US 20160040372A1

(19) **United States**

(12) **Patent Application Publication**

**Eiden**

(10) **Pub. No.: US 2016/0040372 A1**

(43) **Pub. Date: Feb. 11, 2016**

(54) **METHOD OF REMOVING A CUTTING CHAMBER FROM A COLD PLANER**

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(21) Appl. No.: **14/920,882**

(22) Filed: **Oct. 23, 2015**

**Publication Classification**

(51) **Int. Cl.**

***E01C 23/088*** (2006.01)

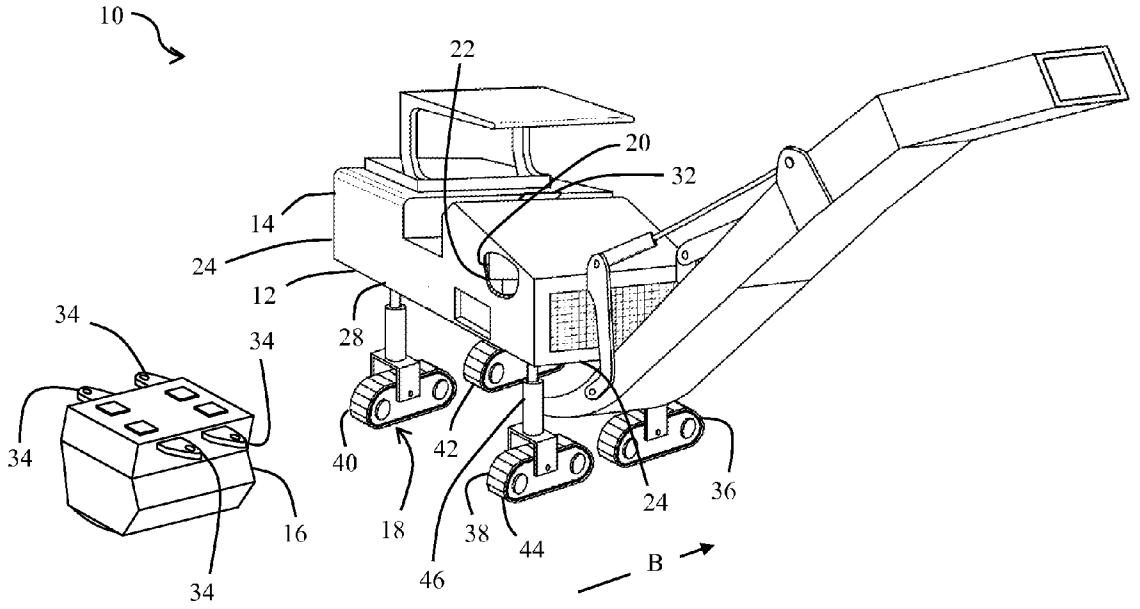
***E01C 23/12*** (2006.01)

(52) **U.S. Cl.**

CPC ..... ***E01C 23/088*** (2013.01); ***E01C 23/127*** (2013.01)

(57) **ABSTRACT**

A method of removing a cutting chamber from a cold planer is disclosed. The method initiates with disconnecting the cutting chamber from a frame of the cold planer. Thereafter, the frame of the cold planer is raised to a height above the cutting chamber. After raising, the cold planer is maneuvered to a second location. More specifically, the cold planer is maneuvered in a direction substantially perpendicular to a direction of travel so that the cutting chamber is no longer under the cold planer.



