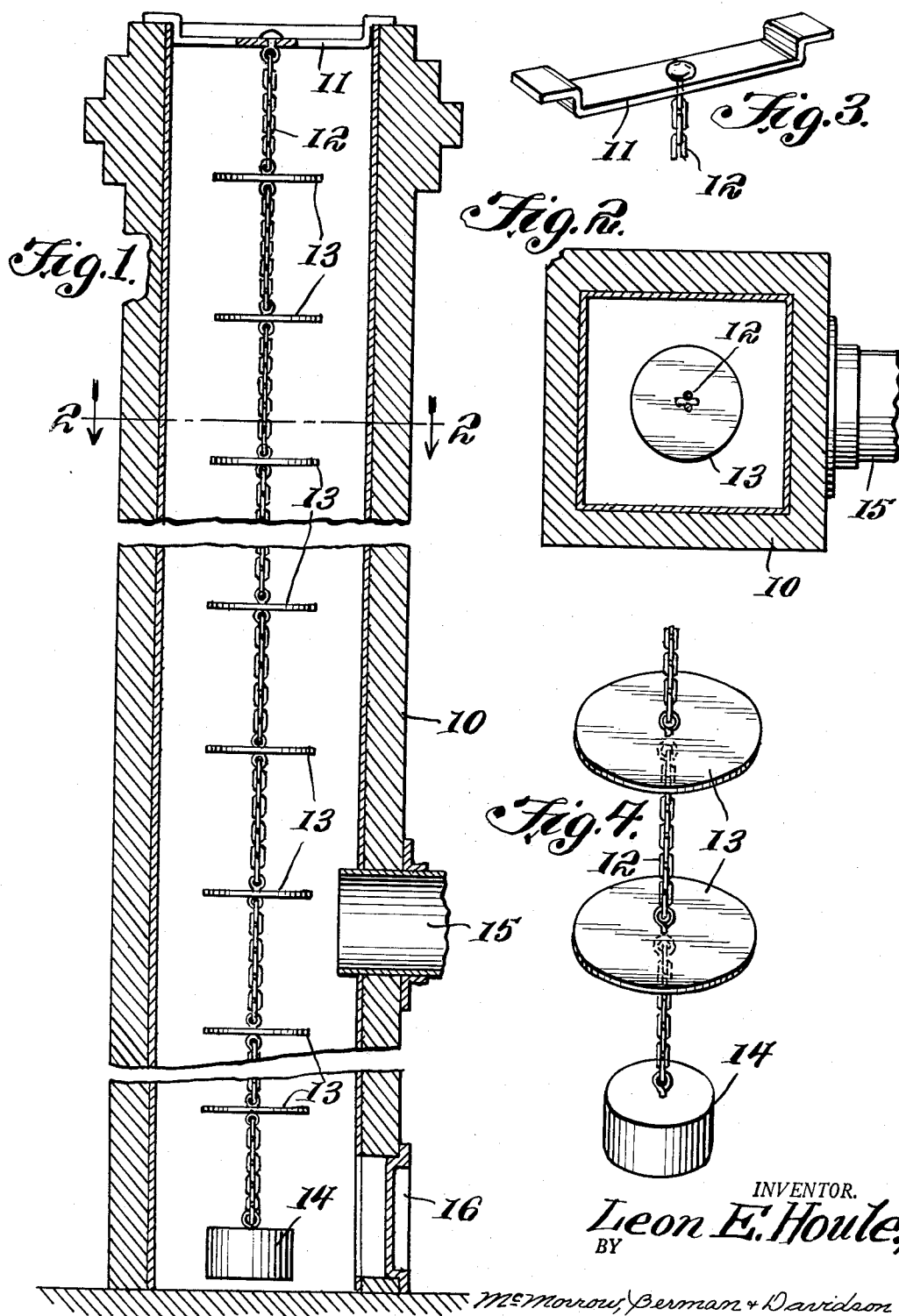


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CHIMNEY SILENCER

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CHIMNEY SILENCER

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2 Claims. (Cl. 181—33)

The present invention relates to chimneys and specifically to a device to prevent the resonating noises of some chimneys which are used to carry off the combustion products of large oil burners.

It has been found that certain chimneys produce loud and disturbing noises when high winds are passing over the top, and when large oil burners are ignited or are running. The combination of winds and the operation of the burners often set the gas column in the chimney into resonance so loud and with vibrations strong enough to be felt throughout the building.

Some oil burners have been installed with a device known as a barometric damper with an intent to eliminate at least partially this undesired phenomena. The damper is installed in the chimney base or in the smoke stack leading into the chimney, and has a vertically hung plate which opens to admit air to the rising column of gases. This damper is frequently fouled with soot and often in spite of the damper, an initial condition of violent resonance takes place in the chimney under certain conditions of wind pressure and temperature variations in the chimney and in the outside air, and the resonance is often sufficient to blow the plate backwards in rapid successive blows, sending clouds of soot into the furnace area.

