densities, especially in those instances in which either horizontal stacking systems or vertical growth towers are used.

**[004]** While hydroponic farming techniques offer a number of advantages over conventional farming techniques, in order to achieve large-scale adoption of these techniques it is vital that the cost per plant be competitive with the costs associated with conventional farming techniques. Accordingly, the present invention provides an apparatus that simplifies hydroponic tower maintenance and reuse.

## SUMMARY OF THE INVENTION

**[005]** According to an aspect of the present invention, a plant growth tower closing apparatus is provided that is configured to close a multi-piece plant growth tower, where the multi-piece plant growth tower is comprised of (i) a tower body that defines at least a first tower cavity (ii) a first tower face plate, where the first tower face plate is hingeably coupled to the tower body, where the first tower face plate is positionable relative to the tower body in at least a first tower cavity closed position and a first tower cavity unclosed position, (iii) a first plurality of plant container supports configured to accept a first plurality of plant containers; and (iv) a first fastener configured to temporarily latch the first tower face plate to the tower body when the first tower face plate is in the first tower cavity closed position, said closing apparatus comprising: a drive system configured to propel said tower through said tower closing apparatus; an alignment system configured to align said tower body within said tower closing apparatus; and a tower closing system configured to move the first tower face plate from the first tower cavity unclosed position toward the first tower cavity closed position.

**[006]** As disclosed, the tower closing system may include a closing initiation stage and a closing finalization stage, where the closing initiation stage is configured to move the first tower face plate from the first tower cavity open position to a first tower face plate partially closed position, and where the closing finalization stage is configured to (i) move the first tower face plate from the first tower face plate partially closed position to the first tower cavity closed position and (ii) latch the first

**WHAT IS CLAIMED IS:**

1. A plant growth tower closing apparatus configured to close a multi-piece plant growth tower, said multi-piece plant growth tower comprising (i) a tower body, said tower body defining at least a first tower cavity, (ii) a first tower face plate, wherein said first tower face plate is hingeably coupled to said tower body, wherein said first tower face plate is positionable relative to said tower body in at least a first tower cavity closed position and a first tower cavity unclosed position, (iii) a first plurality of plant container supports configured to accept a first plurality of plant containers, and (iv) a first fastener configured to temporarily latch said first tower face plate to said tower body when said first tower face plate is in said first tower cavity closed position, said closing apparatus comprising:

a drive system configured to propel said tower through said tower closing apparatus;

an alignment system configured to align said tower body within said tower closing apparatus; and

a tower closing system configured to move said first tower face plate from said first tower cavity unclosed position toward said first tower cavity closed position.

2. The plant growth tower closing apparatus of claim 1, said tower closing system comprising a closing initiation stage and a closing finalization stage, wherein said closing initiation stage is configured to move said first tower face plate from said first tower cavity unclosed position to a first tower face plate partially closed position, and wherein said closing finalization stage is configured to (i) move said first tower face plate from said first tower face plate partially closed position to said first tower cavity closed position and (ii) latch said first tower face plate to said tower body with said first fastener.

3. The plant growth tower closing apparatus of claim 1, said tower closing system comprising a plurality of face plate manipulation rollers configured to move said first tower face plate from said first tower cavity unclosed position toward said first tower cavity closed position as said multi-piece plant growth tower is propelled through said tower closing apparatus.

4. The plant growth tower closing apparatus of claim 1, further comprising at least one idler roller configured to limit movement of said first tower face plate toward said first tower cavity closed position.

5. The plant growth tower closing apparatus of claim 1, said alignment system comprising a plurality of alignment rollers configured to maintain alignment of said multi-piece plant growth tower body as said plurality of face plate manipulation rollers move said first tower face plate toward said first tower cavity closed position.

6. The plant growth tower closing apparatus of claim 1, said closing finalization stage comprising at least one face closing roller configured to (i) move said first tower face plate from a first tower face plate partially closed position to said first tower cavity closed position and (ii) latch said first tower face plate to said tower body with said first fastener.

