

(No Model.)

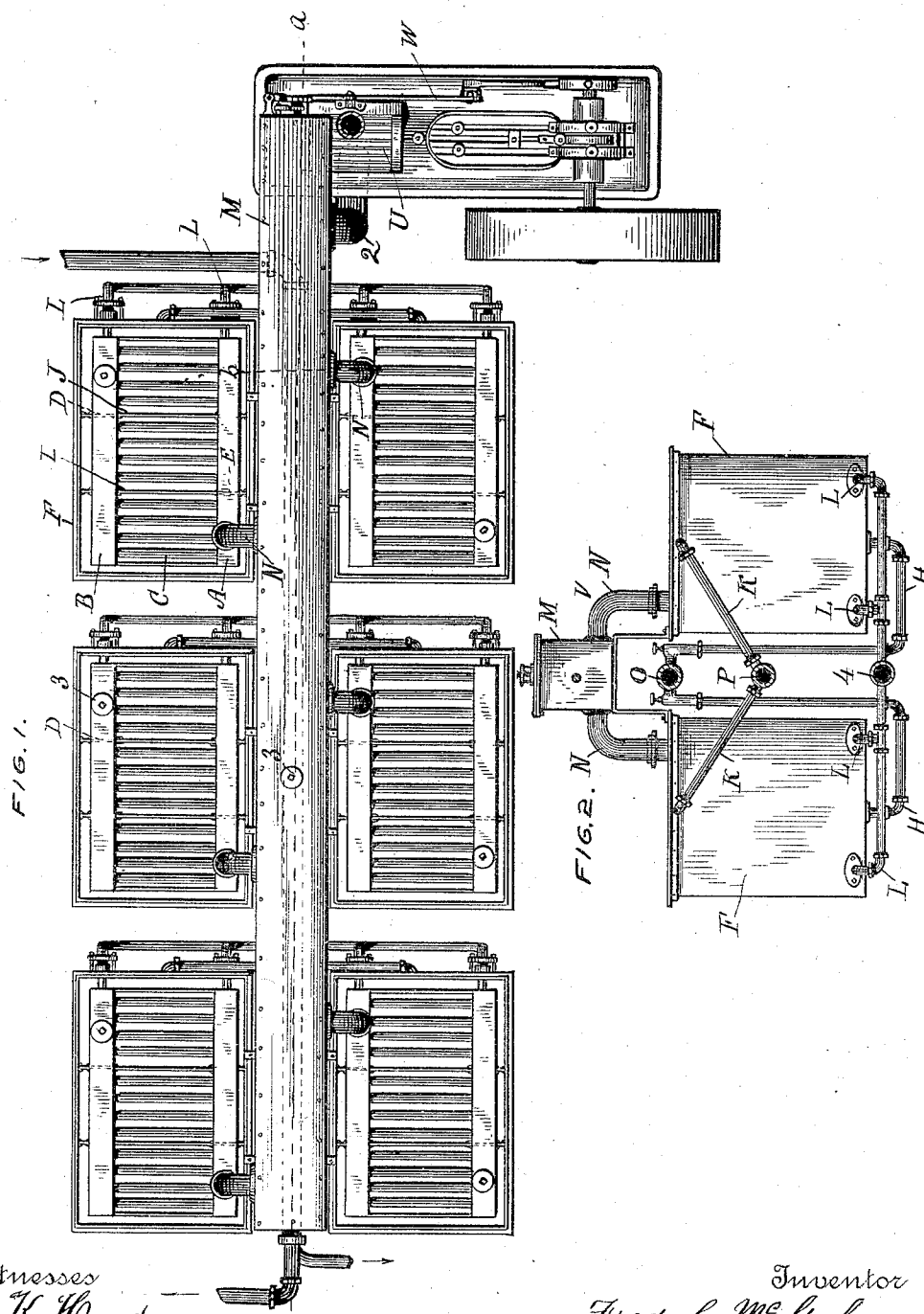
3 Sheets—Sheet 1.

