

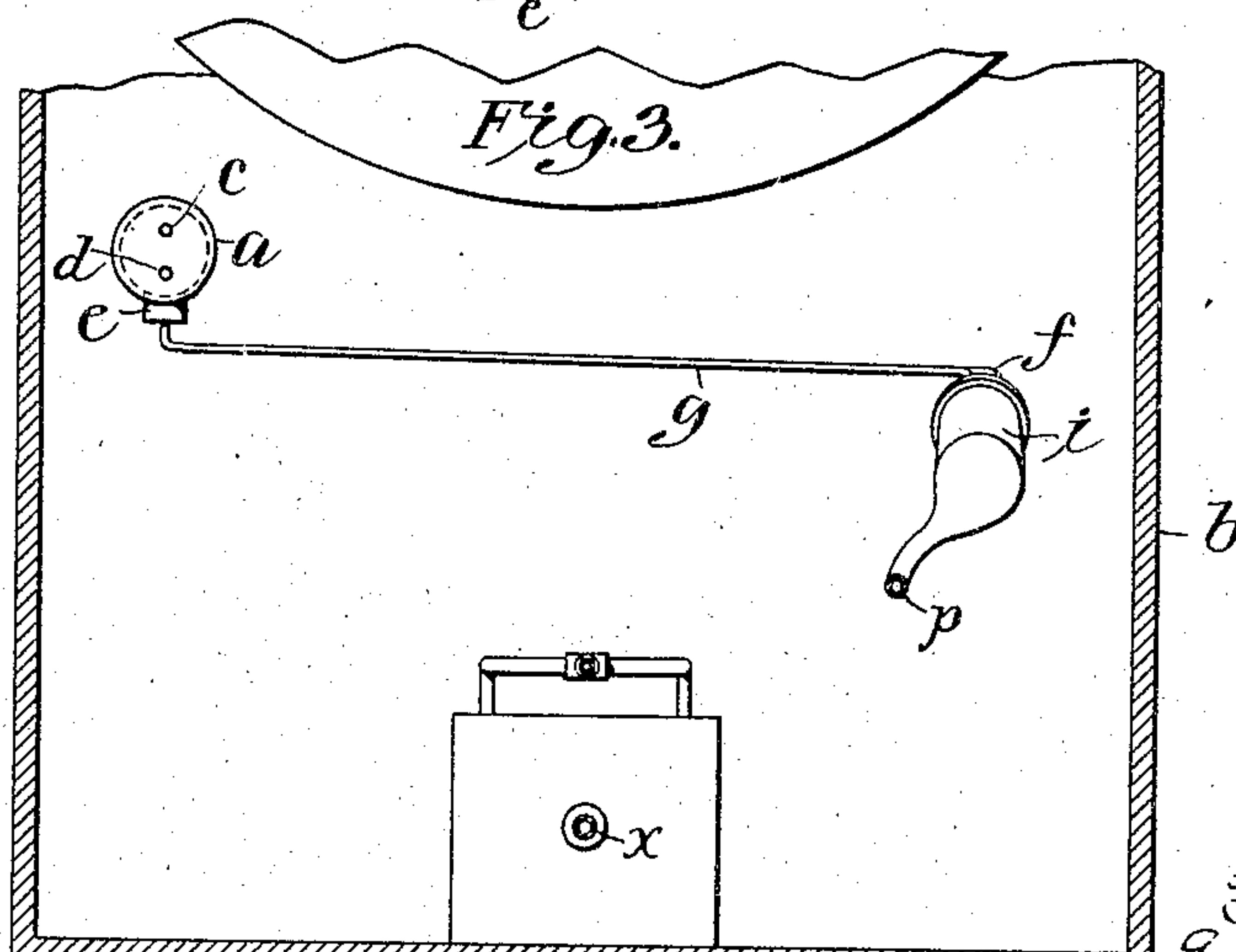
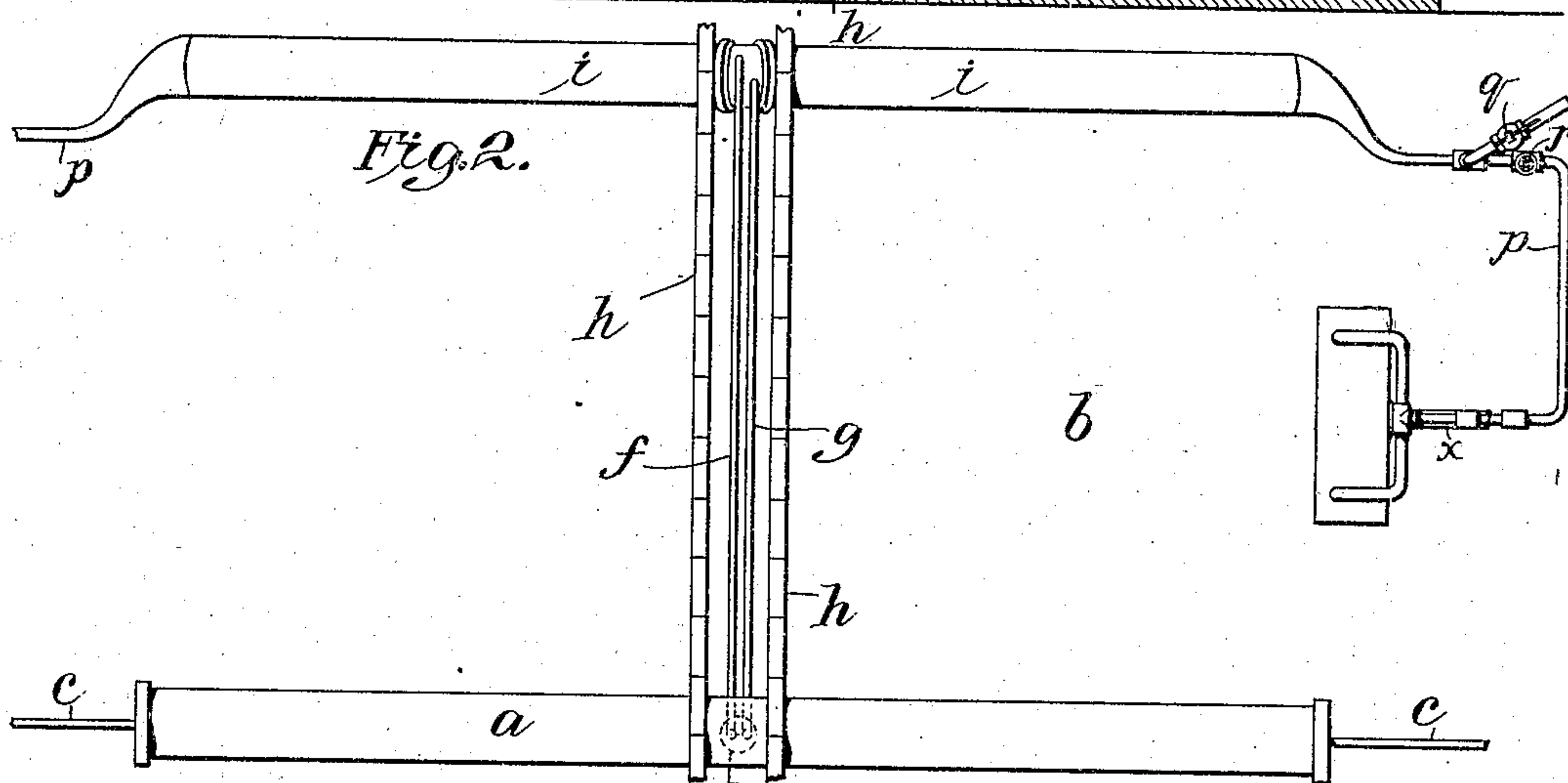
