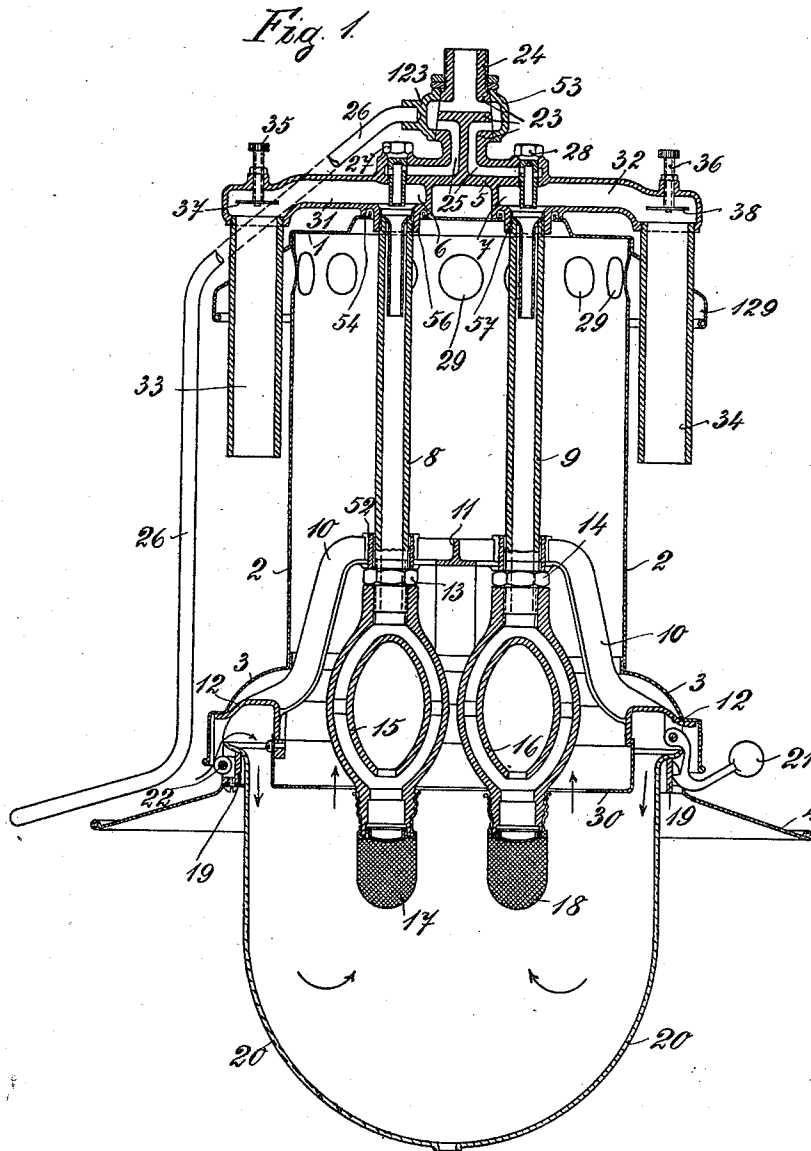


M. GRAETZ.
 INVERTED INCANDESCENT GAS LAMP.
 APPLICATION FILED JAN. 5, 1910.

1,030,079.

Patented June 18, 1912.

4 SHEETS—SHEET 1.



Witnesses:
 Coimms Myers
 Thomas Donnellan.

