United States Patent [19]

Avery

[11] **3,741,192**

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[54] **ABRASIVE CABLE SAW CUTTING MEMBER**

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[73] Assignee: **The Carborundum Company**, Niagara Falls, N.Y.

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[52] **U.S. Cl.** **125/21**

[51] **Int. Cl.** **B28d 1/08**

[58] **Field of Search** 125/18, 21, 22

[56] **References Cited**

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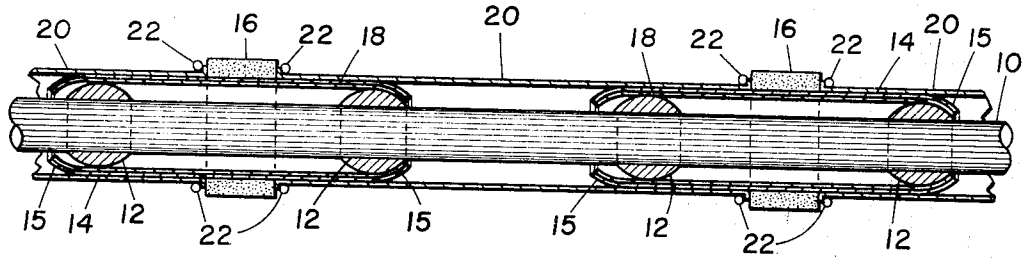
Primary Examiner—Harold D. Whitehead

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[57] **ABSTRACT**

A cable saw in which the cutting members are abrasive bodies bonded to short sections of tubes. The ends of the tubes are swaged over spherical bodies attached to the cable so that the cable may float within the tubular cutting members during operation. The spaces between cutting members are bridged by flexible sleeves which protect the cable from loose abrasive particles.

8 Claims, 5 Drawing Figures



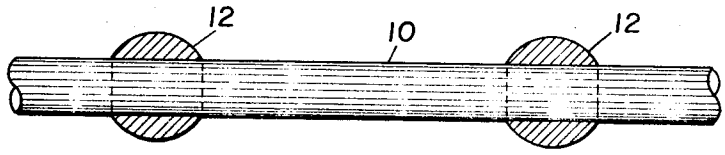


FIG. 1

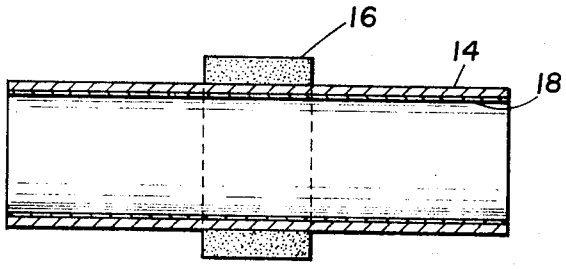


FIG. 2

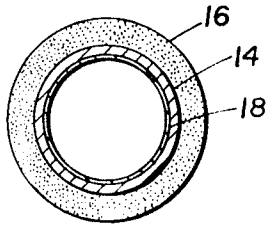


FIG. 3

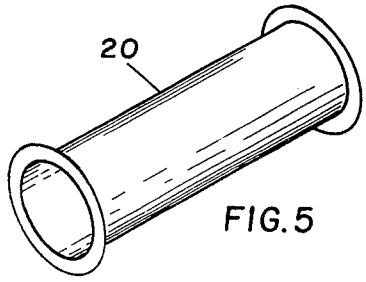


FIG. 5

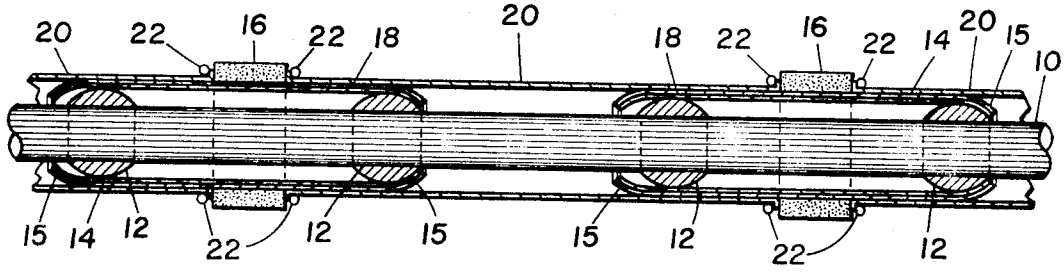


FIG. 4

ABRASIVE CABLE SAW CUTTING MEMBER

BACKGROUND OF THE INVENTION

Wire or cable saws are widely used in industry for cutting stone and similar hard materials, especially in situations where rotary or reciprocating saws are impractical. A cable saw can be constructed for almost any kind of cutting service, using a number of standard abrasives, and can be operated by relatively remote power sources. These saws are well adapted to quarrying operations where cables of several hundred feet in length may be used to make cuts in locations which are inaccessible to other types of cutting devices. A cable saw is usually superior in wear resistance to a chain saw, since it has only a single relatively rigid joint as compared with the numerous flexible wearing link connections in the chain saw. There is a constant flexure of the cable however, as it passes around the cable driving wheels and guide wheels. Since the cutting elements of the saw are rigidly attached to the cable, there is a tendency to concentrate the flexing action of the cable at the points where the cutting elements are attached, thus causing a premature cable failure at one of these locations. The cable usually fails long before the cutting member wears out and although the cable can be repaired, a substantial downtime loss results.

The present invention therefor provides an improved cable saw assembly with cutting elements that are driven by the cable but not in rigid attachment to it. The invention further provides cutting elements whose construction allows the cable to flex normally during operation, thus minimizing cable wear and metal fatigue. Other objects and advantages of the invention, not at this time enumerated, will readily suggest themselves as the nature of the invention is better understood from a consideration of the following detailed description.

