Patent Reading Tool Combined in Searching System of U.S. Patents

InSearchIP Corporation

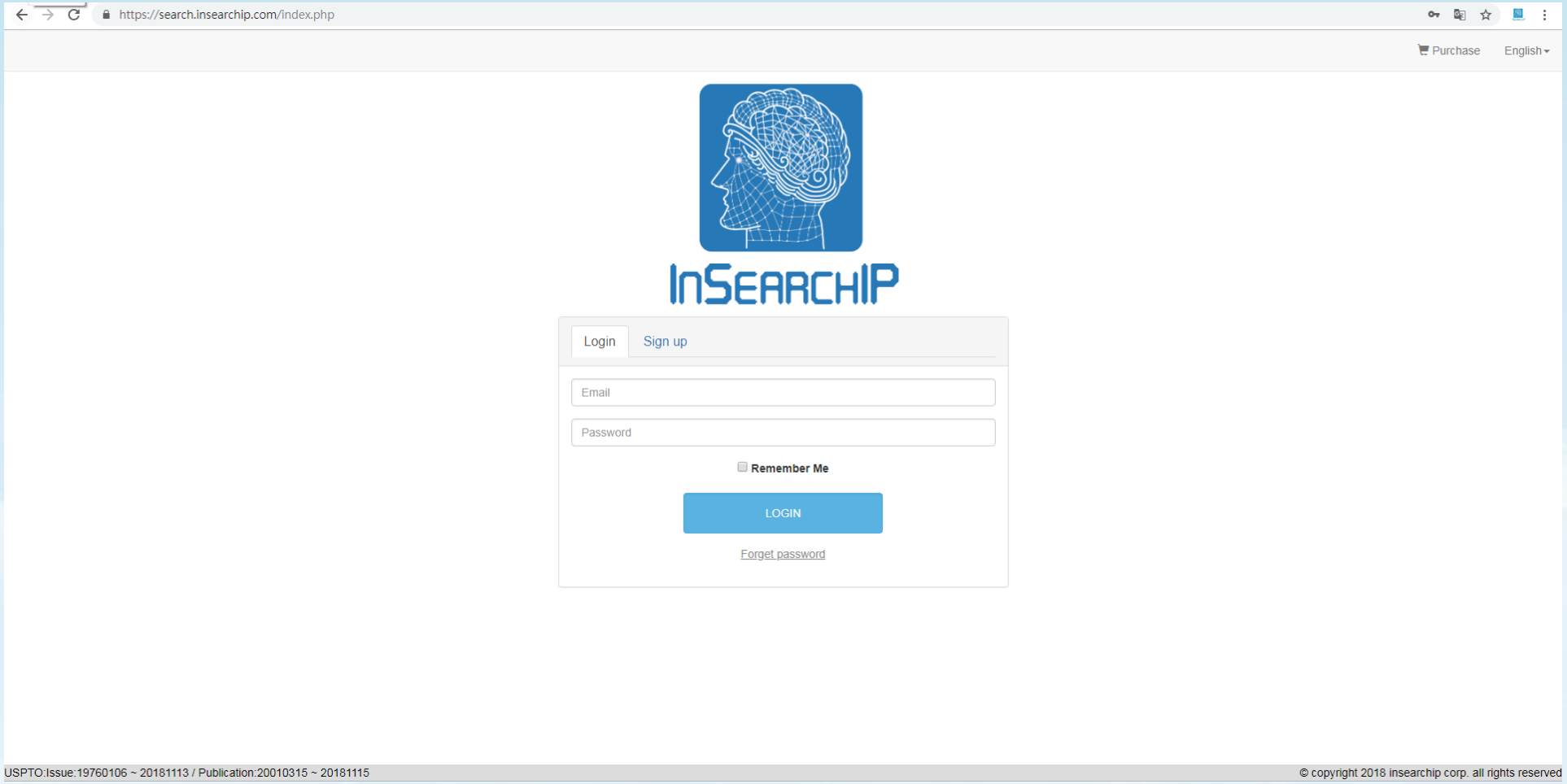
What is Exclusive Patent Easy Reading Tool (ExPER Tool)?

- It is for reading patent detailed description easily
- It is for reading patent claims easily
- It is for reading patent figs (drawings) easily
- It is for reading three parts on one screen easily

Any patent search engine should combine with "Exclusive Patent Easy Reading Tool" because…

- It saves much of your reading time : 35% up at least
- It helps you read more accurately: 25% up at least
- It makes you read more comfortably: unlimitedness

This is the initial display of our ExPER Tool:

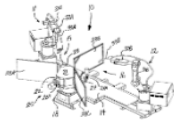


For example, a user enters the keyword “Robot and Index”, then selects one of patents to read:

Robot and Index | Search | Advanced | Purchase | Search history | Project management | English | Cindy

Drawing-Visual | Claim-Visual | Original

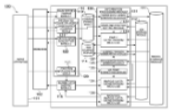
Select All (Search time :0.088 seconds, 66,920 results)



Multi-station robotic welding assembly

Issue Number : 6907318
Issue Date : 2005-06-14
Application Number : 10/339,081
Application Date : 2003-01-09
Inventor : Michael L. Passmore(US), Douglas E. Smyth(US)
Patentee : Advanced Tubing Technology, Inc.(US)

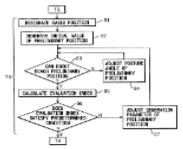
A multi-station robotic welding assembly includes a mounting platform, and a plurality of robots attached to the mounting platform and located in respective weld stations. Each of the robots includes an elongated movable arm and wrist. A welding torch is attached to each of the robots, and is adapted for being manipulated by the movable arm and wrist. A rotatable fixture base is located on the mounting platform, and is adapted for supporting a plurality of fixtures. Each of the fixtures is adapted for holding and positioning a workpiece for we...More



Robot simulator, robot system and simulation method

Publication Number : 20180236657
Publication Date : 2018-08-23
Application Number : 15/898,663
Application Date : 2018-02-19
Inventor : Koichi Kuwahara(JP), Yoshifumi Onoyama(JP), Kenichi Yasuda(JP), Wataru Watanabe(JP)
Patentee : Kabushiki Kaisha Yaskawa Denki(JP)

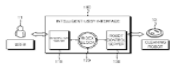
A robot simulator includes a storage device that stores model information related to the robot and an obstacle in the vicinity of the robot, and an acquisition device that obtains first input information defining a start position and an end position of operation of the robot. A processing device generates a path for moving the distal end portion of the robot from the start position to the end position while avoiding collisions between the robot and the obstacle based on the first input information and the model information. The processing devi...More



Calibration device and method for robot mechanism

Issue Number : 7853359
Issue Date : 2010-12-14
Application Number : 12/068,113
Application Date : 2008-02-01
Inventor : Kazunori Ban(JP), Katsutoshi Takizawa(JP), Gang Shen(JP)
Patentee : Fanuc Ltd(JP)

A calibration device and method for automatically determining the position and the orientation of a robot used for measurement. First, an initial position of a preliminary position is generated based on a designated basic position, and it is judged whether the initial position is within an operation range of the robot. If the robot cannot reach the initial position, the preliminary position is adjusted close to the basic position. Otherwise, the preliminary position is evaluated by calculating an evaluation index of the preliminary position. W...More



Intelligent user interface apparatus and control method for control of service robots

Issue Number : 8666545
Issue Date : 2014-03-04
Application Number : 12/883,850
Inventor : Jae Wook Jeon(KR), Tae Houn Song(KR), Soon Mook Jung(KR), Hyun Uk Jung(KR), Myung Jin Kim(KR)
Patentee : Sungkyunkwan University Foundation For Corporate Collaboration(KR)

Showing 16 to 30 of 66920 rows | 15 rows per page | ‹ 1 2 3 4 5 ... ›

The ExPER Tool (Exclusive Patent Easy Reading Tool) reveals 3 windows on a single screen :

Claim-Visual | Drawing-Visual | Detailed Description

Claim-Visual

1. A multi-station robotic welding assembly(10), comprising:
- ★(a) a mounting platform(14);
- ★(b) a plurality of robots(11,12)
  - <~attached to said mounting platform(14)
  - <~and located in respective weld stations,
  - ^^each of said robots(11,12) comprising
  - ☆an elongated movable arm(31A,31B) and wrist;
- ★(c) a welding torch(33A,33B)
  - <~attached to each of said robots(11,12)
  - <~and adapted for being manipulated by said movable arm(31A,31B) and wrist;
- ★(d) a rotatable fixture base(18)
  - <~located on said mounting platform(14)
  - <~and adapted for supporting a plurality of fixtures(F1,F2,F3),
  - ^^each of the fixtures(F1,F2,F3)
  - ~adapted for holding and positioning a workpiece(W1,W2,W3,W4)
  - ~for welding in respective weld stations,
  - ^^wherein said fixture base(18) comprises
  - ★a junction box(21)
  - ~containing an electrical D-ring connector(Null)
  - ~adapted for enabling continuous 360 degree rotation of said fixture base(18); and
- ★(e) a base indexer(18)
  - ~adapted for repeatedly rotating said fixture base(18)
  - ~by a predetermined degree(Null),
  - ~such that the fixtures(F1,F2,F3)
  - ~are positioned within respective weld stations
  - ~for an index interval(Null)
  - ~sufficient to complete welding of the workpieces(W1,W2,W3,W4).