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APPARATUS FOR CONDENSING EXHAUST STEAM.

No. 493,733.

Patented Mar. 21, 1893.



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FIG. 3.

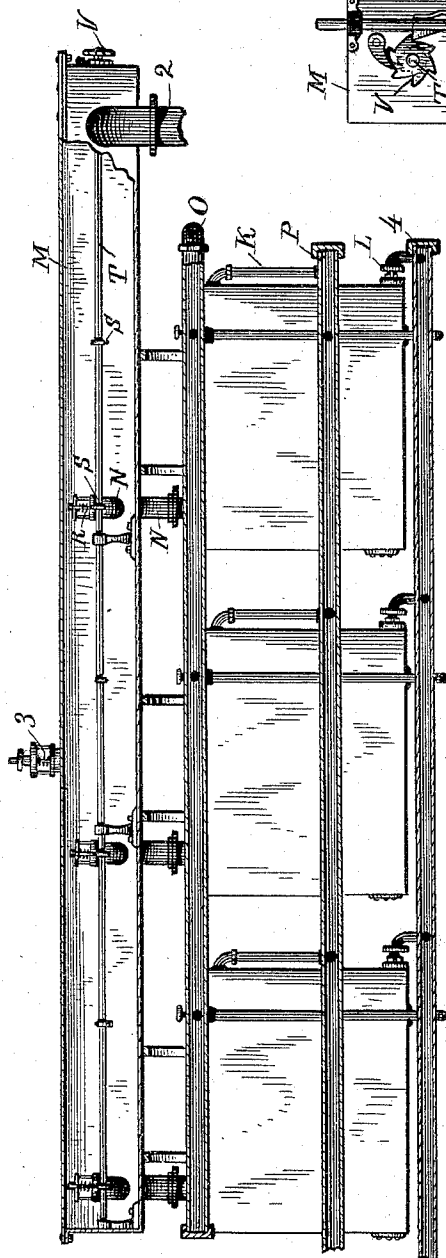


FIG. 5.

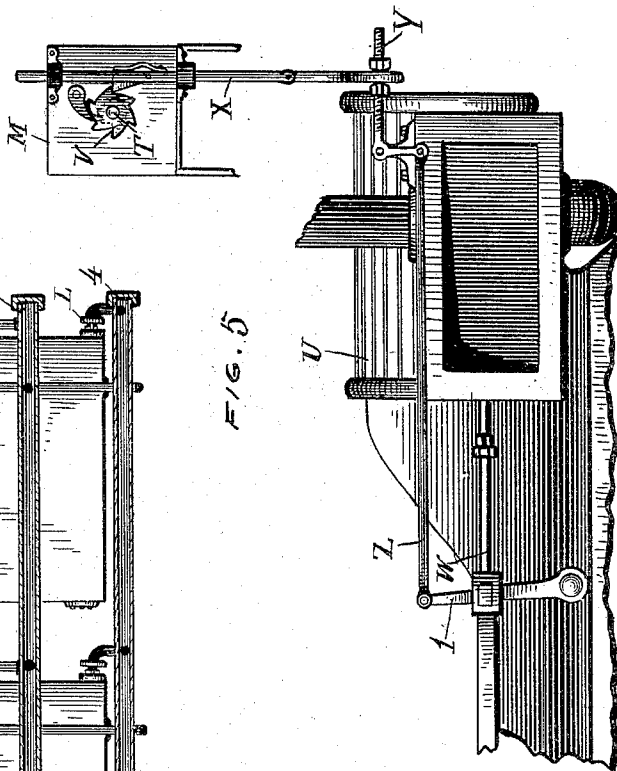
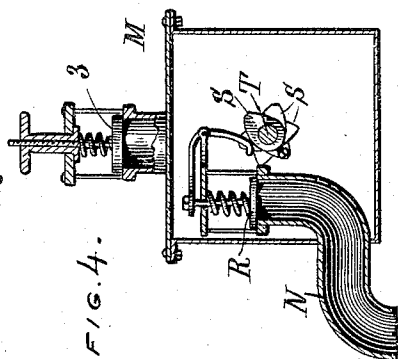


FIG. 4.



