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Hanging Wall Panel for Buildings

Field of the Invention

The invention relates to the technical field of building members, specifically to a hanging wall panel for buildings.

Description of the Prior Art

With the constant improvement of scientific and technological level of building industry, housing construction needs to be industrialized. The wall, kitchen, and toilet, etc. on buildings are all produced in industrial workshops, and then transported to the construction site for assembling so as to reduce the workload of site construction and to control the pollution to the environment on site, which fundamentally improves the construction progress and efficiency. Therefore, industrialization serves as the urgent need for building industry development in this age.

At present, the majority of existing wall panels for buildings are of reinforced concrete prefabricated structure; during the use, the following problems are found: I. The weight of the wall panels is relatively large, and the requirements for the bearing capacity of the foundation and frame of buildings are relatively high, therefore the design standard of the foundation and frame of buildings is higher, resulting in increased construction cost; II. The strength of the wall panels is relatively high, thus it may damage or break the frame of buildings easily during lifting operation, in occurrence of earthquake or other incidents; IV. The surroundings of the wall panel appear flat; when multiple wall panels are assembled on the frame of buildings, it is quite inconvenient to accurately locate each wall panel, which lowers the installation efficiency; moreover, although the space between wall panels is sealed, it still fails to fundamentally prevent the penetration of rainwater; V. The surroundings of the window appear flat; therefore, it is incapable of effectively preventing rainwater from penetrating into the space between the window and the window frame. Due to the above problems, it is difficult to obtain large-scale advancement in the industrialized production of buildings in this field. The solution of the above problems also serves as one of the important research subjects for technicians in this field.

Objectives and Summary of the Invention



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This invention claims a hanging wall panel for buildings, which is capable of solving the existing technical problems.

In this invention, the following technical solution is provided to achieve the above purpose: A hanging wall panel for buildings, comprising at least one wall panel, wherein each wall panel is provided with a frame constituted by the upper, lower, left and right metal sectional bars; one side of the frame is connected with an interior trim panel, while the other side of said frame is connected with an exterior trim panel; a heat insulating material is filled between the interior trim panel and the exterior trim panel; all sectional shapes of said four metal sectional bars are abnormal bulges or abnormal grooves, or one or two appear abnormal bulges and the other one or two appear abnormal grooves; when multiple wall panels are connected, the abnormal bulges match with the abnormal grooves; a top plate bulging outward is located on the section of the abnormal bulge; two ends of said top plate are connected with the upper end of a first vertical panel and a second vertical panel respectively; the other end of the first vertical panel and the second vertical panel extends downward and is connected with one end of a first flat panel and a second flat panel respectively; the other end of the first flat panel and the second flat panel in the horizontal direction is connected with the upper end of a first side panel and a second side panel respectively; a first strip plate bending inward is arranged at the lower end of the first side panel; a second strip plate bending inward is arranged at the lower end of the second side panel; all of the above-mentioned panels constitute a cavity; the top plate bulges outward opposite to said cavity; a top panel projecting inward is located on the section of the abnormal groove; two ends of the top panel are connected with the upper end of a first vertical panel and a second vertical panel respectively; the other end of the first vertical panel and the second vertical panel extends downward and is connected with one end of a first flat panel and a second flat panel respectively; the other end of the first flat panel and the second flat panel is connected with one end of a first side panel and a second side panel respectively; a first strip plate bending inward is arranged at the upper end of the first side panel; a second strip plate bending inward is arranged at the upper end of the second side panel; all of the above-mentioned panels constitute a hollow cavity; the top panel, the first vertical panel and the second vertical panel constitute a groove; and the groove is located outside the hollow cavity.

