

April 4, 1944.

C. W. STICKLER

2,345,636

VENTILATING APPARATUS

Filed July 16, 1941

2 Sheets-Sheet 1

FIG. 1.

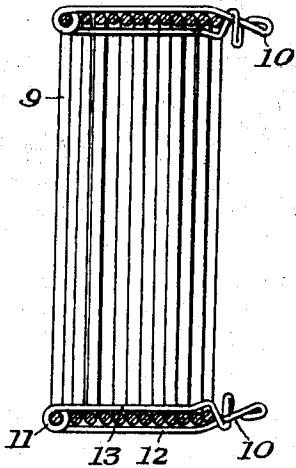


FIG. 3.

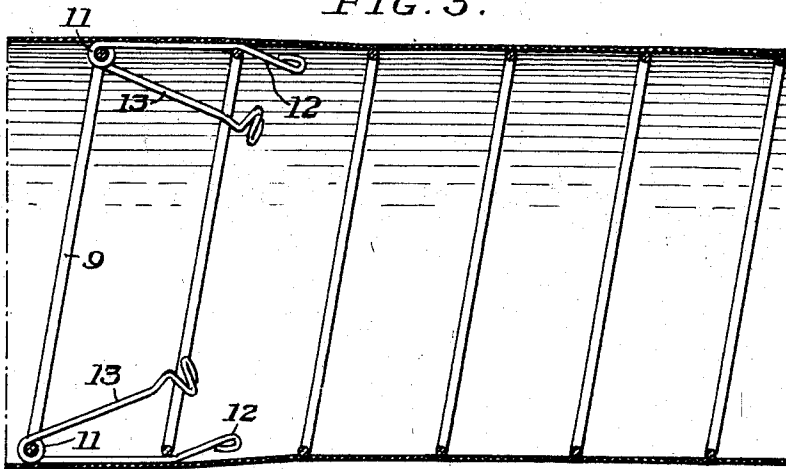


FIG. 4.

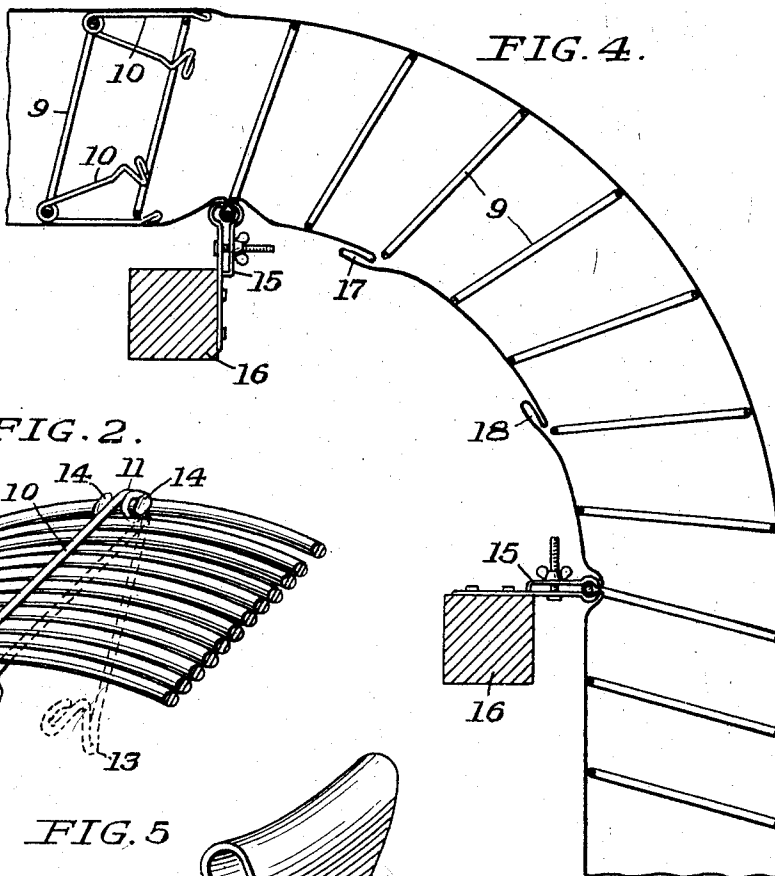


FIG. 2.

