

(No Model.)

3 Sheets—Sheet 1.

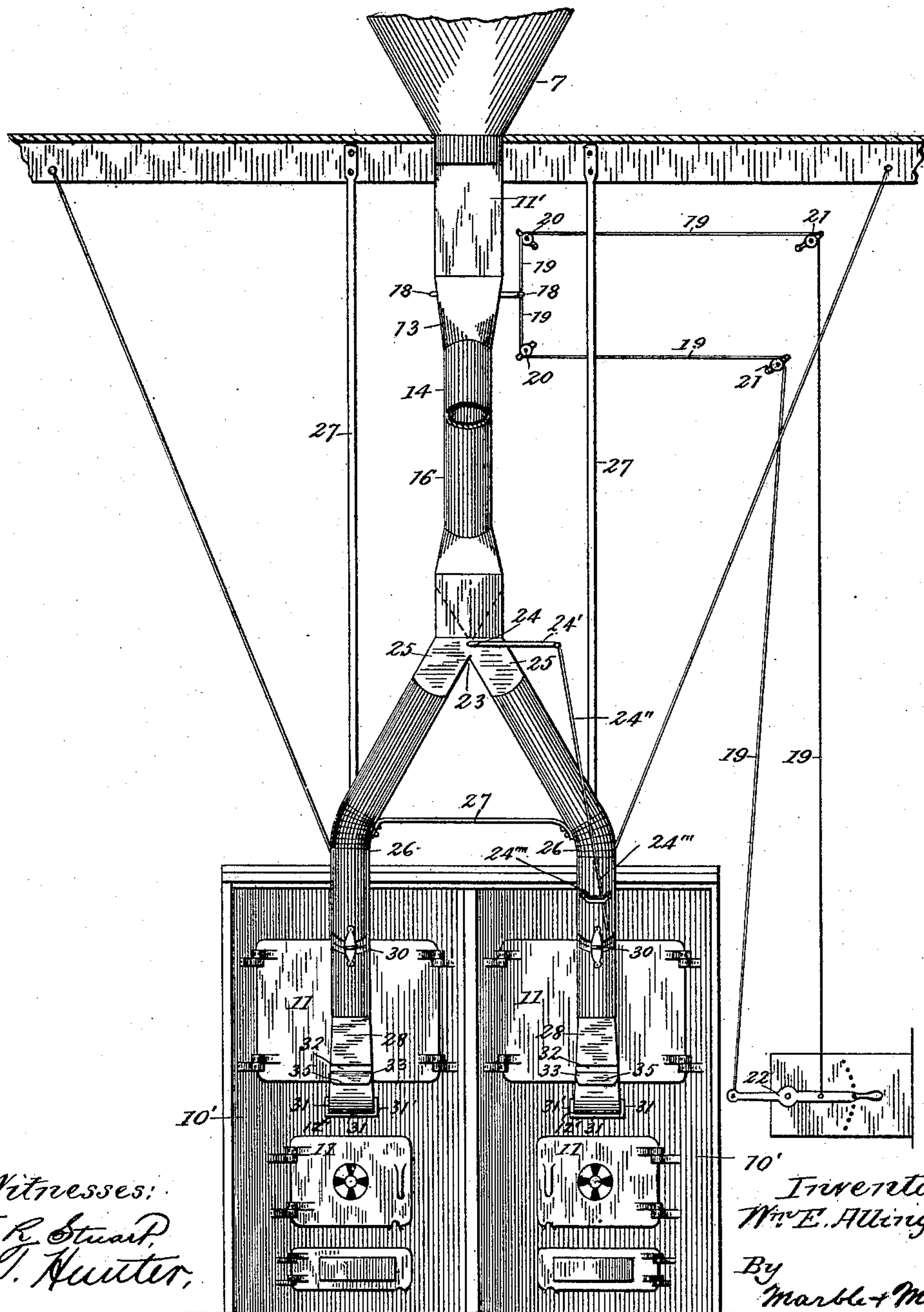
W. E. ALLINGTON.

FURNACE FEEDER.

