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GAS INTAKE SILENCER

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2 Sheets-Sheet 1

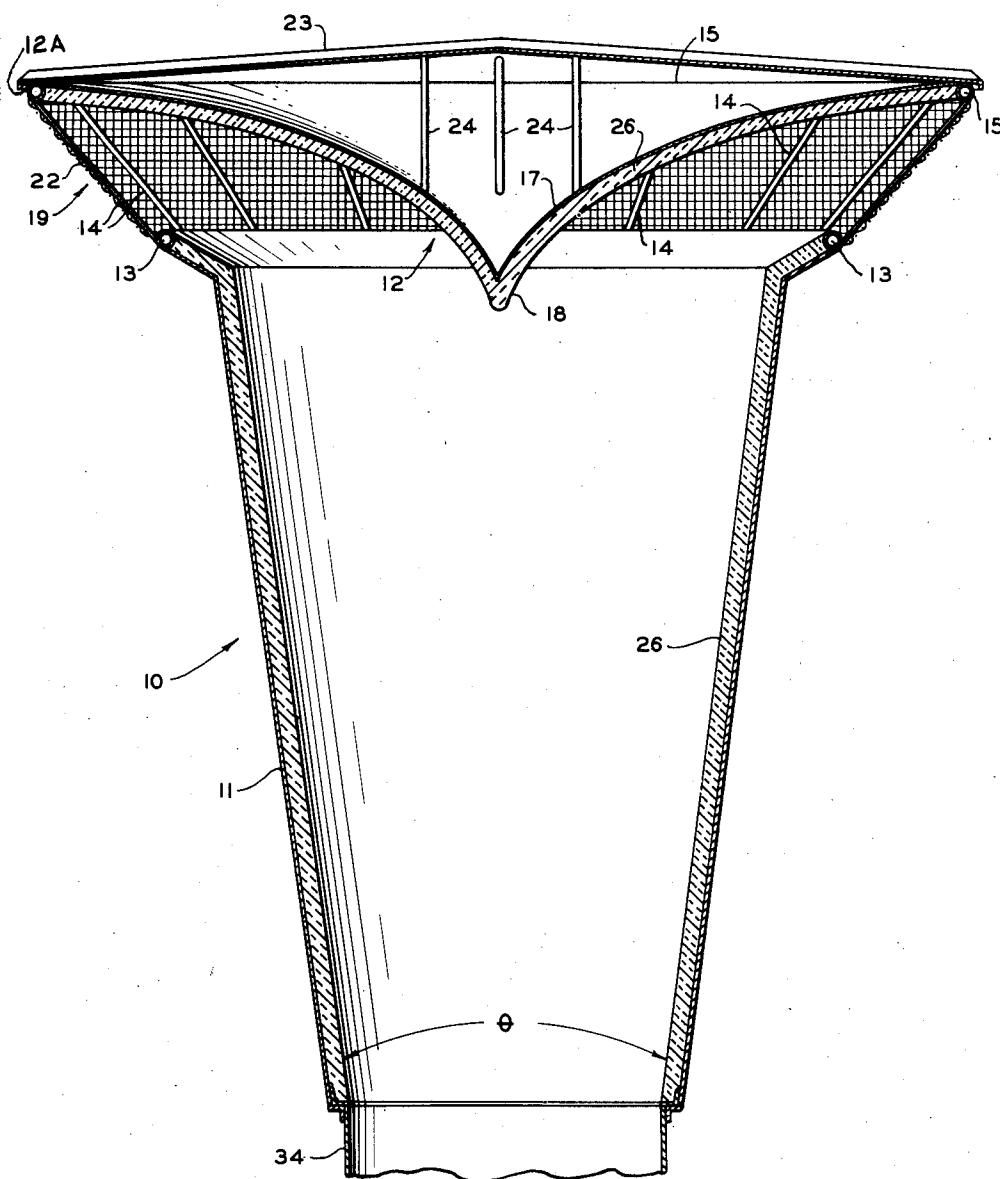


FIG. 1.

