suction fan is operable to draw an air flow from the air inlet through the air channels for cooling the thermal cycler, and to discharge the air flow at the air outlet. The plurality of air channels includes a first air channel configured to cool a heated block assembly of the thermal cycler and a second air channel configured to cool a power supply of the thermal cycler. The power supply does not include a fan.

[0006] According to another aspect of the present disclosure, a method of cooling a thermal cycler is provided. The method includes drawing, by a suction fan, an air flow from an air inlet disposed at a front housing member of the thermal cycler through a plurality of air channels disposed within the thermal cycler for cooling the thermal cycler, and discharging, by the suction fan, the air flow at an air outlet disposed at a rear housing member of the thermal cycler. The suction fan is mounted adjacent to the air outlet. The plurality of air channels includes a first air channel and a second air channel. Cooling the thermal cycler includes cooling a heated block assembly disposed along the first air channel and cooling a power supply disposed along the second air channel. The power supply does not include a fan.

[0007] According to another aspect of the present disclosure, a method of manufacturing a cooling system for a thermal cycler is provided. The method includes providing an air inlet at a front housing member of the thermal cycler, providing an air outlet at a rear housing member of the thermal cycler, forming a plurality of air channels within the thermal cycler between the air inlet and the air outlet, and mounting a suction fan adjacent to an air outlet. The suction fan is operable to draw an air flow from the air inlet through the air channels for cooling the thermal cycler, and to discharge the air flow at the air outlet. Forming the plurality of air channels includes forming a first air channel for cooling a heated block assembly disposed along the first air channel and forming a second air channel for cooling a power supply disposed along the second air channel. The power supply does not include a fan.

[0008] There is also disclosed a thermal cycler having the cooling system as described.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] Embodiments of the disclosure will be better understood and readily apparent to one of ordinary skill in the art from the following written description, by way of example only, and in conjunction with the drawings, in which:

[0010] Figure 1A shows a thermal cycler according to the present disclosure.

[0011] Figure 1B shows an exploded view of the thermal cycler of Figure 1A.

[0012] Figures 2A-2D show various schematic diagrams illustrating a cooling system for cooling the thermal cycler of Figure 1A.

[0013] Figure 3 shows a block diagram illustrating control of the suction fan of the cooling system of Figure 2A.

CLAIMS

1. A cooling system for a thermal cycler, the cooling system comprising:

an air inlet disposed at a front housing member of the thermal cycler;

an air outlet disposed at a rear housing member of the thermal cycler;

a plurality of air channels formed within the thermal cycler between the air inlet and the air outlet; and

a suction fan mounted adjacent to the air outlet, wherein the suction fan is operable to draw an air flow from the air inlet through the air channels for cooling the thermal cycler, and to discharge the air flow at the air outlet,

wherein the plurality of air channels comprise a first air channel configured to cool a heated block assembly of the thermal cycler and a second air channel configured to cool a power supply of the thermal cycler, and wherein the power supply does not comprise a fan.

~~2. The cooling system as claimed in claim 1, wherein the plurality of air channels comprise a first air channel configured to cool a heated block assembly of the thermal cycler.~~

~~3. The cooling system as claimed in claim 2, wherein the plurality of air channels further comprise a second air channel configured to cool a power supply of the thermal cycler, and wherein the power supply does not comprise a fan.~~

~~4~~2. The cooling system as claimed in claim ~~3~~1, wherein the plurality of air channels further comprise a third air channel configured to cool electronic components of the thermal cycler.

~~5~~3. The cooling system as claimed in claim ~~3~~1, further comprising at least one first opening configured to direct a first portion of the air flow from an upstream section of the first air channel to an upstream section of the second air channel, wherein a size of the at least one first opening is selected to control the first portion of the air flow.

~~6~~4. The cooling system as claimed in claim ~~5~~3, wherein the first portion of the air flow comprises between 10% and 20% of the air flow.

~~7~~5. The cooling system as claimed in claim ~~4~~2, further comprising at least one second opening configured to direct a second portion of the air flow from an upstream section of

the first air channel to an upstream section of the third air channel, wherein a size of the at least one second opening is selected to control the second portion of the air flow.

