

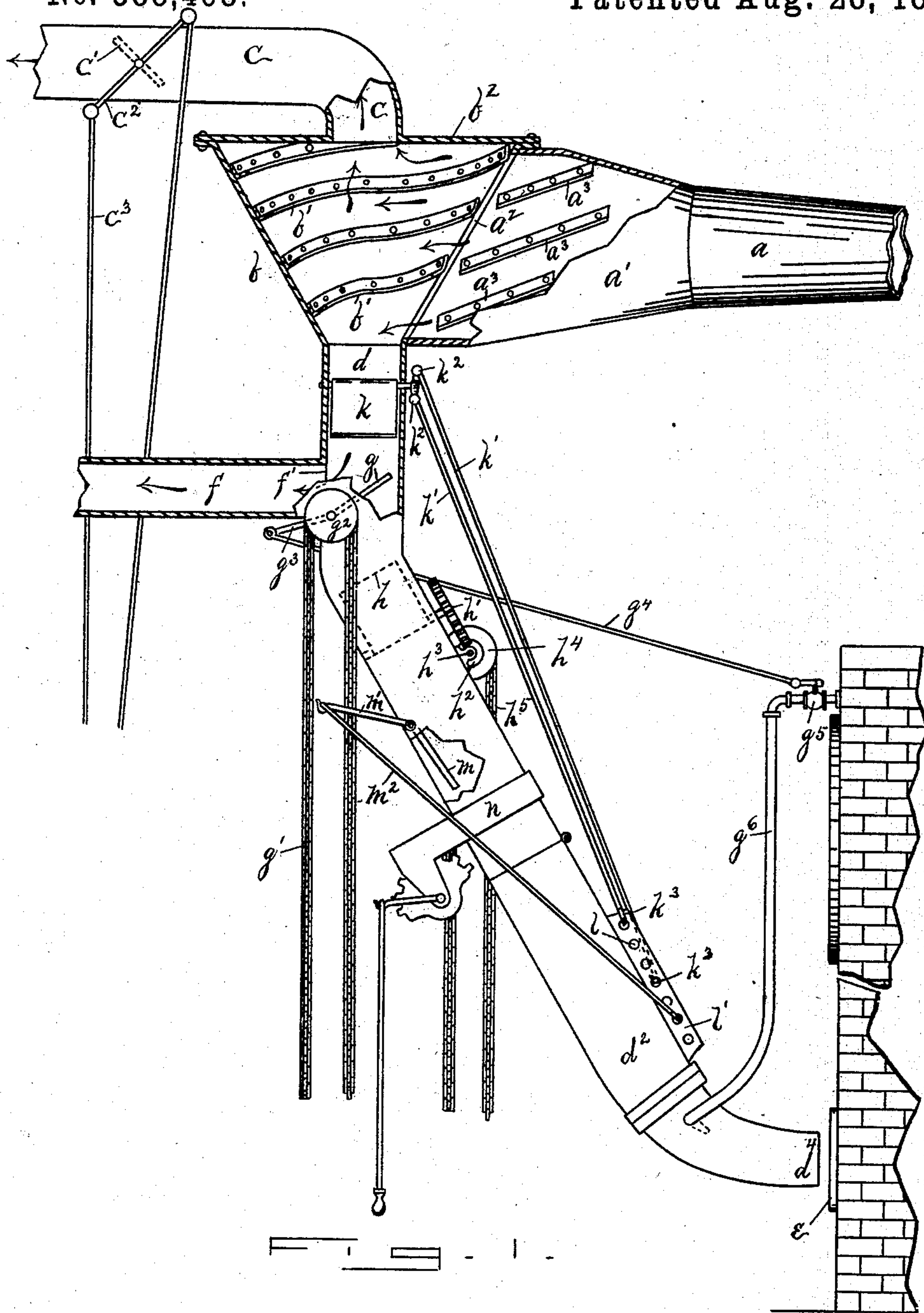
(No Model.)

2 Sheets—Sheet 1.

A. WARNE.  
FURNACE FUEL FEEDER.

No. 388,468.

Patented Aug. 28, 1888.



Witnesses:

Otto Hoddick.

Albert C. Schaaf.

Inventor.

By Arthur Warne.

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Attorney.

