

(No Model.)

W. SIMPKIN.
CONDENSER.

No. 428,233.

Patented May 20, 1890.

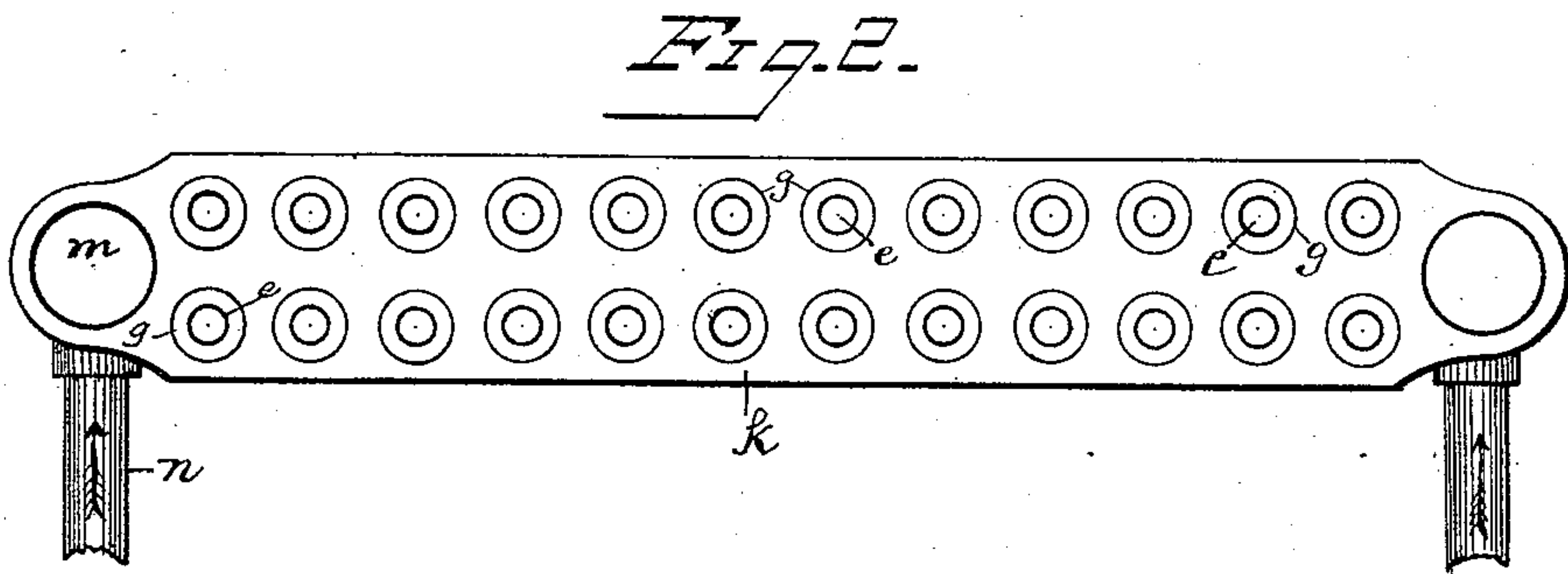
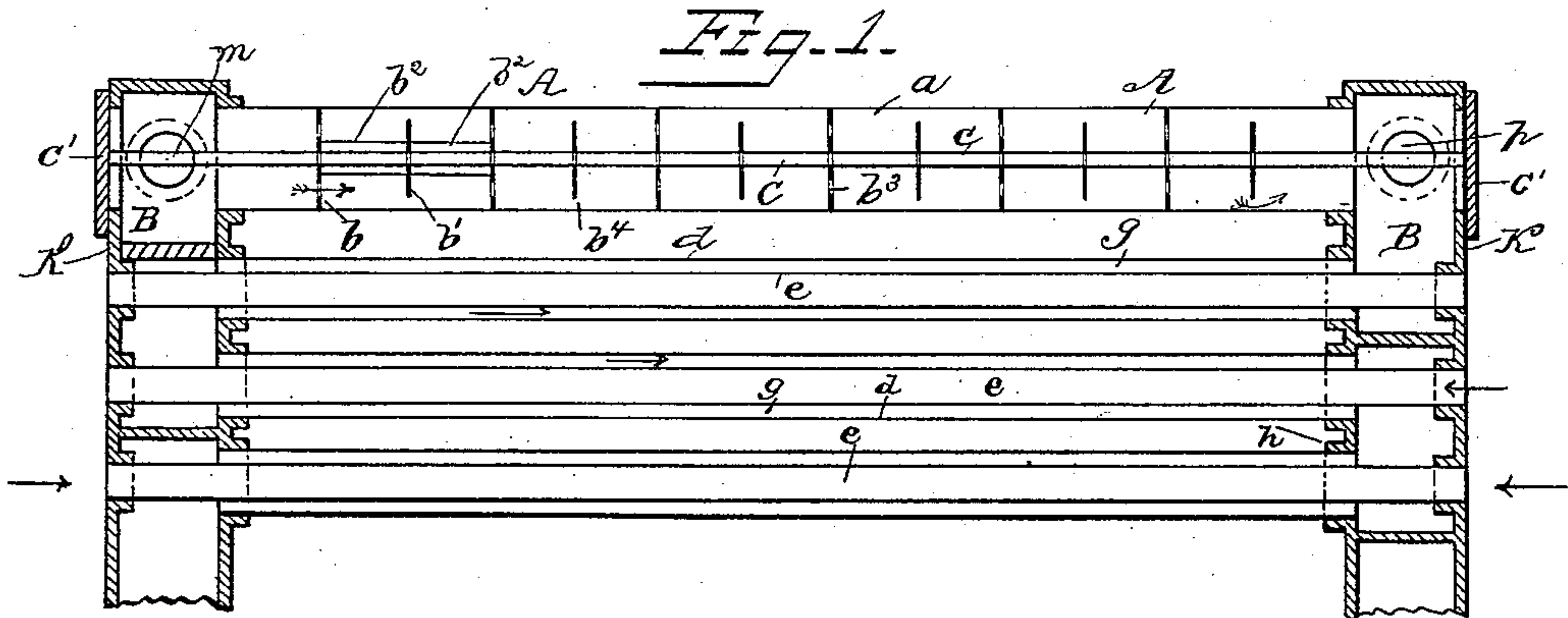


