

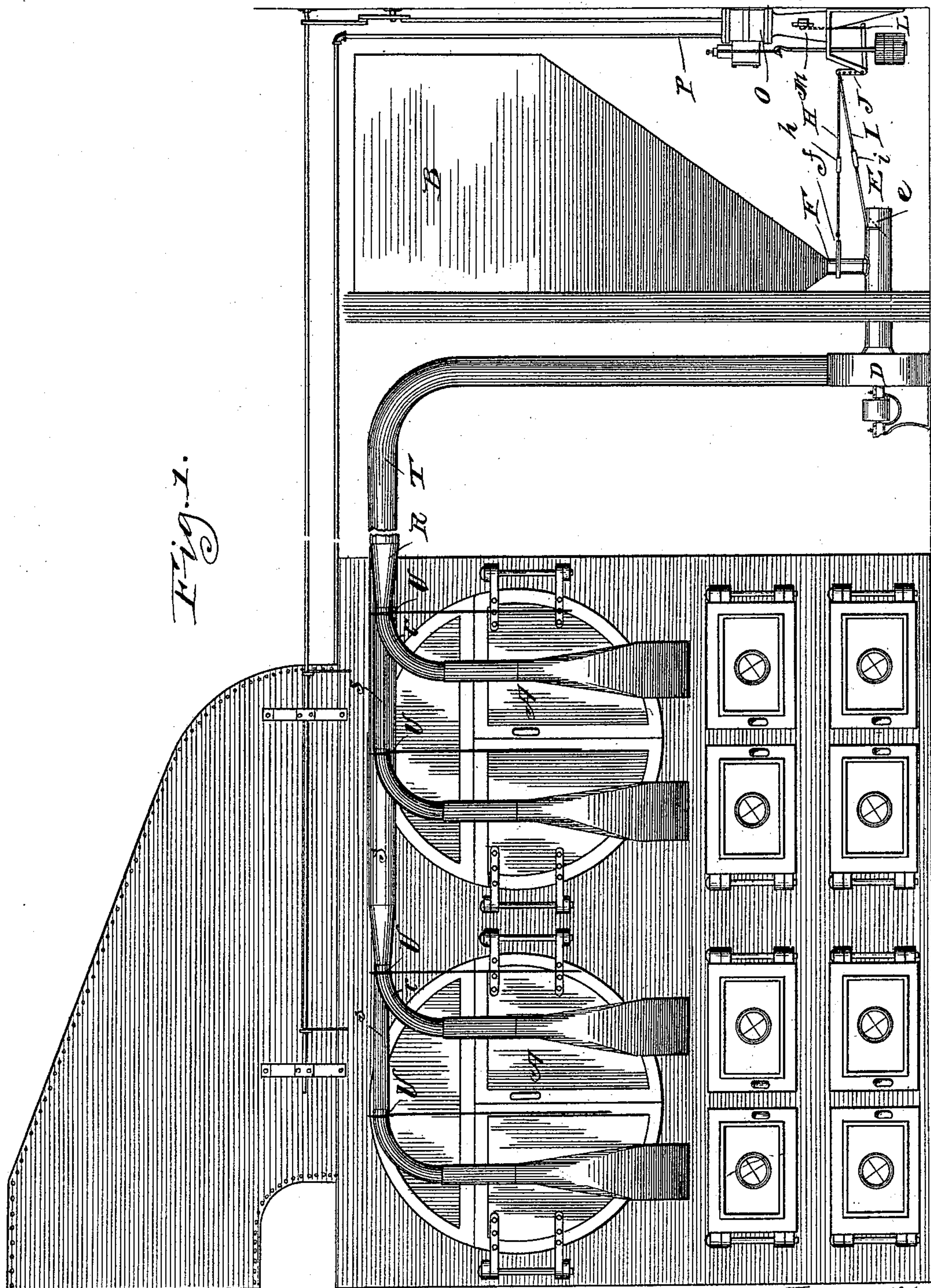
(No Model.)

3 Sheets—Sheet 1.

H. S. GRIGSBY.
PULVERIZED FUEL FEEDER.

No. 494,375.

Patented Mar. 28, 1893.



