May 12, 1970 W. R. MORGAN, JR 3,511,001

RESILIENT LEVELING MEANS FOR FLOORS

Filed March 14, 1968 3 Sheets-Sheet 1

FIG.1

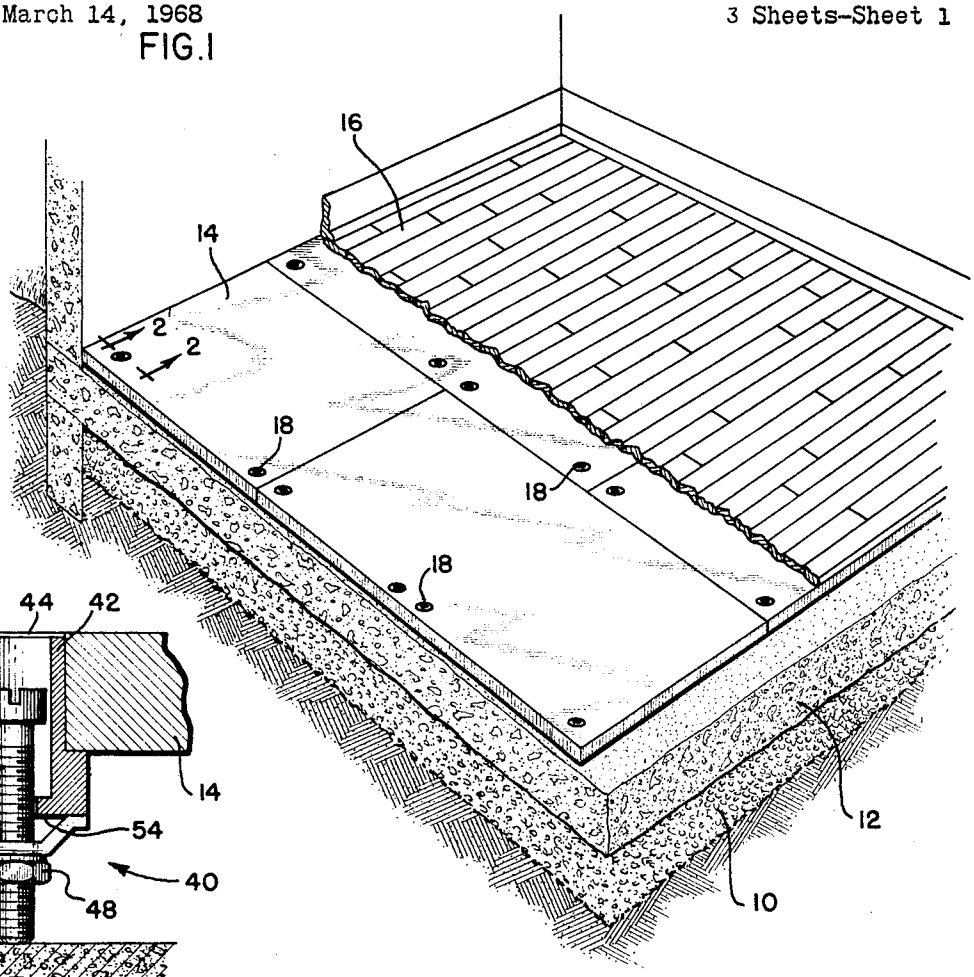


FIG.4

FIG.2

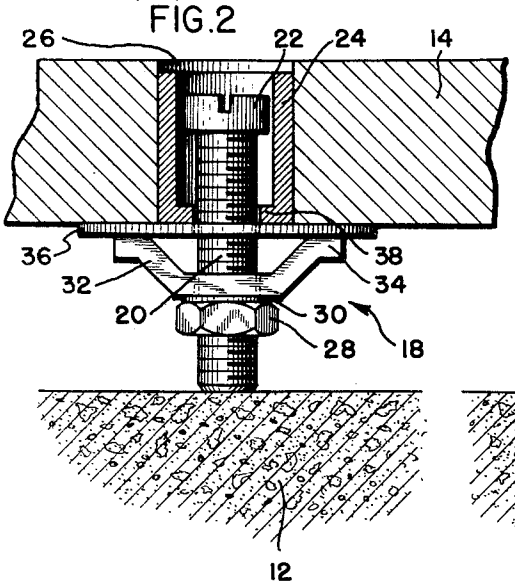
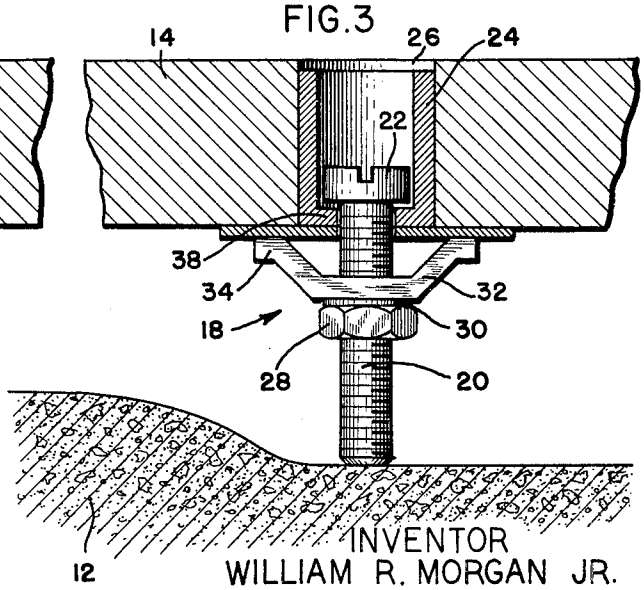


FIG.3



INVENTOR
WILLIAM R. MORGAN JR.

McDougall, Hersh, Scott, & Ladd
ATTYS.

