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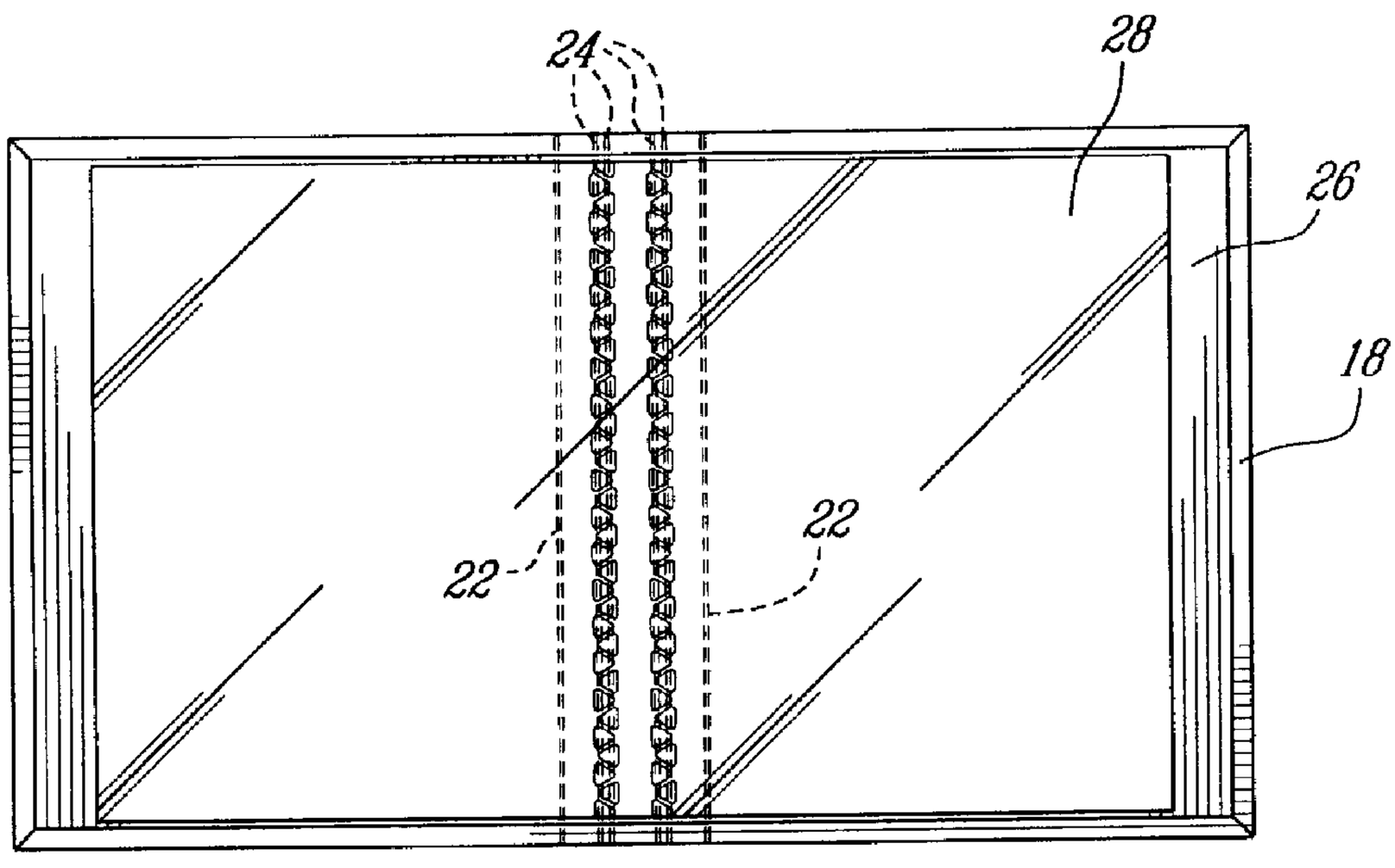
(54) Titre : METHODE DE SOUDAGE AUX ULTRA-SONS DE FEUILLES EN PLASTIQUE A UNE POCHETTE NON CONSTITUEE DE PLASTIQUE

(54) Title: METHOD OF ULTRASONICALLY WELDING PLASTIC SHEETS TO A NON-PLASTIC COVER



(57) Abrégé/Abstract:
There is provided an improved ultrasonic welding method for simultaneously welding a plurality of plastic sheets to a compressible album cover comprising a layer of plastic compatible for ultrasonic welding to the plastic sheets. The improved method generally comprises the steps of: (a) providing an ultrasonic die press having opposing compression die members, the die members including at least one compressed seam producing die surface and at least one ultrasonic welding surface; (b) placing the plurality of plastic sheets on the plastic layer of the album and placing this assemble between the opposing die members; (c) engaging the ultrasonic die press to create at least one compression seam by compressing said album cover between the opposing die members and to create at least one ultrasonic weld between the plastic sheets and the plastic layer thereby obtaining an album with ultrasonically welded sheets; (d) disengaging the die press and removing the completed album therefrom. The present invention also contemplates a method wherein the welding seams in the album cover are obtained by a simple compression die by placing the album cover in a compression die prior to placing thereon the plastic sheets and completing the ultrasonic welding. Also contemplated is a method of creating fold lines in the album cover simultaneously with the welding seam lines.

