

No. 751,058.

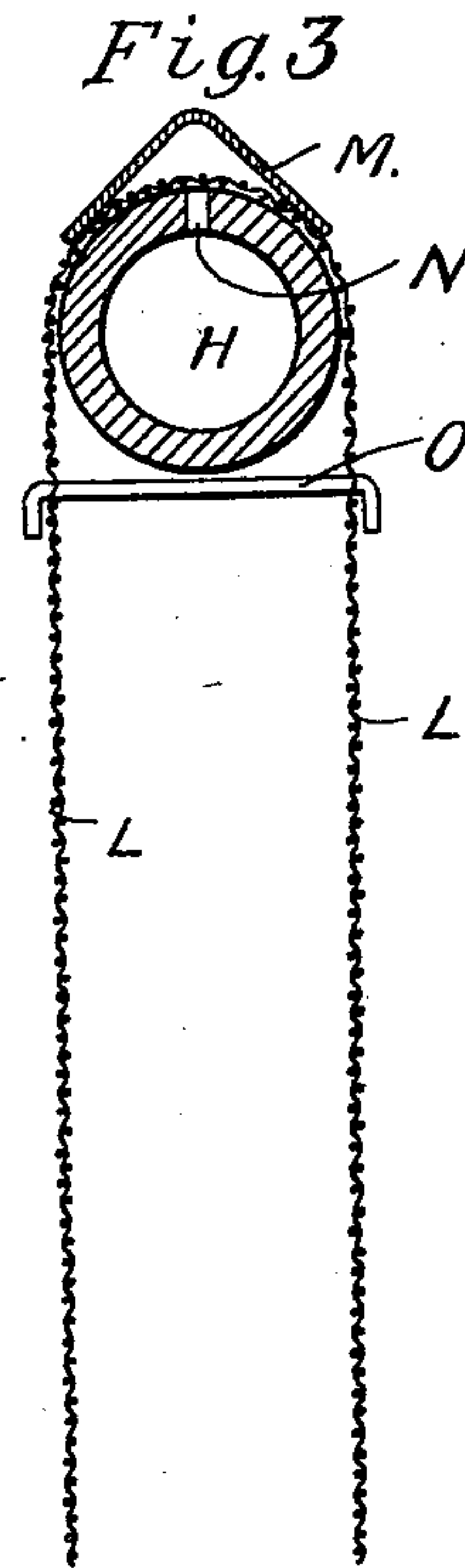
