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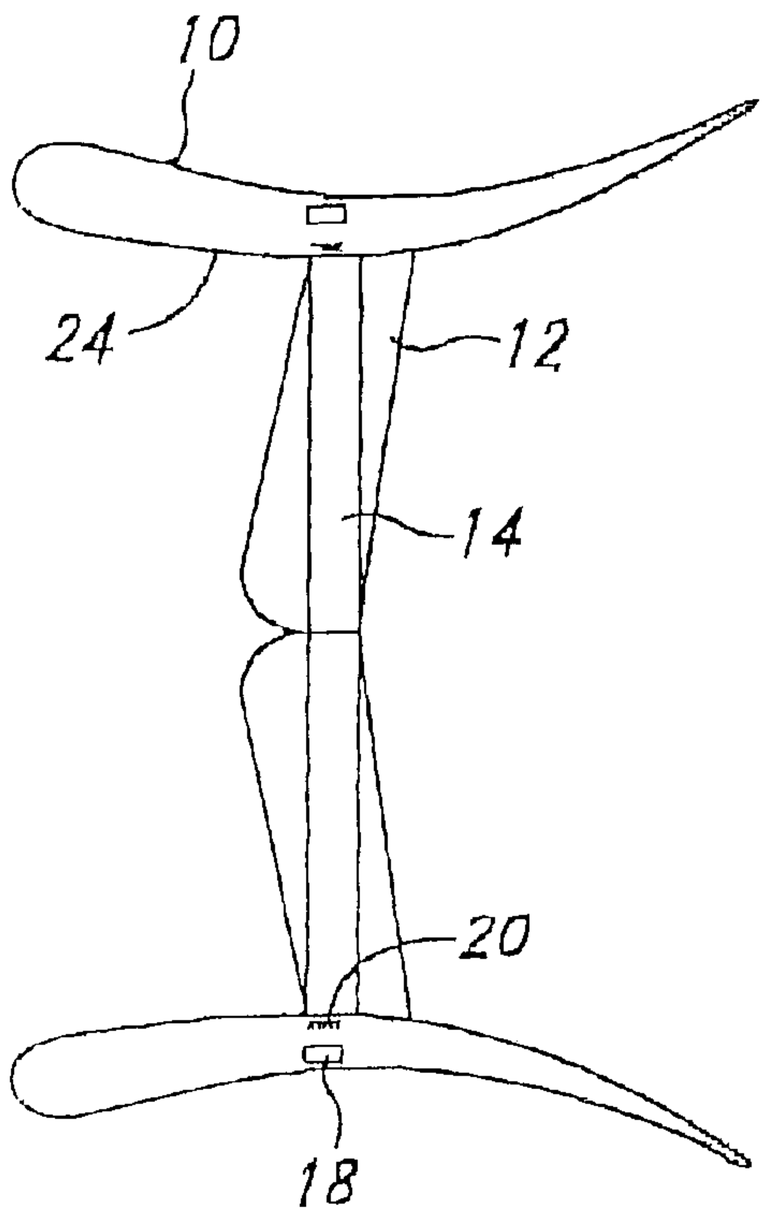

(57) Abrégé/Abstract:
The invention concerns a marine current power installation. This involves not just a known tidal power installation which makes use of the energy of tidal ebb and flow, but a power installation which takes energy from marine currents which constantly occur over all oceans. The invention proposes designing a marine current power installation which takes kinetic energy of flow from the marine current and converts the taken energy into electrical energy. In that case the marine current water power installation according to the invention is used below the water level, for example more than 50 m below the water level, and can make a relatively large amount of power available even when the flow speed of the marine current is relatively low, for example in the region of 1.5 m/sec or less. That is achieved in that the water power installation has a water wheel or a rotor (turbine or propeller) which is of a diameter of for example 10 m or more, preferably between 30 m and 120 m.

ABSTRACT

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POWER STATION USING OCEAN CURRENTS

The invention concerns a marine current power installation. This involves not just a known tidal power installation which makes use of the energy of tidal ebb and flow, but a power installation which takes energy from marine currents which constantly occur over all oceans.

