May 5, 1964 K. LORBER 3,131,445

PAPER CLIP

Filed July 2, 1962

Fig. 1

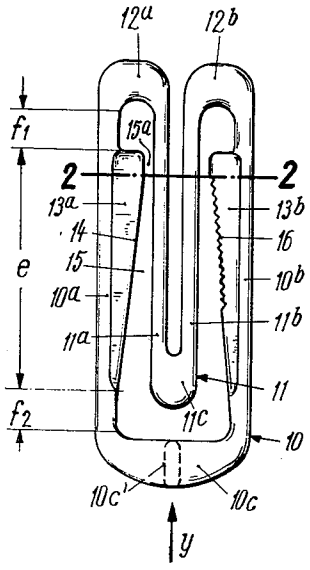
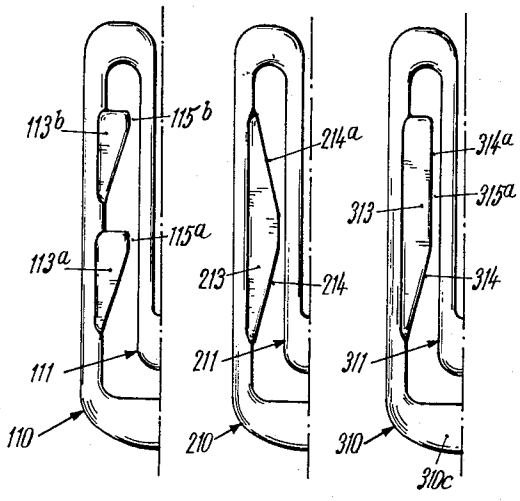


Fig. 4 Fig. 5 Fig. 6



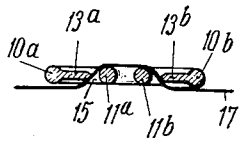


Fig. 2

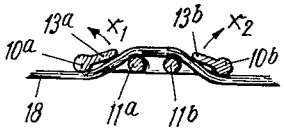


Fig. 3

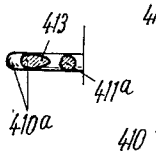


Fig. 8

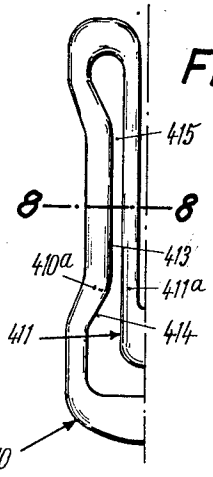


Fig. 7

INVENTOR
Kurt Lorber

BY

Michael S. Striker
ATTORNEY

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Kurt Lorber, Aichelberg uber Esslingen (Neckar), Germany

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9 Claims. (Cl. 24—66)

The present invention relates to a paper clip, and especially to one made of plastic. Such paper clips are preferably cast in the form of an endless strand with an outer U-shaped clamping member and an inner clamping member which is disposed substantially within the same plane as the outer member and is likewise U-shaped. At their free ends, the two clamping members are connected to each other by arcuate or similar crosswebs.

The application is a continuation-in-part application of my co-pending application Serial No. 727,454 filed April 9, 1958, now Patent No. 3,057,028, and entitled "Paper Clip."

As the result of the flexibility and the smooth surface of the material, clips which are made of plastic have the tendency—just like metal clips but usually even to a slightly greater extent—to slide off the clipped papers, especially if a thin stack of them with numerous pages is to be held together.

It is therefore a principal object of the present invention to provide a paper clip of a design which considerably reduces or entirely overcomes the tendency of the clip to slide off the papers to which it is attached. A further object of the invention is to arrange and construct the means for attaining the mentioned purpose in such a manner that the resistance of the clip against sliding off the papers increases with the number of them which is to be held together, that is, with the thickness of the paper stack to be gripped.

A further object of the invention is to provide a paper clip of the above-mentioned design which is especially adapted to be made of plastics and may be manufactured very easily and economically.

An important feature of the present invention for attaining the mentioned objects consists in providing one of the two U-shaped clamping members of a paper clip with one or more projections of a leaflike or similar shape which extend toward the other clamping member. These projections are preferably provided on both longitudinal arms of one clamping member so as to form one or more pairs at both sides of the line of symmetry of the paper clip, and they are adapted to exert a clamping pressure upon the papers which are slipped between the two clamping members so as to be attached to each other.

