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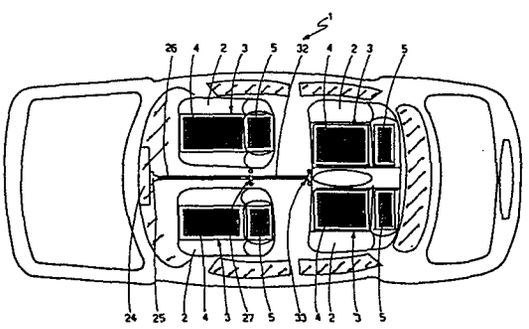
(54) **System for air conditioning at least one seat on a vehicle.**

(57) A system for air conditioning at least one seat (2) on a vehicle (1), characterised by the fact that it comprises a fluid source and at least a first duct (28, 31, 32) for feeding the fluid inside a seat cover (3) inside which are formed ducts (13) for the aforementioned fluid.



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SYSTEM FOR AIR CONDITIONING AT LEAST ONE SEAT ON A VEHICLE

The present invention relates to a system for air conditioning at least one seat on a vehicle.

The aim of the present invention is to provide a system for air conditioning at least one seat on a vehicle, and enabling straightforward, low-cost manufacture.

With this aim in view, according to the present invention, there is provided a system for air conditioning at least one seat on a vehicle, characterised by the fact that it comprises a fluid source and at least a first duct for feeding the said fluid inside a seat cover inside which are formed ducts for the said fluid.

Various embodiments of the present invention will be described by way of examples with reference to the accompanying drawings in which :

Fig.1 shows a plan view of an automobile fitted with a system for air conditioning the seats on the same;

Fig.2 shows a view in perspective of a seat cover;

Fig.3 shows a section of the Fig.2 seat cover;

Fig.s 4, 5 and 6 show three respective embodiments of part of the system according to the present invention.

Number 1 in Fig.s 1, 2 and 3 indicates an automobile fitted with a system for air conditioning seats 2. The said system comprises a fluid source and a duct for feeding the said fluid inside a seat cover 3 constituting either the upholstery or an outer covering fitted over the upholstery on the said seat 2. Through the said seat cover 3, the said fluid is fed towards the part of the user's body resting on the seat cover, for maintaining the said body part at a given temperature.

As shown in Fig.s 2 and 3, seat cover 3 comprises two prismatic box cases 4 and 5 designed to rest respectively on the seat and backrest portions of seat 2. Cases 4 and 5 are preferably formed from impermeable synthetic fabric, and present a bottom wall 6, two long side walls 7, two short side walls 8, and a top wall 9 in which is formed a large rectangular through opening 11 designed to support the user's body and covered with a layer 12 of permeable synthetic or vegetable fabric. Seat cover 3 also comprises a rectangular header 13, in turn, comprising a first portion 14 housed inside case 4 next to side wall 8 forming one end of seat cover 3; a second portion 15, the first part of which is housed inside case 4 next to one of side walls 7, and the second part of which is housed inside case 5 next to side wall 7 corresponding with the former; a third portion 16 housed inside case 5 next to side wall 8 forming one end of seat cover 3; and a fourth portion 17 having, like the said second portion

15, a first part housed inside case 5 next to one of side walls 7, and a second part housed inside case 4 next to side wall 7 corresponding with the former. From a connecting portion between the two parts of second portion 15 of header 13, there extends outwards a union 18 enabling fluid to be fed into header 13. The said header 13 presents a number of radial holes 21 (Figure 3) distributed along its entire length. The inside surface of bottom walls 6 is fitted with a layer 23, preferably of polyvinyl chloride, whereas the inside surface of top walls 9 is fitted with a layer 19 of woven-non-woven fabric for filtering and diffusing the air flow. Between layers 23 and 19, there is inserted a middle layer 22 formed from a honeycomb compound highly permeable by air.