ABSTRACT OF THE DISCLOSURE

There is provided an improved ultrasonic welding method for simultaneously welding a plurality of plastic sheets to a compressible album cover comprising a layer of plastic compatible for ultrasonic welding to the plastic sheets. The improved method generally comprises the steps of: (a) providing an ultrasonic die press having opposing compression die members, the die members including at least one compressed seam producing die surface and at least one ultrasonic welding surface; (b) placing the plurality of plastic sheets on the plastic layer of the album and placing this assemble between the opposing die members; (c) engaging the ultrasonic die press to create at least one compression seam by compressing said album cover between the opposing die members and to create at least one ultrasonic weld between the plastic sheets and the plastic layer thereby obtaining an album with ultrasonically welded sheets; (d) disengaging the die press and removing the completed album therefrom. The present invention also contemplates a method wherein the welding seams in the album cover are obtained by a simple compression die by placing the album cover in a compression die prior to placing thereon the plastic sheets and completing the ultrasonic welding. Also contemplated is a method of creating fold lines in the album cover simultaneously with the welding seam lines.

METHOD OF ULTRASONICALLY WELDING PLASTIC SHEETS TO A NON- PLASTIC COVER

BACKGROUND OF THE INVENTION

1. Field of Invention

The present invention relates to ultrasonic welding of plastic sheets. More particularly, the present invention relates to an improved method of making albums, such as photo albums, containing plastic pages joined at welded seams.

2. The Prior Art

Ultrasonic welding of plastic sheets is known. Welding conventionally takes place in a welding press by squeezing layers of plastic sheets between opposing dies. The two dies define a welding seam where the weld will occur. An electrical transducer imparts vibration to at least one of the dies at a predetermined frequency. This in turn causes localized heating and melting of the plastic. Adjacent plastic sheets will be fused together along the seam upon cooling.

Conventional methods of making photo albums and the like require at least two principal steps. In a first step, a stack of plastic sheets which will later be placed in the album are ultrasonically welded along a seam. In a second step, the lowermost plastic sheet of the welded stack of sheets is glued inside a rigid or semi-rigid cover made of cardboard, leather plastic or other material. The second step is necessary because the cover would interfere with the ultrasonic welding by absorbing vibrations.

The two step method described above is labour intensive and time consuming. Ideally, a one step method would be preferable. Such a method could allow ultrasonic welding of the stack of plastic sheets and simultaneous bonding inside a cover.

European patent application 0 408 452 approaches this goal by providing a two piece cover linked by a PVC sheet spanning the gap between the two halves of the cover. A stack of PVC sheets are then placed inside the cover and an ultrasonic welding operation welds the stack and the initial sheet spanning the cover.

United States Patent No. 3,912,576 issued to Braun on October 14, 1975 provides a method of ultrasonic welding a plastic coated milk carton. The carton walls are sufficiently dense to avoid absorbing ultrasonic vibrations and during ultrasonic welding, the thin plastic coat will melt, flow and seal the carton. However, such method cannot be transposed to the making of photo albums and the like where a stack of plastic sheets are being simultaneous welded.

Thus there remains a need for an improved ultrasonic welding method of making an album containing plastic sheets. One object of the present invention is to provide a one step method for ultrasonic welding of a stack of plastic sheets and simultaneous bonding inside an album cover.

Other objects and further scope of applicability of the present invention will become apparent from the detailed description given hereinafter. It should be understood, however, that this detailed description, while indicating preferred embodiments of the invention, is given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art.

SUMMARY OF THE INVENTION

There is provided an improved ultrasonic welding method for simultaneously welding a plurality of plastic sheets to a compressible album cover

comprising a layer of plastic compatible for ultrasonic welding to the plastic sheets. The improved method generally comprises the steps of:

(a) providing an ultrasonic die press having opposing compression die members, the die members including at least one compressed seam producing die surface and at least one ultrasonic welding surface;

(b) placing the plurality of plastic sheets on the plastic layer of the album and placing this assemble between the opposing die members;

(c) engaging the ultrasonic die press to create at least one compression seam by compressing said album cover between the opposing die members and to create at least one ultrasonic weld between the plastic sheets and the plastic layer thereby obtaining an album with ultrasonically welded sheets;

(d) disengaging the die press and removing the completed album therefrom.

The present invention also contemplates a method wherein the welding seams in the album cover are obtained by a simple compression die by placing the album cover in a compression die prior to placing thereon the plastic sheets and completing the ultrasonic welding.

Also contemplated is a method of creating fold lines in the album cover simultaneously with the welding seam lines.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top view of a polypropylene sheet in accordance with prior art teachings;

FIG. 2 is a top view of a stack of polypropylene album sheets shown after ultrasonic welding to the polypropylene sheet of fig.1;

FIG. 3 is a top view of a completed album with the welded assembly of fig. 2 after gluing inside of an album cover;

FIG. 4 is a top view of a cardboard album cover containing a plastic sheet disposed on its inside surface in accordance with the method of the present invention;

FIG. 5 is a side elevation view of the album cover of fig. 4 and the bottom portion of a die used to achieve densification of the cardboard cover;

FIG. 6 is a top view of an assembled album in accordance with the method of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Before describing the present invention in detail, it is to be noted and understood that the invention is not limited in its application to the details of method steps, construction and parts illustrated in the accompanying drawings and described herein. The invention is capable of other embodiments and of being practised in various ways. It is also to be understood that the phraseology or terminology used herein is for the purpose of description and not limitation.

