Oct. 22, 1946. G. G. GREULICH 2,409,848

TWIN TUBE MINE CLEARING SNAKE

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Fig. 1.

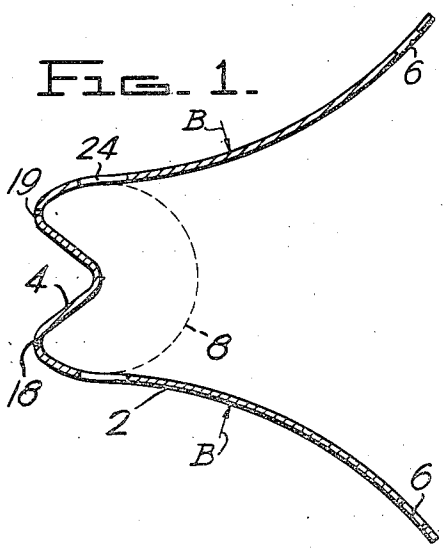


Fig. 3.

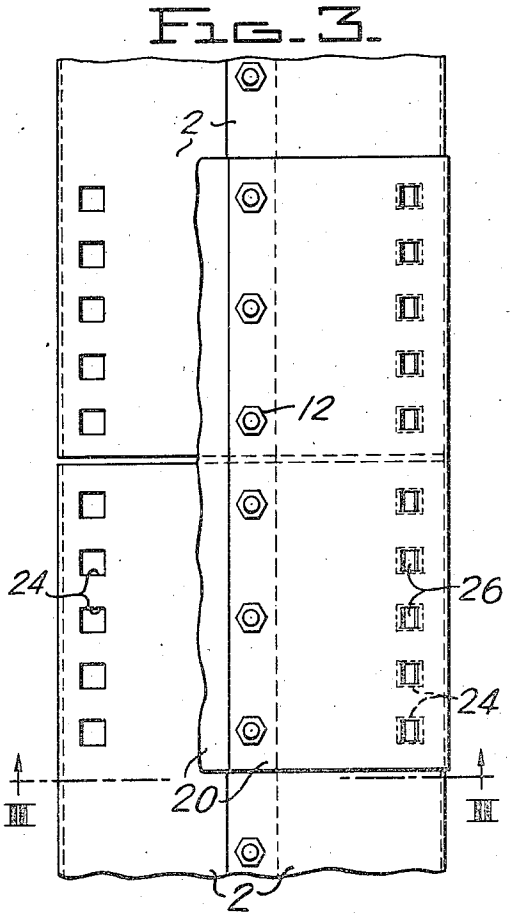
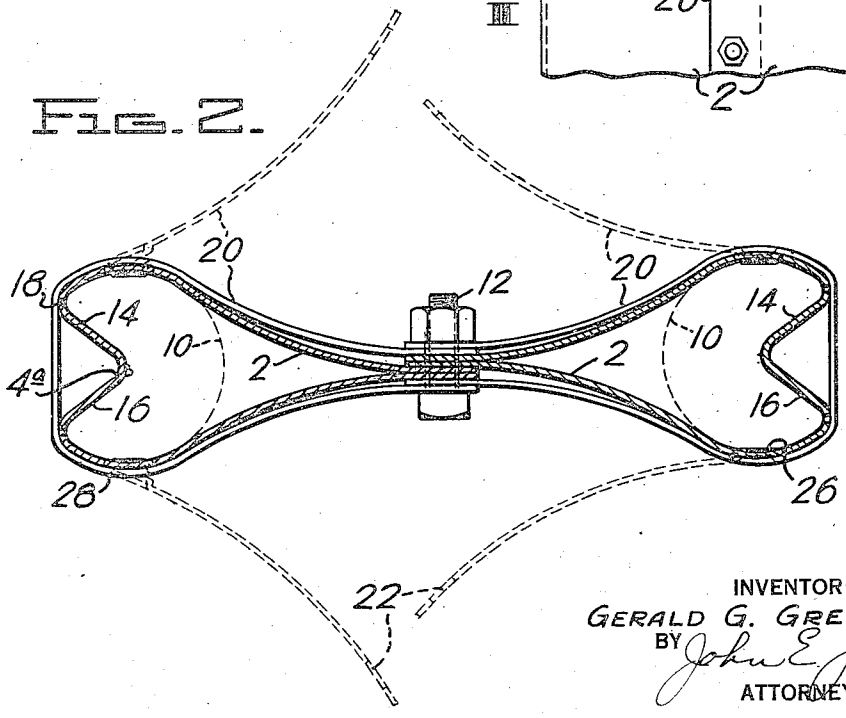


Fig. 2.