Fig. 3.

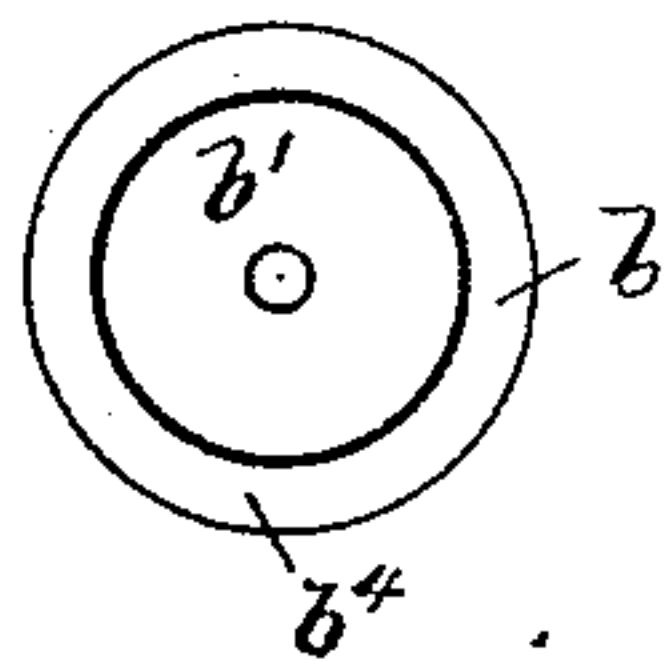
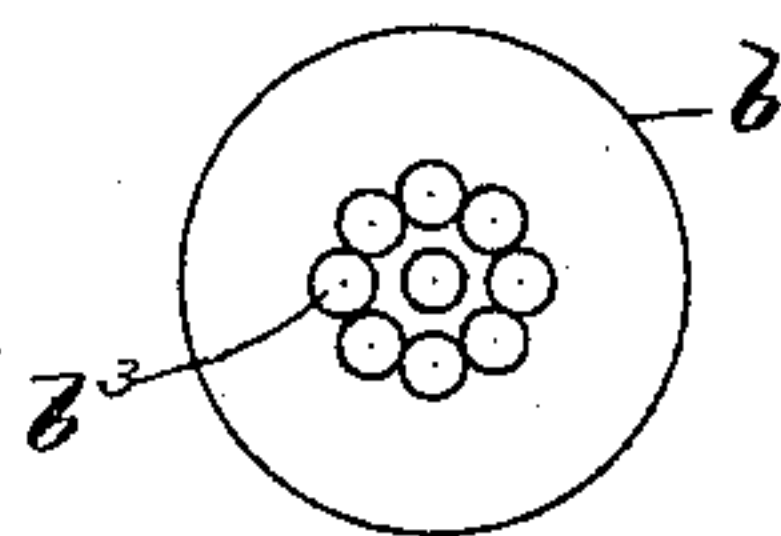


Fig. 4.



Witnesses

Albert Popkin.

John E. Morris.

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By *his* Attorney

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UNITED STATES PATENT OFFICE.

WILLIAM SIMPKIN, OF RICHMOND, VIRGINIA, ASSIGNOR TO THE RICHMOND STREET MOTOR COMPANY, OF SAME PLACE.

CONDENSER.

SPECIFICATION forming part of Letters Patent No. 428,233, dated May 20, 1890.

