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(54) Multipole male-female connector for a blind or shutter drive

(57) Connector comprising a male member (42), to be connected to a multipole cable (32A-C), and a female member (44) to be fastened to a fixed support (30A) of a tubular geared motor (24) actuating rolling members (10), suited to comprise a number of poles (50-60) comprised between four and six in accordance with the wanted use. Also a manufacturing method thereof is disclosed.

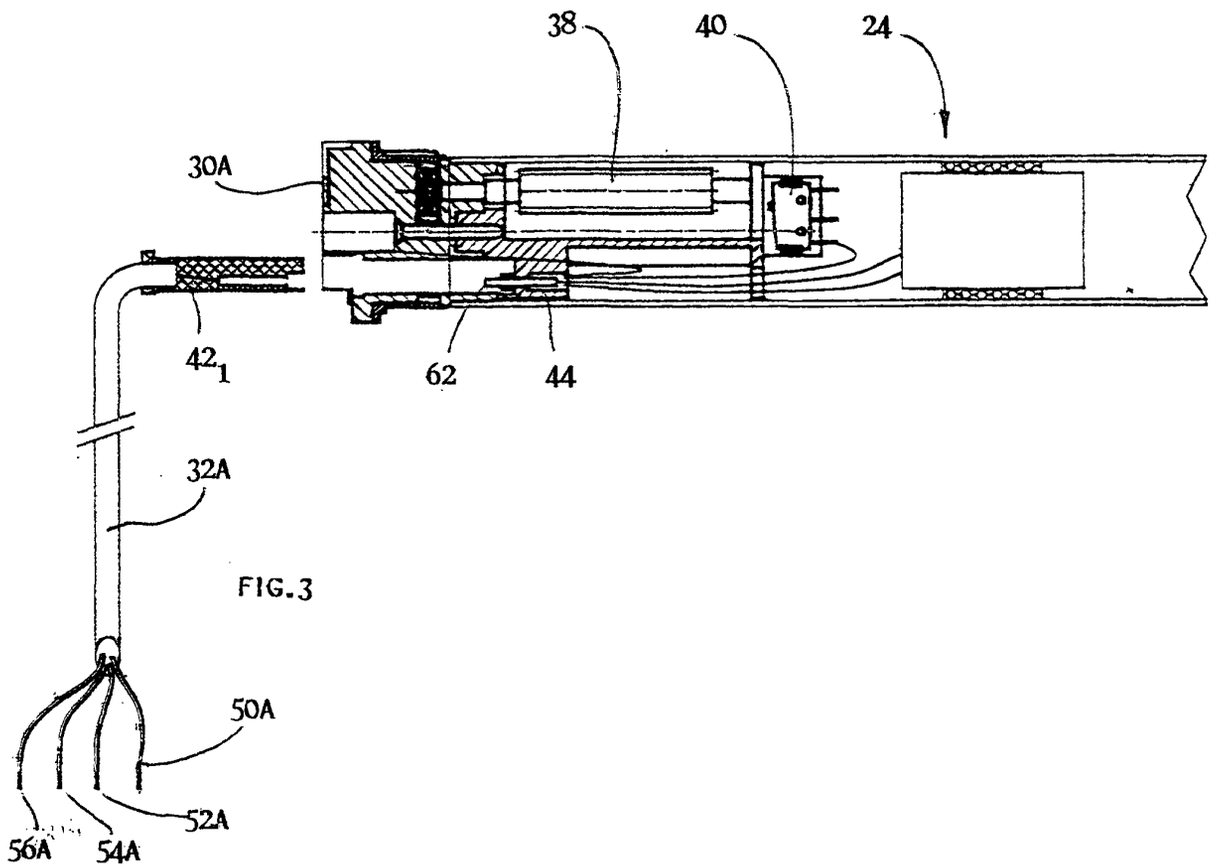

FIG.3

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Description

[0001] The present invention pertains to a male-female connector to be employed in association with electric and/or electronic actuators of rolling members, such as blinds or shutters, provided with a number of poles ranging from a minimum of four to a maximum of six.

[0002] In the field of the electric actuation of rolling members, such as shutters or blinds, are used the so-called tubular geared motors installed by insertion into a tube of the rolling member in order to occupy a space having size substantially equal to that of the served rolling member. For example, in the case of shutters, the use of a tubular geared motor inserted in the hollow shaft, about which is to be wound the shutter, allows to occupy a space substantially consisting of the encumbrance of the shaft with the whole shutter wounded plus the encumbrances of the supports of the shaft itself.

[0003] Presently, are series produced geared motors provided with a multi-wire cable piece to connect the electric portions of the geared motors to the power supply and to control devices and connect their metal mechanic portions to ground to comply with the usual safety rules requiring ground connection of mechanical electrically actuated portions.

[0004] Said cable piece, which during the manufacture of the geared motor is compelled to hang from the housing of the tubular geared motor, requires special care during the movement of the pieces under working, because risks to be entangled with similar cable pieces hanging from other geared motors simultaneously manufactured. Of course, said care protracts manufacturing times of the geared motors with consequent production cost raises.

[0005] It is the main object of the present invention to avoid the drawback of the cable pieces hanging from the housings of the geared motors, by manufacturing the geared motors without cables and connecting the cables to the geared motors themselves just after the completion of the manufacture.

