E. N. MURPHY.

FLOOR CONSTRUCTION.

APPLICATION FILED SEPT. 11, 1917.

1,302,578.

Patented May 6, 1919.

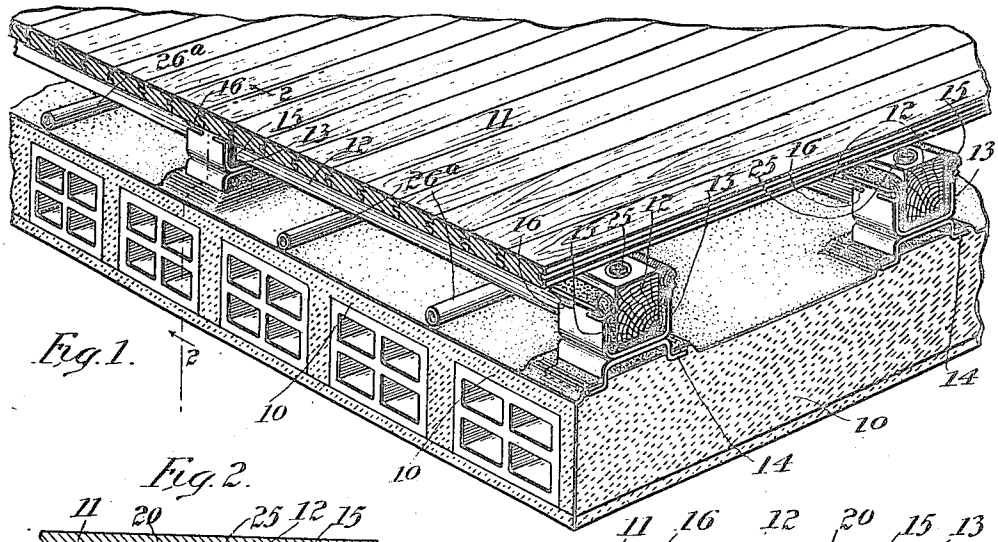


Fig. 1.

Fig. 2.

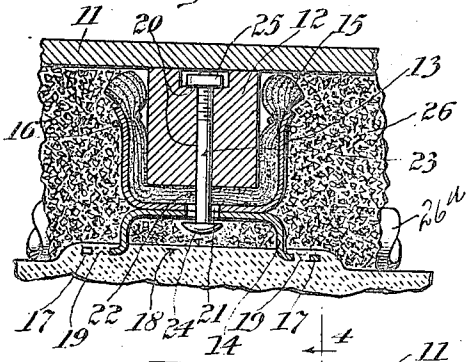


Fig. 4.

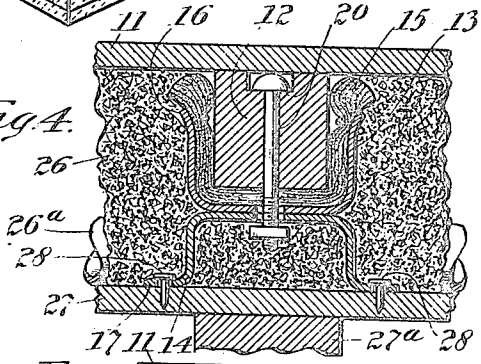


Fig. 3.

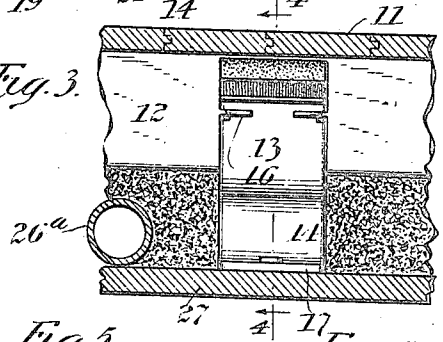


Fig. 7.

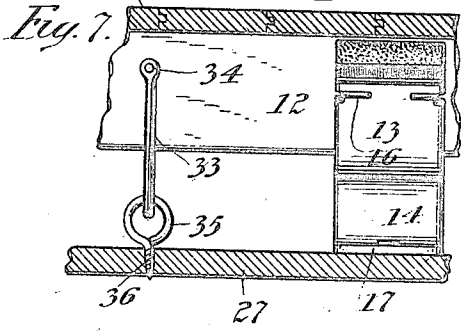


Fig. 5.

