

(No Model.)

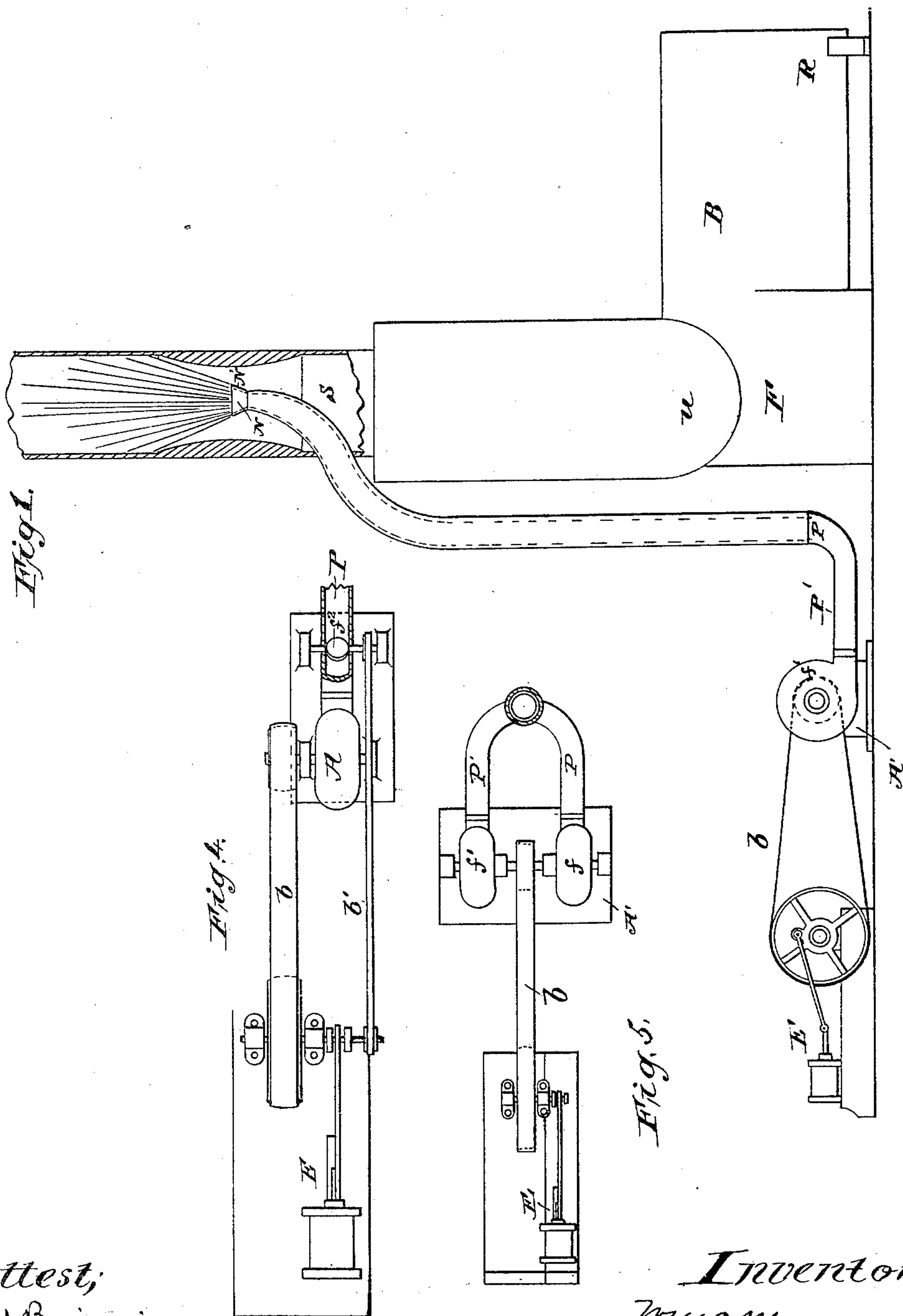
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W. C. MUNROE.

ARTIFICIAL DRAFT APPARATUS.

No. 462,214.

Patented Oct. 27, 1891.



