T. J. KEHOE.

EXHAUST MUFFLER.

APPLICATION FILED SEPT. 12, 1914.

1,157,005.

Patented Oct. 19, 1915.

2 SHEETS—SHEET 1.

Fig. 1.

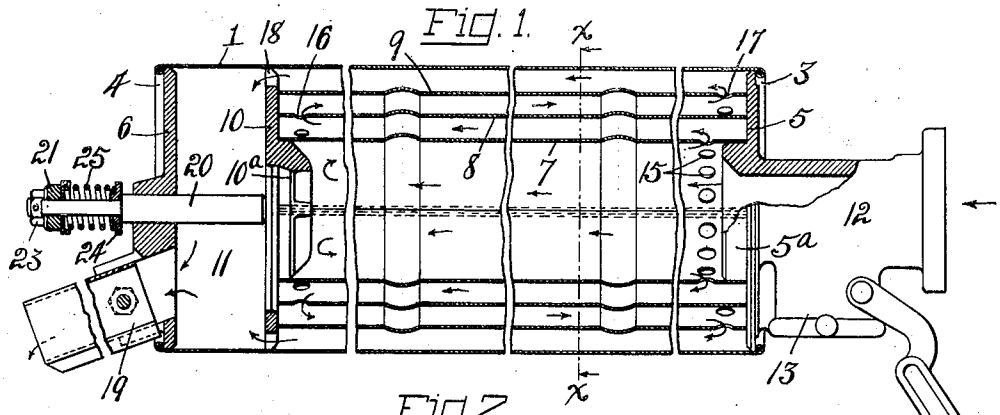


Fig. 2.

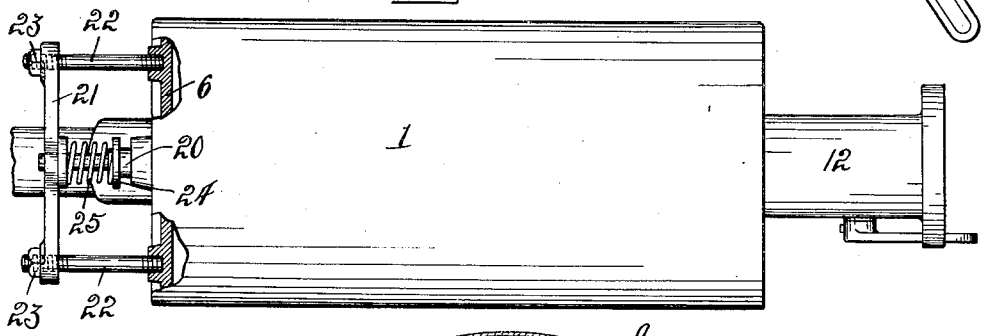
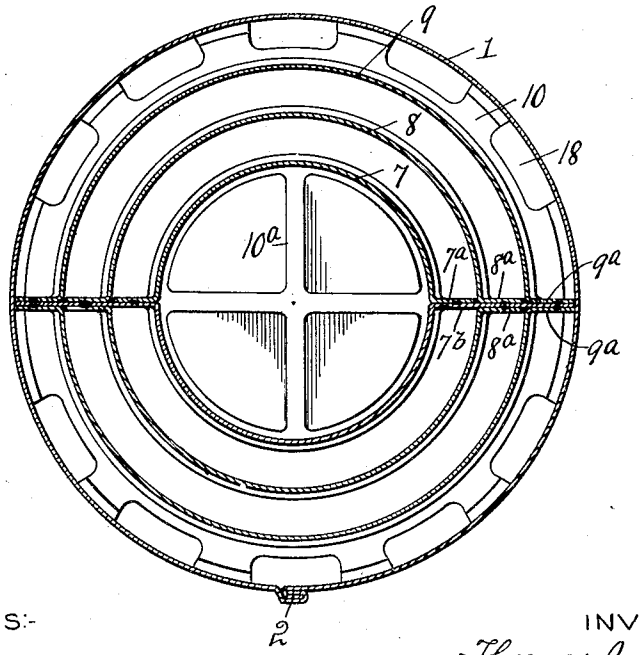


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 4.

