No. 751,798. PATENTED FEB. 9, 1904.

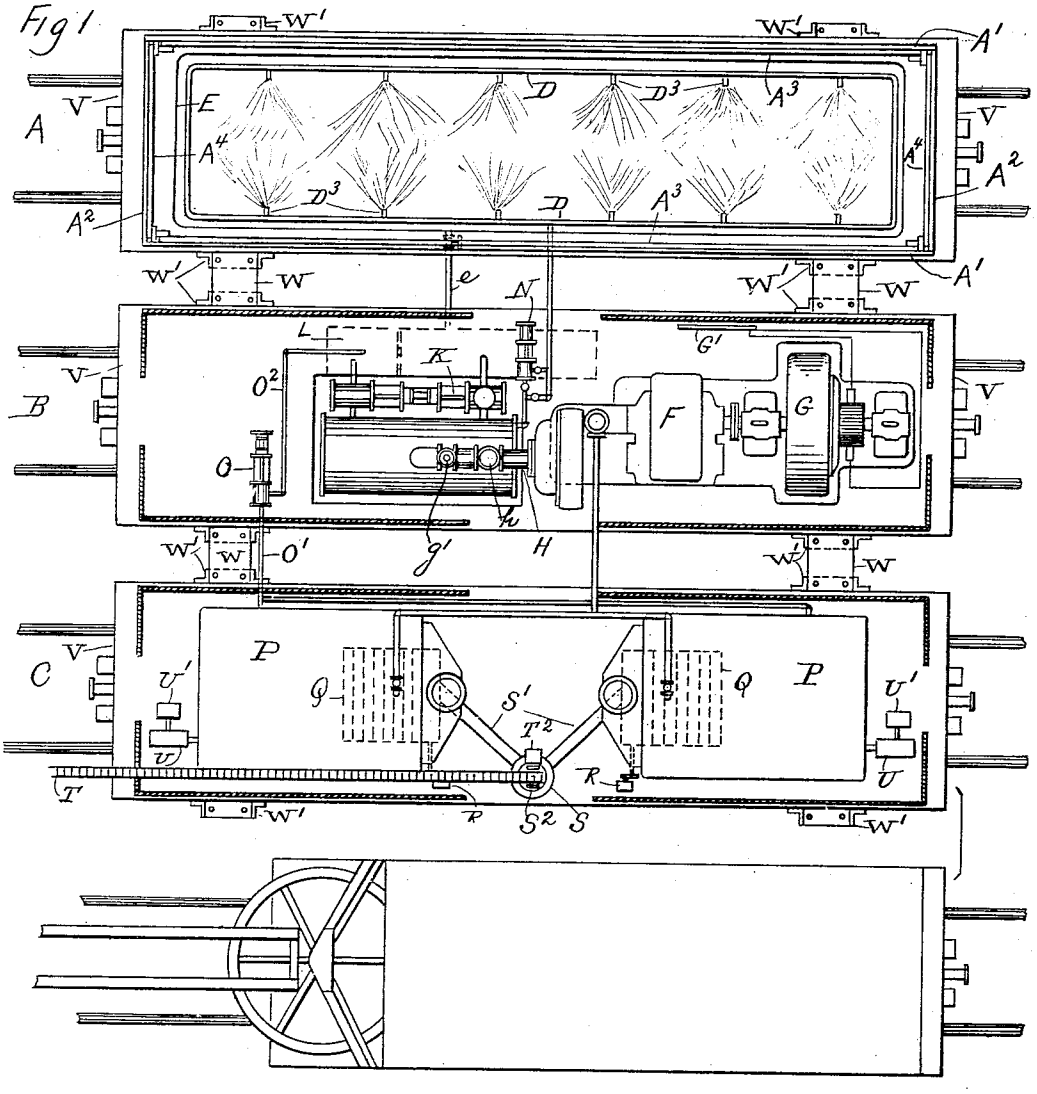
C. A. LIEB.

PORTABLE POWER PLANT.

APPLICATION FILED JULY 1, 1902.

NO MODEL. 3 SHEETS—SHEET 1.