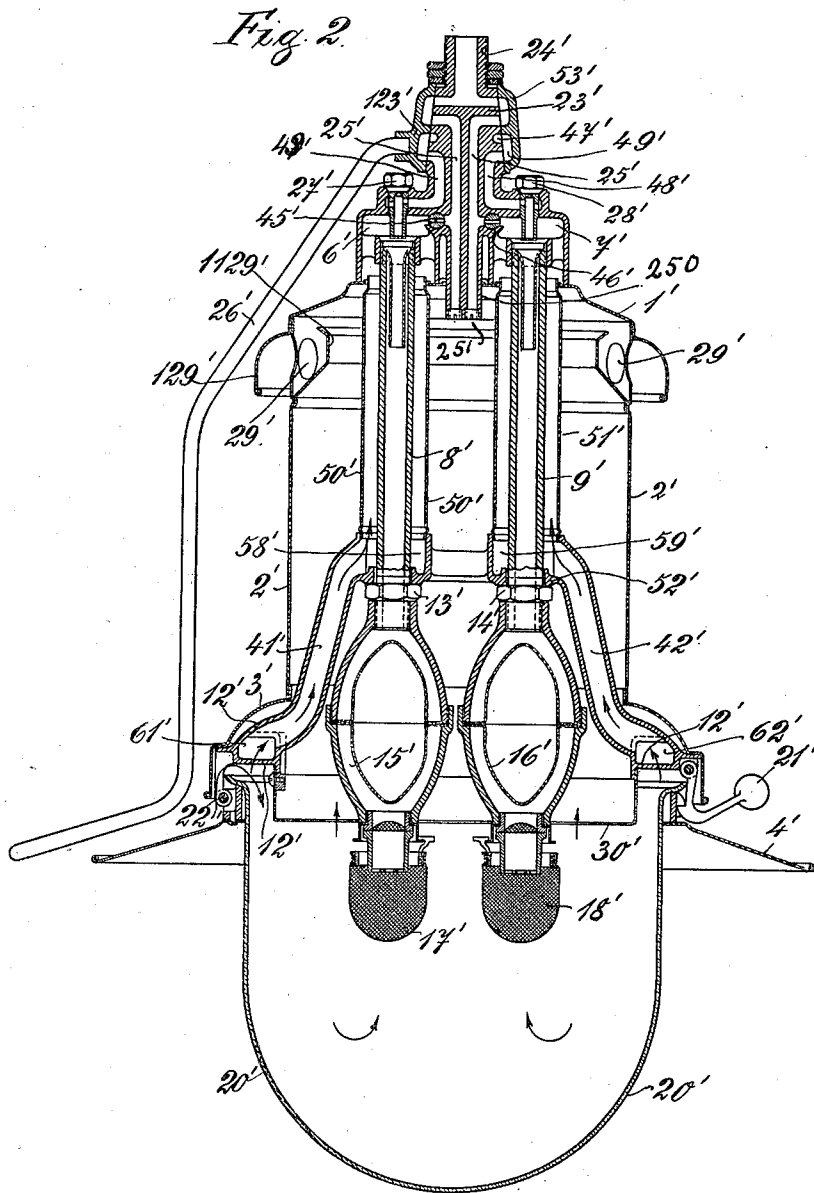
Inventor:
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4 SHEETS—SHEET 2.



Witnesses:
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Thomas Donnellan.