All Drawings(1/8) Select Any Element Number:

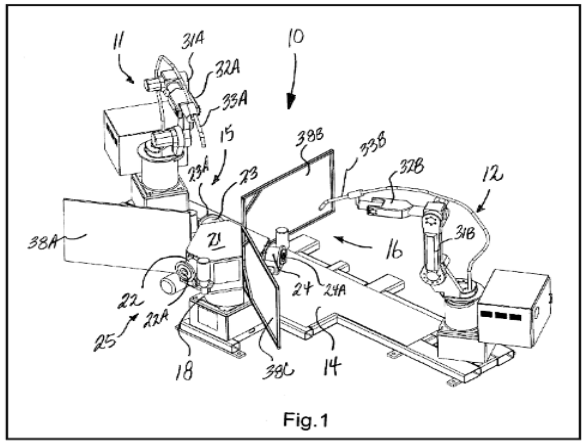


Fig.1

Next

12	second arc welding robots, robot, weld robot, arc welding robots
14	common mounting platform, platform, mounting platform
15	respective weld stations, weld stations, welding stations, respective station, weld station, first weld station
16	respective weld stations, weld stations, welding stations, respective station, weld station, second weld station
18	rotatable fixture base, fixture base, base indexer
21	junction box
22	indexers, indexer, respective indexers

DESCRIPTION OF THE PREFERRED EMBODIMENT AND BEST MODE

Referring now specifically to the drawings, a multi-station robotic welding assembly according to the present invention is illustrated in FIGS. 1-3, and shown generally at reference numeral **10**. The assembly **10** is especially applicable in a production environment for welding items such as bumpers, foot plates, headlight supports, arm rests, and other components commonly used in all-terrain vehicles (ATVs) and golf carts. The assembly **10** includes first and second arc welding robots **11** and **12** attached to a common mounting platform **14** and located in respective weld stations **15** and **16**. A rotatable fixture base **18** is mounted to the platform **14** between the robots **11**, **12**, and includes a junction box **21** and three indexers **22**, **23**, and **24** adapted for carrying respective fixtures used for holding workpieces to be welded. The fixtures "F" and "W" are illustrated in FIGS. 4-8, discussed below. Each fixture is custom designed and secured directly to a face plate **22**A, **23**B, and **24**A of the indexer **22**, **23**, and **24** using a series of bolts and locating dowels. Individual components of the workpiece are loaded into the fixture at an operator's station **25** prior to welding, and are held in place by releasable clamps and holding devices. The mounting platform **14** provides a single common base for all components of the assembly **10**, thus allowing convenient transport and relocation of the assembly without substantial disassembly or breaking down of parts.

Each of the robots **11** and **12** includes a movable arm **31**A, **31**B and wrist **32**A, **32**B adapted for carrying and manipulating a welding torch **33**A, **33**B. The robots **11**, **12** are preferably manufactured by Fanuc Robotics of Rochester Hills, Mich., and sold under the trademark ARC Mate 100iB Robot. Each robot **11**, **12** has a six-axis modular construction, and is electric servo driven for precision high-speed welding and cutting. The welding torch **33**A, **33**B is preferably a robotic, air-cooled MIG gun manufactured by Tregaskiss, Ltd. of Ontario, Canada, and sold as Model AC/QC 22° 4' 0.035".

The rotatable fixture base **18** includes a three-position, DC driven, rotary cam indexer, such as that manufactured by Commercial Cam Co., Inc. (CAMCO) of Wheeling, Ill., and sold as Model #1305. The indexer has a cam-driven index drive which provides repeated movement of the fixture base **18** from one position to another, as indicated by arrow **36** in FIG. 3, thereby rotating the fixtures and attached workpieces between each of the two weld stations **15**, **16** and the operator station **25**. Typical cam-driven index drives have two basic elements: a cam attached to the input shaft (camshaft) and a follower wheel attached to the output shaft. As the cam rotates, followers on the follower wheel are guided through a path dictated by the shape of the cam. During part of the input rotation, the cam confines the followers (and therefore, the output) to a rigid, stationary position called "dwell." During the remainder of the camshaft rotation, the cam geometry causes the followers to move and the output to rotate, or "index". As the camshaft is rotated at a constant velocity, the output stops and starts (dwells and indexes) in a repeating pattern.

The indexers **22**, **23**, and **24** mounted to the junction box **21** and carrying the fixtures are preferably eight-position, DC driven, rotary cam indexers, such as that manufactured by CAMCO and sold as Model #601. Each indexer **22**-**24** moves the fixture and attached workpiece between eight different positions during welding in each of the welding stations **15** and **16**. The fixture

USPTO:Issue:19760106 ~ 20181113 / Publication:20010315 ~ 20181115

Strengths

- Our software is unique in the world that saves customers' time on reading one U.S. patent from 2 hours to 10 minutes.

- Our ExPER Tool (exclusive patent easy reading tool) brings accuracy, convenience and benefits to patent attorneys, patent lawyers, patent engineers, technical engineers, managers of company.

Advantages for Customers

- For patent attorneys, patent lawyers, patent managers, patent engineers and related staff:

(1) Check prior art before application.
(2) Read citations rapidly and comprehend claims accurately with ease.
(3) Learn the writing of U.S. patent projects.
(4) Review your own patent accurately and find its deficiency quickly.
(5) Examine competitors' patents much more properly and discover flaws of their patents promptly.
(6) It's much easier to read patents. The R&D engineers, managers of companies, supervisors of companies (even a related financial staff) can comprehend patent claims easily.

Patented Inventions for ExPer Tool:

Invention	Patent/Application No.	Patent Title or Content
USA	15/011440	Patent Searching Method in Connection to Matching Degree
Japan	6198866	Patent Searching Method in Connection to Matching Degree
Taiwan	I522825	Patent Searching Method in Connection to Matching Degree
Taiwan	103134909	Method for Generating Patent Analysis Report
Japan	6417359	Patent Claims Disassembling and Analyzing Method
Taiwan	I537863	Patent Claims Disassembling and Analyzing Method
Taiwan	I550422	Claim Text Generalizing Method
Taiwan	I622008	Method for Analyzing Patent Trend
Taiwan	I573030	Method for Analyzing Patent Technical Side
Taiwan	I584217	A Verification method of Patent Searching Analysis Result
Australia	2017202783	Element-noun reference numeral acquiring method for acquiring element-noun reference numeral of claim-element-noun
Taiwan	105116756	Element-noun reference numeral acquiring method for acquiring element-noun reference numeral of claim-element-noun
Taiwan	105140048	Method and Device for Automatic Computer Translation of Patent Claims
Taiwan	106122185	Device for Automatic Computer Translation of Patent Claims

Function Descriptions of ExPer Tool

One page view all, OPVA:

The screen is divided into 3 windows. users can click each drop down menu to select the preferred 3 reading items, such as **claim-visual, drawing-visual, detailed description**, abstract, field of invention/prior art, summary, brief description of the drawing, claims, drawings, citations, remark.

Claim-Visual

Claim-Visual

Claim-Visual

1. A multi-station robotic welding assembly(10), comprising:
- ★(a) a mounting platform(14);
- ★(b) a plurality of robots(11,12)
  - <~attached to said mounting platform(14)
  - <~and located in respective weld stations,
  - ^^each of said robots(11,12) comprising
    - ☆an elongated movable arm(31A,31B) and wrist;
- ★(c) a welding torch(33A,33B)
  - <~attached to each of said robots(11,12)
  - <~and adapted for being manipulated by said movable arm(31A,31B) and wrist;
- ★(d) a rotatable fixture base(18)
  - <~located on said mounting platform(14)
  - <~and adapted for supporting a plurality of fixtures(F1,F2,F3),
  - ^^each of the fixtures(F1,F2,F3)
    - ~adapted for holding and positioning a workpiece(W1,W2,W3,W4)
      - ~for welding in respective weld stations,
  - ^^wherein said fixture base(18) comprises
    - ★a junction box(21)
      - ~containing an electrical D-ring connector(Null)
        - ~adapted for enabling continuous 360 degree rotation of said fixture base(18); and
- ★(e) a base indexer(18)
  - ~adapted for repeatedly rotating said fixture base(18)
    - ~by a predetermined degree(Null),
      - ~such that the fixtures(F1,F2,F3)
        - ~are positioned within respective weld stations
          - ~for an index interval(Null)
            - ~sufficient to complete welding of the workpieces(W1,W2,W3,W4).

Drawing-Visual

Drawing-Visual

All Drawings(1/8) Select Any Element Number:

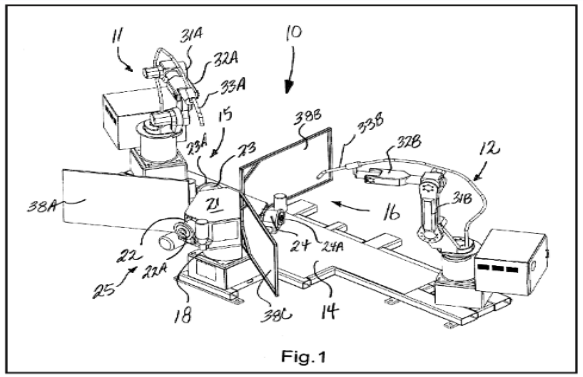


Fig.1

Next

12	second arc welding robots, robot, weld robot, arc welding robots
14	common mounting platform, platform, mounting platform
15	respective weld stations, weld stations, welding stations, respective station, weld station, first weld station
16	respective weld stations, weld stations, welding stations, respective station, weld station, second weld station
18	rotatable fixture base, fixture base, base indexer
21	junction box
22	indexers, indexer, respective indexers

Detailed- Description

Detailed Description

DESCRIPTION OF THE PREFERRED EMBODIMENT AND BEST MODE

Referring now specifically to the drawings, a multi-station robotic welding assembly according to the present invention is illustrated in FIGS. 1-3, and shown generally at reference numeral **10**. The assembly **10** is especially applicable in a production environment for welding items such as bumpers, foot plates, headlight supports, arm rests, and other components commonly used in all-terrain vehicles (ATVs) and golf carts. The assembly **10** includes first and second arc welding robots **11** and **12** attached to a common mounting platform **14** and located in respective weld stations **15** and **16**. A rotatable fixture base **18** is mounted to the platform **14** between the robots **11**, **12**, and includes a junction box **21** and three indexers **22**, **23**, and **24** adapted for carrying respective fixtures used for holding workpieces to be welded. The fixtures "F" and "W" are illustrated in FIGS. 4-8, discussed below. Each fixture is custom designed and secured directly to a face plate **22A**, **23B**, and **24A** of the indexer **22**, **23**, and **24** using a series of bolts and locating dowels. Individual components of the workpiece are loaded into the fixture at an operator's station **25** prior to welding, and are held in place by releasable clamps and holding devices. The mounting platform **14** provides a single common base for all components of the assembly **10**, thus allowing convenient transport and relocation of the assembly without substantial disassembly or breaking down of parts.