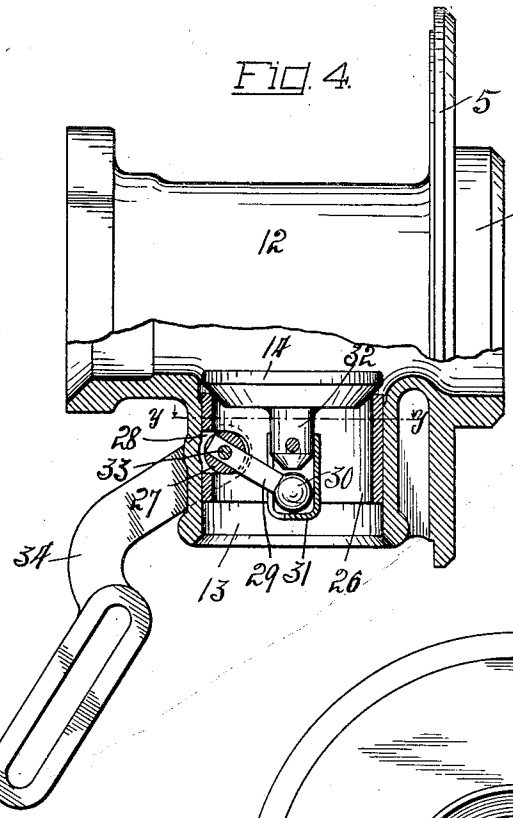


Fig. 5.

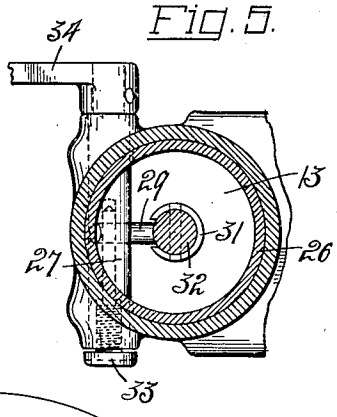
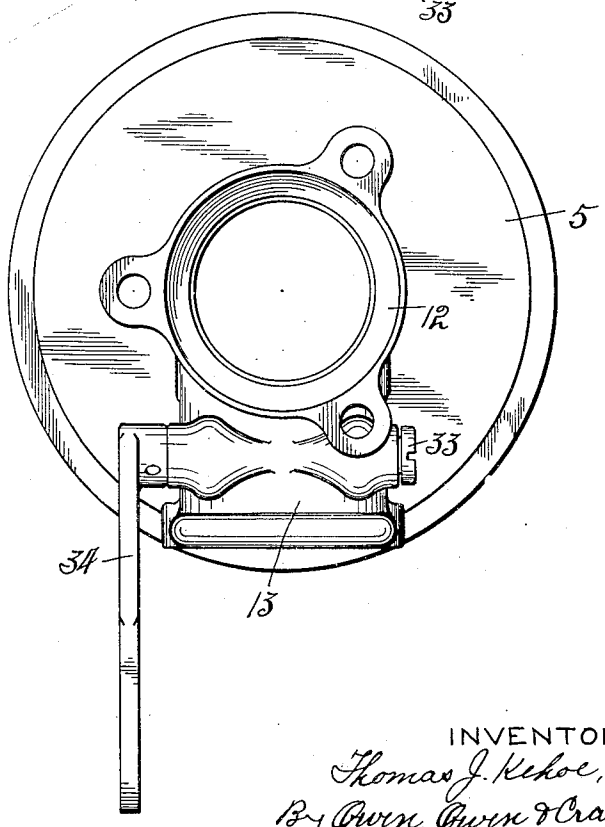


Fig. 6.



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UNITED STATES PATENT OFFICE.

THOMAS J. KEHOE, OF TOLEDO, OHIO.

EXHAUST-MUFFLER.

1,157,005. Specification of Letters Patent. Patented Oct. 19, 1915.

Application filed September 12, 1914. Serial No. 861,396.

To all whom it may concern:

Be it known that I, THOMAS J. KEHOE, a citizen of the United States, and a resident of Toledo, in the county of Lucas and State of Ohio, have invented a certain new and useful Exhaust-Muffler; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention relates particularly to muffling or silencing devices for discharging exhaust gases of internal combustion engines, but is not restricted to such use as it may be used in any connection for which it may be adapted or appropriate.

The primary object of my invention is the provision of a muffler of this character which will allow for the contraction and expansion of the parts thereof under changing temperature conditions without loosening or permitting a rattling of the parts, thus obviating a feature which has been very objectionable in devices of this character and enhancing the commercial value of such devices.