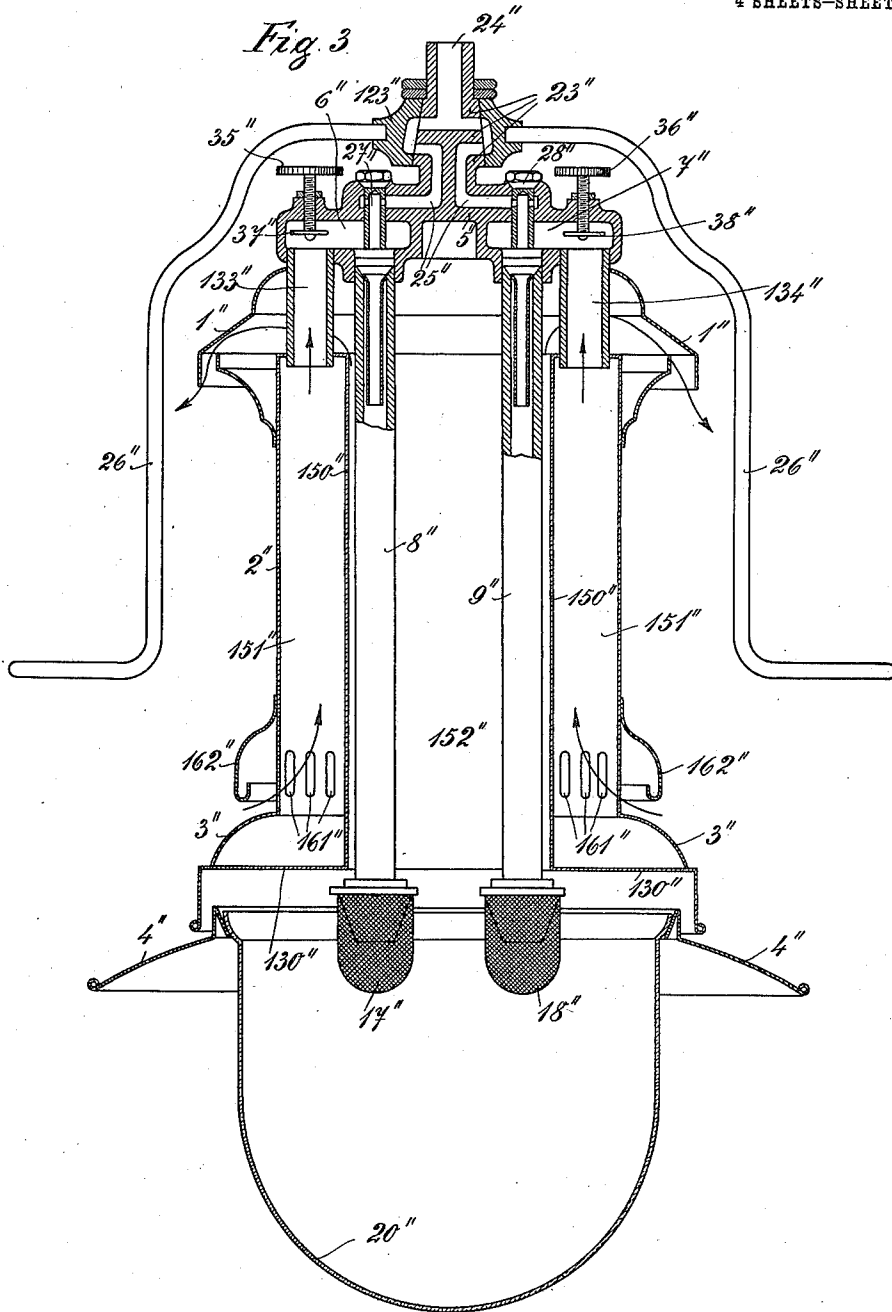
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4 SHEETS-SHEET 3.



