

(No Model.)

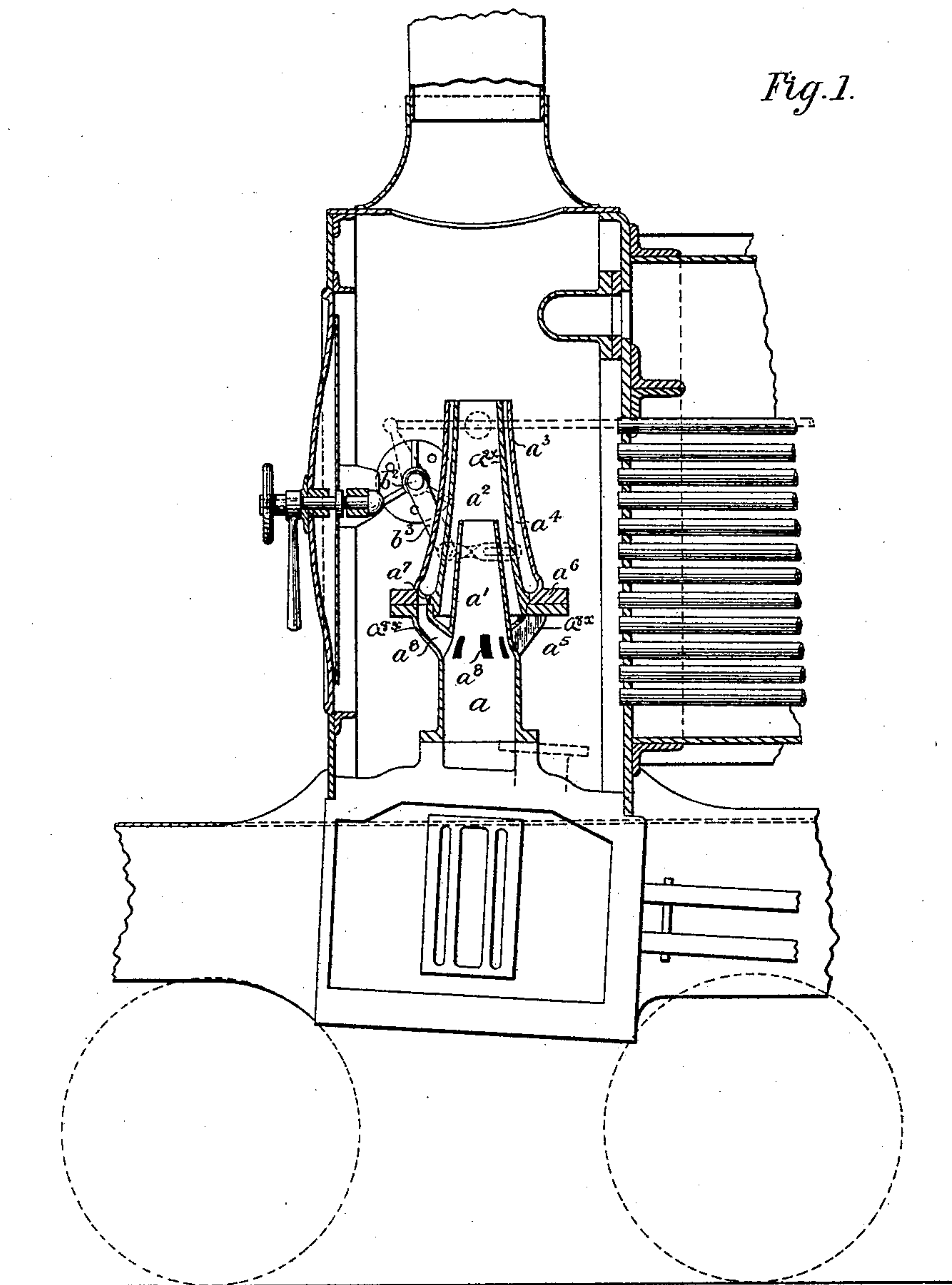
5 Sheets—Sheet 1.

H. APPLEBY & J. G. ROBINSON.

BLAST PIPE.

