July 19, 1949. E. SHINN, JR 2,476,433

HOLLOW REINFORCED CONCRETE BUILDING UNIT

Filed July 24, 1943 3 Sheets-Sheet 1

Fig. 1

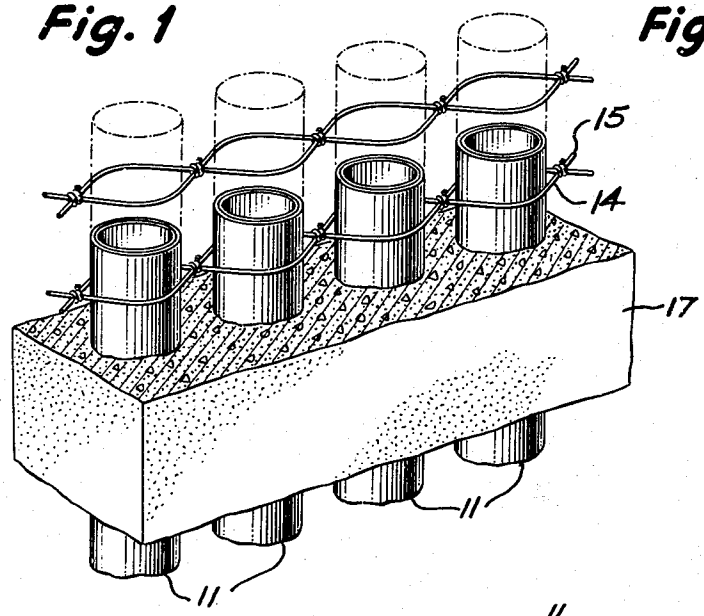


Fig. 2

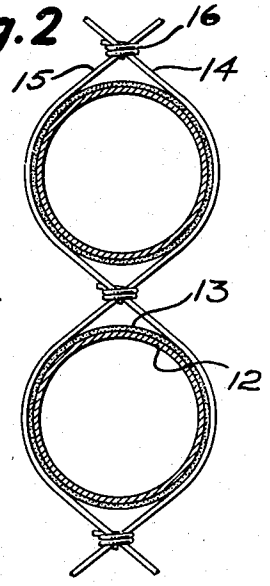


Fig. 3

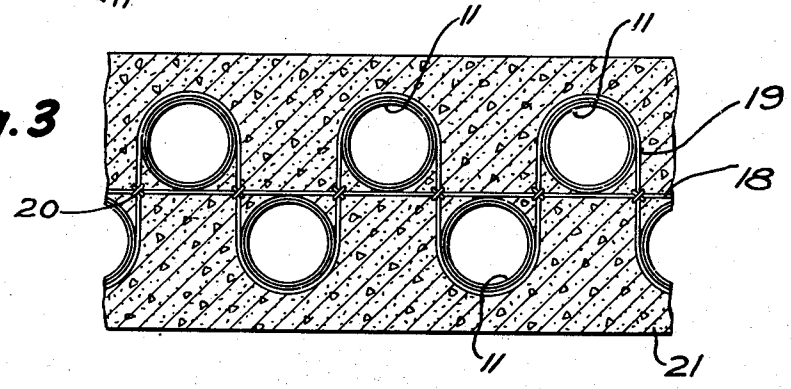
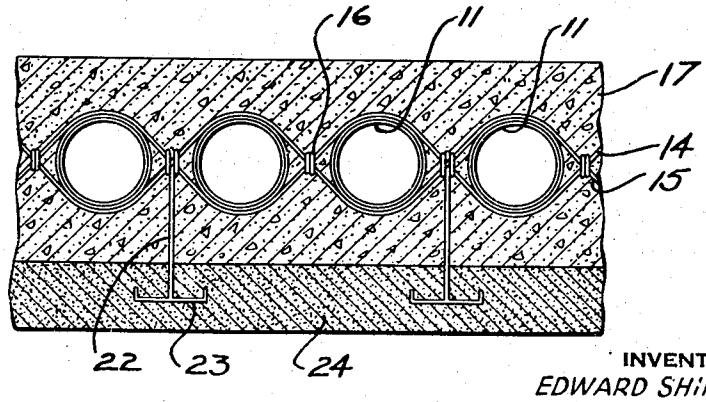


