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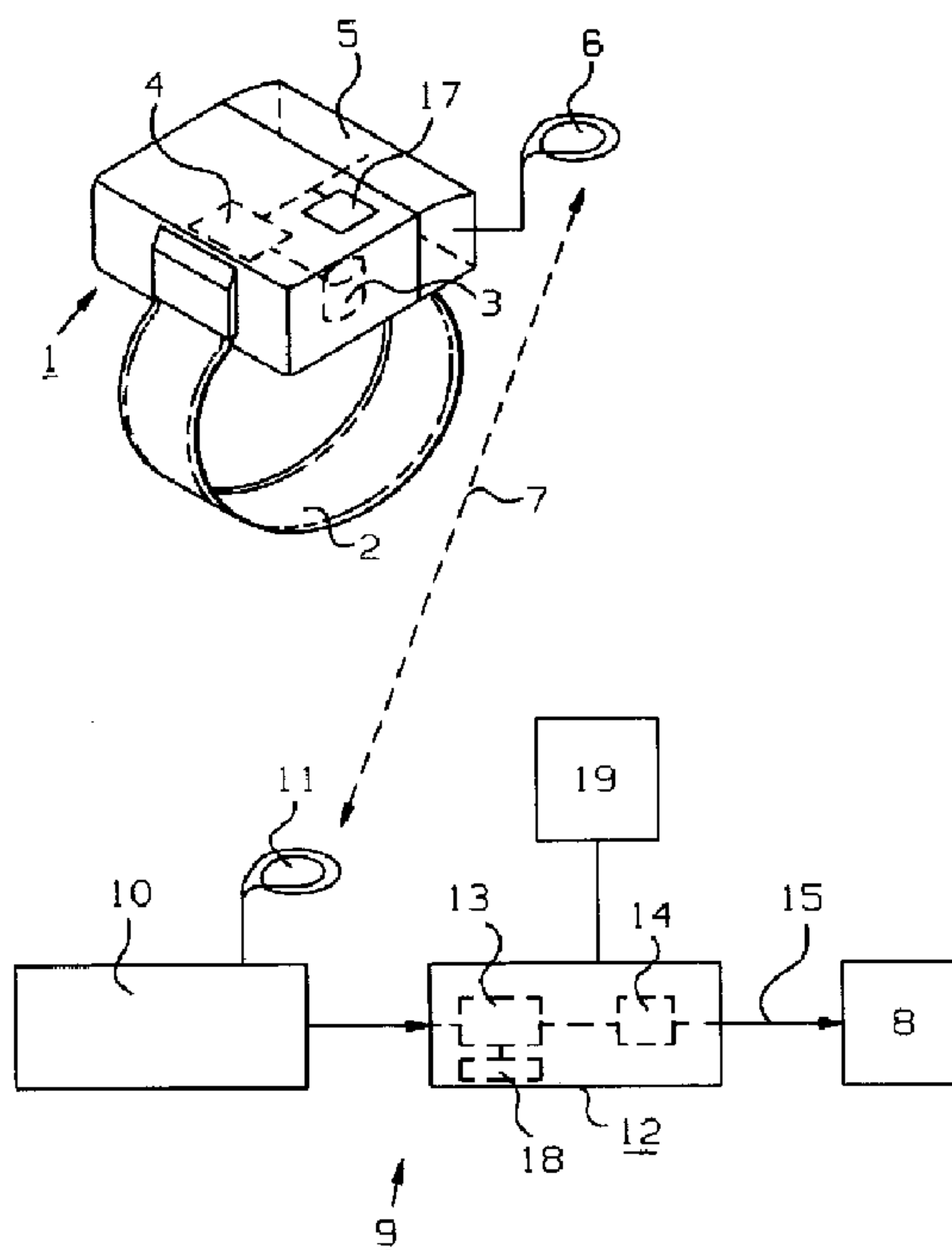
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(54) Titre : DISPOSITIF POUR EMPECHER L'UTILISATION D'UNE MACHINE OU D'UN VEHICULE AUTOMOBILE

