EUROPEAN QUALIFYING EXAMINATION 1992

PAPER A
ELECTRICITY / MECHANICS

This paper comprises:

INSTRUCTIONS TO CANDIDATES

You are to assume that you have received the annexed letter from your client including a description of an invention for which he wishes you to obtain a European patent together with references to the most pertinent prior art known to your client.

You should accept the facts given in the paper and base your answers upon such facts. Whether and to what extent these facts are used is your responsibility.

You should not use any special knowledge you may have of the subject-matter of the invention, but are to assume that the prior art given is in fact exhaustive.

Your task is to draft an independent claim (or claims) offering the applicant the broadest protection possible while at the same time having a good chance of succeeding before the EPO. In drafting your claim(s) you should bear in mind the need for inventive activity over the prior art indicated, the requirements of the Convention as to the form of claims, other requirements of the Convention and the recommendations made in the Guidelines for Examination in the EPO. Dependent claims should be kept to a reasonable number and so drafted as to enable you to fall back upon them should the independent claim(s) fail.

You are also expected to draft an introduction, i.e. that part of the description which precedes the examples or the explanation of the drawings. The introduction should be sufficient to provide support for all claims. In particular, you should consider the advisability of mentioning advantages of the invention in the introduction.

You are expected to draft claims and an introduction for one European patent application only. If you find that the requirements of the Convention as to unity would in practice cause you to make any of these claims the subject of a separate patent application, you should indicate that separately without further elaboration in this respect.

In addition to your elaborated solution, you may - but this is not mandatory - give, on a separate sheet of paper, the reasons for your choice of solution, for example, why you selected a particular form of claim, a particular feature for an independent claim, a particular piece of prior art as starting point or why you rejected or preferred some piece of prior art. Any such statement should however be brief.

It is assumed that you have studied the examination paper in the language in which you have given your answer. If this is not so, please indicate on the front page of your answer in which language you have studied the examination paper. This always applies to candidates who - after having filed such a request when enrolling for the examination - give their answer in a language other than German, English or French.

Client's Letter

We are a firm producing and selling electrical lighting fittings. We specialise in lighting fittings to be suspended from the ceiling of a room, in particular chandeliers having a plurality of arms extending from a suspended central support structure.

A problem with chandeliers is that they occupy a lot of space when assembled, which makes their packaging, storage and shipment in the assembled condition expensive. To solve this problem we developed earlier and have been selling modular chandeliers as described in document I. The arms of these modular chandeliers are releasably (i.e. removably) mountable to the central support structure. This makes it possible to pack the chandeliers in a disassembled condition and thereby to reduce the storage and shipping costs. Such chandeliers are assembled by first suspending the support structure from the ceiling of the room and thereafter mounting the arms on the already suspended support structure. Since the arms are releasably mountable on the support structure, it is even possible to remove them when the chandelier is in place, thereby facilitating cleaning of the chandelier.

In the known chandeliers the central support structure has a plurality of electrical connectors with female electrical contacts which cooperate with the male contacts of corresponding electrical connectors provided on each of the arms. The female contacts are so disposed on the central support structure that, when the support structure is suspended from the ceiling of a room, the male contacts of an arm have to be inserted vertically. This is difficult because the female contacts are not readily accessible to the person mounting the arms.

Furthermore, in the case of the chandelier shown in Figure 1 of document I with large and heavy arms which are releasably attached to the support structure at two vertically displaced positions, it

is necessary to lower the arm vertically so that both mechani and electrical engagement can occur simultaneously at the vertically displaced positions.

We have designed new chandeliers which enable easier mounting of the arms onto the suspended central support structure.

The inventor has prepared the following detailed description of our new chandeliers with reference to the accompanying drawings.

In the drawings:

Figure 1 is an elevation view of a chandelier, shown partially in section, the chandelier having upper and lower support members;

Figure 2 is an exploded perspective view of a connector arrangement of the chandelier of Figure 1;

Figure 3 is a partial cross-section of the connector arrangement of Figure 2; and

Figure 4 is a partial cross-section of a connector arrangement used in a lighter chandelier without the upper support member.

The chandelier, which is partially shown in Figure 1, includes an elongate rigid central support structure 1 and six arms 2, each of which is removably supported at two positions on the central support structure. In the assembled condition of the chandelier the support structure 1 is suspended vertically from the ceiling of a room and each arm 2, only one of which is shown in Figure 1, occupies a vertical plane extending radially from the suspension axis 11 of the support structure.