Fig 1



Witnesses
M. Hubbe
W E de Bonneville

Inventor
Charles A. Lieb
By his Attorney
A E de Bonneville

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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NO MODEL. 3 SHEETS—SHEET 2.

Fig 2

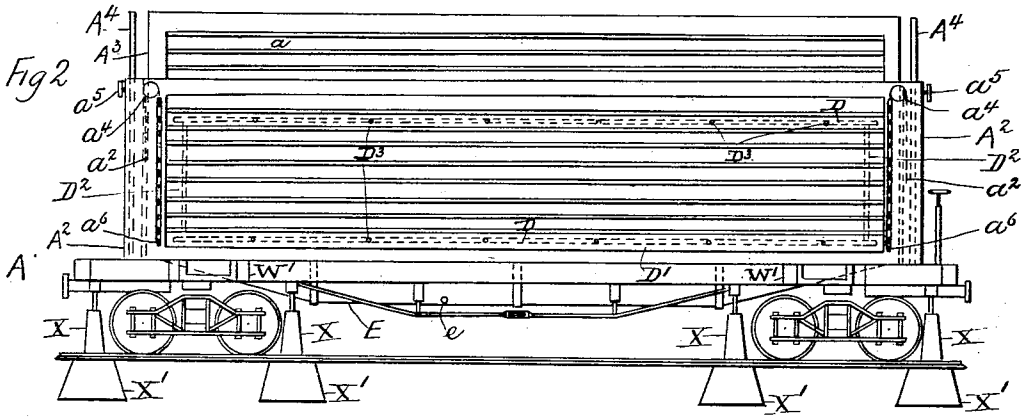


Fig 3

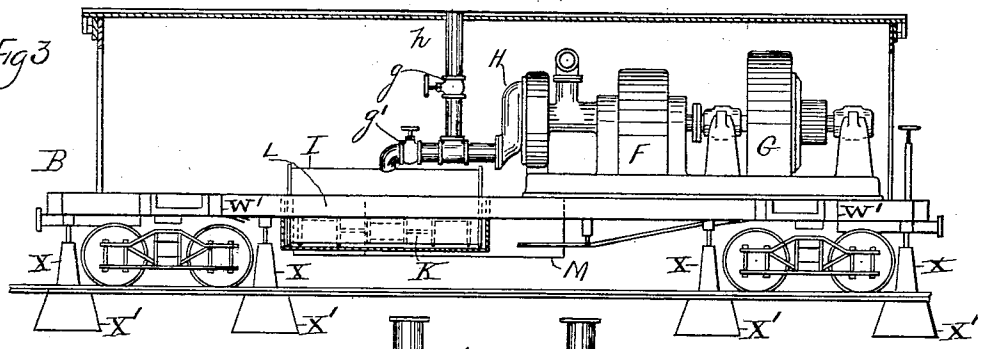
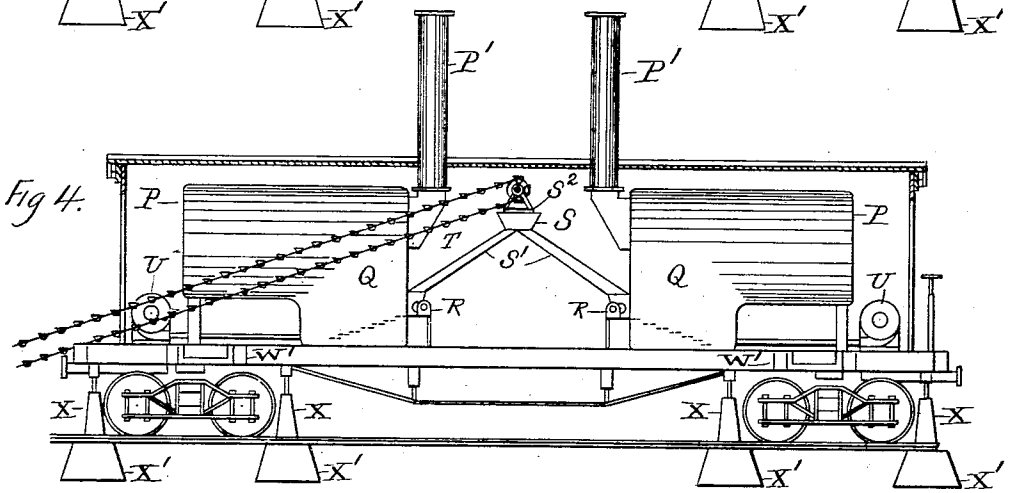


Fig 4.



