(No Model.)

W. KOCHS & M. WOLZ.

REFRACTING LENS.

No. 421,585. Patented Feb. 18, 1890.

Fig. 1.

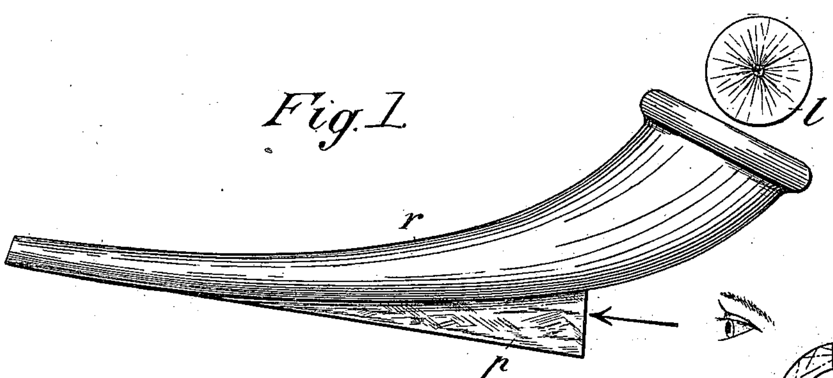


Fig. 3.

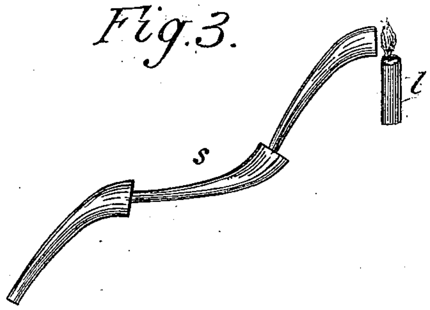
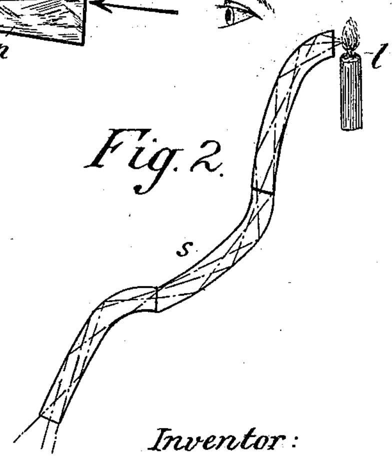


Fig. 2.



Witnesses:

[signature]

[signature]

Inventor:

Wilhelm Kochs and Max Wolz

by

[signature]

attorneys

UNITED STATES PATENT OFFICE.

WILHELM KOCHS AND MAX WOLZ, OF BONN-ON-THE-RHINE, PRUSSIA, GERMANY.

REFRACTING-LENS.

SPECIFICATION forming part of Letters Patent No. 421,585, dated February 18, 1890.

Application filed December 12, 1888. Serial No. 293,394. (No model.) Patented in Germany July 29, 1887, No. 42,818.

To all whom it may concern:

Be it known that we, WILHELM KOCHS and MAX WOLZ, both subjects of the King of Prussia, and residents of Bonn-on-the-Rhine, in the Kingdom of Prussia, German Empire, have invented certain new and useful Improvements in Lenses, which will be fully described in the following specification and accompanying drawings, which form part of this present application, (and for which we have obtained a patent in Germany, No. 42,818, dated July 29, 1887,) of which the following is a specification.

Our invention relates to the manufacture of lenses for collecting the rays of light from a lamp or other illuminating body and refracting the same downward or in any desired direction.

It is well known that rays of light entering a glass body do not pass out of it in the same straight line or plane in which they entered it, but are refracted from the plane of entrance. The greater the angle at which the rays enter the glass body the more they are refracted from the straight, and if the glass body be made of a certain form the rays do not leave it at all, but are refracted from side to side. We have taken advantage of this physical law to collect the rays from an illuminating body and refract them to any desired spot.

Our improved lens is for use as a laryngoscope or opthalmoscope, and compares very favorably with other instruments for the same purpose, as it refracts the light evenly to the desired spot, while most others throw shaddows, causing much inconvenience and often making a clear view of the part in question impossible.

In order to make our invention more clear, we refer to the accompanying drawings, in which similar letters denote similar parts throughout the various figures.

Figure 1 is a side view of our improved lens. Figs. 2 and 3 show a combination of the lenses.

The lens consists of the round glass body *r*, tapering toward its one end and slightly curved, as shown in Fig. 1. It is, however, not necessary that the same should taper, as it may be made in the form shown in Fig. 2. The lens is provided with an eye-piece *p*. By placing a number of such lenses together, as shown in Figs. 2 and 3, the light may be conducted, as through a hose, to any desired point which cannot be lighted directly. We can also make the lenses of the form described, but straight instead of curved.

Having thus fully described our invention, what we claim, and desire to secure by Letters Patent of the United States, is—

1. A refracting-lens consisting of a round glass body, curved in the manner described.

2. A refracting-lens consisting of a round glass body, tapering at one end and slightly curved, in the manner described.

3. A refracting-lens consisting of a round glass body, curved in the manner shown, and provided with an eye-piece *p*, as specified and shown.

4. A refracting-lens consisting of a round glass body, tapering at one end, slightly curved, and provided with an eye-piece *p*, as described and shown.

In witness whereof we have hereunto set our hands in presence of two witnesses.

WILHELM KOCHS.
MAX WOLZ.

Witnesses:
GUSTAVE ALBERT OELRICHS,
GEO. MELFERT.