

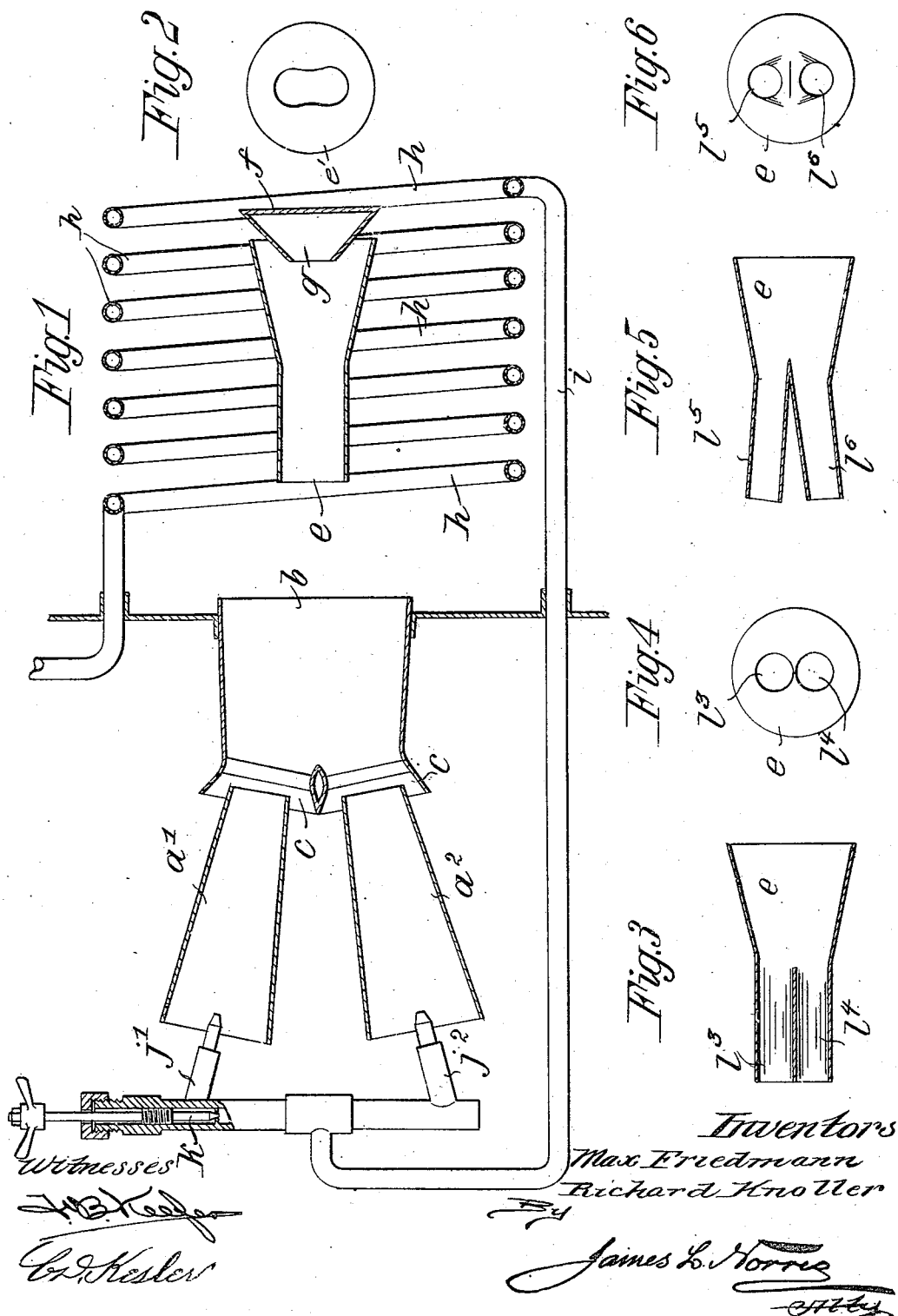
No. 872,810.

PATENTED DEC. 3, 1907.

M. FRIEDMANN & R. KNOLLER

MULTIPLE HEATING BURNER FOR VAPORIZED LIQUID COMBUSTIBLES.

APPLICATION FILED AUG. 3, 1906.