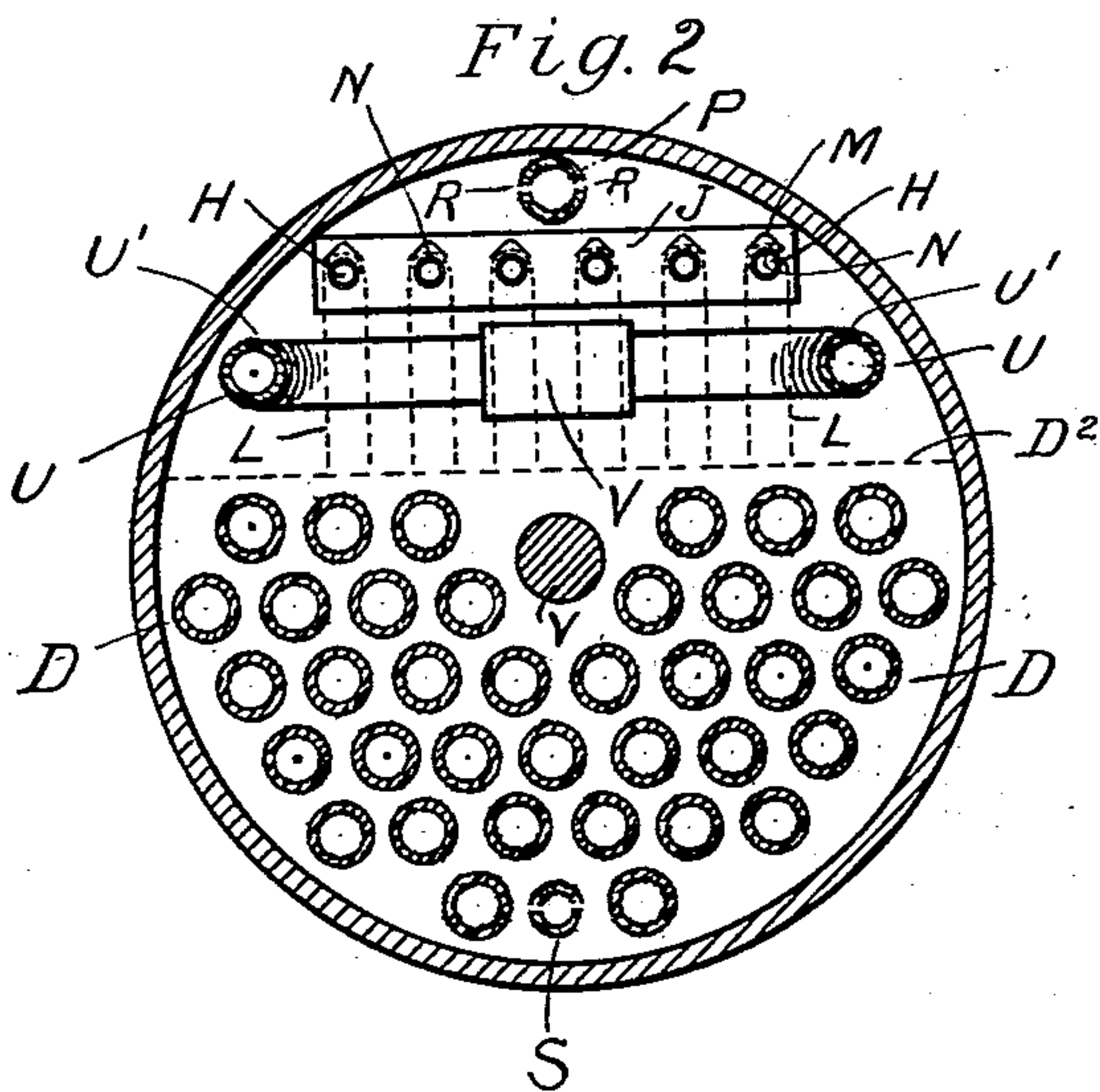
