F. HORNQUIST.

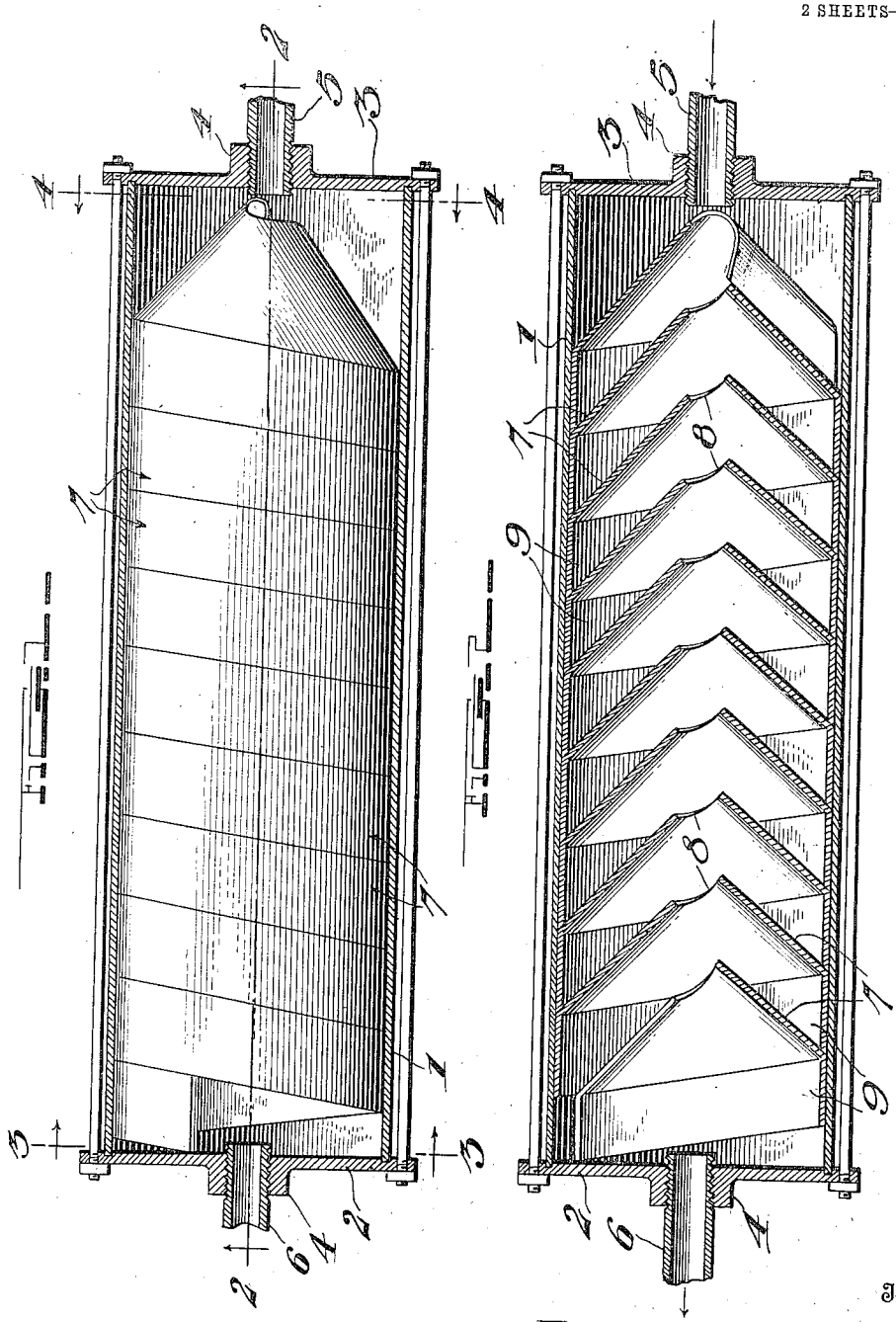
MUFFLER.

APPLICATION FILED JUNE 15, 1914.

1,127,892.

Patented Feb. 9, 1915.

