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(54) Pedal board for a musical instrument.

(57) A pedal board for musical instruments. Pedal mounting, guide, and electrical switch mechanisms are provided in a pedal board for an electronic organ. Each pedal (50) is mounted by a cylindrical pin (54) attached to the back end (56) of the pedal and to the base (52) of the pedal board by an interference fit. A similar, guide pin (60) is attached to the front end (62) of the pedal by an interference fit. The guide pin fits loosely in an aperture which limits lateral movement of the pin and, thence, of the pedal itself. The lower end of the guide pin actuates an elastomer electric switch (68) when the pedal is pressed down. The elastomeric electric switch is mounted on a printed circuit board (114), and includes a chamber (102) having a bell-shaped wall (104) attached to a support strip by weakened edges (126) and may be enclosed at the bottom by a diaphragm (124). The wall carries conductive elements (122). The conductive element shorts contacts (118) on the printed circuit board when the chamber is compressed by the guide pin. Pedal board tension and resiliency is providing by the mounting pin and/or by a bias spring (148).

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PEDAL BOARD FOR MUSICAL INSTRUMENTS

Background of the Invention

This invention relates to pedal boards for musical instruments, and particularly to mounting, guide, and switching mechanisms for pedal boards in pipe or electronic organs.

Organs usually include, in addition to the keyboard, a pedal board comprising a plurality of pedals to be actuated by the musician's feet for producing additional notes. The usual pedal board has a metal spring attached to each pedal. The purpose of this spring is to return the pedal to the normal position after being depressed. Also, the spring adds a predetermined amount of resistance to the pedal movement. The pedal is pivoted at one end and restricted by a guide comb at the other end. Each pedal activates a switch or set of switches inside or outside the pedal board. These switches may control air pressure, vacuum or electrical current.

There are problems with the known mechanical and switching arrangements of pedals in pedal boards for organs. For example, the comb guide for the pedals is relatively difficult to fabricate; and, because the spring does not tend to prevent lateral movement of the pedal very well, the sides of the pedal frequently strike the interior sides of the slot in the comb guide, resulting in unwanted noise.

Alignment of the various pedals and their respective switches is often a difficult problem. In addition, there is the further problem that deterioration of the parts in such a pedal board occurs more rapidly than is desirable.

Additionally, there are well known problems in that pedal boards are intricate to assemble, require a large number of different parts and are noisy in operation in many instances.

Therefore, it is a principal objective of the present invention to provide a novel and improved pedal board for a musical instrument in which the aforementioned problems are reduced or avoided.

Summary of the Invention

In accordance with a primary aspect of the present invention a pedal board is characterised in that it employs an upstanding mounting to position the pedal in a pedal board, limit lateral movement of the pedal, and provide the pedal with resiliency or compliance.

The present invention further provides a pedal board characterised in that it employs an elastomeric electric switch to close the electrical circuit for a corresponding pedal wherein the switch allows a relatively wide tolerance in the range of movement of the pedal and provides a relatively long useful life.

The present invention further provides a pedal board characterised in that it employs a guide for preventing the pedal of a pedal board from moving transversely or longitudinally beyond predetermined limits and for actuating a switch.

The present invention further provides an elastomeric electric switch which includes a surge chamber to ensure that trapped air will not prevent circuit closure.

The present invention further provides a pedal board characterised in that it employs a spring mounted on a movable element to adjust pedal bias.

More particularly, there is generally provided by the invention a pedal board for a musical instrument, comprising:

(a) a base for supporting one or more pedals, said base having a front and a back;

(b) at least one pedal, said pedal being an elongate member having a front end adjacent said front of said base and a back end adjacent said back of said base;

(c) detector means associated with said pedal for producing an electric signal representative of movement of said pedal; and

(d) a mounting pin attached to said pedal adjacent said back end thereof and to said base adjacent said back thereof for supporting said pedal on said base such that downward movement of said pedal bends said mounting pin.

The invention further provides a pedal board for a musical instrument, comprising:

(a) a base for supporting one or more pedals, said base having a front and a back;

(b) at least one pedal, said pedal being an elongate member having a front end adjacent said front of said base and a back end adjacent said back of said base;

(c) detector means associated with said pedal for producing an electric signal representative of movement of said pedal;

(d) spring means, disposed near the front of said pedal and attached to said pedal, for forcing said pedal upwardly; and

(d) a spring mounting member releasably attached to said base near the front thereof and to said spring means, said mounting member being movable vertically for adjusting the tension of said spring means.

The invention further provides a pedal board for a musical instrument, comprising:

(a) a base for supporting one or more pedals, said base having a front and a back;

(b) at least one pedal, said pedal being an elongate member having a front end adjacent said front of said base and a back end adjacent said

back of said base;

(c) pedal mounting means disposed adjacent said back of said base, for supporting said pedal on said base;

(d) spring means, disposed near said front of said pedal and attached to said pedal, for forcing said pedal upwardly; and

(e) a spring mounting member releasably attached to said base near the front thereof and to said spring means, said mounting member being movable vertically for adjusting the tension of said spring means.

The invention also provides a pedal board for a musical instrument, comprising:

(a) a base for supporting one or more pedals, said base having a front and a back;

(b) at least one pedal, said pedal being an elongate member having a front end adjacent said front of said base and a back end adjacent said back of said base;

(c) a mounting attached to said pedal adjacent said back end thereof and to said base adjacent said back thereof for supporting said pedal on said base such that downward movement of said pedal bends said mounting;

(d) a guide attached to said front of said pedal so as to extend downwardly; and

(e) an elastomeric electric switch disposed beneath said guide so as to be forced downward thereby, comprising a pair of contacts that conduct an electric current when shorted, an elastomeric wall forming a chamber, said wall having a principal portion, a mounting portion, and a flange portion disposed between said principal portion and said mounting portion, said flange portion being weaker than said principal portion, and a plurality of conductive elements attached to said wall around its bottom periphery adjacent said contacts such that when said wall is forced downwardly, said conductive elements are forced against said contacts, thereby shorting them.

The invention also provides an elastomeric electric switch, comprising:

(a) a pair of contacts that conduct an electric current when shorted;

(b) an elastomeric diaphragm disposed adjacent said contacts for shorting said contacts when said diaphragm touches said contacts; and

(c) an elastomeric wall forming a chamber over said diaphragm such that when said elastomeric wall is compressed, said diaphragm such that when said elastomeric wall is compressed, said diaphragm is forced against and touches said contacts, said wall having a principal portion, a mounting portion, and a flange portion disposed between said principal portion and said mounting portion, said flange portion being weaker than said principal portion.

The invention also provides an elastomeric electric switch, comprising:

(a) a pair of contacts that conduct an electric current when shorted;

(b) an elastomeric wall forming a chamber, said wall having a principal portion, a mounting portion, and a flange portion disposed between said principal portion and said mounting portion, said flange portion being weaker than said principal portion, and

(c) a plurality of conductive elements attached to said wall around its bottom periphery adjacent said contacts such that when said wall is forced downwardly, said conductive elements are forced against said contacts, thereby shorting them.

A preferred embodiment of the present invention solves the aforementioned problems and provides other advantages through novel pedal mounting, bias, guide, and switch mechanisms. Each pedal key (referred to herein simply as a pedal for convenience) in the pedal board of the present invention is mounted at one end by a mounting pin, post or other upstanding member which attaches to the pedal and to the base of the pedal board assembly. Preferably, the pin is cylindrical and made of fiberglass, though it could also be made of a variety of other materials and in other shapes. It is attached to both the pedal and the base by insertion at each end in respective apertures by an interference fit. When the opposite end of the pedal is pressed down, the pin is bent and provides at least part of the resilient force needed to return the pedal to its normal position when it is released. The angle at which the pin is installed or a further, preferably adjustable spring determines the tension on the pedal. The pin tends to keep the pedal laterally positioned as a result of the restoring force produced when the pin is twisted, but provides some longitudinal compliance for the pedal.

At the opposite end of the pedal, a similar, guide pin is attached at one end to the pedal by insertion of the upper end of the pin in an aperture of the pedal with an interference fit. The opposite, lower end of this guide pin fits loosely in an aperture in the base of the pedal board, which sets limits to the lateral movement of the pedal. The lower end of the guide pin also strikes, and actuates, an elastomeric electric switch which closes the electrical circuit for that particular pedal, thereby linking the pedal with the switch. The switch thus acts as a pedal movement detector that produces an electric signal in response to pedal movement. A rubber or felt bumper strip or ring is provided for reducing noise when the pedal is pushed downwardly to its limit, and one or more felt washers is provided in the base aperture to protect the electric switch and reduce noise when extreme lateral movement does occur.

