Aug. 15, 1961 S. R. SMITH 2,996,295

SPRING END FASTENER FOR DIVING BOARD MOUNT

Filed Nov. 9, 1959

Fig. 1

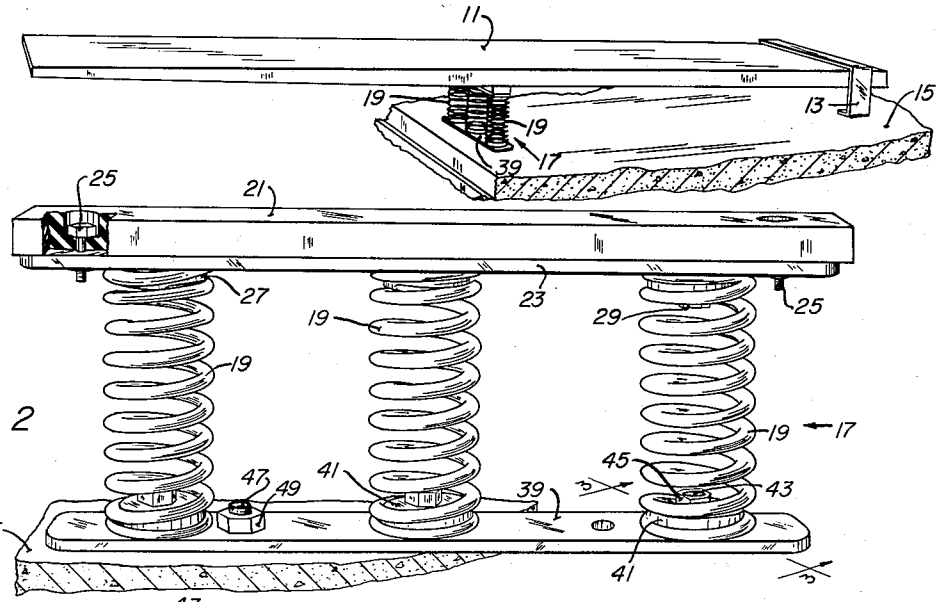


Fig. 2

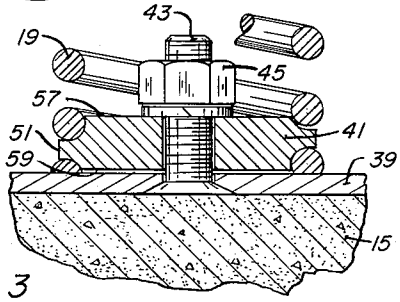


Fig. 3

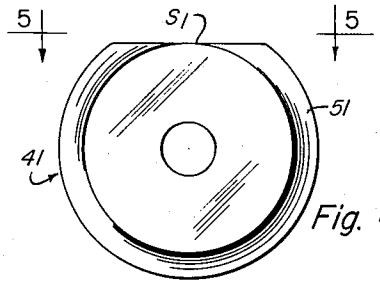


Fig. 4

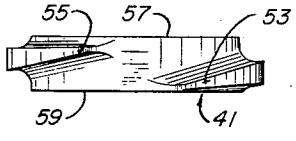


Fig. 5

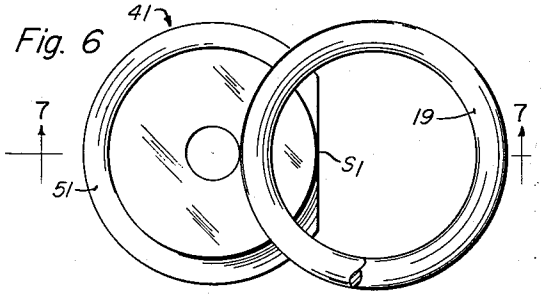


Fig. 6

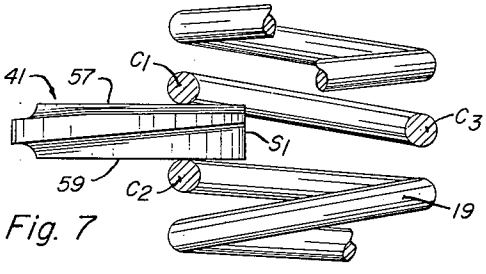


Fig. 7

INVENTOR.
SAMUEL R. SMITH

BY
Buckhorn, Cheatham & Blore
ATTORNEYS

United States Patent Office 2,996,295 Patented Aug. 15, 1961

2,996,295

SPRING END FASTENER FOR DIVING BOARD MOUNT

Samuel R. Smith, Canby, Oreg., assignor to S. R. Smith Co., Inc., Canby, Oreg., a corporation

Filed Nov. 9, 1959, Ser. No. 851,808
8 Claims. (Cl. 267—1)

This invention relates to diving board assemblies, and to mounting arrangements for diving boards.