7. The plant growth tower closing apparatus of claim 1, said alignment system comprising at least one set of tower body alignment rollers, said at least one set of tower body alignment rollers comprising a first tower body alignment roller and a second tower body alignment roller, said first tower body alignment roller located on a first side of said tower body and configured to align said first side of said tower body as said first tower face plate is latched to said tower body, said second tower body alignment roller located on a second side of said tower body and configured to align said second side of said tower body as said first tower face plate is latched to said tower body.

8. The plant growth tower closing apparatus of claim 1, said drive system comprising at least one drive roller coupled to a drive actuator and configured to contact said tower body along at least a first tower body side, wherein operation of said drive actuator causes said at least one drive roller to propel said multi-piece plant growth tower through said plant growth tower closing apparatus.

9. The plant growth tower closing apparatus of claim 8, said alignment system comprising at least one alignment roller configured to align said multi-piece plant growth tower body within said plant growth tower closing apparatus, and to contact said tower body along at least a second tower body side different from said first tower body side.

10. The plant growth tower closing apparatus of claim 1, said multi-piece plant growth tower further comprising:

a first groove running along a first side of said tower body, said first groove comprising a first inner groove wall, a first sloped groove wall coupling a first edge of said first inner groove wall to a first edge of said first side of said tower body, and a second sloped

groove wall coupling a second edge of said first inner groove wall to a second edge of said first side of said tower body; and

a second groove running along a second side of said tower body, said second groove comprising a second inner groove wall, a third sloped groove wall coupling a first edge of said second inner groove wall to a first edge of said second side of said tower body, and a fourth sloped groove wall coupling a second edge of said second inner groove wall to a second edge of said second side of said tower body.

11. The plant growth tower closing apparatus of claim 10, said drive system comprising a plurality of drive rollers, said plurality of drive rollers comprising at least a first drive roller and at least a second drive roller, wherein said first drive roller is coupled to a drive actuator and configured to contact said tower body within said first groove, wherein operation of said drive actuator causes said first drive roller to propel said multi-piece plant growth tower through said plant growth tower closing apparatus, wherein said second drive roller is not coupled to said drive actuator, wherein said second drive roller is configured to contact said tower body within said second groove.

12. The plant growth tower closing apparatus of claim 11, wherein said second drive roller is mounted via a tensioner and configured to apply pressure to said tower body via said second inner groove wall of a second modified V-shaped groove.

13. The plant growth tower closing apparatus of claim 10, said alignment system comprising a plurality of alignment rollers configured within said plant growth tower closing apparatus as alignment roller pairs, wherein a first alignment roller of each alignment roller pair is configured to contact said tower body within said first groove, and wherein a second alignment roller of each alignment roller pair is configured to contact said tower body within said second groove.

14. The plant growth tower closing apparatus of claim 1, wherein said multi-piece plant growth tower is a dual-sided plant growth tower, wherein said tower body defines said first tower cavity and a second tower cavity, said multi-piece plant growth tower further comprising:

a second tower face plate, wherein said second tower face plate is hingeably coupled to said tower body, wherein said second tower face plate is positionable relative to said tower body in at least a second tower cavity closed position and a second tower cavity

unclosed position, said second tower face plate comprising a second plurality of plant container supports configured to accept a second plurality of plant containers;

a second fastener configured to temporarily latch said second tower face plate to said tower body when said second tower face plate is in said second tower cavity closed position; and

the plant growth tower closing apparatus is configured to (i) move said second tower face plate from said second tower cavity unclosed position to said second tower cavity closed position, and (ii) latch said second tower face plate to said tower body with said second fastener.

15. The plant growth tower closing apparatus of claim 1, said drive system comprising a drive actuator to cause propulsion of said multi-piece plant growth tower through said plant growth tower closing apparatus.

16. The plant growth tower closing apparatus of claim 15, said alignment system comprising at least one alignment roller configured to align said multi-piece plant growth tower body within said plant growth tower closing apparatus.

17. The plant growth tower opening apparatus of claim 1, further comprising a plurality of face closing rollers configured to latch said first tower face plate to said tower body with said first fastener.