No. 391,873.

Patented Oct. 30, 1888.

Fig. 1.



Witnesses:
J. R. Stuart,
F. J. Hunter,

Inventor:
W. E. Allington,
By
Marble & Mason,
Attys.

(No Model.)

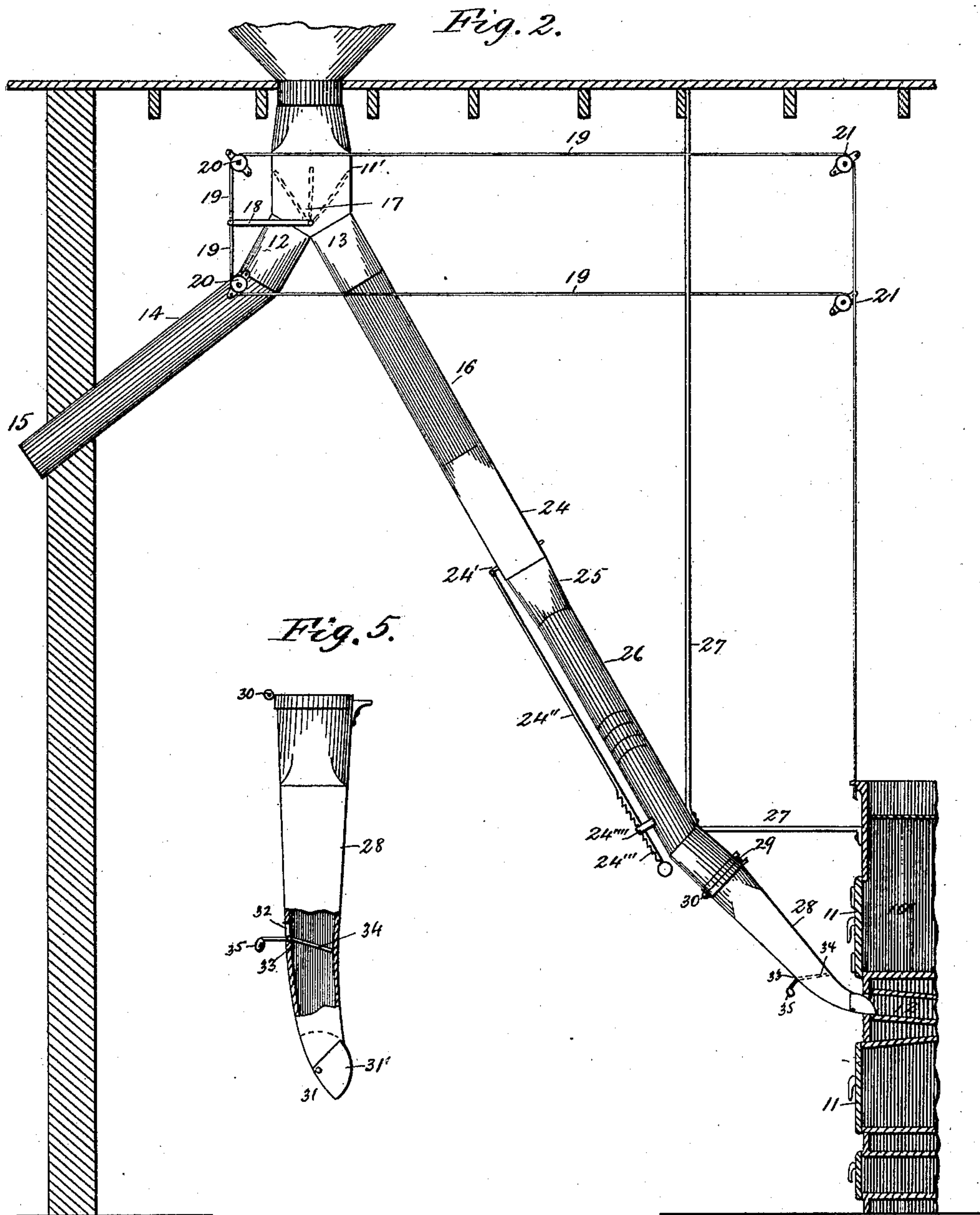
3 Sheets—Sheet 2.

