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Crisp

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(54) METHOD FOR EFFICIENT AND LOCALIZED PRODUCTION OF SHOES

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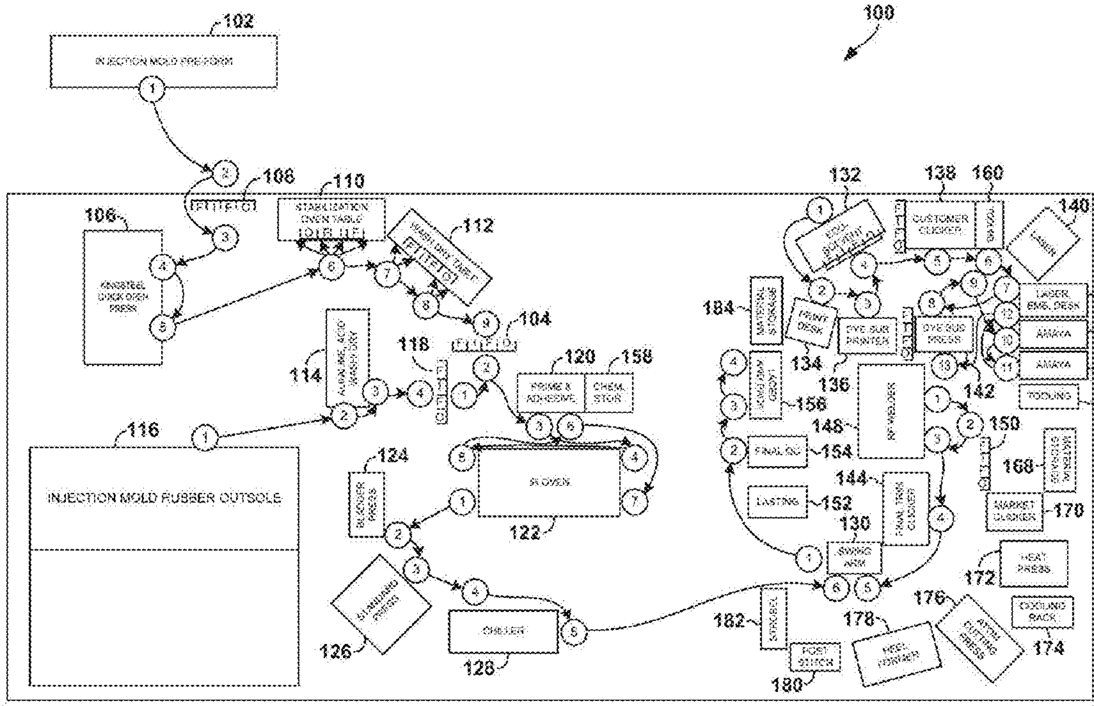
(52) U.S. Cl. .... **12/18.1**; 36/136; 12/142 R

(57) ABSTRACT

Methods and systems relating to efficient shoe manufacturing that reduce the specialized human labor required to manufacture a pair of shoes while avoiding the high costs and special maintenance requirements often associated with highly automated manufacturing equipment are provided. Systems and methods in accordance with the present invention may be used to produce multiple models of custom shoes at a single shoe manufacturing facility using overlapping workflows, thereby reducing the physical footprint of the manufacturing facility. Additionally, embodiments of the invention may provide methods and systems for efficiently producing shoes to meet the demands of a particular geographic location, thereby eliminating the need to import shoes produced in other locations.



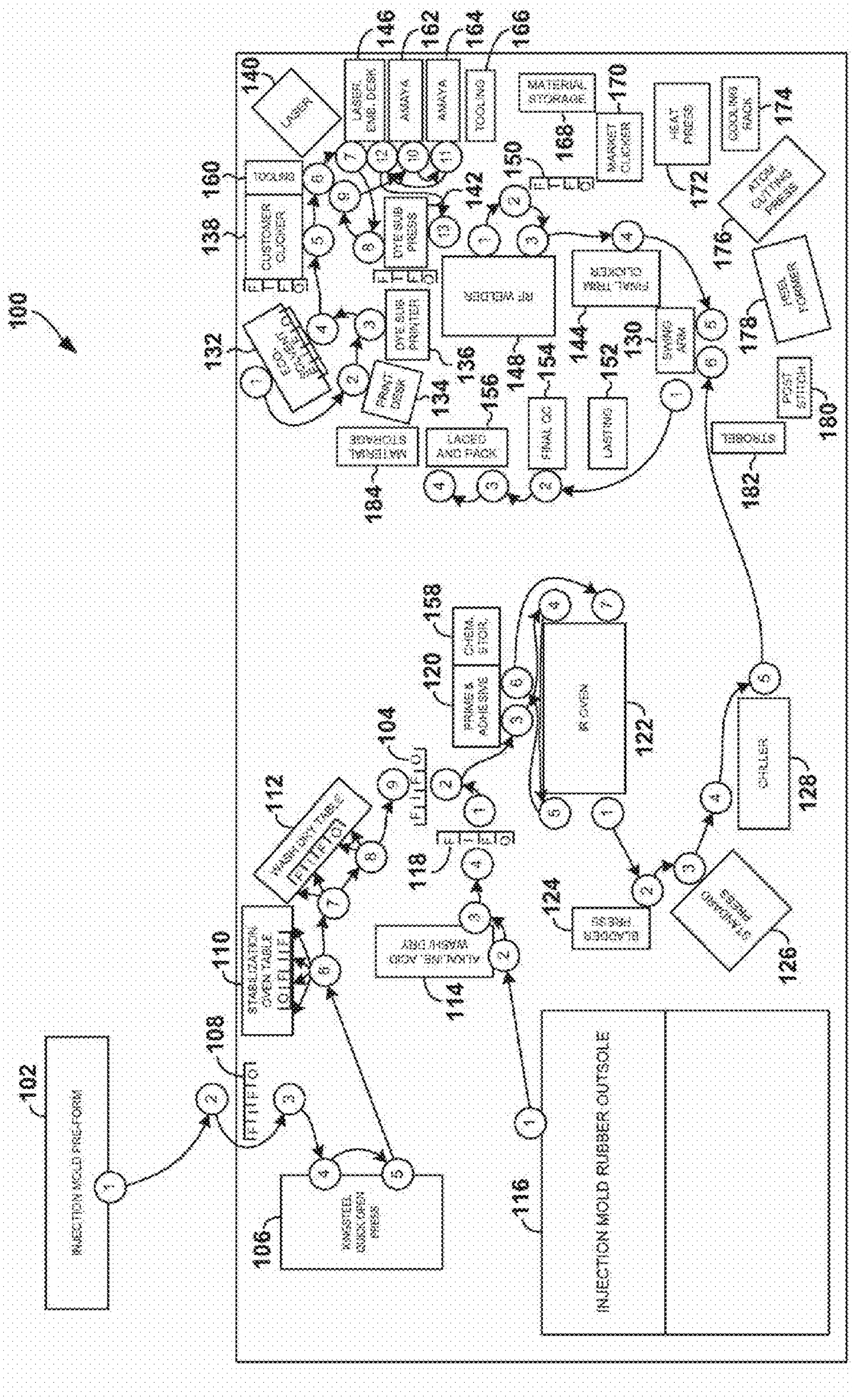

100
INJECTION MOLD PRE-FORM
KINGSTEEL QUICK OPEN PRESS
STABILIZATION OVEN TABLE
WASH DRY TABLE
ALKALINE, ACID WASH/ DRY
INJECTION MOLD RUBBER OUTSOLE
PRIME & ADHESIVE
CHEM. STOR.
IR OVEN
BLADDER PRESS
STANDARD PRESS
CHILLER
RF WELDER
FINAL TRIM CLICKER
SWING ARM
LASTING
FINAL QC
LACED AND PACK
MATERIAL STORAGE
PRINT DESK
DYE SUB PRINTER
DYE SUB PRESS
CUSTOMER CLICKER
TOOLING
LASER
LASER, EMB. DESK
AMAYA
AMAYA
TOOLING
MATERIAL STORAGE
MARKET CLICKER
HEAT PRESS
COOLING RACK
ATOM CUTTING PRESS
HEEL FORMER
POST STITCH
STROBEL

FIG. 1.

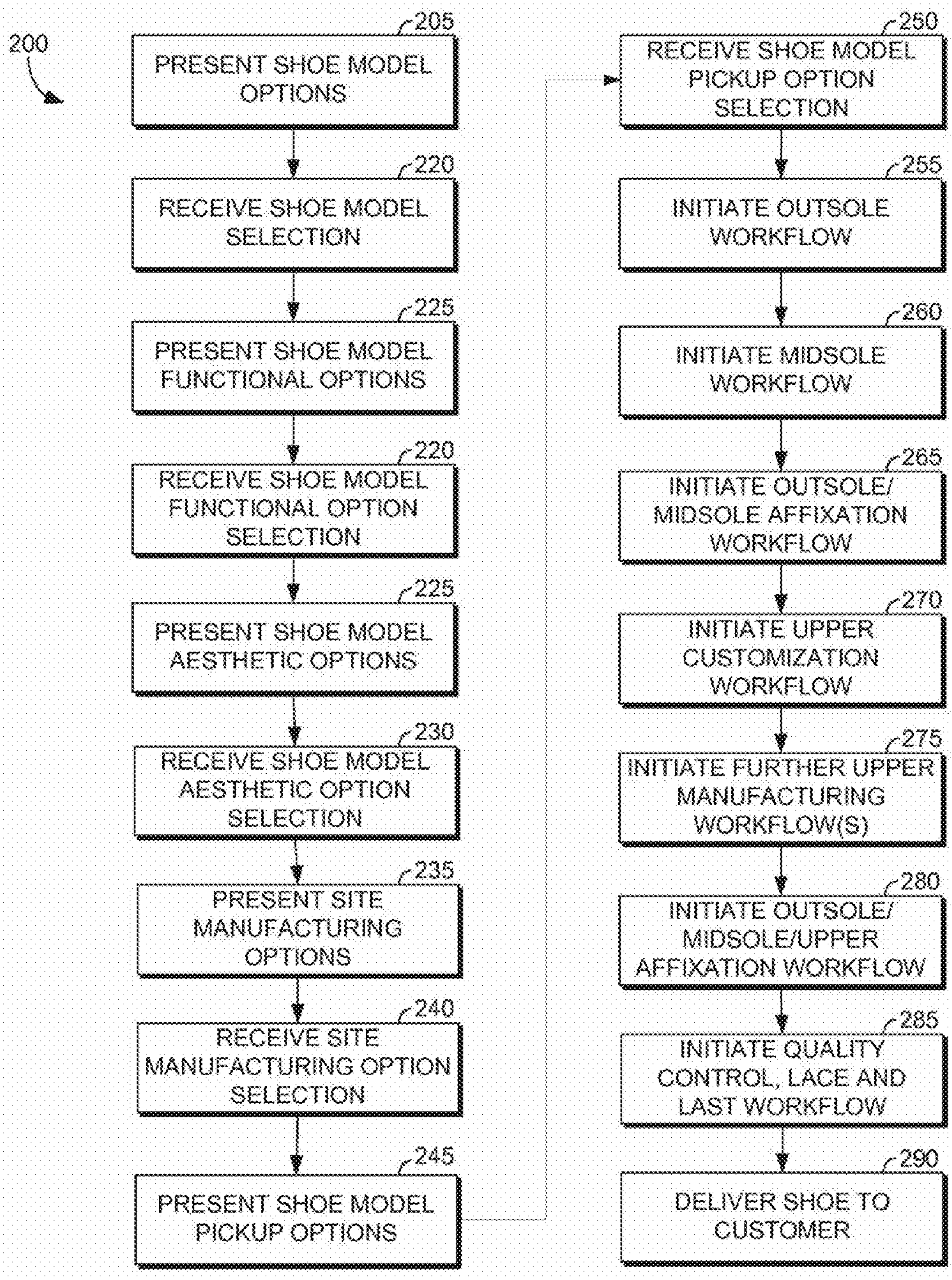

200
205
PRESENT SHOE MODEL OPTIONS
220
RECEIVE SHOE MODEL SELECTION
225
PRESENT SHOE MODEL FUNCTIONAL OPTIONS
220
RECEIVE SHOE MODEL FUNCTIONAL OPTION SELECTION
225
PRESENT SHOE MODEL AESTHETIC OPTIONS
230
RECEIVE SHOE MODEL AESTHETIC OPTION SELECTION
235
PRESENT SITE MANUFACTURING OPTIONS
240
RECEIVE SITE MANUFACTURING OPTION SELECTION
245
PRESENT SHOE MODEL PICKUP OPTIONS
250
RECEIVE SHOE MODEL PICKUP OPTION SELECTION
255
INITIATE OUTSOLE WORKFLOW
260
INITIATE MIDSOLE WORKFLOW
265
INITIATE OUTSOLE/ MIDSOLE AFFIXATION WORKFLOW
270
INITIATE UPPER CUSTOMIZATION WORKFLOW
275
INITIATE FURTHER UPPER MANUFACTURING WORKFLOW(S)
280
INITIATE OUTSOLE/ MIDSOLE/UPPER AFFIXATION WORKFLOW
285
INITIATE QUALITY CONTROL, LACE AND LAST WORKFLOW
290
DELIVER SHOE TO CUSTOMER

FIG. 2.

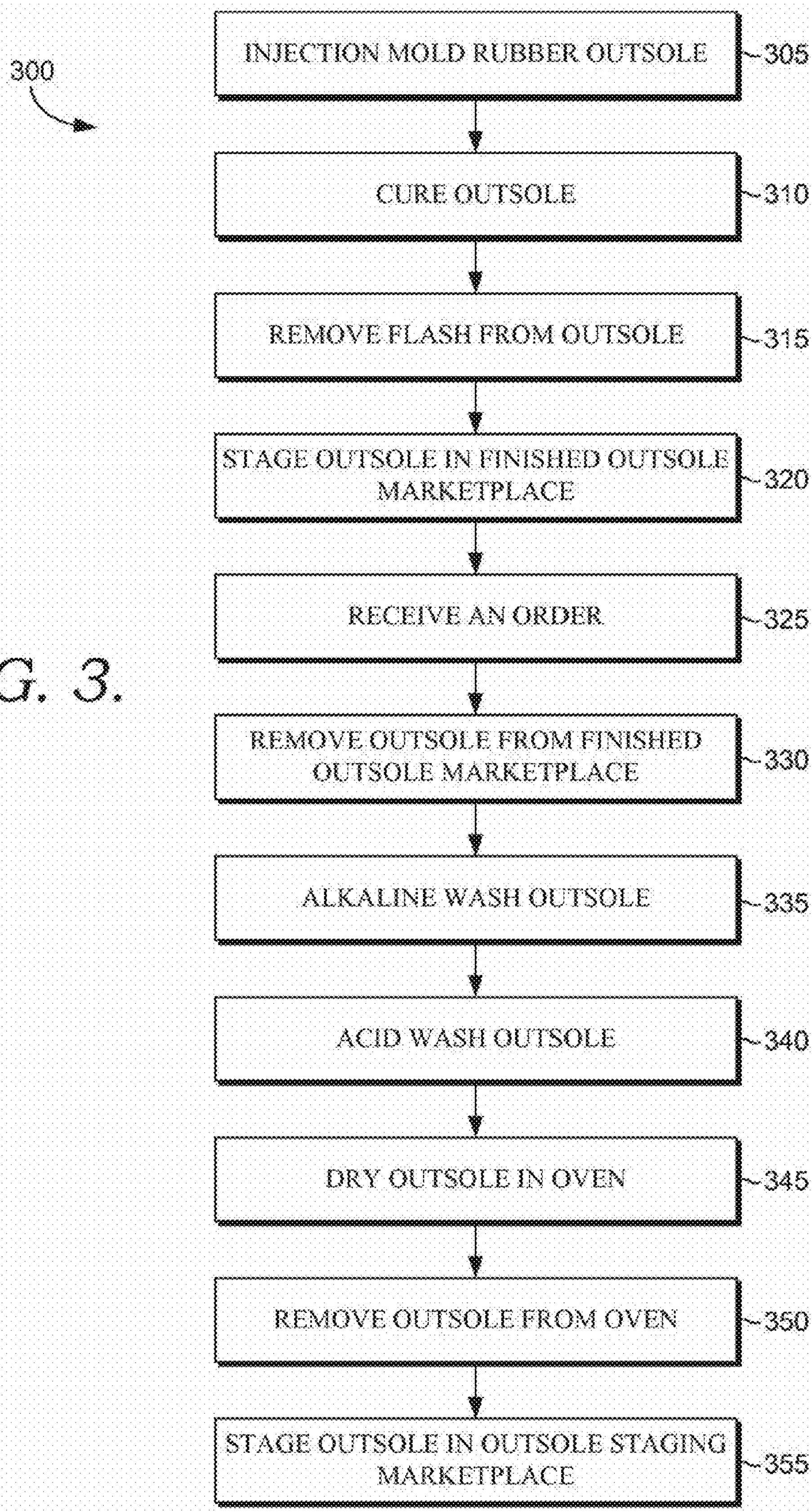
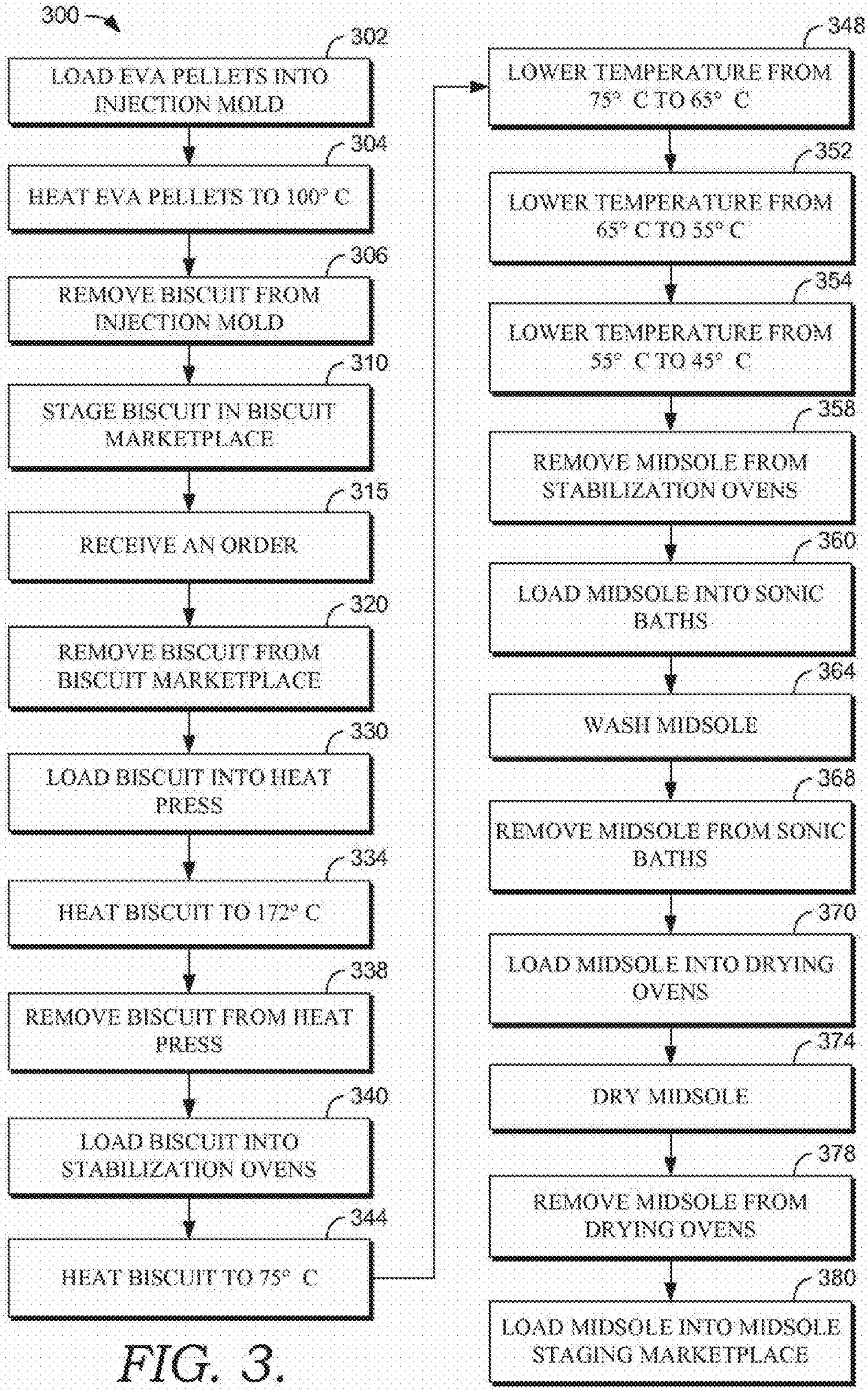

300
INJECTION MOLD RUBBER OUTSOLE
305
CURE OUTSOLE
310
REMOVE FLASH FROM OUTSOLE
315
STAGE OUTSOLE IN FINISHED OUTSOLE MARKETPLACE
320
RECEIVE AN ORDER
325
REMOVE OUTSOLE FROM FINISHED OUTSOLE MARKETPLACE
330
ALKALINE WASH OUTSOLE
335
ACID WASH OUTSOLE
340
DRY OUTSOLE IN OVEN
345
REMOVE OUTSOLE FROM OVEN
350
STAGE OUTSOLE IN OUTSOLE STAGING MARKETPLACE
355

FIG. 3.



300
302
LOAD EVA PELLETS INTO INJECTION MOLD
304
HEAT EVA PELLETS TO 100° C
306
REMOVE BISCUIT FROM INJECTION MOLD
310
STAGE BISCUIT IN BISCUIT MARKETPLACE
315
RECEIVE AN ORDER
320
REMOVE BISCUIT FROM BISCUIT MARKETPLACE
330
LOAD BISCUIT INTO HEAT PRESS
334
HEAT BISCUIT TO 172° C
338
REMOVE BISCUIT FROM HEAT PRESS
340
LOAD BISCUIT INTO STABILIZATION OVENS
344
HEAT BISCUIT TO 75° C
348
LOWER TEMPERATURE FROM 75° C TO 65° C
352
LOWER TEMPERATURE FROM 65° C TO 55° C
354
LOWER TEMPERATURE FROM 55° C TO 45° C
358
REMOVE MIDSOLE FROM STABILIZATION OVENS
360
LOAD MIDSOLE INTO SONIC BATHS
364
WASH MIDSOLE
368
REMOVE MIDSOLE FROM SONIC BATHS
370
LOAD MIDSOLE INTO DRYING OVENS
374
DRY MIDSOLE
378
REMOVE MIDSOLE FROM DRYING OVENS
380
LOAD MIDSOLE INTO MIDSOLE STAGING MARKETPLACE

FIG. 3.

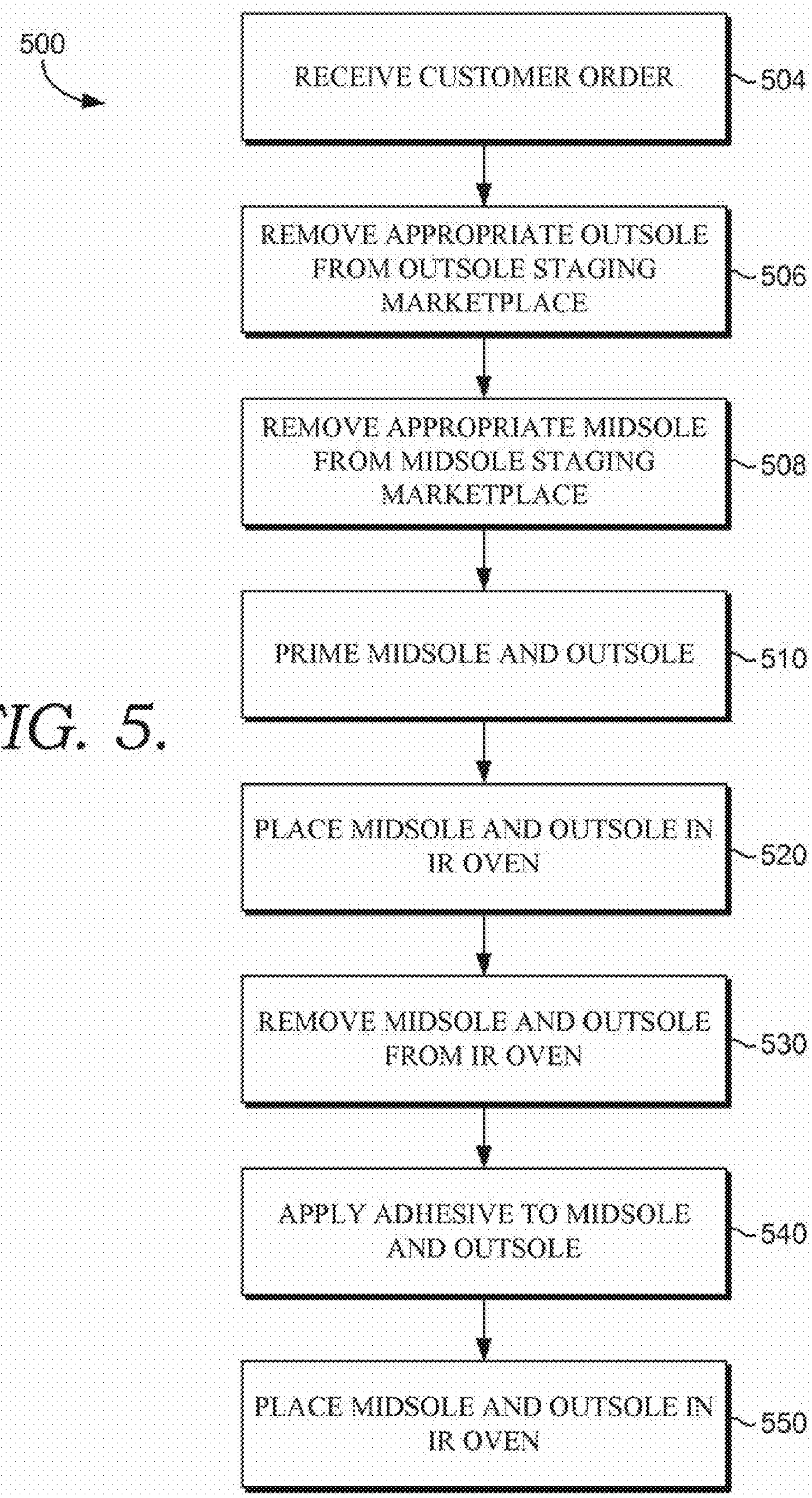

500
RECEIVE CUSTOMER ORDER
504
REMOVE APPROPRIATE OUTSOLE FROM OUTSOLE STAGING MARKETPLACE
506
REMOVE APPROPRIATE MIDSOLE FROM MIDSOLE STAGING MARKETPLACE
508
PRIME MIDSOLE AND OUTSOLE
510
PLACE MIDSOLE AND OUTSOLE IN IR OVEN
520
REMOVE MIDSOLE AND OUTSOLE FROM IR OVEN
530
APPLY ADHESIVE TO MIDSOLE AND OUTSOLE
540
PLACE MIDSOLE AND OUTSOLE IN IR OVEN
550

FIG. 5.

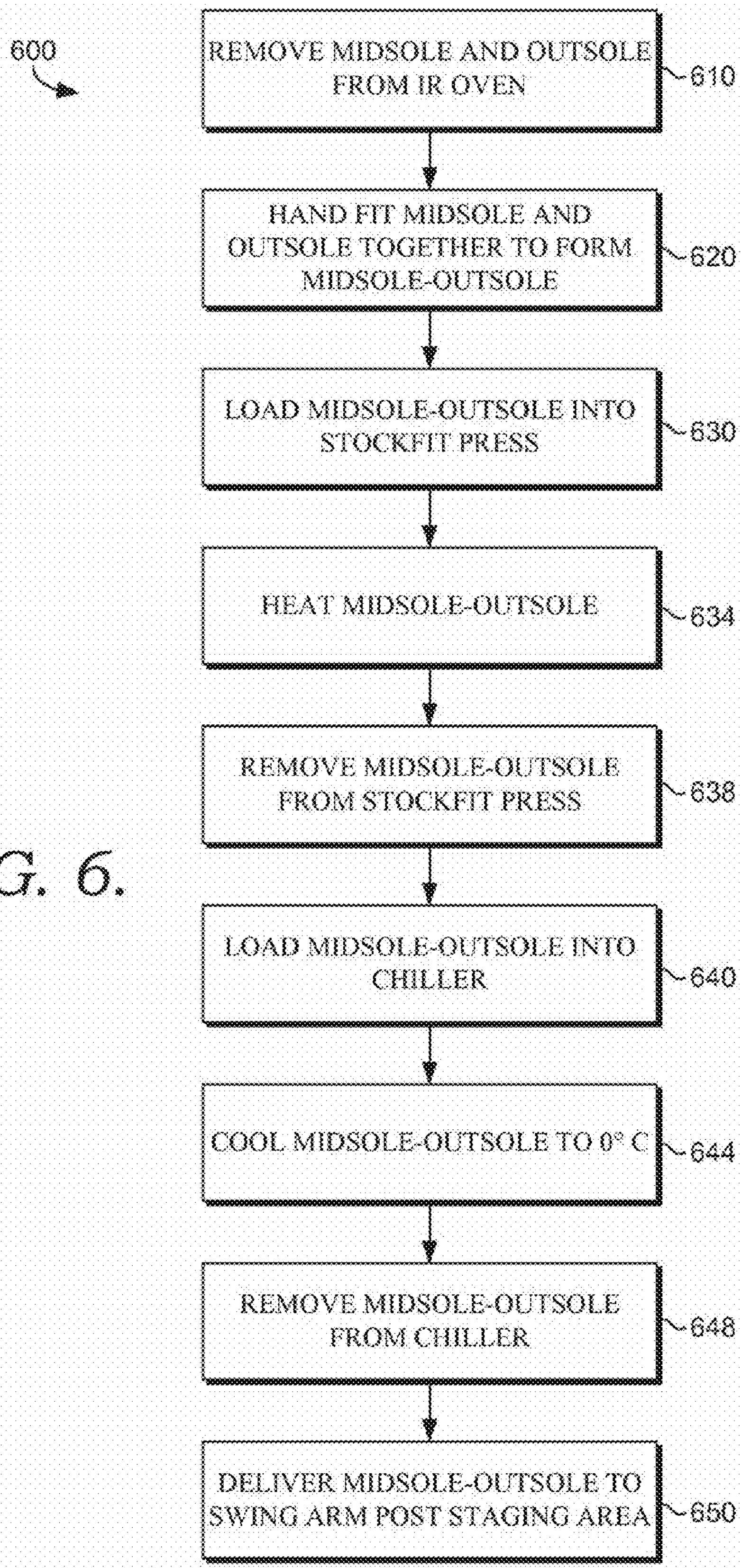

600
REMOVE MIDSOLE AND OUTSOLE FROM IR OVEN
610
HAND FIT MIDSOLE AND OUTSOLE TOGETHER TO FORM MIDSOLE-OUTSOLE
620
LOAD MIDSOLE-OUTSOLE INTO STOCKFIT PRESS
630
HEAT MIDSOLE-OUTSOLE
634
REMOVE MIDSOLE-OUTSOLE FROM STOCKFIT PRESS
638
LOAD MIDSOLE-OUTSOLE INTO CHILLER
640
COOL MIDSOLE-OUTSOLE TO 0° C
644
REMOVE MIDSOLE-OUTSOLE FROM CHILLER
648
DELIVER MIDSOLE-OUTSOLE TO SWING ARM POST STAGING AREA
650

FIG. 6.

