

[54] **DIMENSIONALLY STABLE FILM MOUNTING**

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[51] Int. Cl.² **G09F 3/18**

[58] Field of Search **235/61.11 R, 61.11 E;**
248/473; 40/106.1, 63 A, 64 A, 158, 17, 23,
152

[56] **References Cited**
UNITED STATES PATENTS

1,567,310 12/1925 Weeks 40/152
2,292,312 8/1942 Wittel et al. 40/152

2,450,008 9/1948 Lomholt 40/10 R
2,656,631 10/1953 Caldwell et al. 40/159 X
2,833,072 5/1958 Gregory 40/17 X
3,422,556 1/1969 Lyons et al. 40/129 C X

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[57] **ABSTRACT**

A plate-like film strip mounted on an aluminum base in a manner to compensate for differences in expansion and contraction between the film and the mount caused by temperature and humidity. The film strip is inserted into a slot slightly larger than its thickness and securely fastened at its longitudinal center. Additionally, it is fastened at one longitudinal end of the strip. The assembly eliminates undulations in a film strip which can be caused by differences in expansion properties between the mount and the film.

5 Claims, 3 Drawing Figures

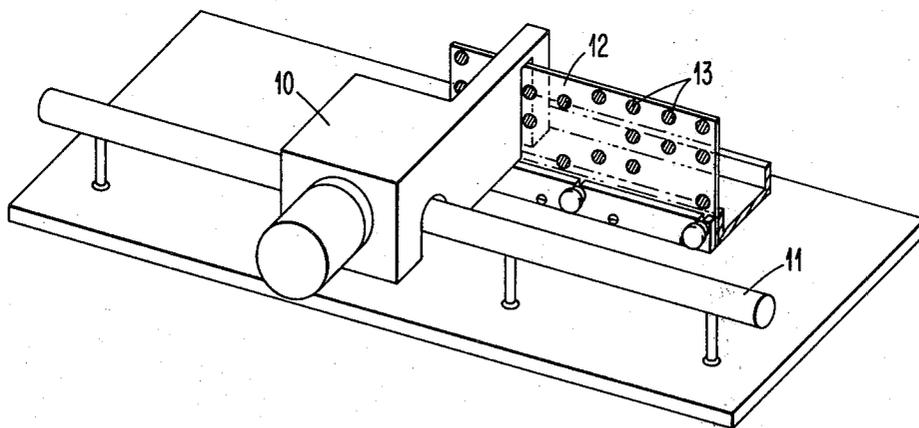


FIG. 1

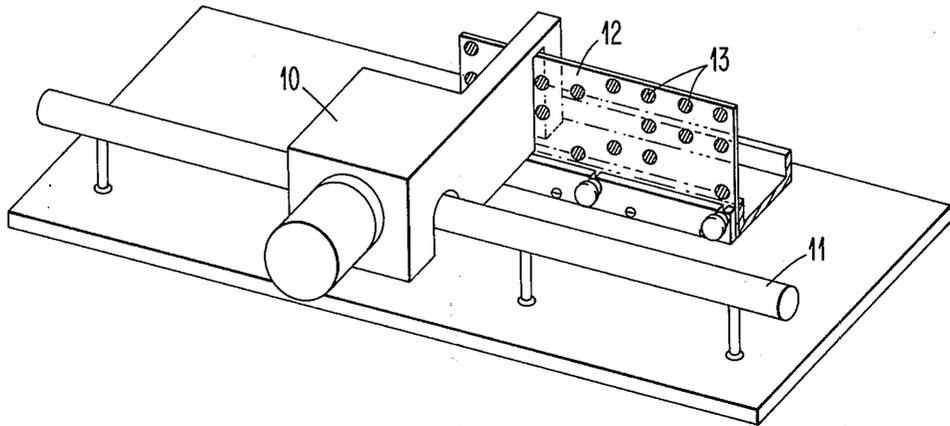


FIG. 2

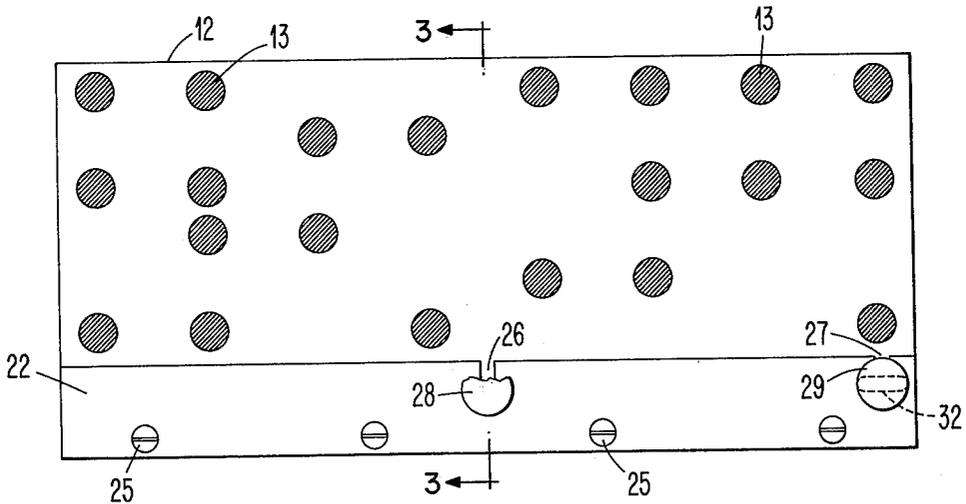
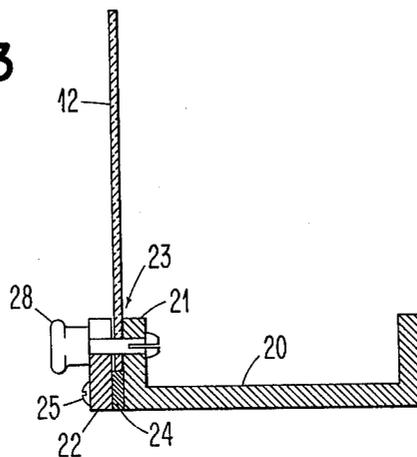


FIG. 3



DIMENSIONALLY STABLE FILM MOUNTING

BACKGROUND OF THE INVENTION

The present invention relates to film mountings and more particularly to film mountings usable for transducing systems.

In automatic tape apparatus, such as shown by Burke et al. in U.S. Pat. Nos. 2,941,738 and 2,941,739, it is extremely important that the present location of a carriage used to transport tape reels or other articles between compartments in the apparatus be precisely located such that the article can be accurately inserted into its respective storage compartment or storage cell. For reliability and high-speed operation reasons, it is desirable that an optical sensing system be employed. For low-cost purposes, it is highly desirable that the position-indicating sheet or strip consist of a plastic-like material, such as Mylar, but be securely and precisely mounted with respect