【Technical Problem】

Accordingly, the present invention has been made in view of the above-mentioned problems occurring in the prior art, and embodiments~~it is an object~~ of the present invention seek to provide a hollow core body that has a substantially high hollow rate and is used for a bidirectional hollow core slab in a structurally stable state.

Embodiments~~It is another object~~ of the present invention also seek to provide a bidirectional hollow core slab that is formed by stably locating hollow core bodies between upper and lower steel bars, thereby ensuring the quality of construction in the structural design.

Embodiments~~It is still another object~~ of the present invention further seek to provide a construction method of a bidirectional hollow core slab that is capable of simplifying the arrangement work of the steel bars.

【Technical Solution】

~~To accomplish the above objects, a~~According to an aspect of the present invention, there is provided a hollow core body that is adapted to be buried into concrete for the construction of a lightweight concrete member, ~~having a generally doughnut shaped outer case~~ having a hollow portion ~~formed on the center thereof~~with a circular section formed in the center thereof and corners rounded with curved surfaces, thereby providing a generally doughnut-shaped outer case.

~~To accomplish the above objects, a~~According to another aspect of the present invention, there is provided a bidirectional hollow core slab ~~that is made by restraining doughnut shaped hollow core bodies into steel bar cages or into upper and lower steel bars, thereby stably locating the doughnut shaped hollow core bodies into slab concrete~~comprising: steel bar cages made by coupling steel

bars; doughnut-shaped hollow core bodies spacedly arranged in rows and columns in such a manner as to be restrained in the steel bar cages; slab lower steel bars crossedly arranged as main bars and distributing bars beneath the steel bar cages; slab upper steel bars crossedly arranged as main bars and distributing bars on the steel bar cages; and slab concrete cast and cured to a thickness through which the slab lower and upper steel bars are buried, wherein each steel bar cage comprises: a first side bent bar bent and divided into a first inclined portion and first horizontal portions formed on both sides of the first inclined portion, the first side bent bar being inclinedly erected to form the first side thereof; a second side bent bar bent and divided into a second inclined portion and second horizontal portions formed on both sides of the second inclined portion, the second side bent bar being inclinedly erected toward the first side bent bar in such a manner as to face the first side bent bar, thereby forming the second side thereof, and the second inclined portion being located in a direction crossing the first inclined portion of the first side bent bar; an upper bent bar bent and divided into a third inclined portion and third horizontal portions formed on both sides of the third inclined portion, the upper bent bar being horizontally located on the upper portion between the first and second side bent bars facing each other, thereby forming the upper side thereof, and the third horizontal portions being connected to the first and second horizontal portions of the first and second side bent bars; a first end tilt bar located to inclinedly connect the first horizontal portion on one

end of the first side bent bar to the second horizontal portion on one end of the second side bent bar; and a second end tilt bar located to inclinedly connect the first horizontal portion on the other end of the first side bent bar to the second horizontal portion on the other end of the second side bent bar, and each doughnut-shaped hollow core body comprises fitting slots formed correspondingly on both sides facing each other, into which the first and second inclined portions of the first and second side bent bars are insertedly fitted, so that the hollow core bodies are inserted into the steel bar cages and the first and second inclined portions of the first and second side bent bars are insertedly fitted to the fitting slots, thereby being restrained into the steel bar cages.

According to another aspect, there is provided a bidirectional hollow core slab comprising: steel bar cages made by coupling steel bars; doughnut-shaped hollow core bodies spacedly arranged in rows and columns in such a manner as to be restrained in the steel bar cages; slab lower steel bars arranged as main bars beneath the steel bar cages; slab upper steel bars arranged as main bars on the steel bar cages in a direction parallel to the slab lower steel bars; and slab concrete cast and cured to a thickness through which the slab lower and upper steel bars are buried, wherein each steel bar cage comprises: first and second lower horizontal bars spaced apart from each other in parallel with each other; first and second upper horizontal bars spaced apart from each other with a width smaller than the first and second lower horizontal bars above the first and second lower horizontal bars; a first side tilt

