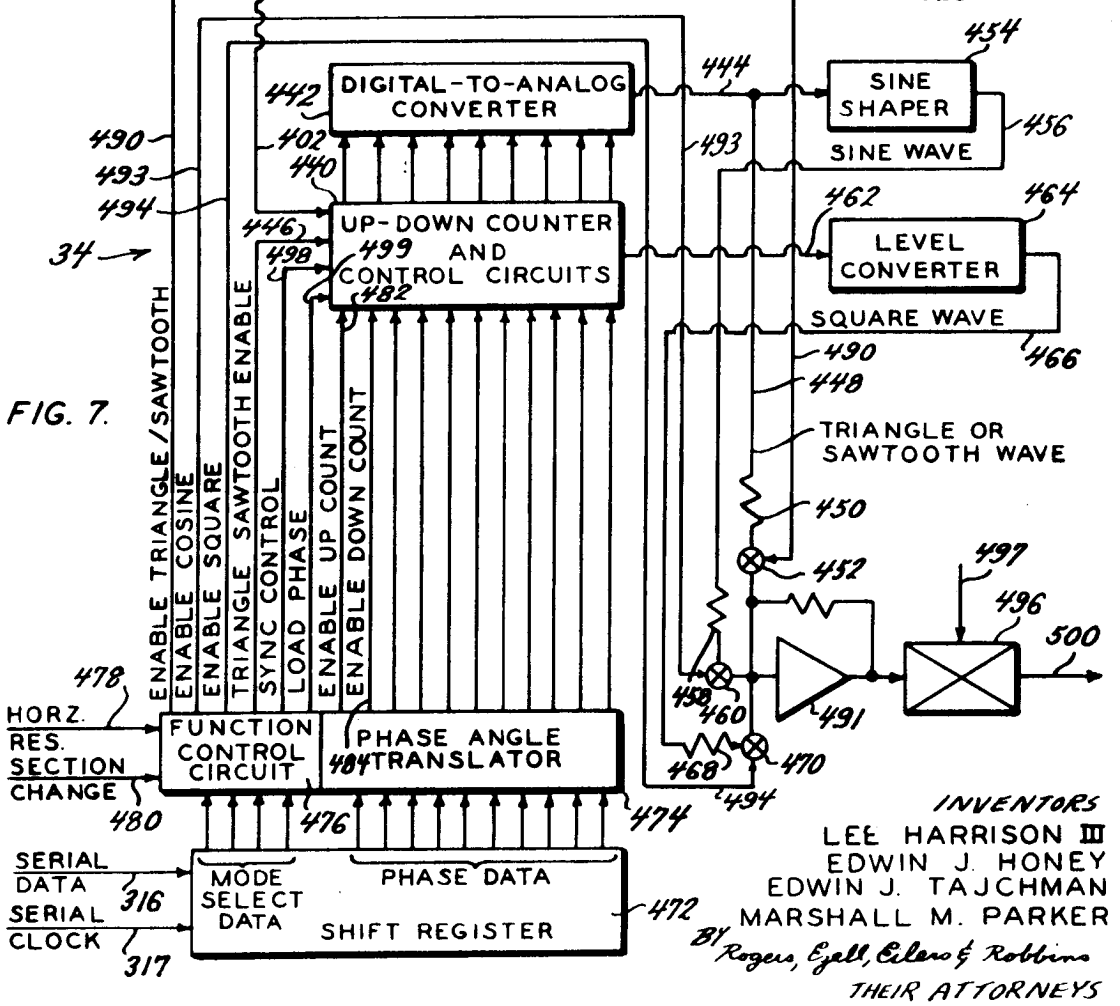


FIG. 7.



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United States Patent [19]

Altemus et al.

[11] **3,710,011**

[45] **Jan. 9, 1973**

[54] **SYSTEM FOR AUTOMATICALLY PRODUCING A COLOR DISPLAY OF A SCENE FROM A BLACK AND WHITE REPRESENTATION OF THE SCENE**

[75] Inventors: **William C. Altemus; James Duca,** both of Littleton, Colo.

[73] Assignee: **Computer Image Corporation,** Denver, Colo.

