May 16, 1944. G. L. FOWLES ET AL 2,349,158

CEILING SYSTEM

Filed June 6, 1941 2 Sheets-Sheet 1

FIG. 1

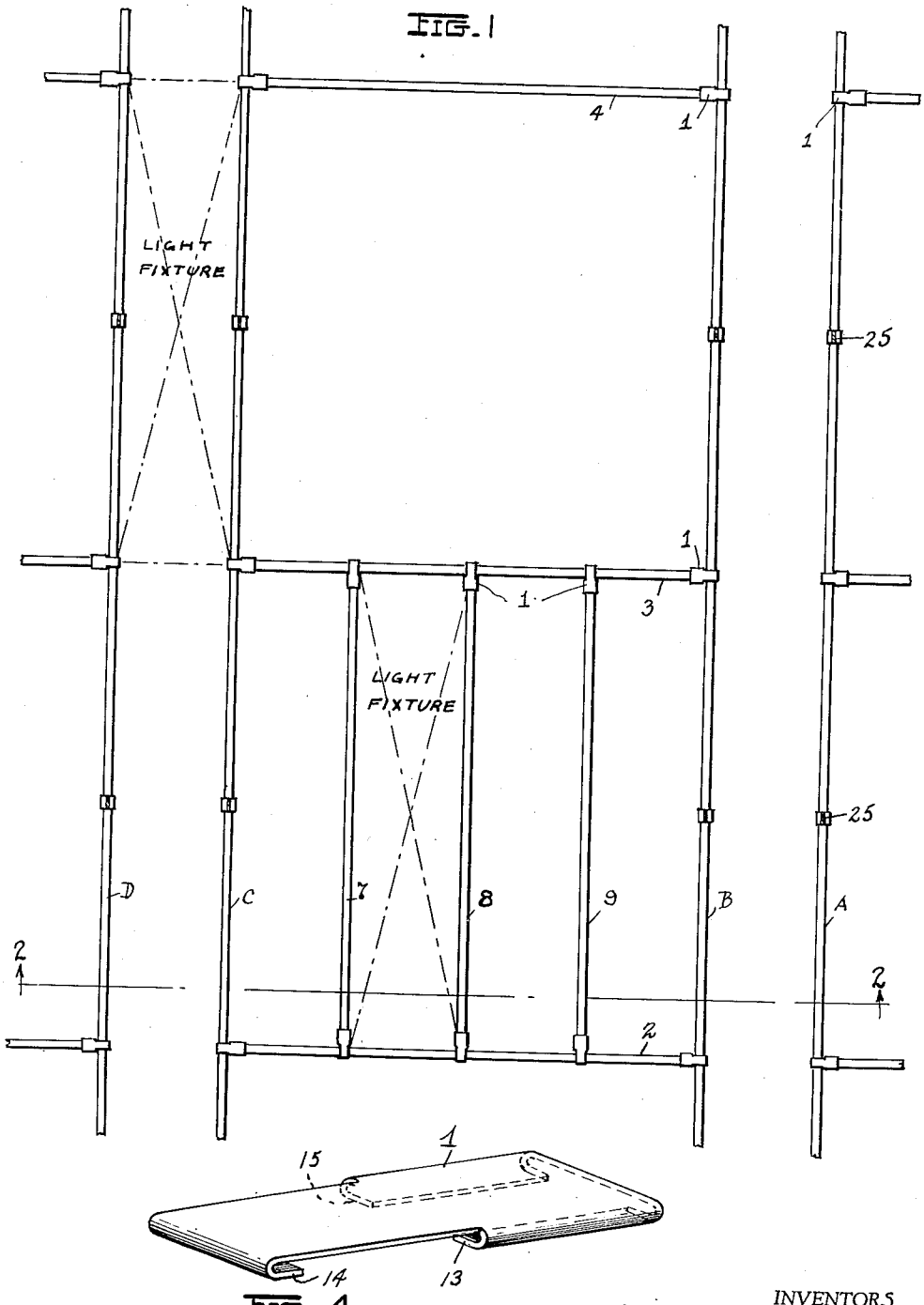


FIG. 4.

