

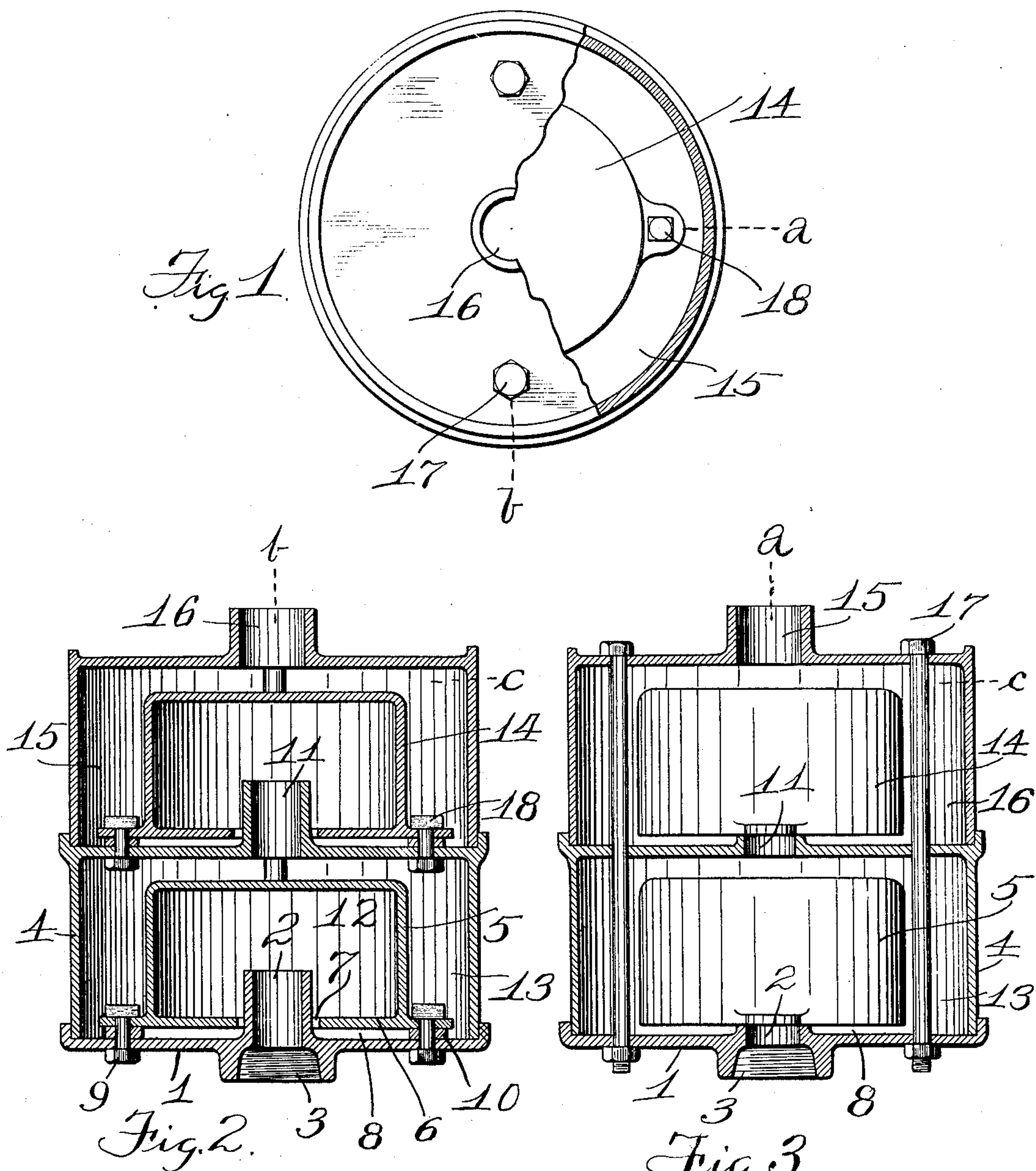
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MUFFLER.

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938,860.

Patented Nov. 2, 1909.



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# UNITED STATES PATENT OFFICE.

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Specification of Letters Patent.

