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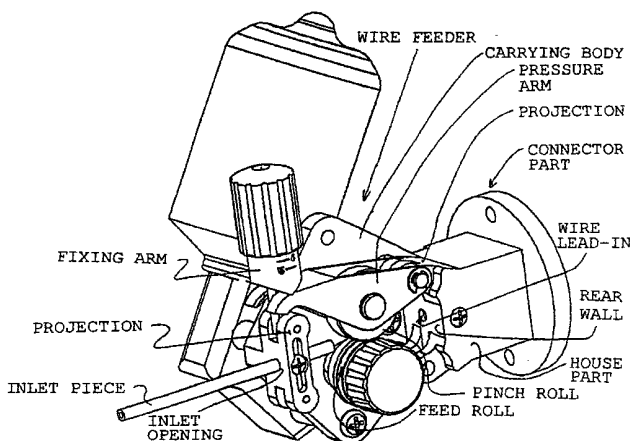
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(54) Title: WIRE FEEDER AND CONNECTOR UNIT



(57) Abstract: The invention relates to wire feeder and connector unit for pushing welding wire into the cable of a welding torch and for receiving the connector on the end of the connecting cable of the welding torch at the same time. The essence of the unit that it has a wire feeder part and a connector part, the carrying body of the wire feeder part and the house of the connector part is designed as a unit in one piece, suitably made of plastic, and the inlet opening of the wire feeder part is situated opposite to the wire lead-in opening on the inner side of the connector part joining to the bottom of the nest for the wire guide, in a given case there is an inlet piece in the inlet opening, the path of the wire defined by these two openings is going between the feed roll and the pinch roll as is known in the prior art, and further, either the axle of the pressure arm with the pinch roll mounted on it or the axle of the fixing arm is fixed to the inner end of the house of the connector part, suitably to a projection established there, and the axle of the other arm is fixed to a projection on the carrying body of the wire feeder part opposite to the other projection, making angular motion of the arms possible.



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## Wire feeder and connector unit

The invention relates to a wire feeder and connector unit, which, due to its structure, is suitable for pushing welding wire into the cable of a welding torch in a way that it is more prevented from inflection, so that it can be used especially as a unit of a welding apparatus, as a combined unit for receiving the connector on the end of the connecting cable of the welding torch and for feeding the welding wire at the same time.

It is well known that the role of the wire-feeder of a welding apparatus is to pull the welding wire from the spool and to push it into the connector connecting the power supply of the apparatus with the cable of the welding torch, ensuring that the welding wire is pushed to the welding torch at a constant speed, guided in the cable of the welding torch.

At the well known welding apparatuses the cable connecting the welding torch with the welding apparatus is constructed in a way that the power-current wire for transporting the welding current and the low-current wires for transporting the control signals for the welding torch run near each other in a common tubular housing, there is a spiral guiding the welding wire in the core of the cable, and there is a duct or a pipe between the housing and the core of the cable so as to transport the protecting gas, e.g. at the construction presented in patent specification no. USP 4,529,861. There is a connector mounted on the end of these cables close to the apparatus, which connector is constructed to match to the cable, and which connector can be coupled to the other connector mounted in most cases on

the head plate of the apparatus via screwing it on, and it is constructed in a way that when the connectors are connected and fixed to each other, the required connection is established between the current-carrying and gas-carrying elements of the connectors at the same time, and the wire guide nose-piece of the connector on the cable also fits into the corresponding nest formed in the connector mounted on the apparatus, ensuring that the welding wire is lead from the apparatus into the cable of the welding torch without distorting or inflecting. The connector mounted on the apparatus is supplied with suitable terminals and a gas supply chunk at its so called inner side facing the inner space of the apparatus, the wire carrying the welding current and the wires carrying the control signal can be connected to these terminals, and the gas conduit can be connected to this gas supply chunk, and further, the welding wire can be introduced in the connector through the intermediate wire guide piece leading into the nest of the welding wire and the liner placed in it.

