# United States Patent

**Meier**

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[45] **Apr. 4, 1972**


## [54] METHOD AND APPARATUS FOR ABSORBING IMPACT FORCES


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[73] Assignee: **Signode Corporation**



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[52] **U.S. Cl.** ..... **105/369 A**, 105/369 U

[51] **Int. Cl.** ..... **B60p 7/10**, B61d 45/00

[58] **Field of Search** ..... 105/367, 369 A, 369 U; 248/119, 361 A; 280/179 A



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*Primary Examiner*—Drayton E. Hoffman

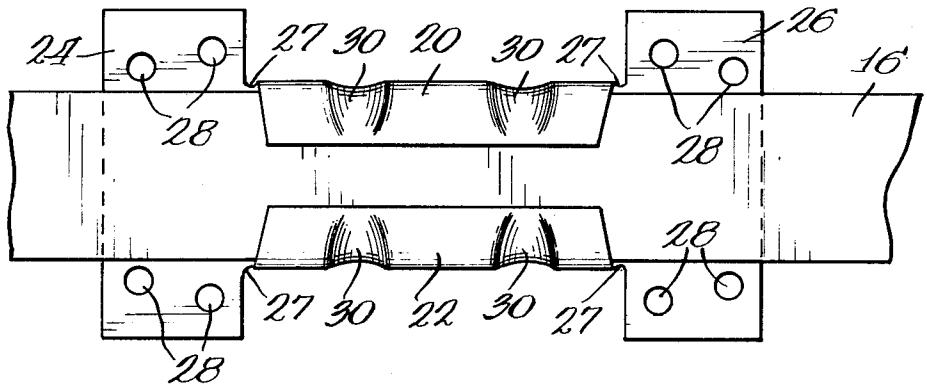
*Attorney*—Dressler, Goldsmith, Clement & Gordon



[57] **ABSTRACT**

The practice of the method disclosed herein acts to absorb the effect of impact forces placed on articles shipped in a railroad car, or other moving vehicle, to prevent or minimize movement of the articles relative thereto. A strap adapted to be disposed about a package being transported is located within a cushion seal, which is subsequently crimped to interlock the strap and seal. The seal is then secured to the base of the transporting member, which will act to absorb the imposed shock loads. The impact energy on the strapped article is converted into heat due to the high friction developed tending to move the strap through the cushion seal. With the cushion seal disclosed herein, a controlled slippage of the strap and thus controlled movement of the article is obtained, which prevents the article from becoming damaged due to hitting the end of the car, or another article in the car, or from sliding into a position where it would block an unloading doorway. The holding power of the cushion seal is of lesser magnitude than the strap tensile force, so that the article will move before the strap is broken.


**8 Claims, 17 Drawing Figures**



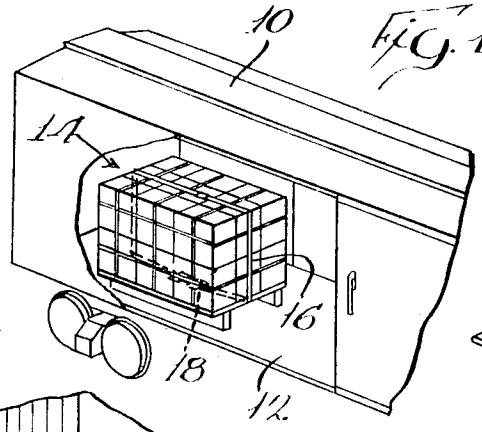



Fig. 1.

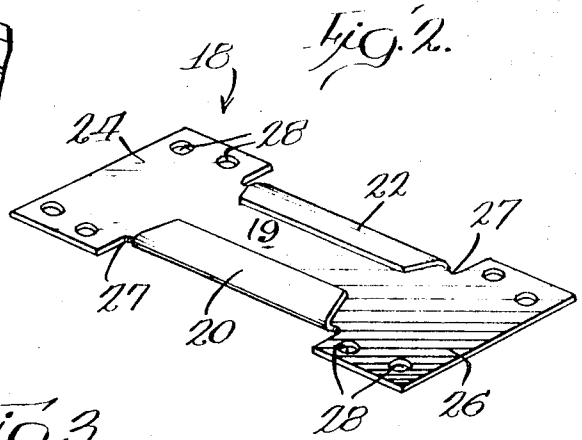



Fig. 2.

