

No. 711,387.

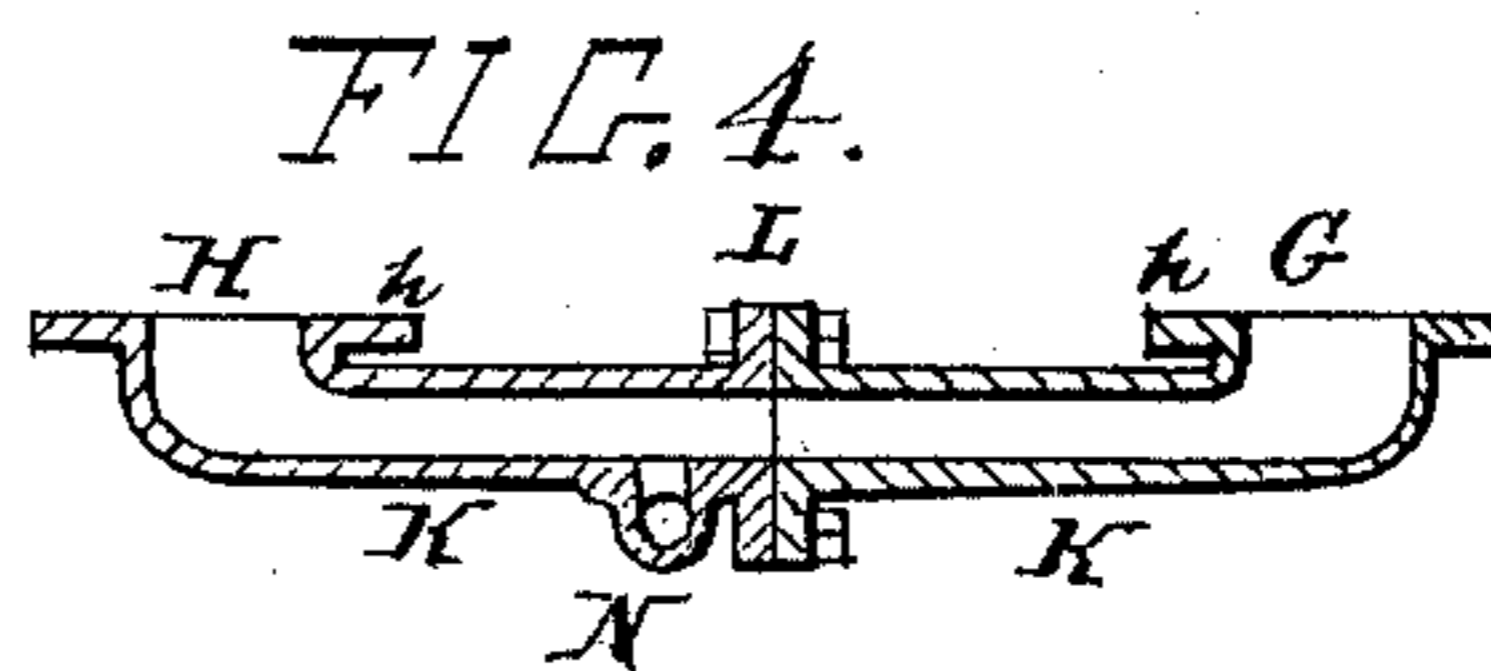