INVENTOR:
GERALD G. GREULICH,
BY John E. Jackson
ATTORNEY

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Fig. 5.

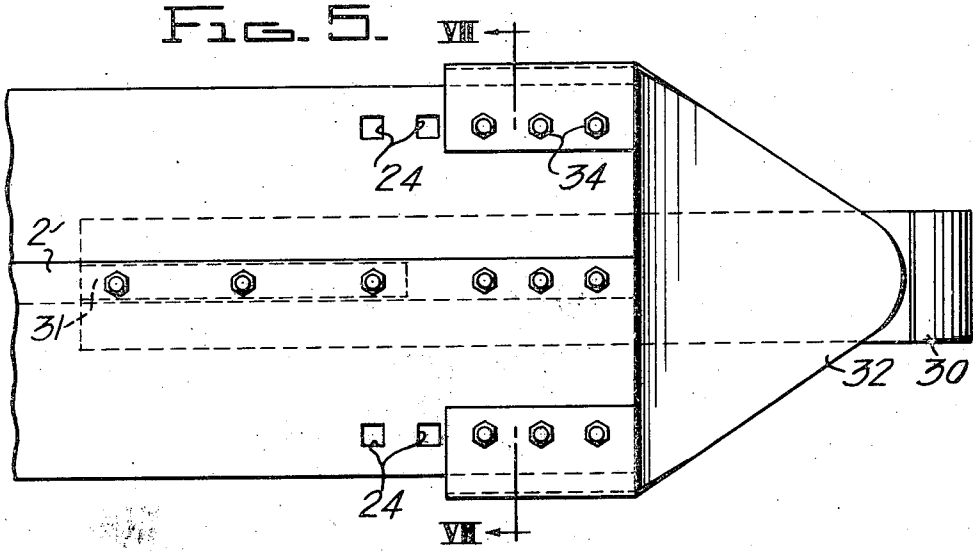


Fig. 6.

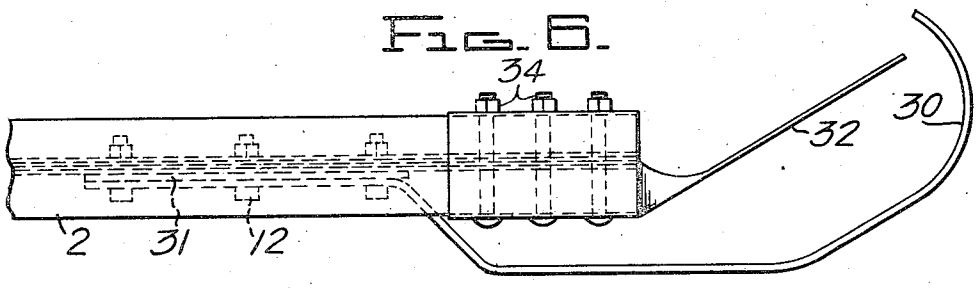


Fig. 4.

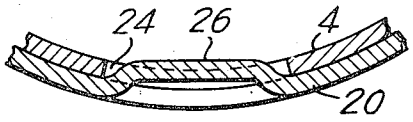
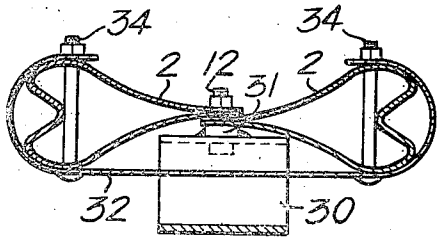


Fig. 7.



INVENTOR:
GERALD G. GREULICH,
BY John E. Jackson
ATTORNEY

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Fig. 8.

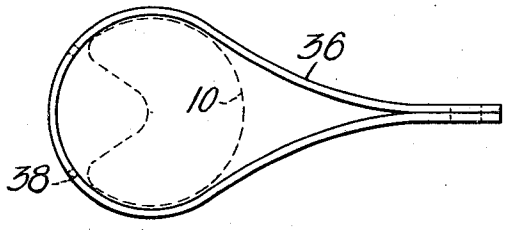


Fig. 9.

