

No. 657,031.

Patented Aug. 28, 1900.

A. REYNOLDS.
BLAST AND CUPOLA FURNACE.

(Application filed Dec. 7, 1898.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.

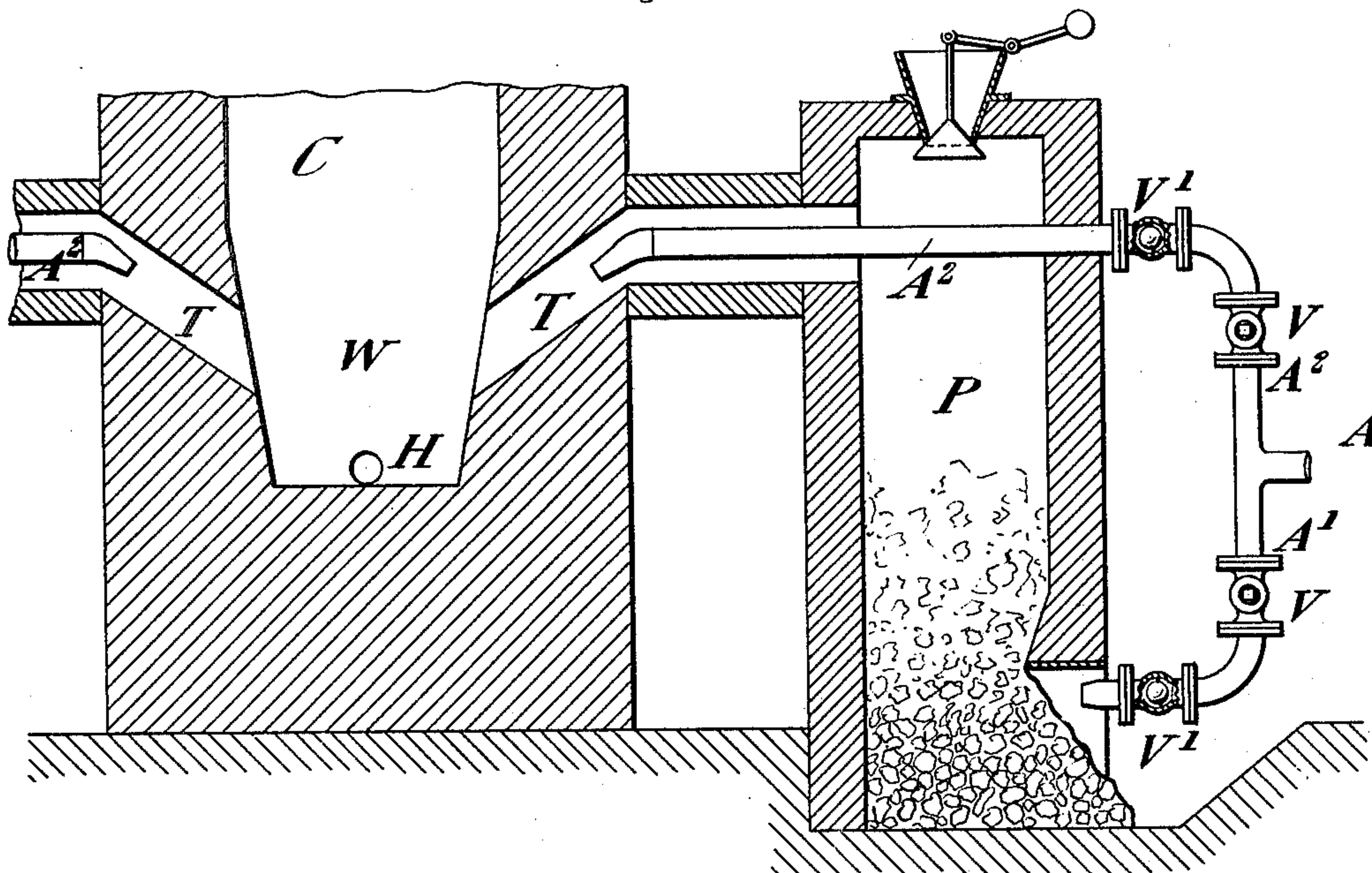
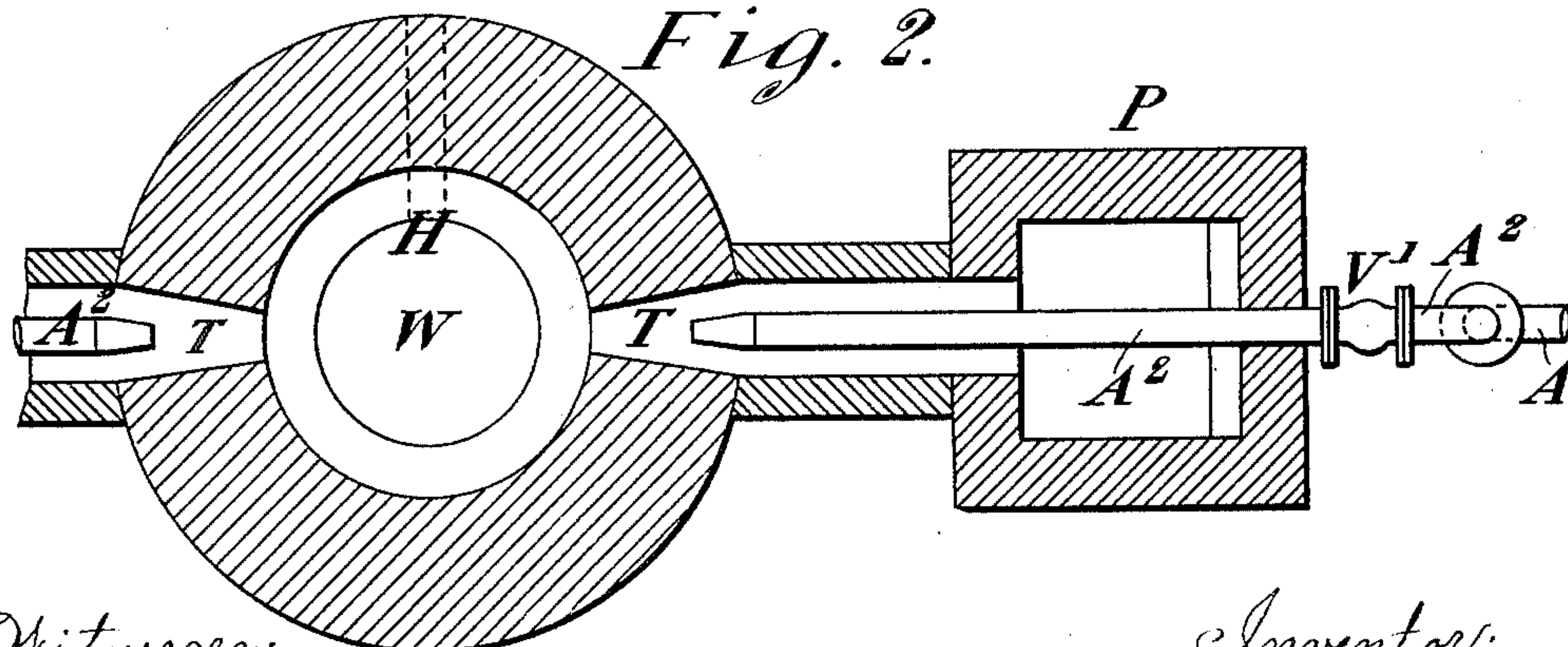


