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Barsun et al.

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(54) **LEVERS FOR SUPPORT OF HEATSINK COMPONENT**

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(52) **U.S. Cl.** **361/704**; 361/703; 361/705; 361/709; 361/719; 257/718; 257/719; 174/16.3; 165/80.3; 24/458

(58) **Field of Classification Search** 361/687, 361/697, 702–710, 717–719; 439/342, 485; 174/16.1, 16.3; 165/80.2, 80.3, 185, 121–126; 257/706–727; 248/505, 510; 24/453, 457, 24/458; 411/516, 522, 523, 520

See application file for complete search history.

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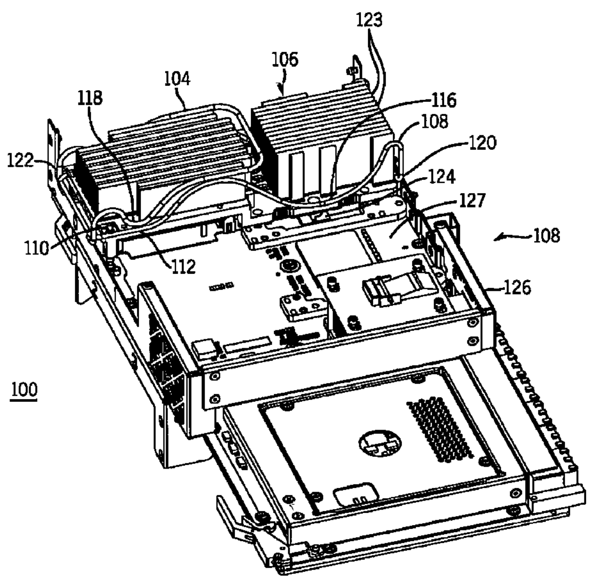
(57) **ABSTRACT**

An apparatus in one example comprises a plurality of levers that convert a lesser input force to a greater output force for support of a heatsink component coupled with an electronic component.

37 Claims, 6 Drawing Sheets



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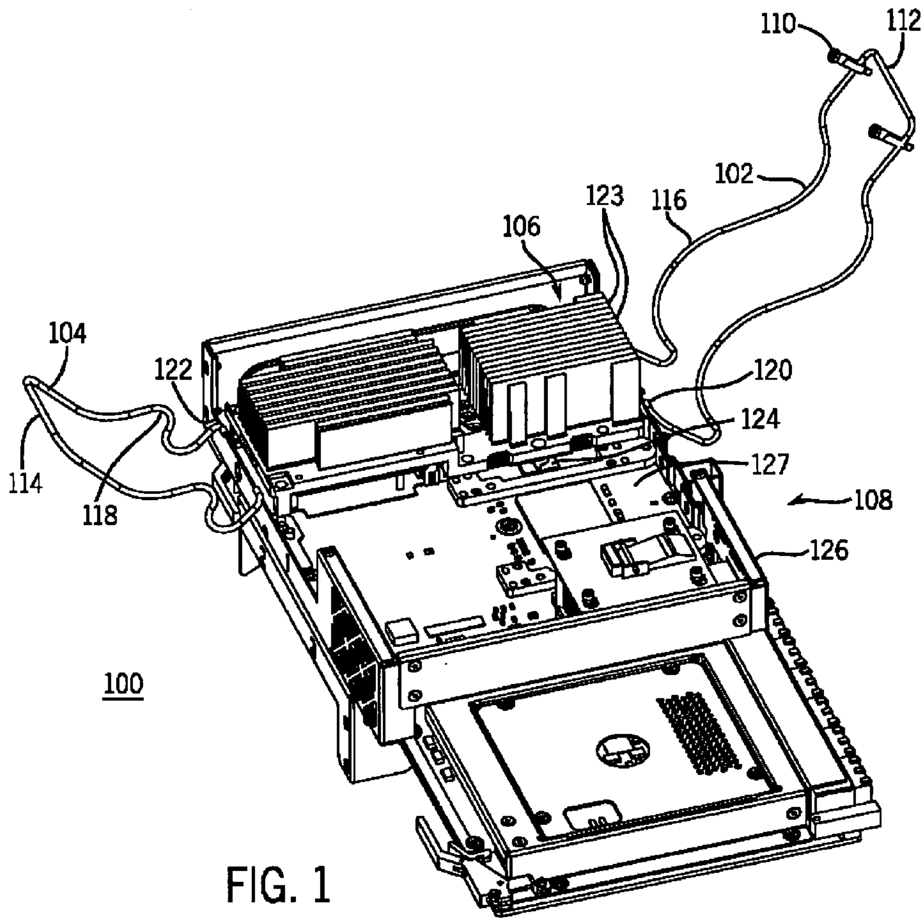