Witnesses:
Corinne Myers
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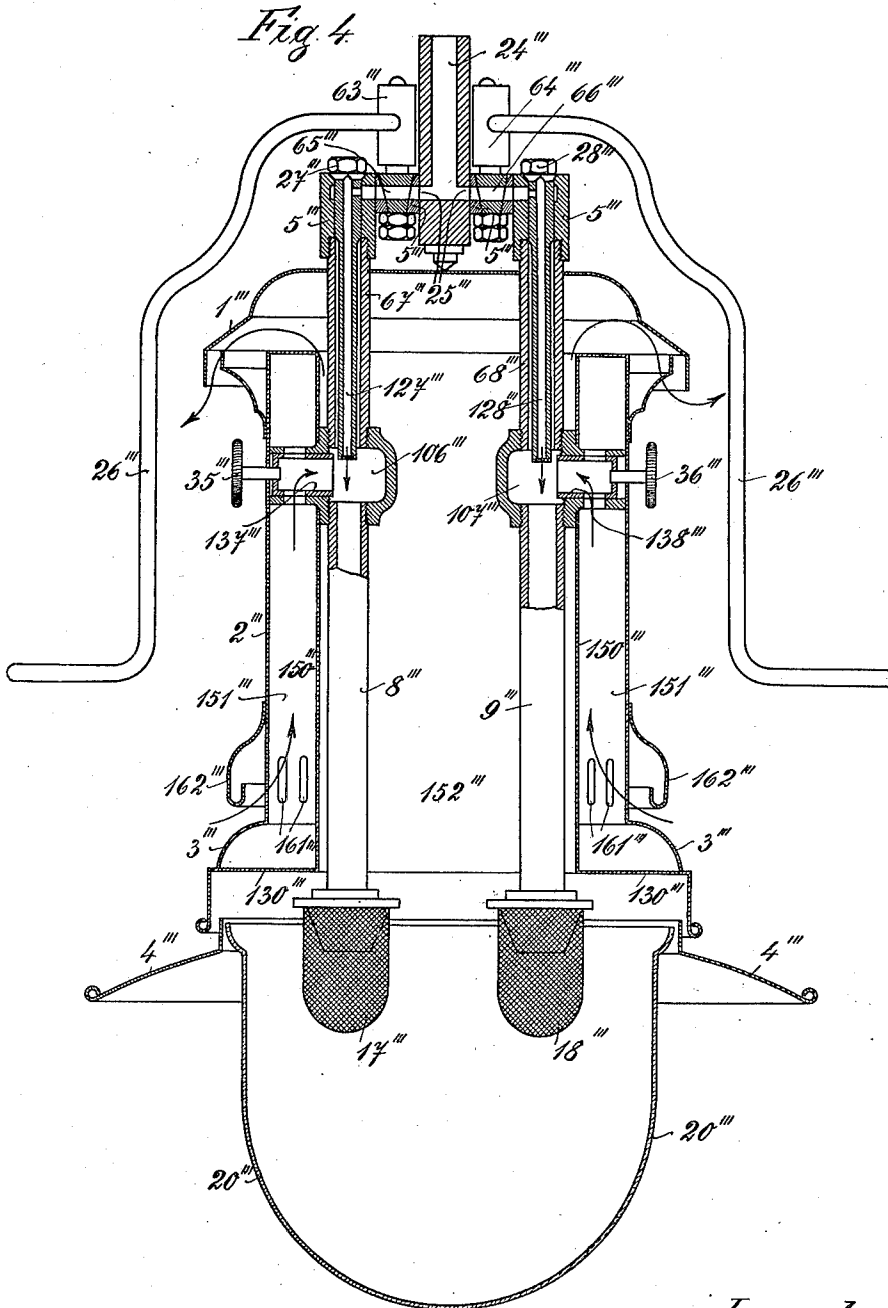
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4 SHEETS—SHEET 4.



Witnesses:
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UNITED STATES PATENT OFFICE.

MAX GRAETZ, OF BERLIN, GERMANY.

INVERTED INCANDESCENT GAS-LAMP.

1,030,079.

Specification of Letters Patent.

Patented June 18, 1912.

Application filed January 5, 1910. Serial No. 536,510.

To all whom it may concern:

Be it known that I, MAX GRAETZ, a subject of the King of Prussia, German Emperor, and resident of 92/93 Elsenstrasse, Berlin, German Empire, have invented certain new and useful Improvements in Inverted Incandescent Gas-Lamps, of which the following is a specification.

This invention relates to inverted incandescent gas lamps especially such as are intended to be employed in the open air and to work with pressure gas or with pressure air. The lamps herein described however may also be employed for ordinary pressures.

The object of the present invention is to construct a lamp which may be easily dismantled and in which those parts requiring frequent attention and adjustment are easily accessible without dismantling the lamp in any way. For instance, the nozzles of the burner which require frequent adjustment and attention may be readily removed without disturbing the lamp parts.

Further it is sought to improve the operation of the lamp by the improved constructions hereinafter described.

The invention will be more readily understood from the following particular description of the accompanying drawings which illustrate four modifications of the present invention by way of example.

In these drawings, Figure 1 is a vertical cross-section through a multiple-burner lamp intended to work with pressure gas. Fig. 2 is a vertical cross-section through a similar lamp intended to work with pressure air. Fig. 3 is a vertical cross-section through a pressure-gas-lamp, similar to that of Fig. 1 but having a somewhat altered arrangement of the air feeding parts and of the burner tubes. Fig. 4 is a vertical cross-section through a further modified construction of a multiple-burner-lamp for pressure-gas.

The same or similar reference numbers denote the same or similar parts in the different figures.

