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Andrews

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[54] **SILENCER FOR VENTILATION DUCTS**

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[73] Assignee: **H. H. Robertson Company**, Pittsburgh, Pa.

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[52] **U.S. Cl.** ..... **181/36 B**; 24/270; 98/DIG. 10; 138/149; 181/42

[58] **Field of Search** ..... 98/50; 138/149; 181/33 K, 35 C, 41–50, 33 GB, 33 H, 33 P, 36 R, 36 B, 36 D, 62; 24/270; 292/256.69, DIG. 49

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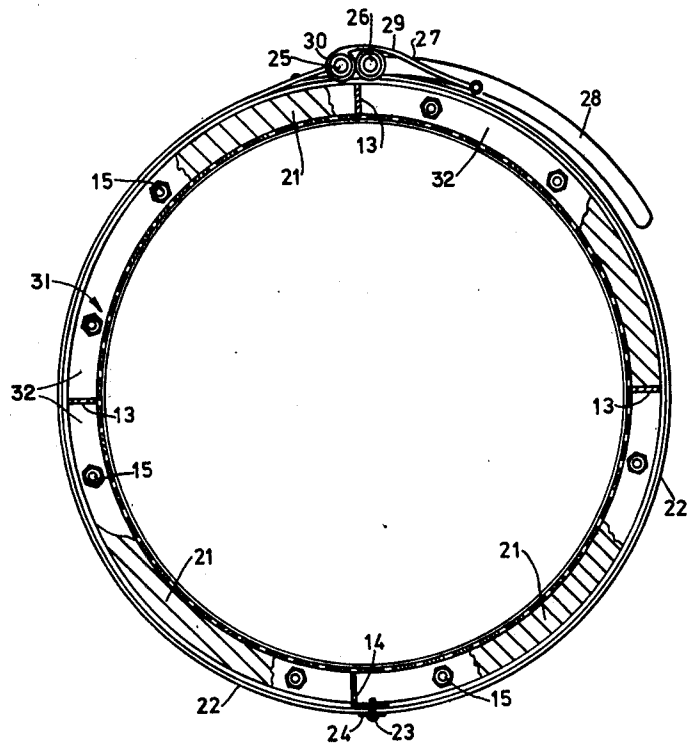
[57] **ABSTRACT**

A silencer having a tubular configuration which can be interposed in a duct and form a part of the duct walls. The silencer has an inner perforate wall and an outer imperforate wall. The annular space between the two walls is filled with acoustical sound absorbing materials. The outer imperforate wall is adapted for quick opening to permit easy replacement of the sound absorbing materials.

