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Apparatus and method for shaping slabs of material

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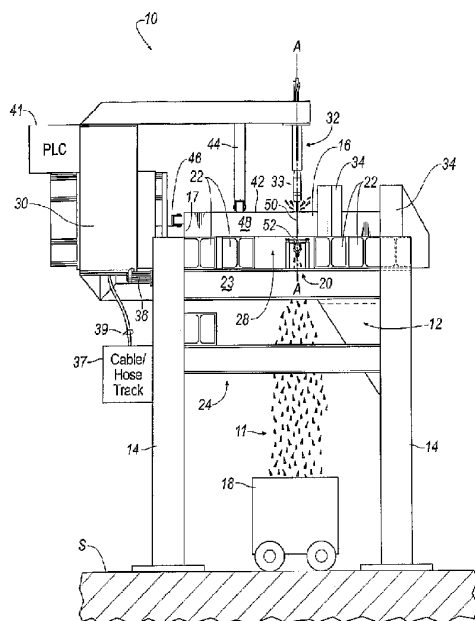
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(54) Title: APPARATUS AND METHOD FOR SHAPING SLABS OF MATERIAL



(57) Abstract: A slab shaping system (10) includes a slab shaping device (30). The slab shaping device (30) includes a cutting device (32) and de-burring device (20), wherein the cutting device (32) and the de-burring device (20), respectively cut and de-burr a slab (16). According to an embodiment, the slab shaping system (10) may include a plurality of spaced apart slab support beams (22) that form at least one slot therebetween (28). According to an embodiment, the cutting device (32) and de-burring device (20) may be axially-aligned. A method for operating a slab shaping system (10) is disclosed. The method includes the steps of positioning a plurality of slab support beams (22) on a table (12) to form at least one slot (28); positioning a slab (16) over the slab support beams (22); positioning a cutting device (32) and de-burring device (20) of a slab shaping device (30) in axial-alignment; and cutting and de-burring the cut in the slab (16) along a length of the at least one slot.

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Field of the Invention

The present invention relates to a slab shaping system for cutting a slab having a plurality of face surfaces; and a method for operating a slab shaping system. For example, the invention relates to a system and method for shaping material.

Background of the Invention

Steel slabs of material are typically shaped using a variety of techniques (such as slitting, cutting, etc.) Cutting machines typically include fixed devices that must be reconfigured / replaced when the shape of the cut or the cut line change. Additionally, known cutting machines may accumulate harmful dross / waste product on or near the cutting machine during a cutting operation. As such, a need exists for an improved apparatus and method for shaping slab material that overcomes the drawbacks associated with known cutting machines/techniques.

It is desired to address or ameliorate one or more of the limitations or disadvantages of the prior art, e.g., as described above, or at least provide a useful alternative.

Summary of the Invention

In accordance with one aspect of the present invention, there is provided a slab shaping system for cutting a slab having a plurality of face surfaces, comprising:

- a slab shaping device including
- 25 a substantially U-shaped carriage having
- a body extending substantially perpendicularly with respect to the slab, wherein the body includes a height bound by a first end and a second end that is greater than a thickness of the slab,
- a first support arm extending substantially perpendicularly from the first end of the
- 30 body and substantially parallel to the slab, wherein the first support arm is located above the slab, and

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a second support arm extending substantially perpendicularly from the second end of the body and substantially parallel to the slab, wherein the second support arm is located below the slab;

5 a cutting device attached to the first support arm and directed toward a lower face of the slab, wherein the cutting device is aligned with an axis that orthogonally traverses the slab, and

10 a de-burring device attached to the second support arm and directed toward a lower face surface of the slab, wherein the de-burring device is aligned with the axis that orthogonally traverses the slab, wherein the body is a carriage that commonly carries both of the cutting device and the de-burring device, wherein the body is selectively movable in a direction that is substantially orthogonal to the slab to provide a corresponding orthogonal movement, in unison, of the cutting device and the de-burring device relative the slab, wherein the cutting device provides

15 wherein the de-burring device provides means for de-burring the lower face surface of the slab once the slab has been cut by the cutting device; and

20 means for manipulating an axial orientation of the body for adjusting an axial distance between the cutting device and the upper face surface of the slab and the de-burring device and the lower face surface of the slab.

In accordance with another aspect of the present invention, there is provided a slab shaping system for cutting a slab having a plurality of face surfaces, comprising:

25 a plurality of spaced apart slab support beams that form at least one slot;

a slab shaping device including

a cutting device positioned proximate a first face surface of the plurality of face surfaces of the slab and away from the plurality of support beams that form the at least one slot, and

30 a de-burring device positioned at least within the at least one slot, wherein the cutting device provides means for cutting the slab, wherein the de-burring device

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provides means for de-burring the slab along the cut once the slab has been cut by the cutting device;

toes that extend from the table at an axial distance, wherein the toes provide means for assisting in a longitudinal positioning of the slab on the plurality of spaced apart slab support beams; and

one or more capping toes selectively engagable with the toes, wherein the one or more capping toes provide

means for longitudinally offsetting the longitudinal positioning of the slab with respect to the one or more toes by a longitudinal distance.

