

No. 791,517.

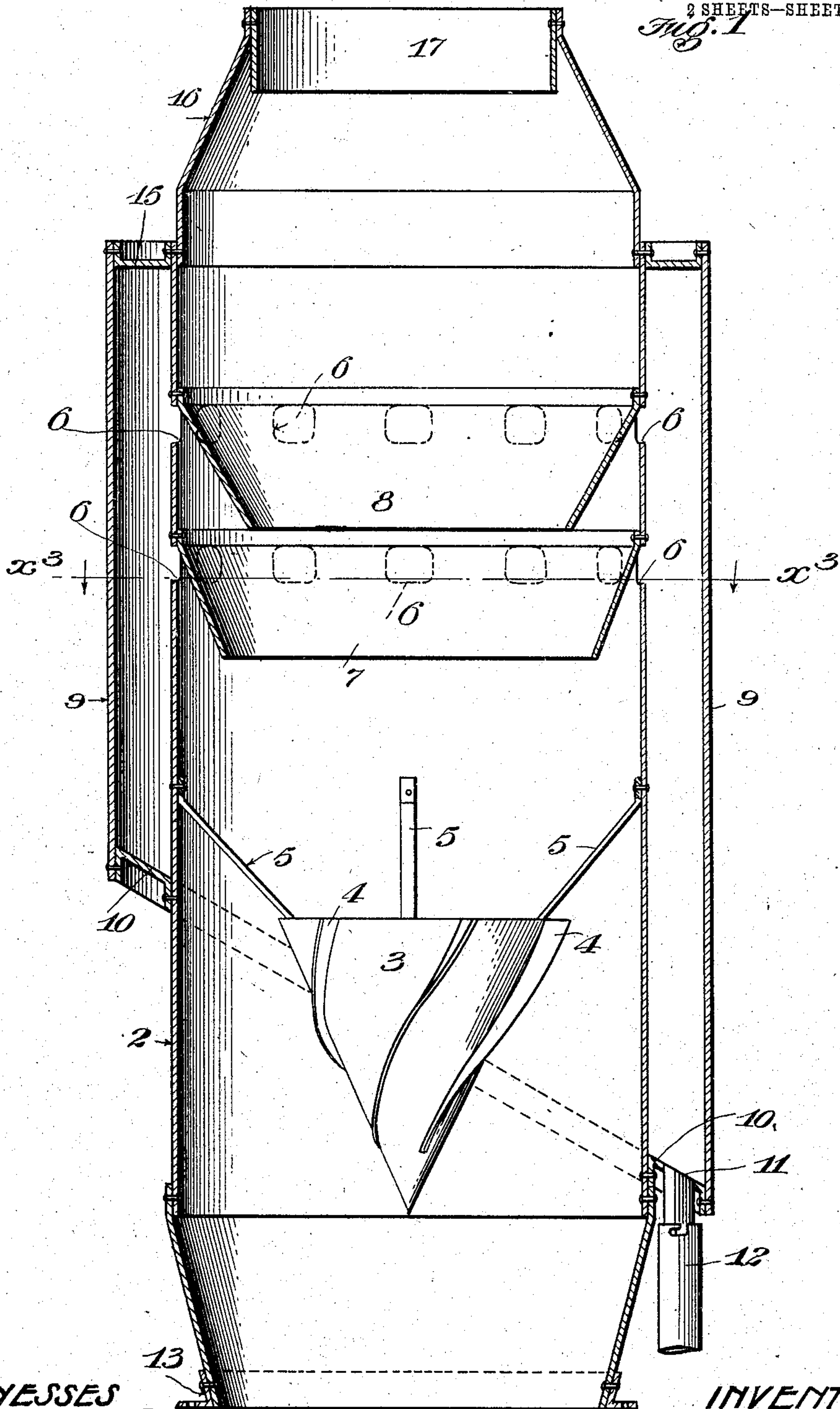
PATENTED JUNE 6, 1905.

S. M. WALKER.
SMOKE CONSUMER AND CINDER ARRESTER.

APPLICATION FILED FEB. 11, 1904.

