

June 4, 1963

M. C. GOLDSTEIN

3,091,856

ELASTIC THREAD LIGATURE

Filed July 14, 1960

FIG. 6

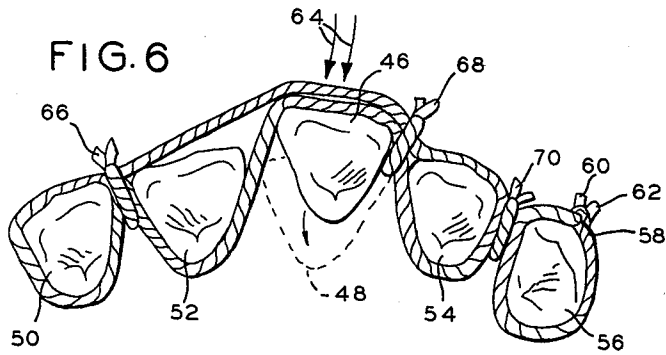


FIG. 7

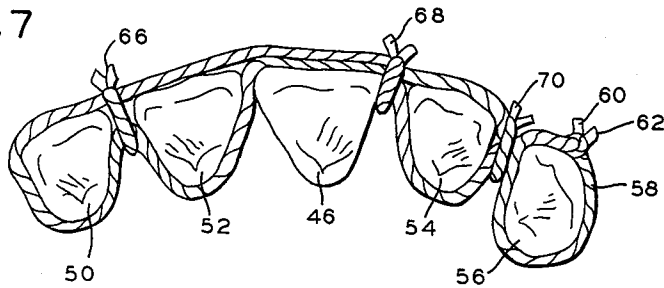


FIG. 2

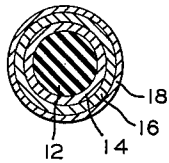


FIG. 1

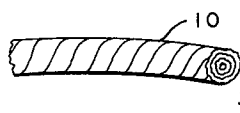


FIG. 3

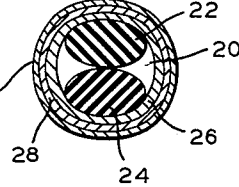


FIG. 5

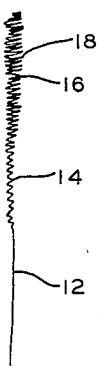
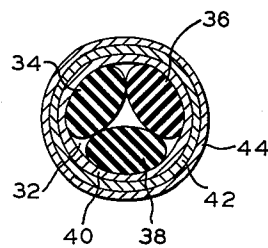


FIG. 4



INVENTOR.
MARVIN C. GOLDSTEIN

BY

Caesar and Rivise

ATTORNEYS.

1

3,091,856

ELASTIC THREAD LIGATURE

Marvin C. Goldstein, 950 W. Peachtree St. NW.,
Atlanta, Ga.

Filed July 14, 1960, Ser. No. 42,836

6 Claims. (Cl. 32-14)

This invention relates to an elastic thread ligature which is especially adapted for use in many orthodontic procedures.

The present invention is particularly intended to assist the orthodontist and the general practitioner in the movement of teeth for reasons of aesthetics, dental health and removal of pain.

It is known to achieve tooth movement by devices such as metal braces and metal wires. However, such devices, while having proved adequate, have also had their limitations.

It is, therefore, an object of this invention to provide a ligature thread of elastic quality.

A further object of this invention is to provide a ligature thread which when applied to misaligned teeth provides a continuing gentle force.

Still another object of this invention is to provide a new ligature thread.

Yet another object of this invention is to provide a new ligature thread which may be used in conjunction with misaligned teeth in a novel way to achieve a new method of aligning teeth.

A further object of this invention is to provide a ligature thread of great versatility which may be employed in many orthodontic techniques.

A still further object of this invention is to provide a new ligature thread which handles easily and which does not require frequent adjustment.

Yet another object of this invention is to provide a ligature thread which may be used to tie individual teeth to a brace or to other teeth which function as a brace.

Another object of this invention is to provide a ligature thread which is economically manufactured, simple in construction, easily used and which achieves outstanding results.