At least one first metal sectional bar and one second metal sectional bar parallel to the horizontal direction are installed in said frame; the first metal sectional bar and the second metal sectional bar are distributed at different heights; at least one third metal sectional bar and one fourth metal sectional bar vertical to the horizontal direction are installed in the frame; the first metal sectional bar, the second metal sectional bar, the third metal sectional bar and the fourth metal sectional bar are located in an identical plane, and two ends of the first metal sectional bar, the second metal sectional bar, the third metal sectional bar and the fourth metal sectional bar are connected with the frame respectively; and the side panels at two ends of the first metal sectional bar, the second metal sectional bar, the third metal sectional bar and the fourth metal sectional bar are connected with the exterior trim panel and the interior trim panel respectively. After the first metal sectional bar, the second metal sectional bar, the third metal sectional bar and the fourth metal sectional bar are assembled, the middle part constitutes a window; the upper and lower ends of the exterior trim panel at the window bend towards the interior of the frame respectively; the bent parts are connected with the first metal sectional bar and the second metal sectional bar respectively; and the height of the exterior trim panel is greater than that of the interior trim panel. A top plate is located in the section of said first metal sectional bar; one end of the top plate is connected with the upper end of the first side panel, while the other end of the top plate is connected with the upper end of the second side panel; the first strip plate bending inward is arranged at the lower end of the first side panel; the second strip plate bending inward is arranged at the lower end of the second side panel; the first flat plate is located in the left of the top plate; the second flat plate is located in the right of the top plate; the first flat plate and the second flat plate are located in different horizontal planes at different heights; an inclined panel is used to connect the first flat plate with the second flat plate; and the sectional shapes of the second metal sectional bar, the third metal sectional bar and the fourth metal sectional bar are the same as that of the first metal sectional bar. A metal mesh is installed in the frame; the metal mesh is connected with the metal sectional bars of the frame; a heat insulating material is filled among the metal mesh, the interior trim panel and the exterior trim panel; and said heat insulating material is foam concrete. A heat insulation pad is installed between the abnormal bulge and abnormal groove on the exterior trim panel and the frame or/and among the first metal sectional bar, the second metal sectional bar, the third metal sectional bar and the fourth metal sectional

bar respectively; one side of the heat insulation pad is attached to the internal surface of said exterior trim panel; the other side of the heat insulation pad is attached to one side of each metal sectional bar respectively; and the other side of each metal sectional bar is attached to the interior trim panel respectively. A cushion pad is installed between the metal sectional bars of the frame in the position where every two wall panels are connected; specifically, the cushion pad (33) is installed in the position where the top plates of the abnormal bulge and the abnormal groove match with each other; a filling strip is installed between two heat insulation pads in the position where every two wall panels are connected; sealant is filled between two ends of two exterior trim panels in the position where every two wall panels are connected; and the sealant keeps close contact with said filling strip . A first hanger and a second hanger are installed in the upper part of the wall panel; the structure of the two hangers are the same; the hanger is equipped with one rectangular box body; two ends of a horizontal hanging scroll located in the box body are connected with the box body respectively; the first hanger and the second hanger are connected with the metal sectional bars of the frame in a secure manner; and the external surfaces of the two hangers and the external surface of the interior trim panel are located in an identical plane. At least one connector is opened in the lower part of the wall panel; and the depth of the connector depends on the exposed external surfaces of the metal sectional bars of the frame. The first vertical panel and the second vertical panel in the abnormal bulge are inclined panels; and the first vertical panel and the second vertical panel in the abnormal groove are inclined panels.

The weight of the hanging wall panel for buildings disclosed in this invention is approximately 60% less than that of the reinforced concrete prefabricated wall panel of the same specification, thereby significantly reducing the requirements for bearing capacity of the foundation and frame of buildings and saving about 30% overall construction cost of buildings; mutually matched metal sectional bars are utilized for the wall panel in this invention, therefore the wall panel is capable of positioning accurately and quickly and can be installed conveniently and swiftly, making the production efficiency about 40% higher than that of prior art; moreover, thanks to the specific structure of metal sectional bar, rainwater will not penetrate into the wall panel when the wall panels are connected with each other, which completely solves the problem of water penetration at the wall panel connection in prior art; additionally,

the hanging wall panel for buildings can reduce the construction dust and avoid pollution during the construction; the hanging wall panel for buildings in this invention is advantaged in short manufacturing cycle and energy conservation, and follow-up maintenance is not required.