In accordance with another aspect of the present invention, there is provided method for operating a slab shaping system, comprising the steps of:

providing a slab shaping device including a cutting device and a de-burring device each attached to a substantially U-shaped carriage having a body extending substantially perpendicularly with respect to the slab, wherein the body includes a height bound by a first end and a second end that is greater than a thickness of the slab, a first support arm extending substantially perpendicularly from the first end of the body and substantially parallel to the slab, wherein the first support arm is located above the slab, and a second support arm extending substantially perpendicularly from the second end of the body and substantially parallel to the slab, wherein the second support arm is located below the slab, wherein the cutting device is attached to the first support arm and directed toward an upper face surface of the slab, wherein the cutting device is aligned with an axis that orthogonally traverses the slab, wherein the de-burring device is attached to the second support arm and directed toward a lower face surface of the slab, wherein the de-burring device is aligned with the axis that orthogonally traverses the slab, wherein the upper face surface and the lower face surface are directly opposite sides of the slab, wherein the body is a carriage that commonly carries both of the cutting device and the de-burring device;

cutting a slit through the slab from the upper face surface to the lower face surface by using the cutting device and de-burring the lower face surface of the slab

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proximate a location of the slit at the lower face surface using the de-burring device; and
selectively moving the body in one or more of a lateral and longitudinal direction to
synchronously manipulate one or more of a lateral and longitudinal orientation of
5 the cutting device and the de-burring device and wherein the selective moving of
the body results in the adjustably-maintaining, in unison, of an axial spacing
between the cutting device and the upper face of the slab and the de-burring device
and the lower face surface of the slab, wherein the axial spacing is orthogonal to
the slab.

Brief Description of the Drawings

Preferred embodiments of the present invention will now be described, by way of example
only, with reference to the accompanying exemplary drawings, wherein:

Figure 1 is a front view of a slab shaping system according to an embodiment wherein no
slab is present;

Figure 2 is a left side view of a slab shaping system according to an embodiment;

Figure 3 is a top view of a slab shaping system according to an embodiment;

Figure 4 is a front view of a slab shaping system according system to an embodiment
wherein a slab is present;

Figure 5 is a left side view of a slab shaping system according to an embodiment wherein a
slab of material is positioned on the slab shaping system;

Figure 6 is a top view of a slab shaping system according to an embodiment including a
slab of material positioned on the slab shaping system;

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Figure 7A is a front view of a slab of material and a slab shaping device of a slab shaping system according to an embodiment;

Figure 7B is an embodiment of the system of Figure 7A, wherein a capping toe is functionally positioned to offset the position of the slab; and

Figure 8 is a top view of a slab of material and a slab shaping device of a slab shaping system according to an embodiment.

10 **Detailed Description of Preferred Embodiments of the Invention**

Referring now to the drawings, the preferred illustrative embodiments of the present disclosure are shown in detail. Although the drawings represent some preferred embodiments of the present disclosure, the drawings are not necessarily to scale and certain features may be exaggerated to more clearly illustrate and explain the present disclosure. Further, the embodiments set forth herein are not intended to be exhaustive or otherwise limit or restrict the disclosure to the precise forms and configurations shown in the drawings and disclosure in the following detailed description.

Figures 1-3 illustrate an embodiment of a slab shaping system, which is shown generally at 10. According to the illustrated embodiment, the slab shaping system 10 includes a table 12 supported on beams 14. The table 12 can be elevated at a distance, D, approximately equal to, for example, ten or more feet from an underlying surface, S. Among other things, the elevated distance, D, of the table 12 can provide one or more of the following benefits:

(a) improved visibility for an operator / crane driver (e.g., when loading or unloading a slab of material 16 -- slab 16 not shown in Figure 1) to/from the table 12, (b) efficient removal of dross / metallic waste 11 (e.g., slag removal system is represented in Figure 4 by a wheeled cart 18) from underneath the table 12; and/or (c) the creation of an additional clearance underneath the table 12 for a slab de-burring device 20, which is referred to in the art as a

“spyder.” Although the slag removal system is depicted as wheeled cart 18, any removal system including conveyor belts or the like may be used. The slab of material 16 may include, but is not limited to slab steel. However, any material capable of being cut and de-barred can be processed by the present invention.