The foregoing and other objects of this invention are achieved by providing an elastic thread ligature which comprises a central core of one or more parallel elastic strands, an inner covering of nylon wrapped in one direction and an outer covering of nylon wrapped in a different direction and being coated with a water and acid resistant material. The ligature is secured at spaced points to either a brace or to teeth acting as a brace in such a manner that gentle firm pressure is exerted against the tooth or teeth to be moved.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is a fragmentary, enlarged perspective view of length of elastic thread ligature embodying the present invention;

FIG. 2 is a lateral cross-sectional view through a first embodiment of the present invention;

FIG. 3 is a lateral cross-sectional view through a second embodiment of the present invention;

FIG. 4 is a lateral cross-sectional view through a third embodiment of the present invention;

FIG. 5 is a fragmentary perspective view of a length of elastic thread ligature constituting a first embodiment of the present invention with portions of the inner and outer covers removed;

FIG. 6 is a plan view of several teeth including a mis-

2

aligned tooth and showing the elastic thread ligature of the present invention applied to correct the misalignment, and

FIG. 7 is a plan view similar to FIG. 6 but showing the misaligned tooth after it has been guided to the correct position.

Referring now in greater detail to the various figures of the drawings wherein similar reference characters refer to similar parts, an elastic thread ligature, embodying the present invention is generally shown at 10 in FIG. 1, and includes as the first embodiment shown in FIG. 2 a core 12 of rubber or elastic material, an inner cover 14 of nylon material, an outer cover 16 of nylon material and a water and mouth acid coating 18 on the exterior surface of covering 16.

The core 12 should be of a resilient expandable material such as rubber or elastic, a preferred material being "37's rubber."

Inner nylon cover 14 is 100 denier and is wrapped in a given direction in an S twist at twenty turns per inch.

Outer nylon cover 16 is also 100 denier and is wrapped in a direction opposite to cover 14 in a Z twist at twenty turns per inch. Cover 16 is wrapped in a direction opposite to cover 14 for two reasons. First, when the elastic thread ligature is cut by the dentist to a given length, the unraveling of the ends of the ligature will be minimized. Second, when the thread is stretched, the core 12 will still be covered by at least one layer of nylon.

Waterproof covering 18 should also be capable of resisting mouth acids and may be comprised of a composition known under the trademark "Zelan," produced by the Du Pont Co. of Wilmington, Delaware. Nylon layers 14 and 16 are sterilized prior to the application of the waterproof coating 18.

As shown in FIGS. 2, 3 and 4, core 12 is positioned in a longitudinal direction and the nylon layers 14 and 16 spirally wound thereabout. Nylon is a preferred material because of its strength and relative low cost.

In the embodiment shown in FIG. 2, core 12 consists of a single elastic thread. The embodiment of FIG. 3 is similar to that of FIG. 2 and includes a core 20 of longitudinally disposed elastic threads 22 and 24 similar to core 12. Wrapped about threads 22 and 24 as a unit is an inner nylon covering 26, an outer nylon covering 28 wrapped thereabout in an opposite direction and waterproof coating 30 applied over covering 28.

The embodiment of FIG. 4 is similar to the embodiments of FIGS. 2 and 3 and includes a core 32 of longitudinally disposed elastic threads 34, 36 and 38 similar to cores 12 and 20. Wrapped about threads 34, 36 and 38 as a unit is an inner nylon covering 40, an outer nylon covering 42 wrapped thereabout in an opposite direction and waterproof coating 44 applied over covering 42. It should be noted that the embodiments of FIGS. 2, 3 and 4 may be respectively classified into three sizes, namely light, medium and heavy. The respective sizes may be carefully measured to stretch so that each gives proportionately twice as much strength as the preceding one. The determination of which size the dentist or orthodontist should use will become readily apparent in view of the following discussion of the use of the elastic ligature thread.

As shown in FIG. 6, tooth 46 is misaligned from its normal position 48 whereas the neighboring teeth 50, 52, 54 and 56 are properly aligned and will provide an excellent anchor for the elastic thread ligature 58 which when properly secured will urge tooth 46 to its normal position 48 as shown in FIG. 7.

