

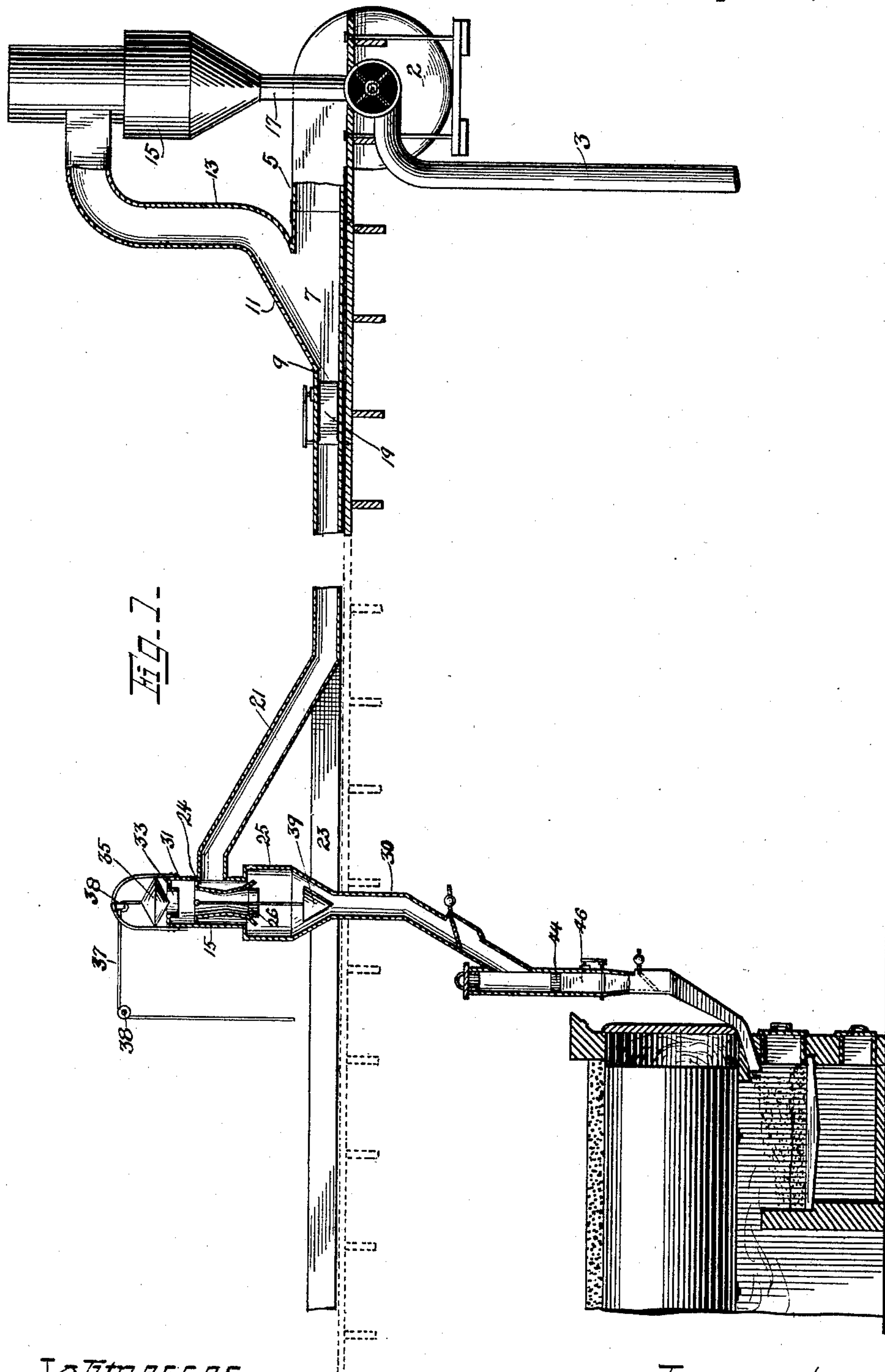
(No Model.)

