

C. W. Baldwin.

Air Engine.

No 55,601.

Patented June 19, 1866.

Fig 4.

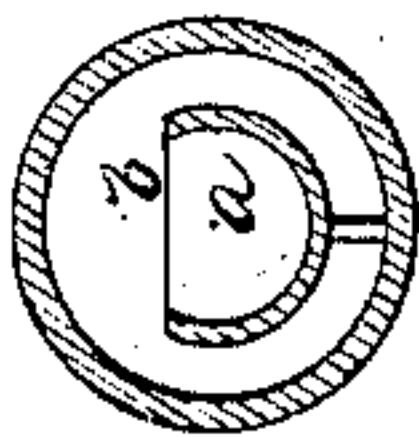


Fig 2.

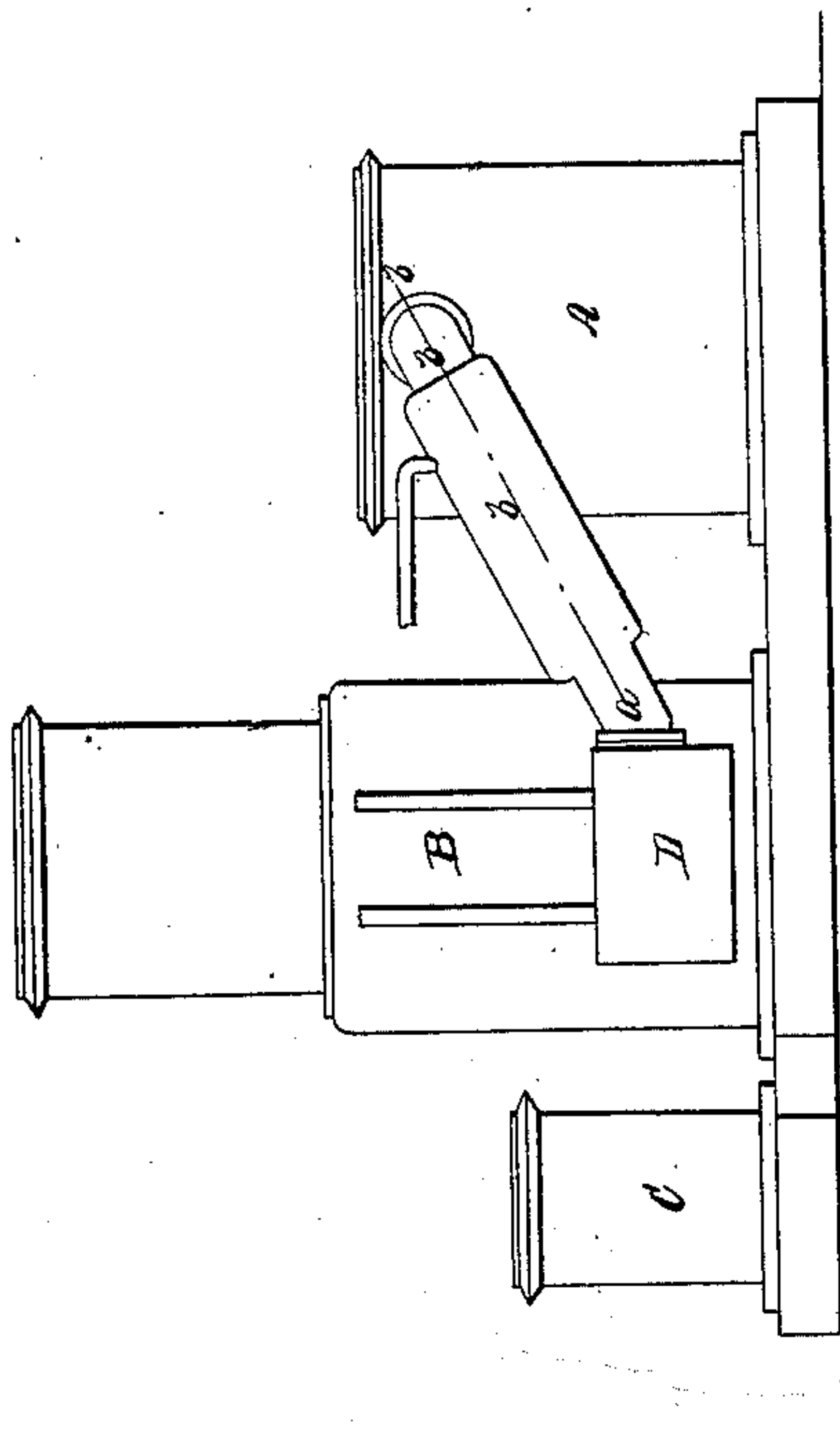


Fig 3.

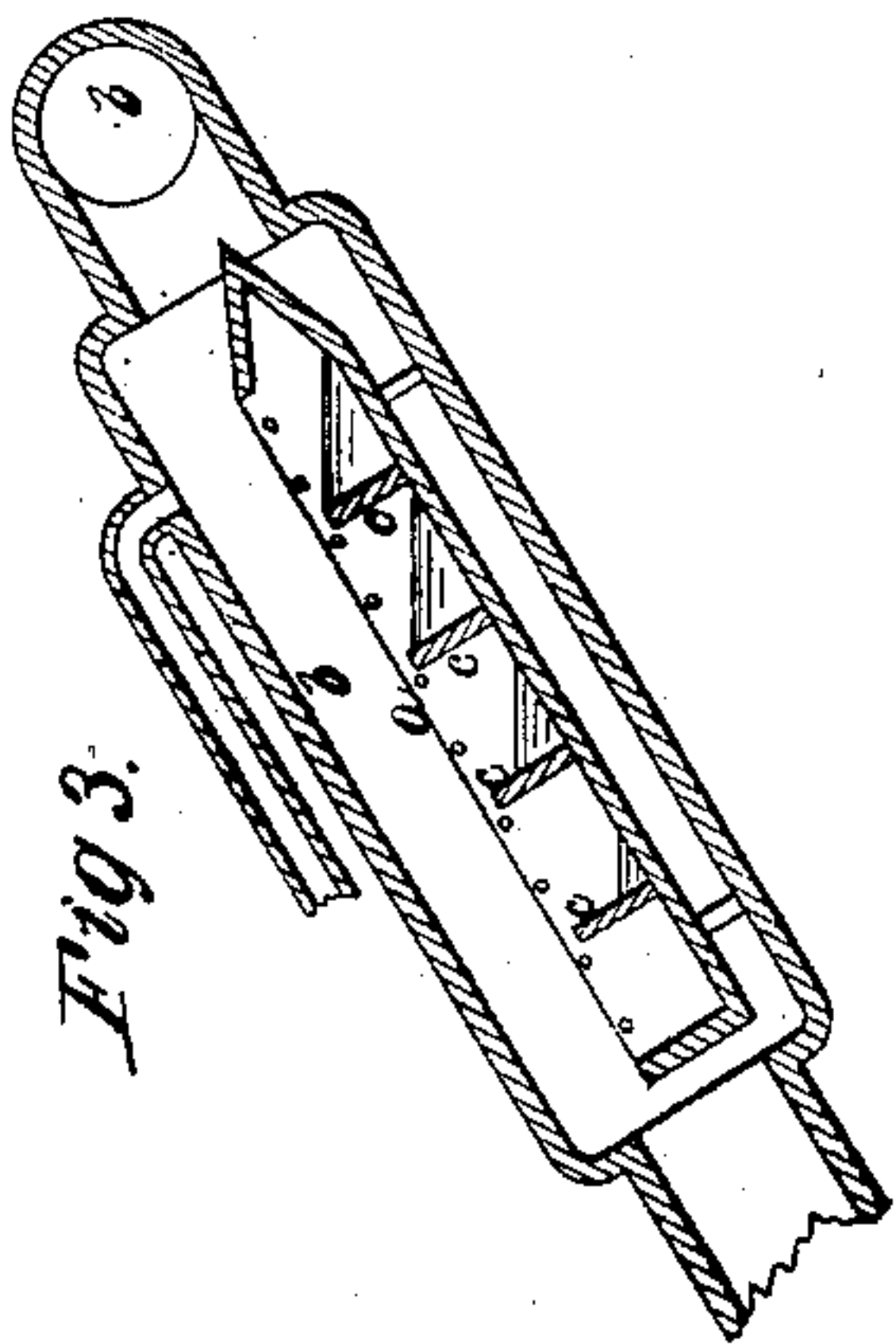


Fig 5.

