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SHIM CONSTRUCTION

Filed Nov. 26, 1963

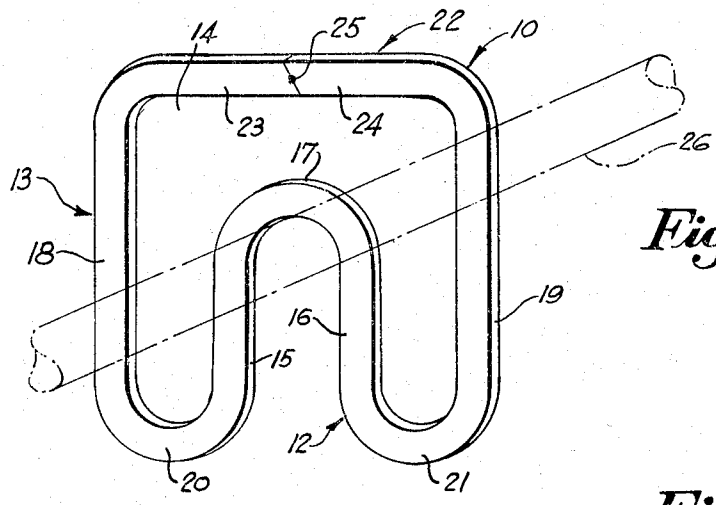


Fig. 1

Fig. 2a

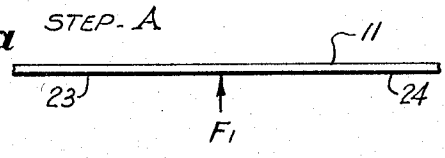


Fig. 2b

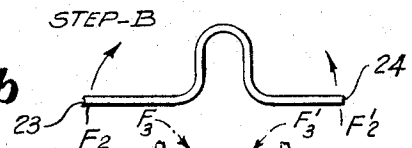


Fig. 2c

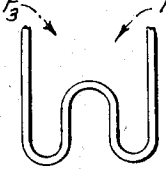


Fig. 2d

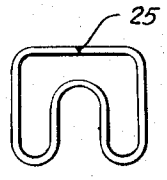


Fig. 3

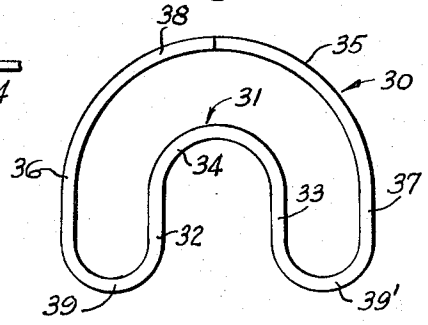
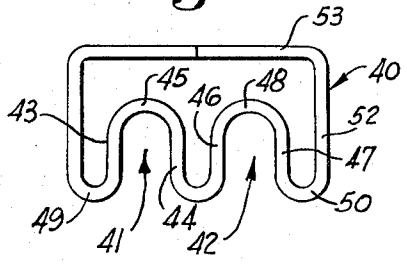


Fig. 4



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SHIM CONSTRUCTION

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This invention relates to a shim construction and refers more particularly to self-balancing shims.

Shims are used extensively in building and other industries as spacers between structural elements. In prior art, they consisted of steel plates having elongated slots therein, the inner reach of the slots having curved edges so that the plates could be mounted vertically upon horizontal bolts or other supporting members. Then the structural elements were permanently fixed. Shims located between these structural elements are subjected to forces of compression which extend in the direction of the thicknesses of the shims. Thus these forces are only a small fraction of the actual tensile strength of the plate-like shims.

An object of the present invention is to provide a self-balancing shim of novel construction.

Another object is to provide a shim which is easily made from a piece of stock without wasting any of the stock material.

Still another object is to provide a shim which has a large safety factor but which is lighter in weight and has less material than prior art shims.

