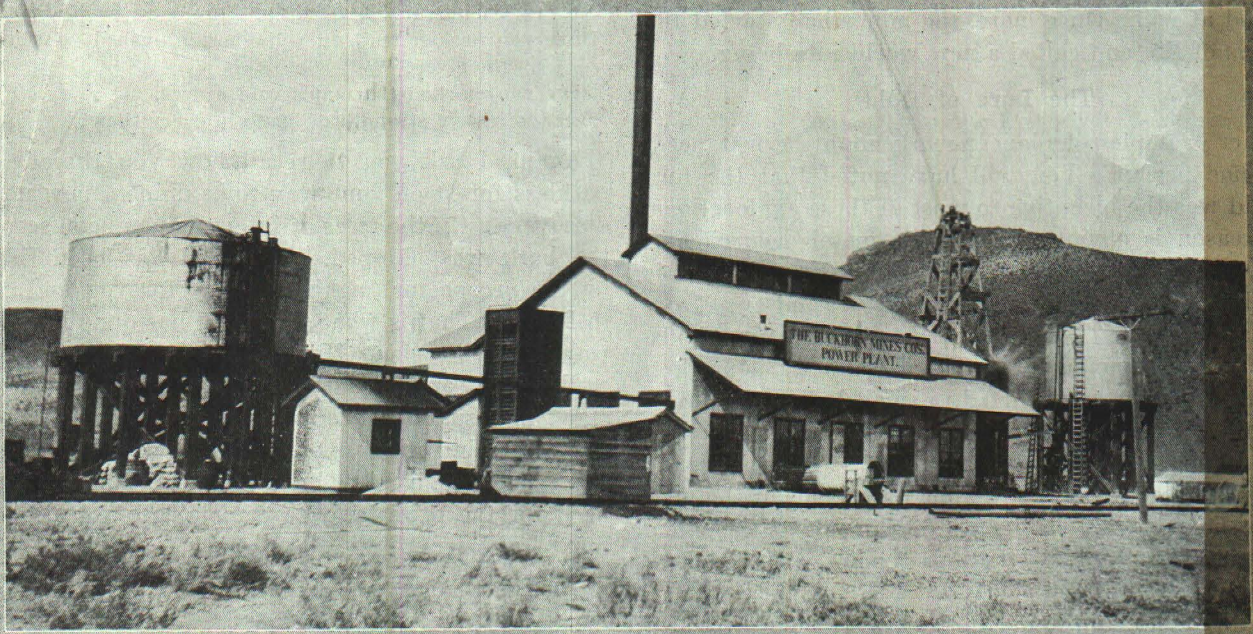


The Buckhorn Mines Company's Power Plant

By E. H. Leslie

While the use of the locomobile type prime mover is by no means an innovation in steam power-plant engineering, having for many years been in successful operation in European countries, and Germany in particular, its advent in this country is marked with the initial installation at Beowawe, Nevada. Here two 350-hp. units are in successful operation supplying power for the Buckhorn mines and mill, the electric power generated at Beowawe being transmitted a distance of 35 miles to Buckhorn.

This type of engine, as will be seen from the illustrations, bears more semblance to a modern traction engine, which has been inverted and remodeled for stationary power purposes, than any of the standard types of American steam-engines. The surname of this type of engine, 'locomobile,' suggests its progenitor, and in fact it is an adoption of locomotive type power-plants to stationary requirements. The two Buckhorn units have a capacity of 350 hp. each. The engines are compound, the high-pressure cylinder being 11¾ in. diameter, and the low 23 in., with a 20-in. stroke, and are operated condensing.

The boiler plant upon which the engine is superimposed presents many interesting features. The boiler tubes are mounted as shown in Fig. 1, and are easily removed from the shell of the boiler and another inserted if occasion demands. The illustration shows a set of tubes which have been removed, and furnishes an idea as to the boiler construction. In the operation of the plant, the engine has been 'shut-down,' the boiler replaced, and the engine again under steam in ten hours. While this record is itself a good one, a still better record will be possible under present operating conditions, which provide for having a spare boiler readily accessible. Since the beginning of operations it has been necessary to replace one boiler. This is attributed to the fact that the boiler was used for sinking a well before the power-plant was put into commission, and in so doing it was necessary to use a boiler water which was extremely alkaline and also contained considerable oil from the pumps. Since the removal of this boiler, no further troubles have been experienced. It is hoped that a permanent supply of pure artesian water for boiler purposes will soon be obtained.