In carrying the invention into effect according to the first form shown in Fig. 1 the lamp casing consists of an upper cover part 1, a cylindrical main casing or chimney part 2 and a casing-underpart 3. Above the upper part 1 there is arranged a cast upper structure 5 in which the air suction chambers 6 and 7 are formed. Screwed into

the upper structure and opening from the suction chambers 6 and 7 are two straight vertical burner tubes 8 and 9. The vertical burners 8 and 9 pass through bosses 52 formed in a cast understructure comprising radiating arms 10 and 11 connected at their outer ends by a ring or flange 12. The flange 12 extends under the lower part 3 of the lamp casing so that by tightening up the nuts 13 and 14 on the lower parts of the straight burner tubes 8 and 9 the upper structure 5 and the lower structure 10, 11, 12 are firmly bound together with the lamp parts 1, 2 and 3. The ends of the straight burner tubes 8 and 9 are threaded below the nuts 13 and 14 to receive the mixture heating chambers 15 and 16 which are of the elongated widened form shown. The mixing chambers 15 and 16 have their exits directly into the burner heads on which the mantles 17 and 18 are arranged. To a bracket formed on the lower cast structure there is pivoted at 22 a ring 19 adapted to support the glass shade 20. The ring 19 has also fixed to it the reflector 4. A catch 21 pivoted to the lower cast structure and arranged opposite to the pivot 22 is arranged to hold the globe of the shade 20 and ring 19 in place. To the flange 12 there is fixed a reflector plate 30 arranged within the glass shade 20.

Cast with the upper structure 5, in the form shown, is a cock-barrel 23 to which gas is led by the pipe connection 24. Around the cock-barrel 23 there is arranged a rotatable channeled sleeve 53 which is adapted in one position to establish connection between the gas supply pipe 24 and the gas supply channels 25 leading to the nozzles 27 and 28 and in another position to cut off communication between the supply 24 and the channels 25.

The channeled sleeve 53 is adapted to be rotated by a rod 26. The channels 25 as aforesaid lead to the nozzles 27 and 28 which are adapted to be screwed into the cast upper structure 5 and project into the suction chambers 6 and 7, of the burner tubes 8 and 9. By this arrangement the said nozzles 27, 28 may be removed from the upper structure 5 for cleaning and adjustment without disturbing any other part of the lamp. Leading to the suction chambers 6 and 7 there are also air supply pipes 31 and 32. In the illustrated form these pipes 31, 32 or equivalent passages in the upper

cast structure are in connection with two pipes 33 and 34 which are extended downwardly to a point well below the openings 29 in the chimney or casing 2 through which the waste or burnt gases find their exit into the atmosphere. By a cap or shelter 129 the entrance of rain or wind into the chimney casing 2 and its interference with the exit of the waste-gases is prevented. For controlling the air supply to the chambers 6 and 7 screws 35 and 36 carrying disks 37 and 38 are arranged where the pipes 33 and 34 communicate with the cast upper structure.

In order to make the lamp storm-proof, the upper cast structure is provided with annular ridges 54, arranged concentrically with the bosses 56, 57 to which the burner tubes 8 and 9 are fixed. The annular ridges 54 press on the cover plate 1 of the lamp casing and the said cover plate is turned up near the edges of the holes through which the bosses for the burner tubes pass, as can be seen in Fig. 1. In this way rain is prevented from obtaining access to the interior of the lamp.

In addition to the advantages mentioned the lamp possesses the great advantage of simplicity in structure and enables the application of straight burner tubes which, as is known, offer least resistance while at the same time the objections usually associated with straight burner tubes are avoided. In order to secure a sufficient air suction to the lamp it is necessary that the air should be rather cool, that is to say, that the air should not be expanded by heat. Experience has shown that the air is considerably warmed even when it is exposed over a very short stretch of its path to heat. By arranging the mixing chamber or suction chamber externally and above the lamp a considerable advantage in this respect is obtained as the mixing chamber, being in the open air, readily gives up its heat and thereby remains comparatively cool. Further this action is considerably increased by forming the mixing chamber not out of sheet metal but out of comparatively thick walled cast metal which permits of very rapid conduction of the heat. This action is further enhanced by forming the cock barrel and air conduit pipes of a single casting having comparatively thick walls. Such a casting rapidly conducts the heat to all parts of the same and thereby a very extensive cooling surface is offered. Also, by arranging the tubes 33 and 34 well below the openings 29 the objections associated with the suction of air from a point above the chimney openings are avoided, while at the same time by employing the downwardly opening pipes the action of the lamp is not disturbed by wind.