Fig.s 4, 5 and 6 show three preferred embodiments of the system, depending on the type of automobile it is installed on. The part of the system common to all three embodiments comprises a duct 26, a first end of which is connected to a four-way distributor 27 from which extend two ducts 28 and 31 connected to the respective unions 18 of seat covers 3 on front seats 2, and a duct 32 connected to a three-way distributor (Figure 5) from which extend a further two ducts relative to seat covers 3 on rear seats 2. Ducts 28, 31 and 32 are fitted with a throttle valve 34 for regulating the air supply to seat covers 3. In Fig.s 4, 5 and 6, the component parts on the system are shown schematically, for the sake of simplicity, as are the automobile parts which have been modified for installing the system covered by the present invention.

The system shown in Fig.4, and indicated as a whole by

20, comprises an air distributor 24, which may consist of the existing fan normally incorporated in the air conditioning circuit on automobile 1. From distributor 24, there extends a union 25 connected to a second end of duct 26. In this embodiment, air supply may be regulated either by throttle valves 34, or by means, on distributor 24, commonly used on automobiles and not shown for the sake of simplicity. As currently marketed distributors 24 normaly present means for regulating the temperature of the air supplied to the passenger compartment on the automobile, system 20 may also provide for regulating the temperature of the air supplied to seat covers 3.

Number 35 in Fig.5 indicates a compressor forming part of an air conditioning circuit on automobile 1, here shown only partially. On such a circuit, compressor 35 is fitted onto a rotary shaft 36, onto which is also fitted a pulley 37 connected by belt 38 to a pulley 41 on the drive shaft, and to a pulley 42 on the output shaft of the alternator. On this circuit, which supplies a gas, such as freon, a first duct 43 is fitted with a radiator (not shown) for cooling the air inside the passenger compartment, and a second duct 44 with a radiator (not shown) for cooling the engine. As the aforementioned features are already known, only part of the air conditioning circuit is described and illustrated. The system for air conditioning seat covers 3, as shown in Fig.5 and indicated as a whole by 29, comprises an air intake 45 possibly fitted with a filter and from which extend two ducts 46 connected, by means of a three-way valve 47, to an inlet duct 48 on a compressor 51 fitted onto shaft 36. From compressor 51,

there extends a duct 26 for connecting seat covers 3 as already described. As compressor 51 is a rotary type, system 29 is preferably provided with a maximum pressure valve 52 on duct 26. System 29 comprises two heat exchangers 53 fitted onto ducts 43 and 44 and through which run respective ducts 46. As compressor 35 forms part of the air conditioning circuit on automobile 1, ducts 46 downstream from respective exchangers 53 supply hot and cold air respectively, which may be drawn off selectively by valve 47 and mixed to produce a single stream of air at a given temperature.

The system shown in Fig.6, and indicated as a whole by 49, comprises an air intake 54 possibly fitted with a filter and connected, via duct 55, to a rotary power compressor 56 on the output shaft 57 of a d.c. motor 58 supplied by the battery (not shown) on automobile 1 by means of an electric cable 61. The said cable 61 is fitted with a voltage regulator 62, for regulating the speed of power compressor 56, and with a safety fuse 63. From the said power compressor 56, there extends duct 26 fitted with maximum pressure valve 52. Power compressor 56 may be replaced by a power blower, also supplied by the automobile battery. All the air supply ducts are preferably formed from plastic, in particular, polyvinyl chloride. Air intakes 45 and 54, shown schematically in Fig.s 4 and 5, may be installed at the front or rear of automobile 1.