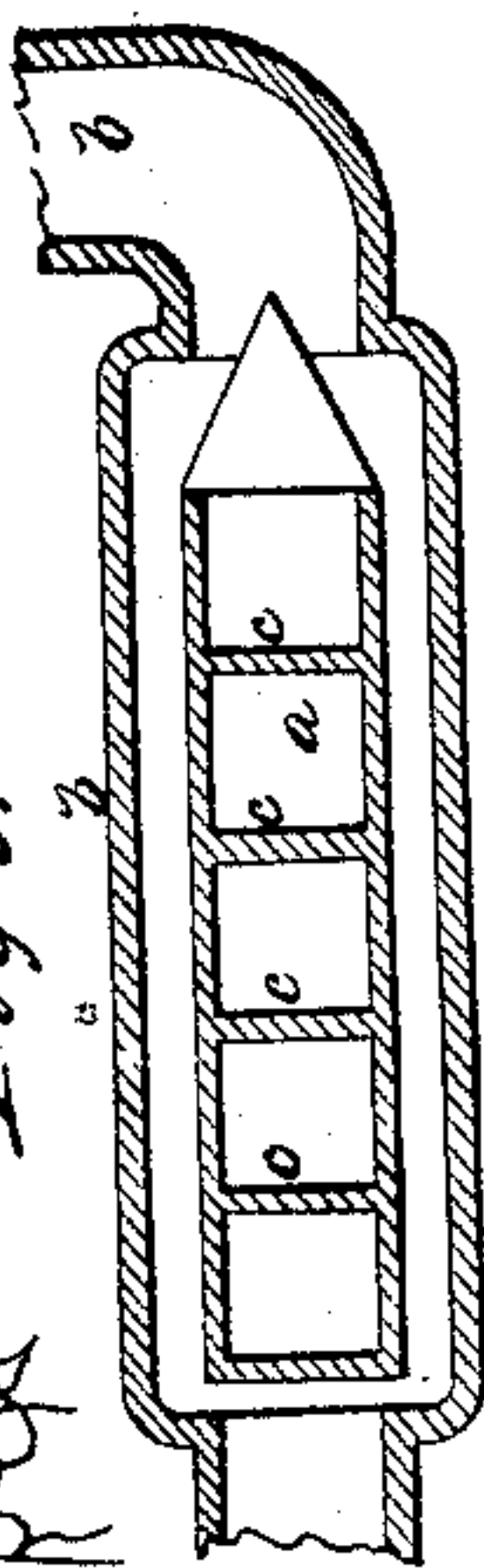
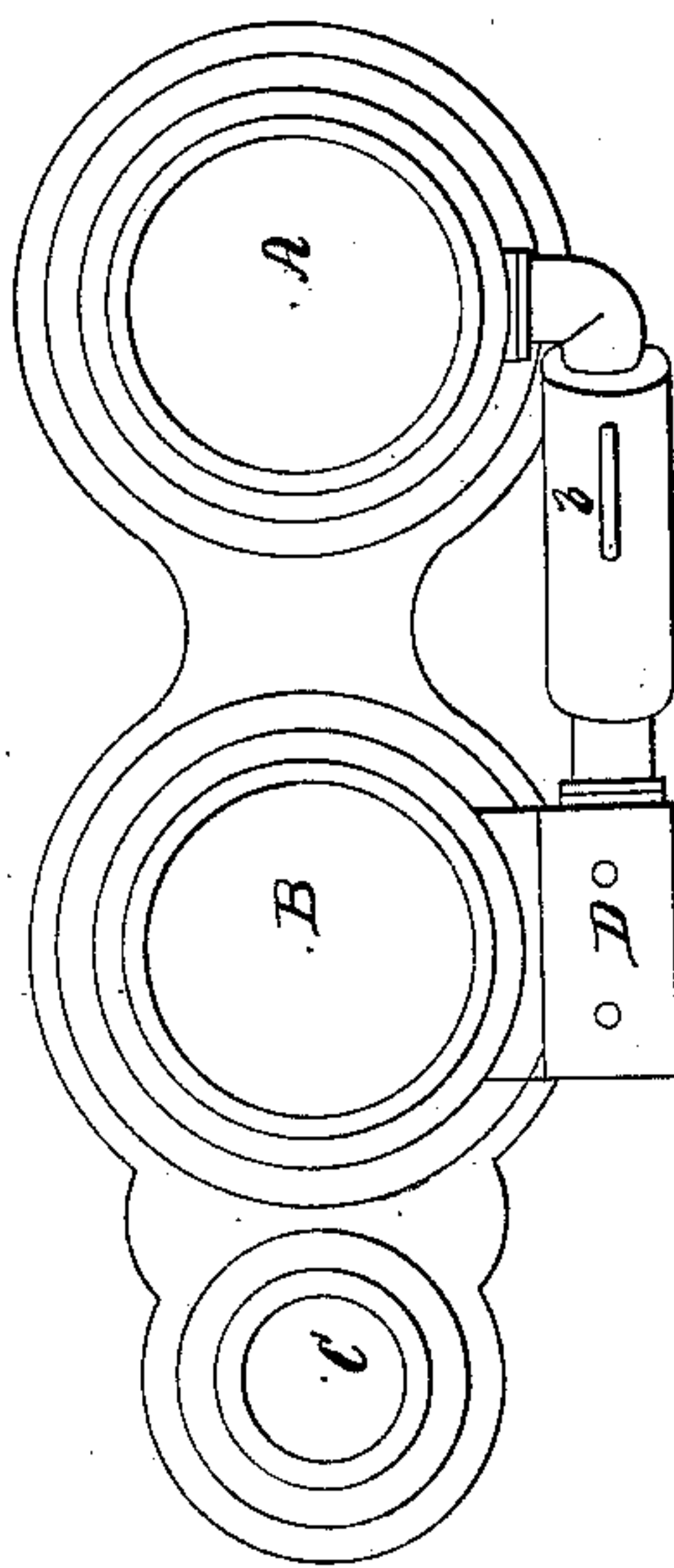


