

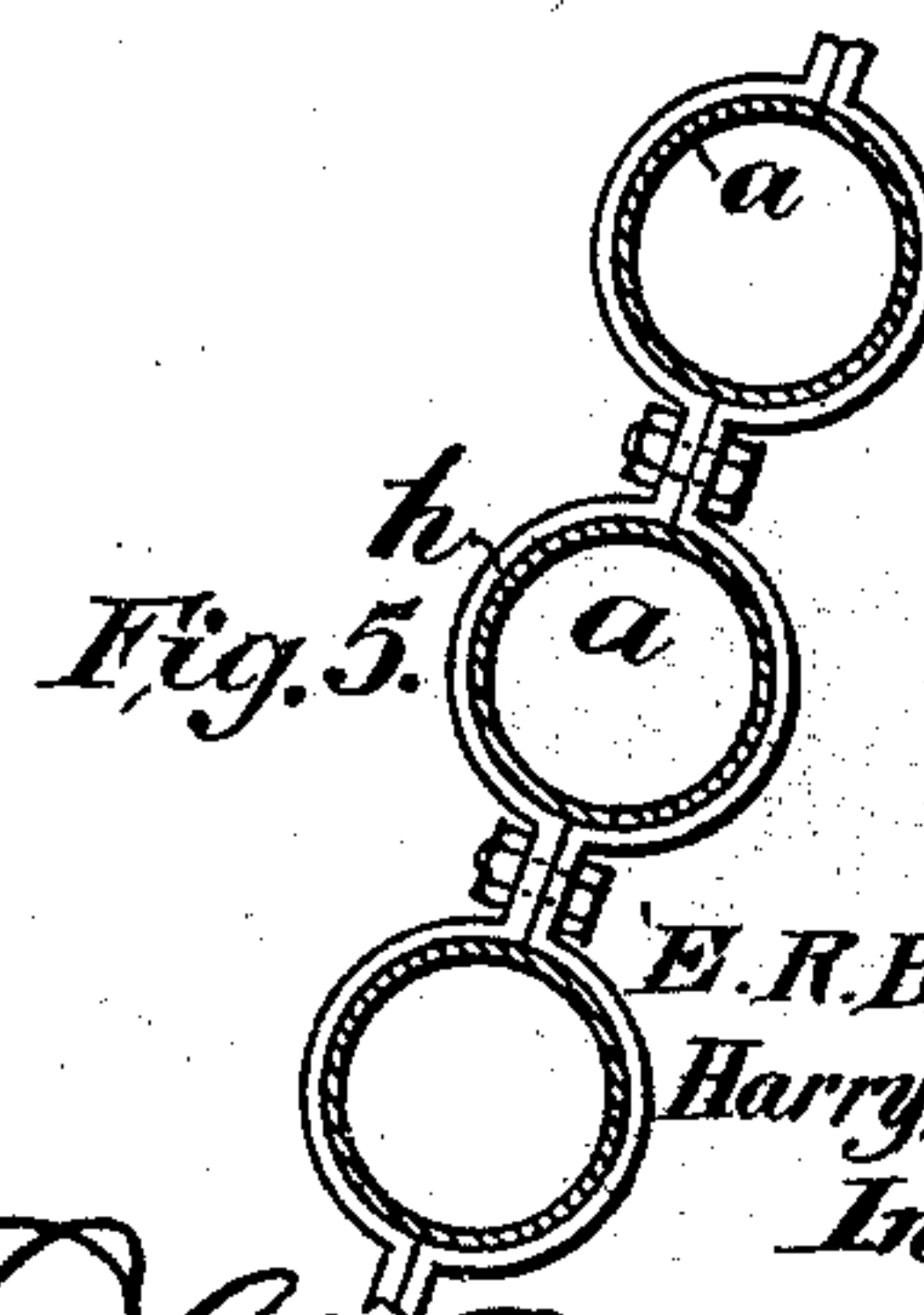
