No. 743,764 PATENTED NOV. 10, 1903.

J. S. SHERMAN & G. H. HARMS.

HYDROCARBON BURNER.

APPLICATION FILED OCT. 11, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

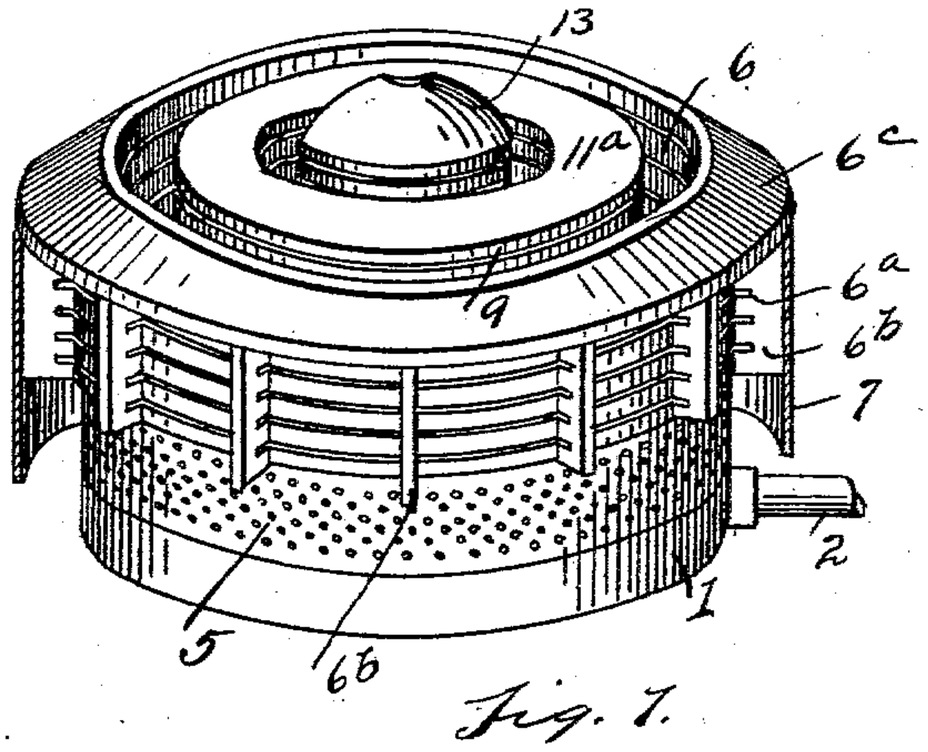

Fig. 1.

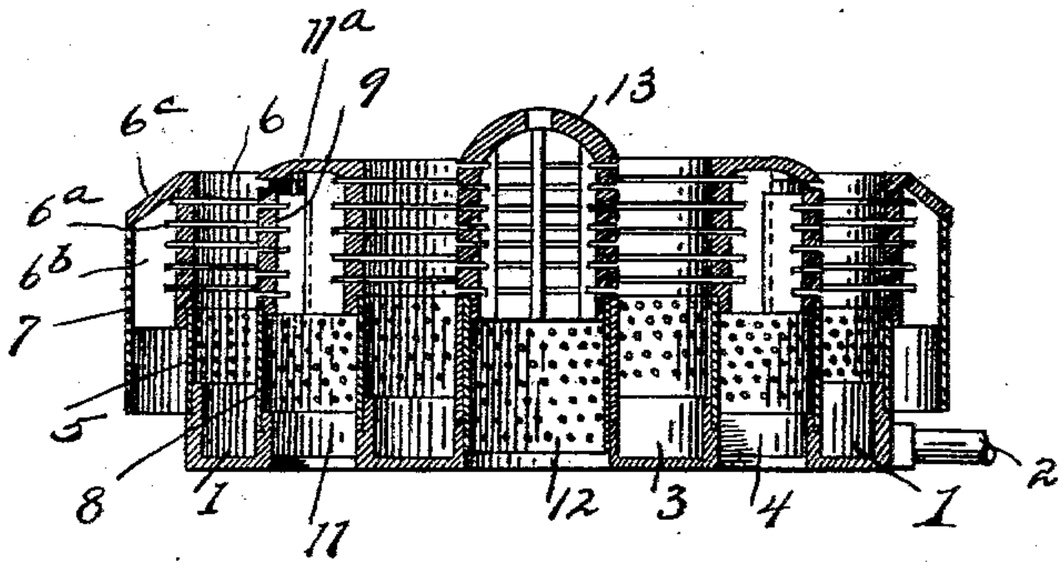

Fig. 2.

