

[54] **EDGE PROTECTOR**
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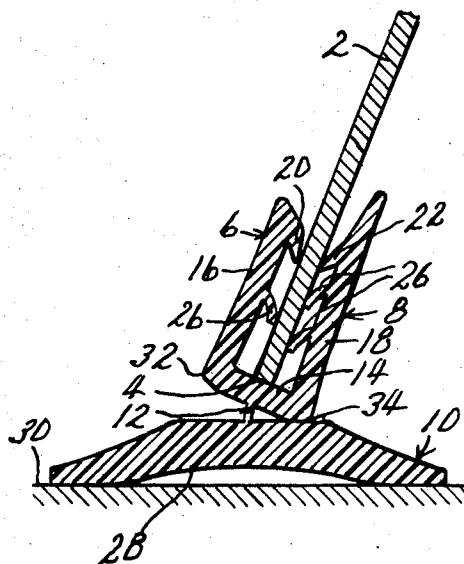
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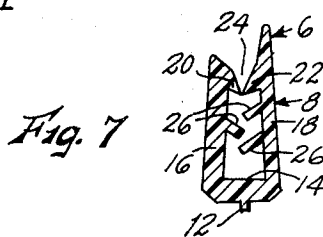
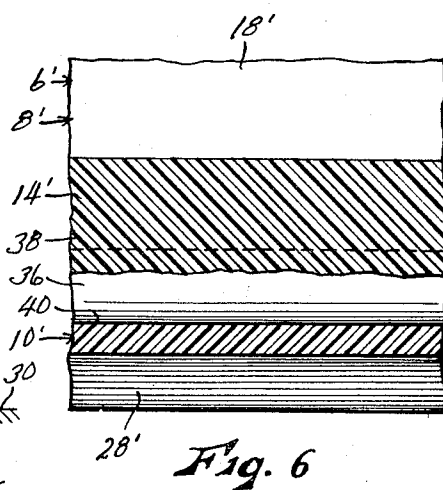
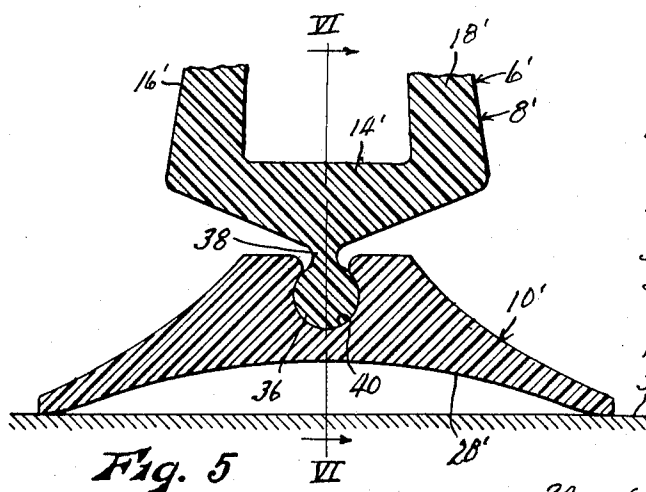
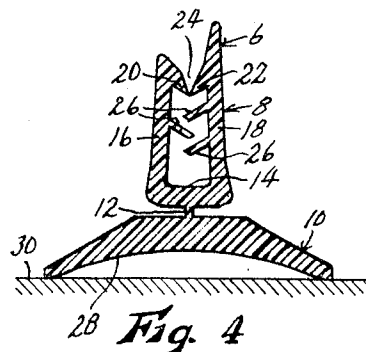
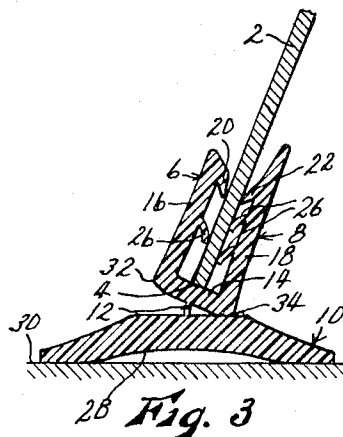
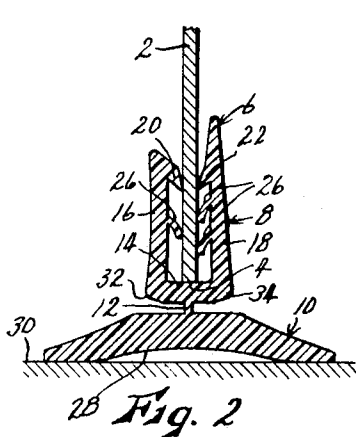
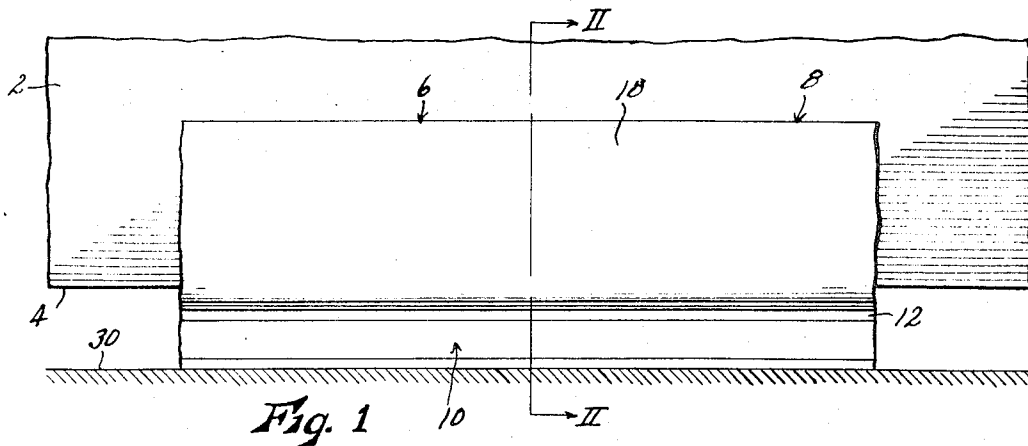
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[57] ABSTRACT

