

No. 753,673.

PATENTED MAR. 1, 1904.

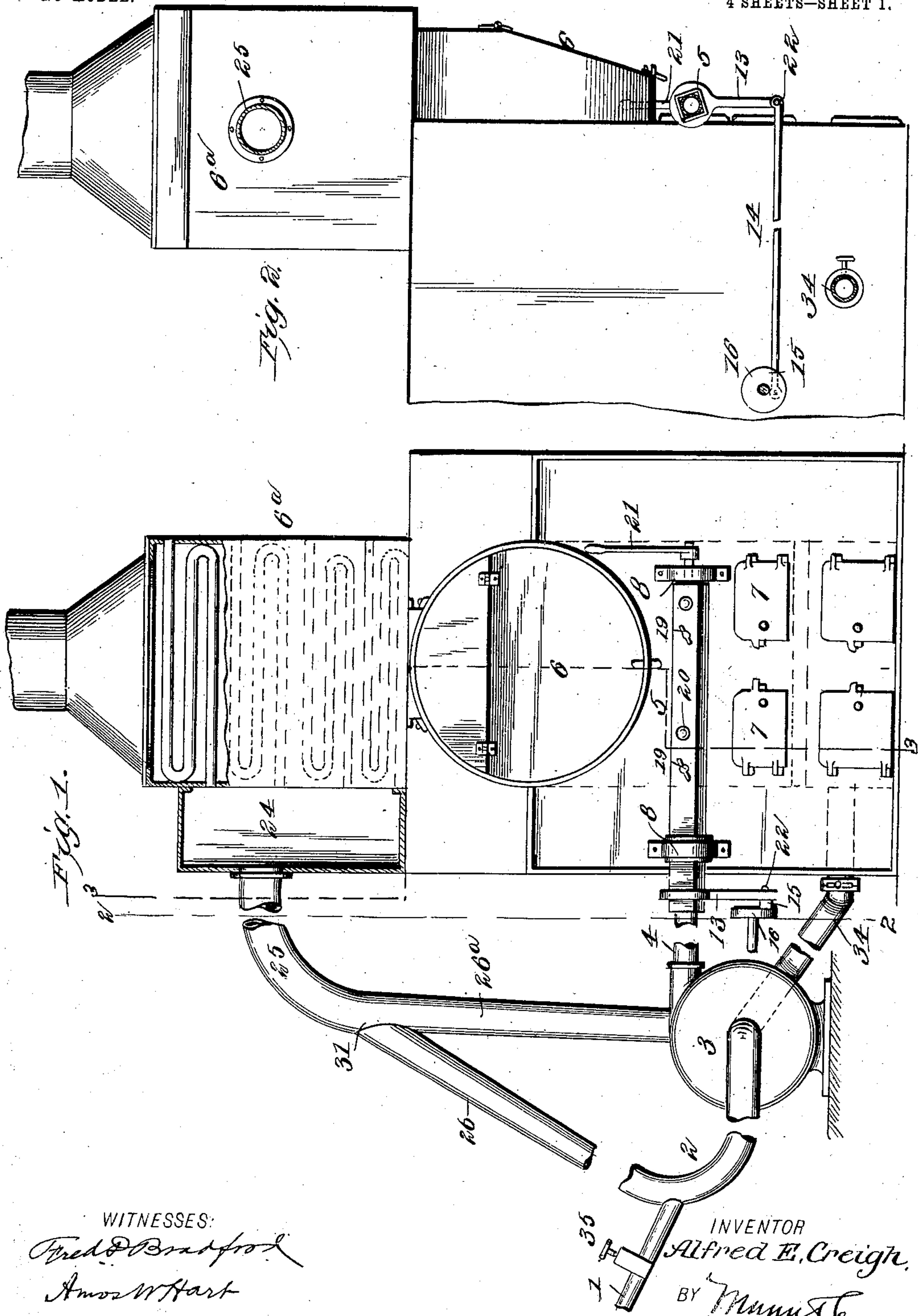
A. E. CREIGH.

APPARATUS FOR FEEDING FINE FUEL AND AIR TO FURNACES.

APPLICATION FILED MAY 20, 1903.

NO MODEL.

4 SHEETS—SHEET 1.



WITNESSES:

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INVENTOR

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ATTORNEYS.

