

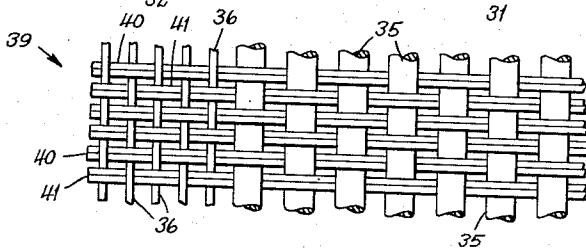
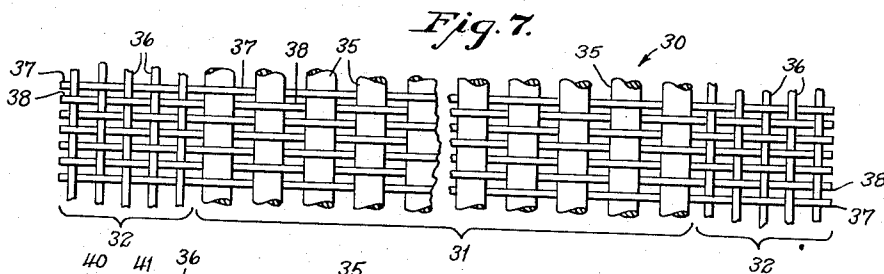
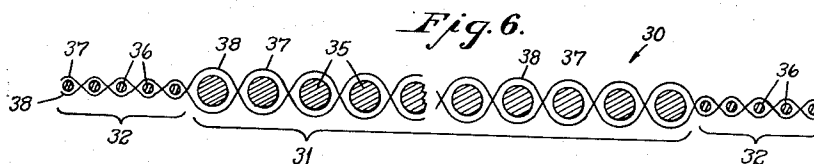
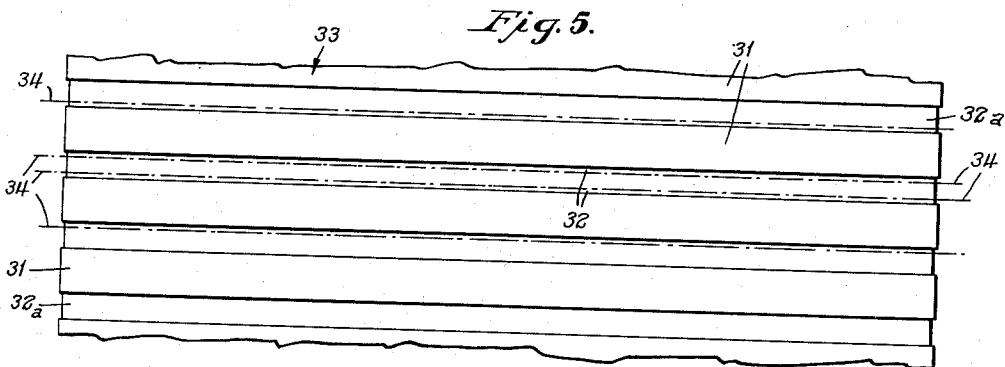
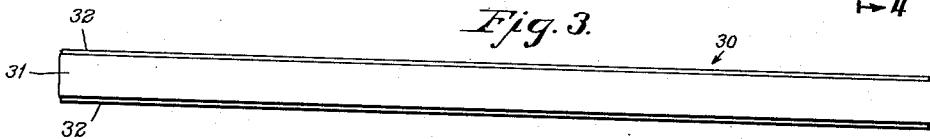
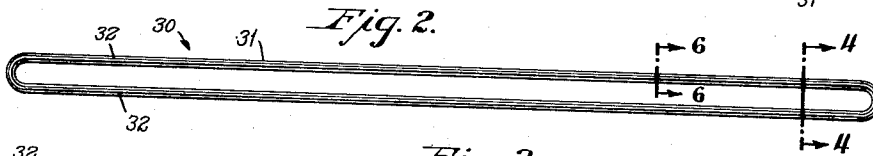
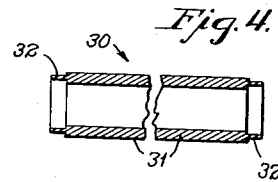
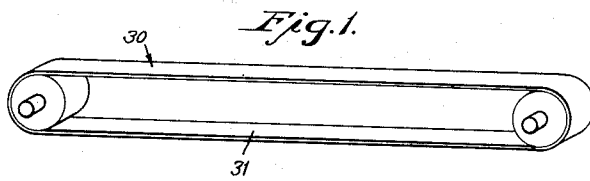
March 16, 1954

