Sept. 13, 1960 H. J. MODREY 2,952,343

SUPPORT STRUCTURE FOR SUPPORTING ARTICLES ON PERFORATED SHEET MATERIAL

Filed May 6, 1958 4 Sheets-Sheet 1

FIG. 22

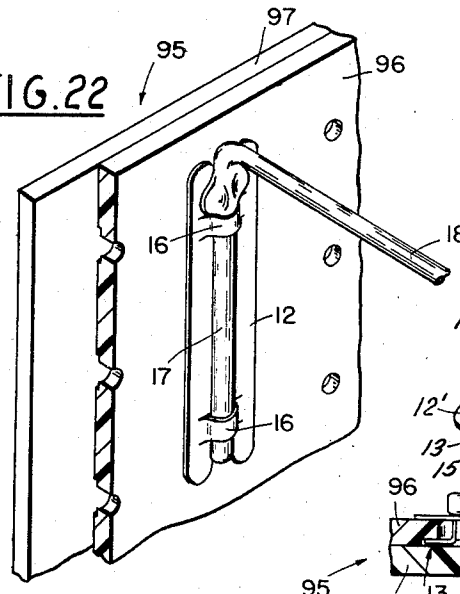


FIG. 1

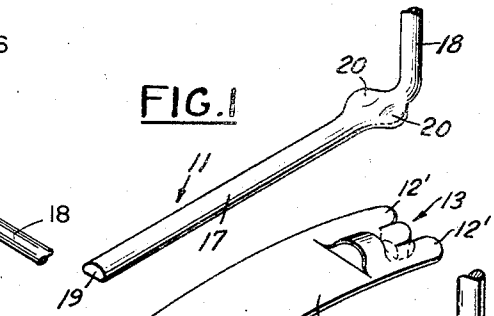


FIG. 2

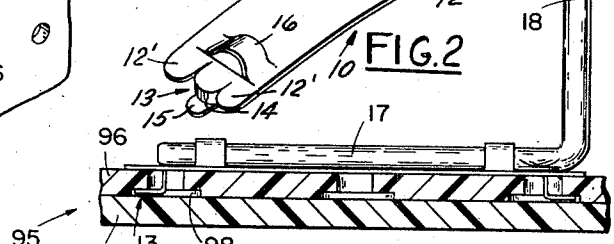


FIG. 23

FIG. 21

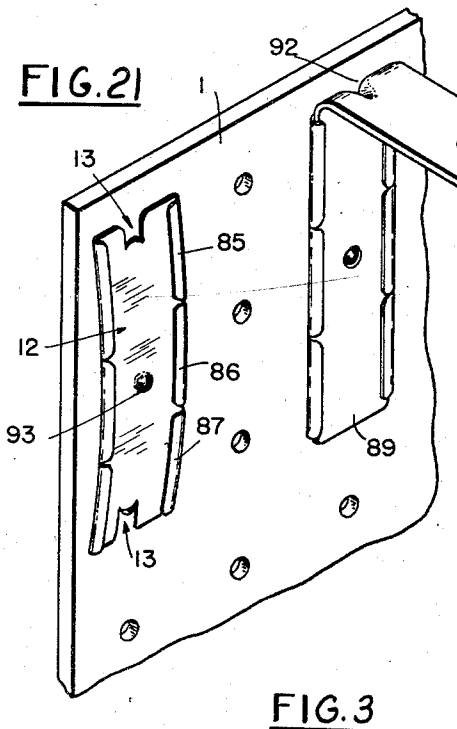
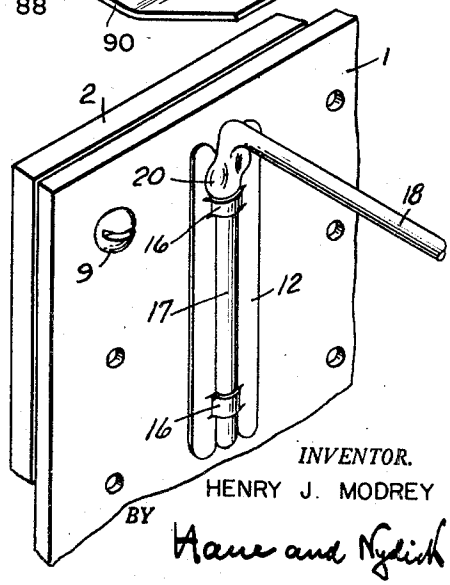


