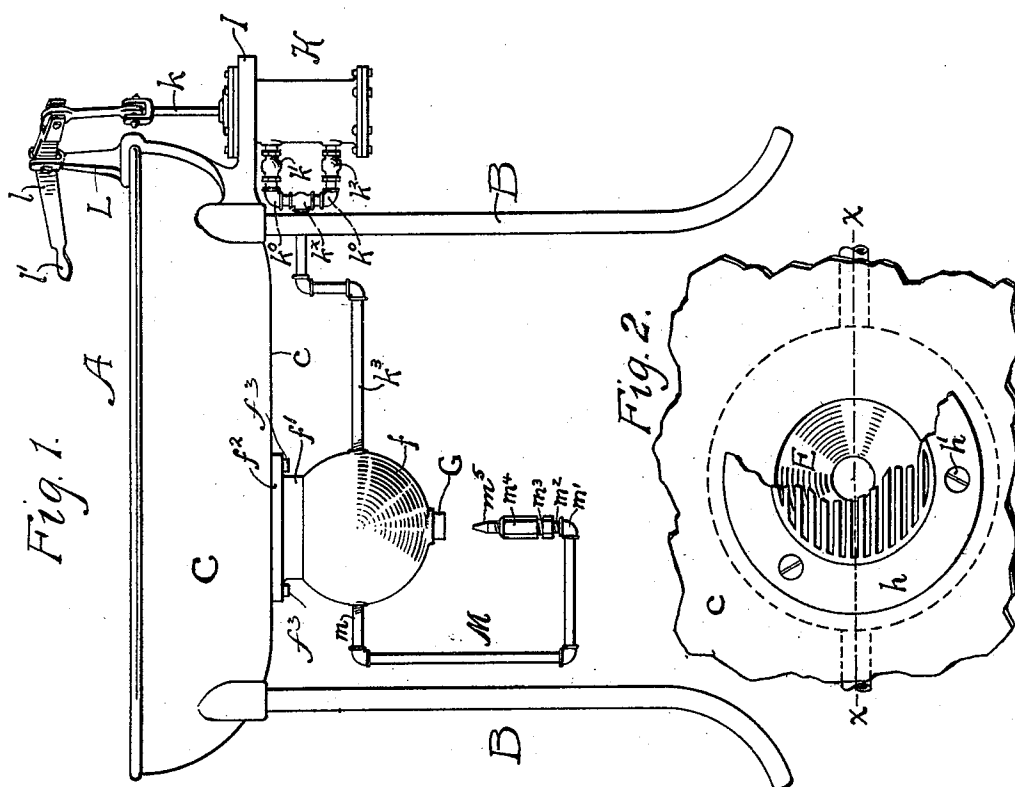
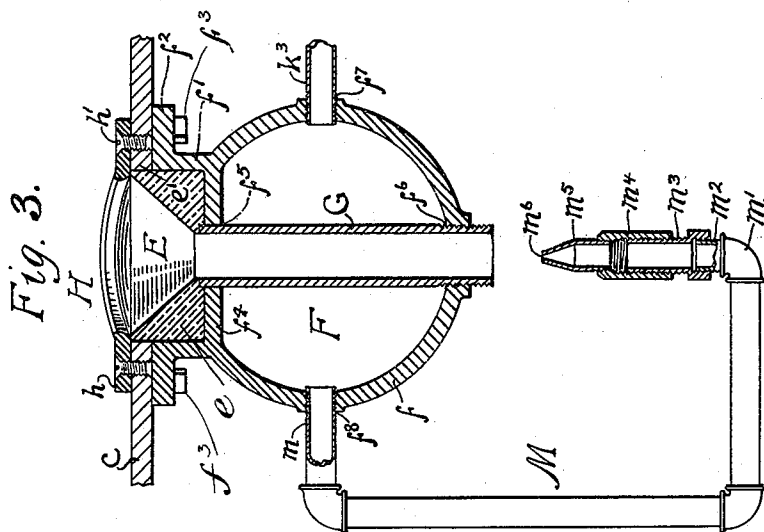


(No Model.)

J. GILLHAM, Jr.
BLOWER FOR FORGES, FURNACES, &c.

No. 552,178.

Patented Dec. 31, 1895.



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BLOWER FOR FORGES, FURNACES, &c.

SPECIFICATION forming part of Letters Patent No. 552,178, dated December 31, 1895.

Application filed August 4, 1894. Serial No. 519,509. (No model.)

