

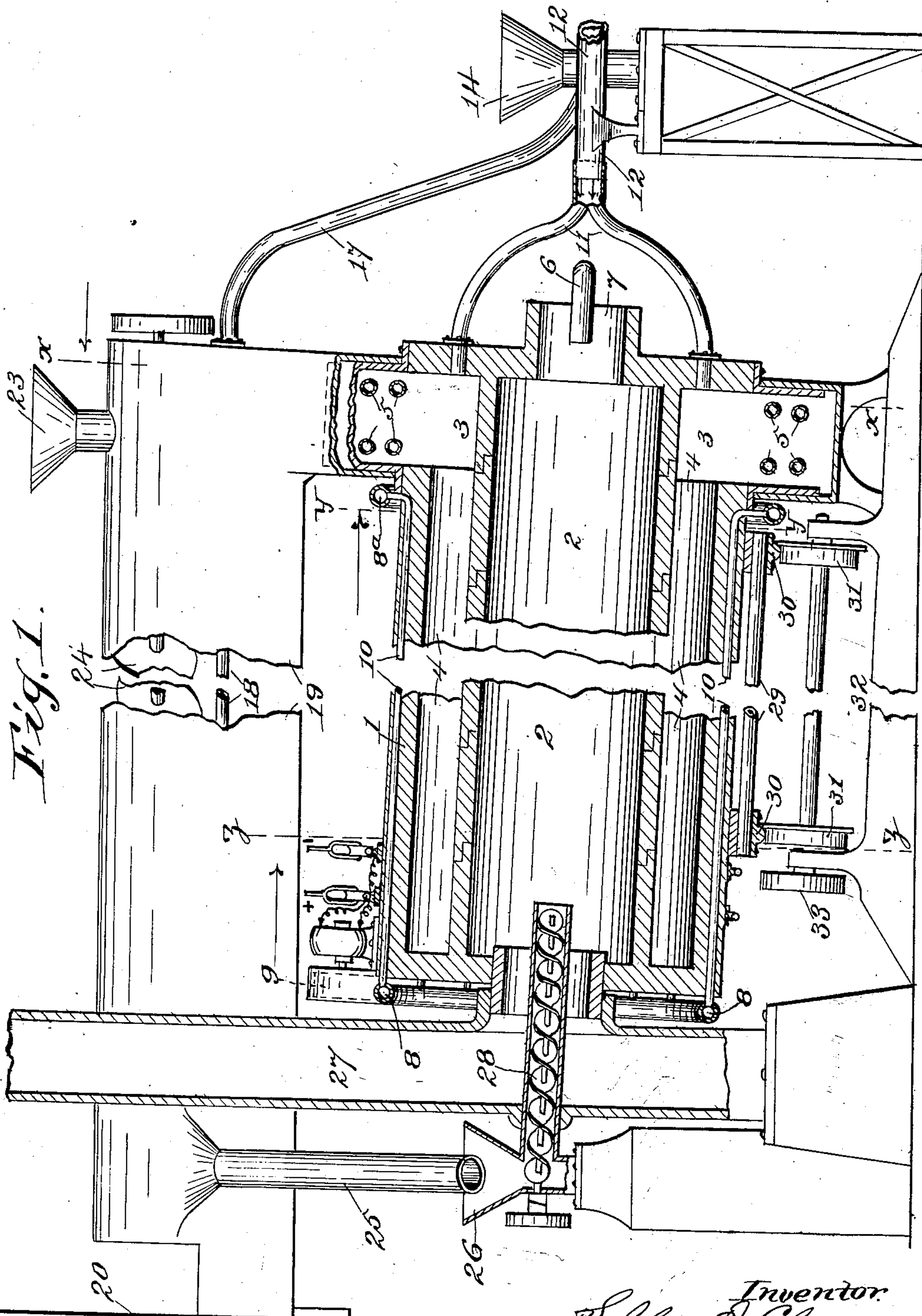
No. 829,843.

PATENTED AUG. 28, 1906.

S. I. CLAWSON.
ROASTING AND VOLATILIZING FURNACE.

APPLICATION FILED SEPT. 9, 1905.