The welding wire is moved in the connector and the cable by the wire feeder, which is usually situated fixed inside the apparatus. The usual construction of the known wire feeders is as follows: they have a carrying body which is either a cast product or made of metal sheet, there are one or two pairs of rolls feeding the welding wire, consisting of a feed roll and a pinch roll located on one side of the carrying body, the shaft of the feed roll is practically orthogonal to the mounting plate of the carrying body, further, there are one or more pressure arm(s) fixed to the carrying body by a turning joint, the pinch roll(s) are fixed to this pressure arm by a free-running bearing preventing axial movement of the pinch roll(s), further,

there is a fixing arm locking the pressure arm(s) to the carrying body providing pressing force by spring force adjustable by pre-stressing, and there is a catch arrangement to fix the closed position of the pressure arm(s) to the carrying body. In the position of the pressure arm closed to the carrying body, the fixing arm elastically presses the pinch roll against the feed roll opposite to it in a way that the wire to be fed is nipped between the two rolls, while in the open position the pinch roll is detached from the feed roll.

In one side wall of the carrying body there is an opening for the first wire guide piece, and in the other side wall opposite to it there is an opening for the second wire guide piece, defining the path of the wire running between the feed roll and the pinch roll in the position of the pressure arm fixed to the carrying body. The first and second wire guide pieces suitable for leading the wire in and out are usually constructed using a spiral spring.

The driving unit is mounted on the other mounting plate of the carrying body, the output shaft of the driving unit is in direct or indirect forced coupling delivering torque through the feed roll or rolls. Further, the carrying body has a base surface, and the wire feeder can be mounted on the supporting plate, console, support etc. inside the apparatus by the holes in the base surface using screw joint, near the connector as far as possible. There are several examples for this kind of wire feeders, e.g. USP 5,155,332; 4,404,450; 4,898,317; 5,053,598 and 5,137,223.

For using the welding apparatus, the welding wire must be lead through the wire feeder, and it must be introduced in the connector mounted on the apparatus, which usually

requires opening the apparatus. When using the apparatus, when the welding wire gets stuck in the apparatus, when the wire is changed or replaced, this procedure must be repeated again and again. One condition of the proper movement of the welding wire is that the wire feeder and the connector mounted on the apparatus providing guide for the welding wire should be situated close to each other so that the wire should not be inflected or distorted in the way between the wire feeder and the connector, as it would result in failure in the operation of the apparatus, and the apparatus should be opened and the wire should be inserted again so as to eliminate the failure. There are constructions for leading the welding wire in an appropriate guiding cable on the path between the wire feeder and the workpiece, e.g. in patent specification USP 4,102,483, however, these constructions did not really work in practice.

Further, it is a constant problem when constructing welding apparatuses to find a place for the wire feeder, generally inside the apparatus, where the wire feeder is fixed to the apparatus, generally to the frame of the apparatus by the base surface of the wire feeder, while it should be easy to access the wire feeder with as little dismantling of the apparatus as possible, and further, the wire feeder should be located inside the apparatus in such an accessible position that it makes it easy to insert, remove or replace the wire, to change the rolls, adjust pressing force etc., and even less skilled persons should be able to do it on the site, in hard circumstances as well.

Our aim with the invention is to solve the above described problem, that is, to establish a path for the welding wire between the wire feeder and the connector mounted on the

apparatus, providing guide for the wire essentially preventing the wire from inflection or distortion, in a way that the wire feeder and the connector should be easy to access, and it should be easy to make the reparations and adjustments required in the course of normal operation of the apparatus.

The fundamental idea of the invention is that the solution for the problem is a construction where the wire feeder and the connector are mounted on the same unit, in a way that they are close to each other.

