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(54) **Power socket with a disengagement arrangement**

(57) The present invention relates to a power socket for the mains supply, comprising a casing with two holes for accommodation of and electrical interconnection with respective contact pins of a mating power plug, a disengagement member that is mounted in the casing for displacement between a first position, in which the disengagement member is substantially accommodated within the casing, and a second position, in which the disengagement member protrudes out of the casing from a surface of the power socket intended for facing the mating power plug when the power plug is mechanically and electrically interconnected with the power socket, and a user operated actuator for displacing the disengagement member from the first position to the second position.

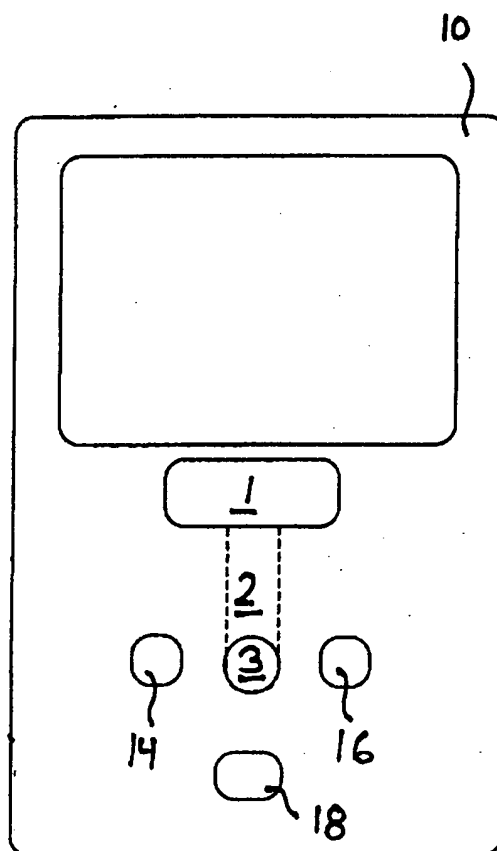


Fig. 1

Description

[0001] The present invention relates to a power socket for the mains supply, such as a wall socket, a socket outlet, etc., with a casing with at least two holes or recesses for accommodation of and electrical interconnection with respective contact pins of a mating power plug.

[0002] The term "mains supply" refers to the general purpose alternating current (AC) electrical power supply. Alternatively, the mains supply may be termed household power, household electricity, domestic power, wall power, line power, AC power, city power, grid power, etc.

[0003] Worldwide, many different mains power systems are found for the operation of household and light commercial electrical appliances and lighting. The different systems are primarily characterized by their voltage, frequency, and wall sockets or receptacles. Typically, industrial plants have poly-phase power systems with different and higher voltages and different sockets and plugs installed for large equipment.

[0004] Power plugs are male electrical connectors that fit into female electrical sockets. They have contacts that are pins or legs that connect mechanically and electrically to holes or slots in the socket.

[0005] Power sockets are female electrical connectors that have slots or holes which accept the pins or blades of power plugs inserted into them and deliver electricity to the plugs.

[0006] The present invention is suitable for the various domestic and industrial mains power systems.

[0007] In order to meet national and international standards, many power plugs of plug-and-socket connections for the mains supply have round and relatively thick contact pins. Therefore, the pins often fit very tightly in especially older wall sockets, which are often designed for insertion of flat or thin contact pins.

[0008] In many cases, it can be difficult to pull a power plug out of, e.g., a wall socket for the mains supply. The wall socket is often worn and gradually loses its hold in the brickwork and the electric connections. Loose power outlets increase the risk of short circuits and electric shocks.

[0009] Persons having rheumatism in the hands or persons with hands of reduced strength for other reasons find it very difficult to get a grip on, e.g., a power plug and pull it out of a wall socket. A power plug of a domestic appliance, such as a vacuum cleaner or an iron, has to be inserted into and pulled out of a wall socket many times. Typically, they are pulled out by its electric wire with a risk of damaging the plug, socket and the wire.