2 SHEETS—SHEET 1.



Witnesses

H. Woodard

E. Cameron

Inventor

Frank Hornquist

By H. B. Williamson & Co

Attorneys

F. HORNQUIST.

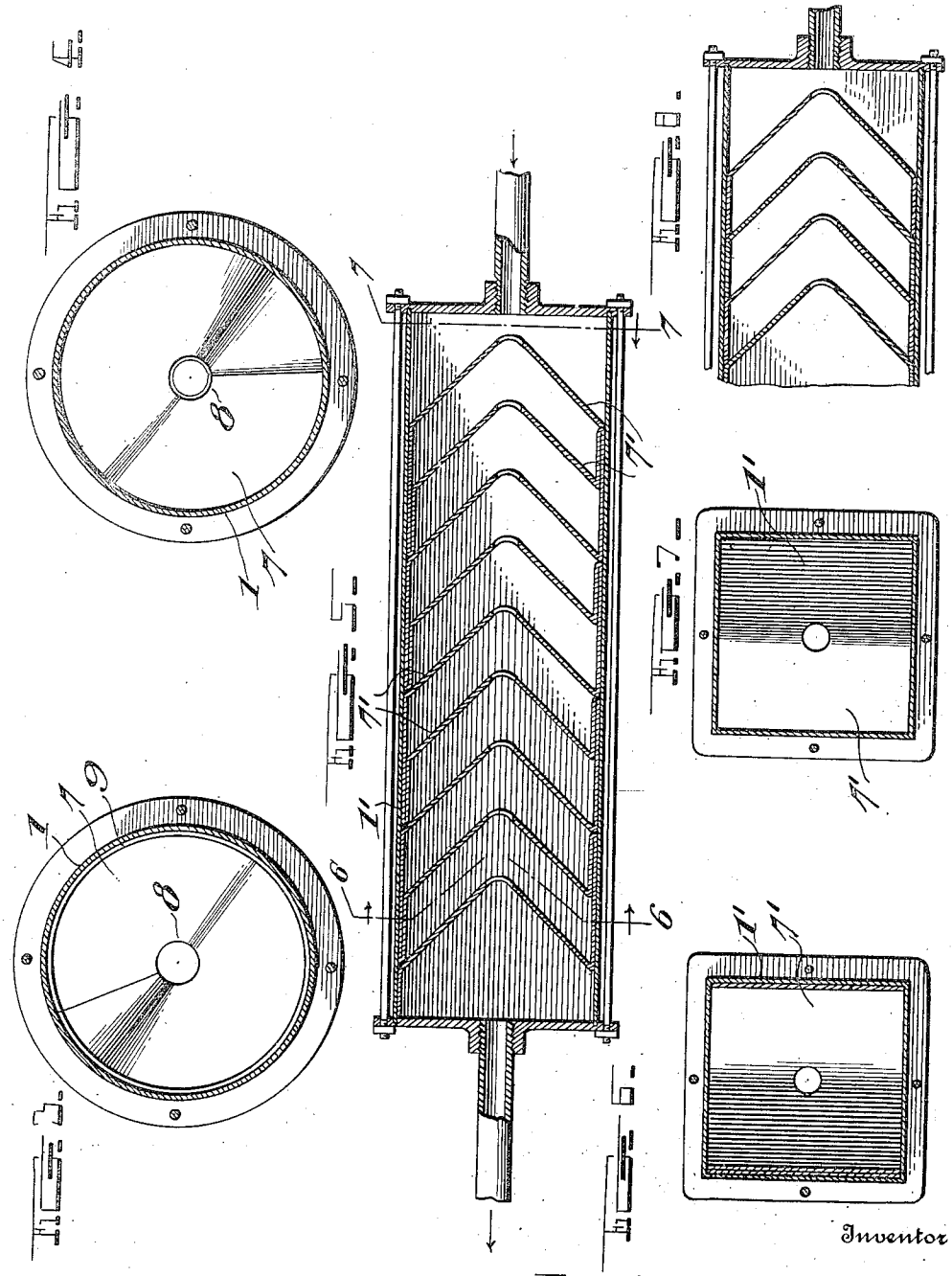
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H. Woodard

Inventor

Frank Hornquist

By A. Bowerman & Co

Attorneys

UNITED STATES PATENT OFFICE.

FRANK HORNQUIST, OF MOUNT JEWETT, PENNSYLVANIA.

MUFFLER.

1,127,892. Specification of Letters Patent. Patented Feb. 9, 1915.

Application filed June 15, 1914. Serial No. 845,284.

To all whom it may concern:

Be it known that I, FRANK HORNQUIST, a citizen of the United States, residing at Mount Jewett, in the county of McKean and State of Pennsylvania, have invented certain new and useful Improvements in Mufflers; and I do 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.

This invention relates to improvements in silencers being more especially directed to a muffler designed for use with engines in which the energy of exhaust gases is dissipated by counteracting their velocity of movement and changing their path of direction within the silencer.

The principal object of the invention is to provide a muffler which will draw in the exhaust and cause it to spread to the outer edges of the muffler and which is so constructed that the dead air is given a chance to escape at the outlet and simultaneously produce suction from the engine thereby facilitating the work of the engine and keeping the air channels of the inlet empty ready to take care of the gas exhaust.

Another object of the invention is to provide a spiral muffler constructed in one piece and having means for preventing the exhaust from pressing the spirals together.

With these and other objects in view, the invention consists of certain novel features of construction and the combination and arrangement of parts as will be more fully described and claimed.