The support structure 1 comprises an upper support member 12, a rigid stem 13 and a lower support member 14, the lower support member 14 also serving as electrical connector means. The upper support member 12 has a cylindrical outer wall 15 in whose upper

edge six notches 16 are formed. The lower support member 14 ha cylindrical wall 17 in which are formed six openings 18. Each notch 16 is vertically aligned above one of the openings 18. Two insulated electric supply wires 19 extend through the stem 13.

As shown in Figure 1 each arm 2 carries a lamp 21. In its lower portion 2a the arm 2 includes an electric connector plug 22 comprising two parallel flat metallic contact pins 23 which, when the arm is mounted on the support structure, extend horizontally towards the axis 11 of the support structure. The contact pins 23 are connected to the lamp 21 by insulated conductors not shown in Figure 1.

In its upper portion 2b each arm 2 has a hook 24 which is adapted to engage one of the notches 16. The hook 24 is provided on both sides with a vertically extending slot thereby forming a neck 25 of reduced cross-section. The neck 25 is received within one of the notches and is sufficiently wide at its upper portion to accommodate comfortably the cylindrical wall 15 of the upper support member. The neck 25 widens further towards its lower end so that, when the hook 24 is received in one of the notches 16, the arm 2 may be pivoted slightly about the hook in a vertical plane.

To mount an arm the hook 24 is first engaged with a notch 16 and then the arm 2 is pivoted towards the support structure 1 to insert the connector plug 22 in a substantially horizontal direction into the corresponding opening 18. In this way it is easy to attach an arm 2 to the support structure 1.

Figures 2 and 3 illustrate the internal construction of the lower support member 14, which includes the electrical connector means for receiving the connector plugs 22 of the arms 2.

The connector means include two identical electrically conduc plates 30, 31, which are preferably made of a copper alloy. The plates 30, 31 are separated by an insulating spacer 32, made of a resilient material, having a generally cylindrical configuration. The axis of the spacer 32 coincides substantially with the suspension axis 11 of the support structure 1.

The spacer 32 is formed with a peripheral rim 33, 34 on each of its upper and lower surfaces. Pairs of radially extending recesses 35 are formed in the rims 33, 34 and the upper and lower surfaces of the spacer 32 for receiving the contact pins 23 of respective plugs 22.

The spacer has an axial central opening. A locating slot 36 is formed in the periphery of the spacer 32 about midway between two adjacent pairs of recesses 35. A locating and access slot 37 formed opposite the slot 36 communicates with the central opening.

The plate 30, which is located at the upper surface of the spacer 32, has a central opening and the outer circumferential edge of the plate 30 is bent slightly upwards. The plate 31 is located at the lower surface of the spacer 32 with its bent edge directed downwards. The plate 31 also has a central opening.

The lower support member 14 comprises an upper housing portion 38 and a lower housing portion 39, both made of an insulating material. The housing portions 38, 39 enclose the spacer 32 and the plates 30, 31.

As best seen on Fig. 2 the upper housing portion 38 comprises a downwardly extending pedestal 40 with a circumferential groove 41. Beyond the groove 41 the circumferential edge of the pedestal 40 is

inclined to fit within the peripheral rim 33 of the spacer 32. the inclined edge of the pedestal 40 there are formed a pair of diametrically opposed positioning notches 42.

The lower housing portion 39 includes a circular base integral with the circumferential cylindrical wall 17 in which are formed the six openings 18 of the lower support member 14. In the center of the lower housing portion 39, on its upper side, there is formed a raised pedestal 43 having a circumferential groove 44 similar to the pedestal 40 and the groove 41 of the upper housing portion 38. A pair of diametrically opposed walls 45 are provided in the lower housing portion 39, the walls 45 being located midway between adjacent openings 18 and extending in a radial direction.

During the assembly of the lower support member 14 the upper housing portion 38 is secured to the lower end of the stem 13 by a nut 46. After the supply wires 19 have been soldered to the plates 30 and 31, the plates 30, 31 are located on the upper and lower surfaces respectively of the spacer 32. The wire for the plate 31 is inserted into the central opening of the spacer 32 using the access slot 37. The slots 36, 37 of the spacer 32 receive the opposed walls 45 to locate the spacer 32 and prevent rotation thereof. The positioning notches 42 of the upper housing portion 38 engage with the opposed walls 45. Screws 47 pass through holes in the notches 42 into the opposed walls 45 to fasten the lower housing portion 39 to the upper housing portion 38.