May 12, 1970 W. R. MORGAN, JR 3,511,001

RESILIENT LEVELING MEANS FOR FLOORS

Filed March 14, 1968 3 Sheets-Sheet 2

FIG.5

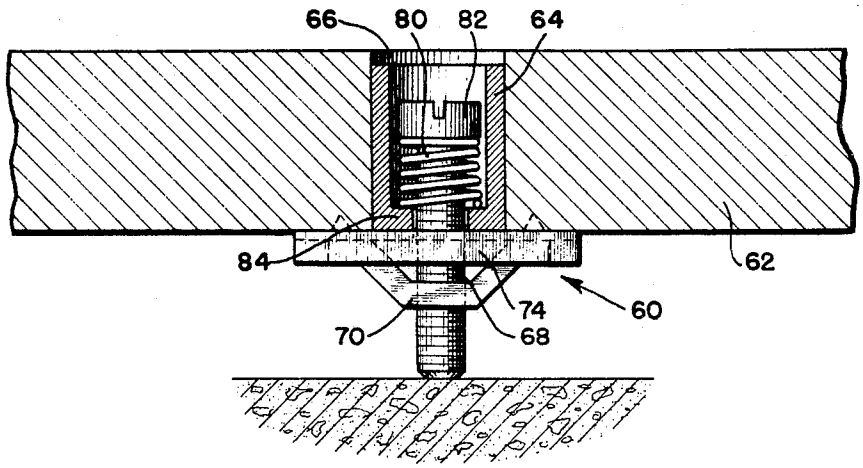


FIG.6

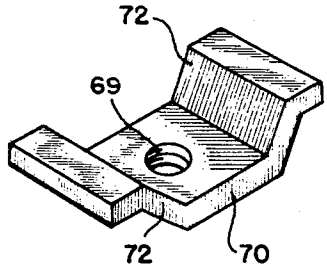


FIG.7

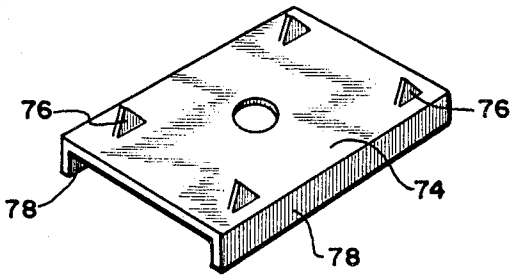
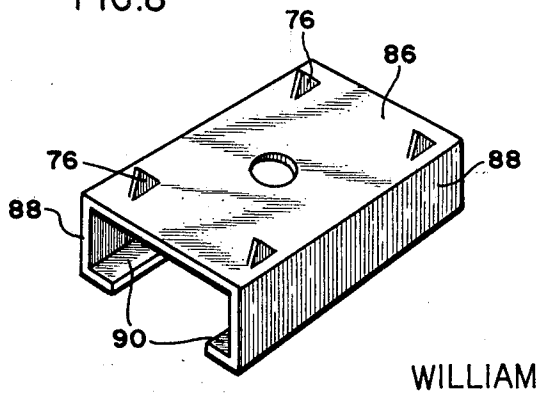


FIG.8



INVENTOR
WILLIAM R. MORGAN JR.

