July 20, 1965 R. H. LAGARDE ETAL 3,195,939

ANCHORING MEANS FOR FLAT BANDS

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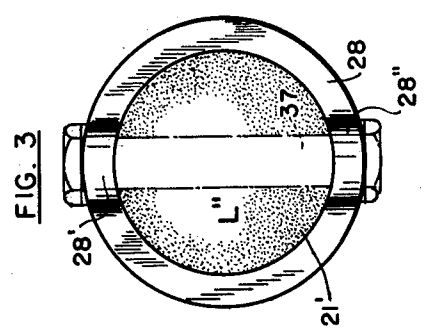


FIG. 3

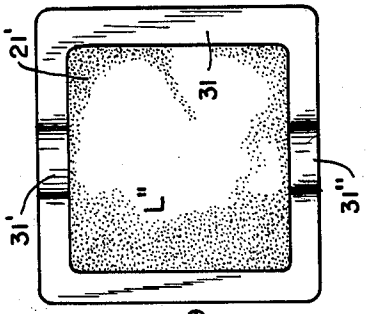


FIG. 9

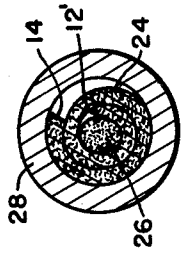


FIG. 2

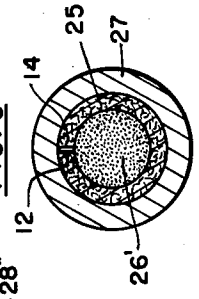


FIG. 5

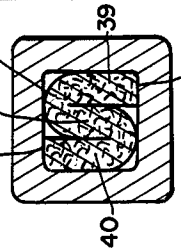


FIG. 8

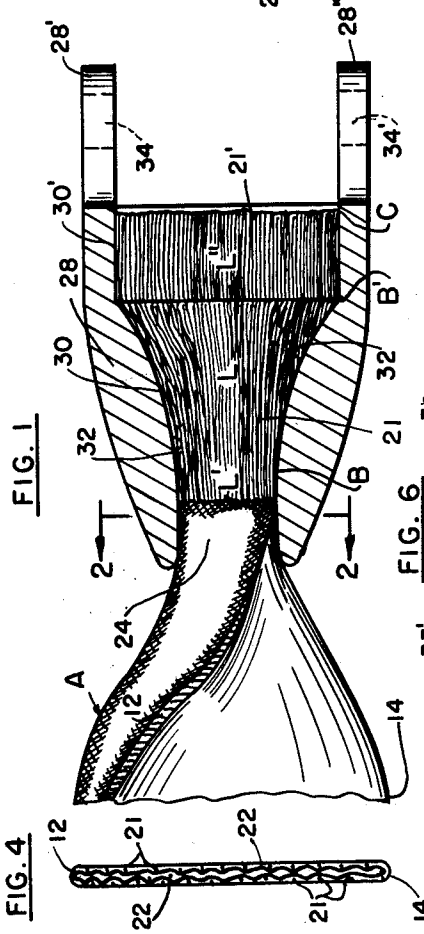


FIG. 1

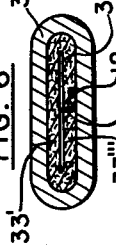


FIG. 6

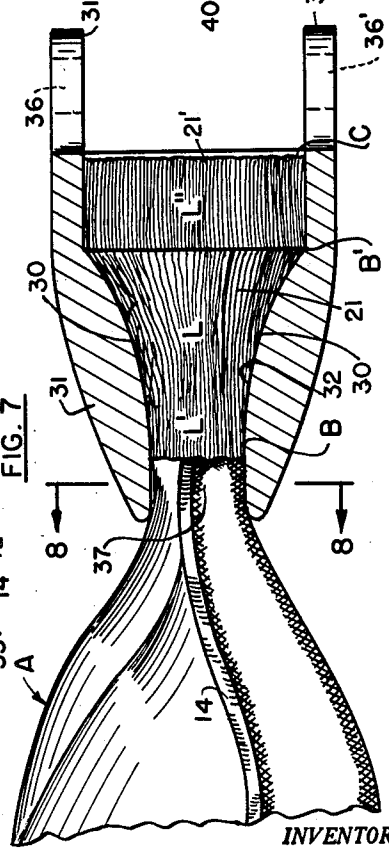


FIG. 7

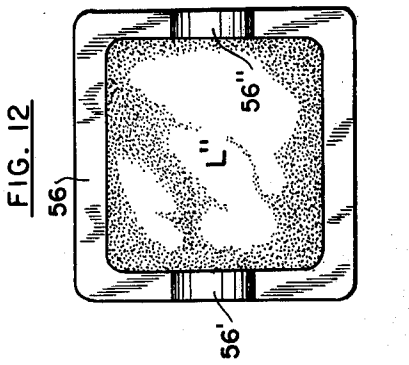
FIG. 4

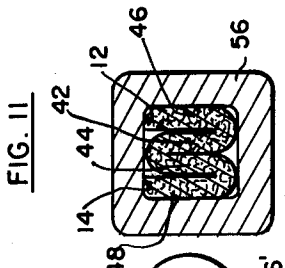
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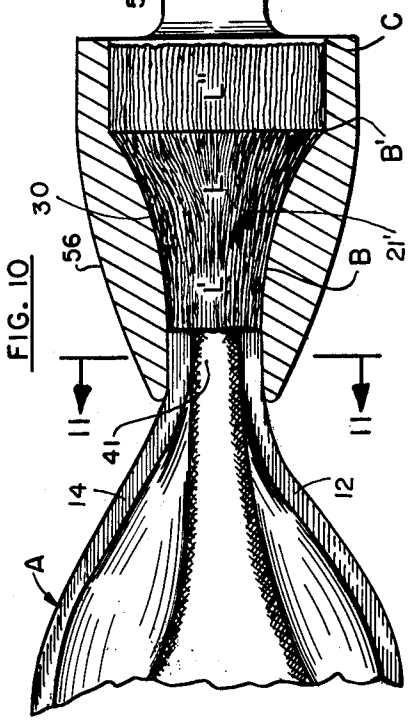