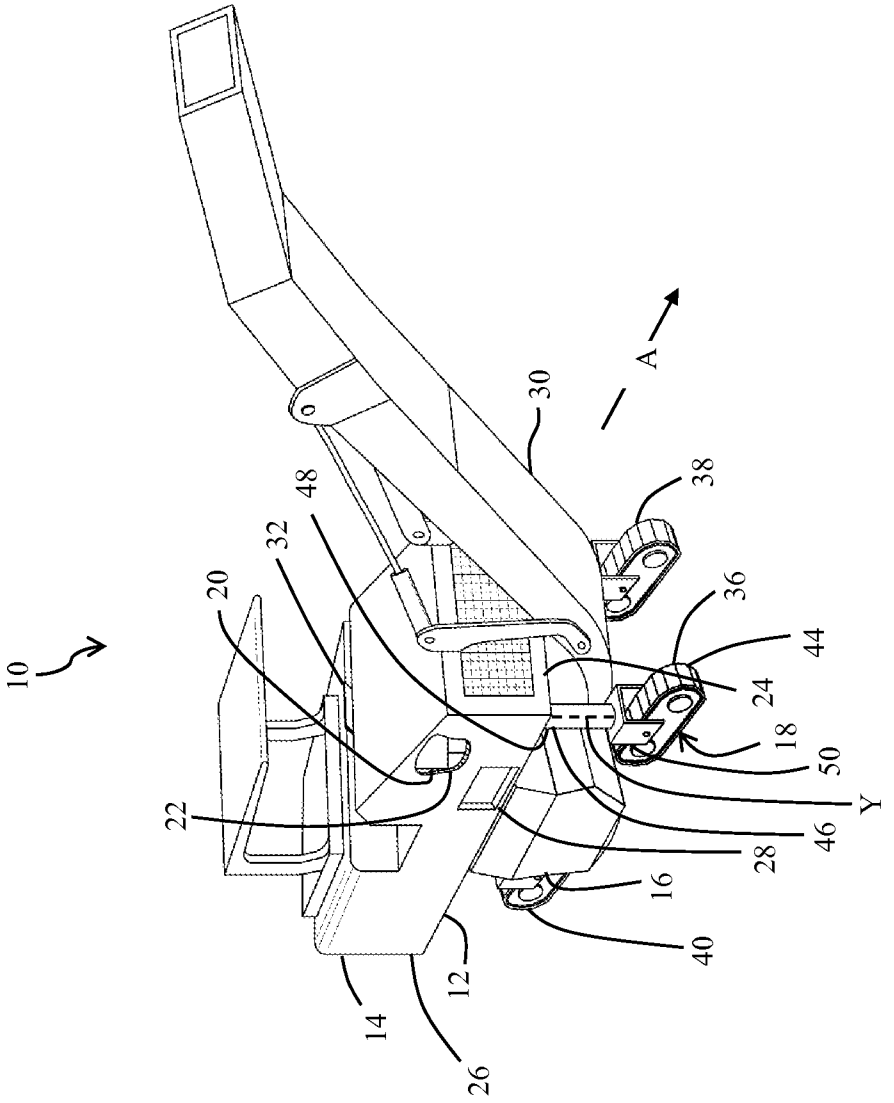



FIG. 1

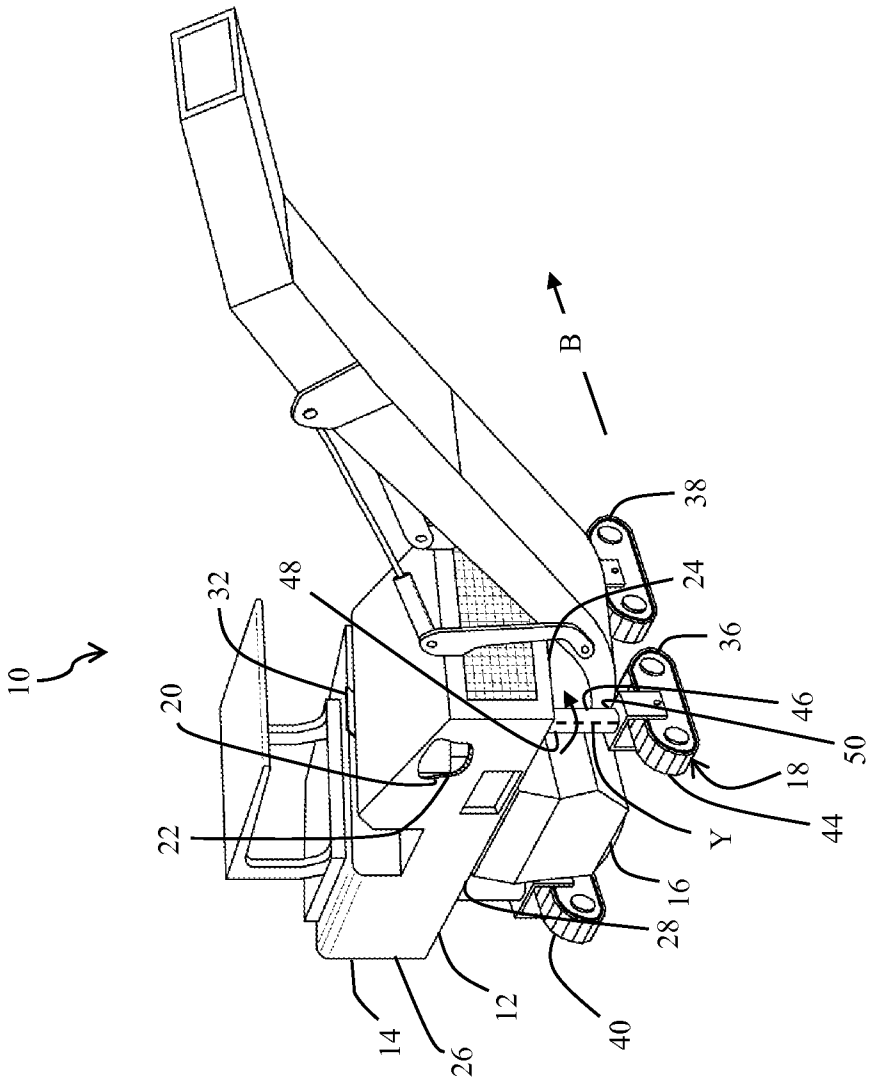



FIG. 2

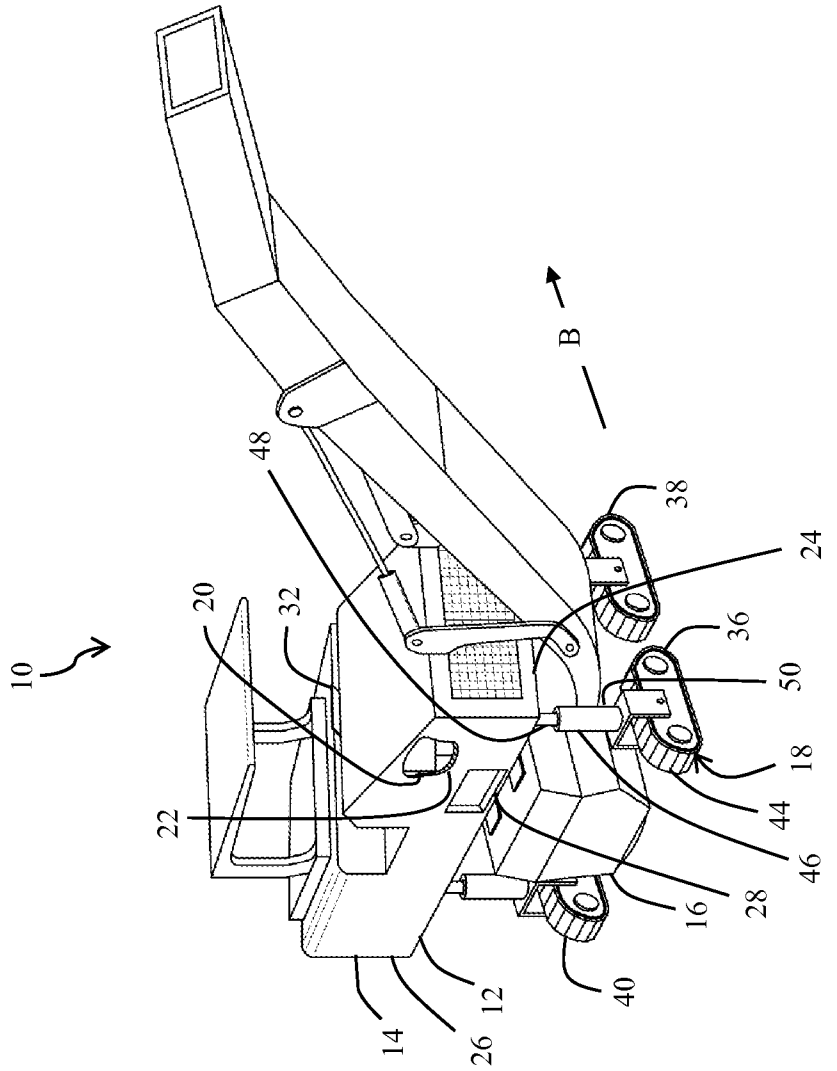



FIG. 3