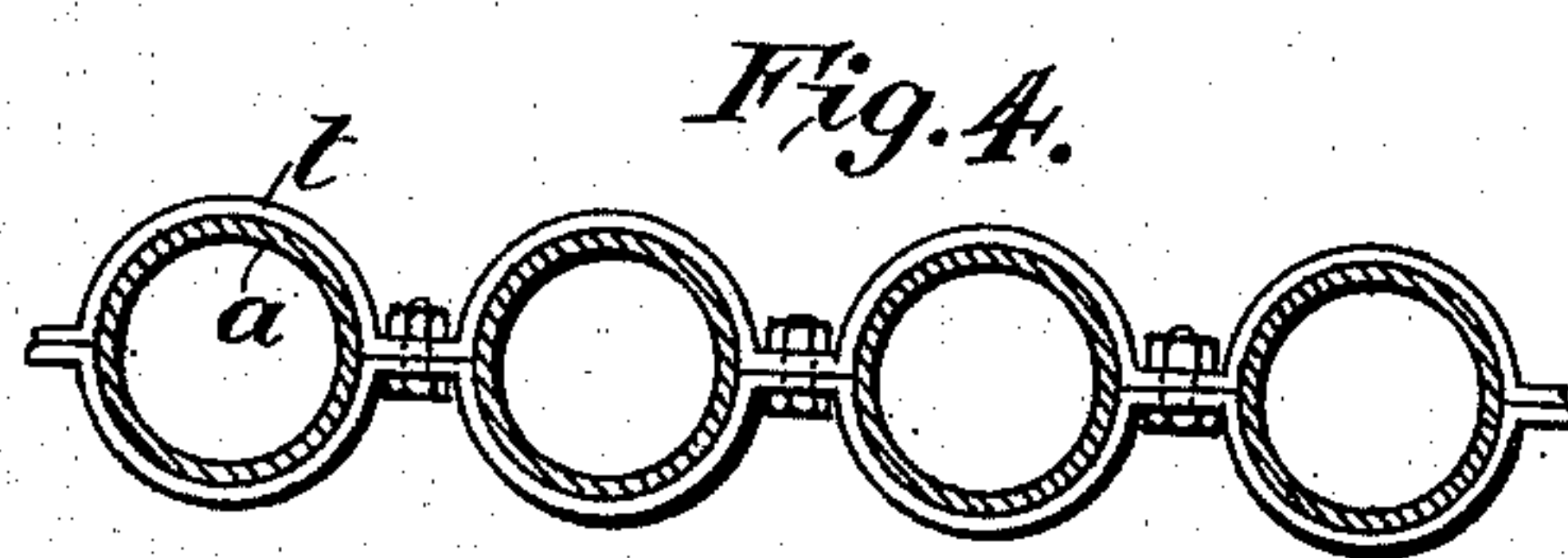
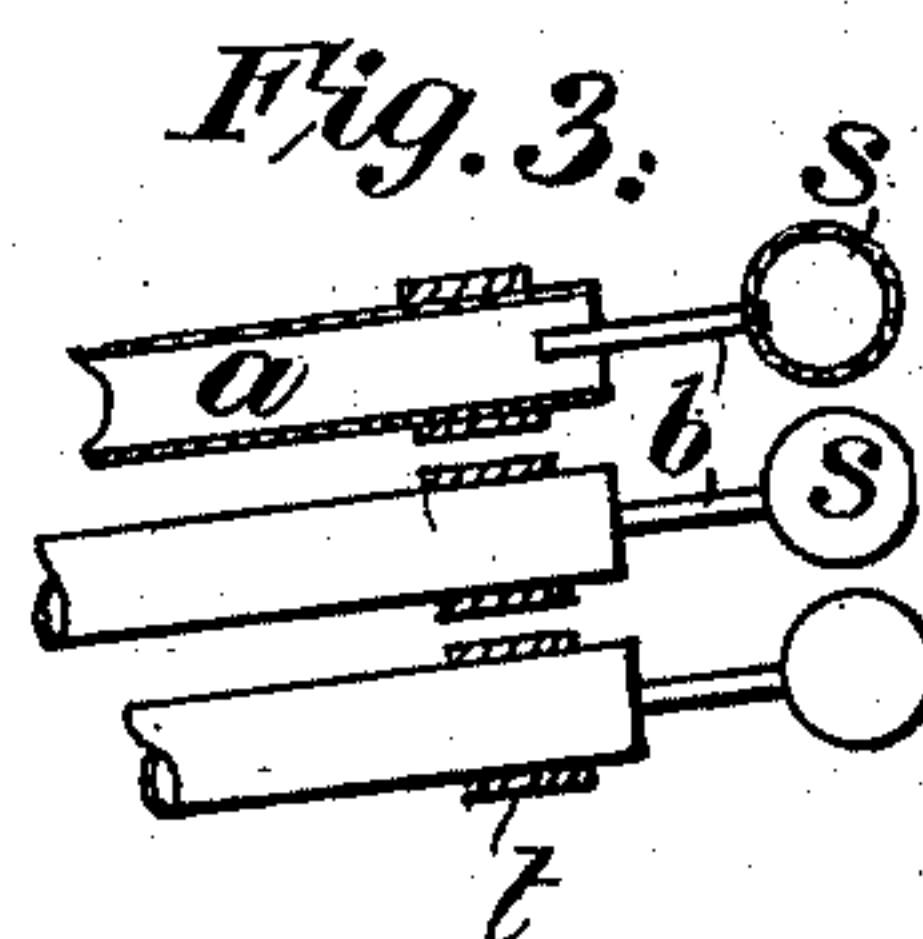
