

May 4, 1943.

J. C. WALTON ET AL

2,318,441

NONSTATIC BELTING

Filed May 21, 1941

2 Sheets-Sheet 1

Fig. 1.

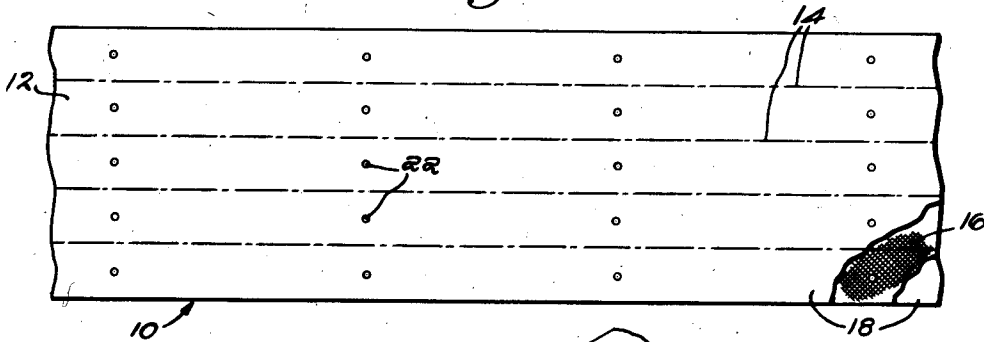


Fig. 2.

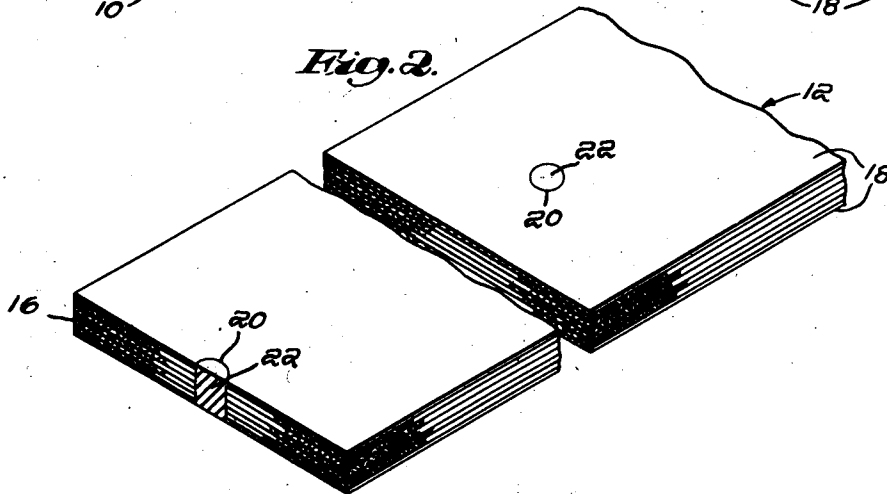


Fig. 3.

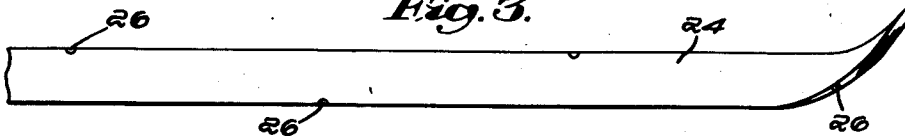
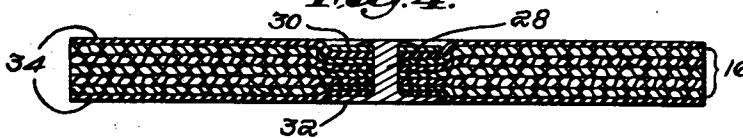


Fig. 4.



Inventors:
James C. Walton,
George E. Hall,
by Kenway & Witter
Attorneys

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2 Sheets-Sheet 2

Fig. 5.

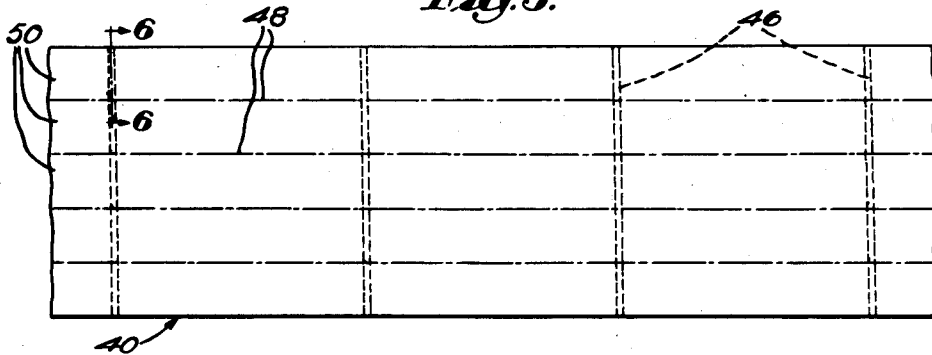


Fig. 6.