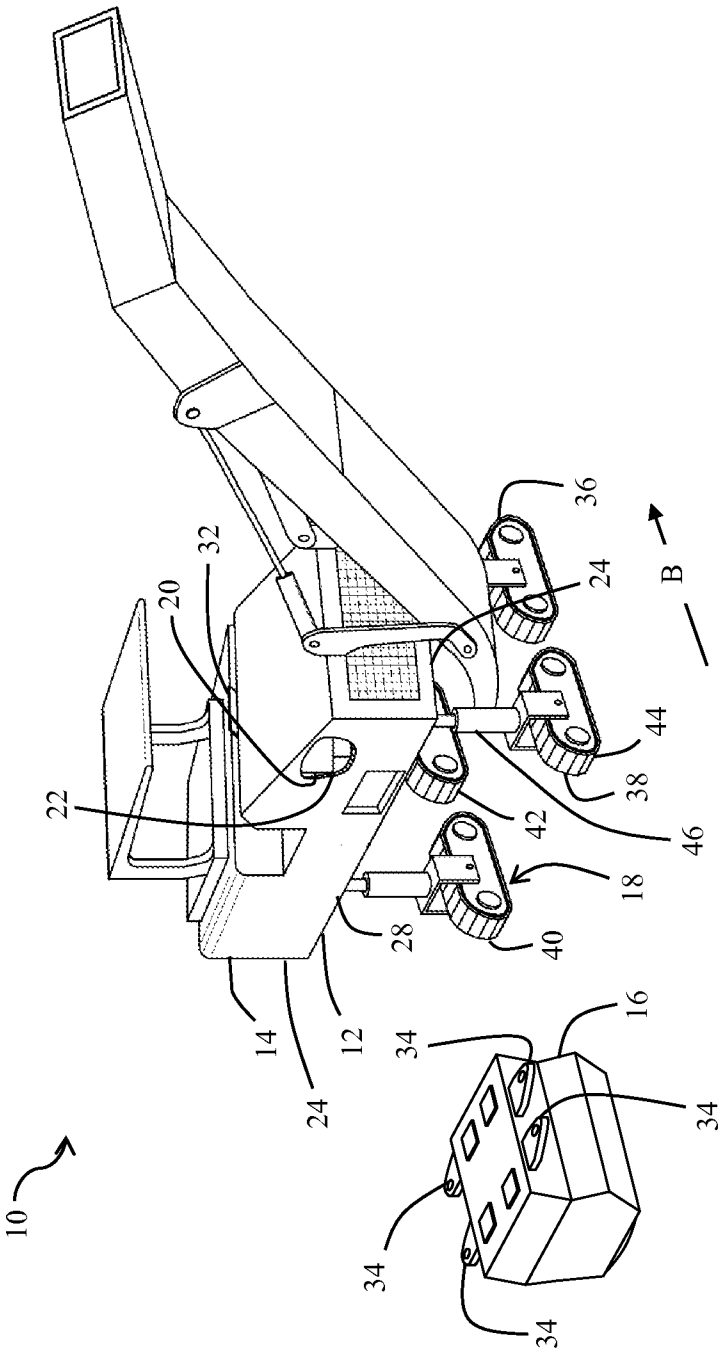



FIG. 4

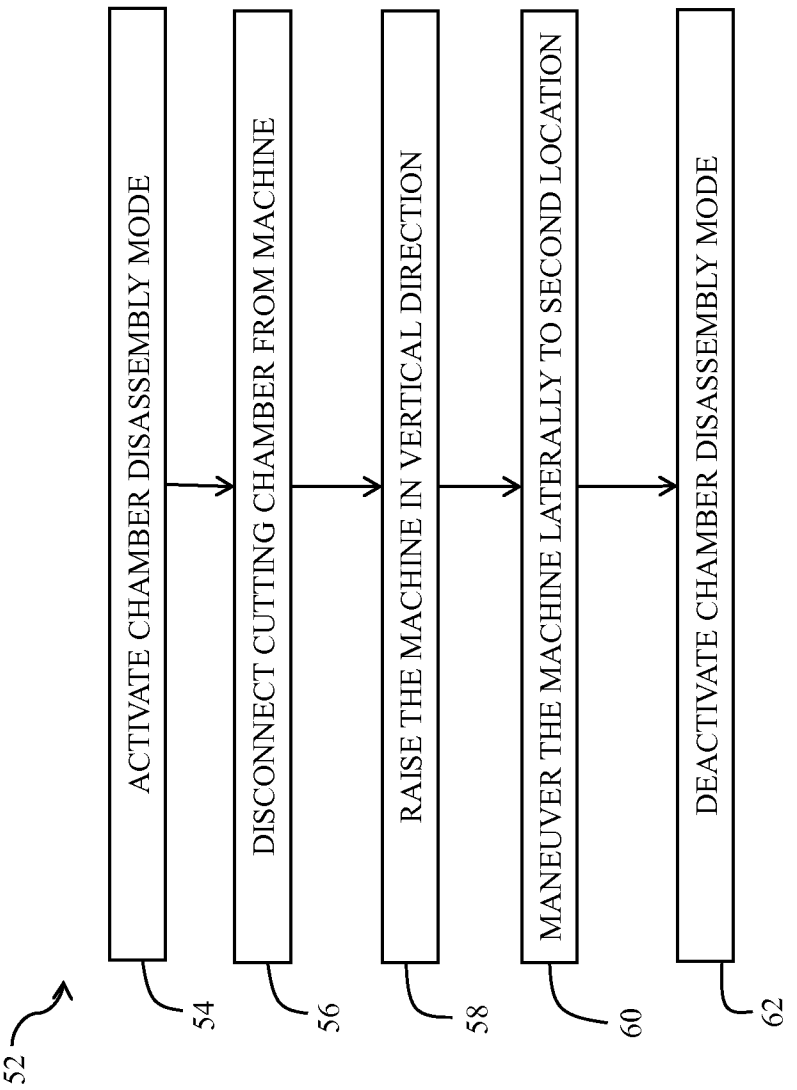

52
ACTIVATE CHAMBER DISASSEMBLY MODE
54
DISCONNECT CUTTING CHAMBER FROM MACHINE
56
RAISE THE MACHINE IN VERTICAL DIRECTION
58
MANEUVER THE MACHINE LATERALLY TO SECOND LOCATION
60
DEACTIVATE CHAMBER DISASSEMBLY MODE
62