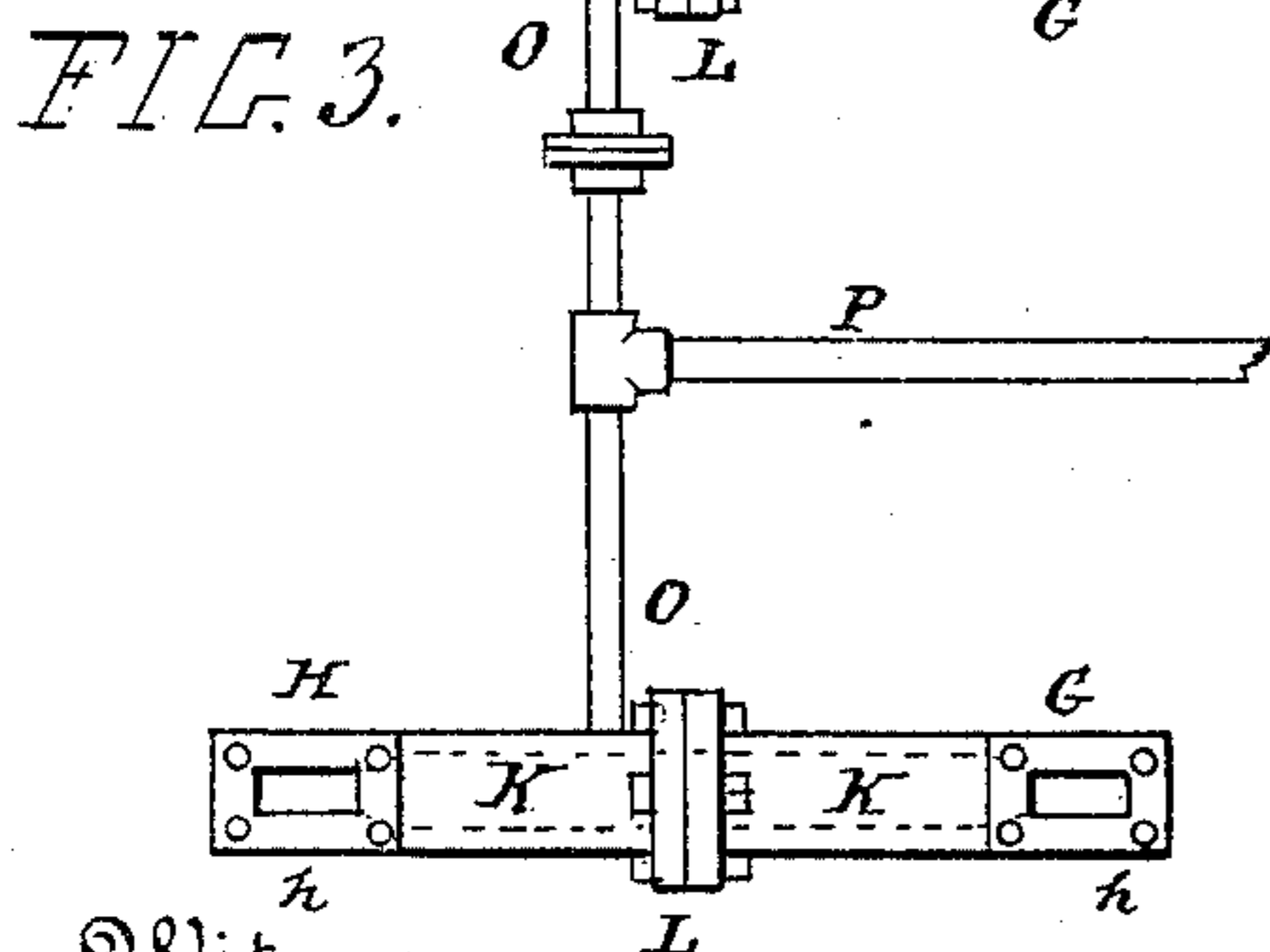
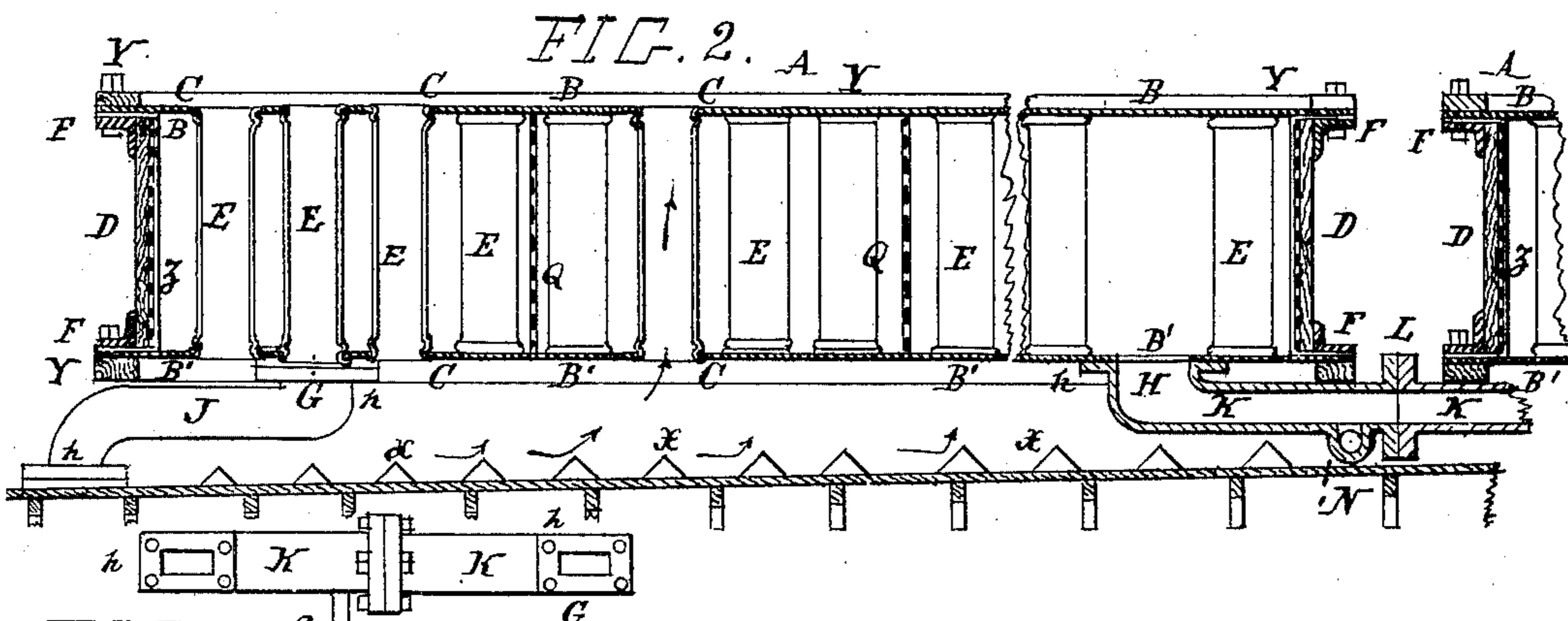