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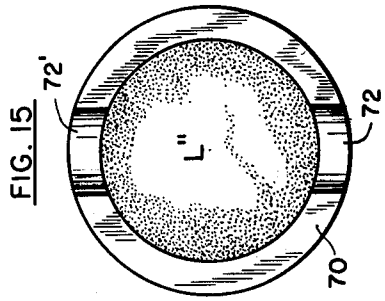
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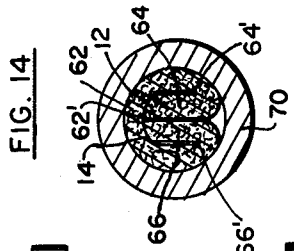
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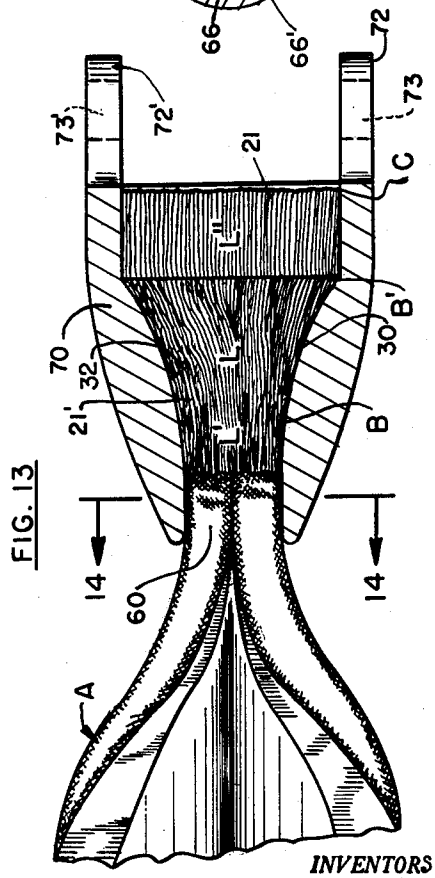












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3,195,939

ANCHORING MEANS FOR FLAT BANDS

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Filed Jan. 29, 1963, Ser. No. 254,788
5 Claims. (Cl. 287—82)

The present invention relates to flat, woven, flexible bands, or webbing, and in particular to the end structure for holding the band in a suitable fixture. The band or web may be constructed from any suitable weavable material, such as, natural, synthetic, metal or glass fibers.