2 SHEETS—SHEET 1.

Fig. 1



WITNESSES

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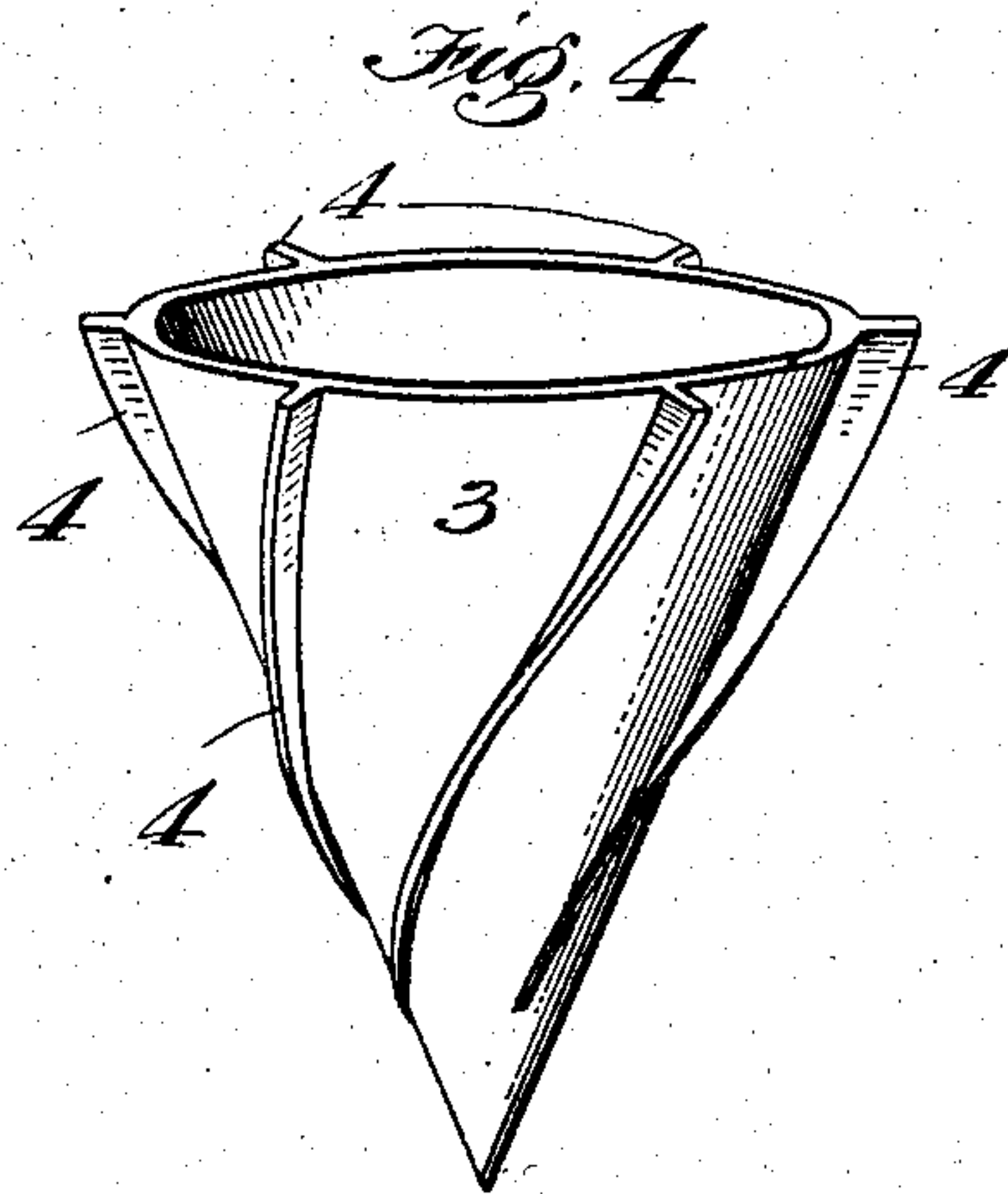