3 Sheets—Sheet 1.

H. L. DAY.  
FUEL FEEDER.

No. 482,424.

Patented Sept. 13, 1892.



WITNESSES.

C. C. Van Doren.  
C. Hawley.

Inventor  
Henry L. Day.  
By Paul & Merwin Attys.

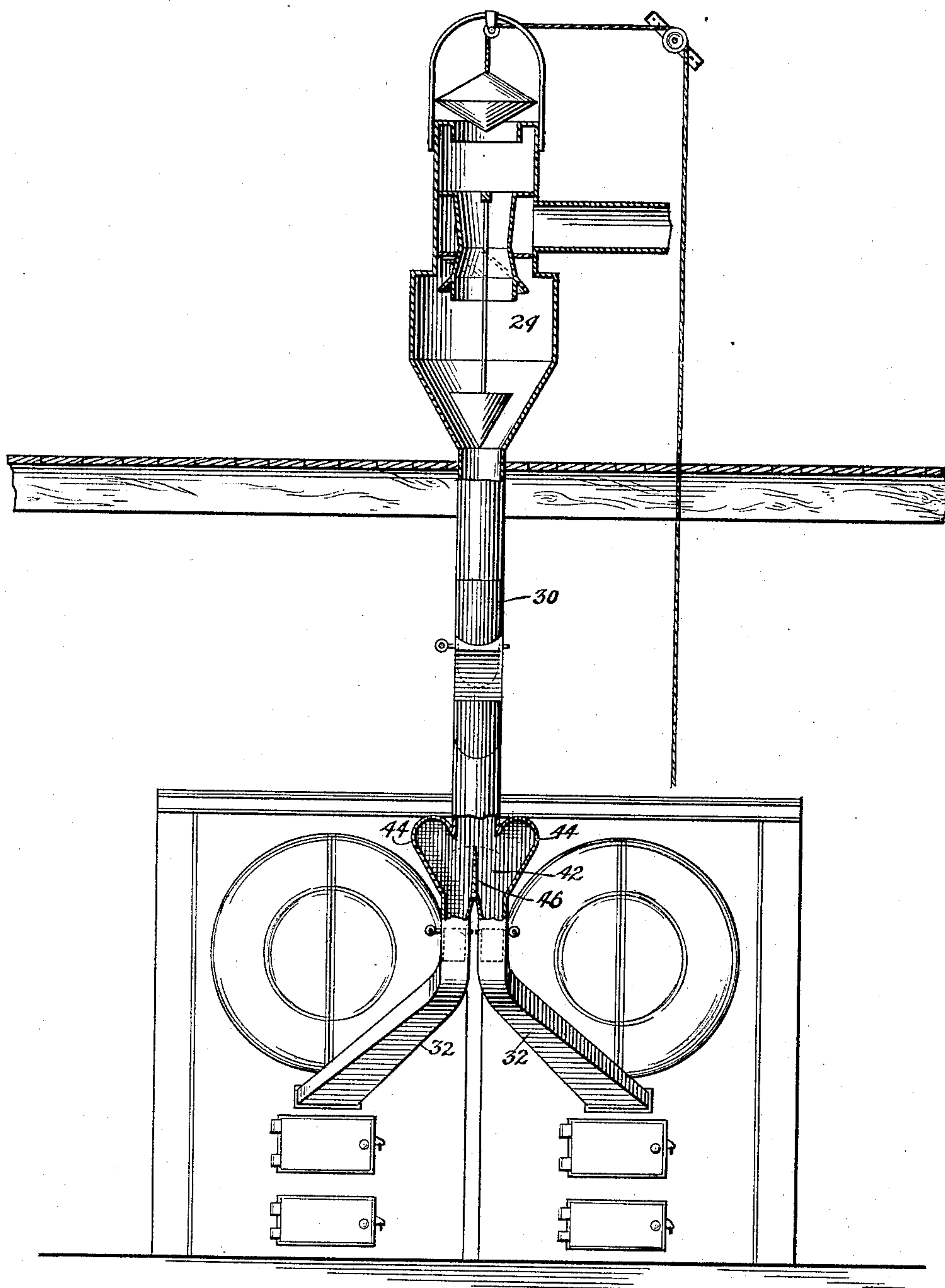
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*C. Hawley*

Inventor.