G. WALTERS
WOVEN ENDLESS BELT

2,672,168

Filed April 25, 1951

2 Sheets-Sheet 1



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WOVEN ENDLESS BELT

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2 Sheets-Sheet 2

Fig. 9.

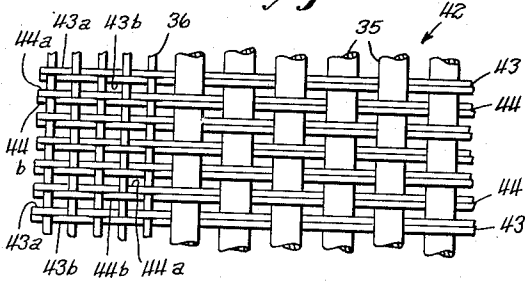


Fig. 10.

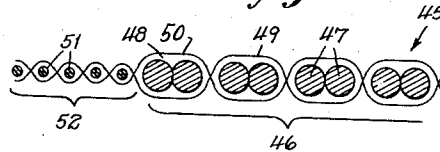


Fig. 11.

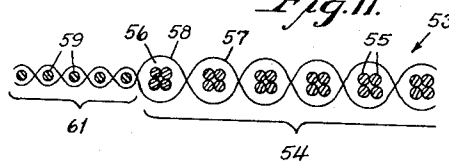


Fig. 12.

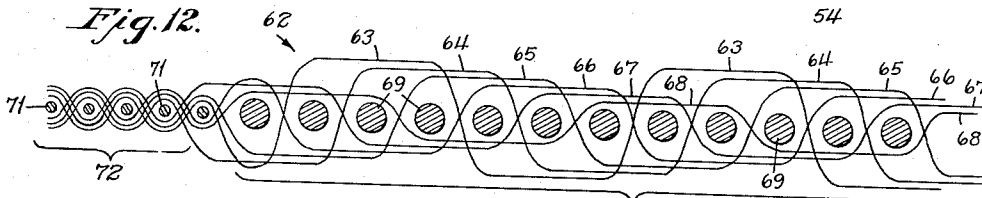


Fig. 13.

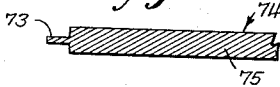


Fig. 14.

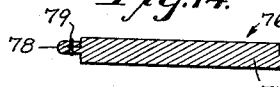


Fig. 15.

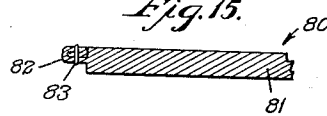


Fig. 16.

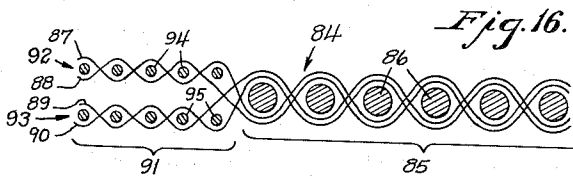


Fig. 17.

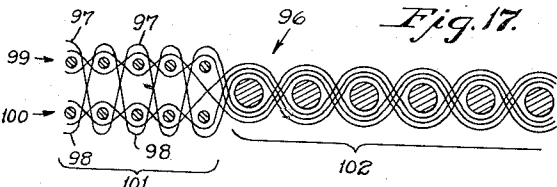


Fig. 18.

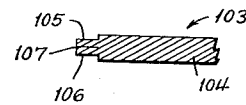


Fig. 19.