Brief Description of the Drawings

See Fig. 1 for the structure in Embodiment I in this invention;

See Fig. 2 for the structure in Embodiment II in this invention;

See Fig. 3 for the A-A sectional structure in Fig. 1;

See Fig. 4 for the A-A sectional structure in Fig. 2;

See Fig. 5 for the structure in Embodiment III in this invention;

See Fig. 6 for the structure in Embodiment IV in this invention;

See Fig. 7 for the cross-sectional structure of said first metal sectional bar (a1) in this invention;

See Fig. 8 for the structure of four mutually connected wall panels;

See Fig. 9 for the E-direction locally enlarged structure in Fig. 8, mainly the structure of the contact surface of every two connected wall panels;

See Fig. 10 for the structure in Embodiment V in this invention;

See Fig. 11 for the sectional shape of said abnormal bulge in this invention;

See Fig. 12 for the sectional shape of said abnormal groove in this invention.

Detailed Description of the Invention

The technical solution of the hanging wall panel for buildings disclosed in this invention is as follows: comprising at least one wall panel, wherein each wall panel is provided with a frame (1) constituted by the upper, lower, left and right metal sectional bars; one side of the frame (1) is connected with an interior trim panel (4), while the other side of said frame (1) is connected with an exterior trim panel (3); a heat insulating material (5) is filled between the interior trim panel (4) and the exterior trim panel (3); all sectional shapes of said four metal sectional bars are abnormal bulges or abnormal grooves, or one or two appear abnormal bulges and the other one

or two appear abnormal grooves; when multiple wall panels are connected, the abnormal bulges match with the abnormal grooves; a top plate (M) bulging outward is located on the section of the abnormal bulge; two ends of said top plate (M) are connected with the upper end of a first vertical panel (M1) and a second vertical panel (M2) respectively; the other end of the first vertical panel (M1) and the second vertical panel (M2) extends downward and is connected with one end of a first flat panel (M3) and a second flat panel (M4) respectively; the other end of the first flat panel (M3) and the second flat panel (M4) in the horizontal direction is connected with the upper end of a first side panel (M21) and a second side panel (M22) respectively; a first strip plate (M21a) bending inward is arranged at the lower end of the first side panel (M21); a second strip plate (M22a) bending inward is arranged at the lower end of the second side panel (M22); all of the above-mentioned panels constitute a cavity (A1); the top plate (M) bulges outward opposite to said cavity (A1); a top panel (W) projecting inward is located on the section of the abnormal groove; two ends of the top panel (W) are connected with the upper end of a first vertical panel (W1) and a second vertical panel (W2) respectively; the other end of the first vertical panel (W1) and the second vertical panel (W2) extends downward and is connected with one end of a first flat panel (W3) and a second flat panel (W4) respectively; the other end of the first flat panel (W3) and the second flat panel (W4) is connected with one end of a first side panel (W21) and a second side panel (W22) respectively; a first strip plate (W21a) bending inward is arranged at the upper end of the first side panel (W21); a second strip plate (W22a) bending inward is arranged at the upper end of the second side panel (M22); all of the above-mentioned panels constitute a hollow cavity (C1); the top panel (W), the first vertical panel (W1) and the second vertical panel (W2) constitute a groove (B1); and the groove (B1) is located outside the hollow cavity (C1). The above mentioned structure is capable of achieving the purpose of this invention and has good and positive effects. Said heat insulating material (5) is preferably foam concrete, which is non-combustible on the premise of high heat insulation performance, so as to eliminate potential fire hazards. Said exterior trim panel (3) can be made into flat panels that are made of different materials such as cement water-proof layer, resin water-proof layer or ceramic tile, so as to prevent water, corrosion, wind and sunshine, and the erosion of other natural environments. Said exterior trim panel (3) can be of different thicknesses according to the requirements for different materials and works. In the above structure, the

