

No. 815,929.

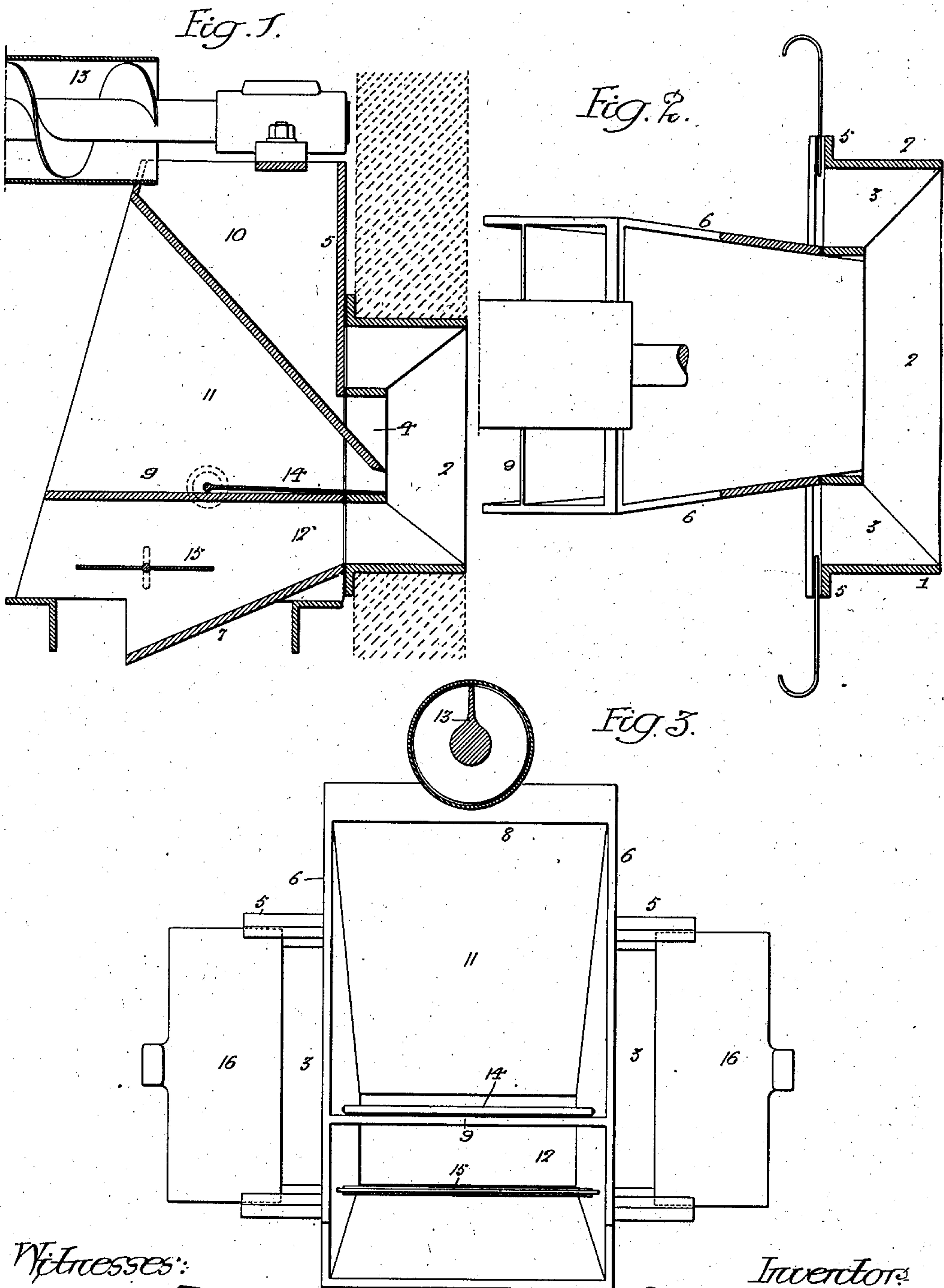
PATENTED MAR. 20, 1906.