As shown in Figure 3, in the assembled condition of the lower support member 14, the upturned edge of the plate 30 extends freely into the groove 41. In similar fashion the downturned edge of the plate 31 extends freely into the groove 44. As the plug 22 of an arm 2 is inserted into one of the openings 18, the flat contact pins 23 enter a pair of recesses 35 in the insulating spacer 32 forcing the plates 30, 31 slightly apart. With the plug fully

inserted, the plates 30, 31 are forced into tight engagement with the pedestals 40, 43 respectively. A substantial length of each contact pin 23 is then in contact with the surface of a plate and a slight vertical space appears between each plate 30, 31 and the insulating spacer 32 as shown in Fig. 3.

The floating relationship of the plates 30, 31 to the spacer 32 insures smooth making and breaking of electrical contact, and also solves a problem of manufacturing tolerances which might otherwise exist. By the use of a resilient spacer, improved electrical and mechanical connection is achieved.

In the chandelier illustrated with reference to Figures 1 to 3 both an upper support member 12 and a lower support member 14 are provided for supporting the arms 2. It is not always necessary however to provide two vertically displaced support members. With a lighter, less ornate arm the necessary support for the arm may be provided from a single support member which receives the connector plug of the arm for establishing the electrical connection. Figure 4 illustrates a support member for such a case.

The chandelier of Figure 4 includes a central support structure 50 which is suspended along an axis 51 and has a single suuport member 52 to which a plurality of arms 60 are releasably attached. The arms 60 are lighter than the arms 2 of Fig. 1, including neither an upper portion (cf. 2b, Fig. 1) nor a hook (cf. 24, Fig 1).

The support member 52 is substantially the same as the lower support member 14 shown in Figures 1 to 3. However the support member 52 is additionally provided with a locking member 53 which cooperates with the arms 60 to lock them securely in place. The locking member 53 is preferably formed of a resilient plastics or like material and has the configuration of a disc 54 with a down-

wardly protruding flange 55 and a handle 56 extending above the disc 54. The handle 56 has a central threaded opening therein and is screwed upon the rigid stem 57 which is threaded. Before inserting the arms 60 in the support member 52 the locking member 53 is screwed down onto the upper housing portion.

It will be seen in Figure 4 that each of the arms 60 has a transverse recess 61 formed in the inclined upper surface of a connector plug 62. When an arm 60 is inserted into the support member 52, due to the resiliency of the locking member 53 the protruding flange 55 rides over the top of the plug 62 and latches in the recess 61. Thus, by resiliently urging the protruding flange 55 into the recesses 61, the arms 60 can be releasably secured in place. The arms 60 are precluded from twisting outwardly from the support member 52 by the action of the flange 55 on the upper part of each plug 62.

To release a single arm the locking member 53 can be urged locally upwards, for example using a screwdriver, to retract the flange 55 from the recess 61 of that arm. To release all of the arms the locking member 53 can be screwed upwards to simultaneously retract the flange 55 from the recesses 61 of all the arms 60.

It will be noted that in the chandelier of Figure 4 the contact pins 63 of the plug 62 provide both electrical connection and a certain amount of mechanical support for the arm 60. The bottom of each opening formed in the lower housing portion is moreover adapted to provide a support 58 under the plug 62.

Of course a locking member as described above can also be added to the lower support member 14 of the chandelier shown in Figure 1.