Each of the robots **11** and **12** includes a movable arm **31A**, **31B** and wrist **32A**, **32B** adapted for carrying and manipulating a welding torch **33A**, **33B**. The robots **11**, **12** are preferably manufactured by Fanuc Robotics of Rochester Hills, Mich., and sold under the trademark ARC Mate 100iB Robot. Each robot **11**, **12** has a six-axis modular construction, and is electric servo driven for precision high-speed welding and cutting. The welding torch **33A**, **33B** is preferably a robotic, air-cooled MIG gun manufactured by Tregaskiss, Ltd. of Ontario, Canada, and sold as Model AC/QC 22° 4' 0.035".

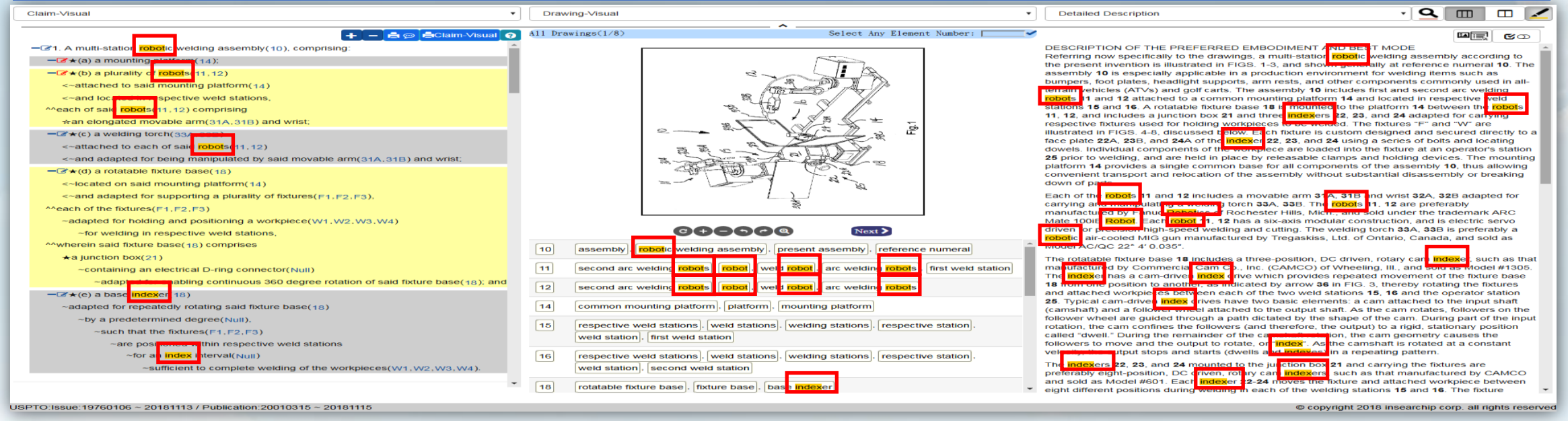
The rotatable fixture base **18** includes a three-position, DC driven, rotary cam indexer, such as that manufactured by Commercial Cam Co., Inc. (CAMCO) of Wheeling, Ill., and sold as Model #1305. The indexer has a cam-driven index drive which provides repeated movement of the fixture base **18** from one position to another, as indicated by arrow **36** in FIG. 3, thereby rotating the fixtures and attached workpieces between each of the two weld stations **15**, **16** and the operator station **25**. Typical cam-driven index drives have two basic elements: a cam attached to the input shaft (camshaft) and a follower wheel attached to the output shaft. As the cam rotates, followers on the follower wheel are guided through a path dictated by the shape of the cam. During part of the input rotation, the cam confines the followers (and therefore, the output) to a rigid, stationary position called "dwell." During the remainder of the camshaft rotation, the cam geometry causes the followers to move and the output to rotate, or "index". As the camshaft is rotated at a constant velocity, the output stops and starts (dwells and indexes) in a repeating pattern.

The indexers **22**, **23**, and **24** mounted to the junction box **21** and carrying the fixtures are preferably eight-position, DC driven, rotary cam indexers, such as that manufactured by CAMCO and sold as Model #601. Each indexer **22-24** moves the fixture and attached workpiece between eight different positions during welding in each of the welding stations **15** and **16**. The fixture

USPTO:Issue:19760106 ~ 20181113 / Publication:20010315 ~ 20181115

The Connection among Claim-Visual, Drawing-Visual and Detailed Description:

Click or Input Reference Numeral/ Keyword Based On… / Highlight Area	Claim-Visual (highlighted reference numeral/ keyword)	Drawing-Visual (highlighted reference numeral/ keyword)	Detailed Description (highlighted reference numeral/ keyword)
Claim-Visual (click reference numeral)	✓	✓	✓
Drawing-Visual (click reference numeral/keyword below)	✓		✓
Detailed Description (click icon " 🔍 " and type keyword)	✓	✓	✓



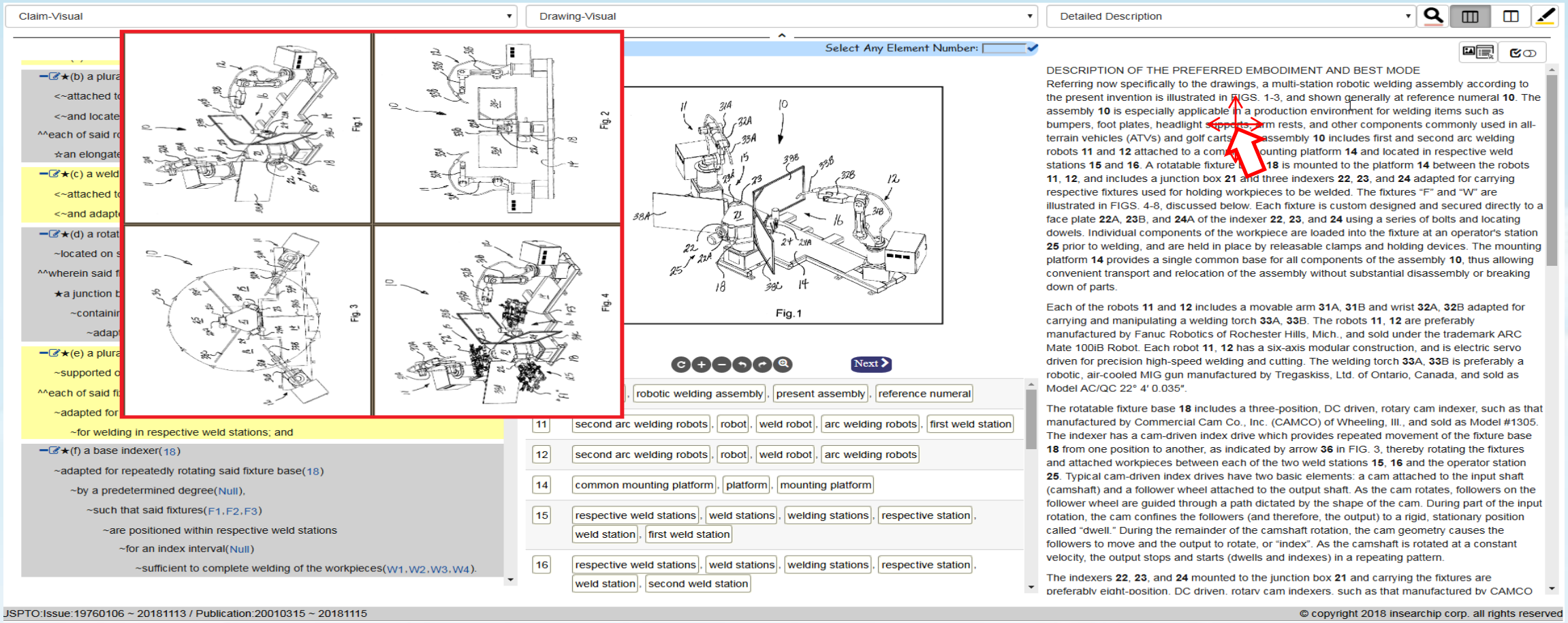
The Connection among Claim-Visual, Drawing-Visual and Detailed Description:

Click Area or Input Reference Numeral/ Keyword Based On… / Highlight	Claim-Visual (highlighted reference numeral/ keyword)	Drawing-Visual (highlighted reference numeral/ keyword)	Detailed Description (highlighted reference numeral/ keyword)
Claim-Visual	✓	✓	✓
Drawing-Visual	✓		✓
Detailed Description	✓	✓	✓

1. **Claim-Visual**: when you click a reference numeral in Claim-Visual window, the counterparts will be highlighted in **Drawing-visual** and **Detailed Description**.
2. **Drawing-visual**: when you click a reference numeral or a keyword below **Drawing**, the counterparts will be highlighted in **Claim-Visual** and **Detailed Description**. When you type reference numeral on search bar above the drawing, the all corresponding drawings will Type ether on three windows.
3. **Detailed Description:** when you click icon "🔍" and type keyword on it, the counterparts will be highlighted in **Claim-Visual**, **Drawing-Visual** and **Detailed Description**.