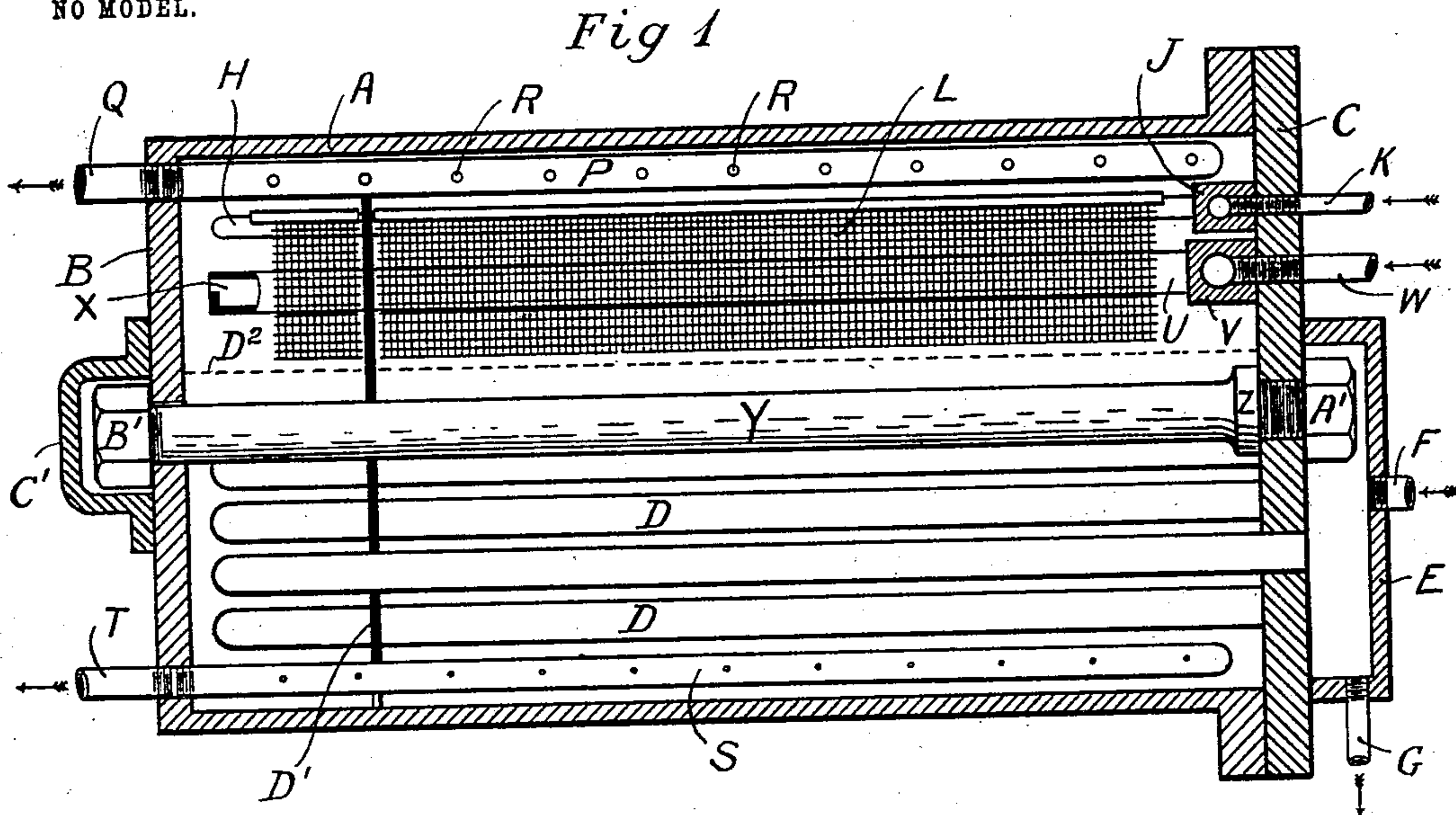
PATENTED FEB. 2, 1904.

