(No Model.)

2 Sheets—Sheet 1.

E. A. HANNA.

FEEDING AIR TO FURNACES.

No. 329,735. Patented Nov. 3, 1885.

Fig. 1.

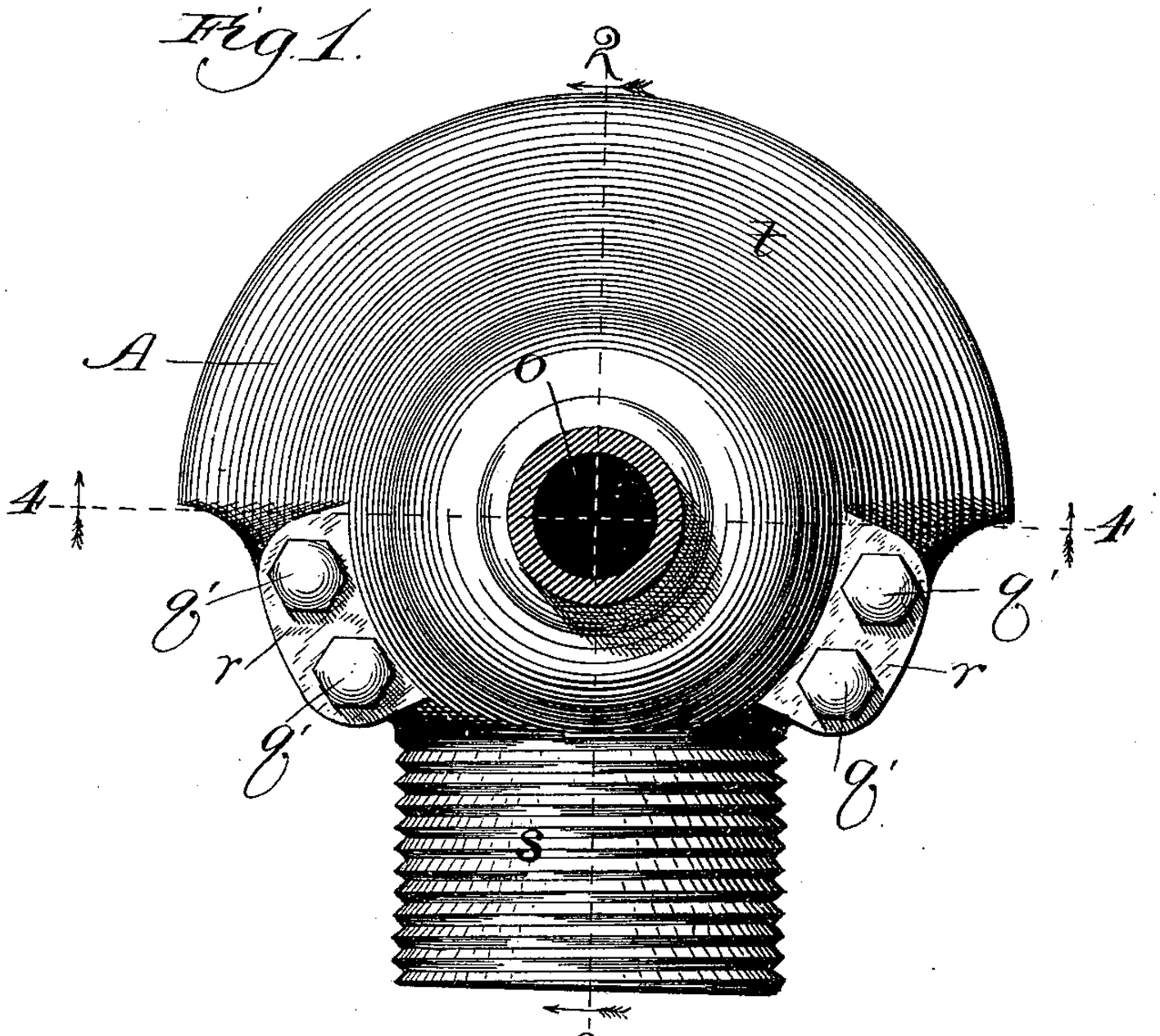
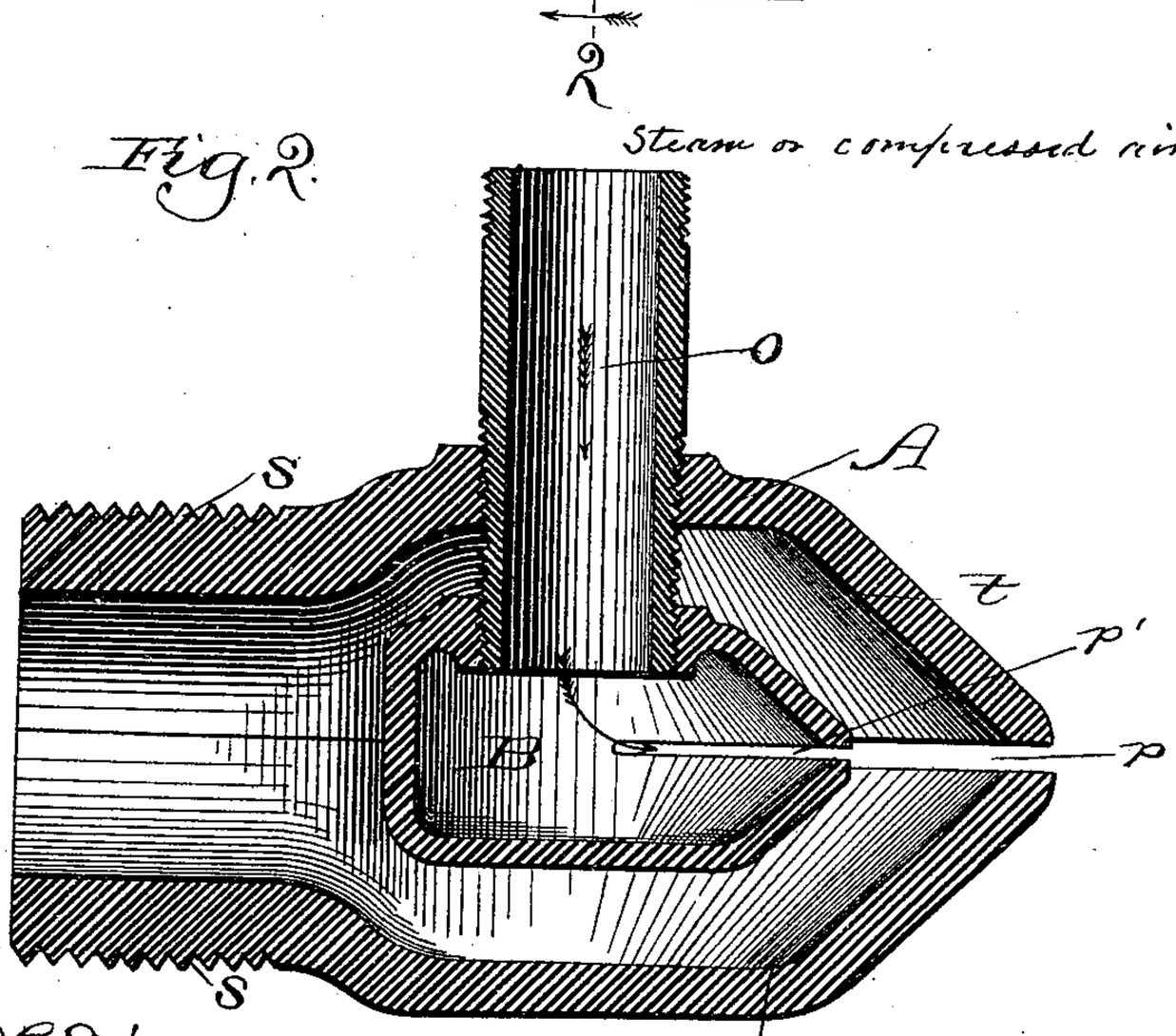


