(No Model.) 2 Sheets—Sheet 1.

B. F. EVANS.

AIR FORCING APPARATUS.

No. 517,039. Patented Mar. 27, 1894.

Fig 1

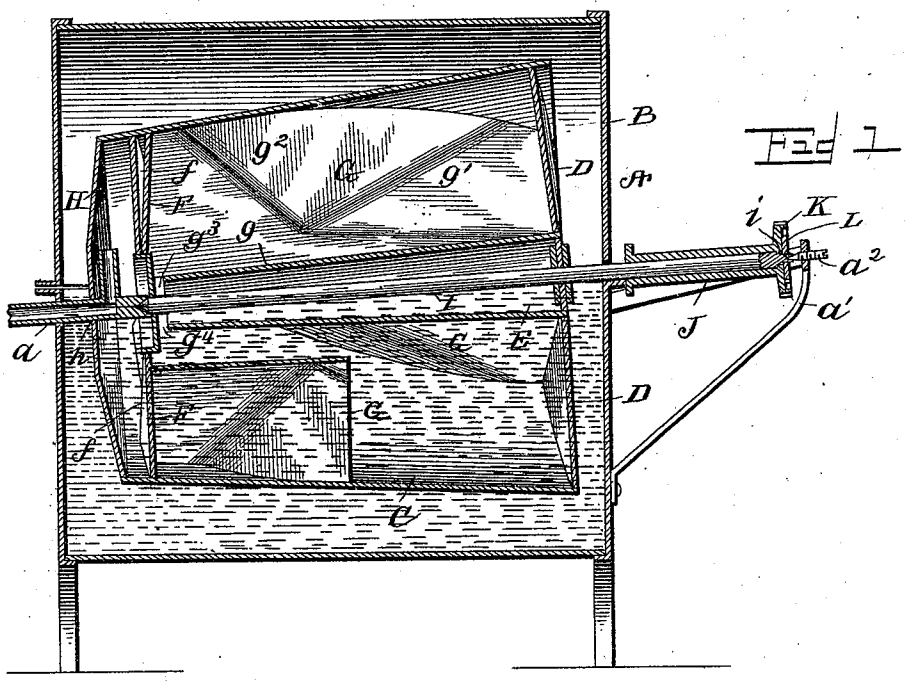
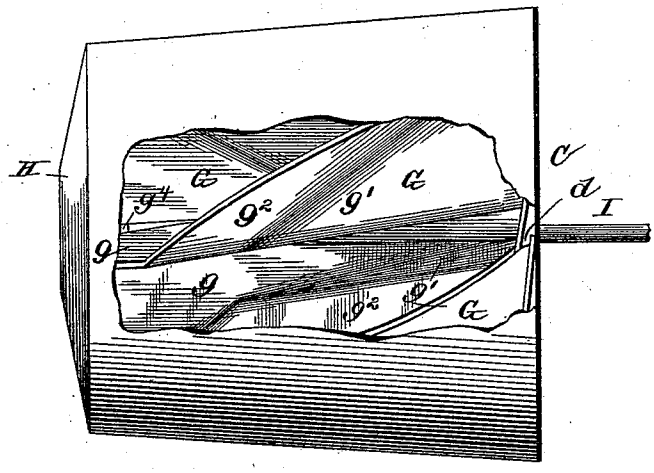


Fig 2



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(No Model.) 2 Sheets—Sheet 2.