Witnesses,
J. J. Mann,
Frederick Goodwin

Inventor,
Hugh S. Grigsby
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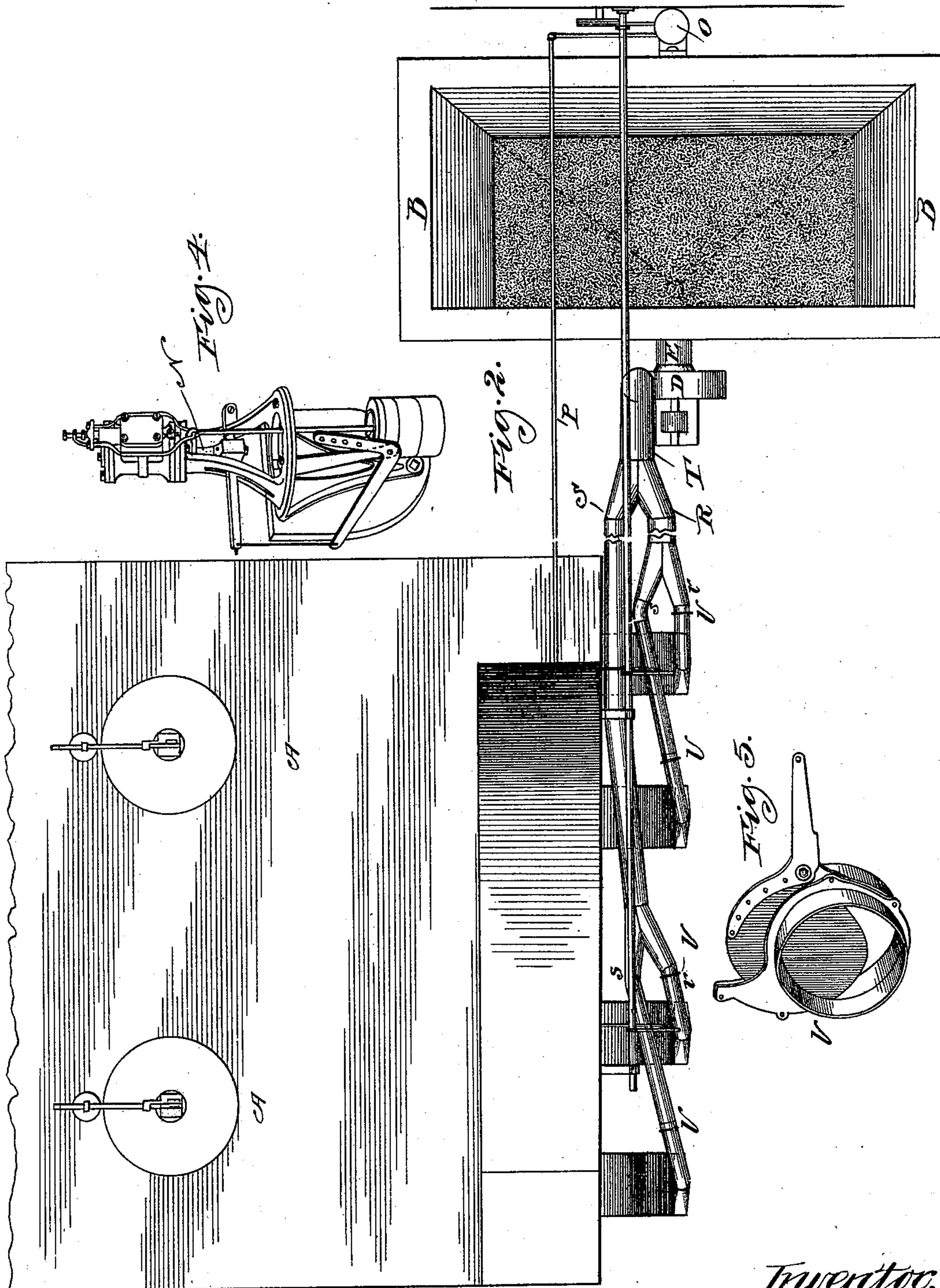
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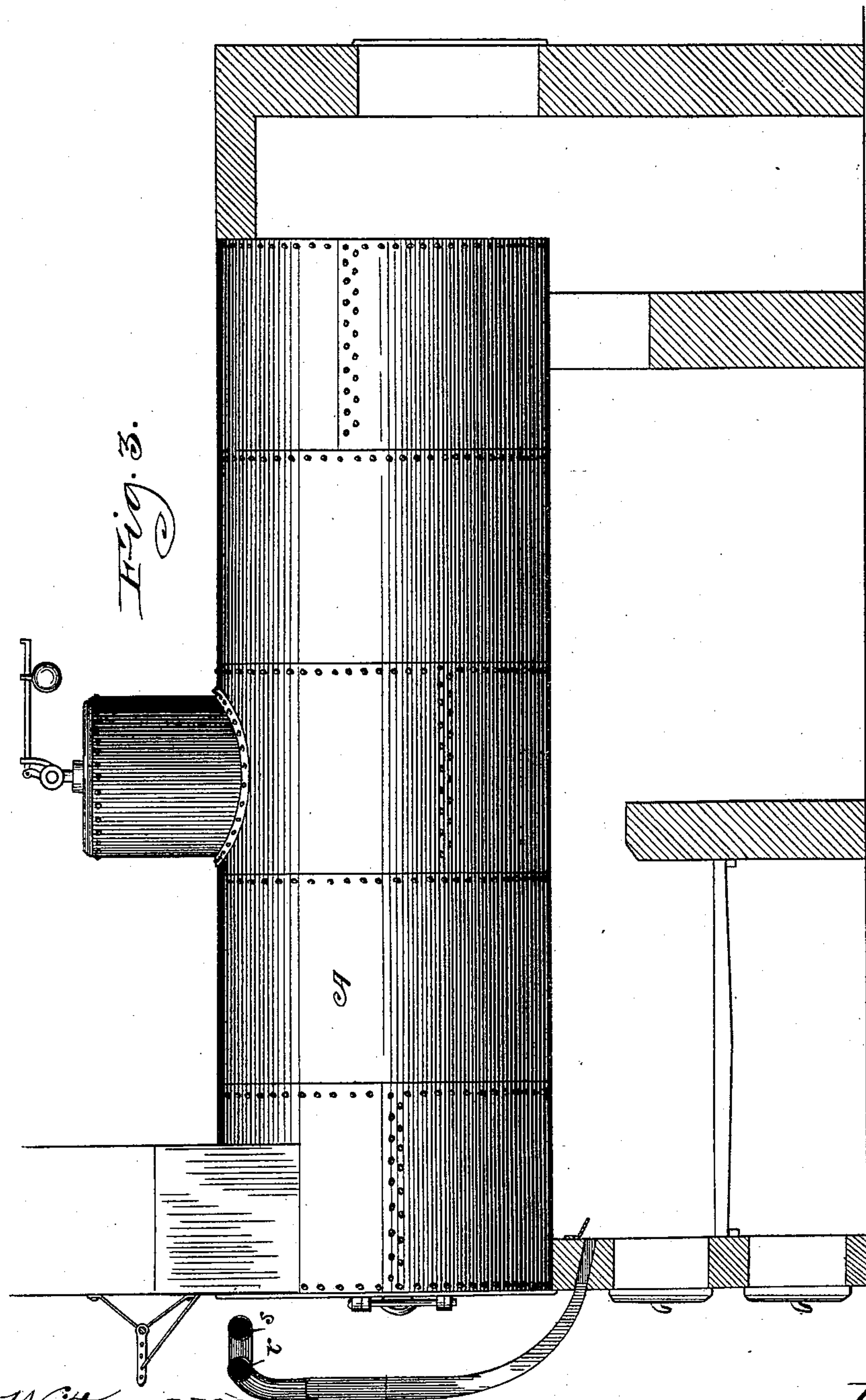
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UNITED STATES PATENT OFFICE.