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4 SHEETS—SHEET 2.

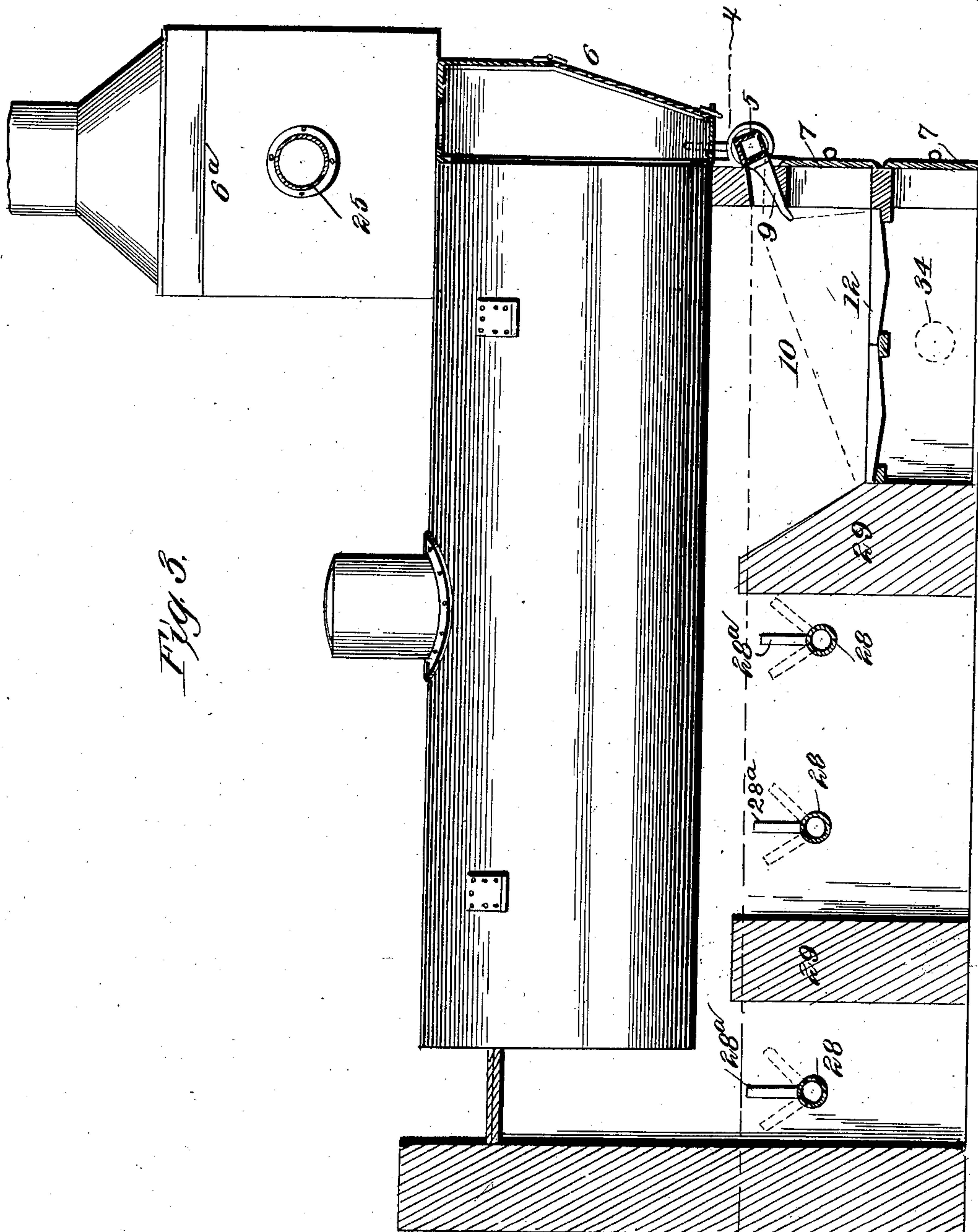


Fig. 3.