To all whom it may concern:

Be it known that I, JOHN GILLHAM, Jr., a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Blowers for Forges, Furnaces, &c.; and I do hereby declare that the following is a full, clear, and exact description of the invention, such as will enable others to make and use the same, reference being had to the accompanying drawings, forming a part of this specification.

The object of my invention is, first, in a forge or furnace to intermix gases under varying degrees of pressure with the products of combustion; second, to impel an artificial current of compressed air through the draft-passage of a forge or furnace and intermix the air under pressure with the products of combustion.

My invention further consists in the novel construction and combination of parts, such as will first be fully described, and specifically pointed out in the claim.

In the drawings, Figure 1 is a side elevation of a portable forge, showing my invention applied thereto. Fig. 2 is a broken detail plan view of the bed of the forge, showing the air-pressure chamber for the compressed and heated air and the fire-surface or grate. Fig. 3 is a broken detail view in vertical section of the bottom of the forge, taken upon the line *xx* of Fig. 2, showing also the air-compressing chamber in section and the inlet and discharge jet-pipe for the compressed air.

Similar letters of reference indicate corresponding parts in all the figures.

In carrying out my invention and referring to the drawings, A represents a portable forge, supported upon the legs B B. The bowl C of the forge is of the usual construction, being oval in form and having a flat bottom or bed *c*.

In the bottom of the bowl C is a circular opening *c'*, which in size is made to correspond with the desired area of fire-surface, and in this instance is nearly three inches in width. The opening *c'* is near one end of the bowl C and at an equal distance from the opposite sides. Beneath the opening *c'* and attached rigidly to the under side portion of the bottom *c* of the

bowl C are the respective chambers E F for the heated and compressed air, the construction of which is as follows: The sides of the chamber F consist of a spherical hollow casting or receiver *f*, to the upper and outer side of which is cast integral with the shell *f* a circular upwardly-extended collar *f'*, the inside diameter of which corresponds with the opening *c'* in the bottom *c* of the bowl C.

To the outer side portion of the collar *f'* and flush with the upper edge of said collar is cast a circular flange *f²*, which is perforated to receive the bolts *f³*, which secure the flanges to the bottom of the bowl C of the forge.

Within the collar *f'* is a diaphragm *f⁴*, which is formed by the apex or top of the shell *f*, said portion being flattened or extended horizontally from one side of the collar to the other.

In the diaphragm *f⁴* and centrally from the inner side of the collar *f'* is a circular opening *f⁵*. In the lower part of the shell *f*, in a vertical line with the opening *f⁵* in the diaphragm *f⁴*, is a screw-threaded opening *f⁶*. In the opening *f⁵* of the diaphragm *f⁴* is fitted closely and air-tight the upper end of a draft-pipe G, which extends within the chamber F of the shell *f*, and the lower end is screw-threaded upon its outer side and fitted to the screw-threaded opening *f⁶* in the lower part of the shell *f* and extends a short distance beyond the outer side portion of said shell.

The upper end of the pipe G extends a short distance above the upper side of diaphragm *f⁴*, and around said end of said pipe and within the sides of the collar *f'* is fire-clay *e*, the surface of which inclines from the upper side of the bottom *c* of the bowl C around the opening *c'* downwardly to the upper end of the draft-pipe G, thus forming a cone-shaped chamber E, extending around the inner side of the collar *f'*. Above the chamber E is a fire-grate H, which is provided with a circular flange *h*, which is secured by the screw-bolts *h'* to the upper side of the bottom *c* of the bowl C.

To the outer side portion of the bowl C, near the line of the bottom *c* and at the end farthest removed from the grate H, is secured a horizontally-extended bracket I. To said bracket is

secured the upper cylinder-head of the air-compressing pump K, the lower end of the pump extending a considerable distance below the line of the bottom of the bowl C. In
 5 the pump K is a piston-rod k . Upon the upper edge of the bowl C, directly above the bracket I, is mounted a standard L, upon the upper end of which is a lever l , the end of which opposite the handle l' is pivotally attached to the piston-rod k .
 10

To the side of the cylinder K, near the upper cylinder-head, is connected one end of an air-conducting pipe k' , which extends a short distance in the direction of and beneath the
 15 bottom c of the forge. To the same side of the cylinder K, near the lower cylinder-head, is connected an air-conducting pipe k^2 . Each outer end of the pipe k' k^2 is provided with elbows k^0 k^0 , which connect with a T-joint
 20 k^x . In the spherical shell f , and in line with the diameter of said shell and in the side toward the pump K, is a screw-threaded opening f^7 , and in the other side of said shell is a screw-threaded opening f^8 .