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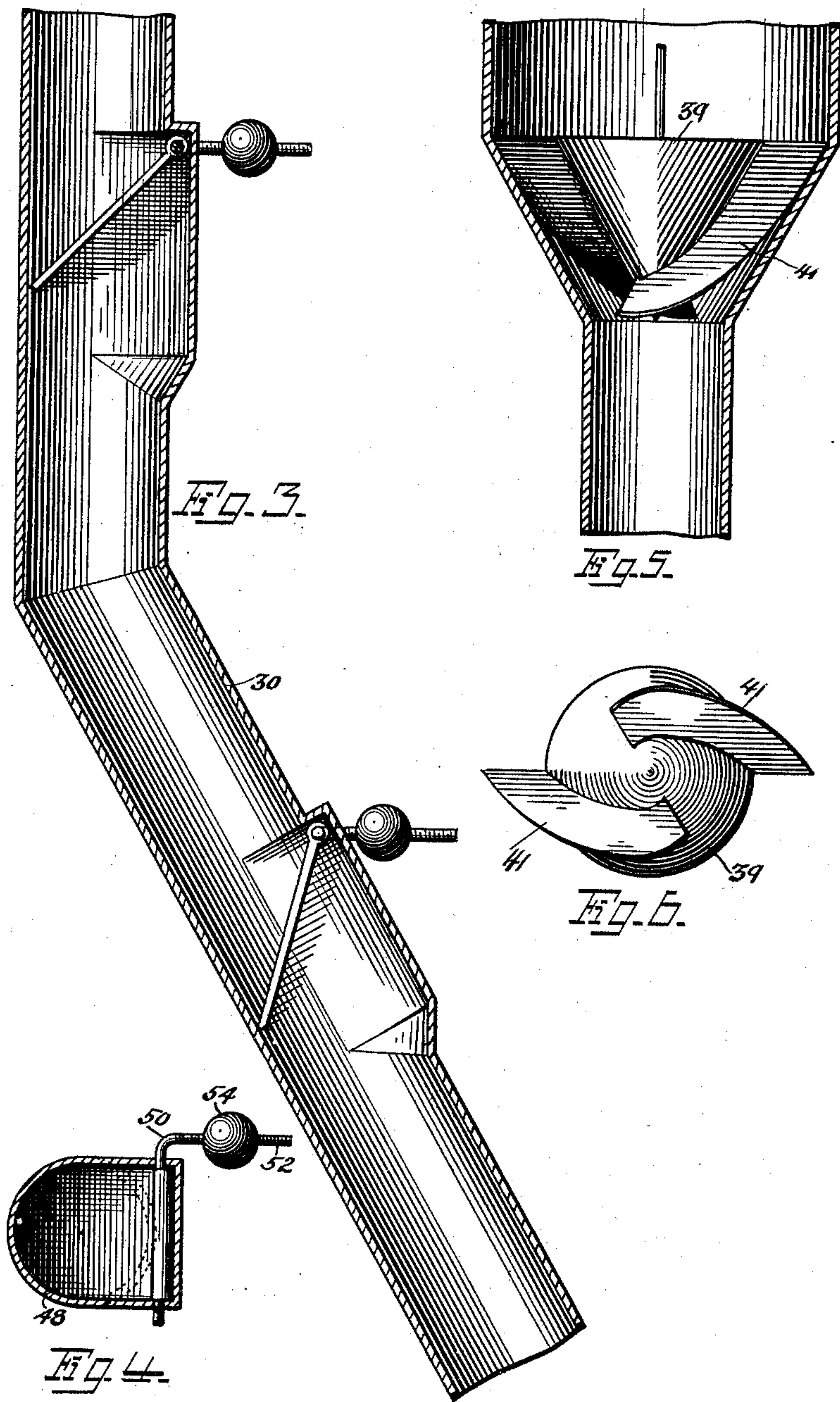
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# UNITED STATES PATENT OFFICE.