# UNITED STATES PATENT OFFICE.

MAX FRIEDMANN, OF VIENNA, AUSTRIA-HUNGARY, AND RICHARD KNOLLER, OF PANTIN, FRANCE.

## MULTIPLE HEATING-BURNER FOR VAPORIZED LIQUID COMBUSTIBLES.

No. 872,810.

Specification of Letters Patent.

Patented Dec. 3, 1907.

Application filed August 3, 1906. Serial No. 329,116.

*To all whom it may concern:*

Be it known that we, MAX FRIEDMANN, a subject of the Emperor of Austria-Hungary, residing at Vienna, Austria-Hungary, and  
5 RICHARD KNOLLER, subject of the Emperor of Austria-Hungary, residing at Pantin, in the Department of Seine, France, have invented certain new and useful Improvements in Multiple Heating-Burners for Vaporized  
10 Liquid Combustible, of which the following is a specification.

This invention relates to a multiple burner for vaporized liquid fuel, for heating boilers the consumption of fuel by which burner can  
15 be varied between very wide limits. In order to extend the limits within which the consumption of such burners can be varied, it has been proposed to employ several separate burners arranged side by side opening  
20 into the same combustion chamber, each such burner being provided with a vaporizing pipe coil, or all having a vaporizing coil in common. With such an arrangement it would be sufficient to shut off a certain num-  
25 ber of the separate burners, and only to leave one or two in action, in order to reduce the consumption to a minimum. Such multiple burners have given good results in combustion chambers in which a sufficiently strong  
30 draft is produced by a chimney or other device. If however such burners require to force the combustible mixture under pressure into the combustion chamber the above described arrangement cannot be used.  
35 When working according to the said method with the multiple burners, detrimental action would occur because, by the pressure produced in the combustion chamber by the burners remaining in action, a striking back  
40 of the flame through the nozzles of the burners that are out of action would take place. Besides a restarting of a burner, that is out of action (which is already difficult on account of the cooling down thereof) is rendered  
45 still more difficult owing to the said backward pressure requiring to be overcome. Furthermore, if there exists an inequality in the feed of the burners, this inequality is increased by the presence of the said pressure  
50 in the combustion chamber so as to hinder the proper working of the insufficiently fed burners.

These disadvantages are obviated according to the present invention in that the suction  
55 nozzles or ejectors, each of which is fed

by a combustible vapor nozzle, are arranged inclined at a suitable angle to each other and enter a mixing nozzle, common to all, at a point where the decrease of pressure in the mixing nozzle is greatest. In consequence  
60 of this arrangement, on shutting off several of the separate burners, the suction action produced by the burners remaining in action will also produce a suction through the closed  
65 burners, whereby any back flash of the flame is prevented. The restarting of the separate burners can in this case be readily effected because in consequence of the convergence of the suction nozzles the flames are directed  
70 towards one and the same point, where the vaporizer is situated, so that this is always heated to the required extent, even when only one or two separate burners are in action. The reignition can also be readily  
75 effected because in consequence of the convergence of the nozzles the unignited gas jets meet those that are ignited. In the axis of the mixing nozzle and at a certain distance from the same may be arranged a flame divider, constituted by a nozzle or tube which  
80 receives the central part of the flame jet which is rich in combustible, whereby the permanence of the zone in which the combustion begins is insured and a uniform heating of the vaporizer is effected. This  
85 flame divider can have either a single opening or several openings for taking up the middle parts of the flames issuing from the several ejector nozzles.

On the accompanying drawing is shown  
90 by way of example a double burner constructed according to this invention, the two converging ejector nozzles of which lie in the same plane.

Figure 1 shows a sectional plan of the  
95 burner. Fig. 2 shows the flame divider, viewed from the end directed towards the mixing nozzle. Figs. 3 and 4 show in horizontal longitudinal section and in end view a modified construction of the flame divider with  
100 two end openings and parallel tubular parts. Figs. 5 and 6 show in horizontal section and in end view another form of flame divider in which the two tubular parts are entirely  
105 separate and are arranged at a certain angle to each other.

