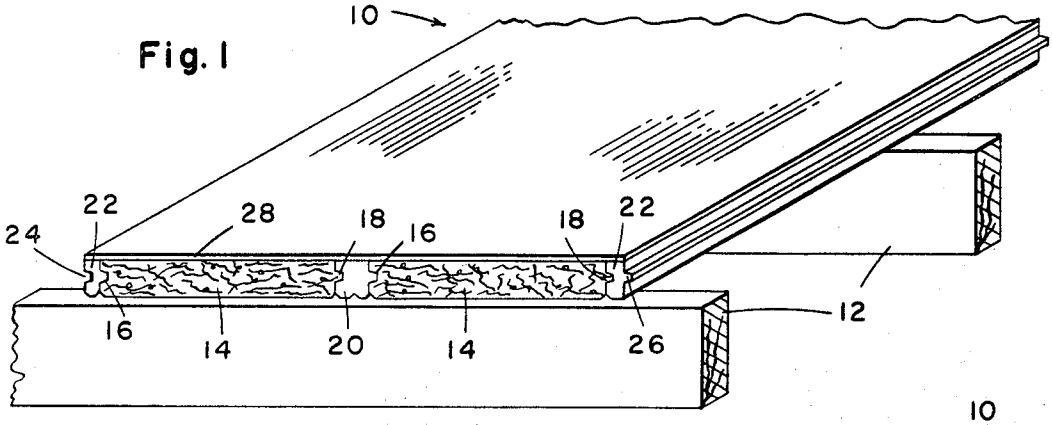
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COMPOSITE FLOOR-CEILING ELEMENT