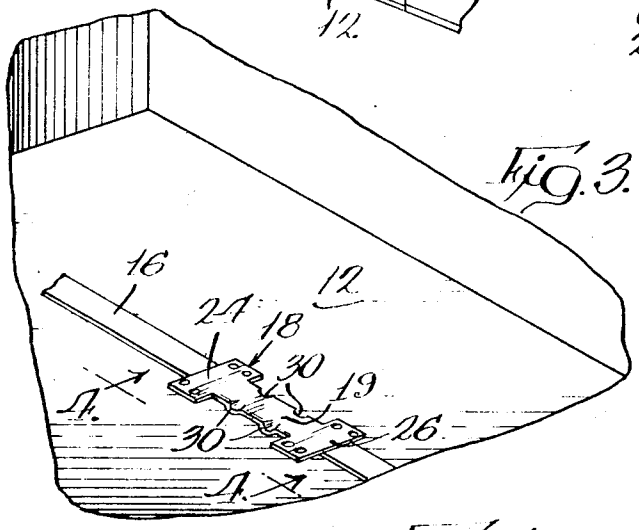



Fig. 3.

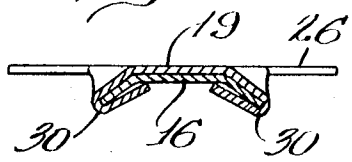



Fig. 6.

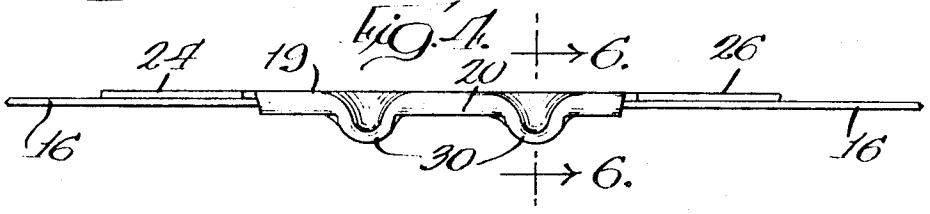



Fig. 4.

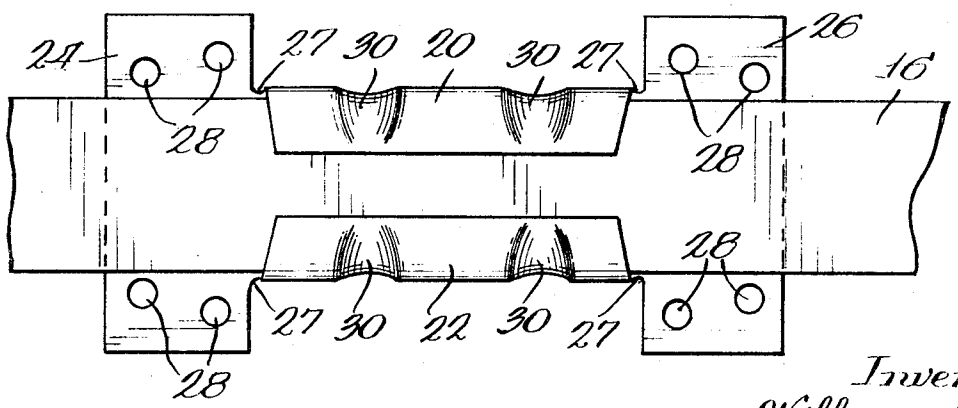



Fig. 5.

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Fig. 7.

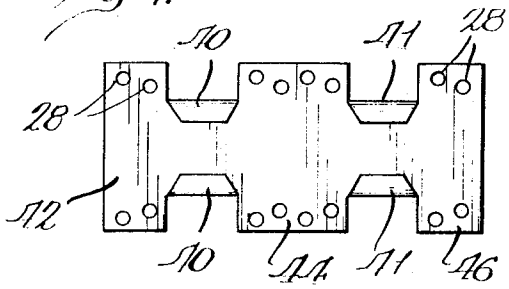



Fig. 7a.

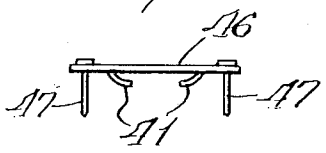



Fig. 8.

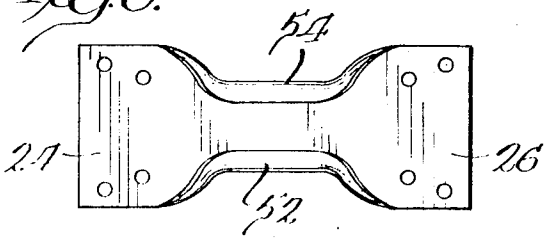



Fig. 8a

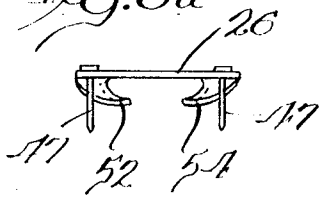



Fig. 9.