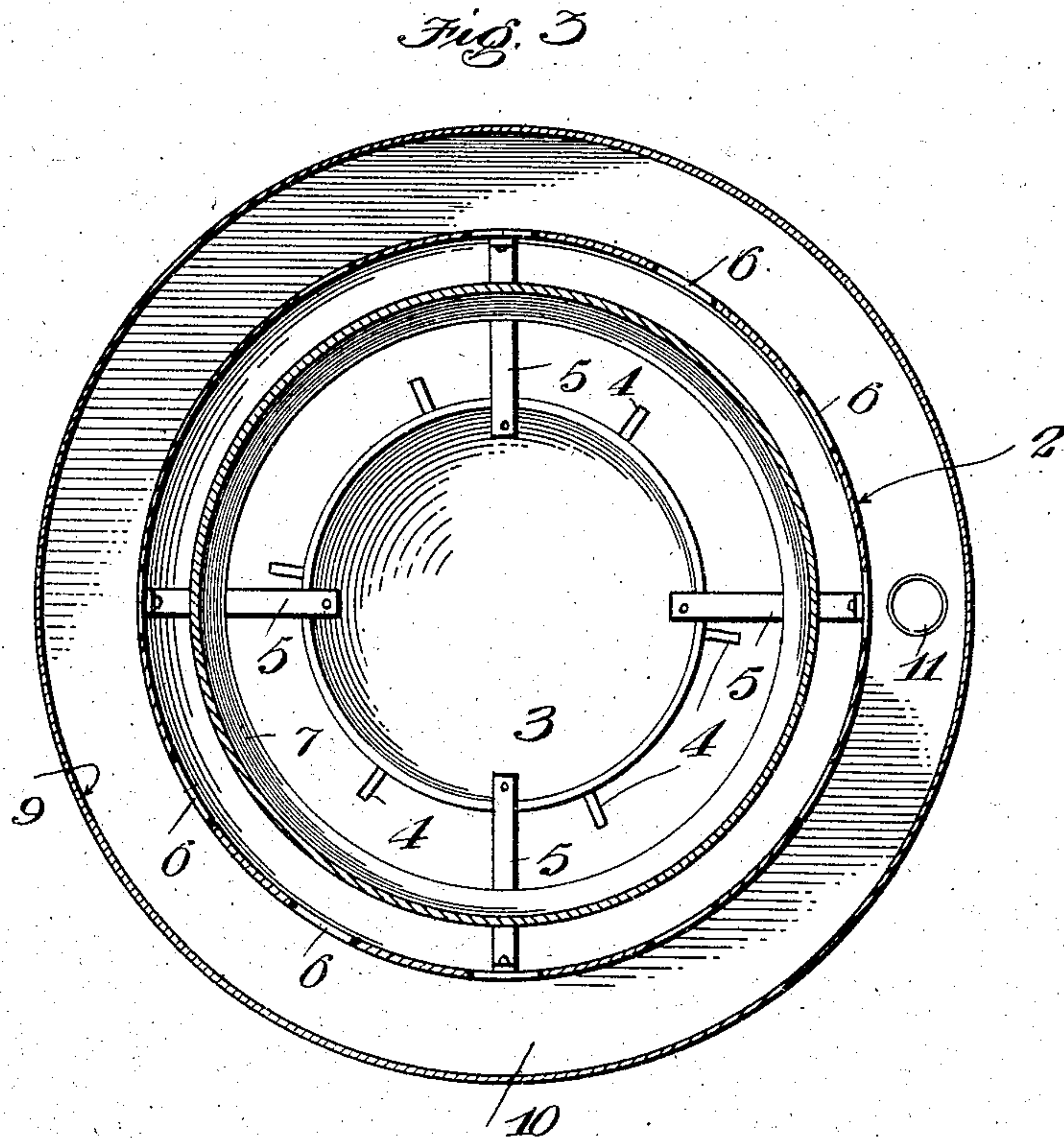
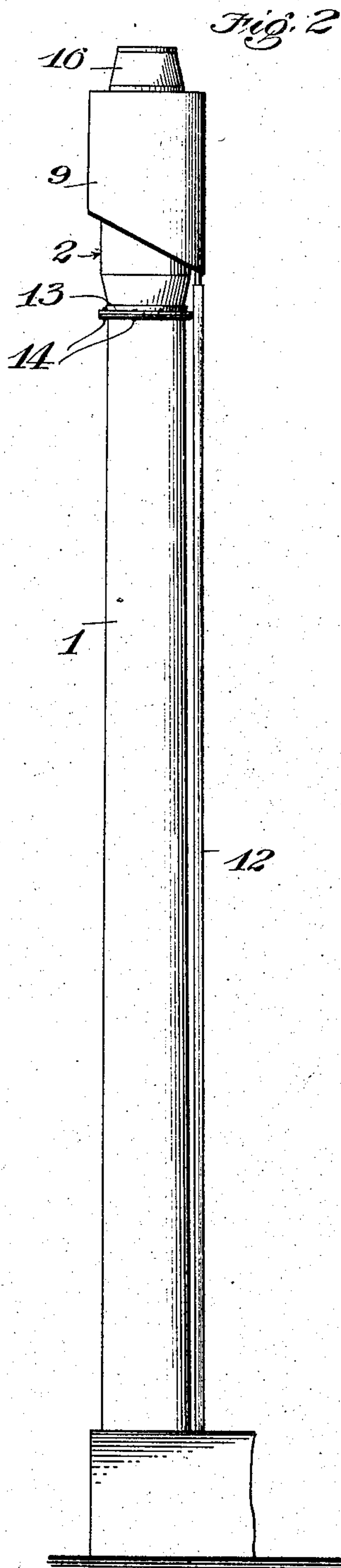
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2 SHEETS—SHEET 2.



