

No. 9,327.

PATENTED OCT. 12, 1852.

W. KIDDER.
GAS ECONOMIZER.

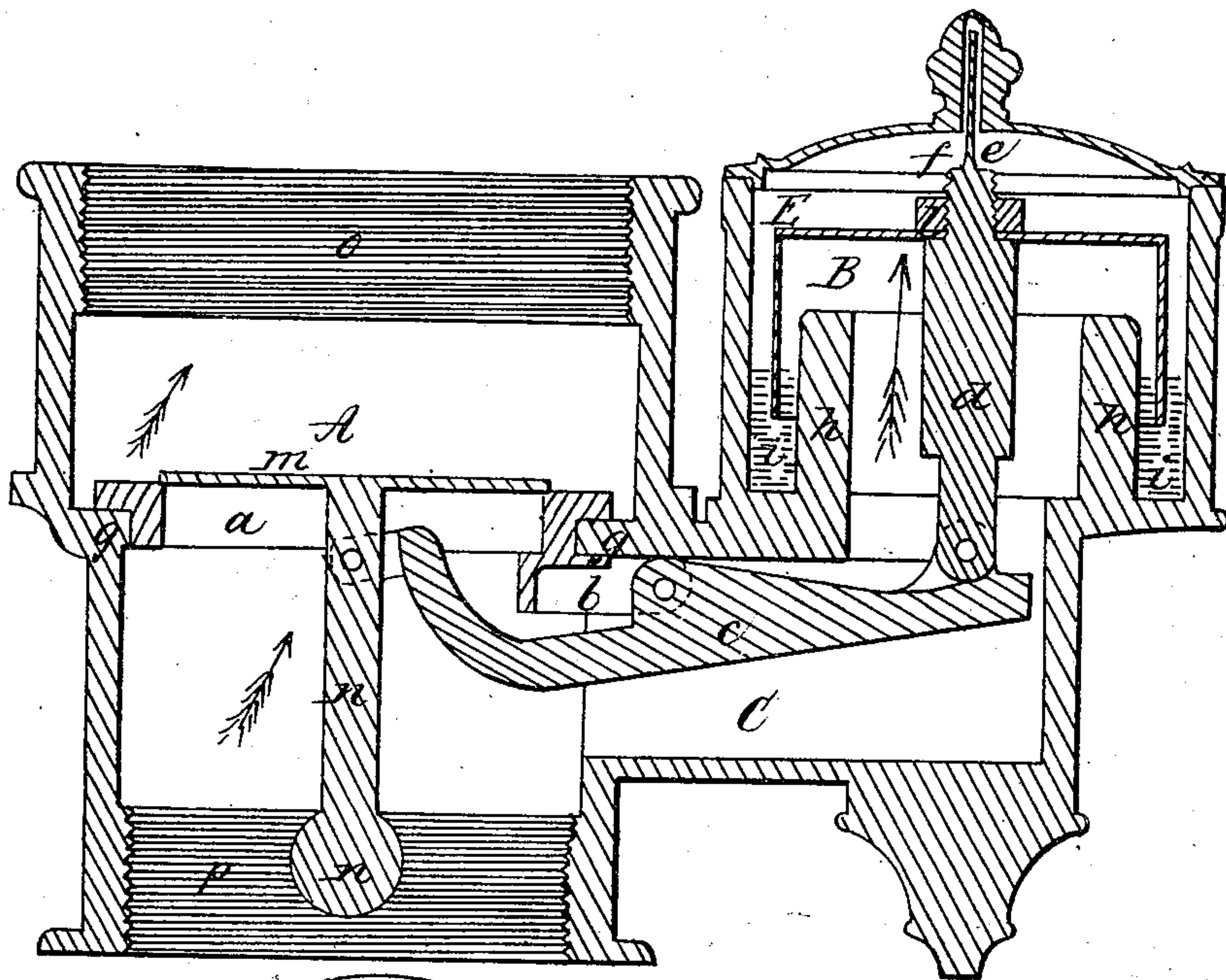


Fig. 1.