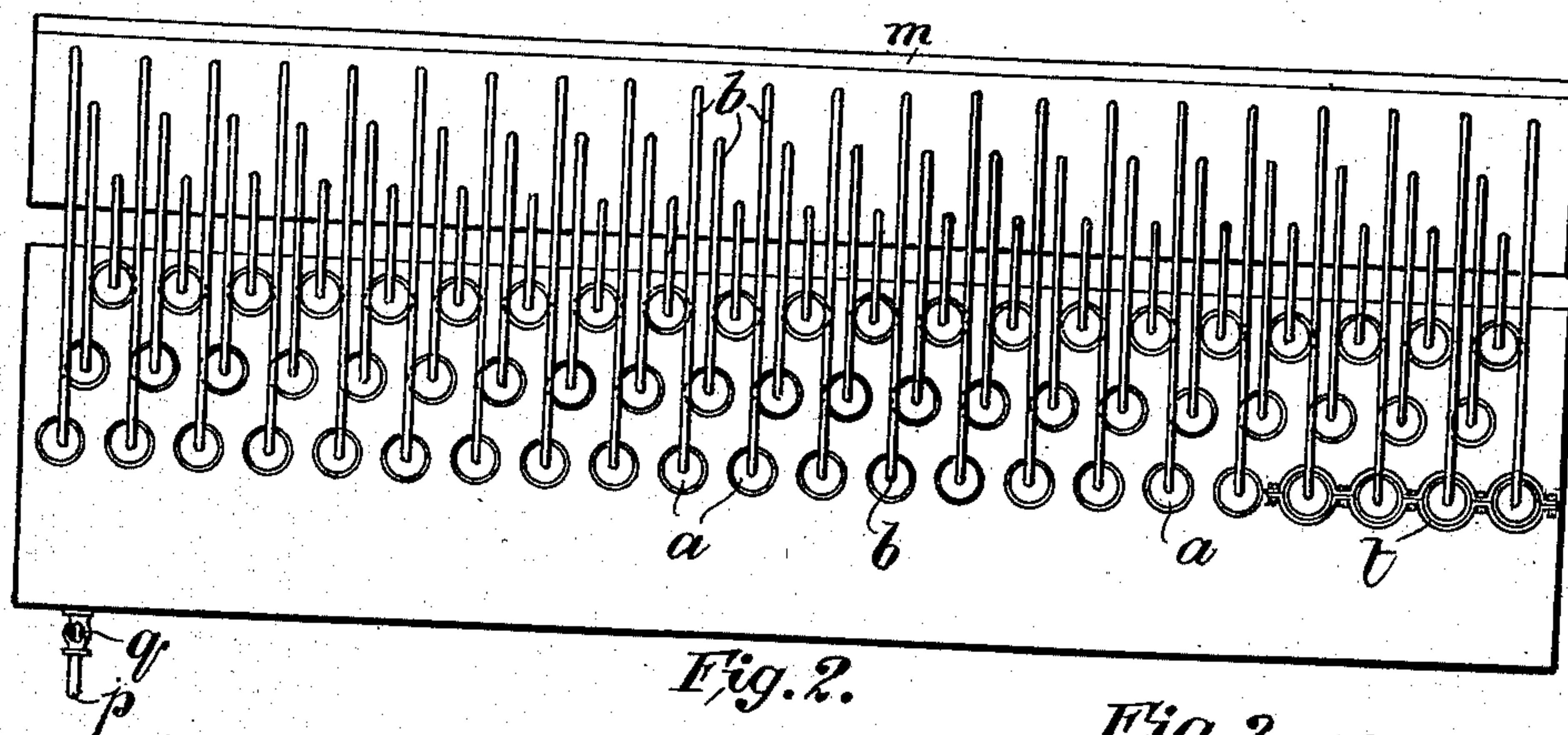