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*To all whom it may concern:*

Be it known that I, GEORGE C. HICKS, JR., a citizen of the United States, residing at Connerville, Fayette county, Indiana, have  
5 invented certain new and useful Improvements in Mufflers, of which the following is a specification.

The present invention relates to sound muffling devices and has been designed with  
10 special reference to deadening the noise from the exhaust of rotary air exhausters employed in connection with vacuum cleaning plants in private residences though, of course, the device is applicable to other situ-  
15 ations.

In connection with the exhaust of rotary blowers it is found that much of the noise is due to the intermittent withdrawal from the atmosphere of air to reënter the apparatus  
20 immediately after the discharge, this reëntering of the air sometimes occurring against a pressure considerably below atmospheric pressure. The present device has been found very efficient.

25 The invention will be readily understood from the following description taken in connection with the accompanying drawing in which:—

Figure 1 is a plan of my improved muffler, parts being broken away and a wall appearing in horizontal section in the plane of line *c* of Figs. 2 and 3: Fig. 2 a vertical diametrical section of the muffler in the plane of line *a* of Figs. 1 and 3: and Fig. 3 a similar section in the plane of line *b* of Figs. 1  
30 and 2.

In the drawing:—1, indicates a disk forming one head of a drum-shaped chamber: 2, a nozzle, but not a restricted nozzle, projecting therefrom: 3, exhaust connection to the  
40 nozzle: 4, the first drum, the same having the base of its peripheral wall resting on disk 1, its top being closed by a head: 5, a second and smaller drum completely inclosed within the first drum, nozzle 2 projecting into the  
45 second drum through an opening in the floor thereof: 6, the floor of the second drum set a slight distance above the floor 1 of the first drum: 7, a narrow annular opening through  
50 the floor of the second drum around the nozzle 2: 8, a narrow space between floor 6 of

the second drum and floor 1 of the first drum, this space being in connection with annular openings 7 and with the annular space within the first drum and surrounding the second  
55 drum: 9, bolts securing the second drum firmly in position in the first drum: 10, washers interposed at bolts 9 between the floors of the first and second drum and serving to maintain the space 8: 11, a nozzle  
60 projecting upwardly from the roof of the first drum: 12, the large chamber formed within the second drum: 13, the large annular chamber formed within the first drum and surrounding the second drum: 14, a  
65 third drum similar to drum 5 and secured to the roof of the first drum at some little distance above the same and having in its own floor an annular opening around the  
nozzle 11: 15, a fourth drum similar to  
70 drum 4 and surmounting the same and surrounding drum 14: 16, a central outlet from the top of the fourth drum: 17, bolts extending through the horizontal walls of the outer drums and securing the drums tightly  
75 together: and 18, bolts, arranged similarly to bolts 9, and securing the third drum to the roof of the first drum.

Disregarding for the present the entire upper drum structure, passages 7 and 8,  
80 while in a sense restricted, should not be less in area than nozzle 2. The fluid under pressure enters the apparatus at nozzle 2 and fills chamber 12 and passes through passages 7 and 8 to annular chamber 13 and thence  
85 out at nozzle 11, the fluid thus proceeding under pressure of the exhaust of the apparatus with which the muffler may be connected. When the pressure of the fluid coming to the apparatus falls to a sufficiently  
90 low point then there is a regurgitation of fluid from the muffler back to the apparatus and this demand for fluid is satisfied, or satisfactorily satisfied by expansion of the fluid in chamber 12. However, along with this  
95 expansion of the fluid in chamber 12 there is likely to be some inflow through the restricted passages 7 and 8, this inflow coming from comparatively large chamber 13 which latter  
permits of some expansion of fluid in satis-  
100 fying the draft upon it. With very rapid alternations of high and low pressure at the



exhaust of the apparatus supplying the muffler, there is a restricted flow in both directions through passages 7 and 8, the fluctuations being largely satisfied by expansion of the fluid in chambers 12 and 13, the result being an outflow, at comparatively steady pressure, from nozzle 11. The upper portion of the apparatus, comprising drums 14 and 15, is practically a duplication of the lower portion, and such fluctuations in fluid pressure as may occur at the discharge from nozzle 11 are equalized by expansion in the two upper drums. The upper portion of the structure is thus cumulative of the equalizing effect of the lower portion, and it is manifest that if the fluctuations of the fluid pressure are of extreme violence, the system may be carried further by the addition of drums to the series.

