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(72) Pietsch, Helge, DE
(73) GEBR. ISRINGHAUSEN, DE
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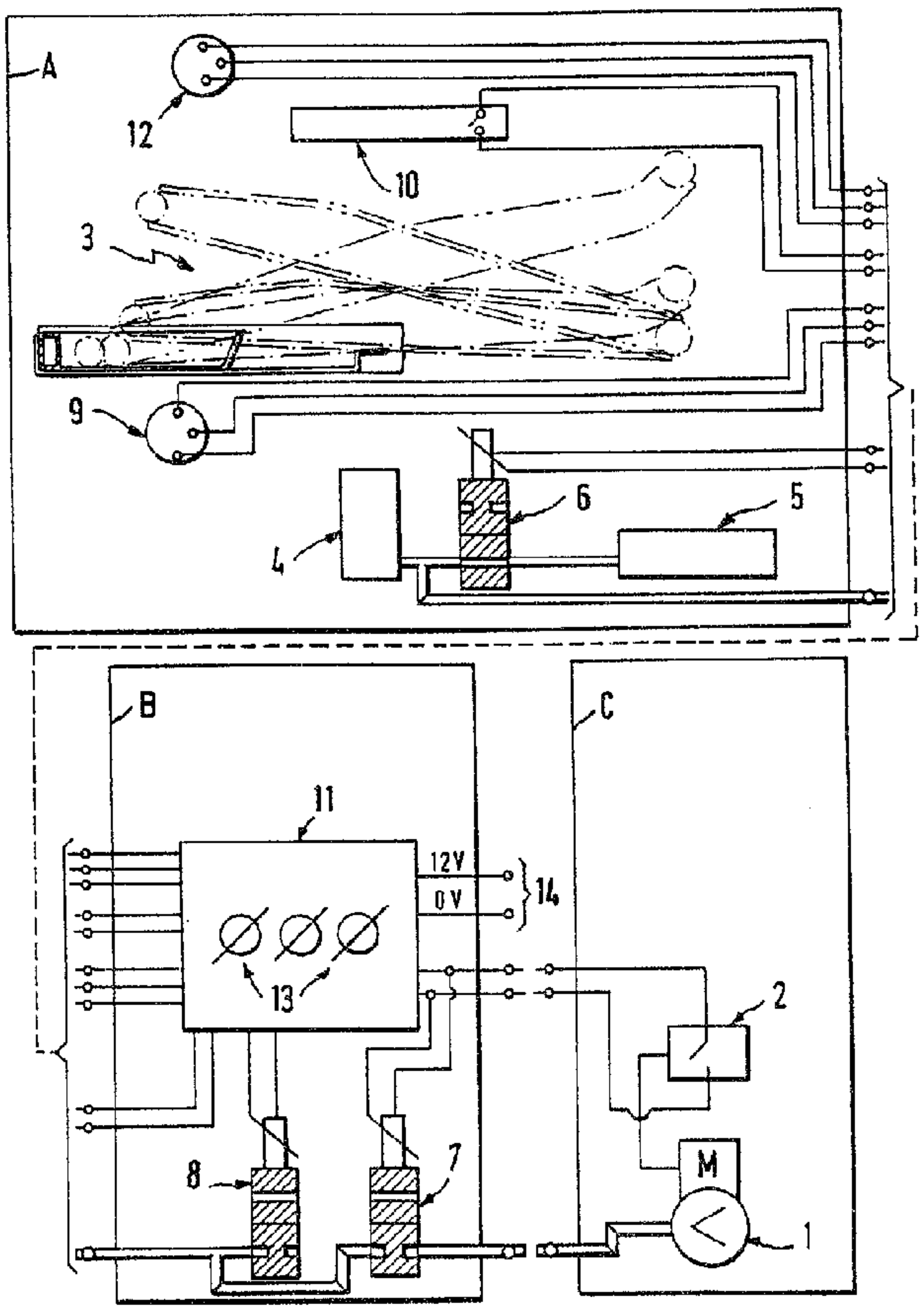
(54) **SIEGE DE VOITURE**
(54) **CAR SEAT**



(57) The invention relates to an air sprung vehicle seat positioned by a linkage system with an electronic control mechanism which controls the air valves of the air spring in accordance with the movements of the linkage system. Using only one movement sensor, the path of movement of the seat is represented by a continuous electrical signal connected to the input of a microprocessor, which functions to compare the signal with pre-set standard values which are capable of being altered if necessary.