[22] Filed: **Dec. 4, 1970**

[21] Appl. No.: **95,096**

[52] U.S. Cl. .....178/5.4 R, 178/5.2 R

[51] Int. Cl. H04n 9/12

[58] Field of Search 178/5.2, 5.4, 6.8

[56] **References Cited**

UNITED STATES PATENTS

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Primary Examiner—Richard Murray

Attorney—Rogers, Ezell, Eilers & Robbins

[57] **ABSTRACT**

This invention comprises a system for producing a color representation on either video tape or a color display device of a static or dynamic scene, each color being independently selective and variable. Signals are generated for representing the scene in discrete shades of gray, which signals are used to generate further signals representing the red, green and blue components of a color assigned to each gray shade. These red, green and blue component signals are used to produce the color representation. The system further includes means for selecting the colors assigned to the various gray shades, and exclusive logic means allowing independent selection and variation of each color. Means are also provided for animating the scene to produce a fully animated color representation.

37 Claims, 14 Drawing Figures

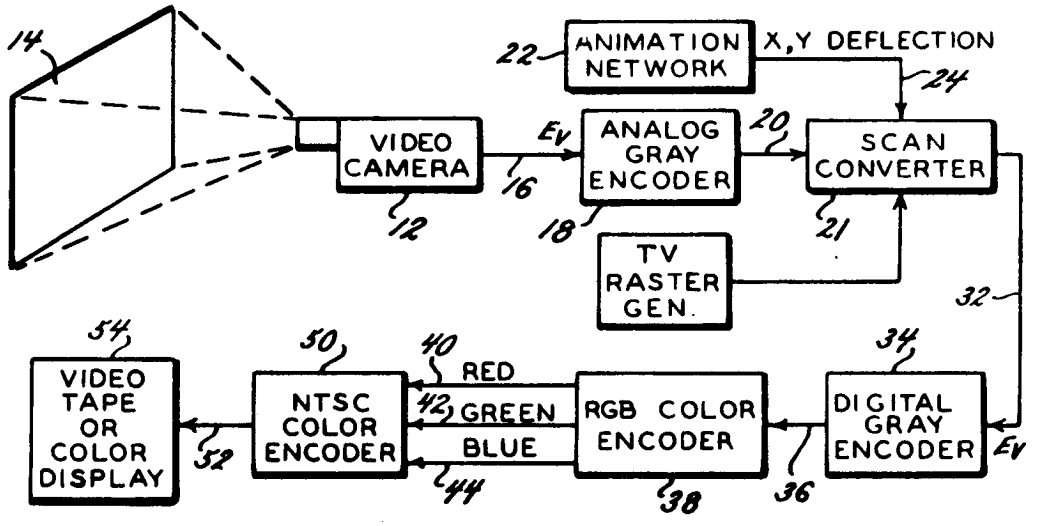
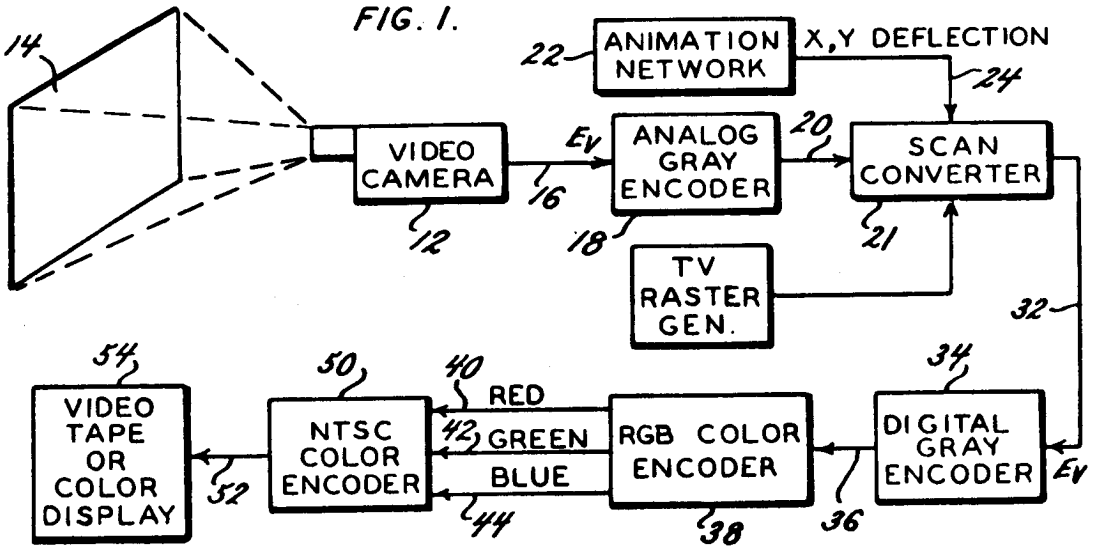
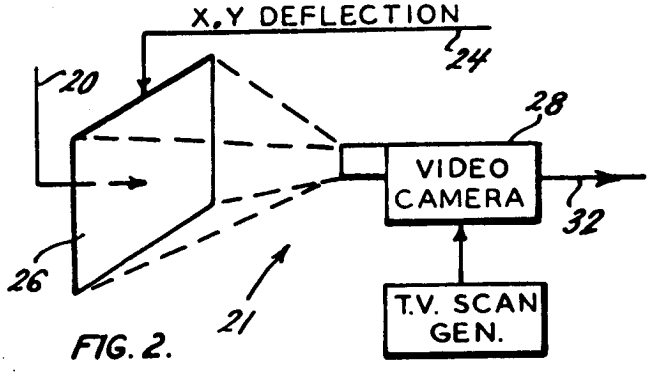


