CLAIMS

1. A cryopump comprising:

a vessel comprising a frontal open area, said frontal open area comprising an inlet to said vessel;

a radiation shield;

a two stage refrigerator extending into a side wall of said vessel at a portion of said side wall remote from said inlet, that is a point closer to a closed end of said vessel than to said inlet, a first stage of said refrigerator being thermally coupled to said radiation shield;

a first stage array arranged within said vessel and thermally coupled to said first stage of said refrigerator;

a cryopanel structure coupled to a second stage of said refrigerator;

said first stage array comprising a plurality of elements arranged at increasing distances from said inlet, said element closest to said inlet being located between said inlet and said cryopanel structure and having a smaller outer perimeter than said elements further from said inlet, said elements further from said inlet each having a passage through a central portion.

2. A cryopump according to claim 1, wherein said cryopanel structure has a diameter at a widest point that is less than 70% of a diameter of said vessel, preferably, less than 55%.

3. A cryopump according to any preceding claim, wherein said refrigerator extends into said vessel at a portion of said side wall that is at a distance of at least 60% of a length of said vessel from said inlet.

4. A cryopump according to any preceding claim, wherein said cryopanel structure has a length that is greater than 70% of a length of said vessel

5. A cryopump according to any preceding claim, wherein said first stage array is mounted on a mounting element, said mounting element being formed of

a thermally conducting material coupled to said first stage refrigerator and to each of said plurality of elements of said first stage array.

6. A cryopump according to any preceding claim, wherein one end of said cryopanel structure extends into said first stage array, such that at least one of said elements further from said inlet surrounds an outer perimeter of said one end of said cryopanel structure.

7. A cryopump according to any preceding claim, wherein neighbouring elements of said first stage array are configured such that for at least some of said elements closest to said inlet an outer perimeter of one element is substantially equal to or smaller than an inner perimeter of a subsequent element located further from said pump inlet.

8. A cryopump according to any preceding claim, wherein said first stage array has a substantially igloo shape, said elements being concentric and said element closest to said inlet having a smallest perimeter, and a plurality of subsequent elements having outer perimeters of an increasing size with distance from said inlet.

9. A cryopump according to any preceding claim, wherein said elements are substantially planar said element closest to said inlet having a disc shape and subsequent elements comprising rings.

10. A cryopump according to any preceding claim, wherein said surfaces of said elements facing said inlet are at an angle of between 0° and 30° to a plane of said inlet, such that they are parallel to said plane or slanted such that a surface closest to said inlet faces towards said radiation shield.

11. A cryopump according to any preceding claim, wherein said element of said first stage array that is furthest from said inlet is mounted closest to said first

stage of said refrigerator, a surface of said first stage array closest to said inlet being between 5 and 15% into said vessel.

12. A cryopump according to claim 11, wherein said first stage array extends from a point between 5 and 15% into said vessel to a point between 25 and 40% into said vessel.

13. A cryopump according to claim 6, or any one of claims 6 to 12 when dependent on claim 6, wherein said cryopanel structure comprises a plurality of panels extending out from a central axis and having a substantially cylindrical envelope with at least one tapered end, one of said at least one tapered end extending into said first stage inlet array.

14. A cryopump according to claim 13, wherein a portion of said cryopanel structure that extends into said first stage array comprises at least 20%, preferably at least 30% of said cryopanel structure.

15. A cryopump according to any preceding claim, wherein said radiation shield is substantially cylindrical and comprises a flattened portion extending into said cylinder for coupling to said refrigerator, said flattened portion extending into said cylinder by less than 8% of a diameter of said cylinder, preferably less than 6%.