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54 **Control systems for air pads or mattresses.**

57 The operation of an air pad or mattress of the kind having one or more sets of air cells (A,B) that are selectively inflatable and deflatable to change from time to time areas of the pad or mattress providing support to a person's body is controlled by a system (10,11,12) including an air pump (14), a series of valves (18 to 21) operable by a control unit (30) to inflate and deflate selectively the cells, and a pressure sensor (25) for sensing air pressures within the cells, information derived therefrom dependent on body weight and weight distribution being used by the control unit to determine operating air pressure values to which selected ones of the cells or sets of cells are to be inflated.

Thus the system serves to adjust automatically air pressure within the cells according to current individual requirements.

Sets of cells may be inflated alternately. Where the pad or mattress is provided with a single set of cells, the cells may be inflated sequentially, either in groups or individually.

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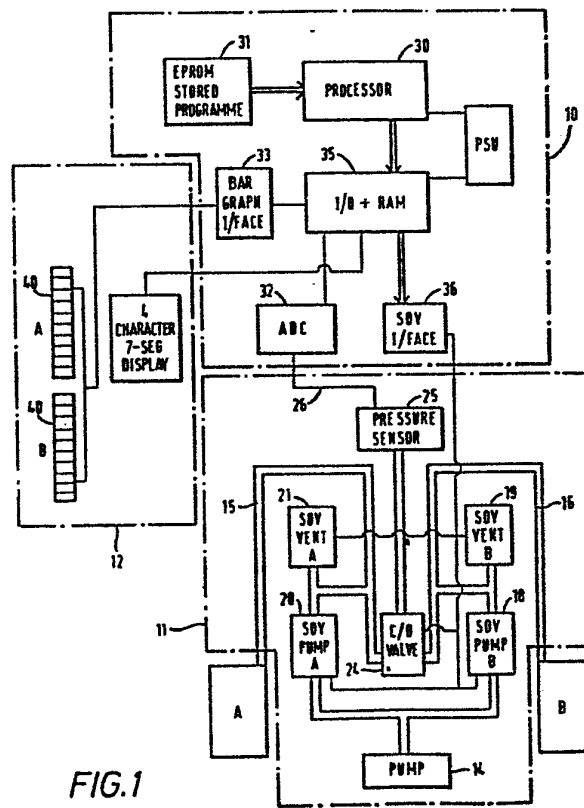


FIG.1

CONTROL SYSTEMS FOR AIR PADS OR MATTRESSES

This invention relates to control systems for air pads or mattresses and their methods of operation.

The invention is concerned particularly with control systems for air pads or mattresses of the alternating pressure kind manufactured by Applicants under the Registered Trade mark "Ripple", especially, but not exclusively, for bed or chair-bound patients, as used for example for the prevention of pressure sores and other conditions resulting from restricted circulation when the patient is capable of only limited movement. One such kind of pad or mattress comprises essentially a number of sets of collapsible air cells which together provide a surface for supporting the patient, the arrangement being such that from time to time some of the cells are inflated and others are deflated, with the result that the patient is supported by pressure exerted at different areas of the body at different times, and no one area of the body remains permanently under pressure.

In one known constructional form, for example as described in the Applicants' British Patent Specification No. 1286197, the pad or mattress has two sets of cells comprising generally cylindrical flexible plastics tubes extending transversely of the pad or mattress with alternate tubes connected together and constituting a respective set of cells. Each set of alternate tubes are inter-connected at their one end through a respective header tube extending lengthwise of the pad or mattress, the header tubes for the respective set of cells being disposed along opposite sides

of the pad or mattress. Air is supplied to and exhausted from each header tube by means of a pump and valve arrangement in such a manner that one set of cells is inflated whilst the other is deflated and vice-versa. This inflation and deflation of each set of cells alternates in a cyclical fashion so that the portions of the pad or mattress providing support to the patient are constantly alternating. At any given time therefore, the patient is supported by the inflated tubes of one set of cells whereas the parts of the patient's body overlying the deflated and collapsed tubes of the other set of cells are not subjected to any significant pressure. Before the pressure of the one set of cells acting on those parts of the patient's body supported thereby can cause any harm as a result of, for example, the constriction of capillaries in the skin at those parts, the one set of cells is deflated and the other inflated so as to transfer support of the patient to other parts of the body.

In another known constructional form of this kind of pad or mattress, two sheets of plastic material are secured, for example welded, at selected areas, so as to define therebetween two sets of cells, each set comprising a number of transversely extending arrays of interconnected diamond-shape segments with one array of each set being connected with the next array of that set by a U-shape tube defined between the two sheets at a respective edge of the pad or mattress. The two sets of cells are, as with the previous arrangement, interdigitated such that an array of one set

lies adjacent to an array of the other set with the respective diamond-shape segments of each adjacent pair of arrays intermeshing with one another. As before, a pump and valve arrangement repetitively inflates and deflates alternatively the two sets of cells, and may be arranged to pump air into one set of cells whilst venting the other set to atmosphere or, alternatively, to transfer air from one set of cells to the other.

The invention is applicable also to mattresses or pads of the so-called sequentially-operated kind, for example as described in British Patent Specification No. 1499938. Such a pad or mattress comprises an assembly of flexible-walled cells disposed side by side so as to be contactable by an area of the body for supporting the body, and a valve arrangement for ensuring in a first group of the cells a fluid pressure greater than atmospheric and in one or more second cells a lesser fluid pressure, the cells constituting the first group and the second cell or cells being changed periodically, and the ratio of the number of cells of the first group to the number of the second cell or cells being always greater than unity.

By way of example, the mattress or pad may have a plurality of elongated cells arranged parallel in a row, only a single one of such cells, or an adjacent group, or a dispersed group, being made non-supporting at any given moment. For instance, the cells may all be connected to a

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