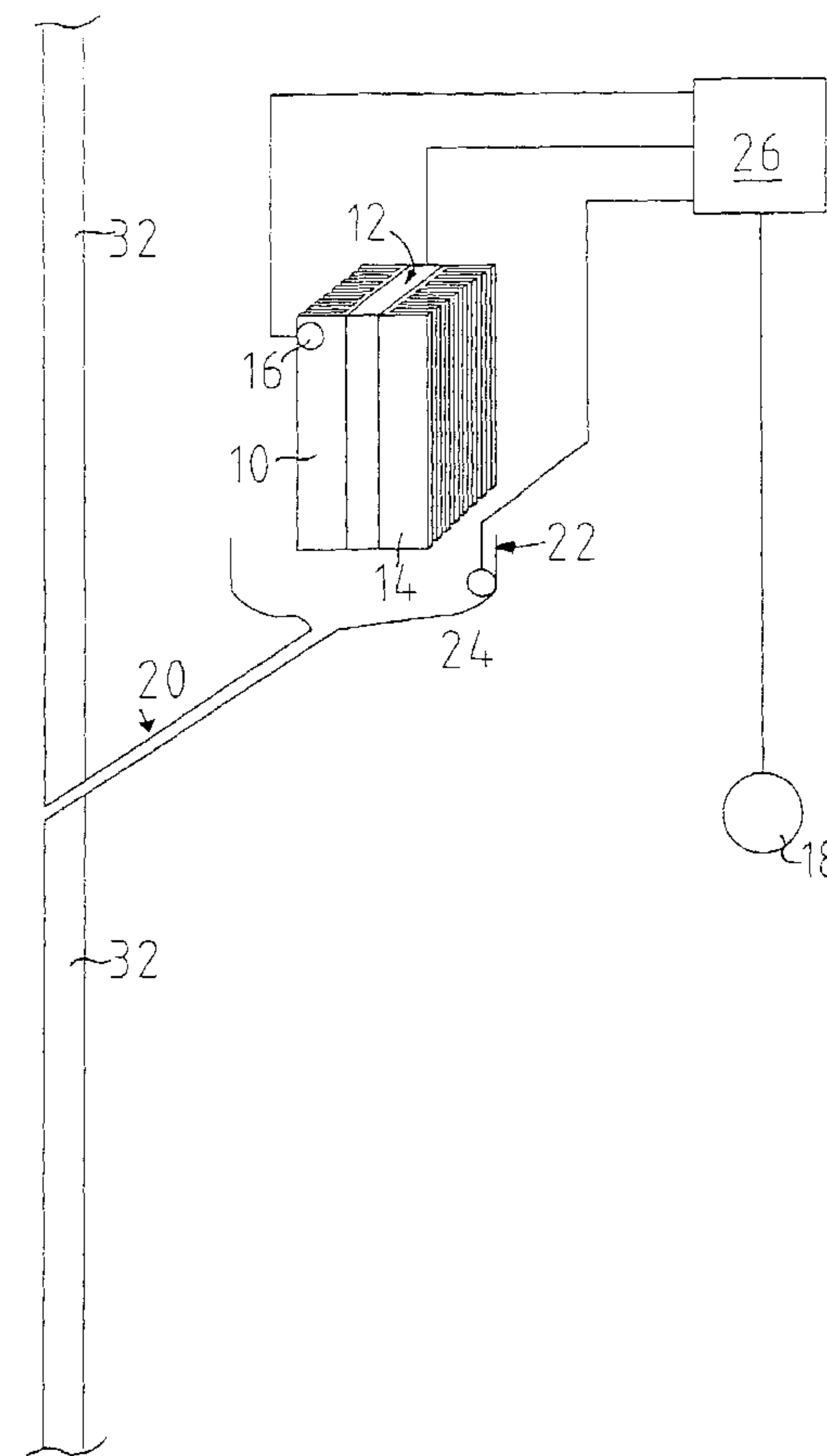




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(54) Titre : INSTALLATION D'ENERGIE EOLIENNE
(54) Title: WIND ENERGY INSTALLATION