FIG. 1.





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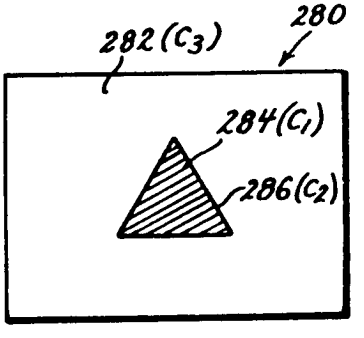

FIG. 9.

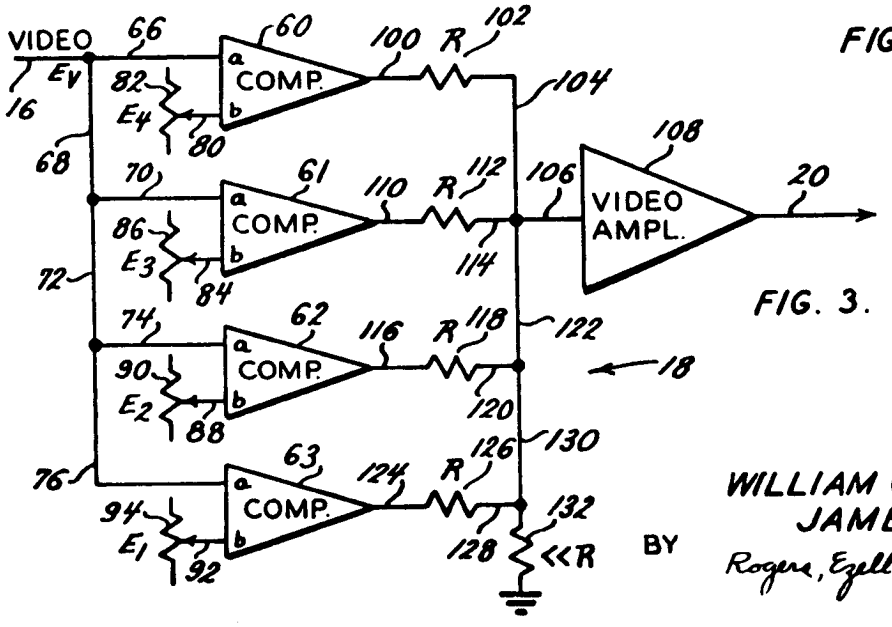

FIG. 3.