SUMMARY OF THE INVENTION

The invention pertains to a cable saw assembly comprising an endless metallic wire cable with a plurality of metallic spherical shapes fastened thereon; and one or more rigid tubular cutting members concentric with the axis of the calbe, each member enclosing one pair of the spherical shapes fastened upon the cable; and one or more flexible sleeves concentric with the axis of the cable and the axis of the tubular cutting memers, said flexible sleeves having their ends secured over the ends of the tubular cutting members, the sleeves bridging the spaces between adjacent tubular cutting members.

DESCRIPTION OF THE DRAWINGS

FIG. **1** is a side view of a short section of cable, showing two of the spherical bodies attached.

FIG. **2** is a side view of a single cutting member, partly in section.

FIG. **3** is an end view of the cutting member of FIG. **2.**

FIG. **4** is a side view of a section of the cable saw assembly, showing two cutting members in position with a flexible sleeve bridging the space between the two members.

FIG. **5** is an isometric view of a flexible sleeve.

DESCRIPTION OF THE INVENTION

The preferred type of cable for this type of saw is one which is made from cable wire cold drawn to a tensile strength of 300,000 pounds per square inch or higher. It is important that no heat be applied to the cable during assembly since heating will decrease the cable strength and fatigue life. A short section of the cable **10** is shown in FIG. **1** with two spherical shapes **12** in place. These are preferably balls and they are fastened securely to the cable by well-known swaging techniques. A cutting member is shown in FIG. **2.** This is made from a short section of metallic tubing **14,** the inside of the tubing being slightly larger than the outside diameter of the spherical shapes **12.** Surrounding this tube and concentric with it is a tubular abrasive body **16** which is firmly fastened to the external circumference of the tube **14.** One or more of these abrasive bodies may be fastened to the tube **14** if desired.

A section of the cable saw is shown in FIG. **4** where two cutting members are shown in position on the cable **10.** Each cutting element is positioned to enclose two of the spherical shapes **12** and each end of the tube **14** is then swaged to a portion of smaller diameter **15,** curved to conform with the curvature of the enclosed spherical shape **12.** For better wear resistance, the inside surfaces of the tube **14** may be coated before swaging with a friction resistant coating **18** of nylon, molybdenum disulfide, Teflon or, mixtures of these. The coating is preferably applied by first heating the tube interior and then spraying or otherwise applying the powdered friction resistant mixture to the hot metal until a film of suitable thickness is deposited. The film thickness may range from 10 to 50 mils with 30 mils being preferred.

After the cutting elements have been swaged in place on the cable, the spaces between the elements are covered by flexible protective sleeves **20,** one of which is shown in FIGS. **4** and **5.** The sleeve is a flexible polymeric material which may be of rubber, neoprene, nylon, polyurethane, polyethylene or mixtures thereof. The sleeve may be made of heat sealable material and may be cut along one side for installation over the ends of the cutting members with the cut being sealed after the sleeve is in place. If the material is sufficiently elastic, the sleeve may be stretched over the outside of the cutting member and snapped into place without cutting. Alternately, the sleeves may be made of a heat shrinkable form of the polymeric material. In any case, the ends of the sleeves are secured to the cutting members by snap rings **22,** the sleeves having shoulders at both ends to prevent the snap rings from sliding off the sleeve. The flexible sleeves therefore act, in conjunction with the tubular cutting members, to completely enclose the saw cable and protect the wearing surfaces within the tubular cutting members from exposure to abrasive particles removed from workpieces as they are being cut. After assembly, the ends of the cable are joined, by known methods, to give an endless sawing unit.

The construction of the tubular cutting members of the invention permits a continuous long radius bend of the cable as it passes around the driving wheel and guide pulleys. This results in a cable saw in which the cable floats within each tubular cutting member and is under a more constant bearing pressure due to the spherical bearing connection in each of the cutting members. A saw of this construction has a longer useful life since flexing stresses are distributed along an extended length of cable rather than being localized at the points where the cutting elements are attached.

What is claimed is:

1. A cable saw assembly comprising:

a. an endless metallic wire cable with a plurality of metallic spherical shapes fastened thereon; and

b. one or more rigid tubular cutting members concentric with the axis of the cable, each member enclosing one pair of the spherical shapes fastened upon the cable; and

c. one or more flexible sleeves concentric with the axis of the cable and the axis of the tubular cutting membes, said flexible sleeves having their ends secured over the ends of the tubular cutting members, the sleeves bridging the spaces between adjacent tubular cutting members.

2. A cable saw assembly according to claim 1 in which the spherical shapes are swaged to the cable.

3. A cable saw assembly according to claim 1 in which the rigid tubular cutting member comprises a metallic tube with each end curvably shaped for slideable engagement with a corresponding spherical shape fastened to the cable.

4. A rigid tubular cutting member according to claim 3 in which the metallic tube has one or more tubular abrasive members, concentric with the axis of the metallic tube and secured around the external circumference of the tube.

5. A rigid tubular cutting member according to claim 4 in which the inside surface of the tube is coated with an anti-friction composition.

6. A rigid tubular cutting member according to claim 5 in which the anti-friction composition comprises material selected from the group consisting of nylon, molybdenum disulfide, Teflon and mixtures thereof.

7. A cable saw assembly according to claim 1 in which the flexible sleeves comprise polymeric material selected from the group consisting of rubber, neoprene, nylon polyurethane, polyethylene and mixtures thereof.

8. A cable saw assembly according to claim 1 in which the flexible sleeves are secured to the ends of the tubular cutting members by snap rings.

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