

With this huge photographic apparatus the lining of flooded mine shafts will be thoroughly explored. The photographs will be pieced together and examined minutely for any signs of German treachery. If any traps are located or any suspicious objects discovered they will be blown up. The exact location and character of breaks will be determined.

We are indebted to the *Illustrated London News* (June 26, 1920) for the accompanying illustrations and for the details of the description given above.

AMMONIA LEAKS IN REFRIGERATING PLANTS

By B. E. HILL

TESTING for ammonia leaks is an important part of an engineer's duty. There are two principal places to test, one being in a submerged tank, where, if there is a leak in the coils, water cooler or any liquid, the ammonia will be absorbed. If the liquid is of great volume there will be a considerable quantity of ammonia taken up before the engineer or attendant can detect the odor.

To test the brine or other liquid for a leak, get a sample of brine in a drinking glass and put in a drop or two of the phenolphthalein. If there is the least trace of ammonia, the phenolphthalein will cause the brine sample to turn a faint pink, and if there is enough ammonia to be detected slightly by smell, the sample will turn a deep red.

The next test is for leaks in the open air, and as the sulphur stick is the most popular, effective and practical, we will consider where it can be used and where not.

To prepare the sulphur stick melt five or ten pounds of either powdered or lump sulphur in a

ladle with a very slow fire. A slow fire is necessary as the sulphur fires at a low temperature and, if too hot, will become lumpy and thick and will run off and drip, when used. When the sulphur is at the right temperature it will be thin like water. Now the sticks should be prepared by splitting up a hundred or so pine strips, cardboard or other material and dipping both ends in the sulphur, which quickly cools; the sticks are now ready for use. To apply the sticks, take a handful and light one, and before one burns out another can be lighted from the one in use.

Any coil that has just been erected or overhauled should first be tested with air pressure, after which the joints should be brushed with soapy water. After all leaks found in this way have been stopped, pump out the air until the vacuum gage shows as high a vacuum as can be had. If it is found that the air is still discharging through the discharge bypass,

keep on pumping till the air is hardly perceptible. This extra precaution is taken to make sure that the air is as nearly all out as can be pumped with the machine; also, there is always a chance that the vacuum gage may not be correct.

After the air has been pumped out the ammonia should be charged into the coil at once and the final test made with the burning sulphur held under and over all joints and connections. If there is a leak at all, it will be shown by a gray smoke wherever the sulphur and ammonia fumes come together. The sulphur fumes are as effective in showing a leak in the open air as the phenolphthalein is for showing one in the brine tank; as, for example, where there is a leak in a thread or joint that is so small that it will not be noticed with the soap bubbles and is difficult to detect by smell after the leak is found, the sulphur will mark the leak by leaving a small yellowish white spot, even though the leak is no larger than a pin point.

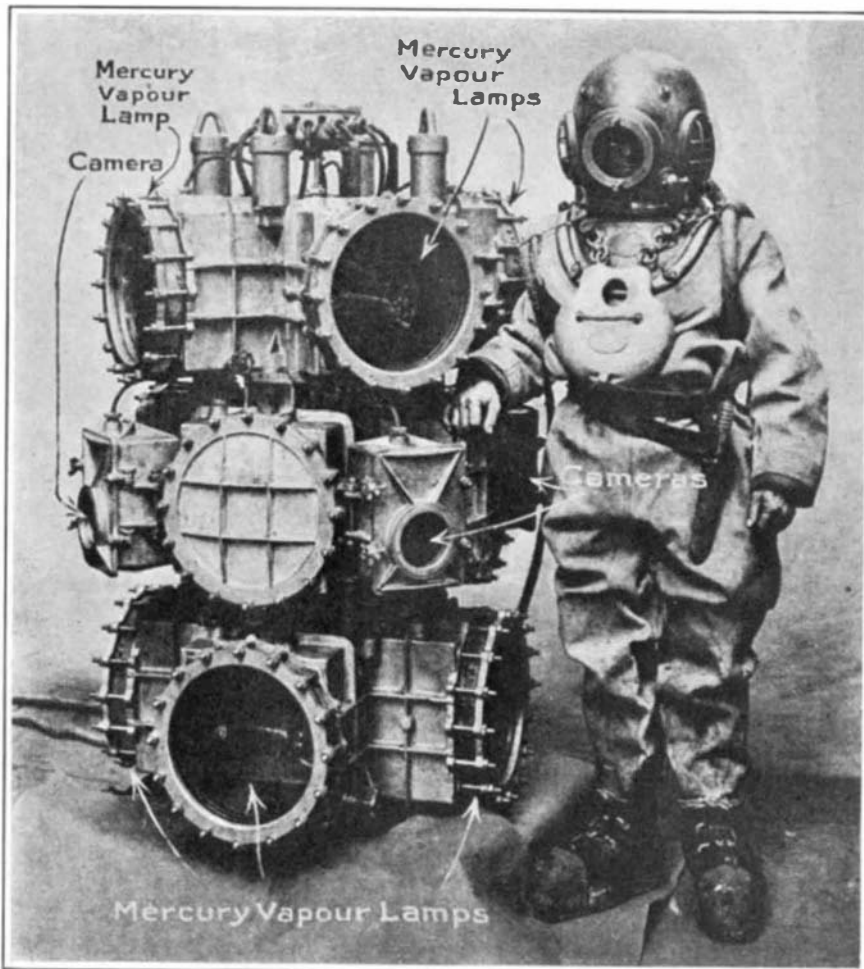
Leaks on return bends of atmospheric condensers, where the condensing water is flowing over the part that is leaking, will cause the solids in the water to accumulate to a considerable extent, which deposit will be of a whitish color. Leaks in water jackets on the compressor, if of any extent, will clarify the water, and if the fingers are dipped in it and rubbed together they will feel soapy. In this case the leak can easily be detected by smell.

In a room where the timbers or building materials of any kind are damp from moisture, the sulphur stick is almost useless, as the moisture will take up the ammonia gas and the sulphur will sometimes "smoke up" the whole room and show smoke on a post or the wall where there is no leak. In such cases it is sometimes necessary to

pump the coil down to about atmosphere on the gage and open the room so that a circulation of air will drive the ammonia out of the room before the leak can be found.—Reprinted from *Power*, June 15, 1920.

MINING IN GERMAN SOUTH-WEST AFRICA

COPPER ranks next to diamonds in the minerals of the Protectorate of South-West Africa, and, unlike diamonds, it seems to be establishing itself as an increasingly productive industry. The chief deposits are in the dolomite rocks of the Otavi district, which is connected with Swakopmund by rail. About a quarter of the line is of Cape gage, the remainder of a 2-foot gage. Other copper areas are Khan and Ida in the Swakopmund, and Sinclair in the Luduitzbucht districts. In 1913 the exports of copper and copper ore were valued at £396,000.—*Indian Engineering*, April 3, 1920.



SUBAQUEOUS PHOTOGRAPHING APPARATUS BUILT FOR EXPLORING THE COAL MINES OF THE LENS DISTRICT