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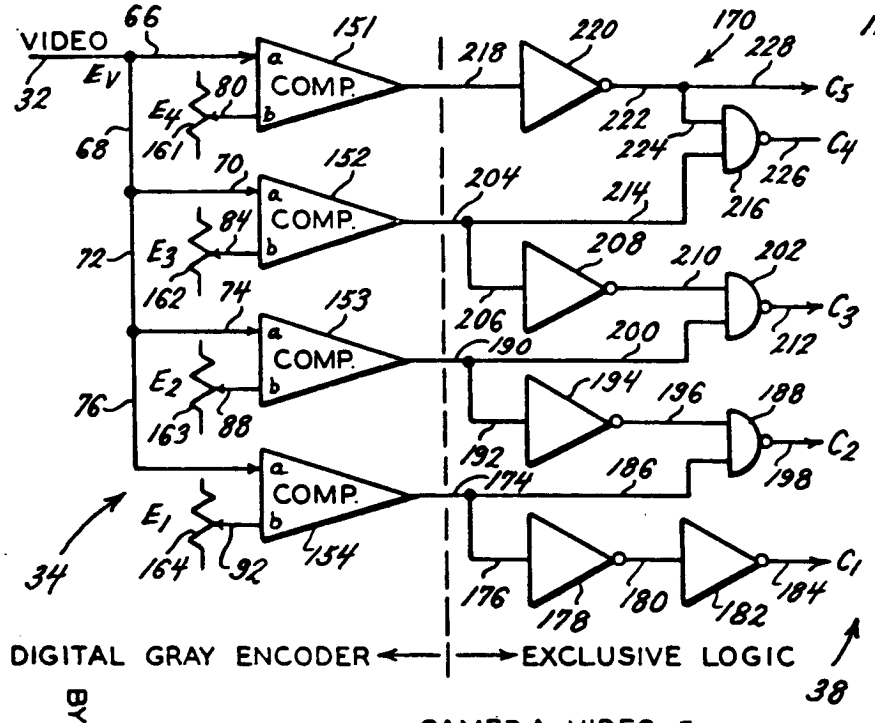
BY Rogers, Egell, Eilers + Robbins

ATTORNEYS



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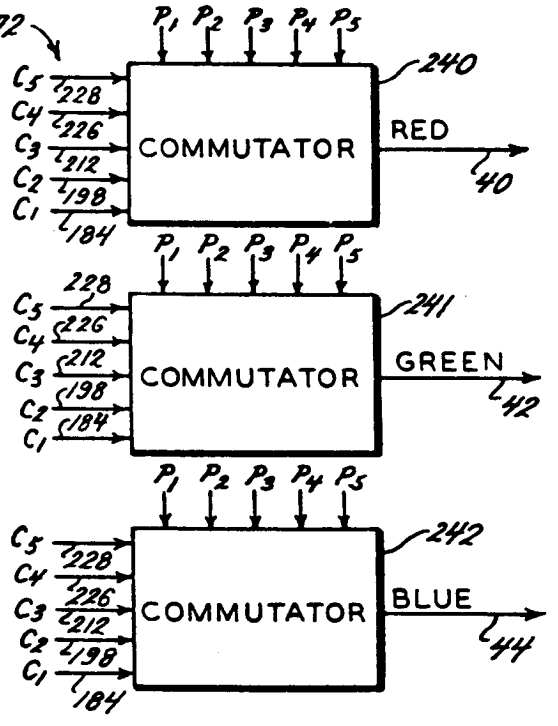

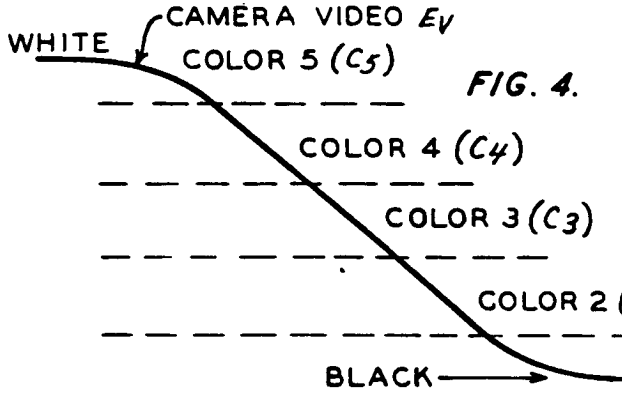

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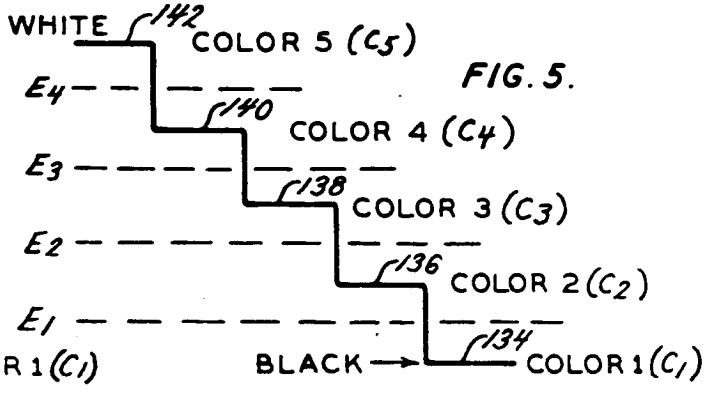

FIG. 5.