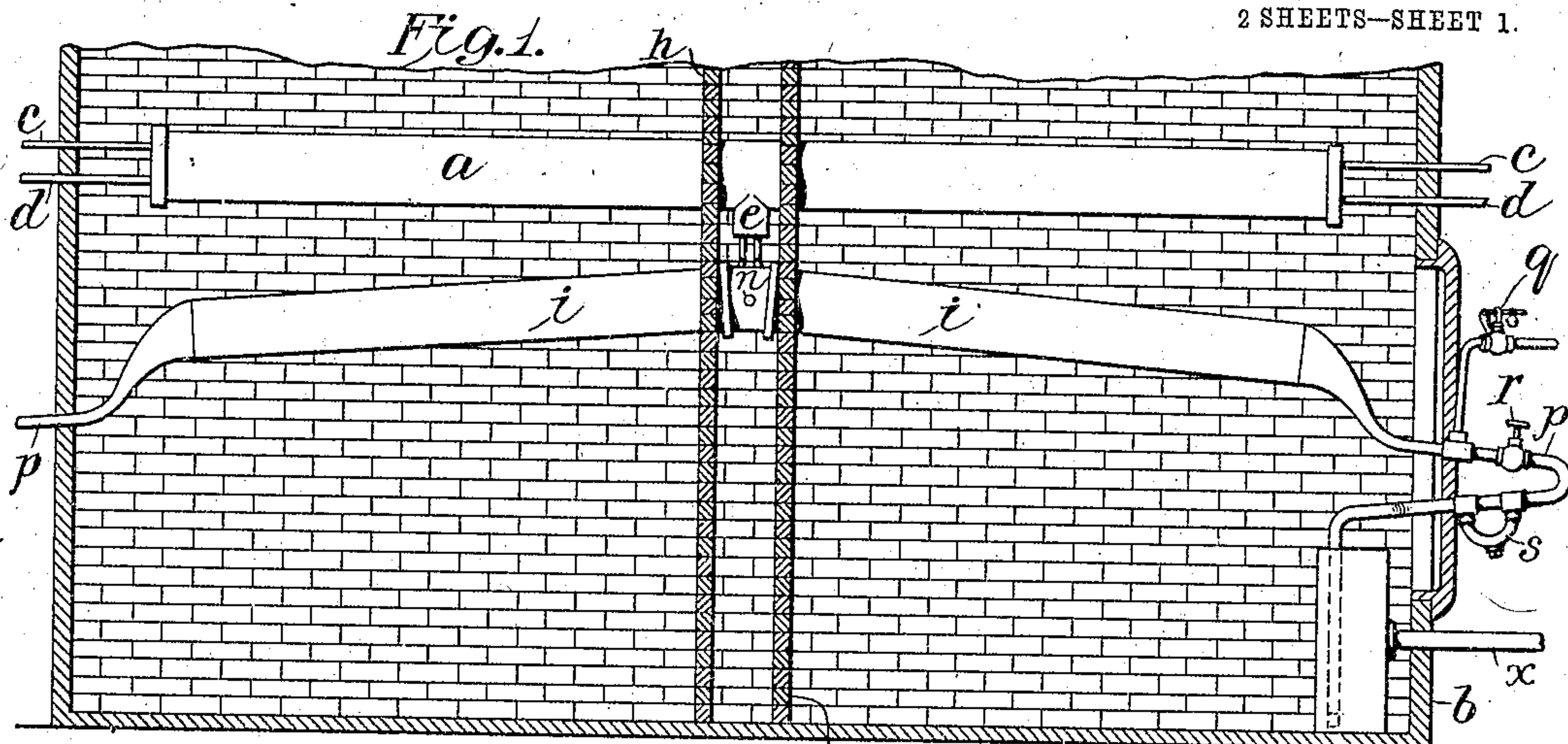
No. 791,613.