[0006] To accomplish a fast and efficient connection of a cable to a geared motor, is used a connector according to the invention consisting of a male member, incorporated in an end of the cable, and of a female or cup member fastened, as recessed, to a fixed support of the geared motor, characterized in that the male member has so many female sockets as they are the conductive wires forming the cable and the female or cup member has so many male plugs as they are the sockets of the male member in order to allow all the necessary connections between the cable and the geared motor.

[0007] Specifically, for the simple manual control of going up and down movements of shutters or opening and closure of blinds, the male member is provided with four sockets connected to the four wires of a cable and the female member is provided with four plugs connected to the same number of conductors for the geared motor.

[0008] Alternatively, for a closure and opening manual control of blinds with the addition of an automatic closure in case of wind having force higher than a pre-set value, the male member is provided with a socket in addition to the preceding four ones for the connection of a fifth wire of a cable serving to send the signal of an anemometer, able to cause the automatic closure of the blind, and the female member is provided with a fifth plug for the transfer of the anemometer signal to the control circuit incorporated in the fixed support of the geared motor.

[0009] Further alternatively, for a control of going up and down movements of shutters availing of stroke limiting device of electronic kind, the male member is provided with six sockets of which two are for the connection to the power supply, a third one is for safety ground connection, a fourth one is to inquire a movement sensor, installed in a circuit board of a geared motor, by a central station controlling all the rolling members, a fifth one transfers answers from the sensor to the central station and a sixth one transfers coded signals recognisable by each circuit board for actuating a pre-selected shutter in accordance to a pre-set software.

[0010] The essential features of the present invention will be defined in the appended claims. However, other features and advantages of the invention will be defined by the following detailed description of embodiments thereof, provided with the enclosed drawings, wherein:

- fig. 1 is a perspective exploded view of a shutter, provided with geared motor, which may contain the present invention;
- fig. 2 is a partial cross-section view of a geared motor provided with directly connected cable according to the prior art;
- fig. 3 is a partial cross-section view of a geared motor connected, by means of a connector according to a first embodiment of the present invention, to a supply and control cable;
- fig. 4 is a front view of a male connector according to the first embodiment of the present invention;
- fig. 5 is a partial and exploded perspective view of a geared motor provided with cable and connector according to the first embodiment of the present invention;
- fig. 6 is a partial cross-section view of a geared motor connected by a connector, according to a second embodiment of the present invention, to a supply and control cable;
- fig. 7 is a front view of a male connector according to the second embodiment of the present invention;
- fig. 8 is a partial and exploded perspective view of a geared motor provided with cable and connector according to the second embodiment of the present invention;
- fig. 9 is a partial cross-section view of a geared motor connected by a connector, according to a third

embodiment of the present invention, to a supply and control cable;

- fig. 10 is a front view of a male connector according to the third embodiment of the present invention; and
- fig. 11 is a partial and exploded perspective view of a geared motor provided with cable and connector according to the third embodiment of the present invention.

[0011] To better understand the invention, reference is made to fig. 1 depicting a shutter 10 connected by means of two straps 12 and 14 to be wound around a shaft 16, up and down moving in accordance to a here depicted harrow 18. The shaft 16 in the shape of a regular prism (usually an octagonal prism) ends at a side with a first rotating support and, at the other side, with a second support 22 rotating around a geared motor 24 to be inserted into the shaft 16. From the geared motor 24 comes out a polygonal pulley 26 suited to be inserted in the inside of the shaft 16 to transmit thereto a movement according to a harrow 28, allowing up and down movement, according to the arrow 18 of the shutter 10. The geared motor 24 is provided with a fixed support 30 for the fastening thereof to a window frame (not shown).

[0012] Reference is made to figure 2 depicting a geared motor 24 firmly connected to a cable 32, according to the prior art. According to this prior art, the fixed support 30 of the geared motor 24 has an opening for inserting and fastening the cable 32 to the fixed portions of the geared motor.

In fig. 2 is depicted the rotating support 22, on which is inserted the shaft 16 (Fig. 1), provided with inner toothing 34 meshing with a gear 36 connected to a turning screw 38, which with a microswitch 40 forms a stroke limiting device, which once it has been calibrated, provides to automatically stop the shutter when it has been completely either wound or unwound.

Reference is now made to figures 3, 4 and 5 depicting the geared motor 24 connected to a cable 32A by means of a male connector 42_1 inserted in a female connector 44 fastened to a fixed support 30A of the geared motor 24 according to the first embodiment of the invention. The male connector 42_1 is provided with sockets 50, 52, 54 and 56 connected to the respective conductors or wires 50A, 52A, 54A and 56A of the cable 32A and has two free recessed slots 57 and 59 suited to possibly house other sockets. The female connector 44 is provided with so many contact plugs 62 as they are the sockets 50-56.