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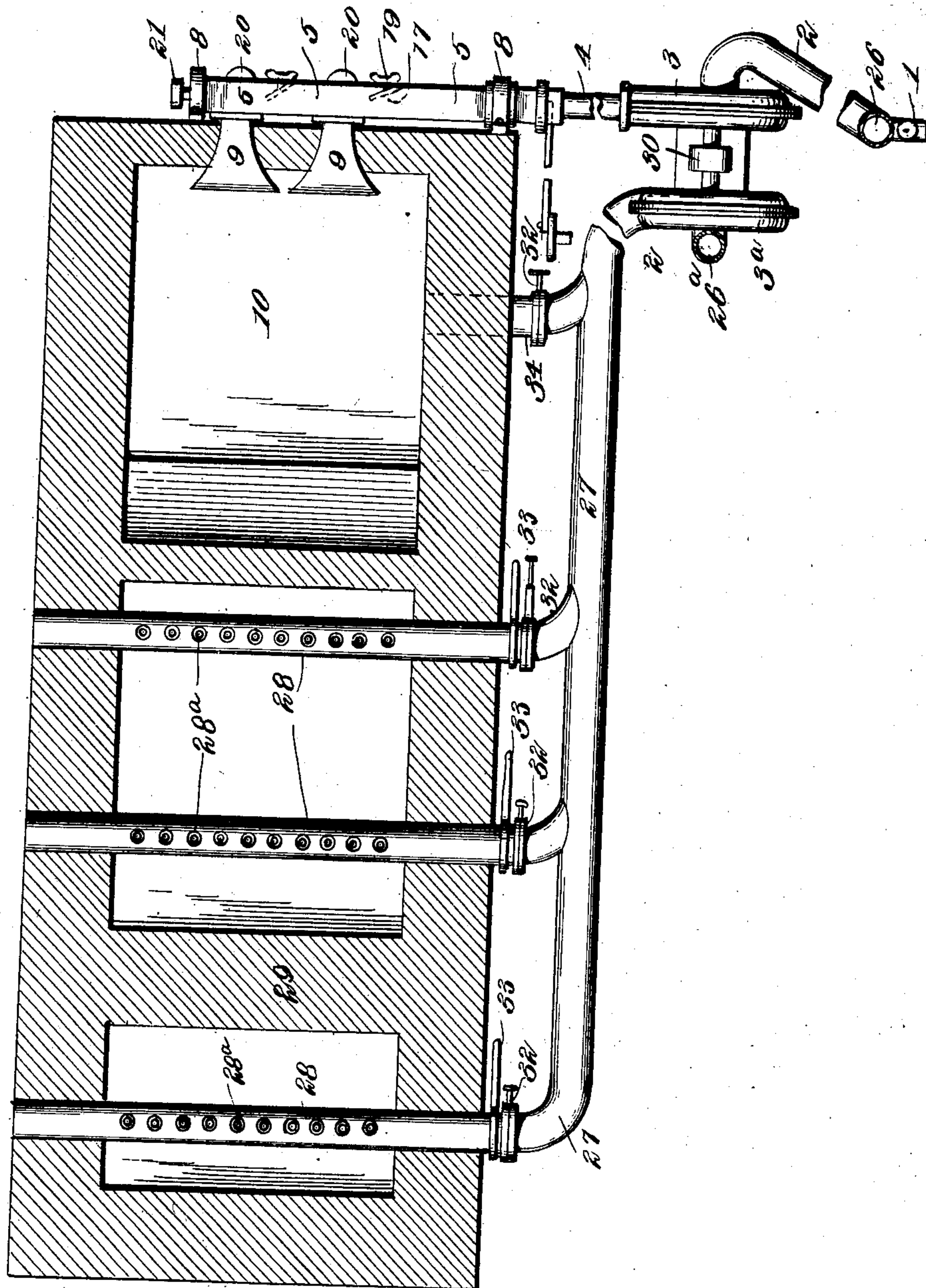
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4 SHEETS—SHEET 3.

Fig. 4.



