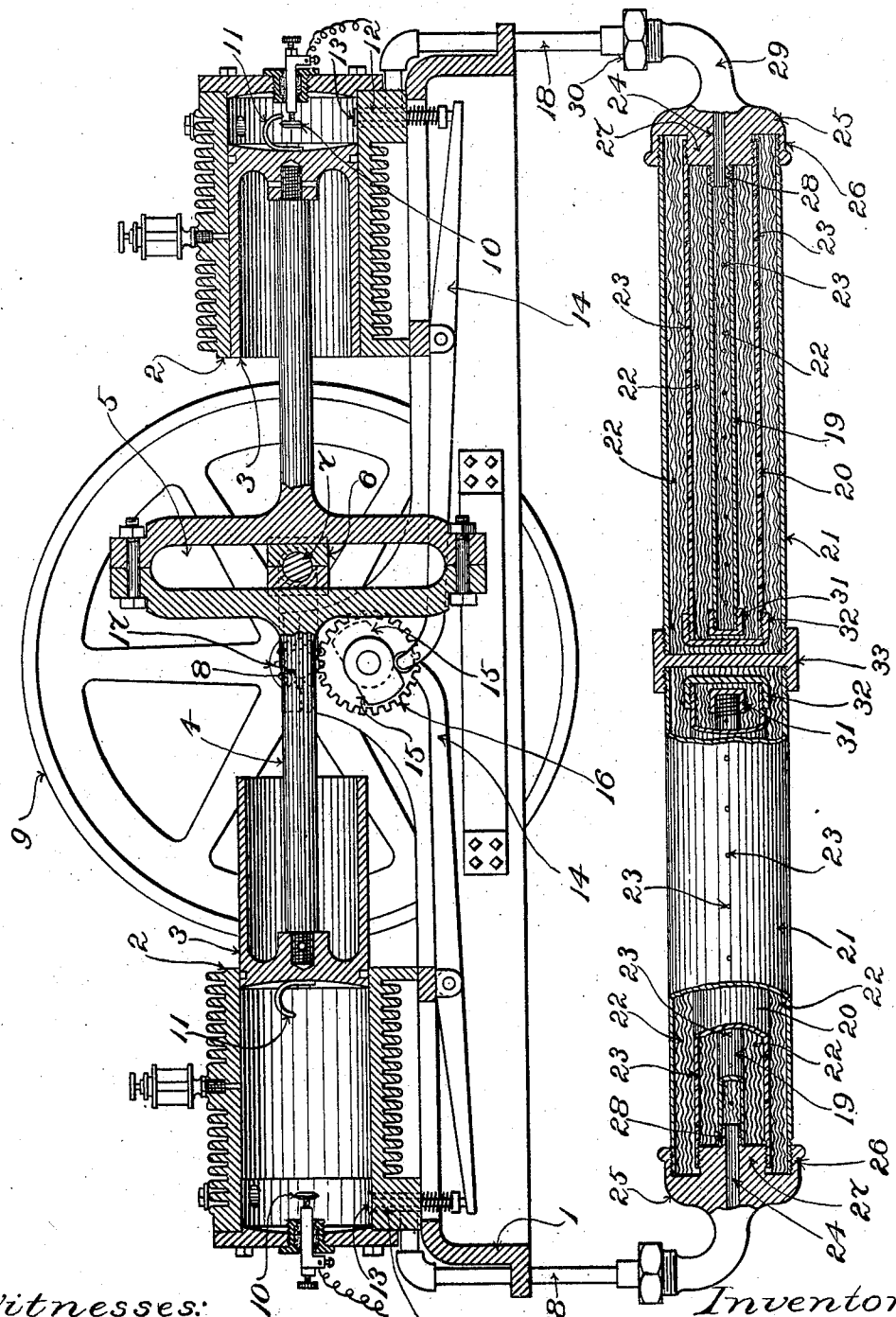
No. 692,211. Patented Jan. 28, 1902.

G. L. REENSTIERNA.

MUFFLER FOR GASOLENE ENGINES.

(Application filed Mar. 21, 1900.)

(No Model.)



Witnesses:
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UNITED STATES PATENT OFFICE.