Referring now to the drawings, namely FIGs. 1 to 3, the prior art teachings are illustrated. Conventional method of making photo albums having rigid or semi-rigid covers involved at least two principal steps. In a first step, a stack of plastic sheets 10 which will later be placed in the album 12 are ultrasonically welded to a base sheet 14 of welding compatible material along a seam 16. In a second step, base sheet 14 is glued inside a rigid or semi-rigid cover 18 made of cardboard, leather plastic or other material. The second step was found necessary because the cover would interfere with the ultrasonic welding by absorbing vibrations.

This conventional two step method was labour intensive and time consuming.

In the present invention, a surprising new method was developed to allow ultrasonic welding of a stack of plastic sheets to a base sheet despite the presence of an album cover made of cardboard or like material.

Turning now to FIGs. 4 to 6, the improved method will now be described in greater detail.

To allow ultrasonic welding through a cover made of cardboard or like material, it has been discovered that if the cover is strongly compressed along the intended ultrasonic welding seams, the accrued density of the compressed cover material will allow conventional ultrasonic welding equipment to emit vibrations capable of transfer through the cover material and to the plastic sheets.

Turning to FIG. 5 there is seen a cover shaping die 20 which can be used to create fold lines 22 in cover 18 and simultaneously score welding seams 24. Cover 18 comprises a layer 26 of plastic material such as for example PVC or polypropylene. Layer 26 can be applied as a coating when manufacturing cover 18 or affixed thereon as a separate layer by gluing or other method.

Covers 18, prepared such as shown in FIG. 5 can be prepared ahead of time or immediately prior to the ultrasonic welding step. Alternatively, the ultrasonic die used for ultrasonic welding may be the same die used creating fold lines 22 and welding seams 24.

In accordance with the method of the present invention, a stack of plastic sheets 28, preferably polypropylene sheets, may be placed above cover 18, conventional ultrasonic welding equipment may then effect an ultrasonic weld along seams 24. Although two seams 24 are preferable to reduce the load on the ultrasonic welds when the plastic sheets contain photographs,

compact disks, etc., a single seam is also contemplated. Similarly, more than two seams can be used.

This one step ultrasonic welding method completed at the end of the manufacturing process allows substantial labour savings.

It is to be understood that plastic sheets 28 are preferably destined to be formed into pockets suitable for receiving photographs or other memorabilia. However, similar plastic sheets may be destined to receive other items such as computer diskettes, optical disks, stamps, coins, business cards, sports cards and the like.

Although the invention has been described above with respect with one specific form, it will be evident to a person skilled in the art that it may be modified and refined in various ways. It is therefore wished to have it understood that the present invention should not be limited in scope, except by the terms of the following claims.

I claim:

1. An ultrasonic welding method for simultaneously welding a plurality of plastic sheets to a compressible album cover comprising a layer of plastic compatible for ultrasonic welding to said plastic sheets, said method comprising the steps of:

(a) providing an ultrasonic die press having opposing compression die members, said die members including at least one compressed seam producing die surface and at least one ultrasonic welding surface;

(b) placing said plurality of plastic sheets on said plastic layer on said cover and placing this assembly between said opposing die members;

(c) engaging said ultrasonic die press to create at least one compression seam by compressing said album cover between said opposing die members and to create at least one ultrasonic weld between said plurality of plastic sheets and said plastic layer thereby obtaining an album with ultrasonically welded sheets;

(d) disengaging said die press and removing said album therefrom.

2. An ultrasonic welding method as in claim 1 wherein in step (a) said die members further comprise at least two compression fold lines producing surface.

3. An ultrasonic welding method as in claim 2 wherein said album cover is cardboard.

4. An ultrasonic welding method as in claim 3 wherein said plastic sheets and said plastic layer are polypropylene.

5. An ultrasonic welding method for simultaneously welding a plurality of plastic sheets to a compressible album cover comprising a layer of plastic compatible for ultrasonic welding to said plastic sheets, said method comprising the steps of:

(a) providing a die press having opposing compression die members, said die members including at least one compressed seam producing die surface;

(b) placing said compressible album cover between said opposing die members;

(c) engaging said die press to create at least one compression seam by compressing said album cover between said opposing die members;

(e) disengaging said die press and removing said album cover therefrom;

(d) placing said plurality of plastics sheets on said plastic layer on said cover;

(e) ultrasonically welding said plastic sheets to said plastic layer.

6. An ultrasonic welding method as in claim 5 wherein in step (a) said die members further comprise at least two compression fold lines producing surface.