Such marine currents are usually large-area stationary current systems, the production of which can be decisively attributed to the thrust force of the wind at the surface of the sea (drift current), internal pressure forces (gradient current) and the rotation of the Earth (Coriolis force) and the topography of the ocean bottom and the coasts. As the most important marine currents mention may be made by way of example of the North and South Equatorial Currents, the Kuroshio, the East Australian Current, the Gulf Stream, the Brazil Current, the Agulhas Current, the North Pacific Current, the North Atlantic Current, the West Wind Drift, the Californian Current, the Humboldt Current, the Canary Current, the Benguela Current, the Western Australian Current, Equatorial Countercurrents, the Alaska Current, the Norwegian Current, the West Spitsbergen Current, the East Greenland Current, the Labrador Current,

the Irminger Current, the Oyashio and the Falklands current. Besides the known surface currents in the oceans there are pronouncedly in the Atlantic and Pacific Oceans the Equatorial Sub-currents (up to 2.5 m/sec flow speed) which at a depth of around 100 m (or deeper) flow eastwards directly onto the Equator under the westwardly directed South Equatorial Current.

The invention proposes designing a marine current power installation which takes kinetic energy of flow from the marine current and converts the taken energy into electrical energy. In that case the marine current water power installation according to the invention is used below the water level, for example more than 50 m below the water level, and can make a relatively large amount of power available even when the flow speed of the marine current is relatively low, for example in the region of 1.5 m/sec or less. That is achieved in that the water power installation has a water wheel or a rotor (turbine or propeller) which is of a diameter of for example 10 m or more, preferably between 30 m and 120 m.

Brief Description of Drawings

Figure 1 shows a cross-sectional view of a marine current power generation structure.

Figure 2 is a cross-sectional view of the marine current power generation structure according to the present invention having chambers therein.

Detailed Description of the Invention

Figure 1 shows by way of example a view in cross-section of a marine current water power installation according to the invention. This power installation has an annular housing 10 which has a very high level of strength. The annular housing is also in the form of a concentrator (duct casing) 24, 23 so that the flow speed of the water passing into the ring is increased. Provided in the central region of the housing is a water wheel or propeller 14 which is driven by the flow speed of the water. It rotates and in so doing at the same time drives a generator rotor 20 of a generator. In this embodiment, the generator is not coupled with a shaft to the turbine but the pole

wheel of the generator rotor 20 is fixed externally to the water wheel. Accordingly, the water wheel or the rotor 20 of the power installation carries the generator rotor 20 at its tip which is surrounded by a generator stator 18 in the housing 24, 23 of the water power installation. The forces acting on the water wheel are carried by main bearings which rest on a support spider 12 which passes through the housing ring.

As shown in Figure 2, preferably the rotor 20 or the water wheel and/or the housing of the water power installation has chambers 22, which may also be called cavities 22, which can be flooded so that a condition of equilibrium of the water power installation in relation to the water occurs. That ensures that the bearing arrangement of the water power installation only has to still carry the thrust of the flowing water.

As shown in Figure 2, the cavities 22 can be filled with air when transporting the water power installation to the position of installation. A ship can thus easily transport the water power installation in a floating condition to the position of installation. As soon as the water power installation has reached its intended position of installation the cavities 22, according to the desired depth and design for that location, are filled to a selected level with water, preferably sea water, so that the water power installation can slowly sink to the desired depth, whether to the partially submerged, fully submerged, or to selected depth or completely to the bottom. If conversion of the water power installation or repair should be necessary, the water can be removed out of the cavities 22 and it will easily float again.

It is possible for the water power installation to be both directly anchored to the bed and/or to be fixed at a certain spacing from the ocean floor by suitable cables or chains which are arrested on the ocean floor, or other structures.

The energy which is produced by the generator is carried away by means of cables and fed directly into the energy network. It is also possible for the energy produced by the marine current water power installation to be used to supply power to sea water desalination plants.

Even if marine currents involve relatively low flow speeds, the following numerical example can make it clear that very large amounts of electrical energy (and a corresponding power of more than 500 KW) can be produced, depending on how high the respective marine current speed is and how large the diameter of the

water wheel of the power installation is.

Thus, it is for example possible to already produce a power output of 500 KW with a marine current speed of 1.5 m/sec and a water wheel diameter of 25 m. If the diameter of the water wheel is increased to 80 m a power output of 5 MW is possible. With a water wheel diameter of 36 m a power output of 1 MW is still possible.

If the marine current speed rises then the amount of electric power rises with the third power in relation thereto.