R. J. CRACKNELL.
AMMONIA STILL.

APPLICATION FILED AUG. 30, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses
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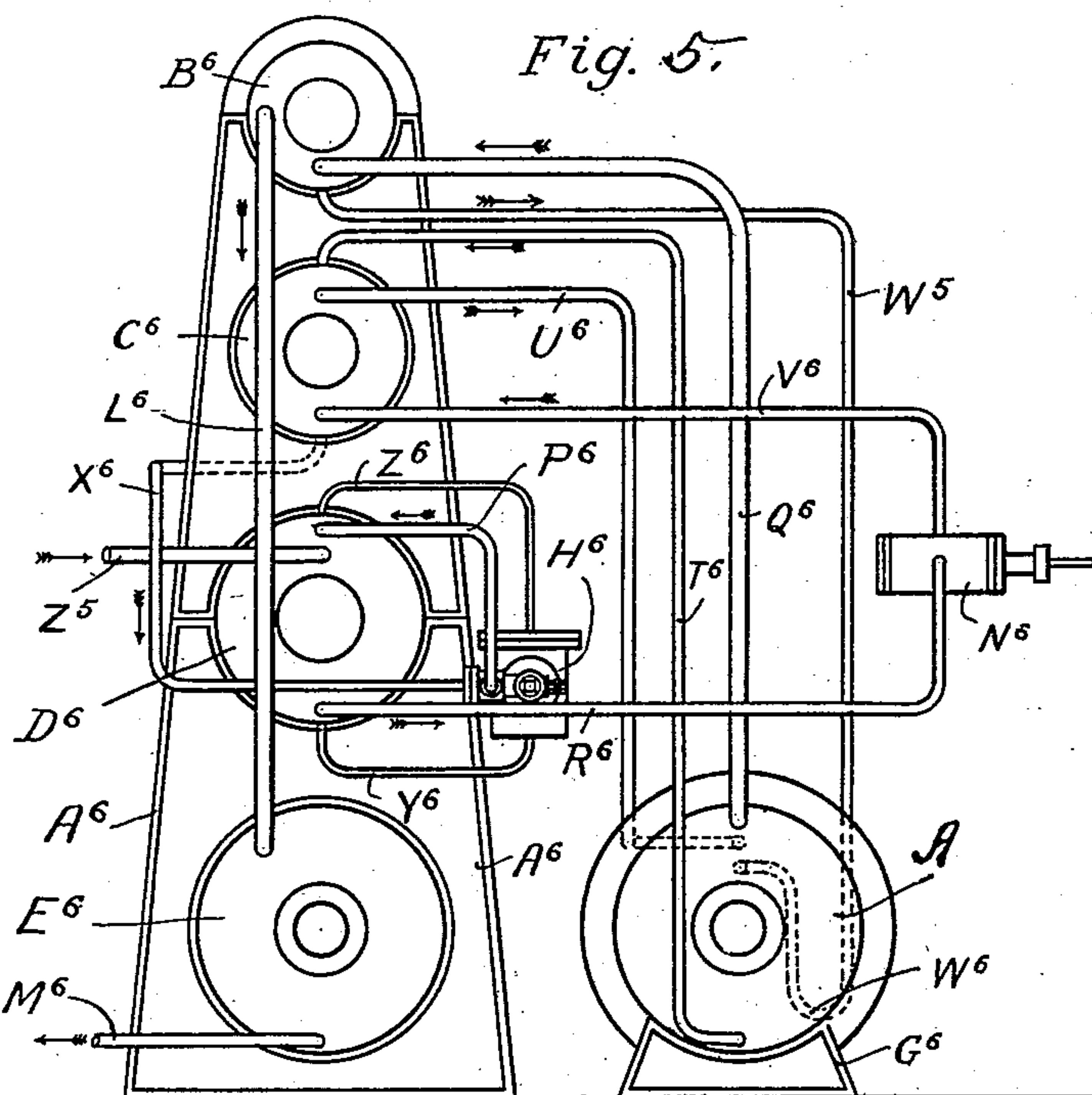
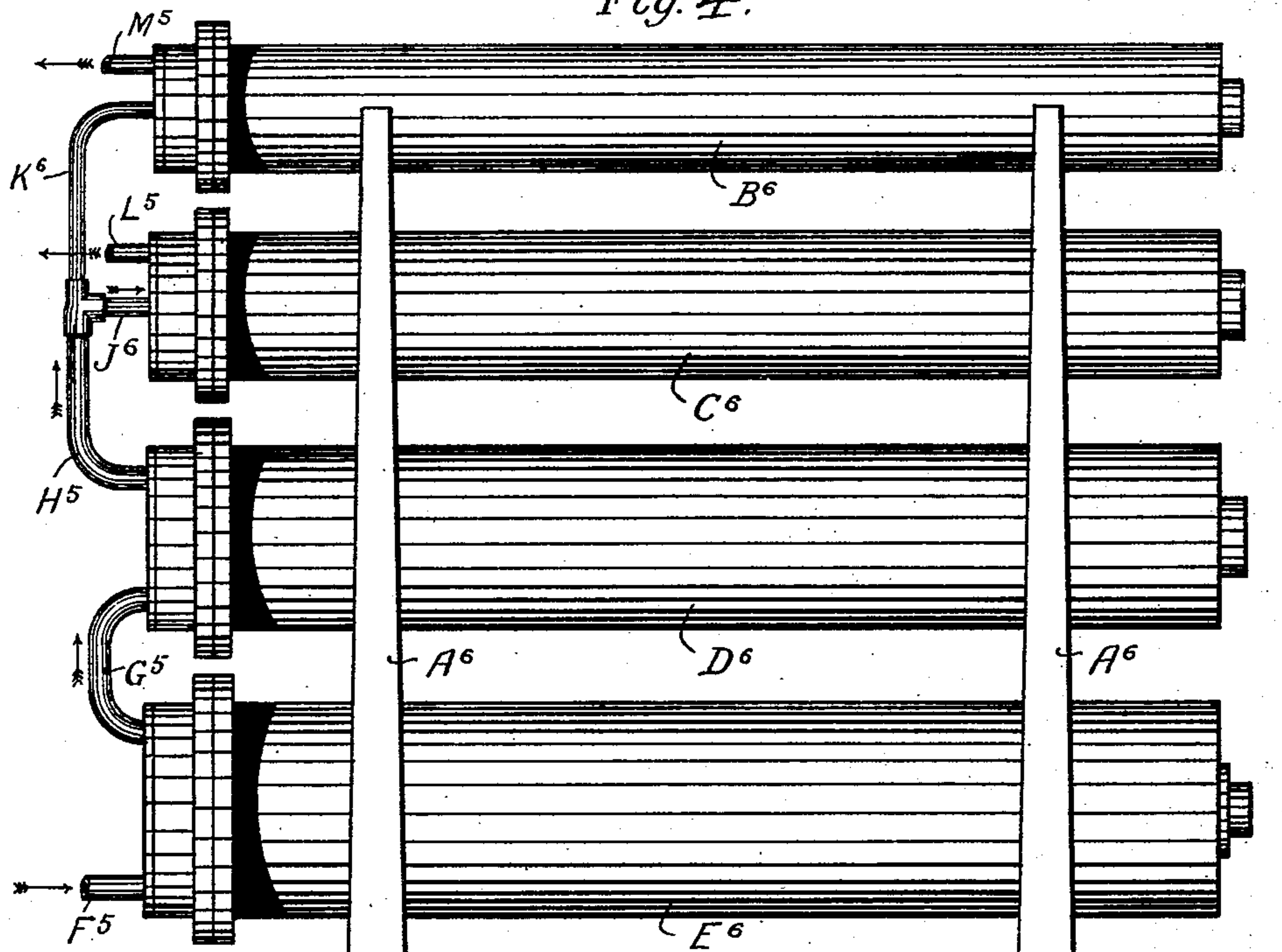
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NO MODEL.

