

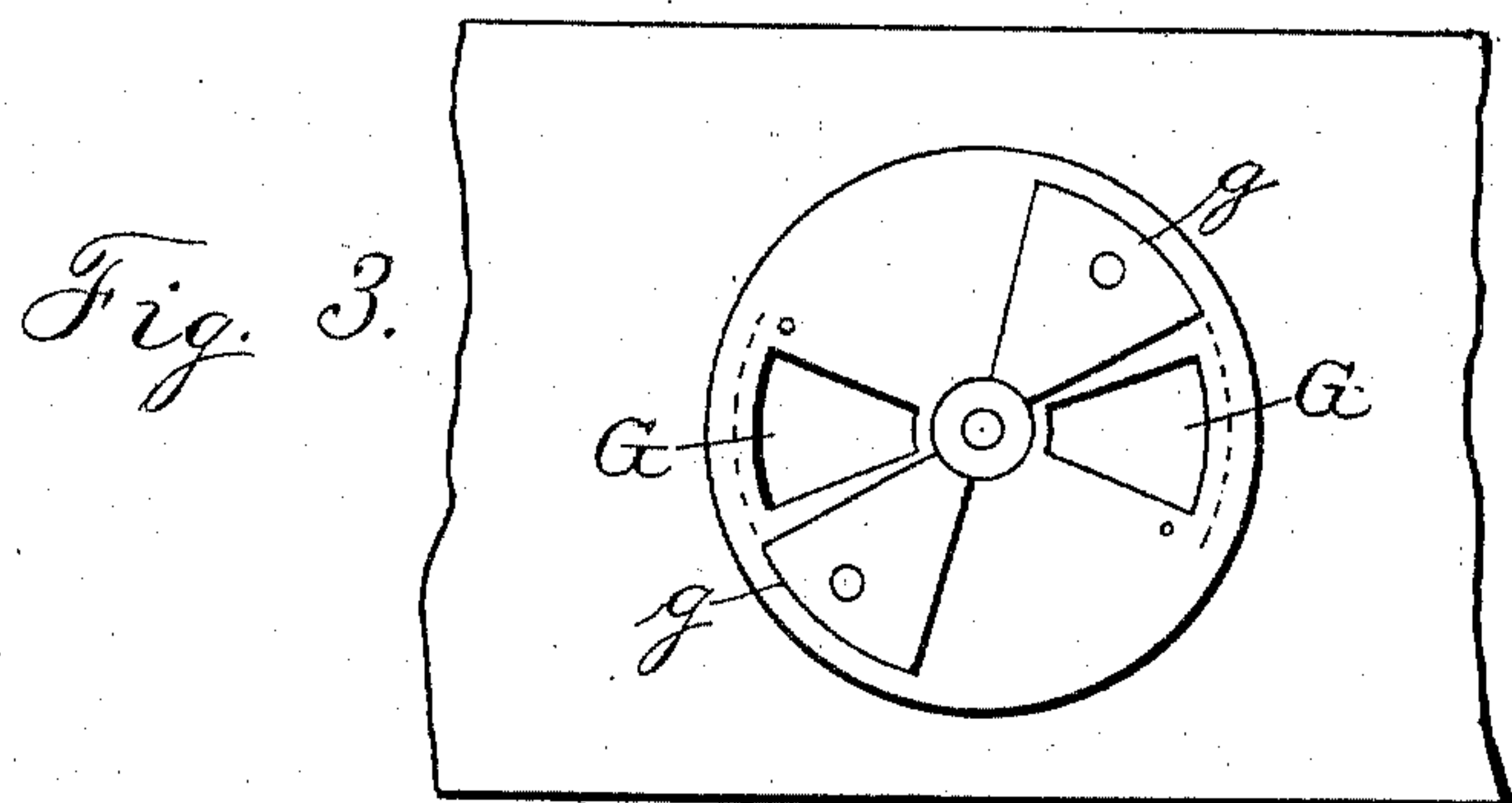
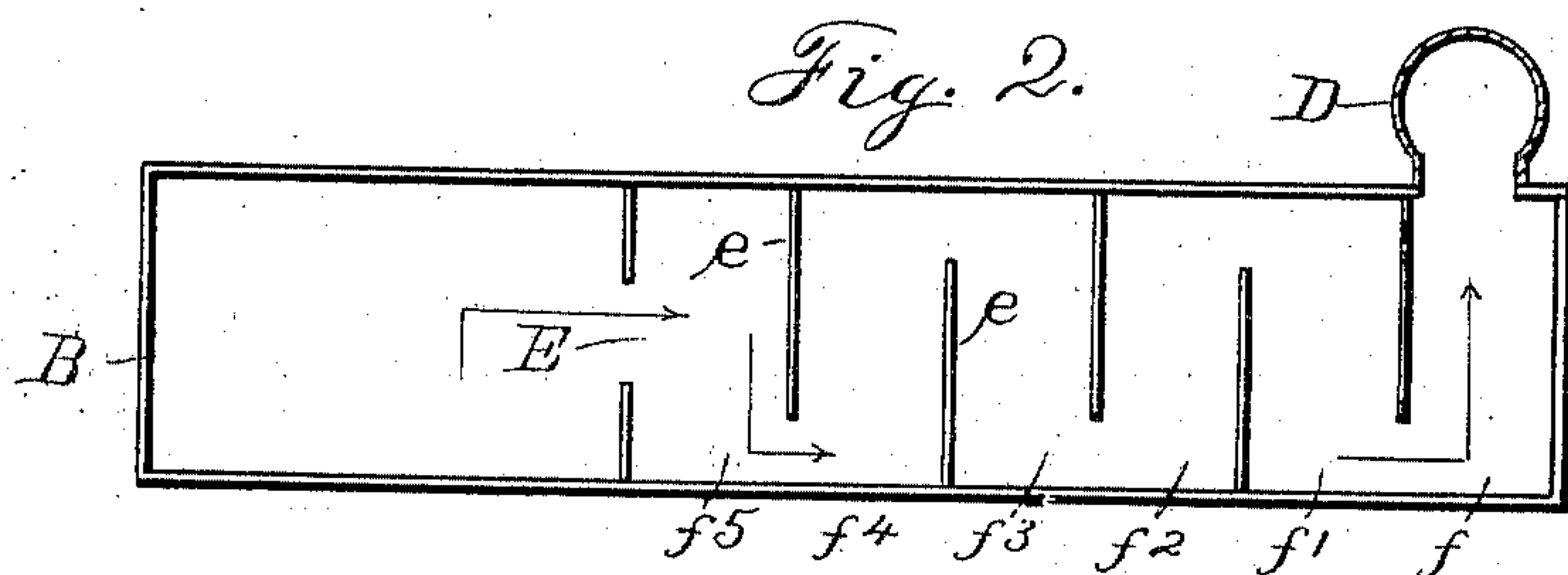
