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(54) **WALL FABRICATION SYSTEM AND METHOD**

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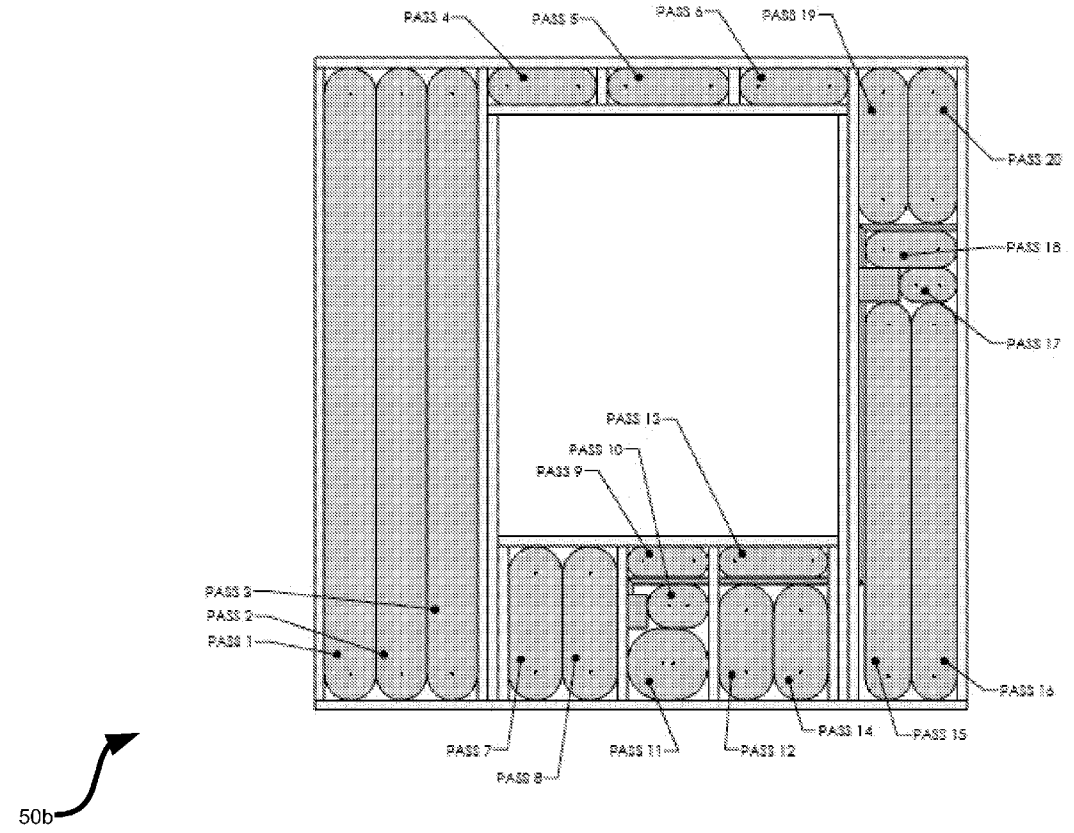
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(57) **ABSTRACT**

A wall fabrication system and method is provided. In an embodiment, an assembly line comprises one or framing stations and one or more insulation stations. The frame stations are configured to build a wall frame consisting of wall studs and a covering such as drywall. The wall studs and drywall define cavities in the frame which are to be insulated. Optionally, mechanical components such as electrical and plumbing can be installed. The wall section is then transferred to the insulation station. The insulation station is configured to fill the cavities in the wall frame with closed cell foam which is injected in flowable form into each cavity.