(54) Title: APPARATUS FOR PREVENTING OPERATION OF A VEHICLE OR A MACHINE



(57) Abrégé/Abstract:

An apparatus for preventing operation of a machine or a motor vehicle by an alcohol-impaired operator, containing a measuring apparatus (1) that identifies the user's blood-alcohol level and an analysis unit (9) that is connected to the vehicle or machine and receives the data that is supplied from the measurement unit (1) and only permits operation of the vehicle or machine if the measurement data satisfy at least one predetermined condition is to be so improved that the sobriety of the user is determined before the vehicle or machine is started, this being done without the user having to provide a breath sample. In order to solve this problem, provision is made such that the measuring apparatus is configured so as to be portable and attachable to one of the user's body parts, preferably one of the arms or legs, and incorporates a gas sensor (3) that measures alcohol level by way of cutaneous permeation.

Abstract

5 An apparatus for preventing operation of a machine or a motor
vehicle by an alcohol-impaired operator, containing a measuring
apparatus (1) that identifies the user's blood-alcohol level and
an analysis unit (9) that is connected to the vehicle or machine
and receives the data that is supplied from the measurement unit
10 (1) and only permits operation of the vehicle or machine if the
measurement data satisfy at least one predetermined condition is
to be so improved that the sobriety of the user is determined
before the vehicle or machine is started, this being done without
the user having to provide a breath sample. In order to solve
15 this problem, provision is made such that the measuring apparatus
is configured so as to be portable and attachable to one of the
user's body parts, preferably one of the arms or legs, and
incorporates a gas sensor (3) that measures alcohol level by way
of cutaneous permeation.

20

Figure 1.

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Apparatus for Preventing Operation of a Vehicle or a Machine

The present invention relates to an apparatus for preventing operation of a motor vehicle by an alcohol-impaired operator.

5 An apparatus of this type is described in US 4,613,845. This apparatus is used to prevent a motor vehicle from being started by an alcohol-impaired driver. To this end, an alcohol sensor and a distance sensor are attached to the steering wheel of the vehicle, and these are
10 connected through an analysis unit to the vehicle electrical system. The distance sensor is used to ascertain the operational readiness of the alcohol sensor and to ensure that the alcohol sensor has not been covered over by a foil or film. If the alcohol sensor provides a measured value that
15 indicates a significant breath alcohol content, the vehicle will not start.

 Also known are alcohol measuring devices that measure the alcohol content of an individual through the skin, and can be strapped to an arm or a leg, so that the
20 apparatus can be worn at all times. This ensures that continuous readings of the alcohol level values are available. These apparatuses are used in the United States when an alcohol abuser is under home arrest, the measured data being transmitted by data link to a central authority. A
25 measuring apparatus of this kind is described in WO 94/07407.

 US 4,912,458 describes a so-called interlock system that requires that, prior to starting a motor vehicle, the driver blow a breath sample into a measuring

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apparatus; this sample is then analysed with respect to alcohol content and the manner in which it was delivered. A disadvantage with this apparatus is that other individuals can see that the driver was required to provide a breath-
5 alcohol sample in order to start the vehicle.

It is the object of the present invention to so improve an apparatus that prevents operation of a motor vehicle or a machine by an alcohol-impaired operator in such a way that sobriety can be ascertained prior to the vehicle
10 being started, without a breath sample having to be submitted.

According to the invention there is provided an arrangement for blocking an intoxicated operator from operating a motor vehicle having an electric ignition, the
15 intoxicated operator having a blood alcohol content and the arrangement comprising: a measuring apparatus for determining the blood alcohol content of the operator; said measuring apparatus including a strap for attaching said measuring apparatus to a limb of said operator; said
20 measuring apparatus also including a gas sensor mounted therein and said gas sensor being disposed so as to lie against the surface of the skin of said operator to measure said blood alcohol content via permeation through the skin; an evaluation unit physically separate from said measuring
25 apparatus and operatively connected to said motor vehicle and having an output for emitting an enable signal to said motor vehicle to permit said operator to start and operate said motor vehicle; an interface between said measuring apparatus and said evaluation unit for passing a signal
30 representing measurement data indicative of said blood alcohol content from said measuring apparatus to said evalu-