C. A. MATCHAM.

PULVERIZED FUEL BURNER FOR FURNACES.

APPLICATION FILED MAY 3, 1905.

3 SHEETS—SHEET 1.



Witnesses:
Hamilton D. Turner
Titus H. Jones.

Inventor:
Charles A. Matcham
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Fig. 4.

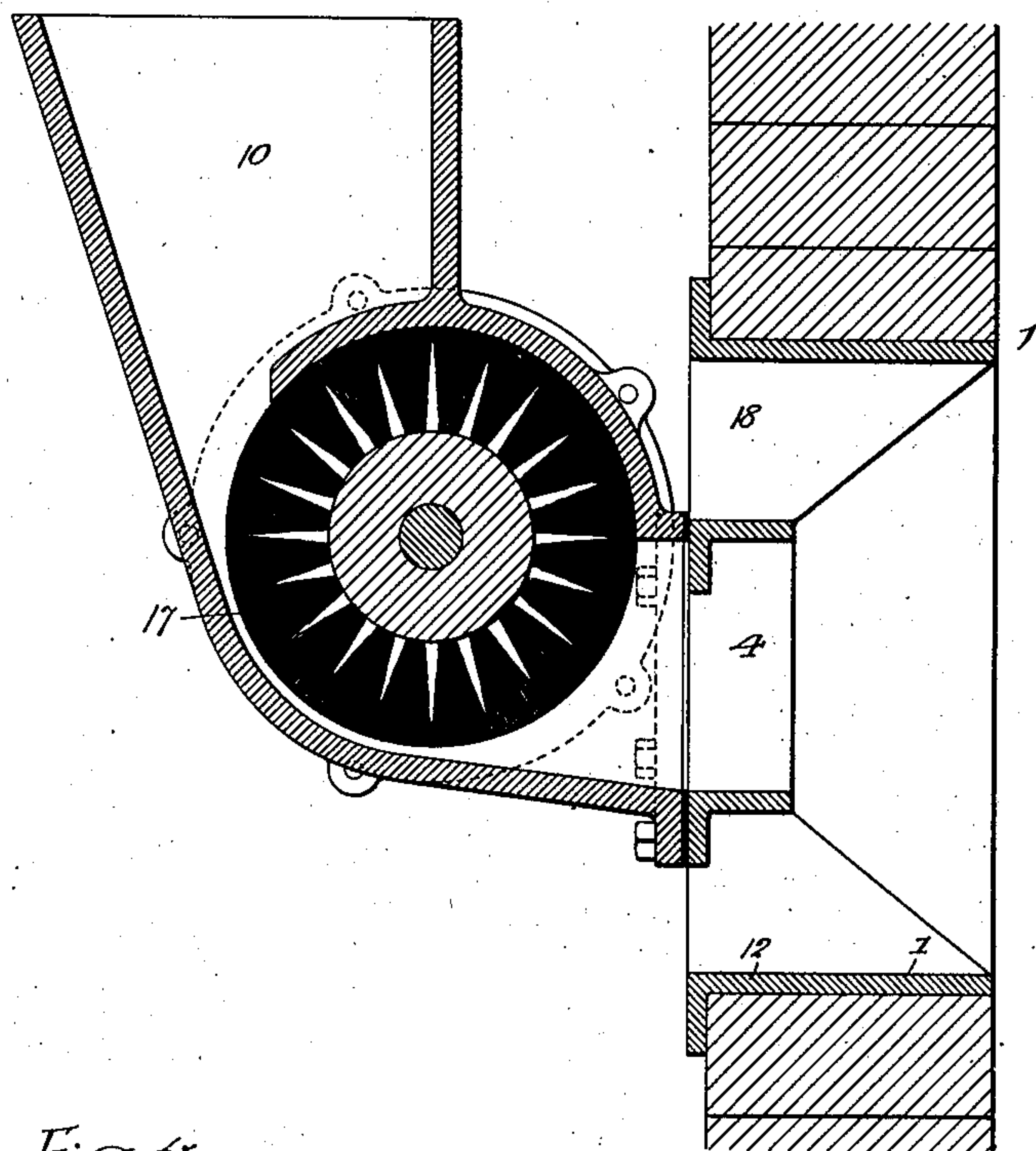
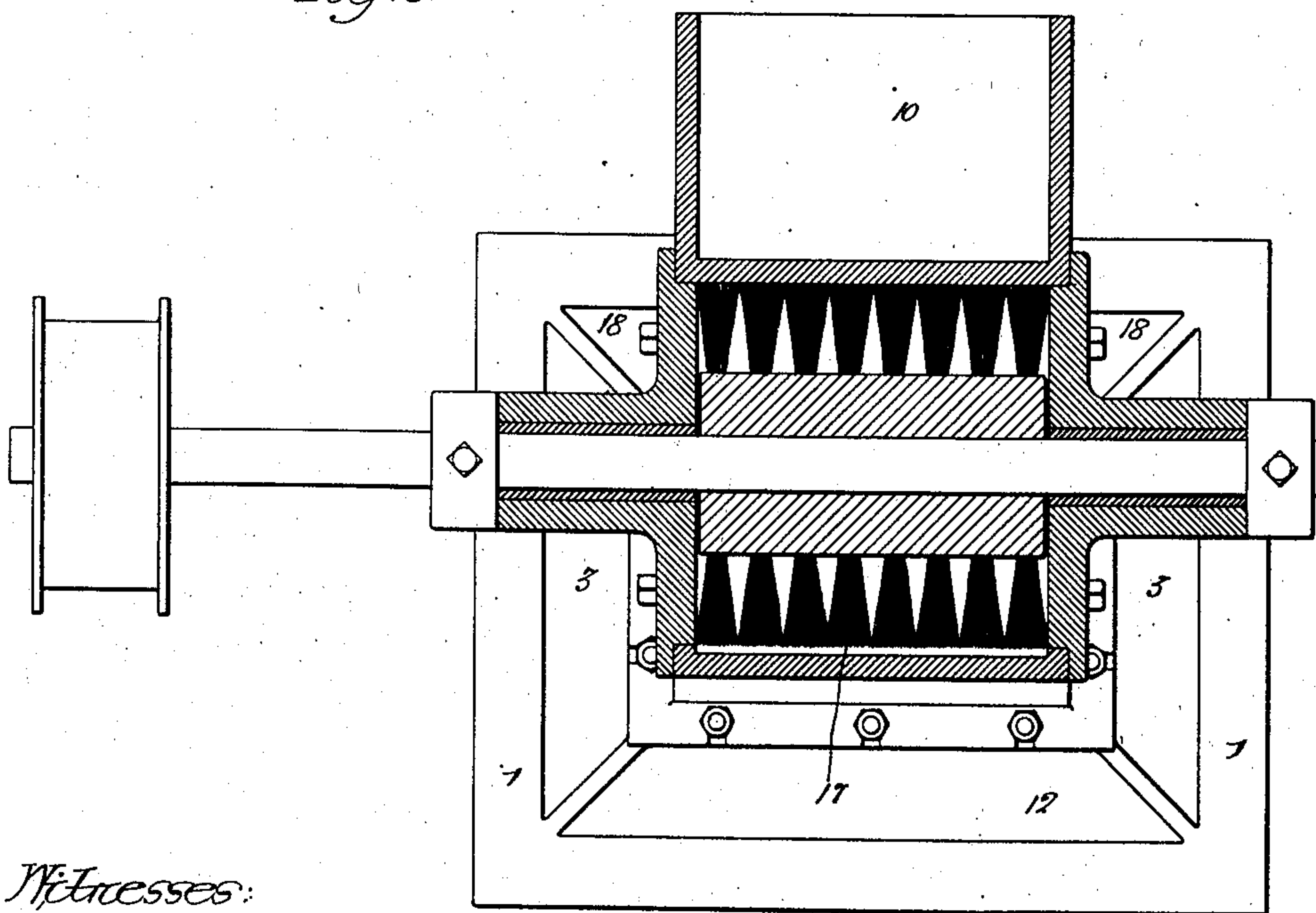


Fig. 5.