FIG. 1

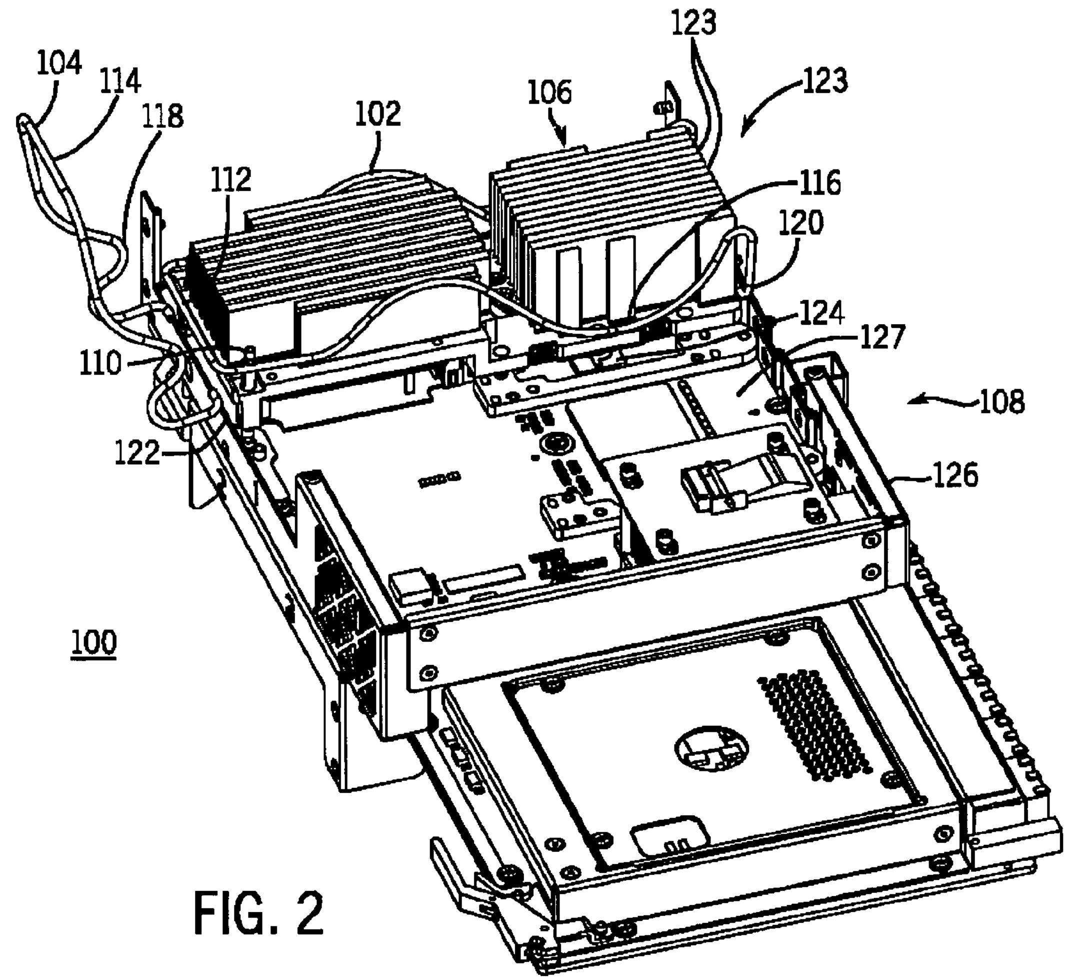
104
114
118
112
102
106
123
123
116
120
124
127
108
110
122
126
100