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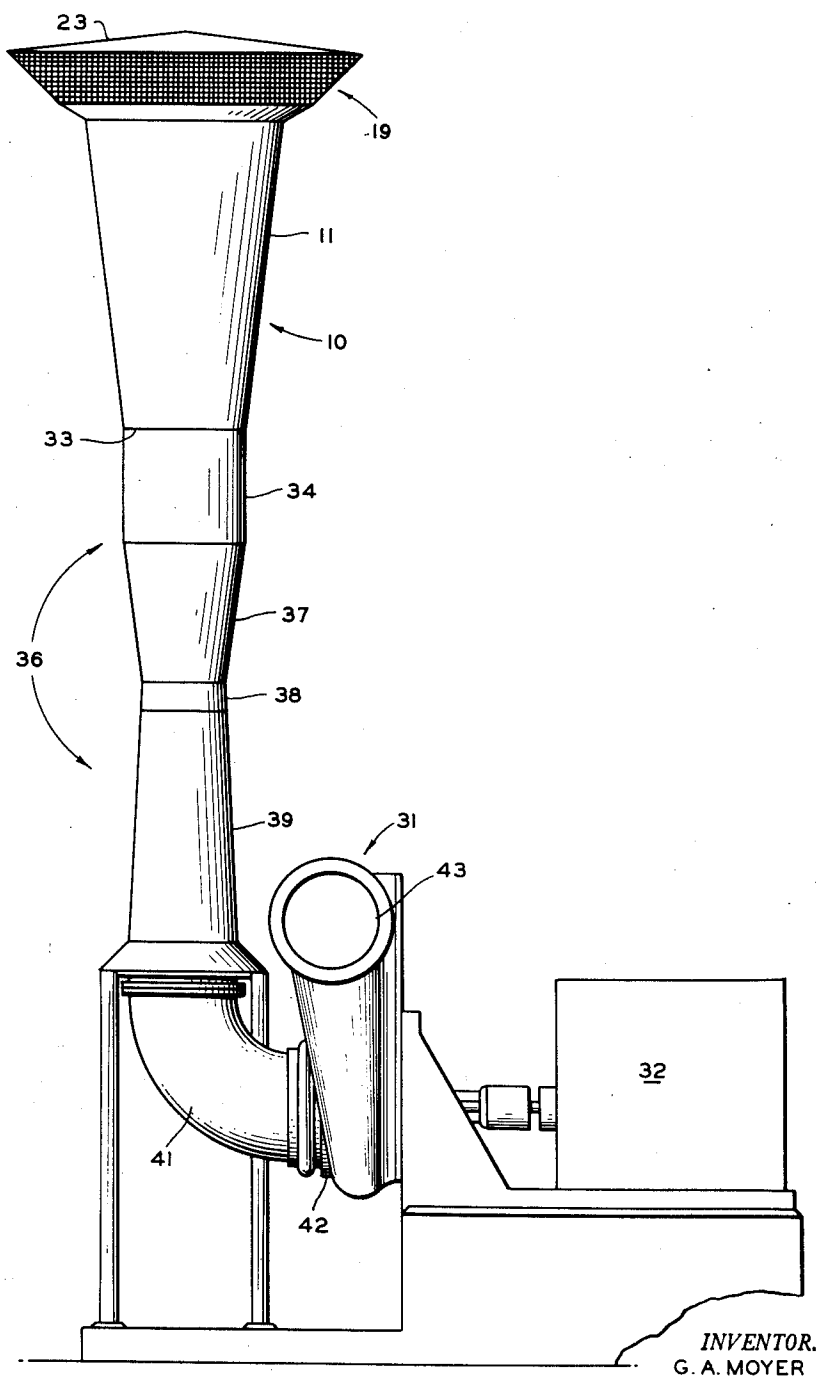


FIG. 2.

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GAS INTAKE SILENCER

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4 Claims. (Cl. 181-42)

This invention relates to a gas intake silencer. In one of its more specific aspects, the invention relates to a silencer adapted for the elimination of substantially all of the noises produced by incoming gases entering an apparatus for supplying gases under pressure. In another of its more specific aspects, the invention relates to a silencer for eliminating substantially all of the noises produced by incoming gas, such as air, entering a centrifugal blower or compressor.