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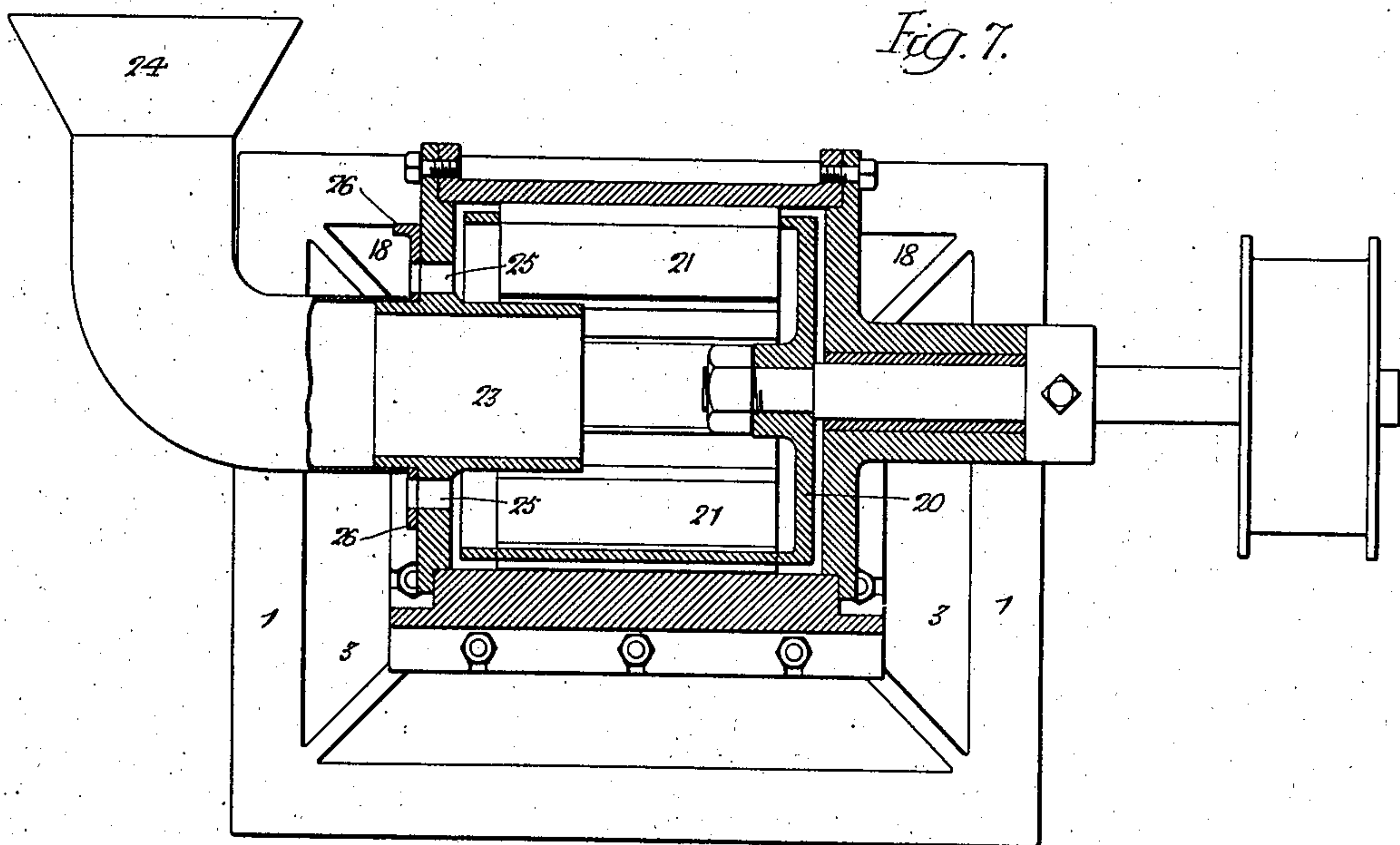