The particular advantage of the marine current power installation according to the invention is that it can be used where in practice the power installation itself does not adversely affect the environment. At the same time the marine current power installation can make available an energy source which is almost inexhaustible and the behavior of which is very accurately predictable. In spite of the size of the marine current water power installation, by virtue of flooding of the cavities 22 or by virtue of expelling the water from the cavities 22, the power installation can be very accurately positioned in the marine currents where it does not have any adverse influence on shipping because it is below the usual draughts of sea-going vessels.

It should be noted that the marine current power installation according to the invention can also be employed to make use of ebb and flow currents which regularly occur with a tide. For that purpose it is desirable for the rotor 20 blades to be so designed that they can convert flows from both sides (rotation in two different directions) or can preferably turn with a change in the flow direction.

CLAIMS

1. A transportable marine current power installation comprising a housing which accommodates a generator comprising a generator rotor and a generator stator, wherein the generator is driven by means of a rotor which is connected to the generator rotor and wherein the power installation is arranged in an extensive marine current installation which is an oceanic current system, wherein a rotor of the power installation has at least one rotor blade which carries the generator rotor of the generator of the power installation and wherein the at least one rotor blade of the power installation has at least one cavity which can be flooded with water, and wherein the generator stator is arranged in said housing such that by the interaction between the generator rotor and the generator stator said generator produces electrical energy.

2. A marine current power installation according to claim 1, characterised in that the least one cavity of the rotor blades are configured to be flooded with water to be possibly displaced again.

3. A marine current power installation according to claims 1 or 2, characterised in that the housing of the power installation is formed at least in part as a concentrator, by means of which the flow speed of the water passing into the power installation is increased.

4. A marine current power installation according to one of the claims 1 to 3, characterised in that the housing of the power installation has closed cavities which can be flooded with water and from which the water can possibly be displaced again.