[0013] Reference is now made to figures 6, 7 and 8 depicting the geared motor 24, which is of the kind able to recognise an external parameter, as for example a signal of wind speed provided by an anemometer, connected to a cable 32B, requiring an additional conductor for the signal from the anemometer, by means of a male connector 42_2 inserted in a female connector 44 fastened to a fixed support 30A of the geared motor 24 in accordance with the second embodiment of the invention. The male connector 42_2 is provided with sockets 52, 54, 56 and 58 connected to respective conductor wires 50A, 52A, 54A, 56A and 58A of the cable 32B and has also a free recessed slot 59 serving to house another possible socket. Also in this case the female connector 44 is provided with so much plugs 62 as they are the sockets 50-58.

[0014] Reference is now made to figures 9, 10 and 11 depicting the geared motor 24 of the kind provided with an electronic stroke limiting device 40' of the kind of resolvers, actuated by a gear 36' and installed on a circuit board 41. The geared motor 24 is connected to a cable 32C by means of a male connector 42_3 inserted in a female connector 44 fastened to a fixed support 30A of the geared motor 24 in accordance with the third embodiment of the invention. The male connector 42_3 is provided with sockets 50, 52, 54, 56, 58 and 60 connected to respective conductors 50A, 52A, 54A, 56A, 58A and 60A of the cable 32C. Also in this last case the female connector 44 is provided with so many plugs as they are the sockets 50-60.

[0015] The manufacture of the cables 32A, 32B and 32C with the corresponding male connectors 42_1, 42_2, or 42_3 occurs in the following way:

one of the cables 32A, 32B or 32C with the conductors 50A-60A connected to the sockets 50-60 is arranged in a mould for plastic material having the shape of the male connectors 42_1, 42_2 or 42_3 and an injection moulding of the conductors is accomplished.

[0016] Of course, the mould is provided in the case of the male connectors 42_1 and 42_2 with one and two auxiliary plugs, respectively, for the forming of the respective recessed slots 57 and 59 for the lacking sockets. This fact allows to have always the same shape of male connector and simultaneously, to spare one or two sockets 58 and/or 60 in the case of the connectors 42_1 and 42_2 connected to the respective cables 32A and 32B.

[0017] What has been here above disclosed depicts just some embodiments of the present invention, not to be considered as limiting the invention, whose scope is defined by the appended claims.

Claims

1. Connector consisting of a male member (42_1, 42_2, 42_3) incorporated in the end of a cable (32A, 32B, 32C) and of a female or cup member (44), fastened as recessed to a fixed support (30A) of a geared motor (24) **characterized in that** the male member (42_1, 42_2, 42_3) has so many sockets (50-60) as they are the conducing wires (50A-60A) of the cable and the female or cup member (44) has so many plugs (62) as they are the sockets (50-60) in the male

member (42_1, 42_2, 42_3) so that all the necessary connections between the cable (32A, 32B, 32C) and the geared motor (24) are allowed.

2. Connector, as in claim 1, used for simple manual control of either up and down movement of shutters or closure and opening of blinds, **characterized in that** the male member (42_1) is provided with four sockets (50, 52, 54, 56) connected to four conductors (50A, 52A, 54A, 56A) of a cable (32A) and the female member (44) is provided with four plugs (62) connected to corresponding conductors entering the geared motor (24).

3. Connector, as in claim 1, used for closing and opening manual control of blinds with the addition of automatic closure in case of wind having force higher than a pre-set value, **characterized in that** the male member (42_2) is provided with a socket, additional with respect to the four preceding sockets (50, 52. 54. 56) for the connection to a fifth conductor (58A) of a cable (32B) serving to send the signal of an anemometer able to cause the automatic closure of the blind and the female member (44) is provided with a fifth plug for the transfer of the anemometer signal to the control circuit incorporated in the fixed support (30A) of the geared motor (24).

4. Connector, as in claim 1, used for an up and down movement of shutters, **characterized in that** is availing of a stroke limiting device (40'), as a resolver, and of a circuit board of an electronic control (41), the male member is provided with six sockets (50, 52, 54, 56, 58, 60) of which two (50, 52) are for the connection to the power supply, a third one (54) is for the safety ground connection, a fourth one (56) is to inquire a movement sensor by a central station controlling all the rolling members of the shutters, a fifth one (58) transfers an answer from the sensor to the central station, and a sixth one (60) transfers coded signals recognisable by each circuit board for actuating a pre-selected shutter in accordance to pre-set software.

5. Manufacturing method for connectors in accordance with the preceding claims **characterized by** comprising:

> arranging one of the cables (32A, 32B or 32C) with the conductors (50A-60A) connected to the sockets (50-60) into a mould for plastic having the shape of the male connectors (42_1, 42_2, 42_3) and carry out an injection moulding of the connectors.

6. Manufacturing method according to claim 5, **characterized by** providing the mould, in case of male connectors (42_1 and 42_2), with two and one auxiliary plug, respectively, for the forming of respective recessed slots (57 and 59) for the lacking sockets.