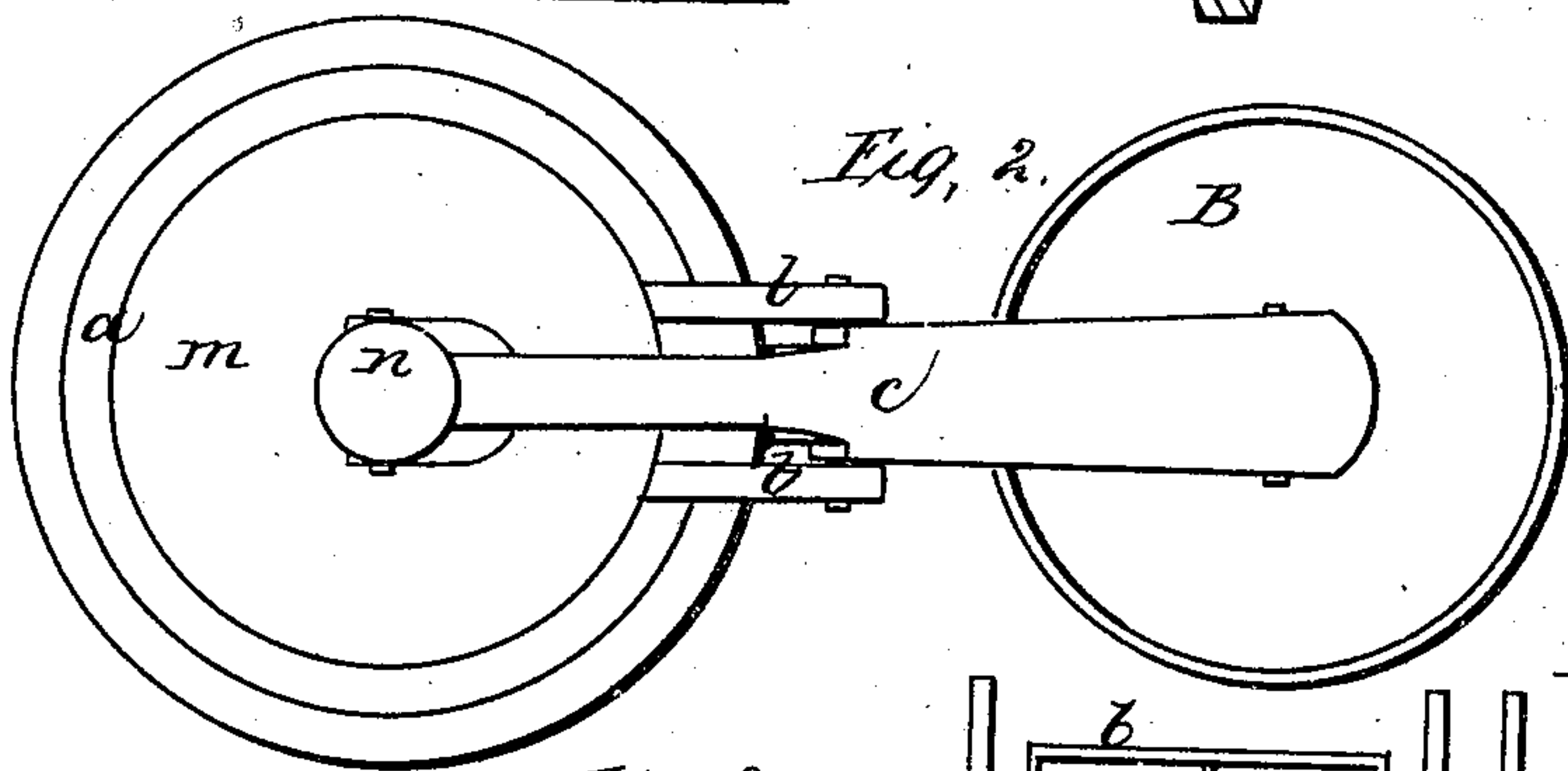


Fig. 2.