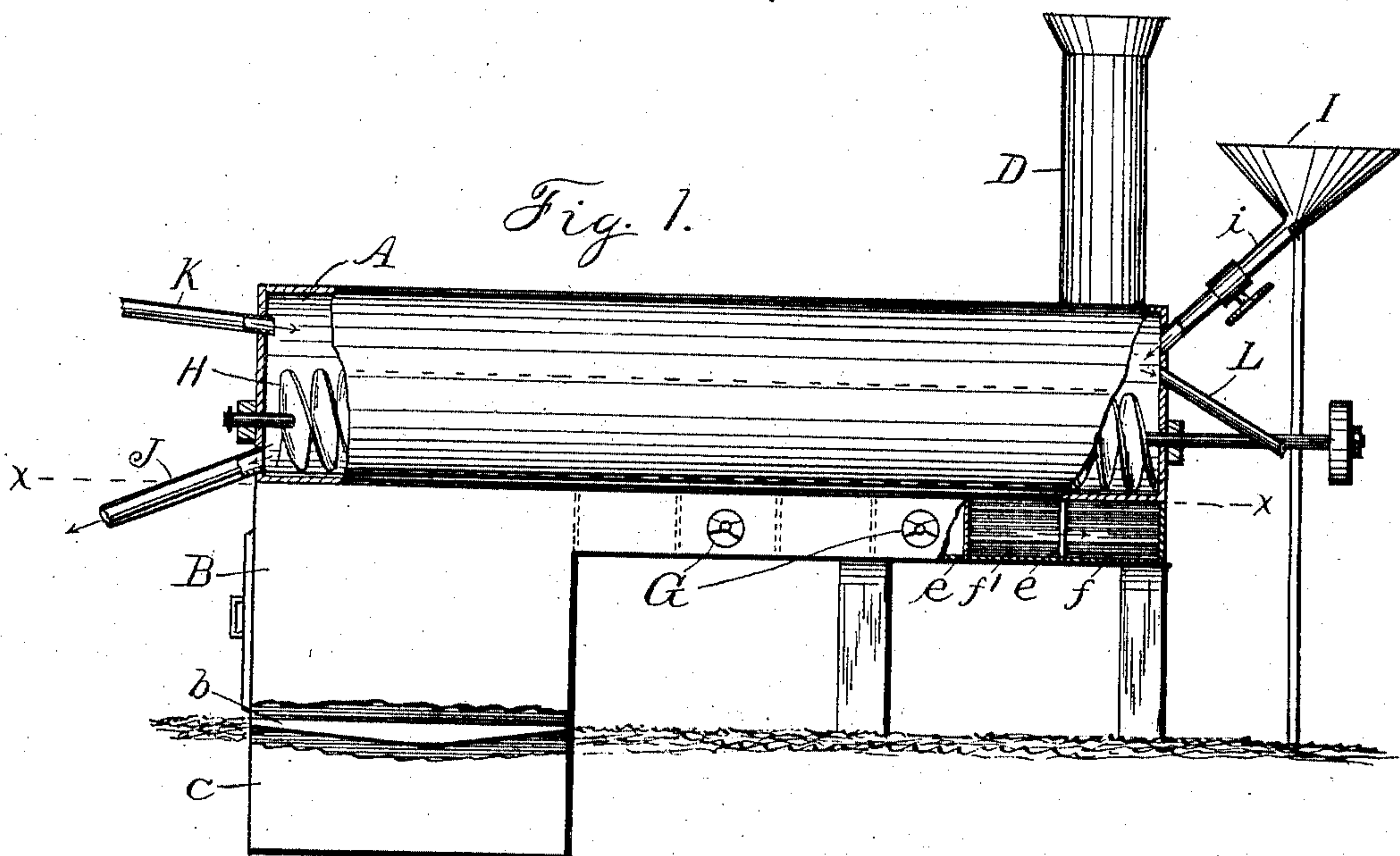
No. 759,988.