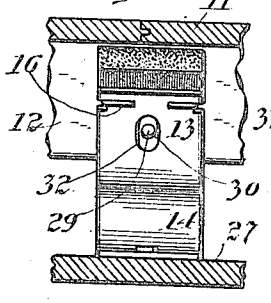
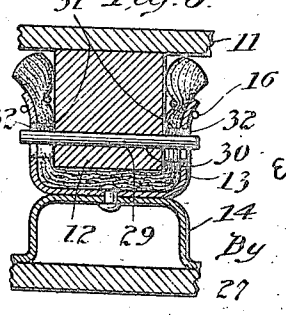


Fig. 6.



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UNITED STATES PATENT OFFICE.

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FLOOR CONSTRUCTION.

1,302,578. Specification of Letters Patent. Patented May 6, 1919.

Application filed September 11, 1917. Serial No. 190,742.

To all whom it may concern:

Be it known that I, EVERETT N. MURPHY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Floor Constructions, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention relates to floor construction of buildings, and has reference more particularly to a known type of sound-proof floor construction wherein the upper or finishing floor is laid upon a series of nailing strips that are seated in chairs which, in turn, rest upon and are secured to the lower rough floor, pads or cushions of felt or other fibrous or yielding material being interposed between the bottoms and sides of the nailing strips and the seats and sides of the chairs and forming the sound-insulating elements of the structure. Heretofore, in order to render the sound-insulating quality of the structure as perfect as possible, the nailing strips have not been fastened or secured either to the chairs or to the lower floor structure, since rigid fastening means between these elements would obviously constitute a vehicle for the transmission of vibrations and would to an extent nullify the vibration-absorbing effect of the fibrous insulation, and the gravity of the nailing strips and upper floor has been relied on to keep the latter in place.

It has been found in practice, however,—more often in the case of fire-proof floor constructions,—that there is or may be a tendency, under certain conditions, for the upper floor to swell and rise. The upper or finishing floor is usually of dry, well-seasoned lumber and is very tightly laid, and the presence of any appreciable amount of moisture therebeneath causes or tends to cause it to swell and arch or buckle up. This is more apt to be the case in fire-proof structures wherein the lower rough floor is constructed of concrete or floor tiling bonded by concrete or mortar. Such buildings are usually erected in greater or less haste, and sufficient time is not allowed for the lower floor structure to thoroughly dry out before the finishing floor is laid. In the case of plain wooden floor constructions the result above noted is liable to occur owing to damp climatic conditions or insufficient seasoning and drying of the materials used, or both.

The object of this invention, generally stated, is to provide an improved floor construction wherein the above described tendency shall be effectively overcome without destroying or impairing the admirable sound-insulating qualities of the construction; and this object is attained through instrumentalities including means for anchoring the upper or finishing floor to the lower or rough floor and which is so constructed and applied as not to transmit vibrations between the floors nor to neutralize or impair the inherent resiliency of the floor nor the vibration-absorbing quality and capacity of the fibrous insulation.

In the drawing, wherein several embodiments of my invention are illustrated, Figure 1 is a fragmentary perspective view of a fire-proof floor construction illustrating one embodiment of my present invention; Fig. 2 is a vertical section on the line 2—2 of Fig. 1; Fig. 3 is a vertical section at right angles to Fig. 2, showing the invention as embodied in a wooden or non-fire-proof floor construction, but employing substantially the same bonding or anchoring means as in Figs. 1 and 2; Fig. 4 is a vertical section on the line 4—4 of Fig. 3; Figs. 5 and 6 are vertical sections at right angles to each other and similar to Figs. 3 and 4 respectively, showing another form of anchoring means; and Fig. 7 is a vertical section similar to Fig. 3 showing still another form of anchoring means which may be employed within the purview of the invention.