INVENTORS
GILBERT L. FOWLES AND
CHARLES S. NOCAR

BY Oberlin Limbach & Day
ATTORNEYS.

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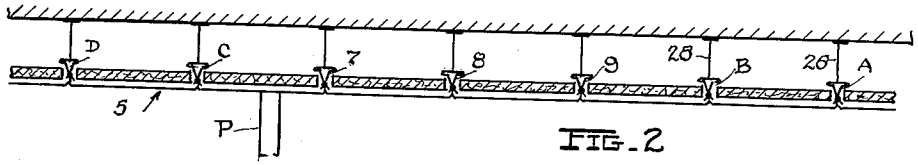


FIG. 2

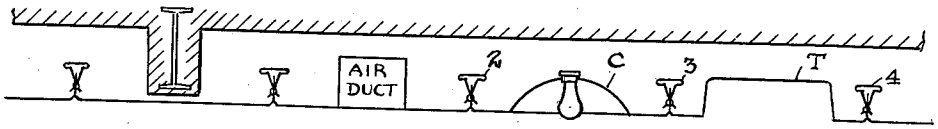


FIG. 3

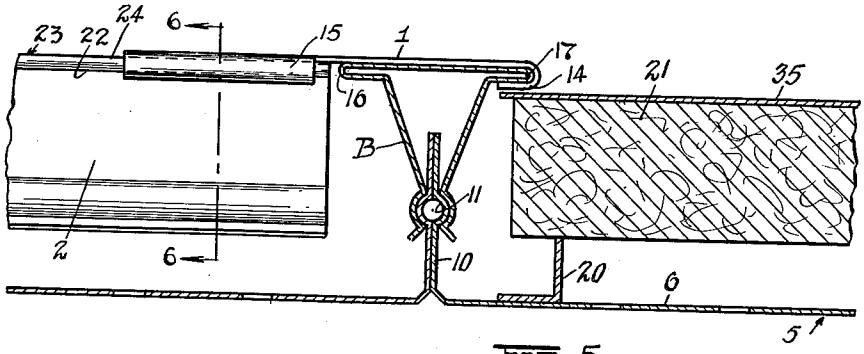


FIG. 5

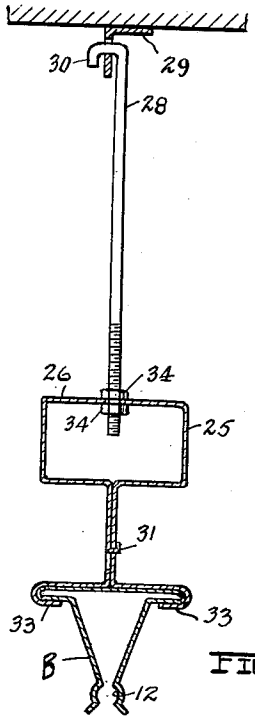


FIG. 8

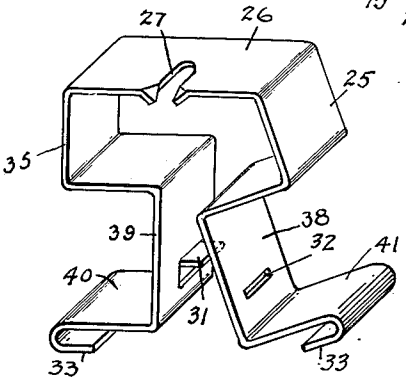


FIG. 7

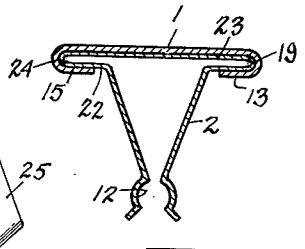


FIG. 6

INVENTORS
GILBERT L. FOWLES and
CHARLES J. NOCAR

BY Oberlin, Limbach & Day.
ATTORNEYS

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UNITED STATES PATENT OFFICE

2,349,158

CEILING SYSTEM

Gilbert L. Fowles, Lakewood, and Charles J. Nocar, Cleveland, Ohio, assignors to The E. F. Hauserman Company, Cleveland, Ohio, a corporation of Ohio

Application June 6, 1941, Serial No. 396,944

8 Claims. (Cl. 189—88)

This invention relating as indicated to a ceiling system, is more particularly directed to a system wherein units such as sound absorbing pans may be suspended from a floor slab or other horizontally extending portion of a building.