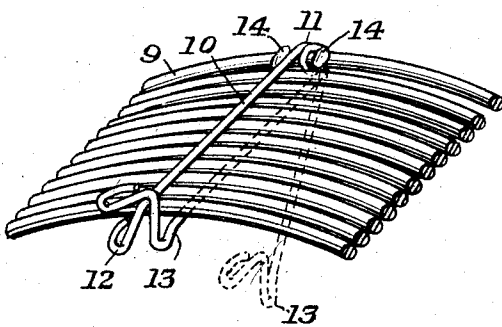
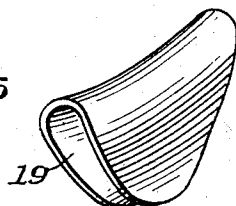


FIG. 5



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2 Sheets-Sheet 2

FIG. 6.

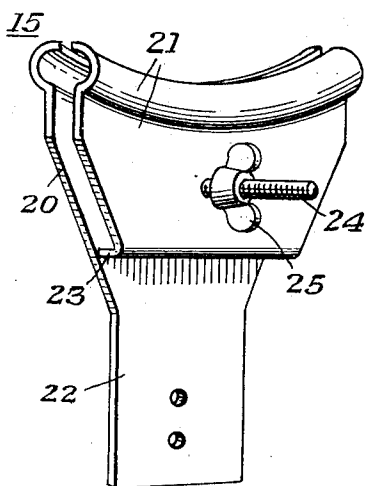


FIG. 7.

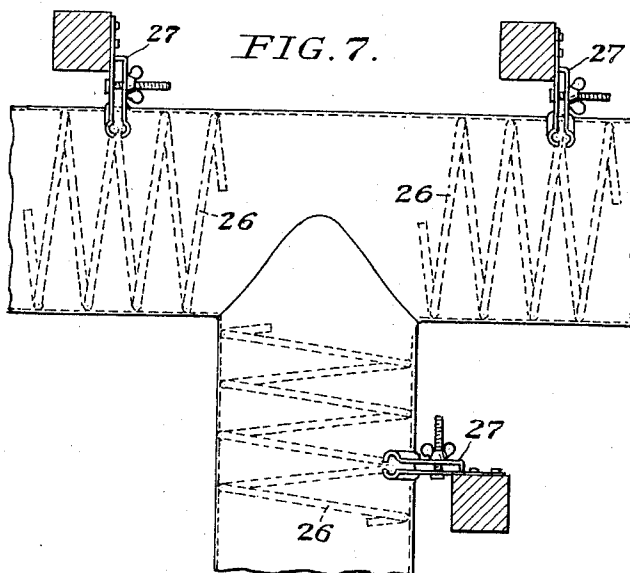
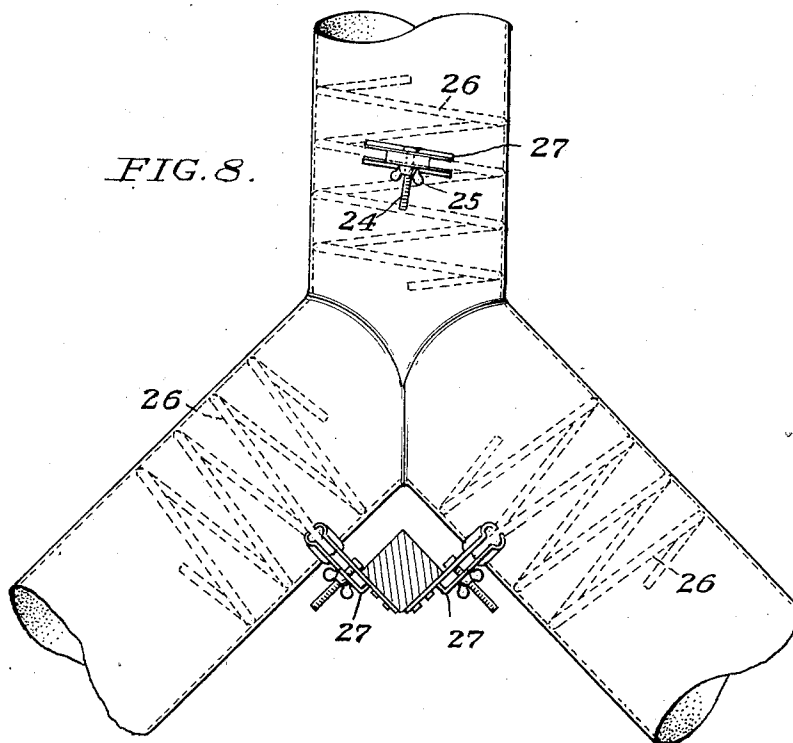


FIG. 8.