The Fire Box

The fire-box end of a unit is shown in Fig. 2. At this plant California crude oil is used for fuel, and is fed in by two injectors. The fuel oil is delivered at the plant in standard tank cars and discharged into a steel sump tank of 8000 gal. capacity, and from which it is pumped by means of a duplex 6 by 4 by 6 Platt Iron Works oil-pump to the storage tank. The storage tank is of corrugated iron and has a capacity of 50,400 gal. (5 carloads). The oil is heavy California petroleum of 16°B. In cold weather it is often necessary to heat the oil before it can be pumped. From the storage tank the oil flows by gravity to a small feed tank on the inside of the building from which it flows to the burners. There are two nozzle-injector burners for each unit. Oil and steam are admitted through the nozzle. The steam, being under a high pressure, atomizes the oil and acts as an injector in drawing the oil from the fuel tank, heating, atomizing, and injecting it into the furnace. With the exception of the pump for raising the oil from the sump to the storage tank, the handling of the fuel oil is by gravity. Under present working conditions, the two units require about 1550 gal. of fuel oil per day, or about 1 lb. of oil per brake horse-power hour. While the engines have a capacity of 350 hp. each, under present working conditions the load is about 550 b-hp., or 275 b-hp. on each unit. With an increased load there would undoubtedly be a better fuel economy and increased thermal efficiency. The present fuel oil consumption, however, is by no means excessive, and compares most favorably with the oil-fired boiler and steam-engine combination in general use.

Engine Pumps

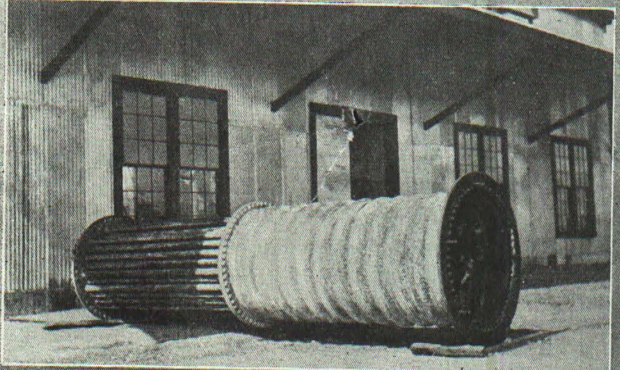
The boiler feed water pump and condenser pump are in tandem and on the same drive at the side of the boiler, and are driven by a belt which is connected with the main engine and generator shaft. The pumping device is most efficient, and the vacuum is kept at about 75 cm. An injector is held in reserve for boiler feed and is shown on the left of the boiler in Fig. 2. The boiler feed water heater is also shown in the same illustration. The exhaust steam from the low-pressure cylinder is drawn by the vacuum pump through the feed water heater, in which are the feed water coils from the feed water pump and connecting with the boiler.

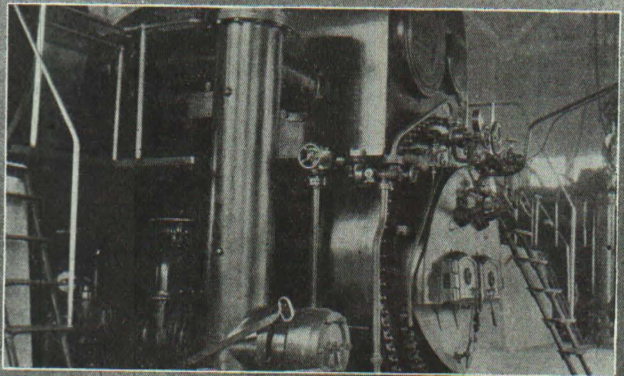
The steam as generated passes to the steam dome and from thence to the super-heater, which is seen in Fig. 3 as the extension of the boiler proper. The steam from the dome enters at the rear of the super-heater and passes through a system of coils, which are given a super-heat by excess furnace gases. The steam then is conducted through an insulated pipe, shown in Fig. 3 from the super-heater to the engine proper.

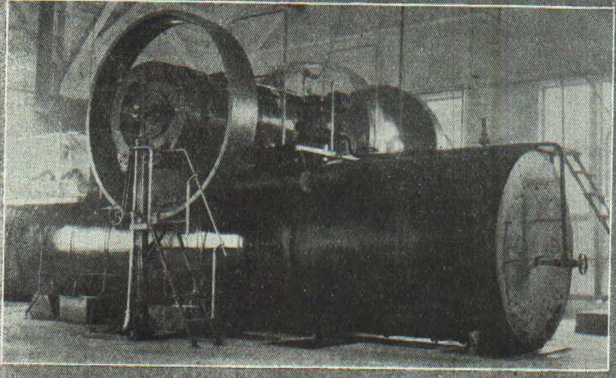
The smoke and burned gases pass from the super-heaters through a brick-lined conduit under the engine-room floor to the stack, which is of steel and 160 ft. high. A damper for regulating the draft is placed in the brick conduit and turned by a key in the floor of the engine-room.