Fig. 4.

2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

RICHARD J. CRACKNELL, OF STREATHAM, ENGLAND.

AMMONIA-STILL.

SPECIFICATION forming part of Letters Patent No. 751,058, dated February 2, 1904.

Application filed August 30, 1902. Serial No. 121,662. (No model.)

To all whom it may concern:

Be it known that I, RICHARD JOHN CRACKNELL, engineer, a subject of the King of Great Britain, residing at 5 Farnan road, Streatham, in the county of Surrey, England, have invented certain new and useful Improvements in Ammonia-Stills, of which the following is a specification.

This invention which relates to ammonia-absorption refrigerating-machines has for its object to simplify and reduce the cost of construction of machines of this type.

My invention comprises certain detail improvements in the construction of the generator or still.

The invention will be clearly understood with the aid of the accompanying drawings, in which—

Figure 1 is a longitudinal section of the generator. Fig. 2 is a transverse section of the same, and Fig. 3 is an enlarged section of one of the perforated pipes with wire-gauze and hood used thereon. Figs. 4 and 5 show by a front and side view, respectively, a system of refrigerating devices with which my generator is employed.

Referring to the drawings, which show my improved generator, A is a cylindrical vessel, preferably with one end, B, welded in and the other end, C, bolted on.

D D are tubes running nearly the whole length of the cylindrical vessel A, screwed or expanded into the end C and closed at the other end. A cover E is bolted to the end C over the ends of the tubes D.

H H are perforated pipes arranged in line, as shown in Fig. 2, closed at one end and fixed into a header J at the other end, the header being connected to the supply-pipe K. The perforations in the pipes H are on the upper side, as shown at N in Figs. 2 and 3. On each of the pipes H is hung a curtain or screen of iron wire-gauze L, above which is a hood or canopy M, attached to the wire-gauze at intervals, preferably by means of solder. Pieces of wire O may be passed through the wire-gauze below the pipes H to prevent the gauze from lifting or getting displaced.

In the generator above the hoods or canopies M is a perforated pipe P, connected to a

supply-pipe Q at one end and closed at the other end, the perforations being preferably along each side, as shown at R in Figs. 1 and 2. Along the bottom of the generator is another perforated pipe S, connected to a pipe T at one end and closed at the other end, the perforations in this pipe being also at the sides. Other pipes U U, with perforations U' U' on the upper side, are provided fixed into a toe-piece V, the latter being connected to the supply-pipe W. These pipes U U are curved outwardly from their connection with the toe-piece V, as shown in Fig. 2. The perforations in these pipes U should be comparatively large and close together. In fact, the upper half of these pipes might be cut away or troughs or gutters substituted for them. The other ends of these pipes U are partly closed, as shown at X in Fig. 1, the upper half of the diameter being left open.

A tie-bolt Y, having a shoulder Z, is screwed and jointed into the end C of the generator, with a nut A' outside. The other end of the tie-rod Y passes freely through the end B and has a nut B' outside. Over the nut B' is a cap C', bolted to the end B.

The whole of the closed-ended tubes, the perforated tubes, and the tie-bolt pass through and are supported by one or more transverse tube-plates D'.

The generator is filled to the level D² with liquor ammoniæ, and a gage-glass is fixed in the usual way to show the level of the ammonia liquor, also a pressure-gage. The pipes H should be high up in the cylindrical vessel A, as shown, and the wire-gauze screens should reach down to the liquor-level D². These pipes H, with wire-gauze and hoods, take the place of the usual arrangement of plates or trays called an "analyzer." The strong ammonia liquor is pumped through the heater and enters by the pipe K into the perforated pipes H, whence it passes through the perforations into the hoods M, which throw it down onto the wire-gauze on both sides of the pipe H, over which it flows down in a thin sheet or film into the body of liquor in the generator. In flowing down over the wire-gauze it meets with the ascending hot ammonia-gas mixed with some watery vapor driven off from the liquor

in the generator by the heat of the steam in the tubes D. It is thus heated up and some of the ammonia which it contains is evaporated and passes on with the ascending ammonia-
 5 gas. At the same time part of the watery vapor contained in the ascending gas is condensed and falls back into the generator. The ammonia-gas and any watery vapor not condensed passes through the perforated pipe P
 10 and outlet Q to a rectifier, wherein it is further cooled and the remaining watery vapor condensed. The latter, holding a large amount of ammonia in suspension, returns from the rectifier by the pipe W, whence it passes into the per-
 15 forated pipes U, and when they are half filled it overflows at the other end X. In passing along these pipes it is heated up by the ascending ammonia-gas and watery vapor, and some of the ammonia which it contains is
 20 driven off through the perforations U' U', and at the same time part of the watery vapor in the ascending ammonia-gas is condensed on the outside of the tube U. The weak liquor leaves the generator through the perforated pipe S
 25 and outlet-pipe T and passes to the heater. The steam for heating the generator is admitted by the pipe F and passes into the tubes D. The steam condensed therein runs back into the cover E, whence it is drained off by
 30 pipe G through a steam-trap. (Not shown.)