It is well known that pan like members usually containing sound absorbing material can be suspended so as to extend in a smooth flat ceiling, this being shown in the patent to R. F. Norris No. 1,726,500 of August 27, 1929. The particular installation shown in the Norris patent has found wide usage as a sound absorbing ceiling and while our ceiling is preferably sound absorbing in character, it need not be so restricted. In sound absorbing or suspended ceilings, as far as we are aware, it is impossible to rearrange the units or parts due to the fact that the furring strips which support the pans are mounted in a fixed position. It is a particular object of this invention to mount the major portion of the furring strips in a ceiling in such manner that they may be moved to obtain a wide assortment of supporting arrangements.

It is a problem in present installations to rearrange light fixtures where partitions are rearranged and normally the light fixtures are left in their original position. This means that the light is not directed efficiently where the partitions have been rearranged and in some instances, the partitions have to be offset with respect to the lighting fixtures. In our improved ceiling system, light fixtures can be re-located in a number of different positions, because the furring strips are slidably mounted, one with respect to the other, and are spaced in a predetermined manner.

It is one object of the invention to provide a new type of connecting means between furring strips so that one furring strip may be moved with respect to another.

It is another object of the invention to provide a new form of furring strip and an improved means for suspending furring strips.

It is a further object of the invention to provide an improved type of a sound absorbing unit.

The general object of the invention is to provide parallel fixed furring strips which are connected by means of movable furring strips, there being still further furring strips which are parallel to the fixed furring strips and movably connected to the movable furring strips.

It is also an object of the invention to provide a suspended ceiling system in which light coffers, light troffers, air ducts and supporting building beams do not interfere with the general arrangement and in which the ceiling units, such as pan members, need not be cut to less than their usual size.

It is a still further object of the invention to provide a ceiling system comprising pan like units and light fixtures, the dimensions of the light fixture being a multiple of the dimensions of the pan like units.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawings and the following description set forth in detail certain structure embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:

Figure 1 is a plan view taken from above.

Figure 2 is a vertical section taken on line 2—2 of Figure 1, showing parts installed.

Figure 3 is a vertical section taken at right angles to section line 2—2 of Figure 1 and drawn upon a smaller scale, showing light fixtures, air duct and building beam.

Figure 4 is a perspective view of the connecting clip.

Figure 5 is a vertical section.

Figure 6 is a vertical section on line 6—6 of Figure 5.

Figure 7 is a perspective view of one of the hangers in open position.

Figure 8 is a vertical section showing hanger mounting.

Referring now to the drawings and more particularly to Figure 1, the framework of our ceiling system will be seen to consist of spaced parallel furring strips A, B, C and D, which may be of conventional T section. These strips are suspended in fixed relationship by means of hangers 25 and the distance from A to B is the same as the distance from C to D, such distances being based upon the width of the lighting fixtures to be employed. These lighting fixtures may take the form of coffers C or troffers T, as shown in Figure 3, or any other desired form. The fixed furring strips B and C are connected by means of transverse furring strips 2 and 3, the fixed furring strips and transverse furring strips being joined by clips 1.

The clip 1, as shown in Figure 4, is substantially rectangular and is provided with a pair of parallel rebent flanges 13 and 15, which form grooves for the reception of the parallel edges on the movable furring strips 2 and 3. A further rebent

flange 14 is provided at the far end of the rectangular body portion of the clip and this provides a groove for the longitudinally extending edge of the furring strip B, for example. Obviously, the clip permits movement of one furring strip in a direction at right angles to the other, since the furring strip can slide along the rebent flanges 13 and 15. The clip also permits movement of one furring strip, such as 2 shown in Figure 5, in a direction parallel to the longitudinal extent of the furring strip B inasmuch as the clip can slide along the upper surface of the strip B. The fixed strips, as stated previously, are spaced apart a distance equal to one dimension of the light fixtures to be employed and the movable furring strips 7, 8 and 9 are spaced apart the same distance. Obviously, a light fixture can be re-located from between the fixed furring strips C and D to a new position between the movable furring strips 7 and 8 or in any other desired position, whenever the partitions beneath the ceiling are re-located.