The elastomeric electric switch comprises a bell-shaped elastomeric chamber having, optionally on a

diaphragm at the lower end, a conductive element disposed on the wall of the chamber or on the diaphragm. The element is positioned over contacts on a supporting circuit board. When the lower end of the guide pin of a pedal pushes downwardly on the bell-shaped portion of the elastomeric electric switch, force transmitted down the wall of the chamber (and the increased pressure in the chamber on the diaphragm) pushes the element downwardly so that the conductive element shorts the contacts and closes the respective circuit. The bell shape of the switch allows the switch to be compressed in varying amounts by the free end of the guide pin so that the distance of travel of the guide pin is not critical. The elastomeric electric switch is provided with air channels leading from the chamber, e.g. beneath the diaphragm, to a surge chamber, so that air will not be trapped e.g. below the diaphragm, and prevent the element from shorting the contacts.

The foregoing and other objectives, features, and advantages of the invention will be more readily understood upon consideration of the following detailed description of examples of the invention, taken in conjunction with the accompanying diagrammatic drawings.

Brief Description of the drawings

Figure 1 shows a side view of a typical prior art pedal board with the mounting base thereof in section.

Figure 2A is a simplified side view of a pedal board according to the present invention, with the pedal board base shown in section, the pedals in their normal positions, and portions of one pedal cut away in section to show mounting and guide pin attachment.

Figure 2B is a simplified side view of the pedal board of Figure 2A with one pedal in its depressed position.

Figure 3A is a partial section of the pedal board of Figure 2A taken along line A-A.

Figure 3B is a partial section of the pedal board of Figure 2A taken along line B-B.

Figure 4A is a blown-up section of a portion of the pedal board of Figure 2A showing a guide pin in normal relation to an elastomeric electric switch.

Figure 4B is a blown-up section of a portion of the pedal board of Figure 2B showing the guide pin in its depressed position with respect to the elastomeric electric switch.

Figure 5 is a top view of a pair of elastomeric electric switches for respective pedals according to the present invention.

Figure 6 is a side section of the elastomeric electric switches of Figure 5 taken along line C-C, and showing one switch in its depressed position.

Figure 7 is a section of one of the switches of Figure 6 taken along line D-D thereof.

Figure 8 is a side section of an alternative elastomeric electric switch according to the present invention.

Figure 9A is a simplified side view of an alternative embodiment of a pedal board according to the present invention, with the pedal board base shown in section, the pedals in their normal position, and portions of one pedal cut away in section to show mounting, and guide pin and spring attachment.

Figure 9B is a simplified side view of the pedal board of Figure 9A with one pedal in its depressed position.

Figure 10 is an expanded view of a portion of the pedal board shown in Figures 9A and 9B, showing the structure of a spring and adjustment element.

Figure 11 is a partial, front section view of the pedal board of Figure 9A taken along line E-E thereof.

Figure 12 is a side section view of another alternative elastomeric electric switch according to the present invention.

Figure 13 is a top section view of the alternative elastomeric electric switch shown in Figure 13.

Description of the Preferred Embodiment

A typical prior art pedal board assembly is shown in Figure 1. A pedal 10, one of a plurality of pedals, is mounted by a flat metal spring 12 to a spring rail 14. An organ typically has pedals for playing sharps, i.e., pedal sharps, and pedals for playing naturals, i.e., pedal naturals. The pedal shown in Figure 1 is a sharp pedal. For purposes of this description, the end of the pedal at which it is mounted to the spring rail will be called the back end 18 and the opposite end will be called the front end 20. A fulcrum 22 is also mounted on the spring rail at the back end. The pedal 10 is typically made of wood. Spring 12 is attached to the pedal by a pair of wood screws 24 and to the spring rail by wood screw 26 and wood screw 28. In its normal position, the pedal rests against an upper bumper 36. The tension by which the pedal 10 resists downward force is adjusted by tightening or loosening wood screws 26 and 28.

The front end 20 of the pedal is inserted through a corresponding slot 30 in a comb guide 32, i.e., a wooden sheet with slots in it resembling a comb. The slot limits both the vertical and the horizontal travel of the pedal. The comb guide is attached to a support 34 which also carries the upper bumper 36 and a lower bumper 38. Pieces of felt 40 are attached to respective sides of the pedal 10 to reduce noise when the pedal strikes the inside surfaces of the comb guide defined by the slot 30. A cover or toe board 42 is attached to the support 34. Similarly, rear trim 44 and a heal board 46 are provided at the back end 18 of the pedal. The comb guide, support, toe board, back trim, heal board and spring rail are held in place by two sides 16 (only one shown), all of which are ordinarily

made of wood. All or some of the comb guide, support, toe board, back trim, heal board and spring rail are referred to herein collectively as a "base," for convenience. The entire assembly is known as a "pedal board."

The flat metal spring 12 of the prior art pedal board tends to provide inadequate resistance to lateral movement of the pedal 10, requires heat treatment prior to installation, and must be adjusted for proper tension. When the front end 20 of the pedal moves in the slot 30, it often strikes the sides of the slot as well as the upper bumper 36 and lower bumper 38. This causes undesirable noise, despite the presence of the felt pieces 40.

A magnet 48 is placed on the front end 20 of the pedal to actuate a reed switch (not shown) as the pedal moves up and down. Alignment of the magnet 48 with the pedal is often critical and difficult. Mechanical switching devices are also used.

Turning now to Figure 2A, a pedal board according to the present invention comprises a plurality of pedals, such as sharp pedal 50 mounted at the back 52 of the pedal board by a mounting pin 54 inserted in the back end 56 of the pedal. The upper end of the mounting pin 54 is inserted in an aperture in the pedal 50 by an interference fit and the opposite, lower end of the mounting pin 54 is inserted in an aperture in a spring rail 58 by an interference fit. The interference fit is accomplished by making the outside dimension of the pin 54 slightly greater than the inside dimension of the aperture in which it is placed. Preferably, the pin is cylindrical in shape, and the interference fit is accomplished by making the outside diameter of the pin 54 slightly greater than the inside diameter of the apertures in which it is placed. The interference fit prevents the connection between the pin 54 and the pedal 50, and the pin 54 and the spring rail 58, from slipping. (A natural pedal 51 is shown behind the sharp pedal and is mounted in a like manner.)

Figure 2A shows the pedal 50 in its normal, upward position. It is held in that position by the resistance of mounting pin 54 to bending. The upper limit of travel of the front end 62 of the pedal 50 is limited by a stop 86. When the pedal is in its normal "up" position the front end 62 rests against the stop. Consequently, the angle O at which the pin 54 is mounted in the spring rail determines the tension exhibited by the pedal 50. Typically, the pedals are mounted so as to be preloaded with a tension of 2-1/2 to 3 pounds.

Typically, the pedal 50 is made of wood and, preferably, the pin 54 is made of fiberglass. It has been found that pulltruded fiberglass provides particularly advantageous and consistent results. However, it is to be recognized that the pin 54 may be made of other materials without departing from the principles of this invention.

A guide pin 60 is attached to the pedal 50 at the front end 62 thereof. The guide pin 60 is attached to the pedal 50 by insertion of its upper end in an aperture with an interference fit. The opposite, lower end of the guide pin 60 fits loosely in an aperture 64 in switch assembly block 66. The guide pin 60 both limits the maximum lateral travel of the pedal 50 and actuates an elastomeric electric switch 68 when the pedal 50 is pressed down by the foot of a musician playing the organ.

The pedal board according to the present invention is also provided with front trim 70, a toe board 72 attached to the front trim, back trim 74, and a heal board 76 attached to the back trim. The heal board is strengthened by a back support 78. The switch assembly block 66 is supported by a switch assembly block support 80 and a spacer 81. The stop 86 is attached to the toe board 72. The entire assembly is held together by sides 82 (one side not shown). The pedal board includes both sharp and natural pedals, pedal 50 being a sharp pedal and having an extension 84 attached thereto for receiving pressure from a musician's foot.

Figure 2B shows the pedal 50 in its depressed position, which it assumes when pushed down by the foot of the musician playing the organ. The resistance of mounting pin 54 provides the tension against which the musician's foot must work, and the resiliency of that pin 54 returns the pedal 50 to its normal position, as in Figure 2A, when the pressure from the musician's foot is released.