Fig. 2.



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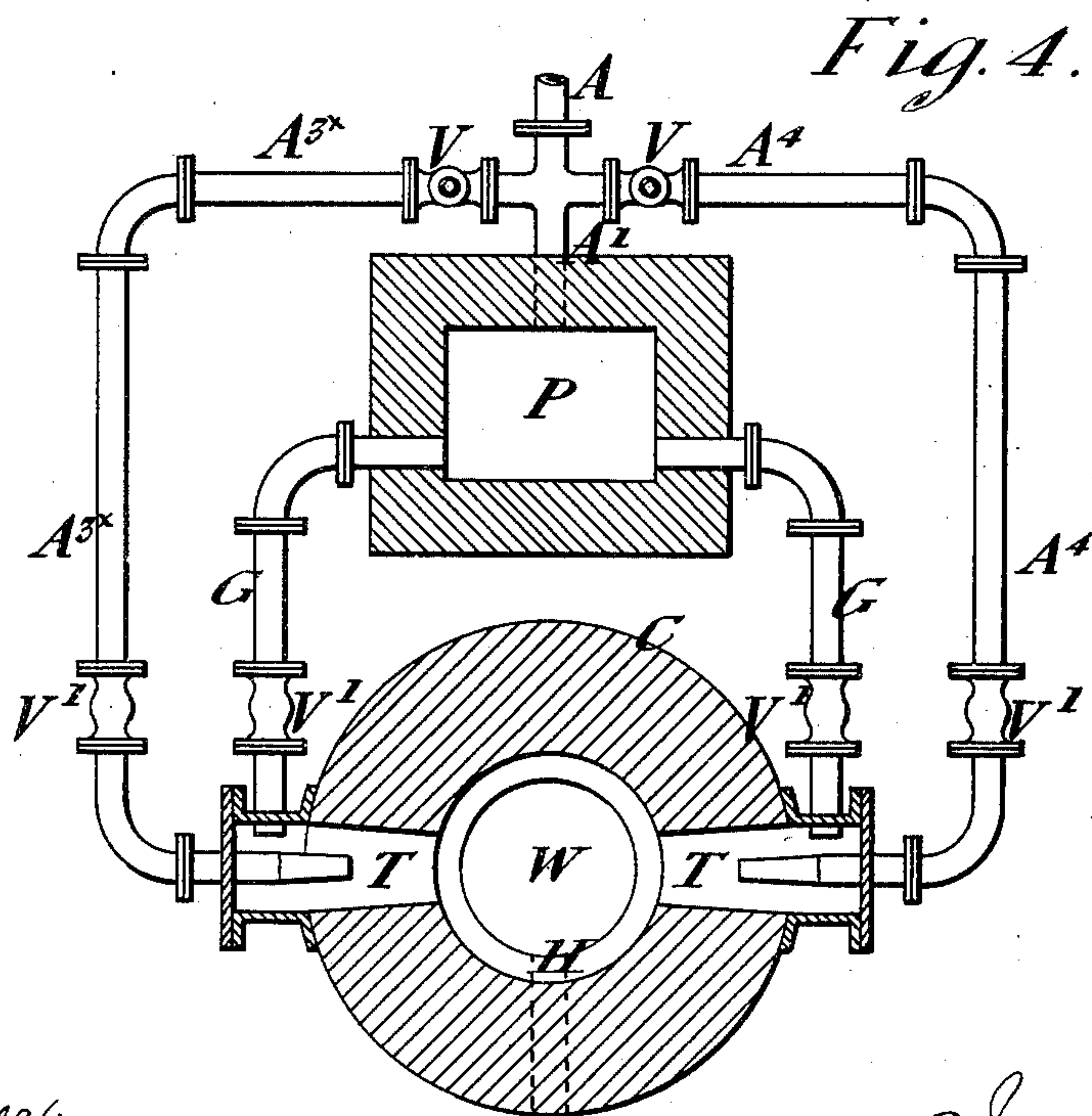