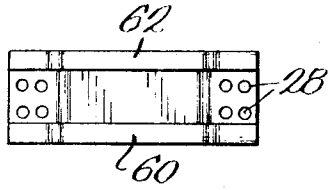



Fig. 9a.

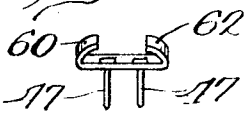



Fig. 9b

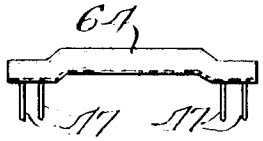



Fig. 10a




Fig. 10.

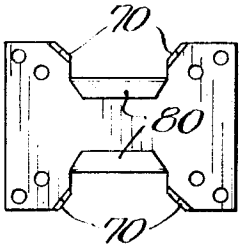



Fig. 10b.

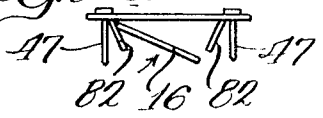
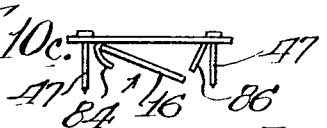



Fig. 10c.




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# METHOD AND APPARATUS FOR ABSORBING IMPACT FORCES

Prior to the present invention, loads were maintained in position in railroad cars, or the like, by the use of snubber plates, which were known in the trade as "mechanical brakmen." Several types of these mechanical brakeman plates are disclosed in patents to Scales U.S. Pat. No. 1,920,197 and Moon U.S. Pat. No. 2,458,287, which are assigned to the assignee of the present invention. These patents discuss in some detail the problems encountered in carrying loads that tend to shift in freight cars and if more specific information with respect thereto is desired, reference should be made to these two patents.

The mechanical brakeman type snubber plate, while generally satisfactory, is subject to a number of deficiencies, which are overcome by the present invention. For example, with the use of the mechanical brakeman plates disclosed in the aforementioned patents, there is a possibility that during impact the strap, which enters the brakeman at a relatively sharp corner, could be fractured by the sharp edge of the plate during the slippage of the strap relative to the brakeman plate. Additionally, it was not possible with the mechanical brakeman to obtain consistent and predictable holding power characteristics. Also, such mechanical brakemen do not have very high initial holding power, nor do they retain their holding power when the strap starts to move through the brakeman.

In accordance with the present invention, there is provided a method for absorbing the energy imposed on a load within a moving vehicle by the use of a cushion seal which provides the desired holding power, but which permits controlled slippage to dampen out the forces imposed on the load. The seal is crimped to a strap directed about a load to restrict the movement of the strap relative to the seal. The holding power of the cushion seal can be varied by changing the gauge of the material, or the depth of the crimp. The crimped seals are then secured to the floor of a freight car by nails, or other suitable fastening means. The term "cushion seal" has been chosen, since when in place it functions to cushion the movement of the load that it connects to the car floor.

In a preferred embodiment, the cushion seals are capable of being crimped to maintain approximately 60 percent of the strap tensile force before movement of the strap will take place through the crimped area. Even after movement, the force required to move will only lower to about 40 percent of the tensile strength and will not even change substantially after that, even though several feet of strap may be drawn through the seal. The dynamic holding power stays high, because the strap is forced to deflect as it passes through the convolutions of the crimped seal. These design criteria have been selected to provide the necessary safety factor to prevent strap breakage under impact conditions.

The crimps, which can be made by conventional crimping tools, are designed to permit sufficient movement of the strap to absorb shocks encountered during transit to relieve the loads slidably secured to the car floor from undue strain and thereby eliminate or lessen the tendency for internal shifting.

Generally speaking, the crimp type joints in the cushion seals force the edges of the seals to convolute as they pass through the crimped areas, which determines the holding power of the cushion seal. However, the holding power of the seal is designed to be low enough, so that failure does not result from pulling nails or tearing through the seal material.

The cushion seals disclosed and claimed herein are lower in cost, higher in efficiency, and can be used in place of a plurality of mechanical brakeman plates.

Several types of cushion seals can be used, depending on whether the seal is to be secured to the floor bed before or after the strap has been positioned relative to the cushion seal.