While the aperture 64 in the switch assembly block 66 limits the maximum lateral travel of pedal 50 due to the guide pin 60, it is to be recognized that the guide pin 60 does not ordinarily strike the inner surface of aperture 64, because the resistance of mounting pin 54 is relatively great. Thence, this preferred embodiment of the invention does not encounter the degree of problem encountered by the prior art illustrated in Figure 1.

Figure 3A shows an end view of a section of the pedal board of Figure 2A taken along line A-A of Figure 2A. As shown, a plurality of pedals 50, and corresponding elastomeric electric switches 68 (only one each of which is shown in Figure 2A) are disposed adjacent one another. Figure 3B shows another end view of the pedal board of Figure 2A taken along line B-B of Figure 2A. While Figure 3A shows the front of the pedal board and switching assembly, Figure 3B shows the back of the pedal board and mounting pins.

The relationship of the pedal 50 and guide pin 60 to the elastomeric electric switch 68 is shown more clearly in Figures 4A and 4B. In these figures, the switch assembly block is shown in greater detail, albeit with a somewhat simplified illustration of the elastomeric electric switch 68. Figure 4A corresponds to Figure 2A, in that the pedal is in its normal, up position, while Figure 4B corresponds to Figure 2B in that the pedal 50 is in its depressed, down position.

In Figures 4A and 4B, it can be seen that the aper-

ture 64 includes a pair of annular washers 130 and 132 made of felt or equivalent material and stacked on a ledge 134 in the aperture. These washers provide a low friction surface for the guide pin 60 on those occasions when it does bump against the side, and also reduce noise as the result of such bumping. They also tend to prevent foreign material from getting into the chamber 65 where the switch is located, thereby protecting the switch. In addition, a felt or rubber bumper 136 is provided at the top of the switch assembly block 66 so that, when the pedal 50 reaches its downward-most position, as shown in Figure 4B, it strikes the bumper 136 which cushions the pedal 50 and minimizes noise. It can also be seen in Figure 4B that, when the guide pin 60 moves downward, it abuts against and compresses the elastomeric electric switch 68. As will be explained hereafter, that causes the switch to close contacts which completes a circuit.

Another embodiment of a pedal board according to the present invention is shown in figures 9A and 9B. It is identical to the embodiment shown in figures 2A and 2B, except that its spring force is not primarily provided by a mounting pin. This embodiment employs a mounting pin 146 which need not be inserted into the spring rail 58 at an angle; that is, it need not be preloaded with tension. Rather, it employs a coiled two-arm or "compass," spring 148 disposed between the pedal 50 and the switch assembly block 80.

The spring 148 is attached at one end 150 by fitting it in a hole in the bottom of the pedal 50. At the other end 152 is disposed in a hole in an adjustment element 154. The adjustment element may be moved up and down to adjust the spring force applied to the pedal 50.

The adjustment element 154 can be understood with reference to Figures 10 and 11. The adjustment element 154 is provided with a vertical slot 156. The element is mounted on the switch assembly block 80 by a bolt 158 placed through the slot 156 and threaded into an anchor 160 having interior matching threads. The bolt may be loosened to allow the element 154 to move up or down, and thereby adjust the spring loading. Once the right position is found for the adjustment element, the bolt 158 is tightened to hold the element in place.

A top view of the elastomeric electric switches is shown in Figure 5. In this figure, the switches are shown apart from the rest of the pedal board. As a plurality of pedals are used in the pedal board, sets of elastomeric electric switches are assembled into a single strip 88, side by side. Preferably, each set of switches is made of a single assembly, typically having 7, 5, or 3 switches molded out of an elastomeric material such as rubber. Figure 5 shows a first switch 90 and a second switch 92. The spaces 94 beneath the switches are connected by molded channels 96, which also connect to molded surge chambers 98. This is so that when a switch is depressed, the air beneath it can escape to another switch or surge chamber.

Turning now to Figure 6, each of the elastomeric electric switches comprises a chamber 102 having a bell-shaped cover upper wall 104, including a concave portion 106 in which an abutment 108 is disposed, and a diaphragm 110 which closes off the bottom portion of the chamber. Fins 112, having spaces therebetween, are provided at the top of each abutment 108 for receiving the end of the guide pin 60, while allowing air to escape from between the end of the guide pin and the top of the abutment 108. The elastomeric electric switch strip 88 is mounted on printed circuit board 114 of a type commonly known in the art. It is positioned on the circuit board by pins 116 which are placed in guide holes 100 in the circuit board. The resultant assembly is mounted by wood screws 116 placed through the holes 101 in the strip 88 as corresponding holes 103 in circuit board 114 (see Figure 5). However, it is to be recognized that other support structures and mounting mechanisms could be used without departing from the principles of this invention.

As shown in Figure 7, the printed circuit board 114 has, printed or etched thereon, contacts 118 and 120, which form the two sides of a switch. When contacts 118 are shorted to contacts 120, a circuit is closed. With reference to both Figures 6 and 7, in the preferred embodiment a plurality of circular conductive elements 122, like pucks, preferably made of graphite impregnated rubber ("conductive rubber"), are disposed on the bottom of each diaphragm 110. The conductive elements 122 are placed on the bottom of the diaphragm 110 in a circular pattern. When the diaphragm is pushed downwardly by force around its periphery 124 and increased pressure within the chamber 102, as shown with respect to switch 92 in Figure 6, the conductive elements 122 are pressed against the contacts 118 and 120, thereby shorting them.

The structure of the elastomeric electric switches permits a relatively wide tolerance in the limit of travel of the guide pin 60. More specifically, each switch has a narrowed, flange portion 126 around the periphery of the wall 104, between a principal portion 105 and a mounting portion 107 of the wall where the wall is attached to the rest of the switch strip 88. Thence, when force is applied to the fins 112 at the top of the abutment 108, the bell-shaped wall 104 both transmits force down to the weaker portions 126 and folds in on itself, increasing the pressure in the chamber 102. The weakened portions bend, moving the diaphragm 124 toward the printed circuit board 114, and the increased pressure in the chamber 102 also pushes the conductive elements 122 firmly against the contacts 118 and 120 on the circuit board 114. Electrical contact is typically made about half way through the range of travel of the guide pin 60. Push-

ing the abutment downwardly more than is necessary merely increases the pressure within the chamber 102, thereby allowing for a relatively wide tolerance in the final stopping point of the guide pin 60. This simplifies manufacture and assembly of the pedal board.

When the diaphragm 110 is pushed downwardly, the air beneath it in space 94 escapes through channel 96 to another switch or to a surge chamber 98.

An alternative embodiment of elastomeric electric switch is shown in Figure 8. It is identical to the switches shown in Figure 6 except that, instead of puck-like conductive elements 122, it employs a layer of conductive material 128 on the bottom of the diaphragm 110. Preferably, this conductive material is a graphite impregnated material pasted on the bottom of the diaphragm. The switch shown in Figure 8 is shown in section as though it had been taken along line E-E of Figure 5.

It has been found that elastomeric electric switches are especially advantageous for detecting actuation of a pedal because of their wide tolerance in the detection of movement and their long useful life, and their reliability. It has also been found that combination of interlaced contacts 118 and 120 as shown in Figure 7, and either conductive rubber puck-like elements 122 or a conductive layer 128 in the bottom of the diaphragm is particularly effective in ensuring electric shorting.

Another alternative embodiment of an elastomeric electric switch is shown in Figures 12 and 13. It is identical to the switch shown in Figures 6 and 7, respectively, except in two respects. First, it needs, and has, no diaphragm because its puck-like, i.e., disc shaped, conductive elements 138 are attached to the wall 104 itself at the bottom of periphery 140 thereof. Second, the number of contacts 142 and 144 may be greater, and their width and spacing may be less, than those in the embodiment of those shown in Figure 7 because the elements 138 may be more widely spaced apart.

The terms and expressions which have been employed in the foregoing specification are used therein as terms of description and not of limitation, and there is no intention in the use of such terms and expressions of excluding equivalents of the features shown and described or portions thereof, it being recognized that the scope of the invention is defined and limited only by the claims which follow.

Claims

1. A pedal board for a musical instrument, comprising:
   (a) a base for supporting one or more pedals, said base having a front (70) and a back (52);
   (b) at least one pedal (50), said pedal being an elongate member having a front end (62) adjacent said front of said base and a back end (56) adjacent said back (52) of said base; and
   (c) detector means (68) associated with said pedal for producing an signal representative of movement of said pedal;
   and characterised in that
   (d) adjacent the back ends of the pedal and base, vertically confronting portions thereof are connected by a flexible upstanding mounting (54) attached at its upper end to said pedal (50) and at its lower end to said base (52) to support said pedal on said base such that downward movement of said pedal bends said mounting.