Witnesses
M. Hubbe
W E de Bonneville

Inventor
Charles A. Lieb.
By his Attorney
Adde Bonneville

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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C. A. LIEB.

PORTABLE POWER PLANT.

APPLICATION FILED JULY 1, 1902.

NO MODEL. 3 SHEETS—SHEET 3.

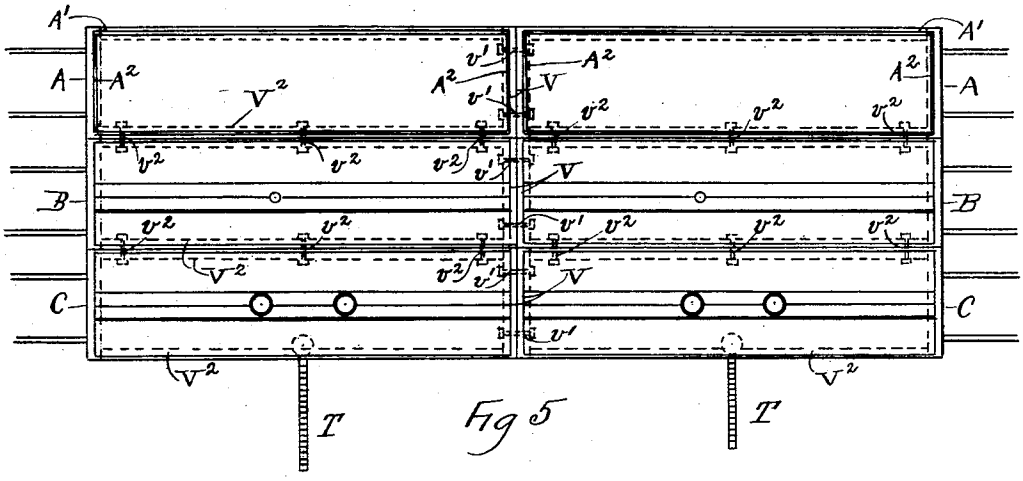


Fig 5

Fig 6

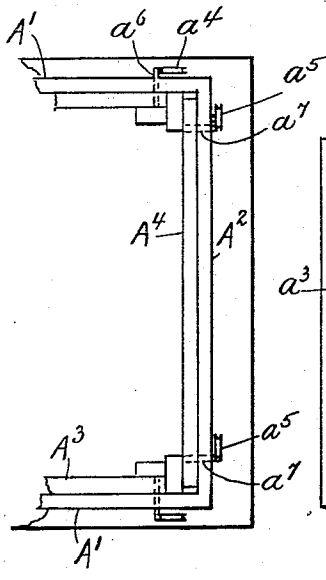


Fig 7

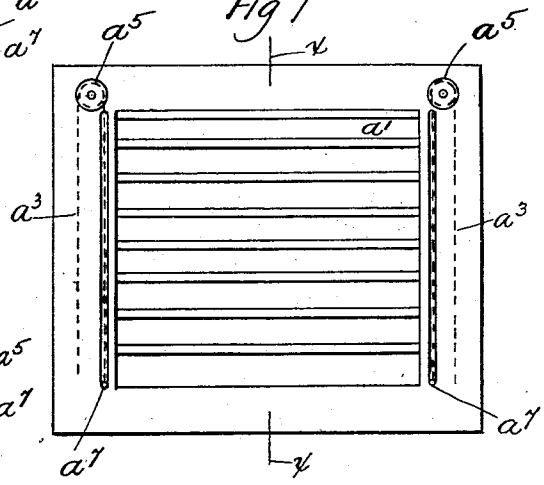
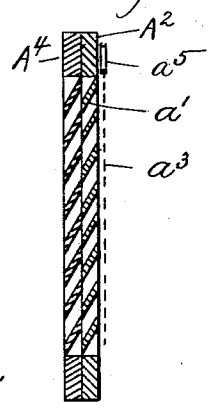


Fig 8



Witnesses
M. Hubbe
W E de Bonneville

Inventor
Charles A. Lieb
By his Attorney
de Bonneville

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 751,798. Patented February 9, 1904.