GUSTAF L. REENSTIERNA, OF WINCHESTER, MASSACHUSETTS.

MUFFLER FOR GASOLENE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 692,211, dated January 28, 1902.

Application filed March 21, 1900. Serial No. 9,525. (No model.)

To all whom it may concern:

Be it known that I, GUSTAF L. REENSTIERNA, a citizen of the United States, residing at Winchester, in the county of Middlesex, State of Massachusetts, have invented a certain new and useful Improvement in Mufflers for Gasolene-Engines, of which the following is a specification, reference being had therein to the accompanying drawing.

The object of the invention is to provide means for preventing the noise which usually is manifest in connection with the exhaust of gasolene and other explosive or internal-combustion engines.

The invention consists in the improved means of preventing noise in connection with the exhaust of engines such as aforesaid, and which means I will now proceed to describe with the aid of the accompanying drawing.

In the said drawing I have illustrated the best embodiment of the invention which I have thus far contrived.

The drawing shows, partly in vertical section, a portion of a gasolene-engine having the said embodiment of the invention applied thereto.

Such features of the engine as are shown in the drawing are substantially the same as the corresponding ones in my application for United States Letters Patent filed November 2, 1899, Serial No. 735,582. The invention itself, however, is not necessarily restricted to use with any particular construction of engine.

The particular engine in connection with which I have illustrated an embodiment of the present invention is provided with a suitable bed, as 1, and the two cylinders, as 2 2, on the said bed in line with each other.

3 3 designate trunk-pistons working in the said cylinders 2 2, and 4 is a piston-rod having its opposite extremities connected with the respective pistons, the said piston-rod being formed with a vertically-extending yoke, in the slot 5 of which works the cross-head 6 on the crank 7 of the crank-shaft 8. The said crank-shaft is shown in dotted lines and carries the balance-wheel 9.

Electrical firing or spark-producing devices of the character of those presented in my application aforesaid for United States Letters Patent filed November 2, 1899, are shown in the accompanying drawing, and comprise, essentially, the disk-like terminal 10, supported in convenient manner by the fixed head of each cylinder 2, and the bent yielding terminal 11, carried by and moving with the trunk-piston 3 within the cylinder. As will be understood, the movement of the piston causes its terminal 11 to make contact with the stationary terminal 10, with resulting production of the spark. The exhaust-ports of the cylinders are supposed to be shown at 12 12, being indicated in dotted lines, and 13 13 designate the valves controlling the said ports. The said valves are operated by means of levers 14 14, which last are operated by means of cams 15 15, the said cams being connected with the gear 16 to turn in unison with the latter, and the said gear being driven by means of the pinion 17 on the crank-shaft 8.

The parts which have been referred to thus far have been described in order to make clear the relations, &c., of the invention. It is to be understood that the said parts, together with the other necessary parts and adjuncts (not shown) of an engine, may be of any suitable or preferred character, construction, and arrangement in practice.

18 18 designate pipes communicating with the exhaust-ports 12 12 and serving to lead away the exhaust from the two cylinders. These pipes communicate with the muffling device, in which the invention more immediately resides. In the present instance the muffling device is made double to correspond with the construction of the engine.

The muffling device comprises, essentially, concentric shells 19, 20, and 21, each perforated, as presently will be explained, and reticulated material—*i. e.*, layers of wire-netting 22 22 22—occupying the interior of the central shell 19 and the spaces intermediate the successive shells and concentric, or substantially so, with the shells between which such layers intervene. The arrangement of shells and wire-netting is clearly illustrated by the sectional representation in the drawing. The perforations of the respective shells are designated 23 23. The perforations of the innermost shell being arranged in a given position,

those of the next outer shell are disposed part way around, so as to stand out of line with the said perforations of the innermost shell or to break joint therewith, while those of the next outer shell in turn are similarly positioned or set. I find in practice that the muffler is most effective for reducing the noises of the exhaust when each perforation of the innermost shell or of the next outer shell is substantially equidistant from each of the group of perforations nearest to it in the next outermost shell—that is to say, a perforation in the innermost shell should preferably be so located that the exhaust passing through it will strike the middle or next outermost shell midway between the perforations in said latter shell, and the same is true of the arrangement of each perforation in the said middle or next outermost shell.