(57) Abrégé/Abstract:

The invention relates to a wind energy installation, in particular to a wind energy installation comprising a device for dehumidifying a gaseous medium in an essentially enclosed chamber inside said wind energy installation. The aim of the



(57) **Abrégé(suite)/Abstract(continued):**

invention is to minimise the human and logistical resources required to maintain the functional capacity of the device and to simplify the construction of the device, to achieve a virtually maintenance-free operation. To achieve this, the device comprises a first planar element (10) and a cooling device (12) for cooling the first element to a temperature below the ambient temperature.

Abstract

The present invention concerns a wind power installation, in particular a wind power installation having an apparatus for the dehumidification of a gaseous medium in a substantially closed space within the wind power installation. In order to keep down the personnel and logistical expenditure for attaining proper operability of the apparatus, to simplify the structure and to permit very substantially maintenance-free operation, the apparatus includes a first aerial element and a cooling device for cooling the first element to a temperature below the ambient temperature.

(Figure 1)

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Wind power installation

5 The present invention concerns a wind power installation, in particular a wind power installation having an apparatus for dehumidifying a gaseous medium in a substantially closed space within the wind power installation.

 Such an apparatus operating on a chemical basis has long been
10 known. In that known apparatus moisture is removed from the ambient air chemically and the moisture is collected in a catch container. That known apparatus however suffers from the disadvantage that the chemical has to be replaced at certain time intervals in order to maintain proper operability of the apparatus. In relation to a large number of apparatuses which are to
15 be centrally monitored and maintained, that requires additional expenditure in terms of personnel and logistics.

 Apparatuses of the kind set forth in the opening part of this specification are also known, in which an enclosed space is cooled on the basis of the operative principle of a refrigerator by way of a
20 compressor/evaporator unit by means of a coolant specifically provided for that purpose, in order in that way to remove moisture from the air contained in that space.

 With those apparatuses however the structure is complicated and expensive and in addition it is necessary for the cooling fluid to be collected
25 separately upon disposal.

 Therefore the object of the present invention is to develop a wind power installation and in particular to design a wind power installation in such a way that moisture problems within the wind power installation can be eliminated in a simple manner.

30 That object is attained by a wind power installation having the features of claim 1. Advantageous developments are set forth in the appendant claims. In the wind power installation according to the invention the object is attained by a first flat or aerial element and a cooling device

for cooling the element to a temperature below the ambient temperature (room temperature). At that ambient temperature a part of the moisture contained in the air condenses at the surface of the first element. That moisture is removed from the ambient air in that way and can be drained
5 off.

In order to permit maintenance-free long-term operation the cooling device is preferably a Peltier element or a group of Peltier elements which withdraw heat from the first element and thereby cool that element. The heat which is withdrawn from the first element is discharged to the ambient
10 atmosphere again by way of a second element.

In order to achieve a particularly good effect the second element can be connected to a wall delimiting the space to be dehumidified or can even be formed by that wall.

The condensate water can be discharged into the open through a
15 duct and a wall opening. In that case the wall opening can preferably be provided in the region of the ground in order to avoid traces of dripping water on outside walls.

In order to prevent the condensate water from uncontrolledly dripping down within the space in the event of a blockage of the duct for
20 draining off the condensate water, it is possible to provide a container which catches those drips. Thus the container can be emptied in the context of an inspection procedure or after signalling from a sensor suitably arranged in the container. At the same time the closure of the duct can be removed so that the condensate water is again automatically removed from
25 the space.

In a particularly preferred development of the invention there is provided a first temperature sensor for detecting the temperature of the first element and a second temperature sensor for detecting the ambient temperature. The apparatus according to the invention can be controlled by
30 means of those sensors and a control device connected on the output side thereof, in such a way that the first element is always at a predeterminable temperature difference with respect to the ambient temperature. A constant dehumidification output can be achieved in that way.

