

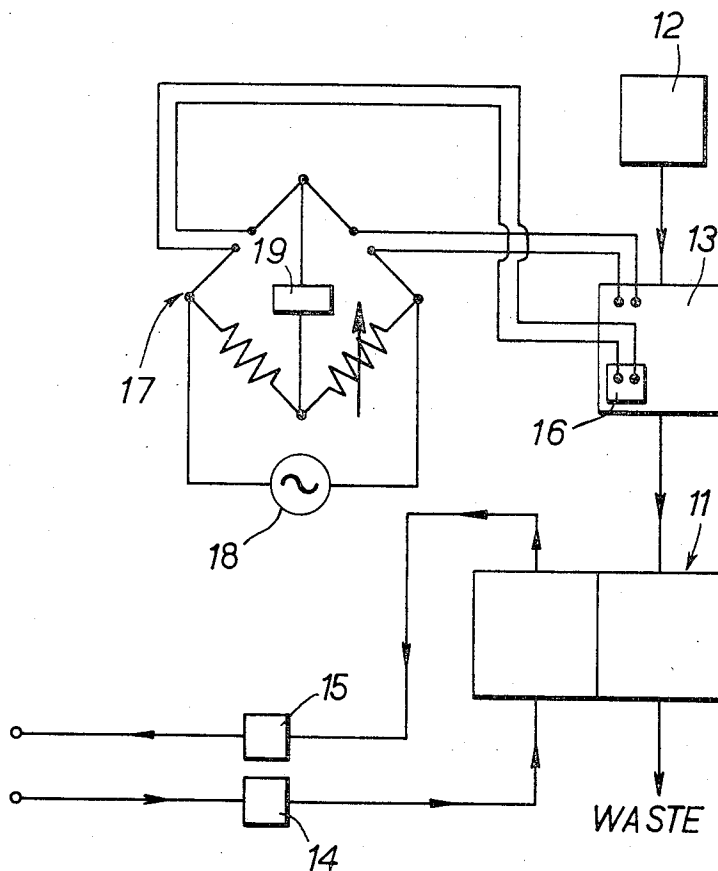
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DIALYSATE CONCENTRATION CONTROL IN ARTIFICIAL KIDNEY MACHINES

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DIALYSATE CONCENTRATION CONTROL IN ARTIFICIAL KIDNEY MACHINES

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2 Claims

ABSTRACT OF THE DISCLOSURE

In an artificial kidney machine a pump is used for pumping blood from a patient through a dialyser, and dialysate is supplied to the dialyser to purify the blood passing through it. The concentration of the dialysate is monitored by comparing it with the concentration of a standard dialysate using probes in the two dialysates, the probes being connected in an unbalanced bridge network.

This invention relates to artificial kidney machines of the kind including a dialyser, pump means for pumping blood from a patient through the dialyser, and supply means for feeding dialysate to the dialyser to purify the blood passing through the dialyser.

Numerous precautions have to be taken in such machines to ensure that a warning is given if any fault should develop. One important factor is the concentration of the dialysate, which must be kept within predetermined limits. The object of this invention is to provide a simple but reliable arrangement for monitoring the dialysate concentration, and for this purpose, use is made of the fact that the conductivity of dialysate is dependent on its ionic concentration.

According to the invention, a machine of the kind specified includes a container having therein dialysate of known concentration, first probe means within said container, second probe means within the dialysate supplied to the dialyser, an A.C. bridge network having the first and second probe means in two arms thereof, and means operable by the bridge output for giving a warning or effecting a control when the concentration of the dialysate supplied to the dialyser departs from a safe level.

Preferably, said container is immersed in the dialysate flowing to the dialyser, so that the machine automatically compensates for temperature variations.

The accompanying drawing is a diagrammatic representation of one example of the invention. It must be emphasised that the drawing is highly diagrammatic, and many parts which are essential in the machine are not shown, since they are not important to an understanding of the present invention.

Referring to the drawing, there is provided a dialyser 11. Dialysate is pumped from a source 12 through a monitoring chamber 13 to the dialyser 11, and thence to waste. Moreover, a pump 14 is used to pump blood from a patient through the dialyser 11, and then back to the patient by way of a bubble trap 15. The action of the dialyser 11 is to purify the blood.

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Within the chamber 13 is a container 16 containing dialysate having a known concentration, and therefore a known conductivity. Within this dialysate are a pair of probes, preferably formed from platinum covered with platinum black. Another pair of probes are housed in the chamber 13, and the two pairs of probes are connected in two arms of an A.C. bridge 17, the other two arms of which contain respectively a fixed resistor and a variable resistor which is used to calibrate the apparatus.

The A.C. bridge is fed from a source 18, and its output is passed to some form of warning device 19. The arrangement is such that when the concentration of the dialysate provided through the dialyser 11 is within predetermined limits, no warning is given, but when the limits are exceeded, a warning is given by the device 19. Preferably, the bridge is arranged to be out of balance for the correct conductivity, and if desired, the output from the bridge can be used to control the dialysate concentration, instead of, or as well as, giving a warning.

The device 19 may take a variety of forms, and could for example, consist of an amplifier, followed by a phase sensitive detector followed by a meter or control device. The meter may have associated therewith a visual and/or warning device.

Having thus described our invention what we claim as new and desire to secure by Letters Patent is:

1. An artificial kidney machine of the kind including a dialyser, pump means for pumping blood from a patient through the dialyser, and supply means for feeding dialysate to the dialyser to purify the blood passing through the dialyser, the machine including a container having therein dialysate of known concentration, first probe means within said container, second probe means within the dialysate supplied to the dialyser, an A.C. bridge network having the first and second probe means in two arms thereof, said bridge network being out of balance when the dialysate has the correct concentration, and then producing a predetermined output, and means operable by variation in the bridge output from said predetermined value for giving a warning or effecting a control when the concentration of the dialysate supplied to the dialyser departs from a safe level.

2. A machine as claimed in claim 1 in which said container is immersed in the dialysate flowing to the dialyser, so that the machine automatically compensates for temperature variations.

References Cited

UNITED STATES PATENTS

1,759,996	5/1930	Parker	137—93 X
1,830,333	11/1931	Parker	137—93 X
1,951,035	3/1934	Parker	137—93
3,352,779	11/1967	Austin et al.	210—321 X
3,406,826	10/1968	Willock	210—321 X

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210—96, 321