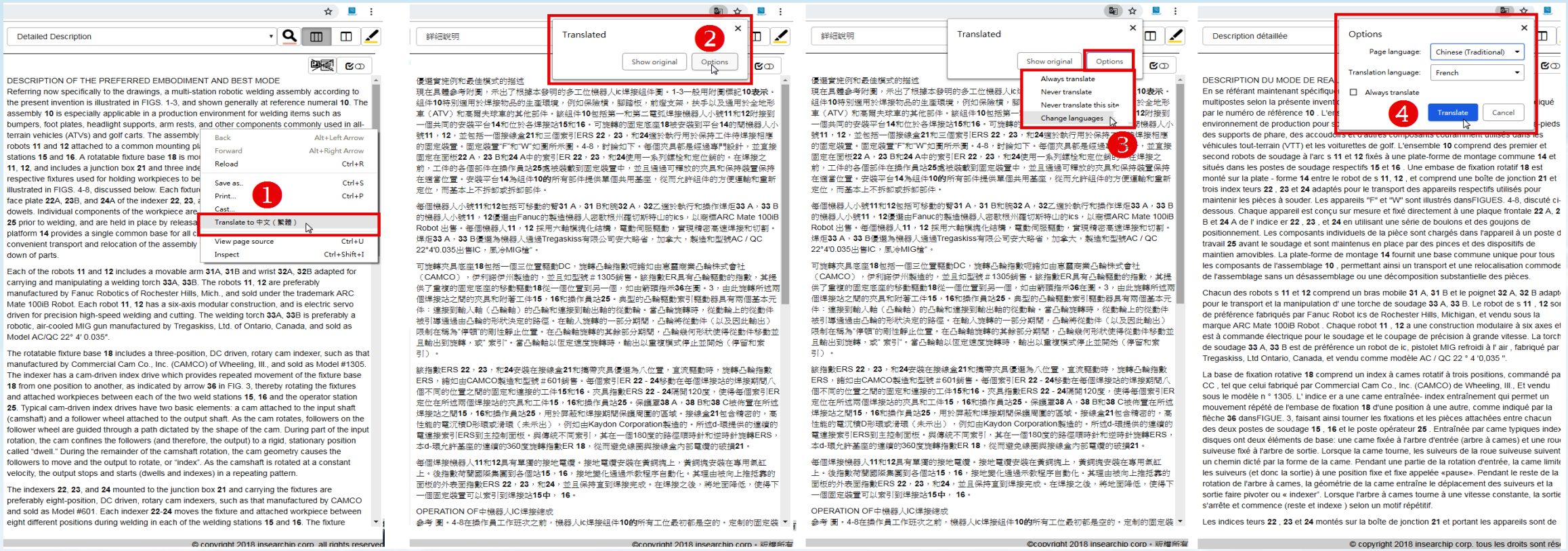
Paragraph Designating Function:

When a user moves the cursor to the designated paragraph, all corresponding drawings will be pop-up together.



Translation:

All contents in these 3 windows could be synchronously translated to any language by clicking right button of mouse and selecting the translating language.***(e.g. To translate language from English to Chinese, then Chinese to French showed as below)***



Details of Claim-Visual:

(1) Hierarchization (display all definitions hierarchically)
(2) Complement symbol (~)
(3) Element symbol (★, ☆, ○, ●)
(4) Matching symbol (<~)
(5) Wherein or micro wherein symbol (^^)
(6) Reference numerals (e.g. 31, 160, 200…)
(7) Color blocks (segment contents by colors)

Claim-Visual

Claim-Visual

1. A multi-station robotic welding assembly(10), comprising:
- ★(a) a mounting platform(14);
- ★(b) a plurality of robots(11,12)
  - <~attached to said mounting platform(14)
  - <~and located in respective weld stations,
  - ^^each of said robots(11,12) comprising
  - ☆an elongated movable arm(31A,31B) and wrist;
- ★(c) a welding torch(33A,33B)
  - <~attached to each of said robots(11,12)
  - <~and adapted for being manipulated by said movable arm(31A,31B) and wrist;
- ★(d) a rotatable fixture base(18)
  - <~located on said mounting platform(14)
  - <~and adapted for supporting a plurality of fixtures(F1,F2,F3),
  - ^^each of the fixtures(F1,F2,F3)
  - ~adapted for holding and positioning a workpiece(W1,W2,W3,W4)
  - ~for welding in respective weld stations,
  - ^^wherein said fixture base(18) comprises
  - ★a junction box(21)
  - ~containing an electrical D-ring connector(Null)
  - ~adapted for enabling continuous 360 degree rotation of said fixture base(18); and
- ★(e) a base indexer(18)
  - ~adapted for repeatedly rotating said fixture base(18)
  - ~by a predetermined degree(Null),
  - ~such that the fixtures(F1,F2,F3)
  - ~are positioned within respective weld stations
  - ~for an index interval(Null)
  - ~sufficient to complete welding of the workpieces(W1,W2,W3,W4).

Drawing-Visual

All Drawings(1/8) Select Any Element Number:

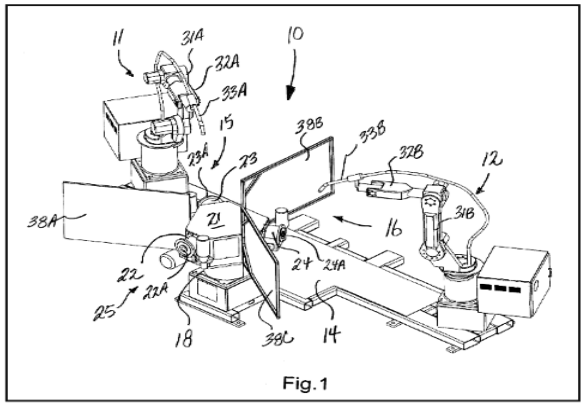


Fig.1

Next

12	second arc welding robots, robot, weld robot, arc welding robots
14	common mounting platform, platform, mounting platform
15	respective weld stations, weld stations, welding stations, respective station, weld station, first weld station
16	respective weld stations, weld stations, welding stations, respective station, weld station, second weld station
18	rotatable fixture base, fixture base, base indexer
21	junction box
22	indexers, indexer, respective indexers

Detailed Description

DESCRIPTION OF THE PREFERRED EMBODIMENT AND BEST MODE

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Each of the robots **11** and **12** includes a movable arm **31**A, **31**B and wrist **32**A, **32**B adapted for carrying and manipulating a welding torch **33**A, **33**B. The robots **11**, **12** are preferably manufactured by Fanuc Robotics of Rochester Hills, Mich., and sold under the trademark ARC Mate 100iB Robot. Each robot **11**, **12** has a six-axis modular construction, and is electric servo driven for precision high-speed welding and cutting. The welding torch **33**A, **33**B is preferably a robotic, air-cooled MIG gun manufactured by Tregaskiss, Ltd. of Ontario, Canada, and sold as Model AC/QC 22° 4′ 0.035″.

The rotatable fixture base **18** includes a three-position, DC driven, rotary cam indexer, such as that manufactured by Commercial Cam Co., Inc. (CAMCO) of Wheeling, Ill., and sold as Model #1305. The indexer has a cam-driven index drive which provides repeated movement of the fixture base **18** from one position to another, as indicated by arrow **36** in FIG. 3, thereby rotating the fixtures and attached workpieces between each of the two weld stations **15**, **16** and the operator station **25**. Typical cam-driven index drives have two basic elements: a cam attached to the input shaft (camshaft) and a follower wheel attached to the output shaft. As the cam rotates, followers on the follower wheel are guided through a path dictated by the shape of the cam. During part of the input rotation, the cam confines the followers (and therefore, the output) to a rigid, stationary position called "dwell." During the remainder of the camshaft rotation, the cam geometry causes the followers to move and the output to rotate, or "index". As the camshaft is rotated at a constant velocity, the output stops and starts (dwells and indexes) in a repeating pattern.

The indexers **22**, **23**, and **24** mounted to the junction box **21** and carrying the fixtures are preferably eight-position, DC driven, rotary cam indexers, such as that manufactured by CAMCO and sold as Model #601. Each indexer **22**-**24** moves the fixture and attached workpiece between eight different positions during welding in each of the welding stations **15** and **16**. The fixture

USPTO:Issue:19760106 ~ 20181113 / Publication:20010315 ~ 20181115

Claim-Visual:

(1) Hierarchization: all definitions are displayed hierarchically.

Claim-Visual | Drawing-Visual | Detailed Description

Claim-Visual

★(b) a plurality of robots(11,12)
<~attached to said mounting platform(14)
<~and located in respective weld stations,
^^each of said robots(11,12) comprising
☆an elongated movable arm(31A,31B) and wrist;

★(c) a welding torch(33A,33B)
<~attached to each of said robots(11,12)
<~and adapted for being manipulated by said movable arm(31A,31B) and wrist;

★(d) a rotatable fixture base(18)
<~located on said mounting platform(14)
<~and adapted for supporting a plurality of fixtures(F1,F2,F3),

^^each of the fixtures(F1,F2,F3)
~adapted for holding and positioning a workpiece(W1,W2,W3,W4)
~for welding in respective weld stations,
^^wherein said fixture base(18) comprises
★a junction box(21)
~containing an electrical D-ring connector(Null)
~adapted for enabling continuous 360 degree rotation of said fixture base(18); and

★(e) a base indexer(18)
~adapted for repeatedly rotating said fixture base(18)
~by a predetermined degree(Null),
~such that the fixtures(F1,F2,F3)
~are positioned within respective weld stations
~for an index interval(Null)
~sufficient to complete welding of the workpieces(W1,W2,W3,W4).