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ation unit; said interface being a wireless, bidirectional transmission path between said measuring apparatus and said evaluation unit; said evaluation unit including means for evaluating said measurement data and for outputting said enable signal via said output when said measurement data satisfies at least one predetermined condition; said measuring apparatus including a memory for storing an identifier specific to said operator; and, said evaluation unit including: means for detecting said identifier; means for comparing said measured data to said predetermined condition only after detection and identification of said identifier; and, said output of said evaluation unit being connected to said electric ignition of said motor vehicle so that said motor vehicle can be started only after said enable signal is outputted.

According to another aspect the invention provides an arrangement for blocking an intoxicated operator from operating a motor vehicle, the intoxicated operator having a blood alcohol content and the arrangement comprising: a measuring apparatus for determining the blood alcohol content of the operator; said measuring apparatus including attachment means for attaching said measuring apparatus to a body portion of said operator; said measuring apparatus also including a gas sensor mounted therein and said gas sensor being a sensor measuring said blood alcohol content via permeation through the skin of said operator; an evaluation unit operatively connected to said vehicle and having an output for emitting an enable signal to said vehicle to permit said operator to operate said vehicle; a wireless transmission path between said measuring apparatus and said

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evaluation unit for passing a signal representing measurement data indicative of said blood alcohol content from said measuring apparatus to said evaluation unit; said evaluation unit including means for evaluating said measurement data
5 and for outputting said enable signal via said output when said measurement data satisfies at least one predetermined condition; said evaluation unit further including an internal clock which is activated after said enable signal is outputted and said internal clock functioning to output a
10 signal within said evaluation unit in accordance with a pregiven time pattern during the operation of said motor vehicle for triggering a renewed comparison of said measurement data then present to said at least one predetermined condition so that a continuous control of said alcohol blood
15 content is made during said operation of said motor vehicle; and, a breath alcohol measuring device connected to said evaluation unit so that said vehicle can be started and operated by a person not equipped with said measuring apparatus for measuring alcohol blood content via permeation
20 through the skin.

According to yet another aspect the invention provides an arrangement for blocking an intoxicated operator from operating a motor vehicle, the intoxicated operator having a blood alcohol content and the arrangement
25 comprising: a measuring apparatus for determining the blood alcohol content of the operator; said measuring apparatus including attachment means for attaching said measuring apparatus to a body portion of said operator; said measuring apparatus also including a gas sensor mounted therein and
30 said gas sensor being a sensor measuring said blood alcohol content via permeation through the skin of said operator; an

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evaluation unit mounted on said vehicle and being physically separated from said measuring apparatus; said evaluation unit being operatively connected to said vehicle and having an output for emitting an enable signal to said vehicle to permit said operator to operate said vehicle; a wireless interface between said measuring apparatus and said evaluation unit for passing a signal representing measurement data indicative of said blood alcohol content from said measuring apparatus to said evaluation unit; said evaluation unit further including an internal clock which is activated after said enable signal is outputted and said internal clock functioning to output a signal within said evaluation unit in accordance with a random time pattern during the operation of said motor vehicle for triggering a renewed comparison of said measurement data then present to said at least one predetermined condition so that said operator cannot know when the next measurement evaluation is made and so that a continuous control of said alcohol blood content is made during said operation of said motor vehicle; said evaluation unit including means for evaluating said measurement data and for outputting said enable signal via said output when said measurement data satisfies at least one predetermined condition.

The advantage of the present invention is essentially that by attaching a transcutaneous alcohol measuring device, known per se, to a body part of an individual who is to be monitored, and by transmission of the measured values to an apparatus by means of which the operation of a vehicle or machine can be released, it is possible to monitor blood alcohol content continuously, even when the vehicle is being operated. The measuring apparatus can be worn on the body

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in such a way that it is concealed, for example on the individual's leg, where it is concealed by the wearer's trousers. It is also useful to attach the measuring device to the lower part of the right arm.