ABSTRACT

The invention relates to an air sprung vehicle seat positioned by a linkage system with an electronic control mechanism which controls the air valves of the air spring in accordance with the movements of the linkage system. Using only one movement sensor, the path of movement of the seat is represented by a continuous electrical signal connected to the input of a microprocessor, which functions to compare the signal with pre-set standard values which are capable of being altered if necessary.

This invention relates to a vehicle seat positioned by a mechanical linkage system under the control of an air spring, with an electronic control mechanism for the control of valves which admit air into the air spring or release air from it dependent upon the movements of the linkage system.

Electronic controls for air sprung seats are well known, e.g. as in DE-AS 27 36 242 and DE-PS 33 12 732. Such controls are designed for specific control functions such as for switching on a servomotor, or for maintaining the standard average position of a seat by admitting air to or exhausting the air from an air spring. Control mechanisms of this type work independently of the movement of the linkage system, with usually two or more sensors detecting certain positions traversed by the linkage system, which information is then sent on to the electronic control mechanism. In practice, control mechanisms of this type require very precise adjustment of the sensors while the positions on the linkage system where each of the sensors are located can vary considerably, according to the type of seat or linkage system which is being used and/or which control function is to be performed by the control mechanism. If, for instance, multiple control functions are to be performed, e.g. turning the air valve on or off to control the flow of air into or out of the air spring and/or the switching on or off of a supplementary air supply, then a corresponding number of sensors have to be installed and adjusted on the linkage system.

It is therefore the purpose of this invention to create an air sprung vehicle seat with an electronic control mechanism which is much easier to set up and which at the same time can also perform a number of control functions without the added expense of positioning and adjusting the sensors. This purpose is accomplished by providing the linkage system with a movement sensor generating a continuous output of electronic signals representing exactly the path of movement of the linkage system during the entire time that the seat is in operation, with this information being fed into a microprocessor. This microprocessor, controlled by a program, compares the movement which actually occurs with preset standard values and, when deviations occur, generates one or more signals to control the flow of air into or out of the air spring as the case may be. The aim of this invention therefore is primarily to free the linkage system from the requirement of having a greater or lesser number of sensors generating discrete signals (e.g. ON/OFF, or Voltage YES/NO) which have to be installed with great precision for this purpose in their various positions, as in presently known systems. By using this invention, it is now possible for one single sensor mounted on the linkage system to fulfill all the demands of electronic seat control, provided however that this single movement sensor continuously sends out an unbroken stream of electrical signals representing exactly the path of movement of the linkage system. The information generated by the sensor regarding the detected movements may take the form either of digital values or of electrical analog signals. The latter are preferably generated by means of a potentiometer, alternatively an inductive transducer or an electronic scanning device of the type in common commercial use may be employed.

The invention requires the resulting electronic image of the movement of the linkage system to be fed into a microprocessor. In this respect, it is advantageous if the microprocessor is located at a position either on the seat or away from it without having to occupy the confined space inside the linkage system. The processor can then query the electrical signal, received in real time according to constantly repeated program sequences in order to compare the movement actually detected with preset standard values, whereby these preset standard values may be altered by using a command, which is a feature peculiar to this invention. This is a considerable advantage, since an unlimited range of actual movements may be covered without the need either for any mechanical regulation or alteration, or the adjustment of any individual sensors on the linkage system. This system is thus free from the necessity of having to make frequent adjustments to the individual sensors as is the case with electronic control mechanisms for covering the various differing input signals in the prior art. It is also a simple and straightforward task using this invention to match the seat control mechanism to the particular type of seat and/or the particular linkage system. It is likewise advantageous, for matching the control mechanism to the individual type of seat and/or for generating particular output signals, to be able to change the way in which the movements detected are actually processed inside the microprocessor, using a microprocessor with programmable memory. The known technology for the construction of seats includes the control of movement of the seat not only by controlling the flow of air into and out of the air spring, but also by using a supplementary air supply for this purpose which may be connected to or disconnected from the system. The existing technology also includes the installation of a supplementary shock absorber which may be turned on to reinforce the dampening effect on seat movements when necessary. The expense of controlling these supplementary elements has in the past been correspondingly high.

The attached drawing shows the operation of the invention, Fig. 1 being the control system of an air sprung vehicle seat according to the invention.