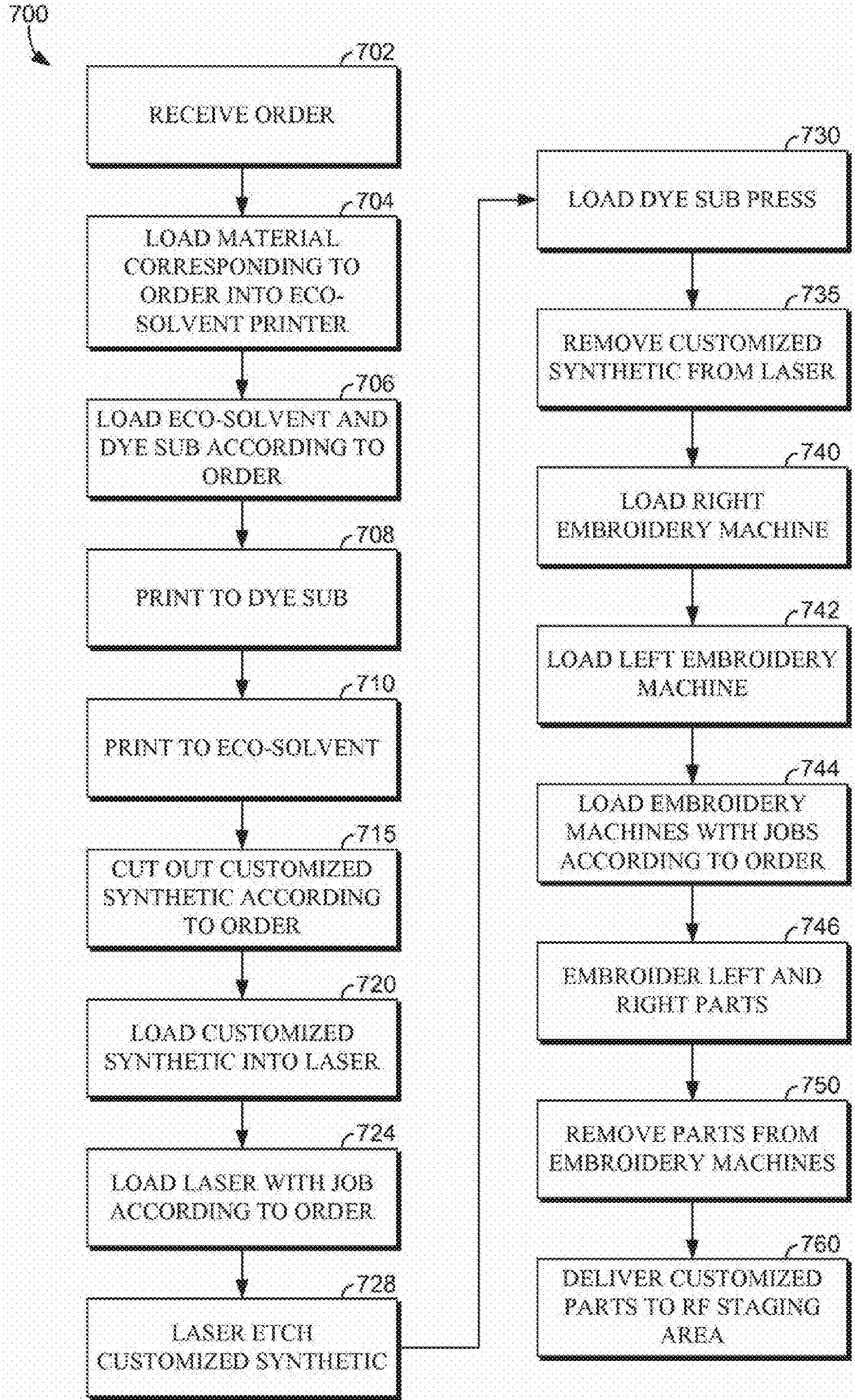

700
702
RECEIVE ORDER
704
LOAD MATERIAL CORRESPONDING TO ORDER INTO ECO-SOLVENT PRINTER
706
LOAD ECO-SOLVENT AND DYE SUB ACCORDING TO ORDER
708
PRINT TO DYE SUB
710
PRINT TO ECO-SOLVENT
715
CUT OUT CUSTOMIZED SYNTHETIC ACCORDING TO ORDER
720
LOAD CUSTOMIZED SYNTHETIC INTO LASER
724
LOAD LASER WITH JOB ACCORDING TO ORDER
728
LASER ETCH CUSTOMIZED SYNTHETIC
730
LOAD DYE SUB PRESS
735
REMOVE CUSTOMIZED SYNTHETIC FROM LASER
740
LOAD RIGHT EMBROIDERY MACHINE
742
LOAD LEFT EMBROIDERY MACHINE
744
LOAD EMBROIDERY MACHINES WITH JOBS ACCORDING TO ORDER
746
EMBROIDER LEFT AND RIGHT PARTS
750
REMOVE PARTS FROM EMBROIDERY MACHINES
760
DELIVER CUSTOMIZED PARTS TO RF STAGING AREA

FIG. 7.

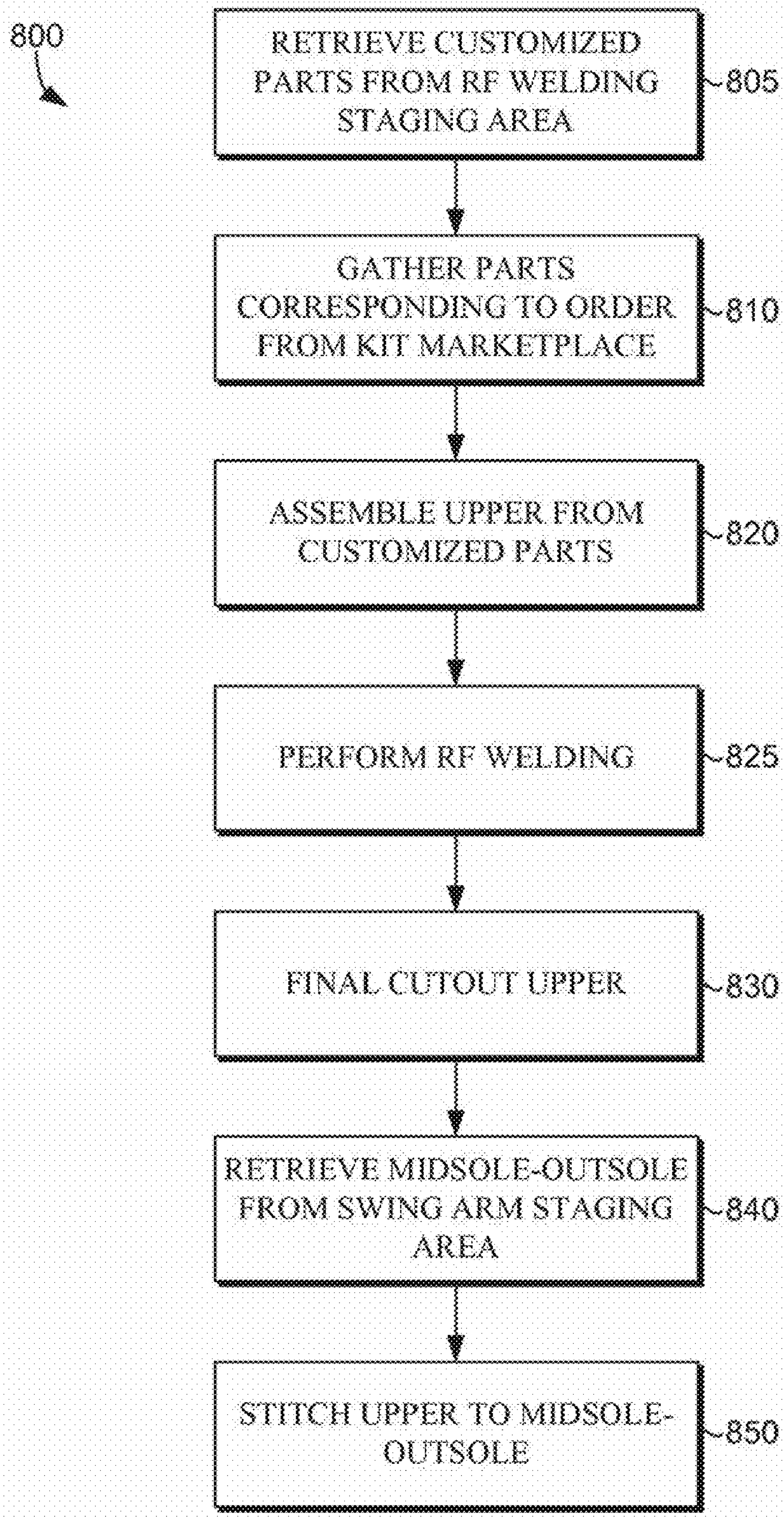

800
RETRIEVE CUSTOMIZED PARTS FROM RF WELDING STAGING AREA
805
GATHER PARTS CORRESPONDING TO ORDER FROM KIT MARKETPLACE
810
ASSEMBLE UPPER FROM CUSTOMIZED PARTS
820
PERFORM RF WELDING
825
FINAL CUTOUT UPPER
830
RETRIEVE MIDSOLE-OUTSOLE FROM SWING ARM STAGING AREA
840
STITCH UPPER TO MIDSOLE-OUTSOLE
850

FIG. 8.

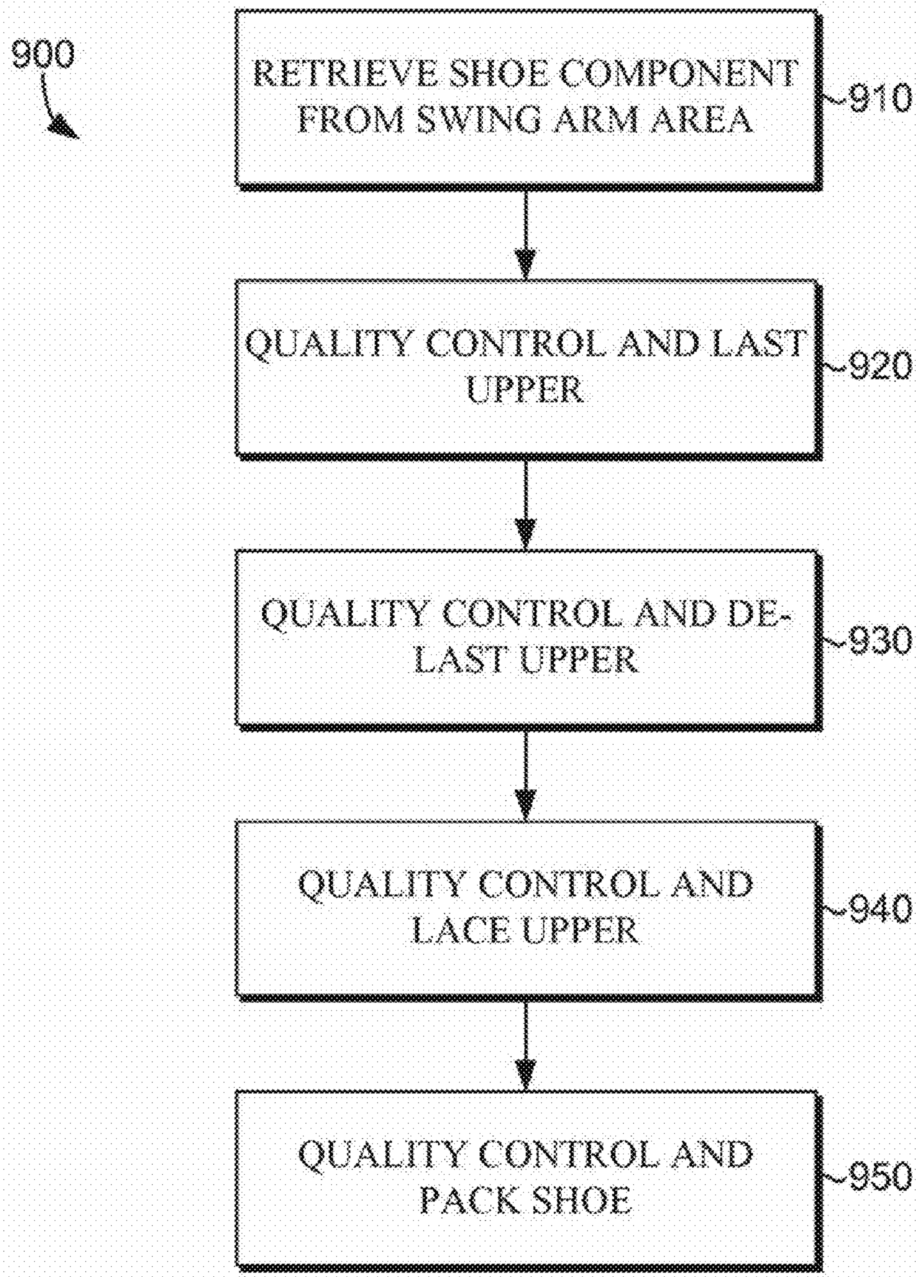

900
RETRIEVE SHOE COMPONENT FROM SWING ARM AREA
910
QUALITY CONTROL AND LAST UPPER
920
QUALITY CONTROL AND DE-LAST UPPER
930
QUALITY CONTROL AND LACE UPPER
940
QUALITY CONTROL AND PACK SHOE
950

FIG. 9.

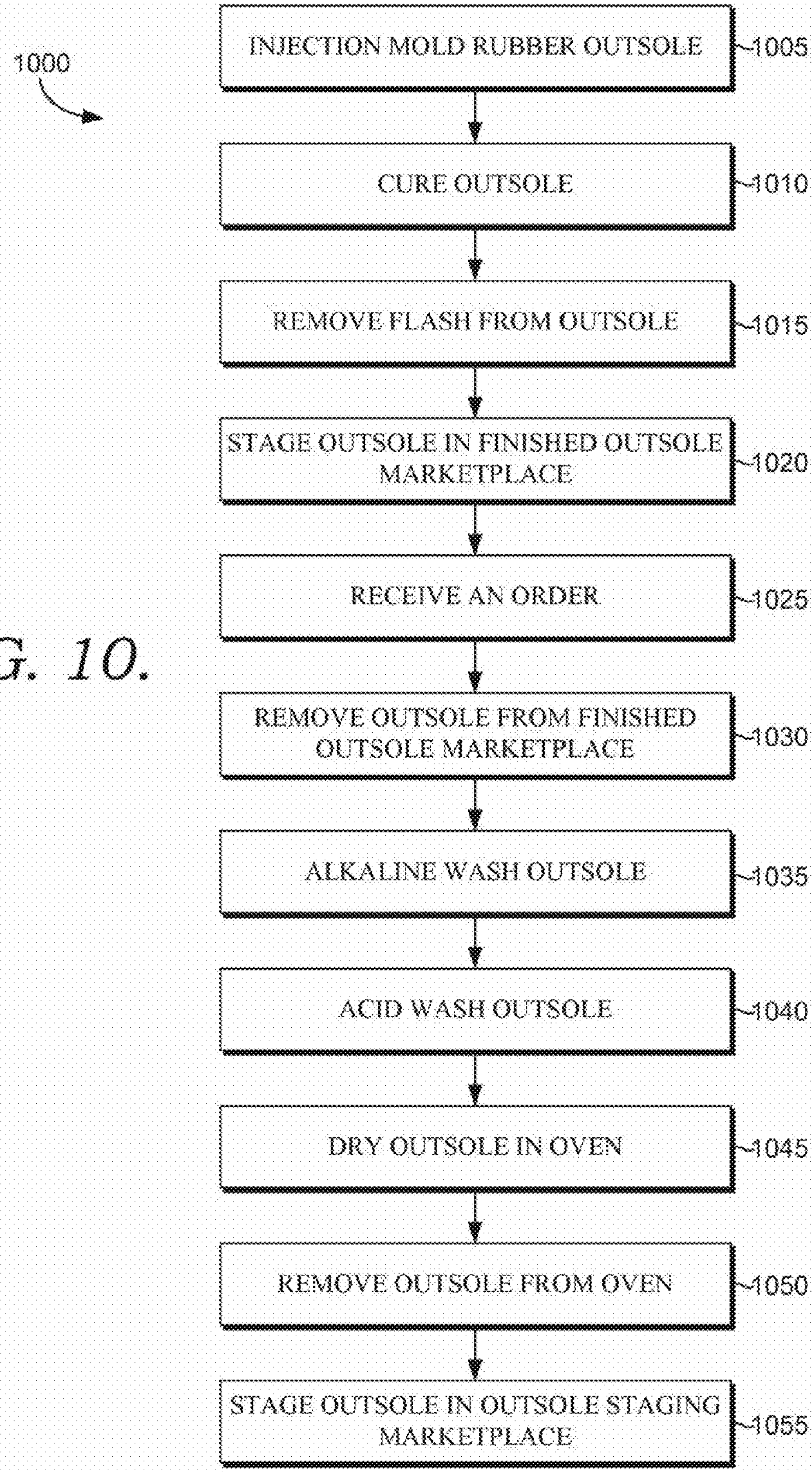

1000
INJECTION MOLD RUBBER OUTSOLE
1005
CURE OUTSOLE
1010
REMOVE FLASH FROM OUTSOLE
1015
STAGE OUTSOLE IN FINISHED OUTSOLE MARKETPLACE
1020
RECEIVE AN ORDER
1025
REMOVE OUTSOLE FROM FINISHED OUTSOLE MARKETPLACE
1030
ALKALINE WASH OUTSOLE
1035
ACID WASH OUTSOLE
1040
DRY OUTSOLE IN OVEN
1045
REMOVE OUTSOLE FROM OVEN
1050
STAGE OUTSOLE IN OUTSOLE STAGING MARKETPLACE
1055

FIG. 10.

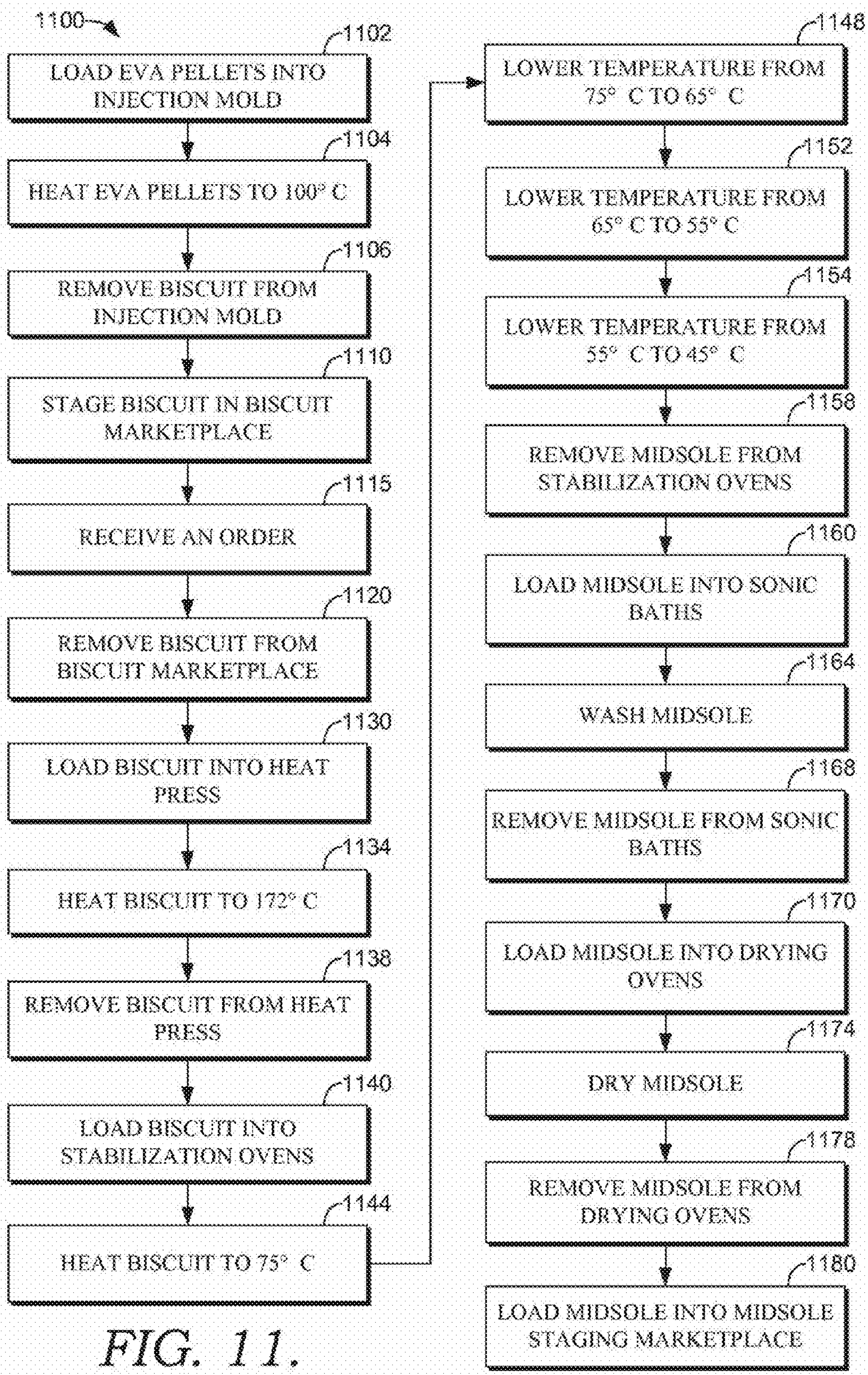

1100
1102
LOAD EVA PELLETS INTO INJECTION MOLD
1104
HEAT EVA PELLETS TO 100° C
1106
REMOVE BISCUIT FROM INJECTION MOLD
1110
STAGE BISCUIT IN BISCUIT MARKETPLACE
1115
RECEIVE AN ORDER
1120
REMOVE BISCUIT FROM BISCUIT MARKETPLACE
1130
LOAD BISCUIT INTO HEAT PRESS
1134
HEAT BISCUIT TO 172° C
1138
REMOVE BISCUIT FROM HEAT PRESS
1140
LOAD BISCUIT INTO STABILIZATION OVENS
1144
HEAT BISCUIT TO 75° C
1148
LOWER TEMPERATURE FROM 75° C TO 65° C
1152
LOWER TEMPERATURE FROM 65° C TO 55° C
1154
LOWER TEMPERATURE FROM 55° C TO 45° C
1158
REMOVE MIDSOLE FROM STABILIZATION OVENS
1160
LOAD MIDSOLE INTO SONIC BATHS
1164
WASH MIDSOLE
1168
REMOVE MIDSOLE FROM SONIC BATHS
1170
LOAD MIDSOLE INTO DRYING OVENS
1174
DRY MIDSOLE
1178
REMOVE MIDSOLE FROM DRYING OVENS
1180
LOAD MIDSOLE INTO MIDSOLE STAGING MARKETPLACE

FIG. 11.

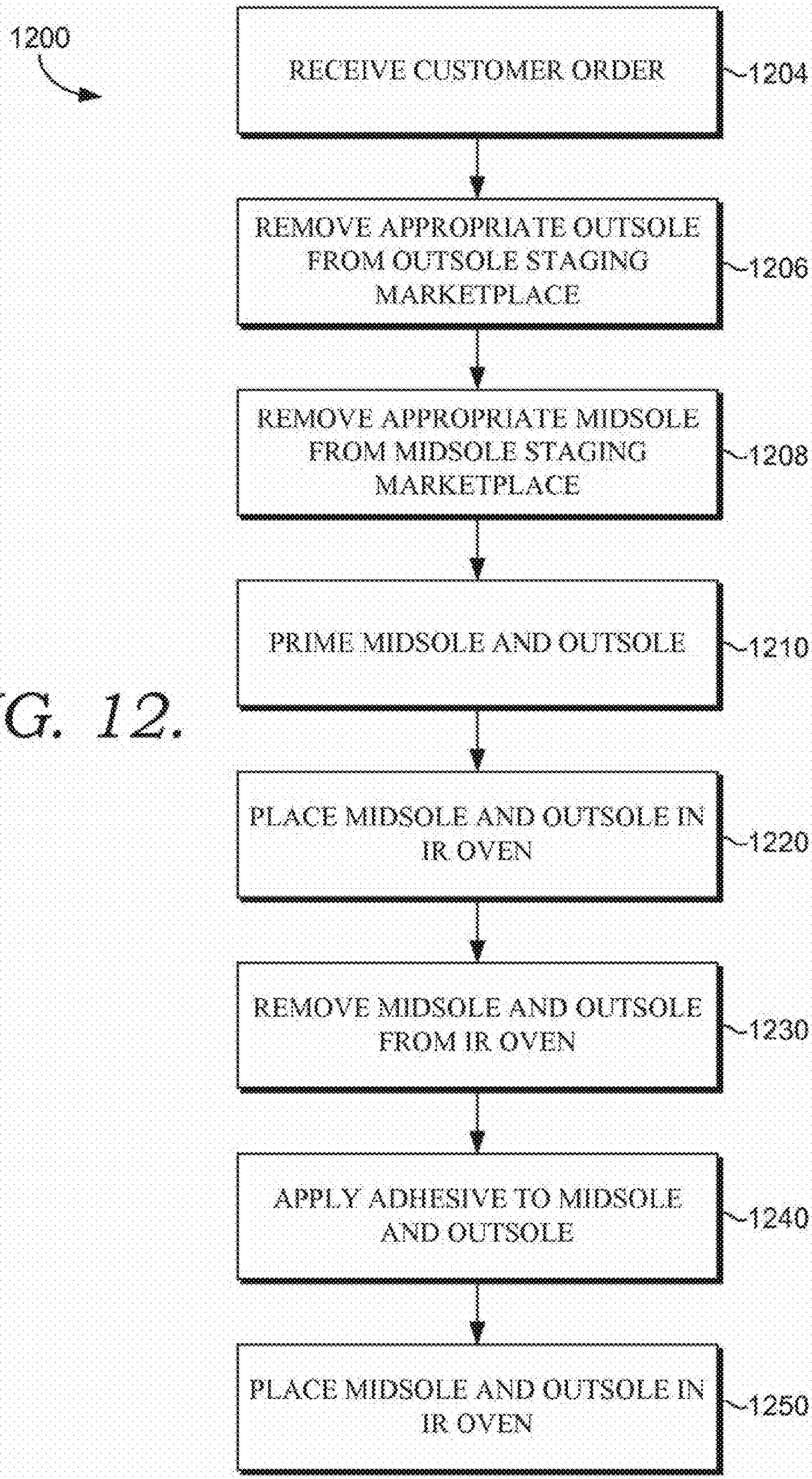

1200
RECEIVE CUSTOMER ORDER
1204
REMOVE APPROPRIATE OUTSOLE FROM OUTSOLE STAGING MARKETPLACE
1206
REMOVE APPROPRIATE MIDSOLE FROM MIDSOLE STAGING MARKETPLACE
1208
PRIME MIDSOLE AND OUTSOLE
1210
PLACE MIDSOLE AND OUTSOLE IN IR OVEN
1220
REMOVE MIDSOLE AND OUTSOLE FROM IR OVEN
1230
APPLY ADHESIVE TO MIDSOLE AND OUTSOLE
1240
PLACE MIDSOLE AND OUTSOLE IN IR OVEN
1250

FIG. 12.