[0017] According to an embodiment, each table 12 includes two or more slab support beams 22 generally extending longitudinally between cross supports 23. Table 12 may include two or more cross supports 23 spaced between opposing end 24, 26 of the table 12. According to an embodiment, the slab support beams 22 may be positioned and spaced to define one or more slots 28 that may extend partially or fully from one end 24 to the opposite end 26 of the table 12. Slots 28 may be, for example, approximately fifteen inches wide. However, it will be appreciated that the slab shaping system 10 is not limited to a specific dimension or shape of the slots 28. De-burring device 20 may travel adjacent, proximate, under, over or within the slot 28.

[0018] The de-burring device 20 and a cutting device 32 are included as part of a slab shaping device 30. The slab shaping device 30, according to an embodiment, may travel fully or partially between ends 24, 26 of the table 12 along longitudinal table axis 13. This travel may be accomplished by way of a track system that couples device 30 to table 12. The slab shaping device 30 generally includes a U-shaped carriage which carries a de-burring device 20 and a cutting device 32. Because cutting device 32 and de-burring device 20 are coupled to a common U-shaped carriage, they move in unison along longitudinal axis 13.

[0019] As seen in Figure 4, the cutting device 32 provides a means 33 for slitting or cutting 50 slab 16. The slit or cut 50 may partially or fully extend into the slab 16. The means 33 may include, but is not limited to a water saw, cutting torch, laser cutting tool, rubber wheel, or the like. According to an embodiment, cutting device 32 may, in some embodiments, be referred to as a torch and the slab shaping device 30 may, in some embodiments, be referred to as a torch carriage U-frame (TCUF).

[0020] As illustrated in Figure 4, a shaping axis, A-A, may pass through the de-burring device 20, cutting device 32, and along the slit or cut 50 in the slab of material 16. Although the illustrated embodiment may include a shaping axis, A-A, extending through the de-burring device 20 and cutting device 32, it will be appreciated that the slab shaping system 10 is not limited to include this axial arrangement nor is it limited to include a de-burring device 20 and cutting device 32.

[0021] According to an embodiment, table 12 may further include toes 34 that extend from the table 12 at a distance, T (Figure 1). One or more toes 34 can be used to assist an operator/crane driver in

positioning of slab 16 on the table 12. According to an embodiment, the toes 34 may extend to a distance, T, for example, approximately eighteen inches above a top surface of table 12. Further, the slab shaping system 10 and associated slab shaping device 30 does not require a slab 16 to reside against one or more of the toes 34 in order for the slab shaping device 30 to cut from one end 24, 26 to another end 24, 26 along an edge 17 of the slab of the material 16. Therefore, if desired, the toes 34 may be used primarily or solely for guiding the operator / crane driver.

[0022] According to an embodiment, service supply lines 39 (such as those carrying water, oxygen, gas, electricity, compressed air, or the like) may be transported along the length of the table 12, for example, by a cable track system 37. Further, control regulators and solenoid valves may, if desired, be located proximate the slab shaping device 30. According to an embodiment, a "home position" of the slab shaping device 30 may permit access for maintenance purposes. If desired, numerous tables 12 can be grouped together and a common control center ("pulpit") can be located between tables 12. For example, according to an embodiment, a pulpit can be included between each block of four tables 12. The pulpit can be used to house, for example, a computer terminal, printer, programmable logic controller (PLC) and/or a labeling machine.

[0023] Figures 7 and 8 illustrate, an end and top view of the slab shaping device 30. The cutting device 32 and de-burring device 20 of the slab shaping device 30 can be adapted and configured to travel longitudinally (e.g., lengthways) along the table 12 and slab 16. If desired, the cutting device 32 and de-burring device 20 may be rigidly located (and, if desired, permanently located) in operational communication with one another along the shaping axis, A-A, so as to be substantially in an opposing operational alignment. Accordingly, the slab shaping system 10 permits, *inter alia*, the ability to accurately align an associated cutting device 32 and de-burring device 20, regardless of where a slab 16 is positioned. This alignment permits both device 32 and device 20 to travel in a substantially "perfect" line along the shaping axis, A-A. Alternatively, selected portions of the slab shaping device 30 may be manipulated by a motor 36, such as, for example, an electric motor. Moreover, the slab shaping system 10 may include various coordinated-movement features, accomplished by using, for example, a rack 38 and pinion 40 assembly coupled to motor 36 and controlled by PLC 41.

[0024] According to an embodiment, the up/down 43 and/or in/out 45 motion of slab shaping device 30 may be controlled by a PLC 41. Motion 43 and 45 may be orthogonal. Such controlled movements of the slab shaping device 30 can, among other things, ensure that the cutting device 32 is in a desired position relative a particular surface of a slab 16 at all times during cutting. For instance,

if a surface of slab 16 is bowed, the cutting device 32 may be moved up or down 43 (as it longitudinally traverses slab 16) to maintain a preferred cutting distance from an upper face 42 of slab 16 and also to ensure that the de-burring device 20 maintains a preferred position with respect to a lower face 47 under slab 16. Other associated positional or relevant information can be detected by indexing arm 44 and/or laser 53 and sent to PLC 41 or any other controller, or network of controllers. If desired, an in/out 45 motion of the slab shaping device 30 can also be fully controlled by a controller, for example, PLC 41.