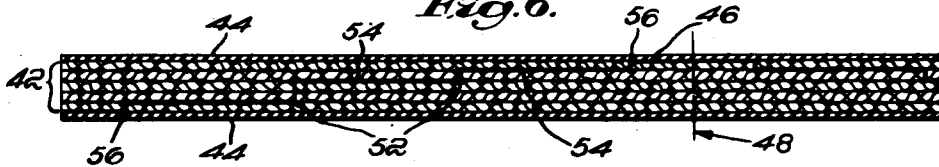
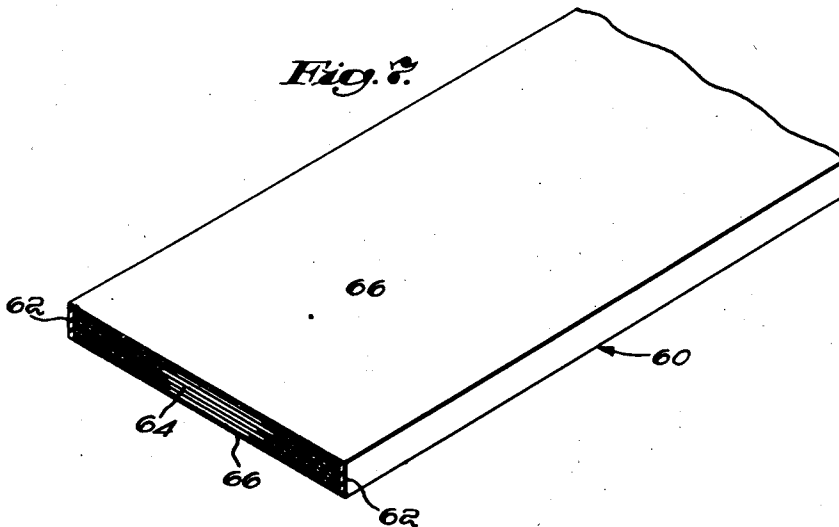


Fig. 7.



Inventors:
James C. Walton,
George E. Hall,
by Kenway & Witter
Attorneys

UNITED STATES PATENT OFFICE

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NONSTATIC BELTING

James C. Walton, Newton Center, and George E. Hall, Dedham, Mass., assignors to Boston Woven Hose & Rubber Company, Cambridge, Mass., a corporation of Massachusetts

Application May 21, 1941, Serial No. 394,556

8 Claims. (Cl. 74-232)

This invention relates to non-static belting in which the dangers resulting from electrostatic charges built up on transmission and conveyor belting in service are eliminated.

Ordinary rubber transmission and conveyor belting in operation builds up large electrostatic charges and such charges are highly dangerous in an explosive atmosphere or in the vicinity of explosives or inflammable material, since igniting sparks are discharged therefrom when the charge becomes sufficiently large. Such belting ordinarily comprises a body including a plurality of fabric plies bonded and vulcanized into a unit and rubber covers on the inner and outer faces of the body. When an electrostatic charge on the inner face of the belting has built up to a potential sufficiently large to overcome the resistance due to the non-conductive character of the cover, a limited discharge or leak onto the pulleys will take place. Such charge, however, presents a considerable hazard and a substantially greater and even more dangerous charge may accumulate on the outer face of the belting, the relatively non-conducting body plies between the two covers thus sometimes acting to form a condenser. The primary object of our invention is the production of a non-static belting employing covers of electro-conductive rubber on both faces and electro-conductive means so connecting the two covers that they remain substantially of equal potential and discharge so freely and continuously onto the pulleys as to eliminate the dangerous condenser effect and hazards heretofore present.

Conveyor belting usually requires a cover with finished edges to withstand a considerable amount of wear and abuse and while transmission belting can be finished in like manner it is more commonly and economically manufactured with raw edges, that is, the intermediate fabric body portion is exposed at the edges. Our invention is applicable to both such types of belting, the inner and outer covers being formed of electro-conductive rubber and so connected as to discharge substantially as a unit. In our finished edge belting the cover material at the edges is of electro-conductive rubber molded and finished integrally with the face covers and providing an electro-conductive connection therebetween.

Raw edge belting is commonly manufactured in substantial widths adapted to be cut apart into a plurality of belt strips or units, it being usually more economical to produce the units in this manner. Our invention contemplates the employment of this method and in conjunction therewith employs relatively simple and novel means for electro-conductively connecting the inner and outer belting covers in a manner producing belt units each having its covers electro-conductively connected at a plurality of locations

therealong. The connections, which preferably embody electro-conductive rubber united integrally with the covers, are thus so located that the two covers are adapted freely to discharge substantially as a unit and thus eliminate the condenser action and hazards heretofore present in the belt body therebetween. This novel production of non-static belting comprises a further object of the invention.