The main object of the present invention is to provide a diving board assembly supported in part by one or more coil springs, with means for firmly and securely fastening the ends of the coil springs in place.

Another object of the invention is to provide an assembly as described above wherein the means are particularly adapted for securing the ends of ground square ends of coil compression springs in place.

Another object of the invention is to provide a novel mounting arrangement for diving boards, wherein the mounting arrangement includes coil springs and novel means for securing the ends of the springs in place.

A further object of the invention is to provide a novel means for securing the end of a coil spring in place, and particularly securing the end of a coil compression spring wherein the end is square and ground.

Further objects of the invention will be apparent from the following description taken in connection with the accompanying drawings, wherein:

FIG. 1 is a perspective view of a diving board assembly embodying the concepts of the present invention;

FIG. 2 is an enlarged perspective view of one of the mounts of the board, with parts broken away for convenience in illustration;

FIG. 3 is an enlarged vertical section taken along line 3—3 of FIG. 2;

FIG. 4 is a top view of the disk member;

FIG. 5 is an elevational view of the disk member taken in the direction of the arrows 5—5 in FIG. 4.

FIG. 6 shows a plan view of a disk member in the process of being inserted in place; and

FIG. 7 is a sectional view taken in the direction of the arrows 7—7 in FIG. 6.

Referring to FIG. 1, the diving board assembly includes a board 11 having a generally channel-shaped base end mount 13, secured to a supporting surface 15. There is a second mount in the form of a spring assembly 17 which is spaced from the base end of the board. In the particular embodiment of the invention shown, the assembly 17 includes three coil compression springs 19. It is understood that more or fewer coil springs could be used as desired.

Referring to FIG. 2, the assembly 17 includes an elastomer rest pad 21, which may be formed of rubber, and upon which the board 11 rests. Below the pad is an upper metal mounting strip 23 to which the pad is secured by bolts 25 which are countersunk into the pad.

The coil springs are of the compression type and thus the coils of a spring are regularly spaced except at the ends of the spring. The end of each spring is square and ground and such an end will be referred to hereinafter as a ground square end. As is well known, a ground square end is formed on a compression spring by permanently deforming an end coil of the spring toward the adjacent coil until the end is in contiguous relation to the adjacent coil. This leaves a coil gap at the mentioned end of the spring that tapers in width or thickness to substantially zero. Then the end coil is ground to form a flat end surface that is perpendicular to the axis of the spring. This means that the end coil will have an exposed flat end surface of a circumferential extension of almost 360 degrees for firm contact with a supporting

surface. The upper ends are clamped against the upper strip 23 by end fasteners or connectors, each of which includes a disk member 27 and a bolt 29 passing through the strip and the disk member. A nut 31 fits on each bolt. The head of the bolt is countersunk into the strip.

The lower ends of the springs bear on a lower strip 39, and these ends are similarly secured in place by disk members 41, bolts 43 and nuts 45. As best shown in FIG. 2, there are stud bolts 47 mounted in the supporting surface 15 and extending upwardly through the lower strip. Suitable nuts 47 are threaded down on the stud bolts to apply downward pressure on the disk members.

The disk members at the upper and lower ends of the spring are identical and thus only one of the disk members need be described. The one chosen is the one shown in FIG. 3 which is a lower disk member. A disk member is designed so that it can be forced between adjacent fully spaced coils of the spring and then threaded toward the desired end, and at such end provide a clamping surface next to the end coil of the spring to enable such end coil to be clamped against an adjacent member.