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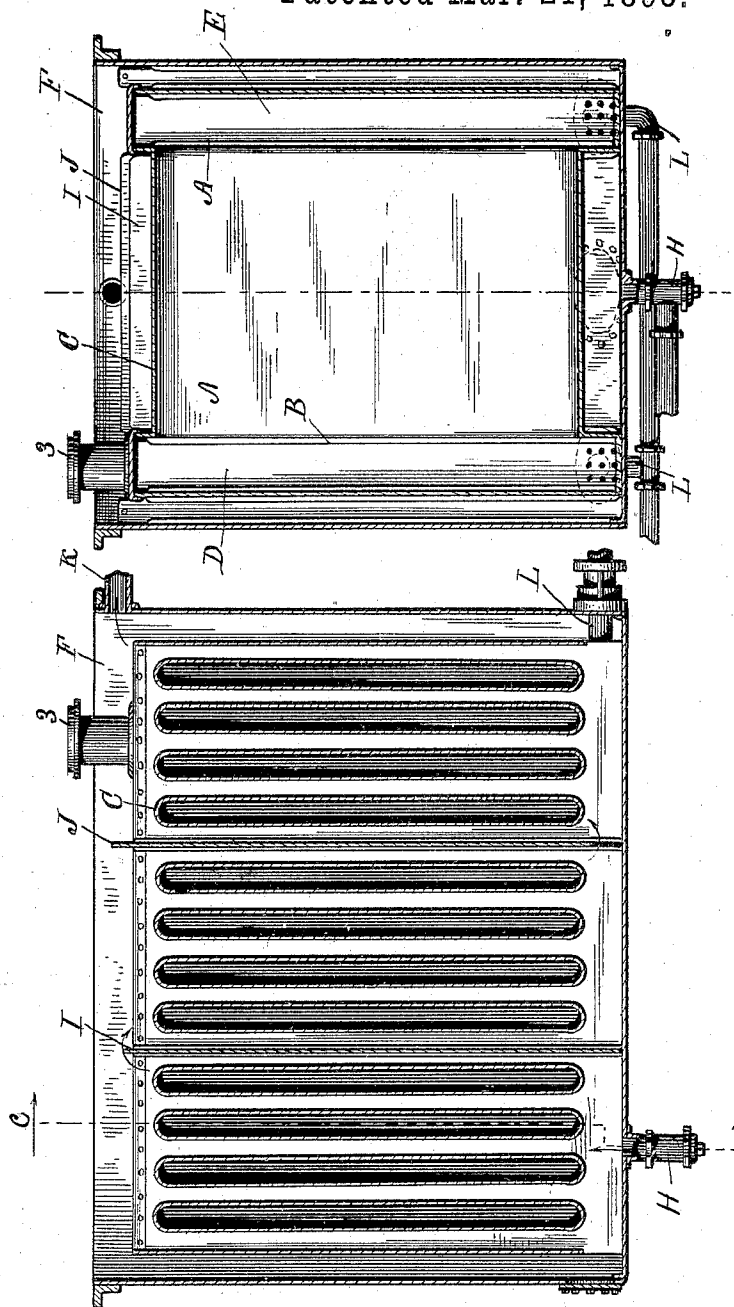
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FIG. 7.

FIG. 6.



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UNITED STATES PATENT OFFICE.

FRED L. MCGAHAN, OF INDIANAPOLIS, INDIANA.

APPARATUS FOR CONDENSING EXHAUST-STEAM.

SPECIFICATION forming part of Letters Patent No. 493,733, dated March 21, 1893.

Application filed December 14, 1892. Serial No. 455,194. (No model.)

To all whom it may concern:

Be it known that I, FRED L. MCGAHAN, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented a new and useful Apparatus for Condensing Exhaust-Steam, of which the following is a specification.

