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AIR RAID WARNING SIREN
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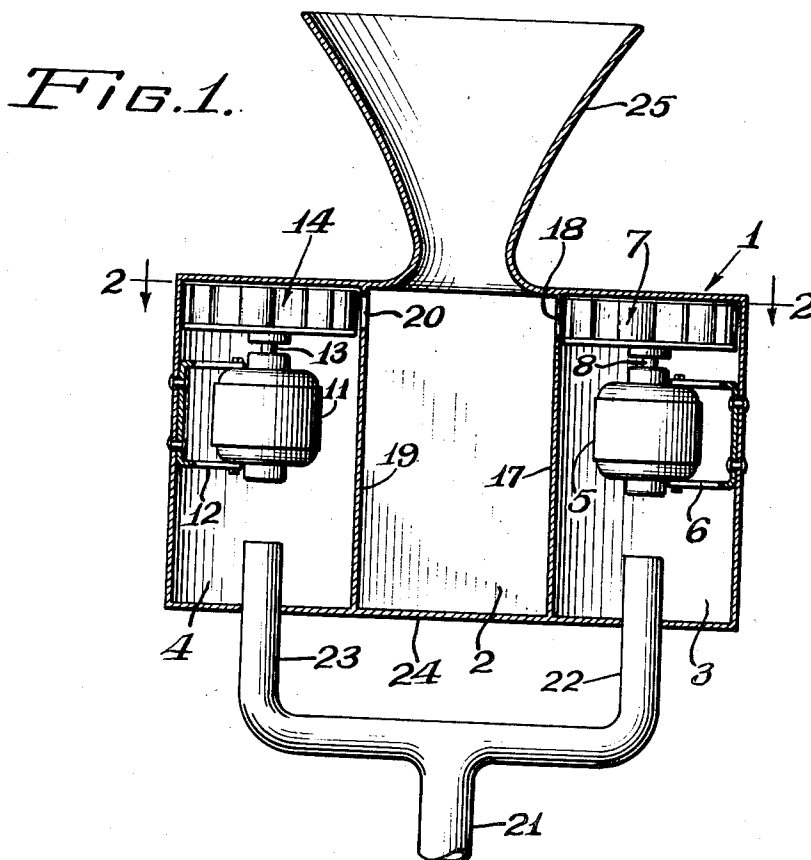
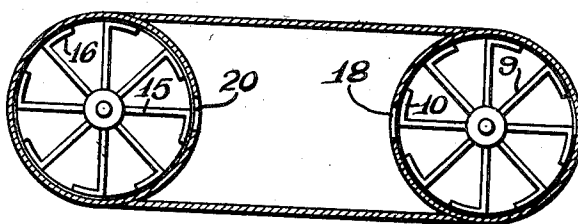


FIG. 2.



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AIR RAID WARNING SIREN

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This invention relates to improvements in sirens of the air raid warning type and refers particularly to a siren characterized by having an emphasized low pitch tone of predetermined frequency.

In producing audible warning signals which are intended to be heard over considerable areas, usually heavily built, populous areas, such as intended with air raid warning sirens, a low pitch component of the tone produced is of advantage. In the first place, the normal noises produced in business offices, banks, manufacturing plants, homes and the like are usually of relatively high pitch and, hence, a warning signal of relatively high pitch is frequently lost in the normal noise and at best is not as attention-arresting as a low tone foreign to the normal noises. Hence, a signal of relatively low pitch gains attention where a high pitch signal may be lost or ignored. Secondly, low pitch sounds are of relatively long wave length and, hence, in heavily built areas, sound shadows and dissipation of the wave energy are less likely to occur.

One of the features of the present invention resides in a siren or the like which produces an attention-arresting signal having a component of low pitch, the low pitch component being a beat note secured by a pair of sound producing members producing relative high pitch sounds of different frequencies, the beat note resulting from the interference of the high frequency signals, and having a frequency equal to the difference in frequency of the high pitch tones.

Another important feature of the invention resides in the provision in a siren of a chamber attuned to the frequency of a low pitched beat note wherein a siren is obtained which produces two relatively high pitched tones with an emphasized low pitch tone.

Other objects and advantages of my invention will be apparent from the accompanying drawing and following detailed description.

In the drawing, Fig. 1 is a sectional view, partially diagrammatic, through my improved siren.

Fig. 2 is a transverse sectional view taken on line 2-2 of Fig. 1.

Referring in detail to the drawing, 1 indicates a housing which, for convenience, is divided into three zones, a resonating chamber 2, and fluid pressure chambers 3 and 4. As will be apparent as the description of the invention proceeds the zones 2, 3 and 4 need not necessarily be contained in a unitary housing, but for purposes of compactness this is the preferred embodiment of the invention.

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An electric motor 5 is positioned in the zone 3 being carried by bracket 6 which may be secured to one of the walls of the housing. A rotor 7 is mounted upon shaft 8 of motor 5 whereby said rotor may be rotated by the motor. The rotor 7 comprises a plurality of radially extending vanes 9 each of which terminates at its outer extremity in an arcuate valve plate 10 which conforms with the inner circumference of the upper portion of that portion of the housing which defines zone 3.