7. An ultrasonic welding method as in claim 6 wherein said album cover is cardboard.

8. An ultrasonic welding method as in claim 7 wherein said plastic sheets and said plastic layer are polypropylene.

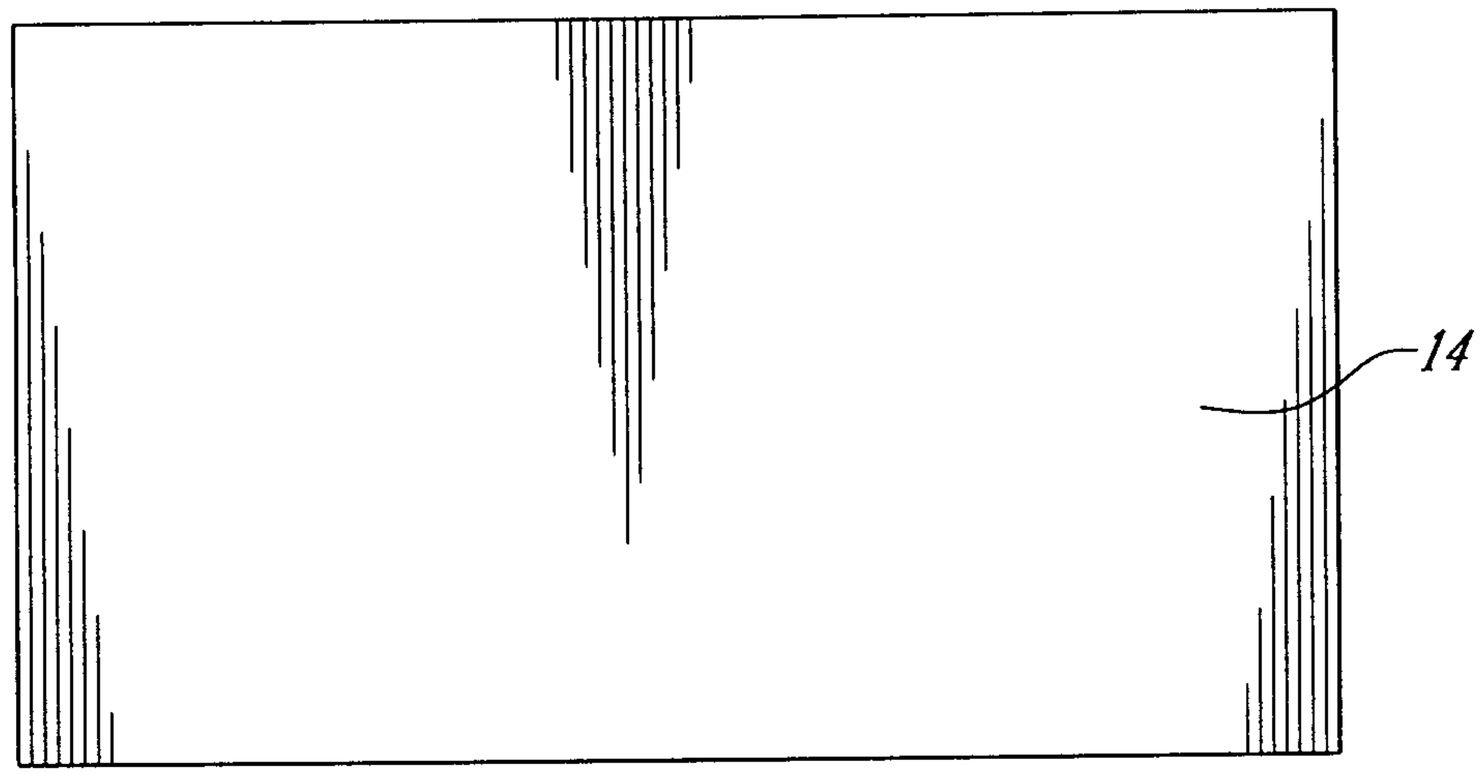


FIG. 1 (PRIOR ART)