FIG. 5

# METHOD OF REMOVING A CUTTING CHAMBER FROM A COLD PLANER

## TECHNICAL FIELD

**[0001]** The present disclosure relates generally to a method of removing a cutting chamber from a cold planer.

## BACKGROUND

**[0002]** Various machines, such as cold planers, are commonly known to employ a rotary cutter system, to perform milling operations on a work surface. The rotary cutter system generally facilitates removal of a paved area on the work surface, such as a paved area laid over a road, a bridge, and/or a parking area. Commonly, the rotary cutter system includes a cutting chamber that performs milling operations on the work surface. The cutting chamber includes a drum, which contains rows of tool holders. Each tool holder receives a cutting tool therein. Customarily, the drum is driven by a motor at a high rate of rotation and the cutting tools, which are fixed to the drum within their tool holders, impact the work surface as the rotating drum is lowered and brought into contact with the work surface. As the cutting tools contact the work surface, pieces or fragments of pavement are spun off and the pavement is removed through successive passes of the cutting tools of the cutting chamber. The spun off particles are directed to an enclosed portion of a cutter enclosure which generally encloses the cutting tools. The particles are generally directed towards the center of the machine within this cutter enclosure and are loaded onto the machine's conveyor belt to be loaded onto a haul vehicle to be hauled away. Cutting tools are subject to extreme abrasion and impact and may become loose or may break off during operation of the cutting chamber. The loss of one or more of the cutting tools from the tool holders fixed to the drum causes a decrease in productivity and if not addressed the tool holders and the drum may be subjected to damage and loss. Therefore, the cutting chamber is periodically removed from the machine for regular inspection and maintenance. Additionally, the cutting chamber may require to be replaced with a new cutting chamber with different specifications, for different operational requirements of the machine. In such situations, the cutting chamber is removed from the machine for chamber replacement.

**[0003]** Conventional methods of removing the cutting chamber from the machine includes disconnecting the cutting chamber from a frame of the machine, raising the frame of the machine vertically, and then dragging and displacing the cutting chamber to a different location. However, dragging the cutting chamber to the different location may require some special equipment or machinery, which may be expensive. Further, this method of removal of the cutting chamber may cause significant wear and damage to the cutting chamber. Furthermore reinstalling the cutting chamber on the machine may also require dragging the cutter drum underneath the machine. This may result in relatively lower life of the cutting chamber.

**[0004]** U.S. Pat. No. 7,942,604 discloses a propulsion system for a road-milling machine, to facilitate removal of a cutter drum from the machine. The propulsion system angularly displaces a front pair of crawler assemblies in one angular direction and a rear pair of crawler assemblies in an opposite angular direction, to facilitate a lateral displacement of the road-milling machine. Although the present disclosure discusses the lateral movement of the road-milling machine to facilitate removal of the cutter drum, this method may cause slipping of the crawler assemblies and may result in undesired wear of the crawler assemblies.

## SUMMARY OF THE INVENTION

**[0005]** Various aspects of the present disclosure are directed towards a method removing a cutter chamber from a cold planer. The method initiates with disconnecting the cutter chamber from a frame of the cold planer. Thereafter, the frame of the cold planer is raised to a height above the cutting chamber. After raising, the cold planer is maneuvered in a direction substantially perpendicular to a direction of travel so that the cutting chamber is no longer under the cold planer.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0006]** FIG. **1** is a perspective view of an exemplary cold planer positioned at a first location that illustrates a cutting chamber and a number of drive units oriented in a first position, in accordance with the concepts of the present disclosure;

**[0007]** FIG. **2** is a perspective view of the cold planer positioned at the first location illustrating the drive units oriented in a second position, in accordance with the concepts of the present disclosure;

**[0008]** FIG. **3** is a perspective view of the cold planer positioned at the first location and raised vertically with the drive units oriented in the second position, in accordance with the concepts of the present disclosure;

**[0009]** FIG. **4** is a perspective view of the cold planer positioned at a second location with the drive units oriented in the second position, in accordance with the concepts of the present disclosure; and

**[0010]** FIG. **5** is a flowchart of a method of removing a cutter chamber from the cold planer, in accordance with the concepts of the present disclosure;

## DETAILED DESCRIPTION

**[0011]** Referring to FIG. **1**, there is shown a cold planer **10**. The cold planer **10** includes a frame **12**, a machine body **14**, a cutting chamber **16**, four drive units **18**, and a chamber disassembly system **20**. A cross-section **22** of the machine body **14** illustrates the chamber disassembly system **20** of the cold planer **10** in FIG. **1**.