Advantageous embodiments are recited in the appendant claims.

Room air humidifiers are already known from DE-U-92 10 970.5, DE 44 23 851, German patent specification No 1 189 250, EP 0 758 730 A2 and US No 5 071 027. The use of such room air humidifiers within wind
5 power installations has hitherto not been proposed.

An embodiment of the invention is described in greater detail hereinafter with reference to the drawings in which:

Figure 1 shows a perspective view of an apparatus according to the invention,

10 Figure 2 shows a further view of the apparatus according to the invention,

Figure 3 shows an arrangement of an apparatus according to the invention in the pylon of a wind power installation, and

15 Figure 4 shows a perspective view of an apparatus according to the invention.

Referring to Figure 1 shown therein is a side view of an apparatus according to the invention. Disposed between a first element 10 and a second element 14 is a cooling device 12. The cooling device 12 is a Peltier element operated with electrical power or a group of Peltier elements. It
20 causes transportation of heat from a lateral boundary surface to the other - in this case the heat is transported from the first element 10 to the second element 14.

If the cooling device 12 is acted upon by a suitable current which is predetermined in respect of amount and direction, heat is withdrawn from
25 the first element 10 and transported to the second element 14 where it is in turn discharged to the ambient atmosphere. The first element 10 and the second element 14 are preferably in the form of cooling bodies, that is to say flat or aerial aluminium elements with cooling ribs extending thereon for increasing the effective surface area.

30 Due to the extraction of heat the first element 10 cools down to below the ambient temperature and the moisture contained in the ambient air condenses at the element 10.

As the surface area-increasing cooling ribs of the first element 10 extend vertically, the condensate water can easily drain away downwardly due to the effect of the force of gravity and can be suitably collected up and if necessary drained off by means of conduits.

5 It can be seen from the side view in Figure 2 that the condensate water which drains off downwardly along the cooling ribs of the first element 10 passes into a duct 20 which is passed into the open air through a wall 32 so that the condensate water can drain off into the open without any problem.

10 If that duct 20 should suffer from a blockage, there is additionally provided a catch space 22 which can store the condensate water so that it does not drip uncontrolledly into regions below the apparatus. Provided in that catch space 22 is a liquid sensor 24 which can detect a rise in the level of liquid and trigger a suitable signal which for example can be used to
15 cause maintenance personnel to remove the closure of the duct 20 and empty the catch space.

The apparatus has a control device 26 in order to detect the temperature of the first element 10 by way of a first temperature sensor 16. The ambient temperature is detected by way of a second temperature
20 sensor 18. The control device 26 can then derive the required control effect for the cooling device 12, from the temperature difference and predetermined reference values. It will be appreciated that this control system can also monitor the liquid sensor 24 and produce and output the corresponding signals.

25 Figure 3 shows a partial view of a pylon 30 of a wind power installation. The apparatus according to the invention which in Figure 3 is identified generally by reference numeral 2 is assumed to be arranged approximately at a halfway position on the height of the pylon 30. The duct 20 for draining off the condensate water is laid within the pylon 30 to a
30 position close to the ground in this Figure and only there issues outwardly through the wall 32 of the pylon 30. That reliably prevents traces of water on the outside of the wall 32.

The preferred position of installation of the dehumidifier according to the invention is in the region of the base of the tower, but installation at other locations on the wind power installation is also possible. The region of the base of the tower has the advantage that air which has already been dehumidified will pass through the rectifiers which are usually arranged in the base of the tower.

A further advantageous possible way of draining off the condensate water from the tower is in the region of the access door. The door is fitted in any case as a separate component element into the lower section of the pylon. It is possible in that way to avoid a change in structure which is essential when making an opening through the wall of the pylon.