W. E. ALLINGTON.

FURNACE FEEDER.

No. 391,873.

Patented Oct. 30, 1888.



Witnesses:
T. R. Stuart,
J. J. Hunter,

Inventor:
Wm E. Allington,
By Marble & Mason,
Attys.

(No Model.)

3 Sheets—Sheet 3.

W. E. ALLINGTON.
FURNACE FEEDER.

No. 391,873.

Patented Oct. 30, 1888.

Fig. 3.

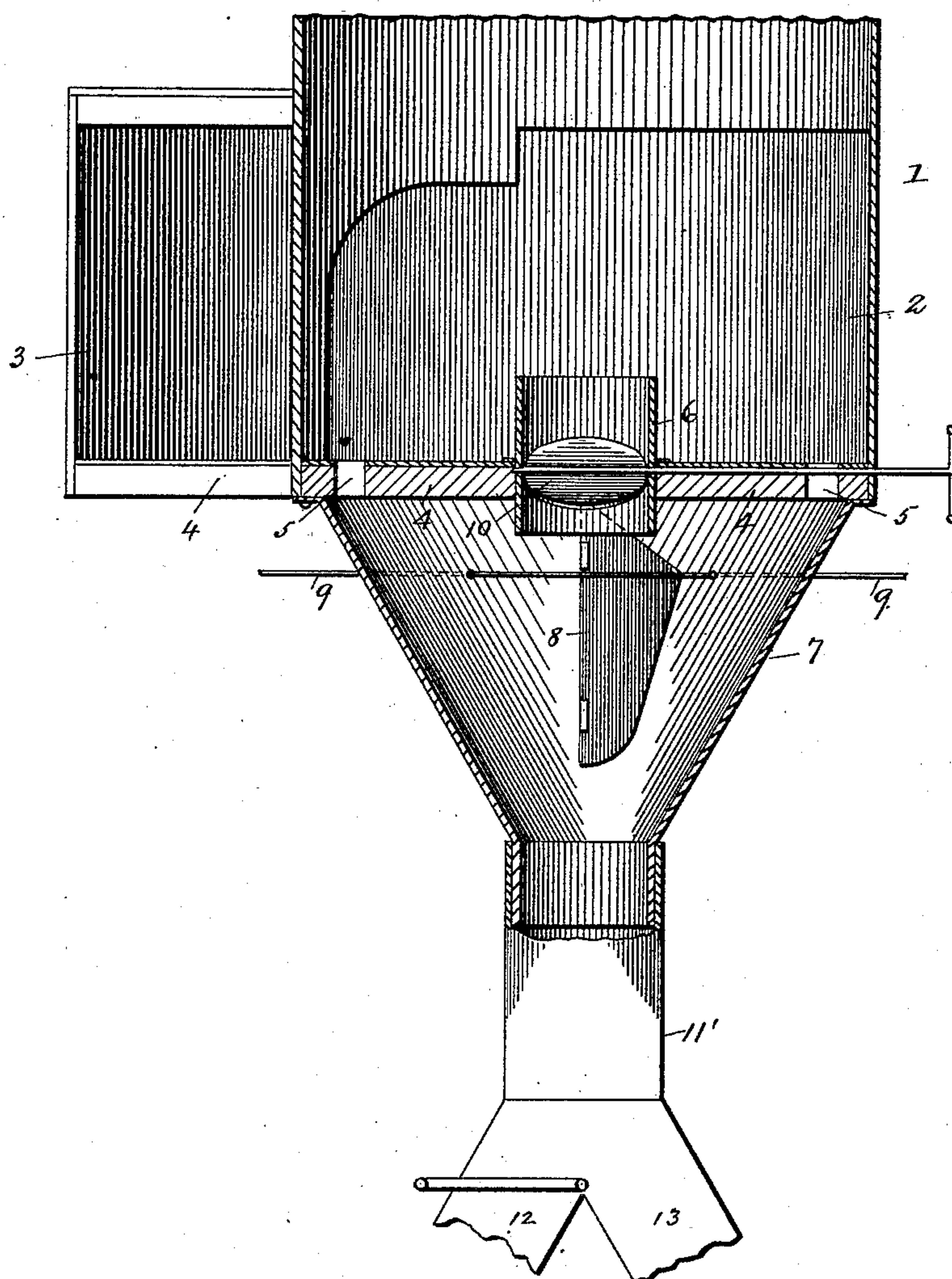
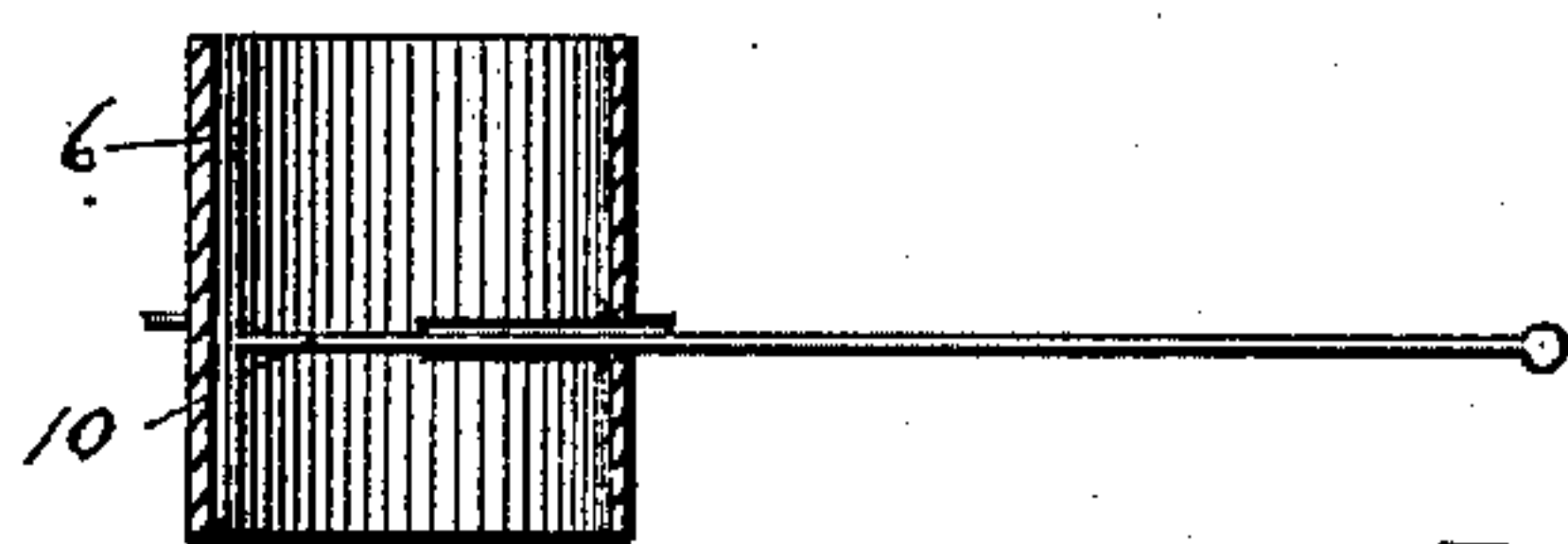


