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(54) **Resilient clips**

(57) A resilient clip 20, for use in releasably accommodating at least one elongate article, comprises a base 22 which may have a pre-applied adhesive backing 24 and/or a pre-formed aperture 26; a resilient arm 32 attached to the base adjacent one margin of the base with a free end of the arm being disposed in spaced overlying relation to the base; and a pressure plate 44 attached to the free end of the arm by a flexible integrally formed portion 42 disposed transversely to the length of the arm and intermediate opposite inner 48 and outer 46 margins of the pressure plate; at least the free end of the arm, and thus overhanging arm portion 40, being resiliently yieldable to permit insertion, between the base and the pressure plate initially adjacent thereto, of the or each elongate article to be accommodated; the portion 42 being sufficiently thin to permit free pivoting of the pressure plate 44, and thereby permit equalisation of pressure across a ribbon-like cable retained by the clip, with rib 52 resisting lateral movement of the ribbon-like cable; and the pressure plate 44 being movable to an over-centre position (Figure 4) defining an enclosure for retaining fragile and soft articles without damage and deformation.

Fig.1

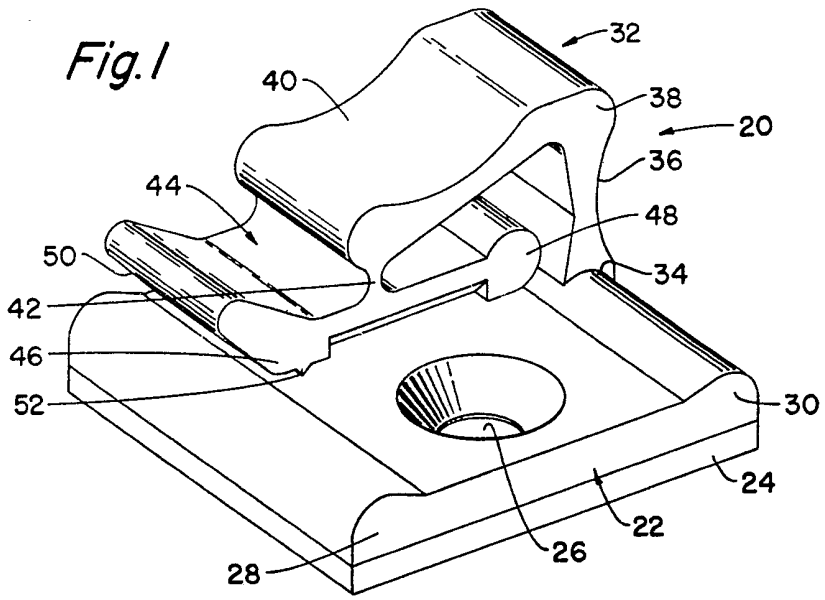

Fig.4

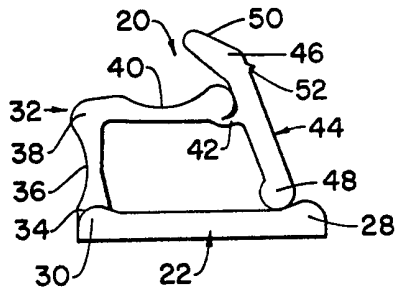

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Fig. 1

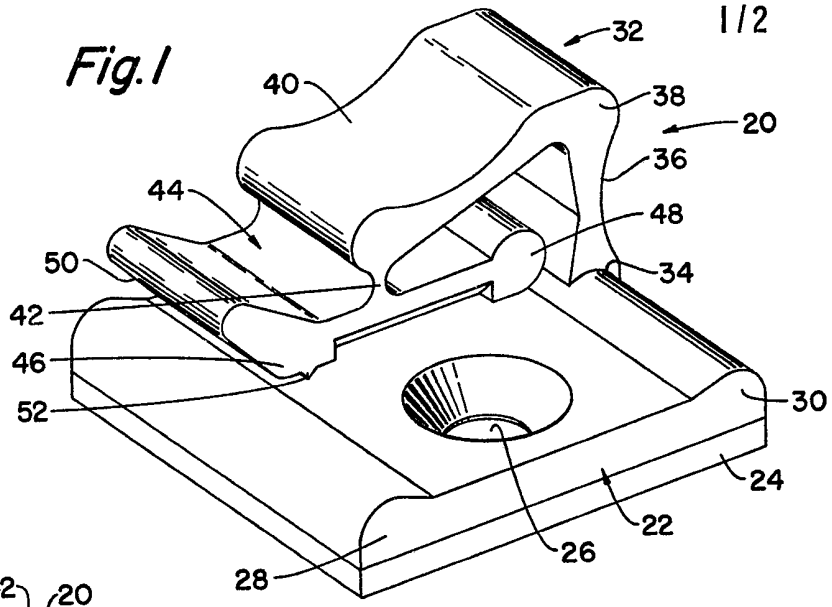


Fig. 2

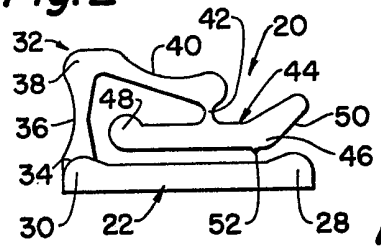


Fig. 3

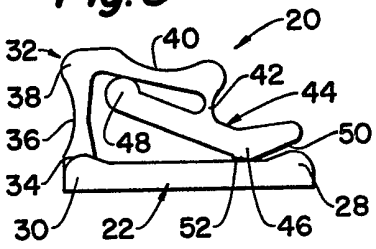


Fig. 5

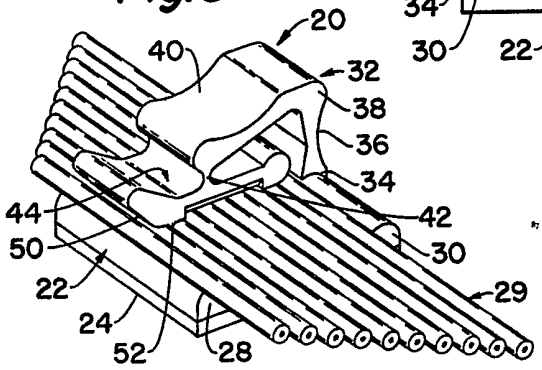


Fig. 4

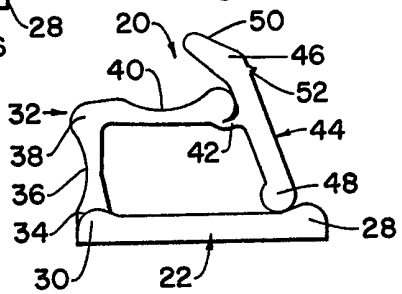


Fig. 6

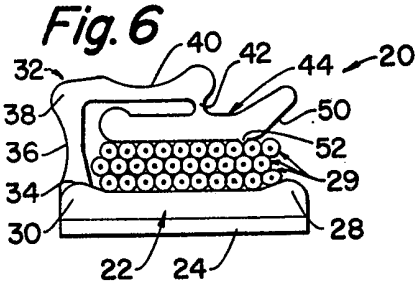


Fig. 7

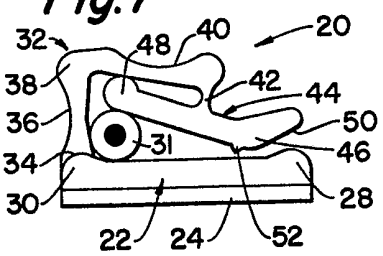


Fig. 8

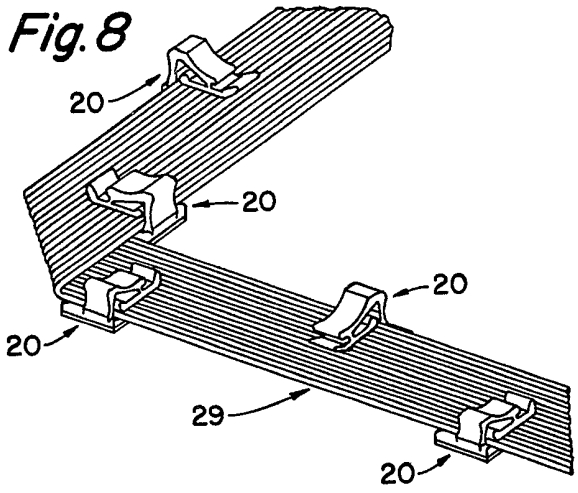


Fig. 9

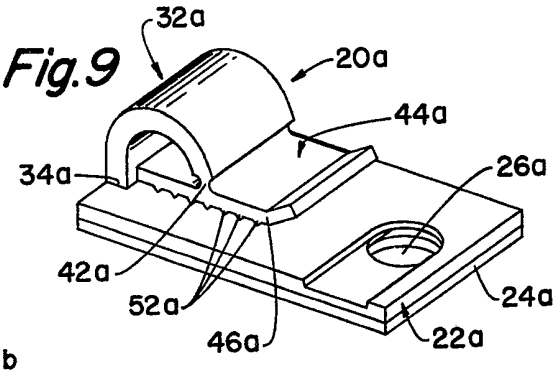


Fig. 10

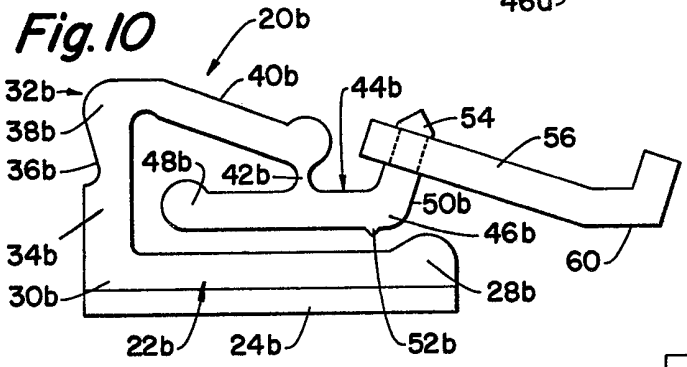


Fig. 13

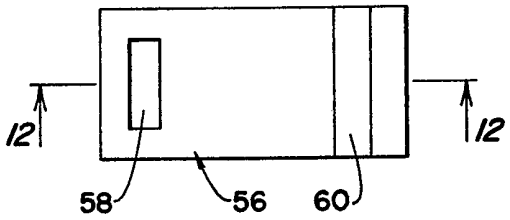


Fig. 11

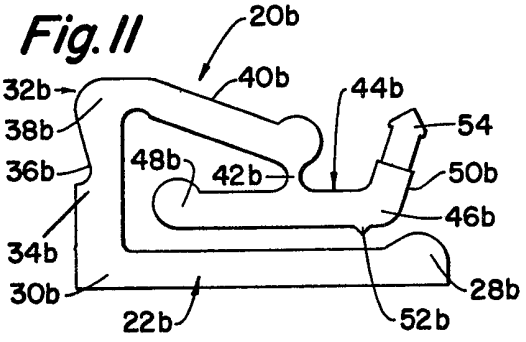
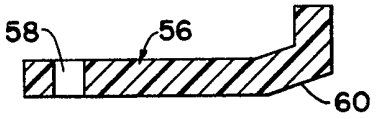


Fig. 12



SPECIFICATION

Resilient clips

The present invention relates to resilient clips for removably attaching various sizes and numbers of elongate articles, such as electric cables, tubes or pipes, to various supports such as walls, skirting boards or cabinets.

A resilient clip, in accordance with the present invention, for use in releasably accommodating at least one elongate article, comprises a base; a resilient arm attached to the base adjacent one margin of the base with a free end of the arm being disposed in spaced overlying relation to the base; and a pressure plate attached to the free end of the arm by a flexible integrally formed portion disposed transversely to the length of the arm and intermediate opposite inner and outer margins of the pressure plate; at least the free end of the arm being resiliently yieldable to permit insertion, between the base and the pressure plate initially adjacent thereto, of the or each elongate article to be accommodated.