WITNESSES

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UNITED STATES PATENT OFFICE.

SAMUEL M. WALKER, OF LOS ANGELES, CALIFORNIA.

SMOKE-CONSUMER AND CINDER-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 791,517, dated June 6, 1905.

Application filed February 11, 1904. Serial No. 193,034.

To all whom it may concern:

Be it known that I, SAMUEL M. WALKER, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Smoke-Consumers and Cinder-Arresters, of which the following is a specification.

The object of this invention is to provide means applicable to chimneys, smoke-stacks, flues, and the like to consume the smoke issuing therefrom or passing therethrough by separating the solid constituents from the gases.

My invention comprises means for subjecting the smoke to a whirling, vortical, or rotary motion, causing the solid particles thereof to separate by centrifugal action from the gaseous constituents of the smoke, and means for collecting or retaining said solid particles, while allowing the gaseous part to pass.

The accompanying drawings illustrate the invention.

Figure 1 is a vertical section of an apparatus embodying the invention. Fig. 2 is an elevation of a stack provided with such apparatus. Fig. 3 is a longitudinal section on the line $x^3 x^3$ in Fig. 1. Fig. 4 is a detail view of a vortical deflector for causing vortical movement of the smoke.

The apparatus is shown as applied at the top of a chimney-stack 1, the casing 2 of the apparatus forming an extension of said stack; but it will be understood that it may be arranged at any desirable place in a flue or stack.

3 designates a deflector, preferably in the form of a cone, with peripheral, helical, or spiral blades 4. This cone is supported within the casing 2 by arms or brackets 5, fastened to said casing and to said cone, the point of the cone being directed downward, so that the ascending gases will be deflected by said blades and given a vortical movement. Casing 2 has perforations 6 to permit passage through the casing of the soot and cinders. Two rows of such perforations are shown, and suitable separators or parting devices in the form of frusto-conical plates or flanges 7 8 are attached to casing 2 above the respective rows to deflect or guide the soot and cinders to said perforations.

A box or chamber 9 surrounds casing 2 and communicates, through perforations 6, with said casing to receive the soot and cinders. The floor or bottom 10 of this outer chamber is inclined and has an outlet 11, from which a conduit 12 may lead to any suitable point for collecting or receiving the cinders and soot. Thus in Fig. 2 the conduit 12 is a pipe leading directly down to the ground, where the solid materials may accumulate.

The bottom of casing 2 may have a base ring or flange 13 for attachment to the top of the stack 1, by suitable means, such as bolts 14. A top plate 15 extends over chamber 9 to close same, and an extension or top piece 16 in the form of a slightly-tapering frusto-cone extends upwardly from the casing 2 to convey away the gaseous part of the smoke. A band 17 around the mouth of this top piece extends downwardly thereinto to intercept and return any solid particles passing up near the walls of the mouth.