5 It is advantageous that a wireless link can be provided between the measuring apparatus and the analysis unit. Optical, magnetic, or high-frequency transmission systems are suitable for such links. It is also advantageous that the link be bidirectional, so as to make data
10 communications between the measuring apparatus and the analysis unit possible in both directions.

 It is also useful that a memory be incorporated in the measuring apparatus so as to permit storage of user-specific identification, and that the analysis unit be such
15 that this identification can be read out from the measurement unit, so that it can be identified in such a manner that only measurement data from an authorized user can be processed by the analysis unit.

It is also an advantage that a timer be incorporated in the analysis unit and that this be activated after the operation of the vehicle or machine has been released for the first time, and that this timer sends a control signal to the analysis unit according to a preselected schedule, so that renewed analysis of measured values can be initiated. The schedule can be fixed or it can be determined by a random generator, so that the individual who is to be monitored does not know when renewed analysis of the measured values is to be carried out.

It is an added advantage that a breath alcohol measuring apparatus can also be connected to the analysis unit in order that the vehicle can be started by an individual who is not wearing a transcutaneous alcohol measuring apparatus.

One embodiment of the present invention is shown in the drawings appended hereto and this will be described in greater detail below. The drawings show the following:

Figure 1: A transcutaneous alcohol measuring apparatus;
Figure 2: An analysis unit as installed in a motor vehicle.

Figure 1 is a perspective view of a measurement apparatus 1 that is secured by a strap 2 to the leg of an individual (not shown in Figure 1), whose blood alcohol concentration is to be monitored.

To this end, the measuring apparatus 1 incorporates an electro-chemical gas sensor 3 that is installed against the individual's skin and identifies the blood-alcohol content by way of cutaneous permeation. The measured values for blood-alcohol levels are
5 stored in a first memory 4. The measuring apparatus 1 also incorporates a first transmitter-receiver unit 5 with a first magnetic contact loop 6. The values for blood-alcohol levels determined by the measuring apparatus 1 are passed from the first transmitter-receiver unit 5 and the first magnetic contact loop 6
10 along a transmission link 7 to an analysis unit 9 that is connected to a vehicle 8. The analysis unit 9 that is shown schematically in Figure 2 consists, essentially, of a second transmitter-receiver unit 10 with a second magnetic contact loop 11 and a computer 12 that incorporates a microprocessor 13 and a
15 second memory 14. The analysis unit 9 is connected by a line 15 to the electrical ignition system of the vehicle 8 in such a manner that it is only possible to start the vehicle 8 after a release signal has been emitted.

20 The apparatuses according to the present invention operates as follows:

Several minutes prior to operation of the vehicle 8, the measuring apparatus 1 is secured to the leg of the individual who
25 is to be monitored by means of the strap 10. User-specific

identification is read into the first memory 4 of the measurement unit 1 by means of a key pad 17 in order to identify the individual, so that the alcohol level values determined by the gas sensor 3 can be associated directly with the individual who is to be monitored. Once the measuring apparatus 1 has been attached, transcutaneous measurement of alcohol levels is initiated by way of the key pad 17. The measuring apparatus 1 also incorporates a distance sensor (not shown in Figure 1) that ensures that the measuring apparatus 1 is not removed once the measurement cycle has been initiated.

Communication between the measuring apparatus 1 and the analysis unit 9 is effected by way of the magnetic contact loops 6, 11. The first magnetic contact loop 6 is an integral part of the measuring apparatus 1 and is only shown as a separate component for purposes of greater clarity. The second magnetic contact loop 11 is arranged in the foot well of the vehicle 8, close to the measuring apparatus 1, so that the transmission section 7 is restricted to the smallest possible path.

Data transmission along the transmission section 7 is effected bidirectionally by way of the transmitter-receiver units 5, 10, between the first memory 4 of the measuring apparatus 1 and the microprocessor 13 and the second memory 14 of the analysis unit 9.