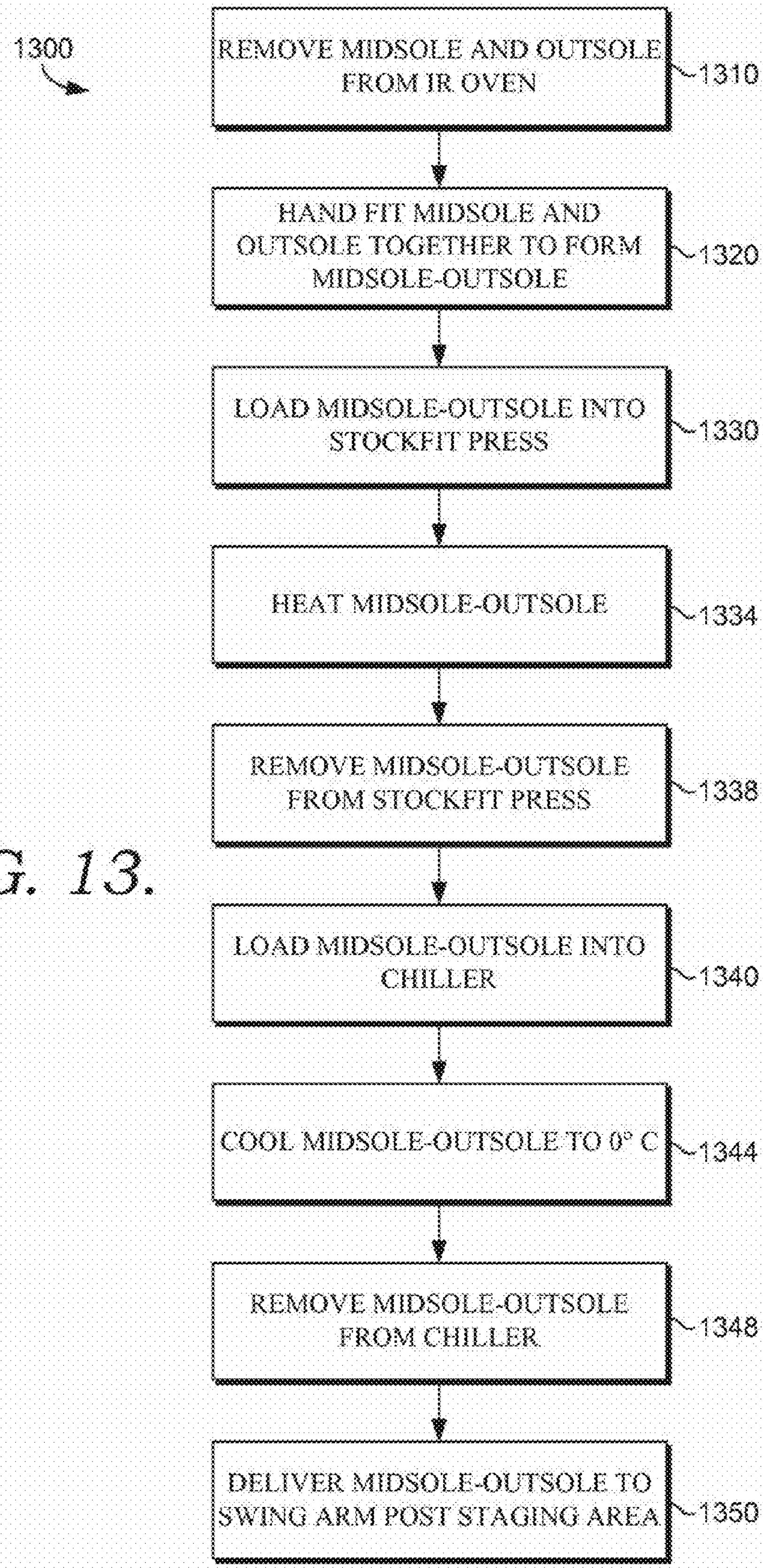

1300
REMOVE MIDSOLE AND OUTSOLE FROM IR OVEN
1310
HAND FIT MIDSOLE AND OUTSOLE TOGETHER TO FORM MIDSOLE-OUTSOLE
1320
LOAD MIDSOLE-OUTSOLE INTO STOCKFIT PRESS
1330
HEAT MIDSOLE-OUTSOLE
1334
REMOVE MIDSOLE-OUTSOLE FROM STOCKFIT PRESS
1338
LOAD MIDSOLE-OUTSOLE INTO CHILLER
1340
COOL MIDSOLE-OUTSOLE TO 0° C
1344
REMOVE MIDSOLE-OUTSOLE FROM CHILLER
1348
DELIVER MIDSOLE-OUTSOLE TO SWING ARM POST STAGING AREA
1350

FIG. 13.

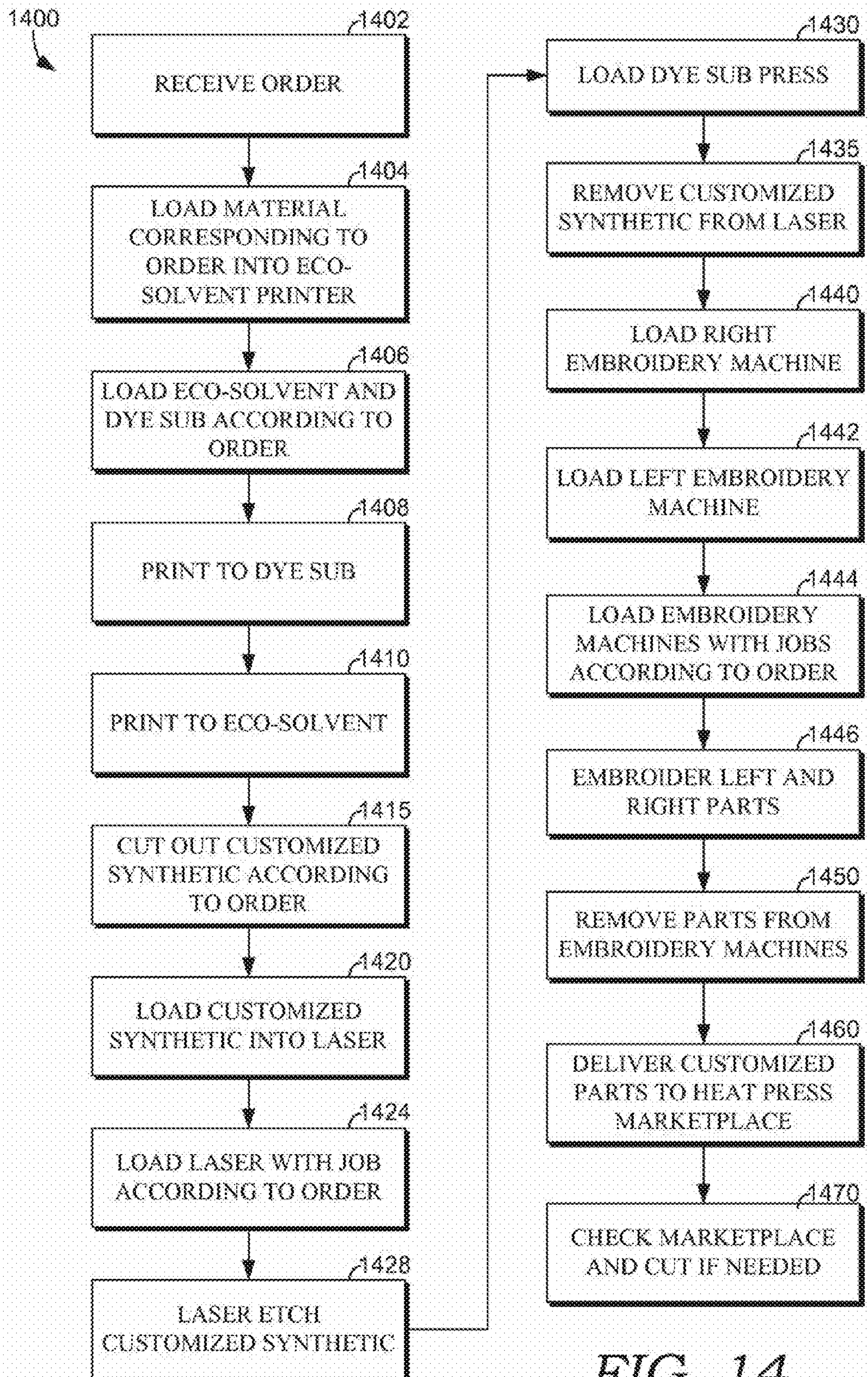

1400
1402
RECEIVE ORDER
1404
LOAD MATERIAL CORRESPONDING TO ORDER INTO ECO-SOLVENT PRINTER
1406
LOAD ECO-SOLVENT AND DYE SUB ACCORDING TO ORDER
1408
PRINT TO DYE SUB
1410
PRINT TO ECO-SOLVENT
1415
CUT OUT CUSTOMIZED SYNTHETIC ACCORDING TO ORDER
1420
LOAD CUSTOMIZED SYNTHETIC INTO LASER
1424
LOAD LASER WITH JOB ACCORDING TO ORDER
1428
LASER ETCH CUSTOMIZED SYNTHETIC
1430
LOAD DYE SUB PRESS
1435
REMOVE CUSTOMIZED SYNTHETIC FROM LASER
1440
LOAD RIGHT EMBROIDERY MACHINE
1442
LOAD LEFT EMBROIDERY MACHINE
1444
LOAD EMBROIDERY MACHINES WITH JOBS ACCORDING TO ORDER
1446
EMBROIDER LEFT AND RIGHT PARTS
1450
REMOVE PARTS FROM EMBROIDERY MACHINES
1460
DELIVER CUSTOMIZED PARTS TO HEAT PRESS MARKETPLACE
1470
CHECK MARKETPLACE AND CUT IF NEEDED

FIG. 14.

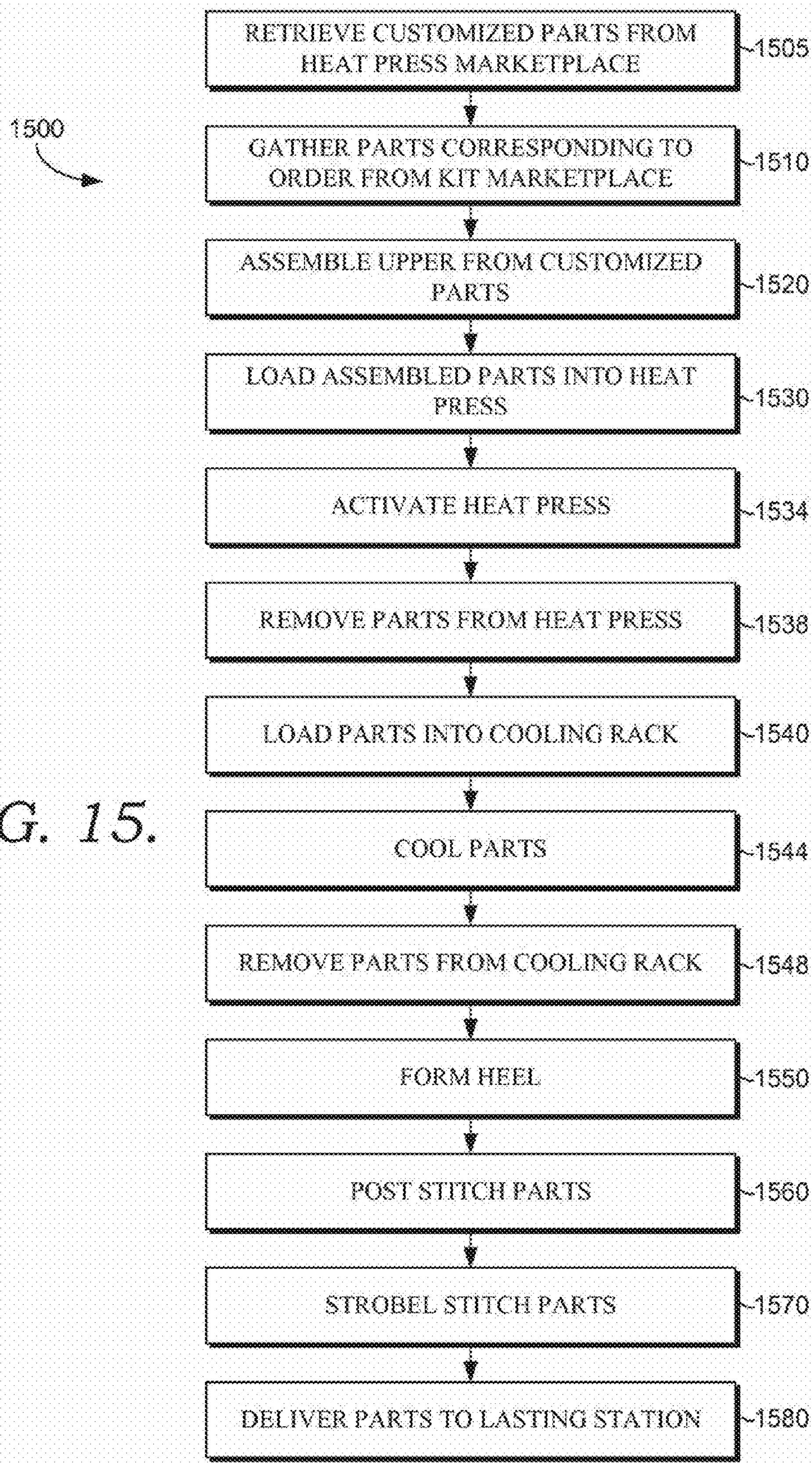

1500
RETRIEVE CUSTOMIZED PARTS FROM HEAT PRESS MARKETPLACE
1505
GATHER PARTS CORRESPONDING TO ORDER FROM KIT MARKETPLACE
1510
ASSEMBLE UPPER FROM CUSTOMIZED PARTS
1520
LOAD ASSEMBLED PARTS INTO HEAT PRESS
1530
ACTIVATE HEAT PRESS
1534
REMOVE PARTS FROM HEAT PRESS
1538
LOAD PARTS INTO COOLING RACK
1540
COOL PARTS
1544
REMOVE PARTS FROM COOLING RACK
1548
FORM HEEL
1550
POST STITCH PARTS
1560
STROBEL STITCH PARTS
1570
DELIVER PARTS TO LASTING STATION
1580

FIG. 15.

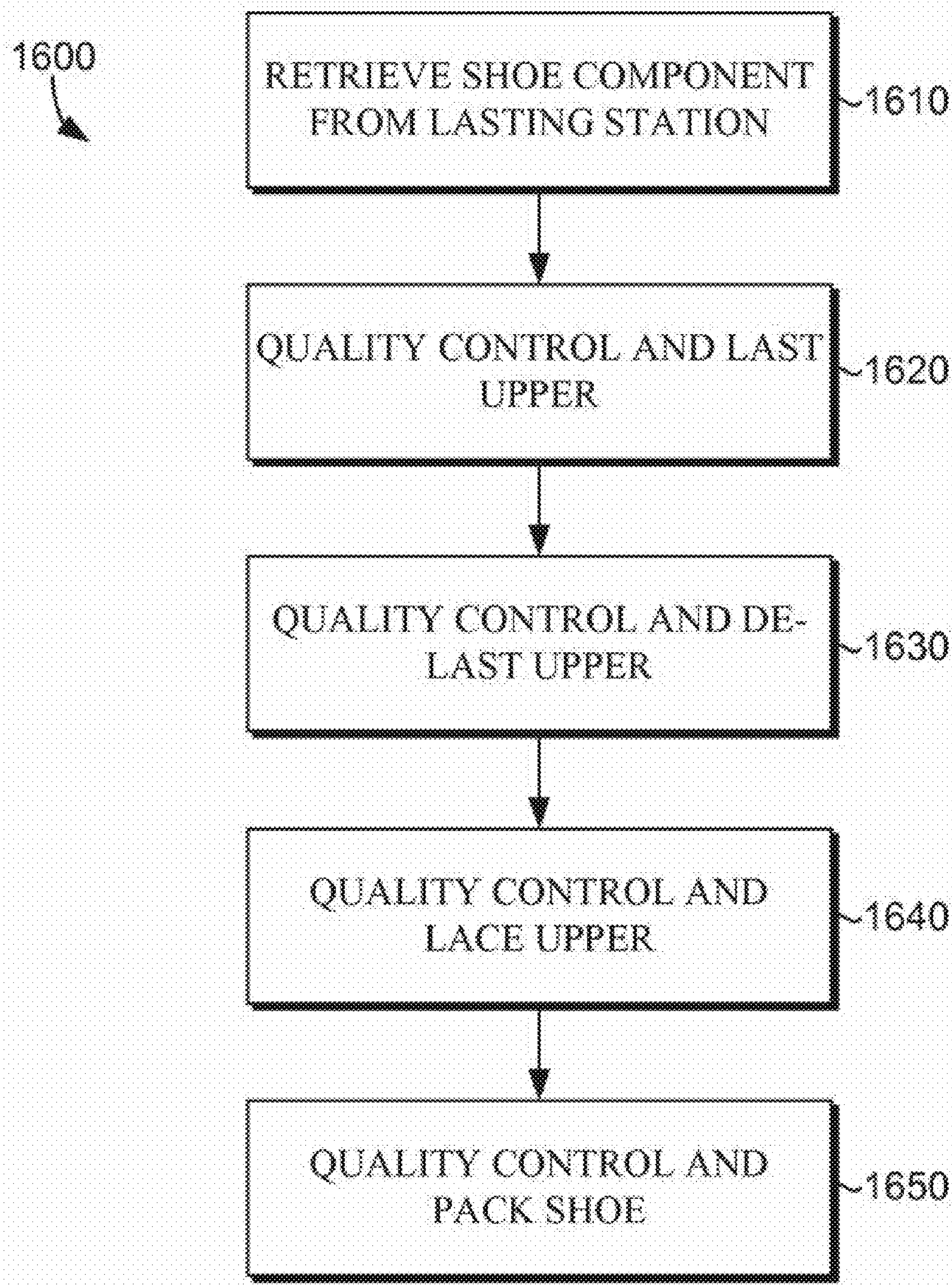

1600
RETRIEVE SHOE COMPONENT FROM LASTING STATION
1610
QUALITY CONTROL AND LAST UPPER
1620
QUALITY CONTROL AND DE-LAST UPPER
1630
QUALITY CONTROL AND LACE UPPER
1640
QUALITY CONTROL AND PACK SHOE
1650

FIG. 16.

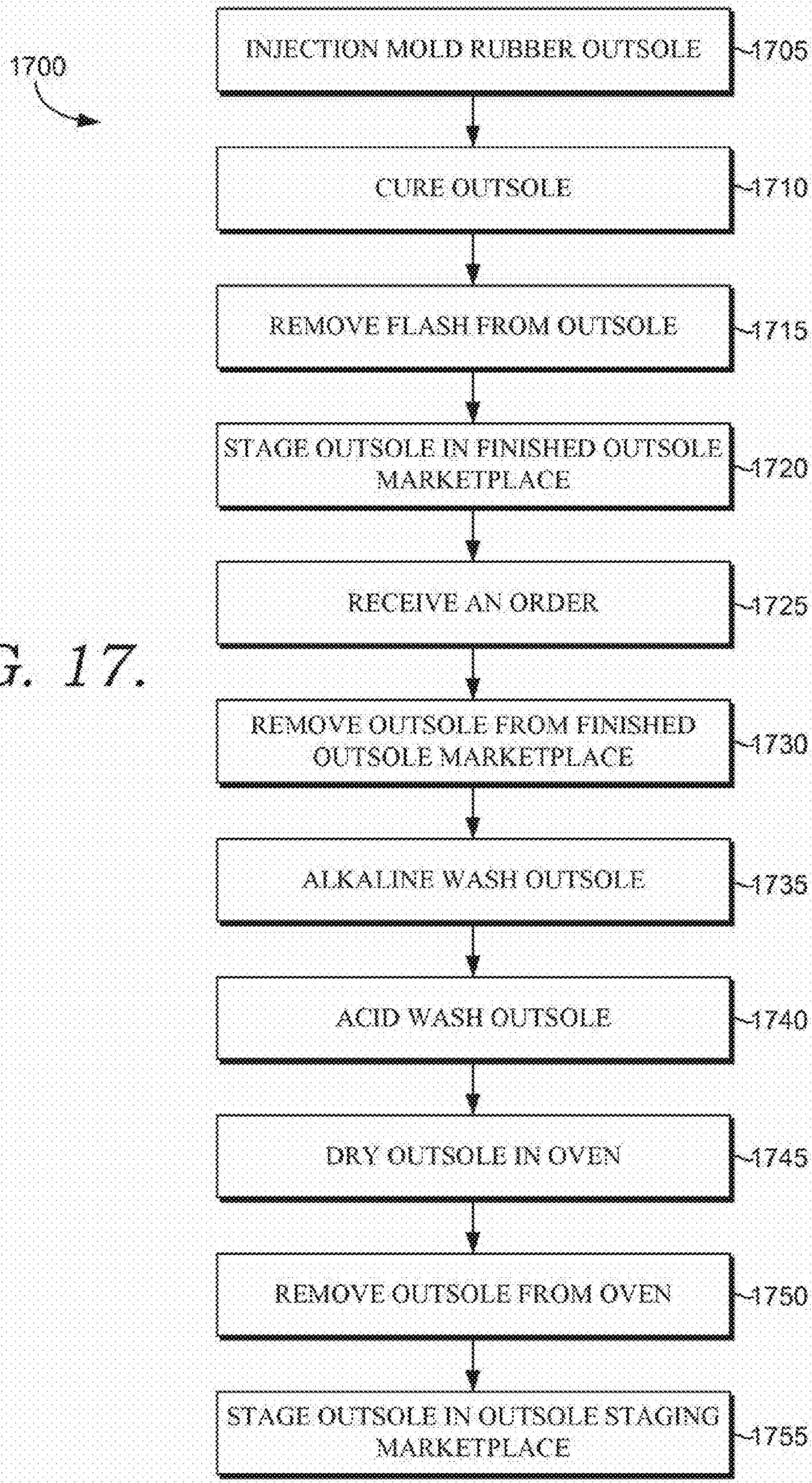

1700
INJECTION MOLD RUBBER OUTSOLE
1705
CURE OUTSOLE
1710
REMOVE FLASH FROM OUTSOLE
1715
STAGE OUTSOLE IN FINISHED OUTSOLE MARKETPLACE
1720
RECEIVE AN ORDER
1725
REMOVE OUTSOLE FROM FINISHED OUTSOLE MARKETPLACE
1730
ALKALINE WASH OUTSOLE
1735
ACID WASH OUTSOLE
1740
DRY OUTSOLE IN OVEN
1745
REMOVE OUTSOLE FROM OVEN
1750
STAGE OUTSOLE IN OUTSOLE STAGING MARKETPLACE
1755

FIG. 17.

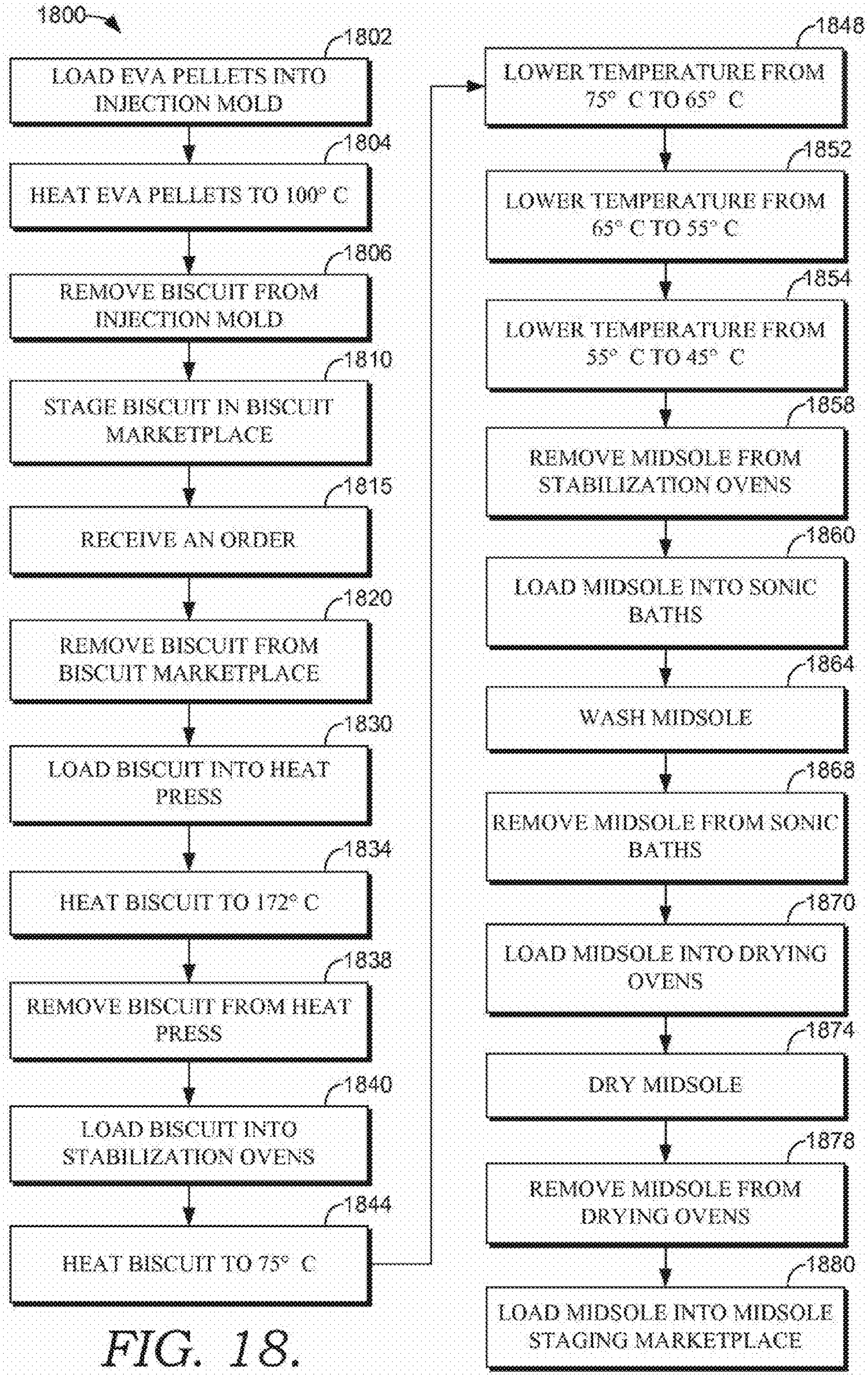

1800
1802
LOAD EVA PELLETS INTO INJECTION MOLD
1804
HEAT EVA PELLETS TO 100° C
1806
REMOVE BISCUIT FROM INJECTION MOLD
1810
STAGE BISCUIT IN BISCUIT MARKETPLACE
1815
RECEIVE AN ORDER
1820
REMOVE BISCUIT FROM BISCUIT MARKETPLACE
1830
LOAD BISCUIT INTO HEAT PRESS
1834
HEAT BISCUIT TO 172° C
1838
REMOVE BISCUIT FROM HEAT PRESS
1840
LOAD BISCUIT INTO STABILIZATION OVENS
1844
HEAT BISCUIT TO 75° C
1848
LOWER TEMPERATURE FROM 75° C TO 65° C
1852
LOWER TEMPERATURE FROM 65° C TO 55° C
1854
LOWER TEMPERATURE FROM 55° C TO 45° C
1858
REMOVE MIDSOLE FROM STABILIZATION OVENS
1860
LOAD MIDSOLE INTO SONIC BATHS
1864
WASH MIDSOLE
1868
REMOVE MIDSOLE FROM SONIC BATHS
1870
LOAD MIDSOLE INTO DRYING OVENS
1874
DRY MIDSOLE
1878
REMOVE MIDSOLE FROM DRYING OVENS
1880
LOAD MIDSOLE INTO MIDSOLE STAGING MARKETPLACE

FIG. 18.

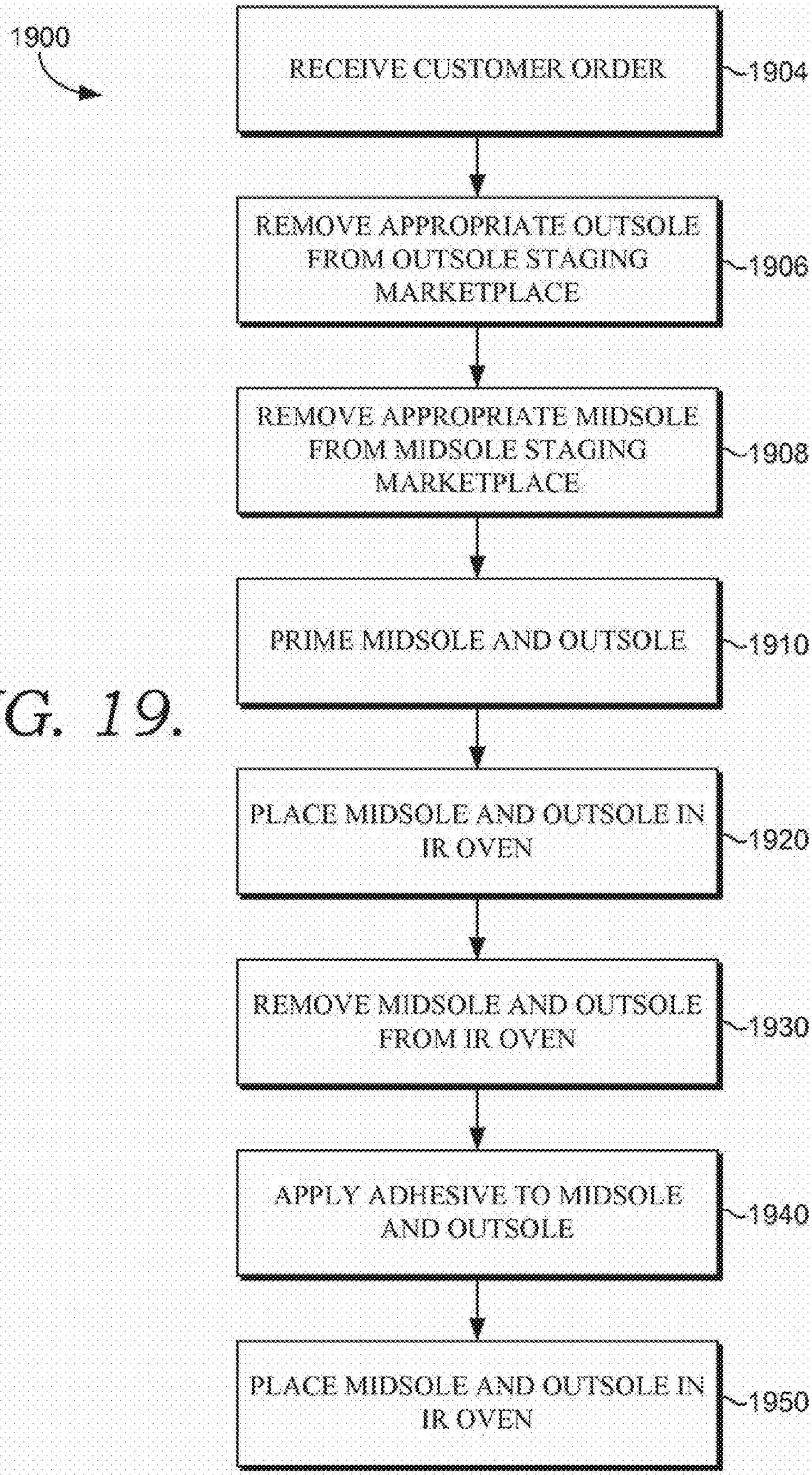

1900
RECEIVE CUSTOMER ORDER
1904
REMOVE APPROPRIATE OUTSOLE FROM OUTSOLE STAGING MARKETPLACE
1906
REMOVE APPROPRIATE MIDSOLE FROM MIDSOLE STAGING MARKETPLACE
1908
PRIME MIDSOLE AND OUTSOLE
1910
PLACE MIDSOLE AND OUTSOLE IN IR OVEN
1920
REMOVE MIDSOLE AND OUTSOLE FROM IR OVEN
1930
APPLY ADHESIVE TO MIDSOLE AND OUTSOLE
1940
PLACE MIDSOLE AND OUTSOLE IN IR OVEN
1950

FIG. 19.

