is aligned with that of the second pulley 106.

The wire fixture 109 is disposed near the first pulley 105a and fixes an end of the wire 104a.

In the robot arm 100a illustrated in FIG. 3, the force driving the joint 103 is amplified to four times the force generated by the wire cylinder 102.

[0022] In the structures illustrated in FIG. 2 and 3, the arm driving direction by the cylinder 102 is the one direction indicated by the arrow.

For this reason, a source for generating driving force in the opposite direction must be considered.

An example of a source for generating driving force in the opposite direction is gravity.

The case in which the source for generating driving force in the opposite direction is gravity can be realized by arranging the driving direction of the arm 101 by the cylinder 102 so as to always be in a direction for lifting the arm 101 in opposition to gravity.

The driving force in the opposite direction is not limited to gravity. Examples of other sources for generating driving force in the opposite direction include springs and motors.

[0023] FIG. 4(A) is a side section view illustrating the structure of the cylinder 102 in the present embodiment, and FIG. 4(B) is a side section view illustrating the structure of a cylinder 10a that is a comparative example.

[0024] The cylinder 102 illustrated in FIG. 4(A) is a wire cylinder, ~~which is disposed in an in-arm space 1010 inside the arm 101, and which is provided with a piston 1020 to which the wire 104 is connected.~~

~~The piston 1020 separates the space inside the cylinder 102 into a first space 1021 surrounded by the inner wall surface of the cylinder 102 and the surface of the piston 1020 to which the wire 104 is connected, and a second space 1022 surrounded by the inner wall surface of the cylinder 102 and the surface of the piston 1020 on the side opposite to the surface to which the wire 104 is connected.~~

which is disposed in an in-arm space 1010 inside the arm 101, and which is provided with a piston 1020 to which the wire 104 is connected.

The piston 1020 separates the space inside the cylinder 102 into a first space 1021 surrounded by the inner wall surface of the cylinder 102 and the surface of the piston 1020 to which the wire 104 is connected, and a second space 1022 surrounded by the inner wall surface of the cylinder 102 and the surface of the piston 1020 on the side opposite to the surface to which the wire 104 is connected.

The first space 1021 and the second space 1022 are each provided with air introduction holes that are not illustrated, configured so that compressed air

can be introduced to the first space 1021 through these air introduction holes, and so that air at ambient pressure can be drawn into and discharged from the second space 1022 through these air introduction holes.

When compressed air is introduced to the first space 1021 through the air introduction holes, the wire 104 is pulled into the cylinder 102.

[0025]

The cylinder 102a illustrated in FIG. 4(B) is a rod cylinder provided with a piston 1020a and a rod 1023, the rod 1023 being disposed between the wire 104 and the piston 1020a.

The piston 1020a separates the space inside the cylinder 102a between a first space 1021a surrounded by the inner wall surface of the cylinder 102a and the surface of the piston 1020a to which the rod 1023 is connected, and a second space 1022a surrounded by the inner wall surface of the cylinder 102a and the surface of the piston 1020a on the side opposite to the surface to which the wire 104 is connected.

The first space 1021a and the second space 1022a are each provided with air introduction holes that are not illustrated, configured so that compressed air can be introduced through these air introduction holes.

When compressed air is introduced to the first space 1021a through the air introduction holes, the rod 1023 is pulled into the cylinder 102a.

When compressed air is introduced to the second space 1022a through the air introduction holes, the rod 1023 is pushed out from inside the cylinder 102a.

~~The first space 1021 and the second space 1022 are each provided with air introduction holes that are not illustrated, configured so that compressed air can be introduced to the first space 1021 through these air introduction holes, and so that air at ambient pressure can be drawn into and discharged from the second space 1022 through these air introduction holes.~~

~~When compressed air is introduced to the first space 1021 through the air introduction holes, the wire 104 is pulled into the piston 1020.~~

~~[0025] The cylinder 102a illustrated in FIG. 4(B) is a rod cylinder provided with a piston 1020a and a rod 1023, the rod 1023 being disposed between the wire 104 and the piston 1020a.~~

~~The piston 1020a separates the space inside the cylinder 102a between a first space 1021a surrounded by the inner wall surface of the cylinder 102a and the surface of the piston 1020a to which the rod 1023 is connected, and a second space 1022a surrounded by the inner wall surface of the cylinder 102a and the surface of the piston 1020a on the side opposite to the surface to which the wire 104 is connected.~~

~~The first space 1021a and the second space 1022a are each provided with air introduction holes that are not illustrated, configured so that compressed air can be introduced through these air introduction holes.~~

~~When compressed air is introduced to the first space 1021a through the air introduction holes, the rod 1023 is pulled into the piston 1020a.~~

~~When compressed air is introduced to the second space 1022a through the air introduction holes, the rod 1023 is pushed out from inside the piston 1020a.~~

[0026] With the cylinder 102 illustrated in FIG. 4(A), a stroke can extend across a portion corresponding to the length of the rod 1023 in the cylinder 102a illustrated in FIG. 4(B).

By using a wire cylinder as illustrated in FIG. 4(A), the stroke length can be extended, thereby increasing the mechanical energy generated by a single stroke of the cylinder 102.

[0027] As explained above, according to the present embodiment, a lightweight

CLAIMS

1. An articulated robot arm having a plurality of serially connected robot arms, comprising:

a pneumatic cylinder that pulls in a wire; and

one or a plurality of movable pulleys that amplify a force generated by the pneumatic cylinder and that transmit the force by the wire,

wherein a plurality of robot arms is serially connected to a joint that is driven by the force amplified by the one or a plurality of movable pulleys, and the joint is disposed between the plurality of robot arms.

~~2. (cancelled)~~

~~3. (cancelled)~~

4<u>2</u>. ~~(amended)~~ The articulated robot arm according to claim 1, wherein, when the wire is pulled into the pneumatic cylinder, the robot arms move in a direction orthogonal to a long-axis direction of the robot arms, with the joint as an axis of rotation.

5<u>3</u>. ~~(amended)~~ The articulated robot arm according to claim 1 or claim 4<u>2</u>, wherein the wire extends from a piston inside the pneumatic cylinder to a fixed pulley, is guided from the fixed pulley to the movable pulleys, and one end of the wire guided from the movable pulleys is fixed.