In operation the ascending current of smoke from the chimney passes upwardly into the casing 2 and strikes the deflector 3, the blades 4 of which impart to the smoke a whirling, rotary, or vortical movement. The vortically-moving current of air passes on into the upward part of the casing, which may be termed a "vortex-chamber," and the centrifugal action due to the whirling movement causes the solid particles—namely, the soot and cinders of the smoke—to move outwardly toward the wall of the casing, leaving the central portion comparatively clear. As the ascending current of smoke passes the first separating device 7 the soot and cinders in the outermost portion of the current, containing the most solid particles, are guided outwardly by said device and caused to pass through the lower row of perforations 6 into the outer chamber 9, said chamber being closed at the top. The amount of gaseous matter passing through said perforations into said chamber will be relatively insignificant in bulk, but will contain a large proportion of the solid matter present in the smoke. Nearly all of the gaseous matter in the smoke will pass on upwardly through the annular separator 7 and into contact with the upper separator 8, which will further divide

the outwardly-flying soot and cinders from the centrally-passing body of gases, and, finally, as the smoke passes the band or flange 17 the solid particles, which constantly tend outwardly toward the casing-wall, are caught by said flange and stopped from passing out of the mouthpiece. Such particles having thus lost momentum will gradually drift down past the separators and be expelled through the perforations. The cleared gases will pass out through the open top of the casing substantially free from all the solid particles. The solid matter collects in the outer chamber 9 and drifting down on the inclined floor thereof passes down through outlet 11 and pipe 12 to the ground or to any suitable receiver. It will be understood that a considerable draft will be necessary to substantial clearing of the smoke by this operation, and it is particularly successful with a forced draft. I have found that in practice as much as ninety per cent. of the solid matter will be removed from the smoke and the latter discharged in a substantially clear state.

The deflecting means may be variously constructed, and any means that will impart to the smoke a rotary movement sufficient to separate the solid from the gaseous constituents thereof will serve the purpose of my invention and come within the scope thereof. Furthermore, the means for collecting or carrying off the solid particles when so separated from the gaseous matter may be variously constructed without departing from my invention. My invention is also applicable in connection with the flues of smelters and refineries, and when so used the solid matter separated and saved will often be of considerable value.

What I claim is—

1. The combination with a smoke-flue, of a vortex-chamber communicating therewith to receive the smoke therefrom, deflecting means in said chamber to impart vortical movement to the smoke, peripheral outlet means from said chamber to receive solid particles, central outlet means from said chamber to receive the gaseous part of the smoke, and an annular flange extending into said vortex-chamber to guide the solid particles toward the outlet means.

2. The combination with a smoke-flue, of a casing forming a vortex-chamber and having perforations around said chamber and a central outlet, of deflecting means in said chamber to impart vortical movement to the smoke, and annular inclined flanges extending into the vortex-chamber to guide the solid particles toward said perforations.

3. The combination with a smoke-flue, of a casing forming a vortex-chamber and having

perforations around said chamber, and a central outlet, a smoke-deflector in said chamber to impart vortical movement to the smoke, an annular flange extending in the vortex-chamber to direct the solid particles at the periphery of said chamber into said perforations, and a chamber surrounding the vortex-chamber and communicating therewith through said perforations.

4. The combination with a smoke-flue, of a casing forming a vortex-chamber and having perforations around said chamber and a central outlet, a smoke-deflector in said chamber to impart vortical movement to the smoke, an annular flange extending in the vortex-chamber to direct the solid particles at the periphery of said chamber into said perforations, an outer chamber surrounding the vortex-chamber and communicating therewith through said perforations, and a conduit leading from such outer chamber.

5. The combination with a smoke-flue, of a casing forming a vortex-chamber and having perforations around said chamber and a central outlet, of a deflector in said chamber to impart vortical movement to the smoke, an annular flange extending in the vortex-chamber to direct the solid particles at the periphery of said chamber into said perforations, a chamber surrounding the vortex-chamber and communicating therewith through said perforations and having an inclined bottom, and a conduit leading from the lower part of said bottom.

6. The combination with a smoke-stack, of a vertical casing thereon forming a vortex-chamber, a deflector therein in the form of an inverted cone having spiral blades, said casing having perforations and having an inclined annular flange above said perforations, and an outer chamber surrounding said casing communicating therewith through said perforations.

7. The combination with a smoke-stack, of a vertical casing forming a vortex-chamber having perforations around said chamber and a central outlet, annular downwardly-inclined flanges extending in said chamber above said perforations, and deflecting means in said chamber to impart vortical movement to the smoke.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, at Los Angeles, in the county of Los Angeles and State of California, this 5th day of February, 1904.

SAMUEL M. WALKER.

Witnesses:

ARTHUR P. KNIGHT,
FREDERICK S. LYON.