To accomplish these objectives, the disk member is made of a thickness slightly greater than the distance between two regularly spaced coils of the spring. By regularly spaced, it is meant to exclude the end coil of the spring because the space or gap between the end coil of a ground square end spring and the adjacent coil tapers from a regular spacing down to approximately zero width or thickness. By width or thickness, it is meant the axial distance between two regularly spaced coils of the spring.

As is evident from FIGS. 3 through 7, the disk member has a thread 51 formed on the periphery of the body of the disk member, but the thread extends around the body member less than 360 degrees. This gives the disk member the appearance of having a flat formed on one side S_1 thereof. The reason for the interruption of the thread is apparent from FIG. 7 where it is evident that when the disk member is shoved between the adjacent coils C_1 and C_2 of the spring, the coil portion C_3 of the spring which is diametrically opposite from the coil portions C_1 and C_2 is directly interposed in the path of movement of the disk member. Thus, if there were a projecting thread portion on the side S_1 of the disk member, this thread portion would abut against the coil portion C_3 and prevent the disk member from assuming a concentric position within the coil. However, because of the interrupted thread, the disk member can assume such concentric position.

The disk member has an outside diameter in a direction parallel to the side S_1 somewhat greater than the mean diameter of the spring. If the disk diameter were less than the mean diameter of the spring, the thread would tend to spread the end coil of the spring when a clamping pressure was applied to the disk member. The diameter of the body portion of the disk member is slightly less than the hole or inside diameter of the spring.

The thread 51 is formed to provide a lower portion 53 which tapers so as to fit between the opposed axially facing walls of the square end coil of the spring and the adjacent coil where the two taper toward one another to limit further threading movement of the disk member toward the square end of the coil. The portion 53 terminates, in a circumferential direction, short of the end of the end coil of the spring, and terminates in an axial or vertical direction at about the lower or outer end face of the disk member. This means that the lower or outer end face of the disk member is spaced from the lower or outer face of the spring and thus from the adjacent mounting strip. This means that a clamping force applied to the disk member will be transmitted to the end

coil of the spring to clamp it firmly against the adjacent mounting strip.

The thread 51 also tapers in the opposite direction from the central portion of the thread to provide a tapered portion 55 which bears against the upper face of the opposed part of the end coil of the spring.

It is apparent that the thread 51 leaves an upwardly projecting circular boss 57 which fits within the coil of the spring adjacent the end coil and thus engages the inner wall or surface of such adjacent coil, and also provides a downwardly projecting circular boss 59 which fits within the end coil and thus engages the inner wall or surface of said end coil to prevent the spring from slipping sideways relative to the disk member.

It is evident that the present invention has provided an end fastener for a coil spring and particularly a coil spring having ground square ends, which fastener may be slipped between the coils of the spring and then threaded down to a desired end of the spring until it can be threaded no farther where it may be used to clamp the end coil of the spring securely to a mounting structure to hold the spring firmly in place. It is pointed out that when the two disk members are threaded as far as they can go toward their respective ends and fastened in place, the spring cannot unthread from either disk member, because turning movement of the spring one way will only jam one end of the spring against the threaded portion of the associated disk member whereas turning movement of the spring in the opposite direction will only jam the other spring end against the threaded portion of the other disk member. It is further apparent that when the coil springs are thus securely fastened in place, no amount of vibration or bouncing or jumping on the diving board will have any adverse affect on the spring, and the springs will correctly yield under the force imposed thereon by the board to give the desired action of the board.

Having described the invention in what is considered to be the preferred embodiment thereof, it is desired that it be understood that the invention is not to be limited other than by the provisions of the following claims.

I claim:

1. In combination, a coil compression spring having at least one ground square end having a coil gap tapering to approximately zero width at said one end, means for clamping said one end against a mounting surface, said means including a member of generally disk shape having a thickness relative to the normal width of the coil gap of the spring such as to permit said member to be inserted between two regularly spaced coils to locate said member generally coaxially of said spring, said member having portions projecting into the coil gap facilitating threading movement of said member relative to said spring to enable said member to be bodily moved in an axial direction toward said one end to locate said member at said one end, at least certain of said portions tapering in thickness toward the adjacent end of the spring and engaging the walls of the coils at the tapered end of the coil gap to limit threading movement of said member in said direction and dispose said member with its outer end face spaced inwardly of the end face of said one spring end so that a clamping force exerted on said member toward a mounting surface will clamp the end coil at said one spring end tightly against said surface, said member in its clamping position having portions engaging inner surface portions of at least one adjacent coil to prohibit relative lateral movement between said member and spring.

