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PROTECTOR FOR FLEXIBLE MEMBER LINKING
TWO RELATIVELY MOVABLE MEMBERS
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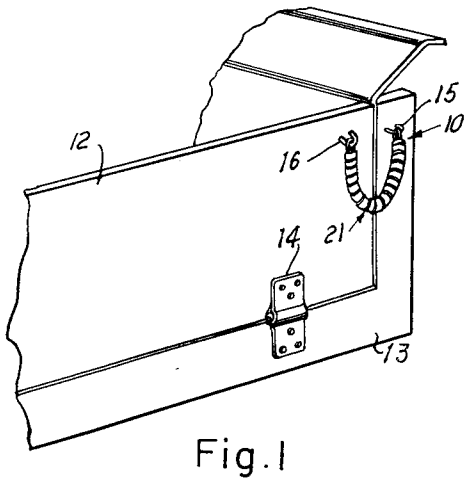


Fig. 1

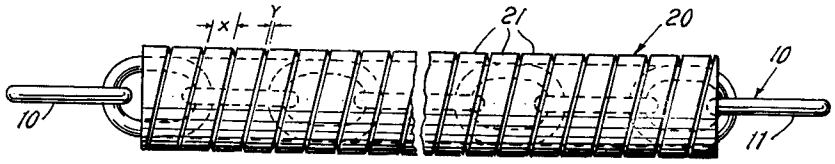


Fig. 2

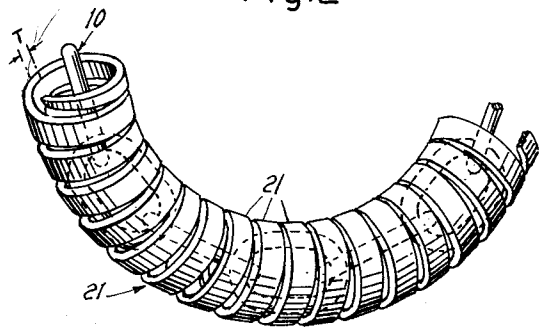


Fig. 3

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PROTECTOR FOR FLEXIBLE MEMBER LINKING TWO RELATIVELY MOVABLE MEMBERS

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This invention relates to chains and more particularly to chains provided with protective means and to the protective means for such chains.

An object of this invention is to provide a new and improved flexible member having a chain protected by an outer protective member.

Another object is to provide a chain having a protective member extending thereover which protects the chain against contacts with articles to which the chain is secured.

A further object is to provide a flexible member having a chain provided with a substantially spiral outer protective member formed of a resilient substance.

A still further object is to provide a flexible member having a chain protected by an outer resilient spiral member wherein the width of the spiral member is substantially greater than the distance separating adjacent coils thereof.

Another object is to provide a chain having a substantially tubular resilient protective member formed of a spiral flat tape whose width is substantially greater than its thickness.

Another object is to provide a protective member for chains or the like which prevents contact of the chain with objects about or to which the chain is secured.

A still further object is to provide a protective member for chains or the like which is formed of a spiral flat member, the width of whose coils is substantially greater than the space separating adjacent coils whereby when the chain forms a dependent loop the portions of the adjacent coils on the upper inside portions of the loop are pressed tightly against one another to exclude water while the lower outside portions of the loop are spaced to allow drainage of water from within the protective member.

A further object is to provide a protective member for chain or the like which resiliently engages the enclosed chain to prevent rattling thereof.

A still further object is to provide a protective member which may be wound about a chain whose outer ends are secured to fixed structures preventing insertion of the chain through a protective member.

Still another object is to provide a protective device for chains or the like formed of a flat spiral coil, the adjacent edges of adjacent coils abutting one another on the inside or concave portion of any curve made by the chain to form a continuous surface to protect any articles about which the chain is secured.

Additional objects and advantages of the invention will be readily apparent from the reading of the following description of a device constructed in accordance with the invention, and reference to the accompanying drawing thereof, wherein:

Figure 1 is a fragmentary perspective view of the tailgate of a truck provided with a chain protected by the protective member embodying the invention;

Figure 2 is a plan view of the protective member disposed on a chain showing it as it appears on a chain which is disposed in a straight line; and

Figure 3 is a perspective view of the chain of Figure 2 showing the chain and protective member as they appear when the chain is disposed in a curve.