Referring now to the drawings in detail, and describing first Figs. 1 and 2, which show an embodiment of the invention in a fire-proof floor construction, 10 designates the lower rough floor of fire-proof material, such as tiling set in and bonded by concrete, mortar or cement and supported by suitable beams (not shown). 11 designates the upper finishing floor that is nailed to underlying nailing strips 12, these latter being in turn supported at intervals in chairs, each of which, in the form herein shown, consists of a pair of generally U-shaped metal members 13 and 14 placed and secured back to back, the upper member 13 having an interior lining or cushion 15 of felt, cattle hair, sea grass or other like fibrous or yielding material secured thereto by wire fastenings 16,

which lining or cushion embraces and directly engages the bottom and sides of the nailing strip 12, and the depending limbs of the lower member 14 terminating in feet 17 that are embedded in slightly raised spots or mounds 18 of concrete or cement formed on the upper surface of the lower rough floor 10. The feet 17 of the chairs may, if, desired, be formed with slots or holes 19, as shown, through which the wet concrete or cement flows and, when dry, strongly unites the feet of the chairs to the lower floor structure. Cast metal or stamped one-piece chairs may obviously be employed.

Each nailing strip 12, at a point centrally over each chair, is formed with a vertical countersunk hole 20 extending from top to bottom thereof, and the transverse member of the chair is likewise formed with a central hole 21 axially in line with and of a somewhat greater diameter than the nailing strip hole 20. The bottom member of the pad or cushion 15 also has a hole 22 in line with the holes 20 and 21, this usually being formed by merely pushing or driving the bolt therethrough. Through these holes and the felt pad is passed a bolt 23, the head 24 lying beneath the horizontal portion or seat of the chair, while its threaded upper end is engaged by a nut 25 lying in the countersunk upper end of the hole 20. When the chairs are first applied to the nailing strips, or vice versa, and the fastening bolts applied, the nuts are turned up tightly until the bolt heads contact suitably with the lower edge of the strips. But the adjustment is such that when the strips and the finishing floor are laid, the insulating pad or cushion is compressed, permitting the nailing strips and their fastening bolts to sink slightly but sufficiently to carry the heads of the bolts out of contact with the chairs, so that there is then no rigid or continuous fastening element or means between the upper and lower floors. Vibrations, and consequently sounds, are therefore normally not transmitted. Likewise the resiliency of the floor due to the pad and chair supports is not affected. But, on the other hand, if the upper floor swells from moisture or other causes and starts to arch, buckle, warp or otherwise rise from normal level position, the fastening bolts arrest such movements practically at their inception, in an obvious manner. When the floor dries out again the parts return to normal position, with the heads of the bolts out of contact with the lower sides of the chair seats, thus restoring the sound-insulating conditions. Between the upper and lower floors a filling 26 of loose dry cinders or similar cellular material occupying the spaces between the nailing strips may be used, if desired. The nailing strips are preferably elevated above the water, gas, and other pipes or conduits, indicated at 26a, so as to clear same and render the cutting of the strips unnecessary in order to lay the pipes, and to prevent noises, etc.

In Figs. 3 and 4 I have shown a similar embodiment of the invention so far as concerns the insulating and bonding or anchoring features that is shown in Figs. 1 and 2, but as applied to a non-fire-proof or wooden floor construction of this general type. In these figures the fire-proof structure of the lower floor 10 of Figs. 1 and 2 is replaced by a rough wooden structure 27, usually consisting of a rough flooring laid on top of the usual joists, 27a, on which the feet 17 of the chairs rest and are secured by suitable fastening means such as nails 28 driven through the holes or slots 19. The bolts 23, in this form, would ordinarily be reversed in position on account of ease of installation, so that the head is in the countersunk portion of the hole 20 and the nut is beneath the chair seat. A cinder filling 26 is usually employed and the nailing strips are raised above the pipes, conduits, etc., 26a. In both these forms, that is, of Figs. 1 and 2 and of Figs. 3 and 4, the upper floor is sure to engage and push the bolts 23 down, in case they do not drop by gravity, so that their lower ends free the bottoms of the chairs when the nailing strips are in normal position. By this bonding or anchoring means the nailing strips are prevented from rising to such an extent that the cinders are liable to work therebeneath and thus prevent them from reseating in normal position on the chairs when the floor dries out again.