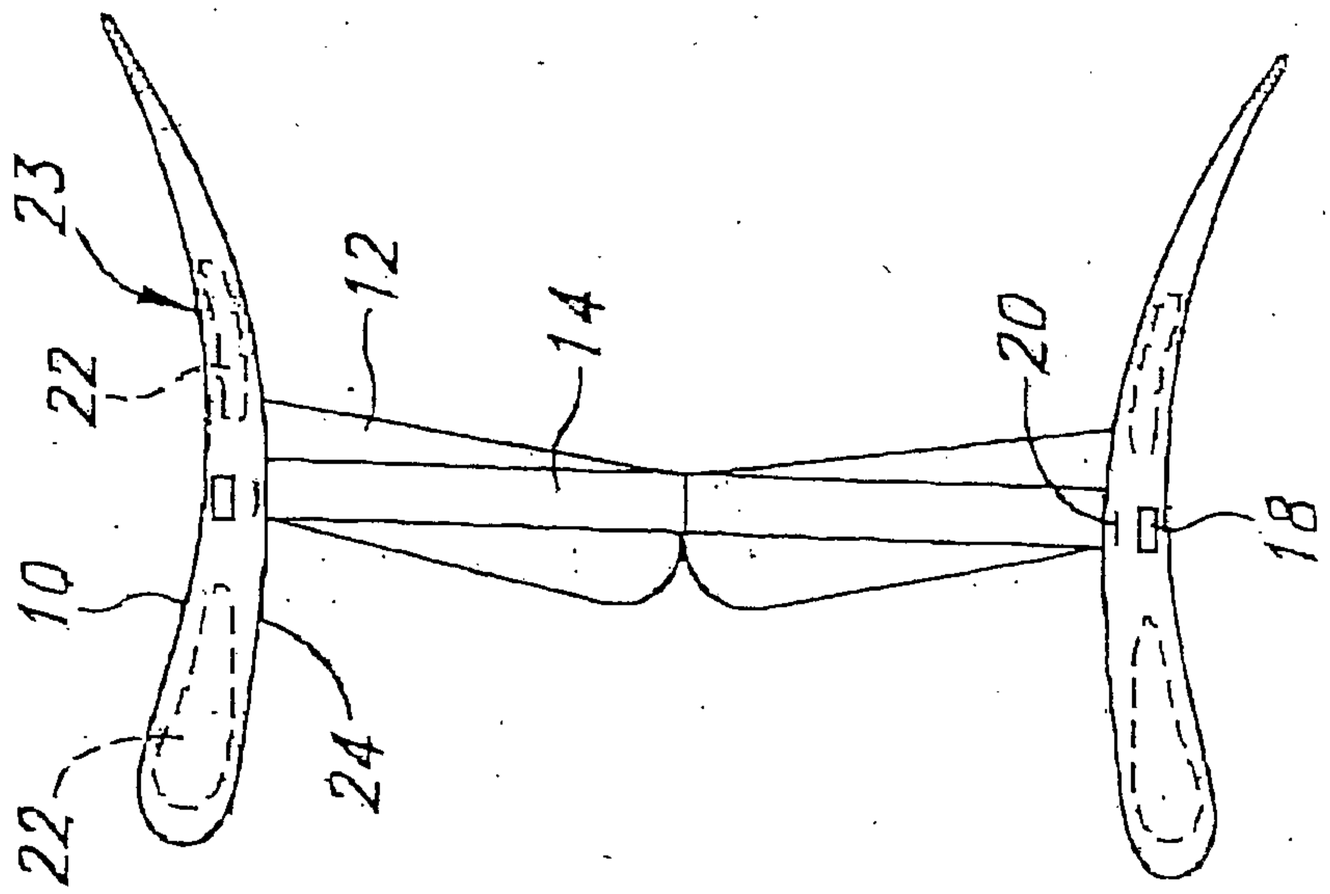


Fig. 2

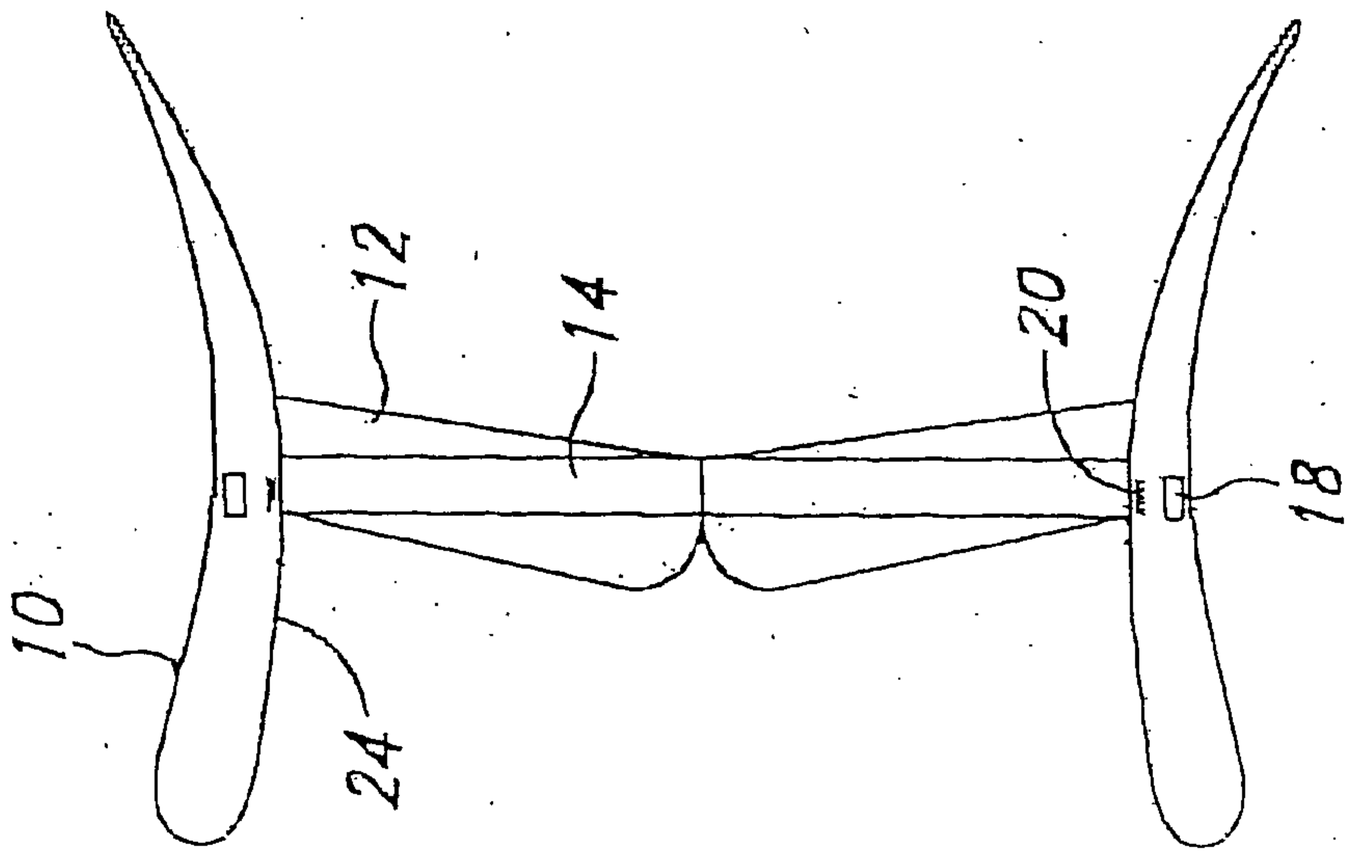