Before the vehicle 8 is started, the analysis unit 9 is activated by the individual who is to be monitored, in that said individual offers up an ignition key for identification by inserting it in order to indicate that he or she wishes to start the vehicle 8.

5 The microprocessor 13 then reads the alcohol level values measured by the gas sensor 3, the time at which the measurements start, and the user-specific identification from the first memory 4, by way of the transmitter-receiver units 5, 10. These data are initially stored in the second memory 14 of the computer 4. In
10 order to verify the data that has been read in, the second memory contains a list of authorized user-specific identifications so as to ensure that the vehicle 8 can only be started by a specific group of individuals. A comparison of the identification of the measuring apparatus 1 with the identification stored in the
15 second memory 14 is then carried out in the microprocessor 13. In addition, the alcohol level values measured by the gas sensor 3 are compared with the limiting values stored in the second memory 14. If the user identifications agree and the measured alcohol level values are below the limiting values, and providing that
20 the measuring apparatus 1 was attached to the operator a specific amount of time before the vehicle or machine was started, a release signal passes along the line 15 to the electrical system of the vehicle 8, and this makes it possible to start the vehicle 8. There is a timer 18 incorporated in the computer 12, and this
25 is activated after the release signal has been sent; this timer

passes control signals to the microprocessor 13 according to a preset or randomly generated schedule, and these control signals initiate renewed analysis of the alcohol level values by the analyses unit 9 is initiated. The time span for one of the subsequent measurements can range from 5 minutes to 1 hour. If subsequent analyses of the measured values for alcohol levels by the microprocessor 13 indicate that the limiting values have been exceeded, depending on the amount by which the limiting values are exceeded, the driver will either receive a message to the effect that he is to stop the vehicle for a few minutes or that he may continue, but that the lights of the vehicle 8 (not shown in the drawing) will flash periodically. It is also possible that the ignition will be switched off if the vehicle 8 is not brought to a standstill within a specified period of time.

In one embodiment of the present invention, provision is made such that a breath-alcohol measuring apparatus 19 is to be connected to the analysis unit 9, in order that the vehicle 8 can also be started by individuals who are not fitted with the measuring apparatus 1.

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CLAIMS:

1. An arrangement for blocking an intoxicated operator from operating a motor vehicle having an electric ignition, the intoxicated operator having a blood alcohol
5 content and the arrangement comprising:

a measuring apparatus for determining the blood alcohol content of the operator;

said measuring apparatus including a strap for attaching said measuring apparatus to a limb of said
10 operator;

said measuring apparatus also including a gas sensor mounted therein and said gas sensor being disposed so as to lie against the surface of the skin of said operator to measure said blood alcohol content via permeation through
15 the skin;

an evaluation unit physically separate from said measuring apparatus and operatively connected to said motor vehicle and having an output for emitting an enable signal to said motor vehicle to permit said operator to start and
20 operate said motor vehicle;

an interface between said measuring apparatus and said evaluation unit for passing a signal representing measurement data indicative of said blood alcohol content from said measuring apparatus to said evaluation unit;

25 said interface being a wireless, bidirectional transmission path between said measuring apparatus and said evaluation unit;

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said evaluation unit including means for evaluating said measurement data and for outputting said enable signal via said output when said measurement data satisfies at least one predetermined condition;

5 said measuring apparatus including a memory for storing an identifier specific to said operator; and,

said evaluation unit including: means for detecting said identifier;

means for comparing said measured data to said
10 predetermined condition only after detection and identification of said identifier; and,

said output of said evaluation unit being connected to said electric ignition of said motor vehicle so that said motor vehicle can be started only after said
15 enable signal is outputted.

2. The arrangement of claim 1, said evaluation unit further including an internal clock which is activated after said enable signal is outputted and said internal clock functioning to output a signal within said evaluation unit
20 in accordance with a pregiven time pattern for triggering a renewed comparison of said measurement data then present to said at least one predetermined condition so as to permit a continuous control of the blood alcohol content of said operator during the operation of said vehicle.

