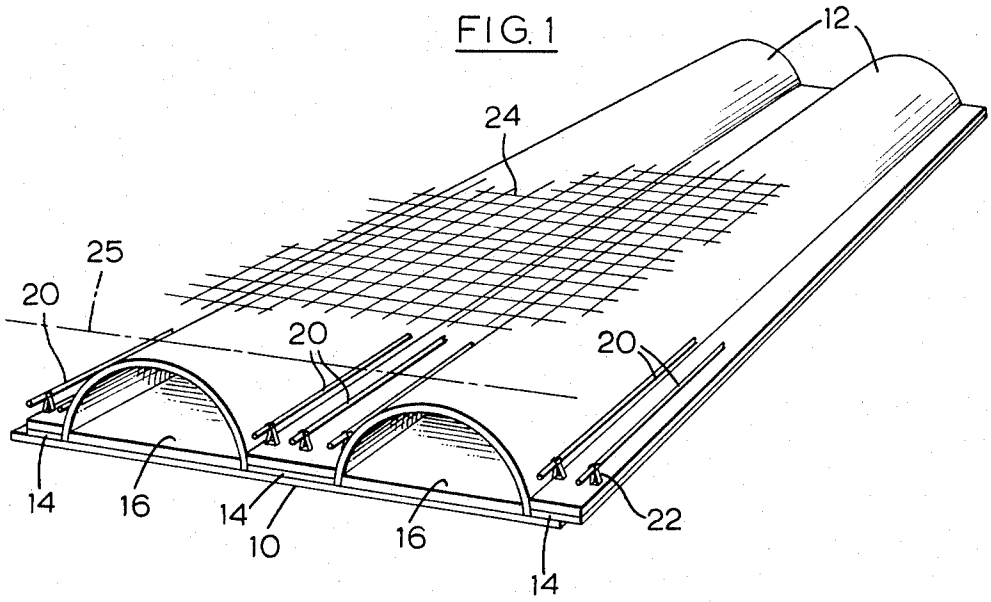
June 25, 1968 W. K. H. GREGORI 3,389,521

CONCRETE FORM STRUCTURE FOR FLOORS

Filed Aug. 3, 1966 2 Sheets-Sheet 1

FIG. 1



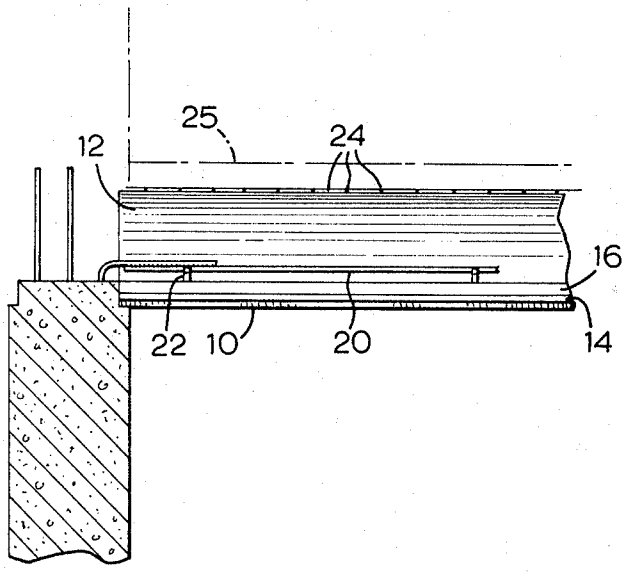


FIG. 2

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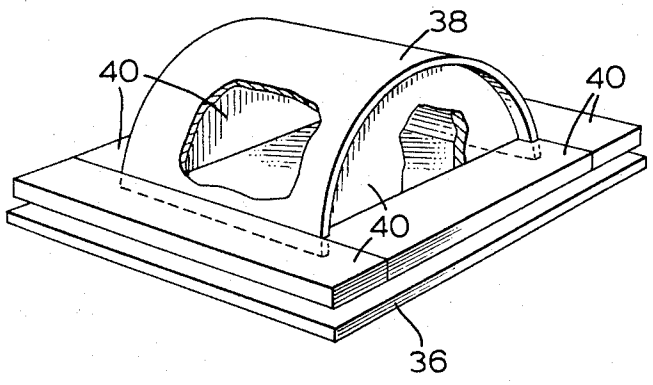