The pressure plate is primarily intended to press against an article which is to be secured by the clip, and may be freely pivotable about the free end of the arm to apply a substantially equalised pressure across a ribbon-like arrangement of ganged or plural articles without concentrating pressure on just one of the articles, but the pressure plate may also be capable of being retained in an over-centre position by the resiliency of the arm to define an enclosure in which a fragile or soft article can be retained without damage or deformation.

The resilient clip may be attached to a support by utilising a pre-applied adhesive backing; by utilising a retaining fastener through a pre-formed aperture; or by utilising both the adhesive backing and the retaining fastener.

The flexible integrally formed portion may have a minimum thickness which is less than the thickness of the arm, may extend along a line substantially equidistant from said inner and outer margins of the pressure plate, and may span substantially the entire width of the arm, the width of the arm being orthogonal to the width of the base and parallel to the length of an electric cable, for example, which is being gripped in the intended manner by the pressure plate.

The resilient clip can be economically moulded in one-piece in an electrically insulating plastics material and be readily positioned for easy, versatile and convenient use with a minimum amount of labour to provide low cost in ultimate installed usage.

Three resilient clips, in accordance with the present invention, will now be described, by way of example only, with reference to the accompanying drawings, in which:—

Fig. 1 is a perspective view of one embodiment of the clip;

Figs. 2, 3 and 4 are side views of the clip of Fig. 1 showing the clip, without the adhesive backing, respectively in its initial condition, with the pressure plate pivoted in a clockwise direction, and with the pressure plate pivoted in a counter-clockwise direction;

Fig. 5 is a perspective view of the clip of Fig. 1 showing a segment of a ribbon-like cable being supported thereby;

Fig. 6 is a side view of the clip of Fig. 1 showing a stack of ribbon-like cables in section being maintained by the clip;

Fig. 7 is a side view of the clip of Fig. 1 showing a single cable being supported thereby;

Fig. 8 illustrates one practical application of a plurality of the clips of Fig. 1 retaining a wide ribbon-like cable;

Fig. 9 is a perspective view of another embodiment of the clip;

Fig. 10 is a side view of yet another embodiment of the clip;

Fig. 11 is similar to Fig. 10 but omits the adhesive backing and the extension;

Fig. 12 is a section taken along the line 12—12 of Fig. 13 through the extension shown in Fig. 10; and

Fig. 13 is a top view of the extension shown in Fig. 12.

The preferred embodiment of the present invention is illustrated as clip 20 in Figs. 1—8 inclusive. The clip 20 is preferably formed from an electrically insulating plastics material having sufficient resiliency to impart the required retaining action. The clip 20 includes a base 22 having on one side thereof a layer of pressure-sensitive adhesive material 24 for securing the clip 20 to the surface of a support. Alternatively, the base may be attached to the surface of a support by a retaining fastener, such as a screw or snap fastener (not shown) cooperating with an aperture 26 formed in the base 22. At the option of the user, either the adhesive or the fastener or both may be used to ensure positive securement of the clip to the surface.

The base 22 includes opposite outer and inner marginal edges 28, 30 of increased thickness. Extending upwardly from a junction 34 with the base along the edge 30 of the base is an arm 32. The arm superimposes the side of the base which is exposed when the clip has been mounted. The arm includes an upstanding portion 36, an elbow 38, and an overhanging arm portion 40. At the free end of the arm 3 there is an area of reduced thickness 42 hingedly attaching a pressure plate 44 thereto. The pressure plate 44 is attached by the hinge along a line substantially equidistant from opposite outer and inner marginal edges 46, 48. The pressure plate 44 substantially spans the width of the base 22 and is generally parallel to the base when at rest. The outer marginal edge 46 of the pressure plate 44 has an outwardly and upwardly inclined flange 50 to act as a cam and as a manually engageable release. On the side of the pressure plate 44 facing the base 22, near the outer marginal edge 46, is a projecting rib 52 which projects towards the base and extends substantially the width of the pressure plate 44.