sectional shapes of metal sectional bars of may be the same or different in one wall panel; for instance, the sectional shapes of all metal sectional bars in one wall panel may be abnormal bulges, and that of all metal sectional bars in another wall panel may be abnormal grooves; when multiple wall panels are connected, the wall panel with metal sectional bars appearing abnormal bulges match with the wall panel with metal sectional bars appearing abnormal grooves; for another example, the sectional shape of one metal sectional bar at the upper end of one wall panel is abnormal bulge or abnormal groove, the sectional shape of one metal sectional bar at the lower end thereof is abnormal bulge or abnormal groove, the sectional shape of one metal sectional bar in the left is abnormal bulge or abnormal groove, and the sectional shape of one metal sectional bar in the right is abnormal bulge or abnormal groove, then the sectional shape of the metal sectional bar of another wall panel connected with this panel is made into a shape matching with the shape of the other metal sectional bar; specifically, the abnormal bulge match with the abnormal groove.

The sectional shape of the metal sectional bar in said wall panel is abnormal bulge or abnormal groove; the first vertical panel (M1) and the section vertical panel (M2) in the abnormal bulge are preferably inclined panels, the first vertical panel (W1) and the section vertical panel (W2) in the abnormal groove are preferably inclined panels; this shape will facilitate the processing and demoulding and has relatively high bearing capacity, deformation resistance and bending resistance to the overall section.

To further improve the overall bearing capacity, support strength and rigidity, an improved technical solution of the hanging wall panel for buildings is disclosed in this invention: at least one first metal sectional bar (a1) and one second metal sectional bar (a2) parallel to the horizontal direction are installed in the frame (1); the first metal sectional bar (a1) and the second metal sectional bar (a2) are distributed at different heights; at least one third metal sectional bar (b1) and one fourth metal sectional bar (b2) vertical to the horizontal direction are installed in the frame (1); the first metal sectional bar (a1), the second metal sectional bar (a2), the third metal sectional bar (b1) and the fourth metal sectional bar (b2) are located in an identical plane, and two ends of the first metal sectional bar (a1), the second metal sectional bar (a2), the third metal sectional bar (b1) and the fourth metal sectional bar (b2) are connected with the frame (1) respectively; and the side panels at two ends of the first metal sectional bar (a1), the second metal sectional bar (a2), the third metal sectional bar (b1) and the fourth

metal sectional bar (b2) are connected with the exterior trim panel (3) and the interior trim panel (4) respectively.

In case a window is required to be opened on the wall panel to meet the construction needs, a window (7) is opened in the middle of the wall panel; the window (7) is constituted by the middle part of the assembled first metal sectional bar (a1), the second metal sectional bar (a2), the third metal sectional bar (b1) and the fourth metal sectional bar (b2); simultaneously, the upper and lower ends of the exterior trim panel (3) at the window (7) bend towards the interior of the frame (1) respectively; the bent parts are connected with the first metal sectional bar (a1) and the second metal sectional bar (a2) respectively; the height of the exterior trim panel (3) is greater than that of the interior trim panel (4); as shown in Fig. 4 and Fig. 6, the lower end of said interior trim panel (4) is higher than the lower end of said exterior trim panel (3), thus preventing rainwater from flowing into the window (7).

The sectional shapes of the first metal sectional bar (a1), the second metal sectional bar (a2), the third metal sectional bar (b1) and the fourth metal sectional bar (b2) installed in the wall panel in this invention are the same; taking the sectional shape of the first metal sectional bar (a1) as an example, the specific shape is as follows: a top plate (D) is located in the section of said first metal sectional bar (a1); one end of the top plate (D) is connected with the upper end of the first side panel (21), while the other end of the top plate (D) is connected with the upper end of the second side panel (22); the first strip plate (21a) bending inward is arranged at the lower end of the first side panel (21); the second strip plate (22a) bending inward is arranged at the lower end of the second side panel (22); the first flat plate (23) is located in the left of the top plate (D); the second flat plate (24) is located in the right of the top plate (D); the first flat plate (23) and the second flat plate (24) are located in different horizontal planes at different heights; an inclined panel (25) is used to connect the first flat plate (23) with the second flat plate (24); and the sectional shapes of the second metal sectional bar (a2), the third metal sectional bar (b1) and the fourth metal sectional bar (b2) are the same as that of the first metal sectional bar (a1). On the premise of meeting the requirements for support strength, this sectional shape makes it possible to install a heat insulation pad, thus achieving fine heat insulation effects and preventing rainwater from penetrating into the interior trim panel (4). In this way, the wall panel in this invention is featured with high support strength and excellent heat

insulation performance and capable of preventing water penetration and leakage, thereby further prolonging the service life of the wall panel.