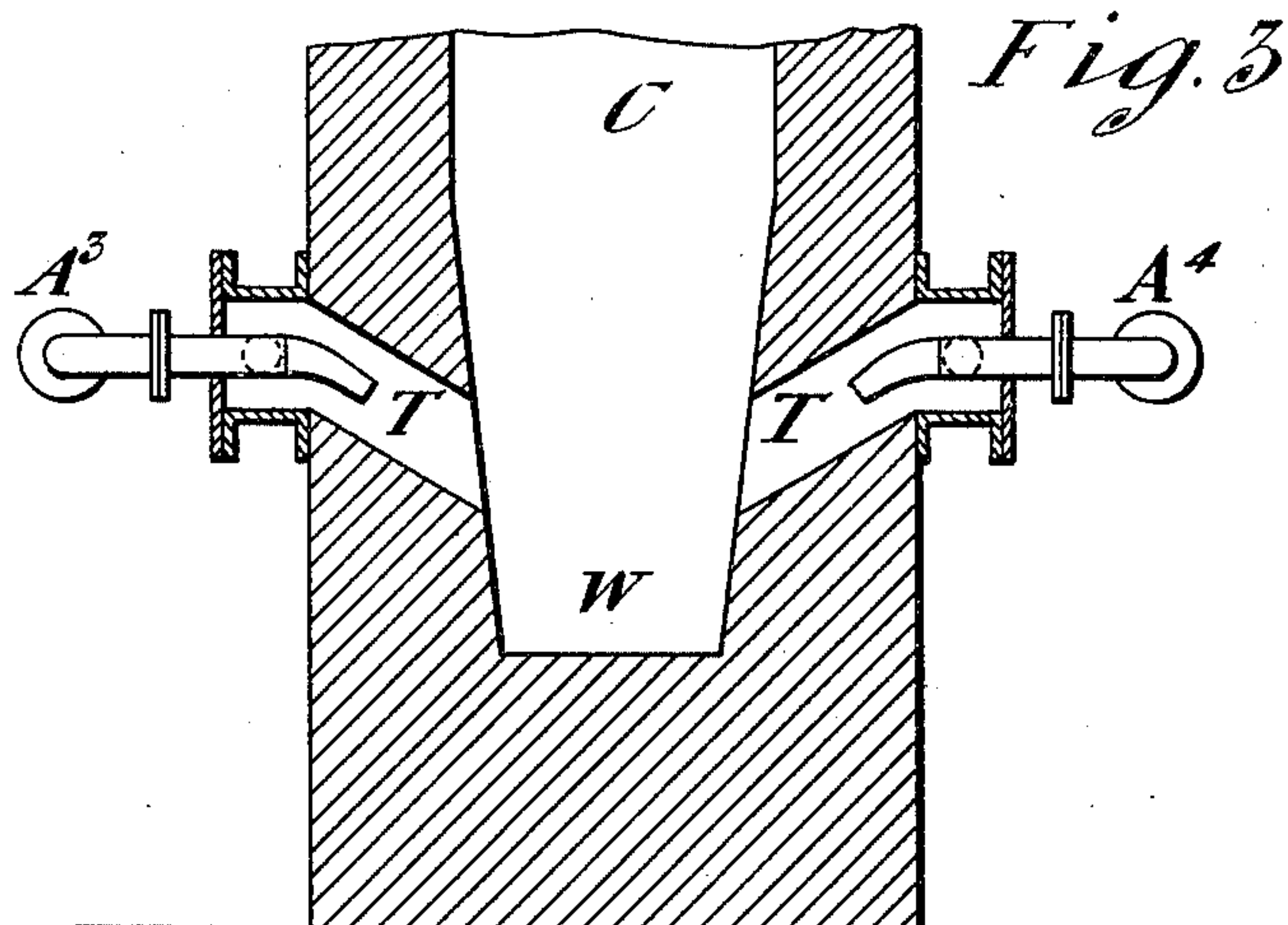
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