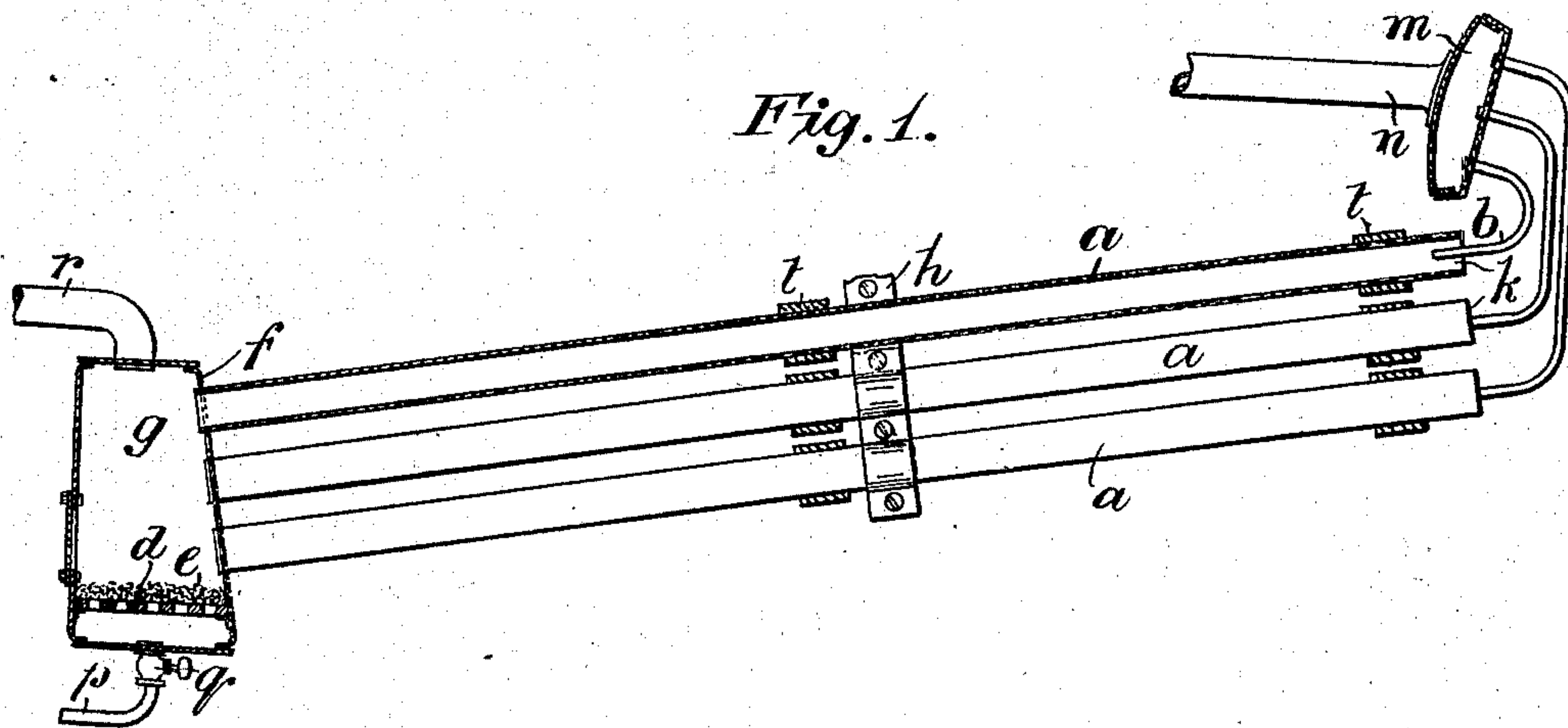
No. 714,445.