bars adapted to connect the first upper and lower horizontal bars to each other, while being inclined to each other along the lengthwise directions of the first upper and lower horizontal bars in such a manner where the inclined directions of the neighboring first side tilt bars are opposite to each other; second side tilt bars adapted to connect the second upper and lower horizontal bars to each other, while being inclined to each other along the lengthwise directions of the second upper and lower horizontal bars in such a manner where the inclined directions of the second side tilt bars are opposite to those of those of the first side tilt bars in such a manner as to cross the first side tilt bars; upper tilt bars adapted to connect the first and second upper horizontal bars to each other, while being inclined to each other along the lengthwise directions of the first and second upper horizontal bars in such a manner as to connect the first and second side tilt bars facing each other; a first end tilt bar adapted to inclinedly connect one end portion of the first upper horizontal bar and one end portion of the second lower horizontal bar; and a second end tilt bar adapted to inclinedly connect the other end portion of the first upper horizontal bar and the other end portion of the second lower horizontal bar or to inclinedly connect the other end portion of the second upper horizontal bar and the other end portion of the first lower horizontal bar, and each doughnut-shaped hollow core body comprises fitting slots formed correspondingly on both sides facing each other, into which the first and second side tilt bars are insertedly fitted, so that the hollow core bodies are inserted into the steel bar cages and the first

and second side tilt bars are insertedly fitted to the fitting slots, thereby being restrained into the steel bar cages.

According to another aspect, there is provided a bidirectional hollow core slab comprising: doughnut-shaped hollow core bodies spacedly arranged in rows and columns; slab lower steel bars arranged as main bars and distributing bars beneath the doughnut-shaped hollow core bodies; slab upper steel bars arranged as main bars and distributing bars on the doughnut-shaped hollow core bodies; steel bar spacers disposed between the doughnut-shaped hollow core bodies and the distributing bars of the slab lower and upper steel bars; and slab concrete cast and cured to a thickness through which the slab lower and upper steel bars are buried, wherein each steel bar spacer comprises: a steel bar coupling piece formed to be welded or fitted to the distributing bars; and a protrusion formed to be fitted to each doughnut-shaped hollow core body, and each doughnut-shaped hollow core body comprises fitting slots formed on the top and underside surfaces facing each other, so that the protrusions of the steel bar spacers are fitted to the fitting slots, thereby being restrained into the distributing bars.

【Advantageous Effects】

According to the present invention, the following advantages can be expected.

【CLAIMS】

【Claim 1】

A hollow core body~~—100~~, which is adapted to be buried into concrete for the construction of a lightweight concrete member, having a hollow portion~~—110~~ with a circular section formed in the center thereof and corners rounded with curved surfaces, thereby providing a generally doughnut-shaped outer case.

【Claim 2】

The hollow core body as defined in claim 1, wherein a cavity area~~—120~~ is formed in the doughnut-shaped outer case.

【Claim 3】

The hollow core body as defined in claim 2, wherein the cavity area~~—120~~ is filled with an insulation material or a vibration-proof material.

【Claim 4】

The hollow core body as defined in claim 2, wherein two or more constitution parts~~—100a and 100b~~ are coupled to each other to form the hollow core body~~—100~~, each of the constitution parts~~—100a and 100b~~ being made of any one of reinforced plastic into which glass fiber is mixed, biodegradable plastic, and biomass plastic.

【Claim 5】

The hollow core body as defined in any one of claims 1 to 4, wherein a height H of the hollow core body~~—100~~ is in a range between 120mm and 150mm, lengths L1 and L2 thereof in a range between 90mm and 270mm, and a diameter D of the hollow portion~~—110~~ thereof in a range between 15mm and 45mm.

【Claim 6】

A bidirectional hollow core slab comprising:

steel bar cages~~—200~~ made by coupling steel bars;

doughnut-shaped hollow core bodies—100 spacedly arranged in rows and columns in such a manner as to be restrained in the steel bar cages—200;

slab lower steel bars—411 and 412 crossedly arranged as main bars and distributing bars beneath the steel bar cages 200;

slab upper steel bars—413 and 414 crossedly arranged as main bars and distributing bars on the steel bar cages—200; and

slab concrete—420 cast and cured to a thickness through which the slab lower and upper steel bars—411, 412, 413 and 414 are buried,