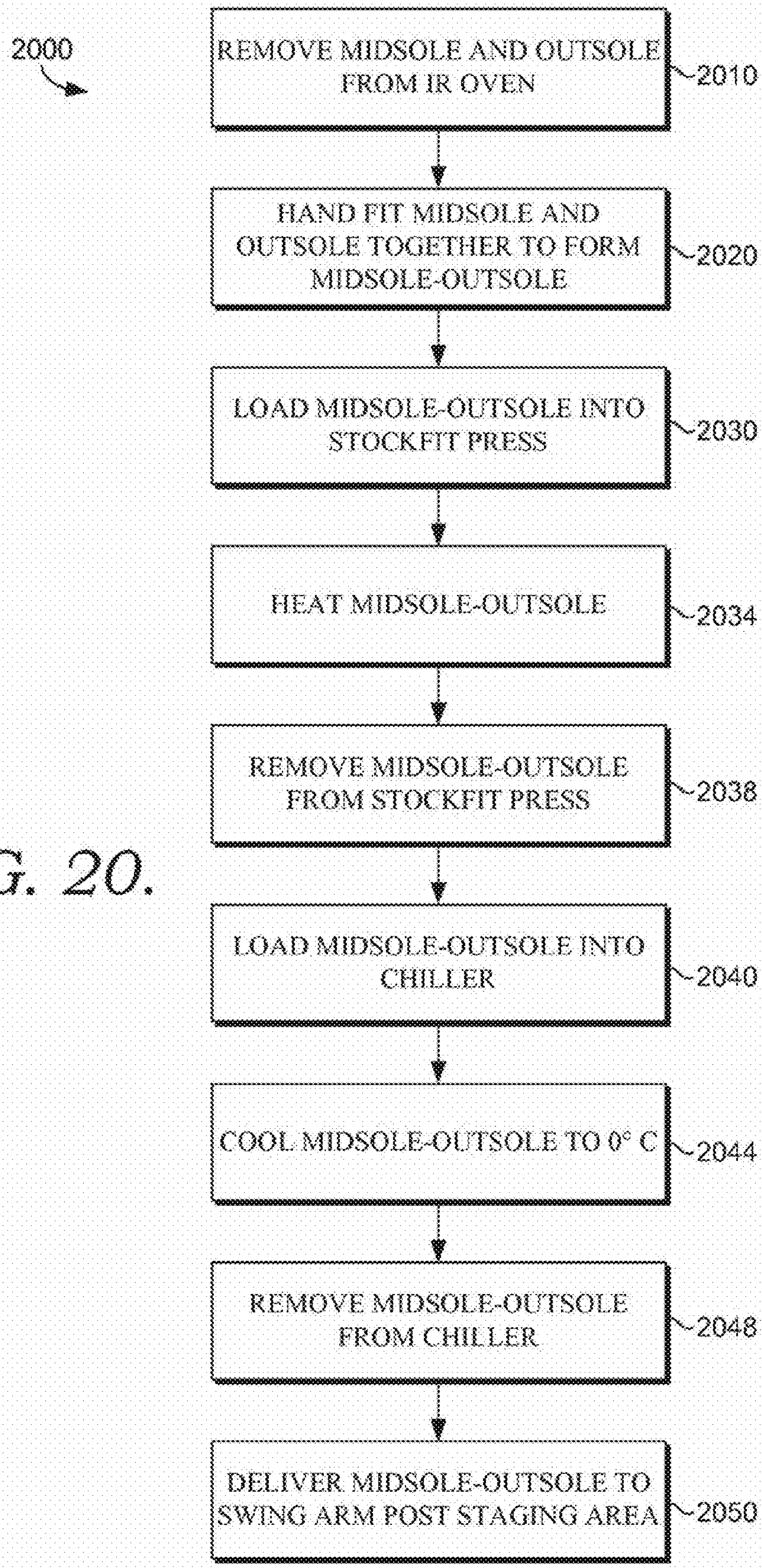

2000
REMOVE MIDSOLE AND OUTSOLE FROM IR OVEN
2010
HAND FIT MIDSOLE AND OUTSOLE TOGETHER TO FORM MIDSOLE-OUTSOLE
2020
LOAD MIDSOLE-OUTSOLE INTO STOCKFIT PRESS
2030
HEAT MIDSOLE-OUTSOLE
2034
REMOVE MIDSOLE-OUTSOLE FROM STOCKFIT PRESS
2038
LOAD MIDSOLE-OUTSOLE INTO CHILLER
2040
COOL MIDSOLE-OUTSOLE TO 0° C
2044
REMOVE MIDSOLE-OUTSOLE FROM CHILLER
2048
DELIVER MIDSOLE-OUTSOLE TO SWING ARM POST STAGING AREA
2050

FIG. 20.

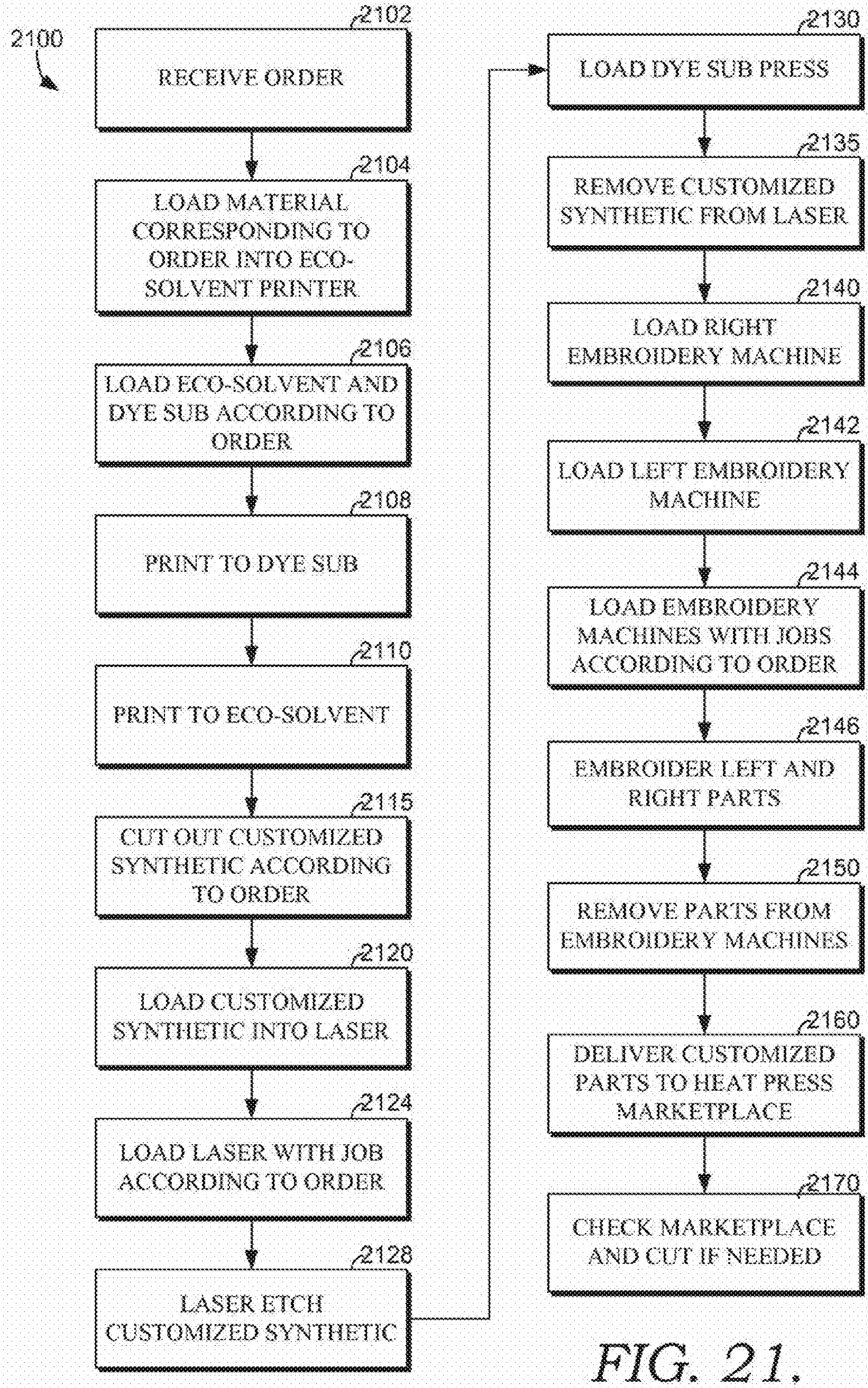

2100
RECEIVE ORDER
2102
LOAD MATERIAL CORRESPONDING TO ORDER INTO ECO-SOLVENT PRINTER
2104
LOAD ECO-SOLVENT AND DYE SUB ACCORDING TO ORDER
2106
PRINT TO DYE SUB
2108
PRINT TO ECO-SOLVENT
2110
CUT OUT CUSTOMIZED SYNTHETIC ACCORDING TO ORDER
2115
LOAD CUSTOMIZED SYNTHETIC INTO LASER
2120
LOAD LASER WITH JOB ACCORDING TO ORDER
2124
LASER ETCH CUSTOMIZED SYNTHETIC
2128
LOAD DYE SUB PRESS
2130
REMOVE CUSTOMIZED SYNTHETIC FROM LASER
2135
LOAD RIGHT EMBROIDERY MACHINE
2140
LOAD LEFT EMBROIDERY MACHINE
2142
LOAD EMBROIDERY MACHINES WITH JOBS ACCORDING TO ORDER
2144
EMBROIDER LEFT AND RIGHT PARTS
2146
REMOVE PARTS FROM EMBROIDERY MACHINES
2150
DELIVER CUSTOMIZED PARTS TO HEAT PRESS MARKETPLACE
2160
CHECK MARKETPLACE AND CUT IF NEEDED
2170

FIG. 21.

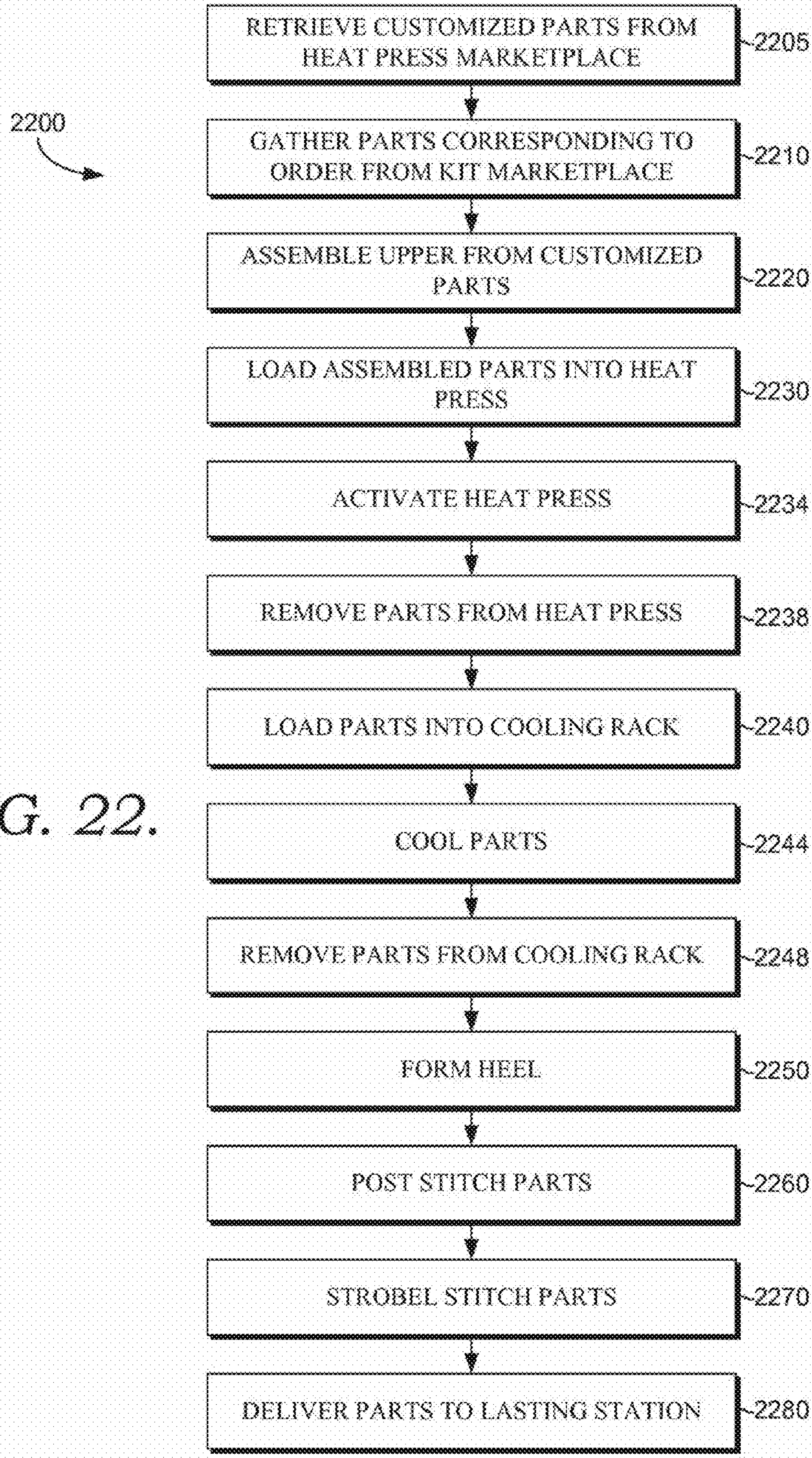

2200
RETRIEVE CUSTOMIZED PARTS FROM HEAT PRESS MARKETPLACE
2205
GATHER PARTS CORRESPONDING TO ORDER FROM KIT MARKETPLACE
2210
ASSEMBLE UPPER FROM CUSTOMIZED PARTS
2220
LOAD ASSEMBLED PARTS INTO HEAT PRESS
2230
ACTIVATE HEAT PRESS
2234
REMOVE PARTS FROM HEAT PRESS
2238
LOAD PARTS INTO COOLING RACK
2240
COOL PARTS
2244
REMOVE PARTS FROM COOLING RACK
2248
FORM HEEL
2250
POST STITCH PARTS
2260
STROBEL STITCH PARTS
2270
DELIVER PARTS TO LASTING STATION
2280

FIG. 22.

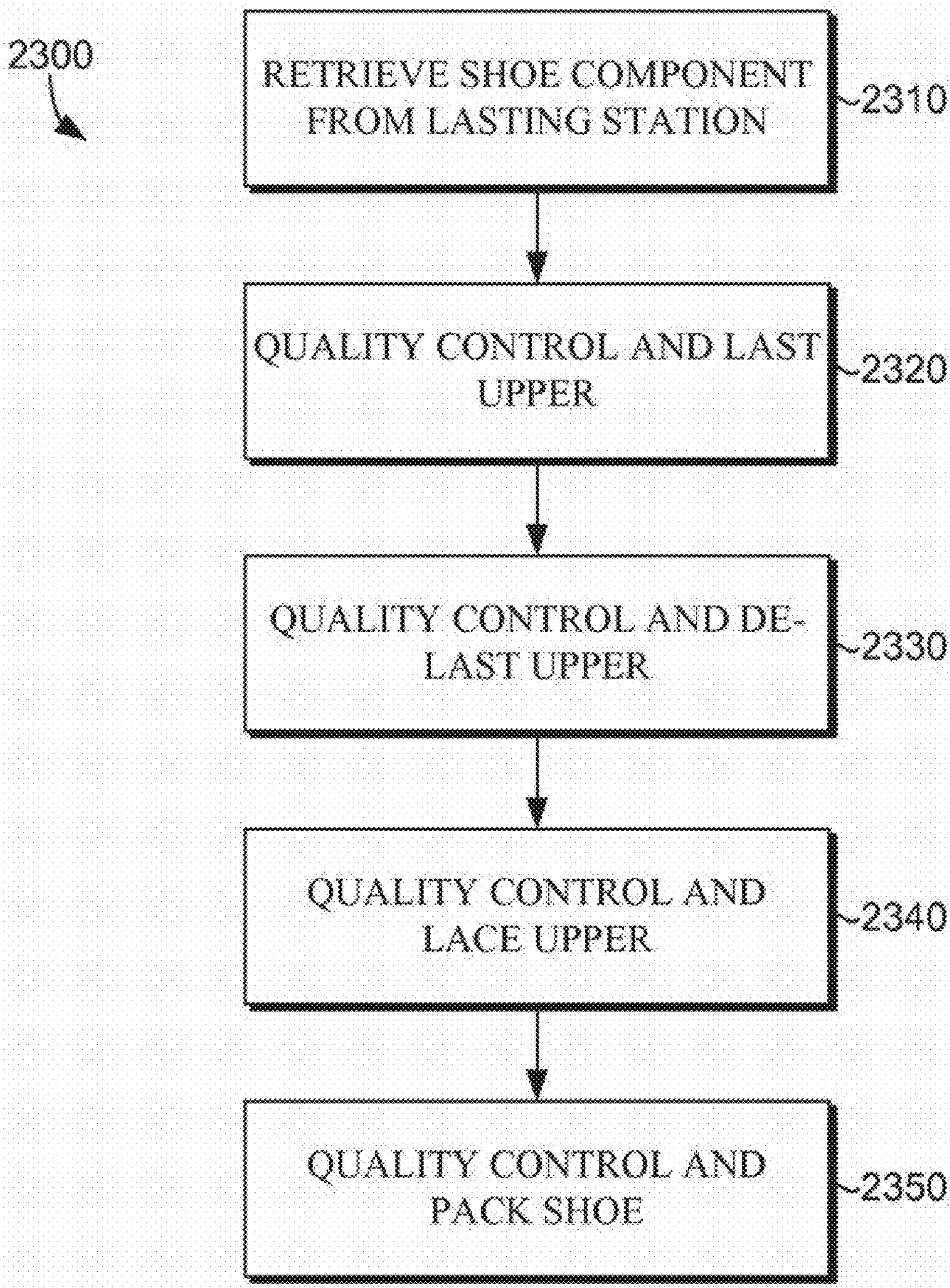

2300
RETRIEVE SHOE COMPONENT FROM LASTING STATION
2310
QUALITY CONTROL AND LAST UPPER
2320
QUALITY CONTROL AND DE-LAST UPPER
2330
QUALITY CONTROL AND LACE UPPER
2340
QUALITY CONTROL AND PACK SHOE
2350

FIG. 23.

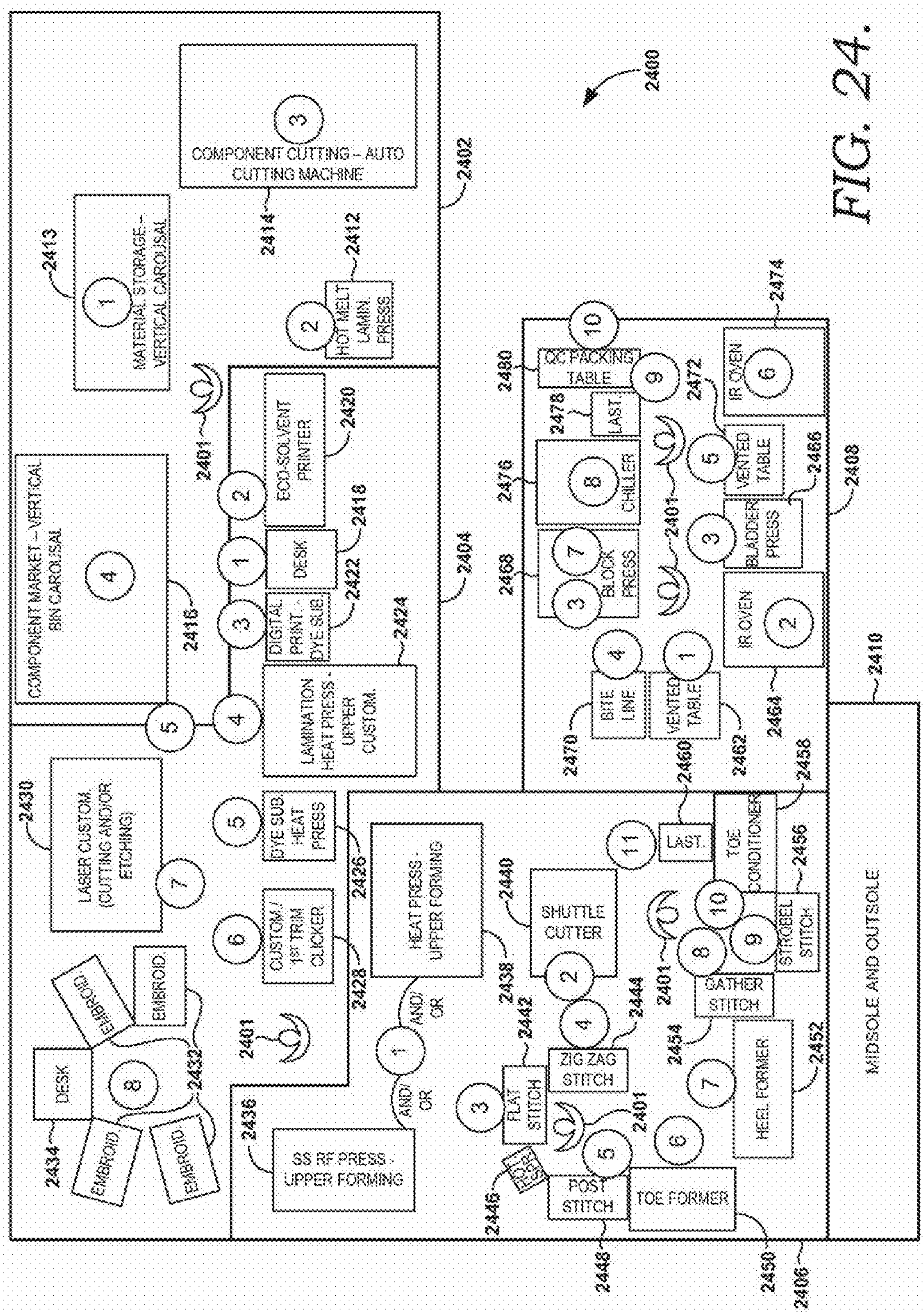

2400
2402
COMPONENT CUTTING – AUTO CUTTING MACHINE
2414
MATERIAL STORAGE – VERTICAL CAROUSAL
2413
HOT MELT LAMIN. PRESS
2412
2401
ECO-SOLVENT PRINTER
2420
DESK
2418
DIGITAL PRINT - DYE SUB
2422
LAMINATION HEAT PRESS - UPPER CUSTOM.
2424
COMPONENT MARKET – VERTICAL BIN CAROUSAL
2416
2404
LASER CUSTOM. (CUTTING AND/OR ETCHING)
2430
DYE SUB HEAT PRESS
2426
CUSTOM / 1ST TRIM CLICKER
2428
EMBROID.
EMBROID.
EMBROID.
EMBROID.
DESK
2432
2434
HEAT PRESS - UPPER FORMING
AND/ OR
AND/ OR
SS RF PRESS - UPPER FORMING
2436
2438
SHUTTLE CUTTER
2440
ZIG ZAG STITCH
2444
FLAT STITCH
2442
POST STITCH
2446
2448
TOE FORMER
2450
HEEL FORMER
2452
GATHER STITCH
2454
STROBEL STITCH
2456
TOE CONDITIONER
2458
LAST.
2460
2406
MIDSOLE AND OUTSOLE
2410
QC PACKING TABLE
2480
LAST
2478
IR OVEN
2474
VENTED TABLE
2472
CHILLER
2476
BLOCK PRESS
2468
BLADDER PRESS
2466
IR OVEN
2464
VENTED TABLE
2462
BITE LINE
2470
2408

FIG. 24.

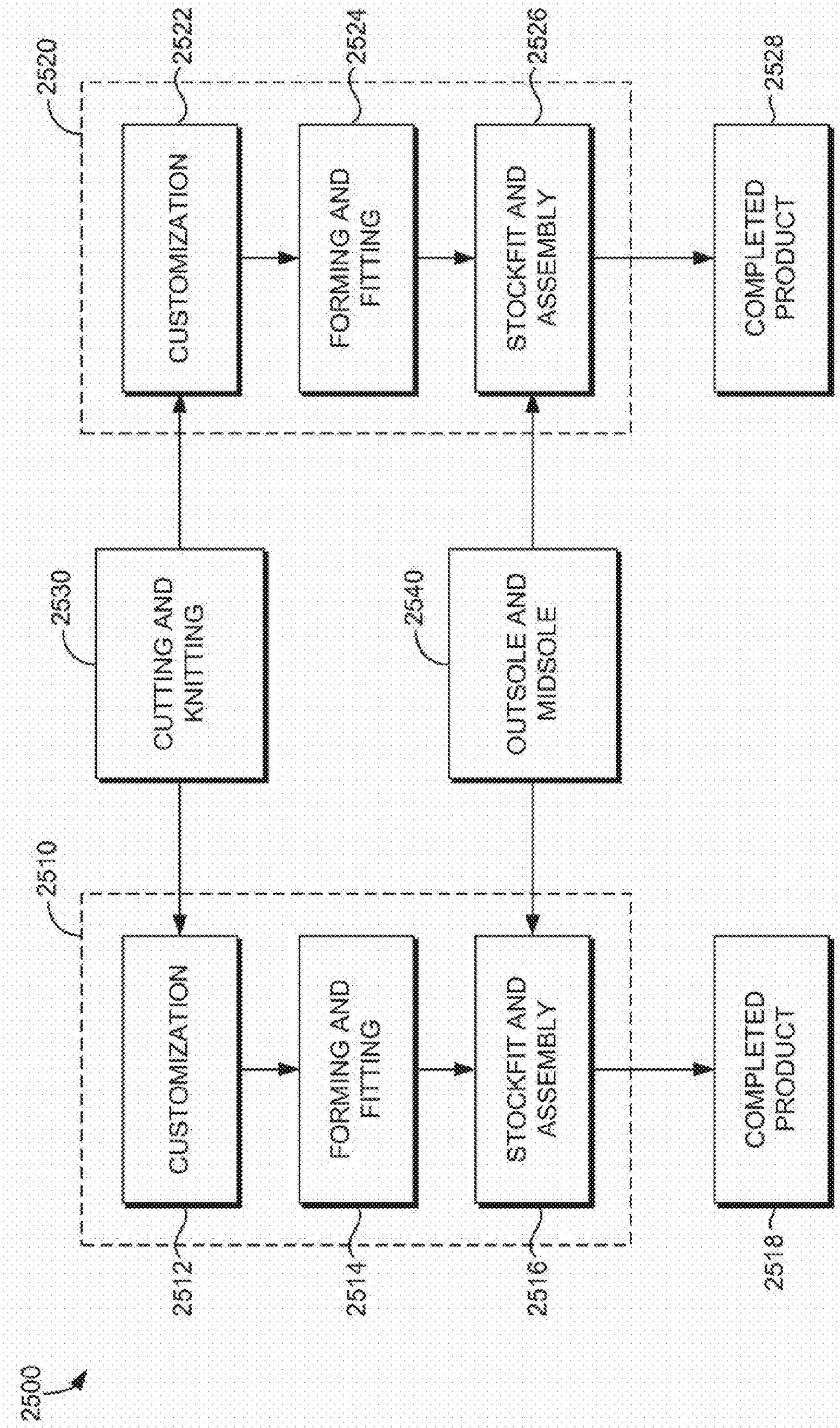

2500
2510
2512
CUSTOMIZATION
2514
FORMING AND FITTING
2516
STOCKFIT AND ASSEMBLY
2518
COMPLETED PRODUCT
2530
CUTTING AND KNITTING
2540
OUTSOLE AND MIDSOLE
2520
2522
CUSTOMIZATION
2524
FORMING AND FITTING
2526
STOCKFIT AND ASSEMBLY
2528
COMPLETED PRODUCT

FIG. 25.

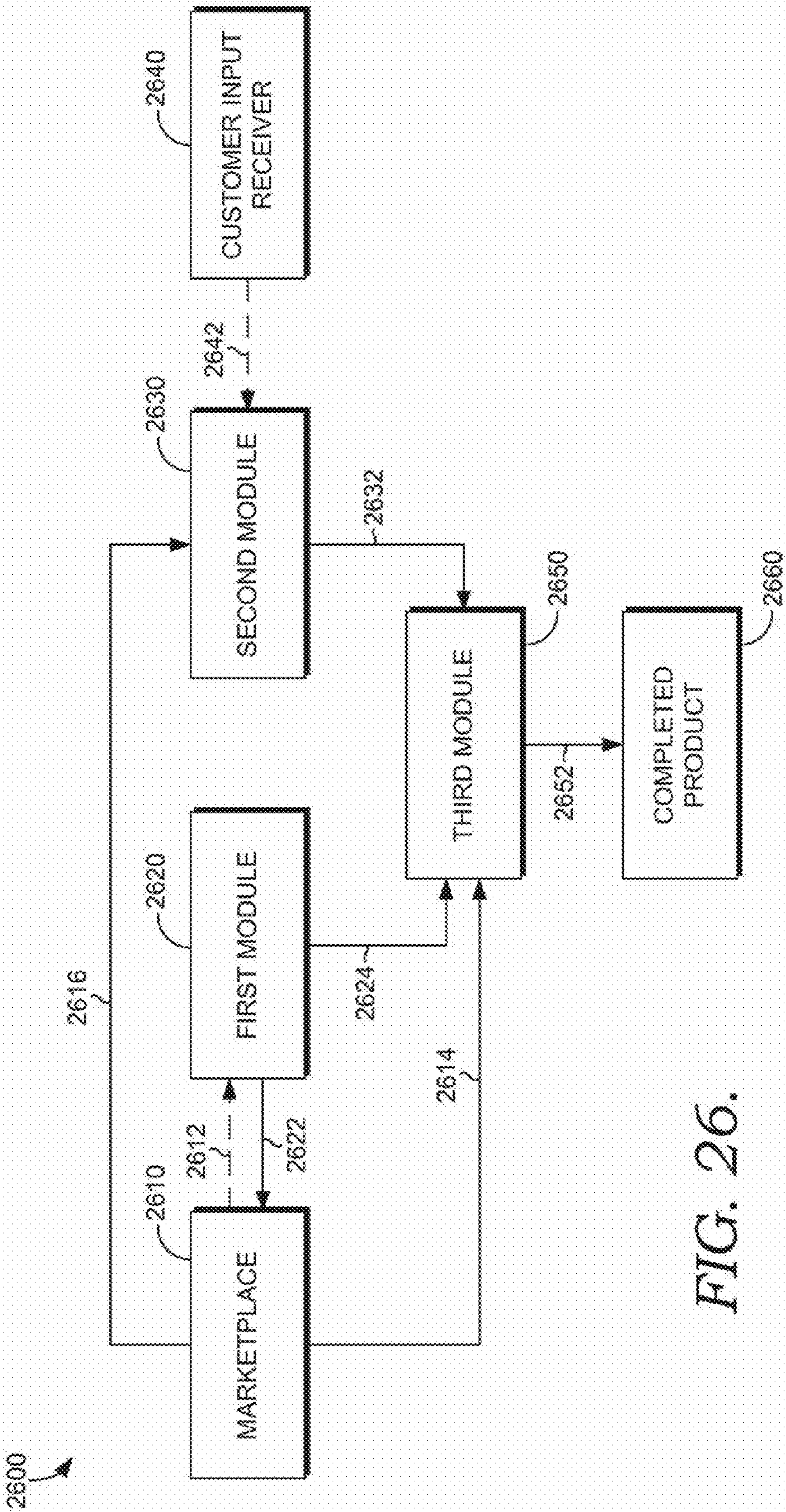

2600
MARKETPLACE
2610
2612
2622
FIRST MODULE
2620
2616
2624
2614
SECOND MODULE
2630
2642
CUSTOMER INPUT RECEIVER
2640
2632
THIRD MODULE
2650
2652
COMPLETED PRODUCT
2660

FIG. 26.