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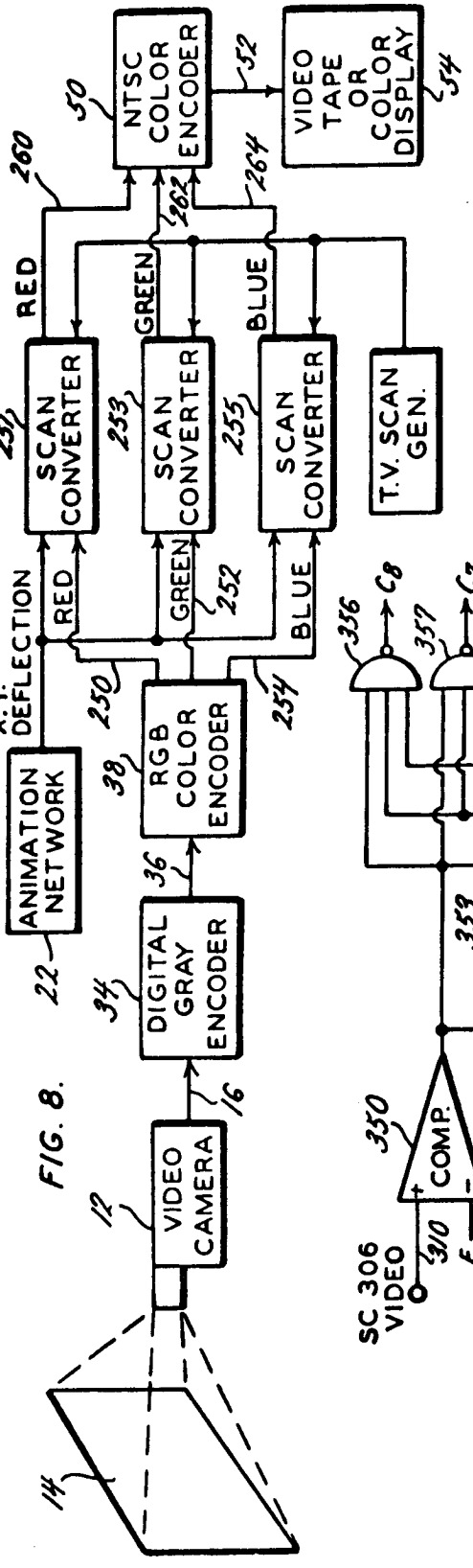

FIG. 8.

OUTPUT	ACTIVE ONLY WHEN	INPUT CONDITION
302		$E_4 < E_V$
303		$E_2 < E_V < E_4$ OR $E_6 < E_V$
304		$E_1 < E_V < E_2$ OR $E_3 < E_V < E_4$ OR $E_5 < E_V < E_6$ OR $E_7 < E_V$

FIG. 12.