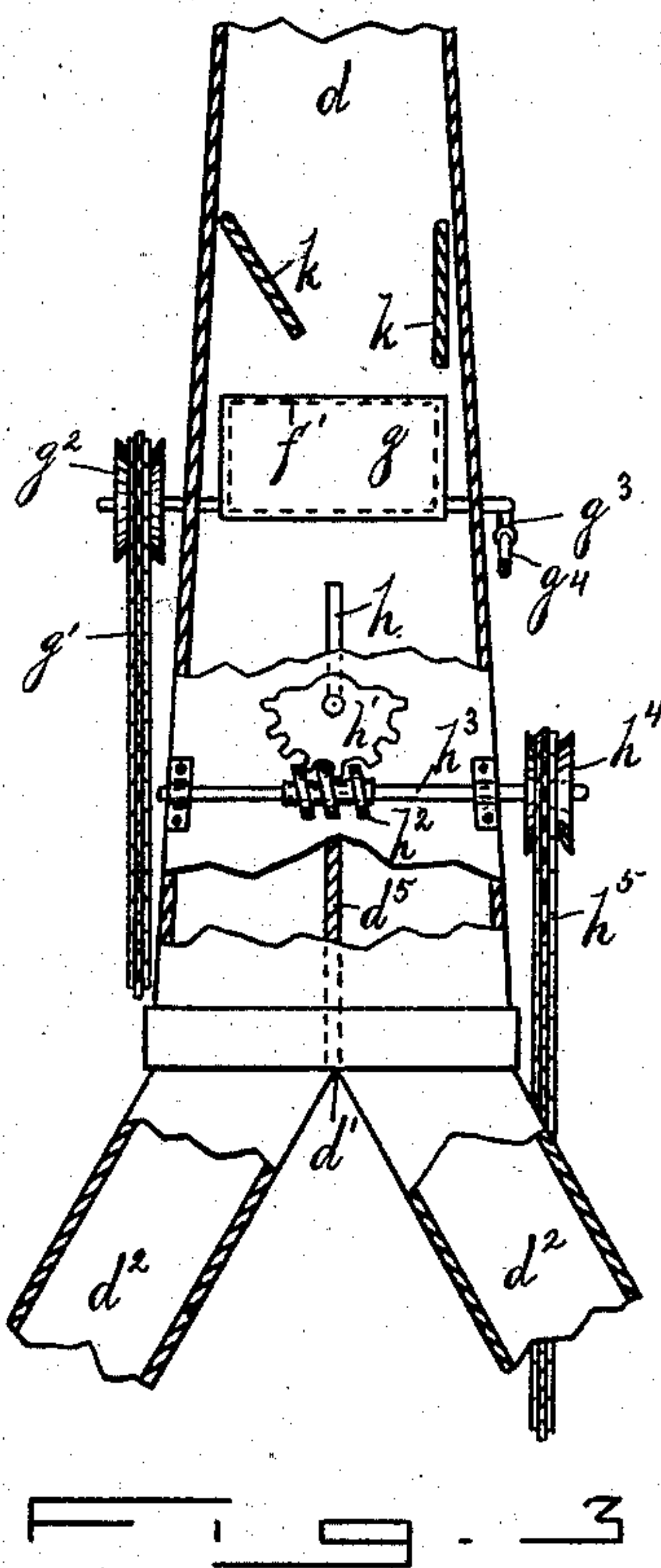
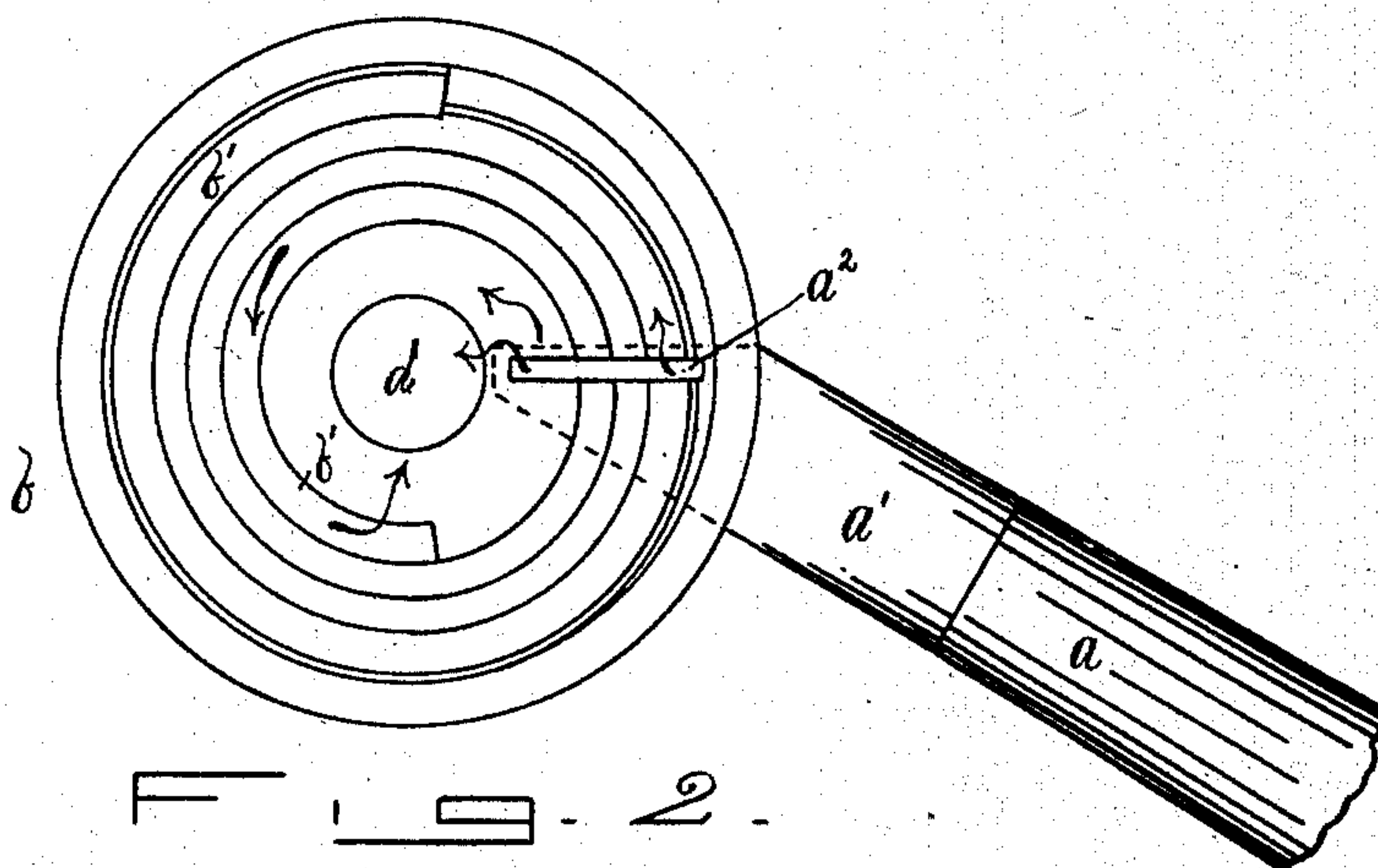
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# UNITED STATES PATENT OFFICE.