To the T-joint k^x , which extends from the air-pump K, is connected one end of a pipe
 25 k^3 , the other end of which pipe is screw-threaded and extends in the direction of the spherical shell f a short distance and is then bent downwardly to a position in a line
 30 horizontal with and fitted within the screw-threaded opening f^7 in the shell f . To the other screw-threaded opening f^8 in the shell f is connected the screw-threaded end m of a
 35 discharge-pipe M, the other end of which pipe extends a short distance horizontally from said shell f and is then bent in a downward direction a considerable distance below the
 40 line of the lower portion of the spherical shell f and thence extended to a position directly beneath the opening in the lower end of the draft-pipe G in the shell f , to which end is fitted an elbow m' . In the elbow m' is fitted a
 45 short piece of pipe m^2 , which is screw-threaded its entire length. To the pipe m^2 is fitted one end of an interiorly-threaded pipe m^3 , the exterior portion of which pipe is screw-threaded. Around pipe m^3 is fitted a sleeve m^4 , which is
 50 screw-threaded upon its inner side. In the upper end of the sleeve m^4 is fitted the lower end of a nipple m^5 , the upper end of which nipple is contracted in width and closed together so as to reduce the size of the opening
 55 m^6 in a very small degree, so that the air will ascend the pipe G in a small jet.

The fire-surface may be increased in extent by increasing the length or the angle of inclination of the sides of the chamber E, the heated air becoming more intensely hot
 60 when acted upon by the compressed air, and in the chamber E at the terminal of the draft-tube the jet of compressed air which passes through a column of normal air expands and intensifies the fire upon the grate.

65 In the operation of my improved blower the

fire is first obtained upon the bed of the forge in the usual manner and the ignited coal distributed over the grate H, the incipient draft of air through the draft-pipe G being such as
 70 to feed the fire until the heat and flame are desired for melting, tempering, or cementing metals. When the higher degrees of heat are desired the lever l is operated and the compressed air in the pump K is forced into the
 75 compressed-air chamber F in the shell f and thence into the pipe M, and a jet of the compressed air is forced through the draft-pipe G into the chamber E beneath the grate H. The air beneath the grate H is previously heated
 80 from the radiant heat of the fire and thus forms a natural current of air in the pipe G. Now by placing the nipple m^5 of the compressed-air-conducting pipe m^3 at a point distant from the
 85 end of the draft-tube, within a neutral point at which no effect is produced upon the air in the draft-tube, the small jet of air delivered from the nipple meets a resistance of the air
 90 outside of the draft-tube, and in forcing through it to the column of normal air within the draft-tube a gyrating movement is communicated to the jet of compressed air which
 95 extends to the grate, which grate never becomes hot, from the fact that the higher the compression the stronger the blast. When the compressed air is impelled within the
 100 chamber E a suction is also caused within the pipe G of great intensity and the heated air is increased in volume from the combustion of the fuel, and the draft of air through the
 105 pipe G creates a pressure in the pipe G which expands in chamber E with great power and extends equally over the grate H, the formation of the sides of the chamber being such as to prevent dead-spaces in which a vacuum
 110 would occur and thus reduce the outward pressure of the air in said chamber. The effect of the pressure of the air in the chamber E is to cause the rapid combustion of the fuel and a flame of intense degree of heat, the atmospheric oxygen which burns in the chamber E
 115 being replenished through the pipe G. The constant operation of the air-pump K is to effect the degree of heat required and maintain an equable pressure, not confined to a small area but coextensive with the chamber E and its enlarged fire-surface.

The action of the jet of compressed air is to cause a suction upon the air within the draft-tube which is regulated by adjusting the nipple m^5 and decreasing the distance between
 120 the nipple and the lower end of the pipe G, and this distance may be increased or diminished as necessity may require.

Where a number of forges are used, a single air-compressor can be employed from
 125 which the individual forges will be supplied by suitable air-conducting pipes.

Having fully described my invention, what I now claim as new, and desire to secure by Letters Patent, is—
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In a blower for forges, &c., an apparatus for transmitting compressed air consisting of a receiver having a chamber at one end, a diaphragm, a draft tube extending through
5 said receiver and diaphragm, an air conducting pipe having a jet opening extending in the line of direction of and beneath the open-

ing in the lower end of the draft tube and a suitable source of compressed air for the purpose described.

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Witnesses:

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