McDougall, Hersh, Scott & Ladd
ATTYS.

May 12, 1970 W. R. MORGAN, JR 3,511,001

RESILIENT LEVELING MEANS FOR FLOORS

Filed March 14, 1968 3 Sheets-Sheet 3

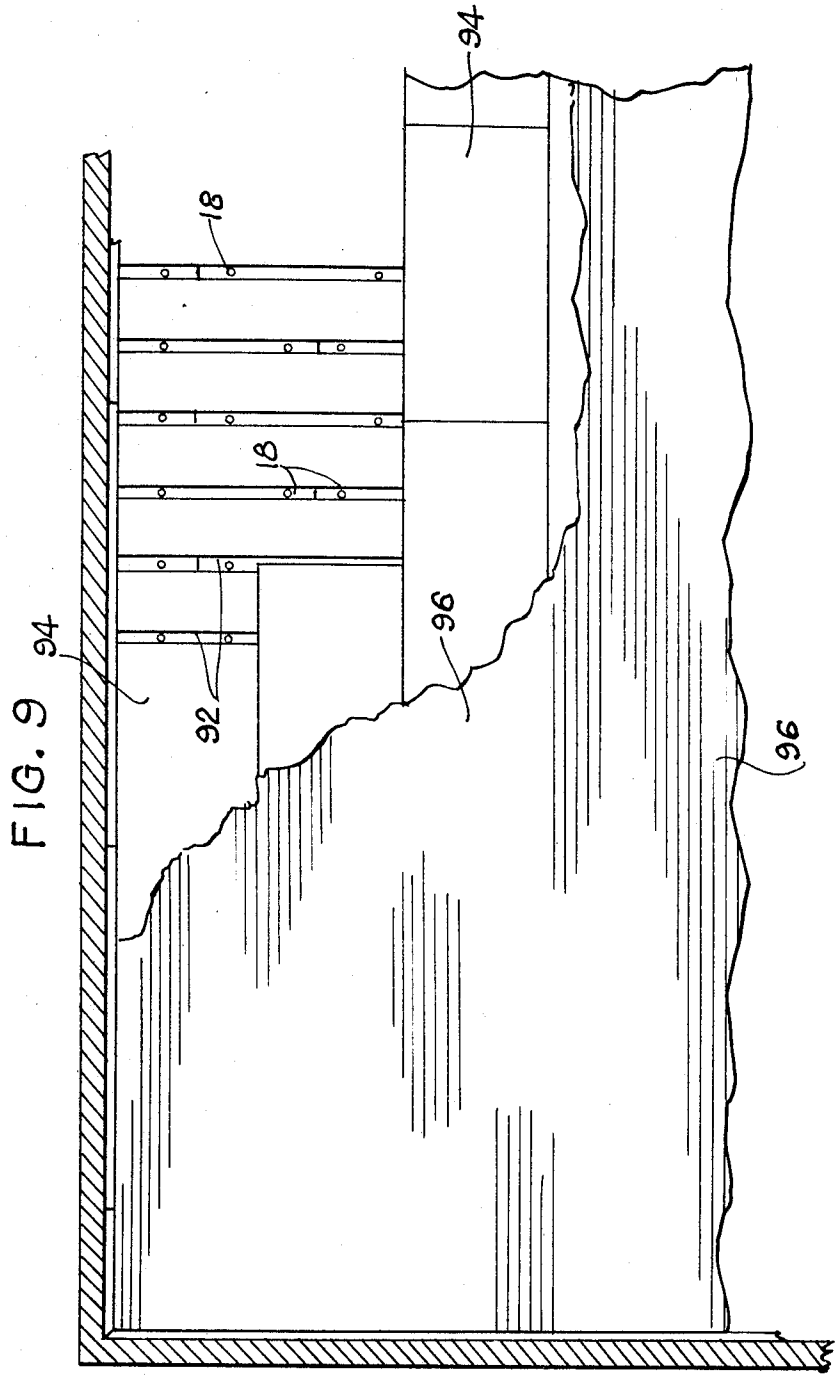


FIG. 9

INVENTOR
WILLIAM R. MORGAN, JR.

McDougall, Hersh, Scott & Ladd
ATTYS.