Other objects of the present invention will become apparent during the course of the following specification:

In achieving the objectives of the present invention, it was found advantageous to provide a shim which is made from an elongated strip of material, such as carbon steel, that is formed into a flat U-shaped body. The U-shaped body has an inner U-shaped section, and a larger U-shaped section extending around the inner section in spaced relation therewith so that the two sections enclose a U-shaped space. The ends of the two U-shaped sections are interconnected by means of curved portions. According to the invention, the inner section of the shim body may comprise a pair of U-shaped sections arranged in side by side relation. The outer section of the shim may be angular or curved. The shim of the present invention may be used as a self-balancing shim on a horizontal support by inserting it on the support with the inner U-shaped section in an inverted position.

The invention will appear more clearly from the following detailed description when taken in conjunction with the accompanying drawings, showing, by way of example, preferred embodiments of the inventive concept.

In the drawings:

FIGURE 1 is a perspective view of a self-balancing shim constructed in accordance with the principles of the present invention, the shim being shown mounted on a horizontal support member, the support member being shown in phantom.

FIGURES 2*a*, 2*b*, 2*c* and 2*d* show diagrammatically the several steps involved in forming the shim illustrated in FIGURE 1 from a metal strip.

FIGURE 3 shows in front view on a smaller scale a somewhat differently constructed shim.

FIGURE 4 shows a double shim in front view on a smaller scale.

Throughout the specification like reference numerals are used to indicate like parts.

The shim **10** illustrated in FIGURE 1 is preferably made from an elongated narrow strip **11** (FIG. 2) of metal, such as carbon steel, which has been annealed and work hardened. The strip is rectangular or square in cross-section, although obviously strips of round or oval cross-sections can be also used. The thickness and width of the strip may vary from about 1/32 inch to one inch

and 1/8 to one inch or more, respectively, depending upon the intended uses of the shim. The shim is formed into a flat U-shaped body having an inner U-shaped section **12** and a larger U-shaped section **13** extending around the inner section in spaced relation therewith so that sections **12** and **13** enclose a U-shaped space **14**.

The inner U-shaped section **12** includes a pair of parallel inner legs **15** and **16**, and an inner curved or arcuate branch portion **17** interconnecting legs **15** and **16** at one end. The outer U-shaped section **13** includes a pair of parallel outer legs **18** and **19**, outer curved or arcuate portions **20** and **21**, which respectively, connect inner leg **15** with outer leg **18**, and inner leg **16** with outer leg **19**. The outer legs **18** and **19** are interconnected by a straight portion or branch **22** which extends transversely perpendicularly to legs **18** and **19** and which is formed by butting together the terminal portions **23** and **24** of the strip **11** (FIG. 2*d*). A spot weld **25** if desired, may then be applied thereto as shown in FIGURE 1.

FIGURES 2*a* and 2*d* illustrate the several steps which, by way of example, may be employed in forming the shim from a metal strip **11**. As seen in step A (FIG. 2*a*), the strip **11** is subjected to a force F acting perpendicularly to the strip at approximately mid-length. This force F is applied until a loop is formed as shown in step B (FIG. 2*b*). As seen in step B, F_2 and F_2' are applied at terminal portions **23** and **24** respectively in order to bend these portions upwardly and parallel with the straight legs of the loop. As seen in step C, (FIG. 2*c*), forces F_3 and F_3' are then applied against the tips of terminal portions **23** and **24** so as to bend them inwardly of the outer legs, as shown in the final step (FIG. 2*d*) and perpendicularly to the outer legs. A spot weld **25** may be applied to the seam formed by the abutting terminal portions.

These operations can be carried out by any suitable metal bending machine known in the art. However, the shims shown in FIG. 1 can be also made by other means, such as casting or molding.

Shims shown in FIG. 1 can be made in a variety of sizes, although sizes ranging from 2 x 2 inches to 7½ x 7½ inches are generally used in the building industry.