25 3. The arrangement of claim 1, further comprising a breath alcohol measuring device connected to said evaluation unit so that said vehicle can be started and operated by a

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person not equipped with said measuring device for measuring alcohol blood content via permeation through the skin.

4. An arrangement for blocking an intoxicated operator from operating a motor vehicle, the intoxicated operator having a blood alcohol content and the arrangement comprising:

a measuring apparatus for determining the blood alcohol content of the operator;

said measuring apparatus including attachment means for attaching said measuring apparatus to a body portion of said operator;

said measuring apparatus also including a gas sensor mounted therein and said gas sensor being a sensor measuring said blood alcohol content via permeation through the skin of said operator;

an evaluation unit operatively connected to said vehicle and having an output for emitting an enable signal to said vehicle to permit said operator to operate said vehicle;

a wireless transmission path between said measuring apparatus and said evaluation unit for passing a signal representing measurement data indicative of said blood alcohol content from said measuring apparatus to said evaluation unit;

said evaluation unit including means for evaluating said measurement data and for outputting said enable signal via said output when said measurement data satisfies at least one predetermined condition;

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said evaluation unit further including an internal clock which is activated after said enable signal is outputted and said internal clock functioning to output a signal within said evaluation unit in accordance with a
5 pregiven time pattern during the operation of said motor vehicle for triggering a renewed comparison of said measurement data then present to said at least one predetermined condition so that a continuous control of said alcohol blood content is made during said operation of said
10 motor vehicle; and,

a breath alcohol measuring device connected to said evaluation unit so that said vehicle can be started and operated by a person not equipped with said measuring apparatus for measuring alcohol blood content via permeation
15 through the skin.

5. The arrangement of claim 4, said attachment means comprising a strap for attaching said apparatus to a limb of said operator.

6. The arrangement of claim 4, wherein said wireless
20 transmission path is a bidirectional transmission path.

7. The arrangement of claim 4, said measuring apparatus including a first memory for storing an identifier specific to said operator; and, said evaluation unit including: means for detecting said identifier; and, means
25 for comparing said measured data to said predetermined condition only after detection and identification of said identifier.

8. An arrangement for blocking an intoxicated operator from operating a motor vehicle, the intoxicated

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operator having a blood alcohol content and the arrangement comprising:

a measuring apparatus for determining the blood alcohol content of the operator;

5 said measuring apparatus including attachment means for attaching said measuring apparatus to a body portion of said operator;

 said measuring apparatus also including a gas sensor mounted therein and said gas sensor being a sensor
10 measuring said blood alcohol content via permeation through the skin of said operator;

 an evaluation unit mounted on said vehicle and being physically separated from said measuring apparatus;

 said evaluation unit being operatively connected
15 to said vehicle and having an output for emitting an enable signal to said vehicle to permit said operator to operate said vehicle;

 a wireless interface between said measuring apparatus and said evaluation unit for passing a signal
20 representing measurement data indicative of said blood alcohol content from said measuring apparatus to said evaluation unit;

 said evaluation unit further including an internal clock which is activated after said enable signal is
25 outputted and said internal clock functioning to output a signal within said evaluation unit in accordance with a random time pattern during the operation of said motor vehicle for triggering a renewed comparison of said

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measurement data then present to said at least one
predetermined condition so that said operator cannot know
when the next measurement evaluation is made and so that a
continuous control of said alcohol blood content is made
5 during said operation of said motor vehicle;

said evaluation unit including means for
evaluating said measurement data and for outputting said
enable signal via said output when said measurement data
satisfies at least one predetermined condition.

10 9. The arrangement of claim 8, said attachment means
comprising a strap for attaching said apparatus to a limb of
said operator.

10. The arrangement of claim 8, wherein said
transmission path is a bidirectional transmission path.

15 11. The arrangement of claim 10, said measuring
apparatus including a first memory for storing an identifier
specific to said operator; said evaluation unit including:
means for detecting said identifier; and, means for
comparing said measured data to said predetermined condition
20 only after detection and identification of said identifier.