4 SHEETS—SHEET 1



Witnesses:
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W. F. Crossman

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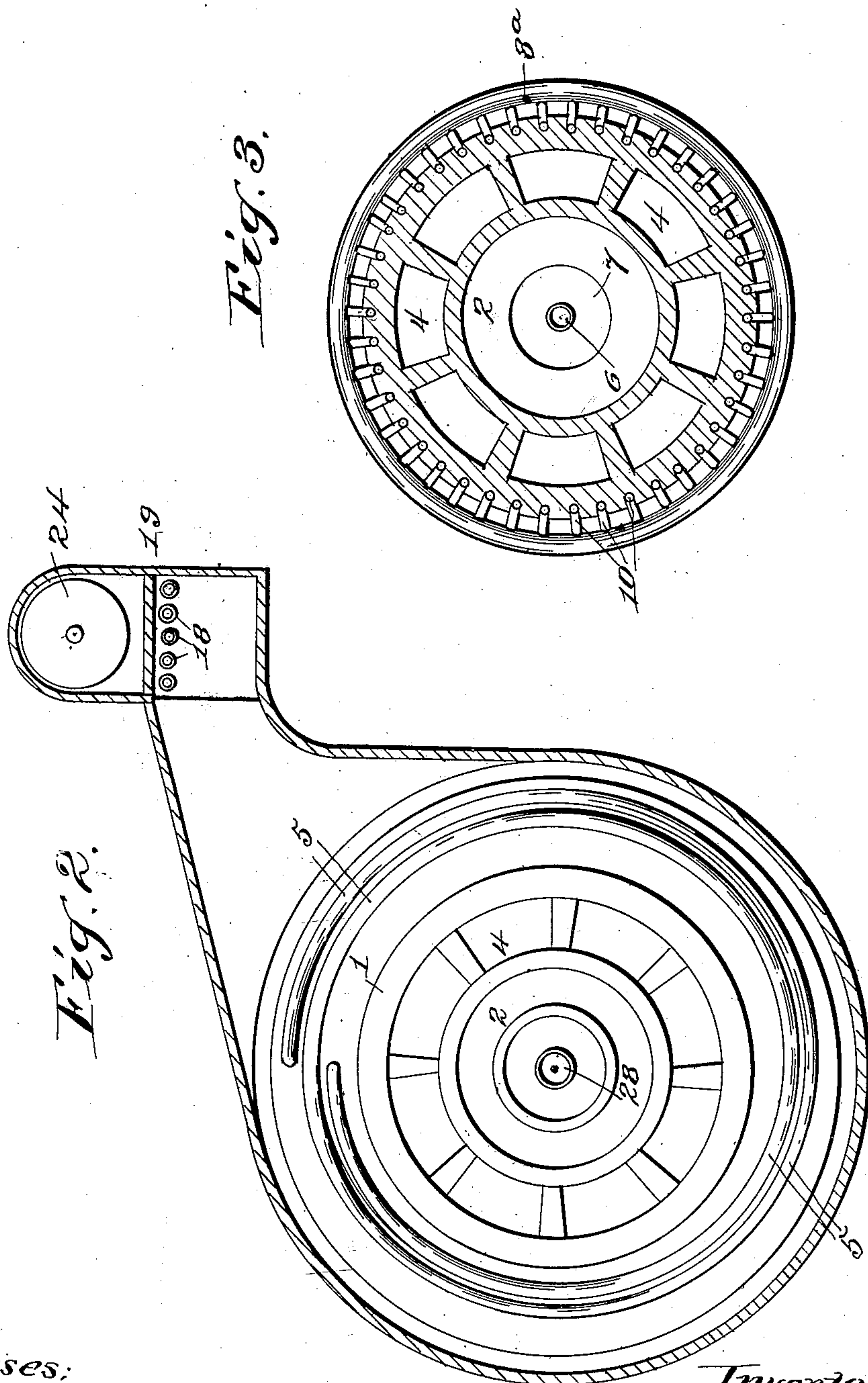