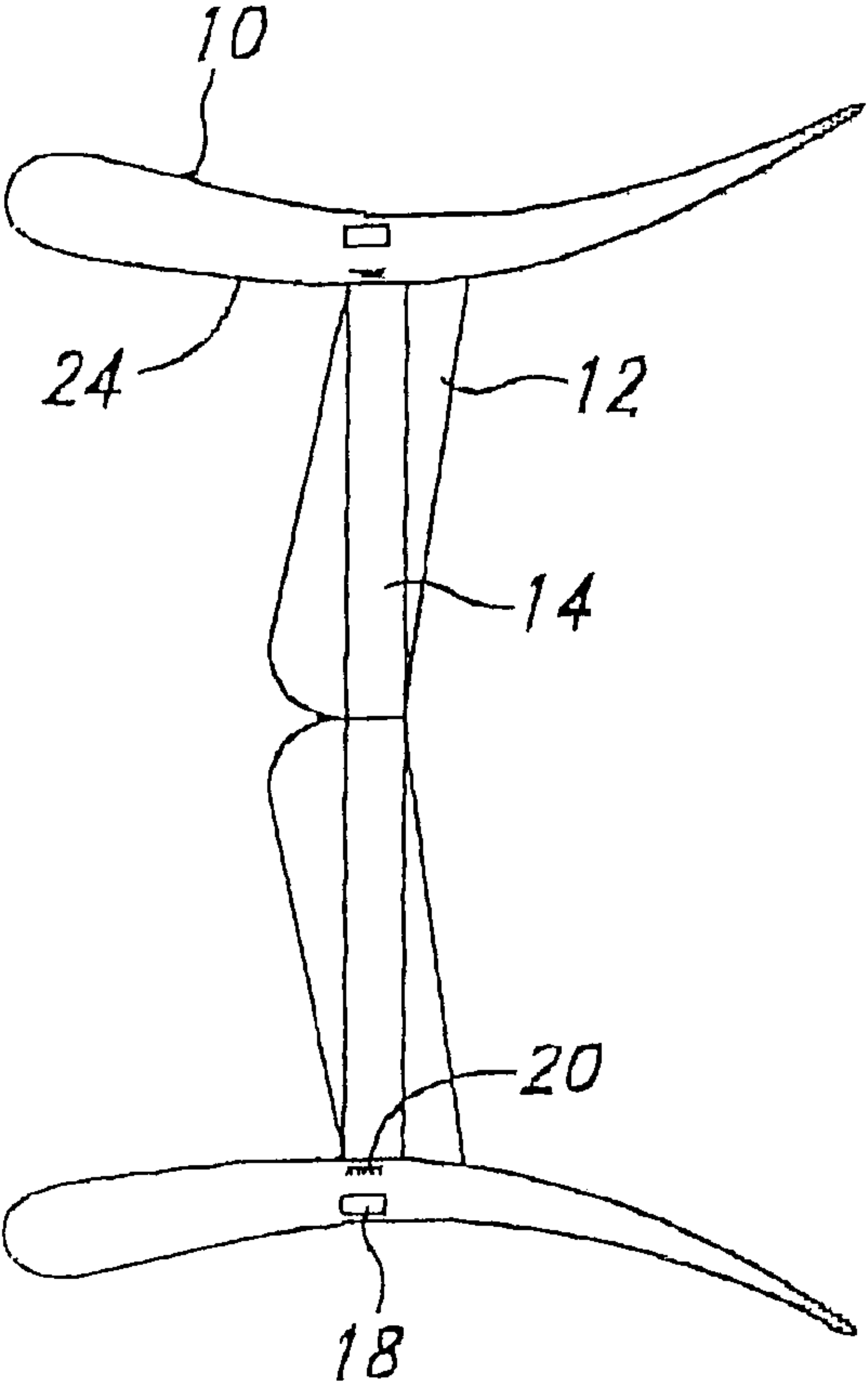


Fig. 1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