In any installation which requires the use of machinery such as blowers and compressors, the elimination of the noises of operation becomes an important consideration. In a working area where the noise level is high, the efficiency and comfort of the workmen will be adversely affected, and the entire operation may be thereby rendered hazardous. Machinery which is utilized to furnish a stream of gas under pressure, such as centrifugal blowers or centrifugal and reciprocating compressors, has a tendency to develop a great deal of noise. In the case of centrifugal blowers, the noise originates primarily at the air intake and results from the air turbulence at the intake and from the impeller vanes biting into the air. To achieve a satisfactory noise level in a working area around such machinery, it is imperative that provision be made for some type of silencer.

The following objects will be attained by the various aspects of the invention.

It is an object of this invention to provide a gas intake silencer for an apparatus adapted for supplying gases under pressure.

Another object of this invention is to provide a silencer which will eliminate essentially all of the noise produced by gases entering the intake of an apparatus for supplying gases under pressure.

Still another object of this invention is to provide an air intake silencer for a centrifugal blower which will eliminate substantially all of the noise at the intake.

A further object is to provide a gas intake silencer which is simply and easily constructed and inexpensive to install.

Still other objects and advantages will be apparent to those skilled in the art from the following description and disclosure.

In accordance with this invention, the gas intake silencer comprises a conduit, tapered at an angle in the range of about 10 to 20° but which preferably has a taper of about 15°, having a conical member with arcuate sides attached to its large end so that the apex of the conical member extends into the conduit and so that an annular opening is formed between the periphery of the base of the conical member and the end of the conduit. The walls of the conduit and the sides of the conical member are lined with acoustical material for sound absorption. By constructing a silencer of this design, the elimination of substantially all noise is made possible through reduction of air turbulence and by sound absorption.

A more complete understanding of the invention may

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be obtained by reference to the following description and the accompanying drawing, in which:

Figure 1 is a vertical sectional view of the gas intake silencer in accordance with this invention, and

Figure 2 is a side elevation of the gas intake silencer of this invention being used with a centrifugal blower.

Referring to the drawing and in particular to Figure 1, conduit 11 of gas intake silencer 10 is illustrated as being substantially cylindrical in shape with its sides being slightly tapered. The angle of taper θ can be in the range of about 10 to 20°, but an angle of about 15° is preferred. A reinforcing member 13 is attached to the large end of conduit 11, which is shown as being flared. Conical member 12 is attached to the large end of conduit 11 by means of several support members 14 which extend between reinforcing member 13 and base member 15 of conical member 12. Reinforcing member 13 and base member 15 are illustrated as being circular pipes, and are preferably so constructed in order to reduce turbulence and noise by presenting a smooth, rounded edge to the gas entering the silencer. It is, however, within the contemplation of the invention to use other forms of construction such as circular metal strips. The support members may be made of small diameter pipe, or they may be in the nature of fins so as to offer as little resistance as possible to the passage of gas. The sides 17 of conical member 12 are arcuated, and its apex 18 extends into conduit 11. Annular opening 19 formed between base member 15 of conical member 12 and reinforcing member 13 of conduit 11 serves as the gas inlet opening and is covered with wire screening 22. A protective hood which comprises plate 23 is attached adjacent the peripheral edge of conical member 12 at 12A to base member 15 of conical member 12 and is supported by several vertical members 24. Insulation material 26 which lines the walls of conduit 11 and the sides of conical member 12 is provided in order to absorb any sound waves which are created. Commercial brands of insulation such as Ultralite #300, offered by Gustin-Bacon, or Asbestos Akoustikos Felt sold by Johns-Manville can be satisfactorily used, but in any case, in order to remove the fire hazard, it is preferred to employ a non-inflammable insulation material.