WITNESSES

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NO MODEL. 2 SHEETS—SHEET 2.

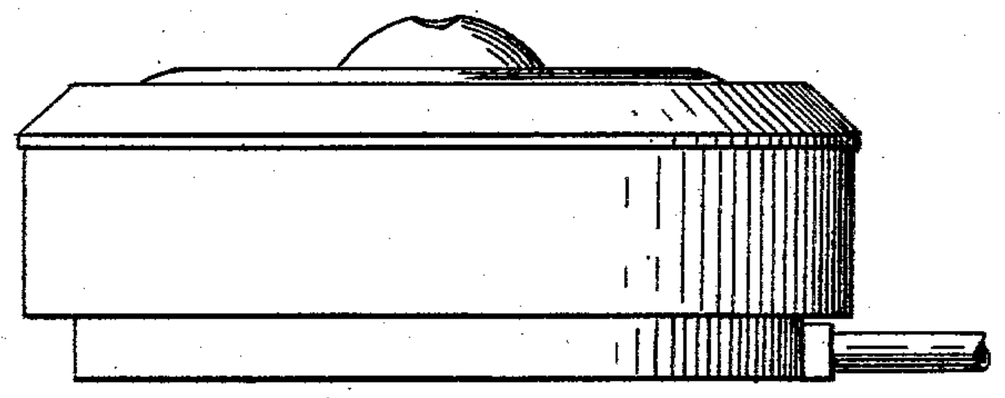

Fig. 3.

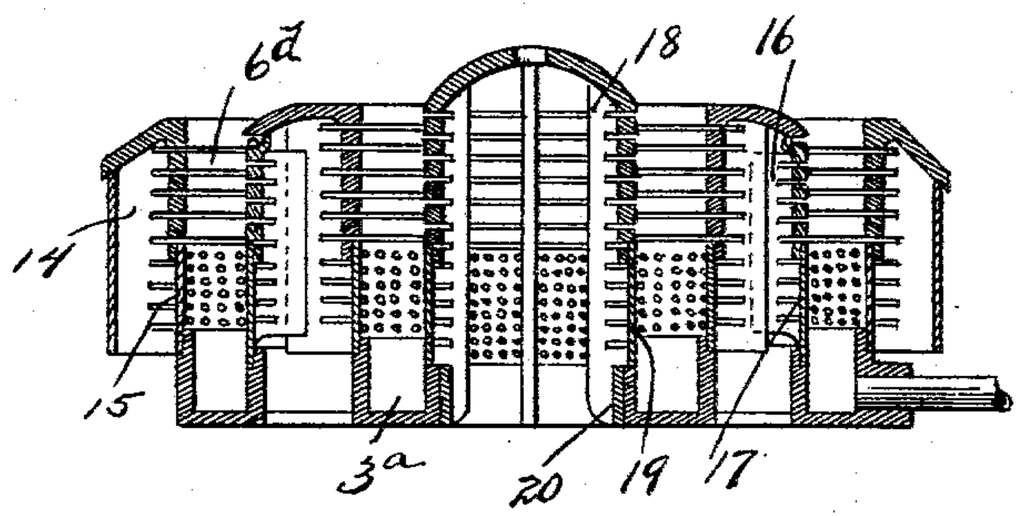

Fig. 4.

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UNITED STATES PATENT OFFICE.

JOHN S. SHERMAN AND GEORGE H. HARMS, OF DETROIT, MICHIGAN.

HYDROCARBON-BURNER.

SPECIFICATION forming part of Letters Patent No. 743,764, dated November 10, 1903.