FIG. 3

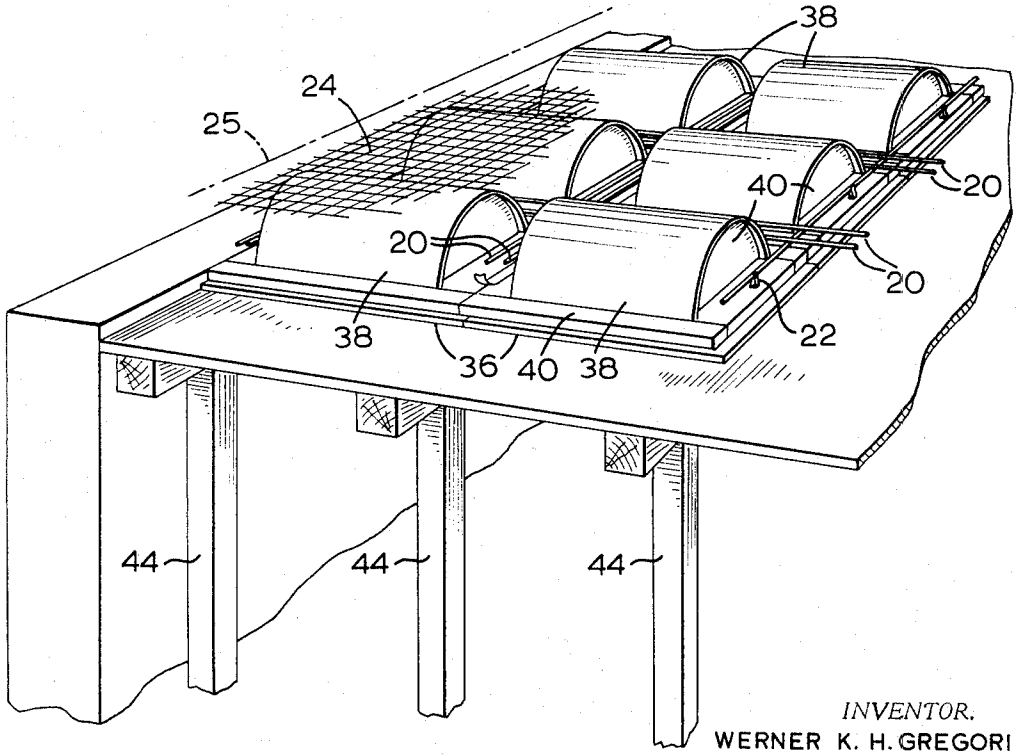

FIG. 4

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United States Patent Office 3,389,521 Patented June 25, 1968

3,389,521

CONCRETE FORM STRUCTURE FOR FLOORS

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Filed Aug. 3, 1966, Ser. No. 569,865
Claims priority, application Canada, June 2, 1966, 961,887
10 Claims. (Cl. 52—309)

This invention relates to building construction and is particularly concerned with a preassembled concrete form structure for use in the construction of concrete floors and intended to be left within the poured floor and to provide a finished ceiling surface for the under side of the poured floor.

The commonly used method of constructing a concrete building floor of the type which also provides a ceiling for a space beneath the floor is to erect temporary scaffolding supporting plywood or the like sheets on to which the concrete is poured. Following setting of the concrete, the scaffolding and plywood are removed and the under side of the floor finished in a traditional manner to provide a finished ceiling surface for the space beneath the floor. This known manner of constructing a concrete floor can be expensive, both due to the time involved in removing the scaffolding and plywood sheets following setting of the concrete and due to the time involved in finishing the underside of the poured floor.

It is, therefore, a chief object of this invention to provide a concrete floor structure which can be left in place following setting of the concrete and which provides a finished under surface to the floor, thereby avoiding the need to finish this under surface in the traditional manner known heretofore.