Fig. 4.



Witnesses:
F. R. Stuart.
F. J. Hunter.

Inventor:
Wm E. Allington.
By Marble & Mason,
Attys.

UNITED STATES PATENT OFFICE.

WILLIAM E. ALLINGTON, OF EAST SAGINAW, MICHIGAN.

FURNACE-FEEDER.

SPECIFICATION forming part of Letters Patent No. 391,873, dated October 30, 1888.

Application filed May 26, 1888. Serial No. 275,222. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. ALLINGTON, a citizen of the United States, residing at East Saginaw, in the county of Saginaw and State of Michigan, have invented certain new and useful Improvements in Furnace-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.

My invention relates to that class of apparatus which is employed in connection with planing-machines, in lumber-mills, and similar wood-working establishments for feeding shavings, sawdust, and similar solid particles to furnaces, where they are consumed as fuel for generating steam to drive the machinery connected with the boilers of said furnaces, and I preferably employ the same in connection with a superposed collector or separating-chamber for separating sawdust, shavings, &c., from the air of the class in which the air laden with the solid particles receives a rapid rotating or whirling motion in the separating-chamber, whereby the solid particles are driven out of the air-current and against the inner surface of said separating-chamber by centrifugal force.

My invention consists of certain novel constructions and combinations or arrangements of parts by means of which, first, the blast of air passing through the feeder-pipes and separator from the fan, however powerful, is under complete control; second, the danger from fire by back-pressure or accumulation of fuel in the pipes is entirely avoided; third, the pipe-nozzles can be quickly and easily moved out of the way when access to the furnaces or doors is desired; and it consists, further, in the construction and combination of parts which are accessorial in the obtainment of the results named, as hereinafter disclosed in the description, drawings, and claims.

The objects of my invention are to provide the feeder-pipes which convey the fuel from the collector or separator to the furnace and storage-vault with adjustable dividing-valves for directing and controlling the flow of fuel into said furnace or vault; to construct said pipes in such manner that quick and easy access to the furnace may be had at all times; to

provide said pipes with automatic safety-valves for allowing any fuel which may escape past the lower dividing-valve when closed to pass out at said safety-valves, and thus prevent the fuel from accumulating in said pipes and finally taking fire, and to provide the hopper of the fuel-separator with an adjustable damper for regulating the force of the blast carrying the fuel and with means for breaking up or dissipating the whirling motion of the air and fuel therein.

In the accompanying drawings, which form a part of this specification, and in which the same numerals of reference indicate the same or corresponding parts in all the figures, Figure 1 represents a front elevation of two boiler-furnaces provided with my invention, the lower portion of the hopper of the collector or separator being shown above as connected to the piping leading to said furnaces, the pipe extending to the storage vault or chamber being broken away; Fig. 2, a side elevation, partly in section, of the feeder-pipes and a portion of the furnace and the storage vault or chamber; Fig. 3, a vertical section of a part of the collector or separator with the upper end of the main feeder pipe or conduit attached to the lower end of the hopper; Fig. 4, a vertical section of the pipe in the bottom of the separator provided with a modified form of valve or damper; and Fig. 5, an enlarged section of a portion of the hinged nozzle, showing the counterbalanced safety-valve and the escape-aperture.

In the drawings, the numeral 1 represents a dust or fuel separator, which may be of any suitable construction otherwise than in the following particulars: It consists of a separating-chamber, 2, having a suitable inlet-opening, 3; of a bottom, 4, formed with one or more discharge apertures or slots, 5, and with a central aperture in which is secured a short pipe, 6, or said bottom may have a plain central aperture or a long pipe, if desired; of a hopper, 7, secured below the bottom of the separating-chamber, and of a wing, 8, hinged with its inner edge to the inside of said hopper and provided with a cord or wire, 9, passing through small holes in the hopper and to the outside for tilting or raising the outer edge of said wing more or less from the inside of the hopper. The use or purpose of the wing just

named is to break up or dissipate the whirling or gyrating motion of the air and material in the hopper and to assist in regulating the force and amount of air required to feed the fuel from the lower end of said hopper through the feeder-pipes and into the furnaces. When a strong air blast is required to feed the fuel from the hopper, the free or outer edge of said wing is moved inward or toward the center of the hopper, which will destroy the whirling motion of the air and fuel and effect their proper discharge.

For regulating the amount or pressure of air in the hopper without producing any effect upon the fan which supplies the blast to the separator I provide the central opening in the bottom 4 of the separating-chamber with a suitable valve or damper, 10, which, for the purpose of illustration, is shown as applied to the short pipe 6, two forms of said valve or damper being illustrated, one of them being tilting, as shown in Fig. 3, and the other sliding, as shown in Fig. 4; but, as before stated, said short pipe may be substituted by a long pipe passing up entirely through the separator and communicating with the outer air, or by a plain central opening without a pipe.