Fig. 4



INVENTOR
EDWARD SHINN, JR.
BY
William A. Galesak
ATTORNEY

July 19, 1949. E. SHINN, JR 2,476,433

HOLLOW REINFORCED CONCRETE BUILDING UNIT

Filed July 24, 1943 3 Sheets-Sheet 2

Fig. 5

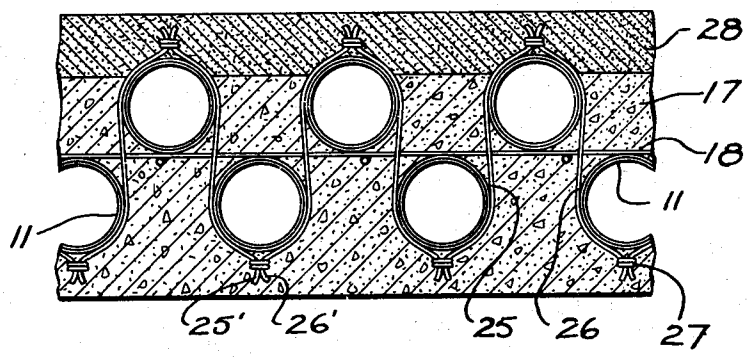


Fig. 6

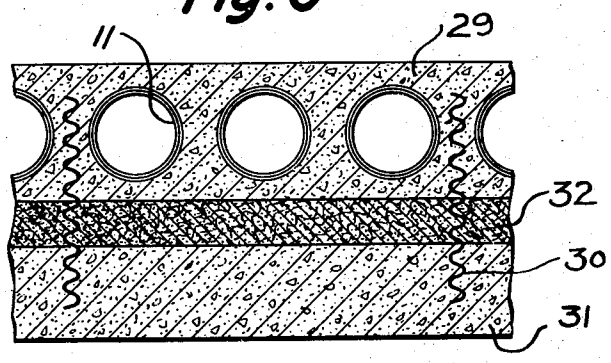


Fig. 7

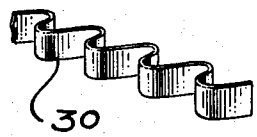
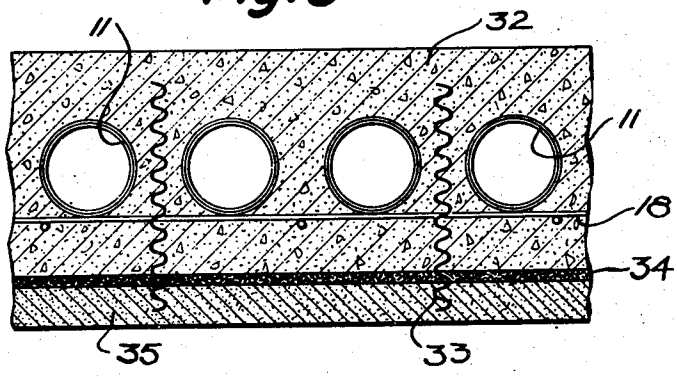


Fig. 8



INVENTOR
EDWARD SHINN, JR.
BY
William A. Zalesak
ATTORNEY

July 19, 1949. E. SHINN, JR 2,476,433

HOLLOW REINFORCED CONCRETE BUILDING UNIT

Filed July 24, 1943 3 Sheets-Sheet 3

Fig. 9

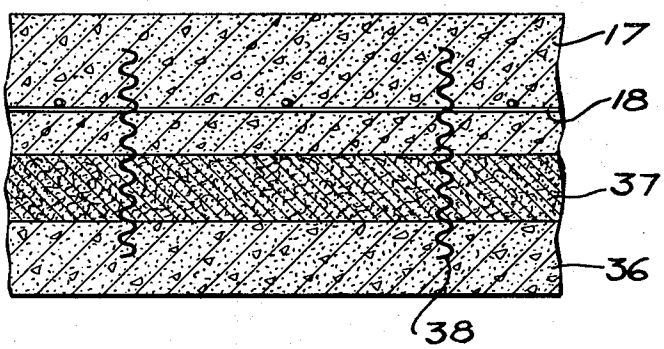
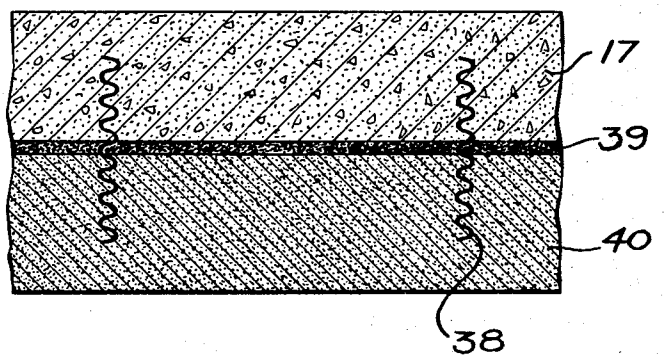


Fig. 10



INVENTOR
EDWARD SHINN, JR.
BY
William A. Galvak
ATTORNEY

Patented July 19, 1949 2,476,433

UNITED STATES PATENT OFFICE

2,476,433

HOLLOW REINFORCED CONCRETE BUILDING UNIT

Edward Shinn, Jr., West Orange, N. J.