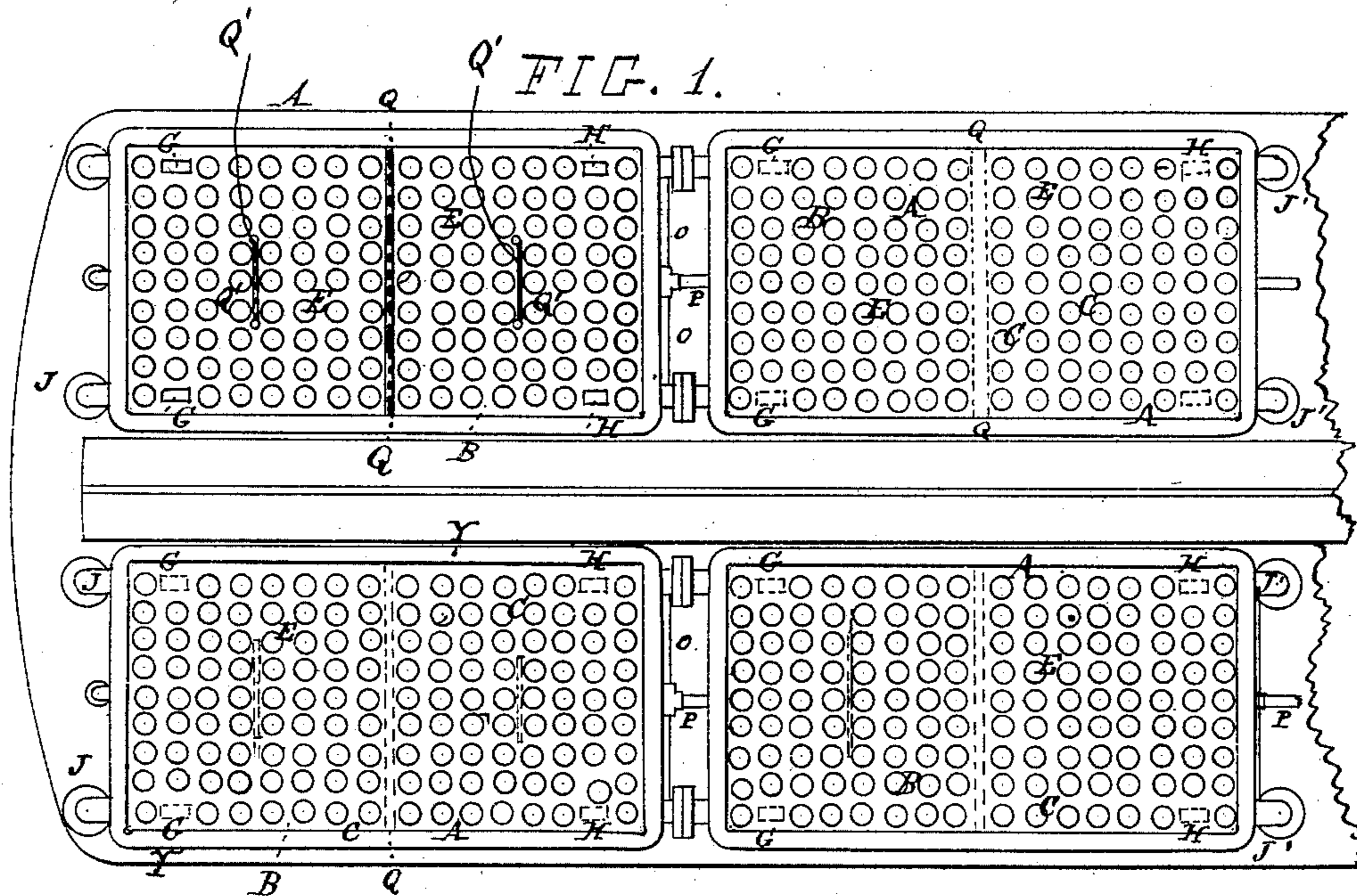
Patented Oct. 14, 1902.