~~8~~6. The cooling system as claimed in claim ~~7~~5, wherein the second portion of the air flow comprises between 10% and 20% of the air flow.

~~9~~7. The cooling system as claimed in claim ~~7~~5, wherein the third air channel comprises a first passage and a second passage, wherein the first and second passages are separated at the upstream section of the third air channel and joined at a downstream section of the third air channel before the suction fan.

~~10~~8. The cooling system as claimed in claim ~~3~~1, further comprising a sensor configured to detect a temperature of the power supply when the thermal cycler is in an idle mode, wherein the suction fan is activated if the detected temperature exceeds a threshold.

~~11~~9. The cooling system as claimed in any one of the preceding claims, wherein a speed of the suction fan is variable based on a detected temperature within the thermal cycler.

~~12~~10. The cooling system as claimed in claim ~~11~~9, wherein a noise level of the suction fan measured at a front side of the thermal cycler is less than 55dB(A) in a first thermal cycling mode.

~~13~~11. The cooling system as claimed in claim ~~11~~9, wherein a noise level of the suction fan measured at a front side of the thermal cycler is less than 65dB(A) during an in a second thermal cycling mode.

~~14~~12. A thermal cycler comprising the cooling system as claimed in any one of the preceding claims.

~~15~~13. The thermal cycler as claimed in claim ~~14~~12, further comprising a heated cover assembly disposed on a top side, wherein the heated cover assembly is mounted to a top housing member by a plurality of fasteners, and wherein the fasteners are accessible from a rear side of the thermal cycler.

~~16~~14. The thermal cycler as claimed in claim ~~15~~13, wherein the heated cover assembly is pivotable between a generally horizontal closed position and a generally upright open position, and wherein the heated cover assembly comprises at least one biasing member configured to push the assembly from the closed position and at least one dampener configured to slow the assembly toward the open position.

~~17~~15. The thermal cycler as claimed in claim ~~16~~14, wherein the heated cover assembly further comprises:

a first metal member configured to contact a top cover of a sample holder when the heated cover assembly is in the closed position;

a heating element configured to heat the first metal member;

a second metal member; and

a plastic insulator separating the first metal member and the second metal member, wherein the plastic insulator is fastened to the first metal member,

wherein the second metal member is configured to exert a pressure on the plastic insulator and the first metal member when the heated cover assembly is in the closed position.

~~18~~16. The thermal cycler as claimed in claim ~~17~~15, wherein the heated cover assembly further comprises a plurality of compression springs disposed between the second metal member and the plastic insulator, and wherein the compression springs are configured to act on selected positions on the plastic insulator to evenly distribute the pressure.

~~19~~17. The thermal cycler as claimed in claim ~~17~~ 15 or ~~18~~16, wherein the heated cover assembly further comprises a plurality of extension springs configured to suspend the second metal member from a top lid member.

~~20~~18. A method of cooling a thermal cycler, the method comprising:

drawing, by a suction fan, an air flow from an air inlet disposed at a front housing member of the thermal cycler through a plurality of air channels disposed within the thermal cycler for cooling the thermal cycler; and

discharging, by the suction fan, the air flow at an air outlet disposed at a rear housing member of the thermal cycler,

wherein the suction fan is mounted adjacent to the air outlet; and

wherein the plurality of air channels comprises a first air channel and a second air channel, wherein cooling the thermal cycler comprises cooling a heated block

assembly disposed along the first air channel and cooling a power supply disposed along the second air channel, and wherein the power supply does not comprise a fan.

~~21. The method as claimed in claim 20, wherein the plurality of air channels comprises a first air channel, and wherein cooling the thermal cycler comprises cooling a heated block assembly disposed along the first air channel.~~

~~22. The method as claimed in claim 21, wherein the plurality of air channels further comprises a second air channel, wherein cooling the thermal cycler further comprises cooling a power supply disposed along the second air channel, and wherein the power supply does not comprise a fan.~~

~~23~~19. The method as claimed in claim ~~22~~18, wherein the plurality of air channels further comprises a third air channel, and wherein cooling the thermal cycler further comprises cooling electronic components disposed along the third air channel.