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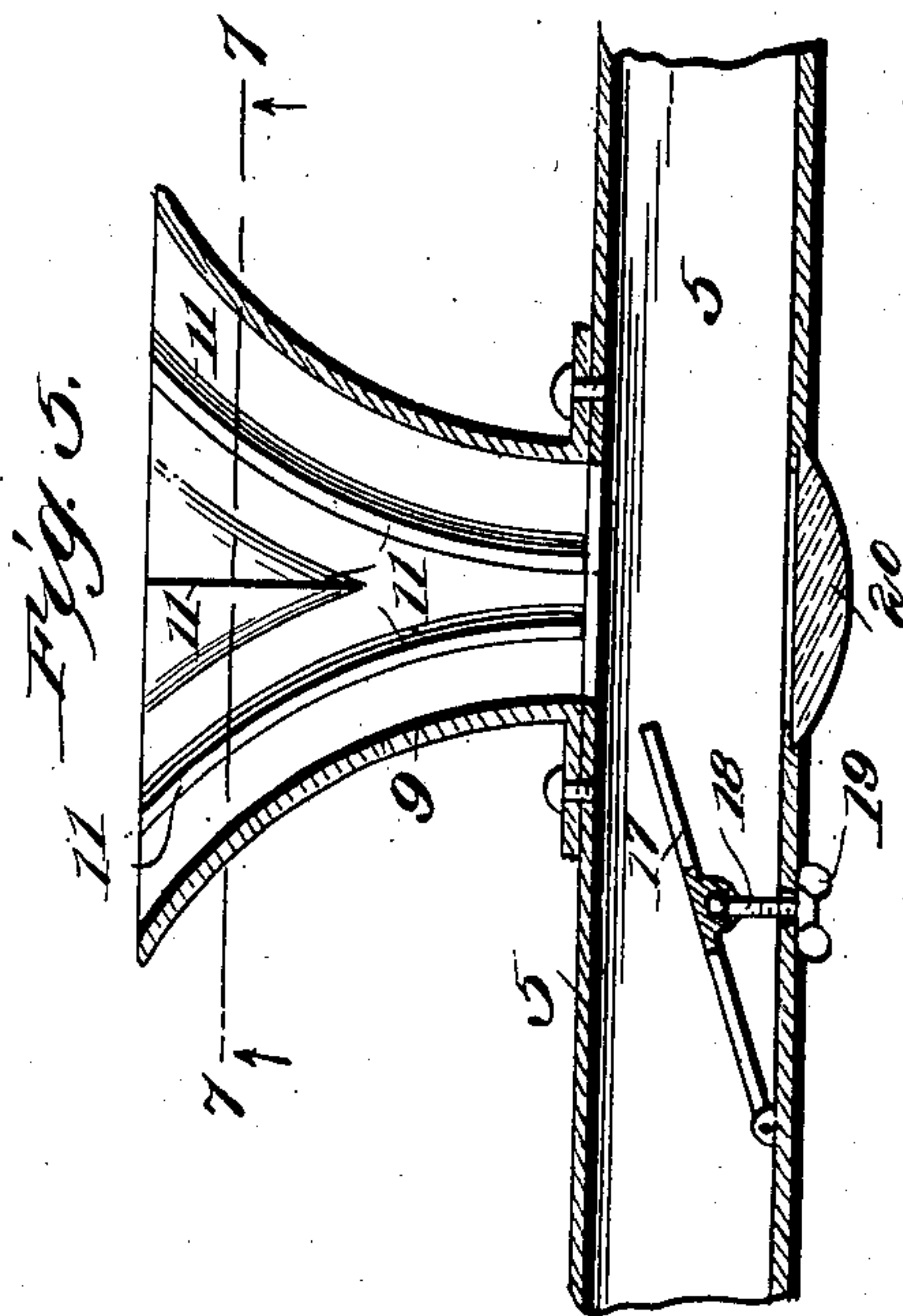
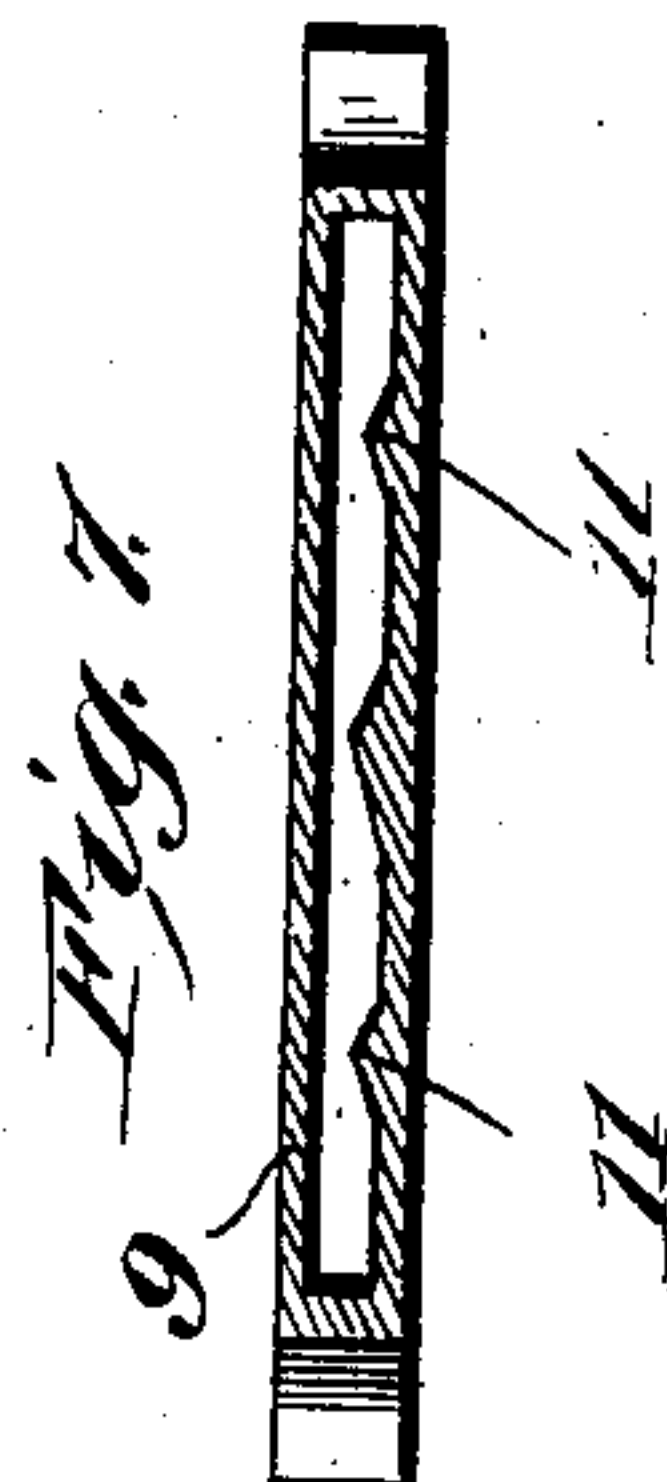