ARTHUR WARNE, OF BUFFALO, NEW YORK.

## FURNACE FUEL-FEEDER.

SPECIFICATION forming part of Letters Patent No. 388,468, dated August 28, 1888.

Application filed February 17, 1887. Renewed November 25, 1887. Serial No. 256,135. (No model.)

*To all whom it may concern:*

Be it known that I, ARTHUR WARNE, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Furnace Fuel-Feeders; 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, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

My invention relates particularly to that class of furnace fuel-feeders for which Letters Patent No. 302,365 were granted to me on the 22d day of July, 1884. In this class of fuel-feeders the chief aim has been to effect a partial separation of the light finely-divided fuel from the air which serves as a motive power to conduct the fuel through the conduit to the fire-pit of the furnace. This separation in substance is to conduct away from the conduit the surplus air (which would otherwise affect the draft of the furnace) in such manner that all of the fuel is delivered to the fire-pit, while the quantity of air forced in with the fuel is so regulated automatically as to leave the draft of the furnace in as normal a condition as possible. With this object in view I have provided my improved fuel-feeder with an inverted-cone-shaped receptacle into which the finely-divided fuel is discharged. In this receptacle a partial separation of the air and fuel is effected by means of an auxiliary conduit, properly valved, extending from the top of such inverted-cone-shaped receptacle, through which the surplus air is conducted away, and a helical or worm-shaped flange or deflector extending around such receptacle and down toward its bottom, against which flange the injected fuel is thrown, which has the effect of forcing such fuel down to the main conduit leading to the fire-pit of the furnace, while the surplus air is being conducted away at the top.

While the above-described feature forms the main part of my invention, I have provided other improvements acting in conjunction therewith, all of which will be more fully hereinafter described and claimed.

In the drawings, Figure 1 is an elevation, partly in section and with portions broken away, of my improved feeder. Fig. 2 is a top plan view of the inverted-cone-shaped receptacle, and Fig. 3 is a detached detail view.