Application filed October 11, 1902. Serial No. 126,836. (No model.)

To all whom it may concern:

Be it known that we, JOHN S. SHERMAN and GEORGE H. HARMS, citizens of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Hydrocarbon-Burners; and we declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to hydrocarbon-burners, and has for its object an improved burner in which the initial lighting of the burner is facilitated by making the lower part of the burner of a light perforated material, retaining a heavier and stronger metal for the upper part.

The improvement is intended to be employed in that class of burners in which the hyrocarbon fluid is vaporized in an open trough-like receptacle, into which it flows and is vaporized and escapes upward therefrom into a chamber that is bounded on either side by foraminous walls, and in this latter chamber the vapor is mixed with air that flows through the openings of the walls, and it is also heated and burned or partially burned in the chamber, some part of the vapor being therein chemically combined with the oxygen of the inflowing air and some part either partially combined or not yet combined, but mixed with oxygen, rises above the chamber, and the chemical action takes place in the open air above the chamber spoken of. In this class of burners the upper part of the burner is heated to a very high temperature. The burner-walls are usually from two and one-half to three inches high. The chamber is spaced to proper size to produce proper combustion. At the lower part of the chamber is the trough, which is usually from three-eighths to one-half inch deep and about the same distance across. From the top of the trough-walls to the top of the foraminous walls that bound the combustion-chamber there are numerous openings through the walls, which may be either round perforations or long saw-kerfs or slits regulated to admit a proper amount of air to produce the most efficient and successful combustion, and the regulation of the slots depends on the height of the walls, distance across the chamber, and to some extent the thickness of the walls through which the holes or slits are cut. At the bottom of the foraminous walls and for about half the distance up the gases are rich in hydrocarbon and not rich in oxygen, and while there is combustion the combustion is not of a character to produce a high heating effect on the walls. The heating effect, however, increases toward the top of the walls and becomes very intense at the top and between the top and about the middle point between the top and the bottom. The intense heat at this part of the burner expands the metal greatly, so greatly that it does not contract fully on cooling and in the course of time produces a permanent swelling at the top of the burner, which so enlarges the chamber that it detracts from the perfect action of the burner, and we have found experimentally that a light metal warps, expands, and sets more quickly than a heavier or thicker metal, and we have therefore found that it was desirable to use a comparatively heavy casting, for the top of the burner at least, in order that the life of the burner may be prolonged and that it may continue to produce good results for a long period of time. On the other hand, the heavy metal is cold, heats slowly, and because it is cold and becomes hot slowly it detracts from the perfect combustion or chemical union of the hydrocarbon and oxygen during the starting period of the fire, and where the heavy cast-iron metal is continued to the bottom it will require a longer time before the metal will become heated to such a degree that it will not detract from the perfect action of the burner. The duration of the period of lighting and before the burner comes into perfect action is increased because the bottom part of the burner where the first part of the combustion takes place is the part which heats most slowly.

We have by the invention herein described produced a burner which is made of thin material at the bottom part, and therefore heats more quickly, and which retains the thick casting at the upper part, and therefore retains the characteristics which give the burner durability.

In the drawings, Figure 1 is a perspective showing the entire burner and having the outer jacket cut away to show the lower foraminous part of the thin metal and the upper foraminous part of the thick metal as it appears in the outer wall of what is known as a "two-ring" burner. Fig. 2 is a vertical cross-section of the burner shown in Fig. 1. Fig. 3 is a side elevation of the complete burner. Fig. 4 is a vertical cross-section of a burner having some structural differences from the burner shown in Fig. 2.