According to the invention, the solution for the problem is a construction having a carrying body, a feed roll driven directly or indirectly and a pinch roll mounted on a pressure arm the position of which can be fixed by a fixing arm, which are acting as the wire feeder further, having a house acting as the connector for transporting the welding current, the control signals, the protecting gas and forwarding the welding wire, which house has terminals and guide parts and/or elements and is fashioned in a way that it can be mounted, and which construction is designed in a way that it defines a path for the welding wire, and the essence of which is that the unit has a wire feeder part and a connector part, the carrying body of the wire feeder part and the house of the connector part is designed as a unit in one piece, suitably made of plastic, and the inlet opening of the wire feeder part is situated opposite to the wire lead-in opening on the inner side of the connector part joining to the bottom of the nest for the wire guide, in a given case there is an inlet piece in the inlet opening, the path of the wire defined by these two openings is going between the feed roll and the pinch roll as is known in the prior art, and further, either the axle of the

pressure arm with the pinch roll mounted on it or the axle of the fixing arm is fixed to the inner end of the house of the connector part, suitably to a projection established there, and the axle of the other arm is fixed to a projection on the carrying body of the wire feeder part opposite to the other projection, making angular motion of the arms possible.

At a preferable embodiment of the wire feeder and connector unit according to the invention the projection on the inner end of the house of the connector part and the projection on the carrying body part opposite to it are mirror-symmetric to the path of the wire.

At a further preferable embodiment of the wire feeder and connector unit according to the invention assembling holes on the carrying body part are positioned to be mirrorsymmetric to the path of the wire.

At a preferable embodiment of the wire feeder and connector unit according to the invention there is a wire guide liner in the wire lead-in opening on the inner side of the wire guide nest in the house of the connector part, and there is a flexible inlet piece, preferably made from a spiral spring, in the inlet opening of the wire feeder part.

At another preferable embodiment of the wire feeder and connector unit according to the invention the connector part has a nest for the wire-guide and a nest for the gas supply conduit on the front surface of its cylindrical connector body, it has electric contacts, usually two electric contacts situated flushed on the front surface and lead out at the rear surface of the connector body, it has a liner connected to the nest for the wire-guide from the

back and a lead-in leading into the nest for the gas supply conduit from the back, further it has a threaded surface made of electrically conductive material and a ring shaped contact surface beside it, and it has a house made of plastic surrounding the connector body from the side shaped to be suitable for mounting it, and further, the connector body and the house is made of plastic, designed as a unit in one piece connected by a rear wall, and further, it has an insert made of electrically conductive material that can be fitted in the nest formed by the side surface of the connector body part and the surface of the house part opposite to this side surface, and the insert is secured rotationally in the nest by form-fitting due to its angled or shouldered shape or by a terminal connected to it, and the insert has a contact surface at its one side surface and there is an opening on the sidewall of the house part providing possibility to access the contact surface.

At this latter embodiment of the wire feeder and connector unit the thicker side-piece of the insert is fitted into the opening on the sidewall of the house part, preferably projecting out of it.

At another embodiment the insert is of uniform thickness, and it has a threaded hole in its side piece suitable for connecting a cable socket to it, and in certain cases there is a cable connector fixed in it by screw joint.

At a preferable embodiment of the wire feeder and connector unit the construction for mounting is a rim formed by the front surface of the house part and bore-holes in the rim.



In what follows, the essence of the invention is described in detail by presenting a preferable embodiment, with reference to the accompanying drawings in which:

Figure 1 is a perspective view of an embodiment of the wire feeder and connector unit according to the invention with one type of connector part, in closed position, viewed from one direction,

Figure 2 is a perspective view of the wire feeder and connector unit shown in figure 1 viewed from the other direction,

Figure 3 is a perspective view of the wire feeder and connector unit shown in figure 1 from one direction, in open position, with the electrically conductive insert removed from its nest and without the driving unit,

Figure 4 is a second possible embodiment of the electrically conductive insert,

Figure 5 is a third possible embodiment of the electrically conductive insert.

The connector part of the unit according to the invention can be different from the construction presented here.

The major advantage of the wire feeder and connector unit according to the invention is that it is a multi-function unit that can be assembled and disassembled in one piece.