An edge protector adapted to be applied over the edges of metal, glass or other sheet materials to prevent damage to the edges of said sheets, and to prevent damage by said edges to adjacent sheets, consisting of continuously extruded section of resilient plastic including in cross-sectional contour, a U-shaped clip portion adapted to engage frictionally therein the edge portion of a sheet, a broad shock-absorbing head portion adjacent the closed edge of the clip portion, and a thin, narrow neck interconnecting the clip and head portions whereby the head portion can tilt laterally with respect to the clip portion.

5 Claims, 7 Drawing Figures





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EDGE PROTECTOR

This invention relates to new and useful improvements in edge protectors, and has particular reference to edge protectors consisting generally of continuous strips of protective material adapted to be applied and secured to the edges of panels of sheet metal, glass, or the like, to prevent damage to or by said edges. Such edge protectors are highly desirable, for example, when large numbers of finished sheets of metal or the like must be shipped, stored, or the like, since they prevent the sharp edges of said sheets from cutting, scratching, marring, or otherwise damaging other sheets, or cutting or destroying paper or other wrappers in which the sheets may be enclosed. They also tend to protect the edges of the sheets to which they are applied, as for example to minimize denting or bending thereof by edge blows thereon, and in the case of enameled or otherwise coated sheets, to prevent scraping contact of the edges of a sheet with obstacles, which could peel the coating away from the sheet for a considerable distance from its edge. The specific uses of edge protectors of this type are too numerous to catalog in detail.

Edge protectors of this general character, consisting essentially of an elongated clip of U-shaped cross-sectional contour, and formed of resilient material to engage frictionally over the edge of a metal sheet, are presently in use, but have been found to possess certain objectionable features. For example, while they are generally effective in preventing the edges of a sheet protected thereby from scratching or damaging other sheets nearby, the connecting base portion of the U-shaped clip is rather thick and seats solidly on the extreme edge of the protected sheet, and therefore has at best rather poor shock-absorbing properties in preventing damage to the sheet itself, in that the sheet edge itself may be rather easily dented or otherwise damaged by external blows against the protector. Accordingly, an object of the present invention is the provision of an edge protector of the general character described having greatly improved shock-absorbing properties. Generally, this object is accomplished by the addition to the U-shaped clip member of a transversely yieldable head member adjacent and aligned with the base portion of the clip. Previous attempts to improve the shock-absorbing properties of the clip have been made by giving the base portion of the clip special configurations permitting some yieldability thereof in the plane of the sheet to which the clip is attached, but the necessarily small dimensions of the clip, and the necessity of using material sufficiently dense to afford the required structural strength, have rendered such attempts at best only partially successful.

