SUMMARY

[0004a] According to a first aspect of the present invention, there is provided a system for processing debris, the system comprising:

a plurality of bins capable of receiving debris, each bin comprising:

a base assembly having a base that is configured for selective movement about and between an open position and a closed position, and an actuator operatively coupled to the base and operable to effect selective movement of the base about and between the open position and the closed position; and

a plurality of walls coupled to and extending upwardly from the base, wherein the plurality of walls and the base cooperate to define an interior space;

wherein as the base of each bin moves from the closed position toward the open position, the base is configured to dispense debris from the interior space of the bin through the base;

a downstream conveyor assembly configured to deliver debris toward the plurality of bins, wherein the downstream conveyor assembly has a top surface that is positioned in communication with at least one wall of each bin of the plurality of bins to facilitate delivery of debris into the interior space of each bin; and

a system controller having at least one processor and at least one memory in communication with the at least one processor, wherein the system controller is communicatively coupled to the actuator of each bin of the plurality of bins,

wherein each bin of the plurality of bins comprises a load cell configured to produce an output corresponding to a weight of debris within the respective bin, and

wherein the system controller is configured to:

receive and store the output from the load cell of each respective bin of the plurality of bins;

determine a total weight of debris within the plurality of bins; and

associate the determined total weight with at least one identifier corresponding to at least one cart within which the debris was collected before unloading of the debris within the system.

[0004b] According to a second aspect of the present invention, there is provided a method of processing debris, comprising:

positioning a plurality of bins along a downstream conveyor assembly having a top surface, each bin comprising a base assembly having a base that is configured for selective movement about and between an open position and a closed position, and an actuator operatively coupled to the base and operable to effect selective movement of the base about and between the open position and the closed position, and a plurality of walls coupled to and extending upwardly

from the base, wherein the plurality of walls and the base cooperate to define an interior space, and wherein the top surface of the downstream conveyor assembly is positioned in communication with at least one wall of each bin of the plurality of bins to facilitate delivery of debris into the interior space of each bin;

transporting debris along the top surface of the downstream conveyor assembly relative to a conveyor axis;

selectively moving the debris into the plurality of bins, wherein each bin of the plurality of bins comprises a load cell that produces an output corresponding to a weight of debris within the respective bin;

receiving, using a system controller, the output from the load cell of each respective bin of the plurality of bins;

determining, using the system controller, a total weight of debris within the plurality of bins;

associating, using the system controller, the determined total weight with at least one identifier corresponding to at least one cart within which the debris was collected before unloading of the debris for processing;

activating the actuator to effect movement of the bases of the plurality bins from the closed position toward the open position; and

unloading debris from the plurality of bins into a plurality of containers positioned below respective bins of the plurality of bins.

[0004c] There is provided a debris bin, comprising:

a base assembly comprising:

a base that is configured for selective movement about and between an open position and a closed position, and

an actuator operatively coupled to the base and operable to effect selective movement of the base about and between the open position and the closed position; and

a plurality of walls coupled to and extending upwardly from the base, wherein the plurality of walls and the base cooperate to define an interior space,

wherein as the base of each bin moves from the closed position toward the open position, the base is configured to dispense debris from the interior space of the bin through the base.

[0005] There is also provided a system for processing debris. The system can have at least one cart, a lifting apparatus, and a first conveyor

assembly (e.g., an upstream conveyor assembly). Each cart can have a base, a plurality of wheels extending downwardly from the base relative to a vertical axis, and a plurality of walls extending upwardly from the base. The walls and the base of each cart can cooperate to define a debris-receiving space. The lifting apparatus can have at least one arm assembly configured to engage a portion of the base of a respective cart of the at least one cart when the cart is in a resting position. Following engagement between the at least one arm assembly and the cart, the at least one arm assembly of the lifting apparatus can be selectively rotatable relative to a rotational axis to move the cart about and between the resting position and an unloading position. The cart can reach the unloading position following rotational movement of the at least one arm assembly of the lifting apparatus along an arcuate path having an arc length ranging from about 130 degrees to about 170 degrees. The first conveyor assembly can be configured to receive debris from the at least one cart when the at least one cart is in the unloading position.