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

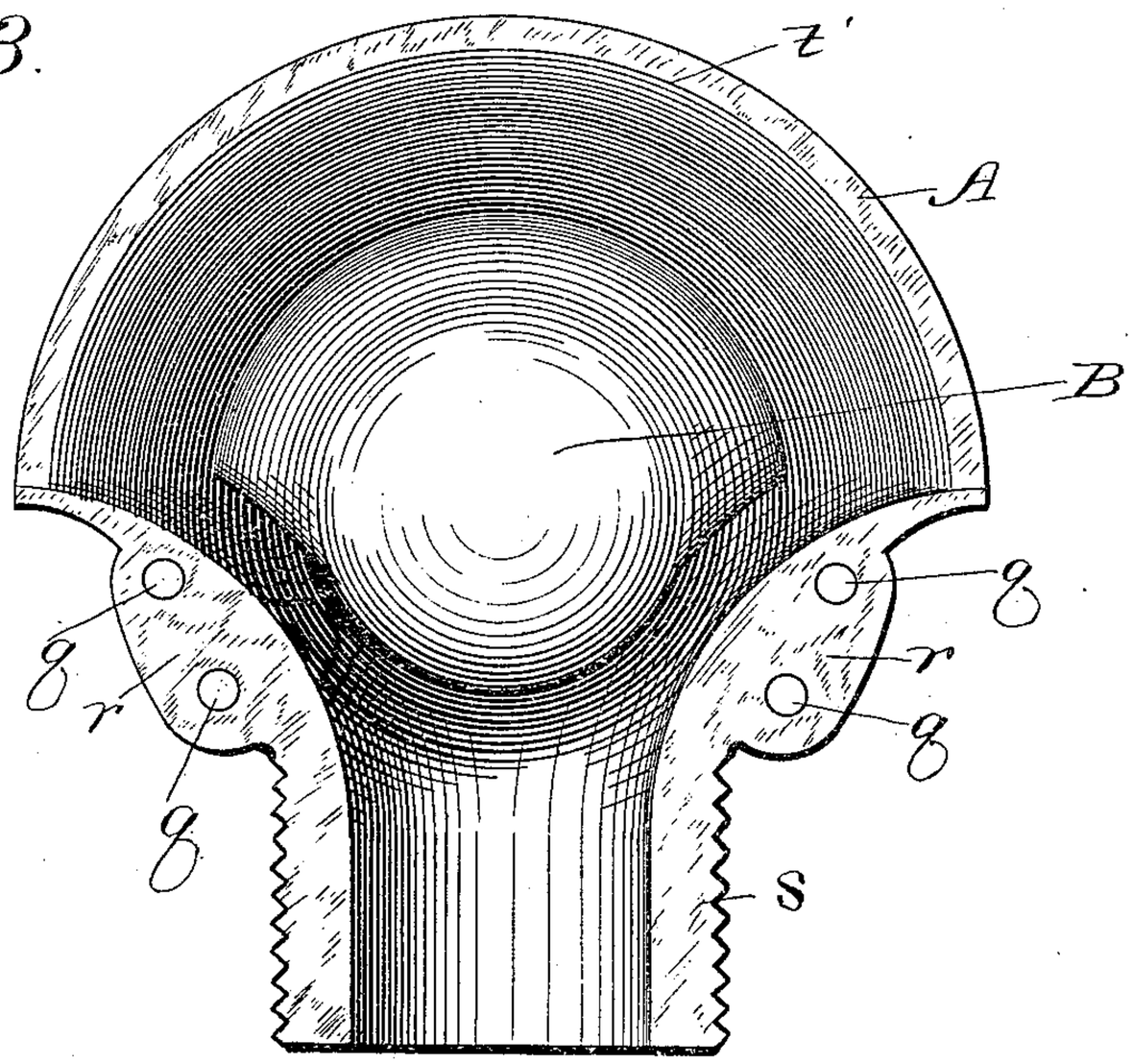
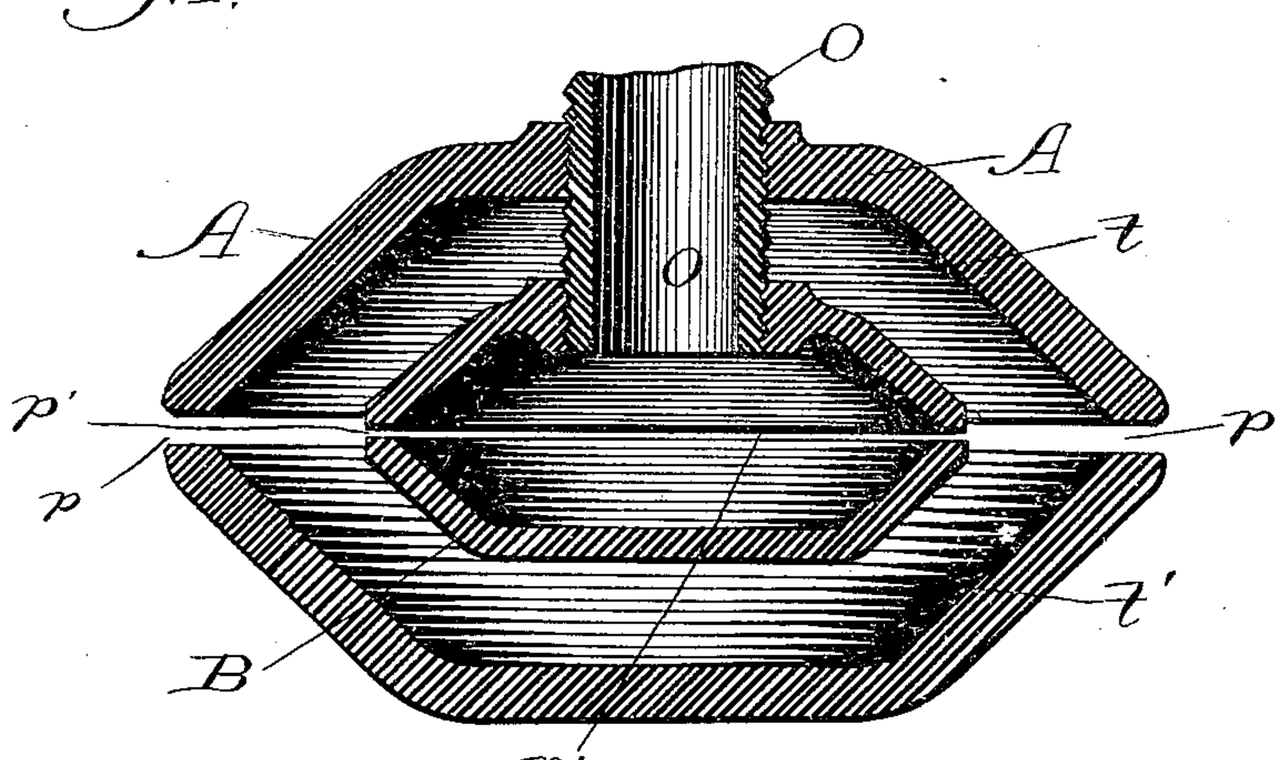