Also, it is evident that in normal use, the plane of a sheet protected by edge protectors will not always be disposed normally or at right angles to the surface engaged by the protector, whether that surface be an adjacent sheet, floor, the wall of a packing case, or anything else, but will often be disposed at some acute angle thereto. With all previous edge protectors of this general class within our knowledge, it has been found that impact blows between the protector and the supporting surface, at such an acute angle, often results in a tendency to spring the walls of the U-shaped clip apart, thereby loosening or completely relaxing the frictional grip of said walls on the sheet, so that there is danger the protector will fall away from the sheet and its protection lost. Furthermore, if the U-shaped clip

has been specially configured to provide a shock-absorbing cushion, the cushion effect is generally, unidirectional relative to the protector, and is lost, or diminished if force is applied thereto at another angle, as for example the acute angle as discussed above. Accordingly, another object of the present invention is the provision of an edge protector of the character described which preserves a uniform cushioning action through a wide range of angles between the protected sheet and the surface engaged by the protector, and the frictional grip of which on the sheet is not loosened by edge blows thereon. This is accomplished by the provision of a hinge connection between the clip and the previously mentioned head member and also by a special configuration of the clip walls.

Other objects are simplicity and economy of construction, the protector consisting entirely of a resilient plastic, and being formed completely by extrusion, in either one or two pieces, and efficiency and dependability of operation.

With these objects in view, as well as other objects which will appear in the course of the specification, reference will be had to the accompanying drawing, wherein:

FIG. 1 is a fragmentary side elevational view of a sheet of metal with an edge protector embodying the present invention applied operatively thereto,

FIG. 2 is a fragmentary sectional view taken on line II—II of FIG. 1,

FIG. 3 is a view similar to FIG. 2, but showing the metal sheet inclined acutely to a supporting surface,

FIG. 4 is a view similar to FIG. 2, but showing the edge protector only,

FIG. 5 is an enlarged fragmentary view similar to FIG. 4, showing a slightly modified form of construction,

FIG. 6 is a fragmentary sectional view taken on line VI—VI of FIG. 5, and

FIG. 7 is a fragmentary view similar to FIG. 4 but showing a slight modification of structure.

Like reference numerals apply to similar parts throughout the several views, and the numeral 2 applies to a sheet of material such as metal, the edge 4 of which is to be guarded and shielded by an edge protector. Edge 4 may be either straight, as shown, or curved. The edge protector contemplated by the present invention, in the form thereof illustrated in FIGS. 1-4, is indicated generally by the numeral 6, and consists of an elongated form of uniform cross-sectional contour which may be conveniently and economically formed by extrusion of a comparatively soft, flexible, resilient material such as certain types of plastics. A low-density polyethylene is entirely satisfactory. It may be formed in continuous lengths, then cut with shears or the like into shorter lengths as may be necessary or desirable for any particular job.

In cross-sectional contour, the protector includes, as best shown in FIG. 4, a U-shaped clip portion 8, a head portion 10, and a narrow neck 12 interconnecting said clip and head portions. Clip portion 8 includes a base connecting portion 14 and a pair of side walls 16 and 18 extending in generally parallel relation from the laterally opposite edge of base 14. The clip portion is adapted to be applied over the edge portion 4 of sheet 2, as shown in FIGS. 1-3, and side walls 16 and 18 project unequal distances from base 14 whereby to facilitate the application of the clip to the sheet. The

shorter side wall 16 has an intumed lip 20 formed continuously along the free edge thereof, said lip being inclined toward base 14. The longer side wall 18 likewise has an intumed lip 22 formed therealong adjacent its free edge and inclined toward base 14. Lips 20 and 22 are spaced equidistantly from base 14, so as normally to engage each other as shown in FIG. 4 whereby to limit the movement of the side walls 16 and 18 toward each other and to preserve a V-shaped entry slot 24 between their free edges. This further facilitates the application of the protector over the edge of sheet 2. Each side wall 16 and 18 also has one or more inwardly directed continuous flaps 26 formed on the inner surface thereof, intermediate base 14 and the free edge lip 20 or 22 thereof. Flaps 26 are also inclined toward base 14, and are relatively thin, and hence more flexible, as compared to the side walls. Also, the flaps 26 of the respective side walls are disposed in staggered relation on said side walls, and extend more than half the distance to the opposite side wall, so that normally the flaps of the opposite walls extend into interdigitating relation, as shown in FIG. 4. The purpose of these flaps will be fully set forth below.