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Fig 3

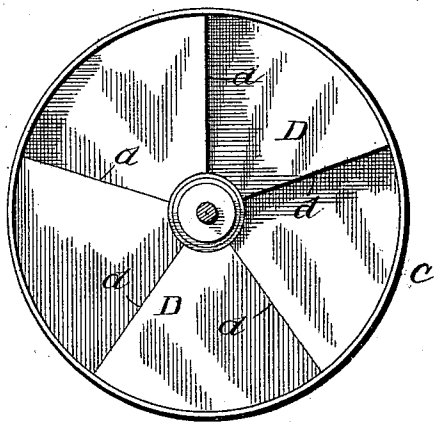


Fig 4

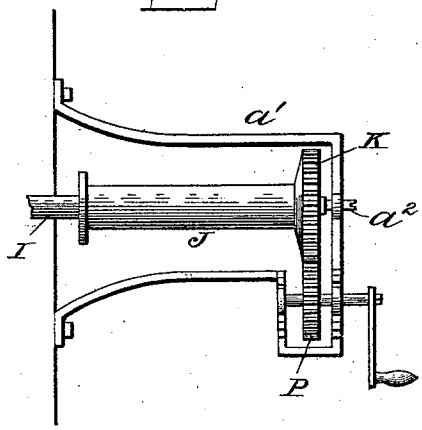


Fig 5

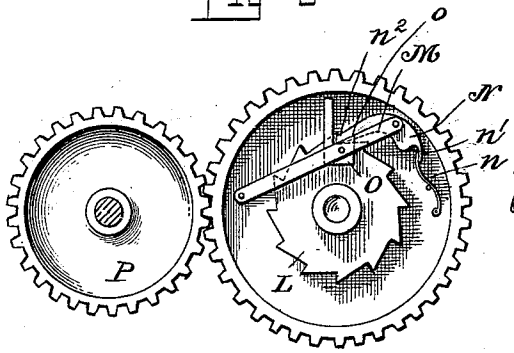
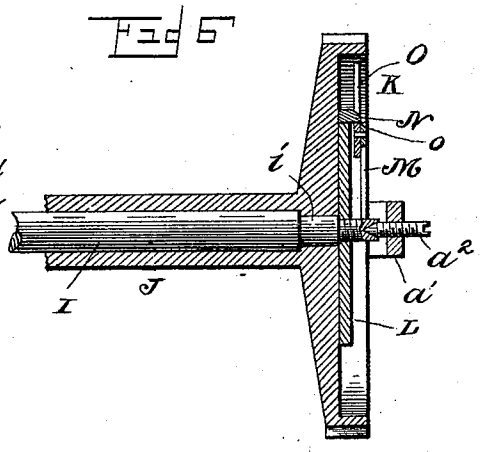


Fig 6



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UNITED STATES PATENT OFFICE.

BENJAMIN F. EVANS, OF NEWTON, KANSAS.

AIR-FORCING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 517,039, dated March 27, 1894.

Application filed August 16, 1892. Serial No. 443,278. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN F. EVANS, a citizen of the United States, residing at Newton, in the county of Harvey and State of Kansas, have invented certain new and useful Improvements in Air-Forcing Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to certain new and useful improvements in rotary air-forcing apparatus more especially designed as an air pump to be used in the manufacture of illuminating gas for the purpose of injecting air into the gas pipe as the gas is conducted from the generator to the point where it is stored or consumed, and it consists in the novel construction and arrangement of parts hereinafter fully described and afterward definitely pointed out in the claims, due reference being had to the accompany drawings forming a part of this specification, wherein—

Figure 1 is a vertical longitudinal section of my improved machine; Fig. 2 a top plan view of the drum, a portion of the outer casing thereof being broken away; Fig. 3 an end view of the drum; Fig. 4 a plan view of the driving mechanism; Fig. 5 an end elevation of the same, and Fig. 6 a longitudinal section taken through the shaft.

Referring to the drawings the letter A, indicates the outer case or vessel provided with a removable cover B, and suitable supports. Fitted in one end of the case A, is an elbow pipe *a*, and secured at the other end is a bracket *a'*, which serves as supports or bearings for the drum shaft, as will more fully hereinafter appear. C, is the drum of the shape of a frustum of a cone. The larger end of said drum, which I will designate as the front end, is closed by a series of segmental disks D, the front end of each disk overlapping the rear end of the disk preceding it forming air and water inlets *d*. The outer edges of said disks are soldered air tight to the outer casing of the drum and their inner edges are likewise secured to the larger end of a cone-shaped tube E, centrally located within the drum.

Near the rear end of the drum C, are arranged disks F, similar in all respects to the disks D, but having the rear edge of each disk overlapping the front edge of the succeeding disk forming outlets *f*. Between the disks D, and F, are secured buckets G, said buckets being secured air tight to the outer casing of the drum and to the cone-shaped tube E, and each bucket extending from the rear edge of one of the disks D, to the front edge of one of the disks F, and by forming the tube E, of the form of a cone the blanks from which the buckets are made can be cut the same width throughout. Each bucket extends diagonally from the front to the rear of the drum and at its inner edge where it is joined to the tube E, forms a tangent to said tube, as at *g*. Its front end is then bent outward radially forming a triangular face *g'*, and is again bent outwardly at an obtuse angle forming a triangular face g^2, the inner end of the bucket forming a third substantially triangular face g^3. The blades constructed as described enable the same to strike the water at an incline and dip first at the large end of the drum. Water at all times entering the several buckets at the upper end of the inclined shaft and forcing the air out at the lower end of the buckets. Said blades having the different angles described cause air to be blown out at the lower end uniformly. The buckets being sealed at their upper ends as they enter the water and follow each other during the revolution of the shaft. This construction prevents air from cupping as it is forced through the buckets and insures a steady and uniform flow. Apertures g^4, are formed at the inner rear edge of the buckets at the points where the buckets are joined to the disks F, for the purpose hereinafter described. The rear edge of the drum is finally closed by a head H, having a central aperture *h*, through which passes the pipe *a*, which is secured in the casing A, and sealed air tight in the rear end thereof.

I is the drum shaft which is centrally located in the tube E and sealed air tight in the front end thereof. One end of said shaft I has a bearing in the pipe elbow *a*, and the other end an adjustable bearing on the bearing screw a^2, tapped in the bracket *a'*. As

thus constructed and when the shaft is located within its bearing the drum rests in an inclined position in the vessel A, the rear end being effectually sealed in water, or other suitable liquid with which said vessel is half filled, the front end of the shaft I, extending over the end of the vessel. As thus constructed the air forcing apparatus is driven by a weight motor constructed as follows.