FIG. 3



INVENTOR.
HENRY J. MODREY
BY Hane and Nydick
ATTORNEYS

Sept. 13, 1960 H. J. MODREY 2,952,343

SUPPORT STRUCTURE FOR SUPPORTING ARTICLES ON PERFORATED SHEET MATERIAL

Filed May 6, 1958

4 Sheets-Sheet 2

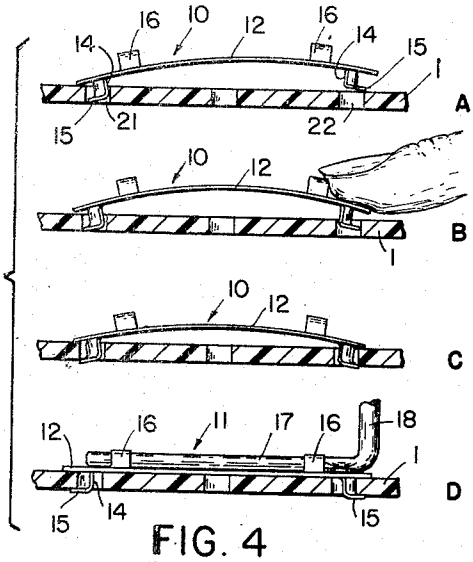


FIG. 4

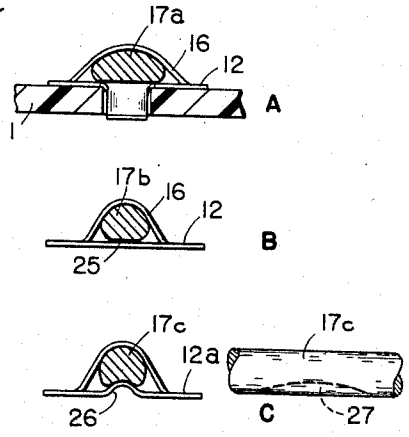


FIG. 6

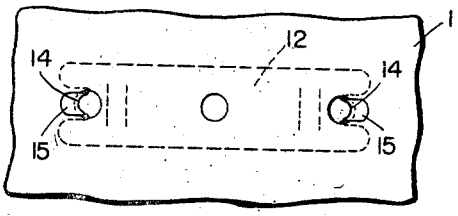


FIG. 5

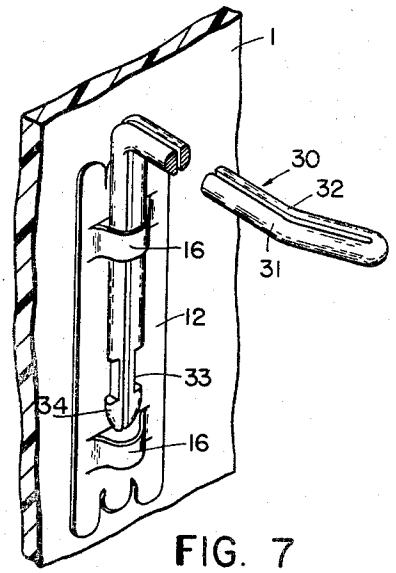


FIG. 7

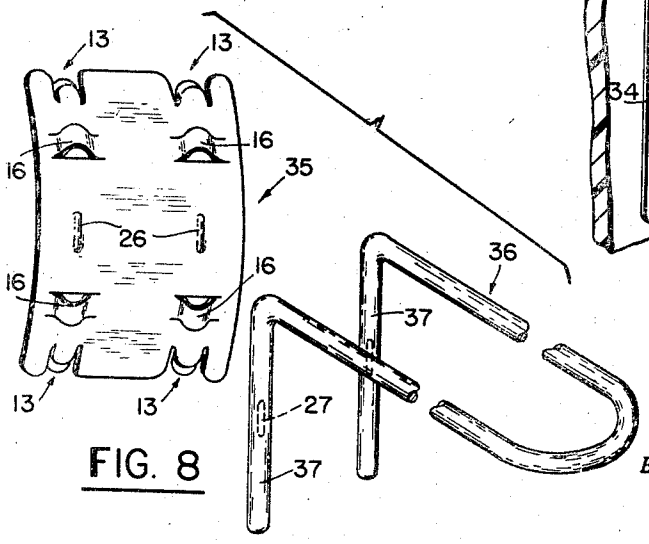


FIG. 8

INVENTOR.
HENRY J. MODREY

BY Hane and Kydick

ATTORNEYS

Sept. 13, 1960 H. J. MODREY 2,952,343

SUPPORT STRUCTURE FOR SUPPORTING ARTICLES ON PERFORATED SHEET MATERIAL

Filed May 6, 1958 4 Sheets-Sheet 3

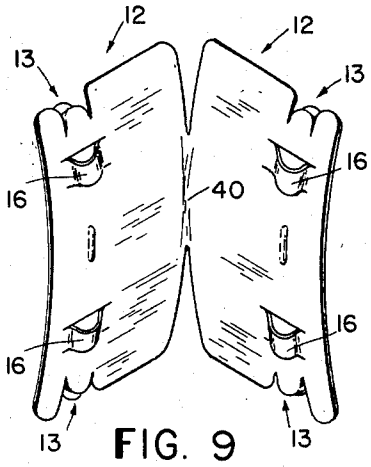


FIG. 9

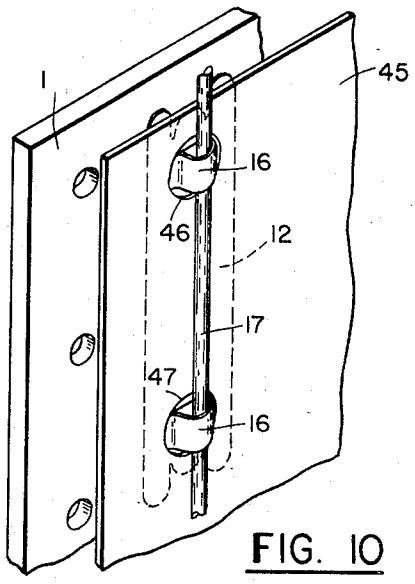


FIG. 10

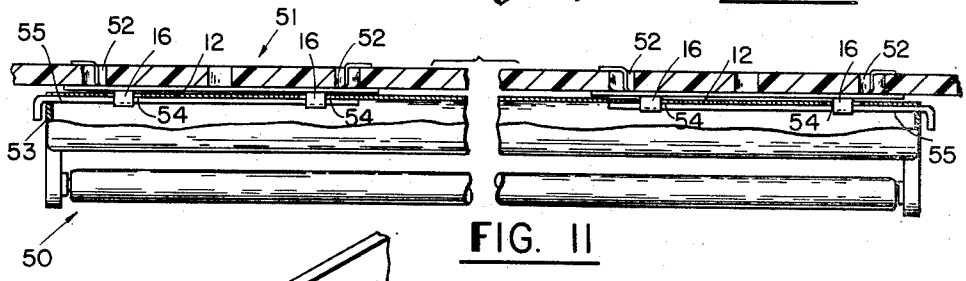


FIG. 11

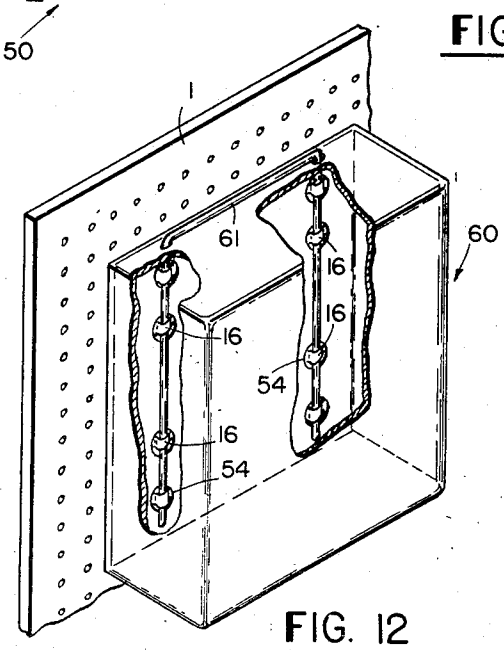
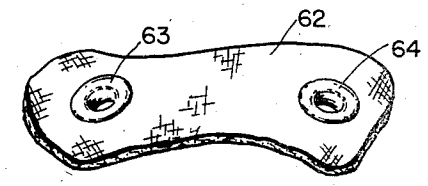