PATENTED JUNE 6, 1905.

G. W. DRÄSEL & T. A. TYAS.
PROCESS OF PREPARING OIL FOR COMBUSTION.

APPLICATION FILED APR. 30, 1903.

2 SHEETS—SHEET 1.



Witnesses
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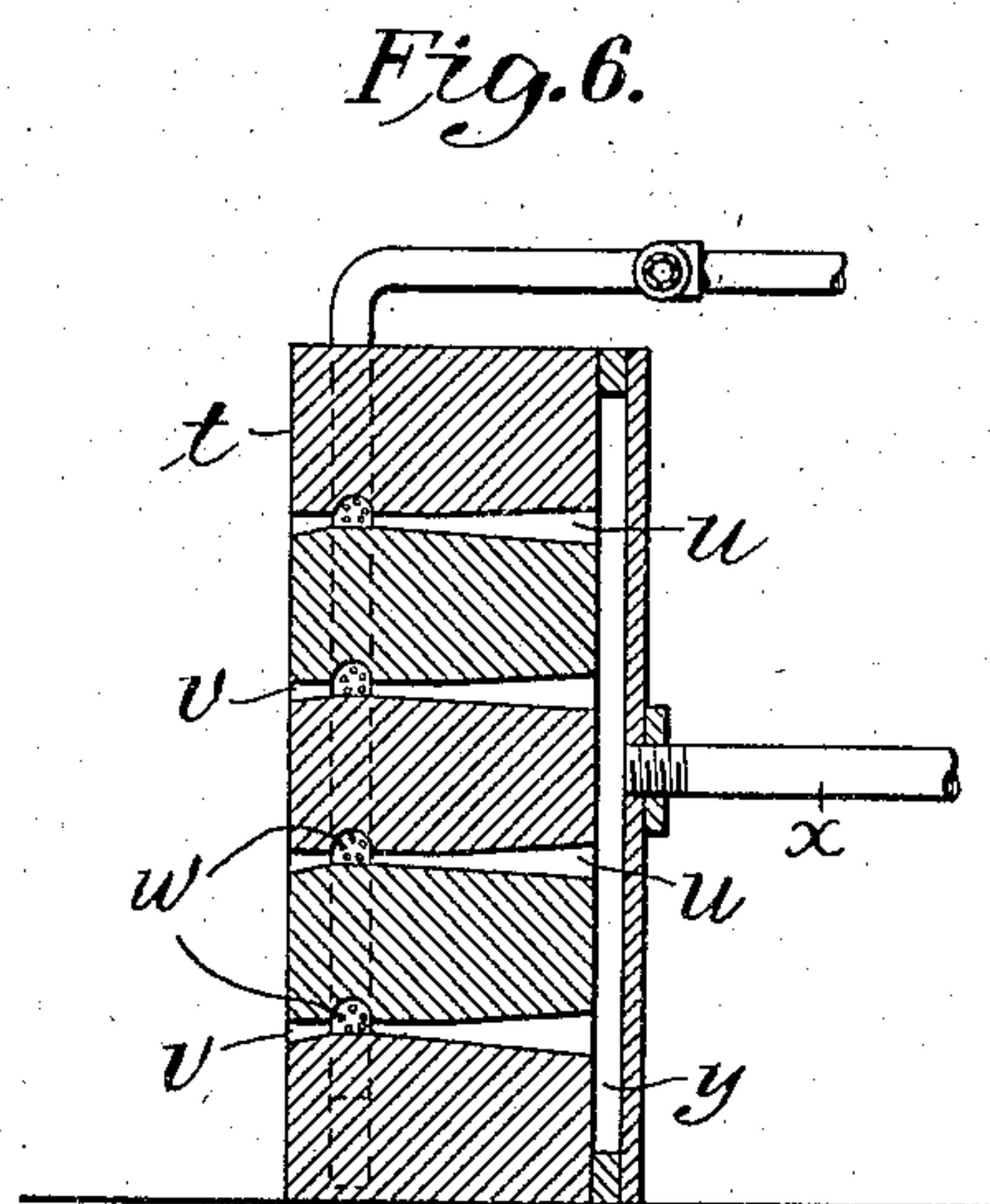