2. A pedal board as claimed in claim 1, wherein spring means (148), disposed near the front of said pedal (50) and attached to said pedal, is provided for forcing said pedal upwardly; and a spring mounting member (154) is releasably attached to said base near the front (70) thereof and to said spring means, said mounting member (154) being movable for adjusting the thrust of said spring means.

3. A pedal board for a musical instrument comprising:
   (a) a base for supporting one or more pedals, said base having a front (70) and a back (52);
   (b) at least one pedal (50), said pedal being an elongate member having a front end (62) adjacent said front (70) of said base and a back end (56) adjacent said back (52) of said base; and
   (c) detector means (68) associated with said pedal (50) for producing an signal representative of movement of said panel;
   and characterised in that:-
   (d) the pedal (50) and base are connected adjacent the back ends (56,52) thereof, and spring means (148), disposed near the front of said pedal (50) and attached to said pedal, is provided for forcing said pedal upwardly; and a spring mounting member (154) is releasably attached to said base near the front (70) thereof and to said spring means (148), said mounting member (154) being movable for adjusting the thrust of said spring means.

4. A pedal board as claimed in Claim 2 or 3, wherein said spring means comprises a two-armed spring, such as a compass, hairpin or sear spring.

5. A pedal board as claimed in Claim 1, 2, 3 or 4, wherein said spring mounting member comprises a block having a vertical slot therein and being releasably attached to base by a threaded fastener inserted through said slot such that said

block can move vertically when said fastener is loosened.

6. A pedal board as claimed in any preceding claim, further comprising a guide attached to said pedal so as to extend downwardly, said guide being disposed in an aperture in said base for preventing excessive lateral movement of said pedal.

7. A pedal board as claimed in Claim 6, further comprising an insert disposed within said aperture at least partially between the outer surface of said guide and the inner surface of said aperture.

8. A pedal board as claimed in Claim 6 or 7 wherein the mounting and/or the guide is or are further characterised by any one or more of the following,
   (a) being of pin form
   (b) being of fibre reinforced plastics material
   (c) being of elongate cylindrical form
   (d) being an interference fit in a socket in the pedal.

9. A pedal board as claimed in Claim 6, 7 or 8 wherein said guide serves to actuate the detector means.

10. A pedal board as claimed in any preceding claim wherein said detector means comprises an elastomeric electric switch.

11. A pedal board as claimed in claim 10, wherein said elastomeric electric switch comprises a pair of contacts that conduct an electric current when shorted, a conductor disposed adjacent said contacts for shorting said contacts when said conductor touches said contacts, and an elastomeric wall forming a chamber over said conductor such that when said elastomeric wall is compressed, said conductor is forced against and touches said contacts.

12. A pedal board as claimed in Claim 11, wherein said elastomeric wall is further characterised in that:
   (a) it comprises a substantially bell-shaped member,
   (b) it includes a principal portion, and a flange portion disposed between said principal portion and said mounting portion, said flange portion being weaker than said principal portion, and/or
   (c) it includes a concave portion having an abutment disposed therein and existing out of said concave portion for receiving force from said guide.

13. A pedal board as claimed in Claim 12, wherein said abutment includes fins thereon separated from one another for allowing air between said guide and said abutment to escape when said guide is forced against said abutment.

14. A pedal board as claimed in Claim 11, 12 or 13 wherein said conductor includes a conductive rubber element attached to an elastomeric diaphragm located above said contacts by said elastomeric wall such that when said diaphragm is forced toward said contacts, said conductive element touches and shorts said contacts.

15. A pedal board as claimed in Claim 14, wherein said contacts are disposed on a printed circuit board, said elastomeric diaphragm and said elastomeric wall are supported by said printed circuit board, and wherein a second chamber is connected to the space beneath the diaphragm for receiving air from said space when the diaphragm is depressed.

16. A pedal board as claimed in Claim 11, 12 or 13 wherein said conductor comprises a circular, conductive rubber disc disposed on the lower periphery of said elastomeric wall.

17. A pedal board as claimed in Claim 11, 12 or 13 wherein said contacts comprise a first plurality of elongate, parallel conductive strips commonly connected together at one end, and a second plurality of such strips commonly connected together at the opposite end, said first strips being interleaved with said second strips; and wherein said conductor comprises a plurality of circular, conductive rubber discs disposed around the lower periphery of said elastomeric wall, each disc being large enough in diameter to short at least one of said first strips to one of said second strips.

18. A pedal board or a switch for a pedal board incorporating any novel feature or novel combination of features herein disclosed.

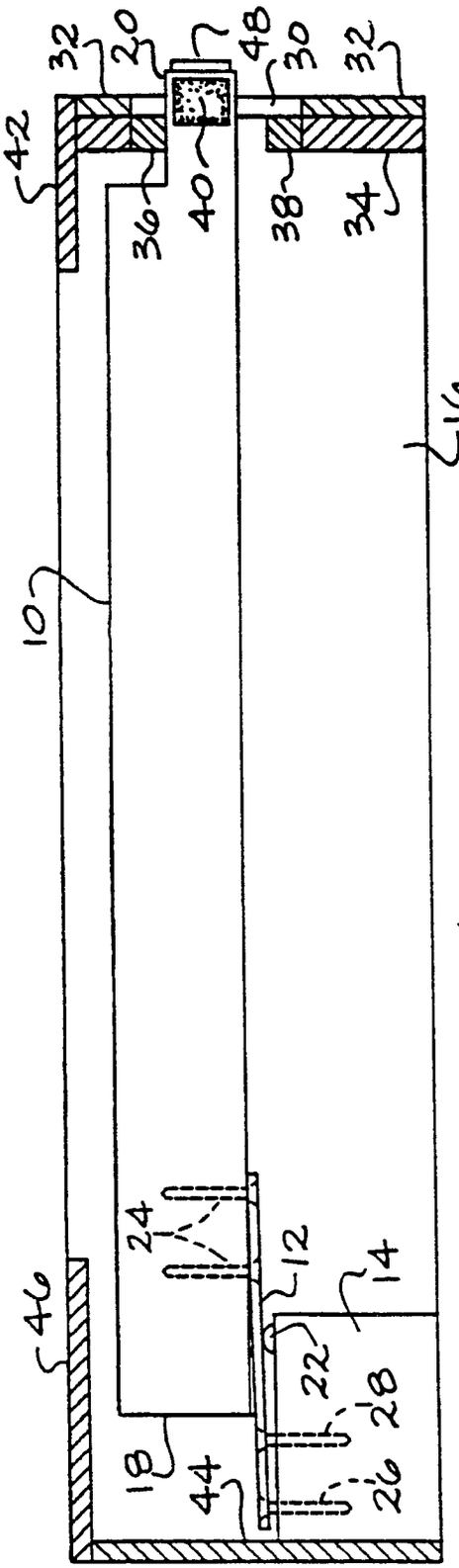

FIG. 1

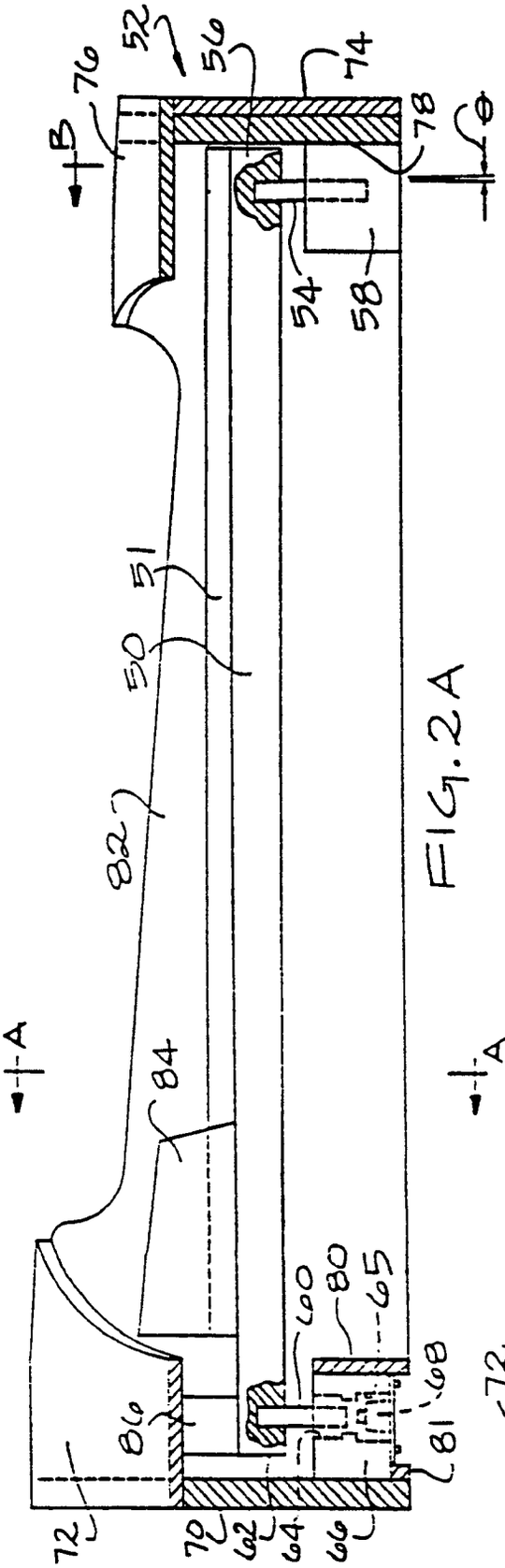
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FIG. 2A