FIG. 2

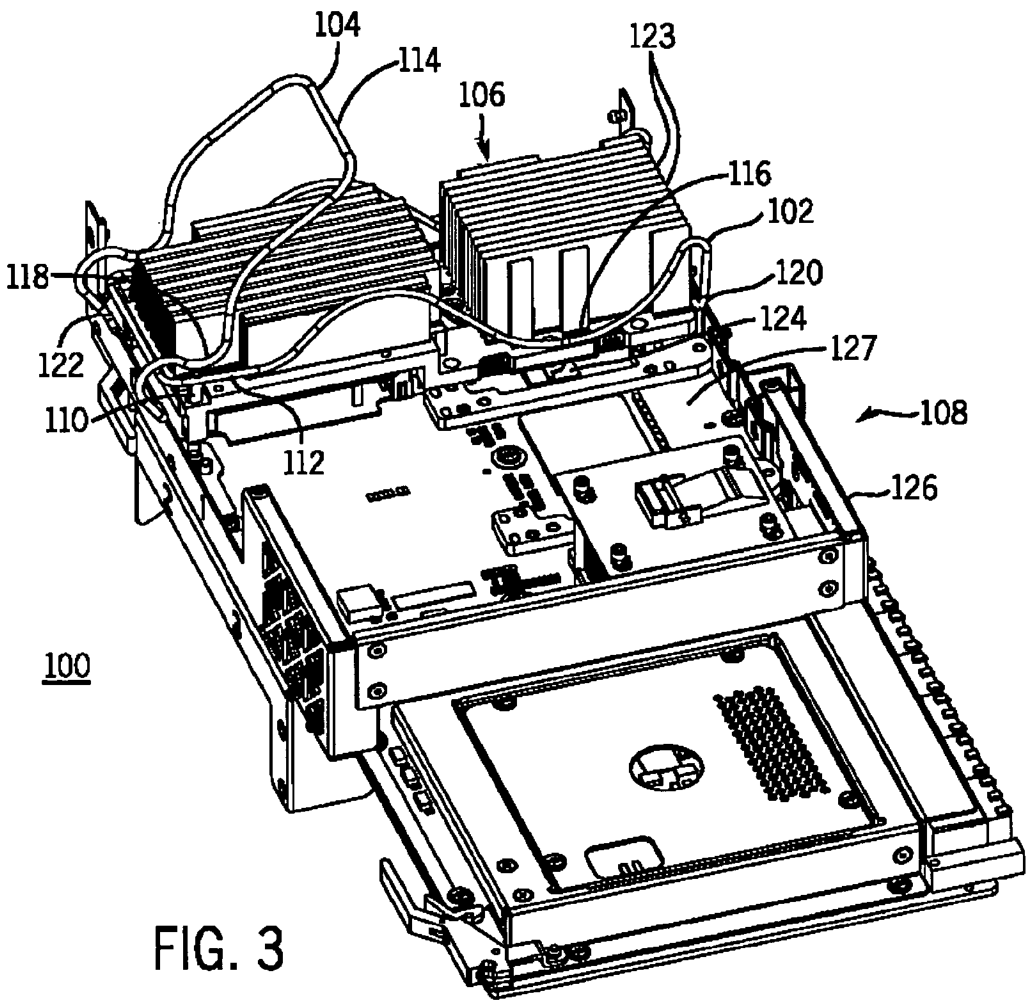

FIG. 3

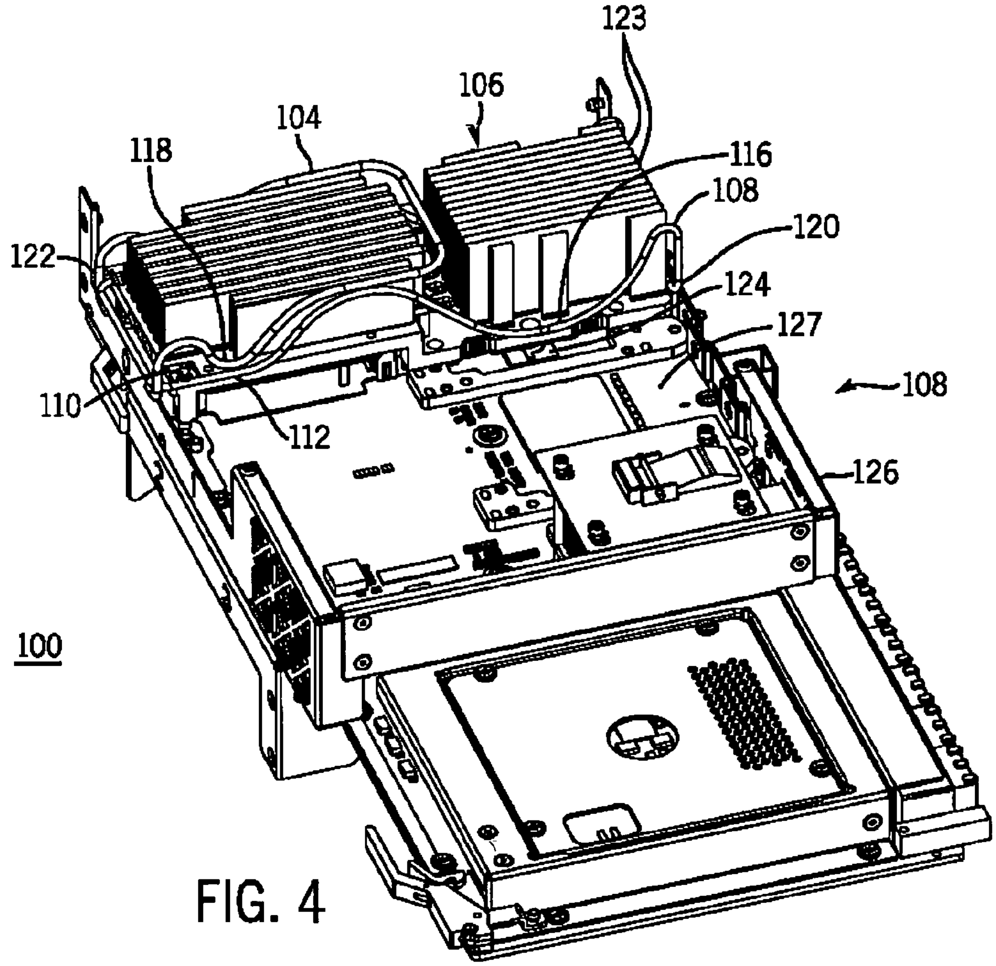

FIG. 4

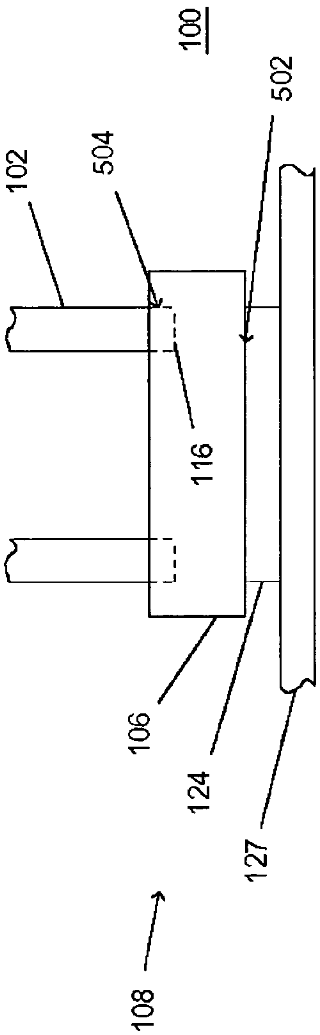
100
102
504
502
116
106
124
127
108

FIG. 5

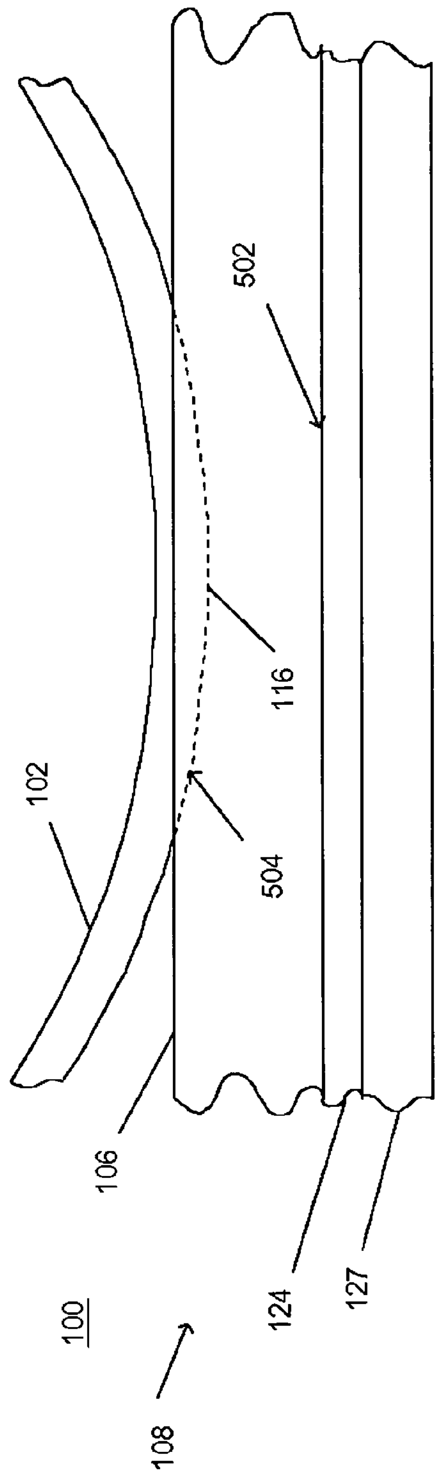
502
116
102
504
106
100
108
124
127

FIG. 6

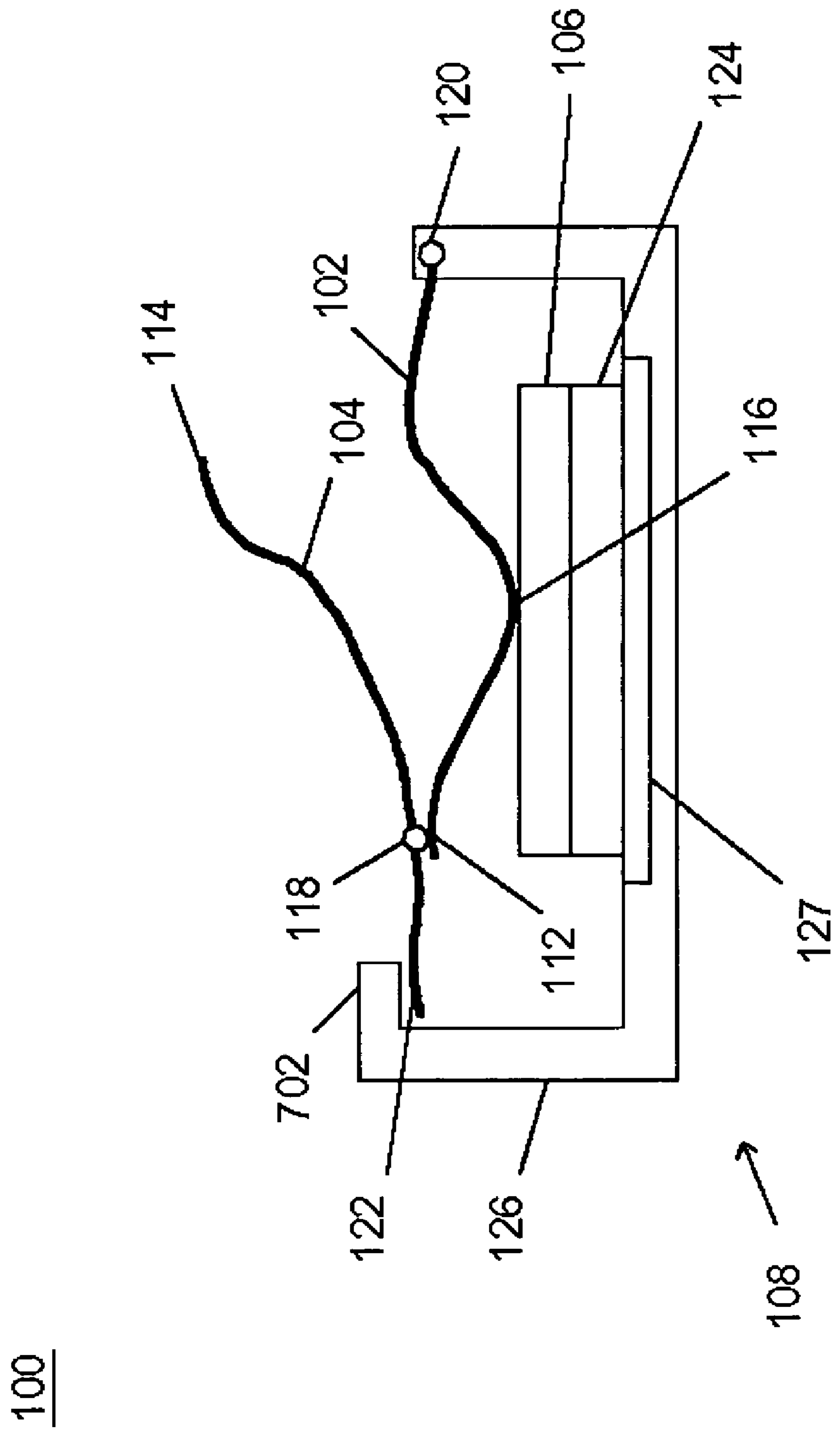

FIG. 7

LEVERS FOR SUPPORT OF HEATSINK COMPONENT

BACKGROUND

Electrical components in one design of an electronic device generate heat during operation. Heatsinks of the electronic device serve to draw the heat away from the electronic components for dissipation into the environment. Coupling devices connect the heatsink to the electronic components to allow for movement and vibration of the electronic device without separation of the heatsink from the electronic components. For example, the coupling devices comprise screws, wireform clips, and/or simple springs.

SUMMARY

The invention in one implementation encompasses an apparatus. The apparatus comprises a plurality of levers that convert a lesser input force to a greater output force for support of a heatsink component coupled with an electronic component.

Another implementation of the invention encompasses a method. A plurality of levers are arranged in a cooperative relationship that promotes an increase in an output force that supports a heatsink component coupled with an electronic component.

A further implementation of the invention encompasses an apparatus. The apparatus comprises means for converting a lesser input force to an intermediate force, where the intermediate force is greater than the lesser input force. The apparatus comprises means for converting the intermediate force to a greater output force on a heatsink component coupled with an electronic component, where the greater output force is greater than the intermediate force. The apparatus comprises means for coupling the means for converting the lesser input force to the intermediate force with one or more