[0025] According to an embodiment, when slab 16 is on the table 12, the slab shaping device 30 may be moved to a "cutting and/or de-burring position." Upon contacting an edge 17 of the slab of material 16 by a horizontal slab shaping device indexing arm 46, the cutting device 32 and de-burring device 20 may be positioned to a desired cutting and/or de-burring position. As slab 16 is being cut, the slab shaping device 30 can travel both along the length of the slab of material 16, and also latitudinally 45. Latitudinal movement of device 30 allows device 30 to move parallel to an edge of slab 16 even if slab 16 is not placed parallel to toes 34.

[0026] Latitudinal movement 45 of both device 32 and 20 can be accomplished through two respectively associated movement mechanisms whose movement is coordinated by a central controller (e.g. PLC 41). Or, alternatively, the longitudinal movement 45 of devices 32 and 20 may be accomplished by moving shaping device latitudinally 45. These types of movement mechanisms are well-known to those skilled in the art.

[0027] Although the slab shaping system 10 as illustrated show one cutting device 32 and one de-burring device 20, it will be appreciated that the slab shaping system 10 may include more than one cutting device 32 and/or more than one de-burring device 20. For example, if more than one cutting device 32 and de-burring device 20 are included, the more than one cutting device 32 and de-burring device 20 may be arranged on the slab shaping device 30 in any desirable configuration or orientation.

[0028] For example, the movement between a pair of the cutting devices 32 (each with a respective, axially-aligned de-burring device 20) can be utilized to shape a slab of material 16. In an embodiment, the cutting devices 32 can start cutting slab 16 at opposite ends of slab 16. The cutting devices 32 may commence cutting slab 16 concurrently, or, in various programmable, timed patterns, towards one another over the length of slab 16. According to an embodiment, before the cutting devices 32 contact one another (or "meet") at a point along the length of the slab of material 16 (which can be, for example, the middle of the length of the slab of material 16), one of the cutting device 32

can be sufficiently retracted or withdrawn (such as by returning to a start position) to permit the other cutting device 32 to complete the desired cut.

[0029] According to an embodiment, the associated PLC can be an ALLEN-BRADLEY® PLC, although it will be appreciated that one or multiple other programmable logic controllers may be used. Various control parameters (inputs and outputs) must be accounted for and controlled. Some parameters may include ignition of the cutting device 32, "seeking the slab edge," preheat time, acceleration curves, deceleration curves, cutting device off/on, regulation of cutting speed. These parameters can be controlled by PLC 41 or in other software or hardware based controllers.

[0030] The slab shaping system 10 of the present invention may further optionally include any or all of the following features: (a) laser distance/position measurement systems 53 (which can, for example, measure one or more slab parameters (e.g., measure the length or surface contour of the slab 16)), (b) On/Off control of the cutting device 32, including those using an ignition system, (c) SPC data and, if desired, an indirect or direct connection with computer networks or computer systems (e.g., computer systems connected by digital communication network (e.g. Ethernet)); (d) emergency stop controls; (e) fully or semi-automatic system operations controlled remotely, such as by a remote-control, hand-held device, or the like; (f) various control procedures, including: (1) prohibiting an operator from cutting a slab of material 16 if data has not been sorted and properly transferred/confirmed; (2) prohibiting the slab shaping device 30 from cutting without a required identification of a slab of material 16; (3) prohibiting cutting of a slab of material 16 if the cutting device 32 is in a non-validated position; (4) if desired, in operation, removing slabs of material 16 from the table 12 and transferring the slabs of material 16 to outgoing cells; (5) building piles of slabs of material 16 in which all slit edges are on the same side; and (6) providing two operators for some applications.

[0031] Further, for quality control purposes, one or more digital video cameras 49 or other visioning devices may be positioned in connection with each cutting station. These one or more visioning devices may be stationed on moving arm 51. Arm 51 substantially follows the exit cut line of the slab and/or the de-burring device 20 across the length of the slab of material 16 to capture, in digital video form, the image along the complete length of the slab of material 16 where the exit cut line is formed on the exit face 47 of the slab 16. Once captured in video format, each cutting process end result can be digitized and displayed on a video monitor (e.g., in a crane operators cabin or pulpit), or transferred and/or stored on a computer network so persons can view and archive the quality and character of the slab's exit cut line. The operator can, among other things, control the speed of the video (slower or

faster) as the video image collection takes place along the length of the cut. This image data allows an operator to visually inspect one or more characteristics associated with the exit slit or cut line 52 across the length of the slab 16 (such as abnormalities or imperfections) created during the cutting and/or de-burring process. If an undesirable characteristic is found by viewing the video information, a crane operator can divert that slab 16 to a slab yard area where the defect can be further inspected and/or corrected. Imperfections (as manifested by the image data) can be screened by a human operator, or various vision recognition software systems can be used to computer automate the quality screening process.