As already stated, ducts 28, 31 and 32 supply air into header 13 which, via radial holes 21, feeds it towards honeycomb layer 22, and through layers 19 and 12 towards the part of the body resting on the said layer 12. As al-

ready stated, on certain systems, use may be made of the existing air conditioning or ventilation circuit on automobile 1, in which case, it is possible to regulate both the air supply and the amount of hot and cold air supplied to seat cover 3. Operation of system 20 in Fig.4 consists quite simply in drawing off from distributor 24 a given amount of air for supplying seat covers 3. On system 29 in Fig.5, the drive shaft, via belt 38, turns pulley 37 and, therefore, also shaft 36. In addition to compressor 35, the said shaft 36 is also fitted with an additional compressor 51 which draws off air from air intake 45 and supplies it to seat covers 3. As it flows through exchangers 53, the said air yields or absorbs heat from the gas flowing inside ducts 43 and 44. Valve 47 provides for mixing the said hot and cold air and, therefore, for supplying seat covers 3 with air of a given temperature. System 49 in Fig.6 enables seat covers 3 to be used on automobiles with no ventilation or air conditioning circuit. System 49, in fact, presents a d.c. motor 58 supplied by the battery on automobile 1 and controlling operation of power compressor 56, which draws off air from intake 54 and supplies it to seat covers 3.

The advantages of the present invention will be clear from the foregoing description.

In particlar, it enables a system for air conditioning seat 2 on automobile 1 to be provided for any type of automobile, with or without existing ventilation or air conditioning circuits. Furthermore, on certain systems described and illustrated herein, certain component parts on the existing ventilation or air conditioning circuit

on automobile 1 may be employed for reducing the maufacturing cost of the system covered by the present invention. Furthermore, the small number of component parts involved provides for troublefree manufacture and maintenance of all the systems described herein. By virtue of being formed from plastic material, header 13 is obviously flexible and therefore adapted easily to any type of seat 2. Finally, seat cover 3 is also cheap to produce, by virtue of being formed from plastic material.

To those skilled in the art it will be clear that changes may be made to seat conditioning systems 20, 29 and 49 as described and illustrated herein without, however, departing from the scope of the present invention.

In particular, air may be supplied differently to seat cover 3, by employing component parts on the existing ventilation or air conditioning circuit on automobile 1. On system 29, only one exchanger 53 may be used. On automobiles with no compressor 35, a rotary shaft may be assembled and fitted with a pulley and compressor. The said pulley may be connected by means of a belt to the pulley on the drive shaft, and to the pulley on the alternator shaft of automobile 1. The compressor may be connected, at one end, to an air intake such as 45 and 54 and, at the other end, to duct 26. Fluid may be fed inside seat cover 3 in any number of ways. For example, a centre header may be provided on the connection between the backrest and the seat portion of seat 2. From the said centre header, a number of ducts may extend towards both the seat portion and backrest covers, the said ducts having a number of radial holes, similar to holes 21, along their entire

length. The shape and material of seat cover 3 may also be other than as described herein. Water may be used in place of air, in which case, the automobile must be provided with an appropriate tank, and seat cover 3 acts as an ordinary heat exchanger between the water circuit inside and the part of the user's body resting on seat cover 3. Obviously, on such a system, both seat cover 3 and the water circuit inside the same must be waterproof. Even using water in place of air, the said circuit inside seat cover 3 may be formed in any number of ways, the only difference, as compared with the air systems already described, being that the water system must be provided with a duct for feeding water from seat cover 3 back to the tank. Instead of a compressor, the said water system will, of course, be provided with a pump for drawing off water from the tank and supplying it to seat cover 3. On the water system also, water may be fed through heat exchangers as shown in Fig.5.

CLAIMS

1) - A system for air conditioning at least one seat (2) on a vehicle (1), characterised by the fact that it comprises a fluid source and at least a first duct (28, 31, 32) for feeding the said fluid inside a seat cover (3) inside which are formed ducts (13) for the said fluid.

2) - A system as claimed in Claim 1, characterised by the fact that it comprises a second duct (26) connected, at a first end, to the said source and, at a second end, to a distrbutor (27) from which extends the said first duct (28, 31, 32).

3) - A system as claimed in Claim 2, characterised by the fact that the said first duct (28, 31, 32) is fitted with a flow regulating valve (34).