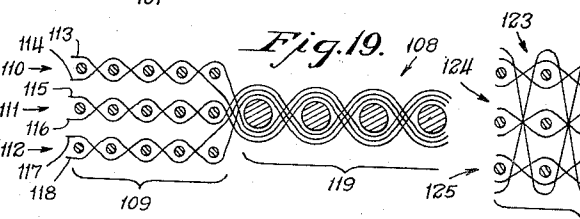


Fig. 20.

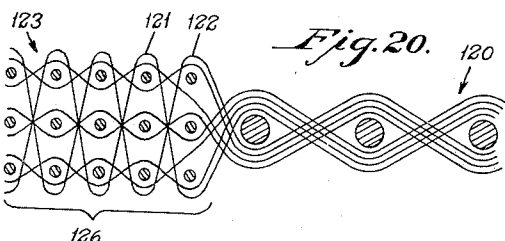
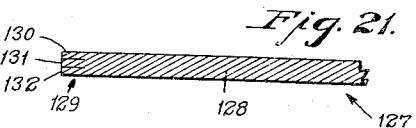


Fig. 21.



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2,672,168

WOVEN ENDLESS BELT

Gustav Walters, Middletown, Conn.

Application April 25, 1951, Serial No. 222,773

13 Claims. (Cl. 139—383)

1 This invention relates to improvements in woven-endless belts, and more particularly to woven-endless belts to be used as belts for pulley-travel mechanical purposes, such as drive belts, conveyor belts and abrasive belts, abrasive belts being those which have an abrasive such as rouge, emery etc. adhered thereto for polishing, abrading, etc.

In the usual way of making woven-endless belts for pulley-travel mechanical purposes, the longitudinal strands are endless but the transverse strands are non-endless, and therefore such belts do not have selvage side edges as woven, with the result that such edges tend to unravel and destroy the side edge construction of the belt, in consequence of which such belts have to be thrown away due to this edge destruction.

One object of this invention, therefore, is to provide an improved woven-endless textile belt for pulley-travel mechanical uses, in which the non-selvage side edges thereof are of improved construction so as to give longer life to the edge portions of the belt, and at the same time to not substantially interfere with the mechanical functioning action of the center or main or body portion of the belt.

With the above and other objects in view as will appear to those skilled in the art from the present disclosure, this invention includes all features in said disclosure which are novel over the prior art.

In the description and claims, various parts and steps are identified by specific terms for convenience, but they are intended to be as generic in their application as the prior art permits.

In the accompanying drawings forming part of the present disclosure, in which certain ways of carrying out the invention are shown for illustrative purposes:

Fig. 1 is a perspective view illustrating a woven-endless belt made in accordance with the present invention and mounted on a pair of pulleys;

Fig. 2 is an edge view of the belt illustrated in Fig. 1;

Fig. 3 is a top plan view of Fig. 2;

Fig. 4 is an enlarged sectional view on line 4—4 of Fig. 2;

Fig. 5 is a top plan view similar to Fig. 3 of a woven-endless tubular fabric comprising a plurality of belt-sections which are ultimately to be cut into separate belt-sections or belts;

Fig. 6 is an enlarged schematic sectional view on line 6—6 of Fig. 2 illustrating one weave construction;

2 Fig. 7 is a schematic top plan view of the weave construction of Fig. 6;

Fig. 8 is a schematic top plan view similar to Fig. 7 of a modified weave construction;

Fig. 9 is a schematic top plan view similar to Fig. 8 of another modified weave construction;

Fig. 10 is a schematic fragmental view similar to the left-hand portion of Fig. 6, of another modified weave construction;

Fig. 11 is a schematic view similar to Fig. 10 of still another modified weave construction;

Fig. 12 is a schematic view similar to Fig. 11 of still another modified weave construction;

Fig. 13 is a sectional view of a fragment of a belt showing the left body and edge-portions corresponding to Figs. 6, 10, 11 and 12;

Fig. 14 is a view similar to Fig. 13 of a modified construction of edge-portion;

Fig. 15 is a view similar to Fig. 14 of still another modified form of edge construction;

Fig. 16 is a schematic view similar to the left end portion of Fig. 6 of a two-ply edge construction;

Fig. 17 is a schematic view similar to Fig. 16 of another two-ply edge construction;

Fig. 18 is a sectional view similar to Fig. 13 of a two-ply edge construction corresponding to Figs. 16 and 17;

Fig. 19 is a schematic view similar to Fig. 16 of a three-ply edge construction;

Fig. 20 is a schematic view similar to Fig. 19 of another three-ply edge construction; and

Fig. 21 is a sectional view similar to Fig. 18 of a three-ply edge construction corresponding to Figs. 19 and 20.