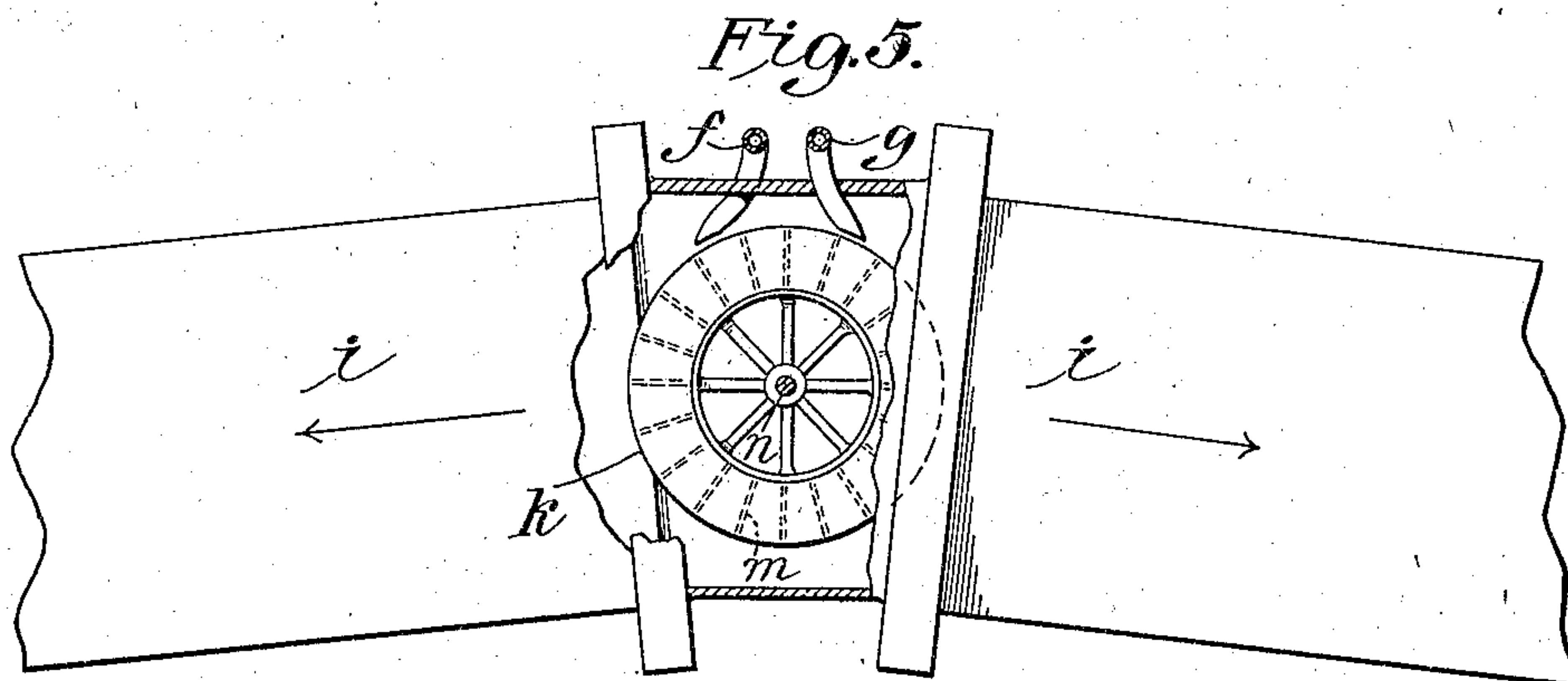
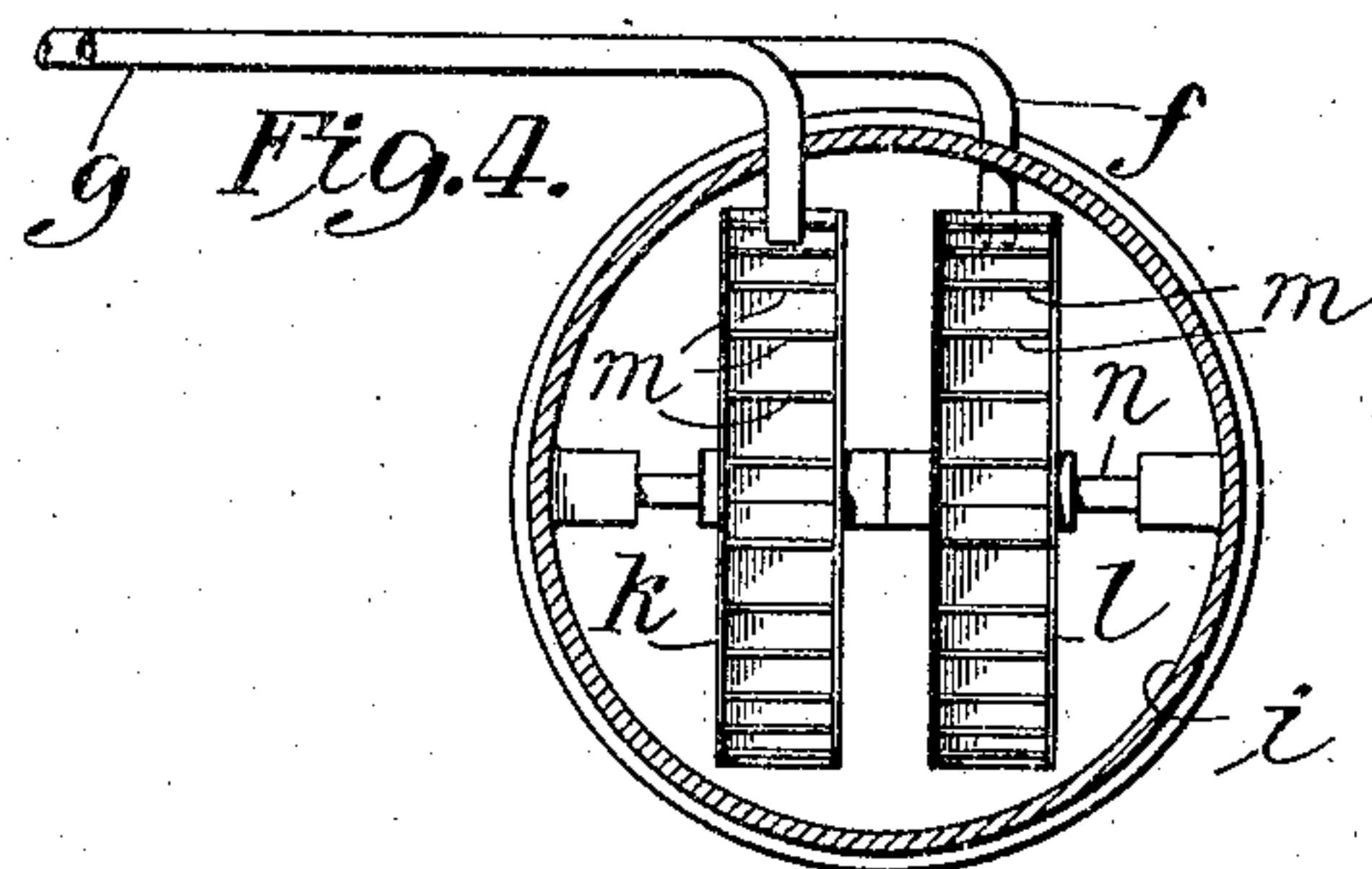
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2 SHEETS—SHEET 2.