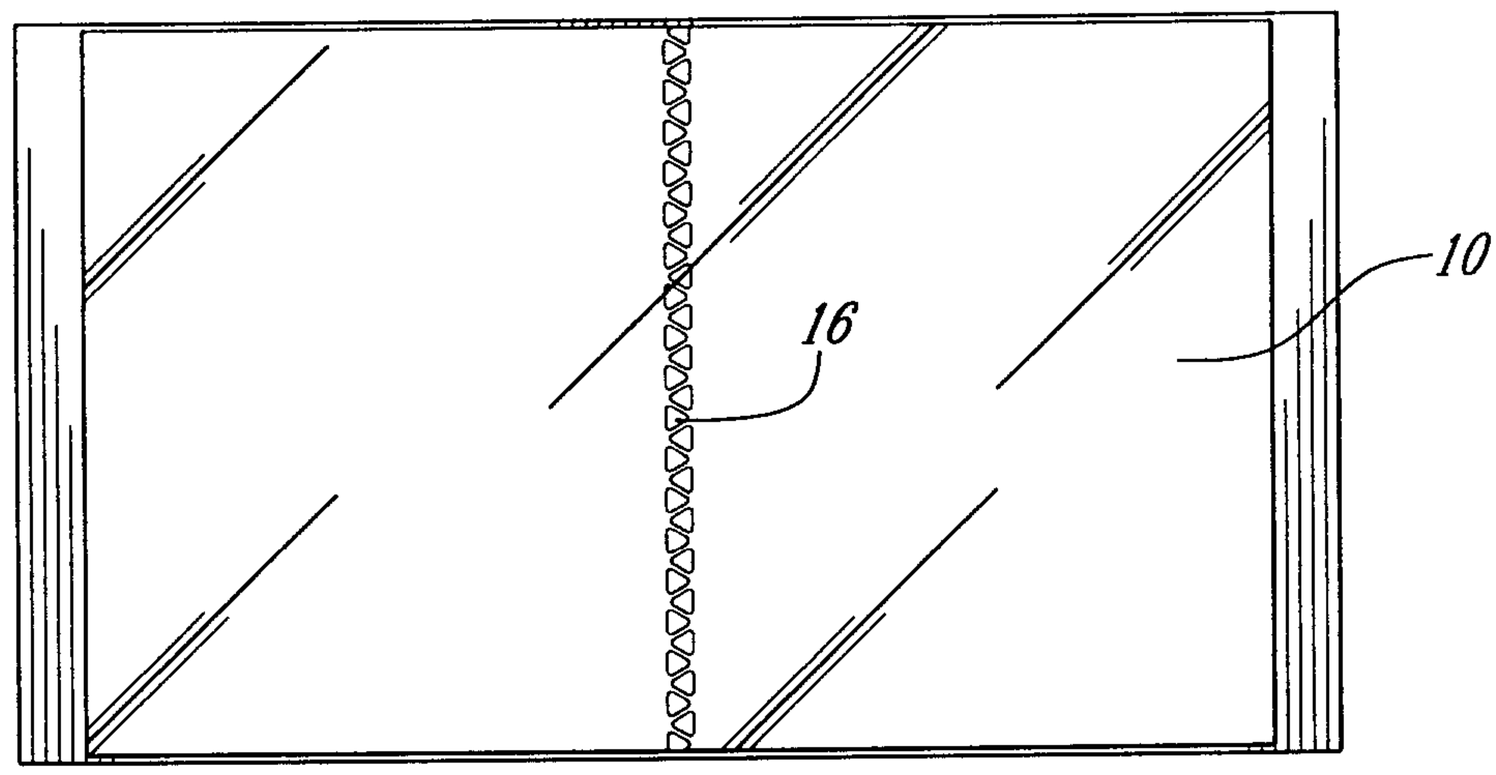


FIG. 2 (PRIOR ART)