The improved technical solution disclosed in this invention is as follows: a cushion pad (33) is installed between the metal sectional bars of the frame (1) in the position where every two wall panels are connected; specifically, the cushion pad (33) is installed in the position where the top plates of the abnormal bulge and the abnormal groove match with each other; a filling strip (31) is installed between two heat insulation pads (12) in the position where every two wall panels are connected; sealant (32) is filled between two ends of two exterior trim panels (3) in the position where every two wall panels are connected; and the sealant (32) keeps close contact with said filling strip (31). After multiple wall panels are connected to constitute an integrated wall panel, this structure is capable of preventing water from penetrating into the wall panel, avoiding rigid contact of metal sectional bars, and making the wall panel free from the collapsing force produced by metal sectional bars during the extension.

To improve the strength of said wall panel, a metal mesh (6) is installed in the frame (1); the metal mesh (6) is connected with the metal sectional bars of the frame (1); a heat insulating material (5) is filled among the metal mesh (6), the interior trim panel (4) and the exterior trim panel (3). Said heat insulating material (5) is foam concrete.

The improved technical solution disclosed in this invention is as follows: a heat insulation pad (12) is installed between the abnormal bulge and abnormal groove on the exterior trim panel (3) and the frame (1) or/and among the first metal sectional bar (a1), the second metal sectional bar (a2), the third metal sectional bar (b1) and the fourth metal sectional bar (b2) respectively; one side of the heat insulation pad (12) is attached to the internal surface of said exterior trim panel (3); the other side of the heat insulation pad (12) is attached to one side of each metal sectional bar respectively; and the other side of each metal sectional bar is attached to the interior trim panel (4) respectively. This structure further improves the heat insulation performance of the wall panel, and reduces the wall panel deformation during the extension of metal sectional bars; as shown in Fig. 5, Fig. 6 and Fig. 10, the heat insulation pad (12) can be installed among the abnormal bulge, the abnormal groove and the exterior trim panel (3); the heat insulation pad (12) can also be installed among the exterior trim

panel (3), the first metal sectional bar (a1), the second metal sectional bar (a2), the third metal sectional bar (b1) and the fourth metal sectional bar (b2); the heat insulation pad (12) can also be installed among the exterior trim panel (3), the abnormal bulge, the abnormal groove, the first metal sectional bar (a1), the second metal sectional bar (a2), the third metal sectional bar (b1) and the fourth metal sectional bar (b2).

To facilitate the installation and fixation of said wall panel, a first hanger (1a) and a second hanger (1b) are installed in the upper part of the wall panel; the structures of the two hangers are the same; the hanger is equipped with one rectangular box body; two ends of a horizontal hanging scroll located in the box body are connected with the box body respectively; the first hanger (1a) and the second hanger (1b) are connected with the metal sectional bars of the frame (1) in a secure manner; and the external surfaces of the two hangers and the external surface of the interior trim panel (4) are located in an identical plane. Of course, the wall panel can be secured in various ways. For instance, a penetrating groove can be manufactured on the support beam of buildings to directly secure the wall panel in the groove.

In order to make multiple wall panels connected in a more secure way, at least one connector (4a) is opened in the lower part of the wall panel; and the depth of the connector (4a) depends on the exposed external surfaces of the metal sectional bars of the frame.

According to the above structure, the wall panel of the invention has multiple embodiments:

Embodiment 1: The basic technical solution of said wall panel comprises a frame (1) constituted by the upper, lower, left and right metal sectional bars; the sectional shapes of the metal sectional bars include abnormal bulges and abnormal grooves; the frame (1) is filled with foam concrete; one side of the frame (1) is connected with an interior trim panel (4), while the other side thereof is connected with an exterior trim panel (3).