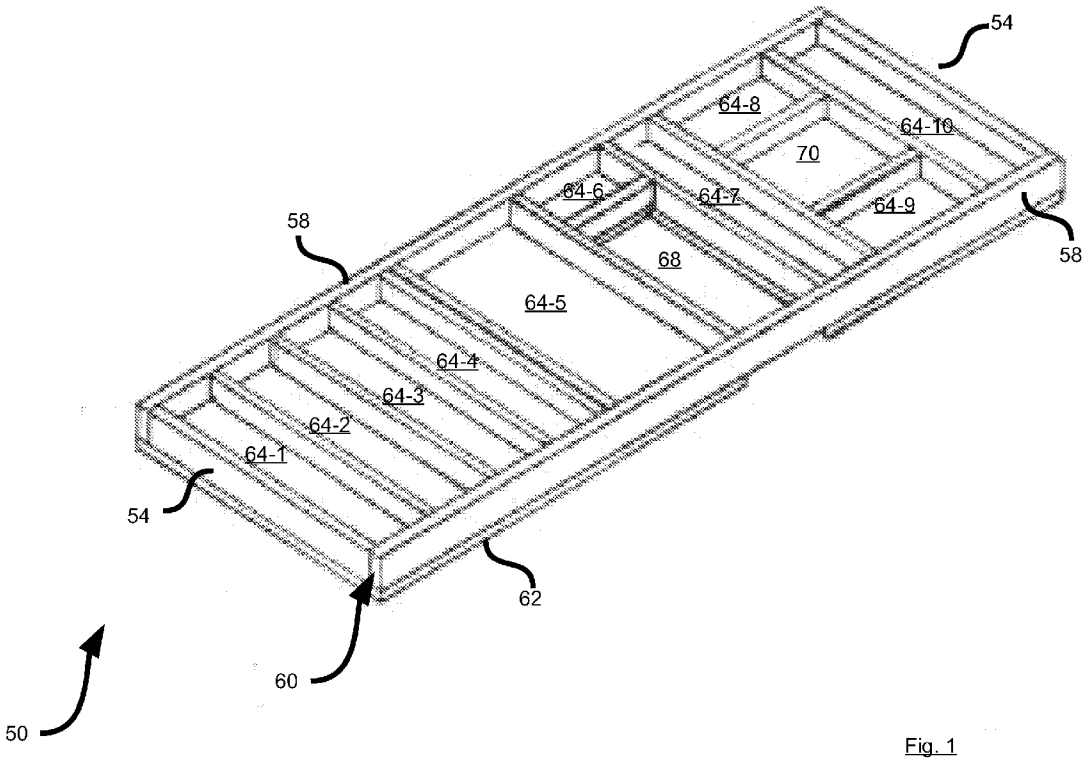


Fig. 1

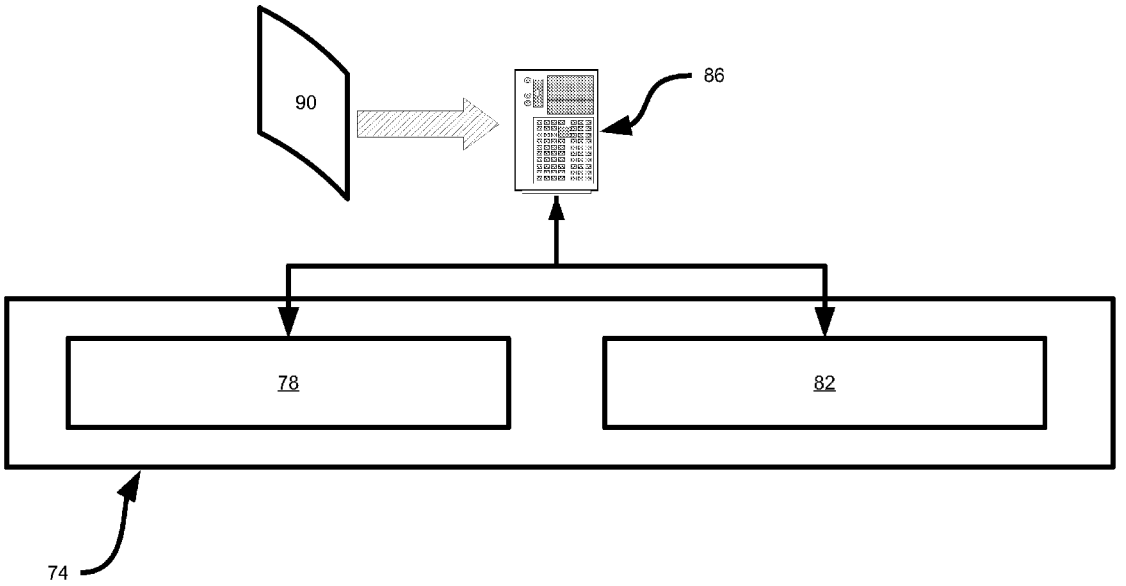


Fig.2

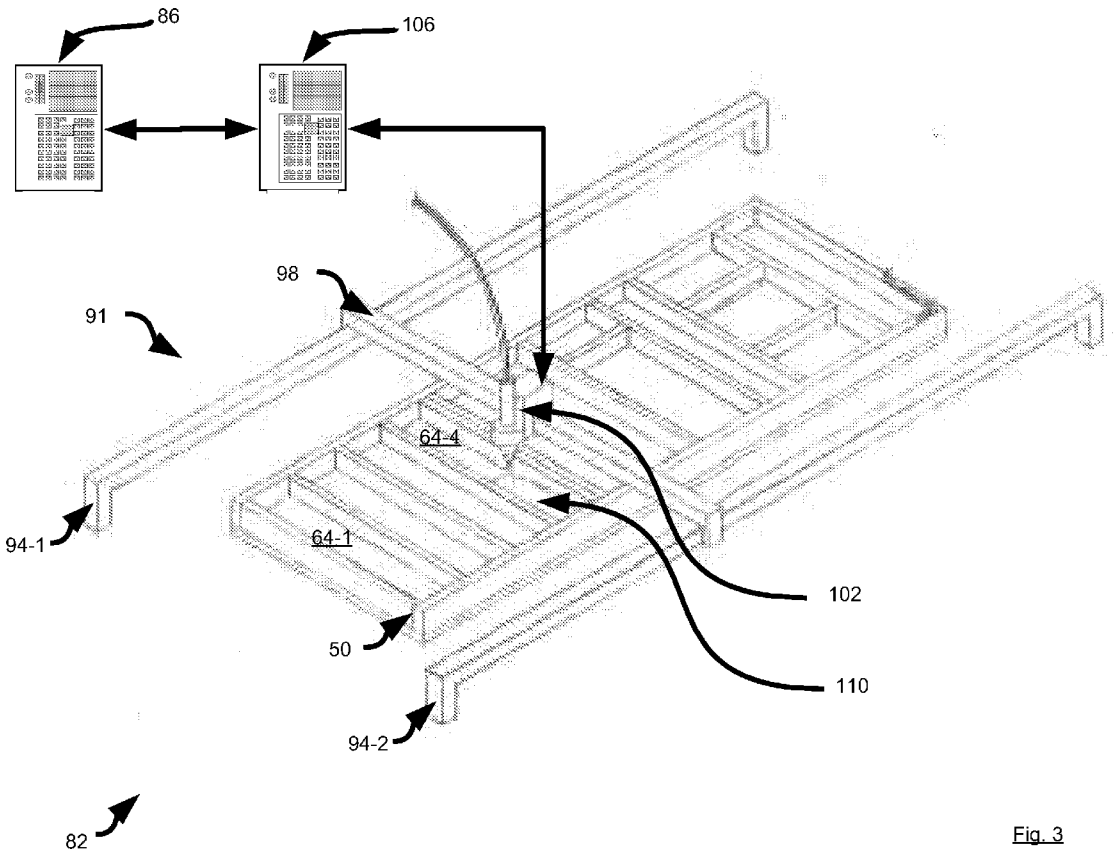


Fig. 3

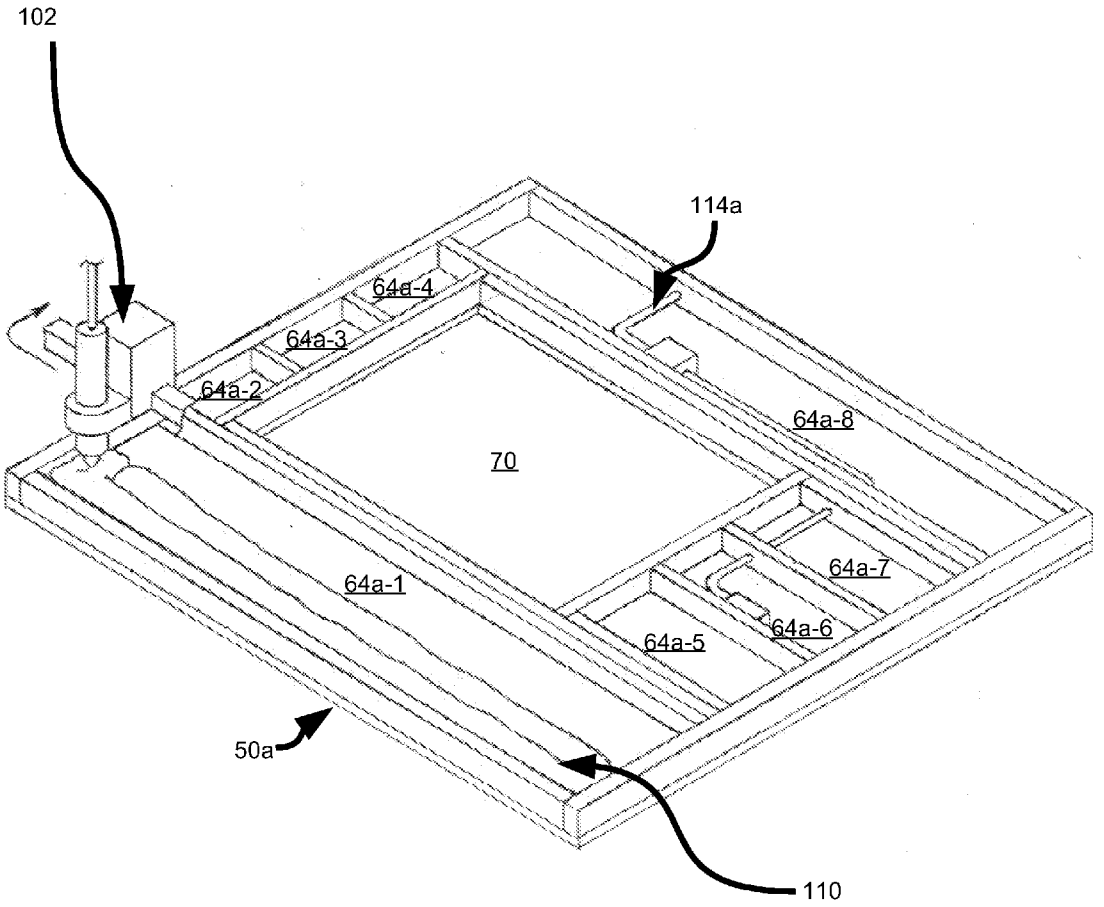


Fig. 4

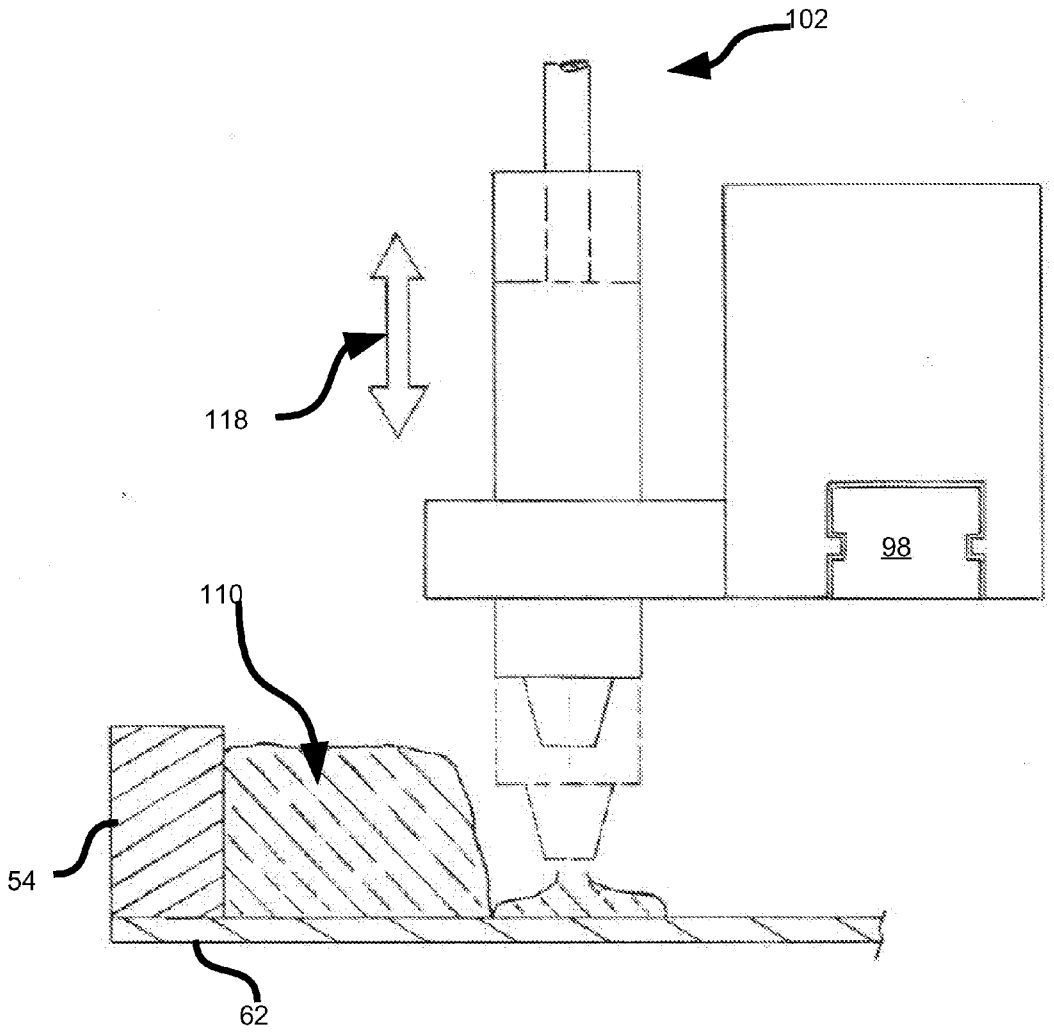