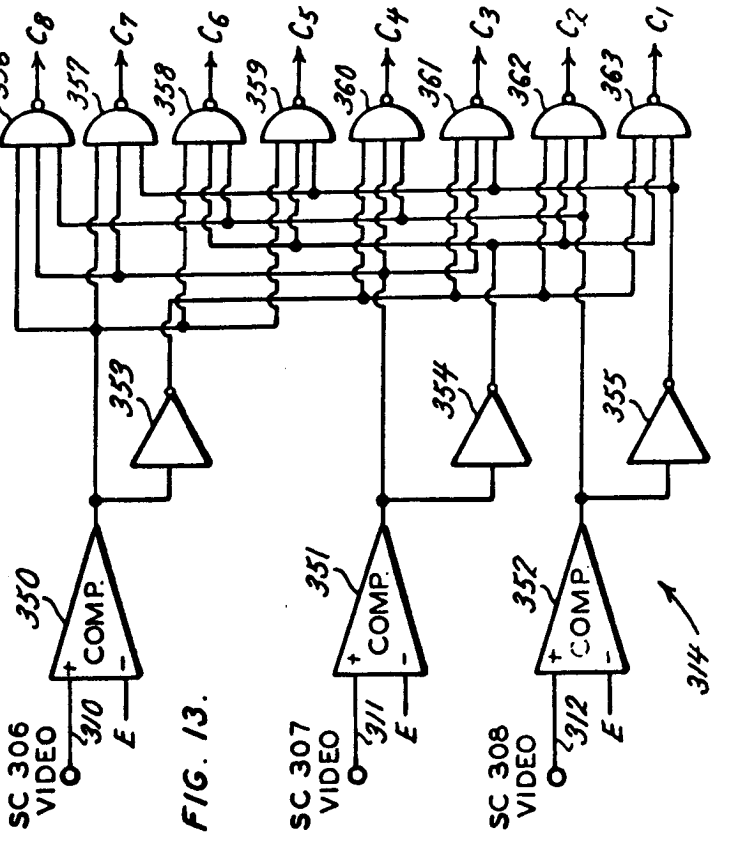

FIG. 13.

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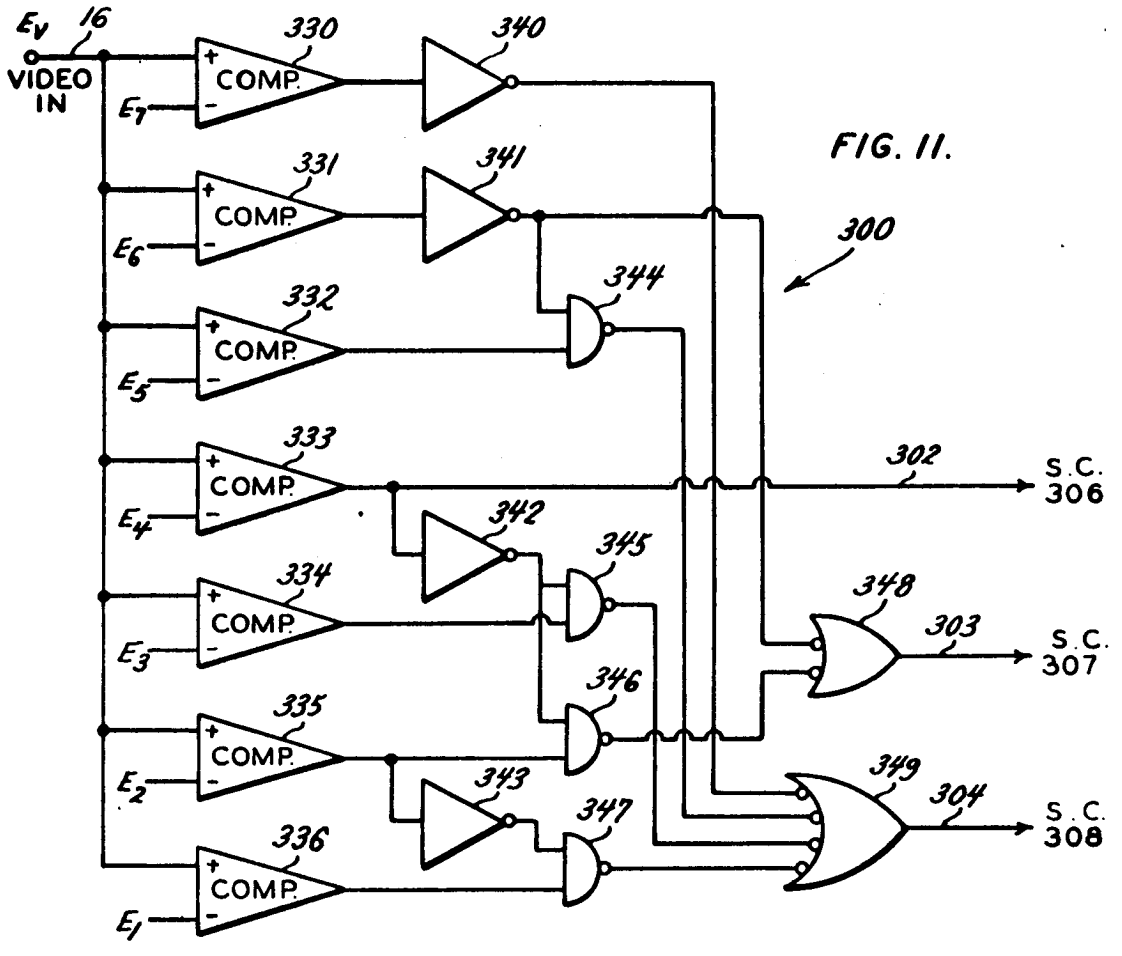

FIG. 11.