Embodiment 2: To further improve the support strength and rigidity of said wall panel, on the basis of Embodiment 1, a metal mesh (6) is added; namely, the metal mesh (6) is installed in the frame (1) and connected with the frame (1) respectively. The metal mesh (6) can be made of tinsel, metal column, or perforated steel plate. The foam

concrete filled in the frame (1) completely holds the metal mesh (6); in this way, the metal mesh (6) plays a supporting role in the foam concrete, further improving the anti-impact strength of said wall panel.

Embodiment 3: As shown in Fig. 5, Fig. 6 and Fig. 10, an heat insulation pad (12) is installed for the wall panel based on the structure in Embodiment 2; specifically, the heat insulation pad (12) is installed among the abnormal bulge, the abnormal groove and the exterior trim panel (3); the heat insulation pad (12) can also be installed among the exterior trim panel (3), the first metal sectional bar (a1), the second metal sectional bar (a2), the third metal sectional bar (b1) and the fourth metal sectional bar (b2); the heat insulation pad (12) can also be installed among the exterior trim panel (3), the abnormal bulge, the abnormal groove, the first metal sectional bar (a1), the second metal sectional bar (a2), the third metal sectional bar (b1) and the fourth metal sectional bar (b2). This structure is capable of avoiding directly transmitting the temperature of said exterior trim panel (3) to the metal sectional bars, further improving the heat insulation performance of said wall panel, and reducing the wall panel deformation during the extension of metal sectional bars.

Embodiment 4: To improve the support strength and rigidity of said wall panel, horizontal and vertical metal sectional bars are provided based on the structure in Embodiment 1, 2 or 3. Namely, at least one first metal sectional bar (a1) and one second metal sectional bar (a2) parallel to the horizontal direction are installed in the frame (1); the first metal sectional bar (a1) and the second metal sectional bar (a2) are distributed at different heights; at least one third metal sectional bar (b1) and one fourth metal sectional bar (b2) vertical to the horizontal direction are installed in the frame (1); the first metal sectional bar (a1), the second metal sectional bar (a2), the third metal sectional bar (b1) and the fourth metal sectional bar (b2) are located in an identical plane, and two ends of the first metal sectional bar (a1), the second metal sectional bar (a2), the third metal sectional bar (b1) and the fourth metal sectional bar (b2) are connected with the frame (1) respectively; and the side panels at two ends of the first metal sectional bar (a1), the second metal sectional bar (a2), the third metal sectional bar (b1) and the fourth metal sectional bar (b2) are connected with the exterior trim panel (3) and the interior trim panel (4) respectively. When the metal mesh (6) is installed in the frame (1), the first metal sectional bar (a1), the second metal sectional bar (a2), the third metal sectional bar (b1) and the fourth metal

sectional bar (b2) are all connected with the metal mesh (6).

Embodiment 5: As required by the construction, after the first metal sectional bar (a1), the second metal sectional bar (a2), the third metal sectional bar (b1) and the fourth metal sectional bar (b2) are assembled, the middle part constitutes a window (7); the upper and lower ends of the exterior trim panel (3) at the window (7) bend towards the interior of the frame (1) respectively; the bent parts are connected with the first metal sectional bar (a1) and the second metal sectional bar (a2) respectively; and the height of the exterior trim panel (3) is greater than that of the interior trim panel (4).

Embodiment 6: When multiple wall panels for buildings are required to be connected, based on the structure of any one of the embodiments 1-5 the following structure should be added: a cushion pad (33) is installed between the metal sectional bars of the frame (1) in the position where every two wall panels are connected; specifically, the cushion pad (33) is installed in the position where the top plates of the abnormal bulge and the abnormal groove match with each other; a filling strip (31) is installed between two heat insulation pads (12) in the position where every two wall panels are connected; sealant (32) is filled between two ends of two exterior trim panels (3) in the position where every two wall panels are connected; and the sealant (32) keeps close contact with said filling strip (31), as shown in Fig. 9.