CLIENT'S DRAWINGS

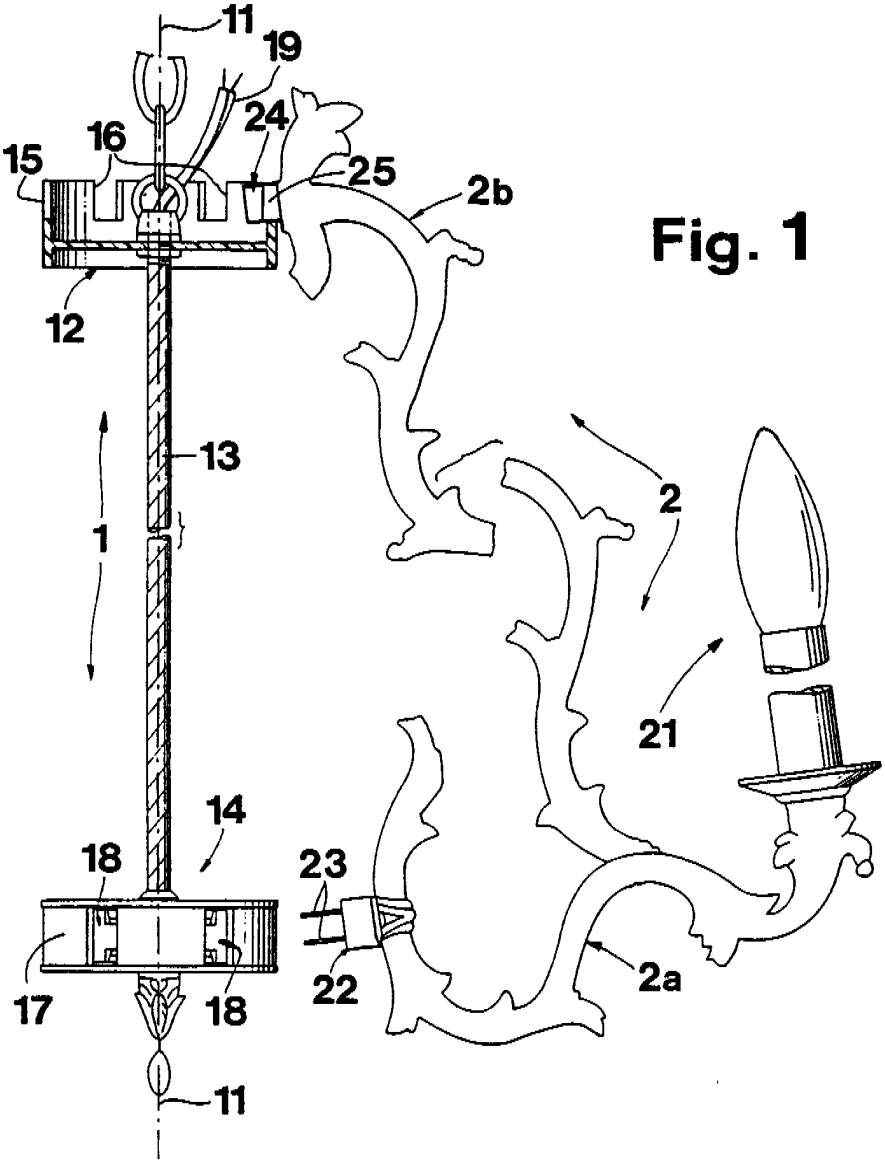

Fig. 1

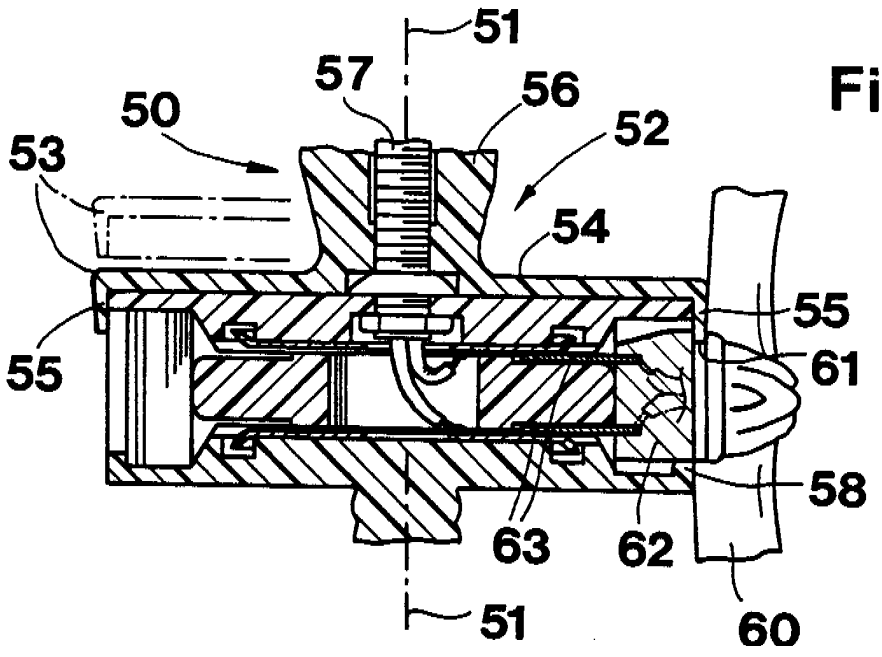

Fig. 4

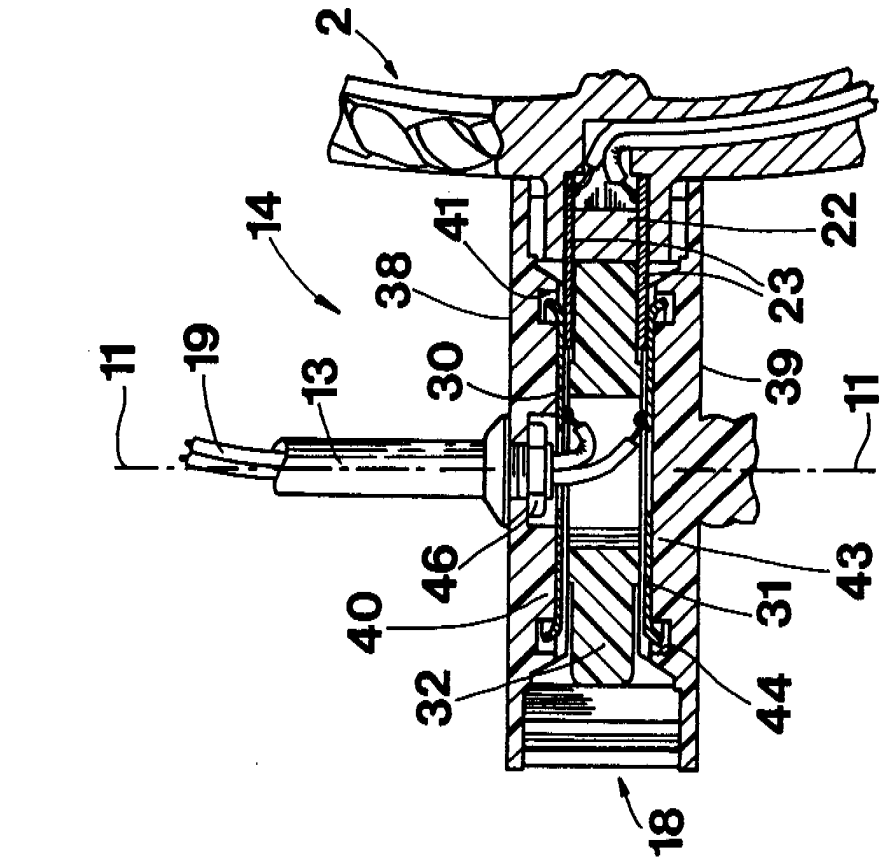

Fig. 3

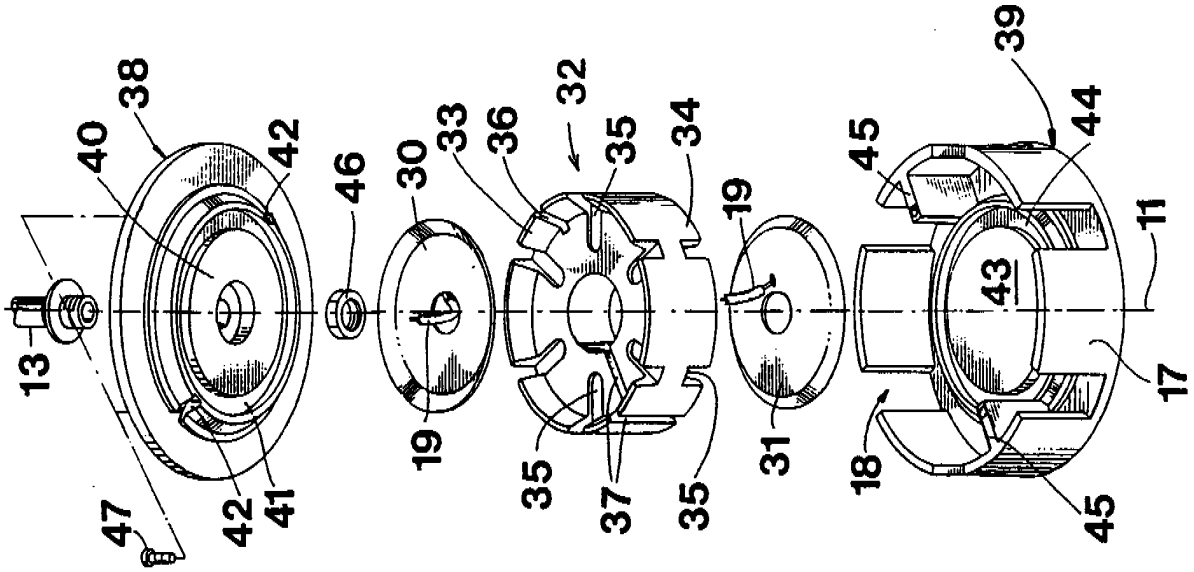

Fig. 2

DOCUMENT I (State of the Art)

This document refers to modular chandeliers which can be packed, stored and transported in a space saving manner. They can quickly and easily be assembled and disassembled. In the drawings:

Fig. 1 is an elevation view of one embodiment of a modular chandelier;

Fig. 2 is a cross-sectional view taken along the line 2 - 2 of Fig. 1; and

Fig. 3 is an exploded perspective view showing the electrical connection of one of the chandelier arms.

The chandelier shown in Fig. 1 includes a rigid central frame F and three radially extending arms A (of which only one is shown). The central frame F includes an upper support 10, a rigid stem 20 and a lower support 30. The upper support 10 has a cylindrical outer wall 11 in whose upper edge three notches 12 are formed. The lower support 30 has a cylindrical wall 31 which is generally identical to the wall 11 and in which three notches 32 are formed.