Many alterations may be made in the con-

struction of the lamp without departing from the principle of this invention, for example, it is sometimes advisable that the air conduction pipes 33, 34 be arranged to project within the chimney-casing 2 and withdraw air from some part or chamber formed within the said casing and closed off from the burnt gases, as hereinafter described with reference to Fig. 3.

According to the form shown in Fig. 2 the lamp is intended to work with pressure air while the gas is under normal pressure. The construction of the lamp is in general the same as that described in Fig. 1. Above the cover 1' of the lamp there is arranged the cock-body 23' which has passages 47', 48', leading to the mixing chambers 6' and 7'. To the mixing chambers 6' and 7' are connected the straight vertical burner tubes 8' and 9'. The lower cast structure is of similar construction to that shown at Fig. 1, and carries the ring 12', which is arranged to engage the lower casing part 3', and the upper cast structure which is united with the cock-body 23' engages the upper casing part 1', the casing parts 1', 2', 3', being held together by the nuts 13', 14' on the lower ends of the straight burner tubes 8' and 9'. The heating chambers 15', 16' for the mixture, the burners 17', 18', the reflector 4', the shade-globe 20' and the reflector plate 30' are arranged as described with reference to Fig. 1. The gas in this case enters by the pipe 24' and passes into the channels 25' which open downwardly into a water-collecting tube 250 closed by a screwed plug 251 and branch into the mixing chambers 6', 7', cocks 45' and 46' being interposed in said branches. The passages in the cocks 45' and 46' are so dimensioned as to insure the correct proportioning of the mixture passing through the mixing tubes 8 and 9.

The pressure air is fed sidewise by connections not illustrated to the annular channel 47'. From this annular channel the compressed air passes through passages 48' and 49' to the nozzles 27' and 28'. The nozzles 27' and 28' are accessible in the same manner as the nozzles described in Fig. 1 and project into the suction chambers 6' and 7' opposite the burner tubes 8' and 9'. Around the burner tubes 8' and 9' there are arranged tubes 50' and 51' which open at their upper ends into the suction chambers 6', 7' and open at their lower ends into other chambers 58', 59', formed in the lower cast structure and the said chambers are connected by the hollow radiating arms 41' and 42' and the windows 61', 62' in the upper wall of the ring-flange 12' with the external air. In consequence thereof air passes in the direction shown by the arrows through the windows, and hollow radiating arms and upward through the annular space between the burner tubes 8' and 9' and the outer

tubes 50' and 51'. Owing to the heating action of the gases rising through the casing or chimney 2' this upward current is to some extent accelerated.

5 The conduction of the air into the suction chamber by means of passages which are heated more or less by the waste gases and through a tube surrounding the burner tube and many other details of the lamp which is
10 illustrated, may be known. The main novelty in the present construction, according to Fig. 2, resides in the peculiar arrangement of the nozzles 27', 28' at an easily accessible place and in providing a passage
15 for additional air arranged as described and adapted to open into a suction chamber which is arranged above the lamp casing and exposed to the atmospheric air. In this way the somewhat heated-air rising through
20 the annular space between the burner tubes 8' and 9' and the outer tubes 50', 51' is cooled and such cooling is of great advantage in providing a proper mixture. It is not necessary however that the tubes 50' and
25 51' surround the burner tubes; as they may if desired be arranged separately or the mixing chambers 6' and 7' may be supplied with additional air by means of a common pipe.

