G. A. WIEDE.

SAFETY LAMP.

APPLICATION FILED DEC. 13, 1910.

1,011,543.

Patented Dec. 12, 1911.

2 SHEETS—SHEET 1.

Fig. 2.

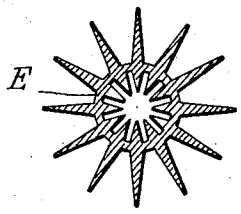

Fig. 1.

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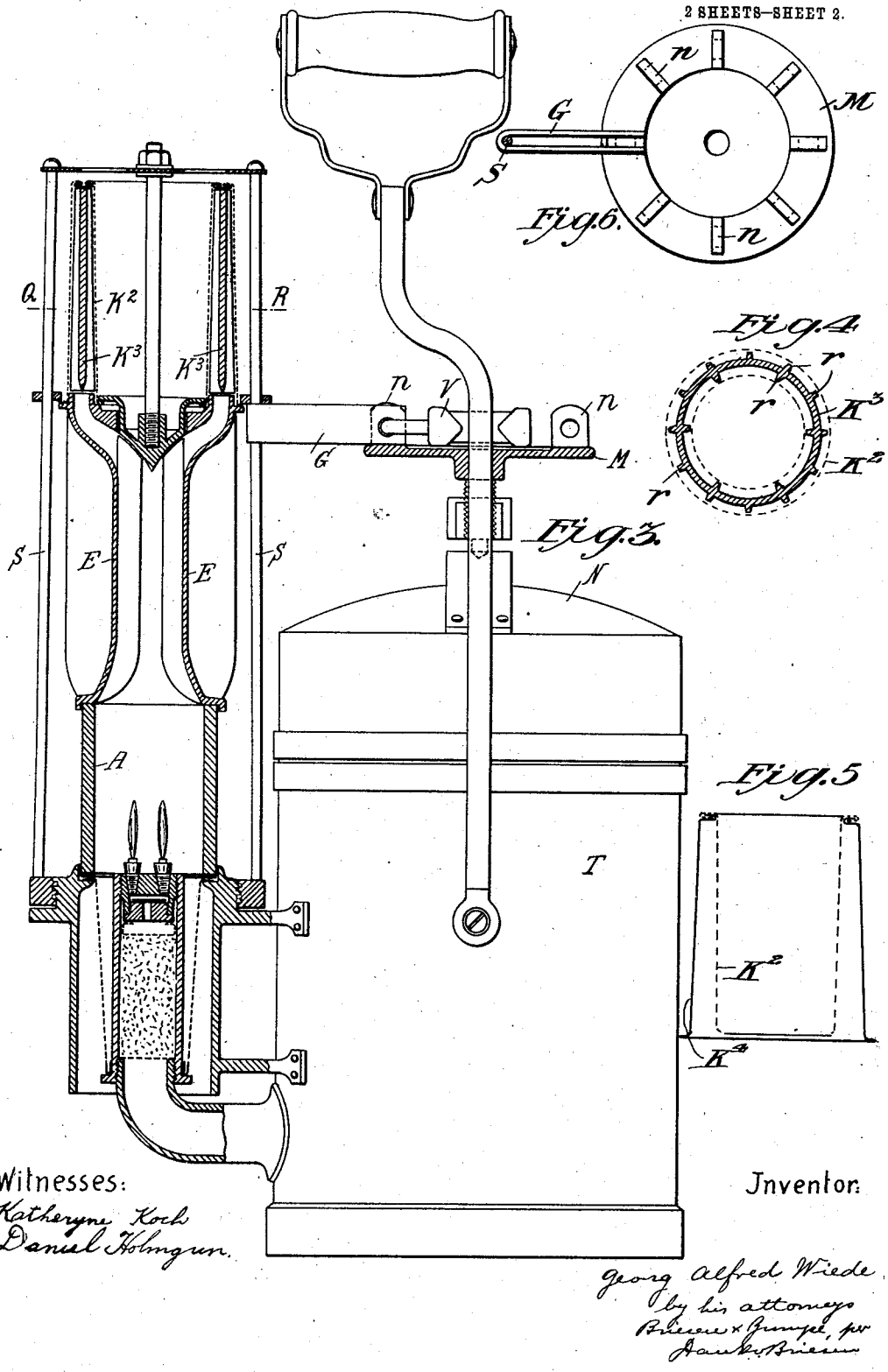

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UNITED STATES PATENT OFFICE.