Embodiment 7: hangers can be installed based on the structure of wall panels in any one of the above embodiments; specifically, a first hanger (1a) and a second hanger (1b) are installed in the upper part of the wall panel; the structures of the two hangers are the same; the hanger is equipped with one rectangular box body; two ends of a horizontal hanging scroll located in the box body are connected with the box body respectively; the first hanger (1a) and the second hanger (1b) are connected with the metal sectional bars of the frame (1) in a secure manner; and the external surfaces of the two hangers and the external surface of the interior trim panel (4) are located in an identical plane.

This invention is not limited to the structural combinations in the above embodiments. The wall panel disclosed in this invention can be used as indoor wall panel and the indoor wall panel and the outdoor wall panel can be made of the same material. In the figure, 5a is the second heat insulating material, and 12a is the second heat insulation pad.

In this invention, the left, right, upper and lower positions refer to the positions shown in the figures.

Claims

1. A hanging wall panel for buildings, comprising at least one wall panel, wherein each wall panel is provided with a frame (1) constituted by the upper, lower, left and right metal sectional bars; one side of the frame (1) is connected with an interior trim panel (4), while the other side of said frame (1) is connected with an exterior trim panel (3); a heat insulating material is filled between the interior trim panel (4) and the exterior trim panel (3); all sectional shapes of said four metal sectional bars are abnormal bulges or abnormal grooves, or one or two appear abnormal bulges and the other one or two appear abnormal grooves; when multiple wall panels are connected, the abnormal bulges match with the abnormal grooves; a top plate (M) bulging outward is located on the section of the abnormal bulge; two ends of said top plate (M) are connected with the upper end of a first vertical panel (M1) and a second vertical panel (M2) respectively; the other end of the first vertical panel (M1) and the second vertical panel (M2) extends downward and is connected with one end of a first flat panel (M3) and a second flat panel (M4) respectively; the other end of the first flat panel (M3) and the second flat panel (M4) in the horizontal direction is connected with the upper end of a first side panel (M21) and a second side panel (M22) respectively; a first strip plate (M21a) bending inward is arranged at the lower end of the first side panel (M21); a second strip plate (M22a) bending inward is arranged at the lower end of the second side panel (M22); all of the above-mentioned panels constitute a cavity (A1); the top plate (M) bulges outward opposite to said cavity (A1); a top panel (W) projecting inward is located on the section of the abnormal groove; two ends of the top panel (W) are connected with the upper end of a first vertical panel (W1) and a second vertical panel (W2) respectively; the other end of the first vertical panel (W1) and the second vertical panel (W2) extends downward and is connected with one end of a first flat panel (W3) and a second flat panel (W4) respectively; the other end of the first flat panel (W3) and the second flat panel (W4) is connected with one end of a first side panel (W21) and a second side panel (W22) respectively; a first strip plate (W21a) bending inward is arranged at the upper end of the first side panel (W21); a second strip plate (W22a) bending inward is arranged at the upper end of the second side panel (M22); all of the above-mentioned panels constitute a hollow cavity (C1); the top panel (W), the first vertical panel (W1) and

the second vertical panel (W2) constitute a groove (B1); and the groove (B1) is located outside the hollow cavity (C1).

2. The hanging wall panel for buildings according to Claim 1, wherein at least one first metal sectional bar (a1) and one second metal sectional bar (a2) parallel to the horizontal direction are installed in the frame (1); the first metal sectional bar (a1) and the second metal sectional bar (a2) are distributed at different heights; at least one third metal sectional bar (b1) and one fourth metal sectional bar (b2) vertical to the horizontal direction are installed in the frame (1); the first metal sectional bar (a1), the second metal sectional bar (a2), the third metal sectional bar (b1) and the fourth metal sectional bar (b2) are located in an identical plane, and two ends of the first metal sectional bar (a1), the second metal sectional bar (a2), the third metal sectional bar (b1) and the fourth metal sectional bar (b2) are connected with the frame (1) respectively; and the side panels at two ends of the first metal sectional bar (a1), the second metal sectional bar (a2), the third metal sectional bar (b1) and the fourth metal sectional bar (b2) are connected with the exterior trim panel (3) and the interior trim panel (4) respectively.