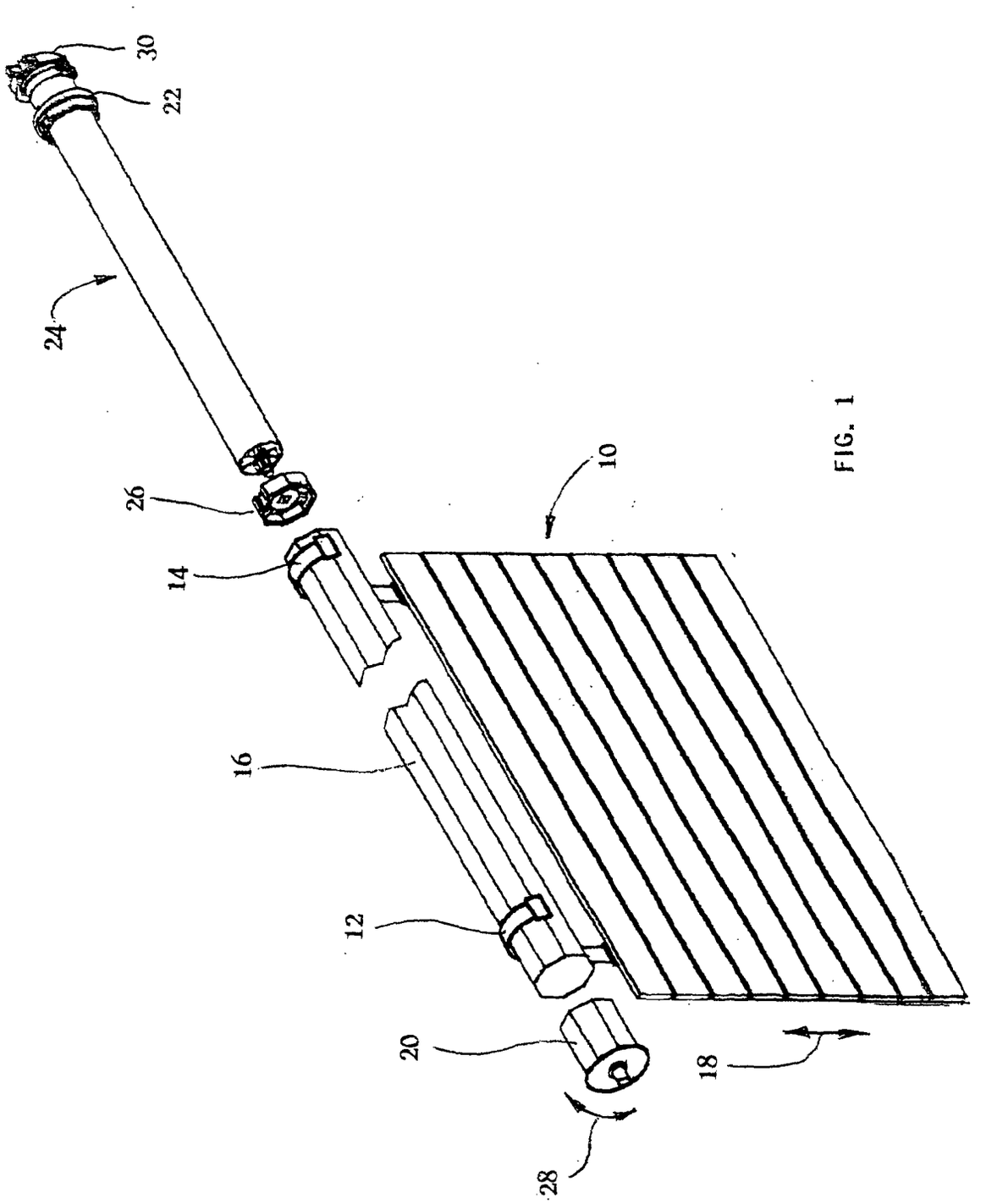

FIG. 1

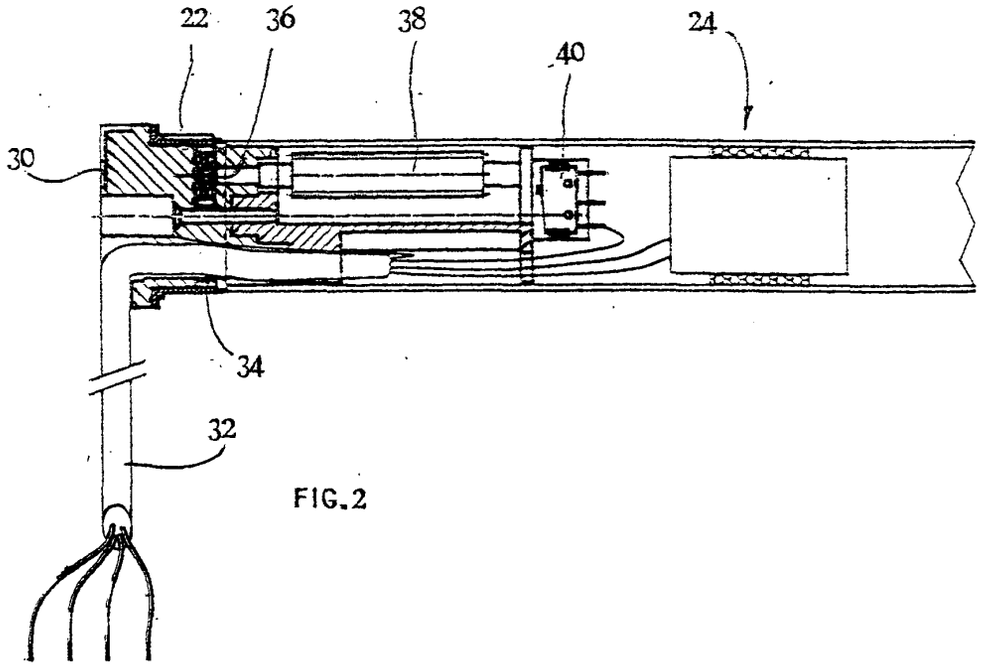