Fig. 5

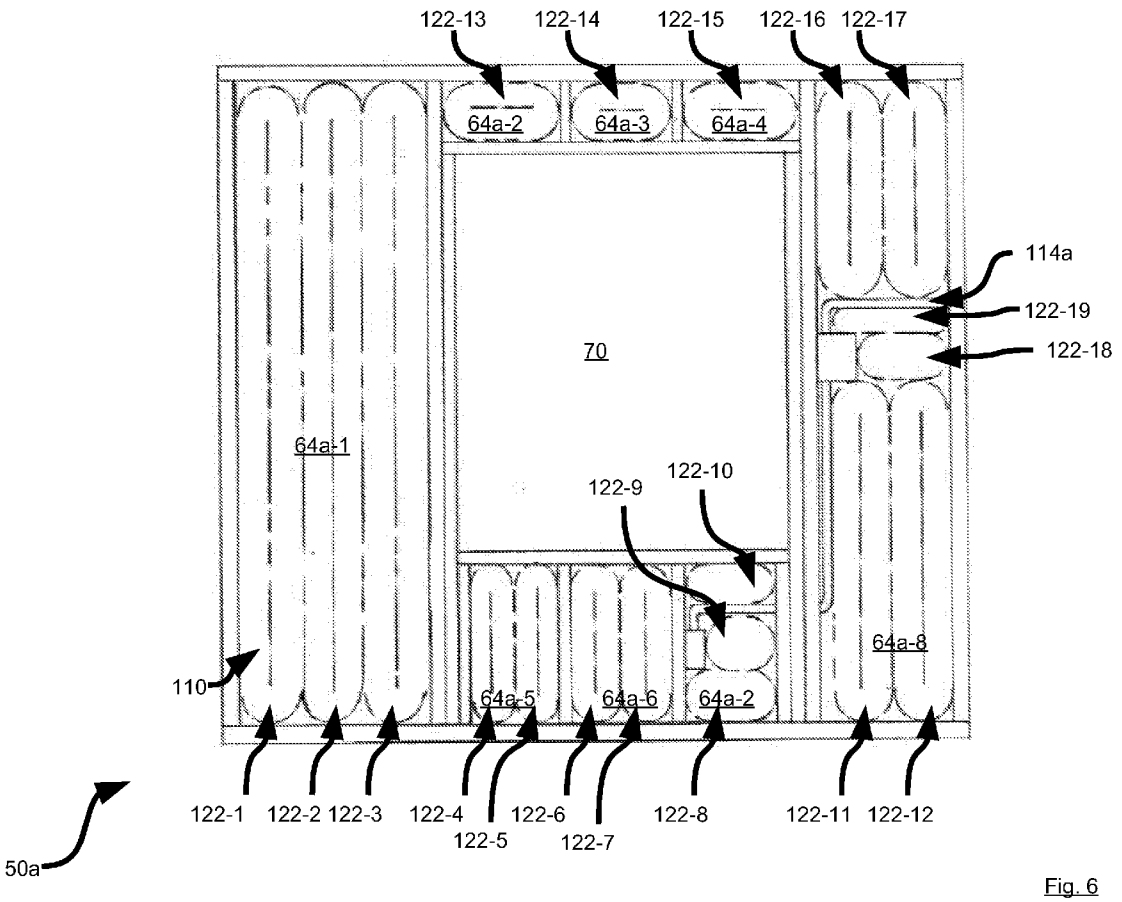

122-13
122-14
122-15
122-16
122-17
64a-2
64a-3
64a-4
114a
122-19
122-18
70
64a-1
122-9
122-10
64a-8
110
64a-5
64a-6
64a-2
122-1
122-2
122-3
122-4
122-5
122-6
122-7
122-8
122-11
122-12
50a