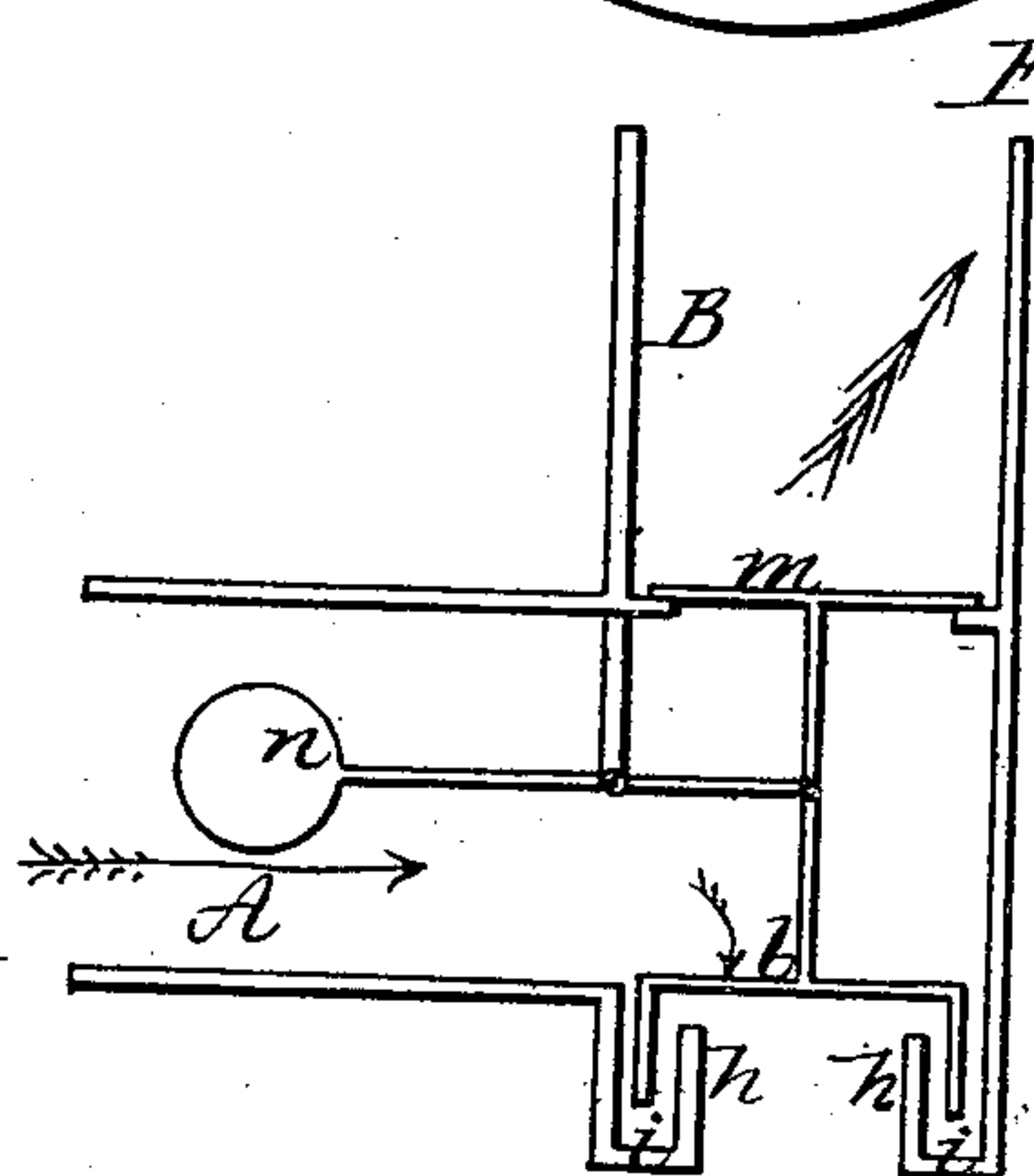


Fig. 3.