Referring now to the drawings, the chain **10** is composed of a plurality of interconnected links **11** formed of steel or other metal and which are free to move relative to one another so that any movement imparted to the chain tends to cause individual links to strike one another and produce undesirable sound. The metallic links of the chain of course also produce noise when the chain is used to secure two objects to one another by striking against such objects whenever any movement is imparted thereto. For example, the chain **10** may be employed to limit the outward pivotal movement of the tailgate **12** hingedly connected to a truck body **13** by hinges **14**. In such case, one end of the chain is connected to a bracket **15** connected to the truck body and the other end of the chain is connected to a bracket **16** connected to the tailgate. It will be apparent that as the truck is driven over roads the chain moves with respect to the truck body and the truck tailgate and produces a rattling noise which is undesirable. Furthermore the constant striking and rubbing of the chain against the truck body and the tailgate damages both the chain and the truck body and tailgate.

The protective member **20** is provided to prevent undue rattling of the chain and to prevent the chain from directly striking or wearing against other objects. The protective member **20** is substantially tubular in form and formed of a plurality of continuous spiral coils **21**. The protective member is made of a suitable substance, such as rubber or a plastic. The width of the coils **21**, indicated by the reference character x in Figure 2, is substantially greater than the distance y separating edges of adjacent coils. For example, the width x of the coils may be one inch while the distance y may be $\frac{1}{64}$ of an inch.

The thickness t of the coils **21** of the protective member **20** is also preferably substantially smaller than the width x of the coils. For example, the thickness t of protective member may be $\frac{1}{8}$ of an inch where the width x thereof is one inch.

The inside diameter of the protective member **21** is preferably substantially equal or slightly less than the outer diameter of the links **11** of the chain, so that the links of the chain are fitted snugly within the protective member **20** which thus holds the links **11** against undue movement with respect one to another and thus prevents rattling of the chain.

The protective member **20** may be fitted over a chain **10** by inserting the chain through the tubular protective member **20** from one end thereof and drawing it out the other end thereof. Alternatively, the protective member **20** may be disposed about a chain which it is to protect by winding the coils **21** about the chain, the resilient properties of the coils permitting their distortion to accomplish this result. This method of assembly of the protective member on a chain is especially advantageous where the chain is already secured at both ends to fixed structures such as the tailgate **12** and truck body **13** and the freeing of either end thereof would entail considerable expenditure of time and effort.

It will now be seen that when the chain is provided with the protective member **20** any looping or curling of the chain will be permitted by the protective member since its coils **21** will flex as indicated in Figure 3. The edges of adjacent coils **21** on the inside or concave side of the chain abut one another to close the spaces y therebetween and form a substantially continuous surface while the portions of the coils **21** on the outer or convex

side of the chain move farther apart. Thus when the chain **10** forms the loop shown in Figure 1 any water falling upon the truck and chain and protective member is excluded from the interior of the tubular member since the upper portions of the coils abut one another. Any rain or water entering into the tubular member drains freely through the enlarged spaces *y* on the convex or outer side of the loop formed by the chain and protective member.

It will also be apparent that the resilient member **20** prevents contact of the chain **10** with any objects to which the chain **10** is attached or about which it is secured and thus protects both the objects and the chain from frictional wear. In addition, the individual links **11** of the chain are held snugly in the protective member **20** against movement relative to one another.

It will also be seen that chains provided with tubular protective members **20** may also be used to bind material such as bales of wood without harming or scarring such material since the coils **21** of the member move close together to form a continuous surface to protect the bound material from contact with the chain.

It will also now be seen that the protective member **20** is tubular in form and formed of a plurality of continuous coils **21** which form an integral spiral strip and that the width of the individual coils is substantially greater than the space *y* separating adjacent edges thereof.

It will also be apparent that the thickness of the coils is substantially smaller than the width *x* while being substantially greater than the space *y* whereby looping or curving of the protective member and of the chain **10** enclosed thereby results in the inside portions of the inner or concave side of the curve abutting one another to form a continuous surface while the outer portions of the coils **21** tend to move apart on the outer or convex side of the curve.