Referring to Figs. 4, 5 and 6 of the drawings I, denotes the shaft before described which near its front end is slightly reduced as at *i*. Over said shaft is loosely slipped a spool J, carrying at its outer extremity a cog wheel K, which fits the reduced end *i*, of the shaft and upon which it is adapted to freely turn. The extreme end of the shaft I, is again slightly reduced and screw-threaded and a ratchet-wheel L, screwed thereon which holds the spool J, and cog wheel K, in place on the shaft.

M, indicates a bridge bolted or otherwise secured to the outer face of the cog wheel K, and at a sufficient distance therefrom to permit the ratchet wheel L, to freely revolve between the same and the face of the cog wheel K. Pivoted between the cog wheel and said bridge is a pawl N, one end of which engages the ratchet wheel L, and is maintained in engagement therewith by means of a spring *n*, which bears against the tail *n'*, of said pawl.

O, indicates a dog pivoted to the bridge M, and having a projection or shoulder *o*, which is adapted to engage the free end n^2, of the pawl N, which extends above the plane of the ratchet wheel L for the purpose, as is clearly shown in Fig. 6. As long as the pawl N, is permitted to remain in engagement with the ratchet wheel L, motion communicated in the proper direction to the cog wheel K, will also be communicated to the shaft I, but if the dog O, is swung around upon its pivot the pawl N will be disengaged from the ratchet wheel and the cog wheel will loosely revolve upon the shaft I, without communicating motion thereto. Around the spool J, is wound a rope which, by means of a weight and pulley (not shown) drives the apparatus.

P, indicates a small cog wheel which gears with the cog wheel K, and is provided with a crank and by means of which the cord and weight are wound up. Before winding up the cord and weight the pawl N, is disengaged from the ratchet wheel L, by means of the dog O, which allows the operation to be performed without communicating motion to the air forcing apparatus.

In practice I prefer to so construct the cog wheel P, that it may be thrown out of engagement with the cog wheel K, when not employed in winding up the cord and weight, as by sliding it longitudinally upon its shaft or in any well known manner.

The operation of my device is as follows: The vessel A, is half filled with water and the loose top placed thereon. The elbow pipe *a*, is connected by means of a "union" or otherwise with the gas pipe and the apparatus set in motion. As the drum revolves in the water the compartments formed by the buckets are successively submerged in the water, the water entering at the front end of the drum and forcing the air through the outlets *f*, into the space between the disks F, and the head H, and out through the elbow *a*, to the gas pipe. As the buckets enter the water the faces g', g^2, enter the water at an incline and owing to their peculiar configuration and presenting gradually receding inclines the air and water are forced through the drum with great regularity and with a minimum of friction. As the drum continues to revolve and the buckets are brought to near a vertical position the compartments between the buckets are completely emptied of water through the apertures g^4, which is facilitated by the inclined position of the drum and the trough shape given the end of the compartments by the faces g^3, of the buckets. As constructed the drum is completely sealed by the water in such manner that no leakage can occur and the air must take the course desired without producing any back pressure and the supply of air is so uniform and regular that the necessity of a regulator is obviated.

Having described my invention, what I claim is—

1. In an air forcing apparatus the combination with the water vessel, of the conical drum C, rotating at an angle therein and provided with buckets G, and having inlets *d*, at its larger end and an outlet pipe *a*, at its smaller end, said buckets at their inner and lower ends being provided with drain openings g^4, substantially as described and for the purpose specified.

2. In an air forcing apparatus the combination with the water vessel, of the conical drum C, rotating at an angle therein and provided at its ends with overlapping disks D, F, and closed at its rear end by a head H, and the inclined buckets G, having the inclined triangular faces g', g^2, g^3, substantially as shown and described and for the purpose specified.

3. In an air forcing apparatus the combination with the water vessel, of the conical drum C, mounted upon an inclined shaft I, having a bearing at one end in an elbow pipe *a*, and at the other end on an adjustable bearing screw a^2, said drum having inlets *d*, at one end and an outlet through the elbow *a*, at the other end and provided with diagonal buckets G, substantially as shown and described.

4. In an air forcing apparatus the combination with the water vessel, of the conical drum C, the conical tube E, mounted upon a shaft I, and centrally secured within said drum, and the parallel diagonally arranged buckets G, secured between said conical tube and the outer casing of the drum, said drum

being provided at one end with inlets *d*, and at the other end with an outlet *a*, substantially as shown and described.

5. In an air forcing apparatus the combination with the water vessel, of the inclined rotating conical drum C, provided at its ends with overlapping disks D, F, and closed at its rear end by a head F, having an outlet pipe *a*, and having secured between said disks parallel diagonally arranged buckets, G, said buckets having variously inclined triangular shaped faces g', g^2, g^3, and drain outlets g^4, substantially as shown and described.

In testimony whereof I affix my signature in presence of two witnesses.

BENJAMIN F. EVANS.

Witnesses:
JOSEPH W. ADY,
GEORGE B. LAWTON.