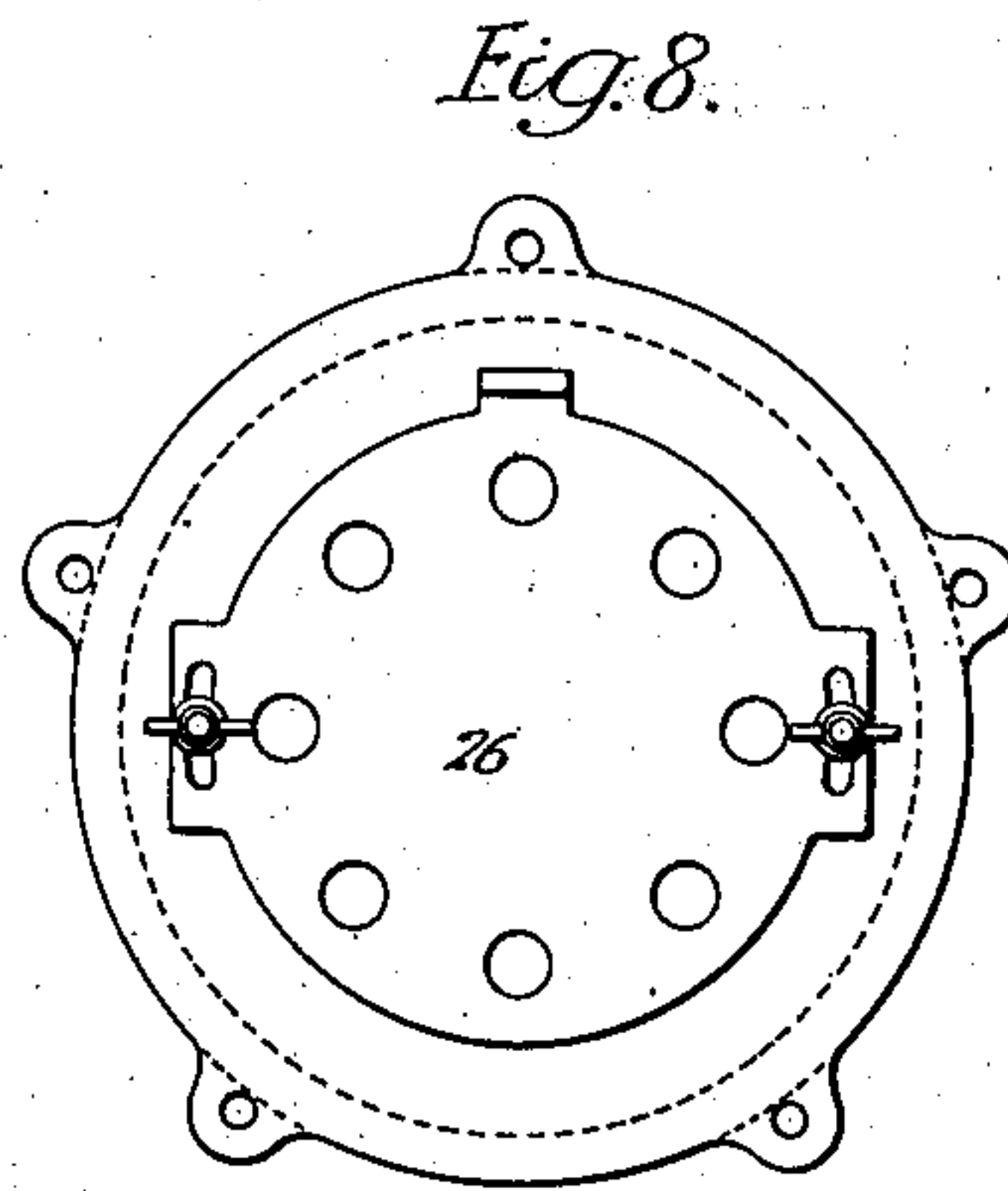
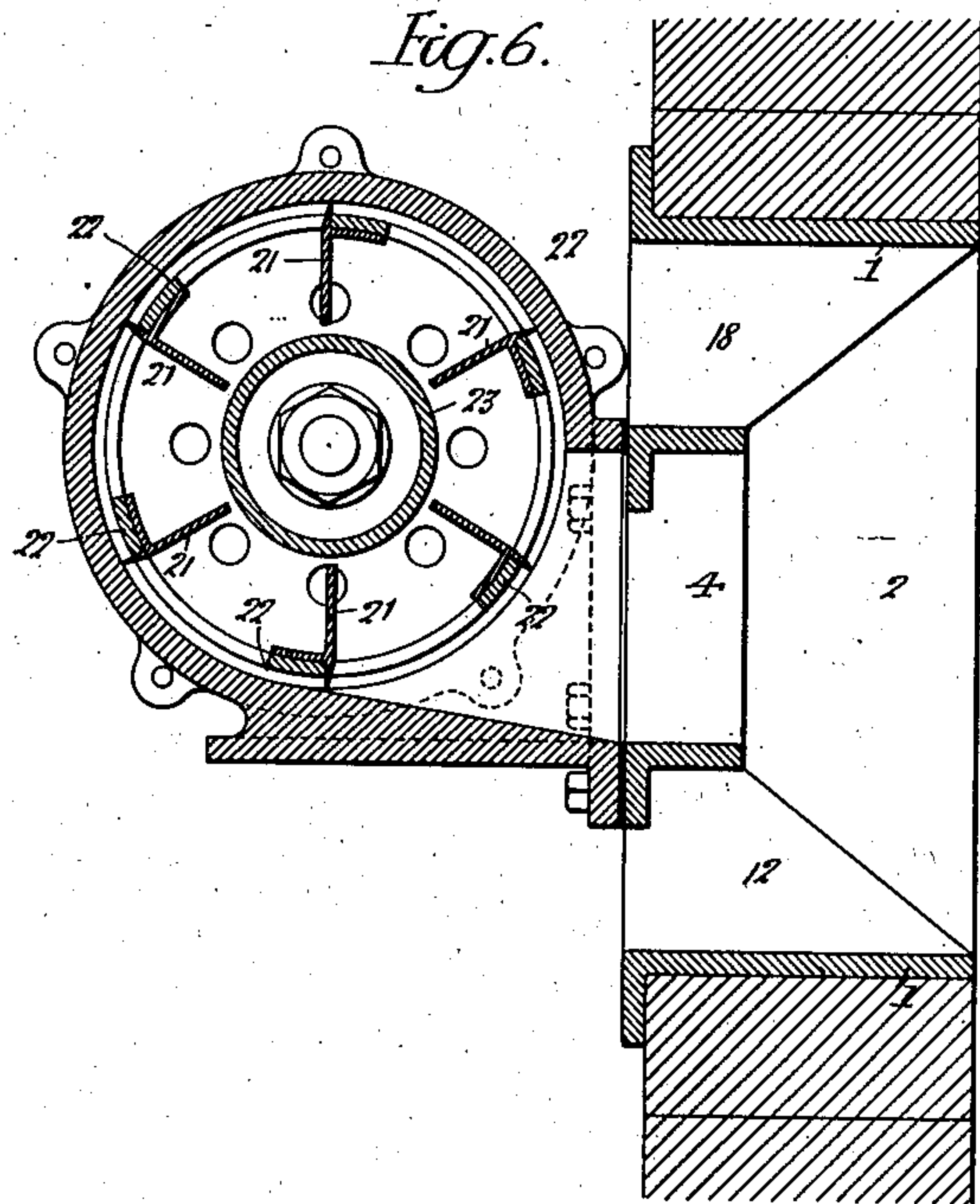
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3 SHEETS—SHEET 3.