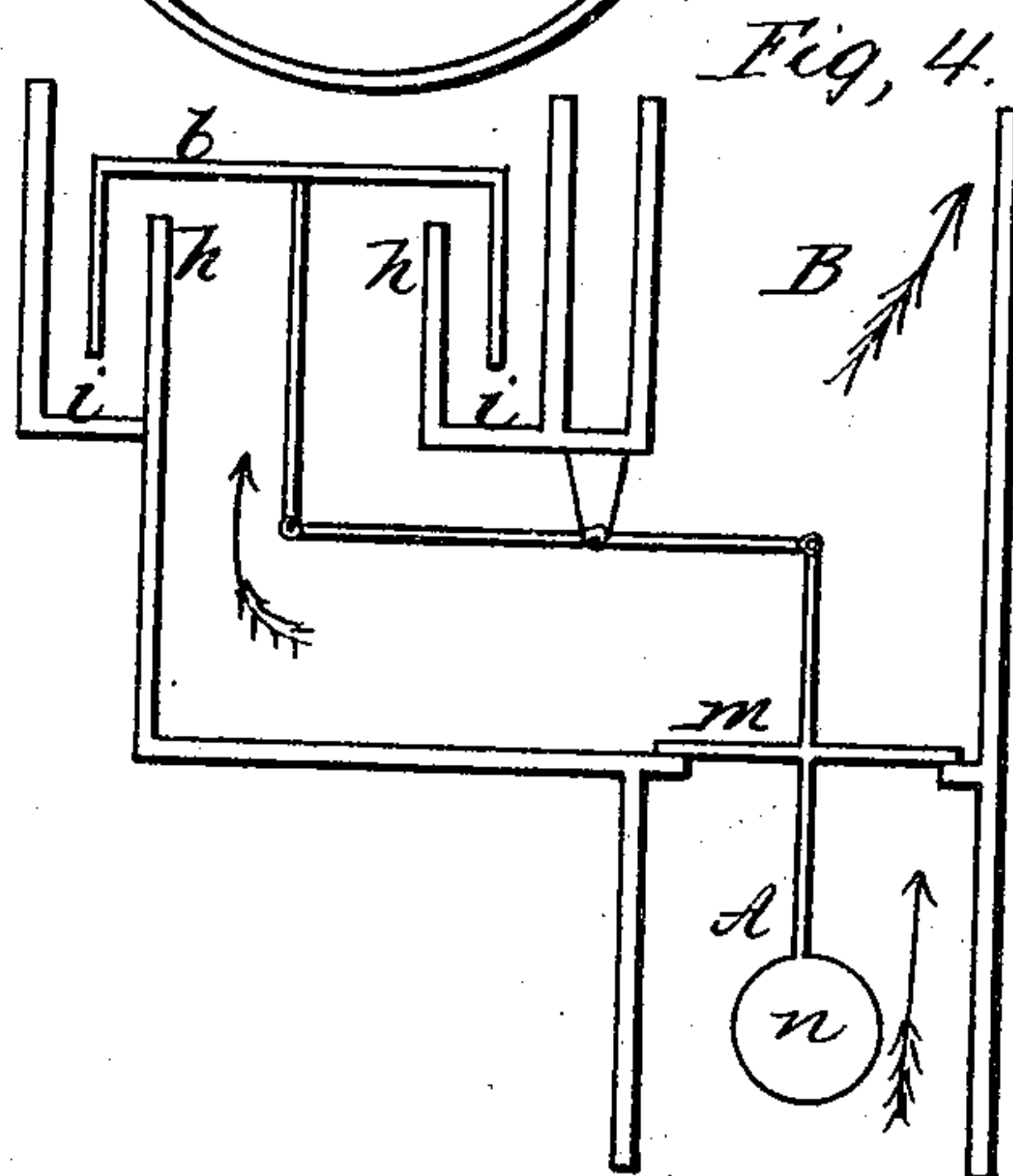


Fig. 4.

UNITED STATES PATENT OFFICE.

WALTER KIDDER, OF LOWELL, MASSACHUSETTS.

GAS-REGULATOR.

Specification of Letters Patent No. 9,327, dated October 12, 1852.

To all whom it may concern:

Be it known that I, WALTER KIDDER, of Lowell, in the county of Middlesex and State of Massachusetts, have invented a new and Improved Gas-Economizer; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

Figure 1, is a longitudinal vertical section, through the center, of my improved economizer; and Fig. 2, a view of a part detached.

Like letters, refer to like parts, in both figures.