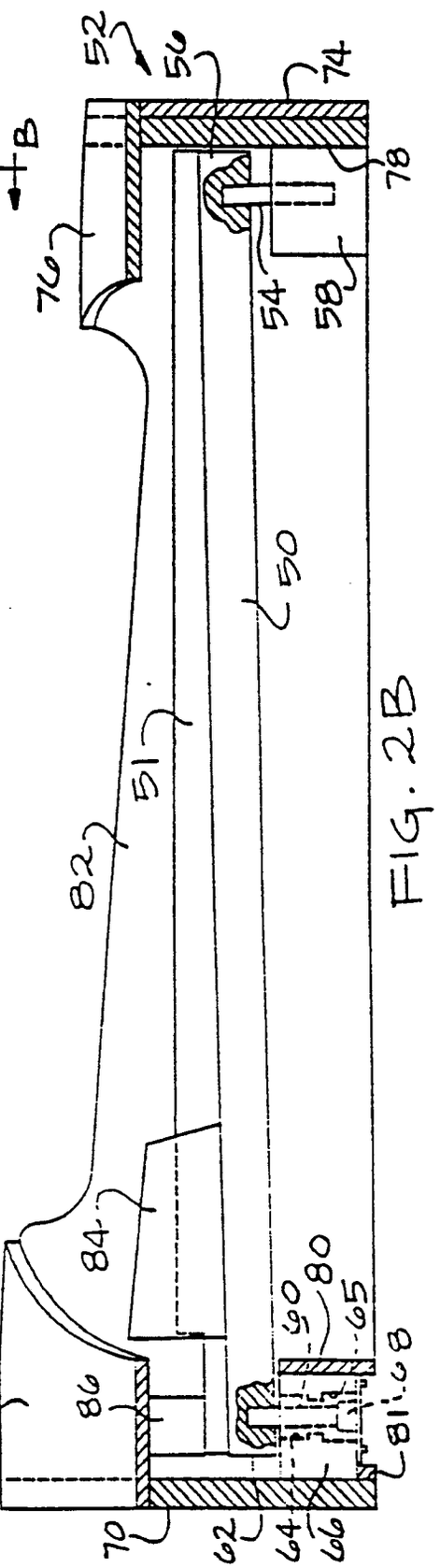
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FIG. 2B