to the storage compartments or cells. Mylar and other materials have a greater susceptibility to humidity changes, hence, expands and contracts differently from the mounting base. Such dimensional changes induce stresses in the film resulting in undesired wrinkling or surface undulations. That is, after the mounting, the dimensional stability of the strip should be such that the indications maintain a preciseness for suitable high-speed operation. This is particularly critical when small articles, such as miniature tape reels or film reels, are employed. It should be noted that in data processing environments with high signal packing densities, extremely small articles can be employed for containing a large amount of data. Hence, as technology advances, the information-bearing documents to be stored and exchanged in accordance with the Burke et al. patents, supra, are expected to become smaller and smaller. For example, the disclosed Burke et al. storage container had two reels each capable of containing 2,400 feet of magnetic tape. An improvement on the Burke et al. apparatus included a small tape reel having a dimension of less than 2 inches \times 2 inches cross-section with a length of less than four inches. As technology advances, it is expected that a 1 inch \times 1/2 inch cross-section storage cell may be employed. From the above, it can be seen that dimensionally stable location indications become increasingly more important.

In attempting to solve the above problem, Applicants employed various techniques, but not to the success achieved by the present invention. For example, light spring or yieldable fingers held a film strip against a flat plate with the strip anchored at the strip longitudinal center. Because of the friction between the spring fingers and the strip, undulations resulted in the film strip as the temperature and humidity changed. The above arrangement was modified, but to no avail, by adding a spring-loaded bar, plus the spring finger anchoring. Again, perturbations were noticed. The strip was then reinforced by bonding a strip of Mylar in the clamping area. This selection improved the stability to a limited degree.