HUGH S. GRIGSBY, OF CHICAGO, ILLINOIS.

PULVERIZED-FUEL FEEDER.

SPECIFICATION forming part of Letters Patent No. 494,375, dated March 28, 1893.

Application filed February 23, 1892. Serial No. 422,374. (No model.)

To all whom it may concern:

Be it known that I, HUGH S. GRIGSBY, a citizen of the United States, residing at Chicago, Illinois, have invented certain new and useful Improvements in Pulverized-Fuel Feeders, of which the following is a specification.

My invention has for its object to provide a pulverized fuel feeder by means of which the supply of fuel and the necessary air to support combustion is automatically regulated by the steam pressure generated in a boiler by means of the combustion of such fuel.

The application of my invention which I have shown for illustration is a battery of steam boilers, but the invention may be applied to a single boiler or to other uses—as, for example, blast furnaces, heating systems, &c., provided only that a steam generator is placed in such proximity to the fire that is supplied with fuel, that the steam generated therein will control the supply of fuel and the necessary oxygen to support combustion.

The apparatus shown in the drawings comprises in addition to the boilers, a receptacle for the pulverized fuel, an exhaust fan having a suction and a discharge pipe, the former communicating with the fuel receptacle and with the atmosphere, and having valves to govern the passage of the fuel and of the air to the fan. These valves are automatically controlled by the movement of a piston within a cylinder which is supplied with water from the boiler so that the movement of the piston caused by the variation of pressure with the boiler will operate automatically the valves so as to increase or diminish the supply of fuel and air through the fan to the fire of the furnace, and thereby bring each particle of fuel into immediate contact with sufficient air to support perfect combustion. The return of the piston may be effected by any suitable resistance of the opposing steam pressure—as, for example, a weight, spring or other suitable appliance.

The particular form of apparatus which I have shown in the drawings for operating the dampers is not essential to my invention, but is a type of device already known and one which I have found suitable to my apparatus.