4) - A system as claimed in Claim 2 and/or 3, characterised by the fact that the said second duct (26) presents the said first end connected to an air distributor (24).

5) - A system as claimed in Claim 2 and/or 3, characterised by the fact that the said second duct (26) presents the said first end connected to a compressor (51), in turn, connected to a first air intake (45) by means of at least one third duct (46).

6) - A system as claimed in Claim 5, characterised by the fact that a portion of the said third duct (46) goes through a heat exchanger through which also goes a fourth duct (43, 44) forming part of the air conditioning circuit on the said automobile (1).

7) - A system as claimed in Claim 6, characterised by the fact that, from the said first air intake (45), there ex-

tend two of the said third ducts (46), each going through a respective said heat exchanger (53); the said air conditioning circuit on the said automobile (1) presenting two of the said fourth ducts (43, 44) along which flows a gaseous fluid at different temperatures.

8) - A system as claimed in Claim 7, characterised by the fact that the said third ducts (46) are connected to a fifth duct (48) at the inlet to the said compressor (51) by means of a mixing valve (47).

9) - A system as claimed in Claim 2 and/or 3, characterised by the fact that it comprises an electric motor (58), the output shaft (57) of which is fitted with a power compressor (56) connected, at one end, to a second air intake (54) and, at the other, to the said first end of the said second duct (26).

10) - A system as claimed in Claim 5 or 9, characterised by the fact that the said second duct (26) is fitted with a maximum pressure valve (52).

11) - A system as claimed in any one of the foregoing Claims, characterised by the fact that the said seat cover (3) is fitted inside with at least a first header (13) extending along the periphery of the said seat cover (3) and having a number of radial holes (21); the said first header (13) being connected to the said first duct (28, 31, 32).

12) - A system as claimed in any one of the foregoing Claims from 1 to 10, characterised by the fact that the said seat cover (3) is fitted inside with at least a second header from which extend a number of ducts having a number of radial holes; the said second header being

connected to the said first duct (28, 31, 32).

13) - A system as claimed in Claim 11 or 12, characterised by the fact that the said seat cover (3) comprises at least a box element (4, 5) having a bottom wall (6) and a top wall (9); the air supplied by the said header (13) coming out through the said top wall (9).

14) - A system as claimed in Claim 13, characterised by the fact that, between the said bottom wall (6) and the said top wall (9), there is provided a first layer (22) of a honeycomb compound highly permeable by air.

15) - A system as claimed in Claim 14, characterised by the fact that, in the said top wall (9), there is formed a through opening (11) covered with a second layer (12) of permeable fabric.

16) - A system as claimed in Claim 15, characterised by the fact that the inside surface of the said top wall (9) is fitted with a third layer (19) of woven-non-woven fabric acting as an air filter.