The burner selected for description is what is known as a "two-ring" burner—that is, it contains two vaporizing-troughs, each of them annular, and the two are arranged concentric. The outer trough 1 receives the fluid hydrocarbon from any suitable source of supply through a feed-pipe 2. The inner annular trough 3 receives its supply of hydrocarbon generally in the form of vapor that has been produced in the outer trough through a covered passage 4, that forms a communicating channel between the troughs 1 and 3. The outside of the trough 1 is continued upward with a band of foraminous metal 5 of comparatively thin sheet metal filled with small round perforations. The thin band of metal 5 continues upward for approximately half the distance it is desired to carry the walls of the combustion-chamber 6, and the wall above the foraminous band 5 is continued with a band of heavier material, generally and preferably cast metal, cut into rings by sawkerfs 6^a and the rings held together by ribs 6^b, that extend vertically. The outer wall, composed, as described, the lower part of foraminous thin metal and the upper part of foraminous heavier metal, is shielded by an imperforate ring of metal 7, that drops as a surrounding band or apron from a flange 6^c, that extends outward from the upper edge of the wall. The inside wall of the trough 1 is extended upward by a foraminous wall 8, of thin metal, that rises to a height about equal to that to which the wall 5 rises, and above this the wall is continued, but is made from heavier and preferably cast metal 9. These two walls form the outer and inner walls of the combustion-chamber 6 and all that are essential to make a complete burner. For practical burners, however, it is desirable to have a larger heating-flame in the burner, and this is produced by adding other combustion-chambers, and generally there are two combustion-chambers, the one already described and the one over the trough 3, the walls of which are similar in every respect to the walls of the combustion-chamber 6, already described.

Where two combustion-chambers are employed, the outer wall of the inner combustion-chamber and the inner wall of the outer combustion-chamber are spaced and air is admitted to the chamber between them, (the chamber 11 in Fig. 2,) and this air is prevented from escaping directly upward by a cover-plate 11^a, which is sometimes made integral, as shown in the drawings, and sometimes made as a separate and removable piece.

The inner wall of the inner combustion-chamber is generally and preferably made as a hollow cylinder with an opening 12 to permit access of air into the chamber from the bottom, and generally and preferably there is a small opening through the top wall 13. This, however, is not a part of the present invention, and for the purpose of this invention it is immaterial whether such opening be used or not.

The construction shown in Fig. 4 is structurally different from that shown in Fig. 2 in that the ribs 14, that hold the cast rings of the outer wall, are continued downward and form a support for the band 15 of the lighter perforated material. In this construction the entire wall at the outside of the chamber 6^d can be lifted as one connected piece, whereas in the construction shown in Fig. 2 the two parts of the wall are separable, and the upper part simply rests on the lower part. In the construction shown in Fig. 4 the two parts may be separable, but generally remain connected together. The inner wall of the combustion-chamber 6^d is formed with an upper part of cast metal, the rings of which are connected by ribs 16, and these ribs are continued downward and form supports for the underlying ring 17 of thin perforated metal. The inner wall of the inner combustion-chamber is formed of an overlying part consisting of rings of cast metal held together by ribs 18, that extend downward and form supports for the underlying ring 19 of thin perforated metal and extend still farther downward to form the support for a band 20, that engages inside the inner wall of the trough 3^a.

What we claim is—

1. In a hydrocarbon-burner of the class specified, the combination of a generating-trough, and a combustion-chamber thereabove, said combustion-chamber being formed by a band of foraminous thin metal forming the lower part of the wall thereof, and foraminous heavier metal forming the upper part thereof, substantially as described.

2. In the combustion-wall of a hydrocarbon-burner of the class specified, the combination of a band of perforated thin metal forming the lower part of said wall, a plurality of rings of heavier metal forming the upper part of said wall, means for holding the rings of heavier metal together, substantially as described.

3. In the wall of the combustion-chamber of a hydrocarbon-burner of the class specified, the combination of a band of thin perforate metal forming the lower part of said wall, rings of heavier metal forming the upper part of said wall, means for holding the rings together and for holding the rings to the band of perforate metal, substantially as described.

4. In a hydrocarbon-burner of the class specified, the combination of an outer wall to the combustion-chamber formed of thin perforate metal at its lower part and heavy metal at its upper part with provision made for the admission of air through said parts, and an inner wall formed of like thin metal at its lower part and of like heavy metal at its upper part with provision made for the passage of air through both the lower and upper part, substantially as described.

In testimony whereof we sign this specification in the presence of two witnesses.

JOHN S. SHERMAN.
GEORGE H. HARMS.

Witnesses:
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MAY E. KOTT.