

P. HAENLEIN.

Improvement in Balloon-Locomotives.

No. 130,915.

Patented Aug. 27, 1872.

Fig: 2

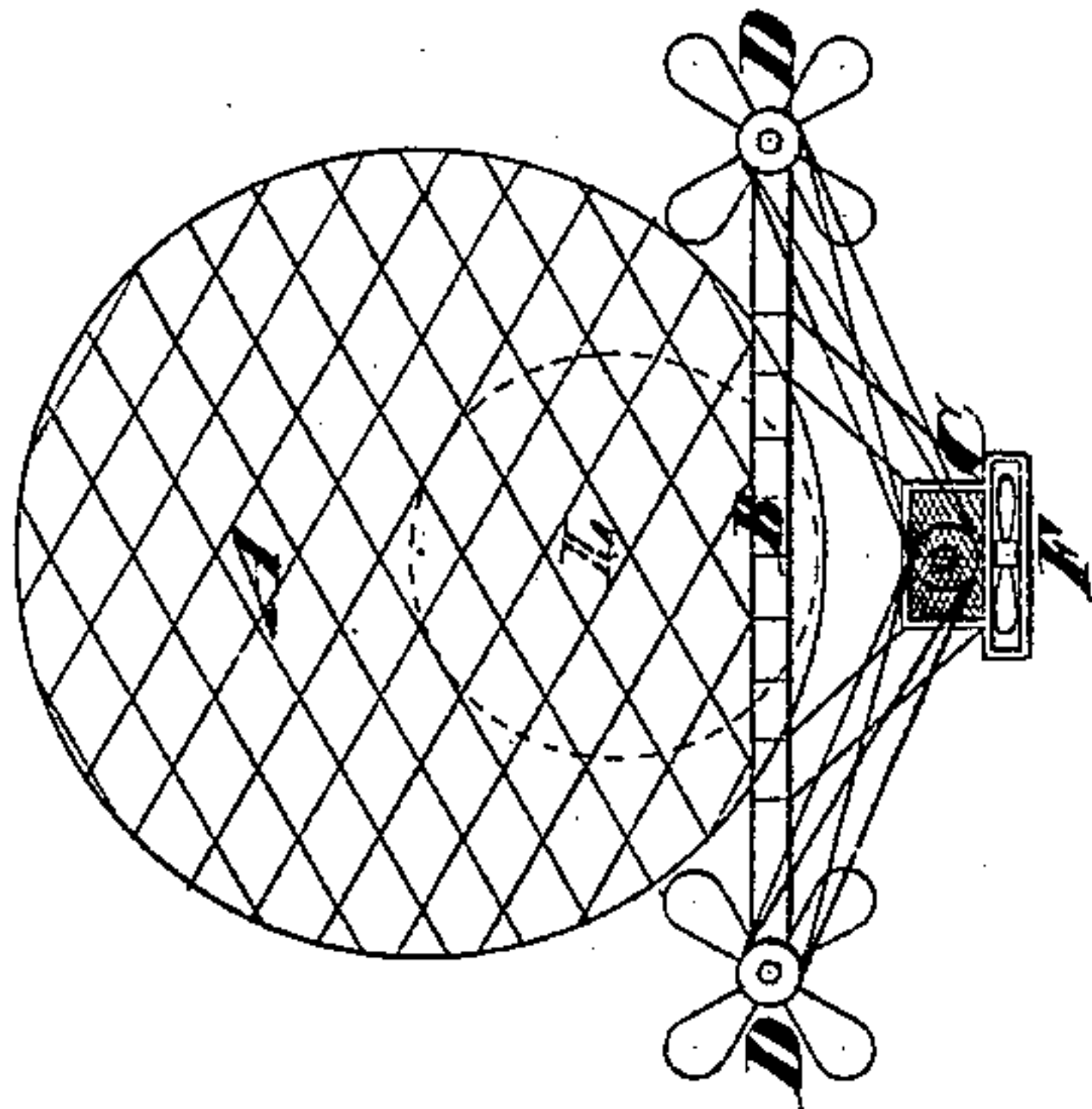


Fig: 1

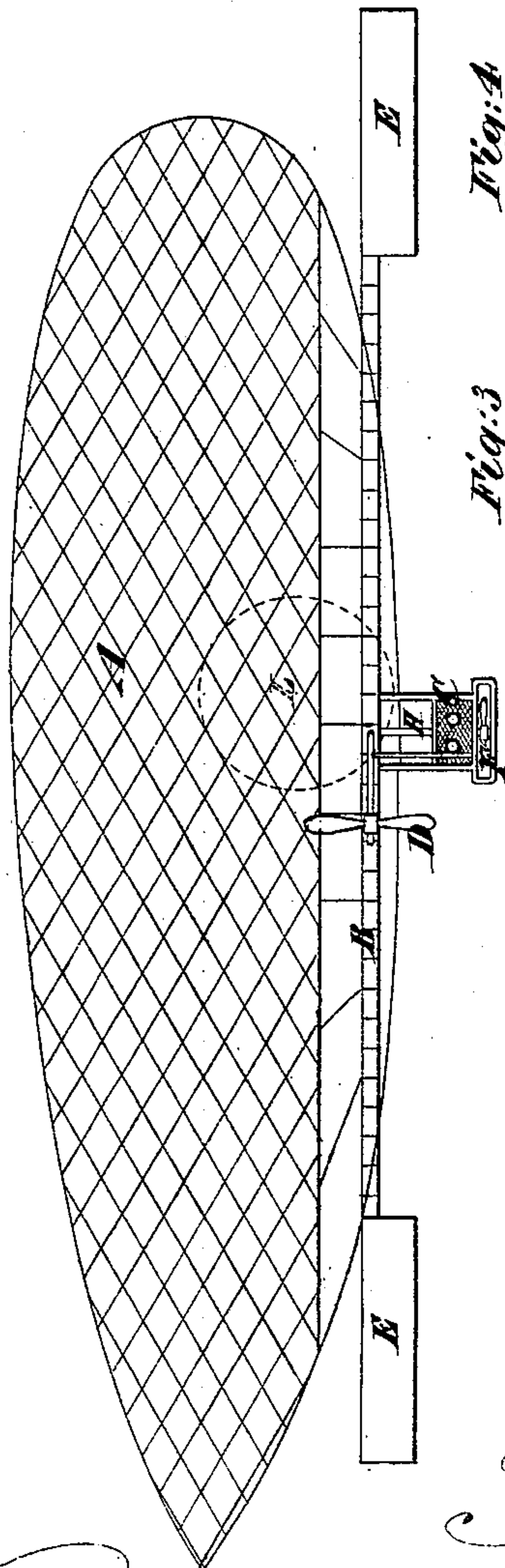


Fig: 4

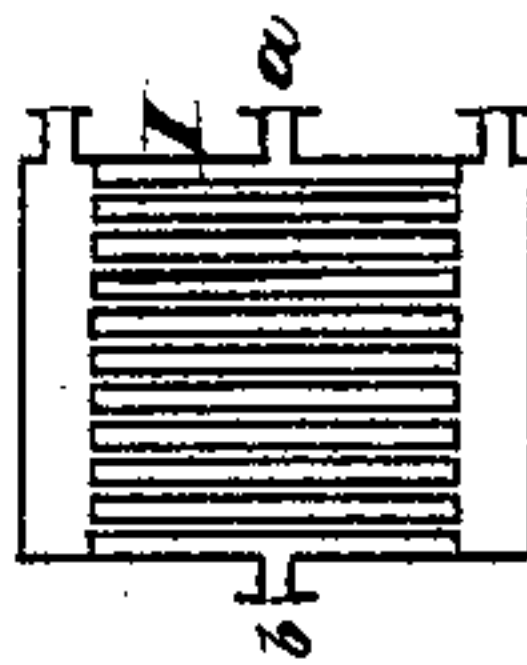
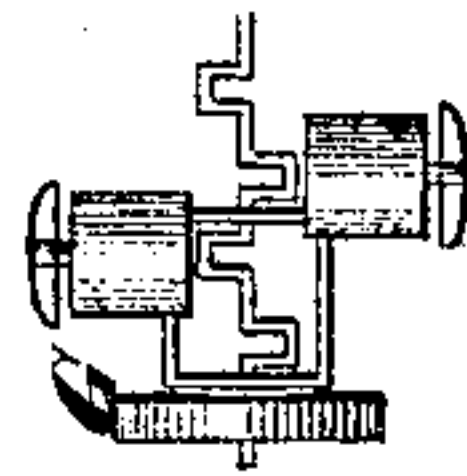


Fig: 3



Witnesses:

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PAUL HAENLEIN, OF MAINZ, GERMANY.

IMPROVEMENT IN BALLOON-LOCOMOTIVES.

Specification forming part of Letters Patent No. 130,915, dated August 27, 1872.

Specification describing an Improved Balloon-Locomotive, invented by PAUL HAENLEIN, of Mainz, Germany.