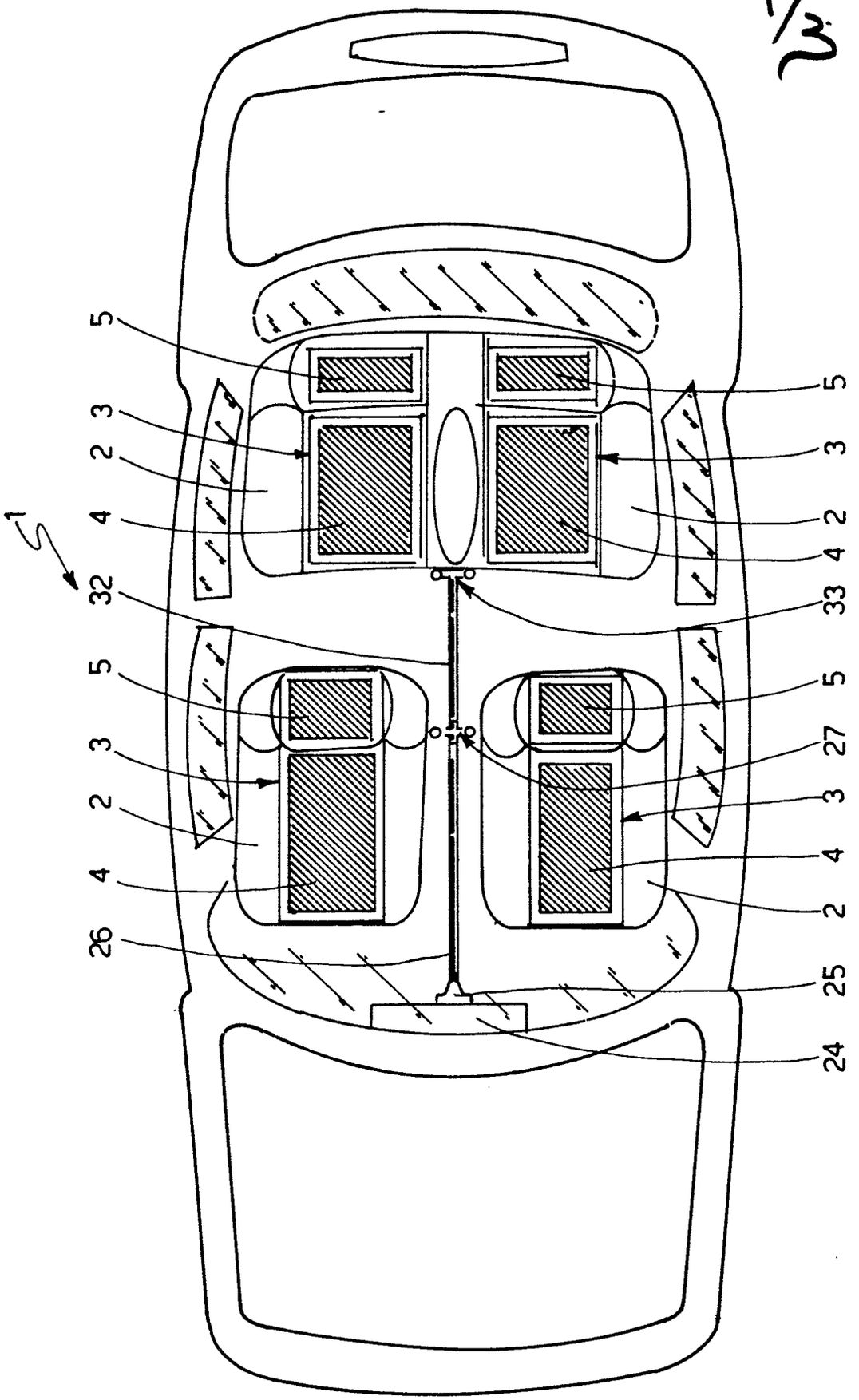