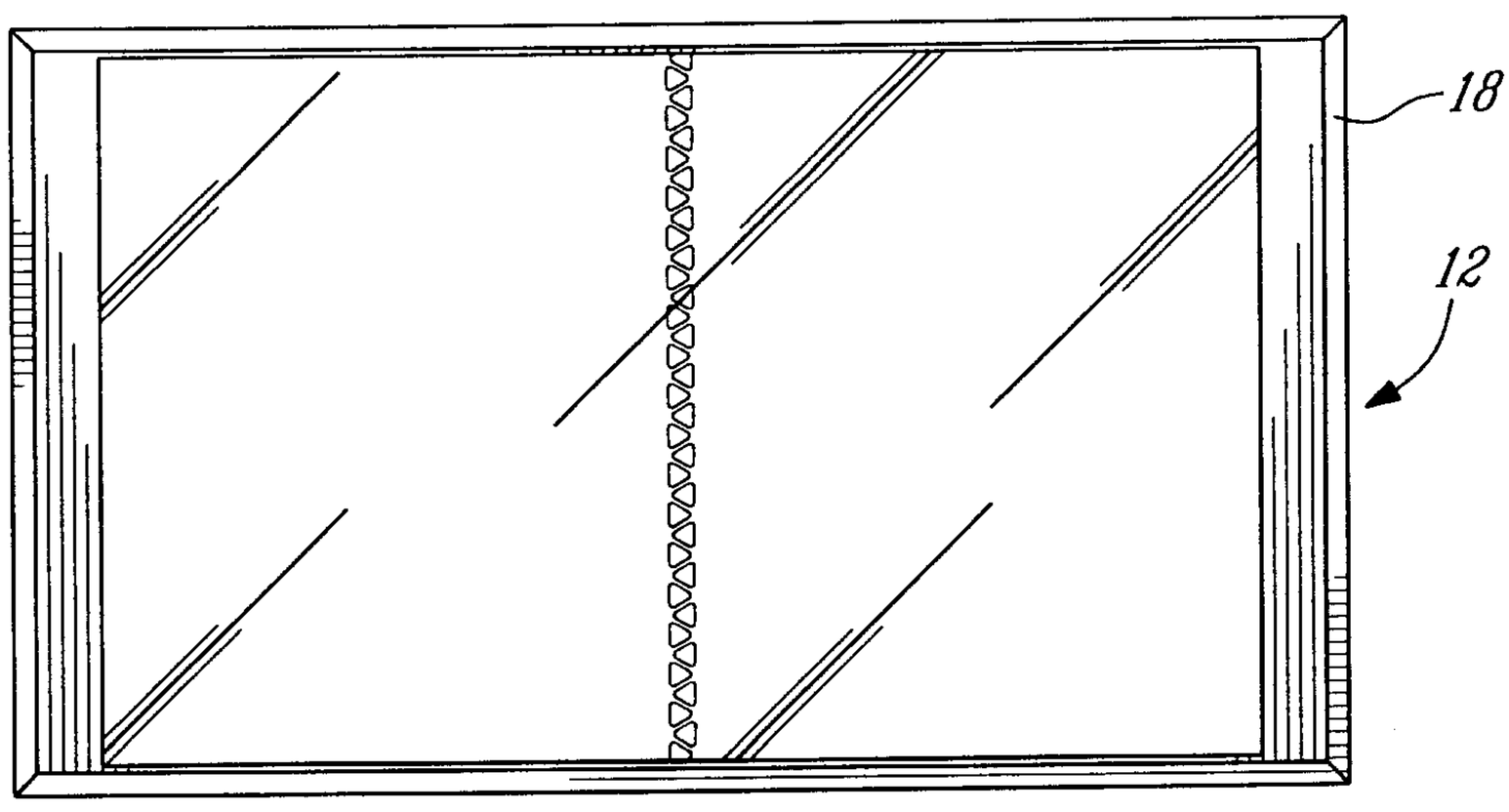


FIG. 3 (PRIOR ART)