[0010] A tightly coupled electrical connection between such a plug and socket connector is furthermore difficult to disconnect by means of only one hand.

[0011] It is an object of the present invention to overcome these and other difficulties.

[0012] According to the present invention the above-mentioned and other objects are fulfilled by a power socket of the above-mentioned type characterized in that the

power socket further comprises a disengagement member that is mounted in the casing for displacement between a first position in which the disengagement member is substantially accommodated within the casing, and a second position in which the disengagement member protrudes out of the casing from a surface of the power socket intended for facing the mating power plug when the power plug and the power socket is mechanically and electrically interconnected.

[0013] The power socket may further comprise a user operated actuator for displacing the disengagement member from the first position to the second position.

[0014] The power socket may further comprise a spring applying a force to the disengagement member in a direction from the first position towards the second position.

[0015] The actuator may be mounted in a channel extending into the casing from the surface intended for facing the mating power plug when the power plug is mechanically and electrically interconnected with the power socket. Further, the actuator may be mounted in the channel for displacement between a free first position in which the actuator is protruding from the surface, and an activation position in which the actuator is displaced into the channel for displacement of the disengagement member to the second position of the disengagement member.

[0016] The channel may extend substantially in parallel with the disengagement member.

[0017] Alternatively, the channel may extend substantially perpendicular to the disengagement member.

[0018] The actuator may be connected to the disengagement member via a rotatably mounted member that is rotated by displacement of the actuator which in turn displaces the disengagement member from its first position to its second position.

[0019] A surface of the actuator abutting the disengagement member may form an angle with a longitudinal extension of the disengagement member.

[0020] Further, a surface of the disengagement member abutting the actuator may form an angle with the longitudinal extension of the disengagement member.

[0021] The actuator may be connected to the disengagement member via a member mounted for displacement between a first position and a second position in such a way that displacement of the actuator from its free first position to its activation position moves the member from its first position to its second position thereby displacing the disengagement member from its first position to its second position.

[0022] The actuator may be engage with a member mounted in a fixed position in such a way that displacement of the actuator from its free first position to its activation position turns the actuator for displacement of the disengagement member from its first position to its second position.

[0023] The disengagement member may extend substantially in parallel with the pins of the mating power plug

when the power plug is interconnected with the power socket.

[0024] The disengagement member may be displaceably accommodated in the casing with a friction fit.

[0025] The disengagement member may have a pressure base received in a recess in the casing in the first position.

[0026] The disengagement member may protrude from the surface of the casing in the second position of the disengagement member and the length of the protrusion ranges from 0.1 to 1.0, preferably from 0.2 to 1.0, more preferred from 0.4 to 0.8 times the length of the pins of the mating power plug.

[0027] The above and other features and advantages of the present invention will become readily apparent to those skilled in the art by the following detailed description of exemplary embodiments thereof with reference to the attached drawings, in which:

Fig. 1 is a front view of a wall socket according to the present invention,

Fig. 2 is a side view of the wall socket of Fig. 1,

Fig. 3 is a front view of another wall socket according to the present invention,

Fig. 4 is a side view of the wall socket of Fig. 3,

Fig. 5 is a front view of a socket outlet according to the present invention,

Figs. 6 and 7 illustrate from the side the operation of a disengagement arrangement according to the present invention,

Figs. 8 and 9 illustrate from the side the operation of another disengagement arrangement according to the present invention,

Figs. 10 and 11 illustrate from the side the operation of yet another disengagement arrangement according to the present invention,

Fig. 12 is a front view of another socket outlet according to the present invention, and

Figs. 13 and 14 illustrate from the side the operation of the disengagement arrangement of the socket outlet of Fig. 12.

[0028] The figures are schematic and simplified for clarity, and they merely show details, which are essential to the understanding of the invention, while other details have been left out. Throughout, the same reference numerals are used for identical or corresponding parts.