Figure 4 shows a modified representation of Figure 1. The difference in relation to Figure 1 essentially lies in a baffle plate 40 which is arranged above the cooling body (first and second element) 10, 14 and which deflects cooled air which is guided along the first (cooling) element by a fan. That cooled air is deflected on to the second (warm) element 14 by the baffle plate 40 and cools the second element. In that arrangement the baffle plate 40 is held in a predetermined position by supports 42. For the sake of clarity of the drawing only one support 42 is illustrated.

Accordingly, heat is extracted at the first element 10 from the air flowing therepast, and that heat is transported to the second element 14 by the cooling device (Peltier element) 12. The baffle plate 40 deflects the cooled air to the second element 14 and there the air picks up again the heat (previously extracted from it). In that way the fan power required for cooling the second element 14 and thus the power consumption of the apparatus can be reduced.

As described, the function of the cooling device such as for example the Peltier element is therefore as a foreground matter not cooling of the air within the wind power installation but solely dehumidification of the interior of the installation, for which reason also the cooled air is deflected from one side of the cooling device to the other and is then equally warmed again and the temperature in the installation is thus scarcely affected.

CLAIMS

1. A wind power installation having a generator, optionally a transformer and a rectifier coupled to the transformer, wherein provided in the proximity of the generator or the transformer and/or the rectifier is a device for dehumidifying the air, wherein the dehumidification device is characterised by a first aerial element (10) and a cooling device (12) coupled thereto for cooling the first element (10) to a temperature below the temperature in the proximity of the generator or the transformer and/or the rectifier.

2. A wind power installation according to claim 1 characterised in that the dehumidification device is characterised by a first aerial element (10) and a cooling device (12) coupled thereto for cooling the first element (10) to a temperature below ambient temperature, wherein the air humidification device is arranged substantially in the interior of the wind power installation.

3. A wind power installation according to claim 1 or claim 2 characterised in that the second element (14) is connected to a wall (32) or is formed by the wall (32).

4. A wind power installation according to one of the preceding claims characterised in that the cooling device (12) is arranged between the first element (10) and the second element (14) and preferably connects them.

5. A wind power installation according to one of the preceding claims characterised by a cooling device which utilises the Peltier effect.

6. A wind power installation according to one of the preceding claims characterised in that there is provided a catch unit and/or a duct for removal of the liquid extracted from the gaseous medium.

7. A wind power installation according to claim 6 characterised in that the liquid caught with the first surface element (10) is passed out of the space by way of a suitable device, preferably the duct (20).

8. A wind power installation according to claim 7 characterised in that the duct is arranged in the region, near the ground, of the space, in the base region of the pylon in the case of a wind power installation.

9. A wind power installation according to one of the preceding claims characterised in that provided for catching the liquid extracted from the gaseous medium is a catch space in which the liquid is collected.

10. A wind power installation according to one of the preceding claims characterised in that there are provided a first temperature sensor (16) for detecting the temperature of the first element (10) and a second temperature sensor (18) for detecting the ambient temperature, that the temperatures are preferably detected and processed by a control device, and the control device sets the temperature of the first element by variations in the cooling power of the cooling device (12).

11. A wind power installation according to claim 10 characterised in that the control device is controlled in such a way that the temperature of the first element (10) is a predeterminable amount below the ambient temperature and/or does not exceed a predeterminable temperature.

12. A wind power installation comprising a pylon and a machine housing arranged at the top of the pylon for accommodating various machine assemblies of the wind power installation, characterised in that arranged in the pylon and/or the machine housing is a device according to one of the preceding claims.