4 Claims, 3 Drawing Figures



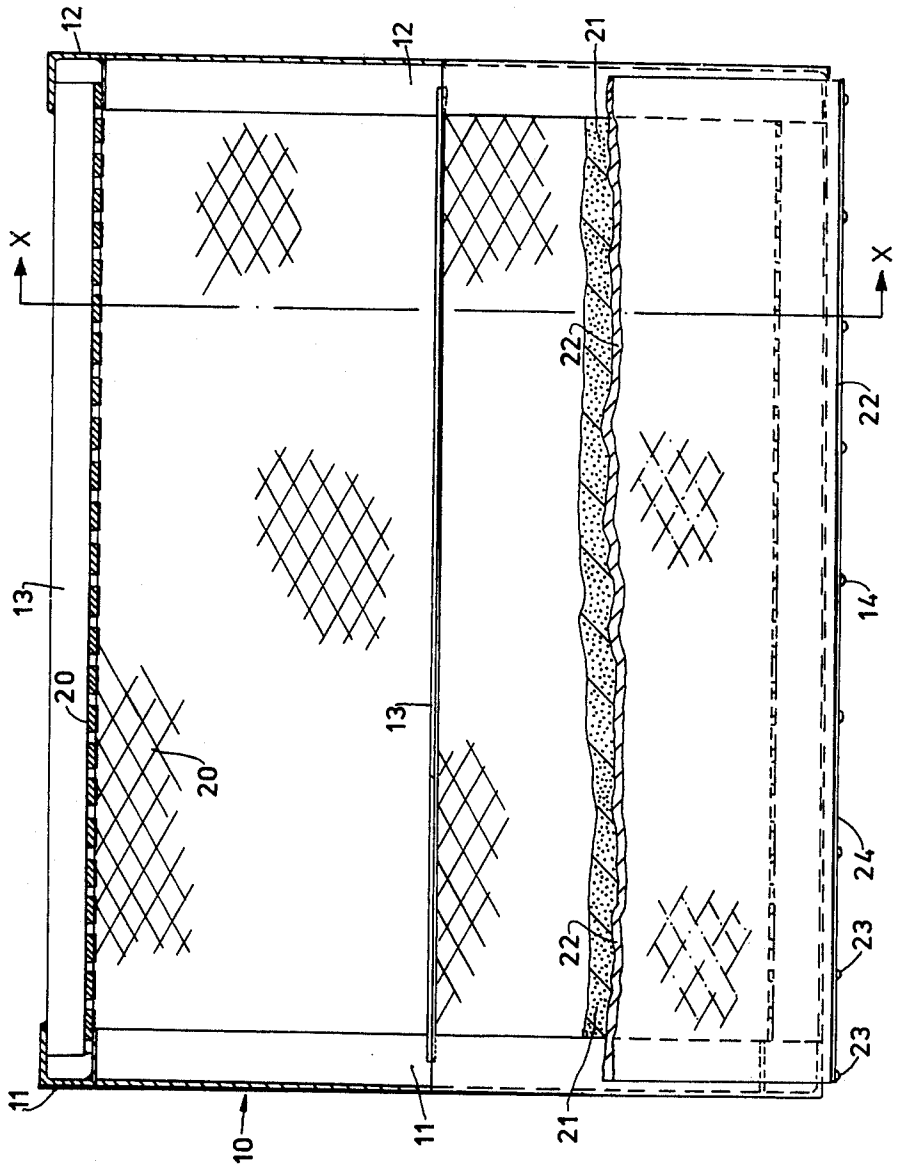


FIG. 1.

FIG. 2.