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Fig. 1



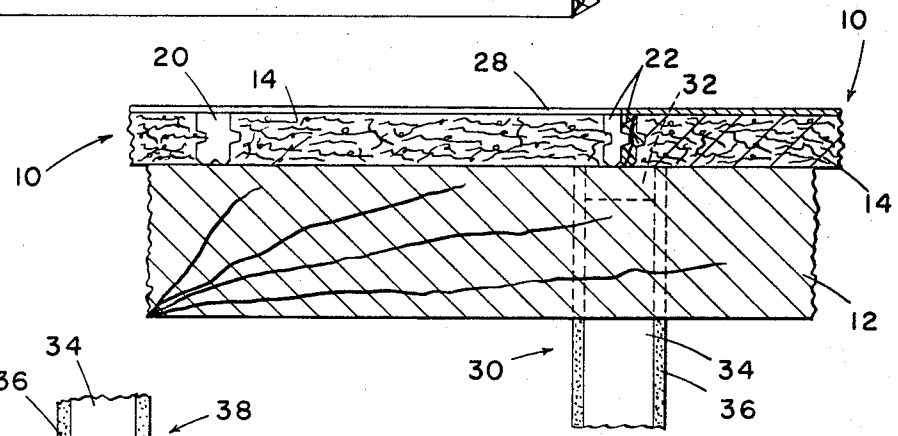


Fig. 2

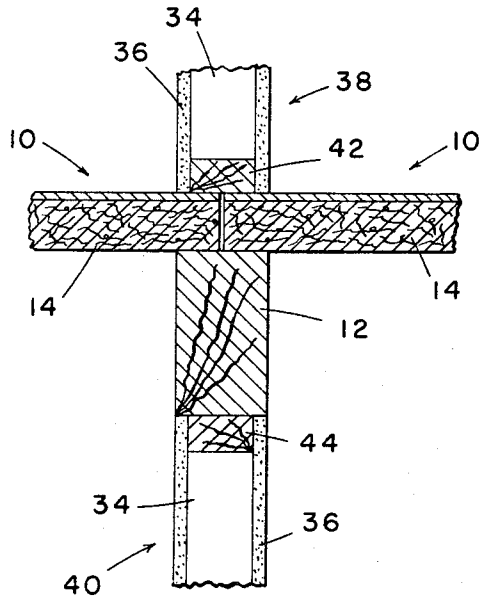


Fig. 3

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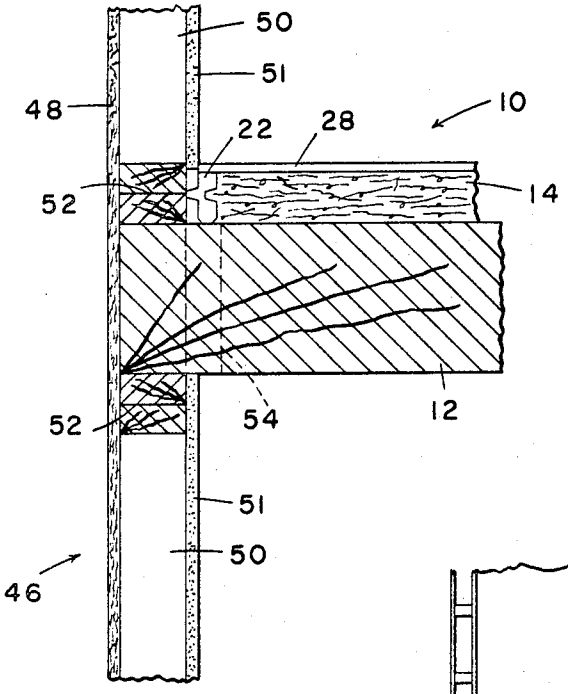


Fig. 4

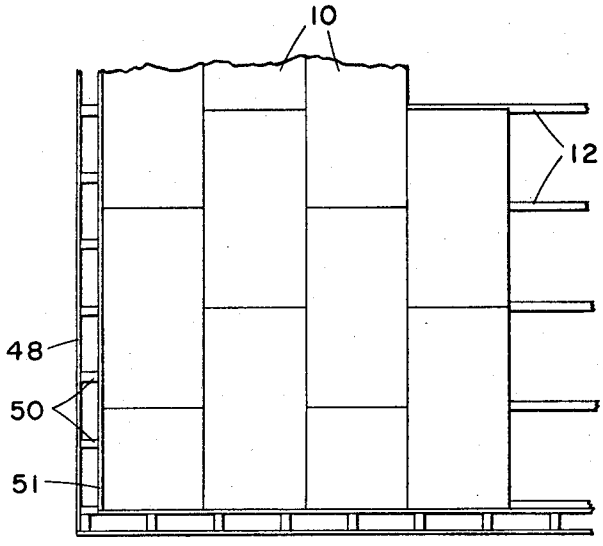


Fig. 5

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COMPOSITE FLOOR-CEILING ELEMENT

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8 Claims. (Cl. 52—483)

ABSTRACT OF THE DISCLOSURE

A prefabricated panel including as one face a relatively thin, dense floor board and including as the opposite face a plurality of elements for forming an exposed ceiling and for providing the structural characteristics necessary for combination with a floor board for stiffness, which plurality of elements includes a plurality of relatively, thick, low density ceiling boards and a plurality of narrow, dense stiffeners, with the stiffeners between adjacent ceiling boards and at the outer edges of the ceiling boards, the stiffeners and ceiling boards being adjoined by respective tongue and groove edges, and the ceiling boards and the stiffeners being laminated to the floor board.

This invention relates to a building product and, particularly, to a novel combination suitable for prefabrication for easy shipment and rapid affixing to the joists of a building, which combination then forms both a ceiling and a floor of highly advantageous character.

A primary object of the invention is to provide an improved combination of building elements in a unitary floor-ceiling panel for mounting atop joists.

It is a further object to provide such improved panel with markedly improved structural stiffness and strength relative to the amount and type of the respective materials required.

Briefly, the present invention contemplates the combination of relatively thick, lightweight, low density, sound absorbing, fibrous panels, suitable for exposed ceilings, adjoined between the side edges with a small elongated stiffening element, and with a plywood top face disposed atop the panels and stiffeners providing a suitable floor base material.

These and other objects of the invention will be more readily apparent when considered in relation to the preferred embodiment as set forth in the specification and shown in the drawings in which:

FIG. 1 is a perspective view from one end of the composite panel built in accordance with and embodying the present invention.

FIG. 2 is a vertical sectional view of a floor-ceilng construction embodying the composite panel of FIG. 1, taken in the plane of the supporting framing.

FIG. 3 is a vertical sectional view in a plane perpendicular to that of FIG. 2.

FIG. 4 is a vertical sectional view of the junction of the floor-ceiling construction of FIG. 2 and an exterior wall.

FIG. 5 is a plan view of a plurality of the panels of FIG. 1, disposed atop framing, showing the staggered disposition of the panel end joints.