Application July 24, 1943, Serial No. 496,003

2 Claims. (Cl. 72—42)

1

My invention relates to building structures, more specifically to a building unit suitable for use as a wall element but which may also be used as a floor or ceiling element.

In the past attempts have been made to provide prefabricated units to be used in building structures and so designed that these units could be quickly and easily incorporated in the building structure. Wall elements suitable for such structures usually comprise concrete slabs encompassed in steel beam edgings for reenforcement and assembly. These units are usually heavy in order to obtain strength. These heavy structures are not moisture and damp proof and are not designed for heat insulation. Nor are they sound proof. Finished surfaces are not provided and it is necessary to apply furring on the slab surfaces and hand plastering on the job.

An object of my invention is to provide an improved building unit, particularly suitable for wall construction of prefabricated building structures, but also suitable for other uses.

Another object of my invention is to provide such a unit of concrete which is strong but light in weight and easily handled.

A still further object of my invention is to provide a prefabricated concrete unit which has high heat insulating value.

A still further object of my invention is to provide such a building unit which provides inner and outer walls of proper texture and formation for finished walls.

A further object of my invention is to provide a prefabricated wall unit through which pipes or conduits can be run or through which air can be circulated.

A still further object of my invention is to provide such a building unit which is sound-proof and moisture-proof.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims, but the invention itself will best be understood by reference to the following description taken in connection with the accompanying drawing in which Figure 1 is a perspective with parts broken away to show details of construction of a construction unit made according to my invention; Figure 2 is a transverse section of parts of Figure 1 showing an arrangement of details used in the construction shown in Figure 1; Figures 3, 4, 5 and 6 are transverse sections of modifications of buildng units made according to my invention; Figure 7 is a perspective showing details of an element used in Figure 6; Figures 8, 9 and 10 are

2

still further modifications of building units made according to my invention.

Referring to Figure 1, a building unit made according to my invention may be formed in the shape of an elongated rectangularly shaped slab comprising a plurality of tubular members or cores 11 arranged linearly and tied together by means of interlaced tie wire elements 14 and 15 tied between tubular members by means of the tie loops 16. These interlaced tie wires are spaced longitudinally along the tubular members 11. The tubular members 11 include the tubes of cellulosic material 12 with a water-proof coating 13 on the outside of the tubular members. These tubular members, after being tied, may be placed in forms and concrete poured into the forms and allowed to set so as to provide the composite unit shown in Figure 1. I have found for optimum conditions that the diameter of the tubular member 11 should not exceed one-third the thickness of the slab.

These cores 11 of paper tubing lighten the weight of the wall as well as provide insulation by providing air cells in the heart of the wall. The cores may also be used as ducts for heating purposes to carry air, wiring ducts, pipe ducts, handling recesses and capillary attraction ducts to divert moisture from vital parts of the finished structure. They also provide strength to the unit if used as a truss member since they compensate for the displacement of the strength of the concrete through the principle of multiple arch formation.

In Figure 3 I show a modification of the construction shown in Figure 1. In this form I use a square mesh reinforcing mat 18, one of conventional size being 6" x 6", and on opposite sides of which are positioned the tubular members 11 of the same construction shown in Figure 1. A tie wire 19 may be threaded back and forth through the mesh and around the tubular members to tightly hold them against the reinforcing mesh. The wire 19 is locked to the mesh by the elements 20. When this tube and mesh assembly is placed within a form and the concrete 21 poured, the finished slab is of great rigidity, strength and lightness.

A still further modification of the arrangement shown in Figure 3 is shown in Figure 4. Figure 4 utilizes much the same construction shown in Figure 1, except that in addition wire tie T's 22 are secured to the tie loops 16 of the tie wires 14 and 15 and extend outwardly from the concrete to provide tying fingers or cross elements 23 to which the coating of heat insulating mate-

rial 24 may be secured. This coating may be made of such material as combined expanded mica concrete. This coating is preferably added to the concrete slab 17 after the concrete has been poured. This coating also serves as a sound absorbing medium as well as a shock absorbing medium and in addition to increasing the safety factor of the structure may serve as an interior wall or as a plaster base for an interior wall.

A still further modification of my invention is shown in Figure 5. The square mesh reinforcing mat 18 is again used as well as the tubular members 11 which are positioned on opposite sides of the mat in alternate positions and tied thereto by means of the wires 25 and 26. It will be noted, the tie loops 27 engage ends 25' and 26' of the tie wires 25 and 26 so that the ends or fingers 25' and 26' extend outwardly from the assembly. The concrete 17 may be poured around the forms and the insulating layer 28 added, this being retained by means of the fingers 25' and 26' on the tie wires 25 and 26. This layer 28 may be of expanded mica concrete.