No. 390,937.

Patented Oct. 9, 1888.



WITNESSES:

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INVENTORS:

Henry Appleby.
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(No Model.)

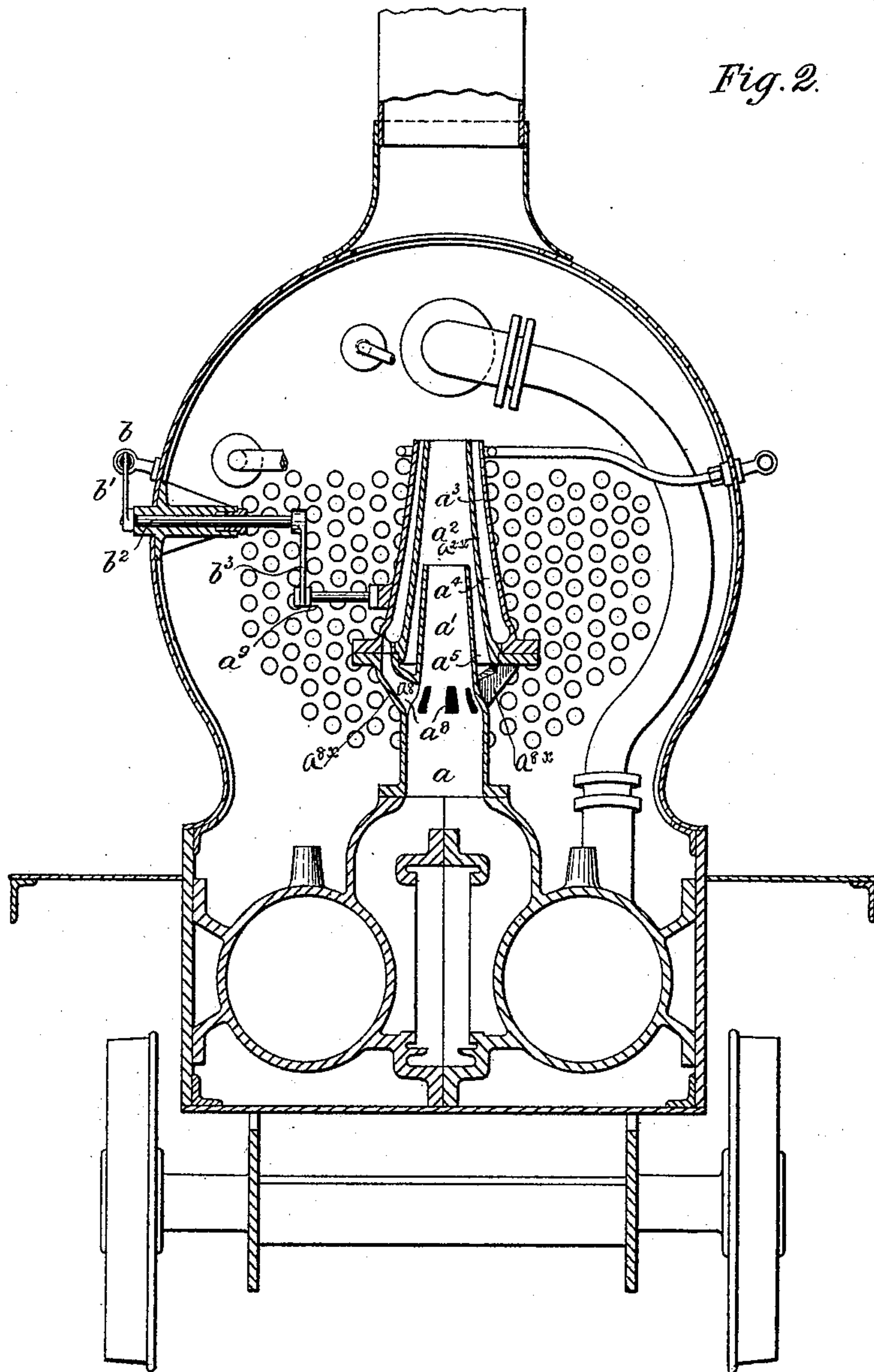
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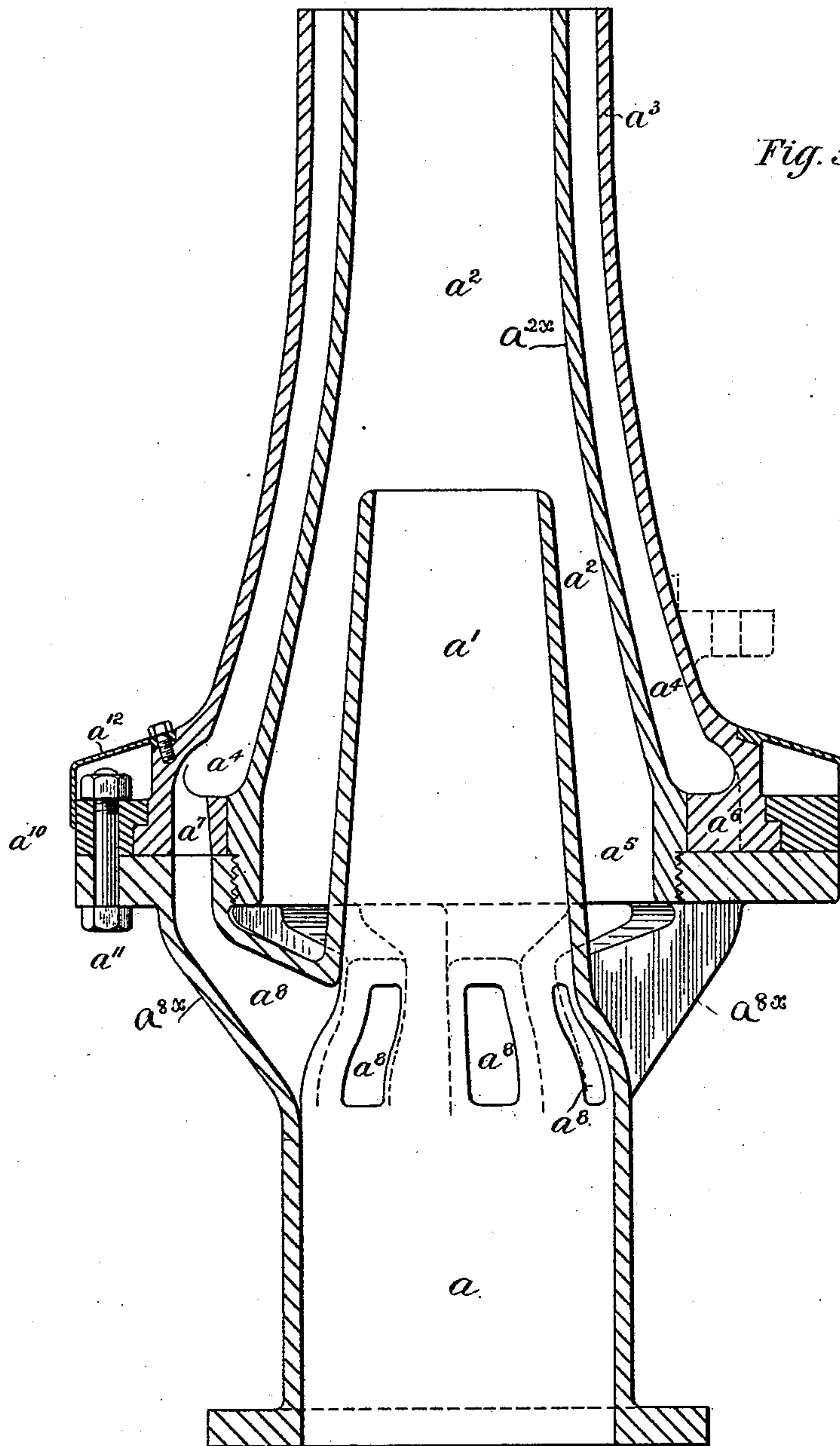
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BLAST PIPE.