Fig. 6

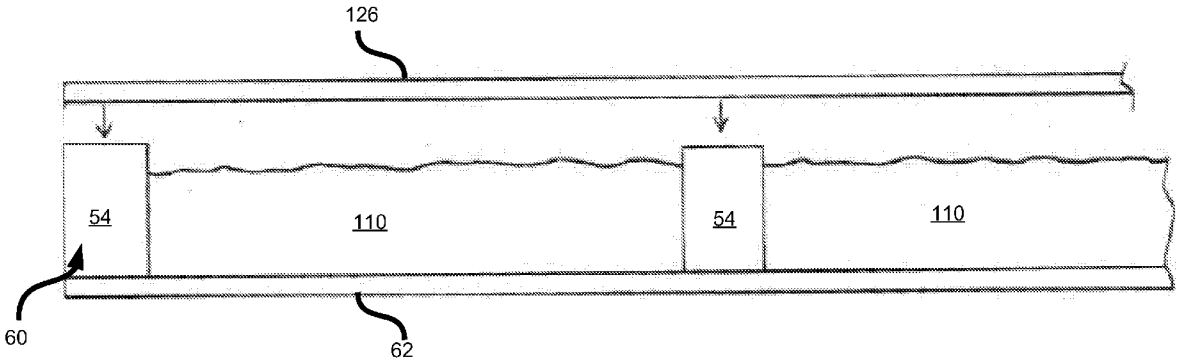


Fig. 7

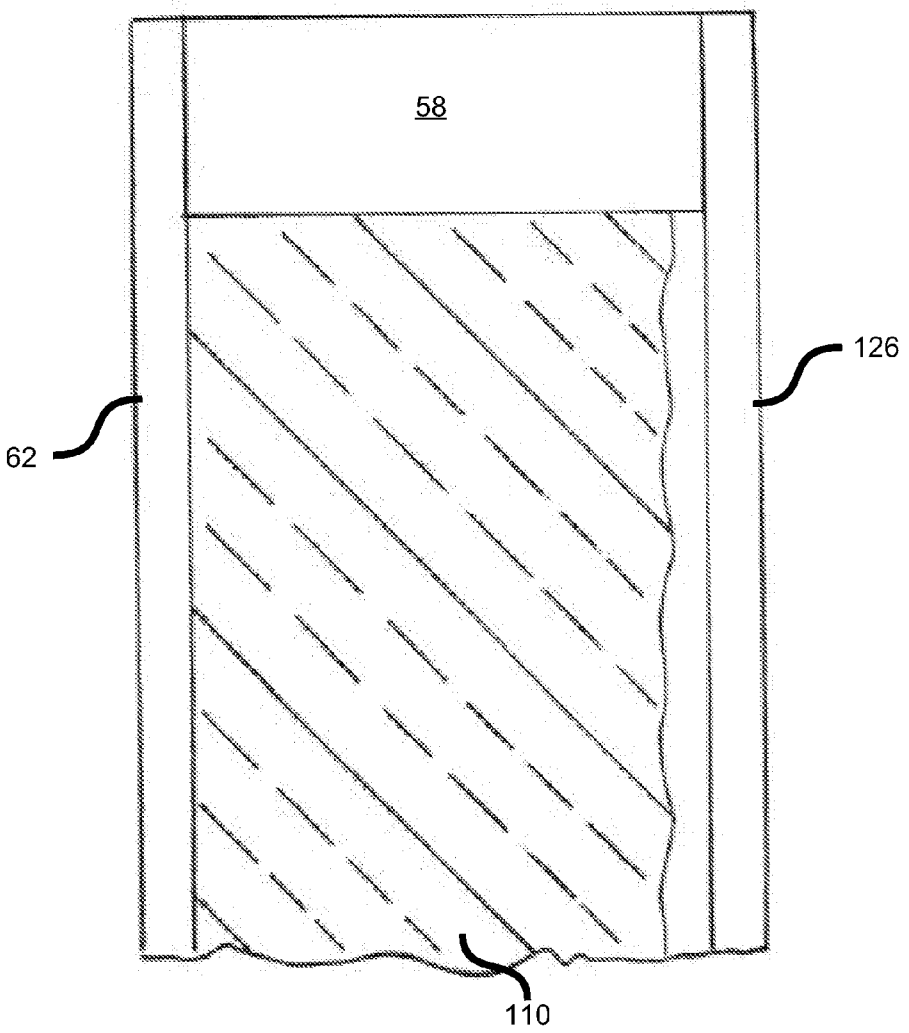


Fig. 8

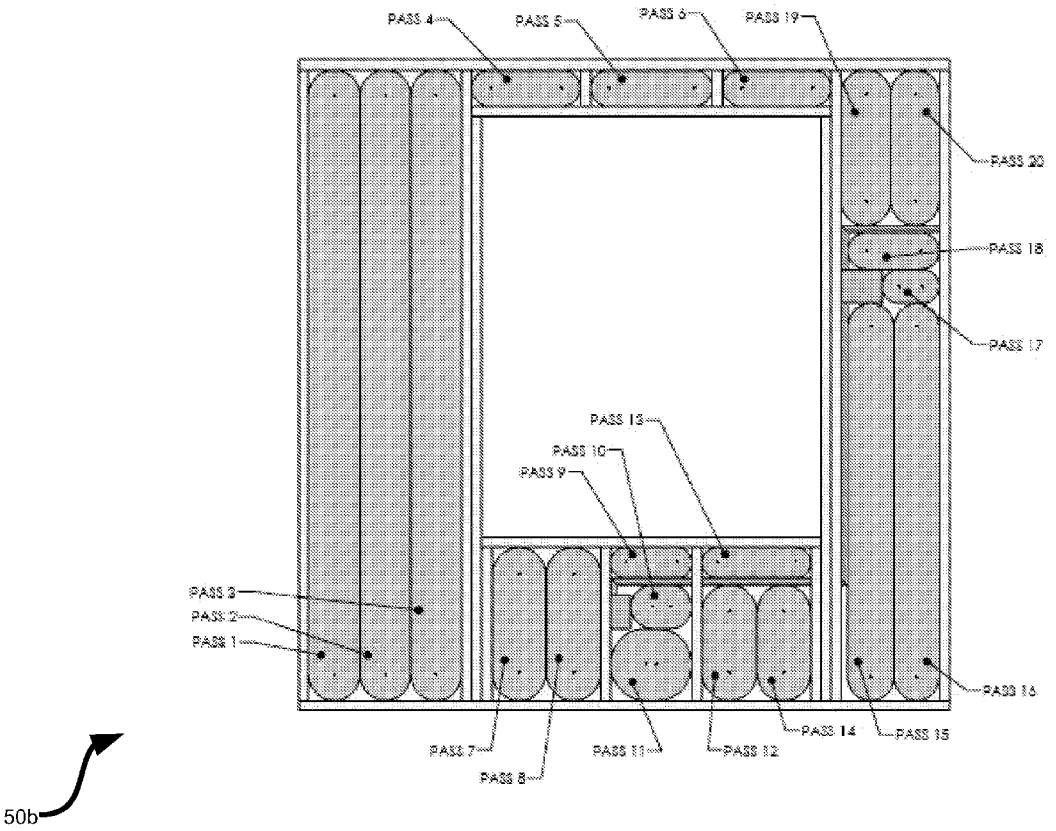

PASS 4
PASS 5
PASS 6
PASS 19
PASS 20
PASS 18
PASS 17
PASS 13
PASS 10
PASS 9
PASS 3
PASS 2
PASS 1
PASS 16
PASS 14
PASS 15
PASS 7
PASS 11
PASS 12
PASS 8
50b