FIG. 12



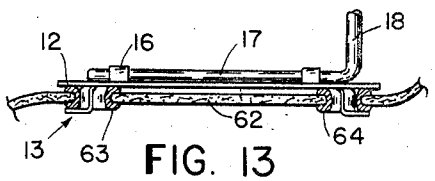


FIG. 13

INVENTOR.
HENRY J. MODREY
BY Hane and Nydick
ATTORNEYS

Sept. 13, 1960 H. J. MODREY 2,952,343

SUPPORT STRUCTURE FOR SUPPORTING ARTICLES ON PERFORATED SHEET MATERIAL

Filed May 6, 1958 4 Sheets-Sheet 4

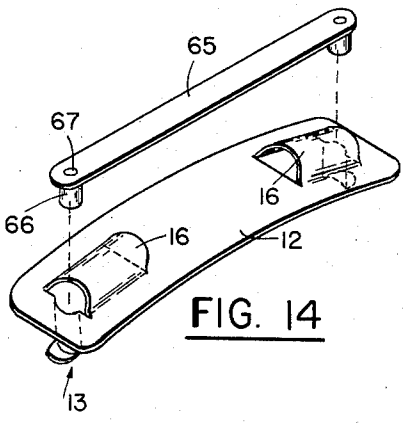


FIG. 14

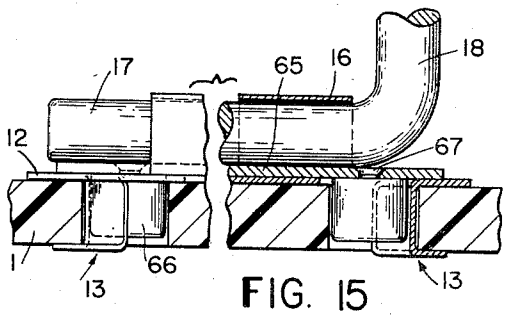


FIG. 15

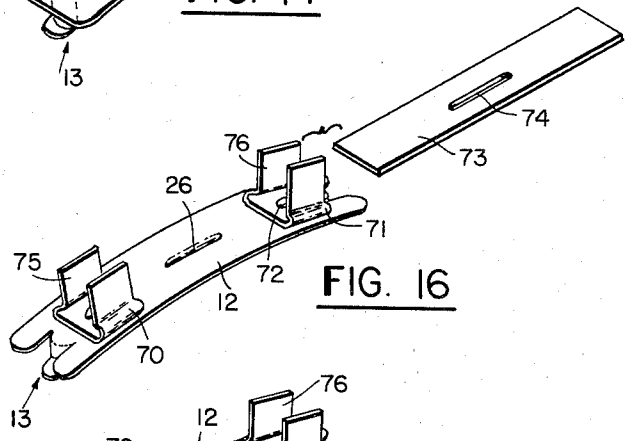


FIG. 16

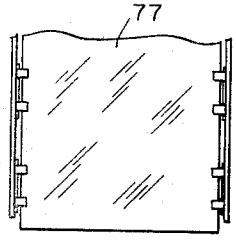


FIG. 17

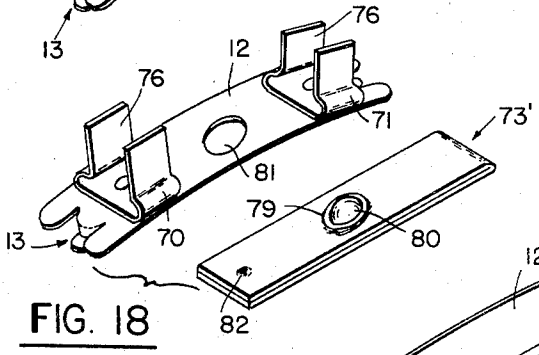


FIG. 18

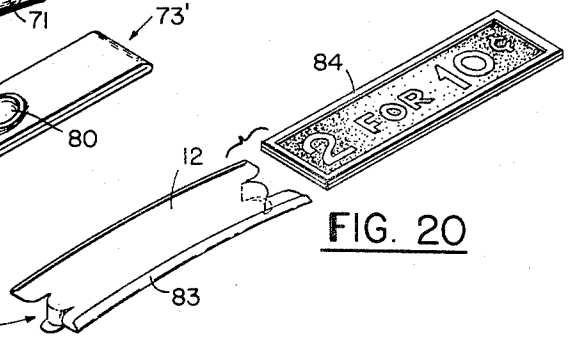


FIG. 20

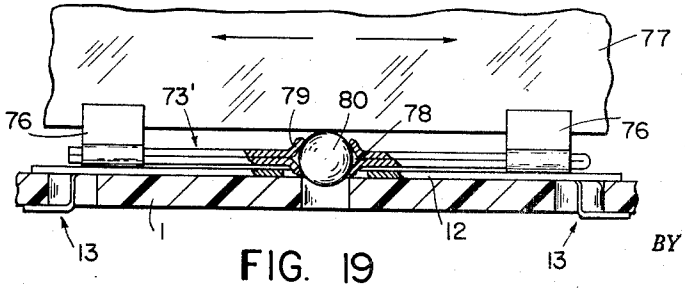


FIG. 19

INVENTOR.
HENRY J. MODREY
BY Hauer and Nydick
ATTORNEYS.

United States Patent Office 2,952,343
Patented Sept. 13, 1960

2,952,343

SUPPORT STRUCTURE FOR SUPPORTING ARTICLES ON PERFORATED SHEET MATERIAL

Henry J. Modrey, Eagle Drive, Stamford, Conn.

Filed May 6, 1958, Ser. No. 733,282

23 Claims. (Cl. 189—36)

The present invention relates to a detachable support structure for supporting articles on apertured or perforated sheet material.

The term "sheet material" as herein used refers to both sheets and boards of any configuration. The material may be cut from fibrous material such as hardboard, plywood, metal, etc. The apertures may be disposed in any distribution, but rows are generally provided.

There are known several article supporting structures of the general kind above referred to, which terminate at one end in a hook portion which is inserted in a selected one of the apertures of the sheet material. Such an attachment of the support structure is inherently rather unstable and the supports are especially likely to become dislodged when the support is slightly lifted as often occurs when an article is removed from the support. Furthermore, the insertion of a hook portion in an aperture and the thickness necessary to lend sufficient strength to the hook require considerable clearance on the side of the board or sheet opposite the side of the insertion which entails that spacers or furring strips must be interposed between the sheet material proper and the wall on which it is mounted.

It is an object of the present invention to provide a novel and improved article supporting structure which can be rapidly and positively locked to any selected two apertures of the sheet material and which can be equally rapidly detached from the sheet material. Such positive locking affords the advantage over support structures as heretofore known that the support structure and the articles supported by it will not become accidentally dislodged.

It is also an object of the invention to provide a novel and improved article supporting structure which does not require either for insertion or removal an appreciable clearance behind the sheet material. As a result, the aforementioned spacers or furring strips are no longer required, but the perforated sheet material can be mounted flat upon a supporting wall for instance, by simply nailing or screwing it to a wall.