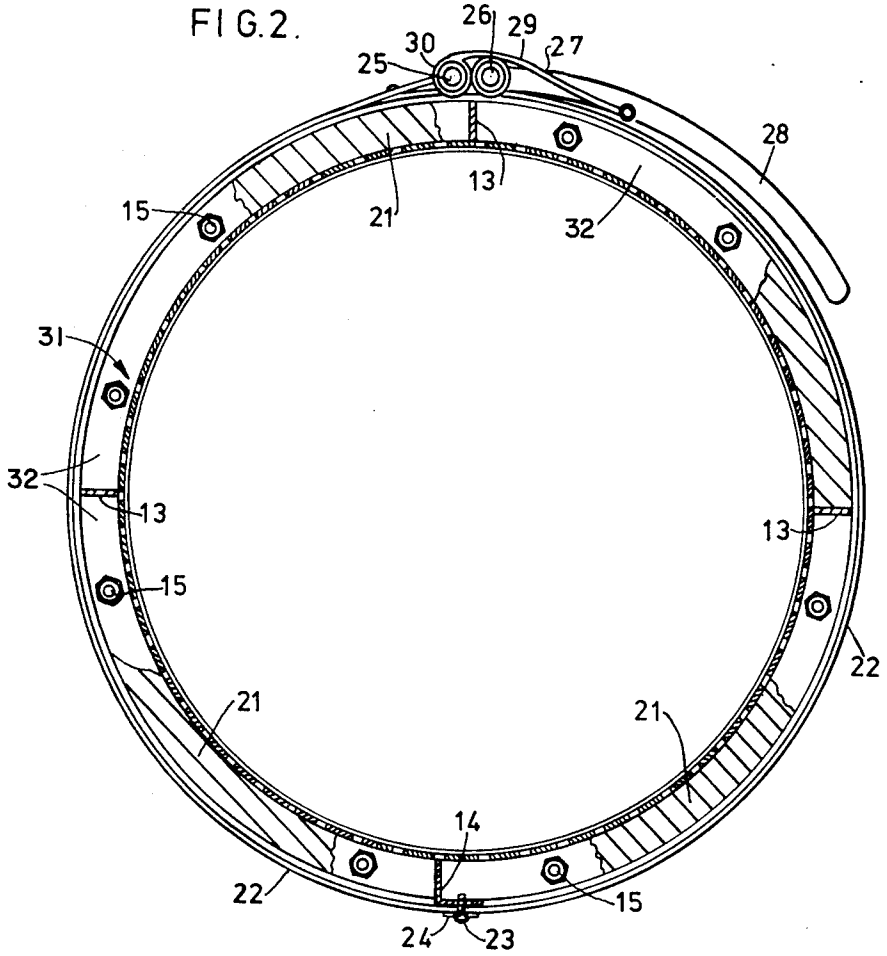

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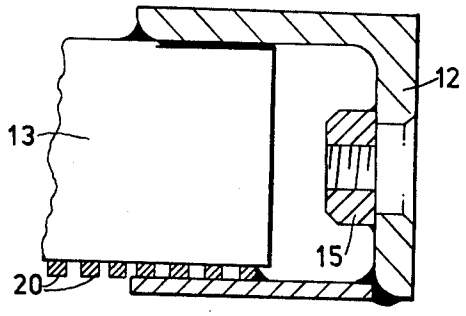
FIG. 3.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SILENCER FOR VENTILATION DUCTS

BACKGROUND OF THE INVENTION

1. Field of the Invention:

This invention relates to silencers sometimes referred to attenuators of the type interposed in ducting of ventilation systems such as the ventilating and air cleaning systems employed in coal mines. The purpose of the silencer is to reduce the acoustical energy generated from such ducting.

2. Description of the Prior Art:

The silencers of the prior art have a tendency to become choked with deposited foreign matter and to become ineffective for sound attenuating purposes. The prior art silencers can be replaced in a lengthy, costly procedure but cannot be easily repaired without replacement.

SUMMARY OF THE INVENTION

The present silencer permits rapid replacement of clogged sound absorbing material. The silencer has a generally tubular configuration with a cross-section corresponding to the duct in which it is to be interposed. The silencer includes an inner perforate wall, an outer perforate wall or cover spaced apart from the inner perforate wall. Sound absorbing elements are provided in the annular space between the inner wall and the outer wall. The outer wall has a flexible nature or a hinged nature and includes at least one openable joint which is secured by quick release means. The inner perforate wall may be composed of expanded metal or perforated metal sheeting. The outer wall may be of rubber or plastic coated fabric such as asbestos cloth or glass fiber cloth. The outer wall alternatively may be two or more rigid metal sheets which are hingedly connected and separable from the ducting.

The sound absorbing elements comprise pads or mats of a suitable open cell foamed plastics material or pads or mats of mineral wool or glass fiber. When the outer wall of the silencer is removed or opened, the fouled and blinded sound absorbing elements can be easily replaced.

BRIEF DESCRIPTION OF THE DRAWING(S)

FIG. 1 is a partly sectional elevation of a silencer according to the invention;

FIG. 2 is a cross-sectional view taken along the line X—X of FIG. 1; and

FIG. 3 is an enlarged fragmentary view of a portion of FIG. 1 showing some details which do not appear in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

A silencer **10** is customarily interposed in the ducting of a ventilating system of the type employed in coal mines. The silencer **10** comprises a pair of terminal flanges which constitute inwardly facing generally channel section end rings **11, 12** which are connected one to the other in parallel by uniformly spaced frame members **13, 14.** Three frame members **13** are shown consisting of mild steel strips of appropriate length, width and thickness welded to the end rings **11, 12.** The frame member **14** is an angle section having one flange disposed radially and the other chordwise of the outer walls of the channel section end rings **11, 12.** The end rings **11, 12** are drilled and tapped or are provided with

screw threaded elements **15** (FIG. **2**) to receive flange connection bolts of duct work in which the silencer assembly is to be interposed. Tack welded to the frame members **13, 14** and ring members **11, 12** is an inner tubular wall **20** of perforate sheet metal such as expanded metal.