Referring to Figs. 1 to 7 of the drawings showing the form of invention illustrated therein, the belt 30 is of woven-endless construction having a central- or main- or body portion 31 and two opposite edge-portions 32. The body portion of the belt can be said to be the belt proper which performs the mechanical functions for which the belt is intended, and the edge-portions are for the purpose of securing a satisfactory locking of the longitudinal edge-strands against unraveling.

In the weaving of this belt, as shown in Fig. 5, a woven-endless fabric 33 is woven with alternate body portions 31, and thinner portions 32a from which the edge-portions 32 are formed. Each belt unit or belt 30 is made by cutting longitudinally through the thin portions 32a as indicated by the broken lines-of-cut 34, to form the edge-portions 32 of belt 30. Ordinarily, the edge-portions 32 of a belt will be given some further

3 treatment to increase their resistance to unraveling, before such a belt is to be actually employed for a belt use. And the body portion of the belt may also be given further treatment before being used as a belt, all as will be more fully hereinafter set forth.

Referring to Fig. 6 which is an enlarged schematic cross-sectional view on line 6—6 of Fig. 2, the body-portion 31 of the belt 30 and the two edge-portions 32 thereof are all of single-ply construction in which the longitudinal body-strands 35 of the body-portion 31 are endless longitudinal strands which are also weft strands, and the longitudinal edge-strands 36 of the edge-portions 32 are also endless longitudinal or weft strands, 15 the endless longitudinal strands 35 and 36 being woven with non-endless transverse or warp strands or sets of strands 37 and 38 to form the single-ply fabric 33, and the belts 30 which are cut from the fabric 33. The transverse strands extend integrally continuously across the body portion and both edge portions. 20

In the claims, the term endless longitudinal or weft strand or strands is used in its sense as understood by those skilled in the art, that is, that although a weft strand is ordinarily of indefinitely great length except when it breaks during weaving or the weaving of a different size of weft strand is to be started, it is not necessary to have it of indefinitely great length if the picks constituting a weft strand or strands are constituted of weft strands, a majority of which are long enough to form at least three successive picks of the helix in which the weft strand extends in weaving a tubular fabric, so that the tubular fabric will have ample strength along the locations of the beginning and end of the picks. 30

It will be noted from Figs. 6 and 7, that the endless longitudinal weft edge-strands 36 and the non-endless transverse warp strands 37 and 38 40 are shown as of similar size, and much smaller than the longitudinal body-strands 35, whereby the opposite edge-portions 32 of the belt 30 are very flexible and can be rendered non-raveling by treating the same with rubber and/or as otherwise hereinafter set forth.

Instead of making a belt such as 30 hereinbefore set forth, a belt 39 may be made as illustrated in plan view in Fig. 8, which differs from the belt 30 illustrated in Figs. 6 and 7 in that, instead of having the non-endless transverse warp strands arranged as singles, they are arranged as pairs 40 and 41 in conjunction with the endless longitudinal weft strands 35 and 36 as in Figs. 6 and 7. 50

Or, a belt such as 42 as shown in plan view in Fig. 9 can similarly have pairs of transverse strands 43 and 44 woven with the longitudinal strands 35 and 36 by having them extend as pairs in woven relation with the body-strands 35, and then each pair of strands 43, 44 can change to be woven as singles 43a and 43b and 44a and 44b with the edge-strands 36, to thus bring about a better locking action with the edge strands 36 than is accomplished in the construction of Fig. 8. 60

