

[54] **UNITARY SPACE FRAME**

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[73] Assignee: **Hercules Incorporated**, Wilmington, Del.

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[52] U.S. Cl. 5/351, 5/256, 5/263

[51] Int. Cl. A47c 23/04, A47c 25/00

[58] Field of Search 5/256, 259 R, 263, 266, 5/351, 246; 267/84; 264/51

[56] **References Cited**
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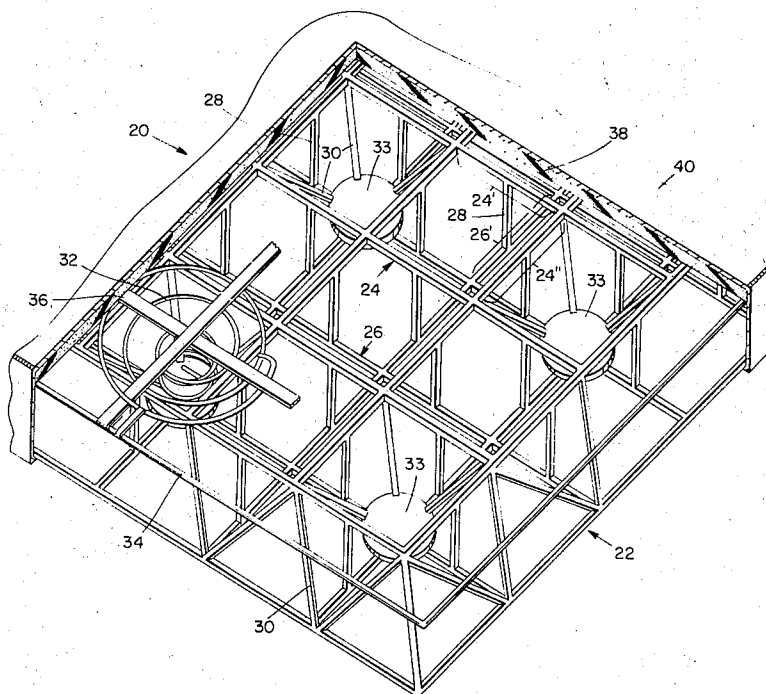
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Primary Examiner—Casmir A. Nunberg
Attorney, Agent, or Firm—James W. Peterson

[57] **ABSTRACT**

The invention is a unitary space frame that has utility as a box spring frame and can be injection molded in a simple two-piece mold comprising an offset grid space frame having two grids similar in geometry with one grid offset from the other in plan said grids connected by connecting members that are parallel to the direction of mold opening travel and that interconnect angularly askewed members of said grids.