In operation, the clip 20 is attached to a

support structure such as a cabinet or wall and then an elongated article is inserted in the clip and retained thereby. It is contemplated that standard electrical wire 31 of various sizes, ribbon-like wire 29 which is simply a plurality of coated wires attached along their outer peripheries, as well as tubes and pipes can be secured by the clip 20. The article to be supported by the clip 20 is guided into the clip 20 initially by the cam surface 50. Then the pressure plate 44 pivots and the resilient arm 32 flexes to permit the article to be positioned between the pressure plate 44 and base 22. In the situation where the article is a single cable 31 or a tube it is preferably positioned towards the connection 34 of the upstanding arm and base as in Fig. 7. The pressure plate 44 in this instance will pivot until its inner edge 48 engages the overhanging arm 40 or the outer edge 46 engages the base 22, depending upon the diameter of the article. When the inner edge 48 engages the overhanging arm 40 the pressure transmitted to the cable 31 is substantially greater than when the base 22 is engaged.

Of particular benefit is the capability of the clip 20 to retain ribbon-like cables and plural, single articles. When a ribbon-like cable is inserted in the clip 20 the pressure plate 44 pivots to engage and apply pressure equally to each of the wires that comprise the ribbon. This avoids damaging any of the wires due to excessive pressure being applied, over a period of time, to just one of the wires. The rib 52 on the pressure plate 44 will engage the ribbon cable between any pair of juxtaposed wires of the cable and aid in the retention of the cable in the clip by resisting lateral sliding movement of the cable. The rib 52 has a secondary effect in that it will create a greater pressure at the inner edge 48 of the pressure plate 44 if the ribbon cable moves laterally. This is due to the rib 52 riding up over a component wire of the ribbon cable causing the pressure plate 44 to pivot the inner edge 48 downward, thus squeezing the cable more tightly against the base 22.

The enlarged edges 28, 30 of the base 22 normally position an article therebetween but when a ribbon cable 29 of a width greater than the base is supported, the enlarged edge 28 along the outer margin acts to create a pressure ridge in the cable and coacts with the rib 52 on the pressure plate 44 to maintain a positive grip. Where the flat cable is of excessive width a plurality of staggered clips can be used along opposite edges of the cable as shown in Fig. 8. When a plurality of single articles, e.g. wires or tubes, are inserted in the clip 20 the pressure plate 44 will pivot to apply an equalized pressure to each of the articles along the line where the article is engaging the plate 44.

Figure 4 shows a position in which an article may be supported by the clip 20 without any pressure being applied thereto. This is important if a soft flexible tube is to be positioned and the tube must not be squeezed, e.g. in the routing of tubes from e.g. saline drip or other I.V. bottles. In this position the pressure plate 44 is pivoted outwardly until the inner edge 48 is past the point where it would be perpendicular to the base 22. The pressure plate 44 is held in this over-center position by the resiliency of the arm 32.

Fig. 9 discloses a slightly modified form of the clip. The structural elements of this embodiment which function similar to like elements previously described are identified by corresponding numerals bearing the subscript "*a*". In this embodiment the overhanging arm 32*a* follows a continuous radius and the surface of the pressure plate 44*a*, that faces the base 22*a*, has a plurality of ribs 52*a* thereon. The stress of flexing in the overhanging arm 32*a* is transmitted continuously therealong to its area 34*a* of attachment to the base. In this embodiment the area of attachment 34*a* of the arm 32*a* to the base 22*a* needs to be of sufficient strength to avoid fatigue and failure. The plural ribs 52*a* may be evenly or randomly spaced and where a particular gauge of ribbon-like cable is used the spacing may be predetermined to permit each rib 52*a* to engage the cable between adjacent pairs of wires.

Figs. 10—13 disclose a further embodiment wherein similar numerals are used to designate similar parts with the addition of the suffix "*b*", and wherein the clip 20*b* is adapted to have an extension 56 extending from the outer edge 46*b* of the pressure plate 44*b*. In this embodiment the outwardly and upwardly inclined flange 50*b* includes a projection 54 which has an enlarged end. Cooperating with the pressure plate 44*b* to extend the effective reach of the clip 20*b* is an extension 56. The extension 56 has an aperture 58 near one end and an upwardly inclined flange 60 at the other end. The aperture 58 is sized to coact with the projection 54 to secure the extension 56 to the pressure plate 44*b*. The inclined flange 60 at the outer end of the extension 56 is meant to function in essentially the same manner as flange 50 in Fig. 1. With the extension 56 secured to the pressure plate 44b it will be seen that there is an area above the marginal edge of increased thickness 28 which will coact with the edge 28 and the pressure ridge created in the ribbon cable to positively retain the same.