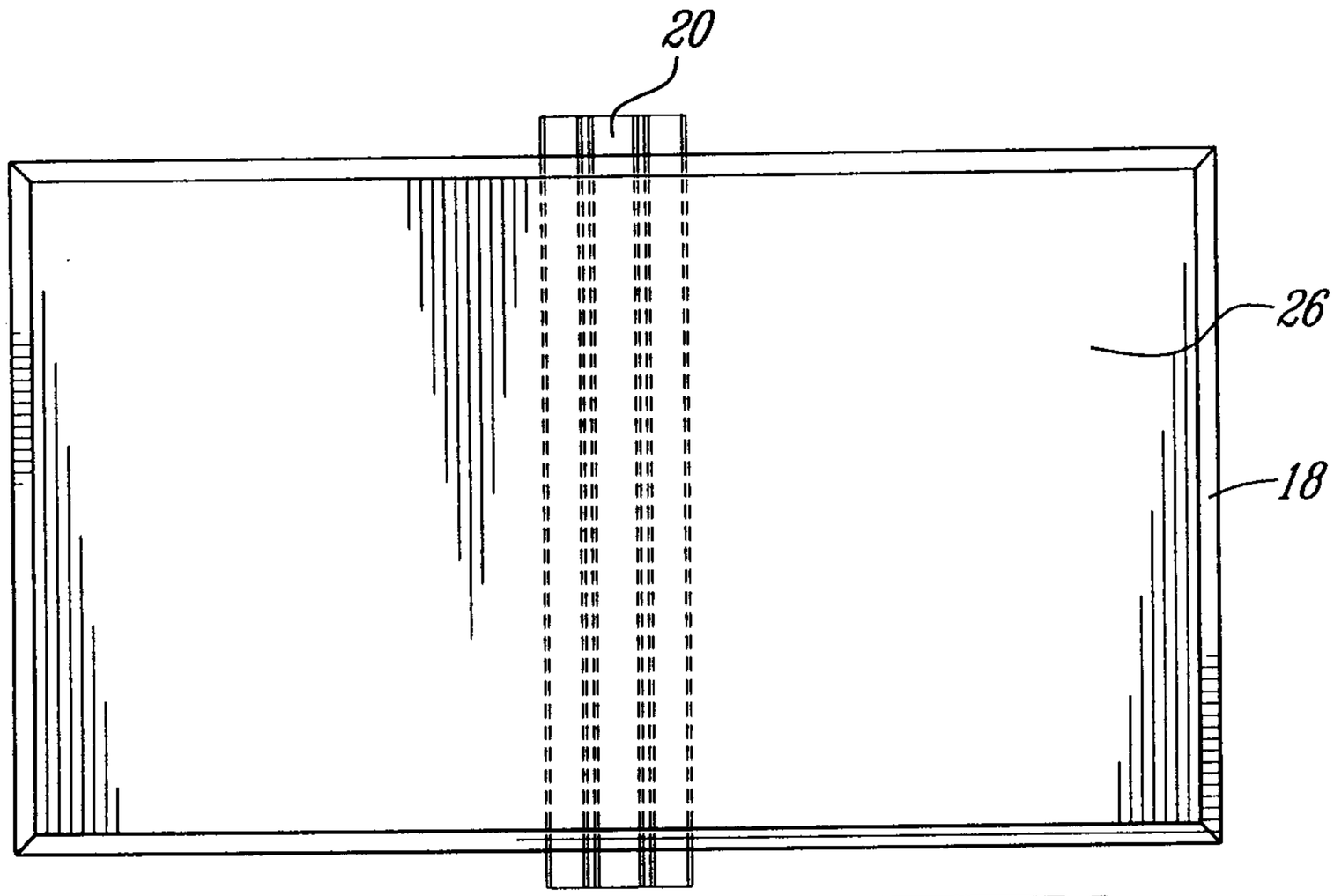


FIG_4

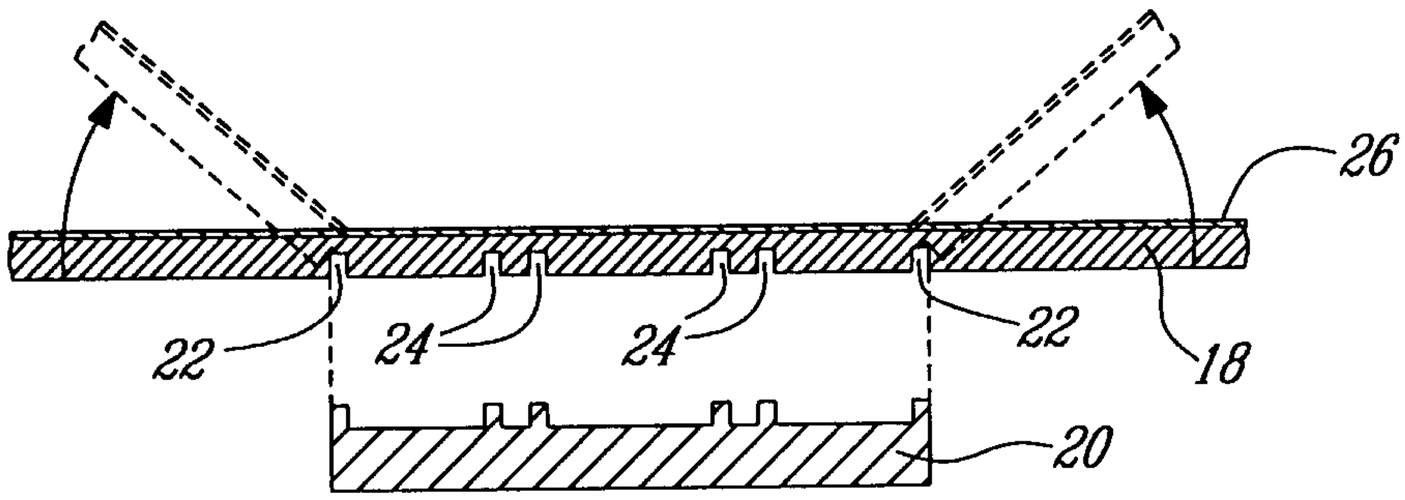


FIG_5

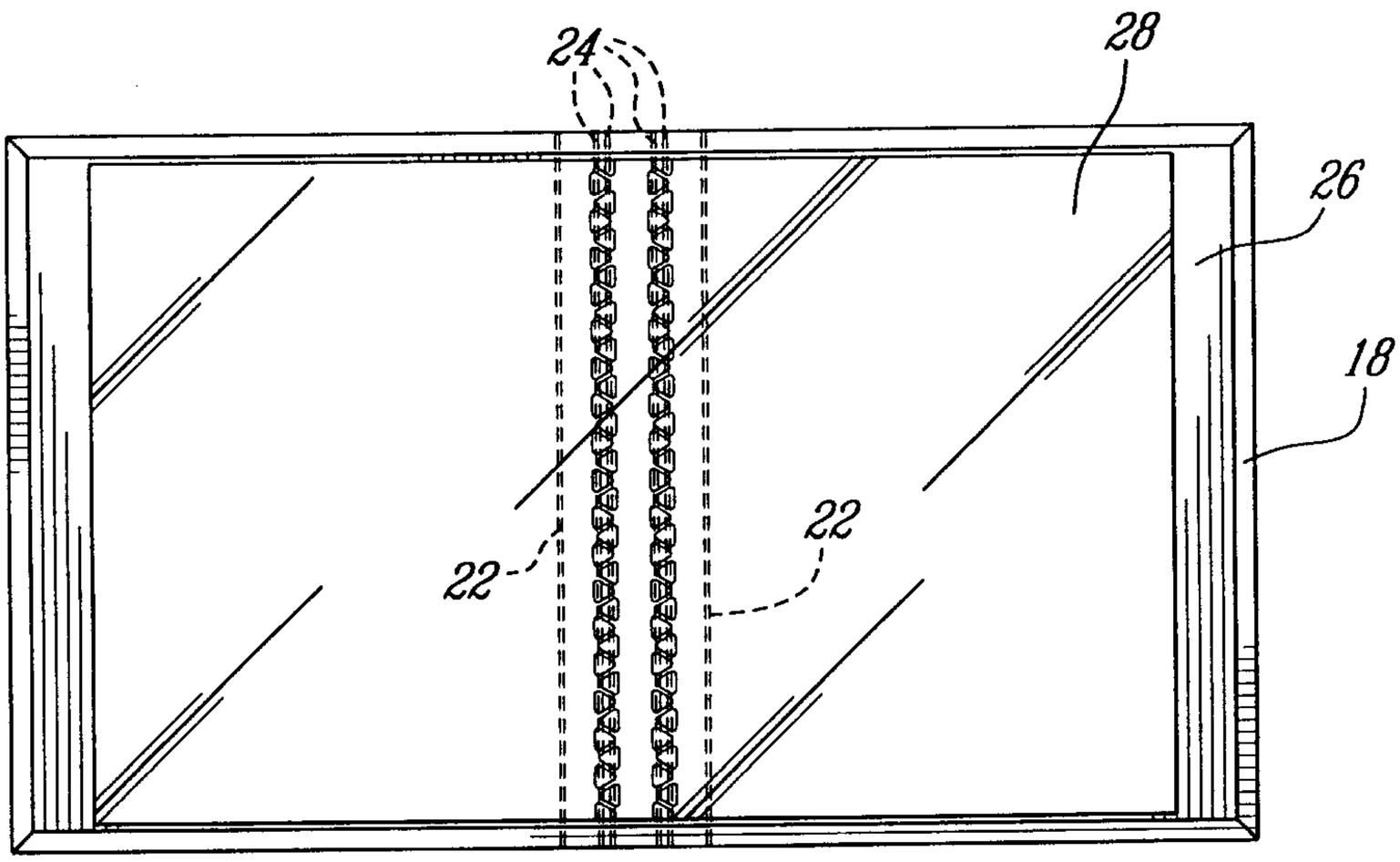