Referring to the drawings, *a* is the pipe or conductor, which leads into the planing-mill, and through which the shavings from the machines are conducted to the feeder. Its end *a'* is enlarged or flattened out vertically where it is attached to the inverted-cone-shaped receptacle *b*, the opening *a''* between the parts *a'* and *b* being on a line with the sloping side of the receptacle *b*.

*a'''* is a series of flanges or deflectors inclining downwardly upon the side wall of the part *a'*, in order that the shavings, as they pass into the receptacle *b*, may have a downward course. This receptacle *b* is of the shape of an inverted cone and has the top plate or cover, *b''*, into which opens the pipe or conduit *c*, into which the surplus air is forced. A valve, *c'*, within this conduit, the position of which is adjusted by the rod *c''* and cord *c'''*, serves to regulate the amount of surplus air to be conducted away through the conduit *c*.

Around the interior inclined walls of the receptacle *b* is arranged the helical or worm shaped flange or deflector *b'*, extending from the top to the bottom of same, where it opens into the conduit *d*. In this receptacle the separation of the surplus air from the fuel is effected, as will more fully hereinafter appear. The conduit *d*, which conducts the fuel directly to the furnace, extends downwardly and inwardly toward the furnace, and at the point *d'* (see Fig. 3) separates into the two branches *d''* and *d'''*, one of which is fully shown in Fig. 1 in side elevation. The mouth or nozzle *d''* of these branches, as will be seen, is smaller than the furnace-door *e*, and is located a few inches away from the same to insure protection against the backing up of the fire into the conduit when the blast is cut off.

*f* is an auxiliary pipe or conduit opening at *f'* into the conduit *d*. This pipe *f* is for conveying away the fuel to the shavings-room when it is not being fed into the fire-pit of the furnace. *g* is a valve pivoted at the opening *f'* to open the pipe *f* and close the conduit *d* simultaneously, or vice versa.

When it is desired to either feed the fuel to



the furnace or conduct it away to the shavings-room, it is turned into either of its two operative positions by means of the chain  $g'$  and wheel  $g^2$ .

5  $g^3$  is an arm extending from the axis of the wheel  $g^2$ , to the end of which is pivoted one end of the rod  $g^4$ , the other end of which operates a steam-valve,  $g^5$ , to which is connected the steam-pipe  $g^6$ , the lower end of which enters the branch  $d^2$  just back of the nozzle  $d^4$ .  
10 This automatic arrangement just described operates as follows: When the valve  $g$  is thrown over to close the conduit  $f$ , so that the fuel may be fed to the furnace, the steam-valve  $g^5$   
15 is opened by means of the rod  $g^4$ , and a jet of steam is thrown toward the furnace-door while the fuel is being fed to the furnace. Should the blast be accidentally or even intentionally cut off while the valve  $g$  is open with respect  
20 to the conduit  $d$ , the steam-jet would prevent the backing up of the fire within the conduit  $d$ . When the valve  $g$  is closed down over the conduit  $d$ , it automatically shuts off the steam-jet, as it is not then needed.

25 Extending up from the junction of the two branches  $d^2$   $d^2$  and within the conduit  $d$  is the short partition  $d^5$ , at the upper end of which is the valve  $h$ , pivoted in the walls of the conduit  $d$ . Connected with the valve  $h$ , and on the out-  
30 side of the conduit, is the spur-wheel  $h'$ , which intermeshes with the worm  $h^2$  upon the shaft  $h^3$ , loosely secured to the outside of the conduit  $d$ . At the outer end of the shaft  $h^3$  is the pulley  $h^4$ , over which works the chain or belt  
35  $h^5$ , by means of which the valve  $h$  is turned from one side to the other within the conduit  $d$ , to shut off the supply of fuel from either of the two branches  $d^2$   $d^2$  when it is desired to use only one.

40 Under the action of the cone-shaped separator  $b$   $b'$  the finely-divided fuel is whirled around and enters and passes down the conduit  $d$  in a helical path, and as it strikes the point of junction of the two branches  $d^2$   $d^2$  it  
45 often happens that either more fuel enters one branch than the other or that the entire mass is thrown into only one branch. To obviate this difficulty and cause an equal division of the fuel between the two branches, I have pro-  
50 vided the conduit  $d$  at a point above the valve  $h$  with the two deflectors  $k$   $k$ , each adjusted in position from the outside of the conduit by the rods  $k'$   $k'$ , attached at their upper ends to the short levers  $k^2$   $k^2$ , secured to the valves  $k$   $k$ ,  
55 their lower ends,  $k^3$ , being hook-shaped to engage with the holes  $l$  in the plate  $l'$ , by means of which arrangement the deflectors may be caused to assume the position within the conduit necessary for the proper effect upon the  
60 descending fuel. With these deflectors  $k$   $k$  the path of the fuel can be so changed and regulated as to effect a proper division of the same for each of the branches  $d^2$   $d^2$ .