12. The arrangement of claim 8, further comprising a
breath alcohol measuring device connected to said evaluation
unit so that said vehicle can be started and operated by a
person not equipped with a measuring device for measuring
25 alcohol blood content via permeation through the skin.

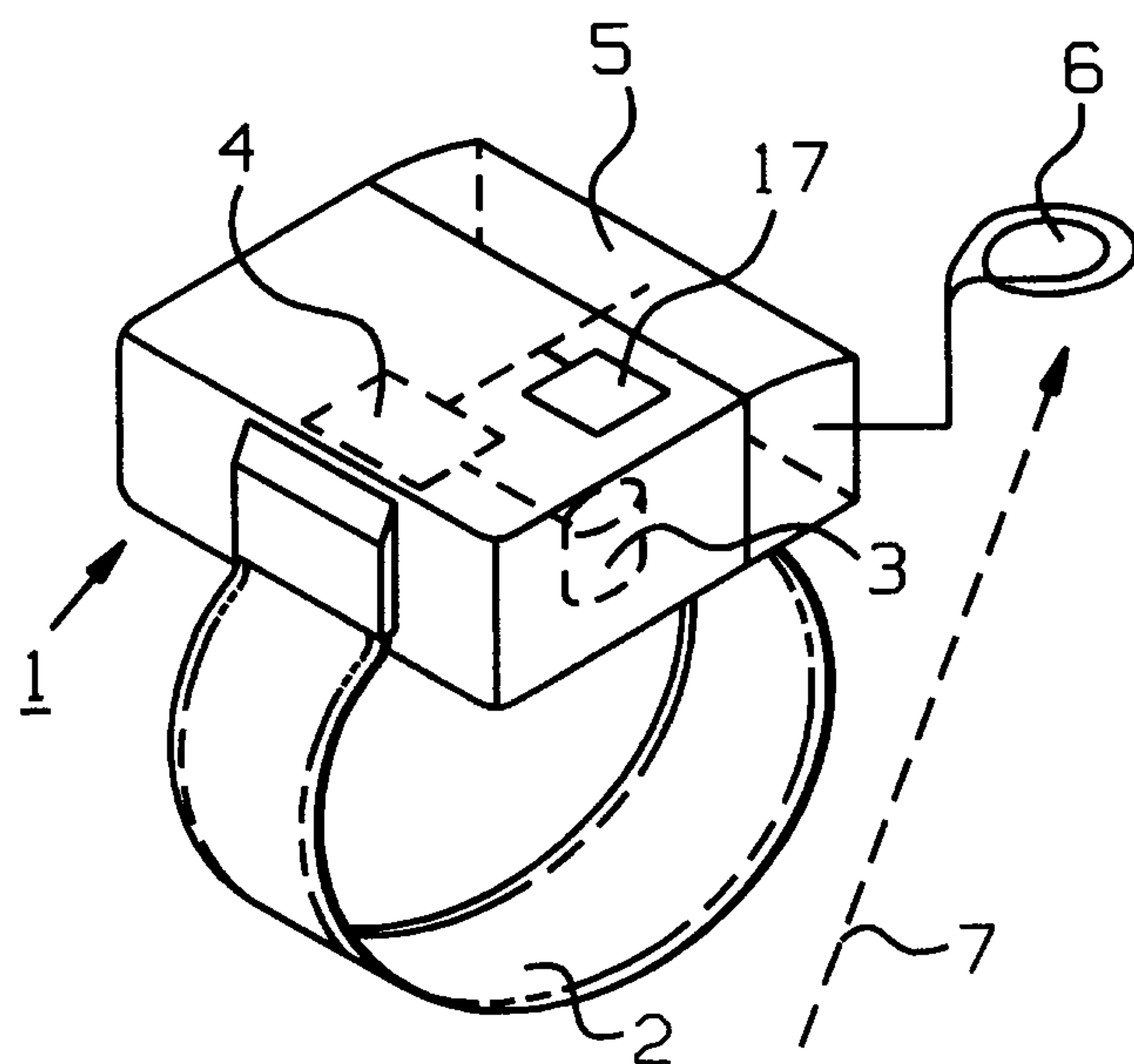


Fig. 1

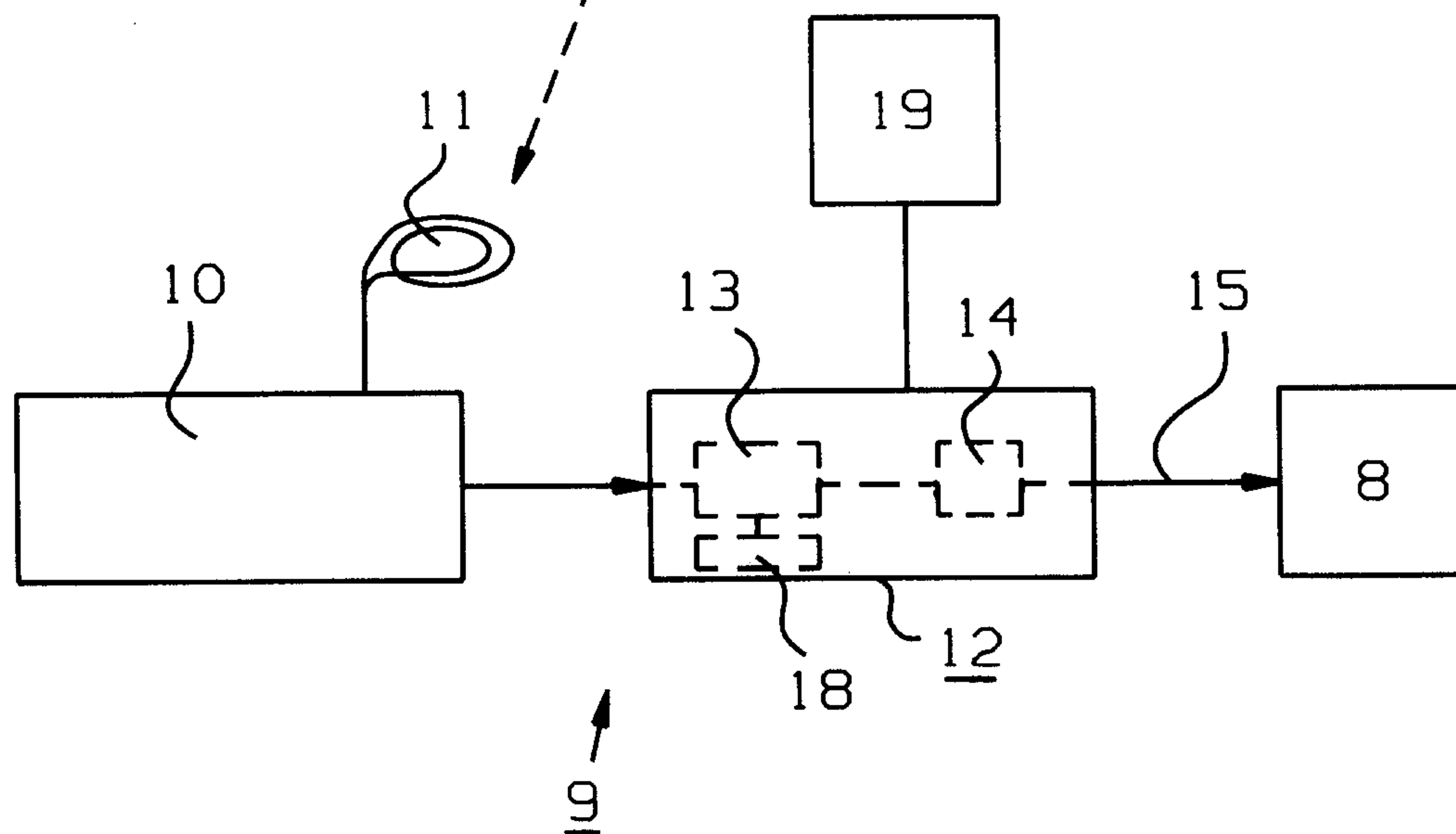


Fig. 2