Referring to the general arrangement shown in Figs. 4 and 5, A⁶ A⁶ are cast-iron supports carrying the rectifier B⁶, heater C⁶, absorber D⁶, and condenser E⁶. The cooling
 35 water enters by the pipe F⁵, passes through the closed-ended tubes in the lower half of the condenser E⁶, then through those in the upper half, then by the pipe G⁵ through the tubes in the lower half of the absorber D⁶,
 40 and then through those in the upper half and out by the pipe H⁵, when it divides, part of it passing by the pipe J⁶ through the tubes in the heater C⁶ and to waste by the pipe L⁵, the other part passing by the pipe K⁶ through
 45 tubes in the rectifier B⁶ and to waste by the pipe M⁵. When the temperature of the cooling water is high, a double supply may be used, one supply being used for condenser and rectifier and another supply for absorber
 50 and heater. In Fig. 5 the generator A, supported on stools G⁶, the weak-liquor-regulating valve H⁶, and the ammonia connecting-pipes are shown.

The ammonia-gas, with some watery vapor,
 55 passes from the generator A by the pipe Q⁶ to the rectifier B⁶, the condensed vapor being returned from the latter by the pipe W⁵, which must be trapped, as shown, at W⁶. The dry ammonia-gas passes on by the pipe
 60 L⁶ to the condenser E⁶, where it is liquefied, and then passes by the pipe M⁶ through an expansion-valve to the cooler or refrigerator coils, which are not shown in the drawings.

It is there evaporated in the usual way, and the gas returns by the pipe Z⁵ to the absorber
 65 D⁶. The weak liquor passes by the pipe T⁶ from the perforated pipe in the bottom of the generator to the heater C⁶, where it is cooled, and then passes by the pipe X⁶ to the weak-
 70 liquor-regulating valve H⁶, then by the pipe P⁶ to the absorber, where it meets the ammonia-gas entering by the pipe Z⁵, the two combining and forming strong ammonia
 75 liquor. The latter passes through the pipe R⁶ to the suction of the ammonia-pump, and which delivers it through the pipe V⁶ into the tubes in the heater C⁶, where it is heated up
 80 and passes out by the pipe U⁶ into the perforated pipes in the generator, flowing down over the wire-gauze screens, as already explained.

The weak-liquor-regulating valve H⁶ is connected to the top of the absorber by the pipe Z⁶ and to the bottom by the pipe Y⁶, so that the level of the liquor round the float in the
 85 regulator is the same as in the absorber.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. In ammonia-absorption refrigerating machinery of the continuous type, a generator
 90 provided with pipes for the admission of the strong liquor having perforations along their upper sides, canopies or hoods arranged on said pipes above said perforations, and screens
 95 or curtains of wire-gauze suspended on said pipes and depending below, substantially as described and for the purpose stated.

2. In ammonia-absorption refrigerating machinery of the continuous type, a generator
 100 provided with pipes for the admission of the strong liquor having perforations along their upper sides, canopies or hoods arranged above said perforations, screens of reticulated material extended above said perforations and
 105 depending below the pipes, and perforated tubes disposed below said tubes and partially closed at their inner ends for the admission of the liquid contents in the rectifier.

3. In ammonia-absorption refrigerating machinery of the continuous type, a generator
 110 provided with pipes for the admission of the strong liquor having perforations along their upper sides, canopies or hoods arranged on said pipes above said perforations, and screens
 115 or curtains of wire-gauze suspended on said pipes and depending below, and a perforated pipe disposed above said canopies, as and for the purpose specified.

In testimony whereof I have hereunto set my hand, in presence of two subscribing wit-
 120 nesses, this 19th day of August, 1902.

R. J. CRACKNELL.

Witnesses:

JOSEPH LACHE,
 E. D. BAUM.