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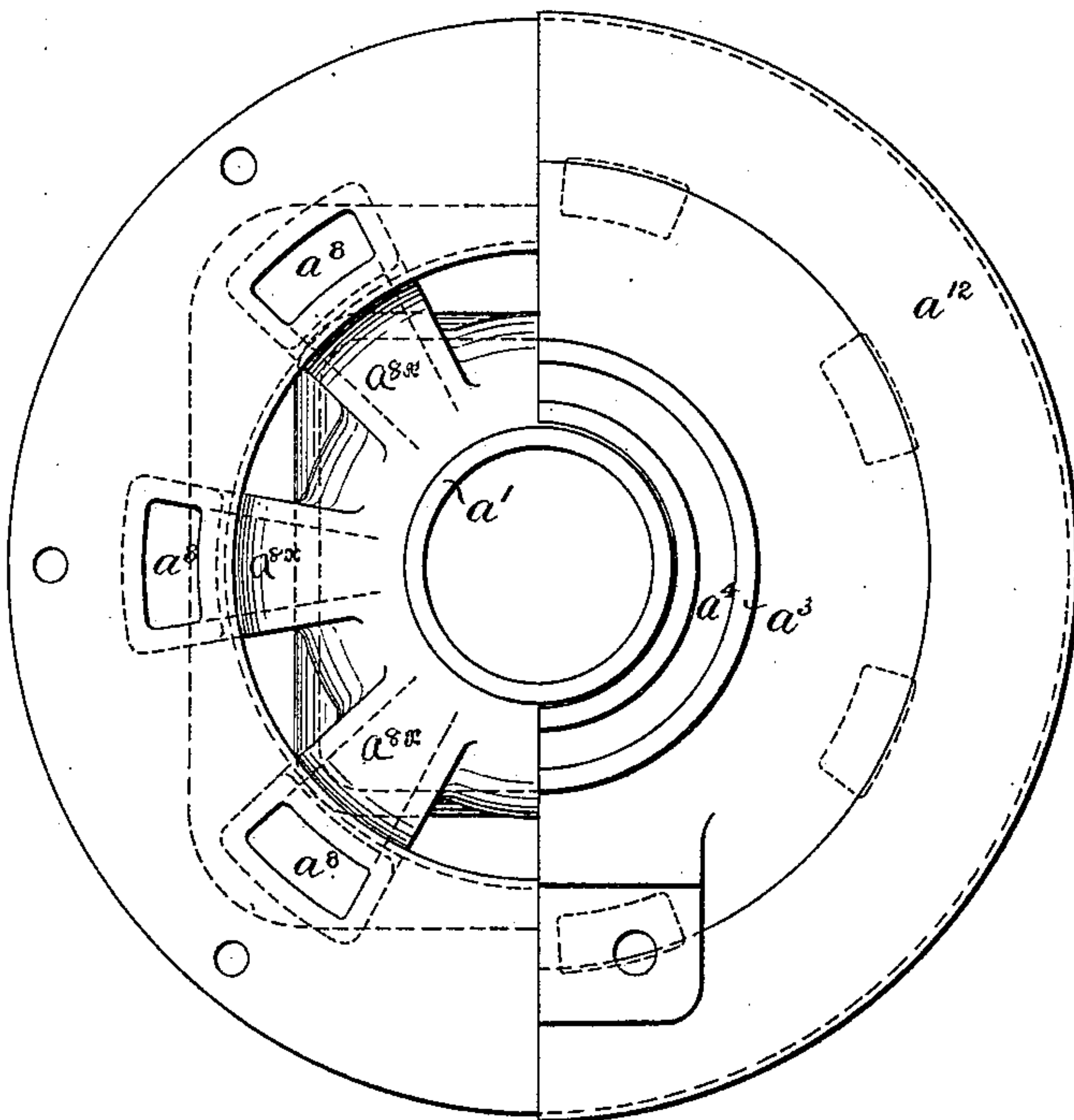
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Fig. 4.