HENRY L. DAY, OF MINNEAPOLIS, MINNESOTA.

## FUEL-FEEDER.

SPECIFICATION forming part of Letters Patent No. 482,424, dated September 13, 1892.

Application filed February 24, 1891. Serial No. 382,405. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY L. DAY, of Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain Improvements in Fuel-Feeders, of which the following is a specification.

This invention relates to improvements in that class of devices designed for feeding by pneumatic means fine material, such as shavings, sawdust, dust, &c., and delivering the same directly to furnaces, or delivering such material to suitable storage-rooms or other receptacles, or delivering sufficient quantities of such material to the furnaces and the remaining portions of the material to suitable receptacles or storage-houses; and it consists generally in a feeding system employing a suitable fan or fans by which the material is taken up from the machines where it is made or separated from other material operated upon by said machine, separating and relief valves by means of which a large portion of the air is permitted to escape and the material brought into more compact form so that it can be divided and directed into any desired pipe or pipes to be conveyed either to the furnace or to any suitable receptacle, means for separating the finer particles of material or dust from the air after it escapes from the relief-valve and before it enters the outer atmosphere and returning said fine material to the fan or to the pipes or to a suitable receptacle, in a separator by means of which the amount of air that enters the furnace or receptacle with the fuel or material may be regulated, and in automatic valves arranged to form an air-space or compartment for preventing fire from passing up in the pipe or receptacle through which the material is fed to the furnace.

The invention consists, further, in the construction and combination hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, forming a part of this specification, Figure 1 is a side elevation and partial section of an apparatus embodying my invention. Fig. 2 is an end elevation of a portion of a furnace, showing my apparatus, partially in section, applied thereto. Fig. 3 is a detail section of a portion of a feeder-pipe, showing the arrangement of

the valves therein for forming an air-compartment. Fig. 4 is a transverse section of the same, showing the construction of the valve that I prefer to use. Fig. 5 is a detail of the separator, showing the cone arranged in the lower part thereof provided with inclined wings. Fig. 6 is an under side view of the cone shown in Fig. 5.

In the drawings, 2 represents a suitable fan by which the material to be fed is taken up through suitable pipes, as 3, from the planing-machines or other apparatus where the shavings or fine material are made or separated. This fan may be arranged in any suitable manner and any suitable number of pipes may be connected therewith. The fan connects at its outlet side with a suitable blast-pipe 5, into which the material and the air from the fan are blown. After the blast of air carrying the fine material leaves the fan it is desirable to bring the fine material into a smaller compass, in order that it may be divided up and directed into a number of different pipes and a portion of it conducted directly to the furnace or furnaces and other portions conducted to storage-receptacles. As, however, any reduction in the volume of material without permitting a free escape of the air would create a back-pressure upon the fan, I provide a relief-valve in which the material is reduced to a smaller compass, while the air is given a free escape. This valve consists of an expansion-chamber 7, with which the pipe 5 communicates, and having an outlet-opening 9 of considerably less area than the inlet-opening. An inclined deflector 11 is arranged opposite the inlet-opening, and as here shown forming the front wall of the valve-chamber. An air-escape pipe 13 connects with the valve-chamber 7. As the volume of air enters the valve-chamber 7 the shavings and heavy material carried by the air-current strike the inclined deflector 11, and are thereby thrown downward toward the bottom of the chamber and pass out at the opening 9. The air which does not pass through the opening 9 finds a ready escape through the pipe 13. As more or less of the finer material will be carried out by the air-current passing through the pipe 13, I prefer to connect this pipe with a separator 15, having its dust-discharge 17 connected to the in-