In regulating the force or pressure of air in the operation of feeding from the hopper, if only a little air be required to feed very light fuel, the damper or valve 10 will be left entirely open, so that the hopper will get full relief through the pipe or opening. If more air be required, the damper will be partly closed, and if still more air be needed the damper will be entirely closed. If, again, a still stronger force or pressure be necessary, the damper will remain closed and the wing will be opened out more or less from the side toward the center of the hopper. With the wing fully moved out toward the center of the hopper and with the damper entirely closed, the same blast will be produced from the hopper as is received in the separator proper from the fan. It will thus be seen that the force or pressure of the air is under perfect control at all times, and that the fuel can be fed with a force varying from no air at all, as when it descends by its own gravity, to the full blast received by the separator, and that this could not be accomplished in a separator having no bottom without making adjustments at the purified-air outlet of the separating-chamber, which would of course cause the air to react upon the fan which creates the blast and cause irregularities in the operation of the same, which would destroy or impair the effectiveness of the separator.

The numerals 10' indicate the furnace-fronts, which are provided with doors 11, of any usual or preferred construction, and with apertures 12' for the feeder-nozzles. These apertures are shown in the drawings as made in the front walls of the furnaces; but they may be formed in the furnace-doors, if such be more convenient or desirable. I have found it to be most

advantageous to arrange said apertures about twelve inches above the grates.

The main feeder pipe or conduit 11' is secured to the lower end of the hopper of the separator, the latter being arranged in such a manner above the boiler-furnaces and the storage-vault that it will allow the smaller feeder-pipes and their branches to descend to said furnaces with as steep inclination and as slight bends or curves as possible. The main feeder pipe or conduit 11' is bifurcated at its lower portion, forming branches 12 and 13, one of which, 12, is extended by a pipe, 14, to the storage-vault 15, while the other, 13, is extended by a branched pipe, 16, toward the furnaces.

A dividing-valve or cut-off, 17, is pivoted or hinged in the crotch of the bifurcation of the main pipe 11' for dividing the fuel between the furnaces and storage-vault. It is also adapted to be tilted to entirely or partly close either of the pipes 14 and 16, and for this purpose it is provided with an arm, 18, forming part of its pivoted pintle or shaft. To the end of said arm are secured ropes or cords 19, which pass around two guide-pulleys, 20, arranged one above and one below the outer end of the valve-arm, and are thence carried over guide-pulleys 21 and down to an adjustable operating-lever, 22, which is fulcrumed within convenient reach of the fireman or attendant to the furnaces. Thus said dividing-valve or cut-off may be set to direct the current of air and fuel discharging from the hopper of the separator, so as to pass either into the pipe 14, leading to the vault, or into the branched pipe 16, leading to the furnaces; or it may be so set or adjusted as to pass a part of the air and fuel through both of said pipes at the same time. When this valve is so adjusted as to shut off all air and fuel from the pipe leading to the vault, there is generally enough air delivered from the bottom of the hopper to properly convey said fuel into the furnaces; but when said valve is so set as to divide the air and fuel it will be obvious that the air-current passing through the branched pipe 16 to the furnaces will be weakened, and that in such case it will only be necessary to adjust the damper and wing in the bottom and hopper of the separator, since thereby the blast, although divided, will be so increased in strength that it will have the proper force to deliver the fuel into the furnaces.

The branched pipe 16, which leads toward the furnaces, is bifurcated at the point 23 and provided with a tilting or dividing valve, 24, and branches 25, similar to those extending from the main feeder pipe or conduit 11'. This dividing-valve is provided with an arm, 24', forming part of its pivot, to which is attached a handle, 24'', having at its lower end suitable devices for securing it adjustably upon the lower end of one of the pipes leading from the branches 25, said devices consisting of a rod having notches 24''' and a catch, 24''', upon said pipe. As only two furnaces are illustrated,

only one bifurcation is shown in the pipe 16; but if it be desired to feed a greater number of furnaces than two it is only necessary to increase the number of the bifurcations and branch pipes accordingly.