5 Claims, 13 Drawing Figures



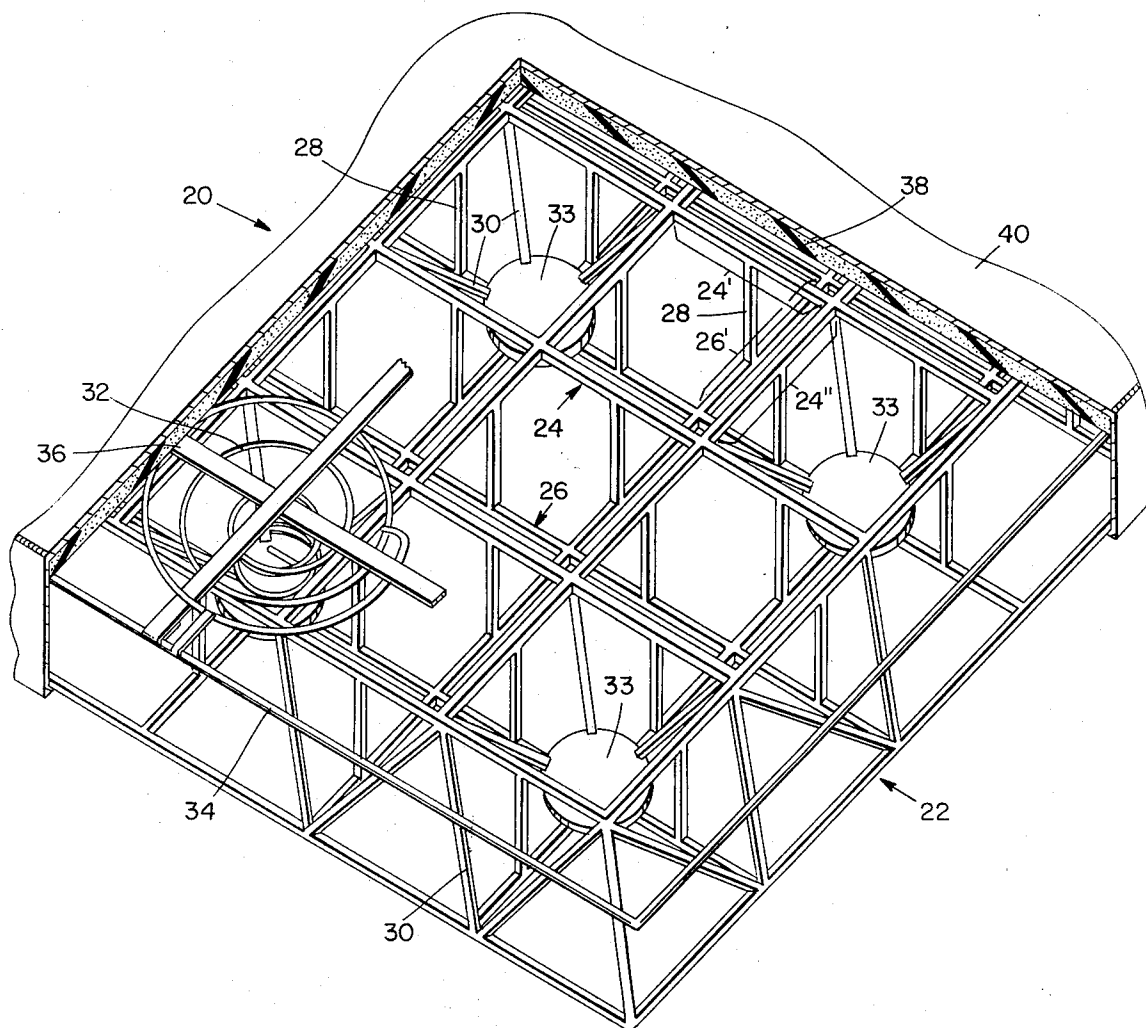


FIG. 1

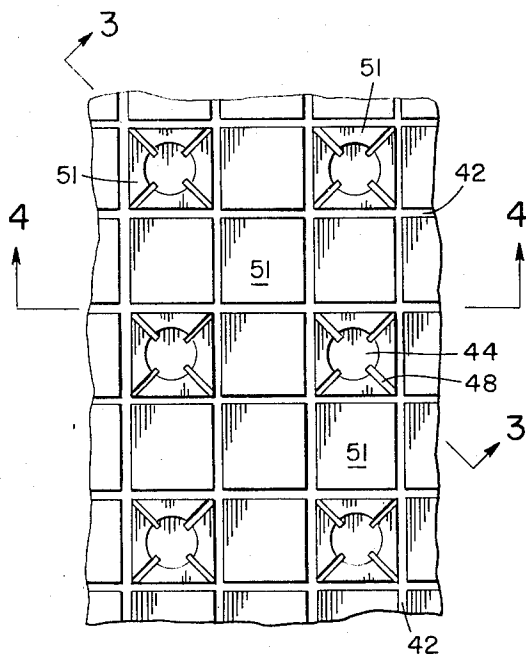


FIG. 2

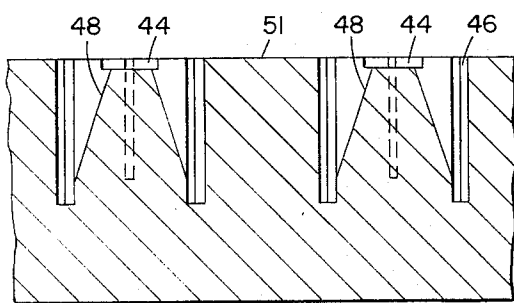


FIG. 3

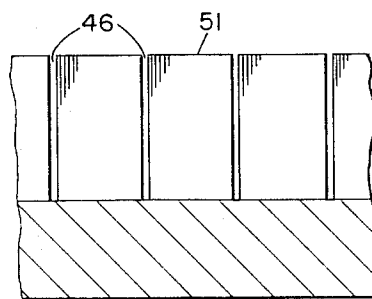


FIG. 4

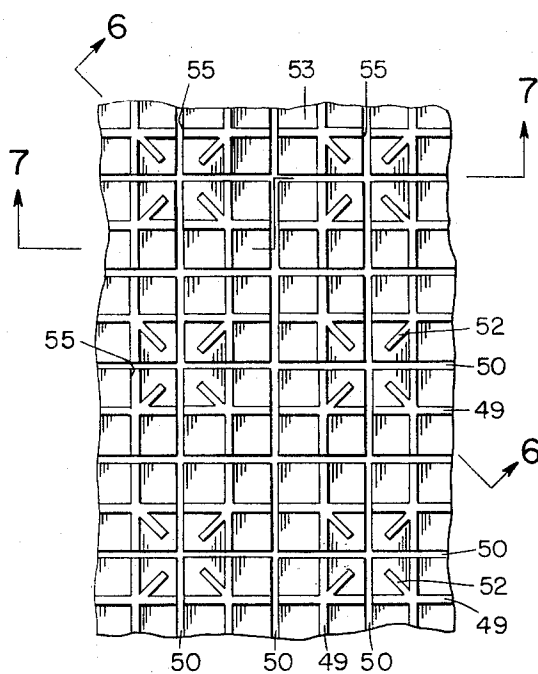


FIG. 5

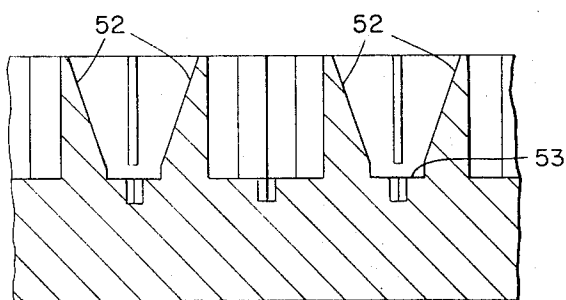


FIG. 6

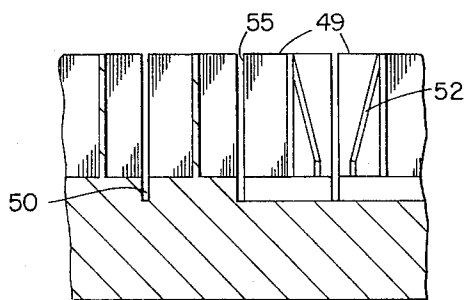


FIG. 7

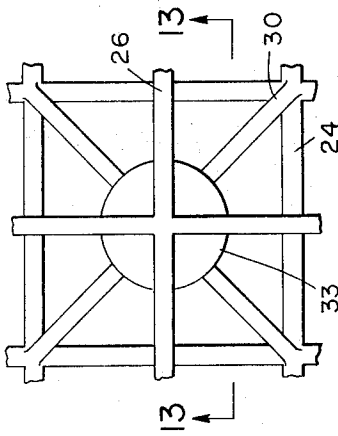


FIG. 12

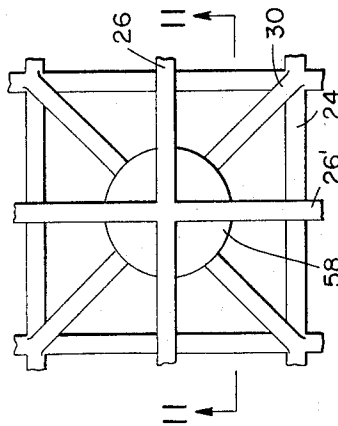


FIG. 10

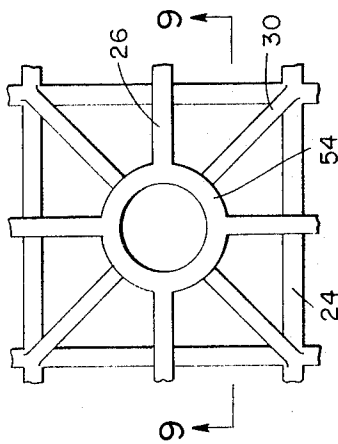


FIG. 8

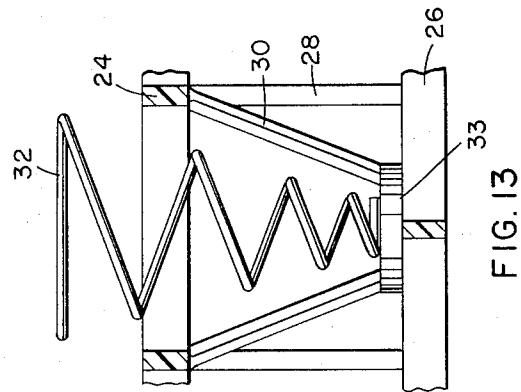


FIG. 13

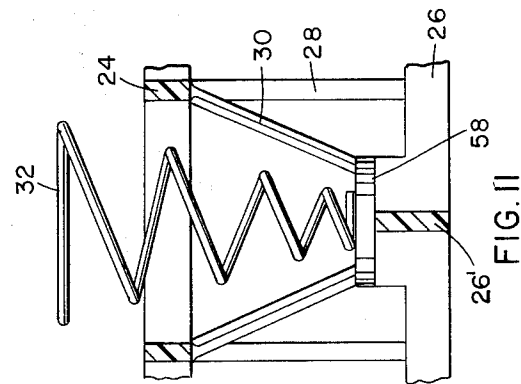


FIG. 11

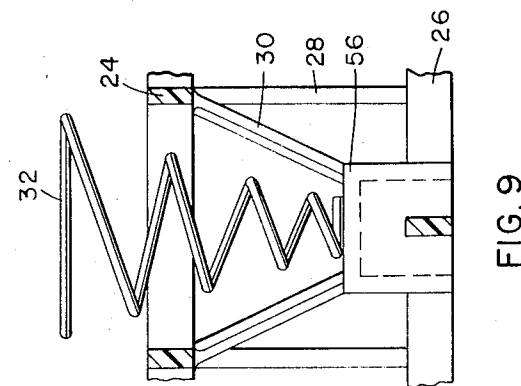


FIG. 9

UNITARY SPACE FRAME

BACKGROUND OF THE INVENTION

Bed box spring frames have previously been made in the form of a wooden pallet. It is extremely desirable to provide a suitable substitute for expensive kiln-dried hardwoods in the making of furniture substructures which can be considerably less expensive in practice than hardwood frames. The instant invention provides a unitary plastic space frame structure in the form of an offset grid space structure that completely eliminates the necessity for hand labor in the assembly of a multiple section frame unit. The instant invention provides a novel structure that may be injection molded utilizing a simple two-piece mold.

OBJECTS OF THE INVENTION

It is a principal object of the instant invention to provide a box spring frame which is equivalent or superior to a substructure formed from dried hardwoods and at the same time is considerably less expensive in practice than hardwood frames.

Another object of the instant invention is to provide an improved unitary three-dimensional space structure wherein assembly time and thereby overall cost is reduced by eliminating the need to individually assemble a large number of small structural units into a complete space frame.

Still another object of the instant invention is to provide a box spring frame having integral joints, said frame having molded integral attachment areas and being made from a stapleable material.