One embodiment of a cushion seal forming the present invention includes a central portion having inturned legs and flanged end portions which contain holes through which nails are driven for securing the cushion seal to the floor, or other wall portion of a railroad car, or the like. The seal can be of the thread-on, snap-on, or drop-on varieties, but in the preferred embodiment, the seal is a "thread-on" construction, which facilitates crimping of the seal to the strap when it is located in place in the railroad car. When practicing the novel method disclosed herein, the strap is threaded through the seal, the seal and strap are crimped together, and then the seal is nailed to the car floor. The design of the seal depends on the requisite design criteria, such as the number and depth of crimps desired, the number of fastening elements needed, and whether it is to be used with dry, painted, or waxed strapping. For example, the nail holes can be located intermediate the seal legs, or in spaced flanges. By locating the nail holes between the seal legs, there is no cantilever action imposed on the flanges. If desired, a plurality of cushion seals could be used. The several arrangements described and illustrated have various advantages, and they will be set forth in detail hereinafter. In addition, the portions of the seal which are nailed to the floor can be provided with inturned flanges, which penetrate the wood to assist the nails in holding the seals in position, if so desired.



Other advantages of the system and apparatus disclosed herein will be seen from the following description taken in conjunction with the attached drawings, in which:

FIG. 1 is a cut away perspective view of a railroad car showing a loaded pallet disposed therein and secured relative to the floor to absorb impact forces;

FIG. 2 is a bottom perspective view of a cushion seal forming one embodiment of the invention;

FIG. 3 is a perspective view showing a crimped seal and strap secured in place;

FIG. 4 is an elevation view taken along line 4—4 of FIG. 3;

FIG. 5 is a bottom view of the cushion seal illustrated in FIG. 4;

FIG. 6 is a sectional view taken along line 6—6 of FIG. 4;

FIGS. 7 and 7A illustrate a second embodiment of the cushion seal;

FIGS. 8 and 8A illustrate still another embodiment;

FIGS. 9, 9A and 9B show a further embodiment;

FIG. 10 illustrates a seal similar to the one shown in FIG. 2, but includes tabs to supplement the nail holding power; and

FIGS. 10A, 10B, and 10C show some of the various types of seal leg configurations that can be used with any of the various seal embodiments.

Referring now particularly to FIG. 1, there is illustrated a freight car **10** having a floor portion **12** on which a loaded pallet **14** is located. Directed about the loaded pallet is a metal strap, which will be referred to as an anchor strap **16**, since it is used to anchor the loaded pallet relative to the car floor. The anchor strap is secured to the floor **12** by a cushion seal **18**.

A preferred embodiment of a cushion seal is shown in perspective in FIG. 2. In this embodiment, the cushion seal **18** has a main body portion **19** and a pair of inturned flanges or legs **20, 22**, which extend inwardly a sufficient amount, whereby it is necessary to thread the strap through the seal. When the strap is threaded through the seal, it will be retained in position relative to the seal and will facilitate nailing of the seal and strap assemblage to the floor of the railroad car. It is to be noted at this time that while the seal is shown with its legs in an upper position when the seal is to be nailed in place, it is actually inverted to place the legs downward to facilitate crimping of the seal to the strap before the seal is fastened to the car floor. However, while this is the preferred method of installation, the cushion seal could be installed with the legs being located on top. In the latter situation, a crimping tool capable of crimping the seal in this position would have to be used.

Returning now to the structure of the cushion seal shown in FIG. 2, it is seen that the seal contains flange portions **24, 26** located at the outer ends thereof. The juncture between the legs **20, 22** and flanges **24, 26** is formed with a radius **27** to minimize the concentration of stresses in these areas. These flange portions contain openings **28** through which fasteners,

such as nails, can be driven to secure the seal to the floor **12** of the car **10**. The openings **28** are located outwardly of the legs **20, 22**, so that they are accessible after the strap **16** has been threaded through the seal.

When the seal is in place, as shown in FIG. **3**, the crimps **30** serve to provide convolutions for the strap, which serves to increase the holding power between the seal and strap. It is to be noted that the depth of the convolutions will affect the holding power of the strap relative to the seal. The deeper the convolutions, the greater the holding power. Various views of the crimped strap and seal assemblage are shown in FIGS. **4, 5,** and **6**.

Turning to various modified forms of the invention, there is shown in FIG. **7** a cushion seal that has pairs of longitudinally extending legs **40, 41** located between flange portions **42, 44** and **44, 46**, respectively. This design could be used where it is necessary to have an increased amount of holding power between the car floor and the cushion seal. FIG. **7A** is an end view of the seal illustrated in FIG. **7** with the nails **47** being placed in the position the seal is located when it is to be secured to the floor of the freight car.