The components depicted are: A, a seat unit; B, a control module and C, a compressor unit. In this air sprung seat, the air pressure supply is provided by the compressor 1 in the compressor unit C, which can be turned on and off by means of a relay 2. The movement system of the seat, represented in the seat unit A, is a scissor type guide bar linkage system shown in dotted lines and which is well known. The air spring 4 which is actually built in to the linkage system is shown symbolically below the linkage system for greater clarity. The seat is further supplied with a supplementary air supply 5, which can be turned on or off by means of an electromagnetically operated valve 6 connected to the air supply of the air spring 4 which itself takes in air, or exhausts it, through the air intake valve 7 and the air exhaust valve 8 respectively. The intake valve 7 in conjunction with the relay 2 is connected to the control of the compressor 1. In this invention the linkage system possesses a movement sensor in the form of a potentiometer 9, which can be mounted in the simplest way between two components of the scissor type guide bar system 3, each moving relative to the other, to provide an electrical signal representing the exact path of movement of the linkage system.

When an occupant sits down on the vehicle seat, seat contact switch 10 immediately activates the processor which is located in control module B. Provision is made for indicating the operating condition. In operation, the signal representing movement of the linkage system as detected by the potentiometer 9 is constantly supplied as an input to the processor 11. By this means the processor is in a position to compare the electric signal representing the movements with the preset standard values. First of all, i.e. immediately after activation of the control mechanism, the statistically standard average value is sought. This can be preset by means of the easily accessible potentiometer 12 which is mounted on the seat. As soon as the first deviation is detected, the processor 11 generates an output signal turning on the compressor 1 and at the same time opening the air input valve 7. The seat then moves to its statistically average position. Further standard value presettings may be made in control module B by using the potentiometer 13 located there. For example,these standard values could be set just below the average value for the seat so as to shut off the compressor after the seat first comes up, and close the air intake valve 7 again. Other standard value settings adjustable by using the potentiometer 13 are used for maintaining a check on the movement of the seat when in operating condition; when any deviations occur,output signals are generated by the processor 11 to control the air exhaust valve 8 and the air intake valve 7 to the air spring and/or the valve 6 which controls the turning on or off of the supplementary air supply 5. With the present day state of the art in microprocessor technology, there are almost no limits to the possibilities in setting the standard values and/or varying the way in which the microprocessor processes the signals which it receives representing movement of the seat.

CLAIMS:

1. An air suspension seat for a vehicle comprising:

a mechanical suspension system for controlling vertical movements of said seat, said suspension system including an air spring having a predetermined volume, and air valve means for selectively inflating and deflating said air spring; and

an electronic control system for controlling said air valve means comprising sensor means for sensing vertical movements of said mechanical suspension system, said sensor means outputting an uninterrupted stream of electrical output signals during movement of said suspension system, said stream of signals representing an exact position/time image of the movements of said suspension system, and

micro-processor means for selectively controlling said air valve means to inflate and deflate said air spring according to movements of said suspension system, said micro-processor means including a memory which is programmed with one or more pre-set desired values, said micro-processor means receiving said stream of signals from said sensor means and being programmed to compare by continuous recurrent program flows said stream of signals to said desired values, said micro-processor means selectively generating one or more output signals when a deviation exists between said stream of signals and said desired values, wherein said output signals are used to selectively control said air valve means.

2. In the air suspension seat of claim 1, said sensor means outputting an analog signal.

3. In the air suspension seat of claim 2, said sensor means comprising a potentiometer.

4. In the air suspension seat of claim 1, said sensor means outputting a digital signal.

5. In the air suspension seat of claim 1, said pre-established event theoretical values being modifiable.

6. In the air suspension seat of claim 1, said micro-processor comprising a memory-programmable micro-processor.

7. In the air suspension seat of claim 1, said air spring further having a supplemental air capacity for increasing the volume of said air spring and a valve for selectively connecting said supplemental air capacity to said air spring,