2. In combination, a coil compression spring having coils of uniform diameter and of uniform spacing except that the spring has at least one ground square end having the coil gap of the spring tapering to approximately zero width at said one end, means for clamping said one end against a mounting surface, said means including a member of generally disk shape having a thickness slightly greater than the normal width of the coil gap of the spring so as to permit said member to be inserted between two regularly spaced coils, said member having portions projecting into the coil gap facilitating threading movement of said member relative to said spring to enable said member to be bodily moved in an axial direction toward said one end to locate said member at said one end, at least certain of said portions engaging the opposed walls of the coils at the tapered end of the coil gap to limit the threading movement of said member in said direction and dispose said member with its outer end face spaced inwardly of the end face of said one spring end so that a clamping force exerted on said member toward a mounting surface will clamp the end coil at said one spring end tightly against said surface, said member in its clamping position having circular portions engaging inner surface portions of at least one adjacent coil to prohibit relative lateral movement between said member and spring, said member having a circular body of a diameter approximately equal to the inner diameter of said spring, the first named portions of said member being provided by a thread on said body, said thread extending in a circumferential direction sufficiently less than 360 degrees to enable said body to assume a coaxial position relative to said spring when said disk member is inserted into said spring.

3. In combination, a coil compression spring having at least one ground square end having a coil gap of the spring tapering to approximately zero width at said one end, means for clamping said one end against a mounting surface, said means including a member of generally disk shape having a thickness slightly greater than the normal width of the coil gap of the spring so as to permit said member to be inserted between two regularly spaced coils to locate said member generally coaxially of said spring, said member having thread portions projecting into the coil gap facilitating threading movement of said member relative to said spring to enable said member to be bodily moved in an axial direction toward said one end to locate said member at said one end, at least certain of said portions tapering in thickness to conform generally to the tapering gap so as to engage the opposed walls of the coils at the tapered end of the coil gap to limit threading movement of said member in said direction, said member in its clamping position having circular portions engaging inner surface portions of at least one adjacent coil to prohibit relative lateral movement between said member and spring, said thread portions being interrupted at least at one edge of said disk member an extent to enable said disk member to be passed between two regularly spaced coils to a coaxial position relative to said spring.

4. In combination, a coil compression spring having coils of uniform diameter and of uniform spacing except that the spring has at least one ground square end having a coil gap tapering to approximately zero width at said one end, means for clamping said one end against a mounting surface, said means including a member of generally disk shape having a thickness relative to the normal width of the coil gap of the spring such as to permit said member to be inserted between two regularly spaced coils to locate said member generally coaxially of said spring, said member having thread portions projecting into the coil gap facilitating threading movement of said member relative to said spring to enable said member to be bodily moved in an axial direction toward said one end to locate said member at said one end, at least certain of said portions tapering in thickness so as to fit in the tapering coil gap so that such portions are in engagement with the walls of the coils at the tapered end of the coil gap to limit the threading movement of said member in said direction, said member in its clamping position having portions engaging inner surface portions of at least one adjacent coil to prohibit relative lateral movement between said member and spring, said member having a circular body of a diameter approximately equal to

the inner diameter of said spring, the first-named portions of said member being provided by a thread on said body, said thread being sufficiently less than 360 degrees to enable said body to assume a coaxial position relative to said spring, said member having a thickness slightly greater than the width of the coil gap between two regularly spaced coils.