The discharge from the fan to the furnace, where a single furnace is fed, may be a single

pipe, or there may be several pipes entering the front or sides of the furnace, each branch being provided with a valve. And in case a plurality or battery of boilers is used there is employed in addition to the main trunk or discharge pipe a number of branch pipes entering through the front of the fire box, each provided with a valve by the adjustment of which the pressure may be equalized in the discharge to the several boilers so as to insure equal feed into each furnace.

In the accompanying drawings, Figure 1 is a front elevation of the apparatus applied to two boilers. Fig. 2 is a plan view thereof. Fig. 3 is a side elevation, partly in section. Fig. 4 is a detail view of a pressure actuated regulator; and Fig. 5 is a perspective view of a lever valve for the discharge pipes.

In the drawings, A A represent boilers; B a hopper shaped fuel receptacle in which a pulverized fuel is placed. This fuel may be any combustible pulverized material, such as coal, coke, &c., and may be adapted also for feeding dust and shavings.

D is an exhaust fan having the suction open to the atmosphere and the branch F communicating with the fuel hopper.

f is a slide valve in the branch F and e is a rocking damper in the suction E.

H, I represent rods connected, respectively, to the valve f and damper e, said rods being made in two sections, and threaded into couplings h, i, whereby the length of the rods may be varied by turning their sections into and out of the coupling. These rods are connected to one arm of a bell crank lever J, said arm having a series of perforations to adapt the rods H, I for vertical adjustment along said arm, thereby giving them longer or shorter strokes, and consequently varying their effect upon the valve and damper which they respectively operate. To the other member of the bell crank there is connected a link L which is moved by the vibration of an arm M, the latter being connected with the piston rod N of a steam damper regulator of known construction.

Water is admitted to the cylinder O within which the piston works, through the pipe connected with the boiler. The water is admitted below the piston, and the raising of

the steam pressure within the boiler will consequently effect the raising of the piston and the consequent partial closing of the slide valve and damper, whereby the supply both
 5 of fuel and air is diminished, and the diminution of steam pressure within the boiler will permit the return of the piston, the opening of the valve and damper and the increase in the supply of both air and fuel to the furnace.
 10 By this simple means, therefore, the combustion within the furnace is regulated automatically and may be so regulated that the steam pressure will not vary appreciably from the standard desired.
 15 The discharge from the fan in the illustration comprises the trunk T which is divided into the branches S, R, the branches being properly proportioned and properly sub-divided again into the several branches s, r,
 20 which deliver through the nozzles shown into the fire box. Each of these branches is preferably provided with a lever valve V of usual or suitable construction, for example such as shown in Fig. 5, whereby the discharge pipe
 25 through said several branches may be varied in proportion to the length of such branches and the consequent resistance to the delivery of the fuel and an equal delivery made through said several branches.
 30 It will be observed that I have described the application of my invention to a steam boiler, the primary purpose of the arrangement being to produce steam in such boiler, but the invention may be used where the steam
 35 is generated not as the primary object but solely for the purpose of regulating and controlling the fire of the furnace; and in such case the steam generator will be of such size and so located with reference to the furnace fire
 40 as to generate sufficient steam only to perform the work of regulating combustion by varying the supply of fuel and air through the instrumentalities shown. It will be understood that I do not therefore limit my invention to
 45 the precise use described nor to the exact

means employed for performing this regulation.

I claim—

1. In a pulverized fuel feeder, the combination with the fuel reservoir, of a fan interposed
 50 between the fuel supply and the furnace and having its suction connected with the fuel supply and with the atmosphere, a discharge pipe leading from the fan to deliver the fuel
 55 into the fire box, valves for controlling the fuel and air supply passages to the fan, a steam generator located in proximity to the fire box of the furnace, and a regulator actuated by the boiler pressure to operate said valves,
 60 whereby variations of the pressure is utilized to regulate the supply of fuel and air to the furnace, substantially as described.

2. A regulating device for pulverized fuel feeders, comprising in combination with an
 65 exhaust fan having its suction connected with the fuel supply and with the atmosphere, valves in said connections, a steam generator located in proximity to the fire and connected
 70 with a pressure chamber, a piston reciprocating within said chamber, a bell crank operated by the piston rod, and links or rods adjustable as to length and pivotally connected
 to the bell crank, substantially as described.

3. A regulating device for pulverized fuel feeders, comprising in combination with an
 75 exhaust fan having its suction connected with the fuel supply and with the atmosphere, valves in said connections, a steam generator located in proximity to the fire and connected
 80 with a pressure chamber, a piston reciprocating within said chamber, a bell crank operated by the piston rod, and links or rods connected with the valves and adapted to be
 85 connected with the bell crank at different distances from its pivot, substantially as described.

HUGH S. GRIGSBY.

Witnesses:

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