[0006] The system can further comprise a plurality of bins capable of receiving debris. Each bin can have a base assembly having a base that can be configured for selective movement about and between an open position and a closed position, and an actuator that can be operatively coupled to the base and operable to effect selective movement of the base about and between the open position and the closed position. Each bin of the plurality of bins can have a plurality of walls coupled to and extending upwardly from the base. The plurality of walls and the base can cooperate to define an interior space. The system can further include a downstream conveyor assembly configured to deliver debris toward the plurality of bins. The downstream conveyor assembly can have a top surface that is positioned in communication with at least one wall of each bin of the plurality of bins to facilitate delivery of debris into the interior space of each bin. As the base of each bin moves from the closed position toward the open position, the base can be configured to dispense debris from the interior space of the bin through the base.

[0007] There is also provided a method for processing debris. The method can include providing at least one cart to a jobsite, transporting the at least one cart from the jobsite to a debris processing facility, and effecting engagement between at least one arm assembly of a lifting apparatus and a first cart of the at least one cart. Each cart can

have a base, a plurality of wheels extending downwardly from the base relative to a vertical axis, and a plurality of walls extending upwardly from the base. The walls and the base of each cart can cooperate to define a debris-receiving space. The debris processing facility can include a lifting apparatus and a first conveyor assembly. Following engagement between the at least one arm assembly and the first cart, the method can include selectively rotating the at least one arm assembly of the lifting apparatus relative to a rotational axis to move the first cart from a resting position to an unloading position. The first cart reaches the unloading position following rotational movement of the at least one arm assembly of the lifting apparatus along an arcuate path having an arc length ranging from about 130 degrees to about 170 degrees. With the first cart in the unloading position, the first conveyor assembly can receive debris exiting the first cart. The first conveyor assembly (e.g., upstream conveyor assembly) can then deliver the debris onto a downstream conveyor assembly, which in turn, can transport the debris to a position corresponding to (e.g., in alignment or communication with) at least one bin of the plurality of bins such that the debris can be moved into the at least one bin of the plurality of bins. Once each bin of the at least one bin contains a desired amount of debris, the actuator associated with the base assembly of each bin can be activated to effect movement of the base of the bin from the closed position toward the open position. With the base situated in the open position, the debris from the at least one bin can be unloaded into at least one container positioned below the at least one bin.

[0008] There is provided a debris cart having a base, a plurality of wheels extending downwardly from the base relative to a vertical axis, a plurality of walls extending upwardly from the base of the base assembly, and a plurality of receptacles extending downwardly from the base. The plurality of walls cooperate with the base to define a debris-receiving space. The plurality of walls can include opposed front and back walls and opposed first and second side walls. The first and second side walls extend between and are connected to the front and back walls. Each wall of the plurality of walls has a rounded upper edge. The front and back walls have respective outer surfaces. Moving from the respective rounded upper edges of the front and back walls to the base, the outer surfaces of the front and back walls are axially tapered at a first taper angle relative to the vertical axis. The first and second side walls have respective outer surfaces. Moving from the rounded upper edge of each side wall to the base, the outer surfaces of the first and second side walls are axially tapered at a second taper angle relative to the vertical axis. The plurality of receptacles can include: a first set of receptacles having at least one row of

CLAIMS

What is claimed is:

1. A system for processing debris, the system comprising:

a plurality of bins capable of receiving debris, each bin comprising:

a base assembly having a base that is configured for selective movement about and between an open position and a closed position, and an actuator operatively coupled to the base and operable to effect selective movement of the base about and between the open position and the closed position; and

a plurality of walls coupled to and extending upwardly from the base, wherein the plurality of walls and the base cooperate to define an interior space;

wherein as the base of each bin moves from the closed position toward the open position, the base is configured to dispense debris from the interior space of the bin through the base;

a downstream conveyor assembly configured to deliver debris toward the plurality of bins, wherein the downstream conveyor assembly has a top surface that is positioned in communication with at least one wall of each bin of the plurality of bins to facilitate delivery of debris into the interior space of each bin; and

a system controller having at least one processor and at least one memory in communication with the at least one processor, wherein the system controller is communicatively coupled to the actuator of each bin of the plurality of bins,

wherein each bin of the plurality of bins comprises a load cell configured to produce an output corresponding to a weight of debris within the respective bin, and

wherein the system controller is configured to:

receive and store the output from the load cell of each respective bin of the plurality of bins;

determine a total weight of debris within the plurality of bins; and

associate the determined total weight with at least one identifier corresponding to at least one cart within which the debris was collected before unloading of the debris within the system.

2. The system of claim 1, further comprising a support assembly having a rail extending horizontally relative to the downstream conveyor assembly, and a plurality of support posts coupled to and extending downwardly from the rail, wherein the plurality of bins are securely coupled to the rail.

3. The system of claim 1, wherein the system controller comprises at least one programmable logic controller communicatively coupled to the actuator of each bin of the plurality of bins.

4. The system of any one of claims 1-3, further comprising a plurality of sensors, wherein each sensor of the plurality of sensors is positioned proximate a respective bin of the plurality of bins, wherein each sensor is configured to produce an output indicative of a desired amount of debris within the respective bin.

5. The system of claim 4, further comprising an indicator in communication with the sensor and configured to receive the output from the sensor, wherein, upon receipt of the output, the indicator produces an alert corresponding to the output.

6. The system of claim 5, wherein the alert comprises an audible alert, a visual alert, a signal transmitted to a remote device, or a combination thereof.

7. The system of claim 6, further comprising a remote device that receives the alert, wherein the remote device is a computer, a mobile phone, a remote control, a tablet, or a handheld device.

8. The system of claim 7, wherein, following activation of the alert, the remote device is configured to produce an activation signal, wherein upon receipt of the activation signal by the actuator, the actuator effects movement of the base from the closed position toward the open position to permit unloading of the debris from the interior space of the respective bin of the plurality of bins.

9. The system of claim 8, further comprising at least one container that is positioned below a bin of the plurality of bins and configured to receive debris that is unloaded from the bin.

10. The system of claim 1, further comprising:

at least one cart having a base, a plurality of wheels extending downwardly from the base relative to a vertical axis, and a plurality of walls extending upwardly from the base, wherein the plurality of walls and the base of each cart cooperate to define a debris-receiving space;

a lifting apparatus having at least one arm assembly configured to engage a portion of the base of a respective cart of the at least one cart when the cart is in a resting position, wherein, following engagement between the at least one arm assembly and the cart, the at least one arm assembly of the lifting apparatus is selectively rotatable relative to a rotational axis to move the cart about and between the resting position and an unloading position, and wherein the cart reaches the unloading position following rotational movement of the at least one arm assembly of the lifting apparatus along an arcuate path having an arc length ranging from about 130 degrees to about 170 degrees,

wherein the downstream conveyor assembly is configured to receive debris after the debris has been unloaded from the at least one cart.

11. The system of claim 10, further comprising an upstream conveyor assembly configured to receive debris from the at least one cart when the at least one cart is in the unloading position, wherein the downstream conveyor assembly is configured to receive the debris from the upstream conveyor assembly.

12. The system of claim 1, wherein the downstream conveyor assembly is configured to deliver debris toward the plurality of bins at a selectively adjustable rate.

13. The system of claim 1, further comprising a camera that produces an image of the debris.

14. The system of claim 13, wherein the system controller is configured to associate the image of the debris with the at least one identifier.

15. The system of claim 1 or claim 14, further comprising a central computing device, wherein the system controller is configured to provide data associated with the at least one identifier to the central computing device, and wherein the central computing device is configured to generate a report or invoice for a particular customer or job based upon the data associated with the at least one identifier.