of the electronic component and the means for converting the intermediate force to the greater output force on the heatsink component coupled with the electronic component. The apparatus comprises means for coupling the means for converting the intermediate force to the greater output force on the heatsink coupled with the electronic component with the electronic component.

Yet another implementation of the invention encompasses a method. A lesser input force is converted to an intermediate force through employment of a first lever, where the intermediate force is greater than the lesser input force. The intermediate force is converted to an output force on a heatsink component through employment of a second lever, where the output force is greater than the intermediate force.

DESCRIPTION OF THE DRAWINGS

Features of exemplary implementations of the invention will become apparent from the description, the claims, and the accompanying drawings in which:

FIG. **1** is a perspective representation of one exemplary implementation of an apparatus that comprises a plurality of levers, one or more heatsink components, and one or more electronic components, and illustrates one example of non-engagement of a first lever with an electronic component.

FIG. **2** is similar to FIG. **1** and illustrates one example of complete engagement of the first lever with the electronic component.

FIG. **3** is similar to FIG. **2** and illustrates one example of partial engagement of a second lever with the first lever.

FIG. **4** is similar to FIG. **3** and illustrates one example of complete engagement of the second lever with the first lever.

FIG. **5** is a cutaway, partial, sectional, enlarged, side representation of the heatsink component and the electronic component of the apparatus of FIG. **1** and illustrates the heatsink with a recess that receives the first lever and a thermal interface between the heatsink component and the electronic component.