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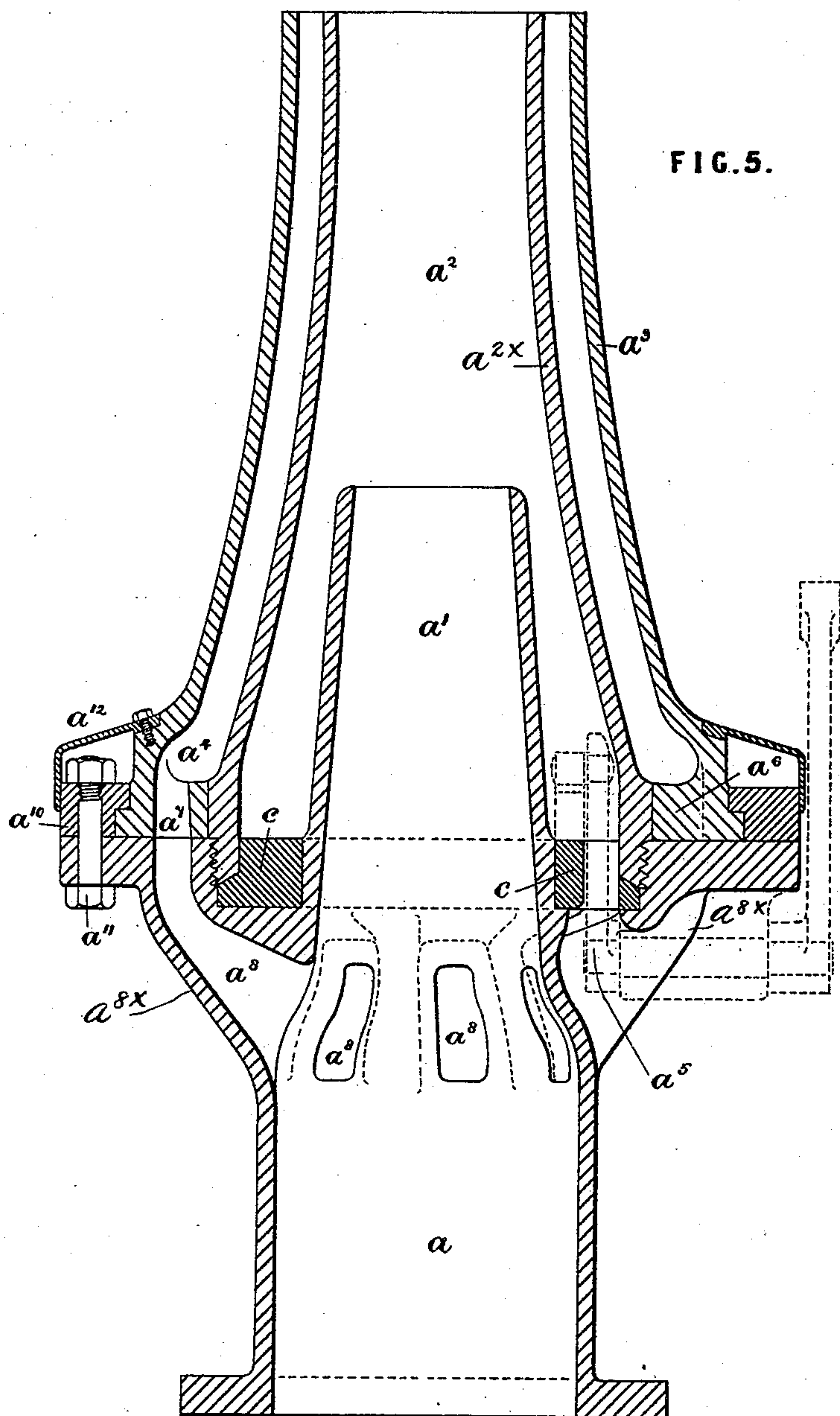
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BLAST PIPE.

Patented Oct. 9, 1888.



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UNITED STATES PATENT OFFICE.

HENRY APPLEBY AND JOHN GEORGE ROBINSON, OF LIMERICK, IRELAND;
SAID ROBINSON ASSIGNOR TO SAID APPLEBY.

BLAST-PIPE.

SPECIFICATION forming part of Letters Patent No. 390,937, dated October 9, 1888.