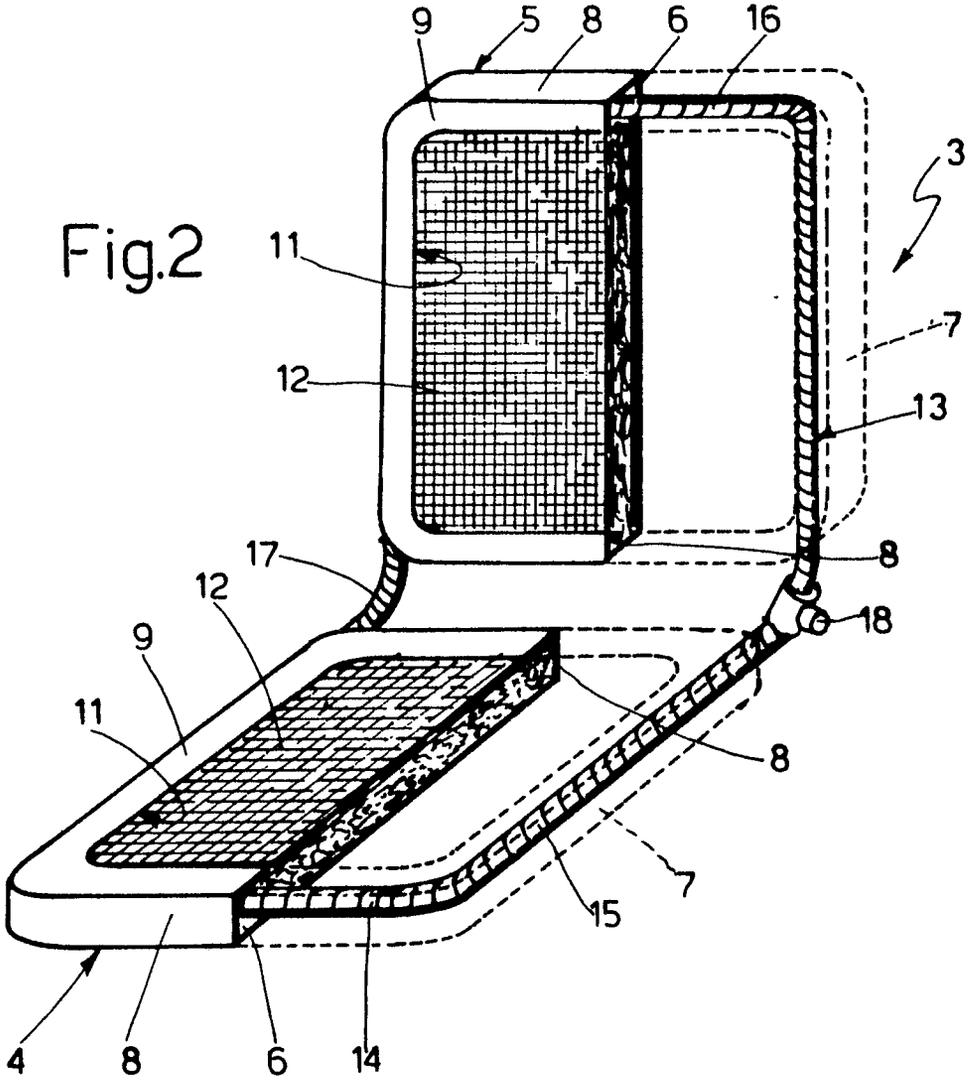