3. The hanging wall panel for buildings according to Claim 2, wherein after the first metal sectional bar (a1), the second metal sectional bar (a2), the third metal sectional bar (b1) and the fourth metal sectional bar (b2) are assembled, the middle part constitutes a window (7); the upper and lower ends of the exterior trim panel (3) at the window (7) bend towards the interior of the frame (1) respectively; the bent parts are connected with the first metal sectional bar (a1) and the second metal sectional bar (a2) respectively; and the height of the exterior trim panel (3) is greater than that of the interior trim panel (4).

4. The hanging wall panel for buildings according to Claim 2 or 3, wherein a top plate (D) is located in the section of said first metal sectional bar (a1); one end of the top plate (D) is connected with the upper end of the first side panel (21), while the other end of the top plate (D) is connected with the upper end of the second side panel (22); the first strip plate (21a) bending inward is arranged at the lower end of the first side panel (21); the second strip plate (22a) bending inward is arranged at the lower end of the second side panel (22); the first flat plate (23) is located in the left of the top plate (D); the second flat plate (24) is located in the right of the top plate (D); the first flat

plate (23) and the second flat plate (24) are located in different horizontal planes at different heights; an inclined panel (25) is used to connect the first flat plate (23) with the second flat plate (24); and the sectional shapes of the second metal sectional bar (a2), the third metal sectional bar (b1) and the fourth metal sectional bar (b2) are the same as that of the first metal sectional bar (a1).

5. The hanging wall panel for buildings according to Claim 1, wherein a metal mesh (6) is installed in the frame (1); the metal mesh (6) is connected with the metal sectional bars of the frame (1); a heat insulating material (5) is filled among the metal mesh (6), the interior trim panel (4) and the exterior trim panel (3); and said heat insulating material (5) is foam concrete.

6. The hanging wall panel for buildings according to Claim 1, 2, 3 or 5, wherein a heat insulation pad (12) is installed between the abnormal bulge and abnormal groove on the exterior trim panel (3) and the frame (1) or/and among the first metal sectional bar (a1), the second metal sectional bar (a2), the third metal sectional bar (b1) and the fourth metal sectional bar (b2) respectively; one side of the heat insulation pad (12) is attached to the internal surface of said exterior trim panel (3); the other side of the heat insulation pad (12) is attached to one side of each metal sectional bar respectively; and the other side of each metal sectional bar is attached to the interior trim panel (4) respectively.

7. The hanging wall panel for buildings according to Claim 1, 2, 3 or 5, wherein a cushion pad (33) is installed between the metal sectional bars of the frame (1) in the position where every two wall panels are connected; specifically, the cushion pad (33) is installed in the position where the top plates of the abnormal bulge and the abnormal groove match with each other; a filling strip (31) is installed between two heat insulation pads (12) in the position where every two wall panels are connected; sealant (32) is filled between two ends of two exterior trim panels (3) in the position where every two wall panels are connected; and the sealant (32) keeps close contact with said filling strip (31).

8. The hanging wall panel for buildings according to Claim 1, wherein a first hanger (1a) and a second hanger (1b) are installed in the upper part of the wall panel; the structures of the two hangers are the same; the hanger is equipped with one rectangular box body; two ends of a horizontal hanging scroll located in the box body

are connected with the box body respectively; the first hanger (1a) and the second hanger (1b) are connected with the metal sectional bars of the frame (1) in a secure manner; and the external surfaces of the two hangers and the external surface of the interior trim panel (4) are located in an identical plane.

9. The hanging wall panel for buildings according to Claim 8, wherein at least one connector (4a) is opened in the lower part of the wall panel; and the depth of the connector (4a) depends on the exposed external surfaces of the metal sectional bars of the frame (1).

10. The hanging wall panel for buildings according to Claim 4, wherein the first vertical panel (M1) and the second vertical panel (M2) in the abnormal bulge are inclined panels; and the first vertical panel (W1) and the second vertical panel (W2) in the abnormal groove are inclined panels.