It is a very important advantage that the section by which the wire is pushed, is close to the connector part

providing continuous guide for the wire, so there is smaller way on which the wire can be inflected, this way, due to the smaller place, the welding wires made of the usual materials having the usual flexibility will inflect in significantly less cases as compared to the traditional wire feeders and connectors.

It is a further advantage that there is no need for special mounting elements in the welding apparatus, but it can be mounted on the head-plate of the welding apparatus by the connector part of the unit.

## Claims:

1./ Wire feeder and connector unit having a carrying body, a feed roll driven directly or indirectly and a pinch roll mounted on a pressure arm the position of which can be fixed by a fixing arm, which are acting as the wire feeder, further, having a house acting as the connector for transporting the welding current, the control signals, the protecting gas and forwarding the welding wire, which house has terminals and guide parts and/or elements and is fashioned in a way that it can be mounted, and which construction is designed in a way that it defines a path for the welding wire, **characterized in that** the unit has a wire feeder part and a connector part, the carrying body of the wire feeder part and the house of the connector part is designed as a unit in one piece, suitably made of plastic, and the inlet opening of the wire feeder part is situated opposite to the wire lead-in opening on the inner side of the connector part joining to the bottom of the nest for the wire guide, in some cases there is an inlet piece in the inlet opening, the path of the wire defined by these two openings is going between the feed roll and the pinch roll as is known in the prior art, and further, either the axle of the pressure arm with the pinch roll mounted on it or the axle of the fixing arm is fixed to the inner end of the house of the connector part, suitably to a projection established there, and the axle of the other arm is fixed to a projection on the carrying body of the wire feeder part opposite to the other projection, making angular motion of the arms possible.

2./ Wire feeder and connector unit according to claim 1 **characterized in that** the functional part of the projection on the inner end of the house of the connector

part and the functional part of the projection on the carrying body part opposite to it are mirrorsymmetric to the path of the wire.

3./ Wire feeder and connector unit according to claim 1 or claim 2 **characterized in that** assembling holes on the carrying body part are positioned to be mirrorsymmetric to the path of the wire.

4./ Wire feeder and connector unit according to any of claims 1-3 **characterized in that** there is a liner fixed in the wire lead-in opening on the inner side of the wire guide nest in the house of the connector part, and there is a flexible inlet piece, preferably made from a spiral spring, in the inlet opening of the wire feeder part.

5./ Wire feeder and connector unit according to any of claims 1-4 **characterized in that** the connector part has a nest for the wire-guide and a nest for the gas supply conduit on the front surface of its cylindrical connector body, has electric contacts, usually two electric contacts situated flushed on the front surface and lead out at the rear surface of the connector body, has a liner connected to the nest for the wire-guide from the back and a lead-in leading into the nest for the gas supply conduit from the back, and has a house made of plastic surrounding the connector body from the side shaped to be suitable for mounting it, and further, the connector body and the house is made of plastic, designed as a unit in one piece connected by a rear wall, and further, it has an insert made of electrically conductive material that can be fitted in the nest formed by the side surface of the connector body part and the surface of the house part opposite to

this side surface, and the insert is secured rotationally in the nest by form-fitting due to its angled or shouldered shape or by a terminal connected to it, further, this insert has a threaded surface at its side surface and a ring shaped contact surface beside it on the front surface, and the insert has a contact surface at its one side surface and there is an opening on the sidewall of the house part providing possibility to access this contact surface of the side surface.

6./ Wire feeder and connector unit according to claim 5 **characterized in that** the thicker side-piece of the insert is fitted into the opening on the sidewall of the house part, preferably projecting out of it.

7./ Wire feeder and connector unit according to claim 5 **characterized in that** the insert has a threaded hole in its side piece suitable for connecting a cable socket to it, and in certain cases there is a cable connector fixed in it by screw joint.

8./ Wire feeder and connector unit according to any of claims 1-7 **characterized in that** the construction for mounting is a rim formed by the front surface of the house part and bore-holes in the rim.