Application filed August 23, 1887. Serial No. 247,650. (No model.) Patented in England May 9, 1887, No. 6,784.

To all whom it may concern:

Be it known that we, HENRY APPLEBY and JOHN GEORGE ROBINSON, subjects of the Queen of Great Britain and Ireland, both of the
5 Waterford and Limerick Railway Company, Limerick, Ireland, have invented new and useful Improvements in Blast-Pipes and in Means for Regulating the Draft Created Thereby, (for which we have applied for Letters Patent in Great Britain, to bear date May
10 9, 1887, No. 6,784,) of which the following is a specification.

This invention relates to improvements in blast-pipes for locomotive and other boilers in
15 which a steam-jet or blast is employed for inducing the requisite draft through the furnace and heating tubes, and in the means whereby such draft may be varied and regulated according to the duty to be performed.
20 The invention is, however, applicable, under other circumstances, where it is desired to set a body of air or other gas in motion with the aid of a steam-jet.

In Figures 1 and 2 of the accompanying drawings is represented, in longitudinal and transverse section, respectively, the smoke-box end of a locomotive-engine furnished with a blast-pipe constructed and applied in accordance with our invention. In Figs. 3 and 4 is represented, to an enlarged scale and in fuller detail,
30 the mode in which we prefer to construct the blast-pipe itself, the former of these being a sectional elevation and the latter a part plan and part horizontal section. Fig. 5 is a view similar to Fig. 3, illustrating the application to the blast-pipe of a register-valve or device for controlling the gas inlets, as will be described.

The improved blast-pipe consists of a central
40 steam-nozzle, a' , which in the present instance communicates through its base portion, a , with the exhaust-ports of passages from the steam-cylinders. Surrounding the nozzle a' is an annular chamber or air-passage formed by an
45 inclosing casing or shell, $a^2 \times a^2$, the latter being rounded by a casing, a^3 , forming passage, a^4 , through which a portion of the exhaust-steam may at times be diverted when it is desired to diminish or
50 moderate the intensity of the draft through

the boiler-furnace and heating-tubes. Openings a^5 , for the intake of air, are provided at or about the level of the lower rows of tubes, the delivery-orifice of the blast-pipe extending upward to or about the level of the higher
55 rows of heating-tubes.

Although we prefer to use a comparatively short central steam-nozzle, a' , as represented in the accompanying drawings, the length of the same may be varied at will, and may, if preferred, terminate in the same plane with the
60 air-passage a^2 and with the outer steam-passage, a^4 . The external casing, a^3 , is formed with a flanged seating, a^6 , and is mounted upon the lower portion of the apparatus and retained
65 in place by a flanged ring, a^{10} , Fig. 3, in such a manner as to enable the upper part, a^3 , to be partially rotated upon the lower part of the apparatus.

The ring a^{10} is secured to the upper flange
70 of the base portion, a , of the nozzle a' by means of bolts a^{11} . a^{12} is a cap which may be advantageously applied to, and which may revolve with, the outer casing, a^3 , for the purpose of excluding ashes or dirt from the working-face
75 of the latter. In the seating a^6 are formed ports a^7 corresponding with passages a^8 , leading from the central steam-nozzle, a' , to the outer steam-passage, a^4 , through radially-arranged tubular arms or brackets $a^8 \times$. When
80 the ports a^7 coincide with the passages a^8 , steam is free to escape by the annular passage a^4 ; but upon the external casing being partially rotated the supply of steam to the external passage, a^4 , is partially or wholly intercepted and
85 the collective area of the steam passage or passages is diminished, with the effect of intensifying the blast and increasing the draft.

It will thus be understood that when both the central and the outer or supplementary
90 steam-passages are in operation air and products of combustion are drawn in at the lower part of the apparatus and are ejected at the top in an annular current, the same surrounding the jet of steam issuing from the central
95 nozzle, and being surrounded by the annular body of steam escaping from the outer annular passage. When, however, the latter is closed, the whole of the exhaust-steam is concentrated so as to issue through the central
100

nozzle, the blast being thereby rendered sharper and the draft intensified.