FIG.2

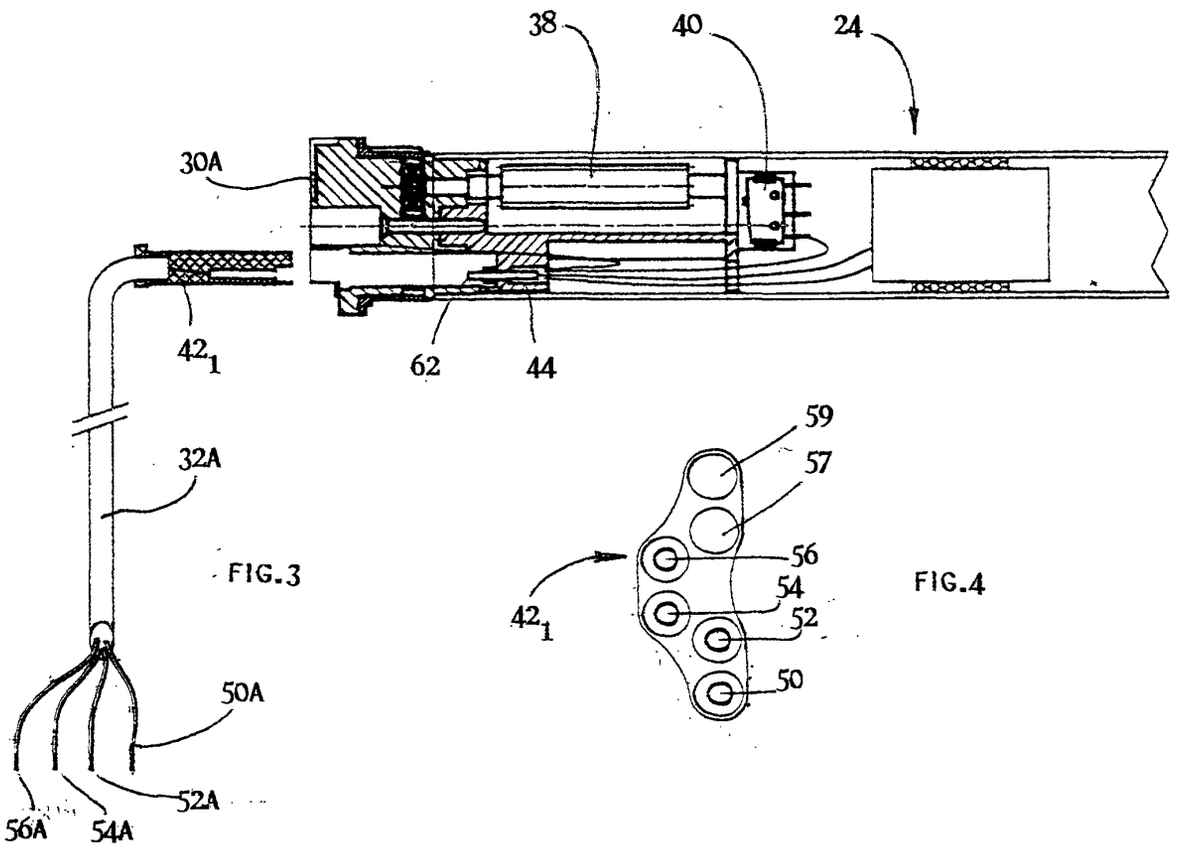

FIG.3

FIG.4