FIG. **6** is a cutaway, partial, sectional, enlarged, front representation of the heatsink component and the electronic component of the apparatus of FIG. **5**.

FIG. **7** is a partial, sectional, enlarged, front representation of another exemplary implementation of the apparatus of FIG. **1** and illustrates the electronic component with an abutment portion that limits a range of movement of a fulcrum of a second lever and the first lever coupled with the second lever.

DETAILED DESCRIPTION

Referring to the BACKGROUND section above, the coupling devices for connecting the heatsink to the electronic component are often unable to provide sufficient force to secure a heatsink of relatively large size and/or mass. Also, the coupling devices often require that extra tools be employed by a user for installation of the heatsink, or for removal of the heatsink to gain access to the electronic components and perform maintenance of the electronic device.

Turning to FIG. **1**, an apparatus **100** in one example comprises a plurality of components such as hardware components. A number of such components can be combined or divided in the apparatus **100**. The apparatus **100** in one example comprises any (e.g., horizontal, oblique, or vertical) orientation, with the description and figures herein illustrating one exemplary orientation of the apparatus **100**, for explanatory purposes.

The apparatus **100** in one example comprises a plurality of levers, for example, levers **102** and **104**, one or more heatsink components **106**, and one or more electronic components **108**. In one example, the apparatus **100** comprises one or more portions of an electronic device. The levers **102** and **104** in one example serve to support the heatsink component **106**. In a further example, the levers **102** and **104** serve to couple the heatsink component **106** with the electronic component **108**. For example, the levers **102** and **104** support and/or secure the heatsink component **106** against one or more portions of the electronic component **108**.

In one example, the levers **102** and/or **104** comprise one or more wireform levers and/or one or more leaf springs. The levers **102** and **104** in one example comprise respective wireform levers. For example, the levers **102** and **104** are formed from bent wire. In another example, the levers **102** and **104** comprise one wireform lever and one leaf spring. In yet another example, the levers **102** and **104** comprise respective leaf springs.

Where the lever **102** in one example comprises a leaf spring, compression of the leaf spring by a user (not shown) causes the leaf spring to bend from an original or unloaded state of the leaf spring. The lever **102** resists the compression with a counteracting force that is (e.g., substantially) proportional to the amount of compression. The lever **102** in one example applies the counteracting force to the heatsink component **106** within a predetermined tolerance range that is selected to maintain integrity of a thermal interface **502** (FIGS. **5**–**6**) between the heatsink component **106** and the electronic component **108**. In one example, the predetermined tolerance range of the load force comprises approximately two hundred sixty-seven newtons (sixty pounds) ±10%, or approximately between two hundred forty newtons (fifty-four pounds) and two hundred ninety-three newtons (sixty-six pounds).

The levers **102** and/or **104** in one example comprise one or more fastener components **110**. For example, the fastener component **110** comprises a latch and/or a lock. The fastener component **110** in one example secures the levers **102** and/or **104** from movement relative to the electronic component **108**. In one example, the fastener component **110** engages the lever **102** with the electronic component **108**. In a further example, the fastener component **110** locks the lever **102** in place against the heatsink component **106** and/or the electronic component **108**.

The lever **102** in one example comprises one or more effort points **112**, one or more load points **116**, and a fulcrum **120**. The lever **104** in one example comprises one or more effort points **114**, one or more load points **118**, and a fulcrum **122**. An effort force applied by the user to the lever **102** at the effort point **112** in one example causes the lever **102** to pivot about the fulcrum **120** and apply a load force at the load point **116**. For example, the user applies the effort force onto the lever **102** by pushing with the user's hand on the effort point **112** to exert a torque on the lever **102** that creates the load force at the load point **116**.

The fulcrums **120** and/or **122** in one example are supported with one or more portions of the electronic component **108**. For example, the electronic component **108** comprises a pin (not shown) that serves as an axis for rotational support of the lever **102** about the fulcrum **120**. In a further example, the levers **102** and **104** comprise second class levers. For example, where the load force applied to the heatsink component **106** is greater than the effort force applied to the effort point **112** and the effort force and load force are on a same side of the fulcrum **120**, the lever **102** as the second class lever converts the effort force into the load force.

The heatsink component **106** in one example comprises a material that promotes an increase in efficiency of heat conduction and/or dissipation. For example, the heatsink component **106** comprises one or more of graphite, copper, and aluminum. The heatsink component **106** in one example comprises one or more fins **123** and one or more recesses **504** (FIGS. **5**–**6**). The fins **123** in one example serve to expose heat conducted therethrough to ambient air for cooling.

In one example, the heatsink component **106** serves to dissipate heat generated by the electronic component **108**. For example, the heatsink component **106** cools the electronic component **108**. The electronic component **108** and the heatsink component **106** transfer heat through the thermal interface **502** between the electronic component **108** and the heatsink component **106** to cool the electronic component **108**. The heatsink component **106** employs convection to dissipate the heat by conducting the heat through the fins **123** that are exposed to a fluid such as air moving across the fins **123**, as will be understood by those skilled in the art.

The electronic component **108** in one example comprises an integrated circuit ("IC") chip **124**, a frame **126**, and a circuit board **127**. The integrated circuit chip **124** in one example is electrically coupled with the circuit board **127**. In a further example, the integrated circuit chip **124** is mounted on the circuit board **127**. In a still further example, the circuit board **127** is mounted on the frame **126**. The levers **102** and **104** connect the heatsink component **106** with the electronic component **108** to promote an increase in efficiency of cooling of the integrated circuit chip **124** and/or the circuit board **127**. For example, the levers **102** and **104** support the heatsink component **106** during vibration and/or movement of the electronic device that comprises the apparatus **100**, to maintain integrity of the thermal interface **502** between the heatsink component **106** and the integrated circuit chip **124**.

The frame **126** in one example supports the fulcrums **120** and/or **122** and the circuit board **127**. In one example, the frame **126** comprises an abutment portion **702** (FIG. **7**). The abutment portion **702** in one example comprises a catch and/or a stop. For example, the abutment portion **702** serves to secure the fulcrums **120** and/or **122** from movement relative to the frame **126**.