PATENTED MAY 17, 1904.

S. L. HAGUE.
RETORT.

APPLICATION FILED MAY 18, 1903.

NO MODEL.



WITNESSES:

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SNYDER L. HAGUE, OF SALT LAKE CITY, UTAH.

RETORT.

SPECIFICATION forming part of Letters Patent No. 759,988, dated May 17, 1904.

Application filed May 18, 1903. Serial No. 157,722. (No model.)

To all whom it may concern:

Be it known that I, SNYDER L. HAGUE, a citizen of the United States, residing at Salt Lake City, in the county of Salt Lake and State of Utah, have invented new and useful Improvements in Retorts, of which the following is a specification.

My invention is a mechanical apparatus for extracting oils from rock or shale containing hydrocarbons in solid form which volatilize at different temperatures. In order to successfully accomplish this, it is essential that the heat should be applied at graded temperatures and that this gradation of temperatures should be under the control of the operator.

In treating shales petroleum-ether, the lightest of all the oils, is evolved at a low temperature. At higher temperatures the heavier oils, and finally at very high temperatures the waxes, are vaporized. Thus in order to prevent destructive distillation of the lighter oils, which ensues in a high temperature, and to extract all the oleaginous and ceraceous values from the shale without injury to any of them I have invented the apparatus illustrated in the accompanying drawings.

Letters of reference are used to denote the various features of the invention, similar letters denoting corresponding parts in the several views.

In the drawings, Figure 1 is a side elevation of the invention, partly in section. Fig. 2 is a plan of a part of the same on line *x x* of Fig. 1, and Fig. 3 is an enlarged face view of an air-valve.

The letter A indicates a retort of any desired shape, but preferably made as shown, being a horizontal cylinder. B is a furnace or fire-box under one end of this retort, having a grate *b* and an ash-pit *c*. D is a smoke-stack at the other end of the retort, but not connected with its interior.

E is a heat and smoke flue passing from the fire-box B beneath the retort A and opening into the stack D. In its passage through the flue E the heated air is diffused and directed from side to side by the deflectors *e e*, extending alternately from either side of the flue E and forming cross-flues *f f' f² f³ f⁴ f⁵*.

These flues may be multiplied to any desired extent. G G are orifices to admit cool air into the cross-flues, and *g g* are valves to regulate the inflow of air at these openings G.

H is a screw conveyer in the lower part of the retort, journaled in the ends of the latter and having a connection with actuating power.

I is a hopper to receive the shale, which must be previously pulverized, and *i* is a conduit to convey the shale into the retort at the end farthest from the fire.

J is a conduit at the lower part of the retort at the end nearest to the fire, through which the exhausted residue is expelled.

K is a pipe by which a jet of steam is forced into the heated end of the retort to drive the vapors out through a pipe L leading to a condenser, where the oils are separated by any of the usual processes.

In operation a fire is started in the furnace B, the conveyer H is set in motion, and the pulverized material is fed into the hopper I. Steam is also turned on at the pipe K. As the shale enters the retort over the flue *f* it encounters the lowest degree of heat, which should be about 70° centigrade, at which temperature petroleum-ether is evolved. Here it is continually turned and gradually moved along into contact with a higher temperature over flue *f'* and parts with its oil, which volatilizes at that temperature. The steam-jet meantime is driving the vapors out through pipe L to the condenser. Thus the operation proceeds, until above *f⁵* and immediately over the furnace the highest degree of heat is applied, and the heaviest oils and the wax are vaporized, the residue passing out through the waste-conduit J. The temperatures of the several flues are regulated by admitting air at the valves *g g*.

The drawings exemplify the preferred form in which my principle is applied; but I do not limit myself to the exact construction here shown.

Having now described my invention, what I claim is—

An apparatus for extracting oil from shale comprising a horizontal retort, a furnace beneath one end of said retort, a series of con-

nected flues extending beneath said retort from the furnace to a smoke-vent, air-valves in said flues, a revolving conveyer to move the shale from the cooler to the hotter end of
5 said retort and a steam-jet to drive the vapors from the hotter toward and out through a vent in the cooler end of the retort, as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SNYDER L. HAGUE.

Witnesses:

Mrs. JESSE JAMES,
CATHERINE H. HARLAN.