**[0012]** The frame **12** is a rectangular support structure that supports various components of the cold planer **10**. For example, the frame **12** supports the cutting chamber **16** of the cold planer **10**. The frame **12** includes a frontal end **24**, a rear end **26**, a first side portion **28**, and a second side portion **30**.

**[0013]** The machine body **14** is a support structure installed on the frame **12**. The machine body **14** extends between the frontal end **24** and the rear end **26** of the frame **12**, along a direction of travel, A. Additionally, the machine body **14** extends between the first side portion **28** and the second side portion **30**, in a lateral direction, B (FIG. **2**). The machine body **14** houses the chamber disassembly system **20** (as shown in the cross-section **22**) of the cold planer **10**. In addition, the machine body **14** supports a control panel **32** of the cold planer **10**. In general, the machine body **14** facilitates an operator to stand on the machine body **14** and access the control panel **32**, to control one or more functions of the cold planer **10**.

**[0014]** The cutting chamber **16** is a rotary cutter chamber of the cold planer **10**. The cutting chamber **16** includes a number of mechanical components, such as but not limited to, a rotary drum, a number of cutter tool bits, and associated components, which in conjunction facilitates a cutting operation on ground surface (not shown). The cutting chamber **16** is attached to and supported by the frame **12**. Moreover, the cutting chamber **16** includes a number of brackets **34** (FIG. **4**) that attaches to the frame **12**, to facilitate an attachment between the cutting chamber **16** and the frame **12**. Various known means of attachment between the brackets **34** and the frame **12** may be contemplated, such as but not limited to, a bolt attachment, a threaded attachment, or a rivet attachment.

**[0015]** The drive units **18** support the frame **12** and are adapted to maneuver the cold planer **10** from one location to another. The drive units **18** are exemplarily shown as four in number, namely a first frontal drive unit **36**, a second frontal drive unit **38**, a first rear drive unit **40**, and a second rear drive unit **42** (FIG. **4**). Although, the drive units **18** are described as four in number, a varied number of the drive units **18**, may also be contemplated. Each of the drive units **18** supports the frame **12** at each corner of the frame **12**. Each of the drive units **18** includes a track unit **44** and a track-adjusting unit **46**.

**[0016]** The track unit **44** is a ground engaging unit of the cold planer **10** that facilitates maneuvering of the cold planer **10** from one location to another. Moreover, the track unit **44** is rotatable about a vertical axis, Y and is adapted to orient in a number of positions. More specifically, the track unit **44** is adapted to orient in a first position and a second position. The first position of the track unit **44** being parallel to the direction of travel, A, of the cold planer **10**. The second position of the track unit **44** is perpendicular to the direction of travel, A of the cold planer **10**. In the first position, the track unit **44** maneuvers the cold planer **10** in the direction of travel, A. In the second position, the track unit **44** maneuvers the cold planer **10** in a lateral direction, B, as is shown in FIG. **2**. Moreover, the track unit **44** is adjusted, with use of the track-adjusting unit **46**.

**[0017]** The track-adjusting unit **46** may be an elongated telescopic actuator that mounts the track unit **44** to the frame **12** of the cold planer **10**. In the current embodiment, the track-adjusting unit **46** includes a first end **48** and a second end **50**. The first end **48** is rotatably attached to the frame **12** of the cold planer **10**. The second end **50** is fixedly attached to the track unit **44**. The track-adjusting unit **46** is adapted to rotate, about the vertical axis, Y, to adjust the track unit **44** between the first position and the second position. Additionally, the track-adjusting unit **46** is adapted to extend and retract, to facilitate vertical movement of the frame **12** of the cold planer **10**, along the vertical axis, Y.

**[0018]** The chamber disassembly system **20** is a combination of several electronic components that facilitates an activation of a chamber disassembly mode of the cold planer **10**. Deactivation of the chamber disassembly system **20** corresponds to deactivation of the chamber disassembly mode of the cold planer **10**. In the deactivated state of the chamber disassembly mode, the track unit **44** is maintained in the first position (parallel to the direction of travel, A) of and cannot be moved to the second position (perpendicular to the direction of travel, A). Actuation of the chamber disassembly system **20** corresponds to activation of the chamber disassembly mode of the cold planer **10**. In the activated state of the chamber disassembly mode, the chamber disassembly system **20** moves the track unit **44** from the first position (parallel to the direction of travel, A) to the second position (perpendicular to the direction of travel, A).