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VENTILATING APPARATUS

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Application July 16, 1941, Serial No. 402,640

6 Claims. (Cl. 138—54)

This application relates to ventilating apparatus, particularly flexible tubing used for mine and tunnel ventilation. While my invention may be used for the reenforcement of many types of flexible tubing, it is particularly useful for reenforcing tubing used in mine and tunnel ventilation and, therefore, will be described with reference thereto.

In recent years, it has become increasingly the practice to ventilate mines and tunnels, particularly the deeper and innermost portions thereof, by delivering fresh air to the working face through tubing from a place in the mine or tunnel where fresh air is available. It has been found that tubing made of fabric impregnated with a rubber compound to make it air tight is especially suitable for this purpose. The fabric is also treated with other chemicals to make it resistant to fungus growths, acid and alkaline waters, and vitiated air, such as are encountered in mining and tunnel work. Such tubing can withstand the hard usage to which it is subjected in mine and tunnel work and can be folded up and carried from place to place in the mine or tunnel as the work proceeds. The tubing varies in diameter from 8" to 36" and is generally made in 25', 50' and 100' lengths.

Heretofore, it has been found that it is difficult to use this tubing where the mining or tunnel conditions require a sharp bend or curve therein because the tubing flattens out or collapses at the bend and blocks the passage of air. To overcome this difficulty, special sections of tubing in the form of various angles have been provided. These sections, however, are expensive. Moreover, it is necessary to cut straight lengths of tubing to fit the particular mine or tunnel entry being ventilated so that the angle sections will be at the place where the bend occurs in the entry.

My invention prevents straight tubing from collapsing at sharp bends and eliminates the use of special angle sections. My apparatus is inexpensive to manufacture and may be easily used without cutting straight tubing into special lengths. It may also be used to reenforce the branches of T and Y joints employed to ventilate more than one entry with the same blower.

My invention comprises an extensible helix having a diameter slightly less than that of the tubing which is to be reenforced. The helix is compressed axially and held in its compressed state by clips. The compressed helix is inserted in the tubing and is slid along inside the tubing to the place where the bend in the tubing is to

occur. The clips are then released from the outside of the tubing and the helix expands to its normal axial length. The tubing can then be bent at any desired angle because the helix will prevent the collapse thereof.

In the accompanying drawings I have illustrated a present preferred embodiment of my invention in which

Figure 1 is a vertical section of a helix embodying my invention, the helix being axially compressed;

Figure 2 is a fragmentary isometric view showing on an enlarged scale one of the clips used to hold the helix in an axially compressed condition;

Figure 3 is a vertical section of a length of tubing provided with my invention;

Figure 4 is a horizontal section of a length of reenforced flexible tubing bent into a right angle;

Figure 5 is an isometric view of a clip used to hold folds of the tubing in place when the tubing is bent;

Figure 6 is an isometric view of a clamp used with my invention; and

Figures 7 and 8 are plan views of T and Y joints made from flexible tubing and provided with my invention.

Figure 1 shows the apparatus which I have invented for reenforcing a curved section of flexible tubing. The apparatus comprises a helix 9 having a diameter slightly less than the diameter of the tubing to be reenforced so as to slide freely therein. The helix is axially compressed and is held in this position by two clips 10 carried on opposite sides of one of the end turns of the helix 9.

The construction of the clips is shown in Figure 2. A length of resilient wire is bent in its center to form a sharp loop 11 around one of the end turns of the helix and to form two arms 12 and 13 which surround the turns of the helix when it is axially compressed to the solid condition. The arm 12 extends across the outside of the turns and a short distance beyond them. The other arm 13 extends across the inside of the turns and is bent first towards the arm 12 and then at a right angle in a direction parallel to the turns to form a catch for the arm 12 as shown in Figures 1 and 2. After the clips are placed on one of the turns of the helix 9, such turn may be flattened on each side of the clips to form lugs 14 which will hold the clips in place on the helix 9.

When it is desired to reenforce a length of flexible tubing, the helix 9 is compressed axially and

secured in its compressed state by the clips 10 as shown in Figure 1. The helix is then inserted in the tubing and slid along inside it to the place where an angle is to be formed. The clips 10 are then opened from the outside by feeling for the ends of the arms through the fabric of the tubing and turning the arms 12 and 13 so that the arm 13 is released from the arm 12 and assumes the position shown in Figure 3 and by dotted lines in Figure 2. The helix 9 will then expand to its normal length inside the tubing as shown in Figure 3, thus forming an elongated, bendable reinforcing cage for the tubing.