From the foregoing it will be apparent that the present invention may be a one-piece, spring-type, injection moulded plastics dielectric clip, and in one embodiment includes a one-piece removable extension, of extremely simple yet practical form. The design of the above described clip and extension renders them easily manufactured by conventional methods of moulding plastics. The incorporation of applicants' novel structural arrangement of the pressure plate and hinge increases the versatility of the clip. An article and/or articles retained by the clip will be positively positioned and retained particularly if the pressure plate is co-extensive with the base (not shown).

The ease of installation of the device on a support and ease of insertion of articles into the clip are clear benefits of the device. The novel

arrangement of applicants' device materially facilitates the ease with which a workman can attach articles, such as electrical conductors and tubes, to a support.

CLAIMS

1. A resilient clip, for use in releasably accommodating at least one elongate article, comprising a base; a resilient arm attached to the base adjacent one margin of the base with a free end of the arm being disposed in spaced overlying relation to the base; and a pressure plate attached to the free end of the arm by a flexible integrally formed portion disposed transversely to the length of the arm and intermediate opposite inner and outer margins of the pressure plate; at least the free end of the arm being resiliently yieldable to permit insertion, between the base and the pressure plate initially adjacent thereto, of the or each elongate article to be accommodated.

2. A resilient clip according to claim 1, wherein the base includes attachment means for use in attaching the base to a support.

3. A resilient clip according to claim 2, wherein the attachment means is a pre-applied adhesive backing.

4. A resilient clip according to claim 2 or claim 3, wherein the attachment means is an aperture through the base for receiving a retaining fastener.

4. A resilient clip according to any preceding claim, wherein a side of the pressure plate facing the base includes at least one rib thereon.

6. A resilient clip according to claim 5, wherein said side of the pressure plate includes a plurality of said ribs.

7. A resilient clip according to any preceding claim, wherein the pressure plate includes a cam portion at its outer margin to facilitate entry of articles to be accommodated by the clip and subsequently permit manual disengagement of the pressure plate to facilitate removal of the articles from the clip.

8. A resilient clip according to any preceding claim, wherein the clip is integrally formed of a moulded plastics material.

9. A resilient clip according to claim 8, wherein the plastics material is electrically insulating.

10. A resilient clip according to any preceding claim, wherein the pressure plate spans substantially the entire width of the base.

11. A resilient clip according to any preceding claim, wherein the base is bounded along opposite inner and outer margins by edges of increased thickness.

12. A resilient clip according to any preceding claim, wherein the flexible integrally formed portion has a minimum thickness which is less than the thickness of the arm to permit the pressure plate to pivot freely about the free end of the arm.

13. A resilient clip according to claim 12, wherein the pressure plate includes an enlargement at its inner margin to co-act with the resilient arm and provide increased resilient engagement of the clip with a single large-sized elongate article.

14. A resilient clip according to claim 12 or claim 13, wherein the pressure plate is pivotable to apply a substantially equalized pressure to a ribbon-like elongate article.

15. A resilient clip according to any preceding claim, wherein the flexible integrally formed portion attaches the pressure plate to the arm along a line substantially equidistant from said inner and outer margins of the pressure plate.

16. A resilient clip according to any preceding claim, wherein the flexible integrally formed portion spans substantially the entire width of the arm.

17. A resilient clip according to any preceding claim, wherein the pressure plate is releasably securable to an extension.

18. A resilient clip according to claim 17, wherein the extension is integrally moulded of a plastics material and includes cam means at its outer free end.

19. A resilient clip according to claim 1 and substantially as hereinbefore described with reference to Figures 1 to 8, Figure 9, or Figures 10 to 13, of the accompanying drawings.

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