By providing the mentioned projections on the longitudinal arms, the further important feature is attained that, when a thin stack of pages or several thicker papers or the like are inserted between the clamping members of the paper clip, the projections—while pressing upon the papers—will be bent resiliently about the axes of the longitudinal arms to which they are integrally connected so that these arms will then act as torsion bars. Consequently, the thicker the stack of papers is which is inserted between the clamping members of the clip, the greater will be the spring pressure and gripping action which is exerted by the projections upon the papers and which prevents the paper clip from sliding off the papers.

The thin projections are preferably provided on the longitudinal arms of the outer clamping member and are directed inwardly so that, under the lateral pressure of the projections the papers which are inserted between the two clamping members will be bent around the inner clamping member and be tightly clamped between the latter and the projections.

According to another feature of the invention, the thin

projections are provided within a central part of the length of the longitudinal arms carrying the same. This permits these arms—and especially the parts thereof which are free of the projections—to yield resiliently under the torsion which is exerted upon them when the paper clip is slipped over the papers.

Another very advantageous feature of the invention consists in providing the thin leaflike projections so as to increase in width in a wedgelike shape from the free ends of the longitudinal arms, that is, from the ends thereof which are connected by the crosswebs of the particular clamping member and which are first slipped over the papers to be clamped together. By thus being spaced from this entering end of the clip, the projection will not at such a time hook into the edges of the papers, but these edges will slide along the wedge-shaped edges of the projections and will be guided by the latter into the free narrow slot between the most projecting part of the projections and the arms of the other clamping member until the papers are firmly gripped between the two clamping members of the clip.

If desired, the projections may also be tapered at both ends or be made of a similar shape. For increasing the grip upon the papers, the clamping edges of the projections may be roughened or serrated.

The objects, features, and advantages of the invention will become more clearly apparent from the following detailed description thereof which is to be read with reference to the accompanying drawings, in which:

FIGURE 1 shows a longitudinal view of the paper clip according to a first embodiment of the invention;

FIGURE 2 shows a cross section taken along line 2—2 of FIGURE 1 but with the clip being slipped upon a thin flexible sheet of paper or the like;

FIGURE 3 shows a cross section similar to that according to FIGURE 2, but in which the clip is applied upon a thick cardboard or a small stack of paper sheets;

FIGURES 4 to 7 show longitudinal views of one half of each of four modifications of the invention; while

FIGURE 8 shows a cross section taken along line 8—8 of FIGURE 7.

In the drawings, and first referring particularly to FIGURE 1, the clip according to the invention is cast of a suitable plastic and consists of an outer clamping member **10** with two arms **10***a* and **10***b* extending in the longitudinal direction of the clip which are connected at the lower ends by a curved crossweb **10***c* of a greater width to form a U-shaped structure, and of an inner clamping member **11** with longitudinal arms **11***a* and **11***b* which are likewise connected at their lower ends by a curved crossweb **11***c* which is also preferably of a greater width. At their upper ends opposite to the crosswebs **10***c* and **11***c* the longitudinal arms of the two clamping members **10** and **11** are connected to each other by further curved crosswebs **12***a* and **12***b* which preferably are likewise of a greater width. The entire clip is thus formed by one closed endless strand.

The rod-shaped arms **10***a*, **10***b*, **11***a*, and **11***b* preferably have in general a circular cross section, while the crosswebs **10***c*, **11***c*, **12***a*, and **12***b* have an elongated cross section of a thickness equal to the diameter of the arms. If desired, the arms of the clamping members may, however also have an oval or angular cross section, for example, one which is substantially square or rectangular.

According to the invention, the longitudinal arms of one of the two clamping members, preferably of the outer member **10**, are provided with leaflike projections **13***a* and **13***b* which are preferably cast integral therewith and are diposed substantially within the plane of the clip, facing toward the opposite arm of the other clamping member, for example, the inner one. These projections preferably have a thickness smaller than the diameter of the arms

and extend, for example, along a distance *e* which is shorter than the length of the arms **10***a* and **10***b* and may amount, for example, to ½ to ¾ of their length, thereby leaving the portions f_1 and f_2 of the longitudinal arms free of projections so that, when a torque is exerted upon these projections **13***a* and **13***b*, it will twist the arms about their longitudinal axes. The projections **13***a* and **13***b* are wedge-shaped increasing in width from the side of the lower crossweb **10***c*, and they extend within the plane of the clamping member so that between each projection and the opposite arm **11***a* or **11***b* of the other clamping member **11** which is bare of projections, the wedge-shaped edge **14** defines a gap **15** which decreases in width toward the upper end of the clamping members and terminates in a narrow slot **15***a* of a width which is preferably smaller than the diameter of the arms of the clamping members.