Attest,  
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Inventor,  
W. C. Munroe  
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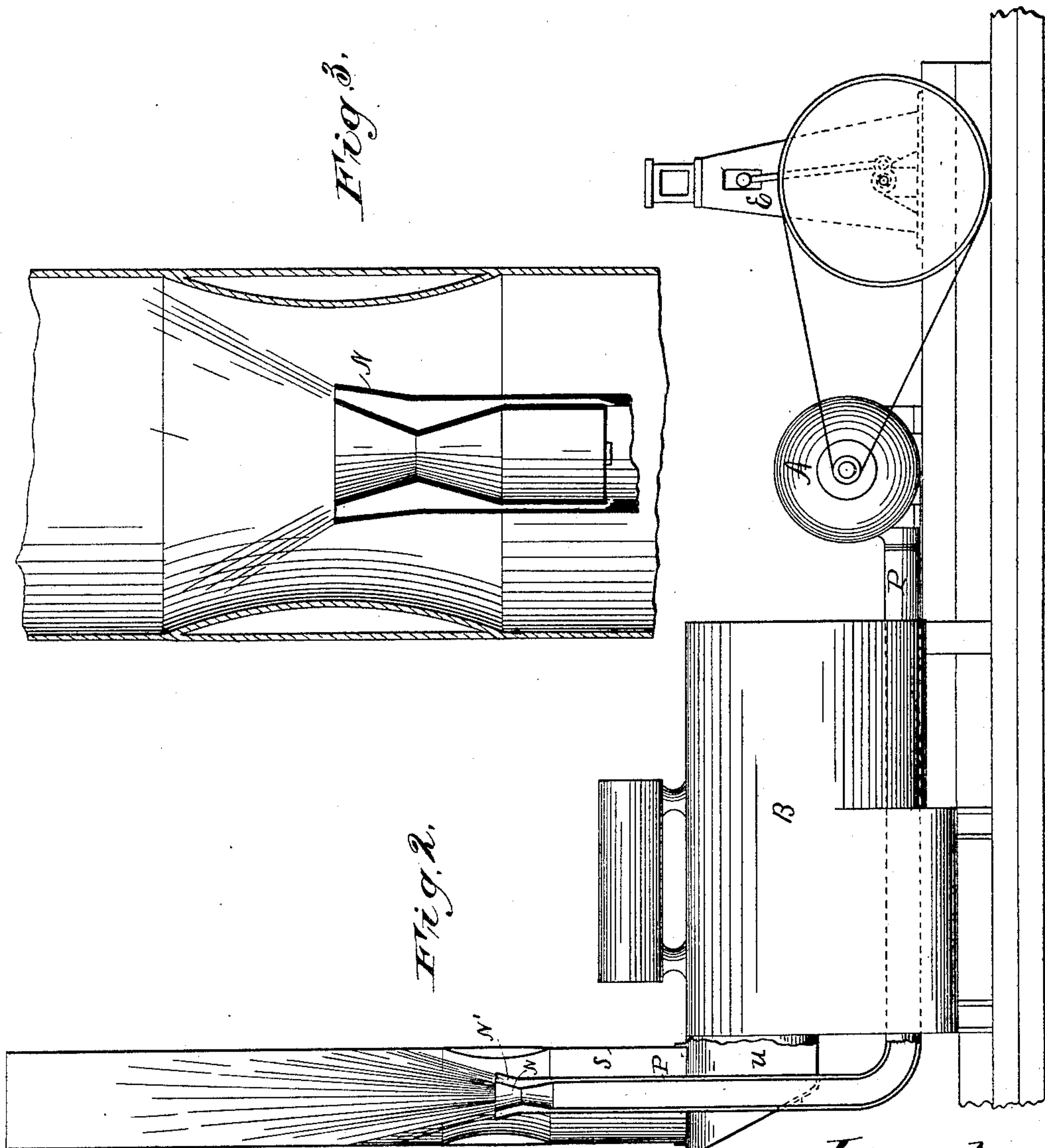
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Witnesses;  
C. W. Benjamin  
Peter H. Vermilyea

Inventor;  
William C. Munroe  
by A. J. Vermilyea  
his Attorney.



# UNITED STATES PATENT OFFICE.

WILLIAM C. MUNROE, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO  
GEORGE W. HALL, OF SAME PLACE.

## ARTIFICIAL-DRAFT APPARATUS.

SPECIFICATION forming part of Letters Patent No. 462,214, dated October 27, 1891.

Application filed September 19, 1890. Serial No. 365,494. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM C. MUNROE, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Artificial-Draft Apparatus, of which the following is a specification, reference being had to the accompanying drawings forming part of the same, in which—

Figure 1 is a representation in side elevation of an apparatus embodying my invention, a part of the stack being broken away to more clearly exhibit the parts. Fig. 2 is a side elevation, partially in section, of such an apparatus with the devices in slightly different arrangement. Fig. 3 is a central vertical sectional view of a portion of the stack and a single nozzle. Fig. 4 is a plan view of a modification whereby the draft is made to operate intermittently. Fig. 5 is a plan view of a double blower arranged to operate the apparatus, one blower leading to one nozzle and the other blower to the other nozzle, that the two jets (when two are used) may be operated independently.