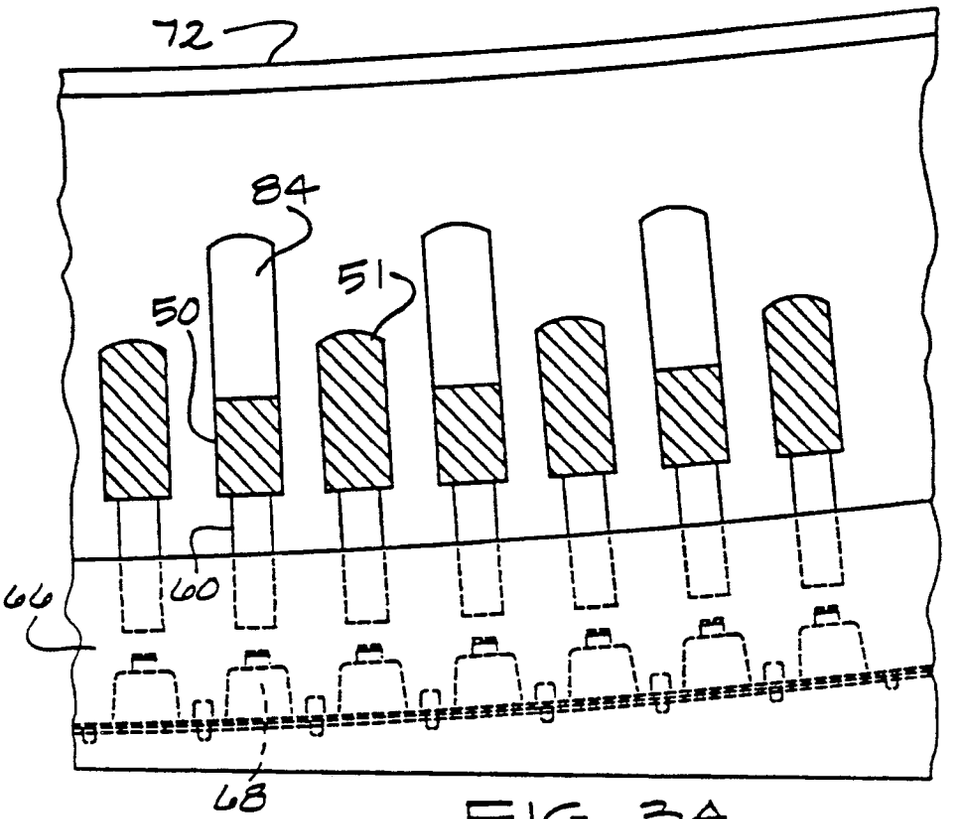

FIG. 3A

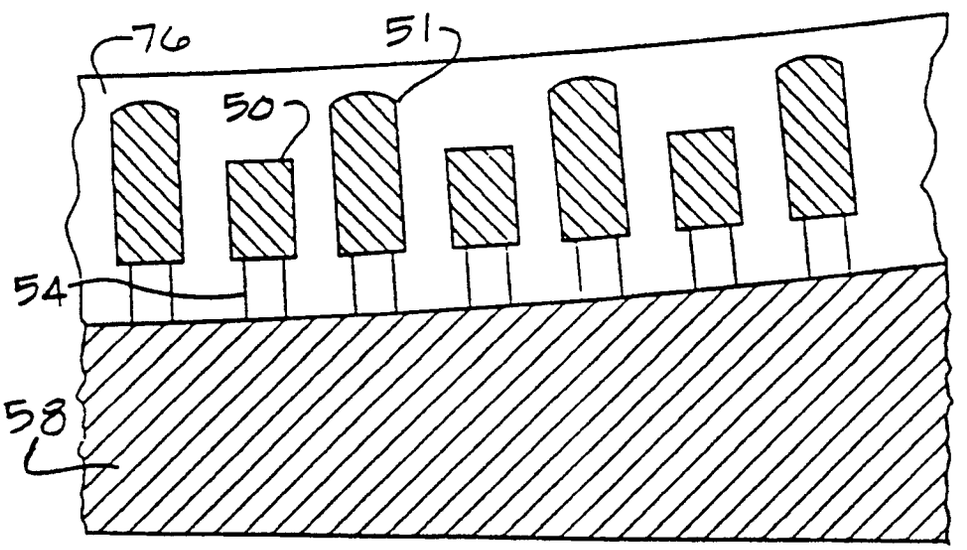

FIG. 3B

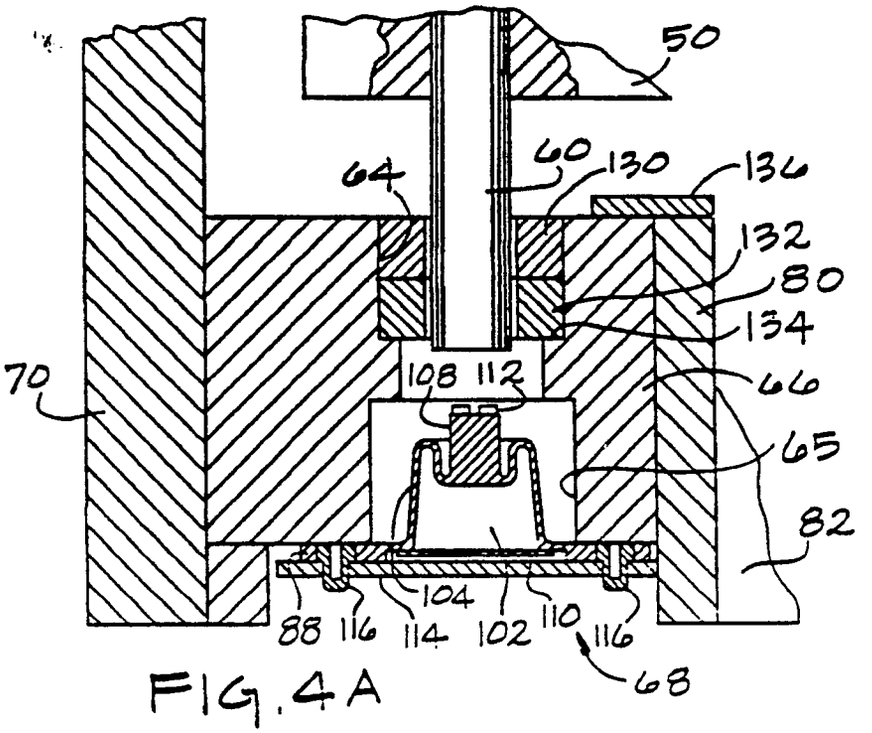
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FIG. 4A

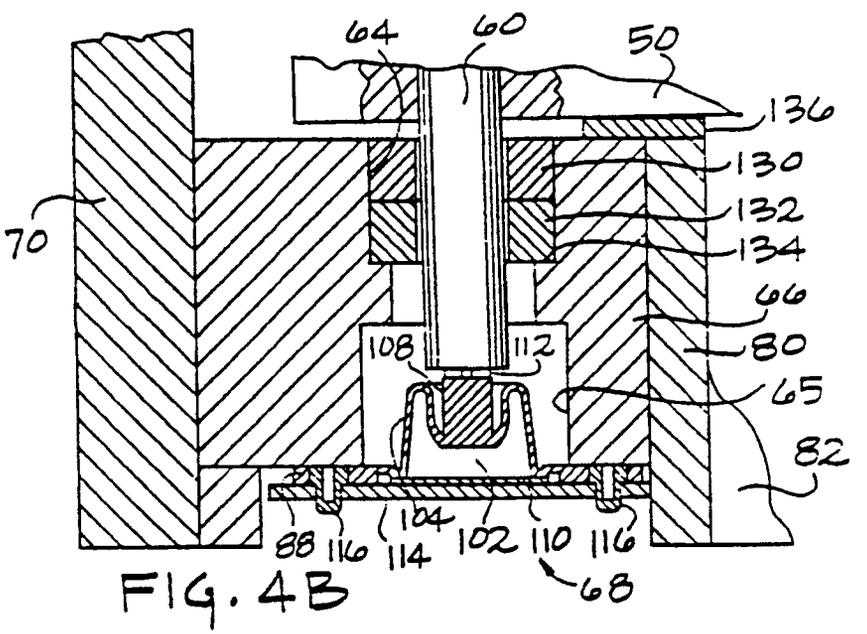
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FIG. 4B

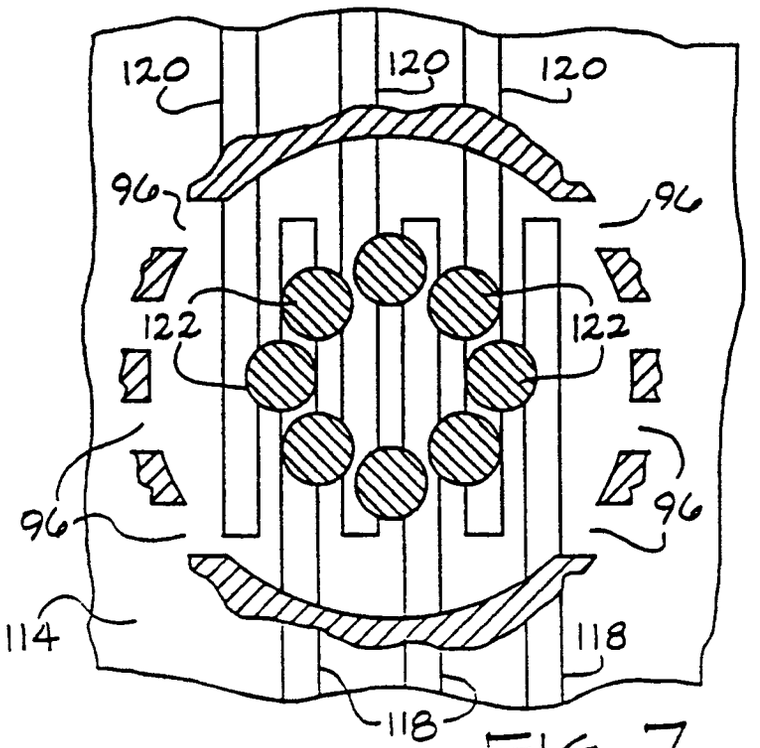
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FIG. 7

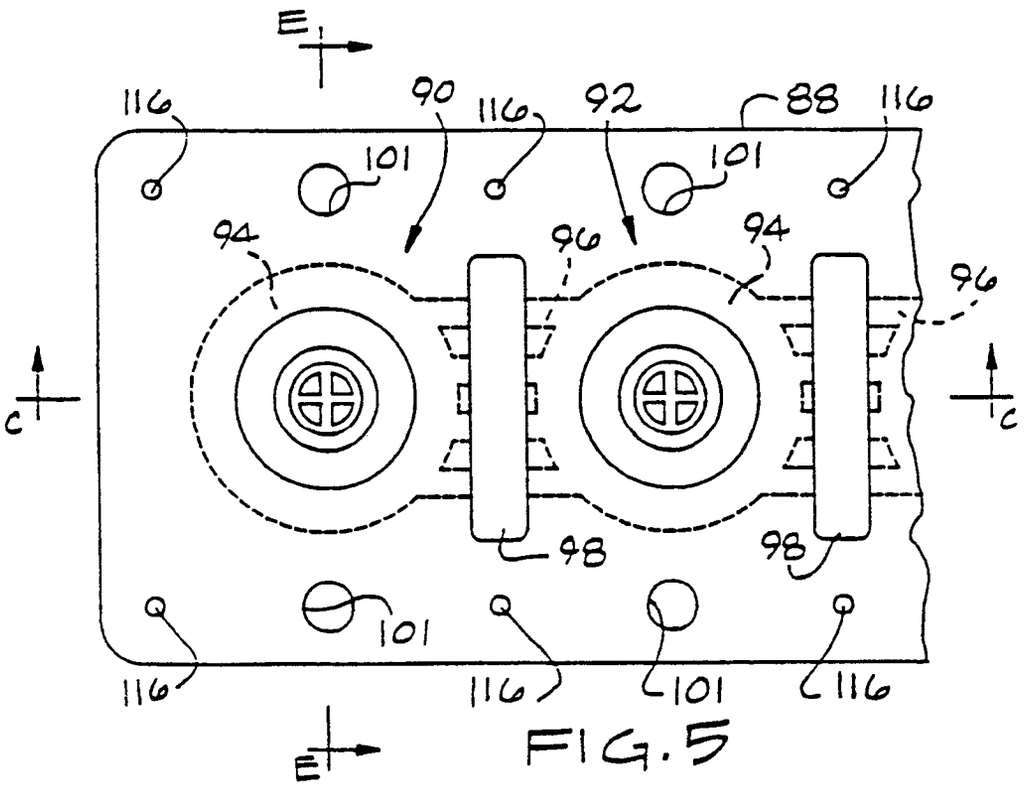
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FIG. 5