In the accompanying drawings: Figure 1 represents a longitudinal section through the muffler casing with the muffling elements shown in side elevation: Fig. 2 is a central longitudinal section taken on line 2—2 of Fig. 1: Fig. 3 is a transverse section taken on line 3—3 of Fig. 1: Fig. 4 is a similar view taken on line 4—4 of Fig. 1: Fig. 5 is a central longitudinal section of another form of the invention: Fig. 6 is a transverse section taken on line 6—6 of Fig. 5: Fig. 7 is a similar view taken on line 7—7 of Fig. 5: Fig. 8 is a detail longitudinal section of still another form.

In the embodiment illustrated in Figs. 1 to 4 a cylindrical casing 1 is shown which may be of any desired construction and which is provided at its opposite ends with heads 2 and 3 each preferably in the form of a disk having a central apertured boss 4 for the reception respectively of an inlet pipe 5 and an outlet pipe 6.

Mounted in the casing 1 is a series of spirally arranged muffling elements or breakers 7 formed from a single strip of sheet metal and each constructed in the form of a frusto-conical member with the apex 8 of one disposed within the other. Each of these breakers 7 has a depending annular skirt 9 positioned substantially at right angles to the base of the member to form a reinforcing exhaust resisting element for preventing the exhaust from forcing the members 7 together which would tend to close or reduce the space between the members and prevent the passage of the exhaust gases between them. By this spiral arrangement of the muffling elements 7 the exhaust is drawn in at the inlet nozzle and caused to spread to the outer edges of the spiral coil and the continuous form of said coil produces an open air chamber in the spirals extending from one end of the muffler to the other thereby providing an escape for the dead air at the outlet and at the same time producing a suction from the engine. This suction from the engine assists it in its work and at the same time tends to keep the air chambers of the inlet empty ready to take care of the next exhaust thus making the exhaust silent.

By constructing this muffler in the form of a continuous spiral coil the sound or report of the exhaust will be silenced even although the opening clear through the muffler is larger than the exhaust pipe on the engine as the coil will produce a suction on the exhaust and adapt the engine to work with less fuel than is necessary when such muffler is not employed.

The spiral coil may be so constructed that the skirts of the muffling elements can be secured to the bases of the cone shaped portion of the elements in such a manner as to produce a smooth outside face and the disks or heads 2 and 3 for connection with the inlet and outlet pipes may be riveted or otherwise secured to the ends of the spiral thereby providing for the construction of the muffler from three parts only.

In the form shown in Figs. 5 to 7 the muffler casing 1′ is shown rectangular in cross section instead of cylindrical as shown in the other figures and the muffling elements 7′ may be constructed from a single

piece of sheet iron as shown in Fig. 5 or may be in separate sections as shown in Fig. 8 as may be desired.

In practice the disposition of the breakers 7 is such that the exhaust under pressure leaving the engine enters through the inlet pipe 5 and first encounters one of the spirally formed breakers. The gases are diffused thereby and pass through the aperture in said breaker into the space between the same and the breaker 7 next beyond and are deflected by the sides of the casing 1 and caused to find their way through the central opening of the next breaker and so on through the silencer, the flow of said exhaust being continuous in one direction but tortuous as indicated by the arrow in Fig. 2 whereby its velocity is broken and its course changed. The spiral arrangement of the muffling elements produces a somewhat whirling movement which forces the gases against the walls of the members until the velocity of movement has been so reduced as to permit the expansive force of the gas to direct the same through the adjacent opening and this reduction of velocity tends to dissipate the energy of the gases so that when delivered into the space between said elements 7 and the casing 1 the gases are practically moving under their expansive force alone which effectively deadens all sound and causes the exhaust gases to pass into the atmosphere without making any noise. It is of course to be understood that any desired number of breakers may be used and that the sizes may be varied, with relation to each other, to any desired extent.

I claim as my invention:

1. A silencer composed of a plurality of spirally arranged frusto-conical muffling elements constructed from a single strip of metal.

2. A silencer composed of a plurality of spirally arranged frusto-conical muffling elements each having a depending annular skirt and constructed from a single strip of metal.

3. A silencer composed of a plurality of connected spirally arranged frusto-conical muffling elements, and means for preventing said elements from being pressed together.

4. A silencer composed of a plurality of spirally arranged frusto-conical muffling elements formed of a continuous strip.

5. A silencer composed of a plurality of spirally arranged muffling elements, said elements being angular in cross section.

6. A silencer comprising an inclosing casing provided at its opposite ends with an inlet and outlet respectively, and a plurality of spirally arranged muffling elements disposed therein and formed of a single piece of metal.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

FRANK HORNQUIST.

Witnesses:
SEXTUS LUNDBERG,
OTTO PEARSON.