Fig 1.



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CYRUS W. BALDWIN, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN HOT-AIR ENGINES.

Specification forming part of Letters Patent No. 55,601, dated June 19, 1866.

To all whom it may concern:

Be it known that I, CYRUS W. BALDWIN, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Heated-Air Engines; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, and in which—

Figure 1 is a top view or plan, and Fig. 2 a side elevation, of part of a heated-air engine containing my invention. Fig. 3 is a vertical and longitudinal section, and Fig. 4 a vertical and transverse section, of the hot-air duct and vaporizing-trough, to be hereinafter explained. Fig. 5 is a lateral section of such pipe on line *a b* of Fig. 2.

Heretofore in the construction and operation of heated-air engines a formidable objection has been experienced in the burning out or destruction of the induction and eduction valves, as well as other parts of the engine, from the intense heat required to drive it at high pressure. In running the engine at its highest power or pressure the heat must necessarily be increased to a great degree, consequently increasing the consumption of fuel and tending to ultimately destroy different parts of it.

My invention has for its object to obtain the highest power of the engine (if not to greatly increase its power from that which can be obtained from the employment of heated air alone) without any increase of heated air or consumption of fuel from that required to run it at a limited pressure or rate of power, or, in other words, to reduce the temperature or keep it at a moderately-low point and at the same time increase the power or pressure of the heated air required to drive the engine, and, as a consequence, keep the valves, as well as the cylinder and other parts, comparatively cool and prevent their "scaling" or being burned out and destroyed.