My invention relates to an improved apparatus for condensing the exhaust-steam from a steam engine.

The object of my invention is, to provide, in connection with a steam engine and a series of condensing chambers, means whereby the exhaust steam from said engine shall be discharged into each of the several condensers of the series in regular succession, all as hereinafter fully set forth.

The accompanying drawings illustrate my invention.

Figure 1 represents a plan of the condensing apparatus and the engine. Fig. 2 represents an end elevation. Fig. 3 is a vertical section at *a*—Fig. 1. Fig. 4 is a transverse section on an enlarged scale at *b*—Fig. 1. Fig. 5 is a partial side elevation of the engine and exhaust chamber. Fig. 6 is a central longitudinal section of one of the condensing chambers. Fig. 7 is a transverse section at *c*—Fig. 6.

In the drawings A and B represent a pair of steam-tight chambers, connected by a series of flattened tubes C, and each having transverse partitions D, and E, whereby steam entering one of the chambers at one end is forced to pass to the opposite chamber through tubes C, and thence backward and forward through said tubes until it has passed to the opposite end of the opposite chamber.

Chambers A and B, and their connecting tubes C, are mounted in tank F, through which is established a current of cold water which passes into the bottom of the tank through a supply pipe H. Tank F is provided with transverse partitions I, and J, and said partitions are so arranged that the water entering through pipe H fills one end of the tank and passes over partition I, thence under partition J, and out through the discharge pipe K.

The chambers A and B are each provided at one end with a pipe L, through which the condense-water collecting in the chamber is discharged into a central pipe 4. A series of

condensers thus formed is arranged in pairs on opposite sides of an inclosed chamber M, with which connection is made through branch pipes N. The water supply pipes H of all of the tanks F are connected with a central supply pipe O, and all of the discharge pipes K are similarly connected with a central discharge pipe P. Each of the branch pipes N, is provided, within the steam chamber M, with a trip-valve R, which is operated by means of a tappet S, secured to a shaft T, which is mounted in suitable bearings and extends the entire length of the chamber, projecting through the end thereof next the engine U. Mounted upon the projecting end of shaft T, is a ratchet wheel V. Motion is imparted to ratchet-wheel V and shaft T, at each movement of the slide-valve-stem W, by means of a sliding pawl X, the bell-crank lever Y, connecting-rod Z, and lever 1. A tappet S is provided for each of the trip-valves R and their arrangement on shaft T is such that the valves are tripped in succession, commencing with that nearest the engine. The exhaust steam passes from the engine into chamber M, through the exhaust pipe 2.

Steam chamber M is provided with a safety valve 3, and each of the steam chambers B, is provided with a similar valve.

In operation, the exhaust-steam passing from the engine fills chamber M. At each forward and backward movement of the slide-valve-stem on the engine, shaft T is turned, thus opening one of the trip-valves R and allowing the exhaust-steam to pass from chamber M into one of the condensers. At the next stroke of the engine, steam is admitted to the next of the series of condensers and so on continuously. By this means, the steam entering either of the series of condensers is entirely condensed, under ordinary circumstances, before another charge is admitted. The condense-water flows through the pipes L, and 4, to a suitable reservoir where it is collected for ice making or other purposes.

I claim as my invention—

1. In an apparatus for condensing steam, the combination of a series of steam condensers, a steam chamber having branch pipes extending to each of said condensers, a trip-valve mounted at the entrance of each branch-pipe, a revoluble shaft, intermediate connect-

ing mechanism connecting said shaft and said trip-valves whereby the valves are successively opened by the revolution of the shaft, and means for revolving the shaft.

5 2. In an apparatus for condensing exhaust steam from a steam-engine, the combination of a series of steam-condensers, the steam-chamber having branch pipes extending to each of said condensers, the trip-valves mounted at the entrance of said branch pipes, and

intermediate connecting mechanism connecting a regularly moving part of the engine, as the valve-stem, and said trip-valves, whereby said valves are operated in succession at each successive stroke of the engine, substantially as set forth.

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