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SAFETY-LAMP.

1,011,543. Specification of Letters Patent. Patented Dec. 12, 1911.

Application filed December 13, 1910. Serial No. 597,119.

To all whom it may concern:

Be it known that I, GEORG ALFRED WIEDE, a subject of the King of Saxony, residing in Weissenborn, near Zwickau, Saxony, German Empire, have invented new and useful Improvements in and Relating to Safety-Lamps, of which the following is a specification.

The safety lamps heretofore generally employed still substantially follow the known form of the Davy lamp. The tendency which is constantly becoming more pronounced to increase the illuminating power of safety lamps is, however, met with considerable difficulties with the usual construction of the Davy wire basket. Large flames raise the wire basket to a great heat and consequently give rise to considerable danger of the penetration of the flames through the gauze of the lamp, so that it is necessary to make the basket of considerably larger size. This, however, results in another defect as, owing to the larger internal area of the lamp, if mixtures of gas become ignited in the lamp, the explosive force of the gases and the heat act relatively more strongly upon a unit area of the wire gauze than in smaller lamps, so that the passage of the flame is facilitated. This is particularly the case in safety lamps in which acetylene gas is the illuminant and lamps which are adapted for self-ignition in which, when the lamp is extinguished, the acetylene enters the lamp chamber and explodes on re-ignition. The higher strains on the wire basket occur because the combustion chamber, that is to say, the volume of the basket and cylinder increases with the square of the diameter, while the surface of the basket increases only in simple proportion to the diameter; consequently in the case of an internal explosion the outward pressure of the gas on each unit of area of the basket is considerably increased.

From what has been stated the following requirements as regards the construction of larger and more powerful safety lamps are arrived at.

Reference will also be had to the accompanying drawing in which Figures 1 and 2 show a lamp embodying my invention, in side elevation and section respectively, the section being taken on the line O—P of Fig. 1. Fig. 3 represents a modified form of construction to which Figs. 4 to 6 show details partly in section, partly in plan view.

Both in the case of lamps supplied with gaseous fuel, such as acetylene, and of lamps with a liquid fuel the glass cylinder A of the safety lamp is made as narrow as possible.

In order that the air may be supplied abundantly from below, the fuel supply pipe B should be prolonged considerably downward thus separating the interior of the cylinder from the lamp body, that is to say from the gas or oil reservoir C in such a manner that a cylindrical or frusto-conical air supply basket K′ suitably dimensioned in proportion to the upper basket can be arranged beneath the flame and the glass cylinder, this lower basket being arranged concentrically around the prolonged gas or wick tube B and protected from injury by a cover D. The arrangement described, which provides for a copious supply of air from below, also renders it possible to employ the Bunsen burner and therefore to resort to incandescent lighting.

In the case of self-lighting lamps the ignition means is carried through the interior of the lower wire basket K′. A gas filter consisting of a plug of cotton wool or the like may be arranged in the interior of the tube B in the usual manner for the purpose of preventing impurities in the acetylene gas from reaching the burners, or a gas purifying device may be provided consisting of a cartridge filled with a porous acetylene purifying mass which will permit of the passage of the gas and which fits closely against the inner wall of the tube.

