S. L. Hay,

Exhaust Mechanism for Locomotives,

No. 13,618. Patented Oct. 9. 1855.

Fig. 4

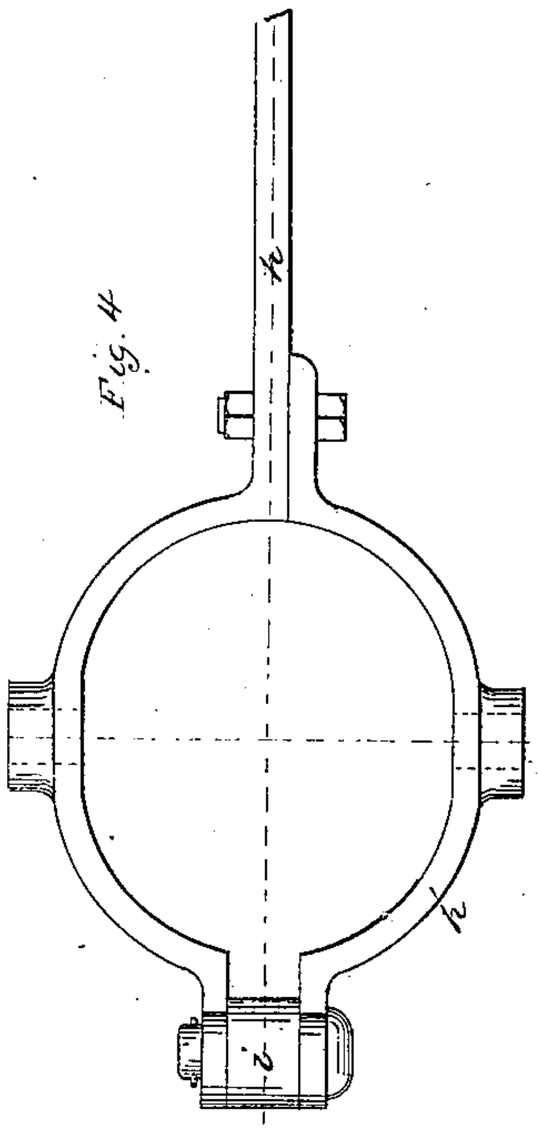

Fig. 2

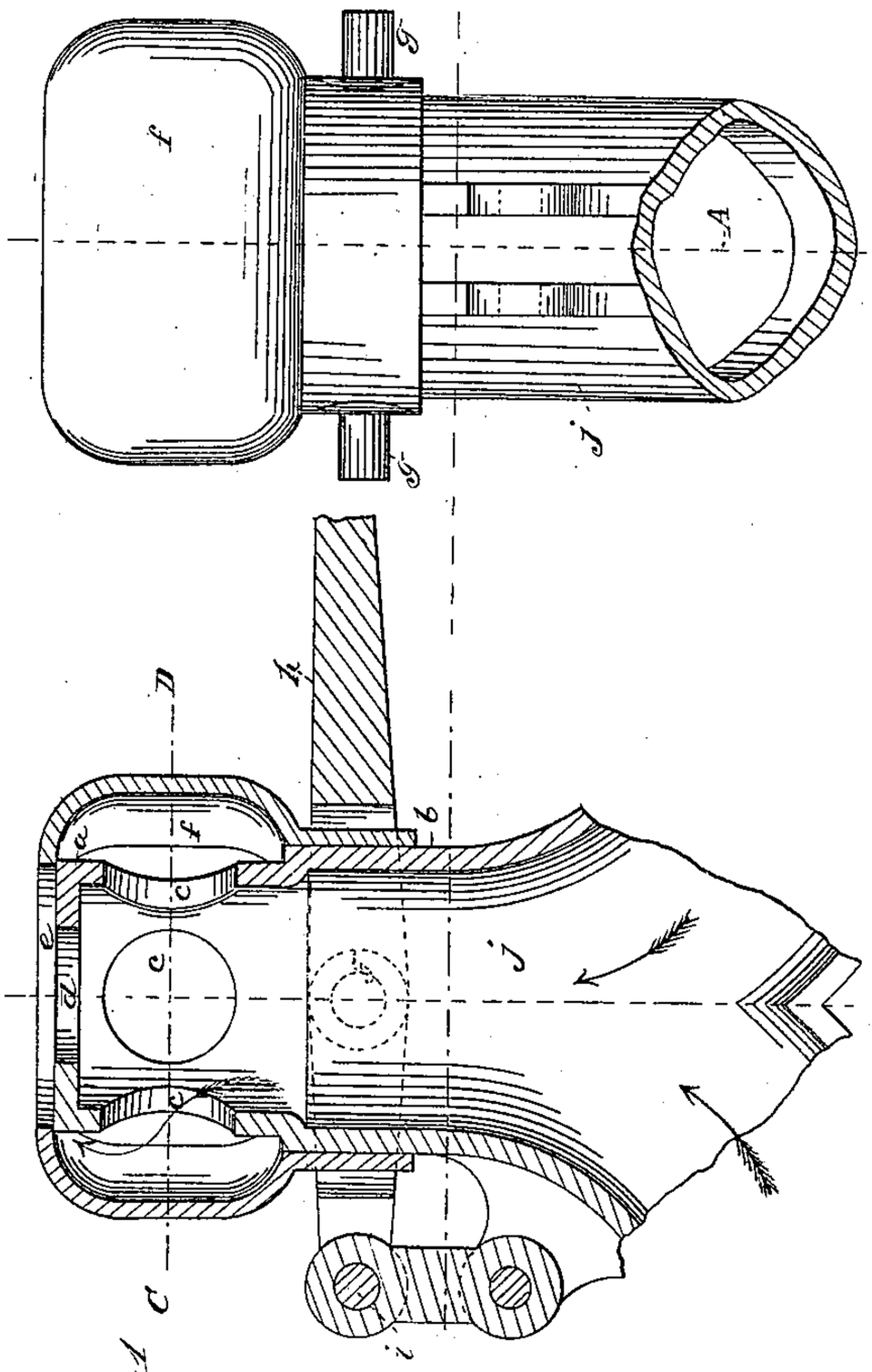

Fig. 3

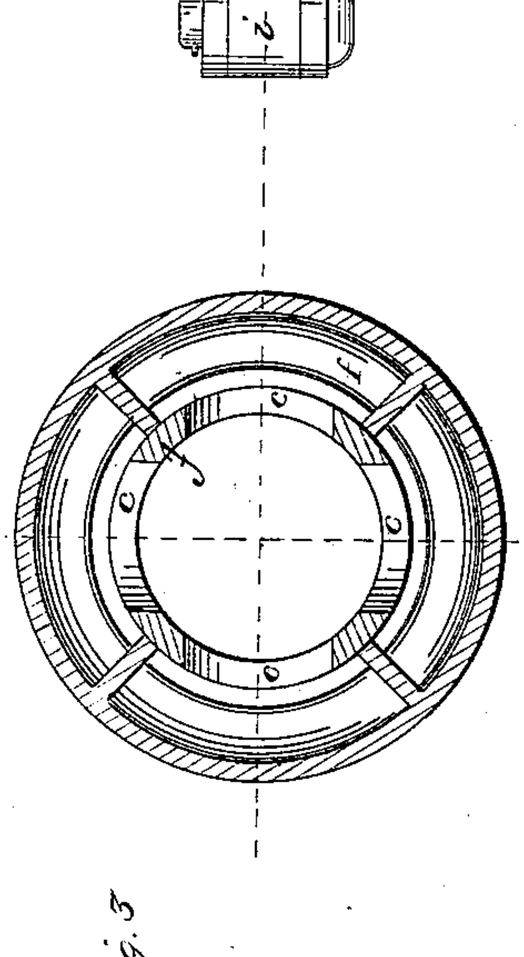

Fig. 1

UNITED STATES PATENT OFFICE.

SAML. L. HAY, OF READING, MASSACHUSETTS.

VARIABLE EXHAUST OF LOCOMOTIVE-ENGINES.

Specification of Letters Patent No. 13,648, dated October 9, 1855.

To all whom it may concern:

Be it known that I, SAMUEL L. HAY, of Reading, in the county of Middlesex and State of Massachusetts, have invented a new and Improved Mode of Regulating the Blast of a Locomotive-Engine; and I do hereby declare that the following is a full and exact description thereof.

It has long been the custom to exhaust the steam of locomotive engines in the smoke pipe through a contracted nozzle for the purpose of increasing its velocity and consequent draft through the furnace. A serious objection to this swaying nozzle is the back pressure on the piston when most steam is passed through the cylinder and most power is wanted. To remedy this difficulty and adapt the trunnions of the blast pipe to the different circumstances various devices have been used, all of which require to be opened or closed by the engineer as circumstances may demand and therefore dependent on him for regulation which is practically impossible with such devices.

The object of my invention is to make a blast pipe self regulating, that is to open with every increase of volume and close with every decrease of volume, without the aid of the engineer, the pipe *f* being acted upon in the same manner as the common safety valve will produce the desired effect.