It is a further object of the invention to provide a form structure of the above type which includes insulation material within the finished floor.

It is a further object of the invention to provide channelways or recesses within the poured floor whereby to achieve a saving in concrete and a reduction in the weight of the floor without reducing the structural strength of the floor.

It is a further object of the invention to provide a form structure of the type described above which is adapted to receive the usual steel reinforcing rods which are often specified for use within concrete floors.

A further specific and related object of the invention is to provide a form structure which is adapted to receive reinforcing rods running in two directions.

The above and further objects of the invention will be more thoroughly understood from the following description of preferred embodiments thereof as read in conjunction with the accompanying drawings.

In the drawings which illustrate these embodiments of the invention,

FIG. 1 is a perspective view of a form structure in accordance with a first embodiment of the invention and showing the manner in which the form structure is adapted to receive reinforcing rod and wire mesh for strengthening the poured concrete;

FIG. 2 is an enlarged vertical cross-sectional view through one end of a form structure of the type illustrated in FIG. 1 and showing the manner in which this form structure is associated with a building wall;

FIG. 3 is a perspective view of a form structure in accordance with a second preferred embodiment of the invention with portions of the structure being broken away for better illustration; and

FIG. 4 is a perspective view showing the manner in which the form structure of the embodiment of FIG. 3 is used in forming a concrete floor.

Referring to FIG. 1, it should be understood that the form structure in accord with this particular embodiment is adapted to receive and support the weight of the poured concrete without assist from temporary scaffolding or other bracing below. The structure essentially consists of a lower panel element **10** adapted to provide a finished ceiling surface for the under side of the poured floor and a plurality of semi-tubular elements **12**. The panel element **10** may consist of a number of different materials depending upon the desired nature of the ceiling finish desired. In the normal course, panel element **10** will be formed of a gypsum board but it will be appreciated that should some other type of ceiling finish be desired, the gypsum board will be replaced in the structure by such sheet material as is desired. The semi-tubular elements **12** are preferably formed of fibreboard and may be made simply by slicing fibreboard tubes longitudinally. Fibreboard is a preferred material as it gives high strength with light weight but here too, it should be understood that alternative materials for the semi-tubular elements are possible within the scope of the invention.

The semi-tubular elements **12** are fixed to the panel element **10** by applying a suitable adhesive to their longitudinal edges with the choice of adhesive depending upon the particular materials used in these two elements. In the case of fibreboard elements **12** and gypsum board, a suitable adhesive is the syntheic rubber based glue sold under the trade name "Bondmaster K 727" by the Adhesive Products Division of the Pittsburgh Plate Glass Company.

In the embodiment of the invention illustrated in FIG. 1, there is shown two semi-tubular elements **12**. However, it should be understood that variations on the number and size of the elements **12** are possible. In all cases, however, the semi-tubular elements are positioned in side-by-side parallel relationship. Fixed to the top surface of the panel element **10** between the semi-tubular elements **12** and at the side edges of the structure are a number of reinforcing strips **14** which are also preferably formed of fibreboard. These strips **14** are also adhesively attached to the top surface of the lower panel element **10** and they are also glued along their side edges to the outer surface of the semi-tubular elements **12**. In manufacturing the structure of FIG. 1, it is the strips **14** which are first fixed to the panel element **10** with the semi-tubular elements **12** being installed following setting of the glue holding the strips **14** to the panel element **10**. The reinforcing strips **14** serve as locaters for the semi-tubular elements but, of greater importance, they prevent outward spreading of the lower ends of the semi-tubular elements under the influence of the weight of eventually poured concrete.

To complete the form structure of FIG. 1, strips of insulation material **16** are adhesively attached to the top surface of the fibreboard strips **14** and directly to the top surface of the gypsum board panel element **10** within the semi-tubular elements **12**. These insulation strips preferably comprise an expanded polystyrene foam, such as the material sold under the trade name "Styrospan" by Dow Chemical of Canada Limited but suitable alternative materials such as expanded urethane foam and foamed glass may be used. The same adhesive mentioned above is suitable for attaching these altenrative foam materials to the gypsum board. The foam selected should, of course, have good thermal insulation properties and be self-extinguishing.