Another object of the invention is to provide as supporting wall for the article supporting structure according to the invention, a laminated wall, one layer of which is a solid sheet and another is an apertured sheet, the apertures in which are slightly countersunk on the side facing the solid sheet to provide the minimal space required for mounting the structures of the invention. This affords the advantage that an outer wall or partition wall and the article supporting sheet material can be installed as a unitary structure and in a single operation thereby materially reducing the cost of an installation.

Another object of the invention is to provide a novel and improved support structure of the general kind above referred to, which is attachable to perforated sheet material by simply fitting a mounting component of the structure in any two selected apertures—an operation

which does not require any tools or mechanical skill—and which will lock itself automatically and positively to the sheet material when the assembly of the structure is completed by the insertion of an article supporting locking component in the mounting component. The removal of the mounted support structure from the sheet material is equally simple. Withdrawal of the article supporting component will unlock the mounting component and with it the entire support structure.

Still another object of the invention is to provide a novel and improved support structure which permits the use of a nearly infinite variety of designs and shapes of the article supporting locking component of the structure. This component may be designed to maintain a fixed angular position relative to the sheet material or to swivel relative thereto. It may be made of flat or rounded stock. The locking component as such may also constitute an article in itself or part of an article, for instance, a name plate or a price tag.

It is a further object of the invention to provide a novel and improved support structure which is releasably but positively attachable to perforated sheet material and which is suitable as a mounting for containers, panels, lighting fixture bases, displays, fabrics, etc. The aforementioned and numerous other items may be equally well suspended from an overhead structure such as a ceiling, supported on a vertical wall, or rest upon a horizontal base. In each installation, the respective item is locked to the supporting surface or released therefrom by the assembly or disassembly of one or several support structures according to the invention.

It is a still further object of the invention to provide a novel and improved support structure which can be releasably but positively attached to perforated sheet material and which when thus attached constitutes a guide track for guiding a sliding panel, glass plate, door or other similar item.

It is also an object of the invention to provide a novel and improved support structure which when mounted is substantially shock and vibration proof so that it lends itself to use on vehicles or on aircraft.

It is still a further object of the invention to provide a novel and improved support structure which can be inexpensively manufactured by typical mass production operations such as punching or stamping.

Other and further objects, features and advantages of the invention will be pointed out hereinafter and set forth in the appended claims constituting part of the application.

The basic concept of the invention resides in providing a support structure which is releasably but positively attachable to perforated sheet material by forcing a flexible member such as a springy strip or clip from a normally flexed or bent configuration into a substantially straight configuration and by utilizing the resulting elongation of the spatial distance between two locking elements on said member to move the two elements from positions just fitting through two selected apertures in the sheet material into positions underlying the rims of the apertures thus locking the member to the sheet material. The flexible member is forced from the flexed condition into a straight condition by a straight locking member which may also constitute a carrier for articles to be supported, or the article itself.

In the accompanying drawing, several preferred embodiments of the invention are shown by way of illustration and not by way of limitation.

In the drawing:

Fig. 1 is a perspective view of a locking member of a support structure according to the invention.

Fig. 2 is a perspective view of the mounting member of the support structure of Fig. 1.

Fig. 3 is a perspective view of the support structure of Figs. 1 and 2 attached to a perforated board.

Fig. 4 shows in four sectional views designated A through D the sequence of steps involved in the mounting of a support structure according to the invention.

Fig. 5 is a bottom view of Fig. 4D.

Fig. 6 shows in three modifications designated A, B and C the article supporting locking member and the corresponding configuration of the mounting member.

Fig. 7 is a perspective view of a support structure with a substantially shock and vibration proof article supporting member.

Fig. 8 is a perspective view of a support structure, the article supporting component of which is positively secured against swiveling and affords a comparatively broad and strong gase for supporting a heavy article.

Fig. 9 is a perspective view of a mounting member of the supporting structure designed for mounting in a corner.

Fig. 10 is a perspective view showing the use of the support structure according to the invention for mounting a wall member on perforated sheet material.

Fig. 11 is a sectional view which illustrates the suspension of a lighting fixture by means of a support structure of the kind shown in Fig. 10.

Fig. 12 is a perspective view showing the utilization of a support structure according to Fig. 10 for attaching a container to perforated sheet material.

Fig. 13 is a perspective view showing the attachment of a support structure according to the invention to fabrics such as canvas having holes for the purpose.

Fig. 14 is a perspective view of a mounting member of the structure of the kind shown in Fig. 2 and of a safety clip coacting with the mounting member to increase the strength of the locking action and thus the load carrying capacity of the support structure.

Fig. 15 is a sectional view on an enlarged scale of a support structure including the safety clip of Fig. 14.

Fig. 16 is a perspective view of a support structure designed for mounting panels and similar plate-shaped components.

Fig. 17 shows a glass plate mounted with supports according to claim 16.

Fig. 18 is a perspective view of a support structure designed for use as a guide track for slidable panels, doors, glass plates, etc.

Fig. 19 is a sectional view on an enlarged scale showing a support according to Fig. 18 mounted as a guide track.

Fig. 20 is a perspective view of a support, the locking member of which is designed to receive a name plate, price tag or similar item.

Fig. 21 is a perspective view of a support structure both components of which are made of flat stock.

Fig. 22 is a perspective view, partly in section, showing the mounting of a support structure according to the invention on laminated material one layer of which is perforated to receive the support structure, and

Fig. 23 is a sectional view on an enlarged scale of the laminate according to Fig. 22 and the support mounted thereon.

Turning now to Figs. 1 through 5 which show a support structure according to the invention, a perforated sheet or board **1** is mounted on a wall **2**. The support structure of the invention does not require an appreciable space between sheet **1** and wall **2** and as a result sheet or board **1** can be mounted flat on wall **2** for instance by simply nailing or screwing the perforated sheet to the wall, a fastening screw **9** being shown. The inherent flexibility of the sheet material between points at which it is nailed or screwed to its supporting wall provides ample space for mounting the support structure.