In the form of the invention illustrated in Figs. 5 and 6, the principal floor anchoring agent is a pin 29 that extends through a horizontal hole 30 in the nailing strip, the end portions of this pin also passing through vertical slots 31 and 32 in the sides of the cushion and chair respectively, with a slight lateral or side clearance in said slots, as indicated in Fig. 5. Under normal conditions the ends of the pins are out of contact everywhere with the edges of the slots 32, as shown, so that, as in the form of anchoring means shown in Figs. 1 to 4, there is no rigid or continuous connection between the upper and lower floors, and consequently no transmission of noise-producing vibrations. At the same time, if the upper floor seeks to rise anywhere from its normal and proper level, this tendency is at once arrested by the engagement of the ends of the pins 29 with the upper ends of the slots 32.

Fig. 7 illustrates an embodiment of the inventive principle here involved wherein the floor-anchoring means is structurally independent of the chair and cushion. In this case a clevis 33 is suspended from the nailing strip 12 by a cross-pin 34 anywhere

between adjacent chairs, and this clevis passes through the head 35 of an eye-bolt or screw 36 embedded or screwed into the lower floor. Under the normal weight or loading of the upper floor the nailing strips are depressed to such an extent as to lower the clevis 33 out of physical contact with the eye 35 of the bolt or screw, so that here also there is no rigid or continuous fastening or connection between the floors, and consequently no transmission of vibrations through the anchoring means.

It is believed that the structural principle underlying this invention, its functional law, and the merits and advantages which it possesses will be entirely clear to those skilled in this art without further detailed description or elaboration of other equivalent specific forms in which the invention may obviously find expression. Hence, without limiting the invention to any or all of the particular embodiments thereof herein selected for purposes of illustration and description,—

I claim—

1. In a building floor construction, the combination with upper and lower floors, and sound-insulating means for supporting the upper floor on the lower floor, of means for anchoring said upper floor to said lower floor, said anchoring means being the only non-cushioned connection and including connected elements normally out of physical contact with each other under the load effect of the upper floor, and which may be drawn into physical contact to positively limit the maximum permissible rise of said floor.

2. In a building floor construction, the combination with upper and lower floors, and a nailing strip for said upper floor, of sound-insulating means for supporting said upper floor and nailing strip on said lower floor, and means for anchoring said nailing strip to said lower floor, said anchoring means being the only non-cushioned connection and including connected elements normally out of physical contact with each other under the load effect of the upper floor, and which may be drawn into physical contact to positively limit the maximum permissible rise of said nailing strip.

3. In a building floor construction, the combination with a lower floor, chairs secured to said lower floor, pads or cushions in said chairs, a nailing strip seated in said pads or cushions, and an upper floor nailed to said nailing strip, of means for anchoring said nailing strip to said chairs comprising a fastening member extending through alined openings in said strip and chair, said fastening member being the only non-cushioned connection and normally maintained out of physical contact with one of said parts by reason of the weight of the upper floor.

4. In a building floor construction, the combination with a lower floor, chairs secured to said lower floor, pads or cushions in said chairs, a nailing strip seated in said pads or cushions, and an upper floor nailed to said nailing strip, of means for anchoring said nailing strip to said chairs comprising a metal fastening member mounted in said nailing strip and projecting through an opening in said chair of sufficient size to afford clearance of said fastening member in said opening, said fastening member constituting the only non-cushioned connection and being normally maintained out of physical contact with said chair by reason of the weight of the upper floor.

5. In a building floor construction, the combination with a lower floor, chairs secured to said lower floor, pads or cushions in said chairs, a nailing strip seated in said pads or cushions, and an upper floor nailed to said nailing strip, of means for anchoring said nailing strip to said chairs comprising a fastening member extending through alined openings in said strip and chairs, said fastening member being the only non-cushioned connection and normally maintained out of physical contact with one of said parts by reason of the weight of the upper floor, and adjustable means associated with said fastening member serving to positively limit the maximum upward movement of said nailing strip.

In witness whereof, I have hereunto subscribed my name.

EVERETT N. MURPHY.