Fig. 9

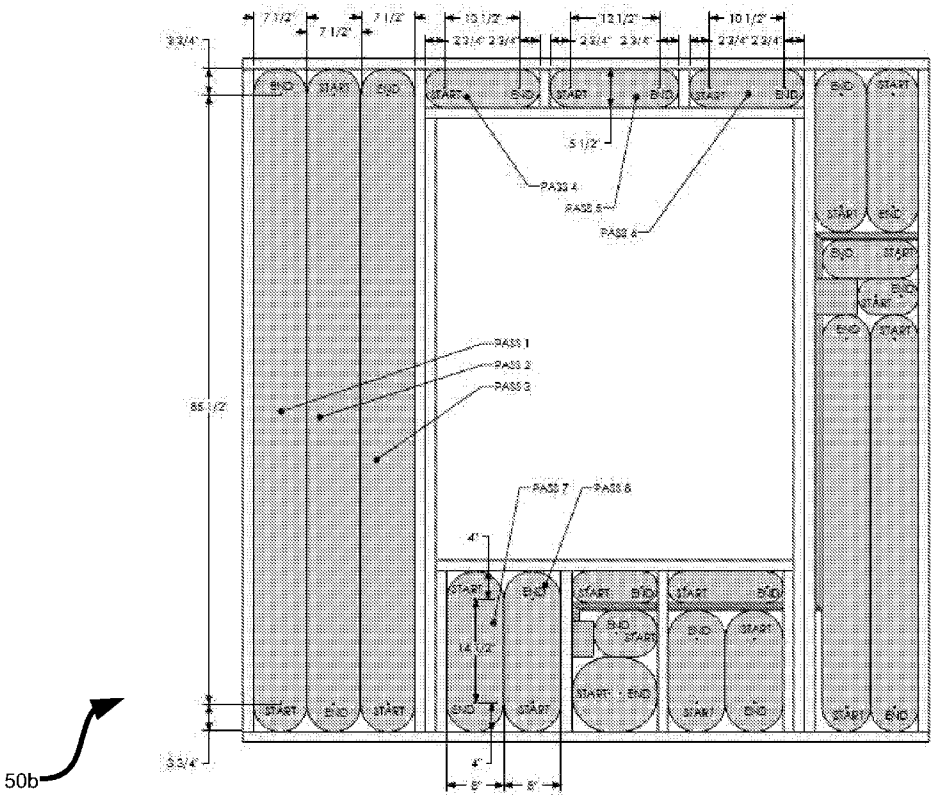

7 1/2"
7 1/2"
7 1/2"
10 1/2"
12 1/2"
10 1/2"
9 3/4"
START
END
5 1/2"
PASS 4
PASS 5
PASS 6
PASS 1
PASS 2
PASS 3
85 1/2"
PASS 7
PASS 8
4"
14 1/2"
3 3/4"
8"
8"
50b

Fig. 10

WALL FABRICATION SYSTEM AND METHOD

CROSS-REFERENCE TO RELATED APPLICATION

[0001] Applicants claim priority of Canadian Application, Ser. No. 2,573,687, filed Jan. 11, 2007.

FIELD OF THE INVENTION

[0002] The present invention relates generally to building construction and in particular to a wall fabrication system and method.

BACKGROUND OF THE INVENTION

[0003] Housing is a critical aspect of social living. The construction of houses and other dwellings is therefore a well-known and highly refined art. Construction techniques and esthetic styles are well known for single family dwellings, detached and semi-detached houses, condominiums, apartment buildings, town houses, and the like.

[0004] Automation is also broad reaching and used heavily in a broad range of industries and is used to build cars, trucks, planes, electronics, appliances and many other products. Automation techniques are increasingly being applied to the housing industry, and indeed are used heavily in the manufacture of modular and panelized homes. Automation is not yet, however, widely applied to the manufacture of traditional site-built homes.

[0005] When insulating walls in traditional site-built homes, it is common to employ skilled labourers to stuff bats of fiberglass insulation within the cavities defined by wall studs. However, it can be difficult to properly fill the cavity, and the fiberglass bats can be prone to sagging so that the upper portions of the wall are not properly insulated. Likewise, not all cavities have uniform shapes and so the bats need to be cut to size, leaving the possibility for gaps. Another disadvantage with fiberglass insulation is that a properly placed vapour barrier is also required. Such a vapour barrier is usually provided via plastic sheets that are applied to the interior side face of the wall. The vapour barrier can be difficult to install, and in any event presents extra cost and time in the home construction process. Another problem with vapour barriers is that mould growth and air leakage can result from punctures that can easily occur in the plastic sheets. Also, application of a moisture barrier in a damp area could actually trap existing moisture within the wall, particularly where the plastic sheeting becomes wrinkled, with all the attendant problems thereto.

[0006] Another common type of insulation is closed cell foam. Closed cell foam can be acquired in rigid sheets, and thus are not prone to sag in the same manner as fiberglass. However, the sheets of foam still need to be cut to size in order to fill irregular shaped cavities. Also, a vapour barrier can still be preferred when using sheets of closed cell foam.

[0007] It is also known to spray closed cell foam in a liquid form into the wall cavities. A spray gun can be used to fill the cavity with the closed cell foam, which then cures and forms an insulating barrier. However, this reintroduces a version of the sagging problem with fiberglass insulation, as the liquid insulation tends to flow downwards in the wall cavity, resulting in an uneven distribution of the insulation within the wall cavity. Overspray is also a serious problem—should the foam be applied to the studs, it can be difficult to attach drywall or other paneling or covering to the wall. Labourers spraying closed cell foam are also exposed to significant environmental hazards and are preferably equipped with gear to reduce inhalation of harmful fumes from spraying closed of cell foams.

SUMMARY OF THE INVENTION

[0008] In an aspect of the invention there is provided a wall section comprising a first set of substantially parallel supports and a second set of substantially parallel supports disposed substantially perpendicular to the first set. The parallel sets of supports are affixed to each other at their junctions. The wall section also comprises a covering applied to one side of the supports. The covering and the sets of supports define a plurality of cavities in the wall section. The wall section also comprises a curable, flowable material that is downwardly injected into one or more of the cavities while the supports are in a horizontal position. Once the material is cured, the wall section can then be moved to the construction site and used to fabricate a home.

[0009] The wall section can further comprise a second covering that is applied to a second side of the supports that is opposite to the first side of the supports.

[0010] The foam material can adhere to both the first covering and the supports in such a manner that the covering is adhered to the supports by the foam material.

[0011] The covering can be drywall, or wood sheathing, or any other type of wall paneling.

[0012] The supports can be made from wood or metal or any other suitable material.

[0013] Depending on the choice of flowable material, when the flowable material cures into a solid form, a torsional and tensional rigidity of the wall section can be increased thereby.