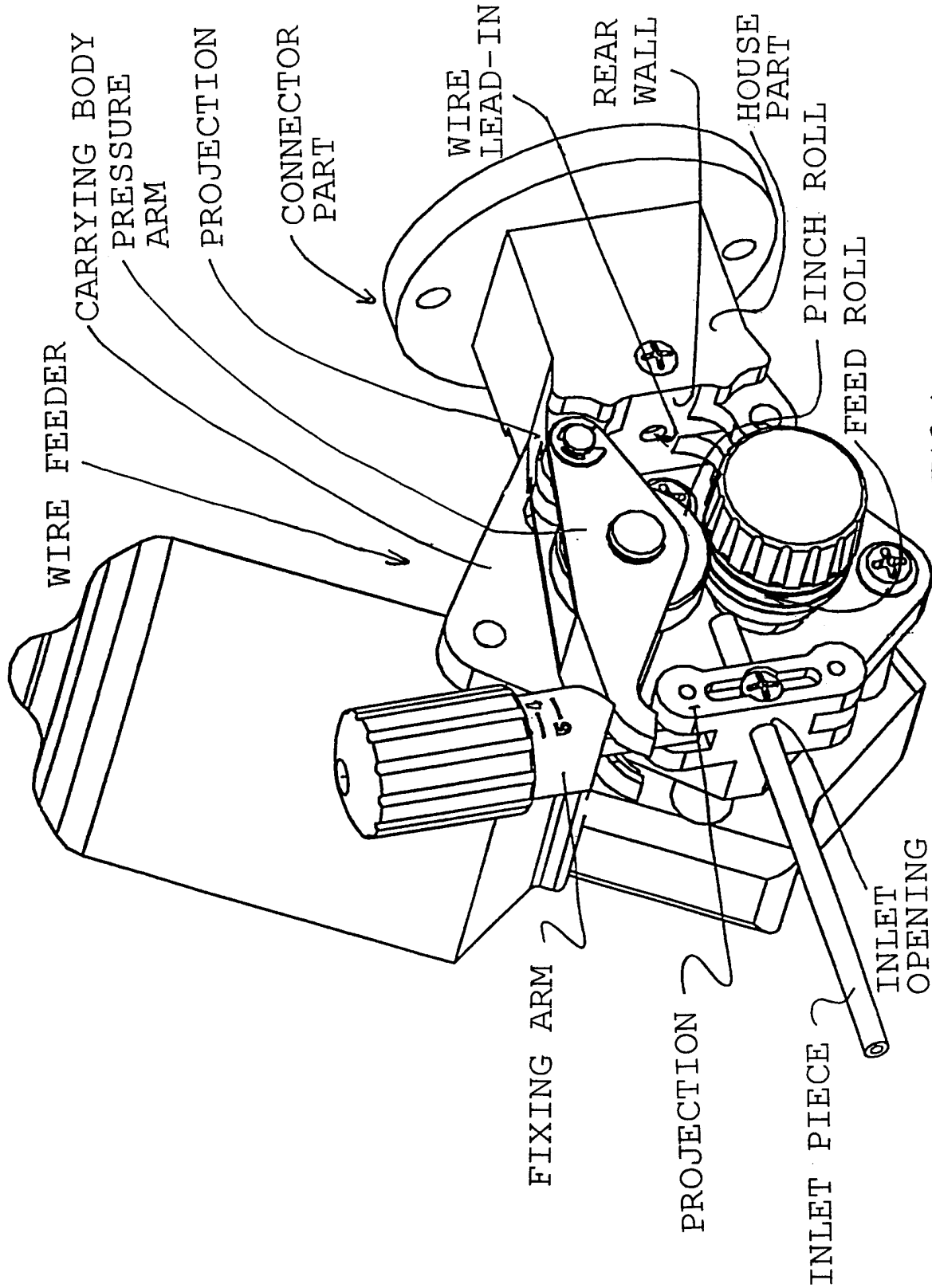