2. A multi-station robotic welding assembly(10)
~according to claim 1,

All Drawings(1/8) Select Any Element Number:

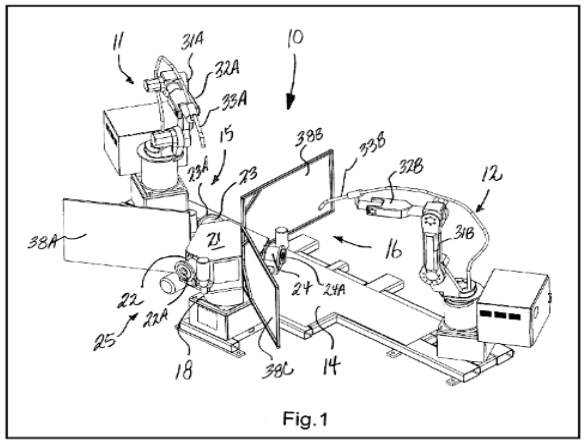

Fig.1

Next

10	assembly, robotic welding assembly, present assembly, reference numeral
11	second arc welding robots, robot, weld robot, arc welding robots, first weld station
12	second arc welding robots, robot, weld robot, arc welding robots
14	common mounting platform, platform, mounting platform
15	respective weld stations, weld stations, welding stations, respective station, weld station, first weld station
16	respective weld stations, weld stations, welding stations, respective station, weld station, second weld station
18	rotatable fixture base, fixture base, base indexer

Referring now specifically to the drawings, a multi-station robotic welding assembly according to the present invention is illustrated in FIGS. 1-3, and shown generally at reference numeral **10**. The assembly **10** is especially applicable in a production environment for welding items such as bumpers, foot plates, headlight supports, arm rests, and other components commonly used in all-terrain vehicles (ATVs) and golf carts. The assembly **10** includes first and second arc welding robots **11** and **12** attached to a common mounting platform **14** and located in respective weld stations **15** and **16**. A rotatable fixture base **18** is mounted to the platform **14** between the robots **11**, **12**, and includes a junction box **21** and three indexers **22**, **23**, and **24** adapted for carrying respective fixtures used for holding workpieces to be welded. The fixtures "F" and "W" are illustrated in FIGS. 4-8, discussed below. Each fixture is custom designed and secured directly to a face plate **22**A, **23**B, and **24**A of the indexer **22**, **23**, and **24** using a series of bolts and locating dowels. Individual components of the workpiece are loaded into the fixture at an operator's station **25** prior to welding, and are held in place by releasable clamps and holding devices. The mounting platform **14** provides a single common base for all components of the assembly **10**, thus allowing convenient transport and relocation of the assembly without substantial disassembly or breaking down of parts.

Each of the robots **11** and **12** includes a movable arm **31**A, **31**B and wrist **32**A, **32**B adapted for carrying and manipulating a welding torch **33**A, **33**B. The robots **11**, **12** are preferably manufactured by Fanuc Robotics of Rochester Hills, Mich., and sold under the trademark ARC Mate 100iB Robot. Each robot **11**, **12** has a six-axis modular construction, and is electric servo driven for precision high-speed welding and cutting. The welding torch **33**A, **33**B is preferably a robotic, air-cooled MIG gun manufactured by Tregaskiss, Ltd. of Ontario, Canada, and sold as Model AC/QC 22° 4' 0.035".

The rotatable fixture base **18** includes a three-position, DC driven, rotary cam indexer, such as that manufactured by Commercial Cam Co., Inc. (CAMCO) of Wheeling, Ill., and sold as Model #1305. The indexer has a cam-driven index drive which provides repeated movement of the fixture base **18** from one position to another, as indicated by arrow **36** in FIG. 3, thereby rotating the fixtures and attached workpieces between each of the two weld stations **15**, **16** and the operator station **25**. Typical cam-driven index drives have two basic elements: a cam attached to the input shaft (camshaft) and a follower wheel attached to the output shaft. As the cam rotates, followers on the follower wheel are guided through a path dictated by the shape of the cam. During part of the input rotation, the cam confines the followers (and therefore, the output) to a rigid, stationary position called "dwell." During the remainder of the camshaft rotation, the cam geometry causes the followers to move and the output to rotate, or "index". As the camshaft is rotated at a constant velocity, the output stops and starts (dwells and indexes) in a repeating pattern.

The indexers **22**, **23**, and **24** mounted to the junction box **21** and carrying the fixtures are preferably eight-position, DC driven, rotary cam indexers, such as that manufactured by CAMCO and sold as Model #601. Each indexer **22**-**24** moves the fixture and attached workpiece between eight different positions during welding in each of the welding stations **15** and **16**. The fixture indexers **22**-**24** are spaced 120 degrees apart, such that each indexer locates a fixture and

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Claim-Visual:

(2) Complement symbol (~)

Claim-Visual | Drawing-Visual | Detailed Description

Claim-Visual

- ★(b) a plurality of robots(11,12)
  - <~attached to said mounting platform(14)
  - <~and located in respective weld stations,
- ^^each of said robots(11,12) comprising
  - ☆an elongated movable arm(31A,31B) and wrist;
- ★(c) a welding torch(33A,33B)
  - <~attached to each of said robots(11,12)
  - <~and adapted for being manipulated by said movable arm(31A,31B) and wrist;
- ★(d) a rotatable fixture base(18)
  - <~located on said mounting platform(14)
  - <~and adapted for supporting a plurality of fixtures(F1,F2,F3),
- ^^each of the fixtures(F1,F2,F3)
  - ~adapted for holding and positioning a workpiece(W1,W2,W3,W4)
    - ~for welding in respective weld stations,
- ^^wherein said fixture base(18) comprises
  - ★a junction box(21)
    - ~containing an electrical D-ring connector(Null)
      - ~adapted for enabling continuous 360 degree rotation of said fixture base(18); and
- ★(e) a base indexer(18)
  - ~adapted for repeatedly rotating said fixture base(18)
    - ~by a predetermined degree(Null),
      - ~such that the fixtures(F1,F2,F3)
        - ~are positioned within respective weld stations
          - ~for an index interval(Null)
            - ~sufficient to complete welding of the workpieces(W1,W2,W3,W4).

2. A multi-station robotic welding assembly(10)
   - ~according to claim 1,

All Drawings(1/8) | Select Any Element Number:

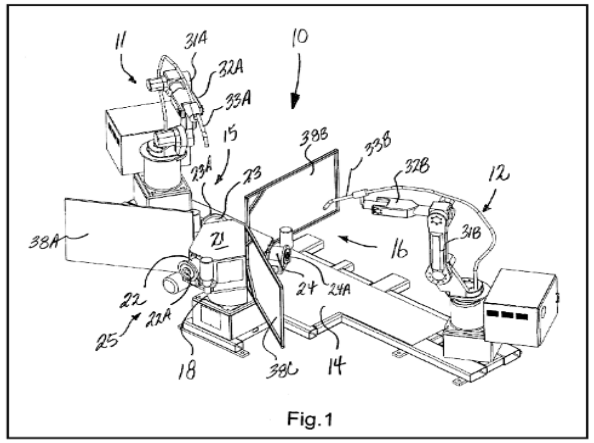

Fig.1

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15	respective weld stations, weld stations, welding stations, respective station, weld station, first weld station
16	respective weld stations, weld stations, welding stations, respective station, weld station, second weld station
18	rotatable fixture base, fixture base, base indexer

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Each of the robots **11** and **12** includes a movable arm **31**A, **31**B and wrist **32**A, **32**B adapted for carrying and manipulating a welding torch **33**A, **33**B. The robots **11**, **12** are preferably manufactured by Fanuc Robotics of Rochester Hills, Mich., and sold under the trademark ARC Mate 100iB Robot. Each robot **11**, **12** has a six-axis modular construction, and is electric servo driven for precision high-speed welding and cutting. The welding torch **33**A, **33**B is preferably a robotic, air-cooled MIG gun manufactured by Tregaskiss, Ltd. of Ontario, Canada, and sold as Model AC/QC 22° 4' 0.035".

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The indexers **22**, **23**, and **24** mounted to the junction box **21** and carrying the fixtures are preferably eight-position, DC driven, rotary cam indexers, such as that manufactured by CAMCO and sold as Model #601. Each indexer **22**-**24** moves the fixture and attached workpiece between eight different positions during welding in each of the welding stations **15** and **16**. The fixture indexers **22**-**24** are spaced 120 degrees apart, such that each indexer locates a fixture and

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Claim-Visual:

(3) Element symbols: the symbols for identifying primary elements and secondary elements, etc.（eg. ★, ☆, ○, ●）

Claim-Visual

Drawing-Visual

Detailed Description

Claim-Visual

(b) a plurality of robots(11,12)
<~attached to said mounting platform(14)
<~and located in respective weld stations,
^^each of said robots(11,12) comprising
an elongated movable arm(31A,31B) and wrist;
(c) a welding torch(33A,33B)
<~attached to each of said robots(11,12)
<~and adapted for being manipulated by said movable arm(31A,31B) and wrist;
(d) a rotatable fixture base(18)
<~located on said mounting platform(14)
<~and adapted for supporting a plurality of fixtures(F1,F2,F3),
^^each of the fixtures(F1,F2,F3)
~adapted for holding and positioning a workpiece(W1,W2,W3,W4)
~for welding in respective weld stations,
^^wherein said fixture base(18) comprises
a junction box(21)
~containing an electrical D-ring connector(Null)
~adapted for enabling continuous 360 degree rotation of said fixture base(18); and
(e) a base indexer(18)
~adapted for repeatedly rotating said fixture base(18)
~by a predetermined degree(Null),
~such that the fixtures(F1,F2,F3)
~are positioned within respective weld stations
~for an index interval(Null)
~sufficient to complete welding of the workpieces(W1,W2,W3,W4).