[0029] It should be noted that in addition to the exemplary embodiments of the invention shown in the accom-

panying drawings, the invention may be embodied in different forms and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the concept of the invention to those skilled in the art.

[0030] Fig. 1 is a front view of a wall socket 10 according to the present invention. Apart from the disengagement arrangement 1, 2, 3; the illustrated wall socket 10 is operated like a conventional wall socket. Like a conventional wall socket, the illustrated wall socket 10 has a casing 12 with three holes (line, neutral, ground) 14, 16, 18 for accommodation of and electrical interconnection with respective contact pins of a mating power plug (not shown). The wall socket 10 has a disengagement member 3 that is mounted in the casing 12 for displacement between a first position, in which the disengagement member 3 is substantially accommodated within the casing 12, and a second position shown in Fig. 2 in which the disengagement member 3 protrudes out of the casing 12 from a surface 20 of the wall socket 10 intended for facing the mating power plug (not shown) when the power plug is mechanically and electrically interconnected with the wall socket 10. The wall socket 10 also has a user operated actuator 1 for displacing the disengagement member 3 from the first position to the second position. In the illustrated embodiment 10, the actuator 1 is connected to the disengagement member 3 via a rotatably mounted member 2 that is rotated by displacement of the actuator 1 and thereby displaces the disengagement member 3 from its first position to its second position.

[0031] As more clearly illustrated in the side view of Fig. 2, when a power plug is inserted into the wall socket 10, the disengagement member 3 is positioned in its first position and the actuator 1 protrudes from the surface 20 of the wall socket 10. When the user pushes the actuator 1 into the casing 12 of the wall socket 10, the member 2 is turned around its axis of rotation and thereby displaces the disengagement member 3 from its first position towards its second position and pushes and disengages the power plug from the wall socket 10 so that the power plug may be easily removed by the user from the wall socket 10.

[0032] In the illustrated embodiment, the actuator 1 is positioned above the disengagement member 3, however the person skilled in the art will recognize that the actuator may be positioned in any suitable position of the surface of the wall socket that is exposed to the surroundings when a power plug is inserted into the wall socket, for example at the lower left corner of the wall socket 10.

[0033] In the illustrated embodiment, the actuator 1 has a pressure base received in a recess in the casing in its actuating position.

[0034] Figs. 3 and 4 show another wall outlet 10 according to the present invention that is similar to the embodiment of Figs. 1 and 2 except for the fact that the actuator 1 is connected to the disengagement member 3 via a member 2 mounted for displacement between a

first position and a second position in such a way that displacement of the actuator 1 from its free first position to its activation position shown in Fig. 4 moves the member 2 from its first position to its second position thereby displacing the disengagement member 3 from its first position to its second position also shown in Fig. 4. As illustrated in Fig. 4, a surface 22 of the actuator 1 abutting the member 2 forms an angle of app. 45° with a longitudinal extension of the member 2 and likewise a surface 24 of the member 2 forms an angle of app. 45° with the longitudinal extension of the member 2 so that a longitudinal displacement of the actuator 1 is converted into a corresponding perpendicular longitudinal displacement of the member 2. In a similar way, a surface 26 of the member 2 abutting the disengagement member 3 forms an angle of app. 45° with the longitudinal extension of the member 2 and a surface 28 of the actuator forms a mating angle of app. 45° with the longitudinal extension of the member 2 so that a longitudinal displacement of the member 2 is converted into a corresponding perpendicular longitudinal displacement of the disengagement member 3, and thus a longitudinal displacement of the actuator 1 is converted into a corresponding longitudinal displacement of the disengagement member 3.

[0035] In other embodiments, the angles may differ from 45° , the only requirement is that the sum of the angles for abutting surfaces remains 90° , for example a surface 22 of the actuator 1 abutting the member 2 may form an angle of app. 60° with a longitudinal extension of the member 2 and likewise a surface 24 of the member 2 may form an angle of app. 30° with the longitudinal extension of the member 2 so that a longitudinal displacement of the actuator 1 is converted into a corresponding geared perpendicular longitudinal displacement of the member 2.