16. A method of processing debris, comprising:

positioning a plurality of bins along a downstream conveyor assembly having a top surface, each bin comprising a base assembly having a base that is configured for selective movement about and between an open position and a closed position, and an actuator operatively coupled to the base and operable to effect selective movement of the base about and between the open position and the closed position, and a plurality of walls coupled to and extending upwardly from the base, wherein the plurality of walls and the base cooperate to define an interior space, and wherein the top surface of the downstream conveyor assembly is positioned in communication with at least one wall of each bin of the plurality of bins to facilitate delivery of debris into the interior space of each bin;

transporting debris along the top surface of the downstream conveyor assembly relative to a conveyor axis;

selectively moving the debris into the plurality of bins, wherein each bin of the plurality of bins comprises a load cell that produces an output corresponding to a weight of debris within the respective bin;

receiving, using a system controller, the output from the load cell of each respective bin of the plurality of bins;

determining, using the system controller, a total weight of debris within the plurality of bins;

associating, using the system controller, the determined total weight with at least one identifier corresponding to at least one cart within which the debris was collected before unloading of the debris for processing;

activating the actuator to effect movement of the bases of the plurality bins from the closed position toward the open position; and

unloading debris from the plurality of bins into a plurality of containers positioned below respective bins of the plurality of bins.

17. The method of claim 16, further comprising returning the base to the closed position following the step of unloading the debris from the at least one bin.

18. The method of claim 16, further comprising selectively adjusting a speed of the downstream conveyor assembly prior to unloading the debris from the at least one bin.

19. The method of claim 16, further comprising selectively sorting the debris on the top surface of the downstream conveyor assembly.

20. The method of claim 16, further comprising:

providing the at least one cart to a jobsite, each cart having a base, a plurality of wheels extending downwardly from the base relative to a vertical axis, and a plurality of walls extending upwardly from the base, wherein the plurality of walls and the base of each cart cooperate to define a debris-receiving space;

transporting the at least one cart from the jobsite to a debris processing facility, the debris processing facility comprising a lifting apparatus and an upstream conveyor assembly;

effecting engagement between at least one arm assembly of a lifting apparatus and a first cart of the at least one cart; and

following engagement between the at least one arm assembly and the first cart, selectively rotating the at least one arm assembly of the lifting apparatus relative to a rotational axis to move the first cart from a resting position to an unloading position, wherein the first cart reaches the unloading position following rotational movement of the at least one arm assembly of the lifting apparatus along an arcuate path having an arc length ranging from about 130 degrees to about 170 degrees,

wherein the downstream conveyor assembly receives debris after the debris has been unloaded from the at least one cart.

21. The method of claim 20, wherein, with the first cart in the unloading position, the upstream conveyor assembly receives debris exiting the first cart, and wherein the downstream conveyor assembly receives the debris from the upstream conveyor assembly.

22. The method of claim 20, wherein each cart is assigned a unique identifier and provided with indicia of the unique identifier, wherein the method further comprises:

detecting the indicia of the unique identifier of the first cart prior to moving the first cart from the resting position to the unloading position;

measuring a weight of the first cart;

transmitting information regarding the weight of the first cart to the system controller;

using the system controller to associate the measured weight of the first cart with the unique identifier assigned to the first cart;

producing an image of the debris provided from the first cart to the upstream conveyor assembly;

transmitting the image of the debris to the system controller; and

using the system controller to associate the image of the debris with the unique identifier assigned to the first cart.

23. The method of claim of 22, wherein the at least one cart comprises a plurality of carts, wherein each cart of the plurality of carts is associated with a particular job or customer.

24. The method of claim 16, further comprising:

producing an image of the debris; and

associating, using the system controller, the image of the debris with the at least one identifier.

25. The method of claim 16, further comprising:

providing, using the system controller, data associated with the at least one identifier to a central computing device; and

generating, using the central computer device, a report or invoice for a particular customer or job based upon the data associated with the at least one identifier.