The furring strip B is similar to the furring strip 2 and in fact, all of the furring strips have exactly the same cross-section. This is economical since various types of furring strips need not be maintained in stock. The furring strip 2, shown in detail in Figure 6, comprises an upper substantially flat portion 23, having longitudinal edges 19 and 24, such edges merging into portions 22. These portions, it will be noted, extend parallel to the flat upper portion 23, thus providing smooth, rounded edges 19 and 24, which are readily movable in the grooves formed by rebent flanges 13 and 15 on the clip member 1. Each of the lower parallel portions 22 then merges into an angularly extending flange and this merges into an arcuate portion 12, finally terminating in a flaring portion. The downwardly extending flanges are complementary in shape so that the arcuate portion 12 forms a receiving groove in which the rib 11 on the flange 10 of the pan 6 is adapted to be received. The furring strips are preferably made of spring metal so that when two flanges on the pans 6 are received in the grooves 12, the pan is held in fixed relationship.

The so-called, fixed, furring strips A, B, C and D are supported by means of hangers generally indicated at 25 in Figure 7. These hangers comprise tong like sheet metal members with a slotted hole 27 in the upper portion 26 to readily receive a tie rod 28 by which each is suspended. Angle irons 29 with slotted holes are fastened to the ceiling which is usually wavy and out of level and hooked ends 28 on the tie rods provide a simple means of fastening them. One leg of the hanger has an extruded lug 31 which passes through a slot 32 in the other leg and is twisted to lock the two legs together. The legs serve as tongs and end in rebent portions 33 which support the furring strips. It is only necessary to provide a few holes in the ceiling to support the angle irons 29 whereupon the whole system is readily installed and brought to level by adjusting the lock nuts 34.

The hanger generally indicated at 25, thus consists of an upper portion 26 and dependent legs 25 and 35 and these legs are spaced from each other immediately below the upper portion 26 so that a space results in which the lower end of the tie rod 28 can travel when the hanger is elevated above the position shown in Figure 8.

The dependent legs 25 and 35 are then bent at right angles in such manner that the portions 38 and 39 are formed and then are adapted to abut, or lie face to face when the lug 31 is placed in the slot 32 and bent upwardly.

The vertical depending portions 38 and 39 then merge into outwardly extending portions 40 and 41 which terminate in rebent flanges 33.

From this it will be seen that the furring strips A, B, C and D are held securely in fixed relationship and all level.

The sound absorbing pans generally indicated at 5, consist of a major, substantially flat, perforated body portion 6 and upwardly extending flanges 10. The pans are preferably square, or oblong, equivalent to two squares.

It is to be understood that the pan member 5 may be made of rubber, wood, or any other desired material.

From the foregoing description, it will be seen that we have provided an extremely simple ceiling system readily installed in which the lighting fixtures can be rearranged at will. It will be noted that we have provided an inexpensive system because only three different elements are necessary, these being furring strips, all having the same cross-section; hangers, all of which are identical; and clips. From these three elements a flexible ceiling support may be arranged with a minimum of labor and where partitions or walls are moved, the system may be rearranged. It is also to be observed that a nice fit is obtained by the connecting clips since the weight of the sound absorbing pans will cause the parallel portions 22 of the furring strips to sag slightly, thus tightly engaging the rebent flanges 13 and 15 on the connecting clip 1. The same action takes place with respect to the rebent flange 14, thus eliminating all looseness in the ceiling.

Where a room dividing partition is installed beneath an acoustically absorbent hung ceiling there is practically no resistance to sound transmission. Such a partition is indicated at P in Figure 2. About 80% of the noise striking the perforated pans will pass through them and through the pads into the space above and will come freely down through the pads and pans on the other side of a cross partition. The difference between absorption and transmission phenomena should be borne in mind. A surface which absorbs 80% of sound energy is considered very efficient, but a wall which reduces sound transmission by the same rate is poor although it reduces sound energy transmitted. Even a two inch opening above it negatives the soundproof value of a partition and the space between a perforated ceiling and the structural ceiling is about equivalent to a free opening from the sound transmission standpoint.