[0036] Fig. 5 a front view of a socket outlet 10 according to the present invention.

[0037] Figs. 6 and 7 are side views that illustrate the operating principle of one example of a disengagement arrangement of the socket outlet of Fig. 5. A surface 22 of the actuator 1 abutting the disengagement member 3 forms an angle of app. 45° with a longitudinal extension of the disengagement member 3 and likewise a surface 28 of the disengagement member 3 forms an angle of app. 45° with the longitudinal extension of the disengagement member 3 so that a longitudinal displacement of the actuator 1 is converted into a corresponding perpendicular longitudinal displacement of the disengagement member 3, and thus a longitudinal displacement of the actuator 1 is converted into a corresponding longitudinal displacement of the disengagement member 3.

[0038] Figs. 8 and 9 are side views that illustrate the operating principle of another example of a disengagement arrangement of the socket outlet 10 of Fig. 5. The actuator 1 engages with a member 2 mounted in a fixed position in the socket outlet 10 and abuts the disengagement member 3 along a surface that extends in parallel with a longitudinal extension of the actuator 1. A surface

22 of the actuator 1 abutting the member 2 forms an angle of app. 45° with a longitudinal extension of the member 2 and likewise a surface 24 of the member 2 forms an angle of app. 45° with the longitudinal extension of the member 2 so that a longitudinal displacement of the actuator 1 is converted into a corresponding perpendicular transversal displacement of the actuator 1 whereby the actuator 1 pushes the disengagement member 3 towards its second position.

[0039] Figs. 10 and 11 are side views that illustrate the operating principle of yet another example of a disengagement arrangement of the socket outlet 10 of Fig. 5. The actuator 1 engages with a member 2 that is rotatably mounted in the socket outlet 10 around an axis of rotation that is perpendicular to the longitudinal extension of the actuator 1 and also perpendicular to the longitudinal extension of the disengagement member 3. A surface 22 of the actuator 1 abutting the member 2 forms an angle of app. 45° with a longitudinal extension of the member 2 and likewise a surface 24 of the member 2 forms an angle of app. 45° with the longitudinal extension of the member 2 so that a longitudinal displacement of the actuator 1 is converted into a corresponding rotation of the member 2 whereby the member 2 pushes the disengagement member 3 towards its second position.

[0040] In the same way as for the embodiment of Figs. 3 and 4, the embodiments shown in Figs. 6 - 11 may have surfaces forming angles different from 45° thereby providing geared displacement of the disengagement member.

[0041] In another embodiment of the invention, the conversion of a displacement of the actuator into a corresponding displacement of the disengagement member is provided by a flexible member positioned in a channel or a tube in the power socket. This is illustrated in Figs. 12 - 14 wherein a number of balls 32 of a suitable material, such as plastic or steel, is accommodated in mutual abutment in a channel 30 in the power socket 10 forming an angle of 90° and wherein a first ball at one end of the channel 30 abuts the actuator 1 and a second ball at a second opposite end of the channel abuts the disengagement member 3 so that the disengagement member 3 is pushed out from the power socket casing when the user pushes the actuator 1 into the channel 30.

[0042] A power plug with the disengagement arrangement illustrated in Figs. 12 - 14 may also be provided.

[0043] The balls may be substituted by a longitudinal flexible member or a chain extending throughout the channel and abutting the actuator and the disengagement member at respective opposite ends thereof. The actuator, the flexible member, and the disengagement member may be integrated into a single member.

[0044] In another embodiment, the balls are substituted by a suitable powder or granulate.