Fig.1

Fig.2



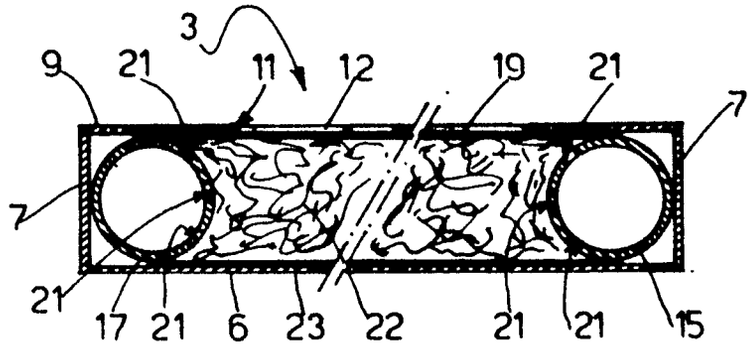


Fig.3

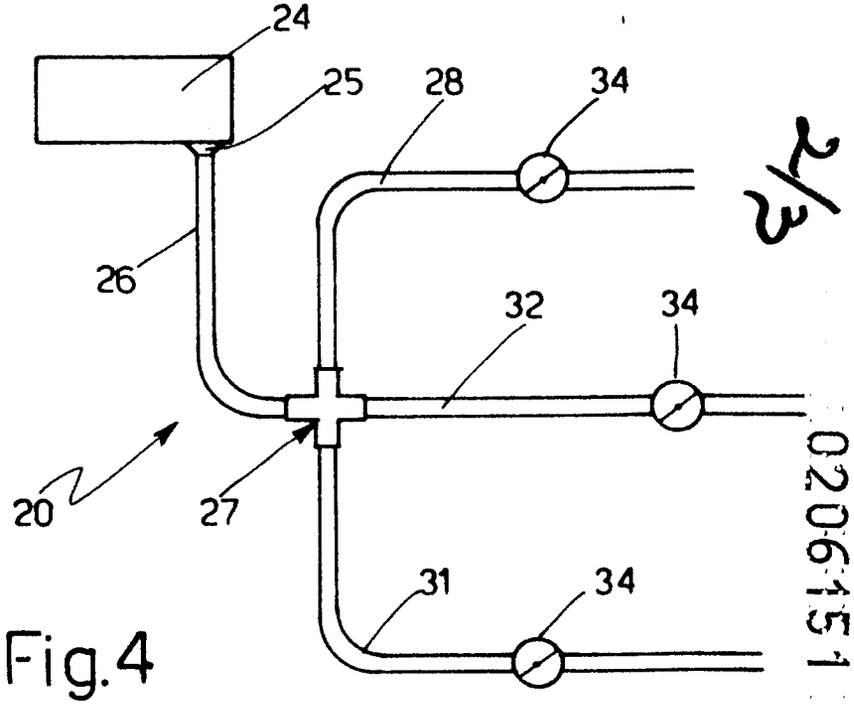


Fig.4

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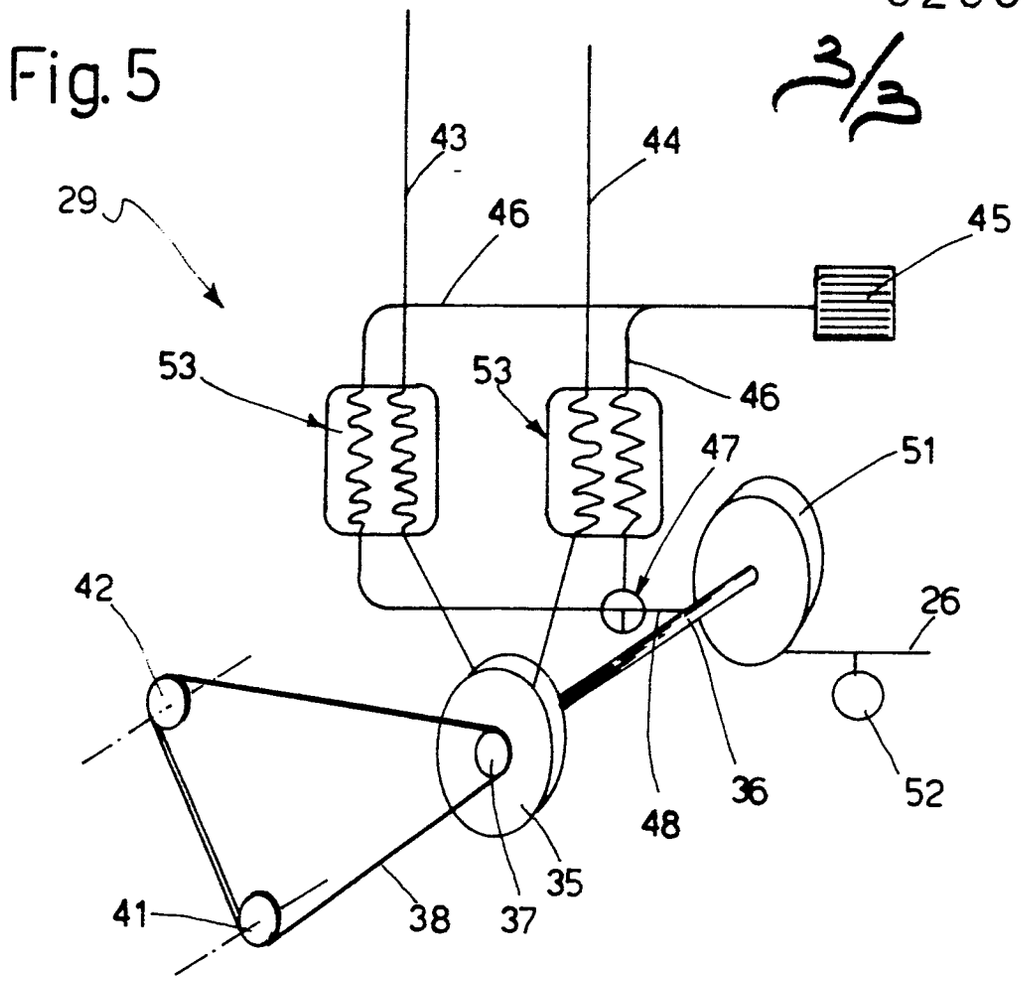
