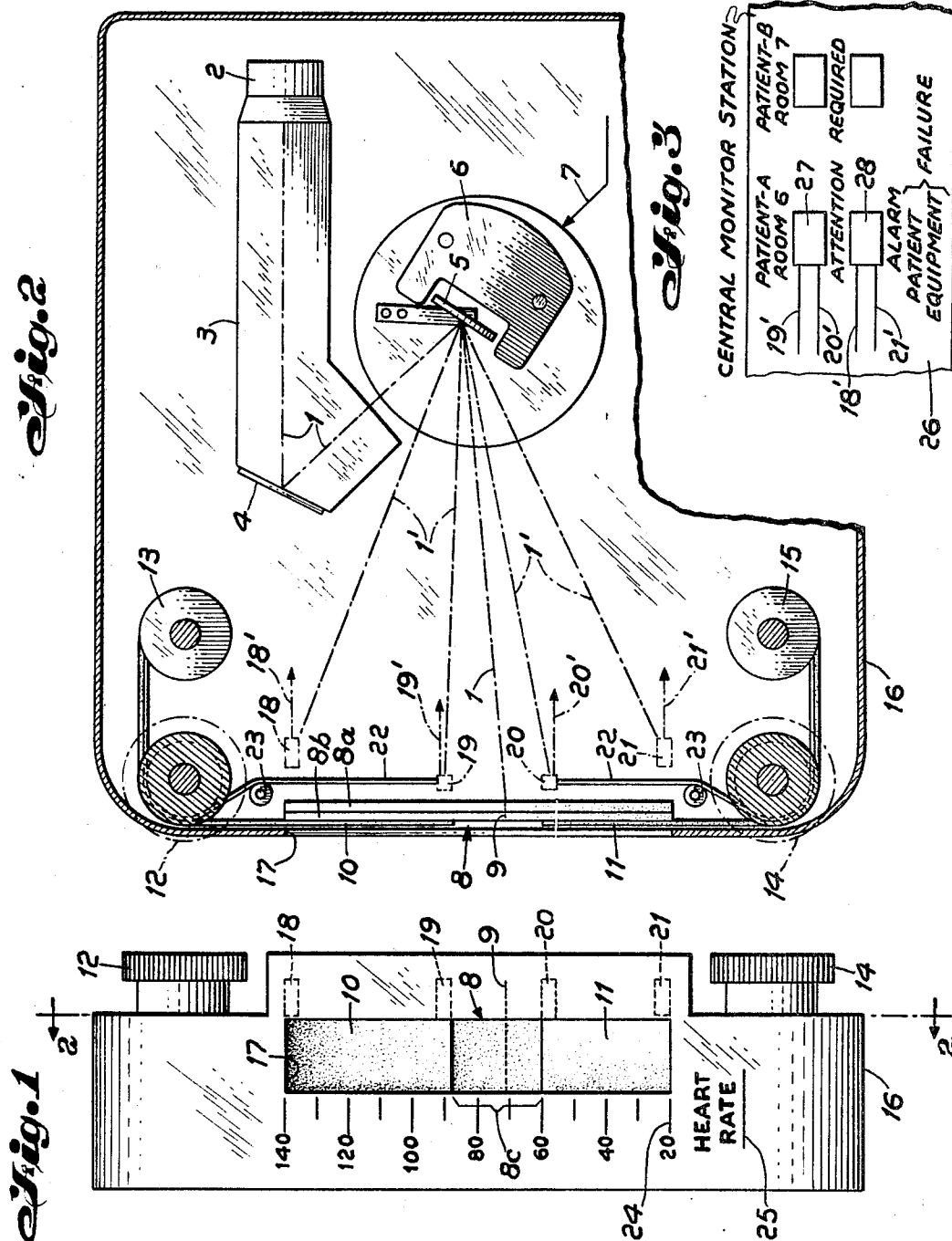


Fig. 2



INVENTOR
RABUN B. HARPER
BY *Philip M. Bolton*
ATTORNEY

1

2

3,394,370

DISPLAY MONITOR HAVING LIGHT BEAM DEFLECTED OVER PLURAL COLORED SCREENS

Rabun B. Harper, Chatsworth, Calif., assignor to International Telephone and Telegraph Corporation, a corporation of Delaware

Filed Dec. 3, 1965, Ser. No. 511,422

2 Claims. (Cl. 340—373)

ABSTRACT OF THE DISCLOSURE

A display for indicating the condition of a hospital patient is disclosed. A first translucent screen of one color and a second translucent screen of another color are manually positioned in proximity in parallel planes by a calibrated positioning mechanism. A beam of light is deflected over the screens in response to the output of a patient monitoring device, and the projection of the beam of light through one or both of the screens gives an indication of the patient's condition.

This invention relates to display units for monitoring a variable parameter, and more particularly a display unit having a display screen with a plurality of distinct zones and detectors to assist monitoring the instantaneous condition of said parameter.

The display monitor of my invention has particular use for hospital patient care where a panel of monitoring units are used to indicate simultaneously several conditions of the patient. The patient, for example, is provided with transducers attached to his person to provide signals indicating the patient's instantaneous temperature, blood pressure, heart rate, respiration, infusion rate, etc. These signals are used to control a bank of display units according to this invention whereby the conditions of the patient can be monitored. This bank of display units is preferably provided at the bedside of the patient although it or a second monitor may be provided at central monitoring station. The patient's doctor adjusts the display zones according to a calibrated scale so that one zone will cover the safe range of a given condition and other zones will represent unsafe ranges.

An object of this invention is to provide a display monitor wherein the distinct zones are adjustable to the preferred operating range of the parameter to be monitored.

