受験番号：14IPM008

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[問１]
[0003]
When a metal product or the like is subjected to high-temperature treatment in a high-temperature furnace, an endless chain-like conveyor belt is used to convey the metal product in the furnace. This chain-like conveyor belt includes a number of chains or spirals, and heat-resistant steel wires are used for the material of chain rods that connect the chains or spirals. However, the bending strength of the chain rod is as low as 3 kg/mm2 at a maximum in an atmosphere of 1000° C to 1200° C. Therefore, the following problems may arise. That is, the rod is deformed in a short period of time. In addition, a uniform shear force no longer acts on the connecting portions between the rods and the chains or spirals, and thus a large shear force acts locally. As a result, the chains or spirals are broken, and the belt makes an irregular meandering movement, thereby making the conveyor unusable.
[0004]
A conveyor belt containing carbon fiber-reinforced carbon is known in the related art. The strength of such a conveyor belt tends to increase in an atmosphere of up to 2500° C as compared to the atmosphere of room temperature. However, it is not desirable to use this type of conveyor belt in an oxidizing atmosphere which may react with carbon.
[0005]
While the conveyor belt goes around in circles inside the furnace, an especially high tension acts on the rods that are assembled in the lateral direction with respect to the moving direction of the belt. In other words, a substantially perpendicular shear force acts on the rods. Therefore, it is necessary to reliably impart a tensile strength particularly to this portion of the rod that is subjected to the shear force, that is, to impart a shear-resistant strength with respect to the direction substantially perpendicular to the longitudinal direction of the rod.

[問２]
[0039]
A rotary valve according to an embodiment of the present invention will be described below using an example where the rotary valve is installed in a flow path of leading air in a stratified scavenging two-cycle engine. However, the usage of the rotary valve is not limited to this example. The rotary valve may be used as a fluid control valve to be installed between fluid flow paths. In addition, the rotary valve can control, for example, the flow rate of fluid such as liquid and gas, as well as that of air. Therefore, the present invention is not limited to the embodiment described below, but can be modified in various ways.
[0040]
In a stratified scavenging two-cycle engine 1, a piston 3 is slidably fitted into a cylinder 2. The cylinder 2 is attached to an upper portion of a crankcase 6. A crankshaft 8 is rotatably attached to the crankcase 6. One end of a crank 9, which is rotatably supported in a crank chamber 7, is coupled to the crankshaft 8. The piston 3 is also coupled to the crankshaft 8 via a connecting rod 4. An ignition plug 5 is attached to the top of the cylinder 2. When an air-fuel mixture that has been compressed in a cylinder chamber C is ignited by the ignition plug 5 at the top dead center of the piston 3, the air-fuel mixture explodes to push the piston 3 downward.

[問３]
1.　An even balance provided with a pan on which an object to be measured is placed and a pan on which a counterweight is placed, the even balance comprising:
a stand including front and rear support plates facing and separated from each other, V-shaped fulcrum members at upper ends of the front and rear support plates, and reverse V-shaped fulcrum members at intermediate positions in a height direction just below the V-shaped fulcrum members of the front and rear support plates;
an upper swing arm including a pair of front and rear swing fulcrum protrusions supported on the V-shaped fulcrum members in the middle of the longitudinal direction thereof, and V-shaped grooved hooks at both ends in the longitudinal direction thereof;
a lower swing arm including another pair of front and rear swing fulcrum protrusions supported on the reverse V-shaped fulcrum members in the middle of the longitudinal direction thereof, and reverse V-shaped grooved hooks at both ends in the longitudinal direction thereof; and
a pair of right and left vertical lift rods including, at each lower end thereof, a pair of windows into which the hooks at both ends of the upper and lower swing arms are movably inserted, the V-shaped grooves and the reverse V-shaped grooves being engaged with each other while the upper and lower swing arms are in parallel to each other between an upper side portion of an upper window and a lower side portion of a lower window.