Fig. 5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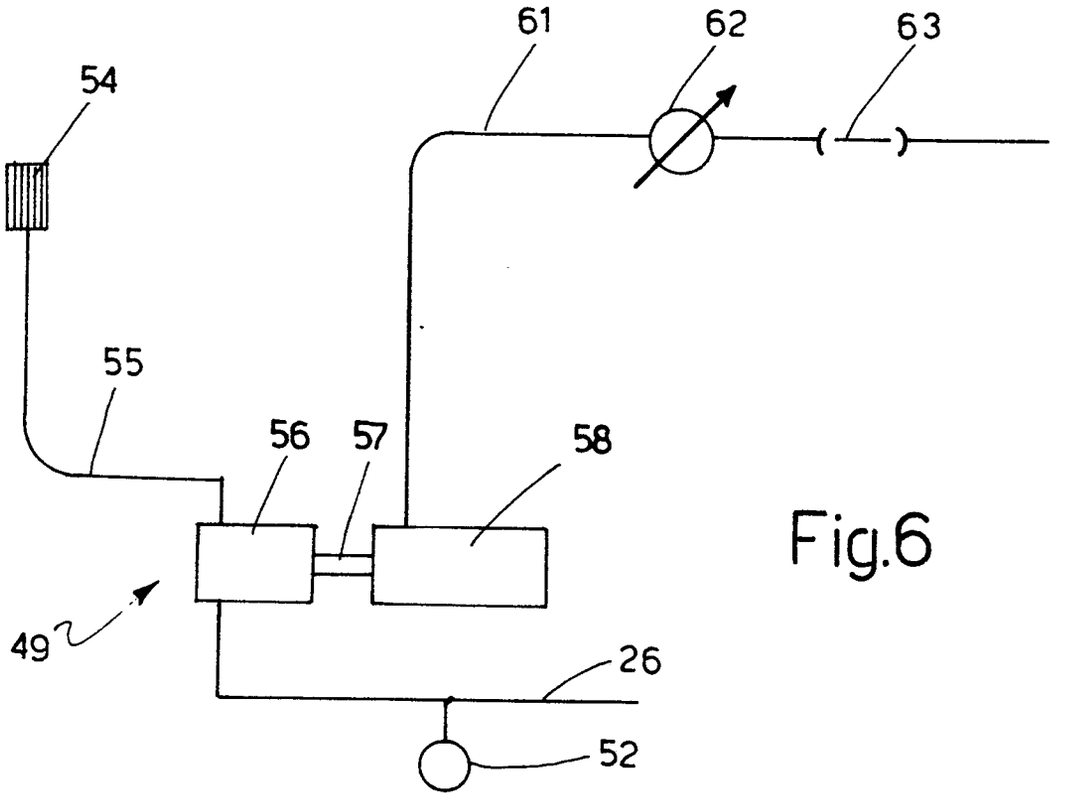
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Fig.6