Application filed October 7, 1889. Serial No. 326,237. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM SIMPKIN, a citizen of the United States, residing at Richmond, in the county of Henrico and State of Virginia, have invented certain new and useful Improvements in Condensers for Steam-Engines, of which the following is a specification.

This invention relates to certain improvements in condensers for steam-engines; and it is especially designed for that class of engines known as compound high and low pressure condensing-engines for steam-motors.

The invention consists in certain novel constructions and arrangement of parts, as will be hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 represents a longitudinal vertical sectional view of the condenser. Fig. 2 is an end elevation of a portion of the same, and Figs. 3 and 4 represent views of diaphragm and deflecting plates forming part of the condenser.

Referring to the drawings, the letter A indicates the shell of the condenser, which is cylindrical in shape, and which is preferably placed in the roof of a motor or in an elevated position. The said condenser is constructed of one or more pipes *a*, according to the size of the engines in connection with which it is to be employed.

The letters *b b'* indicate, respectively, diaphragms and deflecting-plates, which are secured to a longitudinal center rod *c*, and are held at equidistant points apart by means of spacing-sleeves *b²*, which are fitted upon the said rod *c* between the plates. The said center rod *c* is secured at its ends to plates *c'*, which close the openings in the steam-chests B, which are at opposite ends of the condenser-shell A.

The diaphragm-plates *b* extend entirely across the interior of the pipe or shell *a*, and are provided with central openings *b³* for the passage of steam. The smaller plates *b'* alternate with the diaphragms *b*. These do not extend to the inner wall of the pipe *a*, as do the diaphragms, but terminate short thereof, leaving an annular space *b⁴* for the passage of steam. The alternating series of diaphragms and plates constitute a number of deflectors,

which break up the steam as it enters the pipe *a*, causing rapid and perfect condensation.

The condenser further consists of a series of outer pipes *d* and inner pipes *e*, extending through them, with an annular space *g* between the same. The outer pipes *d* at each end are secured to the inner wall *h* of the steam chest or box B. The inner pipes *e* extend through the steam-chests, and have their ends secured to the outer wall *k* of said steam-chest, and the ends of these inner pipes are open to the atmosphere. The exhaust-steam which enters the steam-chest B from the engine-cylinders will pass through the annular space *g* between the outer and inner pipes *d* and *e*.

The letter *m* designates an orifice or inlet which is at one end, through which the exhaust-steam is admitted to the condenser. This orifice is in connection with the exhaust-port of the low-pressure engine by means of a pipe *n*.

An outlet *p* is provided at the opposite end of the condenser similar to the inlet *m*, through which the water of condensation and the uncondensed vapors leave the condenser for a separator and the feed-water tanks, which are not here shown, as they form no part of the present invention.

The operation of my invention is as follows: The exhaust-steam from the engine-cylinders passes into the pipe *a* of the condenser and goes through its whole length, passing alternately through the central openings *b³* in the diaphragms *b* and the annular space *b⁴* between the walls of the pipe *a* and deflector-plates *b'*, the object of this being to break the force of the exhaust and also to deaden its noise. The diaphragm and deflector plates *b b'*, being of very thin material, give way slightly to the steam-pressure, the space through which the steam next passes being of ample area, so as to avoid back-pressure on the engine. The exhaust-steam next passes through the annular spaces *g* in the condenser-tubes *d*, which are shown of cylindrical shape; but it is obvious tubes of polygonal, corrugated, or other shape in cross-section can also be used without departing from the spirit of my invention. The air in the outside pipes and that which is

forced through the pipe *e* while the motor is in motion will thoroughly cool and condense the steam. By this arrangement of the inner and outer tube and annular steam-space the air is brought to act rapidly on the strata of steam passing through the annular space. The condensed steam and uncondensed vapors pass through a pipe (not shown) to a suitable feed-water heater.

10 Having described my invention, I claim—

1. The combination, in a condenser, of the pipe *a*, having a series of perforated diaphragms *b*, each of which fills the pipe, deflecting-plates *b'*, each of which has an annular space around it in the pipe, the steam-chests *B*, and the outer connecting-tubes, arranged substantially as and for the purposes specified.

20 2. The combination, in a condenser, of the pipe having the perforated diaphragms *b* and

plain deflecting-plates *b'*, alternating with each other, and the inner and outer pipes forming an annular steam-space, the inner pipes having their ends open to the air, the whole arranged substantially as and for the purposes specified. 25

3. The combination, in a condenser, of a tube *a*, provided with deflecting-plates, the steam-chests *B*, and the inner and outer connecting-tubes, forming intervening annular condensing-spaces, the said inner tubes having their ends open to the air, substantially as and for the purposes specified. 30

In testimony whereof I affix my signature in the presence of two witnesses.

WILLIAM SIMPKIN.

Witnesses:

JOHN E. MORRIS,
JNO. T. MADDOX.