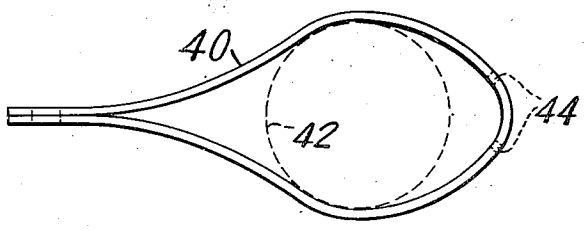
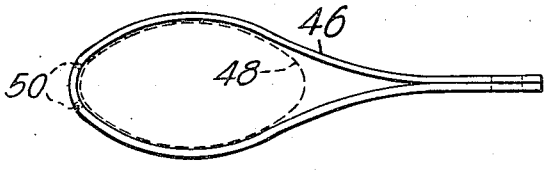


Fig. 10.



INVENTOR:
GERALD G. GREULICH,
BY John E. Jackson
ATTORNEY

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TWIN TUBE MINE CLEARING SNAKE

Gerald G. Greulich, Mount Lebanon, Pa., assignor to Carnegie-Illinois Steel Corporation, a corporation of New Jersey

Application March 10, 1943, Serial No. 478,712

10 Claims. (Cl. 102—22)

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This invention relates to a twin tube mine clearing snake and to a method of making the same. Heretofore, so-called bangalore torpedoes were extensively used for clearing passages for men and vehicles through barbed wire entanglements, strips of land mines, etc. These torpedoes usually consisted of high explosive charges packed into light sheet metal tubes which were connected either rigidly, or by means of articulated joints. These devices seldom exceeded 50 feet in length and were carried to the front and shoved into position under or over the obstructions by hand. Recently it has been found desirable to devise ways and means of detonating paths through mine fields for considerable distances. For this purpose ordinary pipe filled with explosives have been used in continuous lengths up to 400 feet. These lengths are dragged or pulled almost up to the obstruction by some vehicle which then disengages itself from the front end of the tube and returns to the rear end of the tube to shove the tube over the surface of the ground and across the mine field. Thereafter, the explosive is detonated which in turn sets off all the mines adjacent to the explosive tube, thus providing a path for the further advance of vehicles without danger of detonating hidden mines.

It is an object of this invention to provide a mine clearing snake which will cause the utmost lateral destructive effect for a given weight of explosive charge.

Another object is to provide such a snake which has no thick outside projections to impede or increase resistance to advancing the tube.

A further object is to provide a novel method of making such a snake.

These and other objects will be more apparent after referring to the following specification and attached drawings in which:

Fig. 1 shows a half section of the preferred modification of the twin tube as formed, ready for shipment;

Fig. 2 is a cross sectional view taken on line II—II of Fig. 3;

Fig. 3 is a top view showing the splice connecting two sections of tube;

Fig. 4 shows a detail of the invention;

Fig. 5 is a plan of the nose of the snake;

Fig. 6 is a side elevation of the same;

Fig. 7 is a view taken on line VII—VII of Fig. 5; and

Figs. 8 to 10 are views showing half sections of modifications of the twin tube.

Referring more particularly to the drawings,

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the reference numeral 2 indicates a half section of the preferred modification of the twin tube which preferably is made of light sheet metal. The section of tube is bent into the U-shape shown in Fig. 1 with the bottom of the U having a groove 4 therein. The legs of the section have a plurality of bolt holes 6 extending along the length thereof.

The section of tube shown in Fig. 1 is ready for shipment and a plurality of such sections are nested one within the other. Upon receipt of the open nested sections at a base depot in the field of operation each of the sections are clamped about a form 8 (Fig. 1) and shaped into a heart-shaped tubular section by pressure applied with clamps or other devices at points B. The clamps are then opened slightly to allow the edges of the tube to open sufficiently to slide out the bending form 8. Molded explosive charges 10, slightly smaller than form 8, are then slid lengthwise into the tubes. The open edges are then pressed together by means of the clamps and two of the symmetrical tube sections bolted together to form twin tubes carrying explosive charges along each outer edge. The bolts 12 pass through the holes 6 as shown in Fig. 2. It will be seen that considerable metal is placed near the sides or outer edges of the tubes to increase the beam strength, thus providing considerable resistance to lateral deformation or sidewise bending. There is a clamping and spring action in bolting the two halves together which holds the molded explosive securely in its proper position.