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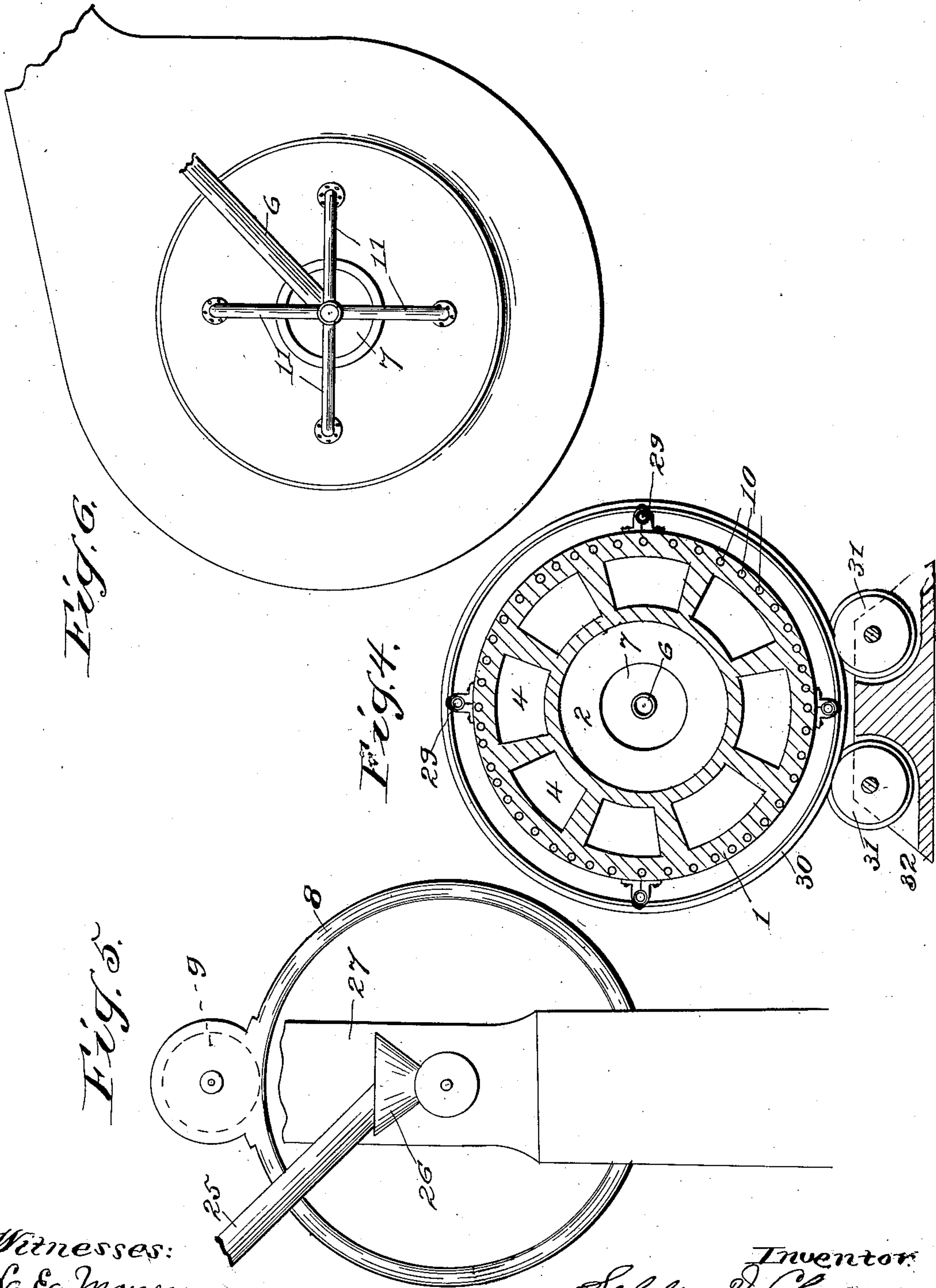
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4 SHEETS—SHEET 4.