FIG. 7.

OUTPUT	ACTIVE ONLY WHEN	INPUTCONDITION
C_5		$E_4 < E_V$
C_4		$E_3 < E_V < E_4$
C_3		$E_2 < E_V < E_3$
C_2		$E_1 < E_V < E_2$
C_1		$E_V < E_1$

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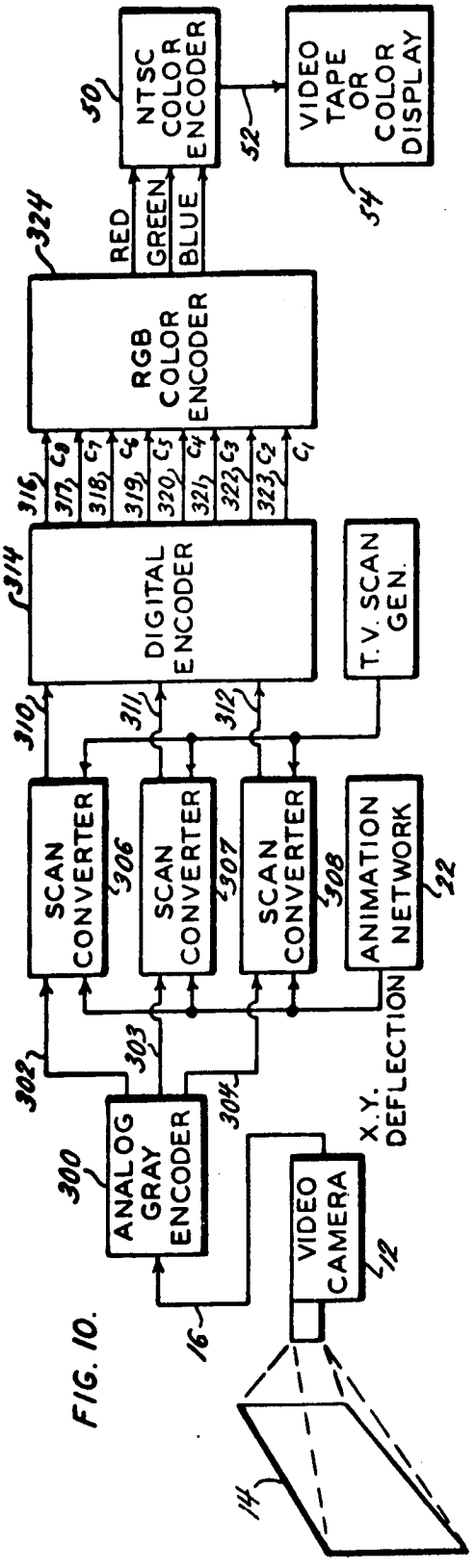

FIG. 10.

OUTPUT	ACTIVE ONLY WHEN	INPUT CONDITION FROM SCAN CONVERTERS	INPUT CONDITION FROM VIDEO CAMERA 12
C_8	↓	306, 307 & 308 ACTIVE	$E_7 < E_V$
C_7		306 & 307 ACTIVE 308 NOT ACTIVE	$E_6 < E_V < E_7$
C_6		306 & 308 ACTIVE 307 NOT ACTIVE	$E_5 < E_V < E_6$
C_5		306 ACTIVE 307 & 308 NOT ACTIVE	$E_4 < E_V < E_5$
C_4		307 & 308 ACTIVE 306 NOT ACTIVE	$E_3 < E_V < E_4$
C_3		307 ACTIVE 306 & 308 NOT ACTIVE	$E_2 < E_V < E_3$
C_2		308 ACTIVE 306 & 307 NOT ACTIVE	$E_1 < E_V < E_2$
C_1		306, 307 & 308 NOT ACTIVE	$E_V < E_1$

FIG. 14.

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