United States Patent Office 3,511,001 Patented May 12, 1970

3,511,001

RESILIENT LEVELING MEANS FOR FLOORS

William R. Morgan, Jr., R.R. 2, P.O. Box 106G, Long Grove, Ill. 60047

Filed Mar. 14, 1968, Ser. No. 713,069
Int. Cl. E04f 15/22
U.S. Cl. 52—126 17 Claims

ABSTRACT OF THE DISCLOSURE

A floor construction of the type including supporting members located above a base and having a finished floor disposed on the supporting members. The invention relates to spacer means which are associated with the supporting members whereby the position of the supporting members relative to the base can be adjusted. The spacer means include a bolt, a sleeve, a threaded element and spring means associated with the bolt and located between the supporting members and the threaded element on the bolt. The bolt permits movement of the support means relative to the base while the spring means provides a resilient cushion.

This invention relates to means for resilient leveling of floors. The invention will be described with reference to the leveling of floors in gymnasiums or the like. It will be understood, however, that the instant invention is directly applicable to various other uses, and the description in this case is not limited to athletic areas.

In the installation of floors in gymnasiums, it is necessary to take a great deal of care in order to insure that the floor will be level. This is, of course, necessary, for example where the floor is to be used as a basketball court.

In constructing a floor, the usual practice is to provide a concrete base. Sleepers, and/or a sub-floor are then located above this base, and the finished floor is secured thereto. Inserts may be located at some intermediate point to provide a cushioning effect. This is desirable in order to increase the "give" of the floor since a floor of this type is much more desirable from the standpoint of the comfort and endurance of persons running on the floor. Thus, a very solid floor without "give" can cause athletes to become leg-weary much more quickly, and can also result in injuries.

In order to provide a level floor constructed in the manner described, it is necessary to make sure that the concrete base is exactly level. Thus, variations in the concrete base will be directly reflected as variations in the finished floor.

Relatively expensive techniques are employed for providing a level concrete floor. Such expansive techniques are required since concrete will harden, settle, expand and contract in an unpredictable manner. After hardening of the concrete, it usually becomes necessary to level-off high spots in the floor, for example, by grinding, and to fill-in lower spots by applying additional wet concrete, or special leveling materials.

Various means have been devise with a view toward adjusting floor levels even where a concrete base may not be level. Examples of such devices are found in Whittaker Pat. No. Re. 16,416, Cinnamond Pat. No. 1,599,745, and Bailey Pat. No. 3,211,454. These devices are, however, considered unsatisfactory for various reasons. They are considered to be difficult to insert, or unduly difficult to operate, and this leads to additional expense which tends to offset the value of eliminating the need for leveling the concrete.

It is a general object of this invention to provide an improved device for use in leveling floor constructions

whereby the floor constructions can be provided completely level in a relatively economical fashion.

It is a further object of this invention to provide devices of the type described which include resilient parts whereby cushioning means can be associated with a floor in combination with the adjusting means.

These and other objects of this invention will appear hereinafter and for purposes of illustration, but not of limitation, specific embodiments of the invention are shown in the accompanying drawings in which:

FIG. 1 is a perspective view, partly cut away, illustrating a floor construction which includes devices of the type contemplated by this invention;

FIG. 2 is an enlarged fragmentary cross-sectional view taken about the line 2—2 of FIG. 1 and illustrating a device of the type contemplated by the invention;

FIG. 3 is a view corresponding to FIG. 2 and illustrating a device at a different position relative to the base and floor supporting member;

FIG. 4 is a fragmentary sectional view illustrating a modified form of the invention;

FIG. 5 is a fragmentary sectional view illustrating an additional modification of the invention;

FIG. 6 is a detail view of a spring design suitable for use in the leveling means;

FIGS. 7 and 8 illustrate alternate versions of bearing plates suitable for use in the leveling means; and

FIG. 9 is a plan view, partly cut away, illustrating application of the invention to a floor including sleepers and an overlying subfloor.

This invention generally relates to a floor construction wherein floor supporting members are maintained in spaced-apart relationship above a base. The supporting members may comprise sleepers or panels which will be disposed beneath the finished floor. In the case of a hardwood floor for example, the hardwood strips are nailed to sleepers or panels which are in turn mounted immediately above a base construction. The base construction, in typical applications, consists of a concrete slab disposed over a gravel base.