Heretofore it was most difficult to hold the end of a band or webbing, particularly when the band was made from synthetic fibers and when the band was under a high degree of tensional strain.

The primary object of the invention is to provide an improved lapped end structure for a band or the like wherein, the band may be attached to a more compact holding element.

Another object of the invention is to provide an improved lapped end structure for a band wherein, the end may be effectively held by a holding element of no greater width than the width of the band.

A further object of the invention is to provide a lap structure whereby the thickness of the band will be increased and its width decreased adjacent the end of the band to permit its attachment to a greater variety of shapes of holding elements and at the same time increase the holding capacity of the holding element upon the band.

A still further object of the invention is to provide an improved method of constructing the end of the band into a lug for holding the same within a holding element.

While several objects of the invention have been pointed out, other objects, uses and advantages will become more apparent as the nature of the invention is more fully disclosed, the same consists in its novel arrangement and forming of its several parts shown in the accompanying drawings forming a part of this specification, and in which:

FIGURE 1 is a fragmentary view in elevation of a flat woven band showing one form of lap and lug construction formed on the end of the band and a sectional view of the lug holding element engaging the lug.

FIGURE 2 is a sectional view taken substantially along line **2**—**2** of FIGURE 1.

FIGURE 3 is an end view looking from right to left in FIGURE 1, showing the outer end of both the lug and the lug holding element.

FIGURE 4 is a sectional view of the flat woven band or web, showing particularly the longitudinal and lateral strands.

FIGURE 5 is a sectional view of a modified form of lap similar to that shown in FIGURE 2.

FIGURE 6 is a sectional view of still a further modified form of lap similar to that shown in FIGURE 2.

FIGURE 7 is a fragmentary view in elevation of the band showing a modified form of lap and a lug formed on the end of the band and a sectional view of the fixture engaging the lug.

FIGURE 8 is a sectional view taken substantially along line **8**—**8** of FIGURE 7,

FIGURE 9 is an end view, looking from right to left in FIGURE 7 showing both the outer end of the lug and the lug holding element.

FIGURE 10 is a fragmentary view in elevation of the band showing another modified view of lap and the lug formed on the end of the band, and a sectional view of the lug engaging element.

FIGURE 11 is a sectional view taken along line **11**—**11** of FIGURE 10.

FIGURE 12 is an end view looking from right to left in FIGURE 10 showing both the outer end of the lug and the lug holding element.

FIGURE 13 is a fragmentary view in elevation of the band showing a further modified form of lap formed on the end of the band, and a sectional view of the lug holding element engaging the lug.

FIGURE 14 is a sectional view taken along line **14**—**14** in FIGURE 13.

FIGURE 15 is an end view looking from right to left in FIGURE 13 showing both the outer end of the lug and the lug holding element.

In the description to follow, like character references are used in designating like and similar parts throughout the several views.

Throughout the several views the band, or web is generally designated by the letter A having lateral edges **12** and **14**. The band with longitudinal, or woof strands **21** and lateral, or weft strands **22**.

Referring first to FIGURES 1 to 6 inclusive, the end of the band A is unbraided, or unwoven by removing the lateral, or weft strands **22** for a distance at least equal to one-third the width of the band. However, there is no limit to the length of the unbraided longitudinal strands **21'** and if desired, may extend from the end of the woven portion outwardly to the outer end of the lug.

The woven portion immediately adjacent the unbraided strands **21'** and designated by the numeral **24** is tightly lapped upon itself. (See FIGURES 1 and 2.) This reduces the width of the band and also reduces the width of the area to be occupied by the unwoven strands **21'**. This lapping also increases the thickness of the band and the area to be occupied by the unbraided strands, which will hereinafter be referred to more in detail.

The lapped portion **24** is shown in FIGURE 2 to be wrapped about a core **26**. This is desirable if the band is of such thickness, or texture to resist bending it into a tight lap. If the band is pliable and will allow the band to be tightly rolled, or lapped and where there is no opening, or practically no opening between the laps, the core **26** may be dispensed with. The lapping of the band is substantially parallel with the longitudinal or woof strands **21**.

The unwoven longitudinal or woof strands **21'** are extended outwardly from the woven folded portion **24** in a diverging flare, that is, the opening between the strands is greater as the distance from the woven lapped portion **24** increases, as shown in FIGURE 1.