2. A multi-station robotic welding assembly(10)
~according to claim 1,

All Drawings(1/8) Select Any Element Number:

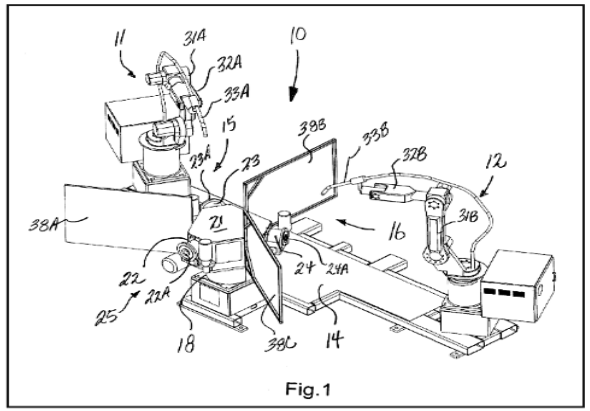


Fig.1

Next

10	assembly, robotic welding assembly, present assembly, reference numeral
11	second arc welding robots, robot, weld robot, arc welding robots, first weld station
12	second arc welding robots, robot, weld robot, arc welding robots
14	common mounting platform, platform, mounting platform
15	respective weld stations, weld stations, welding stations, respective station, weld station, first weld station
16	respective weld stations, weld stations, welding stations, respective station, weld station, second weld station
18	rotatable fixture base, fixture base, base indexer

Referring now specifically to the drawings, a multi-station robotic welding assembly according to the present invention is illustrated in FIGS. 1-3, and shown generally at reference numeral **10**. The assembly **10** is especially applicable in a production environment for welding items such as bumpers, foot plates, headlight supports, arm rests, and other components commonly used in all-terrain vehicles (ATVs) and golf carts. The assembly **10** includes first and second arc welding robots **11** and **12** attached to a common mounting platform **14** and located in respective weld stations **15** and **16**. A rotatable fixture base **18** is mounted to the platform **14** between the robots **11**, **12**, and includes a junction box **21** and three indexers **22**, **23**, and **24** adapted for carrying respective fixtures used for holding workpieces to be welded. The fixtures "F" and "W" are illustrated in FIGS. 4-8, discussed below. Each fixture is custom designed and secured directly to a face plate **22**A, **23**B, and **24**A of the indexer **22**, **23**, and **24** using a series of bolts and locating dowels. Individual components of the workpiece are loaded into the fixture at an operator's station **25** prior to welding, and are held in place by releasable clamps and holding devices. The mounting platform **14** provides a single common base for all components of the assembly **10**, thus allowing convenient transport and relocation of the assembly without substantial disassembly or breaking down of parts.

Each of the robots **11** and **12** includes a movable arm **31**A, **31**B and wrist **32**A, **32**B adapted for carrying and manipulating a welding torch **33**A, **33**B. The robots **11**, **12** are preferably manufactured by Fanuc Robotics of Rochester Hills, Mich., and sold under the trademark ARC Mate 100iB Robot. Each robot **11**, **12** has a six-axis modular construction, and is electric servo driven for precision high-speed welding and cutting. The welding torch **33**A, **33**B is preferably a robotic, air-cooled MIG gun manufactured by Tregaskiss, Ltd. of Ontario, Canada, and sold as Model AC/QC 22° 4' 0.035".

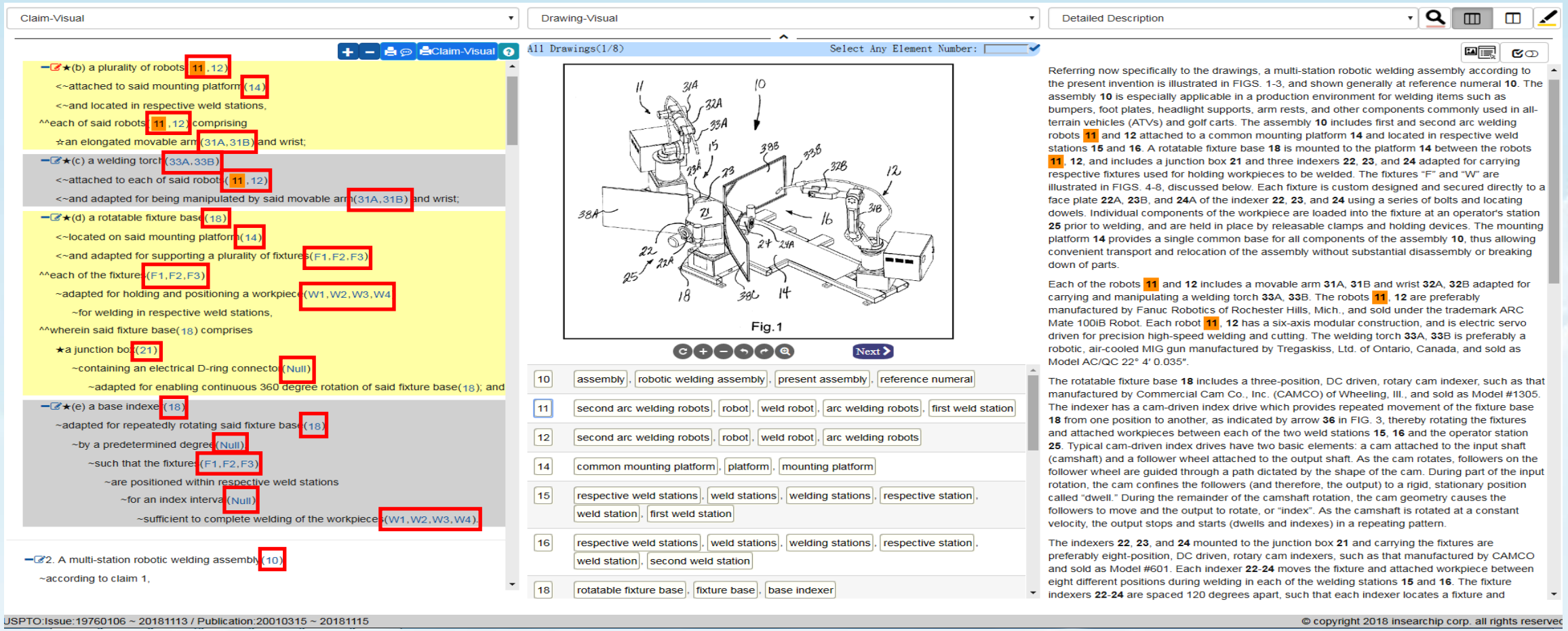
The rotatable fixture base **18** includes a three-position, DC driven, rotary cam indexer, such as that manufactured by Commercial Cam Co., Inc. (CAMCO) of Wheeling, Ill., and sold as Model #1305. The indexer has a cam-driven index drive which provides repeated movement of the fixture base **18** from one position to another, as indicated by arrow **36** in FIG. 3, thereby rotating the fixtures and attached workpieces between each of the two weld stations **15**, **16** and the operator station **25**. Typical cam-driven index drives have two basic elements: a cam attached to the input shaft (camshaft) and a follower wheel attached to the output shaft. As the cam rotates, followers on the follower wheel are guided through a path dictated by the shape of the cam. During part of the input rotation, the cam confines the followers (and therefore, the output) to a rigid, stationary position called "dwell." During the remainder of the camshaft rotation, the cam geometry causes the followers to move and the output to rotate, or "index". As the camshaft is rotated at a constant velocity, the output stops and starts (dwells and indexes) in a repeating pattern.

The indexers **22**, **23**, and **24** mounted to the junction box **21** and carrying the fixtures are preferably eight-position, DC driven, rotary cam indexers, such as that manufactured by CAMCO and sold as Model #601. Each indexer **22-24** moves the fixture and attached workpiece between eight different positions during welding in each of the welding stations **15** and **16**. The fixture indexers **22-24** are spaced 120 degrees apart, such that each indexer locates a fixture and

USPTO:Issue:19760106 ~ 20181113 / Publication:20010315 ~ 20181115

Claim-Visual:

(4)We derive all reference numerals from the specification and display the reference numerals behind the element nouns in the formatted claim.



Claim-Visual:

(5)Matching symbol（<~）

Claim-Visual | Drawing-Visual | Detailed Description

Claim-Visual

★(b) a plurality of robots(11,12)
<~attached to said mounting platform(14)
<~and located in respective weld stations,
^^each of said robots(11,12) comprising
☆an elongated movable arm(31A,31B) and wrist;

★(c) a welding torch(33A,33B)
<~attached to each of said robots(11,12)
<~and adapted for being manipulated by said movable arm(31A,31B) and wrist;

★(d) a rotatable fixture base(18)
<~located on said mounting platform(14)
<~and adapted for supporting a plurality of fixtures(F1,F2,F3),
^^each of the fixtures(F1,F2,F3)
~adapted for holding and positioning a workpiece(W1,W2,W3,W4)
~for welding in respective weld stations,
^^wherein said fixture base(18) comprises
★a junction box(21)
~containing an electrical D-ring connector(Null)
~adapted for enabling continuous 360 degree rotation of said fixture base(18); and

★(e) a base indexer(18)
~adapted for repeatedly rotating said fixture base(18)
~by a predetermined degree(Null),
~such that the fixtures(F1,F2,F3)
~are positioned within respective weld stations
~for an index interval(Null)
~sufficient to complete welding of the workpieces(W1,W2,W3,W4).