In other burner installations, special provisions are made for the admission to the boiler of what is known as secondary air, a blast of air controlled in volume by the temperature and smoke density of the combustion products. Often, as the secondary air is admitted to the burner and thence to the chimney, a new and more disturbing condition of resonance is initiated, frequently disturbing the secondary air control to the point where it is totally inoperative, or apparently so. Efforts to adjust this control are then made without cause, the whole of the disturbance being the result of the acoustic phenomena of the column of gas in the chimney.

It is therefore the principle object of this invention to provide a device which entirely eliminates the condition of resonance in the chimney, and one which is simple and easily constructed and installed.

Another object of the invention is the provision of such a device in a chimney which results in the saving of fuel, as well as preventing the noises which sometimes occur during high winds and under certain conditions of operation of the oil burner connected to the chimney.

Other objects will be fully apparent from the following description of the present invention and on consideration of the annexed drawings, in which like numerals indicate like parts throughout the several views, and in which:

Figure 1 is a view in cross section of a chimney with the present invention installed therein;

Figure 2 is a top view taken on line 2—2 of Figure 1;

Figure 3 is a perspective view of the bracket support of the chain; and,

Figure 4 is a detailed view of the chain and discs, with the weight at the end which hold the assembly in position.

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In the drawings, a chimney is indicated by the reference numeral 10, showing the present invention to consist of a bracket 11 resting across the top opening of the chimney and supporting a long chain 12 having a series of vertically disposed parallel discs 13 each spaced from each other, and at the lower end of the chain 12 a weight 14 is secured to keep it more or less taut and to keep it from excessive swinging in the column of gases rising from the stack opening 15. It is considered a pertinent part of the invention that the length of chain 12 be sufficient to maintain the weight above the lower end of the chimney 10, and generally this condition is ascertained by inspection through the clean-out door 16.

The spacing of the discs 13 relative to each other is computed in the following manner, the chimney being known to have a resonance frequency proportional to the product of two times its length in feet divided into the speed of sound in gases of known composition and temperatures. To eliminate this resonance or noise it is necessary to "jam" the frequency and its harmonics by introducing surfaces which reflect and interrupt the resonance.

It has been found that if the discs 13 are spaced from each other at a distance of one-third the wave length of a higher harmonic frequency than the first or fundamental frequency and higher than the second, third, or fourth harmonic, that the chimney can no longer resonate at its natural or fundamental frequency, nor at the frequency of the superposed frequency either. It has therefore been proven that spacing of the discs at one-third the wave length of the fifth harmonic of the fundamental frequency of a chimney computed according to its height is effective to eliminate all chimney noises due to resonance.

For example, a chimney 44.5 feet in height with gases of an average temperature of one hundred and ten degrees centigrade, and the speed of sound being approximately 1300 F. P. S. in gases at that temperature, then the fundamental frequency is 14.6 cycles per second and the fifth harmonic is 467.2 C. P. S. The one-third wave length of the latter frequency equals 1.85 feet or 22.2 inches, which is the distance between the discs in this example.

It is known that short chimneys either do not resonate at all or at such frequencies that they are inaudible, but the larger chimneys of schools, institutions and in some homes are prone to have this disturbance, and the foregoing example is only an instance of this phenomena, and the present invention as above described is totally effective to eliminate the noise. It has been noted that the invention further effects a savings in fuel when the total cross sectional area of each disc is greater than twelve percent but no more than eighteen percent of the total cross sectional area of the chimney throat.

While a single embodiment of the present invention has been here illustrated and described, it is contemplated that other embodiments of the invention may be made and practiced without departing from the spirit and scope of the invention as more particularly defined in the appended claims.

What is claimed is:

1. A device to prevent noises in chimneys resulting from the resonance of the column of gas therein comprising a bracket adapted and arranged to be supported by its ends across the open top end of a chimney, a chain secured by one of its ends to said bracket midlength thereof, a plurality of horizontally disposed discs secured to said chain in spaced relation to each other, and means on said chain at its other end operable to restrain movement of said chain in the chimney.

2. A device to prevent noises in chimneys resulting from the resonance of the column of gas therein compris-

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ing an elongated bracket adapted and arranged to be supported by its ends across the open top end of a chimney, a chain secured by one of its ends to said bracket mid-length thereof, a weight secured to said chain at the other end thereof, said chain being dimensioned to extend substantially the full length of the chimney with said weight adjacent the lower end thereof, and a plurality of discs each secured to said chain in spaced relation to each other at a distance equal to one-third the wave

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length of the frequency of a harmonic higher than the first and second harmonics of the resonance frequency of the column of gas in the chimney.

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