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MUFFLER FOR DOWNSPOUTS AND MUFFLED DOWNSPOUT

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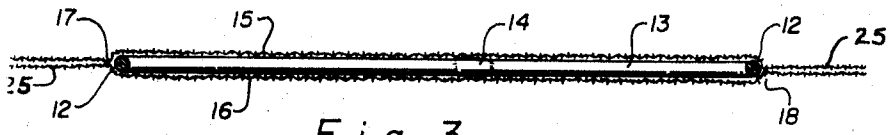


Fig. 3

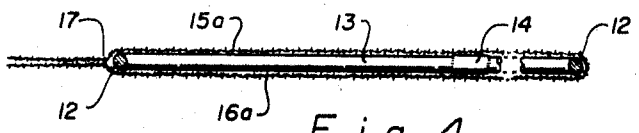


Fig. 4

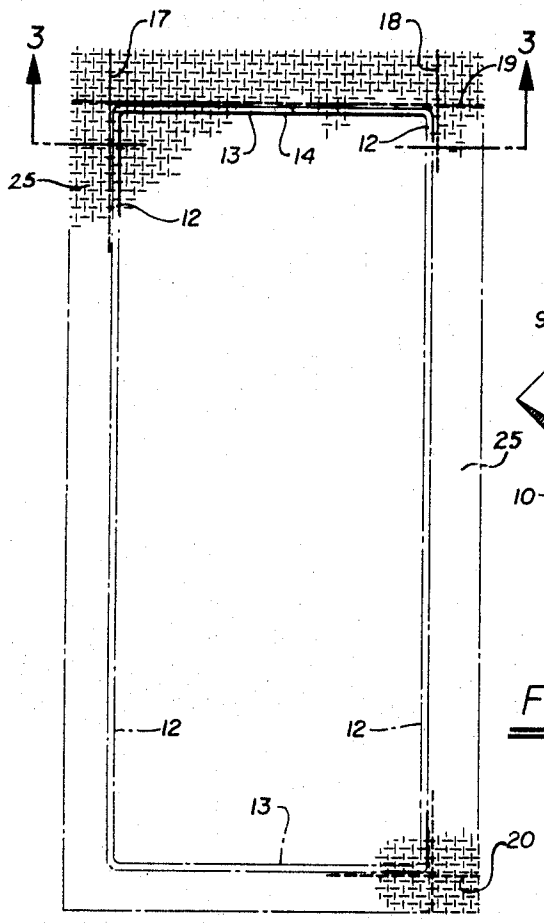


Fig. 2

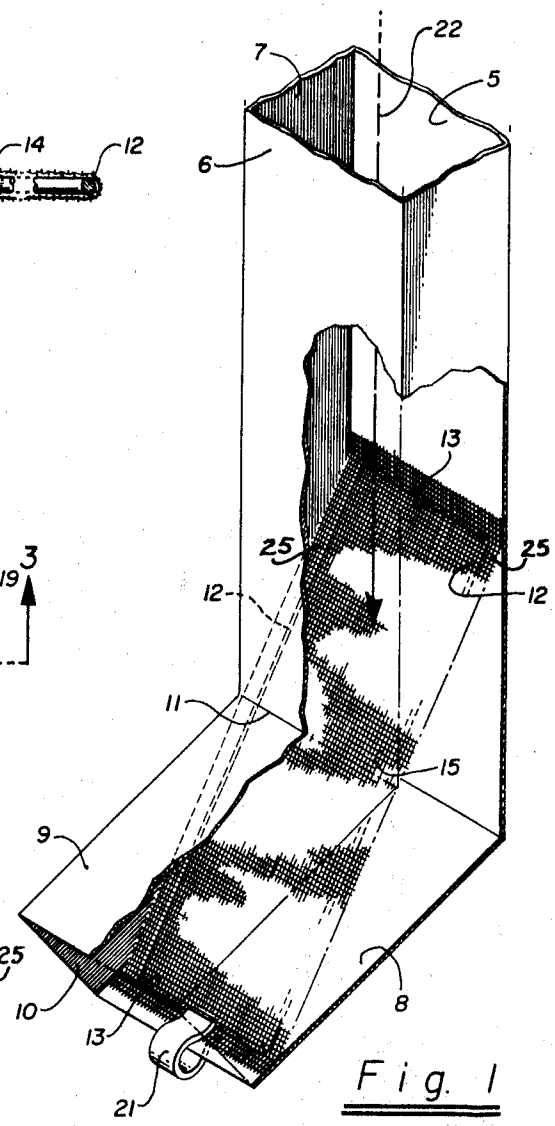


Fig. 1

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ABSTRACT OF THE DISCLOSURE

The noise caused by water falling through the upright conduit of a downspout having a discharge conduit angularly related thereto at the bottom is muffled by a muffler comprising a frame carrying at least one and, preferably, two layers of a sieve screen, disposed in an inclined position with its ends engaging respectively the rear wall of the upright conduit and the bottom wall of the discharge conduit, and preferably engaging at an intermediate point the junction of the front wall of the vertical and the top wall of the discharge conduit.