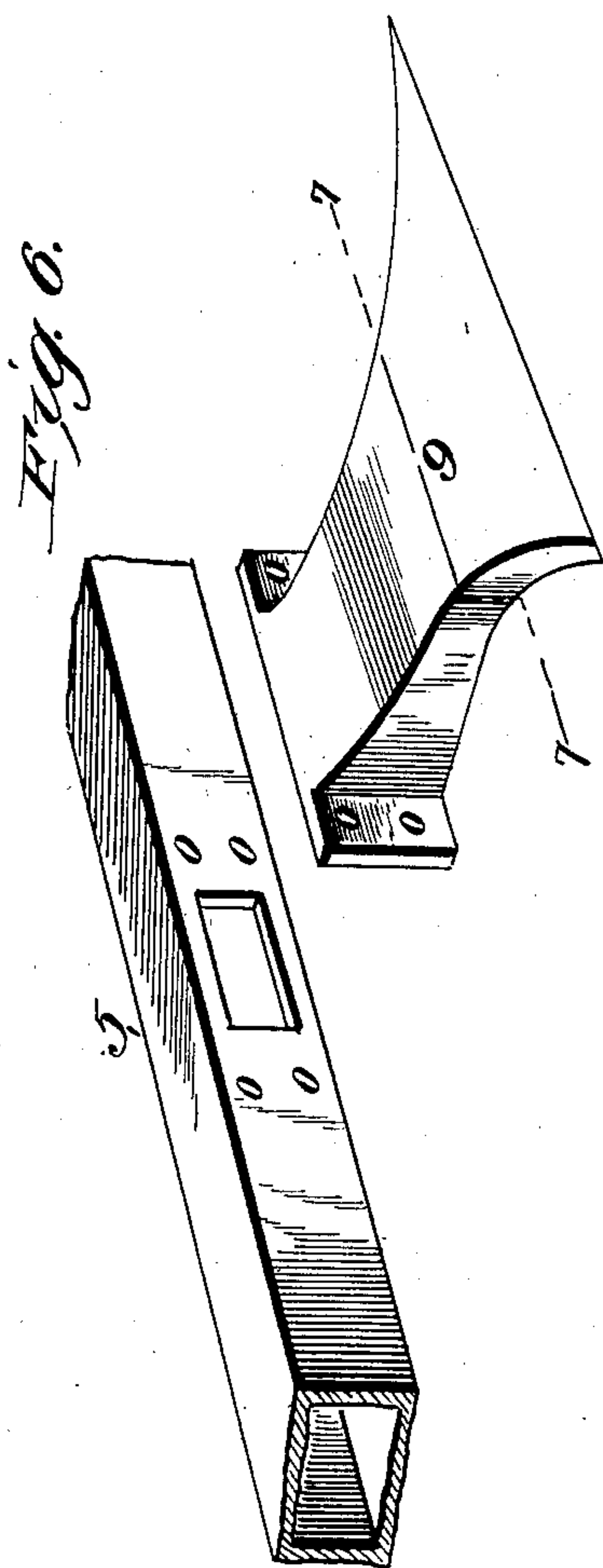
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4 SHEETS—SHEET 4.