To provide means whereby the side edges of the structure may be interlocked with the side edges of similar structures in laying an extended floor area, the side edges are provided with an overlap on one side and an underlap on the other simply by extending the fibreboard strip adjacent one side of the structure laterally beyond the associated side edge of the gypsum board in the case of

the overlap or extending the gypsum board beyond the side edge of the associated fibreboard strip in the case of the underlap.

The form structure is shipped to the building site in the manufactured condition as above described. In using the form structure in circumstances requiring reinforcing rod within the concrete floor, a number of reinforcing rods **20** are laid between the semi-tubular elements and on either side thereof. In fact, these rods are spaced above the surface of the foam by resting them on small brackets known as "chairs" **22** in accordance with known techniques. More or less reinforcing rods may be used, depending upon the strength required in the completed floor. As a further known expedient, a wire mesh grid **24** may be laid on top of the structure whereby to prevent crazing of the top surface of the poured concrete. This use of such a wire mesh is also a known expedient.

The concrete or other cementitious material is poured to a depth extending approximately two inches above the semi-tubular elements **12**. The dashed line **24** indicates the approximate depth of the poured concrete. As previously mentioned, the form structure of the embodiment of the invention shown in FIGS. 1 and 2 is capable of supporting the weight of the poured concrete without support bracing. A typical manner in which the form structure will be associated with a previously poured concrete or the like wall is shown in FIG. 2. The form structure is supported on a suitable ledge formed in the wall and one of the concrete reinforcing rods extending upwardly from the poured concrete wall may be bent over and fixed to one of the reinforcing rods laid on the form structure. The concrete is then poured on the form structure as to form the floor. As a preferred expedient in using the structure of the invention, the joints between overlapped structures are taped prior to pouring of the concrete as to prevent seepage of cement through the overlapped joints which would interfere with the appearance of the under surface which constitutes the ceiling of the space beneath the poured floor.

The embodiment of the invention illustrated in FIGS. 3 and 4 consists of a lower panel element of gypsum board or the like **36** having a short length **38** of a semi-tubular material of fibreboard fixed to the top surface of the gypsum board. Foam insulation material **40** is fixed to the gypsum board all around the semi-tubular element **38** and is also used to block off the two ends of the semi-tubular element. As in the case of the first described embodiment, the form structures of FIGS. 2 and 3 are provided with overlaps and underlaps on their side edges whereby they might be smoothly associated with like form structures in a large floor area.

The form structure of FIGS. 3 and 4 is used where it is required to have reinforcing rods extending in both directions. While the form structure of FIGS. 1 and 2 is capable of supporting by itself the weight of the poured concrete due to the structural strength of the elongated semi-tubular elements **12**, the use of a plurality of short semi-tubular elements **38** in accordance with the embodiment of FIGS. 3 and 4 dictates the use of the usual temporary support scaffolding consisting of, for example, sheets of plywood **42** supported by bracing members **44**. However, the same advantage wherein the form structure of FIG. 1 provided an already finished ceiling surface for the under side of the floor is obtained by the form structure of FIGS. 3 and 4.

In using the form structures of the second embodiment, the procedure is quite similar to the procedure in using the form structure of FIGS. 1 and 2 with the exception that reinforcing rods are laid in both directions. The same type of interconnection between the reinforcing rods in the floor and the reinforcing rods in the associated walls may be used when employing the form structures of FIGS. 3 and 4.

It is also to be noted that in accordance with the embodiment of FIGS. 3 and 4, no fibreboard elements comparable to strips **14** of the embodiment of FIGS. 1 and 2 are used. In the FIG. 1 embodiment, these fibreboard elements themselves provide structural strength in the structure whereby to better support the weight of the poured concrete but in addition they serve to strengthen the semi-tubular elements **12** by preventing them from spreading apart and it is the semi-tubular elements which provide the main structural strength in the form structure of FIGS. 1 and 2. Since the same structural strength is not required in the embodiments of FIGS. 3 and 4 because it is necessary to support the structures from underneath in any case, the use of the fibreboard board-like elements is eliminated.