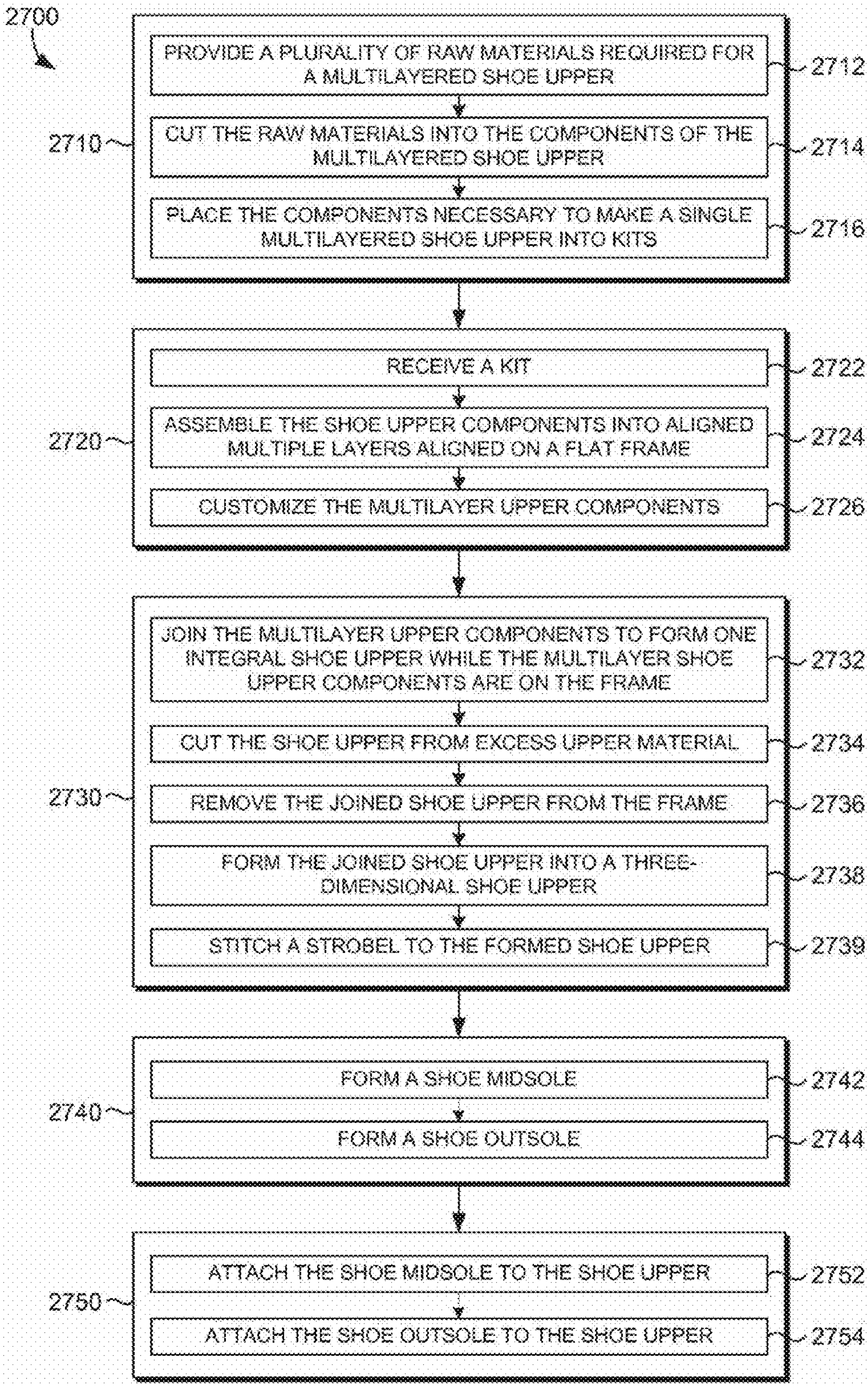

2700
2710
PROVIDE A PLURALITY OF RAW MATERIALS REQUIRED FOR A MULTILAYERED SHOE UPPER
2712
CUT THE RAW MATERIALS INTO THE COMPONENTS OF THE MULTILAYERED SHOE UPPER
2714
PLACE THE COMPONENTS NECESSARY TO MAKE A SINGLE MULTILAYERED SHOE UPPER INTO KITS
2716
2720
RECEIVE A KIT
2722
ASSEMBLE THE SHOE UPPER COMPONENTS INTO ALIGNED MULTIPLE LAYERS ALIGNED ON A FLAT FRAME
2724
CUSTOMIZE THE MULTILAYER UPPER COMPONENTS
2726
2730
JOIN THE MULTILAYER UPPER COMPONENTS TO FORM ONE INTEGRAL SHOE UPPER WHILE THE MULTILAYER SHOE UPPER COMPONENTS ARE ON THE FRAME
2732
CUT THE SHOE UPPER FROM EXCESS UPPER MATERIAL
2734
REMOVE THE JOINED SHOE UPPER FROM THE FRAME
2736
FORM THE JOINED SHOE UPPER INTO A THREE-DIMENSIONAL SHOE UPPER
2738
STITCH A STROBEL TO THE FORMED SHOE UPPER
2739
2740
FORM A SHOE MIDSOLE
2742
FORM A SHOE OUTSOLE
2744
2750
ATTACH THE SHOE MIDSOLE TO THE SHOE UPPER
2752
ATTACH THE SHOE OUTSOLE TO THE SHOE UPPER
2754

FIG. 27.

METHOD FOR EFFICIENT AND LOCALIZED PRODUCTION OF SHOES

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Patent Application No. 61/194,496, filed Sep. 26, 2008, entitled "Method for Efficient and Localized Production of Shoes."

BACKGROUND OF THE INVENTION

[0002] Shoe production is a labor-intensive process that has changed little despite advancements in automation over the past 100 years. Thus, most shoe manufacturing operations today require a significant amount of manual input. For example, one worker may cut, form, align, and stitch an upper piece of a shoe. While this process may utilize a number of machines, there is still a significant amount of human input required that can introduce variation between any two different uppers. This upper shoe piece may then be passed to another worker who may then add embroidery or other embellishments, which also require a significant amount of human input. These high levels of human input can introduce undesired variations in the finished shoe-product. Further, the large amount of human labor required in the making of shoes has limited the ability to produce on-demand custom shoes at a price deemed acceptable by most customers.

SUMMARY OF THE INVENTION

[0003] This Summary is provided to introduce a selection of concepts in a simplified form that are further described below in the Detailed Description. This Summary is not intended to identify key features or essential features of the claimed subject matter, nor is it intended to be used as an aid in determining the scope of the claimed subject matter. The present invention offers several practical applications in the technical arts, not limited to methods for the production of specific types of shoes that are herein described.

[0004] The present invention relates to efficient shoe manufacturing methods and systems that reduce the specialized human labor required to manufacture a pair of shoes while avoiding the high costs and special maintenance requirements often associated with highly automated manufacturing equipment. Systems and methods in accordance with the present invention may be used to produce multiple models of custom shoes at a single shoe manufacturing facility. For example, one customer may order a particular model of shoe while a second customer may order a different model of shoe, yet both shoe models may be manufactured at the same facility by utilizing overlapping workflows.

BRIEF DESCRIPTION OF THE DRAWING

[0005] The present invention is described in detail below with reference to the attached drawing figures, wherein:

[0006] FIG. **1** illustrates a diagram of a shoe component-manufacturing facility for the manufacture of custom shoe components in accordance with an embodiment of the present invention;

[0007] FIG. **2** illustrates a flowchart of a method of efficiently manufacturing multiple models of custom shoes at a single manufacturing facility in accordance with an embodiment of the present invention;

[0008] FIG. **3** illustrates a flowchart of an outsole manufacturing workflow for a running shoe for the outsole/midsole module in accordance with an embodiment of the present invention;

[0009] FIG. **4** illustrates a flowchart of a midsole manufacturing workflow for a running shoe for the outsole/midsole module in accordance with an embodiment of the present invention;

[0010] FIG. **5** illustrates a flowchart of a workflow for a running shoe for the priming and adhesive module in accordance with an embodiment of the present invention;

[0011] FIG. **6** illustrates a flowchart of a workflow for joining an outsole and a midsole into a midsole-outsole on a running shoe in accordance with an embodiment of the present invention;

[0012] FIG. **7** illustrates a flowchart of a workflow for customizing an upper for a running shoe in accordance with an embodiment of the present invention;

[0013] FIG. **8** illustrates a flowchart of a workflow for assembling an upper for a running shoe in accordance with an embodiment of the present invention;

[0014] FIG. **9** illustrates a flowchart of a workflow for lasting and quality control for a running shoe in accordance with an embodiment of the present invention;

[0015] FIG. **10** illustrates a flowchart of an outsole manufacturing workflow for a basketball shoe for the outsole/midsole module in accordance with an embodiment of the present invention;

[0016] FIG. **11** illustrates a flowchart of a midsole manufacturing workflow for a basketball shoe for the outsole/midsole module in accordance with an embodiment of the present invention;

[0017] FIG. **12** illustrates a flowchart of a workflow for a basketball shoe for the priming and adhesive module in accordance with an embodiment of the present invention;

[0018] FIG. **13** illustrates a flowchart of a workflow for joining an outsole and a midsole into a midsole-outsole on a basketball shoe in accordance with an embodiment of the present invention;

[0019] FIG. **14** illustrates a flowchart of a workflow for customizing an upper for a basketball shoe in accordance with an embodiment of the present invention;

[0020] FIG. **15** illustrates a flowchart of a workflow for assembling an upper for a basketball shoe in accordance with an embodiment of the present invention;

[0021] FIG. **16** illustrates a flowchart of a workflow for lasting and quality control for a basketball shoe in accordance with an embodiment of the present invention;

[0022] FIG. **17** illustrates a flowchart of an outsole manufacturing workflow for a skate shoe for the outsole/midsole module in accordance with an embodiment of the present invention;

[0023] FIG. **18** illustrates a flowchart of a midsole manufacturing workflow for a skate shoe for the outsole/midsole module in accordance with an embodiment of the present invention;

[0024] FIG. **19** illustrates a flowchart of a workflow for a skate shoe for the priming and adhesive module in accordance with an embodiment of the present invention;

[0025] FIG. **20** illustrates a flowchart of a workflow for joining an outsole and a midsole into a midsole-outsole on a skate shoe in accordance with an embodiment of the present invention;

[0026] FIG. **21** illustrates a flowchart of a workflow for customizing an upper for a skate shoe in accordance with an embodiment of the present invention;

[0027] FIG. **22** illustrates a flowchart of a workflow for assembling an upper for a skate shoe in accordance with an embodiment of the present invention;

[0028] FIG. **23** illustrates a flowchart of a workflow for lasting and quality control for a skate shoe in accordance with an embodiment of the present invention;

[0029] FIG. **24** illustrates a work flow diagram of a shoe component-manufacturing facility for the manufacture of custom shoe components in accordance with an embodiment of the present invention;

[0030] FIG. **25** illustrates a schematic of a module configuration for use in shoe production in accordance with an embodiment of the present invention;

[0031] FIG. **26** illustrates a system for producing and assembling shoe components in accordance with an embodiment of the present invention; and

[0032] FIG. **27** illustrates a flowchart of a workflow of a shoe manufactured through a process in accordance with an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0033] The subject matter of the present invention is described with specificity herein to meet statutory requirements. However, the description itself is not intended to limit the scope of this patent. Rather, the inventors have contemplated that the claimed subject matter might also be embodied in other ways, to include different steps or combinations of steps similar to the ones described in this document, in conjunction with other present or future technologies. Moreover, although the term "step" may be used herein to connote different components of methods employed, the terms should not be interpreted as implying any particular order among or between various steps herein disclosed unless and except when the order of individual steps is explicitly described.

[0034] Embodiments of the invention may provide a method for efficiently producing shoes that may meet the demands of a geographic location. By way of example only and not limitation, a production facility for efficient production of shoes may be divided into particular modules, wherein a module may refer to an area of distributive labor or of specificity relating to one or more aspects of the shoemaking process, such as embroider or production of midsoles. In one embodiment, one or more modules may be designed to best benefit the working environment of individual operators such that the interaction between the operator and the machines in an operator's module are ergonomically designed to be conducive to the worker's good health. Each module may be referred to as a "module." As a shoe component moves through modules, different processes and modifications may occur that comprise the steps in the overall manufacture of a shoe.

[0035] A shoe article, wherein a shoe article may be a final shoe or a partially final shoe or a component of a final shoe, may be produced only after a customer order has been received. A customer order may contain custom shoe parameters that pertain to one or more shoes produced for a given consumer. Moreover, since each shoe may be custom-made, each shoe may have a variety of characteristics according to each customer's request (e.g., a left-foot men's size 9 in blue with medium-level hardness may be paired with a right-foot men's size 9.5 with high-level hardness in red).

[0036] Once a customer has placed an order for one or more shoes, the order may be tracked throughout the production system so as to notify one or more operators of the unique characteristics of each order. In one method, the customer order may be presented to one or more operators on one or more sheets of paper. Each sheet of paper may travel to an appropriate operator so as to indicate to the operator what modifications to make to the shoe and/or shoe component the operator is modifying. The operator may then select the desired characteristics, such as a preferred color, from a source of materials within the modularized production facility, or the operator may select the desired design and/or markings from a series of program choices on a computer system. In the latter method, the operator may search through a predefined set of designs available for printing and/or embroidering and/or etching onto a material and may program the computer to print and/or embroider and/or etch the design onto a material. In another method, the operator may input a design or program supplied by the customer as a customized design on one or more shoe components.

[0037] In another embodiment, an operator can access information pertaining to a customer order throughout the shoe component-manufacturing facility by having the customer information stored on a database that is accessible to an operator in the shoe component-manufacturing facility. An operator may access the customer order information through a computer interface at or near one or more modules in the shoe-components manufacturing facility. An operator may also access information pertaining to the customer through the use of one or more bar codes. In one method, a bar code may access customer order info from a database that may contain all of the necessary information for the production of a customer's order of one or more shoes. A bar code may be used to access all information related to one or more shoe components, or may be used to access particular information related to one or more shoe components.

[0038] For example, an operator may scan one bar code at each software access point along the process. In another example, a bar code may be associated with each characteristic aspect and/or component of a shoe. For example, a bar code may be associated with the color which is desired to have on the background of a shoe component. In another example, a bar code may be associated with the components and/or designs desired to be reflected on an upper. In still another example, a bar code may be associated with to selection of components from a marketplace. For instance, one bar code may represent men's running shoes size 9, whereas another bar code may represent women's basketball shoes size 7. In another example, the use of bar codes may be associated with or supplanted by the use of number codes to supply the characteristics of a customer's order. For example, if a barcode is damaged or if a barcode reader is simply not working, an operator may input a number code to reflect the characteristic customer information associated with an order of one or more shoes.

[0039] There may be three starting points from which one or more shoe components are produced: the production of the outsole, the production of the midsole, and the production of the upper. The production of the outsole and/or midsole may begin before a customer places an order. An outsole and/or midsole may also be produced on an as-needed basis after a customer order is received for the production of one or more shoes.

[0040] Referring to the drawings in general, and initially to FIG. **1** in particular, an exemplary operating environment suitable for implementing embodiments of the present invention is shown and designated generally as shoe component-manufacturing facility **100**.

[0041] Shoe component-manufacturing facility **100** is but one example of a suitable manufacturing environment and is not intended to suggest any limitation as to the scope of use or functionality of the invention. Neither should the shoe component-manufacturing facility **100** be interpreted as having any dependency or requirement relating to any one or combination of components illustrated.

[0042] FIG. **1** shows the floor layout of six shoe component-manufacturing modules organized by the processes performed by an operator associated with a module. The six modules represented in FIG. **1** include: the Outsole and Midsole module; the Midsole, Outsole, Upper Prime and Adhesive module; the Final Assembly & Stockfit module; the Upper Customization module; the Upper Forming and Stitching module; and the Lasting, De-Lasting, Quality Control and Packing module. With reference to the diagram of FIG. **1**, the areas of each module in shoe component-manufacturing facility **100** are described. The Outsole and Midsole module may contain injection mold pre-forming machine **102** that may be used to produce phylon biscuits. The Outsole and Midsole module may also contain midsole marketplace **108** that may store phylon biscuits for use in forming midsoles. The Outsole and Midsole module may also contain press **106**, that may specifically be a Kingstead Quick Open Press, that may be used for characterizing phylon biscuits as being right-oriented shoes, left-oriented shoes, or neutral-oriented shoes may. The Outsole and Midsole module may also contain a microwave heat source to pre-heat the phylon biscuit. The Outsole and Midsole module may also contain stabilization oven **110** that may be used to stabilize midsoles and may also decrease the volume of midsoles. The Outsole and Midsole module may also contain a wash/dry are **112**. The Outsole and Midsole module may also contain a midsole marketplace **104**. The Outsole and Midsole module may also contain injection mold rubber machine **116** that may be used to produce outsoles. The Outsole and Midsole module may also contain a wash/dry area **114** that may be used to wash outsoles with an alkaline or acid wash. The Outsole and Midsole module may also contain an outsole marketplace **118**.

[0043] The Midsole, Outsole, Upper Prime and Adhesive module may contain midsole marketplace **104** and outsole marketplace **118**. The Midsole, Outsole, Upper Prime and Adhesive module may also contain primer and adhesive area **120**. In another method, the primer area and adhesive area may be two separate areas. The Midsole, Outsole, Upper Prime and Adhesive module may also contain chemical storage area **156** that may contain chemicals related to one or more processes in the manufacturing of shoe components and/or shoe articles in the shoe-components manufacturing facility **100**. The Midsole, Outsole, Upper Prime and Adhesive module may also contain infrared (IR) oven **122**. In another method, the Midsole, Outsole, Upper Prime and Adhesive module may also contain a standard oven wherein one or more shoe articles may undergo manufacturing processes, such as having adhesive activated.

[0044] The Final Assembly & Stockfit module may contain IR oven **122**. The Final Assembly & Stockfit module may also contain a bladder press **124** that may be used to fit a midsole and outsole together. The Final Assembly & Stockfit module may also contain standard press **126**. The Final Assembly & Stockfit module may also contain chiller **128** that may be used to set the adhesive of a midsole-outsole shoe article. The Final Assembly & Stockfit module may also contain swing arm stage post **130**.

[0045] The Upper Customization module may contain Eco-Solvent Printer **132** and print desk **134** and dye sub printer **136**. The Upper Customization module may also contain custom clicker **138** that may be used to modify material used in upper customization and a tooling area **160** that may contain tools related to one or more processes in the manufacturing of one or more shoe components and/or one or more shoe articles in the shoe-components manufacturing facility **100**. The Upper Customization module may also contain laser **140** that may be used to etch material used in upper customization and a laser/embroidery desk **146**. The Upper Customization module may also contain dye sub press **142**. The Upper Customization module may also contain left embroidery machine **162** and may contain right embroidery machine **164**. The Upper Customization module may also contain tooling area **166** that may contain tools related to one or more processes in the manufacturing of one or more shoe components and/or one or more shoe articles in the shoe-component manufacturing facility **100**. The Upper Customization module may also contain radio frequency (RF) Welder **148** wherein RF Welder **148** may include an RF staging area that may be used to temporarily store shoe components in the process of producing a shoe.

[0046] The Upper Forming and Stitching module may contain RF Welder **148** wherein RF Welder **148** may include an RF staging area that may be used to temporarily store shoe components in the process of producing or modifying a shoe article. The Upper Forming and Stitching module may also contain marketplace **150** that may be used to temporarily store and make easily available customizable parts needed to complete production of a shoe or shoe article. The Upper Forming and Stitching module may also contain material storage **168** that may contain materials and/or shoe components related to one or more processes in the manufacturing of shoe components and/or shoe articles in shoe-component manufacturing facility **100**. The Upper Forming and Stitching module may also contain final trim clicker **144** and wing arm staging area **130**. The Upper Forming and Stitching module may also contain market clicker **170**, heat press **172**, cooling rack **174**, cutting press **176**, heel former **178**, post stitch **180** and strobel stitch **182**.

[0047] The Lasting, De-Lasting, Quality Control and Packing module may contain swing arm staging area **130**. The Lasting, De-Lasting, Quality Control and Packing module may also contain lasting area **152**, final quality control **154**, lacing and packing **156** and storage material **184**.

[0048] With reference to the diagram of FIG. **1**, the production of one shoe through the one or more modules of shoe component-manufacturing facility **100** is described. It should be understood that this and other arrangements described herein are set forth only as examples. Other arrangements and elements (e.g., machines, processes, methods, etc.) can be used in addition to or instead of those discussed, and some elements may be omitted altogether. Further, many of the elements described herein are functional entities that may be implemented as discrete or distributed components or in conjunction with other components, and in any suitable combination and location.

[0049] In one embodiment, the first step in the production of the outsole may utilize injection rubber mold machine **102**. Different-sized and/or -shaped molds may be used to produce a range of outsoles for a range of shoe sizes and styles. Various types and/or colors of rubber may also be used to produce outsoles with different functional and/or aesthetic properties. For example, indicating marks (such as dotted lines) may be used to guide a designer (e.g. someone who embroiders or adds mechanical lights or who uses glue or another form of adhesive to add fabric and accessories onto one or more shoe components) in the production of the outsole. In another case, different colors of shoe components may have a functional component, such as adding an easily seen color, such as bright yellow, to one or more shoe components to make a shoe-wearer more visible. Alternatively, different rubbers with a higher slippage may be placed along a shoe component in order to minimize the extent to which mud or other outside components stick to the shoe-wearer's one or more shoes.

[0050] The operator of injection rubber mold machine **102** may determine the number of each size, style, color, etc. of outsoles to make initially based on an indicator of outsoles required in outsole marketplace **118**. For example, an indicator may include a pre-set range of expected sales for that store. A number of outsoles may also be created upon receipt of an indication of depleting inventory of a particular size, style, color, etc. The pre-set range of sales may be projected for a day or for another period of time, such as a week or a month or a season. The operator of injection rubber mold machine **102** alternatively or additionally may determine which size of outsole to make based on the quantity of outsoles of that size remaining in outsole marketplace **118**. Outsole marketplace **118** of may comprise a plurality of temporary storage methods, with each temporary storage method corresponding to a particular style, size, color, functional property, etc. For example, a temporary storage method may comprise placing newly formed outsoles for size **9** in a first-come-first-serve (i.e. FIFO) queue. In another example, a temporary storage method may consist of an operator placing each newly formed outsole into a bin associated with one or more properties of that outsole (e.g., outsoles for men's size **9** are in one bin while outsoles for men's size 5 are in another bin). In still another example, a temporary storage method may comprise placing all newly formed outsoles into a bin and then allowing the operator to remove the appropriately sized outsole from the bin when needed, e.g. by choosing an outsole based on sight variation between different sized outsoles or by textured indications of different sized outsoles.

[0051] Upon determining that there is a low quantity of a certain size of outsole remaining in outsole marketplace **118**, such as by visual inspection, the operator may then decide to manufacture outsoles of that size. Outsoles may also be produced in direct response to an order, and may be made having the style, size, color, functional properties, etc. specified in an order.

[0052] Once the outsole is removed by the operator from injection rubber mold machine **102** it may be placed into wash/dry area **114**. Wash/dry area **114** may comprise one or more cleaning steps to clean the shoe and remove any residue from the rubber. For example, rubber residue may be caused by the oils and stearic acid used during a curing process. In another example, a curing process may eliminate the use of stearic acid in the curing process and/or reduce the amount of oil used in the curing process, thereby reducing or eliminating the need for wash/dry area **114**. This curing process may reduce or eliminate the rubber residue produced during the curing process and may reduce or eliminate the need for one or more cleaning steps. As such, the outsole could be ready for priming directly after it is formed in injection rubber mold machine **116**.

[0053] After washing, if any, the outsole may be dried. For example, the outsole may be dried using wash/dry area **114**. In another example, the outsole may be dried by placing it in a sufficient heated, sufficiently de-humidified area (e.g. place the one or more shoes next to a window to dry). The operator may remove the dried outsole from wash/dry **114** and place it into outsole marketplace **118** to be available for use.

[0054] Outsole marketplace **118** and midsole marketplace **104** may be comprised of one or more temporary storage methods wherein midsoles may be stored in bins that are arranged according to size, style, color, or other attributes of the components stored in the bins. Outsole marketplace **118** and midsole marketplace **104** may store outsoles and midsoles that have been produced upon receipt of an indication of anticipation of customer orders. Outsole marketplace **118** and midsole marketplace **104** may also contain outsoles or midsoles produced upon receiving a specific customer order. By way of further example, outsoles and/or midsoles produced upon receipt of a customer order may bypass outsole marketplace **118** and/or midsole marketplace **104** and move directly onto further production steps. Still more embodiments may be obvious to one of ordinary skill in the art.

[0055] The production of the midsole may begin before a customer places an order. A midsole may also be produced on an as-needed basis upon the receipt of a customer order for one or more shoes. Further, a midsole may be produced as a result of the receipt of an indication that the quantity and character of midsoles remaining in midsole marketplace **104** should be adjusted.

[0056] To begin midsole production, a pre-measured volume of raw, unblown EVA pellets may be injected into a mold at injection mold pre-form **102** that is heated to approximately 100° Celsius. The temperature of the mold may be hot enough to melt the EVA pellets to conform to the shape of the mold, but not hot enough to activate the EVA's blowing agent. The product is an injection phylon biscuit, hereinafter referred to as a "biscuit," that may be stored prior to activating the blowing agent to fabricate a midsole. Different volumes of EVA pellets may be associated with different shoe sizes, styles, densities and or hardnesses of portions of a midsole. Furthermore, the base polymer that is used in the injection phylon biscuit process may differ based on the ultimate hardness characteristic that is desired in the midsole of a shoe. Each set of shoes may contain one or more biscuits of varying volumes and dimensions comprising the midsole of each shoe. The hardness of one or more biscuits in a midsole may be customized to vary laterally and/or vary lengthwise across the shoe. Such a characteristic may, for example, prevent mild pronation in shoe users, such as runners, or simply enhance comfort.

[0057] Once the biscuit is made, it may be removed and placed into biscuit marketplace **108**. From biscuit marketplace **108**, the biscuits may be taken out on an as-needed basis. When a customer orders one or more shoes, for example, an operator may take one or more biscuits that are in accordance with the customer's order. In another method, operator may take the one or more biscuits from the marketplace and place them in a machine that exposes the one or more biscuits to a source of microwave radiation. For example, one or more biscuits may be placed in a Magic Chef MCB780W 1.2 kilowatt microwave and exposed to microwave radiation at high power for a period of sixty-five seconds.

[0058] Next, an operator may place each biscuit into press **106** which may be designated for left shoes and right shoes or a combination of both. The operator may load the left shoe designation or right shoe designation of press **106**, and may use press **106** to configure each biscuit as "left" or "right." The operator may then unload each biscuit from press **106**. Press **106** may not be limited to holding only one biscuit, but may hold a plurality of biscuits at any given time. Moreover, the pressing of the biscuits need not be in sync with respect to each biscuit in press **106**, but rather, may be designed to have multiple biscuits loading and pressing and unloading at any given time. In still a further example, an operator of a module may bypass the step of using a press **106** to designate a shoe article as being oriented "left" or "right", and may simply use a lathe or a pair of shears or one or more blades to shape the biscuit by hand. An operator may also use another type of machine to designate each biscuit as being oriented "left" or "right" before placing each biscuit into a neutral, un-oriented press **106**. An operator may also keep the biscuit as a neutral designation, such that each shoe part is interchangeable as being used for a left shoe and/or a right shoe.

[0059] Once press **106** contains the biscuit it may heat up to a temperature of approximately 172° Celsius that is sufficient to melt the biscuit. The temperature is sufficient to activate a blowing agent in the biscuit. This blowing agent may degrade the polymer chains and start a foaming process which increases the volume of the biscuit approximately 200% to conform to the shape of the press. Simultaneously, the a curing agent within the biscuit working at a slower reaction rate than the blowing agent may begin to cross-link polymer chains to hold the form of the augment biscuit.

