Aug. 7, 1934. A. D. MACLACHLAN 1,969,227

METHOD OF MAKING HOSE

Filed March 25, 1932

Fig-1

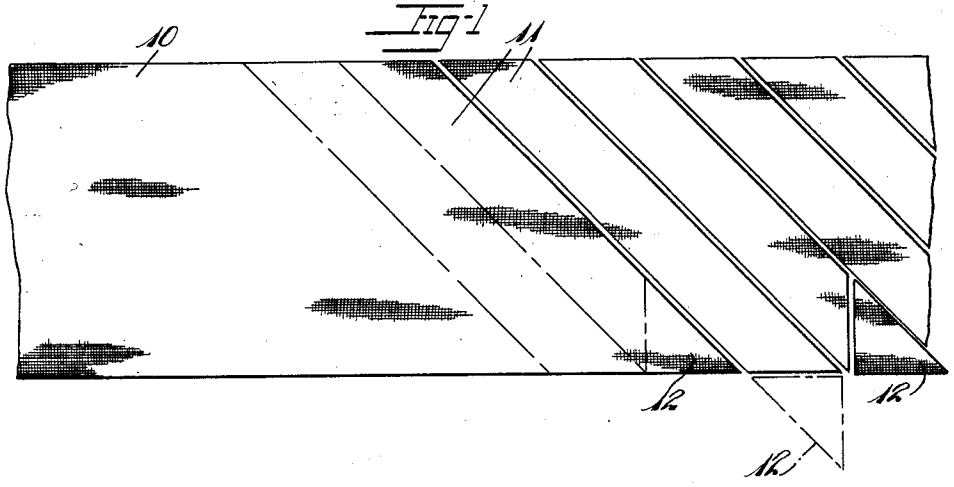


Fig-2

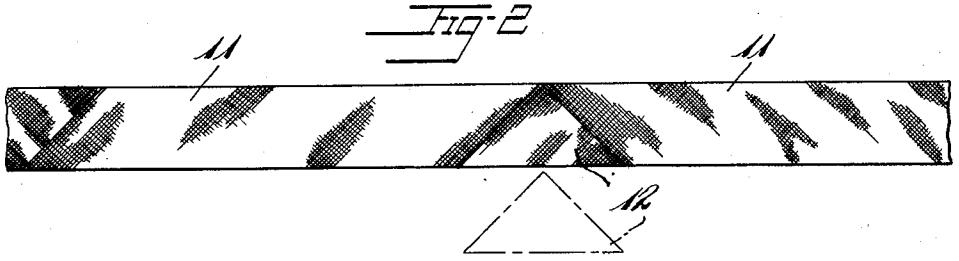


Fig-3

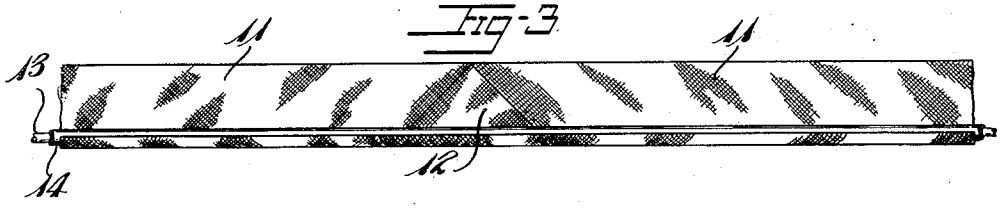
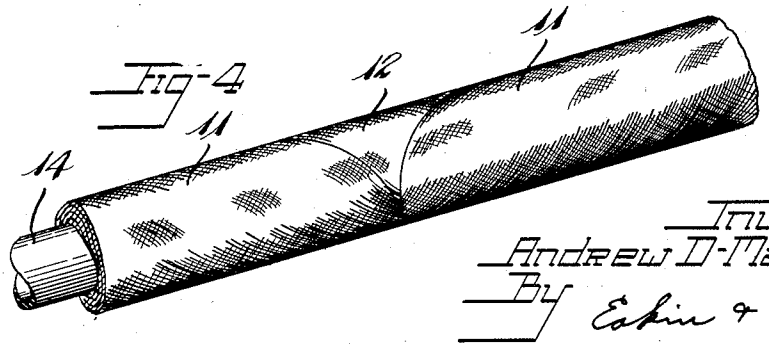


Fig-4



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1,969,227

METHOD OF MAKING HOSE

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1 Claim. (Cl. 154—8)

This invention relates to hose, particularly of the type that is reinforced by one or more plies of wrapped fabric, and to methods of producing the same.

Hose comprising layers of wrapped, square-woven, bias-cut fabric, as commonly constructed heretofore, has had the objection that under sufficient internal pressure it has been caused to twist helically along its length. This has usually been due to the fact that in the prior constructions the set of warp threads and the set of filler threads, respectively, which lie in opposite helical directions in the hose body, have not been of the same degree of sinuosity or crimp incident to their woven relation, and the set of threads that has had the lesser degree of crimp, by being placed in a taut condition sooner than the other set, has caused the hose to twist in a direction in which that set tends to straighten from its helical disposition under longitudinal expansion of the hose wall. In some cases unequal degrees of stretchability of the warp and filler threads also has contributed to the state of unbalance.