The steam as delivered at the high-pressure cylinder has a temperature of 720°F. In the design of this type of power-plant, every effort is made to maintain high temperatures, and toward this end super-heat, compactness of design, and thorough insulation have tended toward higher thermal efficiencies than those shown in the average boiler and steam-engine combinations. While as yet no indicator cards have been taken, and it is impossible to know either the mechanical or thermal efficiency of the plant, the load and fuel consumption are evidence of a satisfactory performance in this respect.

For synchronizing the two units of the plant a retarding device is placed on each unit, by which the







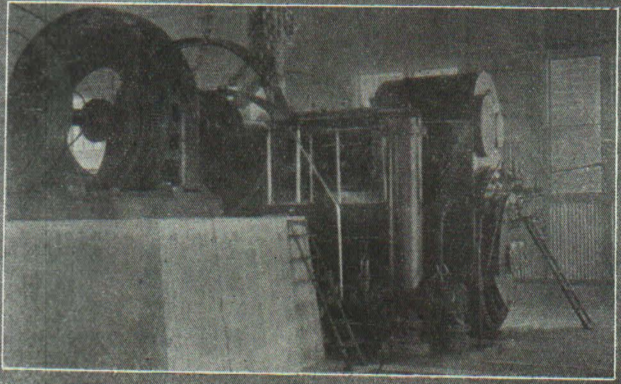


FIG. 1. BOILER TUBES.
FIG. 3. SUPER-HEATER AND SYNCHRONIZING MECHANISM.

FIG. 2. FIRE-BOX END OF ENGINE.
FIG. 4. GENERATOR.

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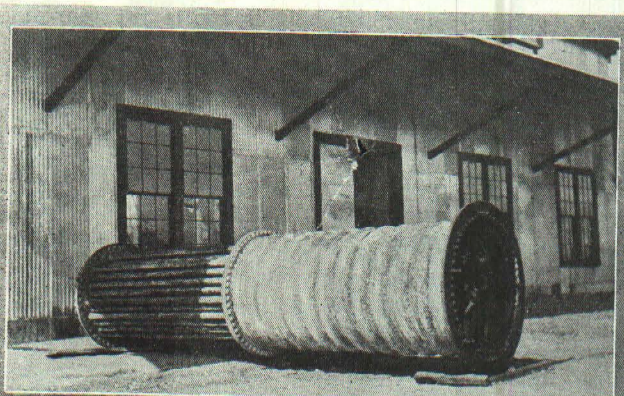
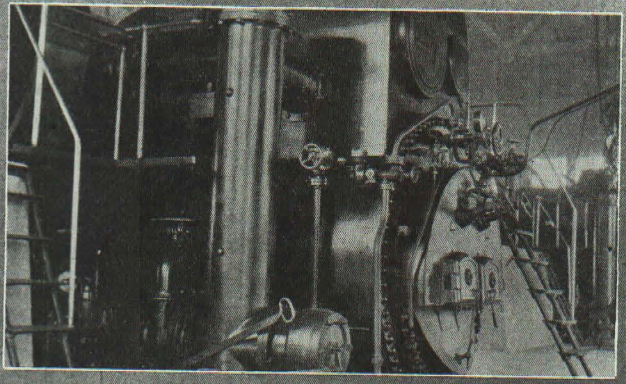
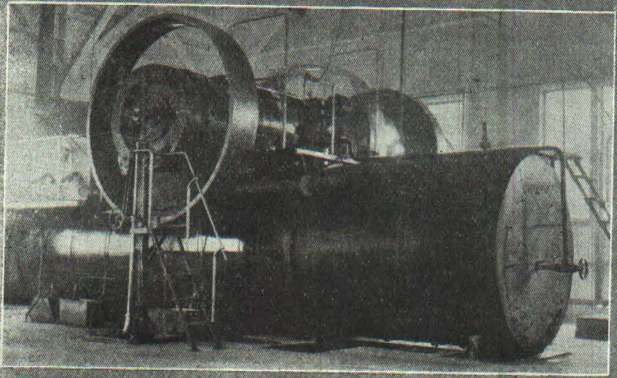
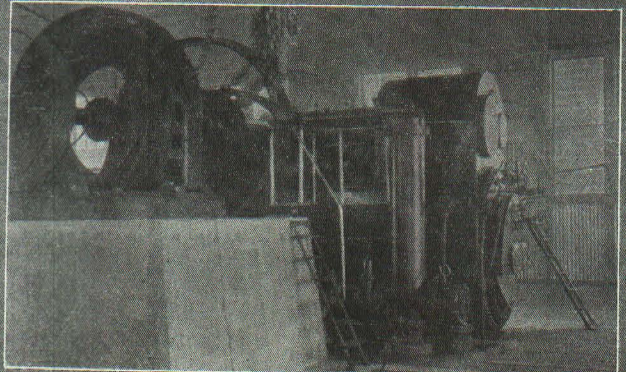

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