The form of the belt construction 45 illustrated in Fig. 10 is similar to that illustrated in Fig. 6, except that in the belt construction 45, the body portion 46 contains pairs or shed-groups of longitudinal body strands 47 in each shed area 48 formed by the sets of transverse strands 49 and 50, while the longitudinal edge strands 51 of each edge portion 52 are arranged as singles in each shed area, as in the previously described constructions. 70

In the belt construction 53 illustrated in Fig. 11, the longitudinal strands are individually all of the same size, but in the body portion 54, the longitudinal strands 55 are arranged in shed-groups of four in each shed area 56 formed by the sets of transverse strands 57 and 58, while the longitudinal edge strands 59 of each edge portion 61 are arranged as singles in each shed area formed by the transverse strands 57 and 58 in each edge portion 61.

In the form of the construction illustrated in Fig. 12, the belt 62 is shown as having groups of six transverse strands 63, 64, 65, 66, 67 and 68, each group forming a repeat-group in an over-three-under-three twill weave construction with the longitudinal strands 69 in the body-portion 70, and then these six strands 63, 64, 65, 66, 67 and 68 are woven with the longitudinal strands 71 in the edge-portion 72 in an over-one-under-one weave, similar to the mode of weaving of the edge-portions illustrated in Figs. 6 and 7.

In the case of all of the foregoing described weave constructions set forth in Figs. 6 to 12 inclusive, the average shed area of the longitudinal strands of the edge-portions is considerably smaller than the average shed area of the longitudinal strands in the body-portion. Therefore, since the transverse strands are the same size throughout the body-portion and edge-portions, each edge-portion will be substantially thinner and more flexible than the body-portion. And by cutting each of the edge-portions 73 of the belt 74 relatively narrow as illustrated in Fig. 13, and treating each of them, and if desired also treating the entire belt 74 including the body-portion 75, with rubber or other elastomer and vulcanizing, when the edge-portions 73 rub against flanges of pulleys or the like, they will temporarily flex out of the way and thus resist tendency to unravel the longitudinal strands thereof, and thus maintain the belt in serviceable condition.

Or, instead of making the edge-portions as illustrated in Fig. 13, they can be made as in Fig. 14 in which the belt 76 has a body-portion 77 and edge-portions 78, each edge-portion 78 being cut wider than in the case of the edge-portion illustrated in Fig. 13, and folded over once to provide two layers or folds which are sewed together by stitching 79 to provide a non-raveling edge-portion 78. If desired, each edge-portion 76 can be treated with rubber either before or after sewing with the stitching 79. 50

In the form of the belt 80 illustrated in Fig. 15, the body-portion 81 is similar to that heretofore described, and each edge-portion 82 is cut wider than is illustrated in the belts of Figs. 13 and 14, and is folded over twice to provide three layers or folds as illustrated, which are sewed together by the stitching 83. The body-portion 81 and/or the edge-portions 82 can be treated with rubber, or otherwise, as herein set forth. 60

In the form of belt construction 84 illustrated in Fig. 16, the body-portion 85 is single-ply and has relatively large-size longitudinal weft strands 86 woven with groups of the transverse warp strands 87, 88 and 89, and each edge-portion 91 consists of two plies 92 and 93, the ply 92 having longitudinal strands 94 interwoven with the transverse strands 87 and 88, and the ply 93 having longitudinal strands 95 woven with the transverse strands 89 and 90. 65

The belt construction 96 illustrated in Fig. 17 is substantially the same as the belt construction illustrated in Fig. 16 with the exception that 75

the additional transverse warp strands 97 and 98 are employed to act as binder-warp strands to bind the upper and lower plies 99 and 100 of each edge-portion 101 together, and also extend across the body-portion 102 of this belt construction. Strands such as the strands 87, 88, 89 and 90 of Fig. 16, and strands 97 and 98 of Fig. 17, are known to those skilled in the art as warps or warp strands. But where warp strands or portions of warp strands such as 97 and 98 bind together two or more plies of woven material such as plies 99 and 100 of the edge portion 101 of Fig. 17, they are more particularly known as binder warps or binder-warp strands. And where it is desired to distinguish strands such as 87 to 90 of Fig. 16, and the portions of strands such as 97 and 98 which extend across the body-portion 102 of Fig. 17, which do not bind two or more plies together, from binder-warp strands, the former are called ground warps or ground-warp strands.

