

(No Model.)

2 Sheets—Sheet 1.

J. HOLDEN.
INJECTOR BURNER.

No. 465,268.

Patented Dec. 15, 1891.

Fig. 2.

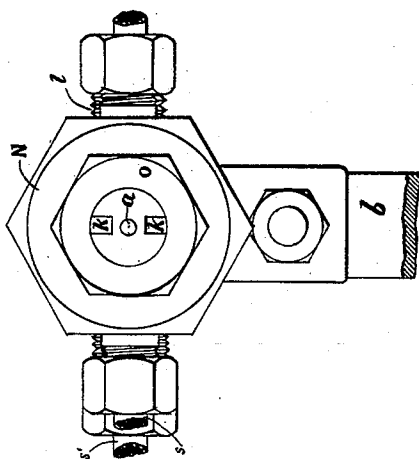
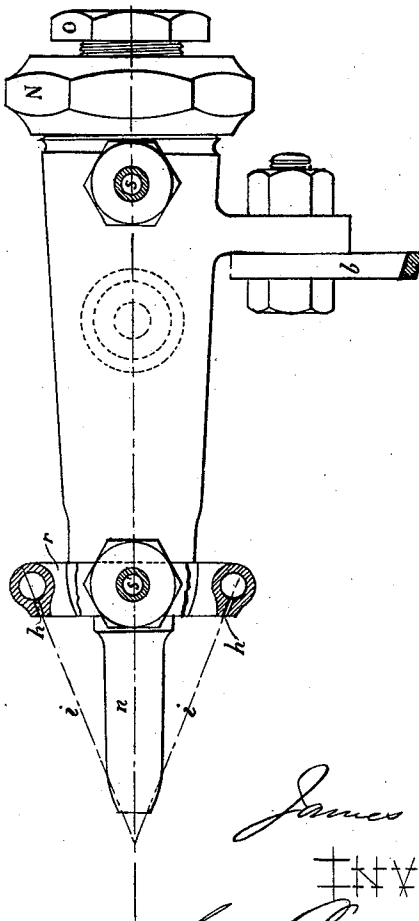


Fig. 1.



WITNESSES
A. B. Blackwood
W. C. Clabaugh

James Holden
INVENTOR
By Conway Bros
att.

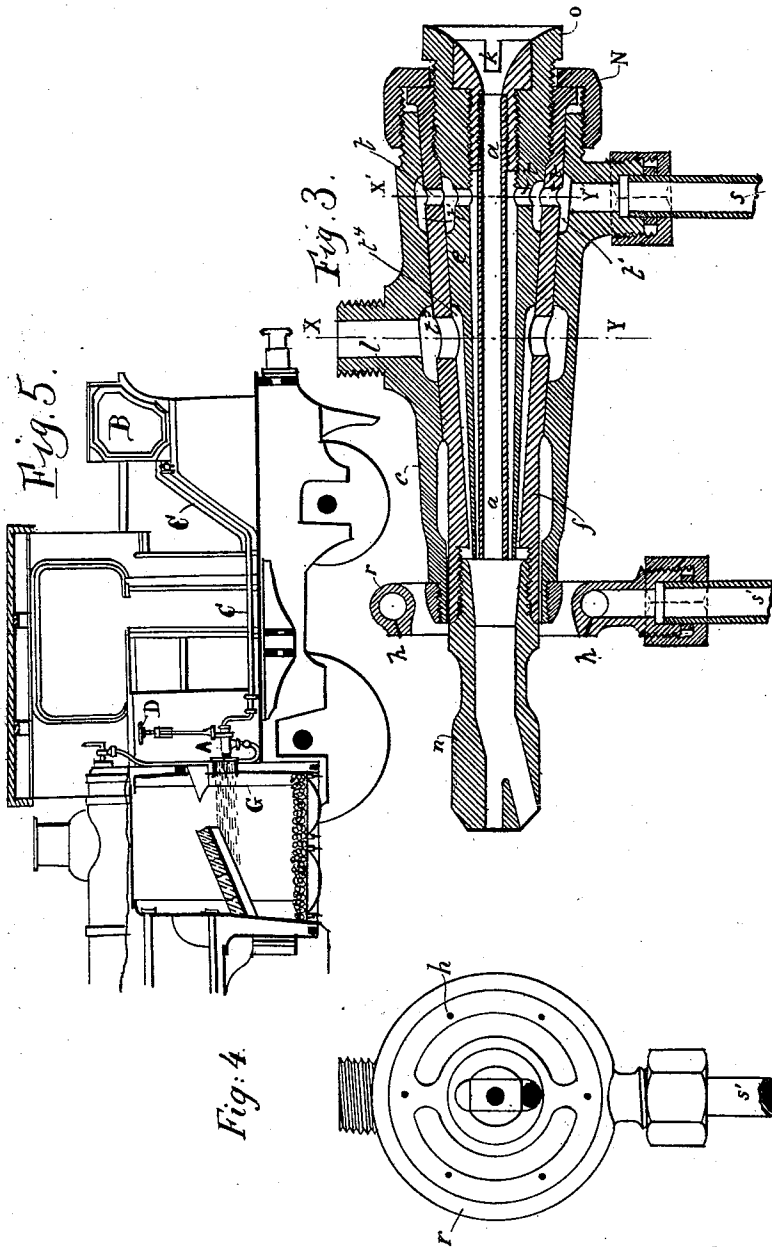
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Attest Blackwood
Wm. Clabaugh

James Holden
INVENTOR
By Charles Brown
Att'y

UNITED STATES PATENT OFFICE.