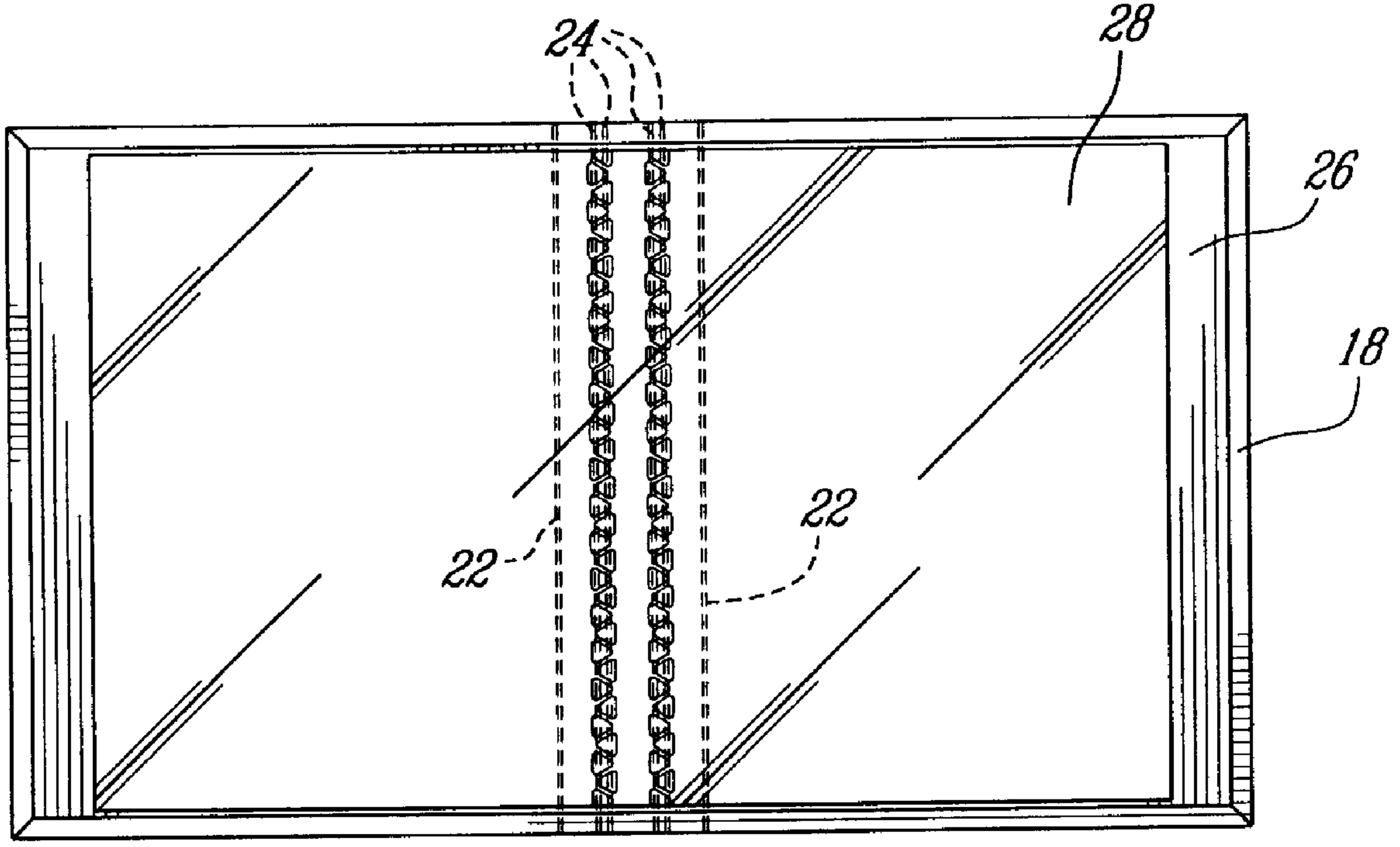


FIG_6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