$a'$   $a''$  are the two conical suction nozzles of the double burner, whose axes are arranged at a slight angle to each other. These two  
110 suction nozzles open into the same mixing

nozzle *b*, through air suction openings *c*. This mixing nozzle is formed slightly conical and the two suction nozzles *a'* *a*<sup>2</sup> penetrate into the mixing nozzle to about the narrowest part thereof at which the greatest reduction of pressure exists.

The mixing nozzle *b* projects into the combustion chamber and in the axis thereof is arranged a flame divider *e* at a certain distance from the discharge opening of the mixing nozzle, the opening of which flame divider directed towards the mixing nozzle may be of an oblong section as at Fig. 2. This flame divider has a backwardly expanding extension in the axis of which is an impact body *f* consisting of a conical frustum *g* which is open at the front narrowest end and is closed at the other end by a suitable plate. Round the flame divider is arranged the vaporizer *h* in the form of a pipe coil, the one end of which is connected to the branch pipes *j'* *j*<sup>2</sup> of the pipe *i* supplying the combustible nozzles.

The action of the above described apparatus is as follows:—When working normally the two branches *j'* *j*<sup>2</sup> are both fed with combustible and the mixture of vaporized combustible and air drawn in through the two ejectors *a'* *a*<sup>2</sup> is forced under pressure into the combustion chamber, where it burns both within and round the flame divider. If by means of a suitable closing device such as a valve *k* the combustible supply to the branch *j'* be cut off and only the branch *j*<sup>2</sup> and nozzle *a*<sup>2</sup> of the burner remain in action, the reduction of pressure at the inlet part of the mixing nozzle thus produced prevents all striking back of the flame into the ejector nozzle *a'*. As already stated the re-starting can be readily effected because the gas jet from the nozzle *a*<sup>2</sup> burns at a point which is symmetrical relatively to the vaporizer so that this is always uniformly heated. On the other hand the ignition can also be readily effected because the converging gas jets impinge upon each other.

In Fig. 2 the flame divider *e'* is shown as having the opening in the end adjacent to the mixing nozzle in the form of two circles *l* and *l'* merging into each other or connected to produce an oblong aperture.

In the modification shown at Figs. 3 and 4 the flame divider is formed with two separate small tubular parts, *l*<sup>3</sup> *l*<sup>4</sup>, which join on to the other part of the divider. In the arrangement at Figs. 5 and 6 the two tubular parts *l*<sup>3</sup> *l*<sup>4</sup> are arranged at an angle to each other, in the axial lines of the ejector nozzles *a'* *a*<sup>2</sup>, so that the reception thereby of the central

parts of the gas jets which are rich in combustible is facilitated.

It will be obvious that the several elements of the multiple burner can be arranged one above the other in a vertical plane, or round in a circle.

#### Claims:

1. In a burner of the class specified, the combination of a combustion chamber, a mixing nozzle projecting into the combustion chamber, a plurality of suction nozzles projecting into the outer end of the mixing nozzle and converging towards each other, means for feeding gaseous fuel to the nozzles and provided with separate branch nozzles individually extending into the said suction nozzles, and a flame divider arranged in advance of the inner end of the mixing nozzle.

2. In a burner of the class specified, the combination of a combustion chamber, a mixing nozzle projecting into the combustion chamber and diametrically reduced towards its outer end, conical suction nozzles having their reduced ends projecting into the mixing nozzle, the suction nozzles opening into the mixing nozzle at its narrowest point where the reduction of pressure in the said mixing nozzle is about the greatest, means for feeding gaseous fuel into the suction nozzles and provided with separate branch nozzles individually projecting into said suction nozzles, and a flame divider arranged in advance of the mixing nozzle.

3. In a burner of the class specified, the combination of a mixing nozzle, a plurality of suction nozzles projecting into the outer end of the mixing nozzle, means for feeding gaseous fuel to the suction nozzles, and a flame divider arranged in advance of the mixing nozzle and comprising a tube having at the end facing the mixing nozzle one or more openings and at the opposite end an impact body having the form of a conical frustum.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

MAX FREIDMANN.

#### Witnesses:

JOSEF RÜBRESCH,  
ALVESTO S. HOGUE.

In witness whereof I have hereunto signed my name this 21 day of July, 1906, in the presence of two subscribing witnesses.

RICHARD KNOLLER.

#### Witnesses:

MARCEL ARMENGAUD, Jeune,  
HANSON C. COXE.