Patented Nov. 25, 1902.

E. R. BRIDSON & H. BROUGH.
AIR CONDENSER FOR STEAM PROPELLED CARS OR VEHICLES.

(Application filed Apr. 17, 1902.)

(No Model.)



Witnesses
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UNITED STATES PATENT OFFICE.

EDWARD RIDGWAY BRIDSON AND HARRY BROUGH, OF NOTTINGHAM,
ENGLAND.

AIR-CONDENSER FOR STEAM-PROPELLED CARS OR VEHICLES.

SPECIFICATION forming part of Letters Patent No. 714,445, dated November 25, 1902.

Application filed April 17, 1902. Serial No. 103,434. (No model.)

To all whom it may concern:

Be it known that we, EDWARD RIDGWAY BRIDSON, engineer, principal of the Motor Construction Company, of Canal street, Nottingham, in the county of Nottingham, and HARRY BROUGH, engineer, also of the Motor Construction Company, Canal street, Nottingham, in the county of Nottingham, England, subjects of the King of Great Britain and Ireland, have invented certain new and useful Improvements in Air-Condensers for Steam-Propelled Cars and Vehicles, (for which we have made application for Letters Patent in Great Britain, No. 23,156, dated November 15, 1901,) of which the following is a specification.

Our invention relates to condensers for the steam-engines of steam-propelled cars and vehicles.

Our invention consists in an arrangement and construction of air-condenser, which will be fully described in the specification and its novel features clearly pointed out in the claims.

Referring now to the accompanying drawings, which illustrate our invention, Figure 1 shows our invention in sectional side elevation. Fig. 2 shows the same in end elevation. Fig. 3 shows a modified arrangement for conveying the steam to the condenser-tubes. Figs. 4 and 5 illustrate the devices employed for supporting the condenser-tubes. These last figures are drawn to a larger scale than the other three.

In carrying our invention into effect we employ a number of nearly horizontal condenser-tubes *a*, which are arranged parallel to the line of motion of the car or vehicle. One end of each tube is fixed in a tube-plate *f*, forming one side of a box *g*. This box supports one end of each tube, and the tubes are supported at the other end and at one or more intermediate points, if desired, by grips *t*, Figs. 1, 4, and 5. Four tubes of one horizontal row connected by grips *t* are shown in Fig. 4. These clips surround the tubes and connect them together and are also used for connecting the tubes to a fixed part of the vehicle. We may also, if desired, clip some of the tubes together vertically or nearly vertically by means of clips *h*, as shown in Figs.

1 and 5. The condenser-tubes are so placed that the car, with the box *g*, is at the rear end of the tubes, and the front ends of the tubes are exposed to the draft caused by the motion of the vehicle. Inside the end *k* of each tube *a* is placed a small tube *b*, which in one form of construction, as shown in Figs. 1 and 2, extends from a chamber *m*, to which is conveyed by the pipe *n* the steam from the exhaust of the steam engine or engines. The chamber *m*, as seen in Figs. 1 and 2, extends at right angles to the condenser-tubes *a*. Inside the vessel *g* may be placed a tray *d*, which is perforated and carries at its upper side a quantity *e* of granulated carbon, charcoal, cotton, or other material adapted to allow water to pass freely through it, but retain the greater portion of the oil or grease carried by the water.