~~24~~20. The method as claimed in claim ~~22~~18, wherein drawing an air flow from the air inlet through the plurality of air channels comprises directing a first portion of the air flow from an upstream section of the first air channel to an upstream section of the second air channel through at least one first opening, and wherein a size of the at least one first opening is selected to control the first portion of the air flow.

~~25~~21. The method as claimed in claim ~~22~~20, wherein the first portion of the air flow comprises between 10% and 20% of the air flow.

~~26~~22. The method as claimed in claim ~~23~~19, wherein drawing an air flow from the air inlet through the air channels comprises directing a second portion of the air flow from an upstream section of the first air channel to an upstream section of the third air channel through at least one second opening, and wherein a size of the at least one second opening is selected to control the second portion of the air flow.

~~27~~23. The method as claimed in claim ~~26~~22, wherein the second portion of the airflow comprises between 10% and 20% of the air flow.

~~28~~24. The method as claimed in claim ~~26~~22, further comprising separating the second portion of the air flow at the upstream section of the third air channel to into sub-flows

along a first passage and a second passage, and combining the sub-flows at a downstream section of the third air channel before the suction fan.

~~29~~25. The method as claimed in claim ~~22~~18, further comprising detecting a temperature of the power supply when the thermal cycler is in an idle mode, and activating the suction fan if the detected temperature exceeds a threshold.

~~30~~26. The method as claimed in any one of claims ~~20~~ 18 to ~~29~~25, further comprising varying a speed of the suction fan based on a detected temperature within the thermal cycler.

~~31~~27. The method as claimed in claim ~~30~~26, wherein a noise level of the suction fan measured at a front side of the thermal cycler is less than 55dB(A) in a first thermal cycling mode.

~~32~~28. The method as claimed in claim ~~30~~26, wherein a noise level of the suction fan measured at a front side of the thermal cycler is less than 65dB(A) in a second thermal cycling mode.

~~33~~29. A method of manufacturing a cooling system for a thermal cycler, the method comprising:

providing an air inlet at a front housing member of the thermal cycler;

providing an air outlet at a rear housing member of the thermal cycler;

forming a plurality of air channels within the thermal cycler between the air inlet and the air outlet; and

mounting a suction fan adjacent to the air outlet;

wherein the suction fan is operable to draw an air flow from the air inlet through the air channels for cooling the thermal cycler, and to discharge the air flow at the air outlet; and

wherein forming the plurality of air channels comprises forming a first air channel for cooling a heated block assembly disposed along the first air channel and forming a second air channel for cooling a power supply disposed along the second air channel, and wherein the power supply does not comprise a fan.

~~34. The method as claimed in claim 33, wherein forming the plurality of air channels comprises forming a first air channel for cooling a heated block assembly disposed along the first air channel.~~

~~35. The method as claimed in claim 34, wherein forming the plurality of air channels further comprises forming a second air channel for cooling a power supply disposed along the second air channel, and wherein the power supply does not comprise a fan.~~

~~36~~30. The method as claimed in claim ~~35~~29, wherein forming the plurality of air channels further comprises forming a third air channel for cooling electronic components disposed along the third air channel.

~~37~~31. The method as claimed in claim ~~35~~29, wherein forming the plurality of air channels further comprises forming at least one first opening to direct a first portion of the air flow from an upstream section of the first air channel to an upstream section of the second air channel through the at least one first opening, and selecting a size of the at least one first opening to control the first portion of the air flow.

~~38~~32. The method as claimed in claim ~~37~~31, wherein the first portion of the air flow comprises between 10% and 20% of the air flow.

~~39~~33. The method as claimed in claim ~~36~~30, wherein forming the plurality of air channels further comprises forming at least one second opening to direct a second portion of the air flow from an upstream section of the first air channel to an upstream section of the third air channel through the at least one second opening, and selecting a size of the at least one second opening to control the second portion of the air flow.

~~40~~34. The method as claimed in claim ~~26~~33, wherein the second portion of the airflow comprises between 10% and 20% of the air flow.