Witnesses
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UNITED STATES PATENT OFFICE.

GUSTAV WM. DRÄSEL AND THEODORE A. TYAS, OF HOBOKEN, NEW JERSEY.

PROCESS OF PREPARING OIL FOR COMBUSTION.

SPECIFICATION forming part of Letters Patent No. 791,613, dated June 6, 1905.

Application filed April 30, 1903. Serial No. 154,958.

To all whom it may concern:

Be it known that we, GUSTAV WM. DRÄSEL and THEODORE A. TYAS, citizens of the United States, residing in Hoboken, county of Hudson, in the State of New Jersey, have invented certain new and useful Improvements in Processes of Preparing Oil for Combustion, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

This invention relates to processes for converting hydrocarbon and other oils from a crude or unrefined state into a combustible vapor or gas.

One objection heretofore to the use of a crude-oil fuel in stoves, furnaces, and other oil-consuming apparatus has been the difficulty of burning such fuel therein without clogging the feed-pipes and burners and without an imperfect combustion and the consequent production of smoky flames. The cause for this difficulty is believed to have been due largely to the presence of impurities in the fuel and also to the imperfect and incomplete manner in which the vaporization and carbureting of the fuel has been effected. Accordingly refined oil from which the impurities and substances difficult of vaporization have been removed has been required to be supplied to such apparatuses, and even with refined oil the objectionable features which accompany the use of crude oil are not entirely eliminated.

The present invention is designed particularly to overcome such difficulties as have been encountered in the attempts to burn crude oil in oil-burning stoves and the like; and to this end the invention is chiefly concerned with effecting the complete and thorough vaporization and carbureting of the crude oil and to the carrying forward into the burner of any and all impurities which may exist in the crude oil and are incapable of being readily converted into a gas. The complete vaporization of crude oil besides being rendered difficult by the presence of impurities is also hindered by the presence of semi-solid and other hydrocarbons which remain unconverted at high temperatures and which

substances, as above stated, the process of refining removes. It is found, however, that many of these refractory hydrocarbons may be converted into a gaseous state if properly agitated, heated, and allowed to expand; and one of the objects of this invention is to provide a process for reducing such substances, as well as the easier vaporizable portions of crude oil, to a gaseous state, and which process shall also be capable of being easily and conveniently applied in the running of furnaces and similar apparatuses where the reduction of crude oil is desirable.