let side of the fan or to some other suitable place. The air which passes into this separator through the pipe 13, after being separated from the fine material carried by it, escapes through the top of the separator, while the light material passes through the pipe 17, and as here shown returns to the fan. The separator which I have here shown for this purpose is that shown and described in Letters Patent of the United States, issued to C. M. Hardenburgh June 26, 1888, No. 385,263; but any suitable dust-collector can be used. After the shavings or similar material have passed from the valve-chamber 7 through the opening 9 they are directed by means of a suitable valve or valves 19 into the furnace feeder-pipe 21 or into a pipe 23, by means of which they may be conducted to a suitable storage house or receptacle. Any suitable number of these pipes may be used and the material may be distributed among the various pipes in any desired proportion.

The relief-valve that I prefer to use is shown and described in a separate application for Letters Patent of even date herewith, Serial No. 382,406. The furnace feeder-pipe 21 connects with a second separator 15. This separator may be of the same construction as the one first described and being provided with a chamber 24 of annular form, into which the air-current enters radially. Below this is a chamber 25, having a conical lower end, and the lower end of the chamber 24 connects with the upper end of the chamber 25. An open tube 26 preferably extends through the chamber 24 and into the chamber 25. A series of inclined flights 29 is arranged between the chambers 24 and 25, so as to give the material and the air a downwardly-inclined direction as they enter the chamber 25. The shavings and similar material pass out at the lower end of the chamber 25 and into the feeder-pipe 30, connected therewith. The air passing up through the central tube 26 and a chamber 31, arranged above the chamber 24, finally passes out through an opening 33 at the center of said chamber. For the purpose of regulating the escape of the air from this separator I prefer to provide the conical cover 35, preferably supported upon a cord 37, that passes over pulleys 38 and extends to a point where it may be conveniently reached by the furnace attendant.

Arranged at the bottom of the chamber 25 is the cone 39, which partially closes the outlet-opening from the chamber and aids in breaking up the air-current and causing the shavings and similar material to pass out of the chamber. For the purpose of insuring the breaking up of the air-current and the discharge of the dust through the opening at the bottom of the conical chamber I in some instances provide the cone 39 with one or more wings 41, arranged thereon and extending from the top of the cone to a point near its apex, as shown in Figs. 5 and 6.

The furnace feeder-pipe 30 extends to the

furnace, and where the feeder is used in connection with a double furnace, as shown in Fig. 2, this pipe is branched into the two pipes 32, which connect with suitable openings in the door or wall of the furnace. At the point where the pipe is divided I prefer to provide a relief-valve, which permits any desired amount of the material to be directed into either of the furnaces, while at the same time the surplus air is permitted to pass through the other pipe and into the other furnace. By this means any desired amount of material may be directed into either furnace without shutting off the supply of air from the other furnace, and this arrangement, while giving perfect control of the fuel, does not shut off the supply of air necessary to combustion in both furnaces. This valve consists, preferably, of a valve-chamber 42, provided with an expansion-chamber 44 at each side thereof. A valve-plate 46 is pivoted centrally at the bottom of said valve-chamber between the branch pipes 32, so that by turning this valve the material may be divided up as desired between the two branch pipes. By leaving the valve-plate in a central position, as indicated in Fig. 2, the material will pass equally into the two branch pipes, and by turning it to either side a greater or less quantity of material may be directed into either pipe, as desired. As the branch pipes 32 are of less area than the feeder-pipe 30, if the valve were turned so as to close or partially close either of the branch pipes there would be a back-pressure created in the pipe 30. When, however, the valve-plate 46 is turned in either direction, there is still an opening above said plate into the expansion-chamber 44 and from said expansion-chamber into the branch pipe connected with it. By this means it will be seen that the surplus air may pass around through the expansion-chamber, and thus escape through the other branch pipe.