Witnesses:
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UNITED STATES PATENT OFFICE.

CHARLES A. MATCHAM, OF ALLENTOWN, PENNSYLVANIA.

PULVERIZED-FUEL BURNER FOR FURNACES.

No. 815,929.

Specification of Letters Patent.

Patented March 20, 1906.

Application filed May 3, 1905. Serial No. 258,683.

To all whom it may concern:

Be it known that I, CHARLES A. MATCHAM, a citizen of the United States, residing in Allentown, Pennsylvania, have invented certain Improvements in Pulverized-Fuel Burners for Furnaces, of which the following is a specification.

The object of my invention is to so construct a pulverized-fuel burner for furnaces that the complete combustion of the fuel in the furnace can be effected without the necessity of employing blast-fans or other apparatus for supplying air under pressure with the powdered fuel, the natural draft of the furnace being relied upon to effect inflow of air in such volume and in such relation to the inflowing stream of powdered fuel as to insure the combustion of the latter. This object I attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical sectional view of a pulverized-fuel burner constructed in accordance with my invention. Fig. 2 is a sectional plan view of the same. Fig. 3 is a front view of the burner. Fig. 4 is a vertical sectional view of a modified form of burner embodying certain features of my invention. Fig. 5 is a transverse section of the same. Fig. 6 is a vertical sectional view of still another form of burner embodying my invention. Fig. 7 is a transverse sectional view of the same; and Fig. 8 is an end view, partly in section, of said burner.

Referring first to Figs. 1, 2, and 3 of the drawings, 1 represents the neck of the burner, which is suitably mounted in the front wall of a furnace, in the fixed end wall of the supporting-structure of a rotating kiln, or in proper relation to any other structure which is to be heated by the combustion of the powdered fuel.

The neck 1 has a central passage 2 for the inflow of the powdered fuel and on each side of the same an air-passage 3, said neck also having a central nozzle 4, through which the powdered fuel is fed. This nozzle 4 preferably terminates in the neck, so that the fuel is free to expand immediately upon its issuance from said nozzle, as hereinafter more particularly described.

In advance of the neck 1 is an air and fuel supply structure comprising a front plate 5, side plates 6 6, bottom plate 7, and two transverse partition-plates 8 and 9, whereby said structure is divided into a fuel-feed hop-

per 10, a chamber 11 for supplying air for projecting the powdered fuel into the furnace, and a chamber 12 for supplying a volume of air below the stream of pulverized fuel, said lower volume of air, in conjunction with the volumes of air supplied through the side passages 3 and with the air which is drawn in with the stream of powdered fuel, serving to supply all parts of said stream with the oxygen necessary to support combustion of the fuel, the flow being induced by the natural draft of the furnace and being of a gentler and easier character than that provided by the usual air-blast apparatus, thereby resulting in a better diffusion of the heat and a substantially equable heating of the furnace, rather than an extreme heating of one part of the same at the expense of other portions. The side passages, it will be noted, flank the fuel-nozzle and are arranged to discharge their contents into the fire in close proximity to the discharge of said fuel-nozzle.

The supply of powdered fuel to the hopper 10 is regulated by a feed-screw 13, and the area of the opening for the issuance of the projecting air-jet from the chamber 11 can be regulated by adjustment of a valve or damper 14 in said chamber, a valve 15 in the chamber 12 serving to regulate the area of passage through the same, so that the volume of air beneath the stream of pulverized fuel can be likewise governed. In like manner the flow of air through the side passages 3 can be regulated by the adjustment of laterally-sliding dampers 16, suitably guided on the plate 5. Hence the regulation of the air-supply can be closely governed to accord with the amount of fuel which is being fed to the furnace and with the character of the combustion which it is desired to maintain therein. Owing, however, to the contracted area of the outlet from the chamber 11, as compared with that from the chamber 12, the current of air from said chamber 11 is usually of a more forcible character than that from the chamber 12.