[0060] After the augmented biscuit is formed, an operator may unload the augmented midsole from press **106** and load the augmented midsole into stabilization oven **110**. Upon entering stabilization oven **110**, the augmented midsole may be approximately 75° Celsius. In another example, the augmented midsole may enter stabilization oven **110** at a temperature that is higher or lower than 75° Celsius. In one example, the augmented midsole may be as hot as the highest temperature achieved in the press **106** and may be transferred at that same temperature into the stabilization oven **110**. The stabilization process in stabilization oven **110** may be comprised of three or more cooling stages in which the temperature may decrease from approximately 75° Celsius to approximately 45° Celsius. In another example, the stabilization process in stabilization oven **110** may be conducted over a greater number of steps through the use of water and or air as mediums of cooling. In still another example, additional media and/or chemical solutions may be used to enhance the cooling process in the stabilization process of stabilization oven **110**. The stabilizing process may decrease the volume of the augmented midsole by approximately 20% such that the midsole resulting from the stabilization process is approximately 160% of the original biscuit volume. In another example, the stabilizing process may be modified to increase or decrease the percentage change seen in the volume of the augmented midsole. In another method, any form of stabilization method may be used to stabilize one or more augmented biscuits, including immersion into water or other liquid at a desired temperature. In another example, augmented biscuits may be stabilized through the use of an aerosol solution or exposure to air at a desired temperature.

[0061] Another method of changing the volume of an augmented midsole may be to modify the midsole by hand, e.g. by the use of a lathe or the use of one or more cutting tools or the use of a second mold from which the augmented midsole may be placed in to decrease volume either by using pressure to shrink volume or using pressure to press a desired form from the augmented midsole and subsequently cutting and/or trimming off any undesired excess material.

[0062] Next, an operator may unload the biscuit from stabilization oven **110** and load the biscuit into wash/dry table **112** wherein a sonic bath may be used to clean one or more midsoles. Wash/dry table **112** may use one or more cleaning stages to clean a midsole. In another embodiment, the stabilization of the augmented biscuit may be combined with wash/dry table **112**. In another embodiment, the biscuit may be unloaded from stabilization oven **110** and loaded into another type of cleaning machine and/or solvent and/or solution wash. In another example, each biscuit unloaded from stabilization oven **110** may be hand-polished by one or more operators.

[0063] Next, an operator unloads the biscuit from wash/dry table **112** and loads the biscuit into the drying oven. In another embodiment, the biscuit may be unloaded from wash/dry table **112** exposed to a sufficiently high temperature to evaporate a desired amount of water from the biscuit. The drying of the midsole may occur by placing the midsoles out to air dry. Next, an operator may unload the biscuit from drying oven and load the biscuit into marketplace.

[0064] At this point in the current embodiment, midsole marketplace **104** and outsole marketplace **118** may be comprised of a series of different classes of outsoles and the one or more midsoles described above. When a customer orders one or more shoes, the outsoles and the one or more midsoles associated with the customer's order may be removed from outsole marketplace **118** and midsole marketplace **104**, respectively, if available. If one or more midsoles or outsoles of a customer's order are not available in midsole marketplace **104** or outsole marketplace **118**, respectively, the necessary component or components may be made on a per-order basis.

[0065] After the outsole and one or more midsoles are removed from outsole marketplace **118** or midsole marketplace **104**, respectively, they may be primed with an UV-activated primer at area **120**. The primer may be placed on the one or more midsoles within 24 hours of its being activated. In an alternative embodiment, the primer can be placed on each outsole and midsole prior to entering outsole marketplace **118** or midsole marketplace **104**, respectively.

[0066] After the outsole and the one or more midsoles are primed, each component may be placed in infrared oven **122**. Once in the oven, the temperature may be increased to approximately 55° Celsius. At a sufficiently high temperature, the primer may be activated. Each component may then be removed from the infrared oven and an adhesive may be applied at prime and adhesive area **120**. Each component may then be loaded into infrared oven **122**, where it may be heated to approximately 55° Celsius, at which point the adhesive may be activated. Each component may then be removed from infrared oven **122**. In an alternative embodiment, each component may have adhesive applied at prime and adhesive area **120** and then loaded into a standard oven to be heated. The standard oven may be heated, at which point the adhesive may be activated. The outsole and the one or more midsoles may be pressed together. For example, the outsole and the one or more midsoles may be hand-fit together through the use of bladder press **124** and standard press **126**. In another example, the outsoles and midsoles may be loaded into a pressing alignment machine that works to fit the outsole and one or more midsoles together.

[0067] Once an outsole is pressed together with its associate midsole, the outsole-midsole is then placed in chiller **128**. Chiller **128** may decrease the temperature of the outsole-midsole, to approximately 0° Celsius, allowing the adhesive to set. In an alternative method, the outsole-midsole may be set out to cool for a sufficient amount of time as is necessary to reduce the temperature of the adhesive to a point that it sets the adhesive. Next, the outsole-midsole may be sent to the staging area at swing arm post **130**.

[0068] In one embodiment, the production of the upper may begin when the customer places an order for one or more shoes. After a customer places an order for one or more shoes, an operator may load a piece of synthetic material (e.g., synthetic leather, polyester, or mesh, etc.) onto eco-solvent printer **132**. The synthetic material may be white, which may allow customer to request synthetic material to be printed with one or more desired aesthetic elements pertaining to the customer's order. Alternatively, the synthetic material may be dyed to customize the customer's order for one or more shoes. In another method, an operator may load a natural material (e.g. cotton or natural leather) onto eco-solvent printer **132**. In another method, the desired color of a material may be loaded into eco-solvent printer **132**. Loading a desired color of a material may reduce or eliminate steps for dyeing material.

[0069] The operator may then load eco-solvent printer **132** and dye sub printer **136** with materials associated with imprinting and/or dyeing and/or marking the parameters of customer's order onto eco-solvent printer **132**. Eco-solvent printer **132** may then print to dye sub printer **136**. Next, eco-solvent printer **132** may print. Next, eco-solvent printer **132** may cut out a customized synthetic from an original piece of synthetic material. In another method, the customized synthetic may be cut with the use of shears or a blade or the use of a press.

[0070] After the piece of customized synthetic has been cut, the operator may load a piece of customized synthetic into laser **140**. The operator may then input the specifications given by the customer and may start the laser etching job, if applicable.

[0071] Next, the operator may remove the piece of customized synthetic and may load it into dye sub press **142**. The dye sub press **142** may be used to imprint designs, such as a Nike swoosh, onto material. The operator may remove the laser cut upper from the dye sub press **142** and load the upper into embroidery machine **146**. The operator may then start embroidering machine **146**, customizing the upper by embroidering a desired set of designs using a desired set of colors. The operator can then unload the customized upper from embroidering machine **146** and deliver it to radio frequency welder **148**.

[0072] At this point in the process, the upper and outsole-midsole may be retrieved by an operator. The operator may also retrieve a kit of the remaining shoe components from marketplace **150**. In one embodiment, the remaining shoe components are composed in a "kit" wherein an operator can, for example, retrieve the remaining components needed for a Men's size 9 running shoe. In another method, one or more operators may retrieve one or more remaining shoe components from a marketplace of kit components. After the shoe components are gathered, the operator may utilize radio frequency welder **148** to combine the components.

[0073] After the parts of the upper have been assembled, the operator may make one or more final cuts with final trim clicker **144** to define the shape of an upper. In another example, the upper may be cut by an operator using visual judgment and or expertise to guide the operator in knowing where and/or at which angle and/or how much to cut. Swing arm **130** may then stitch the upper to the outsole-midsole. In another example, the upper may be stitched by an operator using visual judgment and or expertise to guide the operator in knowing where and/or at which angle and/or how much to cut. This sub-assembly may then be sent to lasting area **152**.

[0074] In FIG. **2**, a method **200** for the efficient manufacturing of multiple models of custom shoes at a single manufacturing facility, such as the facility disclosed above, is illustrated. In accordance with the present invention, a first customer may place an order for a first model of shoe and one or more customization parameters particular to that customer's order. A second customer may place an order for a second model of shoe and one or more customization parameters particular to that customer's order. By utilizing systems and methods in accordance with the present invention, both the first and second customers' shoes may be manufactured in the same facility efficiently, at a reasonable cost and within a reasonable amount of time. By utilizing the systems and methods in accordance with the present invention, the physical footprint of a manufacturing facility capable of producing multiple models of shoes may also be reduced.

[0075] Again, it should be understood that this and other arrangements and workflows described herein are set forth only as examples. Other arrangements and elements (e.g., processes, methods, etc.) can be used in addition to or instead of those shown and discussed, and some elements may be omitted altogether.

[0076] In step **205**, shoe model options may be presented to a customer. Shoe model options presented in step **205** may include, for example, a running shoe model, a basketball shoe model, and a skate shoe model. Of course, other shoe models, both athletic and non-athletic may be alternatively or additionally comprise available shoe model options presented in step **205**. Step **205** may optionally comprise, for example, all available shoe model options that are available to be made on-site at a connected or local shoe manufacturing facility. Additionally, shoe model options may comprise shoe models capable of being made on-site at a connected or local shoe manufacturing facility along with shoe models not capable of being made on-site at a connected or local shoe manufacturing facility. An indication of whether a particular shoe model may optionally be made on-site at a connected or local manufacturing facility or not may also be optionally presented. Step **205** may comprise, for example, presenting information describing the available shoe model options, along with an indication of local manufacturing availability for each particular model, to a customer on a computer using a graphical user interface.

[0077] In step **210**, a customer's shoe model selection may be received. For example, step **210** may comprise receiving a user selection of a presented shoe model from within a graphical user interface. A customer may select a checkbox associated with a basketball shoe model, for instance, to indicate that he or she would like to order a basketball shoe.

[0078] In step **215**, functional options for the selected shoe model may be presented to the customer. Similarly to step **205**, step **215** may be performed, for example, within a graphical user interface operating on a computer. Functional options may include parameters such as shoe size. Other types of options that may be selected in step **215** may include outsole hardness options, support options, motion control options, outsole texture options, outsole material options, and the like. It should be appreciated that step **215** need not necessarily be presented after step **205** and step **210**, but that in many instances the functional options available may depend upon the shoe model selected. For instance, functional options relating to foot motion control may be relevant to a running shoe and therefore made available for customer selection after a customer has selected a running shoe model, while motion control options are not relevant for a basketball shoe, and therefore need not be available for basketball shoe models. Additionally, similarly to step **205**, site-manufacturing information specific to each functional option may be indicated. For example, some functional options may be available for shoes manufactured on-site at a connected or local manufacturing facility, while others may only be available at a non-local manufacturing facility. One or ordinary skill in the art will readily appreciate any number of other types of functional options that are relatively specific to one or more particular model type of shoe.

[0079] In step **220**, a customer's functional options selection may be received. Similarly to step **210**, step **220** may be performed, for example, within a graphical user interface operating on a computer. For example, step **220** may comprise receiving a user selection of a specific functional option, such as midsole hardness, within a graphical user interface. For example, a customer may select a checkbox associated with an indication of midsole hardness to indicate that he or she would like the midsoles on his or her shoes to be of a specific hardness.

[0080] In step **225**, aesthetic options for the selected shoe model and/or functional options may be presented to the customer. Step **225** may occur using a graphical user interface on a computer, similarly to step **205** and step **215**. The aesthetic options presented in step **225** may depend, at least in part, upon the model option selected by a customer and/or the functional options selected by a customer. However, it is also possible that aesthetic options may exist entirely or partially independent of model and/or functional options, in which case step **225** may occur prior to or in conjunction with step **205** and/or step **215**. For example, options regarding shoe color may not depend upon shoe model or functional options. On the other hand, options relating to the color of a particular functional element, for example, will necessarily be dependent upon whether that functional element has been selected, either as part of a shoe model selection or as a functional option. Also, similarly to step **205**, site-manufacturing information specific to each aesthetic option may be indicated. For example, some aesthetic options may be available for shoes manufactured on-site at a connected or local manufacturing facility, while others may only be available at a non-local manufacturing facility.

[0081] In step **230**, the aesthetic option selections may be received from the customer. Step **230** may be performed, for example, by receiving customer selections using a pointing device in a graphical user interface on a computer, for example, by clicking checkboxes appropriate for each aesthetic option selected.

[0082] In step **235**, a customer's site manufacturing options may be presented.

[0083] Similarly to step **205**, step **235** may be performed, for example, within a graphical user interface operating on a computer. Site manufacturing options presented in step **235** may comprise, for instance, an option for on-site manufacture at a connected or local manufacturing facility, the option for manufacture at a specific local or non-local facility, or an option to indicate no site-manufacturing preference. It may be appreciated that the options presented in this step may be influenced by the customer's selection of shoe model in step **210**, the customer's selection of functional shoe options in step **220**, and/or the customer's selection of aesthetic options in step **230**. For example, if a customer selects a shoe model in step **210** that cannot be manufactured on-site at a connected or local manufacturing facility, step **215** might not present such a manufacturing option to the user. Also, as an example, if a customer selects a functional option in step **220** or and aesthetic option in step **230** that cannot be incorporated into a shoe at a specific manufacturing site, such manufacturing site might not be included in the list of manufacturing options in step **235**. Step **235** may comprise, for example, presenting to the user a list of options comprising all sites where a particular model of shoe with the particular selected functional and aesthetic options may be manufactured.

[0084] In step **240**, a customer's site manufacturing selection may be received. Similarly to step **210**, step **240** may be performed, for example, within a graphical user interface operating on a computer. For example, step **240** may comprise receiving a user selection of a presented manufacturing facility from within a graphical user interface. For example, a customer may select a checkbox associated with an local manufacturing facility to indicate that he or she would like his or her shoes to be manufactured on-site at a connected or local manufacturing facility.

[0085] In step **245**, pickup options for the selected shoe model may be presented to the customer. For example, step **245** may comprise presenting a list of options to the user comprising the option of picking up the shoes at the store where an order has been placed, the option of picking up the shoes from a connected or local manufacturing facility, the option of having the shoes delivered to a different store location, and the option of having the shoes delivered to the customer at his or her residence. It will be appreciated by one of ordinary skill in the art that the options presented in this step may be tailored to reflect the customer's manufacturing site selection in step **240**. For example, if in step **240** a user selects on-site manufacturing for his or her order, step **245** may present the user with the option of picking his or her shoes up from the store or from a connected or nearby manufacturing facility. On the other hand, if, for example, the customer in step **240** selects a shoe that cannot be manufactured on-site, the options presented in step **245** might not comprise the option to pick up the shoes at a nearby manufacturing facility.

[0086] In step **250**, a customer's pickup selection may be received. Similarly to step **210**, step **250** may be performed, for example, within a graphical user interface operating on a computer. Step **250** may comprise, for instance, receiving a user selection of a pickup option from within a graphical user interface. For example, a customer may select from a drop-down list to indicate that he or she would like his or her shoes to be available for pickup at the store in which the order was placed. Alternatively, step **250** may comprise receiving an indication that the user would prefer to have his or her order mailed to his or her residence. In another example, step **250** may comprise receiving an indication that the user would prefer to have his or her order delivered to another store site for pickup.

[0087] In step **255**, a workflow may be initiated in a facility designated by the user in step **240** to construct an outsole in accordance with the shoe model option selected by the customer. The workflow may also incorporate the functional options, and/or aesthetic options selected by a customer. For example, if, in step **210**, the customer selected a basketball shoe model, a basketball shoe workflow may be initiated in the outsole manufacturing compartment. It should be noted that the specific basketball shoe workflow for any particular basketball shoe may vary to some degree such that the customer's particular functional and/or aesthetic selections be incorporated into the final basketball shoe yet the workflow may still be considered a basketball shoe workflow (as opposed to being a skate shoe workflow). Alternatively, had the customer selected a running shoe model in step **210**, for instance, a running shoe workflow may be initiated to construct an outsole in accordance with a running shoe model.

[0088] It should first be noted that step **255** need not necessarily incorporate a different workflow for each shoe model, as some shoe models may exhibit a certain amount of overlap in certain component manufacturing compartments. For example, a workflow for a skate shoe outsole may be similar enough to a workflow for a basketball shoe outsole such that there need be only one outsole workflow for the production of both basketball and skate shoe outsoles. This does not necessarily mean, however, that each component for these shoes can similarly share a workflow; while the workflow for a basketball shoe outsole may converge with the workflow for a skate shoe outsole such that a single outsole workflow common to both shoe models may be utilized, for instance, the workflows for each shoe may diverge significantly in the production of their respective midsoles such that separate midsole workflows need be maintained. Different shoe model workflows may thus be implemented in various component manufacturing compartments with varying degrees of overlap. These overlapping, diverging and converging workflows allow for the efficient manufacture of multiple models of shoes in a single manufacturing facility while at the same time reducing physical footprint of said manufacturing facility.

[0089] It should finally be noted that step **255** need not be necessarily initiated by a specific selection by a specific customer. For example, a predetermined level of inventory of outsoles having various characteristics may be maintained. Outsoles in three different colors may be made in each available size for each of three different models of shoes available at a facility, for instance. Outsoles may then be used from the inventory based upon customer orders. Whenever a given model, size, and color of outsole begins to run low in inventory, an operator may then initiate a workflow for that model to construct additional outsoles meeting those parameters. In this way, step **255** may be performed in a way that is responsive to the shoe model, functional options, and/or aesthetic options selected by customers, while not being directly initiated by those customer selections. Further, step **255** may be performed in different ways for different types of outsoles, for example by using an inventory system to initiate workflows for commonly used outsoles and initiating workflows that produce less commonly used outsoles only in response to orders requiring them.

[0090] In step **260**, a workflow for the production of a midsole may be initiated in accordance with the shoe model; functional and/or aesthetic options may also be incorporated in accordance with the customer's selected options. First, it should be noted that, similarly to step **255**, each shoe model may not necessarily have its own specific workflow but rather may share a workflow with another shoe model. Second, similarly to step **255**, a workflow for a particular shoe model may vary to some degree to allow for the functional and/or aesthetic customizations selected by the user to be incorporated into the shoe model. Third, also similarly to step **255**, step **260** need not be initiated in response to any given shoe order by a particular customer, but may instead optionally utilize an inventory system to initiate workflows to produce midsoles having the desired characteristics. Finally, similarly to step **255**, initiating workflows to produce midsoles may be performed in different ways for different types of midsoles, for example by using an inventory system to initiate workflows for commonly used midsoles and initiating workflows to produce less commonly used midsoles only in response to orders requiring them.

[0091] In step **265**, a workflow may be initiated to ready the outsole and midsole to be affixed together in accordance with the selected shoe model; functional options and aesthetic options desired by the customer may also be incorporated. Step **265** may comprise, for example, removing from outsole marketplace one or more outsoles appropriate to the customer's order, removing from midsole marketplace one or more midsoles appropriate to customers order, skiving the edges of the removed midsole(s) and outsole(s), placing the removed midsole(s) and outsole(s) in infrared oven, priming the removed midsole(s) and outsole(s), and again placing the removed midsole(s) and outsole(s) in infrared oven. It should be noted that similarly to steps **255** and **260**, each shoe model may not necessarily have its own specific workflow at step **265** but rather may share workflows with other shoe models. Also similarly to step **255** and **260**, a workflow for a particular shoe model may vary to some degree to allow for the functional and/or aesthetic customizations selected by the user to be incorporated into the shoe model.

[0092] It should also be noted that any and/or all workflows for any and/or all compartments, including those utilized in steps **255** and **260**, may advantageously take similar amounts of time to complete, allowing for completed components to be complete at similar times. For example, the workflows from steps **255** and **260** may produce components that arrive at similar times so that they may be readied in step **265** without the need to delay initiating a workflow in step **265** to wait for certain necessary components to arrive.

[0093] As an example, if a customer selected a basketball shoe model, step **255** may comprise initiating a basketball shoe workflow that comprises the steps of (1) injection molding a rubber outsole taking approximately 220 seconds of machine time and approximately 15 seconds of human time, (2) removing flash and staging the outsole in a finished outsole marketplace taking approximately 5 seconds of human time, (3) removing the outsole from the finished marketplace taking approximately 5 seconds of human time, (4) alkaline washing the outsole taking approximately 50 seconds of machine time, (5) acid washing the outsole taking approximately 50 seconds of machine time, (6) drying the outsole taking approximately 90 seconds of machine time, (7) removing the outsole from the drying oven taking approximately 2 seconds of human time, and (8) staging the outsole in the outsole marketplace taking approximately 3 seconds of human time. Thus, the workflow for producing a basketball shoe outsole in this example may take approximately 350 seconds.

[0094] This being the case in this example, it may be advantageous for the workflow utilized in step **260** to similarly take approximately 350 seconds so that the parts may arrive at similar times so that step **265** may proceed without undue delay.

[0095] It should further be noted that any workflow may overlap not only spatially but also temporally with another workflow. For example, a workflow for the production of a basketball midsole in step **260** may comprise (1) injection molding a biscuit taking approximately 30 seconds of machine time, (2) placing the biscuit in biscuit marketplace taking approximately 10 seconds of human time, (3) heat pressing the biscuit taking approximately 420 seconds of machine time and approximately 20 seconds of human time, (4) loading the biscuit into a stabilization oven taking approximately 5 seconds of human time, (5) heating the biscuit to produce a midsole taking approximately 3600 seconds of machine time, (6) removing the biscuit from the stabilization oven taking approximately 5 seconds of human time, (7) water washing the midsole taking approximately 600 seconds of machine time, (8) drying the midsole and staging it in midsole staging marketplace taking approximately 300 seconds of machine time and approximately 5 seconds of human time, (9) removing the midsole from midsole staging marketplace taking approximately 2 seconds of human time, and (10) staging the midsole for assembly taking approximately 3 seconds of human time.

[0096] Utilizing this example workflow without temporal overlap would thus produce a midsole approximately every 5000 seconds. However, while step (**5**) for instance may in this example take approximately 3600 seconds, the stabilization may be done by a load stabilization oven that may comprise a unit that allows multiple midsoles to be in the process of stabilization at once. So, for instance, a first basketball midsole workflow may be initiated, and steps (**1**), (**2**), (**3**) and (**4**) may be performed on a first biscuit. In step (**5**), the first biscuit may need to remain in the stabilization oven for approximately 3600 seconds to become a first midsole. During this time, while this first biscuit is thus in the stabilization oven, a second midsole workflow, basketball or otherwise, may be initiated, starting with step (**1**) for that particular workflow, and progressing up to the step in that particular workflow wherein the second biscuit is loaded into the stabilization oven, for example. At this point in the example, two separate workflows are in progress, each having progressed up to and being currently in the stabilization step; accordingly, two or more different biscuits, associated with different models of shoe or not, may be in the stabilization oven in different stages of stabilization at any given time. Any number of workflows may thus be initiated be in varying stages of progress and overlap in such a manner. At the point in time when the stabilization of step (**5**) for the first workflow is finished, the first midsole may be removed from the stabilization oven and the first initiated basketball midsole workflow may be resumed at step (**6**).

[0097] In another example of temporally overlapping workflows, and again referring to the example basketball midsole workflow above, after having loaded the first biscuit into the stabilization oven at step (**5**), a second workflow may be initiated to produce a basketball shoe outsole. This second workflow may be completed and a third basketball outsole workflow may be initiated and completed. As would be appreciated by one of ordinary skill in the art, any number of workflows may be thus initiated while the first midsole workflow from the above example remains in step (**5**). At any point in time, the midsole workflow of the original example may be resumed at step (**6**) to complete the first midsole.

[0098] It may be noted that these workflows may overlap in any advantageous manner as would be obvious to one of ordinary skill in the art. In this example, each workflow may be tailored to overlap such that a new midsole will emerge in an amount of time similar to the amount of time it takes to produce other shoe components in this or other shoe component manufacturing compartments. This may advantageously allow various components to arrive at similar times to undergo a joining workflow for instance. In the current example, for instance, through the use of temporally overlapping workflows, a midsole may be produced approximately every 350 seconds to coincide with the amount of time it takes to execute an outsole workflow from the example used in step **255**. These two workflows may thus take a similar amount of time to produce two components to be joined utilizing a joining workflow without undue delay. It should also be noted that the use of temporally overlapping workflows can be applied to any step utilizing workflows, such as, for example, steps **255** and **260**, as would be obvious to one of ordinary skill in the art.

[0099] In step **270**, one or more customization workflows for an upper for a particular shoe model may be initiated in accordance with the shoe model; again, functional options, and/or aesthetic options selected by a customer may be incorporated. It should again be noted that, similarly to step **255**, **260**, and **265**, each shoe model may not necessarily have its own specific workflow but rather may share a workflow with another shoe model. Also similarly to step **255**, **260**, and **265**, a workflow for a particular shoe model may vary to some degree to allow for the functional and/or aesthetic customizations selected by the user to be incorporated into the shoe model. While step **270**, similarly to step **255**, **260**, and **265**, may be performed without regard to any particular order by a customer, in practice the customization attainable in a shoe upper will likely result in step **270** being performed in response to a specific customer order. For example, step **270** may initiate a workflow to construct an upper for a running shoe having a red color. Similarly, step **270** may initiate a workflow to construct uppers for other types of shoe models, such as basketball shoes or skate shoes; these workflows may further incorporate any of a variety of functional characteristics, such as additional ankle support, side ventilation, and other similar functional options, with any of a variety of aesthetic options, such as particular colors, stitching patterns, insignia, and the like.

[0100] As another example, step **270** may comprise initiating a basketball shoe upper customization workflow comprising (1) printing echo-solvent customization taking approximately 120 seconds of machine time and approximately 30 seconds of human time, (**2**) cutting vamp liner and vamp qtr. taking approximately 30 seconds of human time, (3) laser customization taking approximately 120 seconds of machine time and approximately 30 seconds of human time, (4) embroidery customization taking approximately 120 seconds of machine time and approximately 30 seconds of human time, (5) delivering parts to heat press taking approximately 5 seconds of human time, and (6) checking the marketplace and cutting the parts if needed, taking approximately 6 seconds of human time. Thus, the basketball workflow in this example may take approximately 491 seconds. It should be noted that this process may, similarly to steps **255**, **260**, and **265**, use varying degrees of temporally overlapping workflows such that an upper may be produced in a shorter amount of time more similar to the amount of time it takes to produce other components in this or other compartments utilizing different workflows. For example, temporally overlapping workflows may be utilized such that a customized upper, of any model type, may be produced approximately every 350 seconds.

[0101] As another example, and to further illustrate how workflows may overlap spatially, step **270** may comprise initiating a running shoe upper customization workflow in response to having received certain customer model selection input. This workflow might comprise, for example, (1) printing echo-solvent customization taking approximately 120 machine seconds and approximately 30 human seconds, (2) cutting vamp liner and vamp qtr. taking approximately 30 human seconds, (3) print dye sublimation customization taking approximately 120 machine seconds and approximately 20 human seconds, (4) press dye sub.

[0102] customization taking approximately 12 machine seconds and approximately 10 human seconds, (5) laser customization taking approximately 120 machine seconds and approximately 30 human seconds, (6) embroidery customization taking approximately 120 machine seconds and approximately 30 human seconds, (7) delivering customized parts to radiofrequency welding marketplace taking approximately 5 human seconds, and (8) checking radiofrequency welding marketplace and cutting parts if needed, taking approximately 6 human seconds. Thus, in this example, a customized running shoe upper may be constructed in approximately 613 seconds. It should be noted that this process may, similarly to previous steps utilizing workflows, use varying degrees of temporally overlapping workflows such that a running upper may be produced in a shorter amount of time more similar to the amount of time it takes to produce other components in this or other compartments utilizing different workflows. For example, temporally overlapping workflows may be utilized such that a customized running upper, of any model type, may be produced approximately every 350 seconds. It should be noted also that it will be obvious to one of ordinary skill in the art how, in these examples, this running shoe upper customization workflow overlaps similar machines, skills, and work areas involved in the basketball shoe upper customization workflow given as an example above.

[0103] In step **275**, one or more workflows for further manufacturing an upper for a particular shoe model may be initiated in accordance with the shoe model; again, functional options, and/or aesthetic options selected by a customer may be incorporated. It should again be noted that, similarly to step **255**, **260**, **265**, and **270** each shoe model may not necessarily have its own specific workflow but rather may share a workflow with another shoe model. Also similarly to step **255**, **260**, **265**, and **270**, a workflow for a particular shoe model may vary to some degree to allow for the functional and/or aesthetic customizations selected by the user to be incorporated into the shoe model. While step **275**, similarly to step **255**, **260**, **265**, and **270**, may be performed without regard to any particular order by a customer, in practice the customization attainable in a shoe upper will likely result in step **275** being performed in response to a specific customer order, or, more specifically, to the upper piece produced in step **270**. For example, step **275** may initiate a workflow to stitch an upper for a running shoe according to the user selections, said upper having been produced and customized according the user selections in step **270**.

[0104] As an example, step **275** may comprise initiating a basketball upper forming and stitching workflow comprising (1) gathering parts from marketplace taking approximately 15 seconds of human time, (2) assembling the upper pieces taking approximately 20 seconds of machine time and approximately 30 seconds of human time, (3) activating heat press taking approximately 10 seconds of machine time and approximately 2 seconds of human time, (4) loading the parts into cooling rack taking approximately 60 seconds of machine time and approximately 1 second of human time, (5) cutting final trim taking approximately 15 seconds of human time, (6) heel forming taking approximately 180 seconds of machine time and approximately 20 seconds of human time, (7) post stitching taking approximately 30 seconds of human time, (8) strobel stitching taking approximately 40 seconds of human time, and (9) delivering the upper to lasting station taking approximately 5 seconds of human time. Thus, the basketball upper forming and stitching workflow in this example may take approximately 428 seconds. It should be noted that the process in the above example may, similarly to steps **255**, **260**, **265**, and **270**, use varying degrees of temporally overlapping workflows such that an upper may be produced in a shorter amount of time more similar to the amount of time it takes to produce other components in other compartments utilizing different workflows. For example, in step (**6**), while waiting for a machine to stitch the heel, the operator may initiate another workflow for the same or another model of shoe. When the operator reaches step (**6**) in this second workflow, for instance, the first upper may be finished with step (**6**) and the operator may then perform step (**6**) on the second upper and, while allowing the machine to continue with step (**6**) on the second upper, may continue with steps (**7**), (**8**), and (**9**) on the first upper. Any of these or steps any other steps of a given workflow may be advantageously overlapped as would be obvious to one of ordinary skill in the art.