In order to prevent fire from passing up into the feeder-pipe, I prefer to provide automatic shut-off valves which form a comparatively air-tight chamber in said pipe above its connection with the furnace. The valves that I prefer to use for this purpose are shown in detail in Figs. 3 and 4. The pipe is provided with a rectangular projection at one side thereof, and a valve 48 is arranged in the pipe standing when closed at an angle therewith, as shown in Fig. 3, and adapted when open to be turned back, so as to lie within the rectangular projection in the pipe. This valve is mounted upon a shaft 50, having an adjustable weight 54 arranged to balance the weight of the valve and adapted to hold it in any desired position. This weight tends to hold the valve in a closed position, and by adjusting the weight the force with which the valve will be held to its seat will be regulated. These valves automatically open to permit the passage of the material through the pipe and are then closed, forming an air-



chamber between the two valves in the pipe. These valves may be located in any suitable places between the dust-collector and the furnace-inlet.

5 I claim—

1. The combination, with a suitable fan, of a blast-pipe connected with said fan, a relief-valve connected with said pipe and provided with a suitable fuel-discharge outlet, an air-escape pipe connected with said relief-valve, and a separator arranged to receive the air from said air-escape pipe, substantially as described.

2. The combination, with a suitable fan, of a blast-pipe connected with said fan, a relief-valve connected with said pipe and provided with suitable outlet-openings, an air-escape pipe connected with said relief-valve, and a separator arranged to receive the air from said escape-pipe and to return the material from said separator to the inlet side of said fan, substantially as described.

3. The combination, with a suitable fan, of a relief-valve connecting with the exit-opening in said fan and provided with a suitable outlet, valves arranged in said outlet, two or more pipes leading from said outlet, and an escape-pipe connected to said relief-valve, and a separator with which said escape-pipe communicates.

4. The combination, with a suitable fan, of a relief-valve connecting with the exit-opening in said fan and provided with a suitable outlet, two or more pipes leading from said outlet, valves arranged in said outlet, an escape-opening for said relief-valve, a separator with which said escape-pipe communicates, and a connection between said separator and the intake-pipe of said fan.

5. The combination, with a suitable fan, of a relief-valve connecting with the exit-opening in said fan, an air-escape pipe connected to said relief-valve, a fuel-outlet from said relief-valve, and a fuel-pipe leading from said fuel-outlet to a suitable furnace, substantially as described.

6. The combination, with a suitable fan, of

an outlet-pipe connected therewith, a relief-valve connected with said outlet, a separator connected with the intake-pipe of said fan, an air-escape pipe extending from said relief-valve to said separator, pipes extending from said relief-valve, valves for regulating the passing of the material from said relief-valve to said pipes, a separator with which one of said pipes communicates, and a pipe extending from said separator to the furnace, substantially as described.

7. The combination, with a separator provided with a chamber 24 and with a chamber 25 with which said chamber 24 communicates by a series of inclined flights, of a central tube 26 in said separator and an adjustable cover regulating the escape of air through said tube, substantially as described.

8. The combination, with the separator having the conical chamber 25, of the cone 39, arranged in the outlet-opening of said separator, and the adjustable cover 35, arranged over the air-escape outlet of said separator, substantially as described.

9. The combination, with the separator provided with a suitable opening for the escape of the air from said separator, of the conical cover 35 and means for adjusting said cover for the purpose of regulating the escape of the air from said separator.

10. The combination, with the separator provided with the conical lower end, of the cone 39, arranged in the opening in said chamber and provided with the wings 41.

11. The combination, with the feeder-pipe 30, of the branch pipes 32, the relief-valve 42, arranged between said feeder-pipes and said branch pipes and provided with the expansion-chamber 44, projecting in opposite directions, and the pivoted valve-plate 46, substantially as described.

In testimony whereof I have hereunto set my hand this 20th day of October, 1890.

HENRY L. DAY.

Witnesses:

A. M. GASKILL,  
C. G. HAWLEY.