A further object of the invention is to carry forward to the burners or to a trap near the burners all substances whatsoever which may remain over after all the convertible portions of the fuel have been vaporized.

The improved process will be more particularly described hereinafter with reference to the accompanying drawings, where a furnace is illustrated in the operation of which the invention may be applied.

In said drawings, Figure 1 is a longitudinal section through the fire-box of a double boiler, showing an apparatus suitable for the practice of the improved method. Fig. 2 is a general plan of the apparatus shown in Fig. 1. Fig. 3 is a transverse section through the fire-box just inside the front wall. Fig. 4 is a detail in section on the plane indicated by the line 4 4 in Fig. 5 and showing the fans in the fuel-conduit. Fig. 5 is a detail, partly in side elevation and partly broken away, of the parts shown in Fig. 4. Fig. 6 is a detail in transverse section of a burner which may be used in connection with the invention.

In accordance with the invention fuel in the form of crude oil is first delivered from a convenient source of supply into a mixing and vaporizing chamber over a continuous blast of air. For this purpose a chamber *a*, preferably tubular in form, is provided at one side of a fire-box or heater *b*, where it is out of the intensest heat of the fire, and into said chamber lead oil and air supply pipes *c* and *d*, respectively. The tubular chamber should have a relatively large diameter as compared with the fuel and air

pipes, so as to permit the oil to vaporize
 freely and the vapor to expand and com-
 mingle with plenty of air. In the present
 case the invention is illustrated in connec-
 5 tion with a furnace for a double boiler, and
 the sections of chamber *a*, which lie in each
 compartment of the fire-box of the furnace,
 are joined together at the middle of the fire-
 box, and both sections form one continuous
 10 tube, which is preferably integral, as shown
 in the drawings, and which the air and oil
 supply pipes enter at both ends. The air-
 pipes *d* are to be connected to a suitable air-
 supply under pressure, and these pipes fur-
 15 nish to chamber *a* a continuous blast of air
 over and upon which the oil is discharged
 from pipes *c*, the oil being thereby vaporized
 and mingled with air and the mixture di-
 rected into the center of tubular chamber *a*.
 20 This mixture of air and vaporized oil which
 is effected by the air-blast in chamber *a* is
 heated therein and on account of the rela-
 tively large capacity of said chamber is per-
 mitted to expand and to further mingle
 25 itself with air, it being in a constant state of
 agitation owing to the two oppositely-di-
 rected currents of air and oil entering each
 end of the chamber. The mixture thus
 formed is delivered downwardly toward the
 30 burner; but its progress toward the burner is
 retarded somewhat to permit the fuel enter-
 ing chamber *a* to be retained therein long
 enough to be properly treated. For this
 purpose the outlet from the vaporizing-cham-
 35 ber is contracted sufficiently to effect the
 proper retardation, a small nipple *e* being
 provided in the bottom of said chamber at
 the center thereof, from which nipple lead
 two small pipes *f* and *g*, both of which have
 40 slight downward inclinations and extend
 across the fire-box within a brick partition *h*
 between the two sections thereof. The pipes
f and *g* are protected from the direct heat of
 the fire by the brick partition, but are heated
 45 sufficiently to supply heat continuously to
 the contained fuel, which at this point exists
 for the most part in a gaseous state.

In order to further commingle the vapor-
 ized oil and the air which constitute the gas-
 50 eous portions of the fuel delivered from the
 chamber *a* and also to completely vaporize
 any oil which escapes in an unvaporized con-
 dition from said chamber, the fuel after pass-
 ing through the contracted pipes *f* and *g*,
 55 where it is compressed and slightly concen-
 trated, is again heated and permitted to ex-
 pand freely. Preferably, also, the fuel after
 passing through the pipes *f* and *g*, is agitated
 by mechanical means, such as fans or blowers,
 60 which greatly facilitates the vaporization and
 expansion. For permitting expansion a
 chamber *i* of considerable capacity is pro-
 vided in each section of the fire-box, the two
 chambers being united at the center of the
 65 fire-box and the pipes *f* and *g* opening down-