In the zone 4 an electric motor 11 is positioned being carried by bracket 12 which, in turn, is mounted upon one of the housing walls. The shaft 13 of motor 11 carries a rotor 14 which, similar to rotor 7, comprises radial vanes 15 which terminate in arcuate valve plates 16.

Wall 17 which defines a portion of zone 3 and a portion of zone 2 is provided with an opening 18, and wall 19 which defines a portion of zone 4 and a portion of zone 2 is provided with a similar opening 20. It can readily be seen that openings 18 and 20, respectively, provide communications between zones 2 and 3, and 2 and 4 adjacent an end of zone 2.

It will be noted that valve plates 10 of rotor 9 move adjacent opening 18 and, in similar manner, valve plates 16 move adjacent opening 20, when the respective motors 5 and 11 are energized. It will also be noted that the angular spacings of the vanes 9 and 15, respectively, are such, with respect to the circumferential lengths of the valve plates 10 and 16, that the openings 18 and 20 are alternately closed and opened respectively by the valve plates 10 and 16. Thus, communication between zones 3 and zone 2 is alternately opened and closed and communication between zones 4 and 2 is alternately opened and closed as the respective rotors 7 and 14 are rotated.

In the form of sound producing agency illustrated and described fluid under pressure such as air, steam or other gas is introduced into both zones 3 and 4. To accomplish conveniently this end a header 21 connected to a suitable source of fluid under pressure (not shown) may connect into delivery pipes 22 and 23 which open, respectively, in zones 3 and 4. Thus, both zones 3 and 4, during operation of the device may be filled with fluid under pressure.

In a well known manner the escape of the fluid under pressure through openings 18 and 20 with the alternate interruptions by the valve plates 10 and 16, respectively, produces a sound characteristic of that known to be produced by a siren.

As a feature of the present invention, the pitches of the tone produced by the arrangement

contained in zone 3 and the arrangement contained in zone 4 are specifically different. This may be accomplished in any well known manner, as by rotating one rotor faster than the other if the rotors are the same; providing a different number of valve plates on each rotor, if the motors rotate at the same speed; supplying fluid under different pressures to zones 3 and 4 or using fluids of different densities in said zones. The purpose of so producing tones of different pitch is to cause interference between the sounds such as to create an audible beat note adjacent the openings 18 and 20 at the open end of chamber 2.

It is well known that audible beat notes may be created where the difference between the wave length of one tone and the wave length of another tone in interference with the first tone comprises a tone whose wave length is in the audible range. Hence, the sound produced by my siren comprises a complex sound produced by the fundamental of rotor 7 and the fundamental of rotor 14 together with a beat note of a wave length comprising the difference between the two fundamental wave lengths. I contemplate the production of a relatively high pitched audible tone by rotor 7 and a relatively high pitched audible tone by rotor 14, the wave lengths or frequencies, however, being different, but sufficiently close to produce a beat note or tone of relatively long wave length or low frequency. The wave length of the beat note or tone is sufficiently high, however, that the waves coalesce to form a tone of definite pitch but is not so high as to fall within the range of the wave lengths of the average noises of offices, home, street noises, etc.

To cause the waves of the beat note to coalesce and produce a tone of definite pitch the frequency of said note or tone is preferably above about 20 cycles per second. Below 20 cycles per second no definite pitched tone is discernible. For use in towns and cities where relatively high buildings, narrow streets, closed offices, and relatively high pitched sounds are prevalent, an upper limit of the frequency of the beat note or tone of about 75 cycles per second is preferred. If higher frequencies than 75 cycles per second are used in a situs of this character, definite sound shadows are produced, that is, the sound waves are not sufficiently long to render the beat tone materially more effective than the relatively high pitched fundamental tones directly produced by the rotors.

As an example, rotor 7 may be so driven or may be of such character that a tone of 3600 cycles per second is produced. Rotor 14 may be so driven or of such character as to produce a tone of 3660 cycles per second. A beat note will thereby be produced in the compartment 2, adjacent its open end where the major interference will occur, of 60 cycles per second, that is, the difference between the frequencies of the two fundamentals 3600 and 3660. A beat frequency of this character will produce a definite tone, as opposed to a sound disturbance wherein coalescence does not take place and will be sufficiently long in wave length not to be blocked off by the usual obstructions encountered in a town or city. In addition, the tone will be sufficiently below the average noises in pitch that it will be distinctive and attention-arresting.

Of course, it is to be understood that the present invention is not to be limited to the example set forth hereinbefore since higher frequency beat tones may be satisfactory or lower frequency

beat tones may be necessary depending upon the nature of the obstructions or the nature of the normal noise frequencies.

As another important feature of the present invention my siren contemplates means for emphasizing the beat note or beat tone whereby it will be augmented and amplified to make it an effective component of the complex sound issuing from the siren. As has been hereinbefore described, the major interference between the sound waves produced by the two fundamental components occurs adjacent the open end of the compartment 2. I propose to close the compartment 2, as at 24, and the distance between the closure at 24 and substantially the open end of the compartment 2, proper, is made substantially equal to one-quarter of the length of the wave of the beat note or beat tone produced. That is, the closure 24 is substantially one-quarter wave length from the point where the major interference between the fundamental tones is produced.