Further, a film strip was stiffened by bending it into an L-shape along one longitudinal end mounting it with light spring fingers. Such approach resulted in a non-manufacturable structure. Bending the Mylar in L-shape can become expensive. Also, mounting a strip in tension with an anchor or reference point at the longitudinal center was examined. The problem with the lat-

ter approach is to provide the correct amount of tension. It appears tension may vary with the temperature and humidity such that the Mylar, under certain conditions, may stretch. In summary, no inexpensive way was found prior to this invention to provide a dimensionally stable, plastic-like, indicating strip mounted on a metallic base for added strength and reliability.

SUMMARY OF THE INVENTION

It is an object of the invention to provide a simple, low-cost, dimensionally stable, mounting system for a plastic-like film strip with a metallic or other heavy-duty mounting base.

A dimensionally stable indicating assembly, in accordance with the present invention, includes an elongated back plate of metal, such as aluminum, which exhibits a first dimensional expansion/contraction characteristic with respect to temperature and humidity. Such back plate has a first aperture centrally located its length, and a second aperture adjacent one longitudinal end. An elongated cover plate faces the back plate and is arranged to provide a longitudinal extending slot of given width for receiving an elongated plastic plate-like member having indicating indicia thereon, but exhibiting a second dimensional expansion/contraction characteristic with respect to temperature and humidity. The latter characteristic can be quite different from the first characteristic.

A pair of retaining pins extends through the apertures in the cover plate, back plate, and the plastic plate-like member. The central one of the pins precisely locates the plastic member longitudinally; while the second pin, at one longitudinal end of the assembly, orients the plastic plate-like member in a rotational sense, i.e., allows longitudinal expansion. It is preferred that all of the members have substantially the same length.

In a preferred form of the invention, an elongated shim spaces the cover and back plates to form the slot. The assembly is suitably fastened together. The shim has a thickness equal to the given spacing of the slot. The thickness of the plastic plate-like member is slightly less than the spacing between the plates which form the slots. This allows expansion, but also provides frictional forces on the plastic member.

The foregoing and other objects, features, and advantages of the invention will become apparent from the following more particular description of the preferred embodiment, as illustrated in the accompanying drawing.

THE DRAWING

FIG. 1 is a simplified diagrammatic showing of an application of the present invention.

FIG. 2 is a simplified diagrammatic elevational view of a preferred embodiment of the present invention.

FIG. 3 is a simplified diagrammatic cross-sectional view of the FIG. 2 illustrated embodiment taken in the direction of the arrows along lines 3—3 of FIG. 2.

DETAILED DESCRIPTION

The present invention is particularly useful in connection with an automatic article storage and retrieval system such as shown by Burke et al., supra. FIG. 1 illustrates such a system in simplified diagrammatic form wherein a carriage 10 is suitably mounted for travel along a rail 11. Rail 11 is precisely mounted on a frame (not shown). To locate carriage 10 precisely

with respect to a set of storage compartments (not shown), a photosensing system (not shown) is carried by carriage 10. To this end, location-indicating plate 12 is mounted in juxtaposition to the various storage compartments. Plate 12 contains a plurality of location-indicating indicia 13 yielding an address of the storage compartments with which strip or plate 12 is precisely associated. Plate 12 is mounted in a metallic holder such that dimensional stability of the total assembly is enhanced for avoiding undulations in the plate 12 and thence interference with carriage 10 or perturbations in the sensing operation. The term "undulations" means a type of wrinkling of plate 12.

Referring next to FIGS. 2 and 3, the apparatus of the present invention is illustrated and described. Indicating plate 12 is preferably constructed of a Mylar material. Any plastic-like material having good photo-transmissive and opaquing properties is suitably employed with the present invention. It is desired for strength and stability reasons to mount plate 12 on a metallic U-shaped channel 20, which in turn is precisely secured to a frame (not shown). The outward flange 21 of channel 20 is a back plate for supporting plate-like member 12. Back plate 21 is precisely located with respect to the travel path of carriage 10. Cover plate 22, spaced from back plate 21, forms a member receiving slot at 23 for precisely receiving indicating plate-like member 12. In a typical constructed embodiment, the Mylar indicating strip has a thickness of approximately 0.007 inch. Plates 22 and 21 are spaced apart slightly greater than that distance; for example, 0.011 inch. This spacing permits strip 12 to expand and contract without adding substantial frictional engagement between the plate-like member 12 and the supporting plate 21 and 22. Yet, it is sufficiently narrow to maintain strip 12 in a transverse direction to relatively tight tolerances.