I construct a case composed of two vertical compartments A and E, communicating with each other by means of an aperture C. I attach the lower end *p*, of the compartment A, to the main by a suitable connection, and the upper end *o* of the same compartment, to the pipe, which feeds the burners. The inside of the said compartment is furnished with a shoulder *g*, upon which rests a valve seat *a*. On one side of said valve seat is a projection *b*, extending down into the aperture connecting the two compartments of the case. I suspend, by a joint, from this projection, a lever *c*, by its center, in such a manner that its ends will vibrate freely up and down. To one end of said lever I attach a valve *m*, by a joint, and to the other end, by a joint, an arm *d*, which ascends up through the center of the compartment E. The valve *m*, which fits upon the valve seat *a*, is provided with a weight *n*, in order to keep the valve in a horizontal position, and to counterbalance a portion of the superabundant weight resting upon the other end of the lever *c*. Within the compartment E, and concentric with it, rises a short tube *h*, from its bottom, so as to leave a space *i*, between the case and said tube. This space I partially fill with any suitable liquid. I prefer mercury, because it is not liable to freeze or waste away by evaporation. To the upper end of the arm *d*, I attach an air-tight inverted cup B; the superficial contents of whose bottom should be the same as of the valve *m*. The edge of this cup is to sink into the mercury contained in the space *i*, in order to prevent the escape of gas into the chamber E. I usually employ a cover *f*, for the compartment E; but it should not shut so closely as to prevent a free entrance of air into the

upper portion of the compartment. I also usually attach a small wire (or guide,) *e*, to the upper end of the arm *d*, to enter a corresponding aperture in the cover *f*, in order to keep the cup B, in a central position. I usually so shape and incline the lever *c*, that its counter end, as it descends, shall increase its horizontal distance from a vertical line passing through the fulcrum of the said lever, while the valve *m*, as it rises, will be brought horizontally nearer to a vertical line passing through the said fulcrum. The object of which arrangement for shifting the center of gravity, is to compensate for the effect of the buoyancy of the mercury exerted on the inverted cup B. This compensating arrangement is not necessary unless absolute constancy of pressure is required; and the variation of pressure without it would be slight.

It will be seen that, whatever may be the pressure of gas from the main, the pressure on the bottom of the valve *m*, and on the bottom of the cup B, will invariably be equal and balance each other since the gas always presses on two equal counterbalancing surfaces. The counterweight placed on the counter end of the lever *c*, is to be sufficient to counterbalance the whole pressure on the top of the valve *m*, produced by the desired pressure of gas per square inch in the pipe which supplies the burners. Now, it is obvious that, as the pressure above the cup B, is only that of the atmosphere, any amount of pressure of gas above the valve *m*, being additional to that of the atmosphere, will tend to shut said valve; and, as soon as it exceeds the pressure determined by the counterweight, it raises the counterweight and partially or entirely closes the valve, and, when it becomes less than the counter weight, the valve opens again.

The operation of the valve in practice is, to keep constantly open, only vibrating slightly as the varying number of burners lighted requires a larger or smaller aperture to supply the requisite amount of gas to keep the pressure constant at the burners, however variable in number. This will economize the gas as well as produce a more brilliant and equable light. I have found by experience that, common coal gas will furnish 100 per cent. more of light, when burnt with a proper pressure, (which is ascertained to be about $\frac{1}{2}$ ounce to a square inch—equal to about half an inch in depth

of water,) than with a much greater or less pressure; and proportionally less as the pressure varies from that standard. The same is true, to a greater or less degree, of
5 other gases.

Figs. 3 and 4, in the accompanying drawings, are diagrams representing modifications of the application of the principle involved in the above described device; which
10 modifications may be substituted for said device.

Like letters refer to corresponding parts in both figures.

A, induction pipe; B, eduction pipe; *m*,
15 valve; *n*, counter weight; *b*, counter pressure surface; *h*, tube forming mercury cup; *i*, space for containing the mercury.

I may also add that the arms of the lever *c*, are obviously not necessarily equal in
20 length, but may be made of any relative lengths, provided the superficial contents of the valve *m*, and of the counter surface B, are always inversely proportional to the

lengths of their respective arms of the said lever.

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Having thus fully described my improved gas economizer, what I claim therein as new and desire to secure by Letters Patent, is—

The producing at all times a proper and uniform pressure of gas in the branch pipe, which supplies the burners—which will not
30 be essentially varied by the number of burners supplied, nor by the variations of pressure in the main—by means of the induction valve *m*, the vibratory lever *c*, and the
35 counterpoising inverted cup B, combined, arranged, and operating within the chamber C, of the main, substantially as herein represented and described.

The above specification of my new and improved gas economizer signed this 27th
40 day of Feb. 1852.

WALTER KIDDER.

Witnesses:

Z. C. ROBBINS,
J. S. BROWN.