A further object of the invention is the provision of a device of this character which is simple and inexpensive in its construction, and capable of having all the parts thereof easily and quickly assembled in a secure manner.

Further objects will be apparent from the following detailed description.

The invention is fully described in the following specification, and while, in its broader aspect, it is capable of embodiment in numerous forms, a preferred embodiment thereof is illustrated in the accompanying drawings, in which,—

Figure 1 is a sectional view of a muffler embodying my invention with parts in full. Fig. 2 is a side elevation thereof with parts broken away. Fig. 3 is an enlarged cross-section thereof taken on the line x, x in Fig. 1. Fig. 4 is an enlarged side elevation of the inlet nipple portion of the muffler with a part in section, and the cut-out valve closed. Fig. 5 is a section on the line y, y in Fig. 4, and Fig. 6 is an outer end elevation of said inlet nipple portion.

Referring to the drawings, 1 designates the outer body drum of the muffler, which is preferably composed of sheet metal, the edges of which are secured together in any suitable manner, as at 2, and has its end edges inwardly rolled to form internal shoulders 3 and 4. The ends of the drum are closed by end members 5 and 6, which are located at the inner sides of the shoulders 3 and 4, respectively, and are held in outward thrust contact therewith, as hereinafter described.

Located within the drum 1 in spaced relation thereto and to each other are a plurality of concentrically arranged drums, which, in the present instance, are three in number, and designated 7, 8 and 9. Each of the drums 7, 8 and 9 is preferably made in two semi-circular sections or halves, each of which has its side edges outwardly flanged and secured in flat abutting relation to the adjacent flange of the other section by spot welding or in any other suitable manner, as shown in Fig. 3. The flanges of the inner drum are designated 7^a for one section and 7^b for the other, and one flange, 7^b, in the present instance, is made of sufficient length to have contact at its outer edge with the inner surface of the body drum 1. The other flange 7^a is of a length substantially equal to the space between the two drums 7 and 8.

The sections of the drum 8 are provided at their edges with outwardly projecting flanges 8^a of equal length which are secured in opposing relation by spot welding, or in any other suitable manner, to the flange 7^b of the inner drum. The flanges 8^a are substantially equal in length radially of the drum to the space intermediate the drums 8 and 9. The outer drum 9 of the set has its sections provided at the edges thereof with outwardly projecting flanges 9^a, which are substantially equal in length to the space between the drums 1 and 9, and are secured, by electric welding or in any other suitable manner, in opposing relation to the flange 7^b.

It is apparent that the construction and interconnecting of the several drums 7, 8 and 9 in this manner retains the same in rigid spaced relation and also provides a means for securely centering the interior drums within the body drum 1. The lengths of the flange 7^a of the inner drum and the flanges 8^a and 9^a of the drums 8 and 9 may also serve to determine the relative spacing

of the drums and thus facilitate an assembling of the parts.

The drums 7, 8 and 9 are shorter than the body drum 1 and abut at one end against the end member 5 and at the other end against an interior partition or supplemental end member 10, which latter fits closely within the body drum 1 in spaced relation to the end member 6 to provide an expansion chamber 11 for the gases between the members 6 and 10. Each of the members 5 and 10 is provided at its inner side relative to the drums 7, 8 and 9 with an annular shoulder or protuberant part 5^a and 10^a, respectively, which is concentric to and fits closely into the respective ends of the inner drum 7 to firmly support the same relative to said end members. An inlet nipple 12 for the exhaust gases projects centrally from the end plate or member 5 and opens into the interior of the drum 7 through the shoulder or protuberant part 5^a. The nipple 12 is provided at one side with an outlet 13 leading directly to the atmosphere, and a cut-out valve 14 is disposed within this passage and controlled from any convenient point, as is well understood in the art.

The gases which enter the interior of the drum 7 pass therefrom into the space between the drums 7 and 8 through openings 15 provided in the inlet end portion of the drum 7, thence pass from said space into the space between the drums 8 and 9 through a series of openings 16 provided in the forward end portion of the drum 8. The gases thence pass rearward through the space between the drums 8 and 9 and thence into the space between the drums 1 and 9 through a series of openings 17 in the rear end of the drum 9 after which the gases have their exit into the expansion chamber 11 through a series of openings 18 provided in the partition member 10 around the edge portion thereof. The gas passes to the atmosphere from the chamber 11 through an outlet passage 19. It is thus evident that the exhaust gases have a backward and forward passage through the muffler and will have become expanded to very nearly their maximum extent when discharged to the atmosphere.