In the altered embodiment according to
30 Fig. 3 the cover 1'', the cast piece 5'', the outer-casing 2'' and the casing-underpart 3'' are fastened to one another by the mixing tubes 8'' and 9'' in a similar manner to that shown at Fig. 1. The reflector 4'' and
35 the glass-shade 20'' are also arranged and fastened to the casing-underpart 3'' in the manner described above. Also the feeding of the pressure-gas through the tube 24'', the conduction of the gas through the
40 grooves in the cock-casing 23'', and through the bores 25'' to the nozzles 27'' and 28'' and further to the mixing tubes 8'' and 9'' is similar to that in the first example. A distinguishable feature however consists in the
45 fact, that within the outer chimney casing 2'' a cylinder or tube of smaller diameter 150'' is arranged, and that the reflector plate 130'' is fastened to the lower end of said cylinder 150'', so as to form an outer ring-shaped room 151'', and a central cylindrical
50 room 152''. The ring-shaped room 151'' is closed at its upper end and through the closing plate air tubes 133'' and 134'' pass into the mixing chambers 6'' and 7''. The fresh
55 air to be fed enters through the windows 161'' into the ring-shaped room 151'', and by the outer shelter 162'' the entrance of rain or wind into said room, which might disturb the action of the lamp is prevented.
60 Then, in rising within the room 151'' the fresh air is heated to some degree, as it advances comparatively slowly in consequence of the larger contents of this room. From the upper end of the room 151'' the heated
65 air passes through the tubes 133'' and 134''

into the mixing chambers 6'' and 7'', the amount of heated air being regulated by the plates 37'', 38'', which are adjustable by the screws 35'' and 36'', and from the mixing chambers 6'' and 7'' the mixture of gas
70 and air descends through the tubes 8'' and 9'' to the burner mantles 17'' and 18'', the arrangement of special heating chambers for the mixture being dispensed with in consequence of the previous heating of the air
75 which is supplied. The waste or burnt gases escape through the central part 152'' of the chimney to the top of the lamp, where they cross the fresh air feeding tubes 133'', 134'' and finally leave the lamp under
80 the lower brim of the cover part 1''. The waste gases, in rising within the room 152'' considerably heat the mixing tubes 8'' and 9'' and the partition-wall 150'' between the rooms 151'' and 152''.

In the modification of the gas-lamp according to Fig. 4 the outer arrangement of the upper part 1''', the outer casing 2''', the casing underpart 3''', the reflector 4''' and the glass-shade 20''' is similar or the same
85 as in the previous examples. Pressure gas is fed through the tube 24''' and conducted through the channels 25''' to the two or more burners within the lamp. In each of these channels 25''' there is arranged a cock
90 65''', 66''', the upper parts of which 63''', 64''' bear the regulating rods 26''', which rods allow each of these burners to be independently lighted or extinguished, without interfering with the other burners. The cast
95 upper structure 5''', in which the channels 25''' with the regulating cocks are arranged, is continued in the present case by tubes or the like 67''' and 68''' to the mixing-chambers
100 106''' and 107''', which are arranged comparatively low within the lamp. The nozzles 27''', 28''' which are arranged within the tubes 67''', 68''' also lead with their lower hollow stems 127''', 128''' into the
105 mixing chambers 106''', 107'''. As in the previous example there is arranged an inner partition wall 150''' within the outer casing 2''', in order to divide the chimney-part again into a ring-shaped outer-room 151''' and a central cylindrical room 152'''. The
110 outer ring-shaped room 151''' which is closed at its lower end by the reflector plate 130''' and which is likewise closed at its upper end, is supplied with fresh air by the windows 161''', which windows
115 are protected against rain or wind by the outer shelter 162'''. The air rises slowly within this ring-shaped room 151''' to the mixing chambers 106''', 107''', into which it enters through windows in a side pro-
120 longation and through corresponding windows of an inner shell 137''', 138''', within the respective prolongations of the mixing chambers 106''', 107'''. By an outer screw
125 35''', 36''' the adjustment of the shells 130

137"', 138"' and consequently the admission of air to the mixing chambers can be altered. The burnt or waste gases rise likewise in this example in the central room 152"', thereby heating the mixing tubes 8"', 9"', the mixing chambers 106"', 107"' and the partition wall 150"', which in its turn again heats the fresh air which is fed to the mixing chambers. The waste gases then turn to the side at the top of the chimney-part and leave the lamp below the outer-brim of the cover 1"'. 70