When considering the following description, it will be appreciated that the finished floor may comprise a wide variety of arrangements, for example carpeting, tile, or merely a coating such as paint.

The particular improvement of the invention comprises unique spacer means which maintain the sleepers or other supporting members in spaced-apart relationship with respect to the underlying base. The spacer members each include a bolt received in an opening defined in a supporting member. A threaded element is connected to each bolt, and spring means are interposed between each bolt and its associated threaded element. The spring means bear against the supporting members while the bolts are freely received in the openings defined by the supporting members.

The arrangement of the invention provides for adjustment in that the position of each bolt can be changed relative to the supporting members. Accordingly, the supporting members can be adjusted until a completely level arrangement is provided.

The devices of this invention also provide a high degree of resilience in that the spring means permit relative movement between the supporting members and the bolts in response to applied forces. For example, a person running on the surface of the floor will apply localized forces which will result in "give" by the floor. This provides a cushioning effect; however, the spring action will restore the floor to a level condition.

FIG. 1 of the accompanying drawings illustrates a floor construction which includes devices of the type contemplated by this invention. The construction is formed by

providing a layer of gravel **10** and a concrete slab **12** over the gravel. Supporting members **14** are disposed above the concrete slab, and a finished floor **16** is applied over the supporting members.

FIGS. 2 and 3 illustrate a device **18** employed for maintaining the supporting members **14** in spaced-apart relationship with respect to the slab **12**. Although the supporting members **14** are illustrated in FIG. 1 as panels, it will be appreciated when considering FIGS. 2 and 3 that the devices **18** could be readily associated with conventional sleepers.

The devices **18** comprise a bolt which defines a threaded shank **20** and a head **22**. The head **22** is received within a sleeve **24** which is press fit within an opening **26** defined by the supporting member **14**. If desired, the exterior surface of the sleeve **24** may be knurled to insure a tight fit of the sleeve within the opening **26**.

A nut **28** is threaded onto the shank **20** of the bolt, and a washer **30** is interposed between the nut and spring **32**. The spring **32** is of modified U shape with the outer edges **34** bearing against a plate **36**. This plate is situated directly against the under surface of the supporting member and against the bottom wall of the sleeve **24**.

The sleeve defines an open top whereby the head **22** of the bolt is accessible from above the supporting member. An in-turned annular flange **38** is formed at the bottom of the sleeve **24**, and the shank **20** of the bolt passes freely through the opening defined by the flange. The head **22** of the bolt will, however, be restrained by the flange when the bolt is at an extreme lower position within the sleeve.

The head **22** and shank **20** are preferably snugly received within the respective openings provided by the sleeve, since this lends stability to the assembly. Gaps are shown in the accompanying drawings primarily for purposes of illustrating the relationship of the parts.

As indicated by a comparison of FIGS. 2 and 3, the device of this invention permits variations in the spacing between the supporting members **14** and the concrete slab **12**. It will be apparent that the upper surface of the concrete slab need not be uniform since the supporting members can be brought to the same level by rotating the bolts of the respective devices **18**.

The devices also provide an ideal arrangement for cushioning the supporting members. The springs **32**, in combination with the mounting for the bolts, permit relative movement between the bolts and the supporting members in response to the application of localized forces. Obviously, the springs can be brought to a desired temper in order to provide suitable cushioning while also insuring that restoration of the supporting members to a level condition will take place.

FIG. 4 illustrates a modification of the invention wherein a device **40** is associated with a supporting member **14**. The device includes a sleeve **42** secured within an opening **44** in the supporting member. A bolt **46** is received within the bore of the sleeve **42**, and a nut **48** is attached to the bolt shank beneath the lower end of the sleeve. A washer **50** and spring **52** function in the manner previously described. In this instance, however, the bottom surface **54** of the sleeve **42** serves as a bearing plate for the outer edges **56** of the U-shaped spring. An annular shoulder **58** is defined by the sleeve **42** to provide for positioning of the sleeve relative to the supporting member. Adjustment of the device **40** can be accomplished through the open top of the sleeve, and the spring **52** will provide the desired cushioning.

The design of FIG. 4 is especially suitable where the concrete base is very uneven. Thus, a relatively large separation of the supporting member **4** can be achieved with respect to the base even though the exposure of the shank of the bolt **46** beneath the sleeve **42** is not too great. With this minimum exposure of the shank beneath the sleeve, stability can be achieved even when the bolt rests on a very uneven surface. The design of FIG. 4 also provides advantages where the supporting member **14** is relatively thin since the shoulder portions of the sleeve **42** extend downwardly from the supporting member thereby adding to the effective thickness.