Referring to FIG. 1, there is shown one unitary composite panel **10**, mounted atop 4" x 12" framing members, joists or exposed beams, referred to hereinafter as joists **12**, which extend perpendicular to the long dimension of the panel **10**.

Panel **10** is formed from two low density fibrous boards **14**, which in the preferred form are each from 2 to 4 inches thick, 22 inches wide, and from 8 to 18 feet long. The low density boards may be of a type made from fibrous-like wood excelsior and magnesium oxysulfate cement binder, normally being of about 15 to 20 lb./cu. ft. density, such boards being manufactured and sold under

the trademark Tectum, by the National Gypsum Company.

As shown in FIG. 1, each of the two low density boards **14** is formed with an elongate groove **16** on the left side edge and a complementary elongate rib **18** on the right side edge. The two boards are disposed in parallel side by side relation and there is disposed therebetween and adjoining the two boards a central elongate wood stiffener **20**, preferably of about 2-inch average width and a thickness and length equal to the respective thickness and length of boards **14**. A similar but about half as wide wood stiffener **22** is disposed adjacent the outer edge of each board **14**. The stiffeners **20** and **22** each have an elongate groove **24** and an elongate rib **26** on the two respective opposite sides, which grooves **24** and ribs **26** are complementary to the grooves **16** and ribs **18** on boards **14**.

Accordingly, as shown in FIG. 1, one unitary 4-foot wide section is provided by the interengaged three stiffeners **20** and **22** and two boards **14**. Disposed atop and adherred throughout to one face thereof is a 4-foot wide relatively high density plywood sheet **28** of a length equal to that of the boards **14** and stiffeners **20** and **22**. Plywood density will normally be about 36 lb./cu. ft.

The combination of plywood sheet **28** with supporting boards **14** and stiffeners **20** and **22** provides a complete panel **10** which will function as both the floor of a room thereabove and the ceiling of a room therebelow, which panels can be readily placed on joists **12**, preferably in a staggered relation as shown in FIG. 5. With 2-inch thick boards **14** and ⅜-inch thick plywood sheets **28**, 8-foot long panels may be satisfactorily employed, mounted on joists **12** extending perpendicular to the panel **10** long dimension, with joists **12** disposed at 4-foot center to center spacing.

Referring to FIG. 2, there is shown a room partition **30** as such would be constructed in the area below the novel floor-ceiling structure of the present invention, extending parallel to the long dimension of panels **10**. A top runner **32**, such as a short 2" x 4" section of wood, is affixed below and parallel to two adjoined narrow stiffeners **22** of two adjacent panels **10**, extending between each pair of adjacent joists **12**. Vertical studs **34** and wallboards **36** are suitably affixed to and below the top runners **32**.

Referring to FIG. 3, there is shown a room partition **38** as such would be constructed in the area above the novel floor-ceiling structure of the invention and a room partition **40** as such would be constructed in the area below the novel floor-ceiling structure, when such partitions are desired to extend in a direction perpendicular to the long dimension of panels **10**. In each case, partition **38** is disposed immediately above a joist **12**, with a floor runner **42**, such as a wood 2" x 4", affixed therealong on the floor. Vertical stud **34** and wallboards **36** are suitablby affixed to and extending upward from floor runner **42**. Partition **40** is disposed immediately below a joist **12**, with an elongate ceiling runner **44**, such as a wood 2" x 4", affixed to the joist **12** bottom face, and vertical studs **34** and wallboards **36** suitably affixed to and extending downward from ceiling runner **44**.

Referring to FIG. 4, a junction of the floor-ceiling structure of the invention with an exterior building wall **46** is shown. The exterior wall **46** consists of exterior sheathing **48**, exterior wall studs **50**, wall boards **51**, and two wall plates **52**, each formed of two wood 2" x 4" boards, one plate **52** being disposed atop the ends of joist **12** and one plate **52** being disposed immediately under the ends of joists **21**. Disposed immediately inwardly of the two wall plates and extending between adjacent joists **12** is an edge support block **54**, preferably of a height equal to the height of joists **12**. The edge stiffener **22** of the panel **10** adjacent the exterior wall **46** is disposed on the top surface of the

block **54**, and abuts the inner face of the plate **52** which is disposed atop the ends of joists **12**.