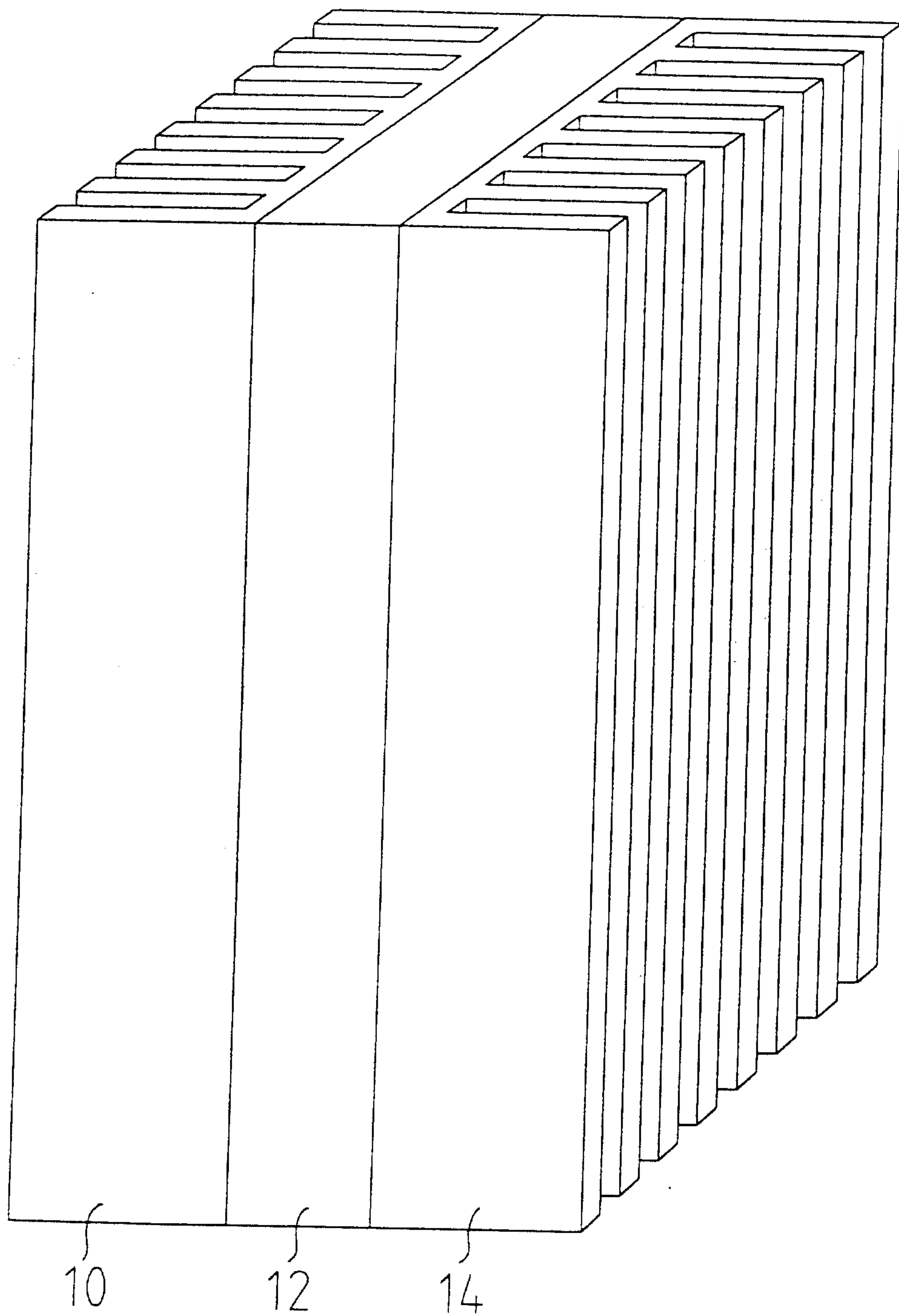
13. A wind power installation according to claim 12 characterised in that the device is arranged approximately in the region of the base of the pylon of the wind power installation.

14. A wind power installation according to one of the preceding claims characterised in that a plurality of air dehumidification devices in accordance with one of the preceding claims are arranged in the wind power installation.

15. A wind power installation according to one of the preceding claims characterised in that approximately one to ten litres of water and preferably two to five litres of water per day are extracted from the air with each air dehumidification device and the total electrical power of the air humidification device is approximately in the range between 50 and 500 W.