Placing two lines of explosive charges increases the lateral destructive effect of the charges inasmuch as high explosive gases tend to travel in all directions and react violently when encountering resistance, either from other gases or from solid obstructions. Thus, the gases tending to travel toward the center of the twin tube react against one another and tend to increase the violence of the explosion.

The gases traveling from the re-entrant angular faces 14 and 16 of the groove 4a in the explosive tend to flare out in a zone roughly parallel to a plane bisecting the angle formed by such faces. The outer edges of the twin tubes are provided with the grooved indentations 4 so as to insure holding the molded explosives in the proper position for the maximum sidewise destructive effect which is highly desirable in clearing the maximum possible width of path through the mine field.

It may be found desirable with certain types of explosives to provide slits or perforations 18

along the entire length on the outer edges of the lobes 19 of the tubes. These form zones of weakness in the outer edges of the tube and permit that portion of the tube formed by faces 14 and 16 to be blown outwardly and thus increase the destructive effect.

After the required number of lengths of twin tube have been formed, filled with explosive, and bolted together, they are transported to the point of assembly in the field. Lengths of tube are abutted as best shown in Fig. 3 and a splice sleeve 20 having the shape shown in dotted lines (Fig. 2) is placed over each heart-shaped section of tube. After the legs of the sleeve are bent downwardly as shown in full lines in Fig. 2, bolts 12 are inserted through bolt holes 22 in sleeve 20 and bolt holes 6 in tube section 2. The nuts are then tightened on the bolts to fasten the sections of tube together. The arrangement of the bolts fastening the sleeves 20 to the tube sections is best shown in Fig. 3. To increase the resistance to lateral bending and to strengthen the splice, the ends of the twin tubes are perforated with square or rectangular holes 24. The sleeves 20 are provided with a plurality of lugs 26 which project into the openings 24 to form highly effective shear connections which act no matter whether the entire tube is placed in tension, compression, or bent laterally so that one edge is in compression and the opposite edge in tension. For relatively short lengths of tube assemblies, this connection may be omitted.

The bottoms 28 of the two outer edges of the twin tubes provide wide-faced curved surfaces which have a sled-runner effect forming shallow, depressed tracks in the ground, thereby helping guide the tubes in a straight line. To further decrease the resistance to sliding, the leading end of the snake may be provided with a nose as shown in Figs. 5 to 7. This nose consists of a spring shoe 30 bent as shown, and bolted to the snake so that the tube will jump over obstructions even when encountered at a steep, vertical angle. A filler plate 31 is welded to the shoe 30 as shown. A horizontal, rounded, triangular-shaped end plate 32 is bolted by means of bolts 34 to the leading end of the twin tubes to prevent the tube from hanging up on any obstruction which may be cleared by the spring nose, but which would not be cleared by blunt ends of the tube.

While not shown, it will be readily apparent that a bridle for pulling the tube may be easily attached by means of the center bolts between the two sections and that similarly a device for pushing the tube may be mounted on the rear end of the snake.

While it is preferred to shape the twin tube as shown in Figs. 1 to 7, it will be apparent that the shape of the twin tube may be varied while obtaining increased sidewise destructive effect. Figs. 8 to 10 illustrate various modified shapes which may be used.

Fig. 8 discloses a tube 36 having a substantially circular end. The molded explosive charge 10 is the same as that used in the preferred embodiment, but could be made cylindrical if desired. Slits or perforations 38 may be provided along the entire length of the tube to form zones of weakness.

In Fig. 9 the tube 40 is oval-shaped and contains a cylindrical molded explosive charge 42. Zones of weakness are formed by the slots 44 in the tube.

Fig. 10 disclosed an elliptical tube 46 containing

an elliptical explosive charge 48 and having zones of weakness formed by the slots 50.

While various modifications have been disclosed, it will be apparent that the tube and explosive charge may have various other shapes without departing from the scope of the attached claims.

I claim:

1. A twin tube mine clearing snake comprising a plurality of sections, each section having two opposed heart-shaped tubes containing explosive charges, means for fastening the tubes together at the points thereof, each of said tubes having longitudinal openings in the lobes thereof to increase the sidewise destructive effect of said explosive, a splice sleeve for uniting adjoining sections, a plurality of longitudinally spaced lugs on said sleeve for insertion into corresponding openings in said tubes, and means for fastening the splice sleeve to adjoining sections.