Claims

1. A power socket for the mains supply, comprising a casing with two holes for accommodation of and electrical interconnection with respective contact pins of a mating power plug, a disengagement member that is mounted in the casing for displacement between a first position, in which the disengagement member is substantially accommodated within the casing, and a second position in which the disengagement member protrudes out of the casing from a surface of the power socket intended for facing the mating power plug when the power plug is mechanically and electrically interconnected with the power socket. 5
2. A power socket according to claim 1, further comprising a user operated actuator for displacing the disengagement member from the first position to the second position. 10
3. A power socket according to claim 1 or 2, further comprising a spring applying a force to the disengagement member in a direction from the first position towards the second position. 15
4. A power socket according to any of the preceding claims, wherein the actuator is mounted in a channel extending into the casing from the surface intended for facing the mating power plug when the power plug is mechanically and electrically interconnected with the power socket, and wherein the actuator is mounted in the channel for displacement between a free first position in which the actuator is protruding from the surface, and an activation position in which the actuator is displaced into the channel for displacement of the disengagement member to the second position of the disengagement member. 20
5. A power socket according to claim 4, wherein the channel extends substantially in parallel with the disengagement member. 25
6. A power socket according to claim 4, wherein the channel extends substantially perpendicular to the disengagement member. 30
7. A power socket according to any of the preceding claims, wherein the actuator is connected to the disengagement member with a rotatably mounted member that is rotated by displacement of the actuator and thereby displaces the disengagement member from its first position to its second position. 35
8. A power socket according to any of claims 1 - 6, wherein a surface of the actuator abutting the disengagement member forms an angle with a longitudinal extension of the disengagement member. 40
9. A power socket according to claim 8, wherein a surface of the disengagement member abutting the actuator forms an angle with the longitudinal extension of the disengagement member. 45
10. A power socket according to any of claims 4 - 6, wherein the actuator is connected to the disengagement member with a member mounted for displacement between a first position and a second position in such a way that displacement of the actuator from its free first position to its activation position moves the member from its first position to its second position thereby displacing the disengagement member from its first position to its second position. 50
11. A power socket according to any of claims 4 - 6, wherein the actuator engages with a member mounted in a fixed position in such a way that displacement of the actuator from its free first position to its activation position turns the actuator for displacement of the disengagement member from its first position to its second position. 55
12. A power socket according to any of claims 4 - 6, wherein the actuator engages with a plurality of balls accommodated in mutual abutment in the channel and wherein a first ball at one end of the channel abuts the actuator and a second ball at a second opposite end of the channel abuts the disengagement member so that the disengagement member is pushed out from the power socket casing towards its second position when the user pushes the actuator into the channel.
13. A power socket according to any of the preceding claims, wherein the disengagement member extends substantially in parallel with the pins of the mating power plug when the power plug is interconnected with the power socket.
14. A power socket according to any of the preceding claims, wherein the disengagement member is displaceably accommodated in the casing with a friction fit.
15. A power socket according to any of the preceding claims, wherein the disengagement member has a pressure base received in a recess in the casing in the first position.
16. A power socket according to any of the preceding claims, wherein the disengagement member protrudes from the surface of the casing in the second position of the disengagement member and the length of the protrusion ranges from 0.1 to 1.0, preferably from 0.2 to 1.0, more preferred from 0.4 to 0.8 times the length of the pins of the mating power plug.