The support structure according to the invention com-

prises a mounting member **10** and a locking member **11**. The mounting member comprises a flexible clip or strip **12** made of suitable springy material such as metal for instance by stamping, and curved about a crosswise or transverse line to have the slight curvature clearly shown in Fig. 2. From the concave side of the spring extends at or near each end thereof a locking element **13**. This locking element is shown in the form of a shoe having a leg portion **14** and a terminal portion **15** extending substantially parallel to the plane of strip **12**. Each leg portion has preferably a rounded cross section the radius of which corresponds to the radius of the aperture in which strip **12** is to be fitted. The concave sides of the two leg portions **14** face in opposite direction. Shoes **13** are preferably formed so that tongues **12'** protrude on each side of the shoe for a purpose which will become evident from the subsequent description. The longitudinal spacing of the shoes and the dimensions thereof are so selected that the shoes including the lateral terminal portions **15** will just fit through any two apertures of the sheet material. Sometimes it may be advantageous to provide a spacing of the shoes such that a slight increase in the curvature of strip **12** is required to fit the shoes through the apertures. In this connection it may be mentioned that the two apertures may be disposed horizontally, perpendicularly or diagonally. The support according to the invention permits full freedom in that respect. The apertures need not be adjacent, but several apertures may be spanned by strip **12** depending upon the length thereof. As a matter of fact all that is necessary for mounting the support structure of the invention is that there are two apertures through a sheet which fit the spacing of shoes **13**.

Mounting strip **12** has on its convex side retaining means which are shown as a pair of longitudinally spaced hoops **16** forced or lanced out of the material of the strip. It is also possible to provide more than two hoops or a single longitudinally elongated hoop.

The locking member **11** is shown as a rod or sufficiently rigid wire which has a substantially straight portion **17** continued in a portion **18** which may have any configuration suitable for its specific purpose, such as supporting an article. As the configuration of rod portion **18** is not essential for the understanding of the invention it is shown in fragmentary form only. Rod portion **17** may be made of round stock but may also be flattened at **19** to retain the article supporting portion **18** in a fixed angular position relative to the mounting strip **12** and to sheet **1**. In order to steady the rod further relative to the mounting member the rod portion **17** is partly flattened to form ears **20** which also limit the depth of insertion of rod portion **17** through hoops **16**. Turning now to Fig. 4, this figure shows the mounting of strip **12** in four stages.

Fig. 4A shows as the initial step of the mounting the left hand shoe of strip **12** inserted in a selected aperture. Fig. 4B shows the insertion of the second shoe by applying downward pressure to strip **12** just above the second shoe. If it is found that the spatial distance between the two shoes is slightly wider than the spacing between the two apertures, the second shoe is simply pushed slightly toward the shoe already inserted thereby correspondingly increasing the curvature of strip **12** and correspondingly shortening the spatial distance between the shoes.

Fig. 4C shows both shoes inserted in apertures but not locked in the same. As will be noted, the forward edge of shoe portion **15** is still within the perimeter of the aperture. Fig. 4D shows the completion of the mounting by inserting locking rod **11**. Tongues **12'** now rest flat upon the sheet material **1**.

As is evident, the insertion of rod portion **17** through both hoops will force strip **12** from its curved position into a flat position. The flattening of the strip causes a

corresponding elongation of the spatial distance between the locking shoes whereby lateral shoe portions **15** are forced into a position underlying the rim of apertures **21** and **22** and the curved leg portion **14** into a position hugging the corresponding wall portions defining apertures **21** and **22**. The mounting strip is now safely and positvely locked in apertures **21** and **22** and will remain so locked until the locking rod **11** is withdrawn. At the same time the locking rod is frictionally retained in the hoops by the recoil pressure of springy strip **12**.

To release the supporting structure all that is necessary is to withdraw the locking rod. Neither the locking operation nor the release operation of the support requires any tools or mechanical skill on the part of the user.

Fig. 6 shows in three detail figures, A, B and C designs for retaining the locking and article supporting rod **11** in or returning into the right angle position relative to mounting strip **12**.

According to Fig. 6A rod portion **17***a* is considerably flattened thereby positively securing the locking rod against turning.

Fig. 6B shows a more rounded portion **17***b* which is flattened for instance by grinding or by a press operation at **25**. The design of Fig. 6B permits turning of the rod, but the spring action of hoops **16** in conjunction with the flattened rod portion **25** will tend to return the rod portion into the right angle position, or in other words, the design of Fig. 6B is self-centering.

According to Fig. 6C mounting strip **12***a* has a raised pip or longitudinal ridge **26** which coacts with a corresponding groove in an otherwise round rod portion **17***c*. The rod in the design of Fig. 6C can be turned by force but it is spring held in the right angle position. The proper right angle position and depth of insertion of the rod will be indicated by an audible click when the pip or ridge engages the groove.

Fig. 7 shows an arrangement in which the locking rod is positively retained within the hoops **16** of the mounting strip. To this end locking rod **30** is shown formed of doubled springy cotter pin wire generally of D-shaped cross section in the manner of a cotter pin. The rod thus formed is undercut near its end at **33**, and the tip of the rod is preferably tapered at **34** to facilitate passage of the tip of the rod through the hoops. When the rod is fully pushed home recess **33** will lock with the second or lower hoop **16** whereby the rod becomes positively latched to the mounting strip. In contrast to the previously described arrangements in which the locking rod can be pulled out against the frictional force by which it is retained, the locking rod of Fig. 7 can be removed only by pressing together the two wire or rod portions **31** and **32**. Otherwise the function of the support structure according to Fig. 7 is the same as has been previously described and will be evident. It will also be evident that the support structure of Fig. 7 is shock and vibration proof and cannot be accidentally dislodged even by a forceful upward push. The design is thus suitable for use in locations subjected to vibrations such as vehicles or aircraft.

Fig. 8 shows a double mounting strip **35** designed to be mounted in four perforations. Accordingly the strip has four locking elements **13** and four retaining means shown as hoops **16**. The details of the locking shoes and retaining means are the same as previously described. The article supporting locking member **36** has accordingly two legs or straight rod portions **37** which are insertable in the hoops to flatten the strip as was previously described. There is no need to secure the locking member **36** against turning, but a pip or ridge **26** coacting with a longitudinal groove **27** as described in connection with Fig. 6C may be provided to secure the locking and support member **36** against dislodgement by an accidental upward push and also to indicate the correct position of member **36** by the aforementioned click. The design is particularly suitable for heavy loads.

Fig. 9 shows a design for fastening two perforated sheets, partition walls or boards having each at least two suitably spaced perforations to each other at a desired angle by means of a structure according to the invention.

According to Fig. 9 two mounting clips **11** of the kind previously described are joined along one edge at **40**. The two strips are shown as defining a 90° angle but of course they may define any other desired angle. The two strip halves are each secured to the respective sheet or wall (not shown) by inserting a straight locking rod through hoops **16** as previously described. In this design the locking rod may also be designed and used to support an article but it may also be used only for securing the mounting strips to the perforated sheet, or in other words, in this design the rod may perform its locking function only and not its article supporting function.