"Forced draft," as it is called, is very generally and commonly employed to increase the heat derived from the combustion of fuel within a fire-box of a given magnitude, and this it does successfully accomplish as now practiced; but the great difficulty with the apparatus ordinarily employed is that it lacks economy in the consumption of fuel. Greater heat, it is true, is developed in a given space, but a much greater quantity of fuel is required for such development, and many other inconveniences arise when the draft is forced from a point at or near the fire-box and on that side nearest the firemen. I have discovered, however, that by leading the nozzle of a blower into the stack-opening beyond the flues (if in a boiler) or equivalent position, and, preferably, but a short distance therefrom, and contracting the draft-passage at or near that point, particularly when a double-jet nozzle is used, I attain the accelerated movement of air and gases (the increased or forced draft desired) without the objectionable features named, and in particular that by so doing I can still at the same time prac-

tice that economy in the consumption of fuel so much to be desired.

In the drawings, B represents a boiler, which may be of any ordinary construction. Here it is a return-flue boiler, the draft-passage being from the fire-box end F to the rear end R, back to the uptake U, and into the stack S, which is contracted, as shown, by means of pieces set in, though the location of such contraction might be slightly varied without departing from the spirit of the invention, and it might be accomplished by contracting the diameter of the stack itself.

A is the blower, provided with a fan  $f'$ , driven by belt  $b$ , leading from engine E. From said fan a delivery-pipe  $P'$  leads into the stack S and terminates in a nozzle  $N'$ , located therein, preferably centrally, and in this figure with its mouth at the line of greatest contraction of stack S. Within  $P'$  is a second pipe P, (indicated by dotted lines,) leading to a second nozzle N, located concentrically within nozzle  $N'$ . If preferred, a double fan, as shown in Fig. 5, may be used, connected, respectively, to pipes P and  $P'$ , instead of one fan for both pipes.

The apparatus of Fig. 2 is substantially similar to that explained, the difference being that the blower (here a single one) is located on the side of the boiler opposite that on which the stack is located, and the delivery-pipe leads lengthwise of the boiler into and through the uptake and to the nozzles, which are located as heretofore described.

At times it may be found to be advisable to have the forced draft to act intermittently, and to that end, as shown in Fig. 4, I have arranged a butterfly-valve  $f^2$  in the supply-pipe P, with its shaft extending through the wall thereof and provided with a pulley, from which a belt passes to the engine E. Twice during each complete revolution of valve  $f^2$  the supply-pipe P will be almost closed, the wings of valve  $f^2$  fitting loosely, and twice it will be fully open, and the result will be an intermittent action such as is desired. Other means might be adopted to accomplish this result.

My method of forcing the draft may be advantageously used in combination with the ordinary method of blowing air directly into



the furnace; but I prefer it as herein represented.

The operation of the apparatus is obvious. Fire being started in the fire-box, the engine  
 5 E is put in motion and at once the fan produces a current of air or currents of air, which, passing through the delivery-pipes P and P', escape at the nozzles N and N', that  
 10 from N' particularly impinging upon the inner surface of the stack, where the friction is greatest. The effect is of course to cause or tend to cause a partial vacuum in S, at the  
 15 rear of the nozzles, which necessarily increases the difference of atmospheric pressure at the different ends of the draft-passages of the boiler. Air enters the fire-box with an accelerated movement and a forced draft is produced. Decreasing the cross-area of the stack  
 20 at the point where the nozzle is located, together with the action of the blast issuing therefrom, increases the velocity of the movement of air at that point, as must be manifest, and to this increased velocity much of  
 25 the admirable effect produced may be attributed. Indeed the action is that of drawing air through the fuel (the natural way) as distinguished from blowing it through, (the common artificial way,) and to do this effectively and with economy it is essential to employ  
 30 an apparatus substantially such as I have described.

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

35 1. An improved forced-draft apparatus consisting of the combination, with the draft-exit of a furnace, of a nozzle located in the exit beyond the fire-box, a delivery-pipe leading to said nozzle, and means, substantially as de-

scribed, for intermittently forcing air into and through said delivery-pipe, substantially  
 40 as set forth.

2. An improved forced-draft apparatus consisting of the combination, with the draft-exit of a furnace contracted beyond the fire-box,  
 45 of two nozzles concentric with each other, located at said contraction within the draft-exit, delivery-pipes respectively leading to said nozzles, and means for forcing air into and through said delivery-pipes and nozzles,  
 50 substantially as set forth.

3. An improved forced-draft apparatus consisting of the combination, with the draft-exit of a furnace contracted beyond the fire-box,  
 55 of two nozzles concentric with each other, located at said contraction within the draft-exit, delivery-pipes respectively leading to said nozzles, each provided with a separate device for forcing air into and through it and its respective nozzle, substantially as set forth.

4. An improved forced-draft apparatus consisting of the combination, with the draft-exit of a furnace contracted beyond the fire-box,  
 60 of two nozzles concentric with each other with their mouths opening at different angles located at said contraction, delivery-pipes respectively leading to said nozzles, and means  
 65 for forcing air into and through said delivery-pipes and nozzles, substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 12th day of  
 70 September, A. D. 1890.

WILLIAM C. MUNROE.

Witnesses:

A. G. N. VERMILYA,  
 PERCY S. VERMILYA.