[0105] As another example, and to further illustrate how workflows may overlap spatially, step **275** may comprise initiating a running shoe upper radiofrequency welding and stitching workflow. This workflow might comprise, for example, (1) gathering parts from radiofrequency welding marketplace taking approximately 15 seconds of human time, (2) assembling upper pieces taking approximately 30 seconds of human time, (3) activating the radiofrequency welding cycle taking approximately 10 seconds of machine time and approximately 10 seconds of human time, (4) cutting final trim taking approximately 15 seconds of human time, (5) stitching upper to sole taking approximately 60 seconds of human time, and (6) delivering to final quality control area taking approximately 5 seconds of human time. This example workflow may thus take approximately 145 seconds. It should be noted that this process may, similarly to previous steps utilizing workflows, use varying degrees of temporally overlapping workflows such that a running shoe upper may be produced in a shorter amount of time more similar to the amount of time it takes to produce other components in this or other compartments utilizing different workflows. For example, temporally overlapping workflows may be utilized such that a customized running upper, of any model type, may be produced approximately every 350 seconds. It should be noted also that it will be obvious to one of ordinary skill in the art how, in these examples, this running shoe upper radiofrequency welding and stitching workflow overlaps similar machines, skills, and work areas involved in the basketball upper forming and stitching workflow given as an example above.

[0106] In step **280**, a workflow may be initiated such that the outsole, midsole, and upper may be affixed together to form the selected shoe model in accordance with the selected shoe model; functional options and aesthetic options desired by the customer may also be incorporated. Step **280** may comprise, for example, matching the appropriate outsole, the appropriate midsole, and a specially customized upper to form a single shoe as ordered by a customer. It should be noted that similarly to steps **255**, **260**, **265**, **270**, and **275**, each shoe model may not necessarily have its own specific workflow at step **280** but rather may share workflows with other shoe models. Also similarly to step **255**, **260**, **265**, **270**, and **275**, a workflow for a particular shoe model may vary to some degree to allow for the functional and/or aesthetic customizations selected by the user to be incorporated into the shoe model.

[0107] In another example, step **280** may comprise (1) applying adhesive to the upper produced by step **275**, the midsole produced by step **260**, and the outsole produced by step **255** taking approximately 75 human seconds, (2) placing the parts in oven taking approximately 120 machine seconds, (3) hand fitting the parts together taking approximately 75 human seconds, (4) pressing the parts taking approximately 30 machine seconds and approximately 10 human seconds, (5) chilling the parts taking approximately 60 machine seconds and approximately 5 human seconds. Thus, the workflow in this example may take approximately 460 seconds. It should be noted that, like the other steps utilizing workflows in this example, and number of workflows may be temporally overlapped to lower the amount of time it takes to complete step **280** as would be appreciated by one of ordinary skill in the art.

[0108] In step **285**, a workflow may be initiated to quality control, lace and last the customized combined shoe component; functional options and aesthetic options desired by the customer may also be incorporated. It should be noted that similarly to steps **255**, **260**, **265**, **270**, **275**, and **280**, each shoe model may not necessarily have its own specific workflow at step **280** but rather may share workflows with other shoe models. Also similarly to step **255**, **260**, **265**, **270**, **275**, and **280**, a workflow for a particular shoe model may vary to some degree to allow for the functional and/or aesthetic customizations selected by the user to be incorporated into the shoe model.

[0109] In an example, step **285** may comprise (1) quality control checking and lasting the combined shoe component taking approximately 90 seconds of machine time and approximately 90 seconds of human time, (2) quality control checking and de-lasting the combined shoe component taking approximately 30 seconds of human time, (3) lacing the combined shoe component taking approximately 60 seconds of human time, and (4) packing the shoe taking essentially no time. Thus, the workflow in this example may take approximately 270 seconds. It should be noted that, like the other steps utilizing workflows in this example, and number of workflows may be temporally overlapped to change the amount of time it takes to complete step **285** as would be appreciated by one of ordinary skill in the art.

[0110] In step **290**, the customized shoe may be delivered to a customer in accordance with the customer's selected pickup options from step **245**. Step **290** may further include inspection and approval by a customer, payment, etc. It should be appreciated that while step **290** may occur geographically distant from the location at which all or parts of the other steps of method **200** are performed, one desirable attribute of method **200** is that it permits the localized manufacture of shoes to custom orders. Such localized manufacturing can be more responsive to local needs and preferences than remote manufacturing, and can provide reduced inventory and shipping costs. Accordingly, step **290** may occur geographically near, in fact in the same larger facility, as does the remainder of steps of method **200**.

[0111] Turning now to FIG. **3**, an illustrative method for creating an outsole for a running shoe is referenced generally by the numeral **300**. At a step **305**, an injection rubber mold outsole is created by way of an injection-mold process. In the illustrative injection-mold-rubber process, rubber is injected into a mold that forms an outsole. In another method, an outsole may be carved and/or cut from a piece of rubber. At **310**, an outsole is cured. In another method, an outsole may be cured using stearic acid and oils. This combination may cause blooming of the rubber, resulting in rubber residue which may not be desired on an outsole.

[0112] At step **315**, flash is removed from the outsole. One method of removing flash from the outsole includes cutting and/or removing and/or trimming undesired excess rubber. Another method of removing flash may be to hand-wipe or hand-pick the flash off the rubber outsole. At a step **320**, the outsole is staged in an outsole pre-wash marketplace. In one alternative, the number and character (e.g., size, shape, color, etc.) of outsoles placed into a marketplace are based on an expectation of demand. At a step **325**, an order is received. An illustrative method for receiving an order includes receiving an order manually. In still another method, an order may be received by uploading details of an order through a web interface. In one alternative, steps **305-320** are not performed until after an order is received. In that alternative, the outsole is produced on an as-needed basis, not as a result of a projected market demand. At step **330**, the outsole is removed from the outsole pre-wash marketplace.

[0113] At step **335** the outsole is washed. In one method, the outsole is washed by way of an alkaline solution. In another method, the outsole may go directly from step **315**, where the flash is removed from the outsole, to step **335**, where the outsole is washed. At step **340** the outsole is washed. In one method the outsole is washed by way of an acid solution. The washing steps **335** and/or **340** may be a means of removing excess rubber residue created by the curing process at step **310**. In another method, a curing process may be used wherein stearic acid is not used, thereby reducing or minimizing the rubber residue produced. In this method, the cleaning steps **335** and/or **340** would be reduced in time and/or materials, or could be eliminated. At step **345** the outsole is dried in an oven. In another way, an outsole may be dried in any way that is capable of producing heat that dries the outsole to a desired dryness within a desired period of time. At step **350** the outsole is removed from the oven. In another method, the outsole may be removed from another heating device that has been used to take away moisture from the outsole mold. At step **355**, the outsole is staged in an outsole staging marketplace. In another method, where there is little or no rubber excess produced from the curing process **315**, the outsole may go directly from the curing process **315** to being staged in the outsole staging marketplace **355**. In another method, where there is minimal rubber residue, the outsole may go from the curing process **315** to a cleaning step **335** wherein the outsole is wiped with a material, such as a cloth, to remove the excess rubber. In the former example, the outsole may either go directly from the curing process **315** to a cleaning step **335**, or may go from the curing process **315** to an outsole marketplace **320** before being removed from an outsole marketplace **330**. The outsole would be able to skip the time spent in an outsole marketplace **320-330** when an order is received prior to the production of the outsole (e.g. when the outsole is produced on an as-needed basis).

[0114] Referring to FIG. **4**, an illustrative method for creating a midsole for a running shoe is referenced generally by the numeral **400**. At step **402**, a pre-specified volume of EVA pellets are loaded into an injection mold. In an alternative, the selection of the type of polymer injected at step **402** may be correlated to the desired hardness associated with the customer order of the resulting midsole. The EVA pellets are processed in the same mold at the same conditions, thus the introduction of EVA pellets with longer polymer chains will result in an increased hardness compared to EVA pellets that are introduced with shorter polymer chains, because the longer polymer chains will not be able to break down to the same extent as shorter polymer chains under the same reaction conditions. At step **404**, the injection mold is then heated to 100° Celsius to form the volume of EVA pellets into a biscuit. In another embodiment, the EVA pellets may be heated to a temperature that may be hot enough to form the EVA pellets into the form of a biscuit and yet may not be hot enough to activate the foaming agent within the phylon. In still another embodiment, the reaction conditions of the mold may be changed to influence the extent that a given polymer is allowed to break down, thereby resulting in a variety of different hardnesses. At step **406** the biscuit is then removed from the injection mold. At step **410**, the biscuit is then staged into a biscuit marketplace. At step **415**, an order is received. An illustrative method for receiving an order includes receiving an order manually. In still another method, an order may be received by uploading details of an order through a web interface.

[0115] At step **420**, the biscuit is removed from the biscuit marketplace. At step **430**, biscuit is then loaded into a heat press. In another method, such as when an order is received prior to the biscuit being made, the biscuit may go directly from being removed from an injection mold **406** to being loaded into a heat press **430**. In another method, there is a right heat press and a left heat press for the right-shoe-biscuit and left-shoe-biscuit, respectively. In still another method, the right heat press and the left heat press may be operated concurrently. At step **434**, the biscuit is then heated to 172° Celsius. In another embodiment, the biscuit may be heated to a temperature that may be hot enough to activate the foaming agent. At step **438**, the biscuit is removed from the heat press. In step **440**, the biscuit is loaded into a stabilization oven. In the stabilization oven, the biscuit is cooled to a lower temperature that allows the biscuit to become the desired size as a midsole. At step **444**, the biscuit may be placed into an air stabilization oven and the temperature may be lowered to 75° Celsius. The process by which air is passed over a biscuit in a stabilization oven may be through the use of one or more air knife centrifugal blowers. In steps **448-452**, the biscuit may have its temperature lowered over three stages. At step **448**, the temperature of the biscuit may be lowered from 75° Celsius to 65° Celsius. At step **452**, the temperature of the biscuit may be lowered from 65° Celsius to 55° Celsius. At step **454**, the temperature of the biscuit may be lowered from 55° Celsius to 45° Celsius. In another method, the cooling stages of **448-452** may be done in three or more stages. In another alternative method, the step at **444** of lowering biscuit temperature to 75° Celsius may be adjusted to a higher or lower temperature. In another method, one or more biscuits may be stabilized using a series of baths of water that may range from 90° Celsius to 45° Celsius. The temperature of the biscuit may decrease from 90° Celsius to 75° Celsius, then 75° Celsius to 45° Celsius, wherein the time within each bath may be spread evenly.

[0116] At step **458**, the midsole is removed from the stabilization oven. At step **460**, the midsole is loaded into one or more sonic baths. At step **464** in the sonic bath, the midsole is washed. In another method, step **458** may be removed and the midsole may be washed while it is still in a dual stabilization-oven-sonic-bath device. At step **468** the midsole is removed from the sonic bath. At step **470**, the midsole is loaded into one or more drying ovens. At step **474** the midsole is dried. At step **478**, the midsole is removed from the one or more drying ovens. At step **480**, the midsole is loaded into a midsole staging marketplace.

[0117] Turning now to FIG. **5**, an illustrative method for applying primer and adhesive on a running shoe is referenced generally by the numeral **500**. At step **504**, a customer order is received. The customer order contains specifications for the characteristics associated with one or more desired running shoes, such as size or style or color. At step **506**, an outsole fitting the characteristics defined in the customer order is removed from the outsole staging marketplace. At step **508**, a midsole fitting the characteristics defined in the customer order may be removed from the midsole staging marketplace. At step **510**, a midsole and an outsole are primed. At step **520**, the primed midsole and the primed outsole may be placed in an infrared (hereinafter "IR") oven. At step **530**, the midsole and outsole may be removed from the IR oven. At step **540**, adhesive may be applied to the midsole and the outsole. At step **550**, the midsole and the outsole are placed in an IR oven.

[0118] Turning now to FIG. **6**, an illustrative method for joining an outsole and a midsole into a midsole-outsole on a running shoe is referenced generally by the numeral **600**. At step **610**, the outsole and the midsole are removed from the IR oven. At step **620**, the outsole and midsole are fit together to form a midsole-outsole. At step **630**, the midsole-outsole is loaded into a stockfit press. At step **634**, the midsole-outsole is heated. The heat may allow the adhesive to more permanently bind the components of the midsole-outsole. At step **638**, the midsole-outsole is removed from the stockfit press. At step **640**, the midsole-outsole is loaded into a chiller. The chiller is used to cool down the midsole-outsole to approximately 0° Celsius to allow the adhesive to set. In another method, the midsole-outsole may be placed in a more temperate area where the midsole-outsole may be left to cool over a longer period of time. In another method, at step **644**, the temperature of the midsole-outsole is lowered. In another method, the press may be turned off and the midsole-outsole may be left to cool in the press until the heat dissipates. In still another method, the press may be wired with both a heating component and a cooling component such that a shoe article, such as a midsole-outsole, may be heated and cooled in one location. In that regard, having a dual heating and cooling press would both save room and would also eliminate the risk of having components of a shoe article become misaligned or fall apart during the period they are moved between the heat press and the chiller. At step **648**, the midsole-outsole is removed from the chiller. At step **650**, the midsole-outsole is delivered to the swing arm post staging area.

[0119] Referring to FIG. **7**, an illustrative method for customizing an upper for a running shoe is referenced generally by the numeral **700**. At step **702**, an order is received.

[0120] An illustrative method for receiving an order includes receiving an order manually. In still another method, an order may be received by uploading details of an order through a web interface. At step **704**, material associated with the order for the upper (e.g. synthetic leather or mesh or polyester, etc.) is loaded into an eco-solvent printer. At step **706**, the eco-solvent printer and dye sub printer are loaded with material, such as desired colors, associated with an order. At step **708**, the dye sub printer is used to print desired designs and/or markings on the desired material used for the upper. At step **710**, the eco-solvent printer is used to print desired designs and/or markings on the desired material used for the upper. At step **715**, a customized synthetic is cut out from the desired material according to the specifications characterizing an order. At step **720**, the customized synthetic is loaded into a laser. At step **724**, the laser is loaded with the specification of the design associated with the order. At step **728**, the laser etches a customized design onto the customized synthetic.

[0121] At step **730**, the dye sub press is loaded. At step **735**, the customized synthetic is removed from the laser. At step **740**, the right embroidery machine is loaded with the customized synthetic. At step **742**, the left embroidery machine is loaded with the customized synthetic. At step **744**, the embroidery machines are loaded with design specifications associated with the order. At step **746**, left and right parts are embroidered using the left embroidery machine and right embroidery machine, respectively. At step **750**, the left part and right part are removed from the embroidery machines. At step **760**, the customized parts are delivered to the radio frequency (hereinafter "RF") welding staging area.

[0122] Note that some of the decorative techniques disclosed above may not be applicable to each shoe model and therefore some of the steps disclosed above may be omitted. For instance, not all shoe models may require embroidery or laser etching. Moreover, different components of an upper may proceed through different steps, in different orders, and at different times.

[0123] Referring to FIG. **8**, an illustrative method for assembling an upper for a running shoe is referenced generally by the numeral **800**. At step **805**, customized parts for the upper are retrieved from the RF welding staging area. At step **810**, a kit is retrieved from the marketplace which contains necessary parts associated with the customer order. At step **820**, an upper is assembled from the customized parts. At step **825**, an RF welding cycle is activated, binding together the assembled upper constructed of the customized parts. At step **830**, a final trim is cut on the upper to define the final shape of the upper. At step **840**, the midsole-outsole is retrieved from the swing arm staging area. At step **850**, the upper is stitched to the midsole-outsole.

[0124] Referring to FIG. **9**, an illustrative method for lasting and quality control for a running shoe is referenced generally by the numeral **900**. At step **910**, the shoe component is retrieved from the swing arm area. At step **920**, a quality control check is performed and the upper is lasted. At step **930**, a quality control check is performed on the lasted upper and the upper is then de-lasted. At step **940** a quality control check is performed and the upper is laced. At step **950**, a quality control check is performed and the shoe is packed.

[0125] Turning now to FIG. **10**, an illustrative method for creating an outsole for a basketball shoe is referenced generally by the numeral **1000**. At a step **1005**, an injection rubber mold outsole is created by way of an injection-mold process. In the illustrative injection-mold-rubber process, rubber is injected into a mold that forms an outsole. In another method, an outsole may be carved and/or cut from a piece of rubber. At **1010**, an outsole is cured. In one alternative, an outsole may be cured using stearic acid and oils. This combination may cause blooming of the rubber, resulting in rubber residue which may not be desired on an outsole.

[0126] At step **1015**, flash is removed from the outsole. One method of removing flash from the outsole includes cutting and/or removing and/or trimming undesired excess rubber. Another method of removing flash may be to hand-wipe or hand-pick the flash off the rubber outsole. At a step **1020**, the outsole is staged in an outsole pre-wash marketplace.

[0127] In one alternative, the number and character (e.g., size, shape, color, etc.) of outsoles placed into a marketplace are based on an expectation of demand. At a step **1025**, an order is received. An illustrative method for receiving an order includes receiving an order manually. In still another method, an order may be received by uploading details of an order through a web interface. In one alternative, steps **1005-1020** are not performed until after an order is received. In that alternative, the outsole is produced on an as-needed basis, not as a result of a projected market demand. At step **1030**, the outsole is removed from the outsole pre-wash marketplace.

[0128] At step **1035** the outsole is washed. In one method, the outsole is washed by way of an alkaline solution. In another method, the outsole may go directly from step **1015**, where the flash is removed from the outsole, to step **1035**, where the outsole is washed. At step **1040** the outsole is washed. In one method the outsole is washed by way of an acid solution. The washing steps **1035** and/or **1040** may be a means of removing excess rubber residue created by the curing process at step **1010**. In another method, a curing process may be used wherein stearic acid is not used, thereby reducing or minimizing the rubber residue produced. In this method, the cleaning steps **1035** and/or **1040** would be reduced in time and/or materials, or could be eliminated. At step **1045** the outsole is dried in an oven. In another way, an outsole may be dried in any way that is capable of producing heat that dries the outsole to a desired dryness within a desired period of time. At step **1050** the outsole is removed from the oven. In another method, the outsole may be removed from another heating device that has been used to take away moisture from the outsole mold. At step **1055**, the outsole is staged in an outsole staging marketplace. In another method, where there is little or no rubber excess produced from the curing process **1015**, the outsole may go directly from the curing process **1015** to being staged in the outsole staging marketplace **1055**. In another method, where there is minimal rubber residue, the outsole may go from the curing process **1015** to a cleaning step **1035** wherein the outsole is wiped with a material, such as a cloth, to remove the excess rubber. In the former example, the outsole may either go directly from the curing process **1015** to a cleaning step **1035**, or may go from the curing process **1015** to an outsole marketplace **1020** before being removed from an outsole marketplace **1030**. The outsole would be able to skip the time spent in an outsole marketplace **1020-1030** when an order is received prior to the production of the outsole (e.g. when the outsole is produced on an as-needed basis).

[0129] Referring to FIG. **11**, an illustrative method for creating a midsole for a basketball shoe is referenced generally by the numeral **1100**. At step **1102**, a pre-specified volume of EVA pellets are loaded into an injection mold. In an alternative, the selection of the type of polymer injected at step **1102** may be correlated to the desired hardness associated with the customer order of the resulting midsole. The EVA pellets are processed in the same mold at the same conditions, thus the introduction of EVA pellets with longer polymer chains will result in an increased hardness compared to EVA pellets that are introduced with shorter polymer chains, because the longer polymer chains will not be able to break down to the same extent as shorter polymer chains under the same reaction conditions. At step **1104**, the injection mold is then heated to 100° Celsius to form the volume of EVA pellets into an biscuit. In another embodiment, the EVA pellets may be heated to a temperature that may be hot enough to form the EVA pellets into the form of a biscuit and yet may not be hot enough to activate the foaming agent within the phylon. In still another embodiment, the reaction conditions of the mold may be changed to influence the extent that a given polymer is allowed to break down, thereby resulting in a variety of different hardnesses. At step **1106** the biscuit is then removed from the injection mold. At step **1110**, the biscuit is then staged into a biscuit marketplace. At step **1115**, an order is received. An illustrative method for receiving an order includes receiving an order manually. In still another method, an order may be received by uploading details of an order through a web interface.

[0130] At step **1120**, the biscuit is removed from the biscuit marketplace. At step **1130**, biscuit is then loaded into a heat press. In another method, such as when an order is received prior to the biscuit being made, the biscuit may go directly from being removed from an injection mold **1106** to being loaded into a heat press **1130**. In another method, there is a right heat press and a left heat press for the right-shoe-biscuit and left-shoe-biscuit, respectively. In still another method, the right heat press and the left heat press may be operated concurrently. At step **1134**, the biscuit is then heated to 172° Celsius. In another embodiment, the biscuit may be heated to a temperature that may be hot enough to activate the foaming agent. At step **1138**, the biscuit is removed from the heat press. In step **1140**, the biscuit is loaded into a stabilization oven. In the stabilization oven, the biscuit is cooled to a lower temperature that allows the biscuit to become the desired size as a midsole. At step **1144**, the biscuit is lowered to a temperature 75° Celsius. In steps **1148-1152**, the biscuit has its temperature lowered over three stages. At step **1148**, the temperature of the biscuit is lowered from 75° Celsius to 65° Celsius. At step **1152**, the temperature of the biscuit is lowered from 65° Celsius to 55° Celsius. At step **1154**, the temperature of the biscuit is lowered from 55° Celsius to 45° Celsius. In another method, the cooling stages of **1148-1152** may be done in three or more stages. In another method, the step at **1144** of lowering biscuit temperature to 75° Celsius may be adjusted to a higher or lower temperature.

[0131] At step **1158**, the midsole is removed from the stabilization oven. At step **1160**, the midsole is loaded into one or more sonic baths. At step **1164** in the sonic bath, the midsole is washed. In an alternative method, step **1158** may be removed and the midsole may be washed while it is still in a dual stabilization-oven-sonic-bath device. At step **1168** the midsole is removed from the sonic bath. At step **1170**, the midsole is loaded into one or more drying ovens. At step **1174** the midsole is dried. At step **1178**, the midsole is removed from the one or more drying ovens. At step **1180**, the midsole is loaded into a midsole staging marketplace.

[0132] Turning now to FIG. **12**, an illustrative method for applying primer and adhesive on a basketball shoe is referenced generally by the numeral **1200**. At step **1204**, a customer order is received. The customer order contains specifications for the characteristics associated with one or more desired basketball shoes, such as size or style or color. At step **1206**, an outsole fitting the characteristics defined in the customer order is removed from the outsole staging marketplace. At step **1208**, a midsole fitting the characteristics defined in the customer order may be removed from the midsole staging marketplace. At step **1210**, a midsole and an outsole are primed. At step **1220**, the primed midsole and the primed outsole may be placed in an IR oven. At step **1230**, the midsole and outsole are removed from the IR oven. At step **1240**, adhesive may be applied to the midsole and the outsole. At step **1250**, the midsole and the outsole are placed in an IR oven.

[0133] Turning now to FIG. **13**, an illustrative method for joining an outsole and a midsole into a midsole-outsole on a basketball shoe is referenced generally by the numeral **1300**. At step **1310**, the outsole and the midsole are removed from the IR oven. At step **1320**, the outsole and midsole are fit together to form a midsole-outsole. At step **1330**, the midsole-outsole is loaded into a stockfit press. At step **1334**, the midsole-outsole is heated. The heat may allow the adhesive to more permanently bind the components of the midsole-outsole. At step **1338**, the midsole-outsole is removed from the stockfit press. At step **1340**, the midsole-outsole is loaded into a chiller. The chiller is used to cool down the midsole-outsole to approximately 0° Celsius to allow the adhesive to set. In another method, the midsole-outsole may be placed in a more temperate area where the midsole-outsole may be left to cool over a longer period of time. In another method, at step **1344**, the temperature of the midsole-outsole is lowered. In another method, the press may be turned off and the midsole-outsole may be left to cool in the press until the heat dissipates. In still another method, the press may be wired with both a heating component and a cooling component such that a shoe article, such as a midsole-outsole, may be heated and cooled in one location. In that regard, having a dual heating and cooling press would both save room and would also eliminate the risk of having components of a shoe article become misaligned or fall apart during the period they are moved between the heat press and the chiller. At step **1348**, the midsole-outsole is removed from the chiller. At step **1350**, the midsole-outsole is delivered to the swing arm post staging area.

[0134] Referring to FIG. **14**, an illustrative method for customizing an upper for a basketball shoe is referenced generally by the numeral **1400**. At step **1402**, an order is received. An illustrative method for receiving an order includes receiving an order manually.

[0135] In still another method, an order may be received by uploading details of an order through a web interface. At step **1404**, material associated with the order for the upper (e.g. synthetic leather or mesh or polyester, etc.) is loaded into an eco-solvent printer. At step **1406**, the eco-solvent printer and dye sub printer are loaded with material, such as desired colors, associated with an order. At step **1408**, the dye sub printer is used to print desired designs and/or markings on the desired material used for the upper. At step **1410**, the eco-solvent printer is used to print desired designs and/or markings on the desired material used for the upper. At step **1415**, a customized synthetic is cut out from the desired material according to the specifications characterizing an order. At step **1420**, the customized synthetic is loaded into a laser. At step **1424**, the laser is loaded with the specification of the design associated with the order. At step **1428**, the laser etches a customized design onto the customized synthetic.

[0136] At step **1430**, the dye sub press is loaded. At step **1435**, the customized synthetic is removed from the laser. At step **1440**, the right embroidery machine is loaded with the customized synthetic. At step **1442**, the left embroidery machine is loaded with the customized synthetic. At step **1444**, the embroidery machines are loaded with design specifications associated with the order. At step **1446**, left and right parts are embroidered using the left embroidery machine and right embroidery machine, respectively. At step **1450**, the left part and right part are removed from the embroidery machines. At step **1460**, the customized parts are delivered to the heat press marketplace. At step **1470**, uppers are checked for excess material and cut when needed.

[0137] Note that some of the decorative techniques disclosed above may not be applicable to each shoe model and therefore some of the steps disclosed above may be omitted. For instance, not all shoe models may require embroidery or laser etching. Moreover, different components of an upper may proceed through different steps, in different orders, and at different times.

[0138] Referring to FIG. **15**, an illustrative method for forming and stitching an upper for a basketball shoe is referenced generally by the numeral **1500**. At step **1505**, customized parts for the upper are retrieved from the heat press marketplace. At step **1510**, a kit is retrieved from the marketplace which contains necessary parts associated with the customer order. At step **1520**, an upper is assembled from the customized parts. At step **1530**, the assembled upper parts are loaded into a heat press. At step **1534**, the heat press is activated and the assembled upper parts are heated. The temperature reached is high enough that the adhesive used to bind parts is activated. At step **1538**, the parts are removed from the heat press. At step **1540** the parts are placed on a cooling rack. At step **1548**, the parts are removed from the cooling rack. At step **1550**, a heel is formed by stitching. In an alternative, the heel may be formed by another binding method. At step **1560**, the parts are post-stitched. At step **1570**, the parts are strobel stitched. At step **1580**, the parts are delivered to a lasting station.

[0139] Referring to FIG. **16**, an illustrative method for lasting and quality control for a basketball shoe is referenced generally by the numeral **1600**. At step **1610**, the shoe component is retrieved from the lasting station. At step **1620**, a quality control check is performed and the upper is lasted. At step **1630**, a quality control check is performed on the lasted upper and the upper is then de-lasted. At step **1640** a quality control check is performed and the upper is laced. At step **1650**, a quality control check is performed and the shoe is packed.

[0140] Turning now to FIG. **17**, an illustrative method for creating an outsole for a skate shoe is referenced generally by the numeral **1700**. At a step **1705**, an injection rubber mold outsole is created by way of an injection-mold process. In the illustrative injection-mold-rubber process, rubber is injected into a mold that forms an outsole. In another method, an outsole may be carved and/or cut from a piece of rubber. At **1710**, an outsole is cured. In one alternative, an outsole may be cured using stearic acid and oils. This combination may cause blooming of the rubber, resulting in rubber residue which may not be desired on an outsole.

[0141] At step **1715**, flash is removed from the outsole. One method of removing flash from the outsole includes cutting and/or removing and/or trimming undesired excess rubber. Another method of removing flash may be to hand-wipe or hand-pick the flash off the rubber outsole. At a step **1720**, the outsole is staged in an outsole pre-wash marketplace. In one alternative, the number and character (e.g., size, shape, color, etc.) of outsoles placed into a marketplace are based on an expectation of demand. At a step **1725**, an order is received. An illustrative method for receiving an order includes receiving an order manually. In still another method, an order may be received by uploading details of an order through a web interface. In one alternative, steps **1705-1720** are not performed until after an order is received. In that alternative, the outsole is produced on an as-needed basis, not as a result of a projected market demand. At step **1730**, the outsole is removed from the outsole pre-wash marketplace.

[0142] At step **1735** the outsole is washed. In one method, the outsole is washed by way of an alkaline solution. In another method, the outsole may go directly from step **1715**, where the flash is removed from the outsole, to step **1735**, where the outsole is washed. At step **1740** the outsole is washed. In one method the outsole is washed by way of an acid solution. The washing steps **1735** and/or **1740** may be a means of removing excess rubber residue created by the curing process at step **1710**. In another method, a curing process may be used wherein stearic acid is not used, thereby reducing or minimizing the rubber residue produced. In this method, the cleaning steps **1735** and/or **1740** would be reduced in time and/or materials, or could be eliminated. At step **1745** the outsole is dried in an oven. In another way, an outsole may be dried in any way that is capable of producing heat that dries the outsole to a desired dryness within a desired period of time. At step **1750** the outsole is removed from the oven. In another method, the outsole may be removed from another heating device that has been used to take away moisture from the outsole mold. At step **1755**, the outsole is staged in an outsole staging marketplace. In another method, where there is little or no rubber excess produced from the curing process **1715**, the outsole may go directly from the curing process **1715** to being staged in the outsole staging marketplace **1755**. In another method, where there is minimal rubber residue, the outsole may go from the curing process **1715** to a cleaning step **1735** wherein the outsole is wiped with a material, such as a cloth, to remove the excess rubber. In the former example, the outsole may either go directly from the curing process **1715** to a cleaning step **1735**, or may go from the curing process **1715** to an outsole marketplace **1720** before being removed from an outsole marketplace **1730**. The outsole would be able to skip the time spent in an outsole marketplace **1720-1730** when an order is received prior to the production of the outsole (e.g. when the outsole is produced on an as-needed basis).