wherein each steel bar cage—200 comprises: a first side bent bar—210 bent and divided into a first inclined portion 211 and first horizontal portions—212 formed on both sides of the first inclined portion—211, the first side bent bar—210 being inclinedly erected to form the first side thereof; a second side bent bar—220 bent and divided into a second inclined portion—221 and second horizontal portions—222 formed on both sides of the second inclined portion—221, the second side bent bar—220 being inclinedly erected toward the first side bent bar—210 in such a manner as to face the first side bent bar—210, thereby forming the second side thereof, and the second inclined portion—221 being located in a direction crossing the first inclined portion—211 of the first side bent bar—210; an upper bent bar—230 bent and divided into a third inclined portion—231 and third horizontal portions—232 formed on both sides of the third inclined portion—231, the upper bent bar—230 being horizontally located on the upper portion between the first and second side bent bars—210 and 220 facing each other, thereby forming the upper side thereof, and the third

horizontal portions—232 being connected to the first and second horizontal portions—212 and 222 of the first and second side bent bars—210 and 220; a first end tilt bar—241 located to inclinedly connect the first horizontal portion—212 on one end of the first side bent bar—210 to the second horizontal portion—222 on one end of the second side bent bar—220; and a second end tilt bar—242 located to inclinedly connect the first horizontal portion—212 on the other end of the first side bent bar—210 to the second horizontal portion—222 on the other end of the second side bent bar—220, and

each doughnut-shaped hollow core body—100 comprises fitting slots—140a formed correspondingly on both sides facing each other, into which the first and second inclined portions 211 and 221 of the first and second side bent bars—210 and 220 are insertedly fitted, so that the hollow core bodies—100 are inserted into the steel bar cages—200 and the first and second inclined portions—211 and 221 of the first and second side bent bars—210 and 220 are insertedly fitted to the fitting slots—140a, thereby being restrained into the steel bar cages 200.

【Claim 7】

The bidirectional hollow core slab as defined in claim 6, wherein the first and second side bent bars—210 and 220 and the upper bent bar—230 of each steel bar cage—200 are continuously bent to a trapezoidal shape to provide two or more first, second and third inclined portions—211, 221 and 231, thereby forming the first, second and third horizontal portions—212, 222 and 232 at both ends of the respective inclined portions, and each steel bar cage—200 has the plurality of doughnut-shaped hollow core bodies—100 restrainedly inserted thereinto.

【Claim 8】

A bidirectional hollow core slab comprising:

steel bar cages ~~200~~ made by coupling steel bars;

doughnut-shaped hollow core bodies ~~100~~ spacedly arranged in rows and columns in such a manner as to be restrained in the steel bar cages ~~200~~;

slab lower steel bars ~~411~~ arranged as main bars beneath the steel bar cages ~~200~~;

slab upper steel bars ~~414~~ arranged as main bars on the steel bar cages ~~200~~ in a direction parallel to the slab lower steel bars ~~411~~; and

slab concrete ~~420~~ cast and cured to a thickness through which the slab lower and upper steel bars ~~411 and 414~~ are buried,

wherein each steel bar cage ~~200~~ comprises: first and second lower horizontal bars ~~251 and 252~~ spaced apart from each other in parallel with each other; first and second upper horizontal bars ~~253 and 254~~ spaced apart from each other with a width smaller than the first and second lower horizontal bars ~~251 and 252~~ above the first and second lower horizontal bars ~~251 and 252~~; a first side tilt bars ~~261~~ adapted to connect the first upper and lower horizontal bars ~~251 and 253~~ to each other, while being inclined to each other along the lengthwise directions of the first upper and lower horizontal bars ~~251 and 253~~ in such a manner where the inclined directions of the neighboring first side tilt bars ~~261~~ are opposite to each other; second side tilt bars ~~262~~ adapted to connect the second upper and lower horizontal bars ~~252 and 254~~ to each other, while being inclined to each other along the lengthwise directions of the second upper and lower horizontal bars ~~252 and 254~~ in such a manner where the inclined directions of the second side tilt bars ~~262~~ are opposite to those of those of the first side tilt bars ~~261~~ in