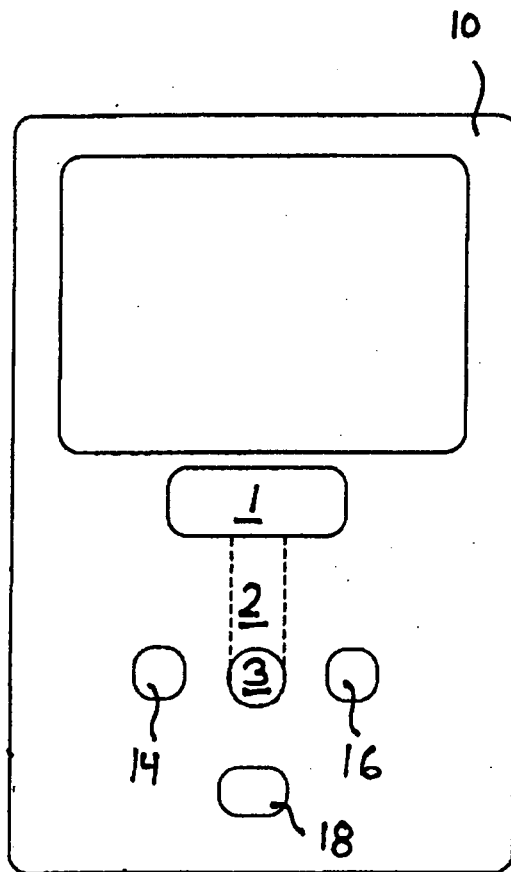


Fig. 1

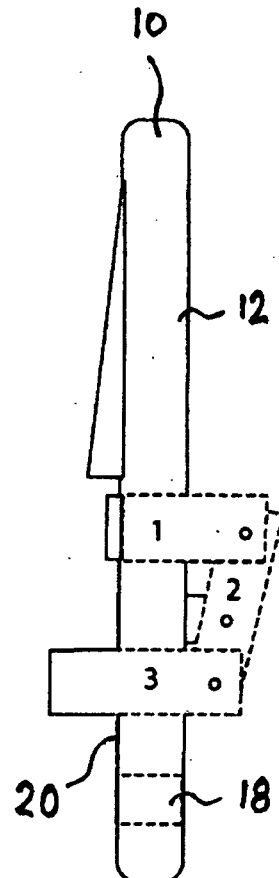


Fig. 2

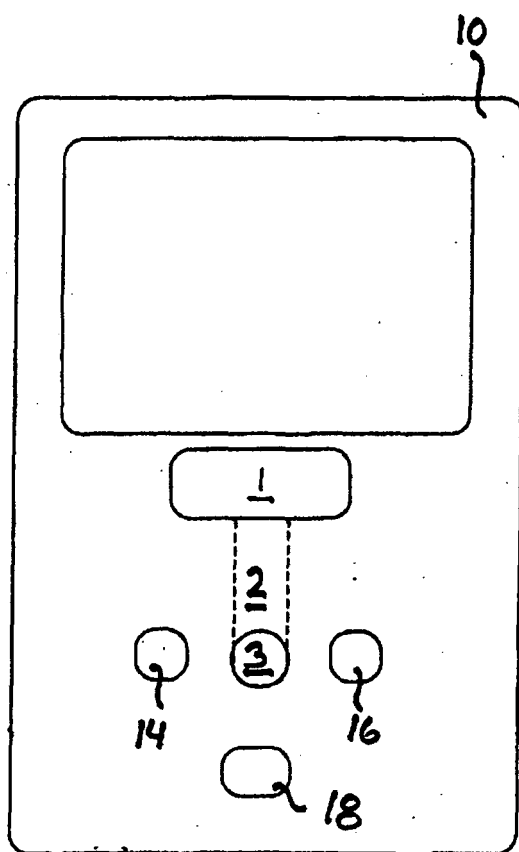


Fig. 3

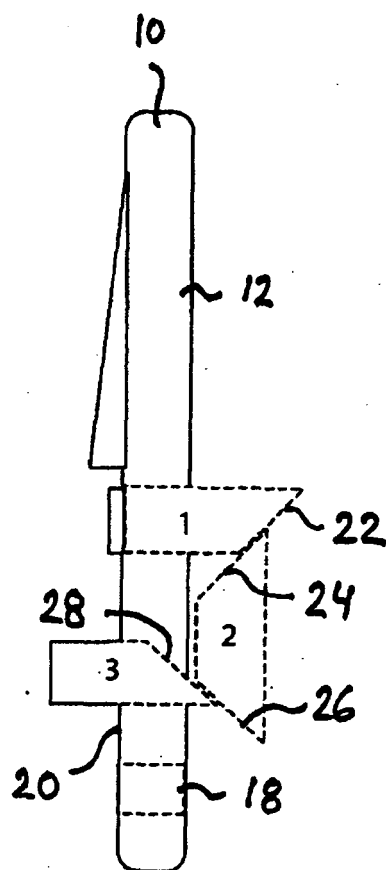


Fig. 4

Fig. 5

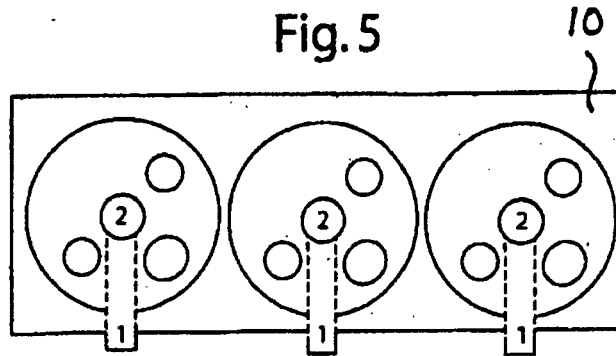


Fig. 6

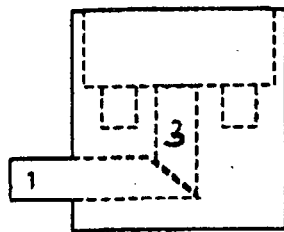


Fig. 7

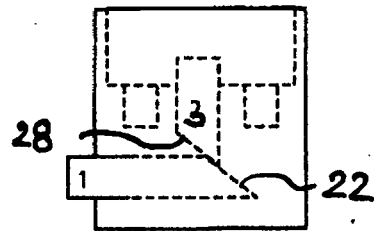