In one example and at a first point in time, referring to FIG. **1**, the lever **102** is not engaged with the heatsink component **106**. The lever **104** is not engaged with the lever **102**. The heatsink component **106** is not secured to the electronic component **108** by the levers **102** and **104**. For example, a shock and/or vibration of the electronic component **108** may dislocate the heatsink component **106**.

In a further example and at a second point in time, turning to FIG. **2**, the lever **102** is engaged with the heatsink component **106**. The lever **104** is not engaged with the lever **102**. The lever **102** converts a force applied to the effort point **112** into a force on the heatsink component **106** that serves to support the heatsink component **106** against the electronic component **108**.

In a still further example and at a third point in time, turning to FIG. **3**, the lever **102** is engaged with the heatsink component **106**. The lever **104** is partially engaged with the lever **102**. The lever **104** converts a force applied to the effort point **114** into a force on the effort point **112**. The lever **102** converts the force on the effort point **112** into the force on the heatsink component **106** that serves to support the heatsink component **106** against the electronic component **108**.

In a further example and at a fourth point in time, turning to FIG. **4**, the lever **102** is engaged with the heatsink component **106**. The lever **104** is engaged with the lever **102**. The lever **104** coverts the force applied to the effort point **114** into the force on the effort point **112**. The lever **102** converts the force on the effort point **112** into the force on the heatsink component **106** that serves to support the heatsink component **106** against the electronic component **108**.

Turning to FIGS. **5**–**6**, the levers **102** and **104** in one example maintain the thermal interface **502** between the heatsink component **106** and the electronic component **108**. When the electronic component **108** and the heatsink component **106** are sufficiently engaged, the thermal interface **502** serves to cool the electronic component **108** by conducting heat from the electronic component **108** and to the heatsink component **106**. The levers **102** and/or **104** store spring energy for maintaining the thermal interface **502** between the heatsink component **106** and the electronic component **108**. For example, the levers **102** and **104** promote retention of the heatsink component **106** against the electronic component **108** to secure the thermal interface **502** during shock and/or vibration of the electronic component **108**.

The recesses **504** of the heatsink component **106** in one example serve to connect the levers **102** and/or **104** with the heatsink component **106**. In one example, the recesses **504** receive and hold a number of the load points **116** of the lever **102**. In a further example, the load point **116** of the lever **102** rests against a sidewall of the recess **504** to promote an increase in stability of the lever **102** and/or the heatsink component **106**.

Turning to FIG. **7**, in another implementation of the apparatus **100**, the load point **118** of the lever **104** is coupled with the effort point **112** of the lever **102**. The load point **118** is coupled with the effort point **112** such that an effort force applied by the user on the effort point **114** rotates the lever **102** about the load point **118**. Next, the fulcrum **122** of the lever **102** engages the abutment portion **702** to stabilize the fulcrum **122**. Subsequently, the lever **102** rotates about the fulcrum **122** to convert the effort force on the effort point **114** to a force on the effort point **112**.

An illustrative description of exemplary operation of the apparatus **100** is presented, for explanatory purposes. At the first point in time, referring to FIG. **1**, the lever **102** is not engaged with the heatsink component **106**. The user wishes to secure the heatsink component **106** to the electronic component **108**. At the second point in time, referring to FIG. **2**, the user applies a lesser input force on the effort point **112**. The effort point **112** receives the lesser input force such that the lever **102** rotates about the fulcrum **120** and the load point **116** engages the heatsink component **106**.

The lesser input force compresses the lever **102** such that the lever **102** stores energy for applying a greater output force to the heatsink component **106**. The lever **102** converts the lesser input force on the effort point **112** to the greater output force through the load point **116** on the heatsink component **106**. The lever **102** employs the greater output force for support of the heatsink component **106** against one or more portions of the electronic component **108**. The lever **102** converts the lesser input force to the greater output force such that the greater output force is greater than the lesser input force, as will be appreciated by those skilled in the art. For example, a ratio of the greater output force to the lesser input force is equal to four.

At the third point in time, referring to FIG. **3**, the user applies the lesser input force to the effort point **114**. The effort point **114** receives the lesser input force such that the lever **104** rotates about the fulcrum **122** and the load point **118** engages the effort point **112** to become completely engaged at the fourth point in time (FIG. **4**). The lever **104** converts the lesser input force on the effort point **114** to an intermediate force through the load point **118** on the effort point **112**. The lever **102** converts the intermediate force to the greater output force such that the intermediate force is greater than the lesser input force, as will be appreciated by those skilled in the art. For example, a ratio of the intermediate force to the lesser input force is equal to three.

The user applies the lesser input force to the lever **102**, which converts the lesser input force to the intermediate force on the lever **104**. The lever **104** converts the intermediate force to the greater output force on the heatsink component **106**. For example, the lever **102** and the lever **104** cooperate to form a compound lever where the lever **104** acts on the lever **102**. The exemplary description herein is easily extendible to an implementation of the apparatus **100** that employs additional levers **104**. Where the intermediate force is three times the lesser input force and the greater output force is four times the intermediate force, the greater output force is equal to twelve times the lesser input force. For example, the user can apply five pounds of force to the lever **102** and achieve sixty pounds of force on the heatsink component **106**, as will be appreciated by those skilled in the art.

In one example, the lever **102** is bent approximately four millimeters from the original state when the heatsink component **106** is in a nominal position with respect to the electronic component **108**. The amount of bending of the lever **102** is affected by the nominal position of the heatsink component **106** with respect to the electronic component **108**, for example, deviations in manufacturing cause a deviation from the nominal position of approximately ±0.4 millimeters. Where the leaf spring of the lever **102** comprises a linear spring rate, the load force will vary by approximately ±10%, as will be appreciated by those skilled in the art. For example, the predetermined tolerance range of the load force comprises approximately two hundred sixty-seven newtons ±10%, or approximately between two hundred forty newtons and two hundred ninety-three newtons.

In another example, the load point **118** is coupled with the effort point **112**. The fulcrum **122** engages the electronic component **108** to stabilize the fulcrum **122**. For example, the fulcrum **122** engages the abutment portion **702** of the frame **126** to stabilize the lever **104**. Other implementations of the apparatus **100** may comprise various arrangements of first class, second class, and/or third class levers. Exemplary types of first, second, and third class levers comprise see-saws, wheelbarrows, and mouse traps (not shown), respectively, as will be understood by those skilled in the art.