Head portion 10 of the protector has the form generally of a continuous flat strip extending parallel to clip 8, and the plane of which is disposed normally at right angles to the plane of a sheet 2 inserted between side walls 16 and 18 of the clip. Head 10 is relatively thick along its midline, but tapers to a relatively thinner section at both of its lateral edges. The surface of the head distal from clip 8 is transversely concave, as indicated at 28. Neck 12 comprises a narrow section of plastic extending longitudinally of the connector, and integrally interconnecting said clip and head along the midline of the exterior surface of base portion 14 of the clip, and the midline of surface of the head opposite from the concave surface 28 thereof. Said neck is sufficiently thin to permit easy, hinge-like pivoting between the clip and head, and normally holds the clip and head in closely spaced apart relation as shown.

In use, clip portion 8 of the protector is applied over edge 4 of sheet 2 as shown and described, the resilience of side walls 16 and 18, lips 20 and 22 and flaps 26 providing a secure frictional grip, so that the concave surface 28 of head 10 rests against any supporting surface, illustrated as 30, which would otherwise engage and support said sheet. It will be seen first that any compressive force between sheet 2 and surface 30, as caused for example by the weight of the sheet or dropping of the sheet to the surface, will cause resilient deformation of the head accompanied by partial flattening of the concave curvature thereof, as shown in FIGS. 2 and 3. This action performs a spring shock-absorbing function which very effectively prevents impact damage or bending of the edges of the sheet. Moreover, this cushioning effect is preserved even if plate 2 should be disposed at an acute angle to surface 30, as shown in FIG. 3, since in that case head 10 merely pivots relative to the clip, as permitted by the flexibility of neck 12, so as to engage surface 30 as before. If head 10 were not effectively hinged to the clip by neck 12, and if sheet 2 were acutely angled to surface 30 as in FIG. 3, then only one or the other of the lateral edges of the head would engage surface 30, and the cushioning effect of the head would be greatly diminished, or lost.

In the absence of head 10, the protector would consist merely of the U-shaped clip portion 8, as do many

edge protectors in current use. In such protectors, it will be understood that impact blows to the outer surface thereof, along the juncture lines between the base and side walls thereof, as indicated at 32 and 34 in FIG. 2, have a definite tendency to "spring" the clip open so that its frictional grip on sheet 2 is diminished, or released entirely. That is, blows along these lines, which are the most exposed points and hence the most likely to receive blows, have a tendency to increase or flatten the angle between the base and the associated side wall. Since the plastic of which the protector is formed is relatively inefficient in recovering completely after deformation, the momentary increase of angle between the base and side wall, resulting from a blow, is likely, in some degree, to remain permanently after the blow. Thus the side walls 16 and 18, after the blow, are spaced a little farther apart, and their frictional grip on sheet 2 is reduced. In the present structure, this undesirable effect is largely prevented by neck 12, which transmits the force of any blow received by head 10, not to the lines 32-34 along the base-side wall angles, but instead to the midline of the base directly over edge 4 of sheet 2. In this manner, any possibility that a blow to head 10 could cause the clip to spring open is virtually eliminated. However, with sheet 2 angled acutely to surface 30 to the maximum extent permitted by hinge neck 12, as shown in FIG. 3, so that one or the other of base-side wall angles 32 or 34 (34 as shown) rests directly on head 10, there would still be the possibility that a blow to head 10 would be transmitted directly to angle 34, though reduced in intensity by the yieldability of the head itself, and thus cause some tendency to spring the side walls apart. In the present structure, this effect is counteracted by flaps 26 of the clip. These flaps, being much thinner and hence more flexible than side walls 16 and 18, are less subject to permanent deformation than said side walls, so that in the event said side walls should be slightly sprung apart as described, flaps 26 simply recover to a slightly greater degree, and hence retain their frictional grip on sheet 2. If there are, as shown, an unequal number of flaps 26 on the two side walls (two on side wall 18 and only one on side wall 16) the flaps on the side wall carrying the fewer flaps may be made thicker than those on the other side wall, to better balance the load and center sheet 2 therebetween.