UNITED STATES PATENT OFFICE.

CHARLES A. LIEB, OF NEW YORK, N. Y.

PORTABLE POWER PLANT.

SPECIFICATION forming part of Letters Patent No. 751,798, dated February 9, 1904.

Application filed July 1, 1902. Serial No. 113,942. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. LIEB, a citizen of the United States, and a resident of the borough of Manhattan, in the county of New York and State of New York, have invented certain new and useful Improvements in Portable Power Plants, of which the following is a specification.

This invention relates to portable power plants; and its object is to provide means by which steam and electricity can be economically generated by apparatus that can be moved from place to place as conditions may require.

This invention is particularly adapted for generating power at a culm heap as it may be moved into the fuel-bed and can be moved from place to place therein as the fuel is consumed, thereby bringing the power plant to the fuel-pile instead of transporting the coal to the said plant. It embraces, essentially, three units—a steam-generating plant, an electric generating apparatus, and a water-cooling device. The units are each mounted on wheeled trucks or cars adapted to travel upon railway-tracks, the dimensions of the cars being such that they can be transported with a train on any of the railways. The three cars with their appurtenances constitute a power plant, which combination may be multiplied as required. The cars are coupled at their sides, either by interposing connecting-blocks or by directly joining their sides or side sills. To couple various sets of units together, the bumpers and buffers of the cars are removed and the ends or end sills are joined, so as to provide a continuous platform.

Referring to the drawings, Figure 1 represents a plan view of the three units with a power-shovel, a horizontal section being taken through the housings of the cars carrying the electric generating apparatus and the boiler plant. Fig. 2 shows a side elevation of a car with the cooling device. Fig. 3 is an elevation of the electric generating apparatus, with a partial longitudinal vertical section through its car. Fig. 4 shows an elevation of the boiler plant, with a partial longitudinal vertical section of the car supporting the same. Fig. 5 is a plan view of two of my power plants coupled together. Fig. 6 shows a partial plan view of one end of the cooling device. Fig. 7 represents an elevation of one of the ends of the receptacle for the cooling device. Fig. 8 is a section of Fig. 7 on the line x x.

The cooling device comprises a platform-car A, on which is rigidly secured a receptacle comprising the sides A′ and ends A^2, having ventilating-openings with slanting slats a and a', respectively. Movable sides A^3 and ends A^4, with similar openings and slats, telescope with those rigidly secured, the former being raised and lowered by means of chains a^2 a^3 turning over sheaves a^4 a^5, connecting with pins a^6 a^7, fastened to the movable portions. Rows of horizontal piping D D′, with risers D^2 and outlets or nozzles D^3, are fixed within the receptacle, and a tank E, with an outlet-pipe e, is provided below the said outlets on the car.

The electric generating apparatus comprises a car B, with a housing B′, and a motor F, in this instance a steam-turbine, coupled to a dynamo G, with a switchboard G′. The exhaust-piping H of the turbine leads to a surface condenser I, provision being made with the piping h and valves g g' to exhaust directly into the atmosphere, if desired. A combined air and circulating pump K is connected with the condenser, the air-cylinder thereof discharging into a hot-well L and the circulating-cylinder drawing from a tank M, which latter is connected by the piping e with the tank E of the cooling device. The circulating-cylinder forces the water through the condenser I and thence either directly into the rows of piping D D′, leading to the outlets D^3 of the cooling device, or a pump N is interposed to force the water after leaving the condenser with pressure through the said outlets D^3. A pump O draws from the hot-well L and discharges through the piping O′ to feed the boilers to be described.