1/4

Fig. 1



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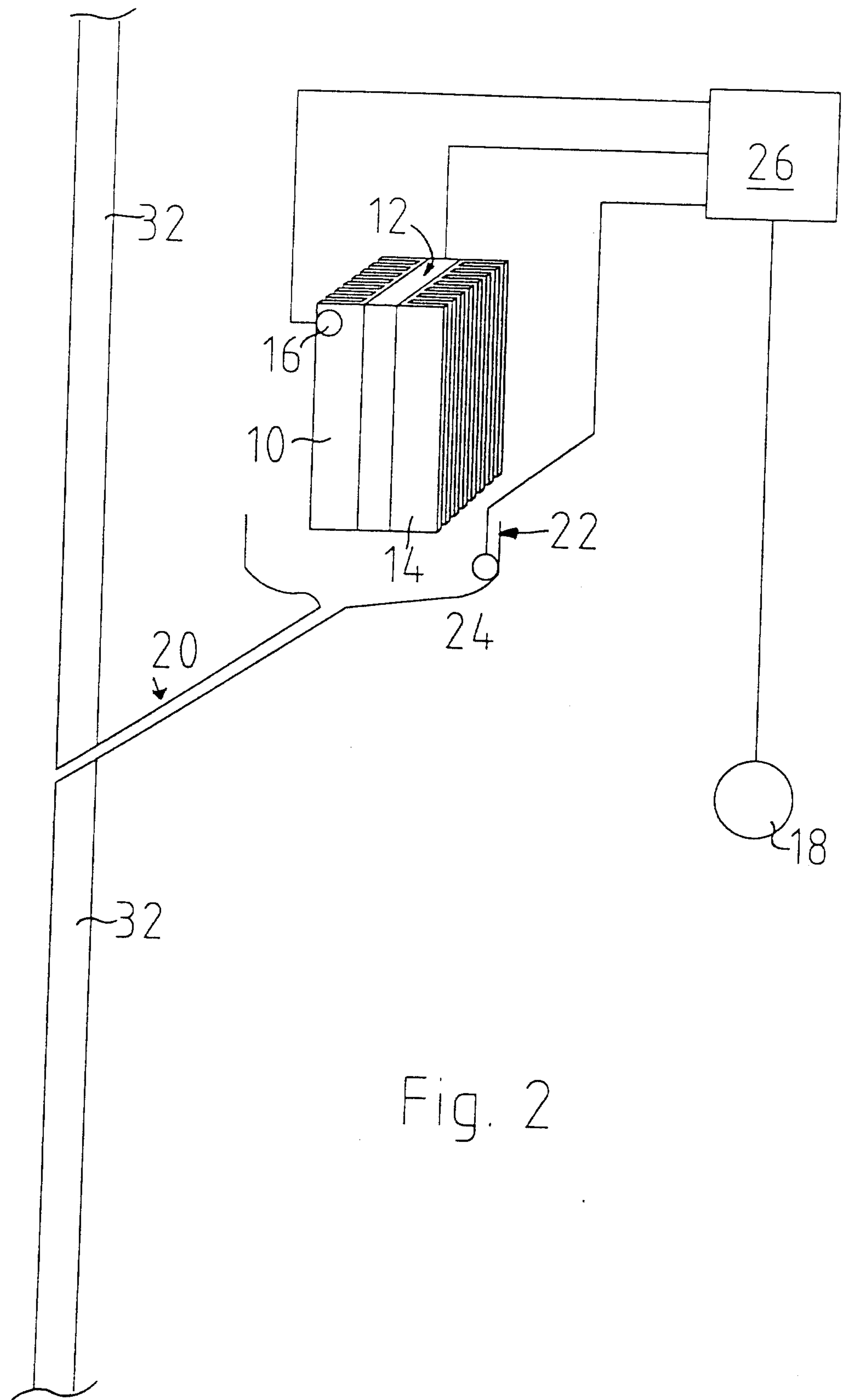
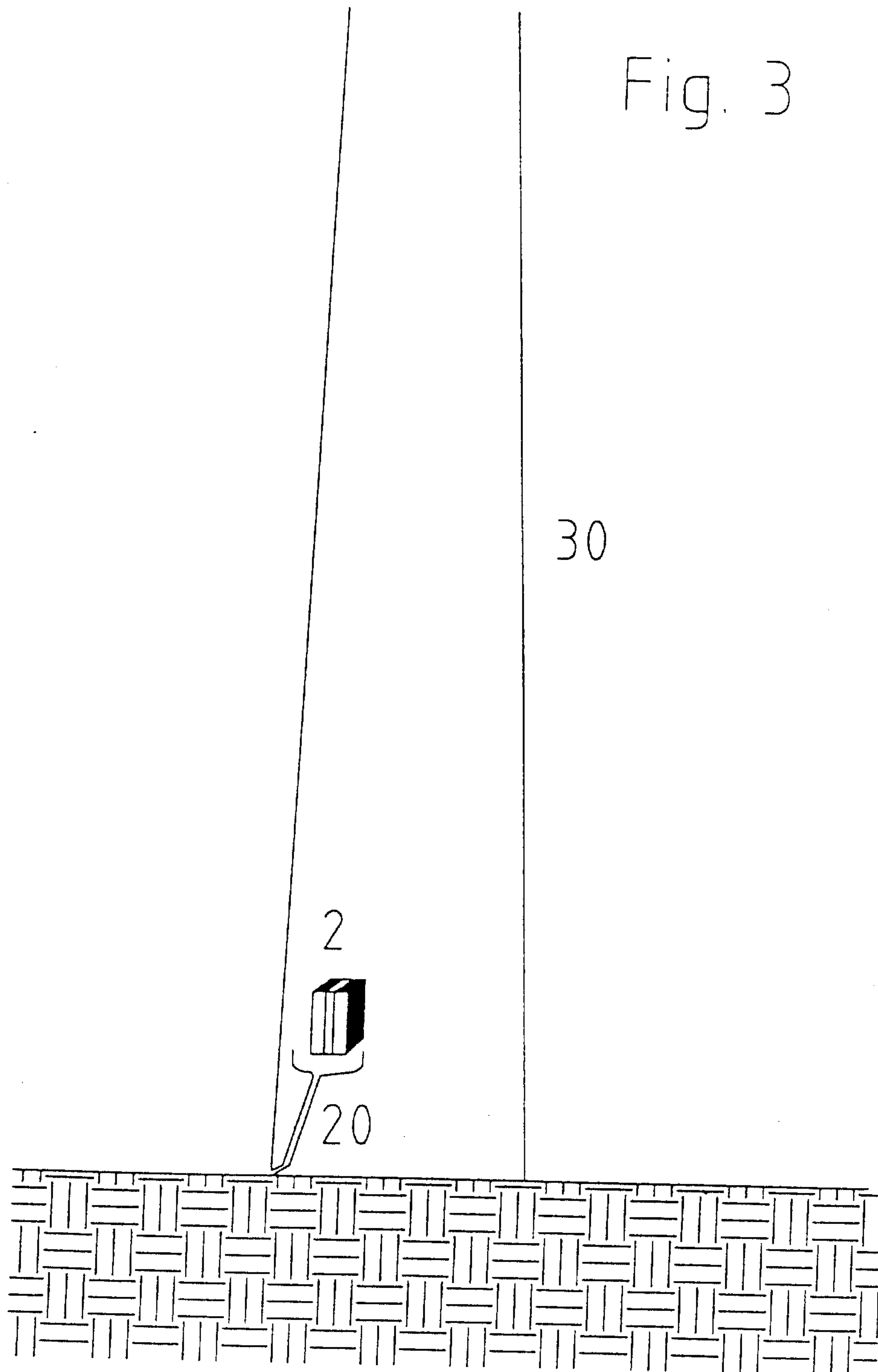


Fig. 2

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Fig. 3



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Fig. 4