To the branches 25 of the lower bifurcation are secured the pipes 26, which are sufficiently curved to bring their lower ends to register with the apertures in the furnace-fronts. These pipes and any other portions of the piping requiring it are firmly supported and braced by braces or rods 27 or the like.

At the lower ends of the pipes 26 are secured nozzles 28, which are preferably flattened or rectangular in cross-section, and which are slightly curved, so as to properly approach the apertures in the furnace-fronts. They are hinged at their upper ends to the lower ends of the pipes 26, so that they may be swung back or away from the furnace-fronts. The connecting ends of said pipes and nozzles are also provided with suitable screw-bolts, 29, arranged opposite the hinges 30 for the purpose of securing the nozzles in operative position.

A shoe or mouth-piece, 31, provided with curved lugs or flanges 31' at its sides, is so hinged or pivoted upon the sides of the mouth of each nozzle that it will swing down and form a chute extending from the mouth of said nozzle to the aperture in the furnace-front when said nozzle is in operative position; also, it will swing up over the mouth of the nozzle and out of the way when said nozzle is swung back out of operative position; also, this shoe or mouth-piece will permit the nozzle to be swung back without moving the pipe to which it is hinged, and will allow of a perfect connection being formed between the mouth of said nozzle and the aperture in the furnace-front, thus preventing the escape of fuel between these parts.

The lower side of the nozzle, which forms the bottom of the same when in operative position, is formed with a transverse slot or aperture, 32, and provided with a valve, 33, which is hinged or pivoted about centrally of said slot and so arranged that its inner portion, 34, will project into the nozzle and its outer portion, 35, extend outside thereof. This inner portion is held down flat or even with the bottom of the nozzle when there is the usual amount of fuel and force of air passing thereover, and when thus held down it will, in connection with said outer portion, close said slot, and thus prevent the escape of any portion of the fuel passing. The outer portion, 35, of said valve is so weighted as to tilt or raise the inner portion, 34, and open the slot when there is no air-blast or fuel or an insufficient amount thereof passing through the nozzle to hold said inner portion down.

It will be evident from the foregoing that the valve 33 is entirely automatic and has the function of a safety-valve, as it serves to catch or stop all the fine particles of fuel which may leak through or past the dividing-valve 24

when it is closed and direct them out through the transverse slot, so that there will be no danger of such particles accumulating in the nozzle and taking fire from the furnace.

Either the valve or damper in the bottom of the separating-chamber or the wing in the hopper may be dispensed with and the force of the air-blast regulated or controlled by the other; but of course this would preclude the wide range of adjustment or control of the air-blast which is possible when both the damper and wing are used.

Having thus fully described the construction, arrangement, operation, and advantages of the several parts of my invention, what I claim as new is—

1. In a furnace-feeder, the combination of a fuel-separator provided with a bottom formed with one or more discharge slots or apertures and with a hopper secured below said bottom, with one or more feed-pipes leading from said hopper, substantially as described.

2. In a furnace-feeder, the combination of a fuel-separator provided with a bottom formed with one or more discharge slots or apertures and with a hopper secured below said bottom and provided with an adjustable wing upon its inner side, with one or more feed-pipes leading from said hopper, substantially as described.

3. In a furnace feeder, the combination of a fuel-separator provided with a bottom formed with one or more discharge slots or apertures, a hopper secured below said bottom, a wing upon the inner side of said hopper, and a cord or wire for adjusting said wing from the outside of said hopper, with one or more feed-pipes leading from said hopper, substantially as described.

4. In a furnace-feeder, a fuel-separator provided with a bottom formed with one or more discharge-apertures and with a central aperture, an adjustable valve or damper for said central aperture, and a hopper below said bottom, in combination with one or more feed-pipes leading from said hopper, substantially as described.