It will be seen that the connection between the central steam-passage in base a and the supplementary steam-passage a^1 is made through the radiating arms a^{2x} , which cross the inlet to annular passage a^2 , but sufficiently below said inlet to permit of free access of the gases thereto. It will also be observed that one characteristic of our invention is the admission of the gases—as the products of combustion, for example—through an annular passage between the central steam-passage, a^1 , and the supplementary annular steam-passage a^4 , the controlling-valve for the latter being arranged at its base.

By means of suitable connections, such as the longitudinal rod b , Fig. 2, lever b^1 , spindle b^2 , and lever b^3 , the last-named engaging with a stud or arm, a^9 , projecting from the external casing a^3 , the said casing may be partially rotated and the action of the apparatus regulated from the foot-plate of the locomotive or other conveniently-accessible position. The rod b may be actuated by screw-gearing operated by means of a hand-wheel.

We sometimes provide means whereby the openings a^5 , provided for the admission of air and products of combustion through the lower portion of the apparatus to the internal annular chamber, may be partially or wholly closed. A blast-pipe thus provided is illustrated in Fig. 5, the same comprising a register-valve, c , formed with openings corresponding with the openings a^5 and furnished with suitable connections (indicated by dotted lines) for enabling the said disk to be so rotated that its solid portions cover the openings a^5 . The said disk or equivalent controlling appliance may be operated from the foot-plate of the engine, or otherwise, in a similar manner to that employed for regulating the flow of steam through the supplementary passage. When the admission of the gases through the openings a^5 is cut off, the action of the apparatus is not directly exerted upon the gaseous contents of the lower portion of the smoke-box, being more immediately effective upon the gases surrounding the upper extremity of the blast-pipe. By partially instead of wholly closing the passages a^5 the action of the apparatus may be modified and the draft through the lower fire-tubes regulated.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. A blast-pipe comprising a centrally-arranged steam-nozzle, an annular supplementary steam-passage surrounding said nozzle, an intervening annular passage for the air or

other gases to be operated on, and means, substantially as described, for wholly or partially intercepting the escape of steam through one of said steam-passages while correspondingly augmenting or concentrating its delivery through the other passage.

2. A blast-pipe comprising a main steam-nozzle, as a^1 , a casing, as a^{2x} , around said nozzle, forming an annular gas-passage, a^2 , a casing, as a^3 , exterior to casing a^{2x} , forming a supplementary annular steam-passage, a^4 , passages, as a^5 , leading from the base of the main steam-nozzle to the passage a^4 , and a valve controlling the admission of steam to the last-named passage, substantially as set forth.

3. In a blast-pipe provided with a central steam-nozzle and a surrounding annular supplementary steam-passage, the means, substantially as herein described, for enabling a portion of the steam to escape by way of the latter passage, which consists of a casing, a^3 , provided with an intumed flange at its base, having ports a^7 , and mounted on a base or seat provided with ports opening to passages a^8 , substantially as set forth.

4. The combination, with the steam-generator of a locomotive or the like, and the smoke-box into which the fire-tubes of the generator discharge, of a blast-pipe arranged in the said smoke-box and having its orifice or inlet for the air and gases to be operated on arranged at about the level of the lower fire-tubes, whereby the blast is caused to act more energetically on the gases in said tubes than on those in the upper tubes, as set forth.

5. In a blast-pipe, the combination, with the base portion, a , the nozzle a^1 , and the tubular branches a^{2x} , of the inner casing, a^{2x} , secured to the parted ring connecting said branches a^{2x} , the exterior casing, a^3 , mounted rotatively on said ring and having a ported base-flange, a^6 , and the retaining-ring a^{10} , whereby the admission of steam to the passage a^4 between casings a^{2x} and a^3 may be controlled by the partial rotation of casing a^3 .

6. A blast-pipe comprising a centrally-arranged steam-nozzle, an annular passage, a^2 , for the air and gases, surrounding said steam-nozzle and provided with inlet-openings a^5 , and a register-valve, c , controlling said openings a^5 , substantially as set forth.

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