wardly into the chambers near the junction
 thereof. For stirring or agitating the fuel
 two fans *k* and *l* may be provided, having a
 plurality of radially-disposed blades *m*, and
 these fans may be journaled upon a trans- 70
 verse axis *n*, mounted in the side walls. The
 fuel is delivered from the pipes *f* and *g* upon
 each of the fans, respectively, the pipe *f* dis-
 charging upon the fan *k* tangentially in one
 direction, while the pipe *g* discharges upon 75
 fan *l* in the same manner but in the opposite
 direction, thus causing the mixture to be
 thoroughly stirred up and commingled and
 any unconverted oil to be discharged from
 the fans into the respective chambers and 80
 quickly vaporized and prevented from falling
 upon the bottoms of the chambers. The ex-
 pansion-chambers are slightly lower, as will
 be observed in the drawings, than chamber *a*
 and are secured to the opposite side of the 85
 furnace-wall out of the intensest heat of the
 fire. The fuel in these expansion-chambers
 is completely vaporized by being permitted
 to expand freely by being reheated to a con-
 siderable degree, owing to the large superfi- 90
 cial area of the chambers, and when the fans
 are employed by being thoroughly agitated.

After the mixture passes the fans and
 while it is being expanded, heated, and agi-
 95 tated in the expansion-chambers it is con-
 tinually advanced in a downwardly direction
 in its progress to the burner. At either end
 of the furnace the mixture passes from the
 expansion-chamber into a small delivery-
 pipe *p*, directed downwardly at all points, 100
 through which it is conducted to the burner.
 This pipe is preferably carried outside the
 furnace and is provided with a safety-valve
q, controlling-cock *r*, and trap *s*. The trap is
 provided to collect any solid or semiliquid 105
 matter which might for any reason collect or
 form in the delivery-pipe, and thus it pre-
 vents such matter from clogging said pipe or
 the burner.

The burner may comprise any suitable ap- 110
 paratus adapted to receive and consume gas-
 eous fuel. As shown in Fig. 6, such a burner
 may be constructed from solid castings *t*, pro-
 vided with grooves in their surfaces, which
 when the castings are assembled form flat 115
 channels *u* and burner-slits *v*. The delivery-
 pipe *p* may be led down through the burner
 and may communicate with the channels *u*
 through small openings *w*. A supply of air
 under pressure may also be furnished through 120
 a pipe *x*, which leads into a narrow chamber
y in the rear of the burner and communicates
 with each channel *u*, whereby additional air,
 if necessary, is furnished to the gaseous fuel
 and the fuel is directed into the burner-slits. 125

It will be understood that the invention is
 not limited to any particular form of appa-
 ratus in which the improved process is prac-
 ticed, the apparatus hereinbefore described
 having been so described merely that the na- 130

ture of the invention might be clearly understood.

We claim as our invention—

5 1. The process of preparing oil for combustion, which consists in mixing the oil with air, heating the mixture within a chamber, forcing the vapor thus formed together with the unvaporized oil downward through a restricted passage into a second chamber, heating
10 the mixture in the second chamber and delivering the final mixture downward to the burner.

2. The process of preparing oil for combustion, which consists in mixing the oil with air,
15 heating the mixture within a chamber, forcing the vapor thus formed together with the unvaporized oil downward through a restricted passage, into a second chamber, agitating the unvaporized oil and vapor as it passes
20 through the restricted passage, heating the mixture in the second chamber and delivering the final mixture downward to the burner.

3. The process of preparing oil for combustion, which consists in discharging the oil
25 upon a continuous blast of air, heating the

mixture within a chamber, forcing the vapor thus formed together with the unvaporized oil downward through a restricted passage into a second chamber, heating the mixture in the second chamber and delivering the final
30 mixture downward to the burner.

4. The process of preparing oil for combustion, which consists in discharging the oil upon a continuous blast of air, heating the mixture within a chamber, forcing the vapor
35 thus formed together with the unvaporized oil downward through a restricted passage into a second chamber, agitating the unvaporized oil and vapor as it passes through the restricted passage, heating the mixture in the
40 second chamber and delivering the final mixture downward to the burner.

This specification signed and witnessed this 27th day of April, A. D. 1903.

GUSTAV WM. DRÄSEL.
THEODORE A. TYAS.

In presence of—

ANTHONY N. JESBERA,
LUCIUS VARNEY.