The partition member 10 is retained in end thrust contact with the drums 7, 8 and 9 by a thrust-rod 20, which projects into the chamber 11 axially thereof through a bearing opening in the central portion of the end plate 6 and has its inner end thrust against the partition member 10. The thrust-rod 20 is mounted for free longitudinal movements in the end plate 6 and has its outer end portion reduced, in the present instance, and projected loosely through a cross-bar 21, which is anchored at its ends to the end plate 6 in spaced relation thereto by bolt members 22—22, which members are shown as having their inner ends threaded into registering sockets in the end plate and their outer ends threaded and provided with nuts 23, which nuts resist an outward movement of the bar 21. The thrust rod 20 is provided between the end plate 6 and cross-bar 21 with a shoulder or collar 24, and interposed between this and the cross-arm 21 is a coiled compression spring 25, which yieldingly resists an outward movement of the thrust-rod 20 relative to the end plate 6. The tension of the spring 25 can be varied by an adjusting of the nuts 23 on the bolts 20 to move the cross-bar 21 inward or outward relative to the end plate 6. The yielding thrust of the rod 20 against the partition member 10 serves to retain the muffler parts in removable relation and at the same time permits an expansion of the parts when heated, and compensates for any contraction thereof when cooled, thus being automatically operable to retain the parts in closely assembled relation under all temperature conditions and preventing any rattling thereof. The outward pull of the bolts 22 on the end plate 6 retains such plate in close outward thrust contact with the outer drum shoulder 4.

My improved muffler provides a very simple and inexpensive assembling proposition as the parts are all made separately and then assembled and no machine work is required during or after the assembling. In assembling the parts, the end member 5 is first placed in one end of the drum 1 by a compressing of the drum to broaden the end opening thereof. The drums 7, 8 and 9 in their assembled form are then dropped into the drum 1 from the other end thereof against the end member 5, after which the intermediate member 10 and the end member 6 are positioned within the outer drum. This having been done the thrust rod 20 and the associated parts are properly positioned and tightened to secure the parts in assembled relation.

The cut-out valve 14 is preferably of the puppet type and seats outwardly against the inner end of a sleeve or bushing 26 that is mounted within the outlet passage 13 of the inlet nipple. A control shaft 27 for the valve 14 is journaled in a bearing provided in a side portion of the part 13 and is disposed in transverse relation to the bushing 26, being projected through an opening or cut-away portion 28 in one side thereof. An arm 29 projects radially from the shaft 27 interiorly of the bushing 26 and is provided at its outer end with a spherical enlargement 30, which fits into a socket part 31 that is attached to the outer end of the valve 32. In the present instance, the inner end of the arm 29 is projected into an opening provided diametrically through the shaft 27, and is secured therein by a screw

33, which is threaded into the shaft 27 axially thereof. The head of the screw 33 coacts with one end of the shaft bearing to limit the movement of the shaft in one direction therein while the crank-arm 34 on the other end of the shaft coacts with its bearing to limit the movement of the shaft in the opposite direction. The crank-arm 34 is connected in any suitable manner to a control mechanism, as is well understood in the art. This manner of mounting and operating the cut-out valve provides a very simple and practical assembling proposition, and also obviates the use of the butterfly valve which is customarily employed in muffler cut-outs and which is not as satisfactory as the form of valve herein shown. With this arrangement the sleeve or bushing 26, together with the valve, can be easily and quickly removed from the passage 13 by unscrewing the screw 33 and removing the shaft 27 from its bearing. Said sleeve and valve can then be cleaned or replaced as desired. It is evident that a considerable opening of the valve 14 may be obtained by a limited movement of the crank-arm 34 so that a practically unobstructed passage of the exhaust gases through the outlet passage 13 may be obtained.

I wish it understood that my invention is not limited to any specific construction, arrangement or form of the parts except in so far as such limitations are specified in the claims.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is,—

1. In a muffler, a plurality of drum-like baffling elements arranged one within another and having radially projecting integral interengaging portions which rigidly connect said elements.

2. In a muffler, a plurality of drum-like baffling elements having integral interengaging flange-like parts disposed diametrically thereof and rigidly connecting the elements.

3. In a muffler, a plurality of drum-like baffling elements disposed one within another in spaced relation and each having flanges projecting radially therefrom with a flange of one secured to and coöperating with the flanges of the other elements to rigidly connect said elements.