2. A multi-station robotic welding assembly(10)
~according to claim 1,

All Drawings(1/8) Select Any Element Number:

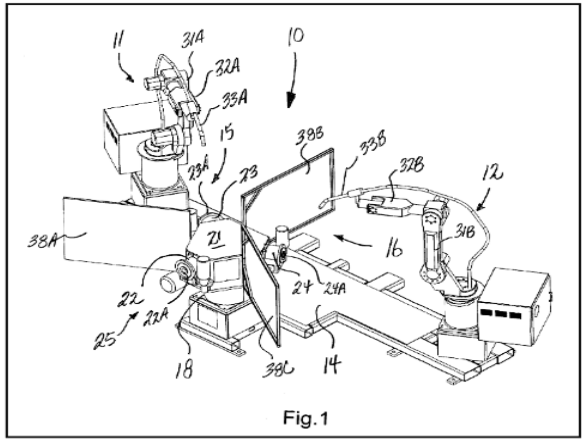


Fig.1

Next

10	assembly, robotic welding assembly, present assembly, reference numeral
11	second arc welding robots, robot, weld robot, arc welding robots, first weld station
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14	common mounting platform, platform, mounting platform
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Referring now specifically to the drawings, a multi-station robotic welding assembly according to the present invention is illustrated in FIGS. 1-3, and shown generally at reference numeral **10**. The assembly **10** is especially applicable in a production environment for welding items such as bumpers, foot plates, headlight supports, arm rests, and other components commonly used in all-terrain vehicles (ATVs) and golf carts. The assembly **10** includes first and second arc welding robots **11** and **12** attached to a common mounting platform **14** and located in respective weld stations **15** and **16**. A rotatable fixture base **18** is mounted to the platform **14** between the robots **11**, **12**, and includes a junction box **21** and three indexers **22**, **23**, and **24** adapted for carrying respective fixtures used for holding workpieces to be welded. The fixtures "F" and "W" are illustrated in FIGS. 4-8, discussed below. Each fixture is custom designed and secured directly to a face plate **22**A, **23**B, and **24**A of the indexer **22**, **23**, and **24** using a series of bolts and locating dowels. Individual components of the workpiece are loaded into the fixture at an operator's station **25** prior to welding, and are held in place by releasable clamps and holding devices. The mounting platform **14** provides a single common base for all components of the assembly **10**, thus allowing convenient transport and relocation of the assembly without substantial disassembly or breaking down of parts.

Each of the robots **11** and **12** includes a movable arm **31**A, **31**B and wrist **32**A, **32**B adapted for carrying and manipulating a welding torch **33**A, **33**B. The robots **11**, **12** are preferably manufactured by Fanuc Robotics of Rochester Hills, Mich., and sold under the trademark ARC Mate 100iB Robot. Each robot **11**, **12** has a six-axis modular construction, and is electric servo driven for precision high-speed welding and cutting. The welding torch **33**A, **33**B is preferably a robotic, air-cooled MIG gun manufactured by Tregaskiss, Ltd. of Ontario, Canada, and sold as Model AC/QC 22° 4′ 0.035".

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Claim-Visual :

(6) Color Blocks:

Claim-Visual | Drawing-Visual | Detailed Description

Claim-Visual

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<~attached to each of said robots(11,12)
<~and adapted for being manipulated by said movable arm(31A,31B) and wrist;

★(d) a rotatable fixture base(18)
<~located on said mounting platform(14)
<~and adapted for supporting a plurality of fixtures(F1,F2,F3),
^^each of the fixtures(F1,F2,F3)
~adapted for holding and positioning a workpiece(W1,W2,W3,W4)
~for welding in respective weld stations,
^^wherein said fixture base(18) comprises
★a junction box(21)
~containing an electrical D-ring connector(Null)
~adapted for enabling continuous 360 degree rotation of said fixture base(18); and

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~adapted for repeatedly rotating said fixture base(18)
~by a predetermined degree(Null),
~such that the fixtures(F1,F2,F3)
~are positioned within respective weld stations
~for an index interval(Null)
~sufficient to complete welding of the workpieces(W1,W2,W3,W4).

2. A multi-station robotic welding assembly(10)
~according to claim 1,

All Drawings(1/8) Select Any Element Number:

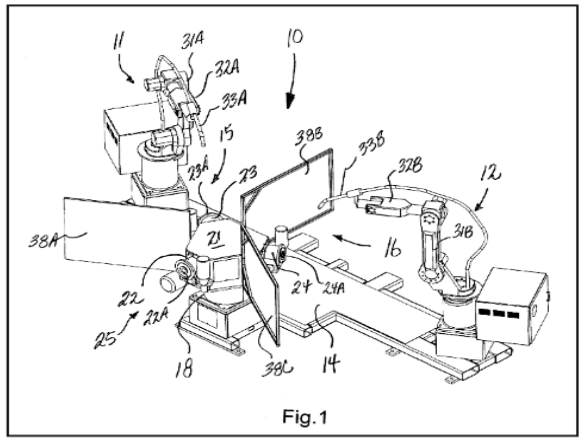

Fig.1

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16	respective weld stations, weld stations, welding stations, respective station, weld station, second weld station
18	rotatable fixture base, fixture base, base indexer

Referring now specifically to the drawings, a multi-station robotic welding assembly according to the present invention is illustrated in FIGS. 1-3, and shown generally at reference numeral **10**. The assembly **10** is especially applicable in a production environment for welding items such as bumpers, foot plates, headlight supports, arm rests, and other components commonly used in all-terrain vehicles (ATVs) and golf carts. The assembly **10** includes first and second arc welding robots **11** and **12** attached to a common mounting platform **14** and located in respective weld stations **15** and **16**. A rotatable fixture base **18** is mounted to the platform **14** between the robots **11**, **12**, and includes a junction box **21** and three indexers **22**, **23**, and **24** adapted for carrying respective fixtures used for holding workpieces to be welded. The fixtures "F" and "W" are illustrated in FIGS. 4-8, discussed below. Each fixture is custom designed and secured directly to a face plate **22**A, **23**B, and **24**A of the indexer **22**, **23**, and **24** using a series of bolts and locating dowels. Individual components of the workpiece are loaded into the fixture at an operator's station **25** prior to welding, and are held in place by releasable clamps and holding devices. The mounting platform **14** provides a single common base for all components of the assembly **10**, thus allowing convenient transport and relocation of the assembly without substantial disassembly or breaking down of parts.

Each of the robots **11** and **12** includes a movable arm **31**A, **31**B and wrist **32**A, **32**B adapted for carrying and manipulating a welding torch **33**A, **33**B. The robots **11**, **12** are preferably manufactured by Fanuc Robotics of Rochester Hills, Mich., and sold under the trademark ARC Mate 100iB Robot. Each robot **11**, **12** has a six-axis modular construction, and is electric servo driven for precision high-speed welding and cutting. The welding torch **33**A, **33**B is preferably a robotic, air-cooled MIG gun manufactured by Tregaskiss, Ltd. of Ontario, Canada, and sold as Model AC/QC 22° 4′ 0.035".

The rotatable fixture base **18** includes a three-position, DC driven, rotary cam indexer, such as that manufactured by Commercial Cam Co., Inc. (CAMCO) of Wheeling, Ill., and sold as Model #1305. The indexer has a cam-driven index drive which provides repeated movement of the fixture base **18** from one position to another, as indicated by arrow **36** in FIG. 3, thereby rotating the fixtures and attached workpieces between each of the two weld stations **15**, **16** and the operator station **25**. Typical cam-driven index drives have two basic elements: a cam attached to the input shaft (camshaft) and a follower wheel attached to the output shaft. As the cam rotates, followers on the follower wheel are guided through a path dictated by the shape of the cam. During part of the input rotation, the cam confines the followers (and therefore, the output) to a rigid, stationary position called "dwell." During the remainder of the camshaft rotation, the cam geometry causes the followers to move and the output to rotate, or "index". As the camshaft is rotated at a constant velocity, the output stops and starts (dwells and indexes) in a repeating pattern.

The indexers **22**, **23**, and **24** mounted to the junction box **21** and carrying the fixtures are preferably eight-position, DC driven, rotary cam indexers, such as that manufactured by CAMCO and sold as Model #601. Each indexer **22**-**24** moves the fixture and attached workpiece between eight different positions during welding in each of the welding stations **15** and **16**. The fixture indexers **22**-**24** are spaced 120 degrees apart, such that each indexer locates a fixture and

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Claim-Visual:

(7) Wherein or micro wherein symbol (^^)

Claim-Visual | Drawing-Visual | Detailed Description

Claim-Visual

★(b) a plurality of robots(11,12)
<~attached to said mounting platform(14)
<~and located in respective weld stations,
^^each of said robots(11,12) comprising
☆an elongated movable arm(31A,31B) and wrist;

★(c) a welding torch(33A,33B)
<~attached to each of said robots(11,12)
<~and adapted for being manipulated by said movable arm(31A,31B) and wrist;

★(d) a rotatable fixture base(18)
<~located on said mounting platform(14)
<~and adapted for supporting a plurality of fixtures(F1,F2,F3),
^^each of the fixtures(F1,F2,F3)
~adapted for holding and positioning a workpiece(W1,W2,W3,W4)
~for welding in respective weld stations,
^^wherein said fixture base(18) comprises
★a junction box(21)
~containing an electrical D-ring connector(Null)
~adapted for enabling continuous 360 degree rotation of said fixture base(18); and

★(e) a base indexer(18)
~adapted for repeatedly rotating said fixture base(18)
~by a predetermined degree(Null),
~such that the fixtures(F1,F2,F3)
~are positioned within respective weld stations
~for an index interval(Null)
~sufficient to complete welding of the workpieces(W1,W2,W3,W4).