In previous instances in which oil-separators have been used, so far as we are aware, pressure or suction has to be applied to the exhaust steam or water condensed therefrom to make it pass through the filtering material. In our arrangement the draft of air through the tubes causes a plenum inside the box *g*, which is sufficient to force the water through the filtering material.

The motion of the car induces a current of atmospheric air through the tubes *a*, and this current of air by an ejector action tends to draw the steam from the chamber *m* through the small tubes *b* into the condenser-tubes *a*. The rush of steam from the small tubes *b* also acts to draw in air. The steam is condensed by contact with the sides of the tubes *a*, which are kept cool both by the atmospheric air passing through them and by the atmospheric air passing along their exterior surfaces. The water condensed from the steam falls to the bottom of the box *g* and is drawn off by a pipe *p*, provided with a valve *q*. The air, with any uncondensed steam, is led away by the pipe *r* and is conveyed by this pipe *r* either to the burners used for heating the steam-generator or to the chimney conveying the products of combustion from the furnace. In the former case it acts to give a more intense heat of combustion, owing to its heated nature, and in the latter case it acts to increase the draft. More than one pipe *r* may be used,

and if desired the air and uncondensed steam may be led away in part to the burners and in part to the chimney.

According to a modified form of construction as illustrated in Fig. 3 we provide a number of horizontal tubes *s* in place of the chamber *m*. One of these tubes *s* extends along the front of each horizontal row of condenser-tubes, and the small tubes *b* extend from these tubes *s* into the front ends of the condenser-tubes.

The ejector action of the air passing through the condenser-tubes assists in drawing the steam from the engines and reducing the back pressure in these.

Having now described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The combination with a steam-propelled vehicle having a steam-generator and a steam-engine, of a plurality of nearly horizontal tubes *a* open to the atmosphere at one end and arranged parallel to the line of motion of the vehicle, a box such as *g* into which the other end of each tube *a* enters, means for conveying the air and uncondensed steam from the box *g*, a chamber *m* placed at right angles to the tubes *a*, small tubes *b* connected to the said chamber *m* and having their open ends inserted in the ends of the tubes *a*, means for conveying the steam from the engine to the chamber *m* and means for drawing off the water from the box *g*, substantially as described.

2. The combination with a steam-propelled vehicle, of a plurality of nearly horizontal tubes *a* open to the atmosphere at one end and arranged parallel to the line of motion of the

vehicle, a box such as *g* into which the other end of each tube *a* enters, a perforated tray *d* contained in said box said tray supporting material adapted to remove most of the oily matter from the water passing through it, and small tubes *b* projecting into the open ends of the tubes *a*, and adapted for discharging exhaust-steam into said tubes *a*, substantially as described.

3. The combination with a steam-propelled vehicle having a steam-generator and a steam-engine, of a plurality of tubes *a* arranged parallel to the line of motion of the vehicle but having a slight inclination upward from the rear to the front, said tubes being open at their front ends, clips such as *t* and *h* adapted to support said tubes *a* and connect them to each other, a box such as *g* into which the rear end of each tube *a* enters, a perforated tray *d* contained in said box said tray supporting material adapted to remove most of the oily matter from the water passing through it, means for conveying away the air and uncondensed steam from the box *g* for use in assisting the combustion of the fire used for heating the steam-generator, small tubes *b* projecting into the front ends of the tubes *a* and adapted for discharging exhaust-steam from the engine into said tubes *a*, and means for drawing off the water from the box *g*, substantially as described.

In witness whereof we have hereunto set our hands in presence of two witnesses.

EDWARD RIDGWAY BRIDSON.

HARRY BROUGH.

Witnesses:

RICHARD CHATTERTON,
ARTHUR MCCREE.