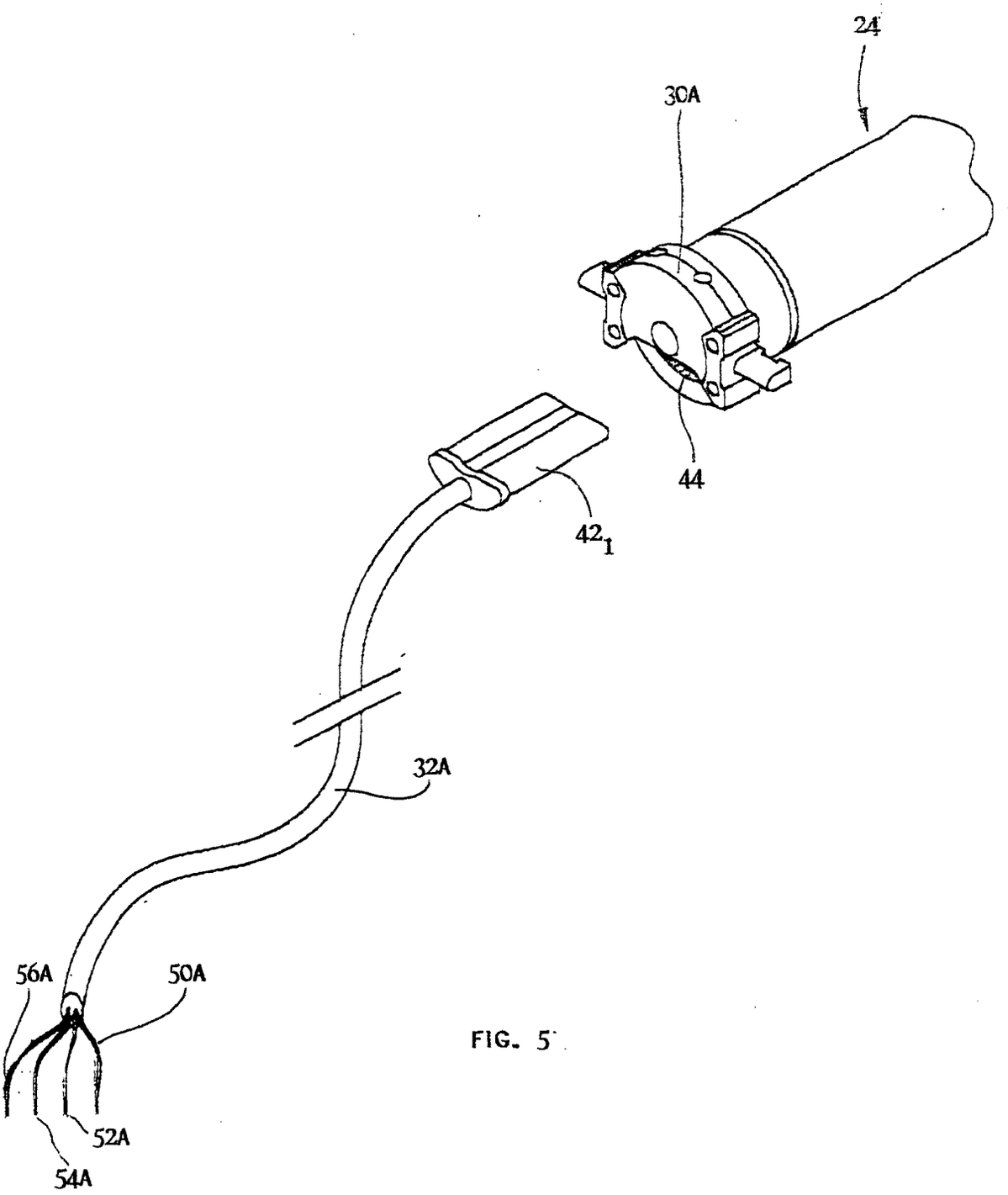

FIG. 5

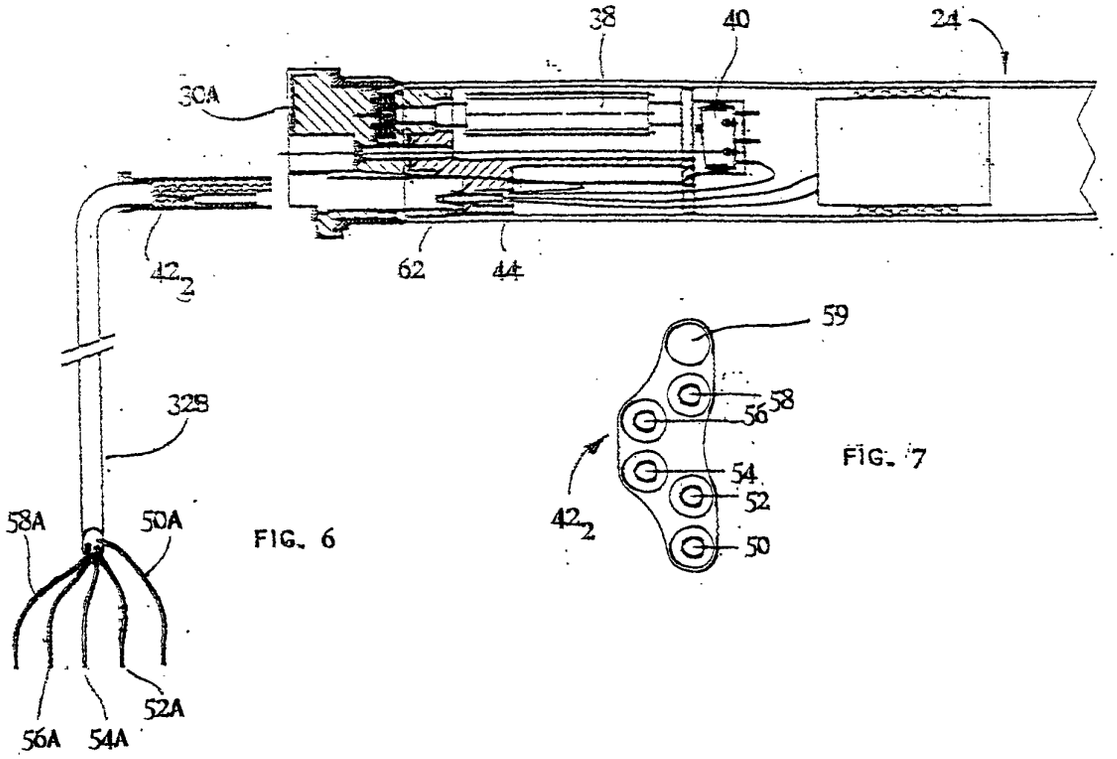

FIG. 6