These diverging strands **21'** are either placed into a suitable mold, or a lug holding element or fixture designed to hold the lug, as shown at **28**.

About the extended and flared unwoven strands **21'** there is introduced preferably, a solidifiable liquid or semi-liquid substance, preferably an organic plastic type. However, other suitable substances may also be used, such as, cement, rubber, epoxy, etc. Nor is the substance to be limited to a solidifiable liquid or semi-liquid, but the substances may be of a granular nature, to which heat and pressure may be applied for solidification, or a solidifying agent may be added to the material within the mold or fixture as the case may be. This solidifiable substance is adapted to solidify into a solid, or semi-solid lug L, filling the spaces between the strands **21'** and adhering to the strands themselves to form a rigid, or semi-rigid mass.

The outer surface of this mass, or lug L will take the form of the mold (not shown) or, that the fixture **28**, whichever the case may be. The preferred shape of the lug is in the form of a modified taper. The taper is shown as being in the form of a gradually concaved surface **30**, beginning with a parallel side surface substantially at point B adjacent the smaller diameter, or

neck portion L' of the lug. The concaved portion 32 of the lug surface extends substantially between the points B and B'. It has been found by experiment that the lug L will have an increasing holding capacity in relation to its diameter if the lug is provided with a head L'', such as shown extending between points B' and C. The thickness of the head L'' has been found to give satisfactory support to the tapered portion L in preventing collapsing of the plug if it is at least one quarter the thickness of the maximum diameter of the upward portion of the lug. The head L'' is shown with cylindrical side wall 30', but is not limited thereto.

It is of substantial advantage to have this particular shaped lug formed with a relatively long concaved surface beginning inwardly upon the woven portion of the band and increasing the curvature of its surface as it approaches the outer limits of the diverging portion of the lug. The inner surface of the fixture, as stated hereinbefore, is of substantially the same shape as the outer surface of the lug and is provided with a portion extending from the points B to B' of convexed form to coincide with the concaved surface of the lug. The remaining portion of the lug surface and inner wall of the fixture extending from the point B toward the lapped portion is parallel with the longitudinal axis of the lug and band. By having the walls of the neck portions of the lug and fixture without a taper will reduce the compression in this area and allows the remainder of the concaved surface of the lug to progressively take up the load.

This area of no taper prevents or reduces a tendency to rupture the plug, or to move out of alignment the unbraided strands 21 adjacent the woven lapped portion.

It has been found by experiment that when the band is formed from artificial organic plastic fibers, it is more desirable also to construct the lug of an organic plastic substance, and further, if the lug is compounded to offer some slight elasticity, it will aid in the holding power of the lug, which allows a certain amount of take-up in the unevenness of the strands within the lug. When the band is under heavy stress a slightly elastic lug also allows the lug to conform to any slight irregularities that may exist between the lug and the fixtures.

As mentioned heretofore, the parallel neck portion of the lug and fixture will allow the longitudinal strands to remain firmly engaged by the lug adjacent the neck portion before the gradual diverging lug increasing surfaces begin to pick up the load. This prevents any distortion of the neck portion of the lug due to high compression on its side walls that might affect the adhesiveness of the lug to the strands 21' adjacent the lapped portion.

The neck portion of the fixture is adapted to extend over at least a portion of the lapped area as shown at 24 in FIGURE 1 in order to give to the unbraided strands 21' a straight pull with the longitudinal axis of the band. The fixture 28 shown in FIGURES 1 to 3 is of circular form and is provided with extending ears 28' and 28'' having holes 34 and 34' extending therethrough for receiving a pin or bolt 37 for anchoring the fixtures to a support (not shown). However, any type of holding means may be employed in place of this arrangement.

A small variation from the form shown in FIGURES 1 to 3 is shown in FIGURES 5 and 6. In FIGURE 5 the band is given one single closed lap, as shown at 25, about a core element 26'. The core may be of any kind of material to which the solidifiable mass would adhere.

The core 26' is of such size as to allow the lateral edges 12 and 14 of the band to abut, and while shown in cross-section to be of circular shape, it may take any desirable form, such as, square, rectangular, etc. The lug would be formed in substantially the same manner as previously described for FIGURES 1 to 3. The fixture 27 is quite similar to the fixture 28 and operates in substantially the same way.