WITNESSES:

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UNITED STATES PATENT OFFICE.

ALFRED E. CREIGH, OF RONCEVERTE, WEST VIRGINIA.

APPARATUS FOR FEEDING FINE FUEL AND AIR TO FURNACES.

SPECIFICATION forming part of Letters Patent No. 753,673, dated March 1, 1904.

Application filed May 20, 1903. Serial No. 158,021. (No model.)

To all whom it may concern:

Be it known that I, ALFRED E. CREIGH, a citizen of the United States, and a resident of Ronceverte, in the county of Greenbrier and State of West Virginia, have made certain new and useful Improvements in Apparatus for Feeding Fine Fuel and Air to Furnaces, of which the following is a specification.

My invention is an improvement in the class of furnace attachments adapted for feeding fine or pulverized fuel and also simultaneously supplying heated air to promote combustion.

A primary object of my invention is to distribute the fuel on the grate in such manner as to insure a better and more economical combustion of the same and the gases arising therefrom, and this is effected by an improved mechanism which is adapted to operate automatically. The fuel-dischargers proper may, however, be manipulated manually when occasion requires, and they are so arranged as to operate effectively without obstructing access to the grate through the ordinary furnace-doors for raking the fire as usually practiced in the case of boiler-furnaces.

The invention further includes improvements in the fuel-dischargers proper, the means for regulating access of fuel to the same, and also for supplying, regulating, and directing the blasts or jets of heated air behind the bridge-wall and beneath the furnace-grate.

The details of construction, arrangement, and operation of the parts embodying the invention are hereinafter fully described in connection with accompanying drawings, in which—

Figure 1 is mainly a front elevation and in part a vertical section of my improved attachment shown in connection with a boiler and furnace. Fig. 2 is a vertical section on the line 2 2 of Fig. 1. Fig. 3 is a vertical longitudinal section on the line 3 3 of Fig. 1. Fig. 4 is a horizontal longitudinal section on the line 4 4 of Fig. 3. Fig. 5 is an enlarged detail horizontal section of the fuel-feed pipe and one of its nozzles. Fig. 6 is a perspective view of a portion of the fuel-feed pipe, together with one of its nozzles, which is shown detached.

Fig. 7 is a transverse section on the line 7 7 of Fig. 6.

Pulverized coal or other solid fuel in comminuted form is received from a crusher or other source of supply (not shown) by a pipe 1, (see Figs. 1 and 4,) which discharges into a hot-air pipe 2, that conveys it to the fan-blower 3, adapted for suction or exhaust, which forces it along through pipe 4 into the rotatable discharge-pipe 5. The latter is arranged horizontally on the furnace-front of the boiler and between the uptake 6 and the ordinary fire-doors 7, by which latter access is had to the fire-box. The said pipe 5 is journaled in suitable keepers 8 and provided with fuel-distributing nozzles 9, (see Fig. 3,) which are arranged and made of such forms and lengths as to adapt them to project through funnel-shape openings in the furnace-front and preferably into the fire-box 10. As shown in detail in Figs. 5 and 6, the nozzles 9 have base-flanges, by which they are secured to the pipe 5, and are flared or widened laterally as well as curved slightly downward at their outer ends. (See Figs. 1 and 6.) They are likewise provided on the lower side with guide-ribs 11, (see Figs. 5 and 7,) which curve or flare outward laterally.