In this fashion a siren or audible signal is produced comprising substantially three components, the two relatively short wave length sounds of the fundamentals and the emphasized relatively long wave length sound of the beat note or tone.

It is to be understood, of course, that in some environments, such as, in relatively flat open country or over water, a higher frequency beat note or tone than 75 cycles per second may be satisfactory where said beat note or tone is emphasized as herein described by the use of the resonating chamber. However, for use in congested areas a beat note or tone below 75 cycles per second is preferred.

The frequency of the two fundamental tones may be selected, as desired, within the audible range so long as their differences produce the desired beat note or tone.

Although a pressure type siren is shown and described, it is to be understood that the present invention is independent of the specific manner in which the fundamental or interfering tones are produced so long as the closed end of the resonating chamber is a distance of about one-quarter wave length from the point at which the major interference of the fundamental tones occur. In addition, if desired, a trumpet portion 25, such as an exponential horn may be employed at the open end of the resonating compartment 2.

I claim as my invention:

1. An air raid siren comprising a sound-producing member for producing a sound of predetermined relatively high frequency, a second sound-producing member for producing a sound of relatively high frequency but of a frequency different from the frequency produced by said first sound-producing member, means for simultaneously operating said sound-producing members, said sound-producing members being disposed adjacent each other to cause interference between the two produced sound waves and create an audible beat note of relatively low frequency, and a closed-end resonating chamber disposed adjacent said two sound-producing members and attuned to the frequency of said beat note to emphasize said relatively low frequency beat note.

2. An air raid siren comprising a sound-producing member for producing a sound of predetermined relatively high frequency, a second sound-producing member for producing a sound of relatively high frequency but of a frequency

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different from the frequency produced by said first sound-producing member, means for simultaneously operating said sound-producing members, said sound-producing members being disposed adjacent each other to cause interference between the two produced sound waves and create an audible beat note of relatively low frequency, and a chamber having a closed end which is at a distance from the zone of major interference between said two relatively high frequency sounds equal to substantially one-quarter wave length of the beat note caused by said interference.

3. An air raid siren comprising a chamber having a closed end and an opposite open end, means for producing a sound of predetermined relatively high frequency adjacent the open end of said chamber, separate means for producing a second sound of relatively high frequency adjacent the open end of said chamber, means for simultaneously operating said sound-producing means, said two sound frequencies differing from each other by a frequency of relatively low order whereby interference takes place adjacent the open end of said chamber and an audible beat note is created of relatively low frequency, the distance of the zone of major interference between said relatively high frequency sounds adjacent the open end of said chamber to the closed end of the chamber being substantially equal to one-quarter of the wave length of the beat note.

4. An audible signal producing device comprising a housing, means carried by said housing for producing a sound of relatively high frequency, separate means carried by said housing for producing a sound of a frequency differing from said first mentioned sound by about 75 to 20 cycles per second, means for simultaneously operating said sound-producing means, said two sound producing means being disposed adjacent each other to cause interference between the respective sounds to create an audible beat note of a frequency of about 75 to 20 cycles per second.

5. An audible signal producing device comprising a housing, means carried by said housing for producing a sound of relatively high frequency, separate means carried by said housing for producing a sound of a frequency differing from said first mentioned sound by about 75 to 20 cycles per second, means for simultaneously operating said sound-producing means, said two sound producing means being disposed adjacent

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each other to cause interference between the respective sounds to create an audible coalescent beat note of a frequency of about 75 to 20 cycles per second, and a resonating chamber carried by said housing for said beat note.

6. An audible signal producing device comprising a housing, means carried by said housing for producing a sound of relatively high frequency, separate means carried by said housing for producing a sound of a frequency differing from said first mentioned sound by about 75 to 20 cycles per second, means for simultaneously operating said sound-producing means, said two sound producing means being disposed adjacent each other to cause interference between the respective sounds to create an audible beat note of a frequency of about 75 to 20 cycles per second, and a resonating chamber carried by said housing, said resonating chamber having side walls and a closed end, said closed end being at a distance from the zone of major interference between said relatively high frequency tones equal to substantially one-quarter wave length of the beat note produced by such interference.

7. An audible signal-producing device comprising a housing, parallel partition walls in said housing dividing said housing into three chambers, means for simultaneously producing an audible sound of relatively high frequency in each of two chambers, each of said partition walls being provided with an aperture adjacent corresponding ends of said walls through which said high frequency sounds issue into said third chamber, said sounds of relatively high frequency having frequencies differing from each other by a predetermined amount whereby interference between said sounds occurs and an audible beat tone of relatively low frequency is produced in said third chamber adjacent the end thereof into which said high frequency sounds issue, said third chamber having an open end adjacent the apertured ends of said partition walls, a closure for the opposite end of said third chamber, said closure being at a distance from the open end thereof substantially equal to one-quarter wave length of the beat tone.

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