In order to keep the heat of the flame, and of the gases burning in the interior of the lamp, as far as possible away from the upper wire basket K^2 the protective action of which is reduced by heating, a gas cooler E of a material which is a good conductor of heat is interposed between the glass cylinder A and the upper wire basket K^2, this gas cooler consists of an inner and an outer tube formed with a large number of ribs, its free internal diameter being not larger than necessary for carrying off the gases. If the flame should smoke the gas cooler would catch the soot and thus prevent the upper gauze from becoming sooty. Toward the upper part the cooler widens out to form an annular space F on which the upper wire basket K^2 is arranged. This basket is characterized by the fact that it does not as heretofore constitute a cylinder or truncated cone

but forms an annular basket owing to the fact that two wire cylinders or truncated cones are arranged concentrically one within the other with a small piece separating them, thereby providing a large superficial area with a small internal volume. The internal volume of the cylinder can also be reduced if the outer cylinder is formed of sheet metal and only the inner cylinder of gauze (Fig. 5).

It is a well known fact that the basket of safety lamps rises to an extra strong heat in case the damps containing air passes the lamp with a greater velocity thereby blowing in at one side of the basket and out at the other. The gas contained in this air ignites within the basket with the aureole which continuously burns and increases the heating effect of the same to such an extent that the basket can reach a bright red heat. This possibility is obviated by arranging within the basket K^2 a screen K^3 of annular shape (Figs. 3 and 4), or by making the outer cylinder of the ring basket of sheet iron K^4 and only the inner cylinder of wire gauze, see Fig. 5. The wind screen K^3 within the annular basket K^2 (Figs. 3 and 4) possesses on both sides vertical narrow projecting ribs $r\ r\ r$ which do not prevent the upward draft of the air, and provide for the necessary space between screen K^3 and basket K^2 essential for the escape of the combustion gases, see Fig. 4. This space however should have the smallest dimensions possible as any formation of aureoles causing the wire gauze to glow is impossible within the narrow exit columns. The aureole only develops in a space of certain dimensions, which when limited by cooling walls would cause its extinction. The lateral penetration of agitated air into the basket is also prevented as already stated if the annular basket consists in its outer cylinder of sheet-iron K^4 and only in its inner cylinder of wire gauze, Fig. 5, so that all combustion gases must escape through the inside hollow space of the basket toward the top and air cannot penetrate laterally from the outside. The outer sheet iron cylinder K^4 of the annular basket K^2 also effects an increased buoyancy of the air in the lamp, because it operates as a chimney elongation.

Safety lamps must be locked so as to hinder the unauthorized opening of the space containing the flame. This lock can be combined with the lock screw of the acetylene generating vessel which likewise dare not be opened without authority.

The hand wheel M Figs. 3 and 6 whose threaded spindle presses cover N against the acetylene generator T is provided with 8 to 10 upward projecting perforated lugs n, n. When the hand wheel M has been turned, a band G (Figs. 3 and 6) bent in form of a fork and perforated at its open end, is placed over that lug of the hand wheel which occupies the suitable position, the said band G holding the rod S of the lamp frame in its closed end. Hereupon a hanging safety lock V is fastened through the perforation on the lug n of the hand wheel M and of the locking band G.

I claim:

1. In a safety lamp, a burner, a chimney surrounding the same, a gas cooler communicating with the chimney, and an annular perforate basket communicating with said cooler.

2. In a safety lamp, a burner, a chimney surrounding the same, a gas cooler communicating with the chimney, and an annular basket communicating with the cooler, and having a perforate wall and a concentric imperforate wall.

3. In a safety lamp, a burner, a chimney surrounding the same, a gas cooler communicating with the chimney and having an annular exit port, and an annular perforate basket communicating with said port.

4. In a safety lamp, a burner, a chimney surrounding the same, a gas cooler communicating with the chimney and having an annular exit port, and an annular basket composed of a perforate wall and a concentric imperforate wall, the space between said walls communicating with the exit port.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

GEORG ALFRED WIEDE. [L. S.]

Witnesses:
WM. WASHINGTON BRUNSWICK,
MAX F. BENNDORF.