[0032] According to an embodiment, the digital representation of video data can be viewed by a crane operator or an operator of the system (e.g., on the floor) by way of a monitor or terminal, such as a hand-held device or a terminal screen, before or during the unloading process. If a defect is observed or detected, the associated slab of material 16 can be moved, for example, by a crane, to a nearby area for visual inspection or defect correction. Such inspection or correction may include manual means or processes.

[0033] Now referring to Figures 7A and 7B, toes 34 have been described herein as members that are essentially fixed to table 12. Although this arrangement is satisfactory for some applications, it may be desirable to position toes 34 along an axis 55 that is essentially parallel to a top surface of slab support beams 22. By allowing toes 34 to be adjusted along axis 55, the position of slab 16 can be manipulated without adjusting cutting device 32 along axis 45. Toes 34 can be adjusted along axis 55 by any type of mechanical/hydraulic/or other actuator well-known to those skilled in the art. The movement of toes 34 along axis 55 may be controlled by one or more controllers, such as, for example, PLC controller 41. Although mechanisms can be added to move toes 34 along axis 55, such mechanisms add to the complexity of the overall invention. In instances where automated means to move 55 toes 34 are not practical, a similar effect can be obtained by fabricating a capping toe 57 that is designed to engage a respectively associated toe 34 (Figure 7B). The capping toe 57 is adapted to positively engage toe 34 such that capping toe 57 will not be dislodged by the frictional engagement of slab 16 during normal operation. By engaging capping toe 57 to toe 34, an offset "d" is established. Thereafter, any slab that is placed on table 12 will necessarily be displaced by a distance "d." Thus, capping toe provides a simple but yet effective, means for offsetting a slab with respect to toe 34. Although capping toe 57 is shown as manipulatable from the top of toe 34, it is contemplated within the scope of this invention that capping toe 57 may be elevatable from below toe 34. Also, capping

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toe 57 can be manipulatable using human intervention or, simple drive mechanisms, well-known to those skilled in the art, may be used to manipulate capping toe 57 into, and out of, its offset position.

[0034] The present invention has been particularly shown and described with
5 reference to the foregoing embodiments, which are merely illustrative of the best mode or modes for carrying out the invention. It should be understood by those skilled in the art that various alternatives to the embodiments of the invention described herein may be employed in practicing the invention without departing from the spirit and scope of the invention as defined in the following claims. It is intended that the following claims define
10 the scope of the invention and that the method and apparatus within the scope of these claims and their equivalents be covered thereby. This description of the invention should be understood to include all novel and non-obvious combinations of elements described herein, and claims may be presented in this or a later application to any novel and non-obvious combination of these elements. Moreover, the foregoing embodiments are
15 illustrative, and no single feature or element is essential to all possible combinations that may be claimed in this or a later application.

[0035] Throughout this specification and the claims which follow, unless the context requires otherwise, the word "comprise", and variations such as "comprises" and "comprising", will be understood to imply the inclusion of a stated integer or step or group
20 of integers or steps but not the exclusion of any other integer or step or group of integers or steps.

[0036] The reference in this specification to any prior publication (or information derived from it), or to any matter which is known, is not, and should not be taken as an acknowledgment or admission or any form of suggestion that that prior publication (or
25 information derived from it) or known matter forms part of the common general knowledge in the field of endeavour to which this specification relates.

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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A slab shaping system for cutting a slab having a plurality of face surfaces, comprising:
 - 5 a slab shaping device including
 - a substantially U-shaped carriage having
 - a body extending substantially perpendicularly with respect to the slab, wherein the body includes a height bound by a first end and a second end that is greater than a thickness of the slab,
 - 10 a first support arm extending substantially perpendicularly from the first end of the body and substantially parallel to the slab, wherein the first support arm is located above the slab, and
 - a second support arm extending substantially perpendicularly from the second end of the body and substantially parallel to the slab, wherein the second support arm is
 - 15 located below the slab;
 - a cutting device attached to the first support arm and directed toward a lower face of the slab, wherein the cutting device is aligned with an axis that orthogonally traverses the slab, and
 - a de-burring device attached to the second support arm and directed toward a lower
 - 20 face surface of the slab, wherein the de-burring device is aligned with the axis that orthogonally traverses the slab, wherein the body is a carriage that commonly carries both of the cutting device and the de-burring device, wherein the body is selectively movable in a direction that is substantially orthogonal to the slab to provide a corresponding orthogonal movement, in unison, of the cutting device and
 - 25 the de-burring device relative the slab, wherein the cutting device provides means for cutting the slab from the upper face surface to the lower face surface, wherein the de-burring device provides means for de-burring the lower face surface of the slab once the slab has been cut by the cutting device; and

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means for manipulating an axial orientation of the body for adjusting an axial distance between the cutting device and the upper face surface of the slab and the de-burring device and the lower face surface of the slab.