[0014] Depending on the choice of flowable material, when the flowable material cures the insulation factor of the wall section can be increased thereby. The thermal resistance (or R value) per inch of flowable material typically surpasses the R value per inch of traditional fiberglass bats. For example, a traditional bat of 3.5 inch fiberglass has an R value of about 12, whereas three inches of closed foam has an R value of about eighteen. In general terms, traditional fibreglass bats have an R value of about 3.4 per inch of fiberglass, whereas closed cell foam has an R value of about six per inch.

[0015] Depending on the choice of flowable material, when the flowable material cures it can provide an air barrier from one side of the wall section to the other side of the wall section. Furthermore, the flowable material can be chosen to have a low vapour permeance, and, when coupled with a vapour-barrier primer (applied as a paint to the drywall), then a vapour barrier can be formed that is suitable to substantially eliminate the need for plastic sheeting as a vapour barrier.

[0016] The flowable material can be closed cell foam. Closed cell foam can result in increased strength, increased insulation (thermal resistance), and act as an air barrier and has a low vapour permeance.

[0017] In other aspects, the flowable material can be open cell foam.

[0018] Another aspect of the invention provides a method of insulating a wall section of a site-built home. The wall section comprises a first set of substantially parallel supports and a second set of substantially parallel supports that are disposed substantially perpendicular to the first set. The parallel and vertical supports are affixed to each other at their junctions. The wall section also comprises a covering posi-

tioned on one side of the supports. The covering and the sets of supports define cavities in the wall section. The method comprises:

[0019] orienting the wall section horizontally such that the cavities face upwards; and,

[0020] injecting a curable flowable material downwardly into one or more of the cavities.

[0021] The method can further comprise applying a second covering to a second side of the supports that is opposite to the first side of the supports.

[0022] The method can further comprise applying the flowable material to both the first covering and portions of the supports that are perpendicular to the first covering and waiting until the foam material cures such that the covering is adhered to the supports.

[0023] Another aspect of the invention provides a system for manufacturing a wall section comprising one or more framing stations for producing wall sections. The wall sections comprise a first set of substantially parallel supports and a second set of substantially parallel supports disposed substantially perpendicular to the first set of supports. The wall sections include a covering applied to one side of the supports. The covering and the sets of supports each define cavities in each wall section.

[0024] The system can also comprise one or more insulation stations for receiving wall sections from the framing stations and for injecting a curable flowable material downwardly into one or more of the cavities while the supports are in a horizontal position.

[0025] The framing stations and the insulation stations can be configured to produce and insulate, respectively, wall sections that have different configurations.

[0026] The system can further comprise automation equipment, such as robotic equipment, for the framing stations and the insulation stations.

[0027] The system can further comprise a computer configured to control the automation equipment in the framing stations and the insulation stations according to a production schedule in order to continuously produce and insulate a plurality of wall sections having different configurations.

[0028] A wall fabrication system and method is provided. In an aspect, an assembly line comprises one or more framing stations and one or more insulation stations. The framing stations are configured to build a wall frame consisting of wall studs and a covering such as drywall. The wall studs and drywall define cavities in the frame which are to be insulated. Optionally, mechanical components such as electrical, plumbing, central vacuum, telephone and the like can be installed into the wall section. The wall section is then transferred to the insulation station. The insulation station is configured to fill the cavities in the wall frame with closed cell foam which is injected in flowable form into each cavity.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] The invention will now be described, by way of example only, with reference to certain embodiments and the attached Figures in which:

[0030] FIG. **1** is an isometric view of a wall section;

[0031] FIG. **2** is a schematic representation of an assembly line for manufacturing and insulating the wall section of FIG. **1**;

[0032] FIG. **3** is an isometric view of the insulation station of the assembly line of FIG. **2**;

[0033] FIG. **4** shows the insulation station of FIG. **3** in greater detail;

[0034] FIG. **5** is a partial cross section showing a wall cavity being filled using the injector of the insulation station of FIG. **3**;

[0035] FIG. **6** shows the wall section of FIG. **3** after having been filled by the insulation station of FIG. **3**;

[0036] FIG. **7** is a partial sectional view of the wall section in FIG. **6** with a second sheet of drywall being applied thereto; and,

[0037] FIG. **8** is a partial sectional view of the wall section of FIG. **6** after the second sheet of drywall has been attached thereto.

[0038] FIG. **9** shows a variation on the wall section of FIG. **6**.

[0039] FIG. **10** shows the wall section of FIG. **9** with various programming parameters identified thereon.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0040] Referring now to FIG. **1**, a wall section for a traditional site-built home is indicated generally at **50**. Wall section **50** comprises a plurality of substantially parallel vertical studs **54** transversely affixed to a plurality of substantially parallel horizontal studs **58**. Not all vertical studs **54** and horizontal studs **58** are labeled in FIG. **1**. Studs **54**, **58** define a frame **60** that is covered on one side by drywall **62** or other type of covering such as plywood, wood or the like. Studs **54**, **58** act as supports for wall section **50**.

[0041] It should be understood that terms such as "horizontal" and "vertical" are used for convenience to assist in understanding the discussion herein, but do not imply herein that studs of a frame need to be arranged in such a manner.

[0042] Studs **54**, **58** can be wood and/or metal and/or any other suitable type of home framing material for a traditional site-built home. Studs **54**, **58** are affixed to each other using nails, staples and/or any other type of suitable fastener. Drywall **62** (typically a plurality of sheets of drywall) is affixed to frame **60** with nails, staples, screw and/or glue or any other type of suitable fastener. As will be discussed in greater detail below, drywall **62** can be only partially affixed to frame **60**, so that drywall **62** is secured to frame **60** so as to simply hold drywall **62** in place so that wall section **50** can be further processed, but not secured to the extent that would traditionally be needed to fully secure drywall **62** to frame **60** in final installation on site. For example, the Ontario Building Code 1977 states that "Spacing of 5/8" long steel drill screws shall be not more than 300 mm along supports, except that on vertical surfaces the screws may be spaced at 400 mm where the supports are no more than 400 mm o/c." The teachings herein can obviate traditional fasteners and/or mitigate the number of screws that are required according to the Ontario Building Code.

[0043] Wall section **50** is thus characterized by a plurality of cavities **64-1**, **64-2**, **64-3** . . . **64-9**. (Generically, cavity **64**, and collectively, cavities **64**). Wall section **50**, in a present embodiment, is also characterized by a door **68**, and a window **70**.

[0044] It should be understood that the size of wall section **50**, the configuration, placement and number of studs **54**, **58**, and the configuration, placement and number of cavities, and

the configuration, placement and number of cavities of doors or windows (if any) therein is not particularly limited. While not shown in FIG. **1**, it is also contemplated that each wall section **50** will also include all mechanical components, including, for example electrical, plumbing, heating ventilation air-conditioning ("HVAC") conduits, central vacuum conduits, telephone, cable television, and/or Ethernet and/or outlets relating to any of the foregoing.

[0045] Referring now to FIG. **2**, wall section **50**, in its entirety, is typically constructed on an assembly line **74** in a manufacturing facility. An example of such a manufacturing facility described in Applicant's co-pending application entitled Housing Manufacturing System and Method and filed in the Canadian Patent Office on Oct. 11, 2006 and bearing application number 2,563,187, the contents of which are incorporated herein by reference.