Yet another object of the instant invention is to provide a box spring frame having sound deadening properties, being lighter in weight than wood and not being susceptible to problems of humidity.

SUMMARY OF THE INVENTION

The purpose of the instant invention is to provide a unitary frame that is injection moldable in a simple two-piece mold. To accomplish this purpose the instant invention provides a unitary offset grid space structure having two grids similar in geometry with one grid offset from the other in plan but remaining directionally the same said upper and lower grids connected by connecting members that are parallel to the direction of mold opening travel and which interconnect angularly askewed members of said grids.

DESCRIPTION OF THE DRAWING

FIG. 1 shows a cutaway partial perspective view of a box spring utilizing the frame of the instant invention.

FIG. 2 shows a partial plan view of the upper half of a two-piece mold used to produce the frame shown in FIG. 1.

FIG. 3 is a partial section view taken along section lines 3—3 in FIG. 2.

FIG. 4 is a partial section view taken along section lines 4—4 in FIG. 2.

FIG. 5 shows a partial plan view of the lower half of the two-piece mold utilized to make the frame shown in FIG. 1.

FIG. 6 shows a partial section view taken along section lines 6—6 in FIG. 5.

FIG. 7 shows a partial section view taken along section lines 7—7 in FIG. 5.

FIG. 8 is a partial bottom view of a first embodiment of a spring attaching portion of the frame.

FIG. 9 is a partial side section view taken along section lines 9—9 in FIG. 8.

FIG. 10 is a partial bottom view of a second embodiment of a spring attaching portion of the frame.

FIG. 11 is a partial section view taken along section lines 11—11 in FIG. 10.

FIG. 12 is a partial bottom view of a third embodiment of a spring attaching portion of the frame.

FIG. 13 is a partial section view taken along section lines 13—13 in FIG. 12.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With continued reference to the drawing FIG. 1 shows a box spring assembly generally noted at 20 having a supporting frame 22. Frame 22 is basically an offset grid space structure having a top grid 24 and bottom grid 26, similar in geometry, with one grid offset from the other in plan but remaining directionally the same. The upper grid 24 is composed of typical integral members 24' and 24''. The lower grid 26 is composed of typical integral members 26'. The upper grid 24 and lower grid 26 are connected by first connecting members 28 and second connecting members 30. Three dimensional space structures of this type are usually constructed by assembling a large number of mass produced three dimensional units into a complete space frame structure. The small three dimensional units are usually composed of steel structural members formed into inverted pyramid shape units assembled together in horizontal arrangement such that the bases of the pyramid shaped units form the upper surface of the space deck and the apexes of the pyramids when interconnected with horizontal side members form the lower surface of the space deck. The present invention overcomes these disadvantages and provides further advantages by providing an integral frame structure that may be injection molded in a simple two-piece mold as shown in FIGS. 2-7. Spirally formed coil springs 32 are attached at their smaller diameter end to the frame 22 by suitable attaching means such as heavy duty staples. The coil springs 32 located at the circumference of the box spring assembly are connected by wires or clips to an outer metal band 34 having the same general outside dimensions as lower grid 26. Inner springs 32 are connected to the outer springs by a latticework of flat thin steel members 36 which are attached at their ends to the band 34. The entire spring assembly is covered with a padding 38 and the entire assembly is covered with a suitable cloth cover 40. The perimeter members of lower grid 26 may be made wider than shown to facilitate fastening cover 40 to the bottom thereof.

FIGS. 2-7 show the simple two-piece mold utilized to injection mold frame 22. FIGS. 2-4 show the upper half of the mold and FIGS. 5-7 show the lower half of the mold. Cavities 42 as shown in FIG. 2 in cooperation with surfaces 49 in FIGS. 5 and 7 will produce top grid 24. Cavities 44 in cooperation with surfaces 53 in FIGS. 5 and 7 will produce the attaching portions 33 as shown in FIG. 1. Cavities 46 as shown in FIG. 2 in cooperation with surfaces 55 in FIGS. 5 and 7 will produce first connecting members 28. As can be seen in FIGS. 5-7 cavities 50 in cooperation with surfaces 51 in FIG. 3 will produce lower grid 26 as shown in FIG.