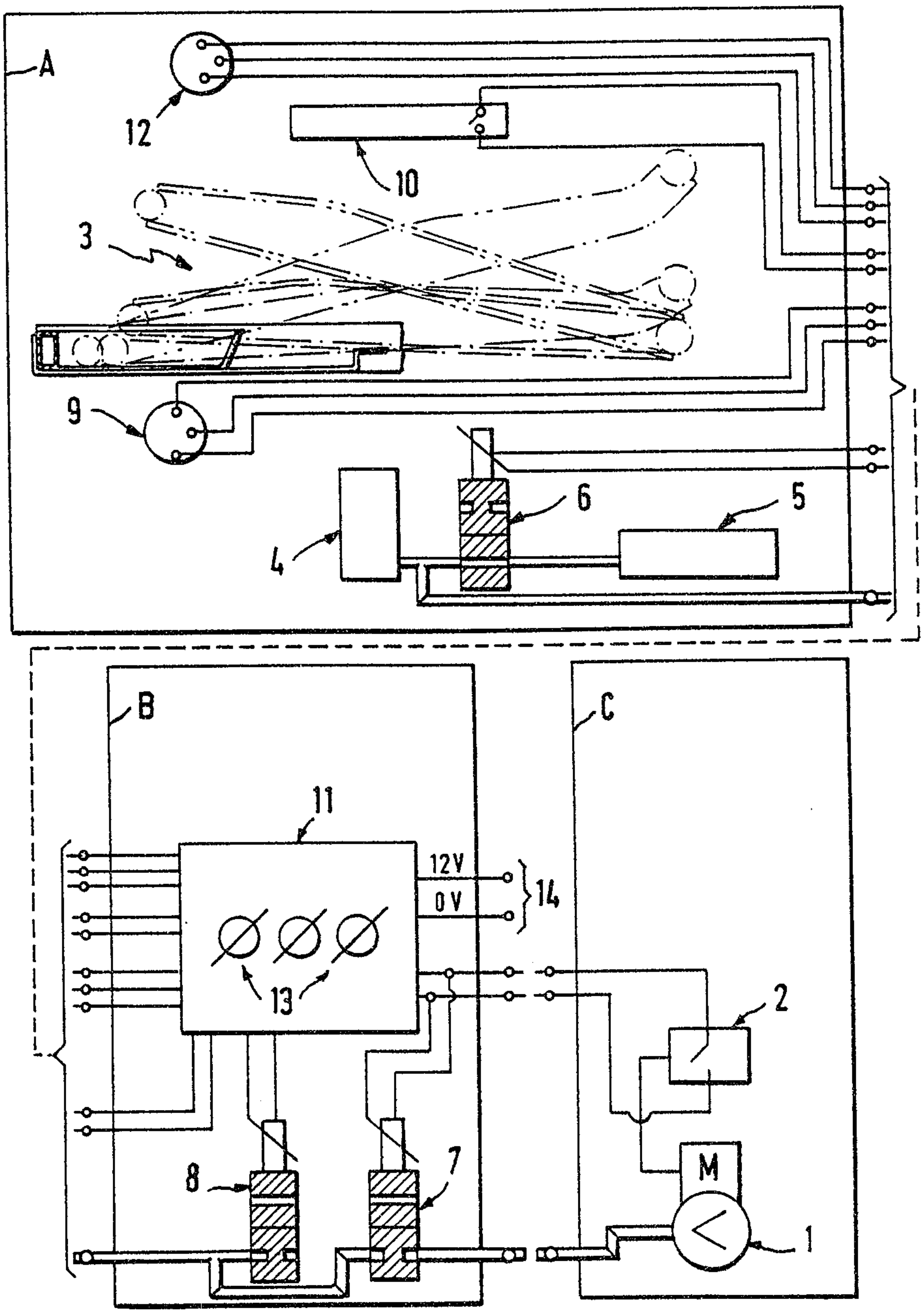
said micro-processor means comparing said stream of signals with at least two pre-set values by means of a logical relation and generating one or more output signals when a deviation exists, wherein said output signals are used for selectively controlling said air valve means for selectively inflating or deflating said air spring and for selectively controlling said valve for connecting said supplemental air capacity to said air spring.

8. The air suspension seat of claim 1 further comprising an adjustable shock absorber mounted to said mechanical suspension system,