A. P. DODGE.

CONDENSER FOR STEAM MOTORS.

(Application filed Feb. 27, 1899. Renewed Mar. 22, 1902.)

(No Model.)



Witnesses  
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# UNITED STATES PATENT OFFICE.

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## CONDENSER FOR STEAM-MOTORS.

SPECIFICATION forming part of Letters Patent No. 711,387, dated October 14, 1902.

Application filed February 27, 1899. Renewed March 22, 1902. Serial No. 99,515. (No model.)

*To all whom it may concern:*

Be it known that I, ARTHUR PILLSBURY DODGE, a citizen of the United States, residing at New York city, State of New York, have invented certain new and useful Improvements in Condensers for Steam-Motors, of which the following is a specification.

My invention relates to condensers for steam-motors; and it includes the construction and arrangement of parts hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a plan view of a portion of a motor-car roof upon which several chambers or sections of my improved condenser are applied. Fig. 2 is a longitudinal vertical section of one of the condensing-chambers, enlarged, showing also the connection between this chamber and the next following and the relation of the chambers to the car-roof. Fig. 3 is a plan view of the pipe connections between the chambers, showing also the pipes for conducting the hot water of condensation. Fig. 4 is a detached sectional view of the pipe connection between the chambers.

In the drawings the condensing-chamber A is shown as arranged horizontally, and it is of rectangular shape. I employ a series of these chambers connected together, and I illustrate in Fig. 1 two series of these chambers, one series extending along and above the car-roof to one side of the center thereof, while the other series similarly extends along the other side of the center. Each condensing-chamber consists of horizontal flat top and bottom plates B B', and sides D, extending vertically between them and at right angles thereto. The top and bottom plates are preferably made of steel, and the sides may be made of thin sheet-iron, steel, or other suitable material. Air-pipes E extend between the top and bottom plates and have their ends expanded steam-tight into openings in the plates. These air-pipes are arranged in longitudinal and transverse rows, and they are placed close together and are sufficiently numerous to thoroughly divide up the chamber and present a large condensing-surface to the action of the steam which must pass between and around the air-pipes in passing from the inlets G to the outlets H. The air-pipes are opened at their upper and