A supply cable 40 passes through the hollow stem 20 of the frame F into the interior of the lower support 30. Within the lower support there are electrical contacts which will be described later.

Each of the arms A carries a lamp 50. Each arm has an upper portion 60 with a hook 61 and a lower portion 70 with a hook 71. Each hook has a vertically extending neck which is received in a corresponding notch 12, 32.

As can best be seen from Fig. 3 each arm A also has a pair of male electrical contacts 75 extending downwardly from the lowermost end

of the hook 71. A cable 80 connects the contacts 75 to the lamp of the arm.

Fig. 2 shows that the lower support 30 includes three pairs of female electrical contacts, the first pair being identified by references B1 and B2. The three pairs of female contacts are connected to the cable 40 so that each pair can supply electrical current to a respective arm.

Each notch 32 in the wall 31 and the associated pair of female contacts cooperate with the hook 71 and the male contacts 75 of an arm, respectively. Each notch 12 in the wall 11 receives a respective upper hook 61.

The assembly of the chandelier is made as follows. After having suspended the central frame F from the ceiling, the first arm is placed in a vertical plane such that the two hooks 61 and 71 are disposed over the respective notches 12 and 32. Then the arm is moved vertically downwards so that both hooks engage simultaneously with their respective notches. This also results in the male contacts 75 being inserted into the female contacts, thereby completing the electrical connection to the lamp 50. The same procedure is then followed for each of the remaining arms. A cover 92 is then screwed over the lower support 30 by means of a thread on the stem 20 in order to prevent dust collecting in the lower support.

In an alternative embodiment which has lighter arms comprising the lower portion 70 only of the arm A, only the lower support is provided, the upper support being omitted.

DRAWINGS OF DOCUMENT I (State of the Art)