Fig. 7

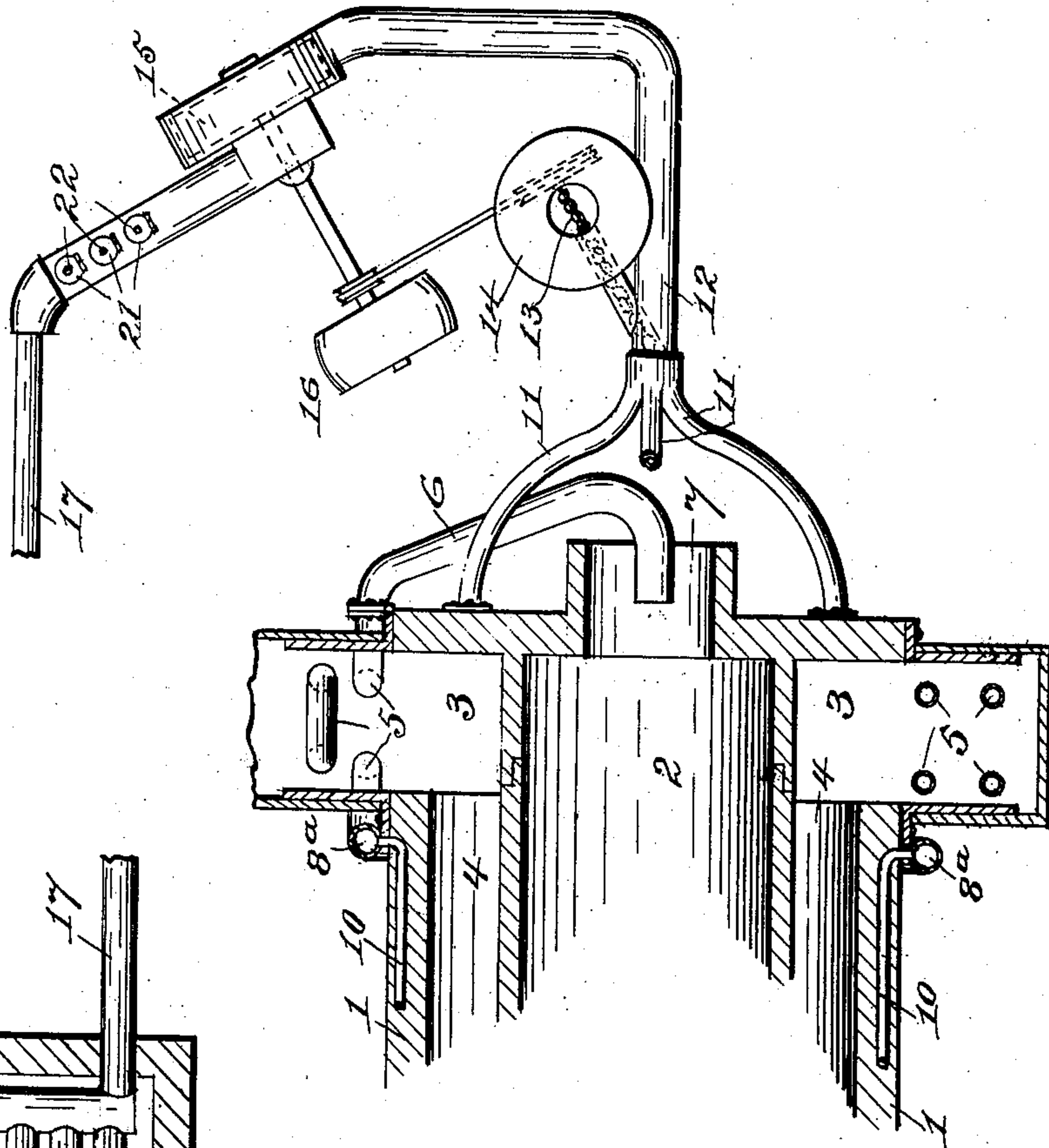


Fig. 9.