1. Surfaces 52 as shown in FIGS. 6 and 7 cooperate with cavities 48 shown in FIG. 3 to produce second connecting members 30. As seen in FIG. 1 the offset grid construction utilizes first connecting members 28 to interconnect members 24' of the upper grid 24 and members 26' of the lower grid 26 that are angularly askew, thereby allowing the entire structure to be injection molded in the simple two-piece mold. The essence of the invention is the injection molding of space frame structure from a simple two-piece mold having an inherent direction of mold opening travel to produce upper and lower offset grids interconnected by first connecting members that are parallel to the direction of mold travel and that intersect members in said grids that are angularly askew.

It can be seen that the upper grid and the lower grid do not necessarily have to be in parallel relationship as long as the first interconnecting members are parallel to the direction of mold travel and connect members in the upper grid which are angularly askew from members in the lower grid. If parallel grid members 26' and 24' were interconnected by members that were parallel to the direction of mold travel the end result would be an inefficient structure composed of plates and not individual members.

The upper and lower grids are further interconnected by second connecting members 30 diagonally mounted that prevent lateral shifting of the offset grids and provide structural connections for the grids and the spring attaching portions.

FIGS. 8-13 show the construction of three different spring attaching portions. The first embodiment in FIGS. 8 and 9 utilize a hollow cylindrical construction. FIG. 8 illustrates lower grid 26 and upper grid 24. The members of lower grid 26 merge with a hollow cylindrical section 54 having a solid top portion 56 to which the spring 32 is attached.

In FIGS. 10 and 11 the members of lower grid 26 intersect to support platform 58 to which the spring 32 is attached by suitable means. In this second embodiment the lower grid 26 consists of deeper grid members 26' directly underneath the support platform 58 for additional strength.

The third embodiment shown in FIGS. 12 and 13 comprises an upper grid 24, lower grid 26, first connecting members 28, second connecting members 30

and spring support portions 33 integral with lower grid 26 for attaching spring 32.

The frame is preferably injection molded from thermoplastic material. It is, however, within the scope of the invention to make the frame from any material that may be suitably introduced in any way into a two-piece mold. Polypropylene structural foam is preferred in the production of box spring frames.

Having described and illustrated the invention in some detail, it will be understood that this description and the illustrations have been offered only by way of example and that the invention is to be limited in scope only by the appended claims.

What is claimed is:

1. A unitary space frame suitable for forming in a simple two-piece mold having a direction of mold opening travel, comprising:

an upper and a lower grid composed of grid members, said upper grid being offset from said lower grid in plan; and

a plurality of first connecting members each interconnecting a grid member in said upper grid and a grid member in said lower grid that are angularly askew, said first connecting members being oriented parallel to the direction of mold opening travel.

2. A unitary box spring frame, comprising:

an upper and a lower grid composed of grid members, said upper grid being offset in plan from and substantially parallel to said lower grid; and

a plurality of first connecting members perpendicular to said upper grid each of said first connecting members interconnecting a grid member of said upper grid and a grid member of said lower grid that are angularly askew with respect to each other.

3. A box spring frame as in claim 2 further including a plurality of second members diagonally interconnecting said upper grid and said lower grid.

4. A box spring frame as in claim 3 further including a plurality of spring attaching portions connected to said second members to which spring may be fastened.

5. A box spring frame as in claim 4 wherein said frame is polypropylene structural foam.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,854,157 Dated December 17, 1974

Inventor(s) David C. Trimble (Case 6)

It is certified that error appears in the above-identified patent
and that said Letters Patent are hereby corrected as shown below:

Column 3, line 22 of printed patent;
" 24' " should read --24"--

Signed and sealed this 18th day of February 1975.

(SEAL)

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents
and Trademarks