- 5 2. The slab shaping system according to claim 1, further including
a table including
at least two spaced apart slab support beams that define at least one slot
therebetween, wherein the de-burring device is located at least proximate or within
the slot and wherein the cutting device is not located proximately the slot and not
10 within the slot, wherein the at least two spaced apart slab support beams provide
means for axially supporting the slab.
3. The slab shaping system according to claim 2, wherein the means for manipulating
the axial orientation of the body results in one of a:
15 decrease in the axial distance between the cutting device and the upper face surface
of the slab as well as an increase in the axial spacing between the lower face
surface of the slab and de-burring device that is located proximately or within the
slot, and the
increase in the axial distance between the cutting device and the upper face surface
20 of the slab as well as a decrease in the axial spacing between the lower face surface
of the slab and de-burring device that is located proximately or within the slot.
4. The slab shaping system according to claim 2, wherein the table further includes
cross supports that provide means for axially supporting said at least two spaced
25 apart slab support beams.
5. The slab shaping system according to claim 1 wherein the slab includes a bowed
steel slab, wherein the means for manipulating the axial orientation of the body
provides
30 means for maintaining the axial distance between the cutting device and the upper
face surface of the bowed steel slab by moving the cutting device in a

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longitudinally, axially-arc'd path as the cutting device longitudinally traverses the length of the bowed steel slab.

- 5 6. The slab shaping system according to claim 2, further including one or more toes that axially extend from the table at a distance that provide means for assisting in a longitudinal positioning of the slab on the plurality of slab support beams.
- 10 7. The slab shaping system of claim 6, further including one or more capping toes engaged with the one or more toes, wherein the engagement of the one or more capping toes with the one or more toes provides means for longitudinally offsetting the longitudinal positioning of the slab with respect to the one or more toes by a longitudinal distance.
- 15 8. A slab shaping system for cutting a slab having a plurality of face surfaces, comprising:
a plurality of spaced apart slab support beams that form at least one slot;
a slab shaping device including
20 a cutting device positioned proximate a first face surface of the plurality of face surfaces of the slab and away from the plurality of support beams that form the at least one slot, and
a de-burring device positioned at least within the at least one slot, wherein the cutting device provides means for cutting the slab, wherein the de-burring device provides means for de-burring the slab along the cut once the slab has been cut by
25 the cutting device;
toes that extend from the table at an axial distance, wherein the toes provide means for assisting in a longitudinal positioning of the slab on the plurality of spaced apart slab support beams; and
one or more capping toes selectively engagable with the toes, wherein the one or
30 more capping toes provide

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means for longitudinally offsetting the longitudinal positioning of the slab with respect to the one or more toes by a longitudinal distance.

9. The slab shaping system according to claim 8 further comprising one or more cross
5 supports that provide means for supporting the plurality of spaced apart slab support beams.
10. The slab shaping system according to claim 8 wherein the slab includes a bowed steel slab, wherein the means for manipulating the spacing between the cutting device and the one surface of the plurality of surfaces of the slab further provides
10 means for maintaining the spacing between the cutting device and the one surface of the plurality of surfaces of the bowed steel slab by moving the cutting device in a longitudinally, axially-arc'd path as the cutting device longitudinally traverses the length of the bowed steel slab.
11. The slab shaping system according to claim 8 wherein the cutting device includes
15 a cutting torch.
12. The slab shaping system according to claim 8, wherein the manipulating the axial spacing includes manipulating the cutting device along an up/down axis, wherein
20 the up/down axis is substantially orthogonal to the slab.
13. A method for operating a slab shaping system, comprising the steps of:
25 providing a slab shaping device including a cutting device and a de-burring device each attached to a substantially U-shaped carriage having a body extending substantially perpendicularly with respect to the slab, wherein the body includes a height bound by a first end and a second end that is greater than a thickness of the slab, a first support arm extending substantially perpendicularly from the first end of the body and substantially parallel to the slab, wherein the first support arm is
30 located above the slab, and a second support arm extending substantially perpendicularly from the second end of the body and substantially parallel to the