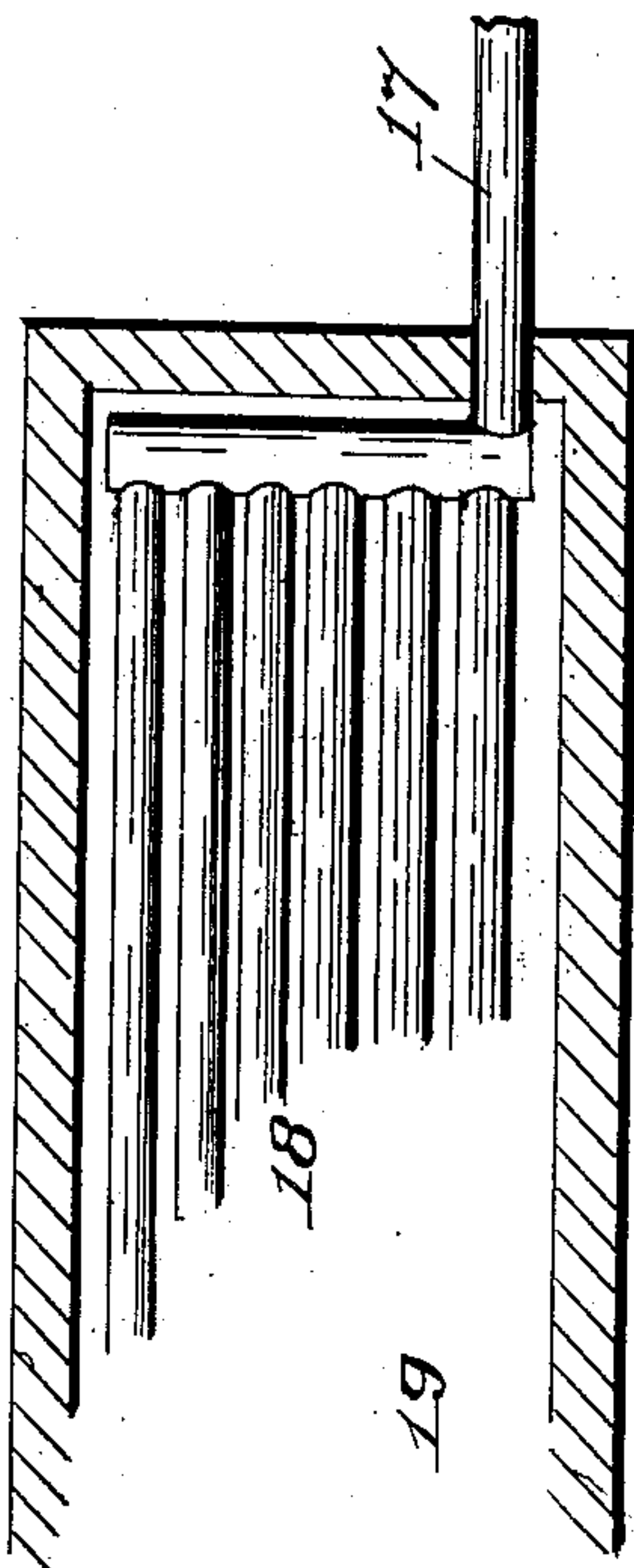
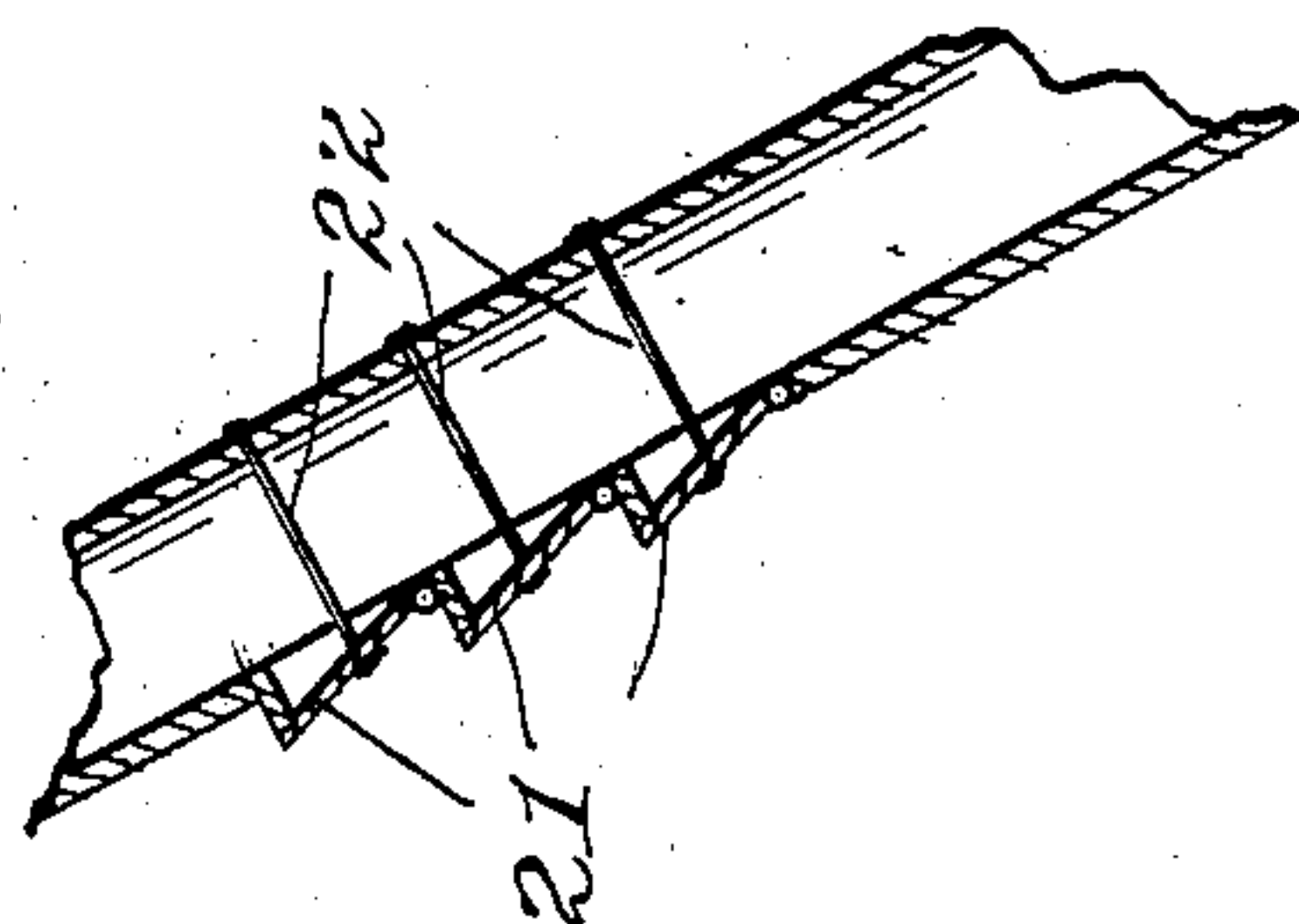