FIG. 5 illustrates an additional modification comprising a device **60** associated with supporting member **62**. A sleeve **64** is fitted within an opening **66** defined by the supporting member. Bolt **68** extends outwardly from the sleeve into threaded engagement with an opening **69** in the element **70**. As shown in FIG. 6, the element **70** includes wings **72** which provide spring action. The modification of FIG. 5 thus provides for the elimination of a nut while accomplishing the advantages of the structures previously described.

The bearing plate **74** shown in FIGS. 5 and 7 is especially suitable for use in conjunction with the element **70**. The bearing plate includes anchoring spurs **76** which provide for rigid attachment of the plate to the underside of the supporting member **62**. The lateral flanges **78** of the bearing plate confine the element **70** to prevent the element from rotating as the bolt shank turns.

A coil spring **80** may be interposed between the head **82** of the bolt, and the annular flange **84** of the sleeve. This coil spring in combination with a bearing plate of the type shown at **74** prevents turning of the bolt which might result due to vibrations created by traffic on the floor. A coil spring of this type may be included in devices of the type shown in FIGS. 2 and 4.

FIG. 8 illustrates a modified bearing plate **86**. This bearing plate includes side walls **88** which terminate in inwardly extending flanges **90**. These flanges fit underneath the spring **70** when utilized in a construction as shown in FIG. 5 to thereby hold the spring and associated bolt **68** in the raised position prior to location on the concrete.

The use of devices of the type described permits adjustment of floor levelers without requiring any high degree of care in the formation of the underlying concrete slab or other base construction. It will be appreciated that panels or sleepers can be put into place, and then final adjustments made to insure a level arrangement. At this time, the finished floor can be laid over the supporting members with the assurance that the final construction will be level. In the event, however, that some portions, for any reason, should be out of a level plane, then the finished floor can be taken up in localized areas to provide the desired corrections. If this becomes necessary, the supporting members need not be disturbed since all of the adjusting devices are accessible from above the supporting members.

FIG. 9 illustrates application of the invention to an arrangement comprising sleepers **92** having the devices **18** associated therewith. Plywood subfloor panels **94** are supported on the sleepers and the finished floor **96** is then located on the subfloor.

The lower ends of the bolt shanks **20** may rest directly on the concrete slab, particularly if flat ends are provided. If desired, however, a foot plate could be situated beneath each bolt to avoid any possibility of the bolts digging into the concrete or base construction and thereby destroying a level condition.

References have been made to the provision of a finished floor immediately above the supporting members which carry the adjusting devices. In addition, as shown in FIG. 9 this invention contemplates the location of a subfloor between supporting members and a finished floor. It is also contemplated that the adjusting devices could rest on some intermediate structures rather than directly on the surface of a concrete slab or other supporting base.

It will be understood that various changes and modifications can be made in the above described construction which provide the characteristics of this invention.

That which is claimed is:

1. In a floor construction wherein floor supporting members are maintained in spaced-apart relationship

above a base, and wherein a finished floor is positioned above said supporting members, the improvement comprising spacer means for maintaining said supporting members in said spaced-apart relationship with the base, said spacer means each including a bolt, openings extending completely through said supporting members for freely receiving each bolt, a threaded element connected to each bolt, and spring means extending between the undersurface of said supporting members and said threaded element, said bolt providing for adjustment of an associated supporting member relative to said base and said spring means providing a cushion beneath the supporting member.

2. A construction in accordance with claim **1** including a sleeve secured within each of the openings in the supporting members, the shank of each bolt being freely received within said sleeve.

3. A construction in accordance with claim **2** wherein the bottom of each sleeve defines an inwardly directed flange, the shank of each bolt being freely received within the opening defined by the flange, an enlarged head defined by each bolt, and wherein the heads of the bolts engage the flange when the bolts are moved to an extreme lower position relative to the sleeve.

4. A construction in accordance with claim **3** including a coil spring fitted around the shank of each bolt, said coil spring being interposed between the head of each bolt and the inwardly directed flange of each sleeve.

5. A construction in accordance with claim **3** including a shoulder defined around the exterior surface of each sleeve, the upper sections of each sleeve being press fit within the openings defined by the supporting members, said shoulders engaging the underside of the supporting members to thereby position the sleeves relative to the supporting members.

