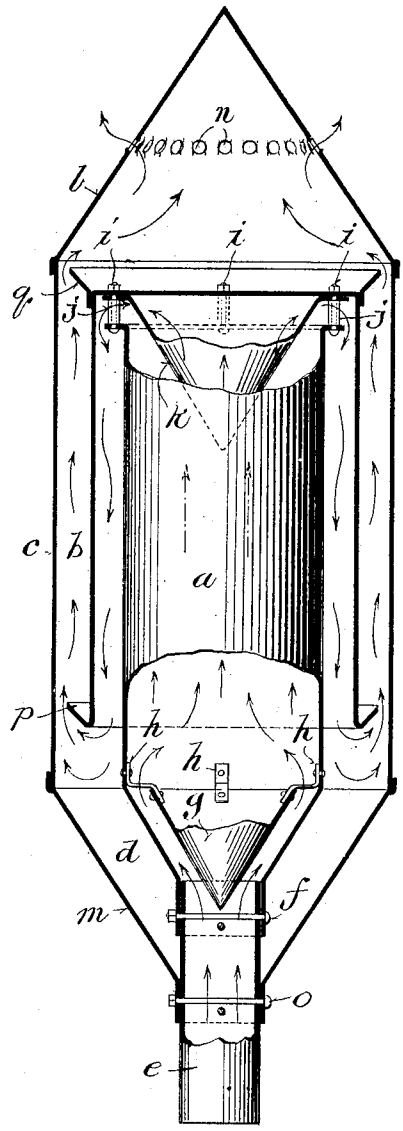
No. 750,011. PATENTED JAN. 19, 1904.

T. J. WILLIS & G. ANDRICHT.

EXHAUST MUFFLER.

APPLICATION FILED OCT. 27, 1902.

NO MODEL.



Witnesses:
Geo. W. Young.
Chas. L. Goss.

Inventors:
Thomas J. Willis,
George Andricht,

By Winkler Flanders Smith Bottum & Vilas,
Attorneys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 750,011. Patented January 19, 1904.

UNITED STATES PATENT OFFICE.

THOMAS J. WILLIS AND GEORGE ANDRICHT, OF MILWAUKEE, WISCONSIN; SAID ANDRICHT ASSIGNOR TO SAID WILLIS.

EXHAUST-MUFFLER.

SPECIFICATION forming part of Letters Patent No. 750,011, dated January 19, 1904.

Application filed October 27, 1902. Serial No. 128,864. (No model.)

To all whom it may concern:

Be it known that we, THOMAS J. WILLIS and GEORGE ANDRICHT, citizens of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Exhaust-Mufflers, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

The main objects of this invention are to prevent or reduce the noise produced by the escape into the atmosphere of the exhaust from engines, and generally to improve the construction and operation of devices for this purpose.

It consists in certain novel features of construction and in the peculiar arrangement and combinations of parts hereinafter particularly described, and pointed out in the claims.

The accompanying drawing is a longitudinal section of an exhaust-muffler embodying our invention.

The muffler consists generally of three cylinders or shells *a*, *b*, and *c*, arranged coaxially one within another. These shells may be made of sheet metal, as shown, or they may be cast or made partly of castings and partly of sheet metal.

The inner shell *a* is open at one end and at the opposite end has a conical or tapering head or reducing-ring *d*, by which it is attached to the exhaust-pipe *e* by bolts *f* or other means.

g is a conical deflector supported at the base by brackets *h* in the end of shell *a* next to the exhaust-pipe *e*, with its walls parallel with the tapering head or reducing-ring *d* and its apex projecting into said exhaust-pipe.

The shell *b* surrounds the shell *a* and has a closed end or head adjacent to the open end of the shell *a*. It is attached to the inner shell and held in the proper relation thereto by stay-bolts *i* passing through the head of shell *b* and an outturned flange on the open end of shell *a* and by tubes *j*, placed on said bolts between said head and flange.

k is a conical deflector attached at its base to the head of shell *b* and extending therefrom into the open end of shell *a*.

The outer shell *c*, which incloses the other two shells, has conical or tapering heads *l* and *m*. The head *l* is formed with a series of openings *n*, and the head *m* is fitted upon and attached to the exhaust-pipe *e* by bolts *o* or other means. The intermediate shell *b* is preferably formed or provided at the ends with inclined flanges *p* and *q*, extending outwardly therefrom toward the outer shell *c* and its head *l*.

The muffler operates as follows: The exhaust-steam or spent gas from the engine enters the muffler through the pipe *e* at the closed end of the inner shell *a* and is directed by the deflector *g* outwardly in all directions against the wall of said shell, which tends to condense it. Deflected outwardly by the deflector *k* through the open end of the inner shell *a* the steam or gas passes in a reverse direction through the annular space between said shell and the intermediate shell *b*, as indicated by arrows. From this space it passes in a reverse direction into and through the annular space between the intermediate shell *b* and the outer shell *c*, from which it escapes into the atmosphere through the openings *n*. Being brought successively into contact with the extended surfaces of the shells *a*, *b*, and *c*, the exhaust-steam or gas is rapidly cooled and condensed, so that when it issues from the muffler it has little pressure, and consequently produces little or no noise.

The flanges *p* and *q* on the intermediate shell and the conical deflectors *g* and *k* tend to prevent reverse currents in the muffler and to reduce back pressure in the exhaust-pipe.

Various changes in minor details of construction may be made without departing from the principle and intended scope of the invention.

We claim—

1. An exhaust-muffler consisting of three shells arranged coaxially one within another and having inlet and outlet openings alternately at opposite ends, the inner shell being

attached at one end to and communicating with the exhaust-pipe around which it is closed, and a conical deflector arranged in the inlet end of the inner shell with its apex projecting into the exhaust-pipe, substantially as described.

2. An exhaust-muffler consisting of an inner shell open at one end and having a tapering head attached to and closing it around the exhaust-pipe at the other end, an intermediate shell surrounding the inner shell and having one end open and the other end adjacent to the open end of the inner shell closed, and an outer shell inclosing the inner and intermediate shells, open to the atmosphere at the end adjacent to the closed end of the intermediate shell and closed at the other end, substantially as described.

3. An exhaust-muffler consisting of an inner shell open at one end and tapered at the other end, which is attached to and closed around the exhaust-pipe, an intermediate shell surrounding the inner shell and having a closed end adjacent to the open end of the inner shell, and an outer shell surrounding the intermediate shell and having conical heads and outlet-openings in the head adjacent to the closed end of the intermediate shell, substantially as described.

4. An exhaust-muffler consisting of three shells arranged coaxially one within another, the inner shell being open at one end and tapered at the other end which is attached to the exhaust-pipe, the intermediate shell having a closed end next to the open end of the inner shell and being open at the other end, and the outer shell having conical heads and outlet-openings in the head next to the closed end of the intermediate shell, conical deflectors arranged in the ends of the inner shell with their apexes toward the exhaust-pipe and flanges projecting outwardly from the ends of the intermediate shell toward the outer shell and inclined toward said outlet-openings, substantially as described.

In witness whereof we hereto affix our signatures in presence of two witnesses.

THOMAS J. WILLIS.
GEORGE ANDRICHT.

Witnesses:
CHAS. L. GOSS,
ALICE E. GOSS.