lower ends to the atmospheric air, and the air circulating through them will keep them cool enough to produce a rapid condensation of the steam. Angle-iron frames F serve to connect the top and bottom plates to the sides, the vertical flanges of the angle-irons being riveted to the sides D, while the horizontal flanges are bolted to the top and bottom plates. Suitable packing is placed between the horizontal flanges and the rims of the top and bottom plates to make the joints steam-tight. The steam enters the first condensing-chamber at the two openings G G and passes out from the chamber through the two openings H H, these openings, as shown, being arranged near the corners of the chamber. The steam enters by the elbow-pipes J, the horizontal flanges h of which are connected, respectively, with the bottom of the condensing-chamber and the roof of the car. The condensation-water leaves the condensing system through pipes J', the horizontal flanges of which are connected with the openings H of the last chamber of the series and with the car-roof.

In order to connect the chambers of the series, I provide elbow-pipes K, having their flanges h connected with the bottom plates of the chambers, so that the steam leaving the openings H of one chamber will pass to the inlet-openings G of the next following chamber. The elbow-pipes K K are connected together at a point between the chambers, as at L. All the pipes J J' K have passages of rectangular shape in cross-section in order to take up less up-and-down space in placing them. In order to carry off the water of condensation from the connecting-pipes K K between the chambers, hollow depending bosses N are cast on the pipes K, with the interior of the pipe communicating with the interior of the boss, and from the bosses N on opposite pipes K K the pipes O extend and connect with the drain-pipe P by means of a T-fitting. The drain-pipe P will convey the water of condensation to a hot-water tank or other suitable receptacle. Each chamber has a laterally-extending screen-partition Q arranged about centrally of the chamber, and supplemental screen-partitions Q' are placed between the said central partition and the inlets G and outlets H, these latter partitions

Q' being short and arranged transversely and about midway of the chamber, while the partition Q extends all the way across the same. I do not limit myself as to the extent or location of these screen-partitions, as they may be long or short. They may have imperforate portions, and they may be located in various positions and to suit the most effective distribution of the steam.

- 10 In motors having a roof not capable of supporting heavy condensers the sides of the condensing-chambers are formed of a skeleton or wooden frame, inside of which are the metallic sides formed of tin plates Z, with  
15 soldered seams, and having horizontal flanges clamped between the rims of the top and bottom plates B B' and the flanges of the angle-irons F. Wooden strips Y may be placed on the outer sides of the rims of the top and bot-  
20 tom plates to prevent buckling of the parts, these strips being held by the same bolts which connect the angle-irons with the rims of the top and bottom plates.

- The condensing-chambers are placed above  
25 the roof of the car a proper distance to provide for a plentiful supply of air, and the space between the bottom of the condensing-chamber and the roof of the car may be larger at the point where the air enters between the  
30 roof and the condenser than at the outlet end of said space in order to give a more effective air-pressure. The roof itself may slope, as shown in Fig. 2, or a special wooden platform may be arranged over the roof to obtain such  
35 space. Guide-pieces X, having inclined sides, may be placed on the roof below the air-pipes B to direct the air up into the pipes, as indicated by the arrows in Fig. 2.

From the foregoing it will be seen that the

steam-space of the condensing-chamber is 40 divided up into a great number of small passages by the air-pipes, and the steam is divided up and caused to flow in numerous directions through the many spaces and into contact with the cooling-surfaces of the air-  
45 pipes, so as to produce a rapid condensation of the exhaust-steam.

I claim as my invention—

1. A condenser for steam-motors comprising a chamber arranged horizontally, a series 50 of pipes extending vertically therethrough and open at their ends to the air and the perforated screen-partitions extending vertically in the chamber among the pipes, substantially as described. 55

2. A condenser for steam-motor cars comprising the chamber arranged horizontally, having a plurality of air-pipes extending vertically therethrough, inlet and outlet openings at opposite ends of the chamber, a per- 60 forated screen-partition Q extending across the chamber at or near its middle and short perforated screen-partitions Q', one on each side of the partition Q and between the same and the inlet and outlet openings respec- 65 tively, substantially as described.

3. In combination a plurality of chambers having vertical pipes extending therethrough, pipe connections between the chambers having hollow bosses thereon and drain-pipes ex- 70 tending from said hollow bosses, substantially as described.

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

ARTHUR PILLSBURY DODGE.

Witnesses:

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