In both embodiments of the invention, there is the advantage that the form structures are left in the poured floor and provide a finished under surface for the floor as to provide a finished ceiling surface for the space beneath the floor. Further, the floor is provided with foam insulation. Still further, the volume of cement or concrete required in the floor is considerably reduced without interfering with the structural strength of the floor. In addition, of course, the embodiment of FIGS. **1** and 2 has the further advantage that its use eliminates the need for any temporary support structure. Further in the FIGS. 1 and 2 embodiment, the semi-tubular members provide excellent channels through the floor for conduits and the like.

I claim:

1. A preassembled concrete form structure for use in the construction of a concrete floor and intended to be left within the poured floor and to provide a finished ceiling surface for the under side of the poured floor, said structure comprising a panel element of a material suitable as a finished ceiling surface and carrying on its top face at least one semi-tubular member of a rigid material, said semi-tubular member having its convex surface facing upwardly and its lower edges adhesively fixed to said top face of said panel element, and a layer of insulating material overlying and adhesively fixed to said panel element around said semi-tubular element, said insulating material consisting of a rigid self-extinguishing, thermal insulating plastic foam.

2. A preassembled concrete form structure for use in the construction of a concrete floor and intended to be left within the poured floor and to provide a finished ceiling surface for the under side of the poured floor, said structure comprising a panel element of a material suitable as a finished ceiling surface, a plurality of semi-tubular members of a rigid material having their convex surfaces facing upwardly and their lower edges adhesively fixed to the top face of said panel element, said semi-tubular members being arranged parallel to one another, spaced from one another and spaced from the side edges of said structure, strips of rigid material adhesively fixed to the top face of said panel element between said semi-tubular members and between said semi-tubular members and the side edges of said structure, and strips of thermal insulating, fire resistant material overlying and adhesively fixed to said strips of rigid material and overlying and adhesively fixed to the top face of said panel element beneath said semi-tubular members.

3. A preassembled concrete form structure as claimed in claim **2** wherein said panel members and said strips of rigid material are formed of fibreboard.

4. A preassembled concrete form structure as claimed in claim **3** in which said panel element is formed of gypsum board and in which said strips of thermal insulating, fire resistant material are formed of plastic foam.

5. A preassembled concrete form structure as claimed in claim **4** in which said plastic form is expanded polystyrene foam.

6. A preassembled concrete form structure as claimed in claim **5** wherein the side edges of said structure are provided with underlaps and overlaps, said underlaps being provided by extending the side edge of said panel ele-

ment beyond the associated strips of fibreboard and plastic foam, said overlap being provided by expanding the strips of fibreboard and plastic foam beyond the associated side edge of said panel element.

7. A preassembled concrete form structure for use in the construction of a concrete floor and intended to be left within the poured floor and to provide a finished ceiling surface for the underside of the poured floor, said structure comprising a panel element of a material suitable as a finished ceiling surface and carrying on its top face a short length of semi-tubular rigid material having its convex surface facing upwardly and having its lower edges adhesively fixed to the top face of said panel element, and a layer of thermal insulating, fire resistant material surrounding said semi-tubular element and adhesively fixed to the top face of said panel element and semi-circular pieces of thermal insulating, fire resistant material closing the opened end of said semi-tubular element with said semi-circular pieces of thermal insulating material being adhesively fixed to the under face of said semi-tubular element and to the top face of said panel element.

8. A preassembled concrete form structure as claimed in claim 7 wherein said semi-tubular element is formed of fibreboard, said panel element being formed of gypsum

board, said insulating material being formed of a rigid plastic foam.

9. A preassembled concrete form structure as claimed in claim 8 in which said rigid plastic foam is expanded polystyrene foam.

10. A preassembled concrete form structure as claimed in claim 9 in which said structure is substantially rectangular in shape and in which two of the side edges of said structure are provided with underlaps and in which the other two side edges are provided with overlaps, said underlap edges having the panel element extended beyond the associated portions of said insulating layer, said overlaps having the insulating layer extended beyond the associated portions of said panel element.

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