The various shells are closed at their ends in a manner as presently will be described, with the exception that a passage for the exhaust communicates with one end of the central shell. This passage is designated 24, and through the same the exhaust passes from the pipe 18 into the interior of the central shell 19. The exhaust fills the said central space, it going through the holes 23 of the central shell into the space intermediate the latter and the next inclosing shell, finding its way in turn through the holes of the latter, and finally issuing through the holes of the outermost shell.

The shells 19, 20, and 21 preferably are composed of pipes of the various diameters which are required, and the closing of the ends thereof is effected by means of caps or equivalent devices having screw-threaded portions, which are caused to become engaged with correspondingly-threaded portions of the said shells. A convenient form of cap which may be employed at one end of the series of shells is indicated at 25. It is formed with an internally-threaded flange 26, a hub 27 inside the said flange and exteriorly threaded, and a nipple 28 on the said hub, the said nipple being exteriorly threaded. One end of the pipe or shell 19 is screwed onto the said nipple 28, one end of the pipe or shell 20 being screwed onto the hub 27 and one end of the pipe or shell 21 being screwed inside the flange 26. Cap 25 has a prolongation 29, to which is connected, by means of a union 30, one end of the exhaust-pipe 18. The opposite end of the pipe or shell 19 is closed by a cap 31, that of the pipe or shell 20 being closed by the cap 32, while the corresponding end of the pipe or shell 21 is closed by a device 33. In the present instance I have illustrated the invention in the form which is suitable for use in connection with an engine having opposite cylinders 2 2 in line with each other, and thus I have shown two sets of the said pipes or shells 19 20 21 arranged and combined in the manner already explained, one set for each cylinder, the device 33 being arranged to connect with the outermost pipes or shells 21 21 or both sets. The device 33 may be termed for convenience of designation a "double cap." In the illustrated embodiment of the invention the double muffling device is arranged below the bed 1 of the engine and parallel with the axes of the two cylinders. This arrangement is adopted for convenience.

It will be obvious that various modifications may be made in the form, construction, and arrangement of the parts without involving a departure from the principle of the invention.

What I claim is—

1. The improved muffling device comprising successive chambers communicating with one another through holes out of line or breaking joint in the successive separating media, woven-wire fabric filling the respective chambers, and means to lead the exhaust into the first chamber of the series, substantially as described.

2. The improved muffling device for gasolene-engines and the like, comprising concentric shells having holes therethrough at different sides thereof to break joints, as set forth, concentric layers of reticulated material filling the spaces of the said shells, and means to lead the exhaust into the central shell, substantially as described.

3. The improved muffling device for gasolene-engines and the like, comprising concentric shells having holes therethrough, concentric layers of reticulated material filling the spaces of the said shells, caps closing the ends of said shells, and a passage leading into one end of the central shell, the exhaust escaping through the holes of the exterior shell, substantially as described.

4. In combination, the cylinder of a gasolene-engine or the like, a set of concentric shells having holes therethrough and closed ends, concentric layers of reticulated material filling the spaces of the said shells, and means to lead the exhaust from the cylinder into one end of the central shell, the said exhaust escaping through the holes of the exterior shell, substantially as described.

5. The improved muffling device for gasolene-engines and the like, comprising concentric shells having holes therethrough, each hole in each of the inner shells being opposite the center of a space between the nearest holes in the next outermost shell, concentric layers of reticulated material filling the spaces of the said shells, caps closing the ends of said shells, and a passage leading into one end of the central shell, the said exhaust escaping through the holes of the exterior shell, substantially as described.

6. In combination, the two engine-cylinders, two sets of concentric shells in which each shell has holes therethrough and wire filling occupying the spaces within the said shells, the double cap connecting and closing the

proximate ends of the outer shells of the two sets, means to close the other ends of the respective shells, and means to lead the exhaust from the respective cylinders into the central shells of the respective sets, the said exhaust escaping through the holes of the exterior shell, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

GUSTAF L. REENSTIERNA.

Witnesses:
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