The steam-generating plant comprises a car C, with a housing C′, boilers P, with mechanical stokers Q, (shown in dotted lines,) and motors R for the stokers. A hopper S is connected with the boilers by means of chutes S′ and carries a turn-table S^2, on which is supported one end of a conveyer T, propelled by

a motor T^2. At each end of the car a blower U, driven by a motor U′, is connected by piping U^2 with one of the boilers. It is to be understood that the stacks P′, as well as the piping between the cars, are disconnected when the latter is transported, and the connections are so arranged that a unit of one plant can be easily coupled to its accompanying unit of another plant. In other words, the units of one plant are interchangeable with corresponding units of another plant.

In Fig. 5 two sets of units are shown coupled end to end by joining the end sills V of the cars with the bolts v' and the side sills V^2 by the bolts v^2, the bumpers and buffers being removed from the cars. In Fig. 1 the sides of the cars are joined by interposing blocks W, which are bolted to brackets W′, secured to the sides of the cars, and it is evident that other means could be employed to join the units of a plant at their sides and corresponding units of different plants at their ends.

In Figs. 2, 3, and 4 are shown screw-jacks X supporting the platforms of the cars and bearing upon the road-bed, in which concrete foundations X′ form suitable supports for the said screw-jacks. The platforms of the cars can therefore be all adjusted to a common level, and excessive vibrations are avoided when operating the plant.

It is evident that the cooling device and its car could be dispensed with where water for the condenser could be easily obtained or where the plant would be operated non-condensing.

To operate my plant, a two-track or three-track road is connected with a railroad-line and extended to the side of a culm heap. The conveyers T are placed in position at the sides or ends of the cars to feed the stokers with fuel. The movable portions of the receptacle of the cooling device are raised, and after steam is generated the steam-turbine F is started, the latter propelling the dynamo G. The steam exhausts either directly into the atmosphere through the piping h or is led to the condenser I, where it is condensed, and removed by the air-cylinder of the combined pump to the hot-well L. The circulating-cylinder of the pump forces the water from the tank M adjacent thereto through the condenser I and then either directly to the outlets D^3 of the cooling device or a pump N takes it from the condenser and forces it with pressure through the said outlets. The water is cooled by virtue of coming into contact with the air in the cooling device and falls into the tank E, carried on the car of the said device, and from there it is led by the piping e back to the tank M. The overflow from the said tank flows into the hot-well L, where piping O^2 leads it to a feed-pump O for the boilers. If required, the blowers U maintain a forced draft through the boilers P.

Having described my invention, I claim—

1. In a car for a boiler plant, and in a car for a steam-generating plant, the combination of side sills on the cars, brackets extending from the side sills, blocks joining the side sills of one car with the brackets of the sills of the other car.

2. In a car for a boiler plant, and a car for a steam-generating plant, the combination of side sills on the cars, bolts securing the said side sills together, other cars like the first, end sills on all the cars, bolts joining the end sills of one pair of cars with another pair of cars.

3. In cars adapted to run on railway-tracks and having apparatus thereon for generating power, the combination of screw-jacks with the said cars bearing up against the cars, to maintain the cars in operative position, and means to connect the side sills and end sills of one car, with the side sills and end sills of another car.

4. In cars carrying a power plant, the combination of bolts coupling the sides of adjacent cars together, and bolts in the end sills coupling other cars to the first lot, and screw-jacks bearing on foundations and supporting the cars.

5. In cars having a power plant, the combination of a housing on each car, side and end sills for each car, bolts in the end sills for coupling the other cars, brackets in the side sills, blocks connecting the brackets of one car with the brackets of another car.

6. The combination of cars adapted to run on railway-tracks, side and end sills on the cars, bolts through the said sills to couple them together and to bolt another lot of cars thereto, and the sills and bolts so disposed that all the cars are interchangeable with one another.

Signed at New York, in the county of New York and State of New York, this 26th day of June, A. D. 1902.

CHARLES A. LIEB.

Witnesses:
MARCUS E. SMITH,
A. G. GREENBERG.