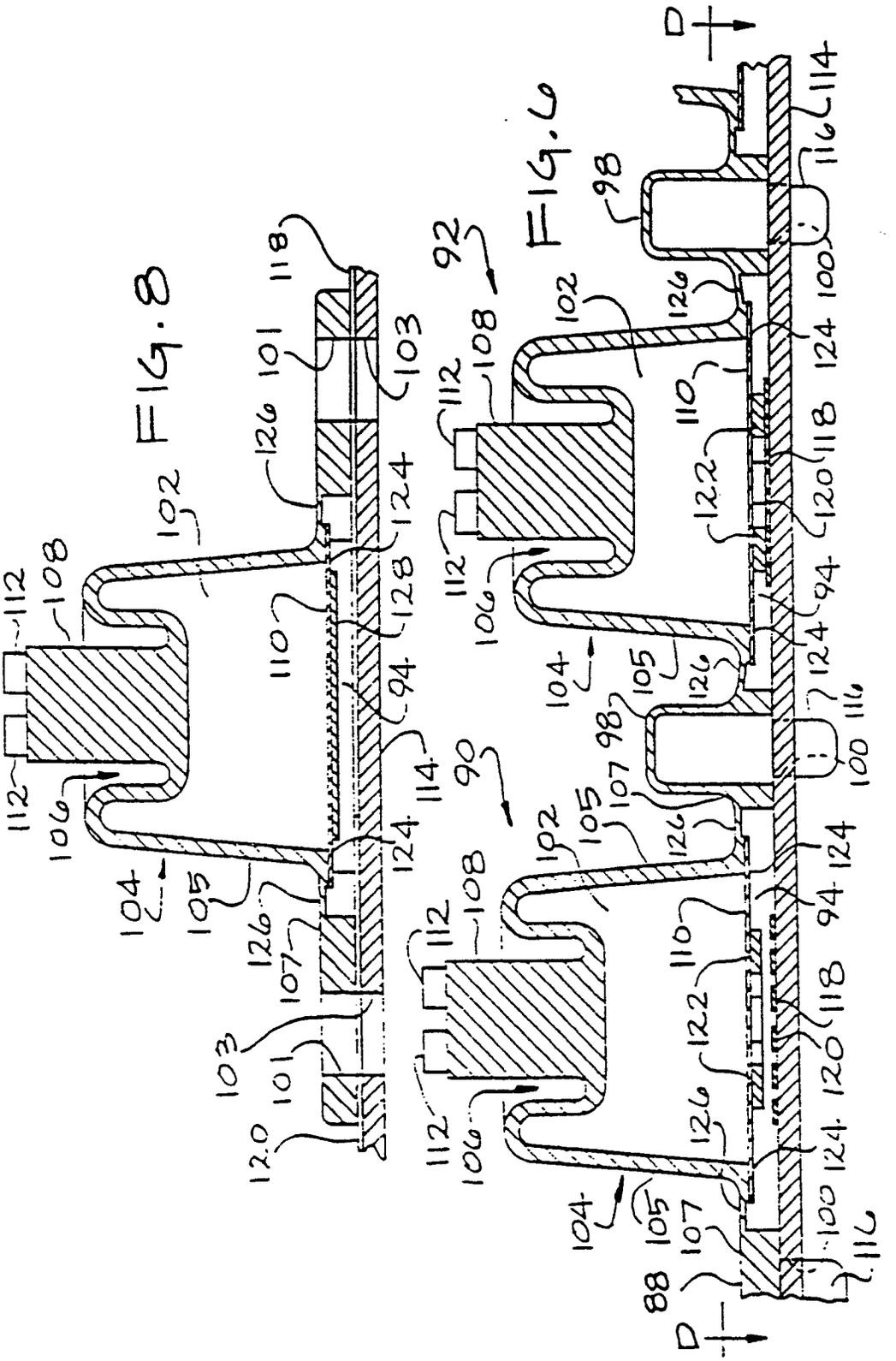
FIG. 8
FIG. 6
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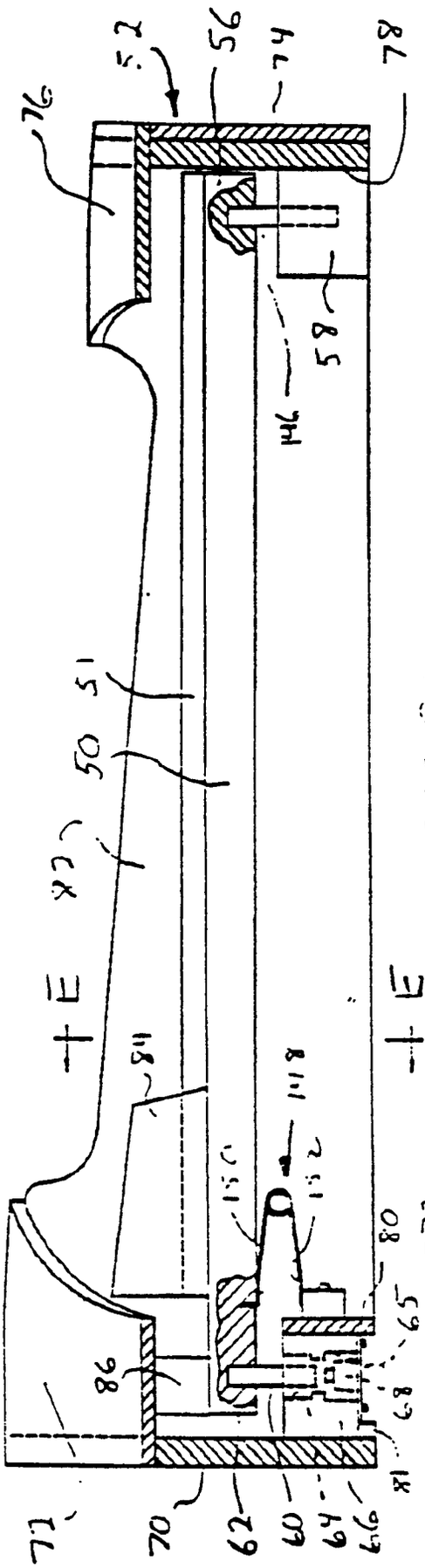
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FIG. 7A

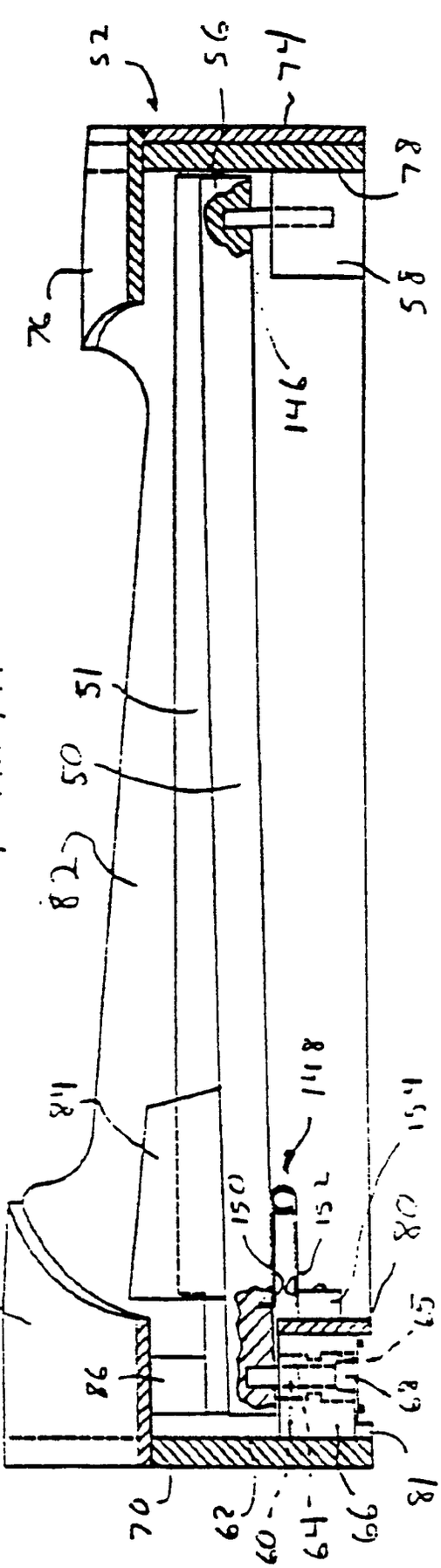
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FIG. 7B

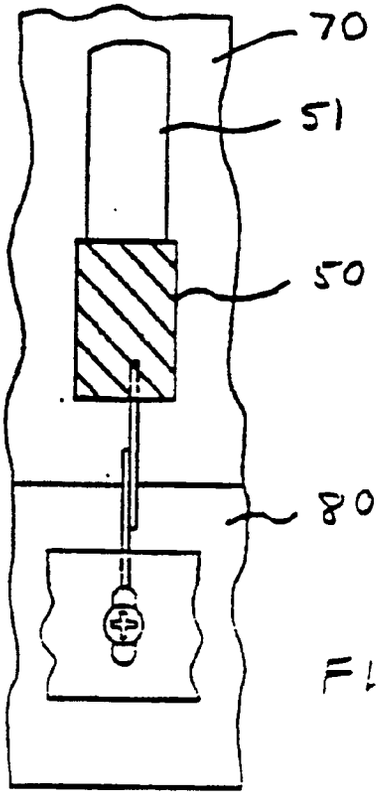
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FIG. 11