A still further form of my invention is shown in Figure 6 in which the tubular members 11 are embedded in the concrete 29, the tie elements 30 being in the form of corrugated ribbon strips. These tie elements 30 are shown in Figure 7. An intermediate heat insulating layer 32, which is sound proof, is positioned intermediate the first layer 29 and the second concrete layer 31. This layer may be compressed rock wool protected by moisture proof film coatings.

A further form of my invention is shown in Figure 8 in which the tubular members 11 are placed adjacent the reinforcing mesh 18, both of which are embedded in the concrete slab 32, the ribbon-like corrugated tie elements 33 extending from this concrete slab and tying to it the layer 35 which may provide a finished surface for papering or painting if this is an inside surface. This layer may be of expanded mica concrete. A further layer 34 of water proof mastic may be used between the layers 32 and 35.

In Figure 9 is shown a still further form of my invention in which the concrete slab 17 has embedded within it the reinforcing mesh 18, the tie ribbon elements 38 extending through a heat-, moisture- and sound-insulating layer 37, for example, rock wool protected against moisture by a moisture-proof coating on either side and into an outer coating 36 of concrete.

In another form the composition wall unit consists of a concrete slab 17 provided with tie elements 38 extending through the moisture-proof material layer 39 into a second layer 40 of light weight concrete, which may be moisture and sound proof.

Thus with the forms of my invention described above, I am able to provide a prefabricated unit which is considerably reduced in weight and which, therefore, aids in design and construction by the removal of excess dead load weight. The units have a decided advantage as floor as well as wall units, as the tube formation provides the internal strength of arches within the unit. The ducts so produced by the tubes provide numerous chases for running pipe and electric lines within the wall or floor. The air enclosed within the tubular members acts as an insulator. The unit is water proof and sound proof. The mica concrete layers may be used as the interior walls and acts as a heat insulate and plaster base of the interior wall. It is sound absorbing and shock absorbing and increases the safety factor of the structure.

While I have indicated the preferred embodiments of my invention of which I am now aware and have also indicated only one specific application for which my invention may be employed, it will be apparent that my invention is by no means limited to the exact forms illustrated or the use indicated, but that many variations may be made in the particular structure used and the purpose for which it is employed without departing from the scope of my invention as set forth in the appended claims.

What I claim as new is:

1. A building unit including a wire mesh reinforcing screen, tubular members positioned on opposite sides of said screen and in contact therewith, the tubular members on one side of said screen lying intermediate the positions of the tubular members on the other side of said screen, tying elements securing said tubular members to said screen, said tubular members, wire mesh and tying elements being embedded in concrete, said tubular members comprising cellulosic material and a water-proof coating on said material.

2. A preformed unit including a wire mesh reinforcing screen, tubular members positioned on opposite sides of said screen and in contact therewith, tying elements securing said tubular members to said screen, said tubular members, wire mesh and tying element being embedded in concrete, said tubular members comprising cellulosic material and a waterproof coating on said material, the the diameter of said tubular members being not greater than one-third the thickness of the slab.

EDWARD SHINN, JR.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
145,700	Vacher	Dec. 16, 1873
386,102	Mack	July 10, 1886
427,914	Schillinger	May 13, 1890
755,122	Fisher	Mar. 22, 1904
1,074,801	Krebs	Oct. 7, 1913
1,115,266	Wiltse	Oct. 27, 1914
1,174,519	Pray	Mar. 7, 1916
1,206,752	Davis	Nov. 28, 1916
1,368,109	Buckhout	Feb. 8, 1921
1,538,681	Buckhout	May 19, 1925
1,864,773	Stanford	June 28, 1932
1,897,327	Olson	Feb. 14, 1933
1,949,692	Pavesi	Mar. 6, 1934
1,949,924	Weichold	Mar. 6, 1934
1,951,421	Kleitz	Mar. 20, 1934
2,063,309	Graef	Dec. 8, 1936
2,127,914	Hadland	Aug. 23, 1938
2,138,683	Weesner	Nov. 29, 1938
2,220,349	Plumb	Nov. 5, 1940
2,250,319	Wright	July 22, 1941
2,292,655	Poston	Aug. 11, 1942
2,309,147	Wilkinson	Jan. 26, 1943

FOREIGN PATENTS

Number	Country	Date
166,623	Great Britain	July 8, 1921
249,007	Great Britain	Mar. 18, 1926
503,759	France	June 17, 1920