All of the currents of air to which the fuel is subjected travel in the same direction, and hence have no tendency to force the volume of flame toward the axial center of the furnace.

In Figs. 4 and 5 I illustrate a modification of my invention in which the pulverized fuel from the hopper 10 is thrown into the furnace by means of a revolving brush 17, the dis-

charge being through the central nozzle 4 of the neck 1, which is provided with side passages 3, and also with a passage 12 below the nozzle, and with a passage 18 above the same so as to provide for an inflow of air on all sides of the stream of pulverized fuel.

In Figs. 6, 7, and 8 I have illustrated still another modification, in which the powdered fuel is projected into the furnace by means of a rotating drum 20, with radial blades 21, carried by transverse staves 22, which constitute the periphery of the drum, the powdered fuel being supplied to the interior of the drum through a hollow hub 23 and hopper 24, and air being also supplied to the interior of the drum through an open end of the same and through openings 25 in the casing in which the drum rotates, the area of said openings being regulated by a damper-plate 26, which is mounted upon the drum-casing, so as to be partially rotatable thereon, as shown in Fig. 8. This projecting apparatus is used in combination with a neck 1 of the same character as that shown in Fig. 4, said neck having the central nozzle 4, side passages 3, top passages 18, and bottom passage 12.

It will be noted that the powdered fuel, however, introduced into the nozzle 4 is free to expand as soon as it leaves said nozzle, and thus comes directly under the influence of the currents of air from the passages 3, 12, and 18, and a further expansion is permitted when the fuel leaves the neck 1, so that the volume of flame produced by the combustion of the fuel has a tendency to fill the furnace at once and is not carried forward in a contracted body, as it is when the fuel is forcibly projected from a nozzle in which it has been laterally confined for some time before it escapes.

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

1. The combination, in a pulverized-fuel burner for furnaces, of a fuel-supply nozzle arranged to discharge the pulverized fuel into the furnace at or over the furnace-wall through which the fuel passes to the furnace, said nozzle having fuel and air supply passages, and having its walls vertically and laterally remote from the boundaries of the fuel-supply mouth, whereby said walls exercise no direct confining or contracting influence

upon the expanding volume of fuel issuing from said mouth, substantially as specified. 55

2. The combination in a pulverized-fuel burner for furnaces, of a fuel-supply nozzle arranged to discharge the pulverized fuel into the furnace at or near the furnace-wall through which the fuel passes to the furnace, whereby the pulverized fuel is free to expand immediately upon issuance from said nozzle, and air-passages flanking said nozzle and discharging air-currents into the furnace in close proximity to the discharge of the fuel-nozzle so that the currents of air from the said passages meet the fuel immediately upon its issuance from its nozzle, and one or more air-passages arranged to discharge currents of air into the fuel as it leaves the nozzle and in the same direction as the first-mentioned air-currents, substantially as specified. 60 65 70

3. The combination, in a pulverized-fuel burner for furnaces, of a neck fitted into an opening in the furnace-wall, a pulverized-fuel supply-passage having its mouth terminating in said neck from which mouth the pulverized fuel is free to expand, and superposed air-passages below said fuel-supply mouth, said upper passage supplying air in lesser volume but with greater force than the lower passage, substantially as specified. 75 80

4. The combination in a pulverized-fuel burner for furnaces, of a neck fitted into an opening in the furnace-wall, a pulverized-fuel supply-nozzle having its discharge end terminating in said neck and from which the pulverized fuel is free to expand as it issues from the nozzle, air-passages flanking said nozzle and arranged to discharge air-currents into the furnace in proximity to the discharge of the fuel-nozzle so that the currents of air meet the fuel immediately upon its issuance from said nozzle, and one or more air-passages arranged to discharge currents of air into the fuel as it leaves the nozzle and in the same direction as the first-mentioned air-currents, substantially as specified. 85 90 95 100

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

CHARLES A. MATCHAM.

Witnesses:

GEO. READER,
E. I. S. ELVEY.