A still further object of my invention is the provision of detection means for alerting a central monitor station whenever the indicating beam moves from one zone on the display screen to another zone.

A feature of this invention is that the display monitor is adjustable to predetermine the safe and unsafe ranges of a variable parameter. The spot-like beam, in response to a signal from the variable parameter, will fall in a safe or unsafe zone. This will enable an instantaneous determination of the condition of the parameter. In addition, whenever the beam moves from one zone to another zone a detector is provided to alert the viewer at a central monitor station of such changing condition.

The above-mentioned and other features and objects of this invention will become more apparent by reference to the following descriptions taken in conjunction with the accompanying drawing, in which:

FIG. 1 is a front view of a display monitor according to this invention;

FIG. 2 is a cross-sectional view taken along line 2—2 in FIG. 1; and

FIG. 3 is a partial view of a central monitor station.

Referring to FIGS. 1 and 2, light beam 1 from optic source 2 in housing 3, is reflected by reflector 4 onto reflector 5. Reflector 5 is responsive to meter movement

6 and signals of source 7, thereby directing light beam 1 onto a projection screen 8, composed of translucent screen 8a and colored overlay screen 8b, to form light spot or bar 9. Screen 8 is partially covered by an upper adjustable color projection screen 10, and a lower adjustable color projection screen 11. Screen 10 is adjustable by operating control knob 12 and tension pulley 13. Screen 11 is adjustable by operating control knob 14 and tension pulley 15.

Housing 16 contains window 17 for viewing the spot-like indicating beam 9 in the exposed portion of screen 8 or through the overlay portion, composed of screen 8 and 10, or screen 8 and 11. The screen overlay 8b is preferably a light green color while the colors of screens 10 and 11 are preferably an orange color which dominates the light green so that when the beam passes from the green zone 8c to screen 10 or 11 the light spot changes from green to orange. Other colors where one dominates the other may, of course, be used.

Photoelectric cells 18, 19, 20, and 21, are contained in housing 16. Photoelectric cells 19, 20 are synchronized with the adjustment movements of screens 10, 11, by connecting lines 22 and guide pulleys 23. Photoelectric cells 19, 20 provide signals over connections 19', 20' whenever light beam 1 extends beyond the established safe range limits as shown by dotted lines 1'. Photoelectric cells 18, 21 provide additional signals over connections 18', 21' whenever the light beam 1 extends beyond the limits of projection display screen 8.

On the front panel of housing 16, to the left and adjacent window 17, is provided a calibrated scale 24 representing the variable parameter 25 to be monitored. Thus, control knobs 12, 14 can easily adjust the screens 10, 11 to the desired or safe range of the parameter being monitored.

FIG. 3 shows part of a central monitor station panel 26, containing for each patient an attention alerting indicator 27, activated by signals over connections 19' or 20', and an alarm indicator 28, activated by signals over connections 18' or 21'.

For example, where the variable parameter 25 to be monitored is the heart rate of a patient, and calibrated scale 24 is marked from 20 to 140 as representing beats per minute of the heart. The upper display limit is adjusted by knob 12. Since an upper limit of 88 beats per minute is permissible for this particular patient, overlay color screen 10 is moved to the calibrated position representing 88 beats per minute. Due to the synchronized movement of photoelectric cell 19 with screen 10, cell 19 also will be adjusted to the calibrated position of 88 beats per minute. The lower display limit is adjusted by knob 14. The lower limit of 60 beats per minute is permissible for this particular patient, and the overlay color screen 11 is moved to the corresponding position. Photoelectric cell 20 synchronized in movement with screen 11, is now located at calibrated position of 60 beats per minute. Thus independent control of upper and lower limits expose a safe range for zone 8c.

Where, for example, signals over source 7 represent the heart rate of a patient being monitored, the signals control movement of meter 6 and reflector 5. Light beam 1 is then projected onto screen 8 and appears as spot-like indicating beam 9. Whenever heart rate signals cause the light spot 9 to move out of zone 8c, photoelectric cell 19 or 20 will provide a signal over 19' or 20', as the case may be, to indicator 27, at the central monitor station, alerting the station operator that prompt attention is required for Patient A in room six. Whenever light spot 9 moves beyond the limits of screen 8, due to patient or equipment failure, photoelectric cell 18 or 21 will provide an alarm signal over 18' or 21' to indicator 28 to inform the station operator that urgent attention is required.

While I have described above the principle of my invention in connection with specific apparatus it is to be clearly understood that this description is made only by way of example and not as a limitation to the scope of my invention, as set forth in the objects thereof and in the accompanying claims.

I claim:

1. In a signaling system, the combination comprising: a support; a first translucent screen fitted to said support; a second translucent screen movable in a predetermined plane contiguous to said first screen; said screens having different colors; mechanical means to adjust the position of said second screen in said predetermined plane; and electrical means selectively actuable to direct a beam of light either through said first screen and not through the second or through both of said screens.

2. The invention as defined in claim 1, wherein said mechanical means includes a photocell, and adjustable means to locate said photocell at the position of one edge

of said second screen and movable concurrently therewith, and a monitor responsive to the output of said photocell for indicating a condition representative of an input to said electrical means, said photocell thereby being supported in a position to intercept at least a portion of said beam of light when it is directed toward said screens in an area near said second screen edge.

References Cited

UNITED STATES PATENTS

1,894,111	1/1933	Marcellus	340—181 X
3,122,730	2/1964	Stahler	340—378 X
3,238,454	3/1966	Martens	250—230 X
3,286,098	11/1966	Long et al.	250—230

JOHN W. CALDWELL, *Primary Examiner*.

H. PITTS, *Assistant Examiner*.