Fig. 8.



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UNITED STATES PATENT OFFICE.

SELDEN I. CLAWSON, OF SALT LAKE CITY, UTAH.

ROASTING AND VOLATILIZING FURNACE.

No. 829,843.

Specification of Letters Patent.

Patented Aug. 28, 1906.

Application filed September 9, 1905. Serial No. 277,672.

To all whom it may concern:

Be it known that I, SELDEN I. CLAWSON, a citizen of the United States, residing at Salt Lake City, in the county of Salt Lake and State of Utah, have invented certain new and useful Improvements in Roasting and Volatilizing Furnaces, of which the following is a specification.

This invention relates to ore-roasting furnaces, and pertains especially to the class of volatilizing-furnaces having rotary cylinders.

The object of the invention is to provide an ore roasting or volatilizing furnace having a continuous feed and discharge without waste of heat and arranged to have a current of air pass over or above the ore independent of the fire-box gases and carry off the volatilized metals or compounds as they rise from the ore.

A further object of the invention is to provide an ore-roasting furnace to volatilize the ore and expel metal values therefrom and arranged to have a continuous current of air for carrying off said values; to provide means for preventing heat radiation and waste and for reusing such heat; to provide means for operating the furnace with powdered coal, and to furnish means for supplying hot air to a fan-blast.

The object still further of the invention is to provide an arrangement of pipes in connection with the furnace whereby the air-currents to the furnace, the ore, and the fuel are all heated by the furnace before entering the latter.

With these and various other objects, advantages, and improved results in view the invention consists in the novel construction and peculiar arrangement of parts, as will be hereinafter more fully disclosed.

In the accompanying drawings, forming part of this application, Figure 1 is a longitudinal section of a furnace constructed in accordance with my invention. Fig. 2 is a section on the line *x x*, Fig. 1. Fig. 3 is a section on the line *y y*, Fig. 1. Fig. 4 is a section on the line *z z*, Fig. 1. Fig. 5 is an elevation of the upper end of the furnace. Fig. 6 is a similar view of the lower end. Fig. 7 is a detail top view of coal-feed fan and fan-pipes, showing lower end of the furnace in transverse section. Fig. 8 is a detail section of part of the pipe having safety-valves. Fig. 9 is a transverse longitudinal section of the chimney-flue, partly broken away.