Fig. 8

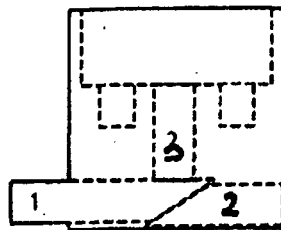


Fig. 9

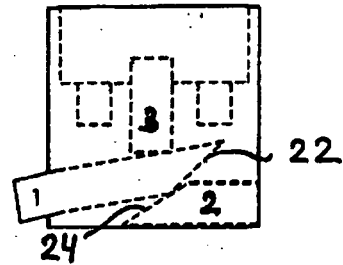


Fig. 10

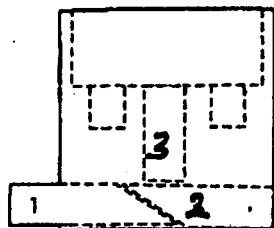


Fig. 11

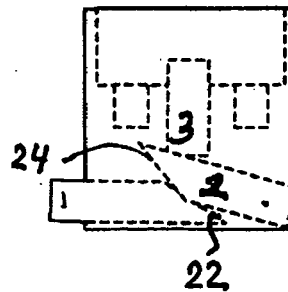


Fig. 12

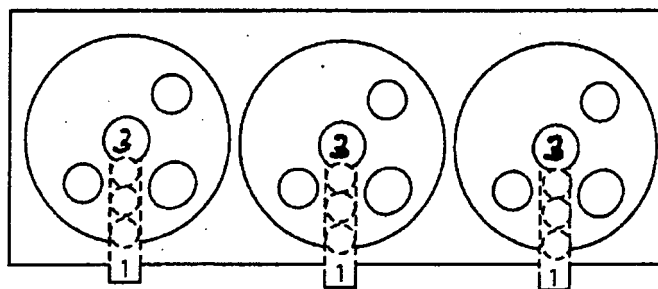


Fig. 13

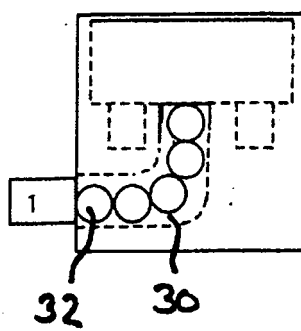


Fig. 14