The foregoing description of the invention is explanatory only, and changes in the details of the construction illustrated may be made by those skilled in the art, within the scope of the appended claims, without departing from the spirit of the invention.

What I claim is new and desire to be secured by Letters Patent of the United States is:

1. In combination: a first member; a second member, said first member being movable relative to said second member; and a flexible member for limiting movement of said first member relative to said second member consisting of: a chain formed of a plurality of links having support means at opposite ends thereof connecting one of said opposite ends of said flexible member to said movable first member and the other of said ends of said flexible member to said second member, said chain being disposed in a depending curve with the portions thereof between said ends being disposed below said ends when said movable first member is disposed adjacent said second member; and a plastic resilient non-metallic, non-rattling, non-scarring protective member disposed about said chain, said protective member comprising a single continuous helically formed strip having a plurality of continuous coils, said coils having adjacent edges spaced from one another, the width of said strip forming said coils being substantially greater than the space between adjacent edges of adjacent coils when the protective member is disposed in a longitudinally extending straight position, the width of said strip forming said coils being substantially greater than the thickness thereof, said protective member having open ends; said chain and protective member when said first member is in position adjacent said second member extending below said support means and disposed in a curve and having the open ends of said protective member opening upwardly and exposed to falling extraneous fluid, said adjacent edges of said coils of said strip forming said protective member abutting one another along the upper concave portion of the curve to form a substantially continuous extraneous fluid shedding surface, and the adjacent edges of the coils of said strip along the lowermost convex portion of the curve being spread apart so as to be spaced from one another a greater distance than the distance between such adjacent edges when said protective member is disposed in said straight position, such greater spacing providing means to insure drainage of extraneous fluid entering the open ends of the protective member from within said protective member to prevent trapping of the extraneous fluid therein and damaging of the chain, said coils of said protective member providing said greater spacing for drainage of extraneous fluid at such lowermost convex portion of said flexible member regardless of the relative positions of said support means when said first member is adjacent said second member; the internal diameter of said protective member being small enough to cause said protective member to fit snugly over said links to prevent rattling of said chain, said protective member preventing noise producing contact of said chain with said first member and said second member.

2. In combination with a vehicle body having a swingable tail gate thereon exposed to weather exteriorly of said body, a flexible member for limiting movement of said tail gate relative to said body and comprising: a chain formed of a plurality of links having support means at opposite ends thereof connecting one of said opposite ends of said flexible member to said body and the other end of said flexible member to said tail gate, said chain being disposed in a depending curve with the portions thereof between said ends being disposed below said ends when said tail gate member is disposed adjacent said body; and a plastic resilient, non-metallic, non-rattling, non-scarring protective member disposed about said chain, said protective member comprising a single continuous helically formed strip having a plurality of continuous coils, said coils having their adjacent edges spaced from one another, the width of said strip forming said coils being substantially greater than the space between adjacent edges of adjacent coils when the protective member is disposed in a longitudinally extending straight position, the width of said strip forming said coils being substantially greater than the thickness thereof, said protective member having open ends; said chain and said protective member when said tail gate is in a position adjacent said body depending below said support means and disposed in a curve, said protective member having its open ends opening upwardly when in such curved position and exposed to falling extraneous fluid, said protective member having adjacent edges of said coils of said strip forming said protective member abutting one another along the upper concave portion of the curve to form a substantially continuous extraneous fluid shedding surface, and having adjacent edges of the coils of such strip along the lowermost convex portion of the curve spread apart so as to be spaced from one another a greater distance than the distance between such adjacent edges when said protective member is disposed in said straight position, such greater spacing providing means to insure drainage of extraneous fluids entering the open ends of the protective member to prevent trapping of extraneous fluids therein and damaging of the chain, said coils of said protective member providing said greater spacing for drainage of extraneous fluids at such lowermost convex portion of said flexible member regardless of the relative positions of said support means when said tail gate is adjacent said body; the internal diameter of said protective member being sufficiently small to cause said protective member to fit snugly over said links of said chain to prevent rattling of said chain, said protective member preventing noise producing contact of said chain with said body and said tail gate.

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