The concept of using the locking member as a locking component only rather than as an article supporting component also is carried forward in the subsequent figures although it should be understood that in each design the locking rod may serve both aforementioned functions. According to the design of Fig. 10 the support structure is used to fasten a panel or board **45** to the sheet material. To this end, panel **45** has two apertures **46** and **47** to receive hoops **16**. The height of the hoops in this design must of course be such that the part of the hoops protruding from openings **46** and **47** is sufficiently wide to accommodate the straight rod portion **17**. As is evident, insertion of rod portion **17** through the protruding hoop parts will flatten mounting strip **12** thereby causing the locking engagement of the locking shoes of strip **12** with the sheet material and the locking rod will press panel **45** against the mounting strip. As a result, the mounting panel is safely and positively locked to the mounting strip and through it to the sheet material **1** until the locking rod **17** is removed. In this connection it should be mentioned that the length of the rod portion **17** may be such that the rod portion can be inserted through the hoops of several aligned mounting strips.

Fig. 11 shows an arrangement in which the concept of Fig. 10 is used to mount an implement or appliance flush to a perforated wall which may either be a perpendicular wall or a horizontal wall upon which the article to be mounted rests or from which it is to be suspended. More specifically, Fig. 11 shows the suspension of the base of a fluorescent lighting fixture **50** from a ceiling **51**. For this purpose, the ceiling is shown as having four apertures **52** but may be visualized as a perforated ceiling. The base **53** of the lighting fixture is shown as having in its bottom wall appropriately spaced holes **54** through which protrude the hoops **16** of the two mounting strips **12** of the kind previously described. Two locking rods **55** or a single rod of appropriate length is pushed through the hoops to mount the lighting fixture on the ceiling as has been previously described for the mounting of panel **45**. As may be observed, the rods are pushed in sideways thus permitting flush mounting. Instead of rods long screws may be used. The threads in the screws increase friction and make them more difficult to withdraw. If the threads are coarse enough the screws will move properly because the springy hoops form a primitive nut. In other words, the screws are self-retaining. All that is necessary to release the lighting fixture from the ceiling is to withdraw rods **55**. The only change that need be made in the fixture are holes **54** which may be drilled or punched in the bottom of the base.

In the structure of Fig. 12 the principle of Figs. 10 and 11 is used to mount a box **60** or other container to a perforated panel or board **1**. Depending upon the weight of the box and its contents one or several mounting strips may be provided. There are shown four mounting strips, only the hoops **16** of which are visible. The mounting strips and thus the box are locked to panel **1** as previously

described by the insertion of the locking members in the form of rods or long screws. The locking means for the four pairs of hoops are shown as a U-shaped rod **61**, but individual locking rods may of course also be provided. As is further evident, more or less than two rows of mounting strips may be installed depending upon the weight to be supported as previously mentioned. The structure of Fig. 12 lends itself to quick attachment of motors, switch gear, electrical apparatus, tool boxes, etc., to perforated sheet material. The box and its contents can be equally quickly released from the supporting wall by withdrawal of U-lock **61**.

Fig. 13 shows the utilization of the support structure according to the invention for the attachment of items to flexible material such as canvas, plastic and similar material.

To attach a support to the canvas **62** or similar flexible material two appropriately spaced eyelets **63** and **64** are provided in the canvas to give the necessary strength to the material. These eyelets serve the same functions as the perforations in the afore-referred to sheet material. In other words, the canvas or similar material constitutes in effect sheet material within the scope of the present invention. A mounting strip **12** having a pair of locking shoes **13** and retaining means in the form of two hoops **16** is pressed into the eyelets as previously described and secured to the canvas by insertion of the locking rod portion **17**. The portion **18** may serve to support articles or may also be designed to constitute an article itself.

As is apparent from an analysis of the previously described exemplifications of the invention the tensile strength with which a locked mounting strip according to the invention resists to being pulled out is determined by the resistance of the shoes against flattening of the lateral shoe portion **15**. Figs. 14 and 15 exemplify a further development of the invention which permits a very considerable increase of the tensile strength of a locked mounting strip without increasing the overall dimensions of the support proper. The mounting strip **12** and the locking rod are the same as shown for instance in Fig. 2 and also function in the same manner. The increase in tensile strength is attained by providing a safety means in the form of a strip **65** from which depend two studs **66** secured to the strip by rivet **67** or other suitable means. The spacing of the studs and the diameter thereof are so selected that the studs will fit the two apertures in which the shoes **13** of the mounting strip are inserted as can be clearly seen in Fig. 15. The safety clip is inserted after the shoes of the mounting strip are inserted in the apertures by slipping the safety clip through the hoops. The subsequent insertion of the locking rod will then press down both the safety clip and the mounting strip. As is apparent, the studs effectively resist flattening of the shoes by pull applied to the locking rod.

Tests have shown that the tensile strength is about tripled by the insertion of a safety clip.

In all the previously described figures the retaining means are shown in the form of closed hoops. However, it is not necessary that the retaining means have a closed configuration such as that of hoops. It is only essential that the retaining means are so designed that the insertion of a substantially straight locking member forces the mounting strip from its initial curved configuration into a substantially straight or flat configuration. Accordingly, Fig. 16 shows open retaining means in the form of two longitudinally spaced guide tracks **70** and **71**. The guide tracks may be pressed or stamped out directly from the material of strip **12** or, as shown, they may be separated shaped elements secured to strip **12** for instance by any suitable means such as rivets **72** or by spot welding.

The locking member coacting with the guide channels for flattening strip **12** as previously described, is shown as a flat key **73**. As is evident, insertion of the key in the guide channels will force shoes **13** into the locking position. Key **73** is preferably provided with a longitudinal slot or indentation **74** engageable with ridge **26** on strip **12**. Engagement of the slot and the ridge will indicate by a click the correct positioning of the key and retain the latter within the guide channels. The key may have an attachment for securing articles thereto or it may be used to join two panels or walls in the manner shown in Fig. 9. Furthermore, the open retaining means of Fig. 16 may obviously be used in any of the afore-described exemplifications.

In the embodiment of Fig. 16, the retaining means serve a dual purpose. They are formed with raised lips **75** and **76** which constitute guides for a sliding panel. Fig. 17 shows a panel **77** guided by four supports of the kind shown in Fig. 16.

Figs. 18 and 19 show the use of a support of the kind shown in Fig. 16 which is specifically designed for slidably guiding a sliding panel. The mounting strip **12** and the guide lips are the same as those shown in Fig. 16. To facilitate sliding of the panels locking key **73'** of Figs. 18 and 19 is doubled over and formed with a center hole **78**. The rims of the center hole are bent out in opposite directions at **79** to form a cage for a ball **80**. The ball protrudes through a circular hole **81** in strip **12** into an aperture of the sheet material. The doubled over parts of the key are secured together by any suitable means such as rivet **82**. As is apparent from Fig. 19, the ball constitutes a simple ball bearing for panel **77**. The ball will automatically engage hole **81** and the aperture in sheet **1** when key **73'** is pushed home.