The invention relates to a muffler attachment for downspout or drains, for silencing or substantially eliminating the annoying sound made by dripping drops of water resulting from the drainage of rain water or dew from the roof of a building, and to a downspout fitted with such a muffler. More particularly, the invention relates to a muffler for dispersing the water droplets traveling through the vertical section of a metallic downspout against an angularly related discharge conduit to minimize or eliminate the noise typically associated with such spouts.

For years, people have been disturbed by the dripping of water falling downward through the common household downspout. Under certain conditions of water flow, the noise of the water striking the bottom wall of the angularly related discharge spout can be very annoying. Attempts have been made to reduce this noise by stuffing rags, sponges or the like into the downspout; also, attempts have been made to reduce the noise by mounting a cushion pad, such as a sponge, at the bottom of the vertical conduit, as suggested in the U.S. patent to Gladding, No. 2,813,593. The former were unsatisfactory in that they resulted in clogging of the downspout or would wash out while the latter were costly and were only partially effective since they filled with water and a water filled sponge transferred the noise of impact instead of muffling it.

It was now found, according to this invention, that the kinetic energy of the falling drops of water can be effectively absorbed, and noise can be materially reduced or eliminated, by mounting a sieve screen within the downspout. It was found that even better results are obtained by employing a plurality, such as two, layers of sieve screen material.

In summary, the muffler of the present invention comprises a screen providing a pair of lateral bars, and at least one fine-mesh sieve screen extending between the bars, the frame having a size and outline to be insertable through the discharge conduit of a downspout for lodgement within the spout in an inclined position with the upper end thereof in engagement with the rear walls of the conduit and the lower end thereof in engagement with the bottom wall of the discharge conduit. The frame may be secured within the downspout in any of several ways, as by forcing it into the spout until an intermediate part thereof engages the junction of the front wall of the upright conduit and the top wall of the discharge conduit and causing a slight deformation of the frame to retain it by friction. The frame can, alternatively, be secured by

means of the clamp which acts between the lower end of the muffler and the bottom wall of the discharge conduit or by forming the screen material in a manner to extend exteriorly of the lateral frame to engage the side walls of the downspout.

The invention will be further described with reference to the accompanying drawings which shows two preferred embodiments wherein:

FIGURE 1 is an isometric view of a downspout with the muffler secured therein, parts being broken away;

FIGURE 2 is a plan view of the muffler;

FIGURE 3 is a section taken on the line 3—3 of FIGURE 2; and

FIGURE 4 is a section corresponding to FIGURE 3 showing a modified embodiment.

Referring to FIGURE 1, the downspout includes a vertical conduit of rectangular cross section having a rear wall **5**, a front wall **6**, and side wall **7**; this is joined at its bottom to an angularly related discharge conduit having a bottom wall **8**, a top wall **9**, and vertical walls **10**. The top wall **9** joins the front wall **6** at a junction line **11**. While the downspout illustrated is rectangular in cross section, the muffler of the present invention is equally well suited for use with cylindrical downspouts where the junction line **11** is merely a gradual bending of the lower end of the downspout. Similarly some rectangular downspouts may be formed in a manner so as to eliminate a definitive junction line **11**. Therefore, the terms "rear wall", "bottom wall" and "junction" as used herein shall be understood to include the corresponding surfaces in a cylindrical downspout although in such a downspout the frame touches two portions of the cylinder and is in effect a chord across the lower or rearward most point on the diameter of the cylinder.

Referring to FIGURES 2 and 3, the muffler includes a frame, such as a piece of wire or plastic or wood bent or formed to the shape of a rectangle and providing a pair of parallel, lateral bars **12** and connecting end sections **13**. The frame wire is preferably peripherally continuous; for this purpose, the ends of the wire may be butt welded as shown at **14**. The shape of this frame is such as to adapt it for insertion into the downspout, and may, for example, have a length of 6.12 inches and a width of 2.5 inches. This configuration fits most standard downspouts but other dimensions are also suitable. Two layers **15, 16** of fine-mesh screening materials are secured to the opposite sides of the frame and interconnected by stitches **17, 18, 19** and **20**, perferably all situated outside of the frame. Alternatively, the screen can be fastened to the frame by stapling, heat sealing or other standard techniques and may be fastened interiorly of the outermost portions of the frame.

According to a modified construction, shown in FIGURE 4, the layers **15*a***, **16*a***, are formed of a continuous piece of screening material which is laid about one of the bars **12**, thereby obviating the need for stitching **18** or other securing means along one side of the frame.