By proportioning the size of the longitudinal strands in the edge-portion as compared to the size of the longitudinal strands in the body-portion of the constructions of Figs. 16 and 17, it is possible to have the two edge plies provide a thickness which will not be more than, but will be less than or substantially the same as, the body-portion. Thus, this is illustrated in Fig. 18 in which a belt construction 103 has the body-portion 104, and the two edge layers or plies 105 and 106 of the edge-portion 107, and by cementing and/or sewing and/or binder-strand weaving the edge layers 105 and 106 together in a way previously described in connection with other constructions, each edge-portion 107 will be suitably protected against unraveling.

The belt 108 shown in Fig. 19 is very similar to the belt 84 shown in Fig. 16, except that the belt 108 has each of its edge-portion 109 formed of three plies 110, 111 and 112, instead of two plies as illustrated in the case of the belt 84 of Fig. 16. And, accordingly, there will be six sets of transverse strands 113, 114, 115, 116, 117 and 118 which extend across each edge-portion 109 and the body-portion 119.

The belt 120 of Fig. 20 is substantially the same as the belt 108 of Fig. 19 except that it adds the two sets of transverse binder-warp strands 121 and 122 to bind the three plies 123, 124 and 125 of each edge-portion 126 together.

By proportioning the size of the average shed area of the longitudinal strands in the edge portions as compared to the size of the average shed area of the longitudinal strands in the body-portion of the constructions of Figs. 19 and 20, it is possible to have the three edge plies provide a thickness which will not be more than, but will be the same as or less than, the body portion. Thus, this is illustrated in Fig. 21 in which a belt 127 has the body-portion 128, and has an edge-portion 129 made up of the three layers or plies 130, 131 and 132, each edge-portion 129 and body-portion 128 being preferably of the same thickness, as illustrated.

In accordance with the present invention, each edge-portion has one or more woven plies, each of which plies is substantially thinner than the woven body portion in order to provide adequate locking against unraveling. Another way of defining this characteristic is to say that the average shed-area of the longitudinal strands of each edge-portion, is substantially less than the average shed-area of the longitudinal strands in the body-portion of the belt. And the edge-portion

are preferably treated with elastic cementitious material, preferably rubber or other rubber-like material or elastomer and/or stitching, in order to further inhibit or prevent the unraveling action of the edge portions. And it is more advantageous to have the average shed-area of the longitudinal strands of each edge-portion not more than half that of the average shed-area of the longitudinal strands of the body-portion, and it is still more advantageous to have the average shed-area of the longitudinal strands of each edge-portion not more than one-fourth the average shed-area of the longitudinal strands of the body-portion, in order to give maximum locking or non-raveling effect. And where there are also two or more plies to the edge-portion, this gives locking action against unraveling, as a result of the cementing of the layers or plies together and/or the action of transverse binder-warp strands when used, or sewing the plies together when that is done. Also, it is preferable to have the transverse strands in the edge-portion extending in an over-one-under-one weave for more effective locking action against unraveling. Belts in accordance with the present invention may have the longitudinal and/or transverse strands made of any suitable material, such as cotton, nylon, etc.

My application Serial Number 222,772 filed April 25, 1951, describes means and method suitable for making woven-endless fabric from which belts in accordance with this invention may be made.

The invention may be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention, and the present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

I claim:

1. A woven-endless pulley-travel belt having a woven-endless single-ply body portion and two woven-endless edge portions, each edge portion being adjacent to and transversely beyond a side edge of the body portion in a direction away from the body portion; the body portion and edge portions each having endless longitudinal weft strands woven with non-endless transverse warp strands, the transverse warp strands extending continuously transversely across the body portion and across and beyond each side edge of the body portion in a direction away from the body portion and connecting the body portion and edge portions together; each edge portion having at least one woven ply; and the average shed-area of the longitudinal weft strands of each edge portion being substantially less than the average shed-area of the longitudinal weft strands of the body portion.