If desired, the wedge-shaped edge **14** may also be serrated, for example, as indicated at **16** at the right side of FIGURE 1.

In FIGURE 2 it is assumed that the paper clip is slipped only over a relatively thin flexible sheet of paper or the like. The projections **13***a* and **13***b* then remain substantially in their normal inactive position within the plane of the clip.

If, however, as illustrated in FIGURE 3, the paper clip is to be applied upon a relatively thick flexible piece **18** consisting, for example, of a small stack of pages which are to be fastened together, the resistance produced by this stack when the clip is slipped thereon causes the projections **13***a* and **13***b* to be turned in the opposite directions as shown by the arrows x_1 and x_2, so that the longitudinal arms **10***a* and **10***b* will be subjected to torsion. This torsion is exerted primarily upon the sections f_1 and f_2 of arms **10***a* and **10***b* which are free of the projections. Owing to the resilient pivoting of the projections, they will then exert upon the paper stack **18** a pressure in the direction opposite to the arrows x_1 and x_2 which increases in accordance with the size of the angle to which they are pivoted. In accordance with this angle, the size of the gap **15** between the projections and the arms of the inner clamping member **11** is also enlarged. The stack of papers **18** is thus clamped tightly in this enlarged gap between the projections and the arms of the inner clamping member, whereby any tendency of the clip to slide longitudinally relative to the stack **18** will also be strongly resisted. This resistance may be further increased if the wedge-shaped edges **16** are provided with the serrations **16**. The wedgelike shape of these edges facilitates the insertion of papers into the clip in the direction of the arrow *y*.

In the embodiment of the invention as illustrated in FIGURE 4, in which only one half of each clamping member **110** and **111** is shown, each of the two arms of the outer clamping member **110** is provided with two thin wedge-shaped or similar projections **113***a* and **113***b* which are disposed behind each other in the longitudinal direction of the clip and the farthest inwardly projecting points of which are spaced from the associated arm of the inner clamping member **111** to define two narrow slots **115***a* and **115***b*. If desired, the projection **113***b* may also be made of a uniform or substantially uniform width along its entire length.

By subdividing the projections into several projections on each arm of the outer clamping member, it is possible to increase the resilience of these arms in the direction in which the torsion is exerted thereon. By doubling the number of projections which act like barbs upon the stack of papers which are held together by the clip, the clamping or gripping effect of the clip upon this stack will also be improved and the resistance of the clip against sliding off the papers will also be considerably increased.

According to the further modification of the invention, as illustrated in FIGURE 5, the projections **213** on the arms of the outer clamping member **210** are wedge-shaped

toward both ends so as to form the inclined edges **214** and **214***a*, while according to FIGURE 6, the projections **313** form at first a wedge-shaped edge **314** tapering outwardly from the arms of the clamping member **310** in the direction in which a stack of papers is slipped into the clip, and then a second section **314***a*, the edge of which extends substantially parallel to the arms of both clamping members **310** and **311** so that narrow slots **315***a* of a considerable length are formed between the adjacent arms of both members. The clamping edges of these projections, and especially those of the section **314***a* may again be serrated or roughened.

FIGURES 7 and 8 finally show a simplified modification of the invention, in which the projections **413** are formed by enlargements in width of the arms of the outer clamping member **410** which are bent inwardly toward the arms of the inner clamping member **411** so that a relatively long narrow slot **415** with tapered portions **414** at each end is formed between the clamping edge of each arm of the outer member **411** and the adjacent arm of the inner clamping member **411**.

The projections on the clamping arms may also be made of any other desired shape as long as they produce the desired effect of an additional resilient clamping action between them and the clamping arms. Although as previously described these projections are preferably provided on the arms of the outer clamping member, they may, instead, also be provided on the outer side of the arms of the inner clamping member, in which case the arms of the outer member are preferably made smooth to facilitate the insertion of a stack of papers between the outer and inner arms. The present invention is also not limited to paper clips which are made of plastic but it may also be applied to clips of other materials, for example, of metal.

Although my invention has been illustrated and described with reference to the preferred embodiments thereof, I wish to have it understood that it is in no way limited to the details of such embodiments, but is capable of numerous modifications within the scope of the appended claims.