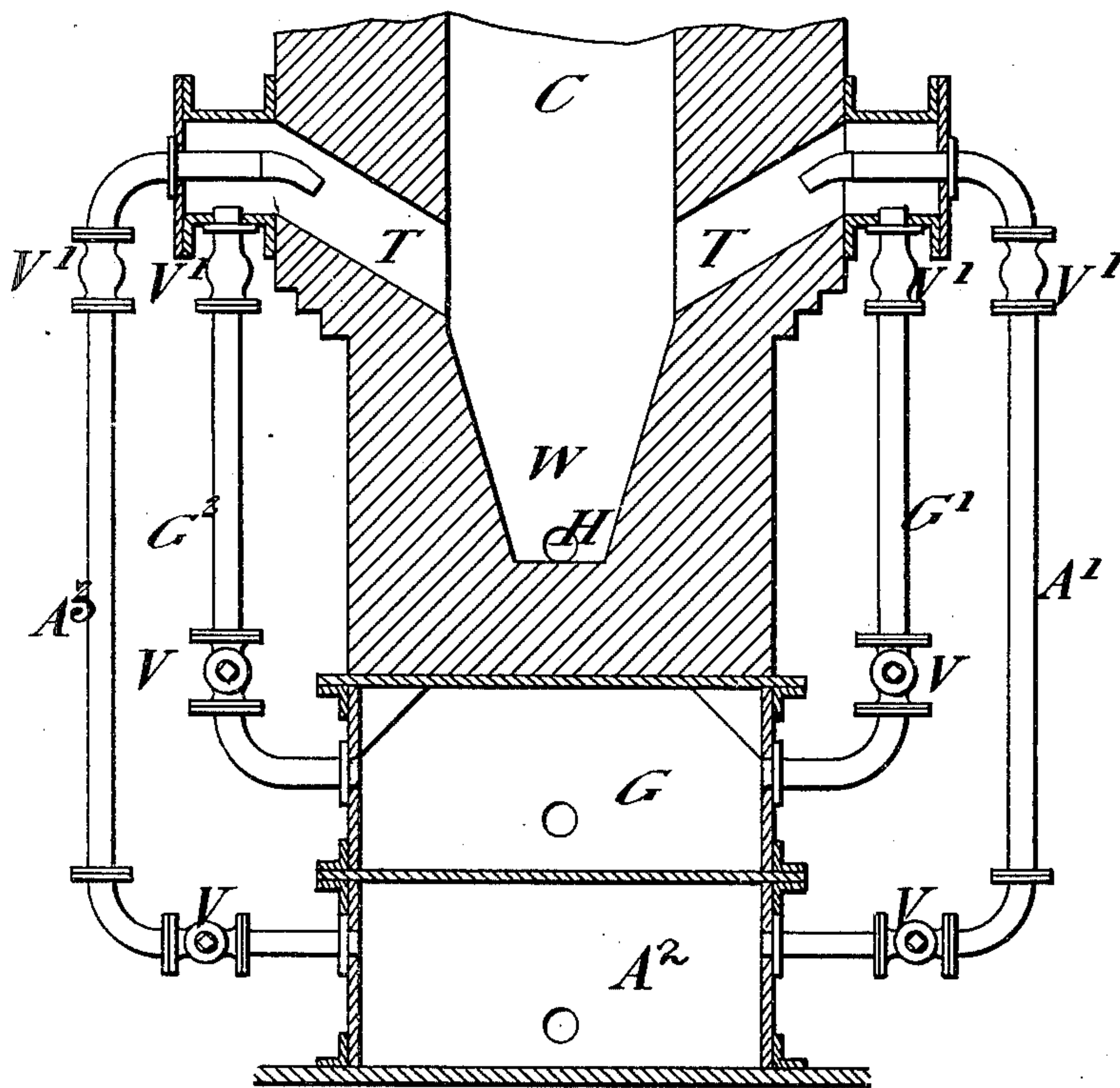
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Fig. 5.