The seal so illustrated in FIG. **8** is similar to the one illustrated in FIG. **2**, but is made slightly longer in the leg area in order to obtain an equivalent holding power due to the fact that the legs **52, 54** of the seal are tapered at its outer ends to prevent stress concentration between the flanges **24, 26** and the legs **52, 54**.

FIG. **9** illustrates a cushion seal that has nail openings **28** located between the longitudinally extending flanges **60, 62**. The flanges **60, 62** extend the full length of the seal. When this seal is used, the seal is initially nailed to the car floor and then the strap is threaded through the flanges. This is necessary since the nail holes would be blocked and fastening of the seal to the car and floor would not be possible if the strap were to be threaded into the seal before the seal is secured in place. This design has an advantage in that it overcomes the cantilever action that exists when the nail openings are disposed outwardly of the seal legs. With this embodiment, it is necessary that the center portion of the legs **60, 62** be raised, as shown at **64**, to permit accessibility of a crimping tool to crimp the strap and seal together after the seal has been nailed in place and the strap threaded therethrough.

FIG. **10** is a seal similar to FIG. **2**, but includes downwardly extending tabs **70** which will penetrate into the car floor to supplement the holding power from the nails. While these tabs have been shown with respect to the embodiment shown in FIG. **10**, such tabs could also be employed in the embodiment shown in FIGS. **7** and **8**.

FIGS. **10A, 10B,** and **10C** show three conventional types of seals generally referred to as "thread-on" (**10A**), "drop-on" (**10B**) and "snap-on" (**10C**). FIG. **10A** shows a threaded seal wherein the legs **80** extend inwardly a substantial amount to require that the strap be threaded on the seal. FIG. **10B** includes longitudinally extending legs **82**, which extend generally vertically and which enable the seal to be dropped on the strap **16**. FIG. **10C** shows a seal having an inwardly directed leg **84** and a generally vertically disposed leg **86**, wherein the seal is snapped in position relative to the strap **16**.

The novel method disclosed herein functions to absorb the effects of an impact force on a load disposed within a moving vehicle. The cushion seal which forms the heart of this invention is designed to receive a strap in crimped relation therewith. The seal also includes portions to permit securing of the strap to the vehicle. After the strap and seal are crimped together to restrict movement between the strap and seal, the seal is secured to the vehicle. The strap is then directed about a load, tensioned, and the overlapping ends sealed in the conventional manner. Depending upon the type of seal that is employed, the sequence of steps would either call for the seal to be secured in place after the crimping takes place, or before.

While the invention has been directed to securing the load to the floor of a freight car, it is, of course, obvious that the invention would apply equally well to a structure which is to be secured to a support and subjected to sudden forces. The cushion seal system would act to dampen out the impact forces imposed on the structure. For example, it is conceivable that the invention could be used with a parking barrier, which upon impact would move and in so doing would tend to absorb the impact energy and help bring the vehicle to a stop with a minimum of damage. In this situation, the strap would be nailed to the parking barriers, rather than in encircling relationship with any portion thereof.

It is, of course, intended to cover by the appended claims all such modifications and embodiments which fall within the claims.

What is claimed is:

**1.** Load retaining means comprising: means defining an attachment surface; a load positioned adjacent said attachment surface; a strap positioned against said load; and a seal having a flat main body portion fixedly mounted on said attachment surface, said seal having legs extending from said main body portion toward said attachment surface and embracing said strap between said main body portion and said legs, said legs being crimped into engagement with said strap to provide mating convolutions in the strap and the seal whereby the seal frictionally engages the strap to absorb impact forces imposed on the load during sudden changes in movement of the attachment surface.

**2.** Load retaining means as set forth in claim **1** wherein said seal includes a single leg at each side of said main body portion.

**3.** Load retaining means as set forth in claim **2** wherein a recess is provided in said main body portion adjacent each end of each leg.

**4.** Load retaining means as set forth in claim **1** wherein a plurality of openings are provided in the main body portion of said seal, and wherein fasteners extend through said openings to fixedly secure the seal to said attachment surface.

**5.** Load retaining means as set forth in claim **1** wherein at least two legs are provided on each side of said main body portion.

**6.** Load retaining means as set forth in claim **1** in which a single leg is provided at each side of said main body portion, each leg having tapered end portions.

**7.** Load retaining means as set forth in claim **1** wherein tabs extend outwardly from said main body portion adjacent the ends of said legs to assist in maintaining said seal on said attachment surface.

**8.** Load retaining means as set forth in claim **1** wherein said strap is a thin, flat metal member that encircles said load.

* * * * *