Figure 4 shows a length of flexible tubing bent to form a right angle turn and reinforced by a helix 9 to prevent the tubing from collapsing at the bend. After the helix has been placed in the tubing as shown in Figure 3, a clamp is fastened from the outside of the tubing around one of the turns of the helix near the point where the tubing first starts to curve. The clamp is then nailed or otherwise secured to a post 16 or other support in the mine. A second clamp is then fastened to a turn of the helix near the point where the tubing straightens out and is secured to another post or support 16.

When the tubing is bent there will necessarily be an excess of material on the inside of the curve, which may buckle and extend inwardly between the turns of the reinforcing helix and obstruct the passage of air. Accordingly, the excess material may be folded upon itself in several places as shown at 17 and 18 in Figure 4. A clip 19 such as is shown in Figure 5 may be slipped over each of the folds to prevent the tubing from unfolding.

Figure 6 is an isometric view showing the construction of the clamp 15. The clamp is made from relatively stiff sheet metal and has two jaws 20 and 21 which are bent at their outer ends to fit around a turn of the helix 9. The jaw 20 has an extended portion 22 by means of which the clamp can be nailed to a post in the tunnel or mine. The jaw 21 has an inwardly curved portion 23 which forms a bearing on the jaw 20. The two jaws are pressed together by a bolt 24 and a wing nut 25.

Obviously, the reinforcing helix may be removed from the tubing or adjusted to a new location therein by manually gathering the turns together, working through the fabric of the tubing, and refastening the clips 10.

Figures 7 and 8 are plan views of T and Y joints made from flexible tubing. The legs of the joints are reinforced by short helices 26 inserted into the legs in the same manner as was described with respect to Figures 1 and 2. The joints may be supported in their correct position in a mine by clamps 27 which are of the same construction as the clamp shown in Figure 6. These clamps 27 may be nailed to posts, sprags or other supports in the mine.

My invention may be used wherever it is desired to bend a length of flexible tubing at a sharp angle. It does away with special expensive angle sections of tubing, and the tubing may be bent at any point along its length without cutting the tubing to insert a special angle section. The apparatus may be readily manufactured at low cost and may be quickly and easily inserted in the tubing.

While I have shown a present preferred em-

bodiment of my invention it is to be distinctly understood that it is not limited thereto but may be otherwise variously embodied and practiced within the scope of the following claims.

I claim:

1. Ventilating apparatus comprising the combination with a fabric, gas-conducting tube, of an extensible helix of a diameter such as to slide within the tube, and means releasable manually through the fabric of the tube for holding the helix in a collapsed state while being positioned at a desired location along the length of the tube, said helix elongating on the release of said means and serving to prevent collapse of the tube on bending thereof.

2. Ventilating apparatus comprising the combination with gas-conducting tube through the material of the tube, of an extensible helix of a diameter such as to slide within the tube, and means releasable manually for holding the helix in a collapsed state while being positioned at a desired location along the length of the tube, said helix elongating on the release of said means and serving to prevent collapse of the tube on bending thereof.

3. Ventilating apparatus comprising the combination with a gas-conducting tube composed of material incapable of self-support, of an extensible supporting helix of a diameter such as to slide within the tube, serving when extended, to prevent collapse thereof, and means releasable manually through said material for holding the helix in a collapsed state while being positioned at a desired location along the length of the tube.

4. The apparatus defined by claim 3 characterized by said holding means including clips secured to a turn of the helix adjacent one end thereof in circumferentially spaced relation.

5. The apparatus defined by claim 3 characterized by means engaging spaced turns of the helix through the material for securing the tube to fixed supports.

6. In a device for sustaining against collapse a gas-conducting tube composed of material incapable of self-support, a helix having a circumference approximating that of the tube and being resiliently compressible to a length less than the diameter of the tube so that the helix may readily be introduced into the tube and moved therealong to the desired point, and means for holding said helix in compressed condition comprising a plurality of spring clips secured to the helix at one end in circumferentially spaced relation and constructed for interlocking engagement at their free ends with the other end of the helix, said clips being of such length as to embrace the turns of the helix when compressed substantially to the solid condition, for restraining them against elongation while the helix is being worked along inside the tube to the desired point, said clips being manually disengageable through the material of the tube after the compressed helix has been properly positioned therein to release the helix and permit it to extend to its full uncompressed length forming an elongated bendable reinforcement for the tube, said clips remaining on the helix after extension thereof in condition for reengaging the turns thereof when they are manually compressed through the material of the tube preparatory to removing the helix therefrom.

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