While this unbalanced condition of unequal degrees of crimp and of unequal stretchability in the warp and filler threads, respectively, can be avoided to a considerable extent by painstakingly stretching the fabric in the proper direction and to the proper degree before the wrapping operation and by providing for retaining the fabric in the proper condition of stretch until its incorporation in the hose body, such procedure has not been wholly satisfactory, especially as the procedure has not lent itself to facility of performance and as it has been difficult to obtain the desired uniformity of the balanced condition throughout.

The chief objects of the invention are to provide a wrapped hose of improved construction in which twisting under internal pressure is substantially avoided, and to provide simplified and facile procedure for producing such hose.

These and further objects will be apparent from the following description, reference being had to the accompanying drawing, in which:

Fig. 1 is a plan view of a strip of hose fabric, illustrating the manner of severing the strip into sections according to the invention in its preferred form.

Fig. 2 is a plan view of fabric sections of Fig. 1, illustrating the manner of assembling the same in accordance with the invention.

Fig. 3 is a plan view of the assembled fabric section of Fig. 2 with an associated hose lining and mandrel, illustrating a manner of incorporating the fabric in the hose body.

Fig. 4 is a perspective view of the hose as it appears after the wrapping operation, the fabric being broken away to show the lining.

Referring to the drawing, a strip of square-woven, preferably rubberized, hose fabric 10 is cut on a bias to provide a plurality of rhomboid shaped sections 11, 11, which, when they are adhered in slightly overlapped, end to end relation and the assembly is wrapped laterally upon itself about a hose lining, will produce a helical disposition of the warp and filler elements with relation to the hose.

The invention provides for so disposing the fabric sections in the hose body that any condition of unbalance due to such factors as unequal degrees of crimp or unequal degrees of stretchability in the warp and filler threads, respectively, will be compensated for, and the hose as a whole will be balanced against twist under internal fluid pressure.

This is carried out according to the preferred form of the invention by so assembling the fabric sections into the strip to be wrapped that after the wrapping operation the warp threads of different sections are disposed in the hose wall in opposite hand helices, and the filler threads of the respective sections are correspondingly reversed, thereby giving the desired balanced condition of the reinforcing elements whereby any tendency of one section to cause twist under internal pressure is compensated for by another section.

Preferably the sections 11, 11 are arranged end to end as shown in Fig. 2, in the same consecutive sequence they had in the fabric strip 10, with alternate sections reversed end for end, or top for bottom, to give the desired reversed disposition of the threads in adjoining sections. Due to the fact that the adjoining sections are taken from adjacent portions of the fabric strip there is substantial uniformity in the crimp and stretch characteristics of these sections, and when the assembled sections are built into the hose wall with the corresponding elements of the adjoining sections disposed in opposite hand helices of equal pitch with respect to the hose axis, a condition of substantial balance against twist of the hose under internal pressure is provided.

In order to avoid waste in assembling the sections in their end to end relation and to avoid an undesirable amount of overlap thereof due to the reversing of certain of the rhomboid shapes, pieces of fabric 12, 12 in the shape of isosceles triangles may be cut from the end portions of cer-

tain of the sections, as shown in Fig. 1 and these pieces may be adhered in their proper fitted relation between the adjoining sections for continuity of the assembled strip as is illustrated in Fig. 2.

The strip of assembled fabric sections may be wrapped in the hose body in any suitable manner, as by means of a rigid mandrel 13 (Fig. 3) on which is mounted a hose lining 14, the fabric being wrapped about the lining with the margin of the strip extending substantially parallel to the longitudinal axis thereof to cause corresponding threads in the reversed fabric sections of the wrapped structure to lie in their opposite hand helices with substantially equal pitch angles in relation to the longitudinal axis of the hose. The wrapped structure (Fig. 4) may be provided with one or more outer layers of rubber or other material (not shown) and vulcanized in known manner, whereby in the final structure the fabric is held embedded in the material of the hose wall.

The invention makes possible the production of the improved hose by a procedure that provides uniformity in the quality of the product despite variations in the crimp and stretch characteristics of the fabric, and without requiring a high degree of skill on the part of the operators.

Advantages of the invention may be availed of with the use of fabrics of wire and other materials, as well as of spun fibers, and it will be understood that these and other variations may be made without departing from the scope of the invention as it is defined in the following claim.

I claim:

The method of making hose which comprises cutting a strip of fabric on a bias to provide a plurality of rhomboid-shaped sections, cutting a triangular piece of fabric from a corner of one of said sections, assembling said sections in end to end alignment with one of the sections inverted and with the said triangular piece filling the space between the adjacent ends of the sections, and wrapping the assembly about a hose liner.

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