The muffler is inserted into the downspout through the angularly related discharge conduit to assume an inclined position as shown in FIGURE 1, with the upper end of the muffler in engagement with the rear wall **5** and its lower end in engagement with the bottom wall **8**; perferably, an intermediate part of the muffler engages the junction **11**. The muffler has a width such as to span substantially all of the flow width of the downspout. The muffler may be secured within the downspout by any suitable means, such as a resilient clamp **21** which engages the bottom of the wall **8** and the top of the muffler screen. It will be understood that other suitable attaching devices, such as an ordinary clothespin, may be substituted. Moreover, the material **25** extending down the sides of

the frame exteriorly thereof will grip by engaging the side walls of the downspout. This engagement serves to insulate the frame from the downspout to prevent the transfer of noise and hold the muffler in the spout.

In operation, water drops falling downwardly along the course indicated by the line **22** strike the screen, which absorbs their kinetic energy by flexing and dispersing the drops into droplets and thereby avoids the noise which would otherwise be caused by striking the water against the wall **8**. It will be understood that such downspouts are commonly made of sheet metal which are readily set into vibrations by water drops. The kinetic energy converted to noise is insulated from the downspout by the screening, which is particularly effective if the frame is held away from the downspout by the portion **25** of the screen extending exteriorly of the frame.

Although various types and sizes of sieve screens are satisfactory, it was found that best results are obtained by using screening material providing small meshes, the minimum dimension of which is between about 0.2 and 0.03 inch; thus, for example, the screen may include strands extending perpendicularly to each other with 8 to 30 strands per linear inch. Preferable screen sizes have been found and are referred to in the trade as 18–14 and 18–16 mesh.

Screens made of metallic material will be effective but will usually not completely eliminate the noise because metal contributes to the noise level itself and transmits the noise to the spout walls. Optimum results are obtained when the strands have at least the outer surfaces formed of plastic material, e.g. such strands may be formed of plastic material or may be plastic-coated fiberglass.

Although a single layer of sieve screening material is effective, better results are obtained when several layers are used. Two layers of relatively spaced screening material was found to give excellent results, and only a marginal improvement occurs when a third layer is added. For this reason, two layers are preferred.

Screening material with such small holes tends to become covered with a film of water because the water is held within each small mesh by the surface tension of the water. Water draining through the vertical section of the downspout onto such a water-logged screen may cause noise. This condition is minimized by positioning the muffler of the present invention in an inclined position in the downspouts whereby collected water runs off. Water logging of the screen further can be corrected by making the screen water-repellant, as by forming it of a suitable plastic which is water repellant or by coating the strands with a water repellant such as wax. The wetting of the screen by water is thereby inhibited and the water penetrates the screen immediately upon contact therewith.

I claim:

1. A muffler attachment for a downspout having an upright conduit joined at the bottom thereof to an angularly related discharge conduit, said muffler comprising a frame which includes a pair of lateral bars and at least one fine-mesh sieve screen, said muffler having a size and outline to be insertable through said discharge conduit for lodgement within the spout in an inclined position with the upper end thereof in engagement with the rear wall of the upright conduit and the lower end thereof in engagement with the rear wall of the upright conduit and the lower end thereof in engagement with the bottom wall of the discharge conduit.

2. A muffler as defined in claim **1** wherein said frame is a peripherally continuous material having a length about twice the width thereof, and said sieve screen includes two layers of screening material extending exteriorly of said frame around the periphery thereof and said material is formed of strands at least the surfaces of which are of plastic material and providing openings the smallest dimensions of which are between about 0.2 and 0.03 inch.

3. A muffler as defined in claim **2** wherein said layers of screening material are situated respectively on opposite sides of said frame and are secured thereto in spaced relation to each other.

4. A muffler as defined in claim **1** wherein said sieve screen is coated with a water repellant.

5. The combination of a downspout having an upright conduit and, at the bottom thereof, a discharge conduit angularly related thereto, and a muffler as defined in claim **1** mounted in said downspout in an inclined position with the ends thereof in engagement with the walls as specified in the said claim.

6. The combination defined in claim **5** wherein said muffler comprises two layers of screening material extending in parallel spaced relation at opposite sides of said frame and extending exteriorly of said frame around the periphery thereof.

7. The combination defined in claim **5** wherein said sieve screen is formed of strands at least the outer surfaces of which are formed of plastic material and providing openings the smallest dimensions of which are between about 0.2 and 0.03 inch.

8. The combination defined in claim **5** wherein said frame is rectangular and includes a continuous wire, said lateral bars being two long sides of said rectangle, and said sieve screen consists of two layers of screening material situated in spaced relation on opposite sides of said frame, and securing means joining said layers outside of said frame.

9. The combination defined in claim **5** wherein said frame is in engagement intermediate its ends with the junction of the front wall of the upright conduit and the top wall of the discharge conduit.

10. The combination defined in claim **5** including, additionally, clamp means acting between the lower end of the muffler and the bottom wall of the discharge conduit for securing the muffler.

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181—36, 56; 239—553.3, 590.3