FIGURE 6 is still a further variation from the form shown in FIGURES 1 to 3, in that, the lapped portion is of elliptical form in cross-section and is not provided with a core element, as shown in FIGURE 5. In this form, the lateral edges 12 and 14 of the lapped portion are shown in abutted relationship, similar ot that shown in FIGURE 5. The band is lapped wherein the central portion 33' of the band extends across one of the longer sides of the ellipse and the side sections 33'' and 33''' extend along the opposite longer side of the ellipse and are abutted adjacent the center of the side section. The lug is formed in substantially the same manner as that described for the form shown in FIGURES 1 to 3. The fixture shown at 39 is of substantially the same structure as those previously described in FIGURES 1 to 3 except the portion engaging the lapped section 33 of the band is of elliptical cross-sectional shape to correspond with the lapped band. However, the outer portions (not shown) of the fixture may take any other conventional form, such as round, square, etc. and having means associated therewith for fastening the same to a suitable support.

Other forms of lapping of a more compounded nature are shown in the remaining illustrations. However, certain parts, such as the band A, the unbraided strands 21', the concaved surface 30 of the lug, the operation and general characteristics of the band, the lug and the fixtures are the same as that previously described in detail, in FIGURES 1 to 3 and therefore no detailed description of these parts is believed necessary to understand the structure and operation of the forms next to be referred to only where necessary to bring out the particular features of the form of lap.

Referring to FIGURES 7 to 9 the fixture 31 is somewhat similar to the fixture 28 shown in FIGURES 1 to 3, but being square in cross-section having ears 31' and 31''' through which are holes 36 and 36' for supporting the fixture to a support (not shown). However, as stated in regard to the fixture 28, the fixtures may be of any convenient shape and may be provided with any suitable means for supporting the same to a support. To conform with the square fixture, the lug would also be square, as shown in FIGURES 8 and 9. The lapped area 37 is folded in the form of a letter S. The lap comprises a central portion 38 and two side portions 39 and 40 lapped so that the lateral edges 12 and 14 of the band are positioned in opposite directions and diagonal with respect to the lap.

In FIGURES 10 and 12 there is shown a different type of lap. This type of lap is shown at 41 and is lapped in the form of the letter M. The lap portion of the band is best illustrated in FIGURE 11 and is provided with a double central portion, as shown at 42 and 44, and two side portions 46 and 48 respectively. The lateral edge 12 of the side portion 46 and the lateral edge 14 of the side portion 48 are extended in the same direction. The fixture 56 is illustrated as being also square in cross-section as previously shown and described for fixture 31 shown in the species illustrated in FIGURES 7 to 9, but likewise may be of any convenient shape. The fixture 56 is provided with ears 56' and 56'' extending outwardly from the main portion of the fixture 56 having hole 57 for receiving a suitable pin for anchoring the fixture to a support (not shown). Again the fixture 56 may be attached to the support in any suitable manner. The longitudinal, or woof strands of the band extend outwardly from the lapped portion 40 and are incorporated into a lug of the same materials and in substantially the same manner as previously described for the foregoing species.

A still further form of lap is illustrated in FIGURES 13 to 15. This form is provided with a lap area 60 in which the central portion 62 of the band is of arcuated form in cross-section (see FIGURE 14). The outer portions of the band, as shown at 64 and 66, are turned inwardly along the lines 64' and 66', wherein the outer side portions 64 and 66 of the band are adjacent each other having their respective edges 12 and 14 abutting adjacent the concaved surface 62' of the arcuated por-

tion 62. This type lap is very compact and is particularly adapted for bands of such thickness and width and of such texture as to permit the band to be folded in this particular manner. In this form, the fixture 70 is shown in circular cross-section form, as previously described in FIGURES 1 to 3. The fixture 70 is provided with extended ears 72 and 72' having openings 73 and 73' therethrough for receiving a pin (not shown) for fastening the fixture to a support (not shown), however, any suitable holding means may be substituted therefor.

The fixtures regardless of the type of lap may be of most any cross-sectional shape, or combination of these shapes, depending upon the circumstances and feasibility in manufacturing.