The invention consists in combining with the air-duct which leads from the fire-box to the valve-chamber a vaporizing-trough for containing water and converting it into vapor or steam by means of the hot air from the fire, which vapor or steam combines with the hot air and passes with it into the valve-chamber

of the engine and increases its pressure or power without increasing its temperature.

When little power is required of the engine it will be desirable to use very little if any vapor, as the heated air will be sufficient with a moderate amount of fire in the fire-box. When more power is required water may be admitted to the trough in sufficient quantities to effect the desired result, varying in quantity with the required increase of power, as it will, of course, be understood that the more water admitted to the trough the greater the quantity of steam produced.

The quantity of water required will be very small, probably not to exceed at any time a column one-half a cubic inch in volume for a four-horse-power engine, and its rate of admission may be adjusted by a regulator attached to the engine and connected with the pump which supplies the water.

It is obvious that the amount of steam may be increased to any extent by increasing the radiating or heating surface of the trough.

This vaporizing-trough may be made of cast-iron, pure copper, or carbon, such as is deposited in gas-retorts, or wrought-iron or steel, or even fire-brick, may be employed for this purpose, the object being to obtain a material which shall withstand the greatest amount of heat in connection with the water or vapor. The upper surface of the trough may be punctured with a number of small holes, inclining at an angle toward the surface of the water, in order to direct jets of heat directly thereto.

I do not intend in this specification to confine myself to any particular form of vaporizing-trough or mode of heating the water admitted about the hot-air duct, the more important feature being its location—that is, between the fire and the valve-chamber of the engine.

As shown in the accompanying drawings, it is a semicircular or partially-cylindrical trough, *a*, placed within the hot-air duct *b*, and stands at an angle to the horizon of forty-five degrees, or thereabout, and has a number of partitions, *c c c*, &c., extended across it, as represented. The water, being admitted into the upper end of the trough, will flow over the successive partitions and be held partially suspended, as it were, in the current of hot air flowing from the fire-box. Before reaching the bottom of the trough the water will have been

entirely converted into steam or vapor, and, mixing with the hot-air current in its passage to the cylinder of the engine, will greatly increase its pressure or power without increasing its temperature.

When the engine is at rest no steam will be formed, because the water, being admitted in regular jets, is entirely vaporized at each stroke of the engine. As soon, however, as the engine is started the current of hot air, impinging against the trough, vaporizes the liquid injected into it. The trough may be pointed at either or both ends to allow the air to more readily pass around and in contact with its surface.

The air-duct above and below the vaporizing-trough should be contracted so as to present about the same internal area as that portion of it which surrounds the trough.

The fire-box of the engine is represented at A, the cylinder at B, the forcing-pump at C, and the valve-box at D, as they are constructed and arranged in the ordinary manner. Only their comparative locations and external forms are exhibited in the drawings.

If desirable, the exhaust air from the engine may be used to heat the water previous to its introduction to the vaporizing-trough.

Instead of the vaporizing-trough, as above described, for generating vapor, I have contemplated the employment of a wire-gauze or perforated diaphragm or shelf, to be placed within the air-duct.

I am aware that in an English patent granted to Sir George Caley in the year 1837 water

was introduced in jets upon the top of the fire to produce steam for the purpose of starting the engine. It is evident that there are great objections to this, one being that the fire is soon deadened and put out, another that the ashes and dirt are raised in quantity from the fire and carried into the air-duct and valve-box, while by my mode of applying the water the tendency is to allay any dust which may escape into the hot-air duct.

I am also aware that steam from a steam-boiler has been introduced directly into the valve-box, and from there passed into the cylinder, as shown in patent numbered 33,497, and dated October 15, 1861, and consequently I lay no claim to such.

What I claim as my invention is—

1. A vessel or reservoir placed between the furnace and the working-cylinder, into which jets of water are introduced at certain intervals and in regulated quantities, for the purpose specified.

2. The combination of the vaporizing-trough, or its equivalent, with the hot-air duct, essentially as above set forth.

3. The peculiar construction of the trough *a*, as made pyramidal or pointed at one or both its ends, and with the partitions *c c c*, in manner and to operate as before set forth and explained.

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Witnesses:

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