One obvious expedient is to extend room partitions through the acoustical ceiling to the structural ceiling or to install baffles located above each room partition. These are common practice.

We use 30 gauge steel plates, slightly narrower than the distance between furring strips and 2 inches longer than the pads. These plates 35 are shown resting on top of the filler pads 21 in Figure 5. They are supported by the filler pads and lap under the furring strips at the sides and over each other at the ends and do not defeat the movability. The pan, pad and 30 gauge plate have a resistance to sound transmission of 22 d. b. and since sound must pass through twice we may use partitions of 44 d. b. reduction anywhere beneath our ceiling, without increasing sound transmission.

Other modes of applying the principle of our invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

We therefore particularly point out and distinctly claims as our invention:

1. In a ceiling construction, the combination of a multiplicity of furring strips supported in fixed position, and other furring strips extending at right angles to such fixed furring strips, with means connecting said other furring strips with such fixed furring strips, said means comprising a clip member having parallel rebent flanges, forming longitudinal recesses, and another rebent flange forming a transverse recess, said other furring strips having spaced parallel edges slidably adjustably seated in said longitudinal recesses and said fixed furring strip having one edge slidably adjustably seated in said transverse recess, whereby said other furring strips may be moved along said fixed furring strips.

2. In a ceiling construction, means connecting a fixed furring strip with a furring strip extending at right angles to said fixed furring strip, said means and such right angled furring strip being slidable adjustable with respect to said fixed furring strip and said connecting means being slidably and adjustably seated upon said right angled furring strip, there being furring strips which extend parallel to said fixed furring strip, said last named furring strips being slidably adjustably connected to said right angled furring strip, one of said connecting means comprising a clip member having parallel rebent flanges, forming longitudinal recesses, and another rebent flange forming a transverse recess, and said furring strip having portions thereof seated in said recesses.

3. A hanger member comprising, an upper portion and dependent legs, said upper portion being apertured for the reception of suspending means, and said legs being spaced from each other for a distance downwardly from said upper portion whereby said hanger member may be moved up and down upon said suspending means, said legs then extending inwardly and abutting each other and securing means extending through said abutting portions, and means integral with said abutting legs to retain a furring strip.

4. A hanger member comprising, an upper portion and dependent legs, said upper portion being apertured for the reception of suspending means, and said legs being spaced from each other for a distance downwardly from said upper portion whereby said hanger member may be moved up and down upon said suspending means, said legs then extending inwardly and abutting each other and securing means extending through said abutting portions, said legs then extending at right angles to said abutting portions, and means integral with said abutting legs to retain a furring strip.

5. A hanger member comprising, an upper portion and dependent legs, said upper portion being apertured for the reception of suspending means, and said legs being spaced from each other for a distance downwardly from said upper portion whereby said hanger member may be moved up and down upon said suspending means, said legs then extending inwardly and abutting each other and securing means extending through said abutting portions, said legs then extending at right angles to said abutting portions and terminating in rebent flanges, whereby a furring strip may be held in position.

6. A hanger member comprising, an upper portion and dependent legs, said upper portion having a slot extending inwardly from one edge for the reception of suspending means, and said legs being spaced from each other for a distance downwardly from said upper portion whereby said hanger member may be moved up and down upon said suspending means, said legs being releasably secured together.

7. Means for suspending a furring strip from a ceiling comprising longitudinally extending members attached to said ceiling, rods supported by said members at spaced locations, and a hanger member supported by each of said rods, said hanger members having means detachably engaging a furring strip, and having means detachably connected to said rods, said means being spaced from each other to provide an area freely accessible from the exterior of said hanger for adjusting the hanger with respect to said rod.

8. A hanger member, adapted to support a furring strip, said member comprising an upper portion and dependent legs, integral with said upper portions, said dependent legs being spaced from each other downwardly for a distance then extending inwardly, then extending downwardly and then extending outwardly and terminating in hook portions.

GILBERT L. FOWLES.
CHARLES J. NOCAR.