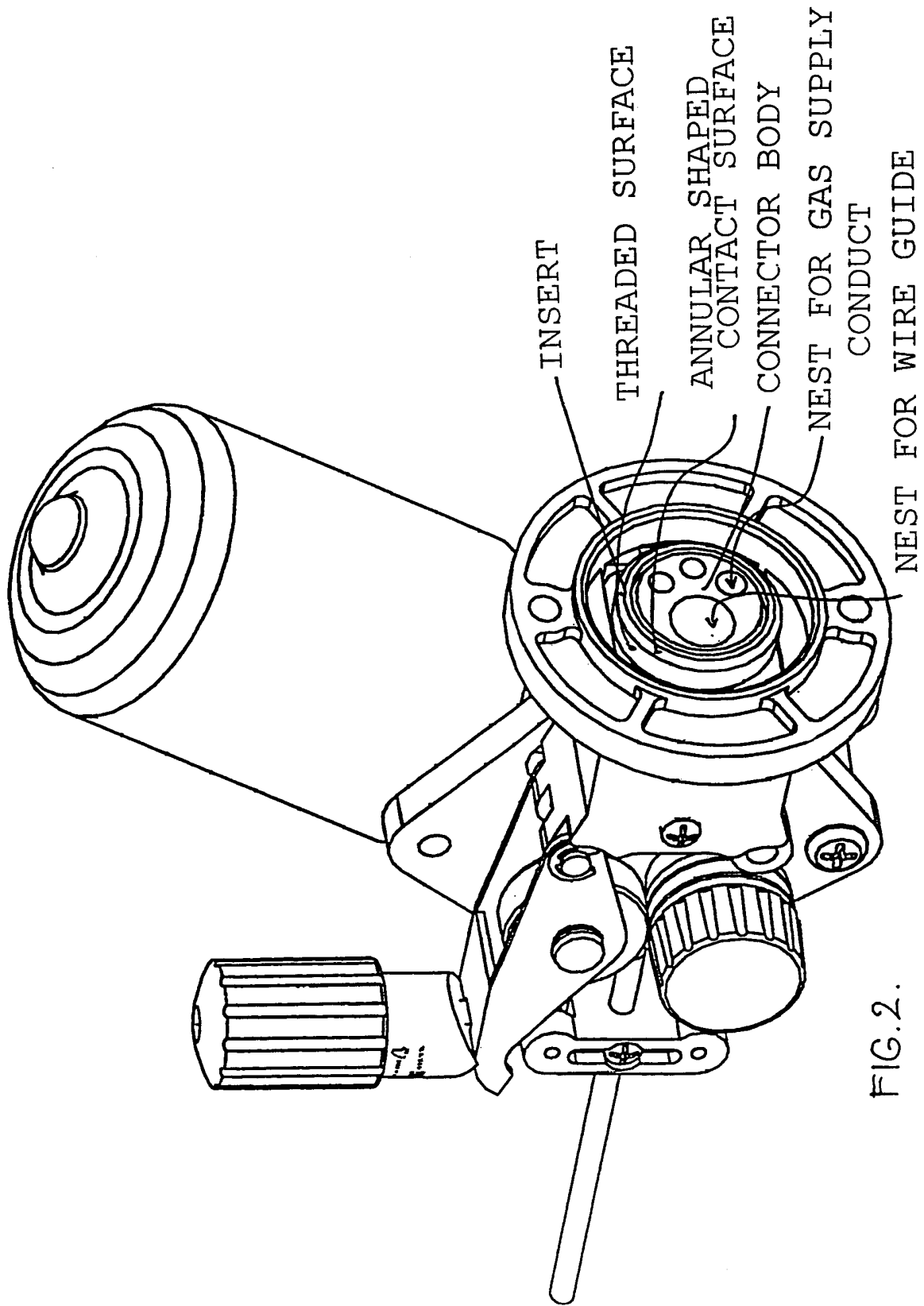