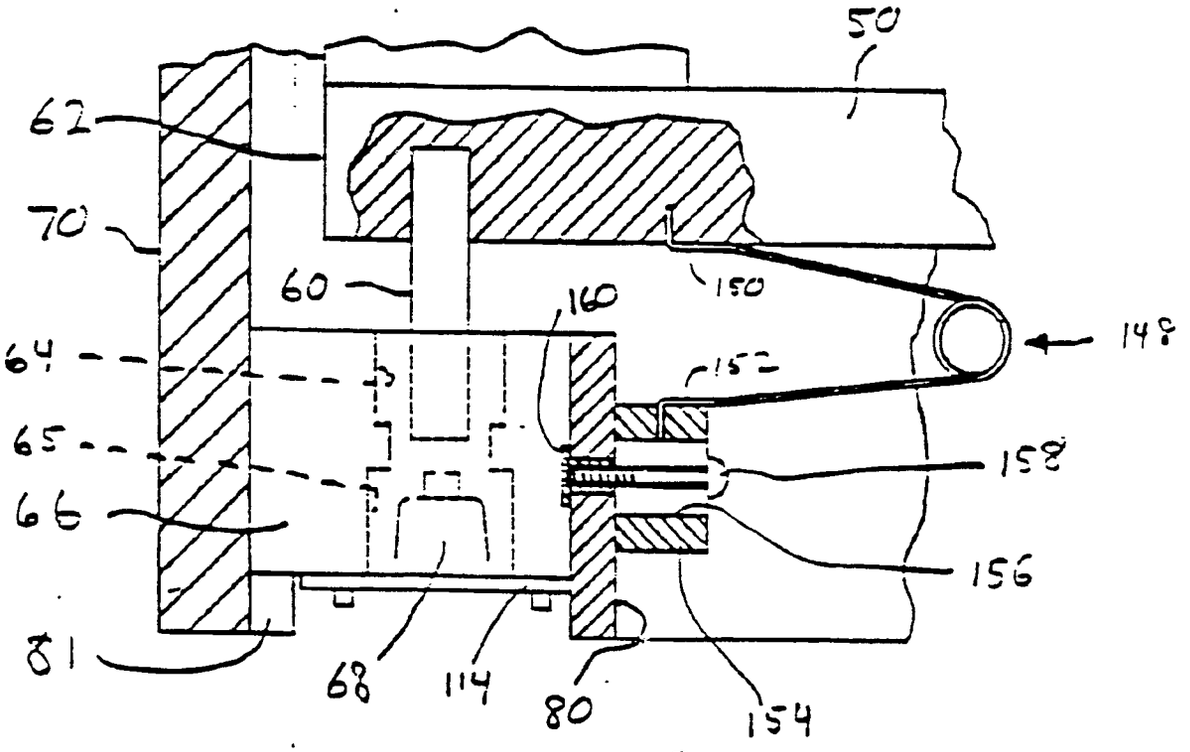
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FIG. 10

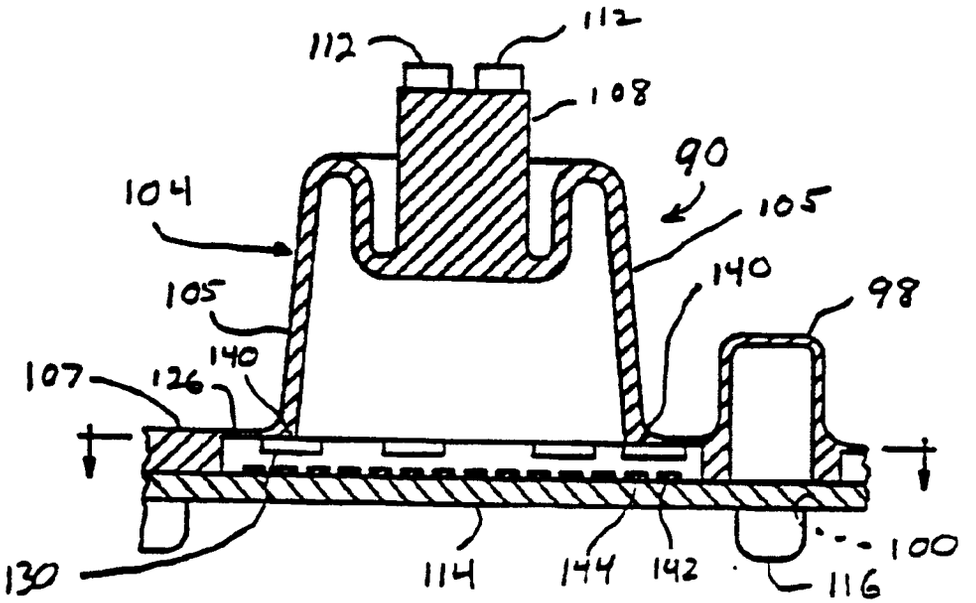
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FIG. 12

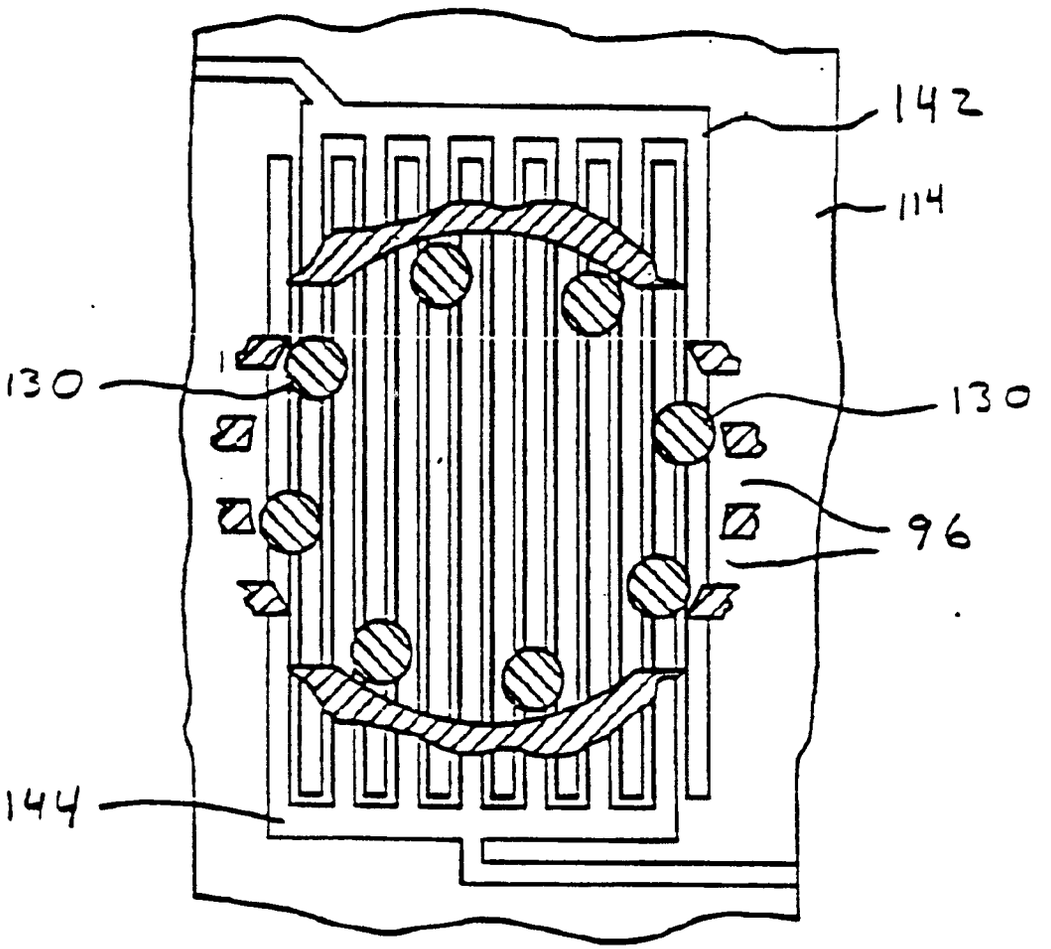
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FIG. 13