FIG. 7

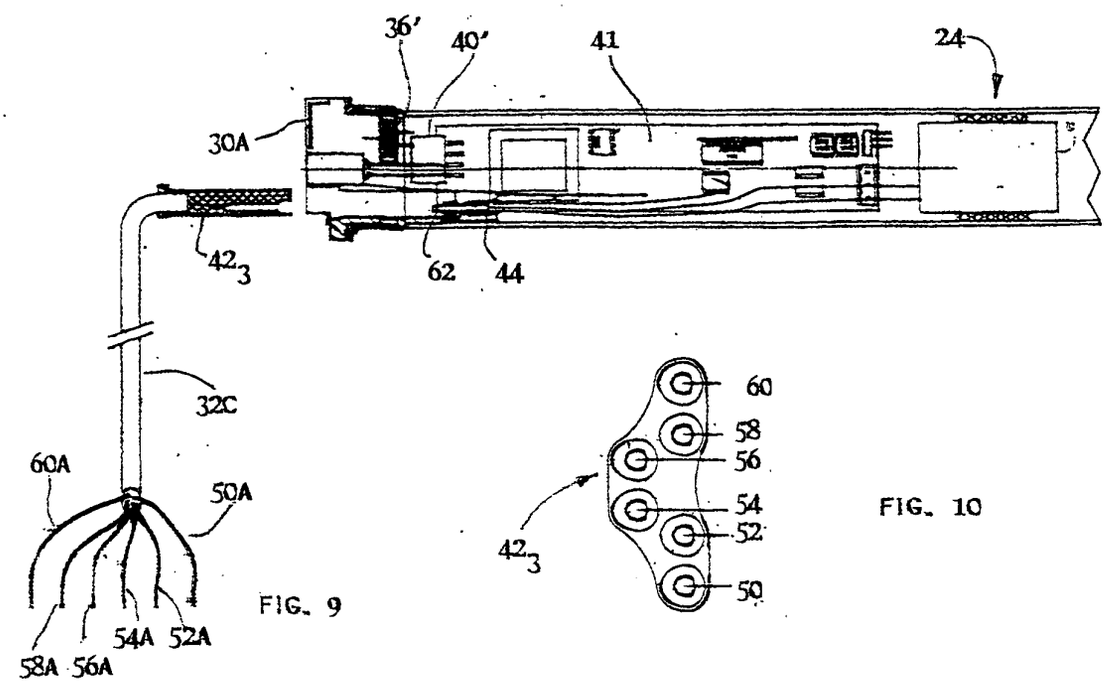

FIG. 9

FIG. 10