**[0019]** The chamber disassembly system **20** is connected to the drive units **18** of the cold planer **10**. More specifically, the chamber disassembly system **20** is connected to the track unit **44** and the track-adjusting unit **46** of each of the drive units **18**. The chamber disassembly system **20** is adapted to rotate the track-adjusting unit **46**, to switch the track unit **44** from the first position to the second position. Additionally, the chamber disassembly system **20** is adapted to actuate the track-adjusting unit **46**, to raise the cold planer **10** vertically, along the vertical axis, Y. Moreover, the chamber disassembly system **20** is adapted to actuate the track unit **44**, to maneuver the cold planer **10** from a first location to a second location, in the lateral direction, B. The chamber disassembly system **20** follows a method **52** (FIG. **5**), to remove the cutting chamber **16** from the cold planer **10**.

**[0020]** Before initiating the method **52** (FIG. **5**) of removing the cutting chamber **16**, the cold planer **10** is positioned at the first location and the track unit **44** of each of the drive units **18** is oriented in the first position. The cold planer **10** positioned at a first location with the drive units **18** oriented in the first position, is shown in FIG. **1**. The method **52** (FIG. **5**) initiates with actuating the chamber disassembly system **20**, to actuate the chamber disassembly mode. Upon actuation of the chamber disassembly mode, the control panel **32** is disabled and the drive units **18** are automatically steered, with use of the chamber disassembly system **20**. More specifically, the chamber disassembly system **20** rotates the track-adjusting unit **46** of each of the drive units **18**, to adjust the track unit **44** from the first position (parallel to the direction of travel, A) to the second position (perpendicular to the direction of travel, B).

**[0021]** Referring to FIG. **2**, there is shown the cold planer **10** positioned in the first location and the drive units **18** oriented in the second position. In the second position, the track unit **44** is perpendicular to the first position of the track units **44**. Additionally, the track unit **44** is aligned in the lateral direction, B, in the second position of the track unit **44**. After positioning the track unit **44** to the second position, the cutting chamber **16** is disconnected from the frame **12** of the cold planer **10**. Although, the present disclosure contemplates manual disconnection of the cutting chamber **16** from the frame **12** of the cold planer **10**, an automatic disconnection of the cutting chamber **16** from the frame **12** with use of the chamber disassembly system **20** may also be contemplated. After disconnection, the chamber disassembly system **20** actuates the track-adjusting unit **46**, to raise the frame **12** of the cold planer **10**, vertically. More specifically, the track-adjusting unit **46** raises the frame **12** of the cold planer **10** to a height above the cutting chamber **16** of the cold planer **10**.

**[0022]** Referring to FIG. **3**, there is shown the cold planer **10** positioned in the first location and vertically raised. When the cold planer **10** is raised, the cutting chamber **16** is dislodged from the cold planer **10**. Thereafter, the chamber disassembly system **20** actuates the track unit **44**, to maneuver the cold planer **10** from the first location to the second location, in the lateral direction, B (perpendicular to the direction of travel, A).

**[0023]** Referring to FIG. **4**, there is shown the cold planer **10** positioned in the second location. As the cold planer **10** is maneuvered to the second location, the cutting chamber **16** is removed from the cold planer **10** and is accessible to an

operator. Thereafter, the chamber disassembly system **20** is deactivated, to deactivate the chamber disassembly mode of the cold planer **10**. Upon deactivation of the chamber disassembly mode, the chamber disassembly system **20** rotates the track unit **44** of each of the drive units **18**, from the second position (perpendicular to the direction of travel, A) to the first position (parallel to the direction of travel, A).

**[0024]** Referring to FIG. **5**, there is shown a flowchart of the method **52** of removing the cutting chamber **16** from the cold planer **10**. The method **52** initiates at step **54**.

**[0025]** At step **54**, the chamber disassembly mode is actuated. The chamber disassembly mode is actuated by actuating the chamber disassembly system **20** of the cold planer **10**. Upon actuation of the chamber disassembly mode, the chamber disassembly system **20** rotates the track unit **44** of each of the drive units **18** from the first position to the second position. More specifically, the chamber disassembly system **20** rotates the track-adjusting unit **46**, to adjust the track unit **44** from the first position to the second position. The method **52** then proceeds to step **56**.

**[0026]** At step **56**, the cutting chamber **16** is disconnected from the frame **12** of the cold planer **10**. More specifically, the brackets **34** of the cutting chamber **16** are disconnected from the frame **12**, to facilitate a disconnection of the cutting chamber **16** from the frame **12** of the cold planer **10**. The method **52** then proceeds to step **58**.