Having thus fully disclosed my invention, what I claim is:

1. A paper clip of resilient material comprising, in combination, three leg portions arranged transversely spaced from each other; transverse connecting portions integrally connecting said leg portions at ends thereof to each other, said portions extending in unstressed condition of said clip substantially in one plane and said connecting portions connecting said leg portions to each other so that at least one of said leg portions can be twisted about the connecting portion connecting said one leg portion to an adjacent leg portion out of said plane; and at least one leaf-like wedge-shaped projection formed on one of said leg portions, having a thickness smaller than the leg portion on which it is formed and projecting from the leg portion on which it is formed toward a leg portion adjacent thereto to define therewith a gap tapering toward the connecting portion which connects the leg portion on which the projection is formed to the leg portion adjacent thereto, whereby, when papers are clamped together by said paper clip, said leaf-like projection will be turned out of said plane and apply a torsional moment to the leg portion to which it is connected creating thereby torsional forces increasing the clamping pressure of said clip.

2. A paper clip of resilient plastic material comprising, in combination, an outer substantially U-shaped clamping member having a pair of outer longitudinal leg portions and an outer transverse base portion connecting said pair of outer longitudinal leg portions at one of the ends thereof to each other, and an inner substantially U-shaped clamping member having a pair of inner longitudinal leg portions and an inner transverse base portion connecting said pair of inner longitudinal leg portions at one of the

ends thereof to each other, said portions being located in unstressed condition of said clip substantially in one plane with said inner U-shaped clamping member located within said outer U-shaped clamping member and said inner and outer leg portions spaced from and substantially parallel to each other; a pair of connecting portions respectively connecting the free ends of said outer leg portions to the free ends of the inner leg portions adjacent thereto so that said portions form an endless member; and a pair of thin leaf-like, wedge-shaped projections respectively integrally formed with two of said longitudinal leg portions and projecting therefrom toward the leg portion adjacent thereto to form between a free longitudinal edge thereof and the leg portion adjacent thereto a gap tapering toward the respective connecting portion, whereby, when papers are clamped together by said paper clip, said projections will be turned out of said plane and apply torsional moments to the leg portions to which they are connected creating thereby torsional forces increasing the clamping pressure of said clip.

3. A paper clip as set forth in claim 2 in which the leg portions on which said projections are formed have a substantially circular cross section and in which said projections have a thickness substantially smaller than the leg portions on which they are formed.

4. A paper clip as set forth in claim 2 in which said free edge portion of said leaf-like, wedge-shaped projection includes with the axis of the leg portion on which it is formed a small acute angle.

5. A paper clip as set forth in claim 2 in which at least one of said projections is formed along at least part of the free edge thereof with serrations.

6. A paper clip as set forth in claim 2 in which said projections are formed only on said outer leg portions.

7. A paper clip as set forth in claim 2 in which said free edge portion of said leaf-like, wedge-shaped projection includes with the axis of the leg portion on which it is formed a small acute angle up to the smallest width of said gap while the edge portion of the projection facing said connecting portion includes with said axis an angle of substantially 90° so as to form a sharp corner on said projection at the smallest width of said gap.

8. A paper clip as set forth in claim 7 in which two projections forming said sharp corner are arranged longitudinally spaced from each other on each of said outer leg portions.

9. A paper clip of resilient plastic material comprising, in combination, an outer substantially U-shaped clamping member having a pair of outer longitudinal leg portions and an outer transverse base portion connecting said pair of outer longitudinal leg portions at one of the ends thereof to each other, and an inner substantially U-shaped clamping member having a pair of inner longitudinal leg portions and an inner transverse base portion connecting said pair of inner longitudinal leg portions at one of the ends thereof to each other, said portions being located in unstressed condition of said clip substantially in one plane with said inner U-shaped clamping member located within said outer U-shaped clamping member and said inner and outer leg portions spaced from and substantially parallel to each other; a pair of connecting portions respectively connecting the free ends of said outer leg portions to the free ends of the inner leg portions adjacent thereto so that said portions form an endless member; and a pair of thin leaf-like, wedge-shaped projections respectively integrally formed with said outer longitudinal leg portions and projecting therefrom toward the inner leg portion adjacent thereto to form between a free longitudinal edge thereof and the inner leg portion adjacent thereto a gap tapering toward the respective connecting portion, whereby, when papers are clamped together by said paper clip, said projections will be turned out of said plane and apply torsional moments to the leg portions to which they are connected creating thereby torsional forces increasing the clamping pressure of said clip.

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