In Figure 2, an installation is illustrated wherein silencer 10 is being used in conjunction with centrifugal blower 31 which is operatively connected to motor 32. While the silencer is shown as being installed vertically, it is not intended to so limit the invention, but rather the silencer can be positioned at any angle as required by the specific installation. The small end 33 of conduit 11 is connected through pipe 34 to one end of venturi 36 which comprises converging section 37, throat 38, and diverging section 39. The other end or diverging section 39 of venturi 36 is connected through elbow 41 to the inlet 42 of centrifugal blower 31. The venturi is included in the installation in order to provide means for measuring fluid flow, and is not necessary to the operation of the silencer of this invention. It is, therefore, within the scope of the invention to connect the silencer directly to the blower without the inclusion of a venturi as illustrated. It is to be understood also, that other means for measuring fluid flow, such as an orifice or Pitot tube, can be utilized instead of a venturi. The gas intake silencer is shown as being used in conjunction with a centrifugal blower primarily for purposes of illustration, and it is to be understood that the silencer can be used with other types of equipment.

In the operation of the gas intake silencer of this invention, referring to Figures 1 and 2, the gas, such as air, which is to be pressurized by centrifugal blower 31, enters the system through annular inlet opening 19. The

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inlet opening is provided with wire screening 22 so as to exclude foreign objects which might be drawn into the system. On entering silencer 10 through inlet opening 19, the air is flowing at a low velocity and thereafter is given a slow, smooth acceleration with no sharp changes in direction. After passing through inlet opening 19, the air is guided and turned by arcuate sides 17 of conical member 12 which prevents a stream of air entering the silencer from one side from impinging against a stream entering from the other side. Because of the shape of the sides of the conical member 12, the direction of air flow is gradually changed so that it flows parallel to the longitudinal axis of conduit 11. Conduit 11 is tapered, preferably at an angle of about 15°, so that the air will be given the proper acceleration through the silencer. The stream of air on leaving conduit 11 passes through pipe 34, and then enters converging section 37 of venturi 36. In passing through venturi 36, the air undergoes a pressure drop which can be measured and a determination made therefrom as to the rate of flow of air to the blower. It is also within the contemplation of the invention to pass the air directly from the silencer to the inlet of the blower in which case the air does not undergo a pressure drop. After flowing through venturi 36, the stream of air enters elbow 41, in which its direction of flow is gradually changed, and thereafter passes through intake 42 into centrifugal blower 31. The rotating impeller vanes of blower 31 pick up the air and force it out through outlet 43 at a high pressure. Thereafter, by means of suitable pipes, the air is passed to the installation requiring pressurized air.

It will be evident that by providing a gas intake silencer of the type described that I have made possible a substantial reduction in the turbulence of the incoming gas, thus essentially eliminating the noise generally generated by the gas entering machinery such as centrifugal blowers or centrifugal and reciprocating compressors. Furthermore, by lining the silencer with sound absorbing material, such sound waves as may still be created will be absorbed so as to ensure practically noiseless operation of the equipment.

As will be evident to those skilled in the art, various modifications of this invention can be made or followed without departing from the spirit of the disclosure.

I claim:

1. An intake silencer, for attachment to the inlet conduit of gas pressuring apparatus, including blowers and compressors, said silencer comprising, in combination: an internally smooth, frusto-conical pipe flared at its larger end and lined with sound-insulating material; a

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smooth, rounded, ring-shaped reinforcing member attached peripherally to said larger end; a hood member positioned over said larger end of said pipe and coaxial therewith, the overall diameter of said hood member being greater than the largest diameter of said pipe; said hood member comprising an outwardly convex outer plate and an arcuately modified conoidal inner wall member, said plate and said wall member being attached to each other at their peripheries; a smooth, rounded, ring-shaped base member attached to said hood member adjacent the periphery thereof; said hood member being attached to the larger end of said pipe by means of supports having smooth rounded surfaces and extending between said reinforcing member and said base member; the apex of said arcuately modified conoidal inner wall member extending into the interior of said frusto-conical pipe, whereby said inner wall member and said pipe define a smoothly curved annular passageway; said arcuately modified conoidal inner wall member being lined with sound-insulating material.

2. A silencer in accordance with claim 1 wherein said taper angle is in the range 10-20°.

3. A silencer in accordance with claim 1 wherein said taper angle is about 15°.

4. A silencer in accordance with claim 1 wherein a screen is positioned to screen the inlet to said smoothly curved annular passageway.

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