These and other features of the invention will be best understood and appreciated from the following description of preferred embodiments thereof selected for purposes of illustration and shown in the accompanying drawings in which:

Fig. 1 is a plan view of a strip of belting material illustrating the manufacture of our improved belting,

Fig. 2 is a fragmentary perspective view of a belt manufactured as illustrated in Fig. 1,

Fig. 3 is a fragmentary perspective view of a modified belt construction,

Fig. 4 is a fragmentary sectional view through a belt showing a further modification,

Fig. 5 is a plan view of a strip of belting showing another modification,

Fig. 6 is an enlarged sectional view taken on line 6-6 of Fig. 5, and

Fig. 7 is a fragmentary perspective view of a further modified form of our improved belt.

The invention contemplates the production of rubber belting having the construction, appearance and characteristics of ordinary rubber belting except that the danger due to accumulation of electrostatic charges is eliminated. Furthermore, the belting can and preferably is constructed in the usual manner and in accordance with the best and most economical practice. The elimination of the electrostatic charges is largely due to the utilization of electro-conductive rubber in the construction of the inner and outer covers of the belting whereon these dangerous charges ordinarily accumulate. A typical composition of the electro-conductive rubber which we have found highly satisfactory is compounded of the following ingredients in the weight proportions indicated:

Rubber	58
Sulphur	13 1/4
Accelerator	1
Zinc oxide	5
Stearic acid	3
Antioxidant	1
Electrically conductive carbon	30 1/4
	100

It will be understood that this formula is presented by way of example only. Other or modified formulae which will serve the purpose can be employed but the composition should be suf-

ficiently soft and flexible to carry out the objects of the invention without interfering with the operation or utility of the belt.

Referring first to Figs. 1 and 2 of the drawings, 10 indicates a relatively wide strip of belting material from which a plurality of independent belts 12 are produced by severing the strip longitudinally along lines 14. The strip comprises a belting body 16 constructed of a plurality of plies of rubberized cotton duck vulcanized into a unit according to established practice. The two faces of the body are covered with electro-conductive rubber at 18 frictioned or skimmed uniformly thereonto or the covers 18 can be hand laid, i. e., thin sheets of conductive rubber applied manually to the two faces of the belt body.

In accordance with the preferred form of our invention the two covers 18 are electro-conductively connected by plugs or masses of rubber extending through openings in and spaced along the belt body. Such openings 20 can be formed through the belt body either before or after the covers are applied and they are so completely filled with electro-conductive rubber 22 that the rubber thereafter directly and integrally joins the rubber in the covers, the strip 10 being thereafter vulcanized to effect this integral junction and complete the bonding of the covers and body into a belting unit, as by the machine illustrated in Bierer Reissue Patent No. 20,037. The openings 20 are preferably arranged in a plurality of rows relatively spaced across the body and the openings in each row are relatively spaced longitudinally of the belting. The completed strip can be severed longitudinally at 14 into a plurality of belts each having its covers electro-conductively connected at spaced locations 22 therealong. It will furthermore be apparent that the original belt as used by the purchaser, can contain one or a plurality of rows of conductive rubber plugs 22 and, should the user at any time so desire, he can convert the belt into a plurality of relatively narrower non-static belts merely by severing the original belt longitudinally along the row or rows of plugs.

It will be appreciated that the openings 20 can be arranged otherwise than illustrated in Fig. 1, the only requirement being that each belt unit 12 shall have its two covers 18 connected by the electro-conductive rubber 22 at spaced locations therealong. For example, the rows of openings can be arranged along the severing lines 14 in a manner producing belts 24 of the nature illustrated in Fig. 3. In such case the severing of the belting strip along such lines would divide the masses 22 of rubber, leaving masses 26 thereof along and extending inwardly of the cut edges of each belt. It will also be understood that the openings will preferably be so arranged that the masses 26 will be in staggered relation on opposite edges of the belts 24.

While as above pointed out, we prefer to employ electro-conductive rubber as the connecting means for and between the belt covers, we do not desire to be limited thereto since other means, also applicable to the economical method of manufacture illustrated in Fig. 1, can be conveniently employed. For example, the covered strip 10 instead of being punctured with openings 20 can have suitable conductive rivets 28 applied thereto, as illustrated in Fig. 4, the rivets being applied to the puncture locations 20. The rivets can be applied to the covered belting with the broad end portions 30 and 32 thereof

drawn tightly into the covers 34 to leave the outer surfaces of the rivets flush within the covers, or the rivets can be applied to the body 16 before the covers are applied, the covers thereafter covering the rivets and bonding directly onto the end portions thereof.