Fig. 20 shows retaining means similar to those of Figs. 16 and 18 but formed in a simplified manner by turning over the longitudinal edges of strip **12** to constitute tracks **83**. Strip **12** of Fig. 20 is straightened during the locking operation by the insertion of a key **84** in the form of a flat metal frame. This frame may serve to receive as indicated a price tag, a name plate, a display, etc. The inserted tag and key are held in position by the springiness of strip **12**.

Fig. 21 shows a support structure similar to those shown in Figs. 16 through 20 in that the retaining means on the convex side of the strip **12** are in the form of guide channels. These guide channels may be separate elements as shown in Figs. 16 and 18, or they may be formed by turning over the longitudinal edges of the strip. Three pairs of track or channel sections, **85**, **86** and **87**, are shown. The three guide channel pairs may be conveniently produced by turning over the edges along the entire length and then notching the turned over edges to permit straightening of the strip. The locking member **88** is shown as a rod made of flat stock having a straight portion **89** and a bent-off portion **90** serving as support for articles, or as a bracket for mounting a fixture or other article. The article may be secured on the bracket **90** by any suitable means such as screws passed through holes **91**. To increase the rigidity of the bracket, an indentation **92** may be pressed in the bent corner of the locking strip **88**. The mounting strip is provided with a raised dimple **93** which engages a hole **94** in strip portion **89** when this portion is pressed home.

The special features hereinbefore described can be transferred to flat-stock fixtures. For example, the double lock shown in Fig. 7 can be paralleled by a flat-stock fixture according to Fig. 21 in which the engagement portion of the fixture is slotted on its center line and provided with two cut-outs on the sides. If this fixture is inserted, it will operate precisely like Fig. 7. The slotted portion will compress during insertion until the cut-outs engage the lower hoop and are retained therein. Conversely, removal requires compression of the slotted portion which disengages the two cut-outs.

In all aforedescribed embodiments of the invention, it has been assumed that the perforated sheet material is secured flat for instance by nailing or screwing to a supporting wall and that the inherent flexibility of the said

material provides the required space for shoe part 15. As is evident, the required space is not more than the thickness of the metal of strip 13, or more specifically of shoe portion 15. Due to this minimal space requirement behind the sheet material, the same may constitute one layer of a laminate 95. Figs. 22 and 23 show a two-layer laminate. Layer 96 is perforated and layer 97 constitutes a solid wall. The two layers are bonded to each other by any suitable means and the space required for shoe portion 15 is provided by countersinking apertures in layer 96 to form a shallow recess 98 which is engaged by shoe part 15 when the support is locked to the laminate as is shown in Fig. 23.

The support structure shown mounted in Fig. 22 is the one of Figs. 2 and 3, but obviously the other exemplified designs can also be used.

The possibility of mounting support structures according to the invention on laminate according to Figs. 22 and 23 affords the advantage that both the perforated wall and the supporting wall, which may be visualized as an outer wall or a partition wall of a building structure, can be erected simultaneously.

While the invention has been described in detail with respect to certain now preferred examples and embodiments of the invention it will be understood by those skilled in the art after understanding the invention that various changes and modifications may be made without departing from the spirit and scope of the invention, and it is intended, therefore, to cover all such changes and modifications in the appended claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. A support structure for releasable attachment to perforated sheet material, comprising a curved springy mounting member, two locking elements depending from the concave side of said member spaced in the direction of the curvature thereof by a distance corresponding to the spacing of two perforations in the sheet material, each of said locking elements fitting through one of said perforations, retaining means on the convex side of said curved member located on both sides of the apex of the curvature thereof and including a keying portion, and a rigid locking member having a curvature less than that of the mounting member and a length at least equal to that of the retaining means in the direction of the curvature, said mounting member being lengthwise slidable into said retaining means from one end thereof and across the apex of the curvature, insertion of the locking member in said retaining means forcing the curved mounting member into a more flattened position and retaining the same in said position, thereby increasing the spatial distance between said locking elements to lock the same in said two perforations.

2. A support structure for releasable attachment to perforated sheet material, comprising a flexible mounting strip curved about a transverse line, a pair of locking elements depending from the concave side of said strip in longitudinally spaced relationship, said locking elements fitting the spacing between the two perforations of said sheet material, retaining means on the convex side of said strip including a keying portion and defining a curved guide path substantially matching the convex curvature of the strip and extending across the apex thereof, and a rigid locking member of less curvature insertable in said guide path from one end thereof and having a length at least equal to that of the guide path, insertion of the locking member in said curved guide path forcing the strip into a more flattened configuration thereby correspondingly increasing the spatial distance between said locking elements, said increase locking the locking elements in said perforations of the sheet material.

3. A support structure for releasable attachment to perforated sheet material, comprising a mounting strip curved about a transverse line, a pair of locking shoes on the concave side of the strip in longitudinally spaced relationship, each of said shoes having a depending leg portion and a terminal portion extending in the longitudinal direction of the strip, said two terminal portions facing in opposite direction and being insertable in two apertures in said sheet material in the curved condition of the strip, retaining means on the convex side of the strip including a keying portion and defining a curved guide path substantially matching the convex curvature of the strip and extending across the apex of said curvature, and a rigid locking member having a length at least equal to that of the guide path and a curvature less than that of the guide path, said mounting member being slidably insertable in said guide path from one end thereof, insertion of the locking member in said guide path forcing said strip into a more flattened configuration thereby correspondingly increasing the spatial distance between said shoes, said increase causing said terminal shoe portions to underlie the rims of the respective apertures, thereby locking the strip to the sheet material and frictionally retaining the locking member in the retaining means.

4. A support structure for releasable attachment to perforated sheet material comprising a springy mounting strip curved about a transverse line, a pair of locking shoes on the concave of the strip, each of said shoes being in the form of a depending L-element, the lateral branches of the elements extending in opposite direction, said shoe being longitudinally spaced to fit two apertures of said sheet material, retaining means on the convex side of the strip including a keying portion and forming a longitudinal guide path substantially following the convex curvature of the strip and extending across the apex of the curvature, and a rigid locking member of less curvature insertable in said guide path from one end thereof, insertion of said locking member in said guide path forcing said strip into a more flattened configuration, thereby correspondingly increasing the spatial distance between said shoes, said increase causing said lateral branches to underlie the rim of the respective apertures whereby the mounting strip is locked to the sheet material and the locking member is frictionally retained in the retaining means.