4. In a muffler, a plurality of drum-like baffling elements disposed one within another and each having a pair of longitudinally extending flanges projecting from opposite sides thereof and coöperating to interconnect the elements in rigid spaced relation.

5. In a muffler, a plurality of drum-like baffling elements disposed one within another and each composed of semi-circular parts having their adjoining edges outwardly flanged with one flange at each side of the inner element extended outwardly between the adjacent flanges of the other elements and coöperating therewith to secure the elements in rigid spaced relation.

6. In a muffler, a plurality of drum-like baffling elements disposed in spaced relation one within another and each having flanges projecting from opposite sides thereof which coöperate to rigidly secure the elements together in spaced relation and serve to determine the spacing of the elements.

7. In a muffler, a plurality of drum-like elements disposed one within another in spaced relation and each having flanges projecting radially therefrom and coöperating to secure the elements together in rigid spaced relation, and an outer drum embracing said elements and spaced therefrom by a portion of said flanges.

8. In a muffler, a plurality of drum-like baffling elements disposed one within another and rigidly secured together in spaced relation, end members in abutment with the ends of said elements and coöperating therewith to form a circuitous passage, and means for securing said elements and end members in assembled relation.

9. In a muffler, a plurality of drum-like baffling elements disposed one within another and secured together in rigid spaced relation, end members forming abutments for the respective ends of said elements, and an outer drum embracing said end members and elements and coöperating therewith to form a circuitous passage.

10. In a muffler, an outer drum, cross-members in said drum, a plurality of drum-like baffling elements disposed one within another within said drum and between said members to coöperate with said drum and members to form a circuitous passage, and means radially disposed with reference to said elements and rigidly connecting said elements and spacing the same from said drum.

11. In a muffler, a drum, a plurality of drum like parts assembled within the drum and coöperating therewith and with each other to form a circuitous passage, and adjustable means for securing said parts in assembled relation within the drum, said means being yieldable in its nature to allow for expansion and to compensate for contraction.

12. In a muffler, a drum, end members in said drum, means disposed between said end members and coöperating therewith and with the drum to form a circuitous passage, and thrust means coöperating with one of said end members without the same to retain said means, drum and end members in yieldingly assembled relation.

13. In a muffler, an outer drum having inwardly shouldered end portions, end mem-

bers disposed within the drum and bearing outwardly against the end shoulders thereof, a plurality of baffling drums disposed one within another within said outer drum and having abutment at one end against one of said end members, a supplemental end member disposed within the outer drum and having end thrust contact with the other ends of said baffling drums, a thrust rod movably projected through one of said end members and in thrust contact with said supplemental member, and means yieldingly urging an inward movement of said thrust rod against said supplemental member and coöperating with the thrust rod to secure the muffler parts in yielding assembled relation.

14. In a muffler, an outer drum, a plurality of parts loosely assembled within said drum and coöperating therewith to form a circuitous passage, a thrust rod loosely projected through one and against another of said parts, and means yieldingly connecting said thrust rod to the part through which it is projected and urging the thrust rod against said other part and coöperating with the thrust rod to secure the several parts in yielding assembled relation within the drum.

15. In a muffler, an outer drum having inwardly shouldered ends, and a plurality of plates disposed within said drum with the two outer plates in outward end thrust contact with the respective inturned shoulders of the drum, a plurality of spaced interior drums supported by two of said plates and coöperating therewith and with the outer drum to form a circuitous passage, and means coöperating with another of said plates to adjustably retain the said interior drums and plates in predetermined assembled relation to the outer drum.

16. In a muffler, an outer drum having internal end thrust portions, a plate disposed within each end portion of the drum in outward thrust contact with the respective one of said thrust portions, a plurality of spaced concentrically arranged internal drums, an intermediate plate coöperating with one of said end plates to support the interior drums in proper spaced relation, said interior drums and the plates supporting the same coöperating to form a circuitous passage in communication at one end with the plates between the interior plate and the adjacent end plate, and said latter end plate having a passage to the atmosphere, and adjustable means for retaining the end plates in outward thrust contact with the respective thrust portions of the drum and for retaining the interior drum and plates connecting therewith in assembled relation to the outer drum.

In testimony whereof, I have hereunto signed my name to this specification in the presence of two subscribing witnesses.

THOMAS J. KEHOE.

Witnesses:
F. E. AUL,
M. H. MAYERS.