20 The muffler is of a very simple and economical construction, and in practice it is found very efficient.

I claim:—

1. A muffler comprising, a first drum having an inlet nozzle from one of its flat walls and an outlet through its opposite flat wall, and a second drum entirely inclosed within the first drum and having one of its flat walls provided with a restricted annular opening surrounding said nozzle and having said flat wall disposed a restricted distance from the nozzle-provided wall of the first drum, combined substantially as set forth.

2. A muffler comprising, a first drum having an inlet nozzle from one of its flat walls and an outlet through its opposite flat wall, a second drum entirely inclosed within the first drum and having one of its flat walls provided with a restricted annular opening surrounding said nozzle and having said flat wall disposed a restricted distance from the nozzle-provided wall of the first drum, a nozzle projecting from the outlet of the first drum, a third drum having one of its flat walls provided with a restricted annular opening surrounding the last-mentioned nozzle and having said flat wall disposed a restricted distance from the outlet-nozzle-carrying wall of the first drum, and a fourth drum secured to the first drum and completely inclosing the third drum and provided with an outlet, combined substantially as set forth.

3. A muffler comprising, a first drum having an outlet through one of its flat walls, a separable flat opposite wall for said drum provided with an inlet nozzle, bolts securing said separable wall to the remainder of the drum, a second drum inclosed within the first drum and having one of its flat walls provided with a restricted annular opening surrounding said nozzle and having said flat wall disposed a restricted distance from the nozzle-provided wall of the first drum,

and bolts securing the second drum fixedly in the first drum, combined substantially as set forth.

4. A muffler comprising, a disk having an inlet nozzle, a first drum having one end closed by said disk and having its opposite flat wall provided with a nozzle, a fourth drum having one end closed by a flat wall provided with an outlet and having its opposite end closed by one of the flat walls of the first drum, a pair of bolts passing through said drums parallel with their common axis and serving to secure the two drums firmly together, a second drum disposed within the first drum and having one of its flat walls provided with a restricted annular opening surrounding the inlet-nozzle and having said flat wall disposed a restricted distance from said disk, bolts securing the second drum to said disk, a third drum disposed within the fourth drum and having in one of its flat walls a restricted opening around the outlet nozzle from the first drum and having said wall disposed a restricted distance from the outlet-provided wall of the first drum, and bolts securing the third drum to the outlet-provided wall of the first drum, combined substantially as set forth.

5. A muffler comprising a first drum having flat side walls with an inlet nozzle in one of said walls and an outlet nozzle in the other of said walls, and a second drum entirely inclosed within the first drum, said second drum being entirely closed except for an opening in one of its side walls and disposed within the first drum with the opening surrounding the inlet nozzle and the wall provided with the opening arranged in close relation to the wall carrying the inlet nozzle.

6. A muffler comprising a first drum having an inlet nozzle on one of the flat walls thereof and an outlet in the opposite flat wall, a second drum entirely inclosed within the first drum and having an opening in the bottom thereof of larger size than the nozzle so as to provide an annular space between the nozzle and the edge of the opening, the bottom wall of the second drum being spaced from the wall of the first drum to provide a continuous passage from the annular space aforesaid, and the top of the second drum being spaced from the opposite wall of the first drum to provide an escape passage to the outlet of the first drum.

7. A muffler comprising a first drum having an inlet nozzle on one of the flat walls thereof and an outlet passage on the opposite flat wall, a second drum entirely inclosed within the first drum having an opening in the bottom thereof of larger size than the nozzle to provide a restricted annular space between the nozzle and the edge of the

opening, the bottom wall of the second drum  
being spaced from the wall of the first drum  
to provide a continuous passage from the  
annular space aforesaid, a third drum hav-  
5 ing one of its flat walls provided with an  
opening surrounding the outlet nozzle and  
said wall being spaced from the outlet noz-

zle-carrying wall of the first drum, and a  
fourth drum completely surrounding the  
third drum and provided with an outlet.

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