The same reference-numerals denote the

same parts throughout the several views of the drawings.

The shell or cylinder 1 is composed of suitable fire-brick and has a central cylindrical muffle or ore-heating chamber 2, the wall of which extends throughout the length of the volatilizing-cylinder 1 and through a fire-box 3, with a series of fire-box chambers 4 between the said two cylinders, whereby the muffle may have full benefit of heat from the fire-box to the entire exclusion of products of combustion. The fire-box is provided with pipe-coils 5, having a pipe 6 leading therefrom into the discharge end 7 of the muffle 2, and the upper end of the volatilizer is provided with a circular pipe 8 and an electric-motor fan 9. Longitudinal pipes 10 connect the pipe 8 with a circular pipe 8^a, and the latter is connected with the coils 5, so that the air to the muffle is heated in its passage from one end of the volatilizer to the other before entering the muffle. The lower end of the volatilizer is provided with a series of pipes 11, terminating central of said end, to which terminal is coupled a pipe 12, having an inclosed feed-screw 13 to feed powdered coal from a hopper 14 into the pipe 12, whence the coal is blown, by a motor-fan 15, through the pipes 11 into the fire-box. The feed-screw 13 is driven by the fan-motor 16. The fan 15 is supplied with hot air by means of a pipe 17, connected to a nest of circulating-pipes 18, extending through the longitudinal branch 19 of the chimney 20. The pipe 17 terminates in the casing of the fan 15 and is provided, preferably near the fan 15, with safety-valves 21, having stems 22 of such metal as will fuse when the air in the pipe 17 reaches a higher temperature than may be desired.

The chimney branch 19 has a suitable ore-hopper 23 and incloses an ore-feed screw 24, located above the nest of pipes 18. A chute 25 carries the ore from the screw 24 into a hopper 26, whence it is carried across a fume-pipe 27 by a screw conveyer 28 into the upper end of the muffle. In this manner the ore is under heat from the time it enters the screw 24 until it reaches the muffle.

The cylinder 1 inclines from its upper to lower ends and is provided with pipes 29, to which are secured rails 30, adapted to rest on the wheels 31 of a truck 32, and said wheels are revolved by suitable power connected to a gear 33, so as to revolve the cylinder.

The operation is as follows: During the

revolution of the cylinder crushed ore mixed with salt is fed by the screw 24 by way of the chute and ore-conveyer into one end of the muffle, while the powdered coal is fed to the fire-box and fire-chambers at the other end; and the air to the muffle is entered at the opposite end. The coal-blast and muffle air-currents are superheated by heat from the furnace after the latter is under way, and by reason of the ore passing through the chimney branch, over the pipe-nest, and through the fume-pipe all moisture is removed and the ore superheated. The ore drifts downwardly from the upper to the lower end of the muffle, where the roasted ore is discharged during the revolution of the cylinder and the volatile metals are carried out of the upper end of the muffle into the fume-pipe.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an ore-roasting furnace, the combination, with a revoluble cylinder having a fire-box, a central muffle extending through the cylinder and fire-box, a series of fire-box chambers surrounding the muffle, and means for feeding ore to the muffle, of the ore and coal heating pipes, a series of pipes carried by the cylinder for inducting hot air into the muffle, and a series of pipes coupled to the coal-pipe for inducting coal into the fire-box.

2. In an ore roasting and volatilizing furnace, the combination, with a revoluble cylinder, an ore-muffle extending from one end to the other of the cylinder, a fire-box encircling the ore-discharge end of the muffle, and a fume-pipe coupled to the ore-intake end of the muffle, of the fire-box pipe-coils having a pipe to convey hot air into the ore-discharge end of the muffle, and a series of air-circulating pipes connected together at one end of the cylinder and joined to the said pipe-coil.

3. In a volatilizing-furnace, the combination, with a revoluble cylinder having a series of longitudinal air-pipes in its wall, and air-pipes surrounding the fire-box end of the cylinder and connected to said longitudinal pipes, of a cylindrical muffle extending from end to end of the cylinder and having an ore-intake at one end and an ore-discharge at the other end, fire-chambers between the muffle and the cylinder, and a pipe leading from said coil into said discharge end of the muffle.