Upon engagement of the lever **104**, the user engages the fastener component **110** to secure the lever **104** in place. For example, the user slides a latch of the fastener component **110** over the lever **104** to secure the lever **104** from movement. The exemplary description herein is easily extendible to an implementation of the apparatus **100** that employs additional fastener components **110**, as will be appreciated by those skilled in the art.

The steps or operations described herein are just exemplary. There may be many variations to these steps or operations without departing from the spirit of the invention. For instance, the steps may be performed in a differing order, or steps may be added, deleted, or modified.

Although exemplary implementaion of the invention have been depicted and described in detail herein, it will be apparent to those skilled in the relevant art that various modifications, additions, substitutions, and the like can be made without departing from the spirit of the invention and these are therefore considered to be within the scope of the invention as defined in the following claims.

What is claimed is:

1. An apparatus, comprising: a plurality of levers that convert a lesser input force to a greater output force for support of a heatsink component coupled with an electronic component;

wherein the plurality of levers comprises a first moment arm lever and a second moment arm lever; wherein the first moment arm lever comprises a leaf spring moment arm lever or wireform moment arm lever that converts the lesser input force to an intermediate force on the second moment arm lever, wherein the intermediate force is greater than the lesser input force;

wherein the second moment arm lever converts the intermediate force on the second moment arm lever to the greater output force, wherein the greater output force is greater than the intermediate force; wherein the second moment arm lever employs the greater output force for support of the heatsink component;

wherein the second moment arm lever applies a compressive force to the heatsink component as the greater output force via a combined deflection of the first moment arm lever and the second moment arm lever.

2. The apparatus of claim **1**, wherein the plurality of levers comprises one or more leaf spring moment arm levers and one or more wireform moment arm levers.

3. The apparatus of claim **1**, wherein the first moment arm lever comprises a first effort point and a first load point, wherein the second moment arm lever comprises a second effort point and a second load point;

wherein the first moment arm lever receives the lesser input force through the first effort point and applies the intermediate force to the second moment arm lever through the first load point; wherein the second lever receives the intermediate force through the second effort point and applies the greater output force to the heatsink component through the second load point;

wherein the second moment arm lever applies the output force to the heatsink component through the second load point for support of the heatsink component.

4. The apparatus of claim **1**, wherein the second moment arm lever applies the greater output force against the heatsink component to secure the heatsink component against one or more portions of the electronic component.

5. The apparatus of claim **1**, wherein the second moment arm lever comprises a second class moment arm lever that comprises a fulcrum that abuts one or more portions of the electronic component for support.

6. The apparatus of claim **5**, wherein the one or more portions of the electronic component comprise one or more first portions of the electronic component, wherein the fulcrum of the second class moment arm lever abuts the one or more first portions of the electronic component for support, wherein the first moment arm lever comprises a second class lever that comprises a fulcrum that abuts one or more second portions of the electronic component.

7. The apparatus of claim **6**, wherein the second moment arm lever supports the first effort point of the first moment arm lever, wherein the one or more second portions of the electronic component comprise an abutment portion of the electronic component;

wherein the fulcrum of the first moment arm lever engages the abutment portion of the electronic component to promote stabilization of the fulcrum of the first moment arm lever.

8. The apparatus of claim **1** in combination with the heatsink component, wherein the heatsink component comprises a substantially flat base that promotes distribution of the greater output force over a face portion of the electronic component.

9. The apparatus of claim **8**, wherein the heatsink component conducts at least a portion of heat away from the electronic component.

10. The apparatus of claim **9**, wherein operation of the electronic component generates at least a major portion of the heat, wherein the heatsink component cools the electronic component through conduction away from the electronic component of at least a subportion of the major portion of the heat.

11. The apparatus of claim **1**, wherein one or more moment arm levers of the plurality of levers are selectively engageable with one or more fastener components for stability of the one or more moment arm levers.

12. The apparatus of claim **1**, wherein one or more moment arm levers of the plurality of levers comprise one or more wireform moment arm levers.

13. The apparatus of claim **1**, wherein one or more moment arm levers of the plurality of levers comprise one or more leaf spring moment arm levers that serve to maintain the greater output force on the heatsink component within a predetermined tolerance range.

14. The apparatus of claim **13**, wherein upon one or more of shock and vibration of the electronic component the one or more leaf spring moment arm levers serve to maintain a thermal interface between the heatsink component and the electronic component in an effective heat conduction relationship.

15. The apparatus of claim **1**, wherein the first moment arm lever acts on the second moment arm lever to convert the lesser input force to the greater output force for support of the heatsink component.

16. A method, comprising the step of:

arranging a plurality of levers in a cooperative relationship that promotes an increase in an output force that supports a heatsink component coupled with an electronic component;

wherein the plurality of levers comprise a first lever and a second lever, wherein the step of arranging the plurality of levers in the cooperative relationship that promotes an increase of the output force to support the heatsink component coupled with the electronic component comprises the steps of: applying a first input force to the first lever to transmit the output force to the heatsink component coupled with the electronic component; and applying a second input force to the second lever to transmit an intermediate force to the first lever that promotes an increase of the output force on the heatsink component;

wherein the second lever comprises a leaf spring, wherein the step of applying the second input force to the second lever to transmit the intermediate force to the first lever that promotes the increase of the output force on the heatsink component comprises the step of:

compressing the leaf spring with the second input force to apply the intermediate force on the first lever.

17. The method of claim **16**, further comprising the step of:

securing one or more of the first and second levers from movement through employment of one or more fastener components to promote an increase in uniformity of one or more of the intermediate force on the first lever and the output force on the heatsink component.

18. The method of claim **16**, wherein the first lever comprises a leaf spring, wherein the step of applying the first input force to the first lever to transmit the output force to the heatsink component coupled with the electronic component comprises the step of:

compressing the leaf spring with the first input force to apply the output force on the heatsink component.

19. The method of claim **16**, wherein the step of arranging the plurality of levers in the cooperative relationship that promotes the increase in the output force that supports the heatsink component coupled with the electronic component comprises the step of:

maintaining a thermal interface between the heatsink component and the electronic component during one or more of shock and vibration of the electronic component.