The inner wall **20** supports sound absorbing elements **21** such as pads or slabs of open celled foamed plastics material or asbestos fibers or glass fibers. The sound absorbing elements **21** are disposed in each of the annular segments **32** between support frame members **13, 14** and are held in an operable position by an outer cover **22.** The outer cover as shown is composed of a plastic coated fabric such as asbestos cloth or glass fiber cloth. As best shown in FIG. **2,** the spacer members **13, 14** are disposed in the annular space **31** between the inner tubular wall or cylinder **20** and an annularly spaced outer cylinder or cover **22.** The spacer members **13, 14** are spaced-apart from each other circumferentially of the inner cylinder **20** and divide the annular space **31** into plural annular segments **32.** The outer cover **22** is secured medially to the outer flange of frame member **14** by means of screws **23** which extend through a clamping strip **24.** The free ends of the cover **22** are secured in any suitable manner to transverse rods **25, 26** arranged for connection to each other by one or more toggle connectors **27.**

The toggle connectors **27** each comprising handle lever **28** pivotally connected at one end to one of the rods **26** and a bifurcated hook member **29** pivotally connected to the lever **28.** A head **30** of the hook member **29** releasably engages an exposed part of the other rod **25.**

In FIG. **2** the lever **28** is shown in its over center, locked position wherein the ends of the outer cover **22** are pulled tightly into abuttment and the cover **22** is stretched tautly around the assembly.

In order to remove the sound absorbing elements **21** for replacement or cleaning it is merely necessary to release the toggle handle lever **28,** turn back the flexible cover **22,** remove the fouled elements, insert replacement elements and refasten cover **22.** No extrinsic tools are required. The silencer assembly remains mounted in operable position.

In place of the toggle connection **27** it is feasible to employ quick release pliable straps such as leather straps having quick release buckle connections.

I claim:

1. An acoustic silencer of the type interposed in ventilating duct systems comprising in combination: a perforate rigid inner cylinder; an annularly spaced outer cylinder; a ring flange secured peripherally at each end of the said inner perforate cylinder; structurally rigid spacer members disposed in the annular space between the said inner cylinder and the said outer cylinder and secured to the said ring flanges and extending substantially parallel to the axis of the said inner perforate cylinder, the said spacer members being spaced-apart from each other circumferentially of the said inner cylinder and dividing the said annular space into plural annular segments; sound absorbing elements disposed in each of the said annular segments and being retained in operable relation relative to the said inner cylinder by the said outer cylinder; said outer cylinder being secured to one of the said spaced members and having at least one operable joint extending between the said ring flanges; and a quick-release closure for retaining the said operable joint in a closed position.

2. The acoustic silencer of claim 1 wherein the said outer cylinder is fabricated from fabric.

3. The acoustic silencer of claim 1 wherein the said outer cylinder terminates along the said operable joint in parallel rigid rods which can be brought into abutment along a line extending between the said ring flanges; and wherein said quick-release closure comprises toggle clamp means including a handle which is pivotally connected to one of the said rods and a toggle connector member releasably and pivotally engaged with the other of the said rods at one end and pivotally connected to a point intermediate of the said handle at its other end.

4. The acoustic silencer of claim 1 wherein the said one of said spacer members comprises an angle having one flange disposed radially of the said ring flanges and the other flange disposed chordwise of the said ring flanges and spaced from the said inner cylinder.

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