such a manner as to cross the first side tilt bars—261; upper tilt bars—263 adapted to connect the first and second upper horizontal bars—253 and 254 to each other, while being inclined to each other along the lengthwise directions of the first and second upper horizontal bars—253 and 254 in such a manner as to connect the first and second side tilt bars—261 and 262 facing each other; a first end tilt bar—241 adapted to inclinedly connect one end portion of the first upper horizontal bar—253 and one end portion of the second lower horizontal bar—252; and a second end tilt bar—242 adapted to inclinedly connect the other end portion of the first upper horizontal bar—253 and the other end portion of the second lower horizontal bar—252 or to inclinedly connect the other end portion of the second upper horizontal bar—254 and the other end portion of the first lower horizontal bar—251, and

each doughnut-shaped hollow core body—100 comprises fitting slots—140a formed correspondingly on both sides facing each other, into which the first and second side tilt bars—261 and 262 are insertedly fitted, so that the hollow core bodies 100 are inserted into the steel bar cages—200 and the first and second side tilt bars—261 and 262 are insertedly fitted to the fitting slots—140a, thereby being restrained into the steel bar cages—200.

【Claim 9】

The bidirectional hollow core slab as defined in any one of claims 6 to 8, wherein the fitting slots—140a of each doughnut-shaped hollow core body—100 are formed in a shape of X corresponding to the arrangements of the first and second inclined portions—211 and 221 of the first and second side bent bars—210 and 220 or corresponding to the arrangement of the first and second side tilt bars—261 and 262.

【Claim 10】

A bidirectional hollow core slab comprising:

doughnut-shaped hollow core bodies ~~100~~ spacedly arranged in rows and columns;

slab lower steel bars ~~411 and 412~~ arranged as main bars and distributing bars beneath the doughnut-shaped hollow core bodies ~~100~~;

slab upper steel bars ~~413 and 414~~ arranged as main bars and distributing bars on the doughnut-shaped hollow core bodies ~~100~~;

steel bar spacers ~~300~~ disposed between the doughnut-shaped hollow core bodies ~~100~~ and the distributing bars ~~412 and 413~~ of the slab lower and upper steel bars; and

slab concrete ~~420~~ cast and cured to a thickness through which the slab lower and upper steel bars ~~411, 412, 413 and 414~~ are buried,

wherein each steel bar spacer ~~300~~ comprises: a steel bar coupling piece ~~310~~ formed to be welded or fitted to the distributing bars ~~412 and 413~~; and a protrusion ~~320~~ formed to be fitted to each doughnut-shaped hollow core body ~~100~~, and

each doughnut-shaped hollow core body ~~100~~ comprises fitting slots ~~140b and 140c~~ formed on the top and underside surfaces facing each other, so that the protrusions ~~320~~ of the steel bar spacers ~~300~~ are fitted to the fitting slots ~~140b and 140c~~, thereby being restrained into the distributing bars ~~412 and 413~~.

【Claim 11】

A construction method of a bidirectional hollow core slab as defined in claims 6 or 7, comprising the steps of:

crossedly arranging main bars ~~411~~ and distributing bars ~~412~~ as slab lower steel bars;

disposing steel bar cages ~~200~~ into which doughnut-shaped hollow core bodies ~~100~~ are restrained on the main bars ~~411~~ of the slab lower steel bars;

crossedly arranging distributing bars ~~413~~ and main bars ~~414~~ as slab upper steel bars on the steel bar cages ~~200~~; and

casting and curing slab concrete ~~420~~ onto the slab lower and upper steel bars.

【Claim 12】

A construction method of a bidirectional hollow core slab as defined in claims 8, comprising the steps of:

crossedly arranging main bars ~~411~~ as slab lower steel bars;

disposing steel bar cages ~~200~~ into which doughnut-shaped hollow core bodies ~~100~~ are restrained on the main bars ~~411~~ of the slab lower steel bars, while first and second lower horizontal bars ~~251 and 252~~ of the steel bar cages ~~200~~ are being arranged to cross the main bars ~~411~~ of the slab lower steel bars;

arranging main bars ~~414~~ as slab upper steel bars on the steel bar cages ~~200~~, while the main bars ~~414~~ of the slab upper steel bars are being arranged to cross first and second upper horizontal bars ~~253 and 254~~ of the steel bar cages ~~200~~; and

casting and curing slab concrete ~~420~~ onto the slab lower and upper steel bars.