65  $m$  is a valve or wind-gate in each of the branches operated by an outside lever,  $m'$ , to which is loosely attached the rod  $m^2$ , adapted for adjustable connection with the perforated

plate  $l'$ , by means of which the wind-gate can be moved or held in the proper position within the conduit to increase or diminish the amount  
70 of air escaping with the fuel into the furnace.

$n$  is a frame containing a shut-off valve operated by a rack and pinion across the conduit. This valve is similar to one shown in my prior patent herein mentioned. 75

The operation of my improved construction described is as follows: Under the action of blowers or suction-fans properly located the shavings are collected from each machine in the mill and brought to the pipe or conductor  
80  $a$ , through which they are forced into the receptacle  $b$ . As they leave the portion  $a'$ , they are thrown downwardly by means of the inclined deflectors  $a^3$   $a^3$ . Under the action of the blast and the worm-flange or deflector  $b'$  85 they are whirled around and down the inverted-cone-shaped receptacle and into the conduit  $d$ , through which they pass to the fire-pit, the valves and other parts being in their proper positions. The outlet pipe or conduit  
90  $c$ , with the position of its valve  $c'$  properly regulated, conveys away the necessary amount of surplus air, which would otherwise retard the proper action of the draft of the furnace. The operation of the various parts below the  
95 receptacle  $b$  has been separately explained, and therefore need no further description.

I claim—

1. In a furnace fuel-feeder, a separating-chamber consisting of an inverted-cone-shaped  
100 receptacle having a conduit for surplus air, and the conduit leading to the mill, provided at its entrance to said cone-shaped receptacle with inclined diverting-flanges, substantially as shown and described. 105

2. In a furnace fuel-feeder, the combination, with the fuel-conduit, of the steam-pipe for injecting steam into the conduit and having a valve, the movement of which is controlled by a valve in said conduit, substantially as and  
110 for the purpose stated.

3. In a furnace fuel-feeder, a separator consisting of an inverted-cone-shaped receptacle provided upon its interior inclined surface with a helical or worm flange, substantially  
115 as and for the purpose stated.

4. In a furnace fuel-feeder, the combination, with a separator consisting of an inverted-cone-shaped receptacle provided upon its interior inclined surface with a helical or worm-shaped  
120 flange, of a conduit,  $a$ , leading to the mill, provided at its entrance to the cone-shaped receptacle with inclined diverting - flanges  $a^3$ , substantially as and for the purpose stated.

5. In a furnace fuel-feeder, the combination, 125 with the inverted-cone-shaped receptacle provided with the helical or worm-flange, of the conduit  $c$ , for surplus air, leading therefrom, provided with a valve for regulating the quantity of surplus air to be discharged, substan- 130 tially as shown and described.

6. In a furnace fuel-feeder, the combination, with the cone-shaped receptacle having a helical or worm flange and the conduit  $d$ , together



with its branches, of the hinged deflectors *k k*, for regulating the even distribution of the fuel to the said branches, substantially as shown and described.

5 7. In a furnace fuel-feeder, the combination, with the main conduit *d* and the auxiliary conduit *f*, leading to the shavings-room, of the pivoted valve *g*, adapted to close either one of said conduits, as desired, substantially as  
10 shown and described.

8. In a furnace-fuel feeder, the combination, with the main conduit and its branches, of the pivoted dividing-valve *h*, operated by the segmental gear *h'*, worm *h<sup>2</sup>*, pulley *h<sup>4</sup>*, and the chain  
15 or belt, substantially as shown, and for the purpose stated.

9. In a furnace fuel-feeder, the combination,

with the valve *g*, operating to close either of the two conduits *d* and *f*, of the steam-valve, its steam-pipe leading into one of the branch 20 conduits *d<sup>2</sup>*, and connections from the said steam-valve to the said valve *g*, whereby the injected steam is automatically cut off when the said latter valve closes one of the said conduits *d f*, substantially as and for the purpose 25 stated.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ARTHUR WARNE.

Witnesses:

OTTO HODDICK,  
W. T. MILLER.