FIGS. 5 and 6 show a slightly modified construction which is identical to that shown in FIGS. 1-4, corresponding parts being indicated by corresponding primed numerals, except that clip 8' and head 10' are formed by separate extrusions, and are joined by a hinge connection other than the integral neck 12 shown in FIGS. 1-4. Lead, a cylindrical rib 6 is formed continuously along the exterior side of clip base 14', at the midline thereof, and connected to base 14' by an integral neck 38 of reduced transverse width. Head 10' is formed with a continuous cylindrical groove 40 in the surface thereof opposite from concave surface 28' thereof, said groove opening exteriorly of the head. The clip and head are assembled by rolling or "popping" rib 36 into groove 40, whereby to form a pivotal connection between said clip and head. The operation of this species of the invention is generally identical to that of the species shown in FIGS. 1-4, although its manufacture is somewhat more expensive. It will be understood, however, that rib 36 engages frictionally in groove 40, so that it will retain any pre-set angularity

between the clip and head. This may be desirable, for example, when using the protector in circumstances involving a very small load between the protector and its supporting surface 30. In such circumstances, the tendency of necks 12 to elastic recovery from any deformed position might tend to move the sheet 2 out of a necessary or desired position, or the like.

While we have shown and described certain specific embodiments of our invention, it will be readily apparent that many minor changes of structure and operation could be made without departing from the spirit of the invention.

What we claim as new and desire to protect by Letters Patent is:

1. An edge protector comprising an elongated member formed of a flexible, resilient plastic material having only moderately efficient recovery characteristics from deforming strains, said protector being of one-piece, homogenous structure and of uniform cross-sectional contour throughout its length, and including the following elements:

- a. an elongated clip member of generally U-shaped cross-sectional contour having generally parallel, spaced-apart side walls connected by a base portion, and adapted to receive therein the edge portion of a sheet article of a thickness for which the protector is designed, said side walls being spaced apart by a distance greater than the thickness of said sheet article and having yieldable inward projections adapted to engage and grip said sheet article therebetween, and to center said sheet article between said side walls,
- b. an elongated head member longitudinally coextensive with said clip member and disposed adjacent and parallel to the base portion of said clip member, and
- c. a narrow neck joining said head and clip members and being sufficiently thin to constitute a flexible hinge permitting relative pivotal movement between said head and clip members about an axis parallel to and intermediate said members, said

neck being centered between the planes of said side walls, and the thickness of said neck, in a plane normal to said side walls, being less than the thickness of said side walls, less than the space between said side walls, and less than the thickness of said sheet article, whereby a shock load transmitted to said clip member by said neck will be delivered to the edge surface of said sheet article.

2. An edge protector as recited in claim 1 wherein said head member comprises a generally planar strip with its plane normally at generally right angles to the planes of the side walls of said clip, and wherein the surface of said head distal from said clip is transversely concave.

3. An edge protector as recited in claim 1 wherein said clip member side walls extend unequal distances from said base connecting portion, and wherein said inward projections of said side walls include a pair of inwardly projecting lips carried respectively by the side walls, said lips being equidistant from said base connecting portion whereby to engage each other normally to preserve a fixed spacing between said side walls, and being inclined toward said base connecting portion.

4. An edge protector as recited in claim 3 wherein said inward projections of said side walls additionally include one or more resilient flaps projecting inwardly from each side wall intermediate the lip thereof and said connecting base portion, said flaps extending more than one-half of the normal spacing between said side walls, being inclined toward said base connecting portion, and being disposed at graduated distances from said base connecting portion whereby the flaps of one side wall will normally interdigitate with the flaps of the other side wall.

5. An edge protector as recited in claim 4 wherein one of said side walls has a lesser number of said flaps than the other side wall, and wherein the flaps carried by said one side wall are thicker and less flexible than the flaps carried by said other side wall.

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