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UNITED STATES PATENT OFFICE.

ALLEYNE REYNOLDS, OF SHEFFIELD, ENGLAND.

BLAST AND CUPOLA FURNACE.

SPECIFICATION forming part of Letters Patent No. 657,031, dated August 28, 1900.

Application filed December 7, 1898. Serial No. 698,556. (No model.)

To all whom it may concern:

Be it known that I, ALLEYNE REYNOLDS, a citizen of England, residing at Bolsover Hill, Sheffield, in the county of York, England, have
5 invented certain new and useful Improvements in Blast and Cupola Furnaces, (for which I have applied for a patent in Great Britain, No. 22,182, dated October 21, 1898,) of which the following is a specification.

10 In blast and cupola furnaces as they are usually worked the metal-bearing materials are in direct contact with the solid fuel and the smelted or melted products are thus rendered more or less impure.

15 My invention has for its object the treatment of ores and metals in furnaces of the blast or cupola type in such a manner as to avoid the objectionable effects of their treatment in contact with solid fuel. For this purpose I blow through refractory twyers into
20 the lower part of the furnace just above the well combustible gas and air under pressure, these or either of them being heated. I shall describe arrangements for this purpose which
25 may be variously modified to suit various circumstances.

Referring to the accompanying drawings, Figure 1 is a vertical section, and Fig. 2 is a sectional plan, of a furnace worked with gas
30 from two producers beside the cupola. Fig. 3 is a vertical section, and Fig. 4 a sectional plan, of a furnace worked with gas from a single producer near the cupola. Fig. 5 is a vertical section of a furnace worked with gas
35 supplied from a distance.

Referring first to Figs. 1 and 2, C is part of a cupola, W its well, and H its tapping-hole. P is one of a pair of gas-producers situated near the cupola, one on each side, and communicating with its well by downwardly-inclined
40 twyers T. A pipe A supplies compressed air to two branches A' and A², each furnished with regulating-valves V and check-valves V'. The lower branch A' supplies air to the lower
45 part of the producer. The upper branch A² extends through the upper part of the producer and partly into the twyer. Thus hot gas as it is produced and air partly heated produce a flame directed downward into the
50 cupola and operate on its charge.

As shown in Figs. 3 and 4, a single producer P is supplied with air at the bottom by a branch

A' from the compressed-air-supply pipe A, from which other branches A³ A⁴ pass to the twyers T at each side of the cupola C, while
55 pipes G from the producer lead gas to the twyers T. V V are regulating-valves, and V' V' are check-valves.

When the gas, which may be water-gas, is supplied from a distance, the arrangement
60 shown in Fig. 5 may be adopted. In this case the air and gas are supplied under pressure to the receptacles A² and G, respectively, from which pipes A' A³ lead the air and G' G² lead the gas to the twyers T, these pipes being fur-
65 nished with regulating-valves V and check-valves V'. The check-valves V' serve in all the arrangements described to prevent back-flow, by which explosive mixtures might be
70 formed in the pipes or receptacles.

The following are examples of the application of a cupola or such like furnace worked as described without solid fuel coming in contact with the charge: The furnace having a basic lining, such as dolomite lime or
75 magnesite, is heated, and then charged to some height above the twyers with lumps of limestone. When the charge is well heated, pig-iron, it may be with scrap and iron ore, is charged into the furnace with excess of lime-
80 stone. As the molten metal descends it parts with phosphorus and other impurities and the purified iron is tapped from the well. When the furnace is employed to smelt chromite, so as to obtain ferrochrome, the lining should be
85 acid or neutral and water-gas is preferably employed.

Having thus described the nature of my invention and the best means I know for carrying the same into practical effect, I claim—
90

In an apparatus for treating ores, the combination with a furnace of blast or cupola type formed with twyers sloping inwardly and downwardly to the inner wall of the furnace; with an apparatus for producing gas located
95 one at each side of the furnace, and communicating with the furnace-twyers by pipes, a compressed-air supply, a branched pipe for conducting such compressed-air supply under pressure both to the gas-producer and inclined
100 twyers to commingle with the hot gases as they enter the furnace; one of said pipes supplying air to the lower part of the gas-producer and the other of said pipes extending

through the upper part of the gas-producer
and partially into the twyer, whereby the
generated gas and the partly-heated air pro-
duce a flame which is directed into the fur-
5 nace; of regulating-valves in said branched
pipes at each side of the main pipe, and check-
valves in each of said branched pipes for sup-
plying the air whereby backflow of gas, by
which explosive mixtures might be formed in
10 the pipes or receptacles, is prevented, all con-

structed and arranged to operate substan-
tially as and for the purpose set forth.

In testimony whereof I have hereunto set
my hand in presence of two subscribing wit-
nesses.

ALLEYNE REYNOLDS.

Witnesses:

JNO. P. M. MILLARD,
FRED. C. HARRIS.