5. In a furnace-feeder, a fuel separator provided with a bottom having one or more discharge-apertures and also a central aperture, a pipe secured in said central aperture, an adjustable valve or damper, and a hopper secured below said bottom, in combination with one or more feed-pipes leading from said hopper, substantially as described.

6. In a furnace-feeder, a fuel-separator provided with a bottom formed with one or more discharge-apertures and a central aperture, an adjustable valve or damper, and a hopper secured below said bottom and provided with an adjustable wing, in combination with one or more feed-pipes leading from said hopper, substantially as described.

7. In a furnace-feeder, a fuel-separator comprising a separating-chamber, 2, having a tangential inlet-opening, 3, a bottom, 4, formed with apertures or slots 5, a hopper, 7, secured

below said bottom and having an adjustable wing, 8, a central pipe, 6, and an adjustable valve or damper, 10, in combination with one or more feed-pipes leading from said hopper, 5 substantially as described.

8. In a furnace-feeder, a fuel-separator provided with a bottom formed with one or more discharge-apertures and a hopper secured beneath the same, in combination with a bifurcated main pipe or conduit secured to the bottom of said hopper and provided with a pivoted dividing-valve, and feed-pipes attached to said bifurcated main pipe or conduit, substantially as described. 10

9. In a furnace-feeder, the combination of a fuel-separator provided with a bottom formed with one or more discharge slots or apertures and with a hopper secured below said bottom and provided with an adjustable wing upon its inner side, with a bifurcated main pipe or conduit secured to the bottom of said hopper and provided with a pivoted dividing-valve, and feed pipes attached to said bifurcated main pipe or conduit, substantially as described. 20

10. In a furnace-feeder, a fuel-separator provided with a bottom formed with one or more discharge-apertures and a central aperture, an adjustable valve or damper, and a hopper secured below said bottom and provided with an adjustable wing, in combination with a bifurcated main pipe or conduit secured to the bottom of said hopper and provided with a pivoted dividing-valve, and feed-pipes attached to said bifurcated main pipe or conduit, substantially as described. 25 30 35

11. In a furnace-feeder, a fuel-separator provided with a bottom formed with one or more discharge-apertures and with a central aperture, an adjustable valve or damper for said central aperture, and a hopper below said bottom, in combination with a bifurcated main pipe or conduit secured to the bottom of said hopper and provided with a pivoted dividing-valve, and feed-pipes attached to said bifurcated main pipe or conduit, substantially as described. 40 45

12. In a furnace-feeder, the combination,

with a feed-pipe, of a hinged nozzle formed with a transverse slot and provided with a valve pivoted to rock within said slot, the inner portion of said valve being arranged and adapted to close said nozzle, and its outer portion being weighted to counterbalance said inner portion and to be closed over said slot by the inner portion being tilted down by the current of air and fuel, substantially as described. 50 55

13. In a furnace-feeder, the combination of the branched pipe 16, provided with the dividing-valve 24, and the curved rectangularly-shaped nozzle 28, formed with the transverse slot 32 in its bottom and provided with the pivoted valve 33, having the inner portion, 34, and the outer weighted portion, 35, substantially as described. 60 65

14. In a furnace-feeder, the combination of a feed-pipe with a movable nozzle provided at its lower end with a pivoted shoe or mouth-piece which is adapted to move down even with the bottom of said nozzle by its own gravity when in operative position, substantially as described. 70

15. In a furnace feeder, the combination of a feed-pipe with a movable nozzle provided at its lower end with the hinged shoe or mouth-piece pivoted to the sides of the mouth or lower end of said nozzle and having curved lugs or flanges at its sides, substantially as described. 75

16. In a furnace-feeder, the combination of a feed-pipe with a hinged and outwardly-swinging nozzle provided at its lower end with a pivoted shoe or mouth-piece adapted to swing freely up and down even with the lower edge of said mouth-piece and provided with curved lugs or flanges at its sides, and devices for removably securing together said feed-pipe and nozzle, substantially as described. 80 85

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

WILLIAM E. ALLINGTON.

Witnesses:

HEMAN B. FERRIS,
JAS. B. PETER.