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- 5 slab, wherein the second support arm is located below the slab, wherein the cutting device is attached to the first support arm and directed toward an upper face surface of the slab, wherein the cutting device is aligned with an axis that orthogonally traverses the slab, wherein the de-burring device is attached to the second support arm and directed toward a lower face surface of the slab, wherein the de-burring device is aligned with the axis that orthogonally traverses the slab, wherein the upper face surface and the lower face surface are directly opposite sides of the slab, wherein the body is a carriage that commonly carries both of the cutting device and the de-burring device;
- 10 cutting a slit through the slab from the upper face surface to the lower face surface by using the cutting device and de-burring the lower face surface of the slab proximate a location of the slit at the lower face surface using the de-burring device; and
- 15 selectively moving the body in one or more of a lateral and longitudinal direction to synchronously manipulate one or more of a lateral and longitudinal orientation of the cutting device and the de-burring device and wherein the selective moving of the body results in the adjustably-maintaining, in unison, of an axial spacing between the cutting device and the upper face of the slab and the de-burring device and the lower face surface of the slab, wherein the axial spacing is orthogonal to
- 20 the slab.
14. The method according to claim 13, further including the step of:
prohibiting the cutting device from cutting the slab without an identification of the slab material.
- 25 15. The method according to claim 13, further including the step of:
prohibiting the cutting device from cutting the slab if the cutting device is in a non-validated position.
- 30 16. The method according to claim 13, further including the step of:
imaging one or more of the upper face surface and the lower face surface and

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displaying at least one characteristic of said slit.

17. The method according to claim 16, further including the step of:
moving an imaging camera along the slit.
18. The method according to claim 16, further including the step of:
digitizing the image and
analyzing at least one characteristic of said slit using automated vision recognition
software.
19. A system substantially as hereinbefore described with reference to the
accompanying drawings.
20. A method substantially as hereinbefore described with reference to the
accompanying drawings.