The nature of my invention consists in making the upper part of a blast pipe cylindrical, and of two different diameters as shown at *a* and *b* Fig. 1 of the accompanying drawing with perforations in the circumference as shown at *c c c*, and also an orifice in the top as at *d*, for the constant discharge of steam. The above pipe is to be inclosed by another pipe *f*, fitting at the surface of contact in such manner that it may work up and down with freedom. Having an orifice at the top larger than that of the inner pipe, as at *e*, the difference between the area of the orifice *e* and the area of the inner diameter of the lower part of the pipe *f*, will be the amount of surface acted upon by the discharging stem to raise the pipe *f*, thereby admitting a free discharge of all the surplus steam over the amount required to produce the determined amount of back pressure.

The outer pipe is provided with two cylindric projections *g*, diametrically opposite each other to which is attached the lever *h*, having its fulcrum at *i*, and the long arm of the lever extending to the outside of the smoke-box sufficient for the attachment of a spring-balance, or other device by which to increase or diminish the back-pressure. The orifice *d* of pipe *j* should be made of such diameter as the locomotive may require for its strongest blast. By this arrangement of blast-pipe the back-pressure is constantly within the control of the engineer, the pipes *f* and *j* may be made of cast-iron, or such other suitable material as the constructor may desire; a horizontal section of the pipes may be of some form other than a circle, but I prefer the circle.

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

The application of a self regulating and adjustable blast-pipe to a locomotive engine, as herein described, or such modification of it as shall be substantially the same.

SAML. L. HAY.

Witnesses:

JOHN EATON,

S. B. TAYLOR.