In order to distribute the coal or other fuel the entire length of the grate, I adapt the pipe 5, with its flared nozzles 9, to oscillate on its axis. The means for effecting this automatically are as follows: As shown in Figs. 1 and 2, the said pipe 5 has a pendent lever-arm 13, which is connected by a rod 14 with a crank or eccentric 15 on a shaft 16, which in turn geared with an engine or motor shaft. (Not shown.) Thus the rotation of shaft 16 will impart a rotary oscillation to feed-pipe 5, so that the nozzles 9 vibrate vertically within the limits indicated in Fig. 2. It is apparent that the fine coal or other fuel will be discharged and spread in layers, so to speak, from front to rear, and vice versa, of the grate 12. This uniformity of distribution of fuel both laterally and longitudinally of the grate-surface, attained by reason of the form and oscillation of the nozzles, is of the utmost importance to proper, rapid, and most

effective combustion, a result long sought and heretofore imperfectly attained in this general class of furnace-feeding attachments.

Two or more nozzles 9 being usually required it is necessary to provide means for supplying the fuel to each in uniform quantity or at least to regulate the supply as occasion requires. To this end I provide the feed-pipe 5 with a deflector or valve 17, (see Fig. 5,) which is a flat plate hinged at one end and having an adjusting device consisting of a screw 18 and nut 19, the screw being journaled on the back of the valve. The latter is located in pipe 5 adjacent to a nozzle 9, so that the stream of fuel will strike upon it before reaching the nozzle-orifice. It is obvious that the angle or degree of inclination of the plate 17 will regulate the quantity or volume of fuel diverted to the adjacent nozzle, and thus also the quantity which will flow on toward the second nozzle.

The feed-pipe 5 is provided with a glass bull's-eye 20 at a point opposite and in line with each nozzle 9, so that the combustion going on in the fire-box 10 may be observed and the distribution of fuel regulated as required.

As shown in Figs. 1, 2, I provide the feed-pipe with a hand-lever by which the former may be oscillated manually whenever desired, and to the same end I make the engine connection detachable at 22.

In connection with the fuel-feed proper I employ an improved apparatus for feeding hot air, whereby I secure an improved result. A series of air-pipes 23 (see Fig. 1) are coiled in the extension 6^a of the boiler-uptake, and the air drawn in at the mouths of said pipes is drawn off from a collecting-chamber 24 by a pipe 25, which divides into two branches 26^a, one, 26, connecting with fuel-feed pipe 2, that leads to the exhauster 3, while the other branch, 26^a, leads to a force-fan blower 3^a, (see Fig. 4,) whence an air-pipe 27 extends to and connects with a series of branch pipes 28, arranged horizontally in the furnace between and parallel to the bridge-walls 29.

The two fan-blowers 3 and 3^a are arranged side by side with a band-pulley 30 keyed on their common shaft, so that both are driven together and in the same direction and at the same speed by suitable connection with the engine or motor.

A valve 31 (see Fig. 1) is located at the junction of pipes 25 and 26 26^a, so that the blast may be regulated in each branch as conditions require.

A valve 32 (see Fig. 4) is also provided for each air-discharge pipe 28 to enable the blast to be further regulated in the respective divisions or compartments of the furnace-chamber. Each branch 28 is adapted to be rotated on its axis, and to that end is provided with a hand-lever 33. Each branch 28 is further provided with radial nozzles 28^a, (see Fig. 3,) whereby dotted lines indicate the usual limits of oscillation.

By this construction and arrangement of parts the pipes 28 may be rotated to set the nozzles 28^a at any desired inclination, so as to effect most thorough combustion of the inflammable gases and carbon particles passing over the bridge-walls.

As shown in Figs. 1, 3, another branch pipe 34 leads from fan 3^a downward and beneath the grate 12, so that hot air may be forced up through the fuel-bed to further promote combustion.

I am well aware that air has been heated and conducted between bridge-walls and beneath furnace-grates for the same general purpose. I have in view and I do not claim such features, broadly, but only certain features of combination and arrangement of parts, as hereinafter specified, whereby I obtain an improved result.