5. A support structure according to claim 4 wherein said apertures in the sheet material are circular and the depending branches of said locking elements have a correspondingly rounded cross section, the concave sides of said branches facing each other.

6. A support structure according to claim 4 wherein said retaining means comprises two longitudinally spaced hoops of substantially equal height relative to the strip.

7. A support structure according to claim 4 wherein said retaining means comprise longitudinally extended keying guide channels substantially matching the curvature of said strip.

8. A support structure according to claim 7 wherein said guide channels are formed by two laterally spaced tracks, each having an inwardly turned portion.

9. A support structure according to claim 8 wherein said tracks comprise two longitudinally spaced sections.

10. A support structure according to claim 7 wherein said tracks have raised lips for supporting therebetween a plate member.

11. A support structure according to claim 3 and further comprising a safety member having depending protrusions fitting said two perforations in the sheet material also engaged by said terminal portions of the shoes when inserted in the perforations.

12. A support structure according to claim 11 wherein said safety member comprises a strip having two longitudinally spaced depending studs, said studs being insertable between said mounting strip and said locking member.

13. A support structure for releasable attachment to perforated sheet material comprising a flexible mounting

strip curved about a transverse line, a pair of locking elements depending from the concave side of said strip in longitudinally spaced relationship, said locking elements fitting the spacing between two perforations of said sheet material, retaining means on the convex side of said strip including a keying portion and defining a curved elongated guide path substantially matching the curvature of the strip and extending across the apex of the curvature and a rigid locking rod having a substantially straight portion insertable into said retaining means from one end thereof and having a length at least equal to that of the guide path, insertion of the straight rod portion in said curved guide path forcing the strip into a substantially flat configuration thereby correspondingly increasing the spatial distance between said locking elements, said increase locking the locking elements in said perforations of the sheet material.

14. A support structure for releasable attachment to perforated sheet material, comprising a mounting strip curved about a transverse line, a pair of locking shoes on the concave side of the strip in longitudinally spaced relationship, each of said shoes having a depending leg portion and a terminal portion extending in the longitudinal direction of the strip, said two terminal portions facing in opposite direction and fitting through two apertures in said sheet material in the curved condition of the strip, each of said retaining means having a keying portion, two longitudinally spaced retaining means on the convex side of said strip, and a locking rod having a portion of less curvature and of a length spanning both said retaining means, said portion being insertable in said two retaining means, insertion of the rod portion in said retaining means forcing said strip into a more flattened configuration thereby correspondingly increasing the spatial distance between said shoes, said increase causing said terminal shoe portions to occupy positions underlying the rims of the respective apertures thereby locking the strip to the sheet material and frictionally retaining the locking rod in said retaining means.

15. A support structure according to claim 13, wherein said rod portion includes means engageable with said mounting member to prevent longitudinal pivoting of the rod relative to the mounting strip.

16. A support structure according to claim 15, wherein said rod portion has lateral protrusions resting upon the mounting strip when the rod is inserted in said retaining means.

17. A support structure according to claim 15, wherein said rod portion has a plane surface engageable with the adjacent side of the mounting strip when inserted in the retaining means.

18. A support structure according to claim 14, wherein said rod portion and said mounting strip have a protrusion and an indentation respectively engaging each other.

19. A support structure according to claim 13, wherein said rod portion comprises a springy latch portion engageable with said retaining means for a substantially vibration proof releasable retention of the rod by the retaining means.

20. An assembly for supporting an article on perforated sheet material, said assembly comprising, in combination, a flexible mounting strip curved about a transverse line, a pair of locking elements depending from the concave side of said strip in longitudinally spaced relationship, said locking elements fitting the spacing between two perforations of said sheet material, retaining means on the convex side of the strip, a locking member having a substantially straight portion insertable in said retaining means, insertion of said member portion in the retaining means forcing said strip into a substantially straight configuration thereby correspondingly elongating the spatial distance between said locking elements, said elongation causing locking of the locking elements in said two perforations in the sheet material; and an article having a wall portion including two openings spaced to receive said retaining means protruding through the openings whereby passage of said straight member portion through the protruding retaining means locks said mounting strip to the sheet material and said wall portion to the mounting strip.

21. An article supporting structure comprising, in combination, a laminate mounting board including, bonding together a solid layer and a perforated layer, said perforated layer including apertures countersunk on the side facing the solid layer, a mounting strip curved about a transverse line, a pair of locking shoes on the concave side of the strip in longitudinally spaced relationship, each of said shoes having a depending leg portion and a terminal portion extending in the longitudinal direction of the strip, said terminal portions facing in opposite direction and being insertable in two apertures in said perforated layer in the curved condition of the strip, retaining means on the convex side of the strip defining a curved guide path substantially matching the convex curvature of the strip, and a substantially straight locking member insertable in said guide path, insertion of the locking member in said guide path forcing said strip into a substantially straight configuration thereby correspondingly increasing the spatial distance between said shoes, said increase causing said terminal shoe portions to underlie the rims of the respective apertures thereby locking the strip to the mounting board and frictionally retaining the locking member in the retaining means.

22. A mounting member for an article supporting structure releasably attachable to perforated sheet material, said mounting member comprising a curved flexible mounting strip, two locking elements depending from the concave side of said strip, spaced in the direction of the curvature thereof, said locking elements being adapted to be inserted in two perforations of said sheet material, and retaining means on the convex side of said curved member including a keying portion and extending in the direction of the curvature across the apex thereof, said retaining means being adapted to receive and retain a less curved locking member of the support structure.

23. A mounting member for an article supporting structure releasably attachable to perforated sheet material, said mounting member comprising a flexible mounting strip curved about a transverse line, a pair of locking shoes on the concave side of the strip in longitudinally spaced relationship, each of said shoes having a depending leg portion and a lateral terminal portion, said terminal portions facing in opposite direction, and retaining means on the convex side of the strip including a keying portion and defining an curved guide path substantially matching the convex curvature of the strip, said guide path being adapted to receive and retain a less curved locking member of the support structure.

References Cited in the file of this patent

UNITED STATES PATENTS

9,203	Shaw	Aug. 13, 1852
1,839,293	Boyce	Jan. 5, 1932
2,087,141	Farrar	July 13, 1937
2,400,666	Tinnerman	May 21, 1946
2,462,622	Farrow	Feb. 22, 1949
2,532,162	Goss	Nov. 28, 1950
2,580,849	Schwartz	Jan. 1, 1952
2,797,817	Shugarman	July 2, 1957
2,817,131	Seegers	Dec. 24, 1957

FOREIGN PATENTS

493,063	Canada	May 19, 1953