Fig. 4.



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Inventor:
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UNITED STATES PATENT OFFICE.

EDGAR A. HANNA, OF CHICAGO, ILLINOIS.

FEEDING AIR TO FURNACES.

SPECIFICATION forming part of Letters Patent No. 329,735, dated November 3, 1885.

Application filed September 20, 1884. Renewed October 7, 1885. Serial No. 179,222. (No model.)

To all whom it may concern:

Be it known that I, EDGAR A. HANNA, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and Improved Device for Increasing Combustion in Furnaces; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to the class of devices by the use of which combustion shall be increased to such an extent that smoke shall be prevented, and it is my object to provide such a device by the use of which air alone may be introduced upon the burning mass within the furnace, or air commingled with liquid fuel or with solid fuel in a finely-divided state.

My invention consists in a device constituting an injector of peculiar construction, having two chambers, one within the other, the outer one opening into the furnace, and the inner one being provided with an opening coinciding with the opening in the outer chamber, one chamber to communicate with a fluid-supply under pressure to create sufficient vacuum within it to draw air or fuel, or a mixture of both air and fuel, through the other chamber, which communicates with the air or with the fuel-supply, or both, and inject the substance thus drawn by the vacuum into the furnace. The present invention, therefore, besides affording means to prevent smoke by increasing combustion, constitutes also a feeder by which hydrocarbon. oil, or the hitherto comparatively useless slack coal produced in such enormous quantities, may be utilized as fuel to produce a heat of great intensity, in the manner hereinafter described.

Referring to the drawings, Figure 1 is a front elevation; Fig. 2, a longitudinal sectional view of the same, taken on the line 2 2 of Fig. 1, and viewed in the direction of the arrows; Fig. 3, a rear elevation of my device, having one-half of the outer shell, formed in two parts, removed to show the inner shell containing the inner chamber; and Fig. 4 a transverse sectional view taken on the line 4 4 of Fig. 1, and viewed in the direction of the arrows.