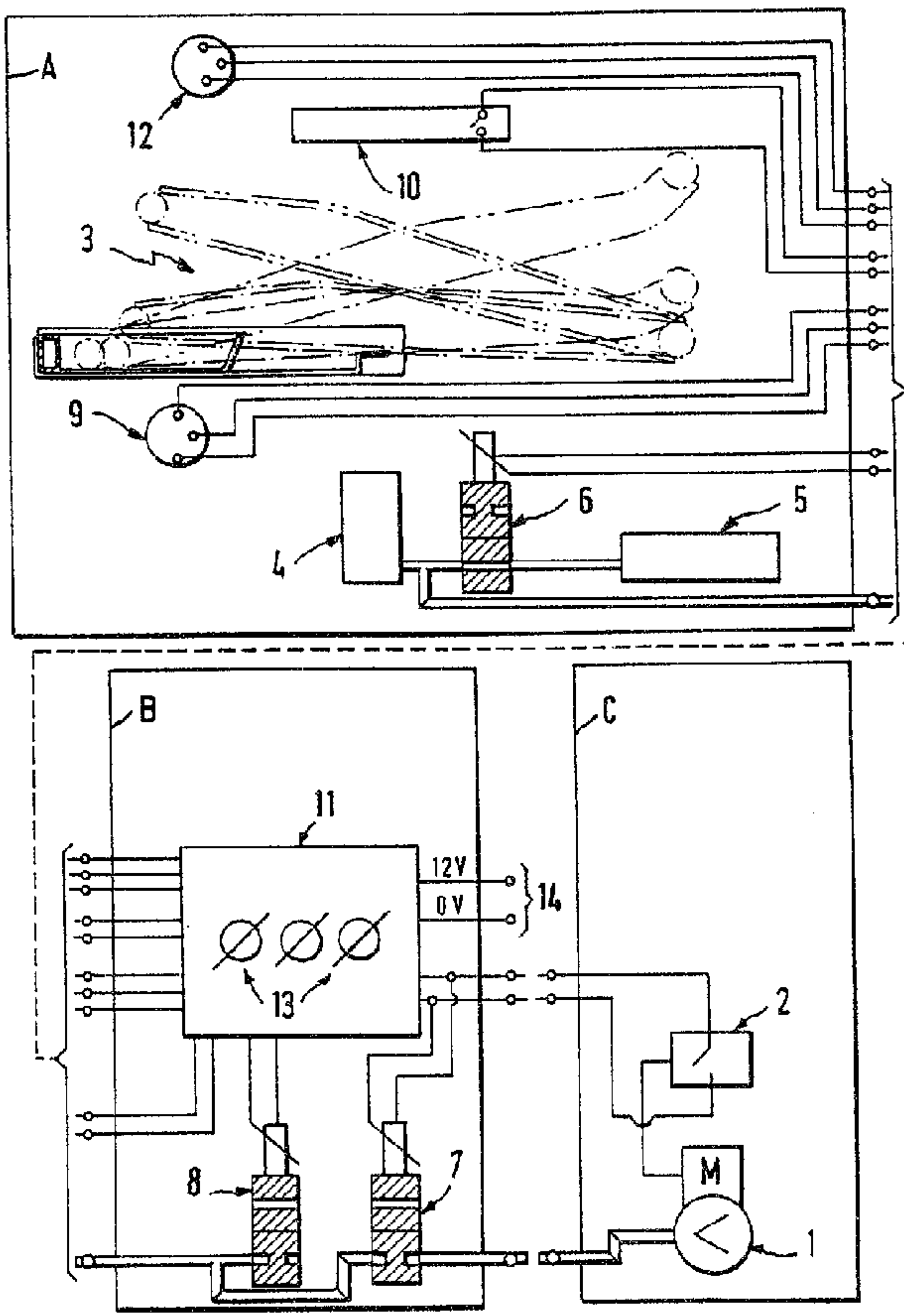
said micro-processor memory being programmed with a pre-set desired velocity valve of said mechanical suspension system, said micro-processor means differentiating once against time at least two actual values of said stream of signals and comparing said once differentiated signal values with said velocity value, said micro-processor means generating one or more output signals when a deviation exists, wherein said output signals are proportional to said deviation and are used to selectively control said adjustable shock absorber.

9. The air suspension seat of claim 1 further comprising an adjustable shock absorber mounted to said mechanical suspension system, said air spring further having a supplemental air capacity for increasing the volume of said air spring, and a valve for selectively connecting said supplemental air capacity to said air spring,

said micro-processor memory being programmed with a pre-set desired acceleration value of said mechanical suspension system, said micro-processor means differentiating twice against time at least two actual values of said stream of signals and comparing said twice differentiated signal values with said acceleration value, said micro-processor means generating one or more output signals when a deviation exists, wherein said output signals are proportional to said deviation, and are used for selectively controlling said valve for connecting said supplemental air capacity to said air spring and for selectively controlling said adjustable shock absorber.



Alex. E. MacRae & Co.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