It will be understood, that the invention may be similarly applied to single burner-lamps or to lamps containing two or more than two burners, by simple duplication of the parts. Further it is clear that instead of one fresh air supplying ring-room several air supplying chambers may be arranged in a manner similar to that shown at Fig. 2. The mixing chambers and the mixing tubes may be arranged either in the waste-gas-containing room, as shown at Figs. 3 and 4, or in the fresh-air-containing room, as shown at Fig. 2. The mixing tubes may be provided with special heating chambers for the mixture near the burners, as shown at Figs. 1 and 2. 75

It will of course be understood that the invention is capable of ready modification without departing from the spirit of the invention, as the main feature of the present invention consists in such an arrangement of the regulating nozzles that these parts, which require greatest attention and frequent adjustment, may be adjusted, taken out and substituted by another one without requiring the dismantling of the other parts of the lamp. 80

I claim:

1. In combination with an inverted incandescent gas lamp having an outer casing, a cover therefor, means for admitting air to and for the exit of hot gases from the interior of the outer casing, a mixing chamber to which air is supplied, and a mixing tube depending vertically from the mixing chamber and communicating therewith and with the burner; a hollow casting mounted above said cover and connected with the gas service pipe, and a vertically arranged gas nozzle intermediate and communicating with said mixing chamber and service pipe, said gas nozzle being screwed, from above, into said casting in alinement with said mixing tube so as to deliver the gas therein and so as to be directly accessible for removal purposes from above the lamp without displacing any of the other parts of the lamp. 85

2. In combination with an inverted incandescent gas lamp having an outer casing, a cover therefor, means for admitting air to and for the exit of hot gases from the interior of the outer casing, a mixing chamber 90

to which air is supplied, and a mixing tube depending vertically from the mixing chamber and communicating therewith and with the burner; a hollow casting mounted above said cover and connected with the gas service pipe, said mixing chamber being located in said casting, vertical air supply tubes communicating at one end with said mixing chamber and open at the other end to the atmosphere and a vertically arranged gas nozzle intermediate and communicating with said mixing chamber and service pipe, said gas nozzle being screwed, from above, into said casting in alinement with said mixing tube. 95

3. In combination with an inverted incandescent gas lamp having an outer casing, a cover therefor, means for admitting air to and for the exit of hot gases from the interior of the outer casing, a mixing chamber to which air is supplied, and a mixing tube depending vertically from the mixing chamber and communicating therewith and with the burner; a hollow casting mounted above said cover and connected with the gas service pipe, said mixing chamber being located in said casting, vertical air supply tubes passing through the interior of the lamp so as to be heated by the hot gases therein and communicating at one end with said mixing chamber and open at the other end to the atmosphere and a vertically arranged gas nozzle intermediate and communicating with said mixing chamber and service pipe, said gas nozzle being screwed, from above, into said casting in alinement with said mixing tube. 100

4. In combination with an inverted incandescent gas lamp having an outer casing, a cover therefor, means for admitting air to and for the exit of hot gases from the interior of the outer casing, a mixing chamber to which air is supplied, and a mixing tube depending vertically from the mixing chamber and communicating therewith and with the burner; a hollow casting mounted above said cover and within which said mixing chamber is located, a cock barrel integral with said casting, gas passages in said cock barrel and casting and communicating with said mixing chamber, and an annular adjustable valve surrounding said cock barrel for controlling the supply of gas to said passages. 105

5. In combination with an inverted incandescent gas lamp having an outer casing, a cover therefor, means for admitting air to and for the exit of hot gases from the interior of the outer casing, a mixing chamber to which air is supplied, and a mixing tube depending vertically from the mixing chamber and communicating therewith and with the burner; a hollow casting mounted above said cover and within which said mixing chamber is located, a cock barrel integral 110

with said casting, gas passages in said cock
barrel and casting and communicating with
said mixing chamber, an annular adjustable
valve surrounding said cock barrel for con-
5 trolling the supply of gas to said passages
and a vertically arranged gas nozzle inter-
mediate and communicating with said mix-
ing chamber and gas passages, said gas noz-

zle being screwed, from above, into said
casting in alinement with said mixing tube. 10

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

MAX GRAETZ.

Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."