While a particular type of lap is shown in FIGURES 7 to 9 and in FIGURES 10 to 12, these laps may be folded in multiples of these forms, provided the band is of a suitable texture and of suitable width and thickness to permit such a fold.

The fixtures regardless of the type of lap are designed to hold and may be of most any cross-sectional shape, or combination of shapes. The fixtures may be made of any suitable material, however, it is preferable to use a strong non-corrosive metal such as stainless steel. It is also not necessary to have the fixtures constructed of a single piece. If the lug L is formed in a separate mold, the fixture may be longitudinally split, so that, it may be readily attached to the lug. In this way the fixture may then be attached to the band at the time it is to be used.

By the use of the present end holding structure, bands and/or webbing having great potential strength may be effectively used in places and for purposes where hereinbefore their use was hampered because of the holding qualities, bulkiness and inappropriate shape of the fixtures and in which the fixtures themselves had a tendency to break the strands of the band long before the tensile strength of the band was reached.

The neck of the lug and the lapped portion of the band are snugly engaged by the neck, or small end of the fixture opening for holding the lapped portion in its designed pattern. This, as has been stated before, keeps the longitudinal strands, which are embedded in the lug, parallel with the axis of the band until they are well extended into the woven portion of the band.

While the invention has been illustrated in several forms, it will be understood that various changes may be made in the detail arrangements and proportions of the parts without departing from the scope of the claims.

We claim:

1. A combination end structure for an elongated substantially flat flexible band including parallel lateral edges wherein the band is constructed of multiple interwoven longitudinal and lateral strands and a holding element therefor, the lateral strands of the band adjacent the end of the band being removed for at least the distance equal to one-third the width of the band leaving the longitudinal strands extending outwardly from the woven portion of the band, the woven portion adjacent the unwoven end portion of the band being lapped parallel with the elongated axis of the band, thereby reducing the width of the band adjacent the unwoven portion, the extended unwoven longitudinal strands forming a diverging flare of spaced longitudinal strands beyond the lapped woven portion, an organic plastic material adhering to the spaced unwoven longitudinal strands and filling the spaces therebetween, the plastic material and the unwoven strands forming a tapered lug having diverging sides extending outwardly from the lapped portion toward the ends of the unwoven strands of a predetermined configuration for holding the unwoven strands in extended and fixed position, the holding element having a tapered cavity and an opening adjacent the smaller end thereof of such size and shape as to snugly accommodate the lapped cross-sectional area of the woven band adjacent the smaller end of the lug through which the band is extendable, the cavity in the holding element being of the same configuration and size as that of the lug, said holding element extending throughout the length of the lug and along the folded section of the band for holding the laps in longitudinal alignment with the longitudinal strands extending into the lug.

2. A combination end structure for an elongated flat flexible band and a holding element therefor as claimed in claim 1 wherein, the lapped portion of the band is lapped with at least one central portion and two side portions extending on the outside of the central portion having the lateral edges extending in opposite directions.

3. A combination end structure for an elongated flat flexible band and a holding element therefor as claimed in claim 1 wherein, the lapped portion of the band is in the form of a fold having at least one double folded central portion and two folded side portions terminating along their parallel lateral edges, the lateral edges of the side portions being positioned on the outside of the lap and facing in the same direction.

4. A combination end structure for an elongated flat flexible band and a holding element therefor as claimed in claim 1 wherein, the lapped portion of the band is in the form of an arcuated central portion and two folded side portions terminating along their parallel lateral edges, the side portions being folded inwardly from the central portion having their lateral edges positioned adjacent the center of the concaved surface of the central section.

5. A combination end structure for an elongated flat flexible band and a holding element therefor as claimed in claim 1 wherein the band is lapped to position one of the lateral edges adjacent the center of the lap and the opposite lateral edge in position on the outside of the lap.

References Cited by the Examiner

UNITED STATES PATENTS

751,729	2/04	Heinitsh et al.	24—143
761,963	6/04	Hiller	24—143
1,293,383	2/19	Eaton	287—82
1,512,162	10/24	Dennis	24—143
1,578,107	3/26	Tippit	280—480
1,772,420	8/30	Harris	280—480
2,317,110	4/43	Person	264—243
2,684,318	7/54	Meek.	
3,008,193	11/61	Been	264—243

FOREIGN PATENTS

489,874	8/38	Great Britain.

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