The combination of elements used in forming the novel panel **10** will be seen to provide a maximum number of functions with an exceptional degree of structural strength per unit weight. The fibrous boards, of low density, provide a very attractive ceiling surface for an exposed beam type ceiling. They function to both absorb noise created in the room below and to reduce substantially the transmission of noise from the room above to the room below. They provide the necessary support to the plywood floor and, in combination with the stiffeners **20** and **22**, are capable of spanning widely spaced joists. With 3-inch to 3½-inch thick panels **10**, it has been found that a joist center to center spacing may be as much as six feet.

The tongue and groove structure of boards **14** and stiffeners **20** and **22** provides integrity of support to the plywood sheets **28** and, secondly, permits the panels to be mounted rapidly, and adjoined to give the essential unity to the resultant floor-ceiling structure.

Having completed a detailed disclosure of the preferred embodiments of my invention so that those skilled in the art may practice the same, I contemplate that variations may be made without departing from the essence of the invention or the scope of the appended claims.

I claim:

1. A floor-ceiling unitary panel comprising a thin, dense rectangular plywood floor board forming a monolithic top face of said panel, said floor board being adhesively laminated to a plurality of thick, low density, rectangular fibrous-like composition ceiling boards forming a major portion of the exposed panel bottom face, said ceiling boards being of a length substantially equal to said floor board, said ceiling boards being disposed in parallel spaced relation, one to another, and elongate narrow dense wood stiffeners disposed between each pair of adjacent spaced ceiling boards and at each side of the outermost ceiling boards, said ceiling boards and said stiffeners all being interconnected by complementary engaged tongue and groove edges providing uniform distributed stiffening throughout the said thin floor board.

2. A floor-ceiling structure comprising a plurality of spaced, parallel, horizontal, exposed ceiling beams and a plurality of floor-ceiling unitary panels, said panels comprising a thin, dense rectangular floor board forming a monolithic top face of said panel, said floor board being adhesively laminated to a plurality of thick, low density, rectangular ceiling boards forming a major portion of the exposed panel bottom face, said ceiling boards being of a length substantially equal to said floor board, said ceiling boards being disposed in parallel spaced relation, one to another, and elongate narrow dense stiffeners disposed between each pair of adjacent spaced ceiling boards and at each side edge of the outermost ceiling boards, said ceiling boards and said stiffeners all being interconnected by complementary engaged tongue and groove edges providing uniform distributed stiffening throughout the said thin floor board.

3. A floor-ceiling structure as defined in claim **2** wherein said ceiling boards are of fibrous-like composition, suitable for absorption of sound.

4. A floor-ceiling structure as defined in claim **2** wherein said ceiling boards are of fibrous-like structure of from about 2 inches to 4 inches thickness.

5. A floor-ceiling structure as defined in claim **4** wherein said floor board is plywood.

6. A floor-ceiling structure as defined in claim **2** wherein said ceiling boards are of fibrous-lke composition, said floor board is plywood, and said stiffeners are wood.

7. A floor-ceiling structure as defined in claim **2**, said ceiling boards being about 2 inches thick, and of about 15 pounds per cubic foot density fiber and cement binder composition, said floor board being plywood of about ⅜-inch thickness and said stiffener being wood, said panels being about 4 foot by 8 foot and said parallel spaced beams being spaced apart a distance abut half the length of said panels.

8. A floor-ceiling structure as defined in claim **7**, wherein the end joints of panels of adjacent rows of panels are disposed on alternate opposite beams.

References Cited

UNITED STATES PATENTS

598,437	2/1898	Piver	52—730
2,001,733	5/1935	Kellogg	52—144
2,015,114	9/1936	Kellog	52—404
2,031,631	2/1936	Bemis	52—615
2,365,579	12/1944	Mulligan.	
2,401,587	6/1946	Smith	52—620
2,553,227	5/1951	Wesner	52—560 X
2,745,779	5/1956	Ritter	52—620
3,070,196	12/1962	Switzgable	52—404
3,293,820	12/1966	Smith	52—615 X

FOREIGN PATENTS

907,538	1945	France.
884,311	1/1953	Germany.

OTHER REFERENCES

Civil Engineering Magazine, September 1944, pp. 395–397, Design of Built-up Plywood Panels.

JOHN E. MURTAGH, *Primary Examiner.*