In Figs. 5 and 6 we have illustrated a further form of the invention. A wide belting strip 40, like the strip 10, comprises a body portion 42 and covers 44. The body incorporates a plurality of fabric plies and woven through the plies from cover to cover are conductive rubber strips 46. The belting strip 40 is constructed to be severed along lines 48 to provide a plurality of belt units 50 and the strips 46 are so woven through the body 42 that after the strip 40 is severed, each belt unit 50 will have its covers connected at spaced locations longitudinally therealong by portions of the rubber strips 46. Each strip portion 46 is connected at its ends to the covers 44 and from thence extends alternately through the plies at 52 and between the plies at 54, the strips being severed into strip portions on the lines 48 at the cover surfaces. It will be understood that this belt 50 can be made as independent units instead of in wide strips if desired and in which case the conductive rubber strips 46 will end at the points 56.

In Fig. 7 is illustrated a belt 60 with finished edges 62. This belt comprises a fabricated body 64 and covers 66 of conductive rubber. The edges 62, also of conductive rubber, are molded and vulcanized integrally with the covers 66. The edge portions 62 serve electro-conductively to connect the covers as will be understood whereby electrostatic charges will be freely and continuously discharged from both covers through the supporting pulleys. As has been heretofore suggested, this belting with finished edges is substantially more expensive to construct than is the raw edge belting illustrated in Figs. 1-6 and heretofore described.

It will now be apparent that we have produced a non-static belting which (1) eliminates the dangerous electrostatic charges that accumulate on the covers of ordinary rubber belting and (2) prevents the condenser action in the plies between the covers. This novel belting not only employs belt covers of electro-conductive rubber which readily conducts the electric charges therefrom with relatively small resistance, whereby avoiding the building up of dangerous potentials on the covers, but the covers are so electro-conductively connected that electrostatic charges discharge freely and simultaneously therefrom and thereby continuously relieve the covers of the dangerous possibilities heretofore present. The invention furthermore is adaptable to the most economical and practical methods of belt construction and permits our novel belting to be manufactured without substantial increase of cost over that of ordinary rubber belting.

Having thus described our invention what we claim as new and desire to secure by Letters Patent of the United States is:

1. Non-static belting comprising a body including a plurality of fabric plies, covers of electro-conductive rubber bonded to and covering the entire areas of both faces of the body, and electro-conductive means connecting the covers along the belting.

2. Non-static belting comprising a body including a plurality of fabric plies, covers of electro-conductive rubber bonded to and cover-

ing the entire areas of both faces of the body, and electro-conductive means extending through the body between its two edges and connecting the covers at spaced locations along the belting.

3. Non-static belting comprising a body including a plurality of fabric plies, covers of electro-conductive rubber bonded to and covering the entire areas of both faces of the body, and electro-conductive rubber connecting the covers along the belting.

4. Non-static belting comprising a body including a plurality of fabric plies, covers of electro-conductive rubber bonded to and covering the entire areas of both faces of the body, the body being recessed at spaced positions therealong and masses of electro-conductive rubber within the recesses and connecting the covers.

5. Non-static belting comprising a body including a plurality of fabric plies, covers of electro-conductive rubber bonded to and covering the entire areas of both faces of the body, and electro-conductive means connecting the covers at spaced locations along the belting, said means including at each location a strip of electro-conductive rubber extending through the respective plies at relatively spaced points and located between adjacent plies between adjacent points.

6. Non-static belting comprising a body including a plurality of fabric plies, covers of electro-conductive rubber bonded to and covering the entire areas of both faces of the body,

and electro-conductive rubber on and covering the two edges of the body along the belting and joined integrally to the covers.

7. Non-static belting comprising an elongated body of substantial width including a plurality of fabric plies, covers of electro-conductive rubber bonded to and covering the entire areas of both faces of the body, and electro-conductive means extending through the body and so arranged longitudinally and transversely thereof that the covered body can be severed longitudinally into a plurality of belts each having its covers electro-conductively connected by said electro-conductive means at spaced locations therealong.

8. Non-static belting comprising an elongated body of substantial width including a plurality of fabric plies, covers of electro-conductive rubber bonded to and covering the entire areas of both faces of the body, the body having a plurality of rows of openings therethrough arranged in spaced relation across the body and the openings in each row being relatively spaced longitudinally of the body, and electro-conductive rubber filling the openings, the rubber at said faces being vulcanized into unity with the rubber in the openings and the body being adapted to be severed longitudinally into a plurality of belts each incorporating therein electro-conductive rubber from one of said rows.

JAMES C. WALTON.
GEORGE E. HALL.