4. In a volatilizing-furnace, the combination, with the revoluble cylinder having a series of fire-chambers and a central muffle separate from the chambers, of a fume-pipe coupled to one end of the muffle, an ore-conveyer extending across the fume-pipe into the muffle, and the fuel-feed pipes carried by the cylinder at the other end of the muffle in communication with the said chambers.

5. In a volatilizing-furnace, the combination, with an inclined revoluble cylinder, a fire-box carried by the lower end of the cylinder,

a central ore-muffle separated from the cylinder by a series of fire-chambers, air-pipe coils around the fire-box, a series of superheating air-pipes extending lengthwise the cylinder and connected with said coils, and means for feeding powdered coal to the fire-box, of a fume-pipe receiving from one end of the muffle, and a blast-pipe extending from said coils into the other end of the muffle.

6. The combination, with an ore roasting and volatilizing furnace having a central muffle, and means for revolving it, of a fixed fume-pipe in which one end of the furnace revolves, an ore-conveyer extending crosswise through the fume-pipe into the muffle, a stationary smoke-stack or chimney a branch of which extends the length of the furnace an ore-feed in said branch, and an ore-chute connecting said conveyer and said feed.

7. The combination, with an ore roasting and volatilizing furnace having a central muffle, and means for revolving it, of a fixed fume-pipe in which one end of the furnace revolves, an ore-conveyer extending crosswise through the fume-pipe into the muffle, a stationary smoke-stack or chimney a branch of which extends the length of the furnace, an ore-feed in said branch, an ore-chute connecting said conveyer and said feed, a nest of superheating-pipes in said branch, a fuel-pipe connected with said pipe-nest, and a series of fuel-pipes carried by the furnace and coupled to said fuel-pipe.

8. The combination, with an ore roasting and volatilizing furnace having a central muffle, and means for revolving it, of a fixed fume-pipe in which one end of the furnace revolves, an ore-conveyer extending crosswise through the fume-pipe into the muffle, a stationary smoke-stack or chimney a branch of which extends the length of the furnace, an ore-feed in said branch, an ore-chute connecting said conveyer and said feed, a nest of superheating-pipes in said branch, a fuel-pipe connected with said pipe-nest, a series of fuel-pipes carried by the furnace and coupled to said fuel-pipe, a coal-conveyer extending into the fuel-pipe, and a fan interposed in the fuel-pipe between said pipe-nest and the coal-conveyer.

9. The combination, with an ore roasting and volatilizing furnace having a central muffle, and means for revolving it, of a fixed fume-pipe around which one end of the furnace revolves, an ore-conveyer extending crosswise through the fume-pipe into the muffle, a stationary smoke-stack or chimney a branch of which extends the length of the furnace an ore-feed in said branch, an ore-chute connecting said conveyer and said feed, a nest of superheating-pipes in said branch, a fuel-pipe connected with said pipe-nest, a series of fuel-pipes carried by the furnace and coupled to said fuel-pipe, a coal-conveyer extending into the fuel-pipe, a fan interposed in

the fuel-pipe between said pipe-nest and the coal-conveyer, and safety-valves in the fuel-pipe between the pipe-nest and the fan.

10. The combination, with an ore roasting
5 and volatilizing furnace having a revoluble cylinder, a muffle separated from the cylinder by chambers, a fixed chimney, a chimney branch extending the length of the cylinder, a fire-box from which the chambers extend, a
10 screw feed in said branch and having an ore-hopper above the fire-box and discharging under the chimney, a fume-pipe at the ore-receiving end of the muffle, an ore-conveyer receiving from said feed-screw and extending

through the fume-pipe into the muffle, a nest 15 of air-pipes in said branch and connected to the coal-feed, pipe-coils surrounding the fire-box and leading into the muffle, and a series of air-circulating pipes extending lengthwise the cylinder and coupled to the pipe-coils. 20

In witness whereof I hereunto set my hand in the presence of witnesses.

SELDEN I. CLAWSON.

Witnesses:

WM. T. FOULGER,
JOHN P. CAHOW,
G. SPENCER CHAMBERS.