2. A woven-endless pulley-travel belt having a woven-endless single-ply body portion and two woven-endless edge portions, each edge portion being adjacent to and transversely beyond a side edge of the body portion in a direction away from the body portion; the body portion and edge portions each having endless longitudinal weft strands woven with non-endless transverse warp strands, the transverse warp strands extending continuously transversely across the body portion and across and beyond each side edge of the body portion in a direction away from the body

of the body portion; and the average shed-area of the longitudinal weft strands of each edge portion being substantially less than the average shed-area of the longitudinal weft strands of the body portion.

10. A woven-endless pulley-travel belt having a woven-endless single-ply body portion and two woven-endless edge portions, each edge portion being adjacent to and transversely beyond a side edge of the body portion in a direction away from the body portion; the body portion and edge portions each having endless longitudinal weft strands woven with non-endless transverse warp strands, the transverse warp strands extending continuously transversely across the body portion and across and beyond each side edge of the body portion in a direction away from the body portion and connecting the body portion and edge portions together; each edge portion having only a single woven ply, and said woven ply of each edge portion lying in a single general plane generally parallel to the general plane of the body portion, and said woven ply of each edge portion containing rubber-like material; and the average shed-area of the longitudinal weft strands of each edge portion being substantially less than the average shed-area of the longitudinal weft strands of the body portion.

11. A woven-endless pulley-travel belt having a woven-endless single-ply body portion and two woven-endless edge portions, each edge portion being adjacent to and transversely beyond a side edge of the body portion in a direction away from the body portion; the body portion and edge portions each having endless longitudinal weft strands woven with non-endless transverse warp strands, the transverse warp strands extending continuously transversely across the body portion and across and beyond each side edge of the body portion in a direction away from the body portion and connecting the body portion and edge portions together; each edge portion having a plurality of woven plies, and said woven plies of each edge portion being secured together; and the average shed-area of the longitudinal weft strands of each edge portion being substantially less than the average shed-area of the longitudinal weft strands of the body portion.

12. A woven-endless pulley-travel belt having a woven-endless single-ply body portion and two woven-endless edge portions, each edge portion being adjacent to and transversely beyond a side edge of the body portion in a direction away from the body portion; the body portion and edge portions each having endless longitudinal weft strands woven with non-endless transverse warp strands, the transverse warp strands extending

continuously transversely across the body portion and across and beyond each side edge of the body portion in a direction away from the body portion and connecting the body portion and edge portions together; each edge portion having a plurality of woven plies, and with said woven plies of each edge portion each lying in a single general plane generally parallel to one another and to the general plane of the body portion, and said woven plies of each edge portion being secured together; and the average shed-area of the longitudinal weft strands of each edge portion being substantially less than the average shed-area of the longitudinal weft strands of the body portion.

13. A woven-endless pulley-travel belt having a woven-endless single-ply body portion and two woven-endless edge portions, each edge portion being adjacent to and transversely beyond a side edge of the body portion in a direction away from the body portion; the body portion and edge portions each having endless longitudinal weft strands woven with non-endless transverse warp strands, the transverse warp strands extending continuously transversely across the body portion and across and beyond each side edge of the body portion in a direction away from the body portion and connecting the body portion and edge portions together; each edge portion having a plurality of woven plies, and with said woven plies of each edge portion each lying in a single general plane generally parallel to one another and to the general plane of the body portion, and each of said woven plies of each edge portion containing rubber-like material; and the average shed-area of the longitudinal weft strands of each edge portion being substantially less than the average shed-area of the longitudinal weft strands of the body portion.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
505,294	Lyall	Sept. 19, 1893
708,907	McLean	Sept. 9, 1902
824,226	Alvord	June 26, 1906
848,121	Moore	Mar. 26, 1907
1,034,063	Bentley	July 30, 1912
1,895,639	Schlegel	Jan. 31, 1933
2,391,674	Brown et al.	Dec. 25, 1945

FOREIGN PATENTS

Number	Country	Date
6,475	Great Britain	of 1898
429,743	Great Britain	June 5, 1935