20. The method of claim **19**, wherein the plurality of levers comprise one or more leaf springs, wherein the step of maintaining the thermal interface between the heatsink component and the electronic component during the one or more of the shock and vibration of the electronic component comprises the step of:

maintaining the output force within a predetermined tolerance range through employment of the one or more leaf springs.

21. The method of claim **16**, wherein the plurality of levers comprises a plurality of leaf springs, wherein the step of arranging the plurality of levers in the cooperative relationship that promotes the increase in the output force that supports the heatsink component coupled with the electronic component comprises the step of:

arranging the plurality of leaf springs in the cooperative relationship that promotes the increase in the output force that supports the heatsink component coupled with the electronic component.

22. The method of claim **16**, wherein the plurality of levers comprises one or more leaf springs and one or more wireform levers, wherein the step of arranging the plurality of levers in the cooperative relationship that promotes the increase in the output force that supports the heatsink component coupled with the electronic component comprises the step of:

arranging the more leaf springs and the one or more wireform levers in the cooperative relationship that promotes the increase in the output force that supports the heatsink component coupled with the electronic component.

23. The apparatus of claim **1**, wherein the first moment arm lever compresses the second moment arm lever.

24. The apparatus of claim **1**, wherein the first moment arm lever and the second moment arm lever cooperate to form a compound lever.

25. The apparatus of claim **1**, wherein the first moment arm lever receives the lesser input force as torque exerted from a hand of a person, wherein the combined deflection of the first moment arm lever and the second moment arm lever causes the greater output force applied to the heatsink component as the compressive force to be substantially greater than the lesser input force as the torque received from the hand of the person.

26. The apparatus of claim **1**, wherein the first moment arm lever receives the lesser input force as a later lesser input force of torque, wherein the second moment arm lever receives an earlier lesser input force of torque, wherein the combined deflection of the first moment arm lever and the second moment arm lever causes a combined mechanical advantage compressive force applied for support of the heatsink component to be substantially greater than a sum of the earlier lesser input force of the torque on the second moment arm lever and the later lesser input force as the torque on the first moment arm lever.

27. The apparatus of claim **26**, wherein the earlier lesser input force on the second moment arm lever and the later lesser input force on the first moment arm lever comprise a substantially same amount of torque exertion, wherein a ratio of the combined mechanical advantage compressive force applied for support of the heatsink component to the substantially same amount of torque exertion is substantially equal to twelve.

28. The apparatus of claim **1**, wherein the first moment arm lever receives the lesser input force as a later lesser input force of torque exerted from a hand of a person, wherein the second moment arm lever receives an earlier lesser input force of torque exerted from the hand of the person, wherein the combined deflection of the first moment arm lever and the second moment arm lever causes a combined mechanical advantage compressive force applied for support of the heatsink component to be substantially greater than a sum of the earlier lesser input force of the torque on the second moment arm lever exerted from the hand of the person and the later lesser input force as the torque on the first moment arm lever exerted from the hand of the person.

29. The apparatus of claim **28**, wherein the earlier lesser input force from the hand of the person on the second moment arm lever and the later lesser input force from the hand of the person on the first moment arm lever comprise a substantially same amount of torque exertion from the hand of the person, wherein a ratio of the combined mechanical advantage compressive force applied for support of the heatsink component to the substantially same amount of torque exertion from the band of the person is substantially equal to twelve.

30. The apparatus of claim **28**, wherein the first moment arm lever and the second moment arm lever cooperate to multiply the later lesser input force from the hand of the person on the first moment arm lever to a substantially larger compressive force component applied for support of the heatsink component.

31. The apparatus of claim **30**, wherein a ratio of the substantially larger compressive force component applied for support of the heatsink component to the later lesser input force from the hand of the person on the first moment arm lever is substantially equal to four.

32. The apparatus of claim **28**, wherein the first moment arm lever and the second moment arm lever cooperate to multiply the earlier lesser input force from the hand of the person on the second moment arm lever to a substantially larger compressive force component applied for support of the heatsink component.

33. The apparatus of claim **32**, wherein a ratio of the substantially larger compressive force component applied for support of the heatsink component to the later lesser input force from the hand of the person on the first moment arm lever is substantially equal to three.

34. A method, comprising the steps of:

converting a lesser input force to an intermediate force through employment of a first moment arm lever that comprises a leaf spring moment arm or wireform moment arm lever, wherein the intermediate force is greater than the lesser input force;

converting the intermediate force to an output force on a heatsink component through employment of a second moment arm lever, wherein the output force is greater than the intermediate force; and

applying a compressive force to the heatsink component as the output force through employment of the second moment arm lever via a combined deflection of the first moment arm lever and the second moment arm lever.

35. The method of claim **34**, further comprising the step of:

securing one or more of the first and second moment arm levers to maintain the output force on the heatsink component.

36. The method of claim **34**, further comprising the steps of:

exerting an earlier lesser input force of torque on the second moment arm lever from a hand of a person;

exerting, as the lesser input force converted to the intermediate force, a later lesser input force of torque on the first moment arm lever from the hand of the person;

wherein the combined deflection of the first moment arm lever and the second moment arm lever causes a combined mechanical advantage compressive force applied for support of the heatsink component to be substantially greater than a sum of the earlier lesser input force of the torque on the second moment arm lever exerted from the hand of the person and the later lesser input force as the torque on the first moment arm lever exerted from the hand of the person.

37. A method, comprising the steps of:

arranging a plurality of levers in a cooperative relationship to support a heatsink component coupled with an electronic component, wherein the plurality of levers comprise a first moment arm lever and a second moment arm lever, wherein the second moment arm lever comprises a leaf spring moment arm lever or wireform moment arm lever; and

applying a first input force of torque to the first moment arm lever and a second input force of torque to the second moment arm lever to cause the first moment arm lever to apply a compressive force to the heatsink component as a combined mechanical advantage compressive force via a combined deflection of the first moment arm lever and the second moment arm lever;

wherein the combined mechanical advantage compressive force applied for support of the heatsink component is substantially greater than a sum of the first input force of torque on the first moment arm lever and the second input force of torque on the second moment arm lever.

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