The invention consists in the use of the gas filling the balloon for propelling power as well as for ascending. The gas-engine is fed from the contents of the balloon itself. The gas is mixed in the interior of the working-cylinder of the engine with air—say, one volume of gas to twelve of air—which is ignited by an electrical spark, by which means the piston of the cylinder is caused to move to and fro. The engine is driven not by an excess of pressure of the gas in the balloon, but by the explosive power of a mixture of gas and air. As, by degrees, the engine consumes gas of the balloon the ascensive power of the latter is lessening, to compensate for which a certain quantity of ballast has to be thrown out; and in the mean time, to keep up the same pressure in the interior of the balloon, as gas is consumed by the engine, air is to be introduced by a fan or some other means. The consumption of the gas by the engine is so little that for ten hours' working it amounts to only three per cent. of the contents of the balloon.

In the accompanying drawing, Figure 1 is a side view of a balloon-locomotive constructed according to my invention. Fig. 2 is an end view of the same. Fig. 3 is a view of the gas-engine detached; and Fig. 4 is a like view of the cooling apparatus.

Similar letters of reference indicate corresponding parts in the several figures.

A is the main balloon, which is of ellipsoidal form, and may be made of any suitable material, and has arranged within it a smaller balloon or gas-reservoir, L, represented by dotted lines in Figs. 1 and 2. It is, as usual, filled with gas of such specific gravity as to give it sufficient ascensional power to carry the gas-engine, cooling apparatus, and freight. A net which surrounds the balloon, and whose meshes may be of any pattern, has secured to its lower portion a frame-work or gallery, B, which may be made of any suitable material, and has secured to its under side the car C, which carries the freight and passengers. On this frame or gallery B and the car C the gas-engine G, electric apparatus for working the same, the gearing, the propellers D D for producing horizontal motion, the cooling appara-

tus, and the rudders E E are arranged, the other propeller F, for producing upward and downward motion, being arranged under the car C. The engine G, which is visible only in Fig. 3, may consist of two or more cylinders, arranged as represented; and the cooling apparatus I, which resembles the surface-condensers used for steam-engines, is sufficiently illustrated in Fig. 4. In the interior of the large balloon A is placed a small one, L, filled partly with common air. Now, as gas is consumed by the engine, L is to be filled with air; and as the balloon ascends and the gas expands, the air in the reservoir L is partly driven out; and if the balloon descends, and the gas in the main body A diminishes, the smaller chamber L must be filled again with air by the fan. Thus the form or bulk of the balloon will never alter.

The operation is as follows: One volume of gas from the balloon A and, say, twelve volumes of air from the reservoir L are fed through the pipe H to the gas-engine and therein are exploded by an electric spark, by which the engine is made to drive the propellers D D, and thus the balloon is moved in a horizontal direction. The upward or downward motion of the balloon is effected without adjusting the ballast or gas simply by driving the propeller F. The cylinders of the gas-engine in working become so hot that it is necessary to cool them. This is effected by the cooling apparatus in the following manner: Water is made to circulate around jackets surrounding the cylinders, and, coming hot from said jackets, enters the cooling device and is distributed into a large number of small copper tubes whose exteriors are exposed to a current of wind produced by a blowing apparatus operated by the engine, and entering the apparatus through a pipe, *a*, and escaping through another pipe, *b*. In order to increase the efficiency of the apparatus, water, ether, ammonia, or any rapidly-evaporating liquid may be caused to trickle down the outside of the said copper tubes, and the current of air coming in contact with it, by causing its rapid evaporation, produces an intense cold, so that the water thus used for cooling the cylinders may be reused by constant circulation. By means of this improved cooling apparatus the necessity for carrying large quantities of water for

the purpose of cooling the engine-cylinders is obviated. The evaporating liquid employed in the cooling apparatus, besides effecting the purpose above mentioned, by degrees lightens the balloon, thus compensating for the diminution of gas caused by the engine. The smaller balloon or reservoir L, as the gas is withdrawn from the larger balloon, has air forced into it by the blowing apparatus to keep the larger balloon always entirely full. The balloon is steered similarly to a vessel in water by turning the rudders in either direction, or it may be steered by moving the propellers D D in reverse directions.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

The employment of the inflating gas from the balloon and air from the reservoir contained within it to drive an engine by explosive force, for the purpose of operating propellers, and so effecting the upward and downward as well as the horizontal movement of the balloon, substantially as specified.

PAUL HAENLEIN.

Witnesses:

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