In further explanation of my invention I will state as follows: The primary fuel-feed pipe 1 is provided with a valve 35, (see Fig. 1,) by which the supply may be regulated or shut off altogether in case it be desirable for any purpose. In practice the feed-pipe 1 will connect directly with a coal-crusher of approved construction, and the same may be located at a considerable distance from the furnace. The heated air dries the coal as well as furnishes the active medium or motor agent by which it is carried into and discharged from the oscillating pipe 5. The heated air also promotes combustion to a marked degree and its raised temperature is obtained at no expense, since only waste heat is utilized.

It will be perceived that my improved attachment may be applied to furnaces already constructed and with comparatively little change or reconstruction and expense and that while it effects a uniform distribution of fine fuel on the grate, so that maximum combustion is obtained, this is accomplished without any modification of the grate itself and without affecting access to the latter in any way. Taking along with the improved fuel-feed the arrangement of hot-air feed mechanism constructed and arranged as described, I produce a superior apparatus by which fine coal or equivalent fuel may be utilized with a higher economy than heretofore.

What I claim is—

1. The herein-described furnace attachment, comprising fuel and air conducting pipes, a fan-blower for producing exhaust, an oscillating connected fuel-discharge pipe operatively connected with said blower and provided with nozzles projecting into the furnace-chamber, and means for operating the blower and oscillating the said discharge-pipe, simultaneously, substantially as set forth.

2. The herein-described furnace attachment, comprising fuel and air conducting pipes, a fan-blower for producing exhaust, an oscillat-

ing connected fuel-discharge pipe operatively connected with said blower and provided with nozzles projecting into the furnace-chamber, a lever-arm pendent from the fuel-discharge pipe, a rod connecting said arm with the engine-shaft, the arm and rod being detachably connected, as set forth.

3. The herein-described furnace attachment comprising fuel and air conducting pipes, a fan-blower for producing exhaust, an oscillating connected fuel-discharge pipe arranged on the front of the furnace above the fire-doors and having nozzles projecting into the furnace-chamber, and means for oscillating said pipe, substantially as shown and described.

4. The combination, with the furnace, of a fuel-discharge pipe arranged on the front of the furnace and having nozzles projecting into the chamber, the said pipe being adapted to oscillate on its axis, means connecting it with the engine and adapted for disconnection, and a hand-lever applied to the said pipe for oscillating it manually, substantially as shown and described.

5. The combination, with a furnace, and a fan of a fuel-discharge pipe arranged on the front thereof and journaled so that it is adapted to oscillate, the same being provided with nozzles extending in through the furnace-front, and means for oscillating the said pipe for distributing the fuel over the grate from end to end thereof, substantially as shown and described.

6. The combination, with a furnace, of a fan-blower and a fuel-discharge pipe journaled in the front portion of the furnace and having nozzles which are flared laterally, and means for oscillating said pipe, whereby fuel is discharged from end to end of the furnace and over the entire width of the grate, substantially as shown and described.

7. The combination, with the furnace-chamber and a fan-blower and fuel-discharge pipe having two or more nozzles projecting into the furnace-chamber, of a valve consisting of the plate hinged in the pipe adjacent to but in front of the first nozzle, and a means for adjusting the valve at a greater or less inclination, substantially as shown and described.

8. The fuel and air feed furnace attachment, comprising two fan-blowers located side by side and having a common shaft, a band-pulley mounted on the said shaft between the blowers, a fuel-pipe leading to and from one of said blowers, a distributing-pipe having nozzles projecting into the furnace-chamber, a hot-air pipe connecting with such fuel-feed blower, and hot-air pipes connecting with the other blower and one of them having branches arranged behind the bridge-walls and provided with lateral outlets, substantially as set forth.

9. The improved fuel and air feed furnace attachment, comprising two fan-blowers located side by side and having a common shaft, a band-pulley mounted on the said shaft between the blowers, a fuel-pipe leading to one of said blowers and another pipe leading therefrom and extending on the front of the furnace and adapted to discharge fuel into the latter, the hot-air pipe having a branch connected with the fuel-pipe and the fuel-blower, and another branch connected with the second blower, and other hot-air pipes leading from the said blower and having branches extending into the furnace-chamber between the bridge-walls, and valves for regulating the blast in the several pipes, substantially as shown and described.

ALFRED E. CREIGH.

Witnesses:

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AMOS W. HART.