A is a shell cast in two parts, *t* and *t'*, of semicircular form at one extremity, and provided with a screw-threaded tubular extension, *s*, projecting backward from its opposite extremity, to afford means for the attachment of the device to a suitable pipe, by means of which communication is afforded to it with the external atmosphere, or with a receptacle containing fuel consisting of hydrocarbon oil or slack coal. Lugs or ears *r* are provided on each side of the parts *t* and *t'* of the shell A toward the base of the semicircular portion, containing screw-threaded bolt-holes *q*, coinciding with each other in the adjacent parts when they are placed together, into which screw-bolts *q'* are inserted to secure the two halves *t* and *t'* together, which are cast to provide, when adjusted together, an opening, *p*, extending around the semicircular portion, and of dimensions depending upon the dimensions of the device, of which there are various sizes for grates of different areas. The part *t* of the shell is provided with a central screw-threaded opening to receive the pipe, *o*, upon the end of which, inside the shell A, is screwed a shell, B, cast in the form shown, to correspond with that of the shell A, excepting that it is unprovided with a rear extension like the tube *s*, and having a central opening formed in its side in casting the shell, to permit the end of the pipe *o* to be screwed into it and support it within the shell A in a manner to cause the opening *p'*, produced, preferably, by sawing after the shell has been cast, to coincide with the opening *p*.

To operate the device it is preferably placed within the front wall of the furnace, above and between the doors, in a manner to leave only the mouth *p* exposed toward the fire-chamber. Connection is made upon the pipe *o* with the steam-supply, (or compressed-air supply, if the latter is the medium to be used,) and upon the extension *s* with the external atmosphere, or with a receptacle containing liquid hydrocarbon or slack coal. When steam is admitted into the chamber of the shell B through the pipe *o*, it escapes through the openings, *p* and *p'*, producing a sufficient vacuum within the shell A to draw the desired substance through the extension *s* and eject it in a fan-shaped spray through the opening *p* upon the burning fuel in the fire-chamber of the furnace. Air alone, when introduced in the manner hereinbefore described, is sufficient to increase the combustion of the fuel in the furnace to an extent that

will prevent smoke; but a hydrocarbon may be used as a fuel when fed as above described, in which case any one of many well-known means may be provided for the purpose of admitting air with the hydrocarbon to promote combustion, if desired. An important feature of my invention consists, however, in the fact that it permits slack coal to be advantageously used for fuel. As hereinbefore mentioned, enormous quanties of slack coal are produced, for which there is a very limited market at a very low price, blacksmiths forming perhaps the best customers for the article to be used as a fuel. The reason why its employment as fuel in furnaces has hitherto been impracticable is that it cakes in the fire-chamber, which to a great extent prevents the mixture of oxygen with it and prevents its combustion. When introduced with air by means of my injector, however, owing to the thinness of the sheet sprayed over the fire, the particles are consumed almost when they strike the bed of coals in the fire-chamber, and thus clogging or caking is avoided and an intensely-hot fire is produced. If it is desired only to prevent smoke by increasing combustion within the furnace, air alone may be introduced with my device, in which the shell B and opening in the form of an extension, *s*, on the shell A can be omitted, when the chamber within the shell A could be made to communicate with the supply of air under pressure, which would be injected through the opening *p* upon the fire within the fire-chamber of the furnace.

What I claim as new, and desire to secure by Letters Patent, is—

A device for increasing combustion and preventing smoke in furnaces, comprising a shell, A, cast in two parts, *t* and *t'*, each semicircular, or nearly so, at one extremity, and secured together, and having an outlet, *p*, between them, the part *t* having an opening in its body, a tubular extension, *s*, projecting from the end of the shell A, a shell, B, corresponding in shape with the shell A, and supported within the said shell A, and provided with an outlet, *p'*, coinciding with the outlet *p*, and with an opening in its body coinciding with the said opening in the body of the shell A, the whole being constructed and arranged to operate substantially as described.

EDGAR A. HANNA.

In presence of—
C. C. LINTHICUM,
DOUGLAS DYRENFORTH.