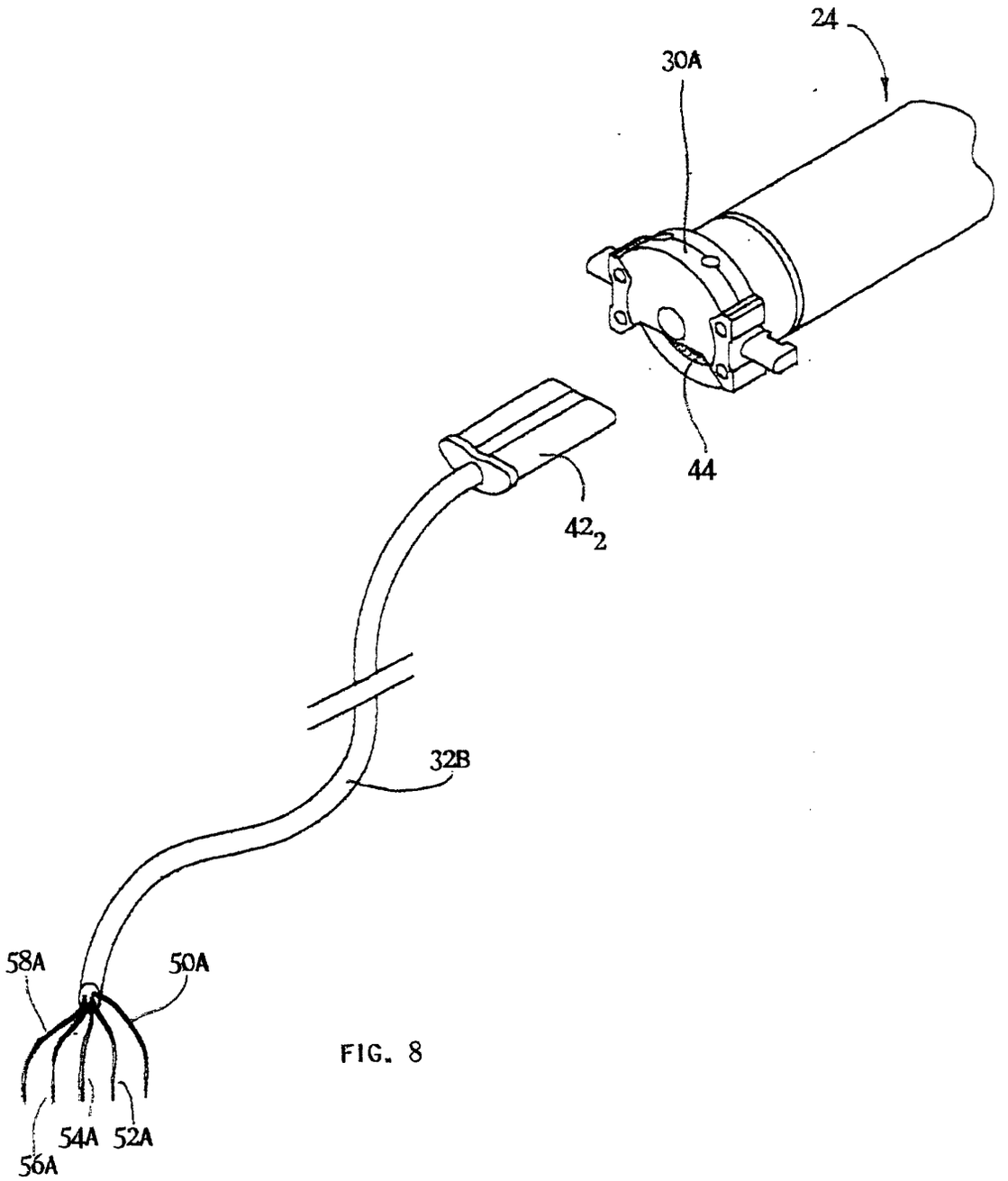

FIG. 8

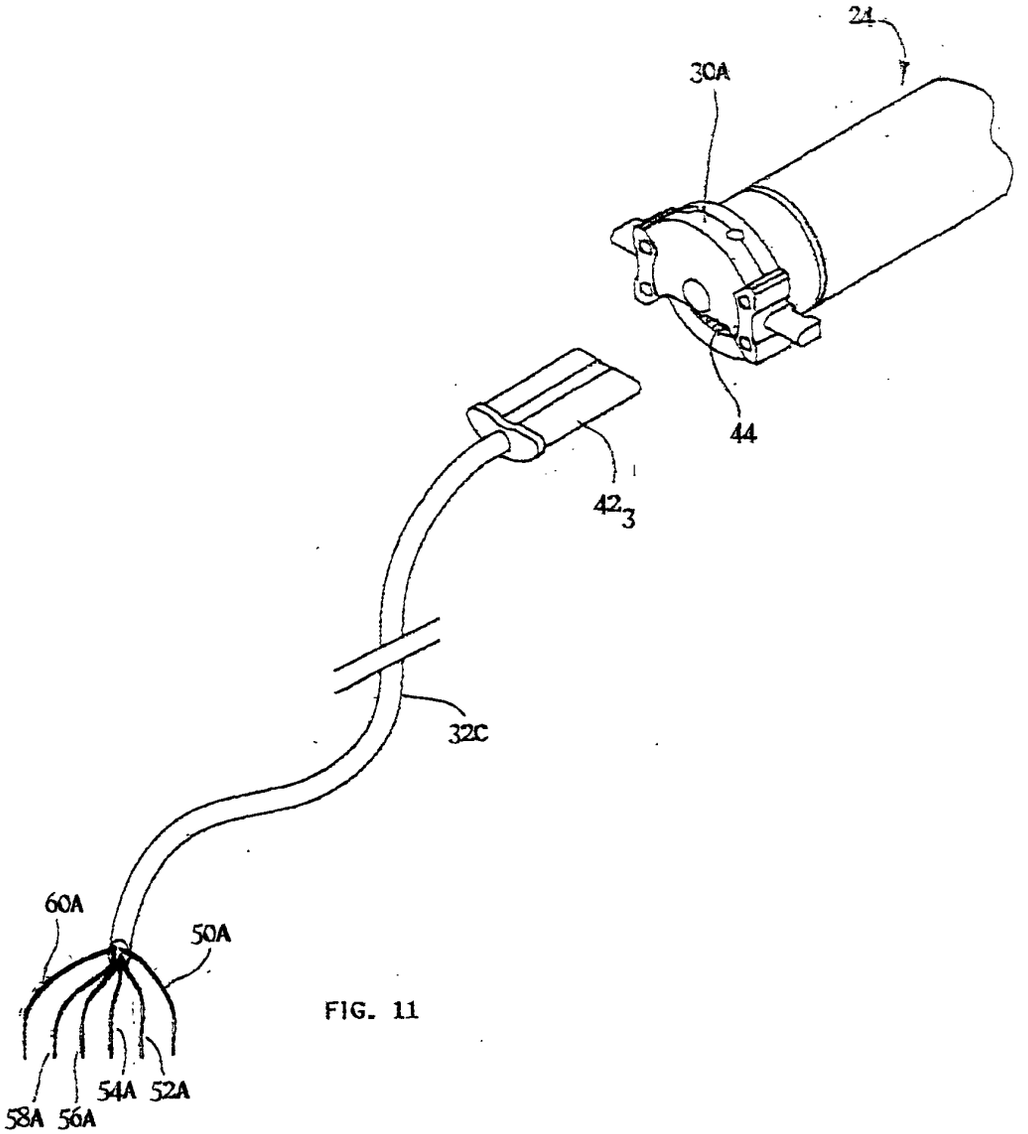

FIG. 11