Ligature 58 has two ends 60 and 62. End 62 is led about tooth 56, then passes between teeth 54 and 56, then passes in front of teeth 54, 46, 52 and 50, then

passes partially about the rear of teeth 50 and 52, then again in front of tooth 46, then about the rear of tooth 54 and finally terminates in end 60 in front of tooth 56. It is thus seen that a gentle, continuing and uniform force in the direction of arrows 64 is exerted upon tooth 46 to urge it to the position of 48 in FIG. 7. Such a position may be reached by the tooth in three, six, twelve or eighteen months or more depending upon the extent of the deviation and other factors attributable to a given patient.

In the example of FIGS. 6 and 7, ligature 58 is preferably of a medium or heavy size depending upon the degree of pressure desired. The ligature is held in place by knotted loops 66, 68 and 70 of light elastic ligature tied respectively between teeth pairs 50, 52; 46, 54; and 54, 56. It should be further noted that in this example of FIGS. 6 and 7, properly aligned teeth 50, 52, 54 and 56 function as an excellent anchor to which elastic thread 58 may be secured for exerting gentle continuing pressure in a single direction upon tooth 46.

It should now be readily apparent that the elastic thread ligature of the present invention constitutes a valuable tool in achieving tooth movement to correct such conditions as retrusion of the anterior teeth, wide spacing of anterior teeth, migration of anterior teeth, movement of protruding incisor, drifting of teeth due to decay and many other conditions where tooth movement is desirable. Moreover, where teeth are not available to be used as an anchor, auxiliary braces or steel wires may be used in conjunction with the present elastic thread ligature to achieve satisfactory results.

Hence, it is seen that the present elastic thread ligature has been devised especially for tooth movement. In this manner the various stretches may be tied from one tooth to another or in certain ways about the teeth so as to secure the same for rotational movements of the teeth or to close spaces left in the mouth due to the loss of certain teeth. As previously stated, the present ligature may be tied about certain metal wires which are usually placed in orthodontic appliances around one or more teeth in order to draw the same either in a distal or mesial fashion in order to upright them or bring certain teeth together. The light elastic thread also finds use in connection with the making of minor improvements or for those movements not requiring much pressure. The elastic thread ligature may also be tied about an erupted tooth and then tied to a metal arch placed around the teeth to bring the tooth from an impacted position.

It is thus seen that the ligature permits certain tightening of dental arches and general movements to be per-

formed in a simple manner which previously could be done only through difficult and complicated procedures. The use of a ligature having the nylon coverings is preferred although the uncovered elastic ligature may perform satisfactorily under certain conditions. Through the use of the present invention a gentle continuing force is exerted upon the desired tooth or teeth. Frequent adjustment is not necessary and the elastic ligature may be handled very easily.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

What is claimed as the invention is:

1. In the method of changing the position of a misaligned tooth by exerting pressure against the tooth in the direction of the desired new position, the improvement comprising securing an elastic thread ligature in bearing relation with said misaligned tooth, said securement being effected by anchoring said elastic thread ligature to properly align teeth on opposite sides of said misaligned tooth, whereby said ligature is held under tension against said misaligned tooth in order to exert a continuing gentle force thereagainst, said ligature constituting an elastic core comprising at least one rubber strand, an inner cover wrapped thereabout in one direction and an outer cover wrapped over said inner cover in a different direction to minimize unraveling and also to insure that said core will be covered in the stretched position.

2. The invention of claim 1 wherein said core comprises one longitudinally positioned strand.

3. The invention of claim 1 wherein said core comprises two longitudinally positioned strands.

4. The invention of claim 1 wherein said core comprises three longitudinally positioned strands.

5. The invention of claim 1 wherein said covers are nylon.

6. The invention of claim 1 wherein said outer cover is provided with a coating of mouth acid resistant material.

References Cited in the file of this patent

UNITED STATES PATENTS

262,088	Morrison	Aug. 1, 1882
534,849	Angle	Feb. 26, 1895
2,072,302	Herrmann et al.	Mar. 2, 1937
2,112,616	Alderfer	Mar. 29, 1938
2,488,941	Schneller	Nov. 22, 1949
2,804,745	Foster	Sept. 3, 1957