[0046] Assembly line **74** thus includes one or more framing station(s) **78** and one or more insulation station(s) **82**. Insulation station **82** will be discussed in greater detail below. Framing station **78** is configured to produce wall section **50**. It is also contemplated that assembly line **74** is "flexible", so that while framing station **78** is configured to produce wall section **50**, framing station **78** is also configured to produce wall sections that have configurations that are different than wall section **50**. In other words, various wall sections produced on assembly line **74** can be different, according to a desired production run for different configurations of traditional site-built homes. Assembly line **74** can also be fully or partially automated, with computers instructing robotic equipment to manufacture each wall section. In a presently preferred embodiment, assembly line **74** is substantially automated, including the transfer of wall sections from station **78** to station **82**. Thus, assembly line **74** includes a central scheduling computer **86** that maintains a production schedule **90** with production runs for station **78** and station **82**. Production schedule **90** thus includes instructions for the configuration of wall section **50** and configurations for every other wall section that is to be produced using framing station **78** and insulated at insulation station **82**. Computer **86** is configured to deliver instructions to operators and/or robotic equipment in framing station **78** as to the configuration of each wall section to be produced. Computer **86** is also configured to notify insulation station **82** as to the configuration of each wall section **78** that has been produced so that insulation station **82** can fulfill the insulation task.

[0047] Referring to FIG. **3**, insulation station **82** is shown in greater detail, which shows wall section **50** within station **82**. In FIG. **3**, insulation station **82** includes a robotic X-Y Gantry **91**. Gantry **91** includes a pair of rails **94**. A transverse rail **98** is positioned perpendicular to rails **94**. Transverse rail **98** is motorized and configured to run along the length of rails **94**. An injector **102** is mounted to transverse rail **98** and is movable along the length of rail **98**. A computerized controller **106** is connected to gantry **91** and can issue instructions thereto in order to move injector **102** to any location above wall section **50**. While the present embodiment contemplates a gantry **91**, it should be understood that other robotic configurations are also contemplated.

[0048] Controller **106** is in turn connected to computer **86** and is configured to receive instructions from computer **86** as to the configuration of the particular wall section **50** within station **82** as found on production schedule **90**.

[0049] Injector **102** is configured to dispense closed cell foam **110** in a flowable form into each cavity **64**. Injector **102** is connected to a reservoir (not shown) of foam that is located proximal to station **82**. In a presently preferred embodiment, rails **94** and **98** are substantially horizontal and wall section **50** is also positioned substantially horizontally, so that injector **102** is above wall section **102** and all foam **110** dispensed from injector **102** flows substantially downwardly.

[0050] Controller **106** is thus configured to instruct gantry **91** so as to move injector **102** above the extent of each cavity **64**, and to issue instructions to a valve associated with injector **102** that causes injector **102** to either dispense foam **110**, or to cause injector **102** to "shut off" and not dispense foam. The valve can also be variable so that the rate of flow of foam **110** is variable. Whether injector **102** is dispensing foam or not, injector **102** is movable along rails **94**, **98** according to instructions from controller **106**.

[0051] Referring now to FIG. **4**, a second wall section **50***a* located within station **82**, while being filled with foam **110** by injector **102**, is shown in greater detail. Wall section **50***a* includes cavities **64***a* and a window **70***a*. Wall section **50***a* is also shown with mechanical components, in the form of electrical conduit **114***a* run within cavities **64***a*-**6**, **64***a*-**7** and **64***a*-**8**.

[0052] In a presently preferred embodiment, controller **106** is preprogrammed with a plurality of paths to follow in order to fill each cavity **64**. Controller **106** is preprogrammed to move injector **102** within each cavity **64***a* according to each predefined path, and dispense a bead of foam **110** along that path. Controller **106** is also preprogrammed to move injector **102** between each cavity **64***a* without dispensing any foam. The rate of travel of injector **102**, and flow rate of foam **110** can be chosen in order to optimize speed of filling each cavity **64**, reduce and/or minimize the overall amount of travel of injector **102** within each cavity **64***a* and/or reduce and/or minimize the amount of travel of injector **102** between each cavity **64***a* where injector **102** is not dispensing any foam. In addition to the foregoing, however, the size of the bead that is injected is chosen so as to optimize any settling and/or expansion that may occur within each cavity **64***a* and the cure times of the foam. It can be desired to control the manufacturing steps for each station **78** and **82** such that the cycle time for each station **78** and **82** are substantially the same, and thus the operation of injector **102** can be configured accordingly.

[0053] Referring now to FIG. **5**, for further control overfilling of cavities **64***a*, it can also be desired to configure injector **102** to be movable along an axis perpendicular to rail **98**, in order to control the depth of foam **110**. In a present embodiment, however, as best seen in FIGS. **7** and **8**, the depth of foam **110** for each cavity is chosen so as to be slightly less than the depth of studs **54**, **58**. The actual depth of foam that is dispensed may be less than the final fill depth, in order to account for any expansion of foam that can occur during the curing process.

[0054] Referring now to FIG. **6**, wall section **50***a* is shown having cavities **64***a* therein completely filled with foam **110** by a plurality of beads **122** of foam **110**. It will be noted that the pattern of fill for each cavity **64***a* is unique to that cavity. Table I provides an exemplary summary of each pattern of fill.

TABLE I

Cavity	Cavity Description	Bead	Sequence	Bead Description
64a-1	8 feet × 1.5 feet	122-1	1	Runs lengthwise, filling one-third of width of cavity 64a
64a-1	8 feet × 1.5 feet	122-2	2	Runs lengthwise, filling one-third of width of cavity 64a
64a-1	8 feet × 1.5 feet	122-3	3	Runs lengthwise, filling one-third of width of cavity 64a
64a-2	0.5 feet × 0.9 feet	122-13	19	Runs along width of cavity 64a-2
64a-3	0.5 feet × 0.9 feet	122-14	18	Runs along width of cavity 64a-3
64a-4	0.5 feet × 0.9 feet	122-15	17	Runs along width of cavity 64a-3
64a-5	0.5 feet × 2.7 feet	122-4	4	Runs lengthwise, filling one half of width of cavity 64a-5
64a-5	0.5 feet × 2.7 feet	122-5	5	Runs lengthwise, filling one half of width of cavity 64a-5
64a-6	0.5 feet × 2.7 feet	122-6	6	Runs lengthwise, filling one half of width of cavity 64a-6
64a-6	0.5 feet × 2.7 feet	122-7	7	Runs lengthwise, filling one half of width of cavity 64a-6
64a-7	0.5 feet × 2.7 feet	122-8	18	Runs along width, filling one third of cavity 64a-7
64a-7	0.5 feet × 2.7 feet	122-9	9	Runs along width, omitting fill for location of electrical outlet
64a-7	0.5 feet × 2.7 feet	122-10	10	Runs along width of cavity 64a-7
64a-8	8 feet × 1 foot	122-11	11	Runs ⅔ of length and filling one-third of width of cavity 64a-8
64a-8	8 feet × 1 foot	122-12	12	Runs ⅔ of length and filling one-third of width of cavity 64a-8
64a-8	8 feet × 1 foot	122-18	13	Runs along width between other beads and omitting fill for location of electrical outlet
64a-8	8 feet × 1 foot	122-19	14	Runs along width between other beads and omitting fill along path of electrical conduit
64a-9	8 feet × 1 foot	122-16	16	Runs remainder of length and filling one-third of width of cavity 64a-8
64a-9	8 feet × 1 foot	122-17	15	Runs remainder of length and filling one-third of width of cavity 64a-8

[0055] The contents of Table I can thus be converted into programming instructions for controller **106**, with each cavity **64***a* being filled by injector **102** in the order according the sequence in Table I.