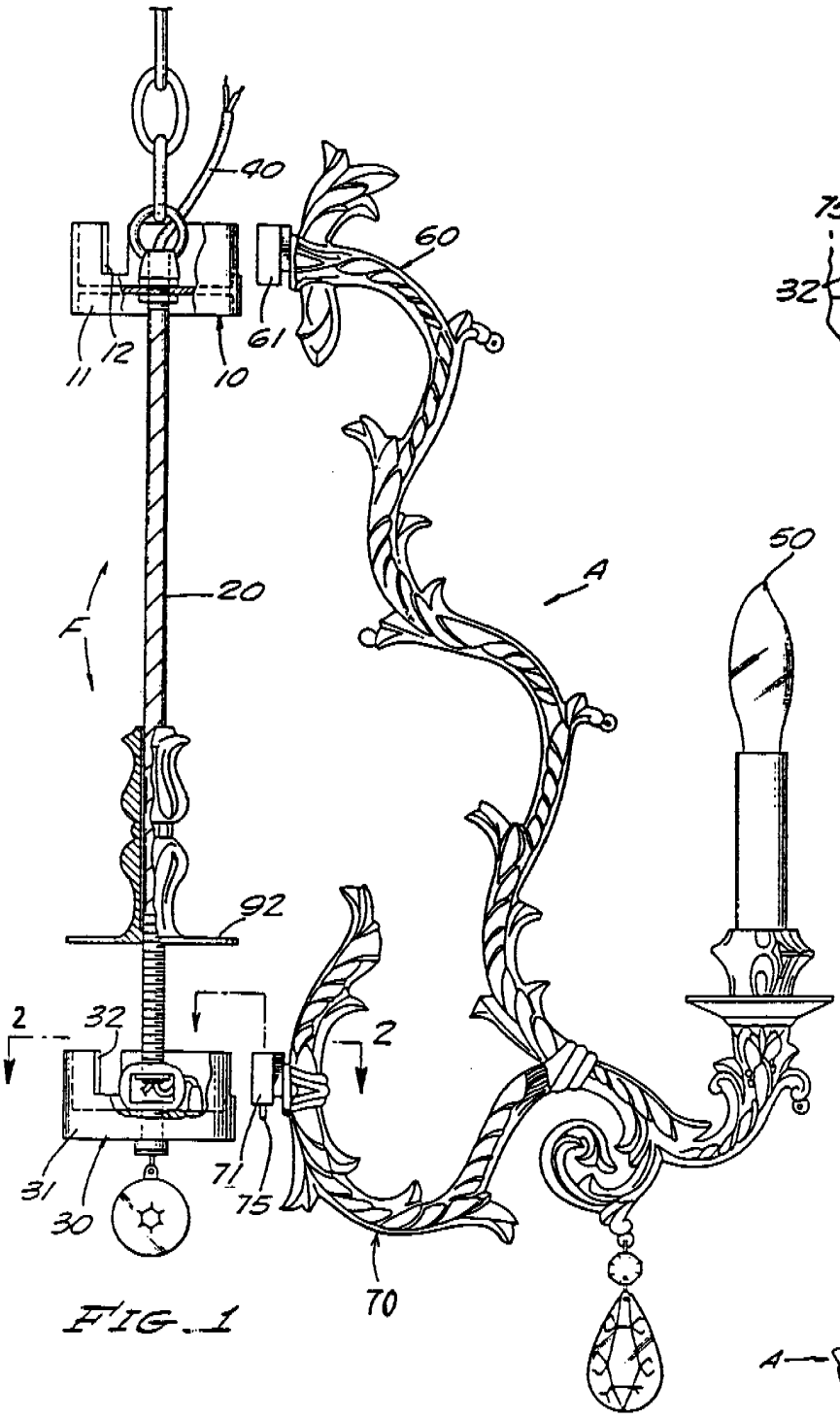

FIG. 1

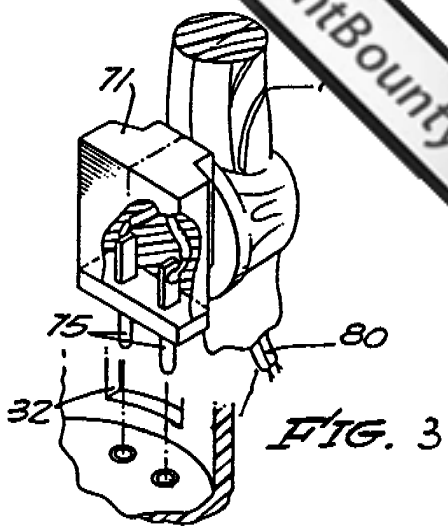

FIG. 3

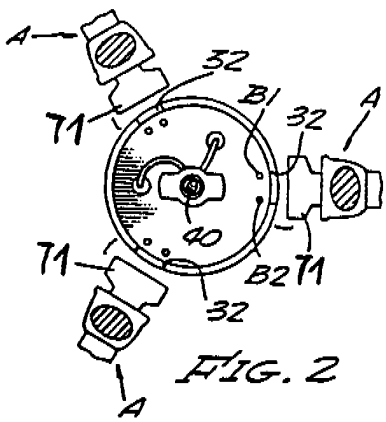

FIG. 2