2. A multi-station robotic welding assembly(10)
~according to claim 1,

All Drawings(1/8) | Select Any Element Number:

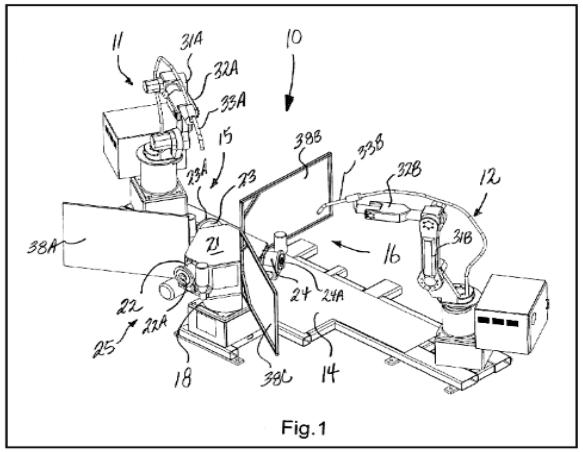

Fig.1

Next

10	assembly, robotic welding assembly, present assembly, reference numeral
11	second arc welding robots, robot, weld robot, arc welding robots, first weld station
12	second arc welding robots, robot, weld robot, arc welding robots
14	common mounting platform, platform, mounting platform
15	respective weld stations, weld stations, welding stations, respective station, weld station, first weld station
16	respective weld stations, weld stations, welding stations, respective station, weld station, second weld station
18	rotatable fixture base, fixture base, base indexer

Referring now specifically to the drawings, a multi-station robotic welding assembly according to the present invention is illustrated in FIGS. 1-3, and shown generally at reference numeral **10**. The assembly **10** is especially applicable in a production environment for welding items such as bumpers, foot plates, headlight supports, arm rests, and other components commonly used in all-terrain vehicles (ATVs) and golf carts. The assembly **10** includes first and second arc welding robots **11** and **12** attached to a common mounting platform **14** and located in respective weld stations **15** and **16**. A rotatable fixture base **18** is mounted to the platform **14** between the robots **11**, **12**, and includes a junction box **21** and three indexers **22**, **23**, and **24** adapted for carrying respective fixtures used for holding workpieces to be welded. The fixtures "F" and "W" are illustrated in FIGS. 4-8, discussed below. Each fixture is custom designed and secured directly to a face plate **22**A, **23**B, and **24**A of the indexer **22**, **23**, and **24** using a series of bolts and locating dowels. Individual components of the workpiece are loaded into the fixture at an operator's station **25** prior to welding, and are held in place by releasable clamps and holding devices. The mounting platform **14** provides a single common base for all components of the assembly **10**, thus allowing convenient transport and relocation of the assembly without substantial disassembly or breaking down of parts.

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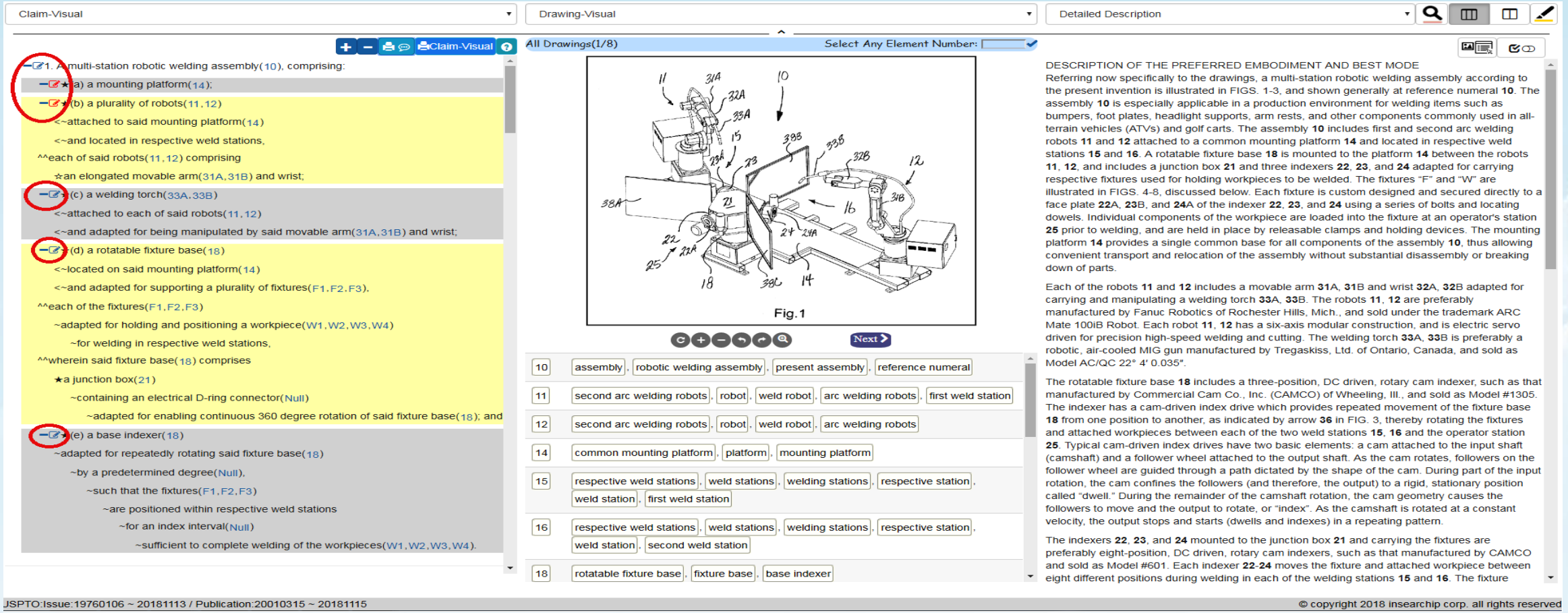
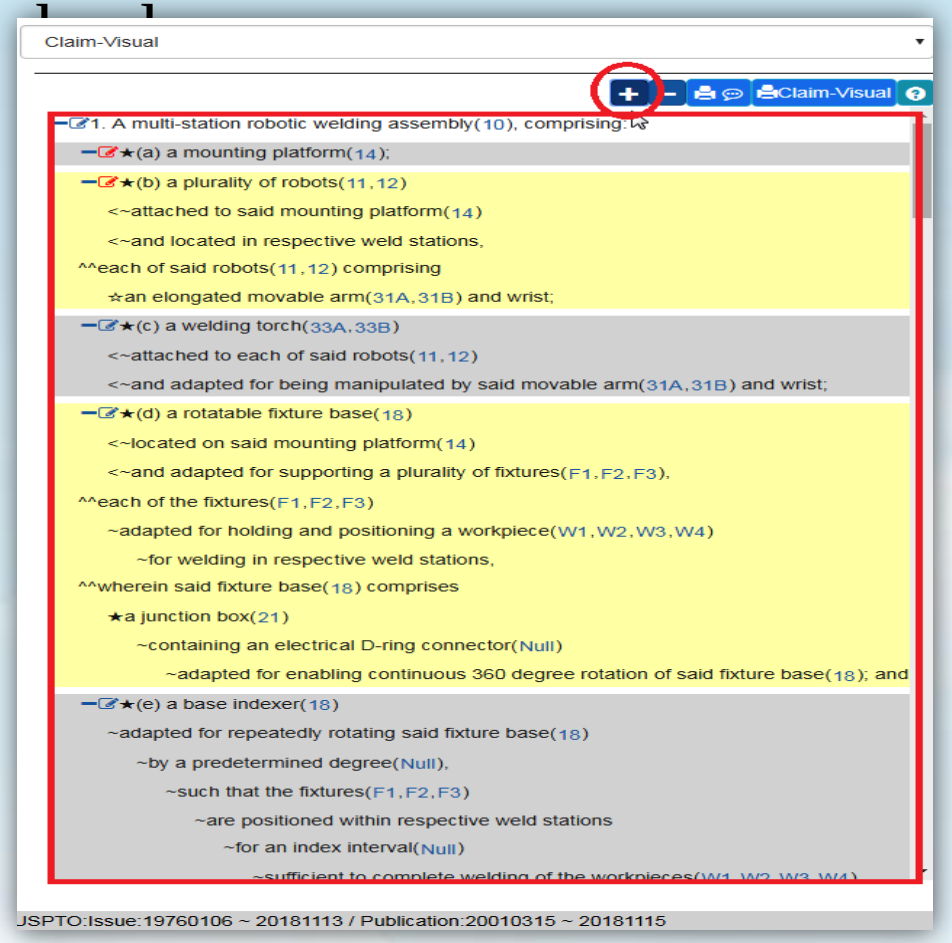
Claim-Visual:

(8) Claim Note Taking: users can take notes by clicking the icon“ ” in the Claim-Visual window. The icon will be in red after the note is saved.



Claim-Visual:

(9) Fold/Unfold Claims: you can click the "-" icon in Claim-Visual window to fold the format, and click "+" icon to expend the original format



fold the contents