**[0027]** At step **58**, the chamber disassembly system **20** raises the frame **12** of the cold planer **10**, along the vertical axis, Y. The chamber disassembly system **20** raises the frame **12** of the cold planer **10** to a height above the cutting chamber **16**. More specifically, the chamber disassembly system **20** actuates the track-adjusting unit **46**, to raise the cold planer **10**, vertically. The method **52** then proceeds to step **60**.

**[0028]** At step **60**, the chamber disassembly system **20** maneuvers the cold planer **10** from the first location to the second location, in a direction perpendicular to the direction of travel, A. More specifically, the chamber disassembly system **20** actuates the track unit **44**, to maneuver the cold planer **10** in the lateral direction, B. The method **52** then proceeds to step **62**.

**[0029]** At step **62**, the chamber disassembly mode of the cold planer **10** is deactivated. More specifically, the chamber disassembly system **20** of the cold planer **10**, is deactivated. Upon deactivation of the chamber disassembly mode of the cold planer **10**, the chamber disassembly system **20** rotates the track unit **44** from the second position to the first position.

## INDUSTRIAL APPLICABILITY

**[0030]** In operation, an operator may initially operate the cold planer **10** in a normal mode of operation. In the normal mode of operation is active, the operator steers the drive units **18** corresponding to a user input obtained at the control panel **32** of the cold planer **10**. After prolonged and continuous operations of the cold planer **10**, the cold planer **10** may require to be serviced. During service of the cold planer **10**, the cutting chamber **16** may require to be removed and accessed by the operator. In certain other situations, such as chamber replacement, the cutting chamber **16** may require to be removed and accessed by the operator. The operator therefore performs the method **52**, to remove and access the cutting chamber **16** of the cold planer **10**. Before initiating the method **52**, the operator initially positions the cold planer **10** at the first location and adjusts the track unit **44** of each of the drive units **18** to the first position.

**[0031]** To perform the method **52** of removing and accessing the cutting chamber **16**, the operator initially activates the chamber disassembly system **20**, to actuate the chamber disassembly mode of operation of the cold planer **10**. In the chamber disassembly mode, the control panel **32** is disabled and the drive units **18** are steered, with use of the chamber disassembly system **20**. More specifically, the chamber disassembly system **20** rotates the track-adjusting unit **46** of each of the drive units **18**, to adjust the track unit **44** from the first position to the second position, as shown in FIG. **2**. Thereafter, the operator disconnects the cutting chamber **16** from the frame **12** of the cold planer **10**. This is accomplished by disassembling the brackets **34** from the frame **12** of the cold planer **10**. After disconnection, the chamber disassembly system **20** actuates the track-adjusting unit **46** of each drive unit **18**, to raise the frame **12** of the cold planer **10** vertically. Notably, the track-adjusting unit **46** raises the frame **12** of the cold planer **10** to a height above the cutting chamber **16**. Once the cold planer **10** is raised, the chamber disassembly system **20** actuates the track unit **44**, to maneuver the cold planer **10** from the first location to the second location. Notably, the chamber disassembly system **20** maneuvers the cold planer **10**, along the lateral direction, B (perpendicular to the direction of travel, A). As the cold planer **10** is maneuvered to the second location, the cutting chamber **16** is removed off from the cold planer **10** and is accessible to the operator. Therefore, this method **52** facilities removing and accessing of the cutting chamber **16**, without dragging the cutting chamber **16**. This results in increased work life of the cutting chamber **16** of the cold planer **10**. Although, the cold planer **10** is described as a preferred embodiment, concepts of the present disclosure may be applied to several other machines, such as but not limited to, a reclaiming machine and a wheeled cold planer.

**[0032]** It should be understood that the above description is intended for illustrative purposes only and is not intended to limit the scope of the present disclosure in any way. Thus, one of ordinary skill in the art will appreciate that other aspects of the disclosure may be obtained from a study of the drawings, the disclosure, and the appended claim.

What is claimed is:

**1**. A method of removing a cutting chamber from a cold planer, the method comprising:

disconnecting the cutting chamber from a frame of the cold planer;

raising the frame of the cold planer to a height above the cutting chamber;

maneuvering the cold planer in a direction substantially perpendicular to a direction of travel so that the cutting chamber is no longer under the cold planer.

**2**. The method of claim **1**, further comprising activating a chamber disassembly mode, wherein the chamber disassembly mode allows a ground engaging unit to be moved substantially perpendicular to the direction of travel.

**3**. The method of claim **2**, further comprising deactivating the chamber disassembly mode, wherein the ground engaging unit cannot be moved substantially perpendicular to the direction of travel.

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