6. A construction in accordance with claim **5** wherein said spring means comprises a U-shaped element having a central opening for receiving the shank of said bolt, the outer edges of the spring means engaging the under surface of said sleeve.

7. A construction in accordance with claim **3** wherein the bottom of each sleeve extends to a position substantially flush with the underside of the supporting members.

8. A construction in accordance with claim **7** including a bearing plate associated with each sleeve, said bearing plate having one side in engagement with the under surface of the supporting members, an opening defined by the bearing plate for receiving said bolt, the opposite surface of said bearing plate engaging said spring means.

9. A construction in accordance with claim **1** wherein said supporting members comprise sleeper elements positioned in spaced-apart locations beneath said finished flooring or beneath a subflooring.

10. A construction in accordance with claim **1** wherein said supporting means comprise large sheets of material, and including openings defined by the supporting means for communication with said bolt.

11. A construction in accordance with claim **1** wherein said openings in said supporting members extend through the upper surface of the supporting members whereby said bolts are accessible from the upper surface to provide for adjustment.

12. A construction in accordance with claim **1** wherein said spring means includes a central portion defining an opening for receiving said bolt, and wherein said threaded element comprises a nut bearing against the central portion of said spring means.

13. In a floor construction wherein floor supporting members are maintained in spaced-apart relationship above a base, and wherein a finished floor is positioned above said supporting members, the improvement comprising spacer means for maintaining said supporting members in said spaced-apart relationship with the base, said spacer means each including a bolt, openings in said supporting members for receiving each bolt, a threaded element connected to each bolt, and spring means extending between each bolt and its associated threaded element, said threaded element comprising a section formed integrally with said spring means, a threaded opening being defined in said section for engagement with said bolt, said spring means consisting of wing portions extending outwardly from said section, said bolt providing for adjustment of an associated supporting member relative to said base and said spring means providing a cushion beneath the supporting member.

14. A construction in accordance with claim **13** including a bearing plate associated with each sleeve, said bearing plate having one side in engagement with the under surface of a supporting member, an opening defined by the bearing plate for receiving said bolt, and wherein said wing portions extend into engagement with the opposite side of said bearing plate.

15. A construction in accordance with claim **14** wherein said bearing plate defines downwardly extending side members for engagement with the side edges of said spring means to confine said spring means against rotary movement.

16. A construction in accordance with claim **15** including inwardly directed flanges formed along the bottom edge of each of said side members, said flanges engaging the under surface of said spring means.

17. In a floor construction wherein floor supporting members are maintained in spaced-apart relationship above a base, and wherein a finished floor is positioned above said supporting members, the improvement comprising spacer means for maintaining said supporting members in said spaced-apart relationship with the base, said spacer means each including a bolt, openings in said supporting members, a sleeve secured within each of the openings in the supporting members, the shank of each bolt being freely received within said sleeve, the bottom of each sleeve defining an inwardly directed flange, the shank of each bolt being freely received within the opening defined by the flange, an enlarged head defined by each bolt, the heads of the bolts engaging the flanges when the bolts are moved to an extreme lower position relative to the sleeves, the bottom of each sleeve extending to a position substantially flush with the undersurface of the supporting members, a threaded element connected to each bolt, and spring means extending between the undersurface of said supporting member and the threaded element, a bearing plate associated with each sleeve, said bearing plate having one side in engagement with the undersurface of the supporting members, an opening defined by the bearing plate for receiving said bolt, the opposite surface of said bearing plate engaging said spring means, said spring means comprising a U-shaped element, and wherein the outer portions of said spring means engage said bearing plate, said bolt providing for adjustment of an associated supporting member relative to said base and said spring means providing a cushion beneath the supporting member.

References Cited

UNITED STATES PATENTS

Re. 16,416	9/1926	Whittaker	52—126
1,319,949	10/1919	Curran et al.	248—350 X
1,599,745	9/1926	Cinnamond	52—365
1,948,600	2/1939	Templeton	52—126
2,743,487	5/1956	Kuhlman	52—480 X
3,211,454	10/1965	Bailey	52—126 X
3,308,587	3/1967	Gilroy et al.	52—126
3,316,680	5/1967	Chrastek	52—126

PRICE C. FAW, JR., Primary Examiner

U.S. Cl. X.R.

52—393, 480; 248—350