In use, the shim **10** may be mounted in a self-balancing position on a horizontal support **26**, as shown in FIG. 1. This support may consist of a bolt or rivet of a suitable diameter. Bolts up to ⅞ inch in diameter are generally used. In mounting the shim, it is inverted so that the inner U-shaped section **12** is positioned with the U pointing downwardly. The legs **15** and **16** thus embrace the support **26** and the arcuate branch portion **17** supports the legs on the support. In this position, the center of weight of the shim passes directly through the axis of the support thus eliminating unbalancing forces which tend to rock the shim off the support.

As was previously mentioned, the shim **10** may be made from steel. In practice it was found advantageous to utilize a cold rolled steel strip **11** forming it into the shape shown in FIGURE 1. After forming the shim it is annealed and work hardened to give it a cold rolled finish. It is also possible to use other materials such as brass, plastic etc. depending on the specific application.

The shim of the present invention offers the advantage of being easily shaped from a strip of material without wastage. It also may be subjected to high compression forces without failure and it may be mounted in a self-balancing position on a horizontal support.

A particular advantage of the shim of the present invention is that it saves a substantial amount of material without any sacrifice in the safety factor. As compared to prior art shims consisting of plates, the shim of the present invention requires only a fraction of their material, and its weight is only a fraction of their weight. The shim of the present invention is much easier to transport

in large quantities and it is easier to apply. Yet extensive calculations have shown that the safety factor of the carbon steel shim of the present invention, namely the ratio of the greatest possible force that could be applied against it to the maximum force which it is able to withstand is not less than 1:5.

FIGURE 3 shows a shim **30** the inner U-shaped section **31** of which is similar to the section **12** of the shim **10**. The section **31** has a pair of parallel inner legs **32** and **33** and in inner arcuate branch **34** interconnecting the legs **32** and **33** at one end. However, in this construction the outer section **35** consists of outer parallel legs **36** and **37** joined by a curved or arcuate portion **38** which is concentric with inner arcuate branch **34**. The shim also includes arcuate branches **39**, **39'** connecting respectively outer leg **36** with inner leg **32** and outer leg **37** with inner leg **33**.

This shape of a shim was found to be advantageously in constructions wherein an easy adjustment of the position of the shim may be required.

FIGURE 4 shows a double shim **40** having two inner U-shaped sections **41** and **42**. The section **41** has a pair of parallel inner legs **43** and **44** joined by an inner arcuate branch **45**. The section **42** has a pair of parallel inner legs **46** and **47** joined by an inner arcuate branch **48**. The outer section of the shim comprises arcuate branches **49** and **50**. Branch **49** connects inner leg **43** with parallel outer leg **51**, and branch **50** connects inner leg **47** with parallel outer leg **52**. The outer legs **51**, **52** are interconnected by transverse, straight branch **53**. The shim **40** is primarily intended for mounting on parallel support bars or like structural members (not shown).

While there is above disclosed but some embodiments of the shim of the present invention, it is possible to produce still other embodiments without departing from the scope of the inventive concept herein disclosed.

What is claimed is:

1. In building industry, a self-balancing shim as spacer between structural elements, said shim consisting of a continuous elongated narrow thin ribbon-like strip curved to form a substantially flat insert having at least one inner member adapted to be mounted upon a structural element and consisting of a pair of parallel inner legs and an inner central curved portion interconnecting adjacent ends of said two inner legs; a pair of parallel outer legs extending parallel to said inner legs, two outer curved portions opposed to said inner curved portion and connecting one end of an outer leg with the other end of an inner leg, alined straight portions extending substantially perpendicularly to said parallel legs and spaced from said inner member, said straight portions having centrally located abutting ends and opposed curved ends connected with said outer legs, all of said legs, said curved portions and said straight portions being in alinement.

2. A shim in accordance with claim **1**, comprising two inner members and an outer curved portion interconnecting adjacent inner legs of the two inner members.

References Cited by the Examiner

UNITED STATES PATENTS

1,489,185	4/1924	Wenciker	308—244 X
1,873,270	8/1932	Blazer	85—8.8 X

FOREIGN PATENTS

458,558	3/1928	Germany.
372,584	5/1932	Great Britain.

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