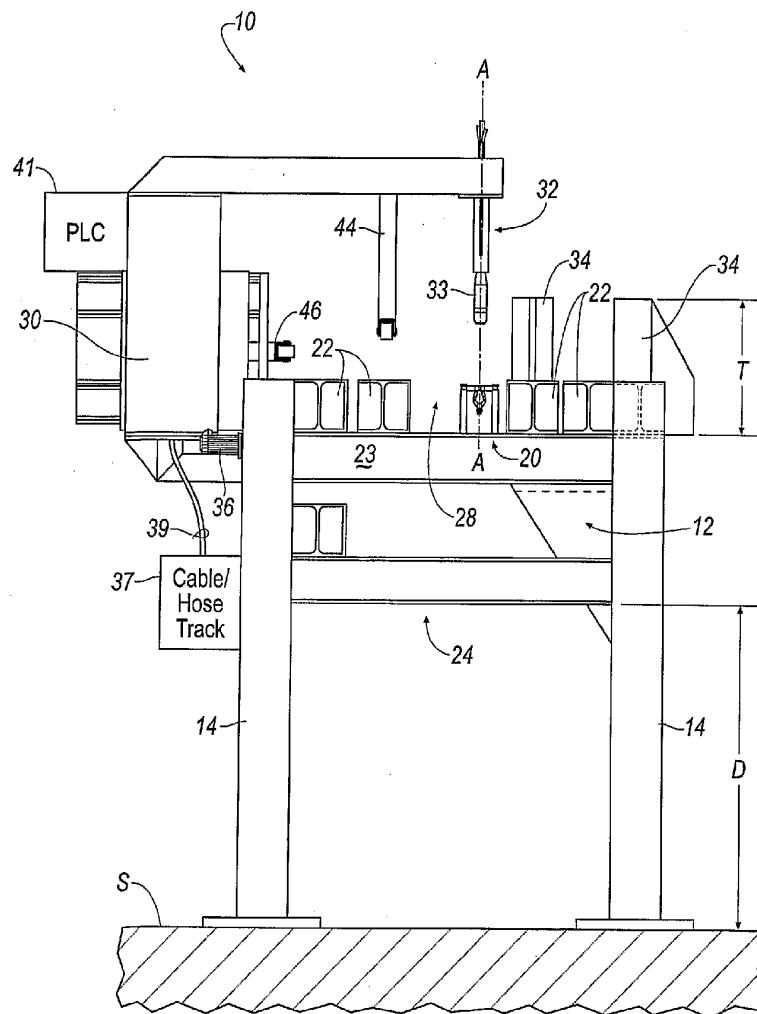


FIG. 1

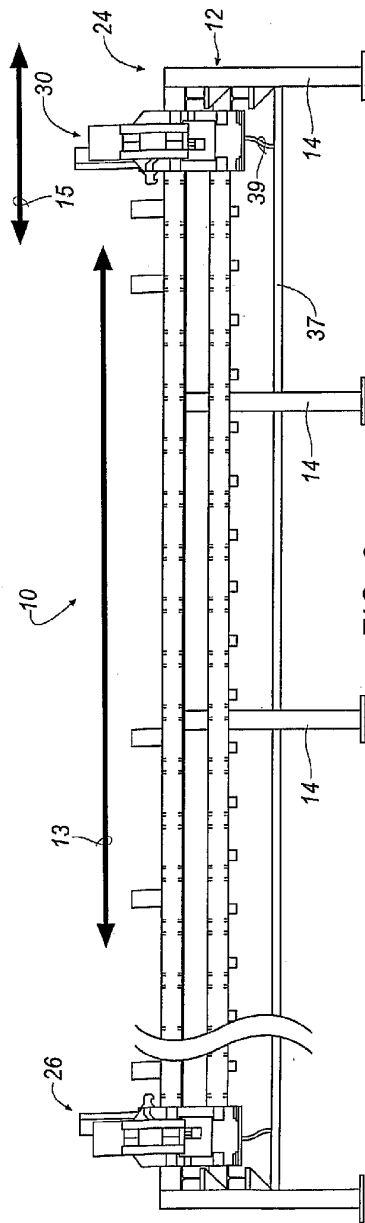


FIG. 2

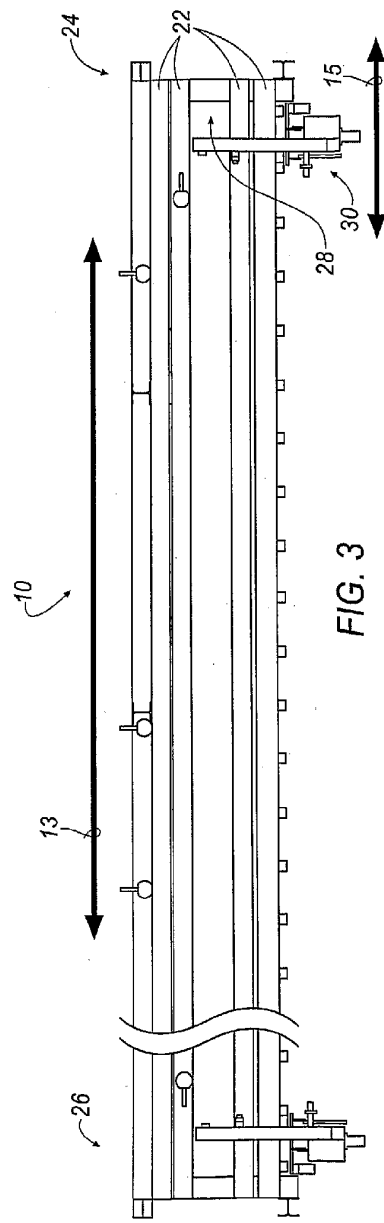


FIG. 3

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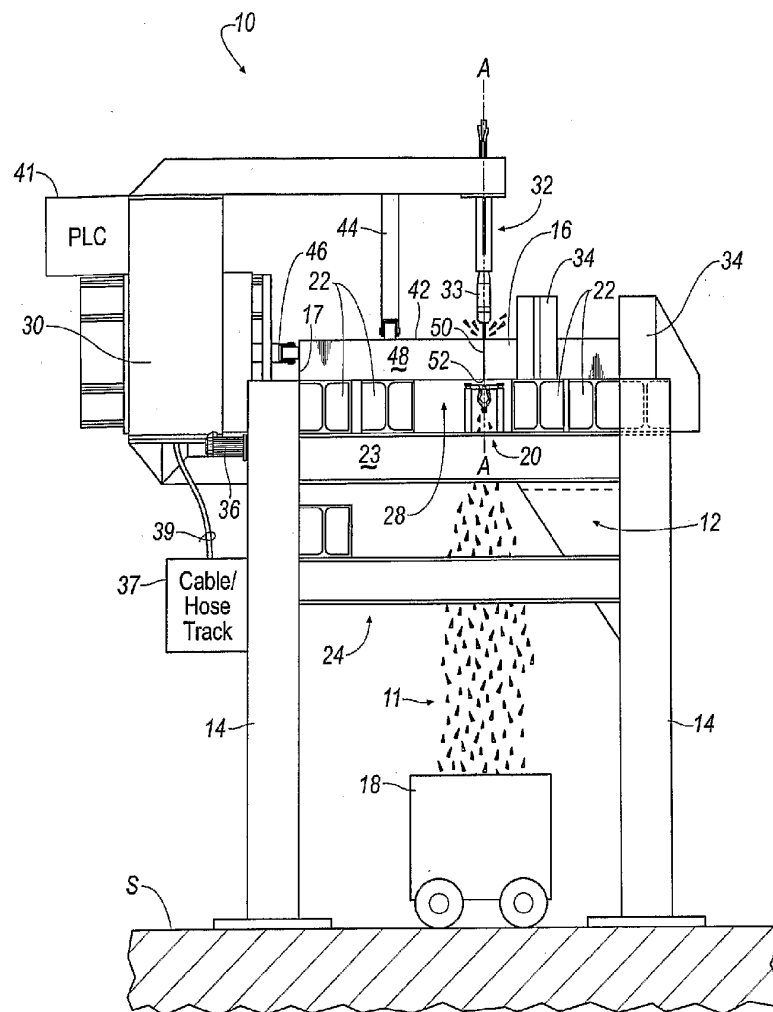


FIG. 4