JAMES HOLDEN, OF SNARESBROOK, ASSIGNOR TO ILLIUS A. TIMMIS, JOHN C. TAITE, AND THOMAS W. CARLTON, ALL OF LONDON, ENGLAND.

INJECTOR-BURNER.

SPECIFICATION forming part of Letters Patent No. 465,268, dated December 15, 1891.

Application filed July 26, 1889. Serial No. 318,804. (No model.) Patented in England May 4, 1886, No. 7,755; in France August 2, 1886, No. 177,735; in Belgium August 3, 1886, No. 74,094; in Italy October 23, 1886, No. 20,632, and in India September 28, 1887, No. 97.

To all whom it may concern:

Be it known that I, JAMES HOLDEN, a subject of the Queen of Great Britain, residing at Hermon Hill, Snarresbrook, in the county of Essex, England, have invented certain new and useful Improvements in Injector-Burners for the Use of Liquid Fuel in the Fire-Boxes of Locomotive and other Boilers, (for which I have obtained the following patents: in Great Britain, No. 7,755, dated May 4, 1886; in France, No. 177,735, dated August 2, 1886; in Belgium, No. 74,094, dated August 3, 1886; in Italy, No. 20,632, dated October 23, 1886, and in India, No. 97, dated September 28, 1887;) and I do hereby declare the following to be a full, clear, and exact description of the invention, reference being had to the accompanying drawings, which form part of this specification.

The object of my invention is to provide a novel construction of injector-burners for injecting and burning liquid or semi-liquid fuel in the fire-boxes of locomotive and other boilers; and the invention consists in the construction, combination, and arrangement of parts hereinafter described and claimed.

In carrying my invention into effect I make the injectors as follows: There is a central supply of steam, which in the shape of a jet draws in a supply of air and liquid fuel. Each of these—steam, air, and liquid fuel—is regulated in the ordinary way; but in addition I fit to the injector a hollow ring, circular or otherwise, which is near the nozzle of the injector. This is pierced with a suitable number of small holes, the direction of the holes being placed so that the steam which issues from them acts most effectively in conjunction with the air, which it draws in on the liquid fuel, which issues from the nozzle of the injector. Thus the liquid fuel not only gets thoroughly broken up, but receives a suitable supply of air and steam, (oxygen and hydrogen,) and the maximum of combustion or heat is attained to heat the boiler. The nozzle may have one or more holes and may be of any convenient form. The tank containing the fuel may have a pipe or pipe-coil for conveying steam through it to keep the fuel as liquid

as possible. The outer ring supply of steam is also regulated, so that the regulation of all the parts enables the man in charge to keep perfect control over the working.

The following description of the drawings attached hereto will enable the injector, which is the special feature of my invention, and the other parts to be understood.

Figure 1 is a top view, and Fig. 2 is a rear view, of the injector. Fig. 3 is a longitudinal section. Fig. 4 is a front end view of the front or extra steam-injector ring, and Fig. 5 is a vertical longitudinal section of a tank-locomotive to which the liquid-fuel injector is applied.

s is the steam-inlet, *a* the air-inlet, and *l* the liquid-fuel inlet. The working of these three supplies is in accordance with well-known practice. Each supply is easily regulated by a suitable cock.

The principal feature in my invention is the extension of the steam-supply pipe *s'* into the ring *r*, from which the steam issues through the holes *h* in the direction of the dotted lines *i*. (Shown in Fig. 1.) It will be seen that this steam-supply draws in a supply of air from all round the ring *r*, and this steam-supply and consequent air-supply are also regulated and impinge on the central supply of liquid fuel, air, and steam as they issue from the nozzle *n*.

The injector is held in position by the bar *b*, to which it is fastened, as shown.

The rear end view, Fig. 2, and Fig. 3 show indents *k*, which are for the purpose of removing the central air-inlet when taking the apparatus to pieces.

The whole of the internal parts of the injector can be removed from the outer casing *c* for the purpose of repairing, examining, or cleaning the apparatus by simply unscrewing the large union nut *N*. The central air-inlet *a* and the concentric steam-nozzle *e* can be removed in a similar manner from the surrounding liquid-fuel nozzle *f* by simply unscrewing the nut *O*. Both these operations can be effected without the whole apparatus having to be taken away from the boiler.

Having now described the nature and ob-

ject of my invention and the way in which the same may or can be effected, I wish it to be understood that what I claim is—

In a hydrocarbon-burner, the combination,
5 with an injector provided with separate internal passages for air, steam, and liquid fuel, a combining-chamber, and a discharging-nozzle, of a hollow perforated ring connected to a steam-supply pipe, said ring being situated
10 entirely outside the injector and surrounding the discharging-nozzle of the same, an air-space being left or provided between the ring

and the said discharging-nozzle, substantially as and for the purpose described.

In testimony that I claim the foregoing I 15
have hereunto set my hand this 28th day of May, 1889.

JAMES HOLDEN.

Witnesses:

THOMAS WILLIAM CARLTON,

J. C. TAITE,

Both of 63 Queen Victoria Street, London,
E. C.