5. In combination, a coil compression spring having at least one ground square end having a coil gap tapering to approximately zero width at said one end, means for clamping said one end against a mounting surface, said means including a member of generally disk shape having a thickness relative to the normal width of the coil gap of the spring such as to permit said member to be inserted between two regularly spaced coils to locate said member generally coaxially of said spring, said member having portions projecting into the coil gap facilitating threading movement of said member relative to said spring to enable said member to be bodily moved in an axial direction toward said one end to locate said member at said one end, at least certain of said portions engaging the walls of the coils at the tapered end of the coil gap to limit threading movement of said member in said direction and dispose said member with its outer end face spaced inwardly of the end face of said one spring end so that a clamping force exerted on said member toward a mounting surface will clamp the end coil at said one spring end tightly against said surface, said member in its clamping position having portions engaging inner surface portions of at least one adjacent coil to prohibit relative lateral movement between said member and spring and a fastening element connected to said member to force it toward the mounting surface.

6. In combination, a coil compression spring having coils of uniform diameter and of uniform spacing except that the spring has at least one ground square end having a coil gap tapering to approximately zero width at said one end, means for clamping said one end against a mounting surface, said means including a member of generally disk shape having a thickness relative to the normal width of the coil gap of the spring such as to permit said member to be inserted between two regularly spaced coils to locate said member generally coaxially of said spring, said member having a thread projecting into the coil gap facilitating threading movement of said member relative to said spring to enable said member to be bodily moved in an axial direction toward said one end, said thread tapering in thickness to fit in the tapering coil gap to enable said member to be located at said one end, certain portions of said thread engaging the opposed axially facing walls of the coils at the tapered end of the coil gap to limit the threading movement of said member in said direction, one end of said thread terminating close to the outer face of said disk member so as to dispose said member with its outer end face spaced inwardly of the end face of said one spring end so that a clamping force exerted on said member toward a mounting surface will clamp the end coil at said one spring end tightly against said surface, said member in its clamping position having circular boss portions engaging inner surface portions of at least one adjacent coil to prohibit relative lateral movement between said member and spring, said member having a circular body of a diameter approximately equal to the inner diameter of said spring, said thread extending only part way around said body and terminating in portions defining a flat at one side of said body to enable said body to assume a coaxial position relative to said spring, said member having a thickness slightly greater than the width of the coil gap between two regularly spaced coils, and bolt means for said member to create the desired clamping force.

7. In combination, a coil type compression spring having coils of uniform diameter and having coils regularly spaced except that at least one end thereof is square and ground with the coil gap at such end tapering to substantially zero, the coil at such end having an exposed end surface that extends almost 360 degrees, an end fastener for said one end, said end fastener comprising a disk-shaped member disposed within said coil spring and including a body portion and a thread portion on the periphery of said body portion, said body portion having a diameter slightly smaller than the inside diameter of said coil spring, said thread having a diameter greater than the mean diameter of said spring so as to project between adjacent coils of said spring, said thread tapering in thickness so as to fit in the tapering gap at said one end of said spring, said body portion extending axially away from said thread to provide portions next to the inner surfaces of the adjacent coil of the spring to prohibit lateral displacement of said disk member relative to said spring when said disk member is at the end of said spring, said thread enabling said disk member to be threaded away from said one end toward the opposite end of said spring to dispose said disk member next to a regular coil gap of said spring, said disk member having a thickness slightly greater than the regular coil gap thickness to enable said disk member to be forced between two regularly spaced coils in removing said disk member from said spring or inserting said disk member into said spring, said thread being interrupted at least at one side of said disk member an extent to enable said body portion of said disk member to assume a concentric position within said coil spring when said disk member is being inserted into said spring.

8. In combination, a coil compression spring having each end square and ground with the coil gap at each end decreasing in width in a direction away from the center of the spring, an end fastener at each end, each end fastener being of disk shape with a body in contiguous relation to the inner walls of the spring at the associated end, each fastener having portions projecting into the coil gap at said end and abutting against the opposed walls of the coils at its spring end, a member adjacent each end of the spring exteriorly thereof, and means securing said fasteners to said members so that said coil spring cannot unthread from said fasteners.

References Cited in the file of this patent

UNITED STATES PATENTS

1,194,336	Keim	Aug. 8, 1916
1,210,920	Fletcher	Jan. 2, 1917
1,966,957	Dunn	July 17, 1934
2,265,629	Christiansen	Dec. 9, 1941
2,661,206	Gregoire	Dec. 1, 1953
2,684,238	Robinson	July 20, 1954
2,852,258	Dunklee et al.	Sept. 16, 1958