FIG. 1.



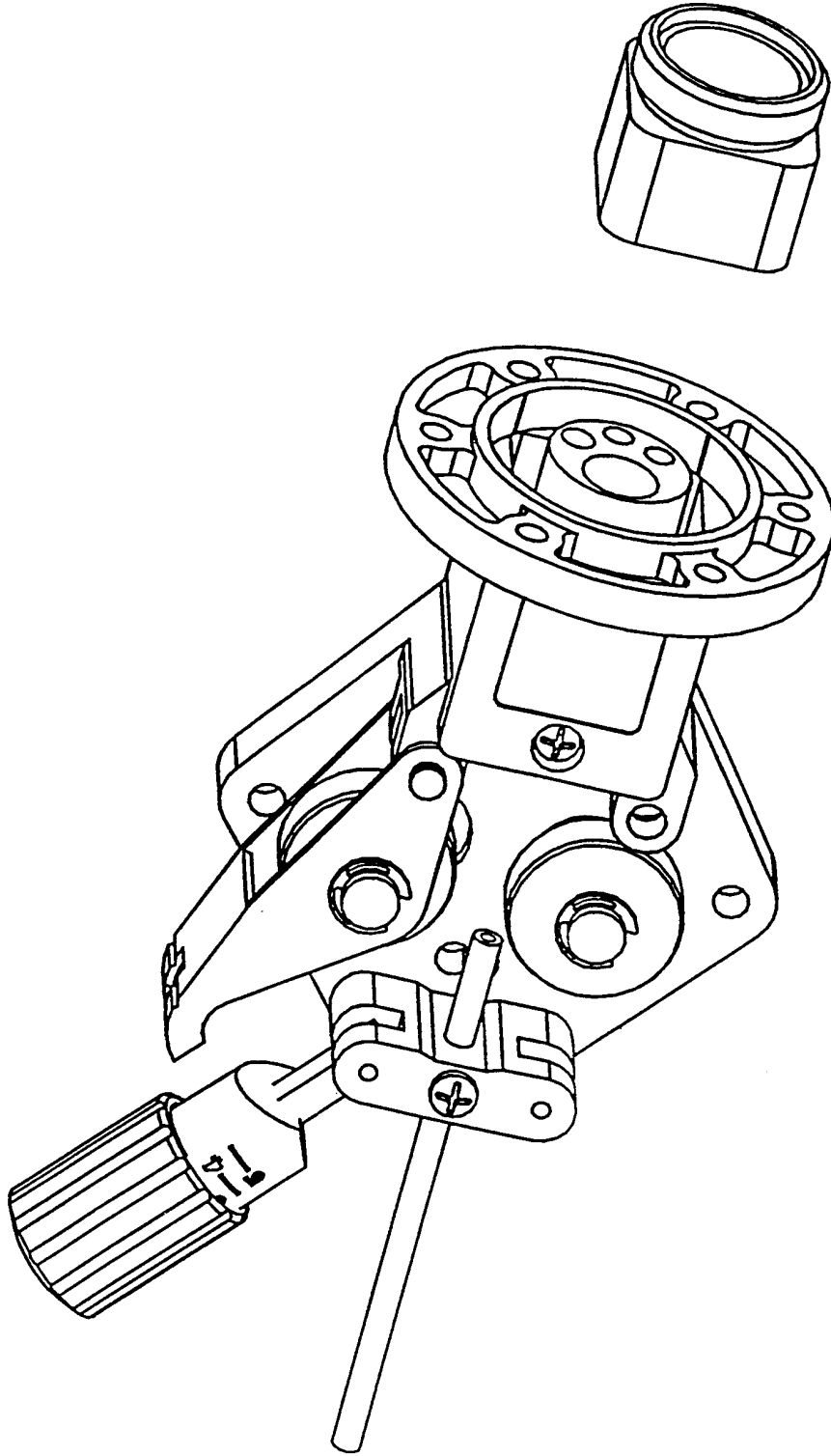


FIG. 3.