[0056] Referring now to FIGS. **7** and **8**, once wall section **50** has been filled with insulating foam **110**, a second covering can be affixed to frame **60**. In a present embodiment the second covering is in the form of drywall **126**. FIG. **8** in particular shows that the depth of foam is such that a small gap exists between foam **110** and drywall **126**.

[0057] However, there is no gap between foam **110** and drywall **62**. This underscores one of the advantages of the present invention, as foam **110** adheres to drywall **62**, thereby affixing drywall **62** to frame **60** in a manner that can be more secure than at least some prior art methods which include the sole use of nails and/or staples and/or glue. Since the use of mechanical fasteners (e.g. nails and/or staples) can be substantially eliminated, or at least reduced, drywall **62** is much less susceptible to the phenomenon of "nail-pops" whereby drywall nails, over time, appear to be driven out of wooden studs **54**, **58** and protrude from the surface of drywall **62**, with an unsightly effect. This annoying phenomenon can be common on traditional wooden wall panels, as moisture evaporates from studs **54**, **58** and giving the appearance of pushing the nails out of the wood frame as the wood shrinks away from the frame. It can be one of the most significant causes of warranty claims on new homes and therefore it is strongly desirable to obviate nail-pops.

[0058] Also, as another advantage, since cavities **64** are filled while wall section **50** is horizontal, the depth of foam **110** is substantially uniform. Likewise the insulating properties are also substantially uniform along the length of wall section **50**. Likewise, the mechanical adherence of drywall **62** to frame **60** is substantially uniform throughout the entire extent of drywall **62**.

[0059] Also, as another advantage, the substantially uniform fill of each wall section **50** can obviate the need for a traditional vapour-barrier of plastic sheeting to be applied, particularly when a vapour-barrier primer is applied to the wall section **50**.

[0060] Also, as another advantage, the filling of each wall section **50** with foam **110** can increase the overall strength, both in torsion and in tension, of each wall section **50**. As a result, when wall sections are manufactured in a facility for shipping to the construction site, wall sections manufactured according to the teachings herein are more resilient during the shipping process and less susceptible to damage than traditional, prior art wall sections.

[0061] It is believed that the teachings herein can, in certain applications, obviate the use of fasteners for drywall **62** to stud **58** altogether, as the adhesion between the foam and the drywall **62** and stud **58** is sufficient. Also the use of closed cell foam, can permit the reduction in the thickness of an exterior wall cavity from six inches to four inches, since the closed cell foam has an R value per inch that is greater than the R value per inch of traditional fiberglass insulation bats. This reduction in wall cavity thickness reduces the amount of lumber

used and reduces stresses on the environment. Thus, a four inch wall cavity using the teachings herein can have the same, or better, air-conditioning and heating costs as a six inch wall cavity that employs traditional fiberglass bats. As a still further advantage, an engineered ventilated station can be configured to thereby reduce exposure to fumes given off during application. When foam is sprayed vertically into wall cavities on a construction site, the operator has to wear ventilation gear, yet an engineered ventilation system can mean that the operator need wear no gear when foam is sprayed using the teachings herein. Further, in a factory environment as described herein, the option exists to substantially completely recover the gases and prevent them from release into environment, and there by substantially reduce off-gassing into the environment.

[0062] Referring now to FIGS. **9** and **10**, a variation on wall section **50***a* is indicated as wall section **50***b*. FIGS. **9** and **10** show the specific sequence of passes for each cavity of wall section **50***b*. Appendix I hereto describes the application parameters of foam for each cavity of wall section **50***b*.

[0063] The present invention thus provides, amongst other things, a novel system and method for manufacturing wall sections of houses by providing an assembly line for producing and insulating wall sections.

[0064] While the foregoing describes certain specific embodiments of the present invention, it should be understood that variations, combinations and sub-sets of those embodiments are contemplated.

1. A wall section comprising:
a first set of substantially parallel supports;
a second set of substantially parallel supports disposed substantially perpendicular to said first set;
a covering applied to one side of said supports;
said covering and said sets of supports defining cavities; and,
a curable flowable material downwardly injected into one or more of said cavities while said supports are in a horizontal position.

2. The wall section of claim **1** further comprising a second covering applied to a second side of said supports that is opposite to said first side of said supports.

3. The wall section of claim **1** wherein said foam material adheres to both said first covering and said supports such that said covering is adhered to said supports by said foam material.

4. The wall section of claim **1** wherein said covering is drywall.

5. The wall section of claim **1** wherein said supports are made from wood.

6. The wall section of claim **1** wherein said supports are made from metal.

7. The wall section of claim **1** wherein said flowable material is closed cell foam.

8. The wall section of claim **1** wherein when said flowable material cures a torsional and tensional rigidity of said wall section is increased thereby.

9. The wall section of claim **1** wherein when said flowable material increases the insulation factor of said wall section.

10. The wall section of claim **1** wherein when said flowable material provides at least a partial vapour barrier from one side of said wall section to the other side of said wall section.

11. A method of insulating a wall section of a site-built home; said wall section comprising a first set of substantially parallel supports; a second set of substantially parallel supports disposed substantially perpendicular to said first set; a covering positioned on one side of said supports;
said covering and said sets of supports defining cavities; the method comprising:
orienting said wall section horizontally such that said cavities face upwards; and,
injecting curable flowable material downwardly into one or more of said cavities.

12. The method of claim **11** wherein further comprising applying a second covering to a second side of said supports that is opposite to said first side of said supports.

13. The method of claim **11** wherein said foam material is applied to both said first covering and portions of said supports that are perpendicular to said first covering and further comprising the step of:
waiting until said foam material cures such that said covering is adhered to said supports.

14. The method of claim **11** wherein said covering is drywall.

15. The method of claim **11** wherein said supports are made from wood.

16. The method of claim **11** wherein said supports are made from metal.

17. The method of claim **11** wherein said curable material is closed cell foam.

18. The method of claim **11** wherein when said curable flowable material is selected such that when said flowable material cures a torsional and tensional rigidity of said wall section is increased thereby.

19. The method of claim **11** wherein said curable flowable material is selected such that when said flowable material cures said material increases the insulation factor of said wall section.

20. The method of claim **11** wherein said curable flowable material is selected so as to provide at least a partial vapour barrier from one side of said wall section to the other side of said wall section when said.

21. A system for manufacturing a wall section comprising:
one or more framing stations for producing wall sections that comprise a first set of substantially parallel supports; a second set of substantially parallel supports disposed substantially perpendicular to said first set; a covering applied to one side of said supports;
said covering and said sets of supports defining cavities;
one or more insulation stations for receiving wall sections from said framing stations and for injecting a curable flowable material downwardly into one or more of said cavities while said supports are in a horizontal position.

22. The system of claim **21** wherein said framing stations and said insulation stations are configured to produce and insulate, respectively, wall sections that have different configurations.

23. The system of claim **22** further comprising automation equipment for said framing stations and said insulation stations.

24. The system of claim **23** further comprising a computer configured to control said automation equipment in said framing stations and said insulation stations according to a production schedule in order to continuously produce and insulate a plurality of wall sections having different configurations.

25. The system of claim **21** wherein said covering is an inside wall of a home.

26. The system of claim **21** wherein said covering is an outside wall of a home

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