In an expensive preferred form of the invention, slot 23 spacing is determined by longitudinal shim 24 disposed between plates 21 and 22 and securely held to U-shaped channel member 20 by a plurality of screws 25. If it is desired, cover plate 22 may have a longitudinal shoulder replacing shim 24; or U-shaped channel member 20 may have a corresponding longitudinal extending shoulder.

Cover plate 22 has a pair of upwardly opening pin-receiving slots 26 and 27, respectively, for receiving spring-type pins 28 and 29. These pins extend through an aperture in cover plate 22, plate-like member 12, and back plate or flange 21. The longitudinal central aperture of back plate 21, which receives pin 28, is precisely located in the longitudinal dimension for precisely locating plate-like member 12. It should be noted that by selecting the longitudinal center of the strip 12, the cumulative dimensional changes at each longitudinal end are halved. Pin 29 extends through apertures in plates 21 and 22 to hold strip 12. In this regard, strip 12 has an elongated slot for allowing longitudinal changes indicated by dashed line 32. By forming slots 26 and 27 in cover plate 22, the precise aperture location is limited to those in channel 20, thereby reducing cost.

To insert or remove plate-like member or strip 12 from the assemblage, the two pins 28 and 29 are removed, allowing the strip 12 to be taken out of slot 23.

It is understood that the above-described assembly is suitable for accommodating various types of materials

in the support apparatus 20, 21, and 22 for supporting the plate-like members from a variety of materials while achieving the results set forth for the specific preferred form of practicing the invention. In the practical embodiment of the FIG. 1 illustration, a plurality of strips 12 would be mounted along rail 11 for identifying address locations of a plurality of storage compartments. All of the members 20, 22, and 12 should have approximately the same longitudinal length, for example, of about 12 inches.

While the invention has been particularly shown and described with reference to a preferred embodiment of the invention, it will be understood by those skilled in the art that various changes in form and detail may be made therein without departing from the spirit and scope of the invention.

What is claimed is:

1. A dimensionally stable indicating assembly, including in combination:

an elongated longitudinally extending back plate member of first material having a first dimensional expansion characteristic and having a first aperture centrally of its length and a second aperture adjacent one longitudinal end;

an elongated cover plate member facing said back plate and having one longitudinally extending edge spaced a given distance from said elongated back plate;

an elongated plate-like member having sensible indicia and a second dimensional expansion characteristic substantially different from the first dimensional expansion characteristic and a first aperture central thereof and a second aperture adjacent one longitudinal end and having a longitudinal edge portion disposed between said plate members such that said first and second apertures are aligned; said members having substantially the same length; retainers extending through both said first and both said second apertures, respectively;

an elongated shim means disposed between said plate members along a second longitudinal edge portion opposite to said first longitudinal edge portion, having a thickness equal to said given distance and having a length about equal to said plate member lengths;

a plurality of fasteners evenly spaced along said length for securing said cover plate member and said shim means to said back plate member; said cover plate member apertures being upwardly extending slots; and

said retainers have an enlarged head portion abutting said cover plate member and resilient locking portion engaging said base plate member whereby a spring loading is exerted on said cover plate member at its said apertures.

2. The assembly set forth in claim 1 wherein said back plate member is a flange portion of an elongated U-channel having a web of greater transverse extent than width of said flange portion.

3. The assembly set forth in claim 1 wherein said plate-like member has a thickness less than said given distance and greater than one-half said given distance.

4. The assembly set forth in claim 3 wherein said retainer in said first apertures precisely locates said plate-like member with respect to others of said members and said retainer in said second apertures aligns said plate-like member in a rotational sense.

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5. A mounting assembly for accommodating a plate-like member exhibiting dimensional expansion and contraction characteristics substantially different than that of the mounting assembly,

the improvement including in combination:

an elongate U-shaped channel member having a back plate flange with a first aperture in the longitudinal center which is precisely located, and a second aperture adjacent one longitudinal end thereof;

an elongate shim disposed along one longitudinal edge of said back plate flange and having a given

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thickness slightly greater than the thickness of the member to be received;

an elongate cover plate having a width substantially equal to said back plate flange and being securely fastened to said elongate shim member for forming a slot between said back plate flange and said cover plate which has a width slightly greater than the thickness of a member to be received; and

means securely affixing said cover plate and shim member to said U-shaped channel.

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