[0143] Referring to FIG. **18**, an illustrative method for creating a midsole for a skate shoe is referenced generally by the numeral **1800**. At step **1802**, a pre-specified volume of EVA pellets are loaded into an injection mold. In an alternative, the selection of the type of polymer injected at step **1802** may be correlated to the desired hardness associated with the customer order of the resulting midsole. The EVA pellets are processed in the same mold at the same conditions, thus the introduction of EVA pellets with longer polymer chains will result in an increased hardness compared to EVA pellets that are introduced with shorter polymer chains, because the longer polymer chains will not be able to break down to the same extent as shorter polymer chains under the same reaction conditions. At step **1804**, the injection mold is then heated to 170° Celsius to form the volume of EVA pellets into a biscuit. In another embodiment, the EVA pellets may be heated to a temperature that may be hot enough to form the EVA pellets into the form of a biscuit and yet may not be hot enough to activate the foaming agent within the phylon. In still another embodiment, the reaction conditions of the mold may be changed to influence the extent that a given polymer is allowed to break down, thereby resulting in a variety of different hardnesses. At step **1806** the biscuit is then removed from the injection mold. At step **1810**, the biscuit is then staged into a biscuit marketplace. At step **1815**, an order is received. An illustrative method for receiving an order includes receiving an order manually. In still another method, an order may be received by uploading details of an order through a web interface.

[0144] At step **1820**, the biscuit is removed from the biscuit marketplace. At step **1830**, biscuit is then loaded into a heat press. In another method, such as when an order is received prior to the biscuit being made, the biscuit may go directly from being removed from an injection mold **1806** to being loaded into a heat press **1830**. In another method, there is a right heat press and a left heat press for the right-shoe-biscuit and left-shoe-biscuit, respectively. In still another method, the right heat press and the left heat press may be operated concurrently. At step **1834**, the biscuit is then heated to 172° Celsius. In another embodiment, the biscuit may be heated to a temperature that may be hot enough to activate the foaming agent. At step **1838**, the biscuit is removed from the heat press. In step **1840**, the biscuit is loaded into a stabilization oven. In the stabilization oven, the biscuit is cooled to a lower temperature that allows the biscuit to become the desired size as a midsole. At step **1844**, the biscuit is lowered to a temperature 75° Celsius. In steps **1848-1852**, the biscuit has its temperature lowered over three stages. At step **1848**, the temperature of the biscuit is lowered from 75° Celsius to 65° Celsius. At step **1852**, the temperature of the biscuit is lowered from 65° Celsius to 55° Celsius. At step **1854**, the temperature of the biscuit is lowered from 55° Celsius to 45° Celsius. In another method, the cooling stages of **1848-1852** may be done in three or more stages. In another method, the step at **1844** of lowering biscuit temperature to 75° Celsius may be adjusted to a higher or lower temperature.

[0145] At step **1858**, the midsole is removed from the stabilization oven. At step **1860**, the midsole is loaded into one or more sonic baths. At step **1864** in the sonic bath, the midsole is washed. In an alternative method, step **1858** may be removed and the midsole may be washed while it is still in a dual stabilization-oven-sonic-bath device. At step **1868** the midsole is removed from the sonic bath. At step **1870**, the midsole is loaded into one or more drying ovens. At step **1874** the midsole is dried. At step **1878**, the midsole is removed from the one or more drying ovens. At step **1880**, the midsole is loaded into a midsole staging marketplace.

[0146] Turning now to FIG. **19**, an illustrative method for applying primer and adhesive on a skate shoe is referenced generally by the numeral **1900**. At step **1904**, a customer order is received. The customer order contains specifications for the characteristics associated with one or more desired skate shoes, such as size or style or color. At step **1906**, an outsole fitting the characteristics defined in the customer order is removed from the outsole staging marketplace. At step **1908**, a midsole fitting the characteristics defined in the customer order may be removed from the midsole staging marketplace. At step **1910**, a midsole and an outsole are primed. At step **1920**, the primed midsole and the primed outsole may be placed in an IR oven. At step **1930**, the midsole and outsole are removed from the IR oven. At step **1940**, adhesive may be applied to the midsole and the outsole. At step **1950**, the midsole and the outsole are placed in an IR oven.

[0147] Turning now to FIG. **20**, an illustrative method for joining an outsole and a midsole into a midsole-outsole on a skate shoe is referenced generally by the numeral **2000**. At step **2010**, the outsole and the midsole are removed from the IR oven. At step **2020**, the outsole and midsole are fit together to form a midsole-outsole. At step **2030**, the midsole-outsole is loaded into a stockfit press. At step **2034**, the midsole-outsole is heated. The heat may allow the adhesive to more permanently bind the components of the midsole-outsole. At step **2038**, the midsole-outsole is removed from the stockfit press. At step **2040**, the midsole-outsole is loaded into a chiller. The chiller is used to cool down the midsole-outsole to approximately 0° Celsius to allow the adhesive to set. In another method, the midsole-outsole may be placed in a more temperate area where the midsole-outsole may be left to cool over a longer period of time. In another method, at step **2044**, the temperature of the midsole-outsole is lowered. In another method, the press may be turned off and the midsole-outsole may be left to cool in the press until the heat dissipates. In still another method, the press may be wired with both a heating component and a cooling component such that a shoe article, such as a midsole-outsole, may be heated and cooled in one location. In that regard, having a dual heating and cooling press would both save room and would also eliminate the risk of having components of a shoe article become misaligned or fall apart during the period they are moved between the heat press and the chiller. At step **2048**, the midsole-outsole is removed from the chiller. At step **2050**, the midsole-outsole is delivered to the swing arm post staging area.

[0148] Referring to FIG. **21**, an illustrative method for customizing an upper for a skate shoe is referenced generally by the numeral **2100**. At step **2102**, an order is received. An illustrative method for receiving an order includes receiving an order manually. In still another method, an order may be received by uploading details of an order through a web interface. At step **2104**, material associated with the order for the upper (e.g. synthetic leather or mesh or polyester, etc.) is loaded into an eco-solvent printer. At step **2106**, the eco-solvent printer and dye sub printer are loaded with material, such as desired colors, associated with an order. At step **2108**, the dye sub printer is used to print desired designs and/or markings on the desired material used for the upper. At step

2110, the eco-solvent printer is used to print desired designs and/or markings on the desired material used for the upper. At step **2115**, a customized synthetic is cut out from the desired material according to the specifications characterizing an order. At step **2120**, the customized synthetic is loaded into a laser. At step **2124**, the laser is loaded with the specification of the design associated with the order. At step **2128**, the laser etches a customized design onto the customized synthetic.

[0149] At step **2130**, the dye sub press is loaded. At step **2135**, the customized synthetic is removed from the laser. At step **2140**, the right embroidery machine is loaded with the customized synthetic. At step **2142**, the left embroidery machine is loaded with the customized synthetic. At step **2144**, the embroidery machines are loaded with design specifications associated with the order. At step **2146**, left and right parts are embroidered using the left embroidery machine and right embroidery machine, respectively. At step **2150**, the left part and right part are removed from the embroidery machines. At step **2160**, the customized parts are delivered to the heat press marketplace. At step **2170**, uppers are checked for excess material and cut when needed.

[0150] Note that some of the decorative techniques disclosed above may not be applicable to each shoe model and therefore some of the steps disclosed above may be omitted. For instance, not all shoe models may require embroidery or laser etching. Moreover, different components of an upper may proceed through different steps, in different orders, and at different times.

[0151] Referring to FIG. **22**, an illustrative method for forming and stitching an upper for a skate shoe is referenced generally by the numeral **2200**. At step **2205**, customized parts for the upper are retrieved from the heat press marketplace. At step **2210**, a kit is retrieved from the marketplace which contains necessary parts associated with the customer order. At step **2220**, an upper is assembled from the customized parts. At step **2230**, the assembled upper parts are loaded into a heat press. At step **2234**, the heat press is activated and the assembled upper parts are heated. The temperature reached is high enough that the adhesive used to bind parts is activated. At step **2238**, the parts are removed from the heat press. At step **2240** the parts are placed on a cooling rack. At step **2244** the parts are cooled from. At step **2248**, the parts are removed from the cooling rack. At step **2250**, a heel is formed by stitching. In an alternative, the heel may be formed by another binding method. At step **2260**, the parts are post-stitched. At step **2270**, the parts are strobel stitched. At step **2280**, the parts are delivered to a lasting station.

[0152] Referring to FIG. **23**, an illustrative method for lasting and quality control for a skate shoe is referenced generally by the numeral **2300**. At step **2310**, the shoe component is retrieved from the lasting station. At step **2320**, a quality control check is performed and the upper is lasted. At step **2330**, a quality control check is performed on the lasted upper and the upper is then de-lasted. At step **2340** a quality control check is performed and the upper is laced. At step **2350**, a quality control check is performed and the shoe is packed.

[0153] Referring now to FIG. **24**, a work flow diagram **2400** of a shoe component-manufacturing facility for the manufacture of custom shoe components is illustrated in accordance with an embodiment of the present invention. Work flow diagram **2400** may represent a physical configuration of a factory floor, but may also be viewed as a generalized work flow methodology. A plurality of modules may be utilized in the efficient fabrication of shoes in accordance with the present invention. Each module may be operated by at least one operator **2401** at each module. These modules may vary, but may comprise, as in the example of FIG. **24**, cutting and kitting module **2402**, customization module **2404**, forming and stitching module **2406**, midsole and outsole fabrication module **2410**, and stockfit and assembly module **2408**.

[0154] Cutting and kitting module **2402** may cut shoe upper components from an inventory of raw upper materials. At least one of the raw upper components may comprise a customizable gray good. The cut shoe upper materials may then be assembled into kits. In embodiments, the kits comprise all of the upper elements necessary to form an entire shoe upper. The kits may then be temporarily stored.

[0155] Initially, cutting and kitting module **2402** may cut out the components required for the fabrication of a shoe upper and prepare those assorted pieces into a kit that may be used in the construction and customization of a shoe. Materials used in the cutting and kitting module **2402** may be stored in a material storage **2413**. The raw materials used to create the shoe components may be supplied by vendors that may or may not apply a hot melt lamination across to the raw materials. The lamination treatment may aid in the construction of the shoe components, as the lamination may be used to adhere the shoe components. As such, if materials for the shoe components do not yet have a hot melt lamination as supplied from the vendors, a hot melt lamination may be applied to the raw material. In embodiments, raw materials retrieved from storage **2413** may have a hot melt lamination applied to the materials at hot melt lamination press **2412**. However, if materials supplied from vendors already have a hot melt lamination applied, hot melt lamination press **2412** may not be needed in diagram **2400**.

[0156] After materials have been retrieved from material storage **2413**, a component cutting machine **2414** may be used to modify the materials into shoe components. Component cutting machine **2414** may comprise an auto-cutting machine that may utilize blades, lasers, and/or any other cutting methodology or tool to cut the fabrics used to construct a shoe upper into one or more pieces for fabrication. Fabric may be held in place using suction, clamps, etc. when used by an auto-cutting machine such as one that may be used by component cutting machine **2414**. The material used in the fabrication of a shoe upper may comprise gray goods that may be readily customized through printing, dying, embroidering, etc. Cut components may be stored in a component marketplace **2416**. Once cut components are stored in the marketplace, the cut components may be assembled into kits. In embodiments, kits may comprise the upper components required to assemble an upper for a single shoe or the uppers for a pair of shoes. In embodiments, storage **2413** and marketplace **2416** may comprise a vertical carousal. Depending upon the shoe designs fabricated, a single kit of upper components may be utilized to assemble a shoe of a single size or a shoe of any of a plurality of sizes. For example, for some shoe designs, a single kit might be able to be used to fabricate and assemble a shoe having men's size 8, 9, or 10.

[0157] Upper kits may be provided from cut components stored in marketplace **2416** on an as-needed basis as shoe orders are processed. Cutting and kitting module **2402** may thereafter respond to shortages for particular components of marketplace **2416** by cutting and kitting the needed types of upper materials.

[0158] After a kit has been selected from component marketplace **2416**, the kit may be customized in customization module **2404**. In alternative embodiments, customization module **2404** may retrieve temporarily stored kits from cutting and kitting module **2402**. Customization module **2404** may then layer the shoe upper components of the kit into a flat framed assembly with multiple layers. Customization module **2404** may then customize at least a portion of the shoe upper components by applying decoration to the shoe upper components.

[0159] In embodiments, customization module **2404** may comprise a plurality of discrete stations, but no single shoe upper need necessarily be processed by every station in customization module **2404**. For example, after a kit has been delivered to desk **2418**, a operator, such as operator **2401**, may load up any print files related to a customization order.

[0160] Print files may be related to order customization as input by a customer at a customer input receiver **2422**. In embodiments, print files may be sent to an eco-solvent printer **2420** and/or a digital printer dye sublimation stations. In embodiments, eco-solvent printer **2420** may be used to print graphics for application to a shoe upper from the kit. Further, digital printing dye sublimation station **2422** may be used to sublimate designs and/or graphics onto a shoe upper.

[0161] The upper customization may also utilize a lamination heat press **2424** to laminate designs onto shoe upper components. Similarly, dye sublimation patterns printed at **2422** may be applied using dye sublimation heat press **2426**. Additionally, customization trim work may be performed at station **2428**, where station **2428** may comprise a first trim clicker. In embodiments, a first trim clicker may be used to modify material used in upper customization. Further, laser customization, such as customized cutting and/or etching, may be performed at laser customization station **2430**. Additionally, a plurality of embroidery stations **2432** may be used to apply embroidered customization to shoe uppers. In embodiments, shoe components may be embroidered once they are loaded into an embroidery machine. After the embroidery of the one or more shoe components, the shoe components may be unloaded from the embroidery machines. In embodiments, the number of embroidery stations may be one or more, although the utilization of four embroidery stations **2432** as illustrated in FIG. **24** may prove desirable. Desk **2434** may also be used in the customization of the shoe upper.

[0162] After customization of an upper, forming and stitching module **2406** may form the upper. Forming and stitching module **2406** may receive the customized shoe upper components. The customized shoe upper components may be placed on a flat frame to keep the components in place. The frame may be loaded into a solid state (SS) RF press **2436** to perform RF welding on the components of the shoe upper. Additionally and/or alternatively, the flat frame may be loaded into a heat press **2438**. Heat press **2438** may be used to form the upper from heat-activated components. Whether press **2436** and/or press **2438** are used, a press is used to join the components of the shoe upper. Once the shoe components are joined together at press **2436** and/or press **2438**, the joined shoe components are cut using shuttle cutter **2440**. Shuttle cutter **2440** removes excess material from the joined shoe components. After shuttle cutter **2440** has removed excess material, the joined shoe components are removed from the flat frame. Further, stitching that is desired may be performed to form an upper at stitching stations such as flat-stitch station **2442**, zigzag-stitch station **2444**, post-stitch station **2448**, and gather-stitch station **2454**, all of which may be used to stitch shoe components in the form of a shoe upper. Additionally, a hot melt sprayer **2446** may be used to affix shoe components to other shoe components and/or a shoe upper in order to hold components into place as the shoe upper is being formed.

[0163] Toe-forming component **2450** may be used in the formation of the toe of an upper. Heel-former component **2452** may be used in the formation of the heel of an upper. Strobel-stitch component **2456** may be used to affix a strobel to a shoe upper for lasting. Toe-condition component **2458** may be used to condition the shoe upper and/or shoe components as part of lasting. For instance, at toe-condition component **2458**, the shoe upper and/or shoe components may be exposed to steam to soften the shoe components. Further, lasting component **2460** may be used after the attachment of a strobel to last a shoe upper prior to affixing a midsole and/or outsole. As such, module **2406** may then form the customized shoe upper components into a three-dimensional shoe upper. Further, module **2406** may affix a strobel to the formed shoe upper. Additionally, module **2406** may last the formed shoe upper and strobel.

[0164] Midsole and outsole component **2410** may fabricate shoe midsoles and shoe outsoles for use in conjunction with lasted uppers for the assembly of shoes. The midsoles and outsoles may be formed in a variety of fashions and from a variety of materials. Midsoles may be formed from phylon materials, and outsoles may be formed from latex rubber. Possible systems and processes for use in midsole and outsole module **2410** are described elsewhere herein. Midsoles and/or outsoles may be provided to stockfit and assembly module **2408** using a marketplace system, or may be provided on an order-by-order basis.

[0165] Stockfit and assembly module **2408** may receive the lasted and formed shoe upper and strobel from the forming and stitching module **2406**. Additionally, module **2408** may receive the shoe midsoles and shoe outsoles from midsole and outsole module **2410**. Module **2408** may then assemble the shoe midsole, the shoe outsole, and the lasted and formed shoe upper and strobel into a shoe.

[0166] In embodiments, midsoles, outsoles, and/or lasted shoe uppers may be received at vented table **2462**. At vented table **2462**, adhesive may be applied to the bottom of a midsole and to the top of an outsole. The midsole-outsole combination may then be placed into an IR oven such as IR oven **2462**. The adhesive on the shoe midsole and the shoe outsole may then be activated at IR oven **2462**. The shoe midsole and the shoe outsole may then be set at bladder press station **2466**, where the midsole and outsole are pressed together to form a seal. In embodiments, a block press **2468** may be used to press the midsole and outsole together to form a seal.

[0167] After the midsole and outsole have been pressed together, the midsole-outsole may be delivered to bite mark machine **2470** to be marked for adhesive. In particular, midsole-outsole may have a shoe upper placed over midsole-outsole to determine the extent of adhesive coverage needed. The midsole-outsole and the shoe upper may then have adhesive applied at vented table **2472**. After adhesive has been applied to the shoe upper and to the midsole-outsole in accordance with the bite line, the shoe upper and the midsole-outsole may be placed in IR over **2474**. At IR oven **2474**, the adhesive applied to the shoe upper and to the midsole-outsole may be activated. The shoe upper and midsole-outsole may then be pressed together at block press **2468**. Once a shoe has been formed by pressing together the shoe upper and midsole-outsole, the shoe may be set at chiller **2476**. Once the shoe has been set, the shoe may be de-lasted at de-lasting station **2478**. Further, the shoe may be checked for quality control and packaged at table **2480**.

[0168] Referring now to FIG. **25**, a schematic **2500** of a module configuration for use in shoe production in accordance with the present invention is illustrated. As illustrated in the example of FIG. **25**, shoes may be manufactured using a single cutting and kitting module **2530** and a single outsole and midsole module **2540** in conjunction with two modules to perform customization, forming and fitting, and stockfit and assembly. The operation of customization, forming and fitting, and stockfit and assembly may be performed in a first section **2510** and/or at a second section **2520**. First section **2510** may include a first customization module **2512**, a first forming and fitting module **2514**, and a first stockfit and assembly module **2516**. The first customization module **2512** may receive completed kits for shoe uppers from cutting and kitting module **2530**. After customization module **2512** performs required customization upon a shoe upper, customization module **2512** may pass the customized shoe upper to first forming and fitting module **2514**. First forming and fitting module **2514** may form the shoe upper and then pass the formed shoe upper to first stockfit and assembly module **2516**. First stockfit and assembly module **2516** may receive formed shoe uppers from first forming and fitting module **2514** and may receive outsoles and midsoles from outsole and midsole module **2540**. First stockfit and assembly module **2516** may assemble and complete a shoe, and thereafter pass the completed shoe to a completed product queue **2518**.

[0169] Similarly, a second section **2520** may comprise a second customization module **2522**, a second forming and fitting module **2524**, and a second stockfit and assembly module **2526**. Second customization module **2522** may receive kits for the fabrication of shoe uppers from cutting and kitting module **2530**. Second customization module **2522** may then perform any required customization for a shoe upper. Second customization module **2522** may thereafter pass a customized shoe upper to second forming and fitting module **2524**, which may then form the required shoe upper. Second forming and fitting module **2524** may then pass a formed shoe upper to second stockfit and assembly module **2526**. Second stockfit and assembly module **2526** may receive formed shoe uppers from second forming and fitting module **2524** and may receive outsoles and midsoles from outsole and midsole module **2540**. Stockfit and assembly module **2526** may pass completed shoes to complete product queue **2528**. Completed product queue **2518** and completed product queue **2528** may be combined into a single completed product queue, and may represent the point at which a customer receives a customized shoe or pair of shoes. All of the modules illustrated in FIG. **25** may be co-located at a single geographical location. However, first section **2510** and first completed product queue **2518** may be located remote from second section **2520** and second completed product queue **2528**, from cutting and kitting module **2530**, and/or from outsole and midsole module **2540**. Similarly, second section **2520** and second completed product queue **2528** may be located remotely from first section **2510** and first completed product queue **2518**, from cutting and kitting module **2530**, and from outsole and midsole module **2540**. The use of a single cutting and kitting module **2530** and/or a single outsole and midsole module **2540** for two or more modules for customization, forming and fitting, and stockfit and assembly may be advantageous to maximize the production of shoes for a set of modules.

[0170] FIG. **26** illustrates a system **2600** for producing and assembling shoe components in accordance with an embodiment of the present invention. System **2600** comprises a customer input receiver **2640**. Receiver **2640** receives customer input related to, for example, a customer's customization of shoes. For example, a customer may input into receiver **2640** an order for red shoes. System **2600** further comprises a marketplace **2610** that stores shoe components. In embodiments, marketplace **2610** serves as a temporary storage bin for a first shoe component. A first shoe component may be produced at a first module **2620**. First module **2620** may comprise a first shoe component-manufacturing module that produces at least a first shoe component upon receiving an indication **2612** from marketplace **2610** to produce the first shoe component. Indication **2612** may be sent to first module **2620** from marketplace **2610** when a threshold amount of the first shoe component stored in marketplace **2610** has fallen below a predefined threshold amount. In embodiments, one or more first shoe components may comprise shoe upper components, midsoles, and/or outsoles.

[0171] System **2600** may also comprise a second module **2630**, where second module **2630** produces one or more second shoe components in response to receiving customer input **2642** from customer input receiver **2640**. In embodiments, customizable components may be produced by second module **2630**, where second shoe components may be produced by modifying shoe components supplied from marketplace **2610** to second module **2630**. The shoe components supplied from marketplace **2610** to second module **2630** may comprise first shoe components produced at first module **2620**.

[0172] After one or more first components and one or more second components are produced, the one or more first components and the one or more second components may be assembled at third module **2650**. The one or more first components may be delivered **2614** to third module **2650** from marketplace **2610**. Additionally and/or alternatively, the one or more first components may be delivered **2624** to third module **2650** from first module **2620**. Further, the one or more second components may be delivered **2632** to third module **2650** from second module **2630**. After the one or more first components and the one or more second components are assembled at third module **2650**, one or more completed shoes may be delivered **2652** to completed product queue **2660**.

[0173] FIG. **27** illustrates a flowchart **2700** of a workflow of a shoe manufactured through a process. The process comprises steps performed in shoe manufacturing modules, such as cutting and kitting module **2710**, customization module **2720**, forming module **2730**, outsole and midsole module **2740**, and stockfit and assembly module **2750**. In cutting and kitting module **2710**, a plurality of raw materials required for a multilayered shoe upper are provided at step **2712**. Further, at step **2714** in module **2710**, raw materials are cut into the components of the multilayered shoe upper. Additionally, at module **2710**, the components necessary to make a single multilayered shoe upper are placed in kits at step **2716**.

[0174] In customization module **2720**, a kit is received at step **2722**. At step **2724**, still at customization module **2720**, the shoe upper components are assembled into multiple layers. The multiple layers are aligned on a flat frame. Further, at step **2426**, the multiplayer upper components are customized by applying decoration to at least one layer of the multilayer shoe upper components. The customization of step **2426**, occurring at customization module **2420**, is performed while the multilayer shoe upper components are on a flat frame.

[0175] In forming module **2730**, the multilayer upper components are joined to form one integral shoe upper at step **2732** while the multilayer shoe upper components are on the frame. At step **2734**, the excess upper material is cut from the shoe upper. Further, at step **2736**, the joined shoe upper is removed from the frame. The formed shoe upper is then formed into a three-dimensional shoe upper at step **2738**. Still in forming module **2730**, a strobel is stitched to the formed shoe upper at step **2739**.

[0176] In outsole and midsole module **2740**, a shoe midsole is formed at step **2742**. Further, a shoe outsole is formed at step **2744**, still in outsole and midsole module **2740**. In stockfit and assembly module **2750**, the shoe midsole is attached to the shoe upper at step **2752**. Still in stockfit and assembly module **2750**, the shoe outsole is attached to the shoe upper at step **2754**.

[0177] The present invention has been described in relation to particular embodiments, which are intended in all respects to be illustrative rather than restrictive.

[0178] Alternative embodiments will become apparent to those of ordinary skill in the art to which the present invention pertains without departing from its scope. Different models of shoes, for example, could utilize different specific processes, materials, or modules and still fall within the scope of the claimed invention as would be recognized by one of ordinary skill in the art.

[0179] From the foregoing, it will be seen that this invention is well adapted to attain all the ends and objects set forth above, together with other advantages which are obvious and inherent to the system and method. It will be understood that certain features and sub-combinations are of utility and may be employed without reference to other features and sub-combinations. This is contemplated by and is within the scope of the claims.

What is claimed is:

1. A system for producing and assembling shoe components, the system comprising: a receiving module for receiving a customer input; a market that provides at least one temporary storage bin of a first shoe component; a first shoe component-manufacturing module that produces at least the first shoe component upon receiving an indication from the marketplace, wherein the marketplace temporarily stores the contents of the first shoe component and provides the indication to the first component-manufacturing module upon one of the at least one temporary storage bins of the marketplace dropping below a predefined threshold amount of the first shoe component; a second shoe component-manufacturing module that produces one or more second shoe components upon receiving the customer input; and a third component-manufacturing module that assembles the one or more of the first shoe components and the one or more of the second shoe components to produce a shoe article.

2. The system of claim **1** wherein the one or more first shoe components are processed after the first shoe component is removed from said inventory.

3. The system of claim **1** wherein the first shoe component manufacturing module produces outsoles.

4. The system of claim **1** wherein the first shoe component manufacturing module produces midsoles.

5. The system claim **1** wherein the second shoe component manufacturing module produces custom upper shoe components.

6. The system of claim **1** wherein the custom shoe component is processed before being coupled to the first shoe component.

7. The system of claim **1** wherein the custom shoe component is comprised of two or more coupled custom shoe components.

8. The system of claim **1** wherein the second shoe manufacturing module comprises a plurality of customization submodules.

9. A processing facility for the modularized production of composite custom shoe components, said processing facility comprising: a cutting and kitting module that cuts shoe upper components from an inventory of raw upper materials, at least one of the raw upper materials comprising a customizable gray good, that then assembles the cut shoe upper materials into kits that comprise all of the upper elements necessary to form an entire shoe upper, and that then temporarily stores the kits; a customization module that retrieves temporarily stored kits from the cutting and kitting module, that layers the shoe upper components of the kit into a flat framed assembly with multiple layers, and that customizes at least a portion of the shoe upper components by applying decoration to the shoe upper components; a forming and stitching module that receives the customized shoe upper components, that forms the customized shoe upper components into a three-dimensional shoe upper, that affixes a strobel to the formed shoe upper, and that lasts the formed shoe upper and strobel; a midsole and outsole fabrication module that fabricates shoe midsoles and shoe outsoles; and a stockfit and assembly module that receives the lasted and formed shoe upper and strobel from the forming and stitching module, that receives the shoe midsoles and shoe outsoles from the midsole and outsole module, and that assembles the shoe midsole, the shoe outsole, and the lasted and formed shoe upper and strobel into a shoe.

10. The processing facility of claim **9**, wherein the cutting and knitting module comprises a material storage component that holds the raw upper materials, a component cutting machine, and a market that holds the kits after assembly.

11. The processing facility of claim **9**, wherein the customization module comprises a hot melt lamination press, an eco-solvent printer, a digital printing dye sublimation station, a trim clicker, and an embroidery station.

12. The processing facility of claim **9**, wherein the forming and stitching module comprises a radio frequency press that joins the layers of the shoe upper, a cutting press that removes the joined shoe upper from excess upper material, a toe-forming component that forms the toe of the shoe upper, a heel-forming component that forms the heel of the shoe upper, and a strobel-stitch component that stitches a strobel to the formed shoe upper.

13. The processing facility of claim **9**, wherein the forming and stitching module comprises a heat press that joins the layers of the shoe upper, a cutting press that removes the joined shoe upper from excess upper material, a toe-forming component that forms the toe of the shoe upper, a heel-forming component that forms the heel of the shoe upper, and a strobel-stitch component that stitches a strobel to the formed shoe upper.

14. The processing facility of claim **9**, wherein the stockfit and assembly module comprises applies at least one adhesive to assemble the shoe outsole, the shoe midsole and the lasted and formed shoe upper and strobel into a shoe.

15. The processing facility of claim **14**, wherein the stockfit and assembly module further comprises a press that applies pressure to the shoe outsole, the shoe midsole, and the lasted and formed shoe upper and strobel after at least one adhesive has been applied between the lasted and formed shoe upper and strobel and the shoe midsole and at least one adhesive has been applied between the shoe midsole and the shoe outsole.

16. A shoe manufactured through a process, the steps of the process comprising: in a cutting and kitting module, providing a plurality of raw materials required for a multilayered shoe upper, cutting the raw materials into the components of the multilayered shoe upper and placing the components necessary to make a single multilayered shoe upper into kits; in a customization module, receiving a kit and assembling the shoe upper components into multiple layers aligned on a flat frame, and customizing the multilayer upper components by applying decoration to at least one layer of the multilayer shoe upper components while the multilayer shoe upper components are on the flat frame; in a forming module, joining the multilayer upper components to form one integral shoe upper while the multilayer shoe upper components are on the frame, removing the joined shoe upper from the frame by cutting the shoe upper from excess upper material, forming joined shoe upper into a three-dimensional shoe upper, and stitching a strobel to the formed shoe upper; in an outsole and midsole module, forming a shoe midsole and forming a shoe outsole; and in a stockfit and assembly module, attaching the shoe midsole to the shoe upper and attaching the shoe outsole to the shoe upper to form a completed shoe.

17. The shoe of claim **16**, wherein the joined upper is cut from the excess upper material using a press.

18. The shoe of claim **16**, wherein the kits of shoe upper components each includes the components necessary to make a shoe upper for a shoe having a predetermined size.

19. The shoe of claim **16**, wherein the multilayer upper components are joined by a heat press.

20. The shoe of claim **16**, wherein the multi-layer upper components are joined by a radio frequency welder.

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