2. A twin tube mine clearing snake comprising a plurality of sections, each section having two opposed heart-shaped tubes containing explosive charges, means for fastening the tubes together at the points thereof, each of said tubes having longitudinal openings in the lobes thereof to increase the sidewise destructive effect of said explosive, a splice sleeve for uniting adjoining sections, a plurality of longitudinally spaced lugs on said sleeve for insertion into corresponding openings in said tubes, means for fastening the splice sleeve to adjoining sections, and a bent spring shoe on the leading end of said snake.

3. A twin tube mine clearing snake comprising a plurality of sections, each section having two opposed heart-shaped tubes containing explosive charges, means for fastening the tubes together at the points thereof, each of said tubes having longitudinal openings in the lobes thereof to increase the sidewise destructive effect of said explosive, a splice sleeve for uniting adjoining sections, a plurality of longitudinally spaced lugs on said sleeve for insertion into corresponding openings in said tubes, means for fastening the splice sleeve to adjoining sections, a bent spring shoe on the leading end of said snake, and an end plate fastened to the leading end of said snake, said end plate being partially enclosed by said spring shoe.

4. An elongated mine clearing snake comprising two tubes, one on each side of the longitudinal axis of the snake arranged in side by side relationship, means for fastening the tubes together at their adjacent surfaces, an explosive charge in each of said tubes, each charge having an outwardly facing V-groove in its surface remote from the longitudinal axis of the snake, the center lines of the grooves being substantially in the same horizontal plane, and a spring shoe attached to the leading end of said snake extending from the bottom to a point above the top thereof.

5. An elongated mine clearing snake comprising two heart shaped tubes arranged in side by side relationship, one on each side of the longitudinal axis of the snake with their points facing inwardly, means for fastening the points of the tubes together, an explosive charge in each of said tubes, each charge having an outwardly facing V-groove in its surface remote from the longitudinal axis of the snake, the center lines of the grooves being substantially in the same horizontal plane, and a spring shoe attached to the leading end of said snake and extending from the bottom to a point above the top thereof.

6. An elongated mine clearing snake comprising two heart shaped tubes arranged in side by side relationship, one on each side of the longitudinal axis of the snake with their points facing inwardly, means for fastening the points of the tubes together, an explosive charge in each of said tubes, each charge having an outwardly facing V-groove in its surface remote from the longitudinal axis of the snake, the center lines of the grooves being substantially in the same horizontal plane, each of said tubes having longitudinal openings in the lobes thereof to increase the sidewise destructive effect of said explosive, and a spring shoe attached to the leading end of said snake and extending from the bottom to a point above the top thereof.

7. An elongated mine clearing snake comprising a plurality of sections, each section having two heart shaped tubes arranged in side by side relationship, one on each side of the longitudinal axis of the snake with their points facing inwardly, means for fastening the points of the tubes together, an explosive charge in each of said tubes, each of said tubes having longitudinal openings in the lobes thereof to increase the sidewise destructive effect of said explosive, and means for joining the sections together in end to end relationship.

8. An elongated mine clearing snake comprising a plurality of sections, each section having two heart shaped tubes arranged in side by side relationship, one on each side of the longitudinal axis of the snake with their points facing inwardly, means for fastening the points of the tubes together, an explosive charge in each of said tubes, each of said tubes having longtudinal openings in the lobes thereof to increase the sidewise destructive effect of said explosive, means for joining the sections together in end to end relationship, and obstruction clearing means attached to the leading end of said snake.

9. An elongated mine clearing snake comprising two tubes, one on each side of the longitudinal axis of the snake arranged in side by side relationship, means for fastening the tubes together at their adjacent surfaces, an explosive charge in each of said tubes, each charge having an outwardly facing V-groove in its surface remote from the longitudinal axis of the snake, the center lines of the grooves being substantially in the same horizontal plane, a spring shoe attached to the leading end of said snake extending from the bottom to a point above the top thereof, and an end plate extending from the leading end of the snake to a point adjacent the top of the spring shoe.

10. An elongated mine clearing snake comprising a plurality of sections, each section having two heart shaped tubes arranged in side by side relationship, one on each side of the longitudinal axis of the snake with their points facing inwardly, means for fastening the points of the tubes together, an explosive charge in each of said tubes, and means for joining the sections together in end to end relationship.

GERALD G. GREULICH.