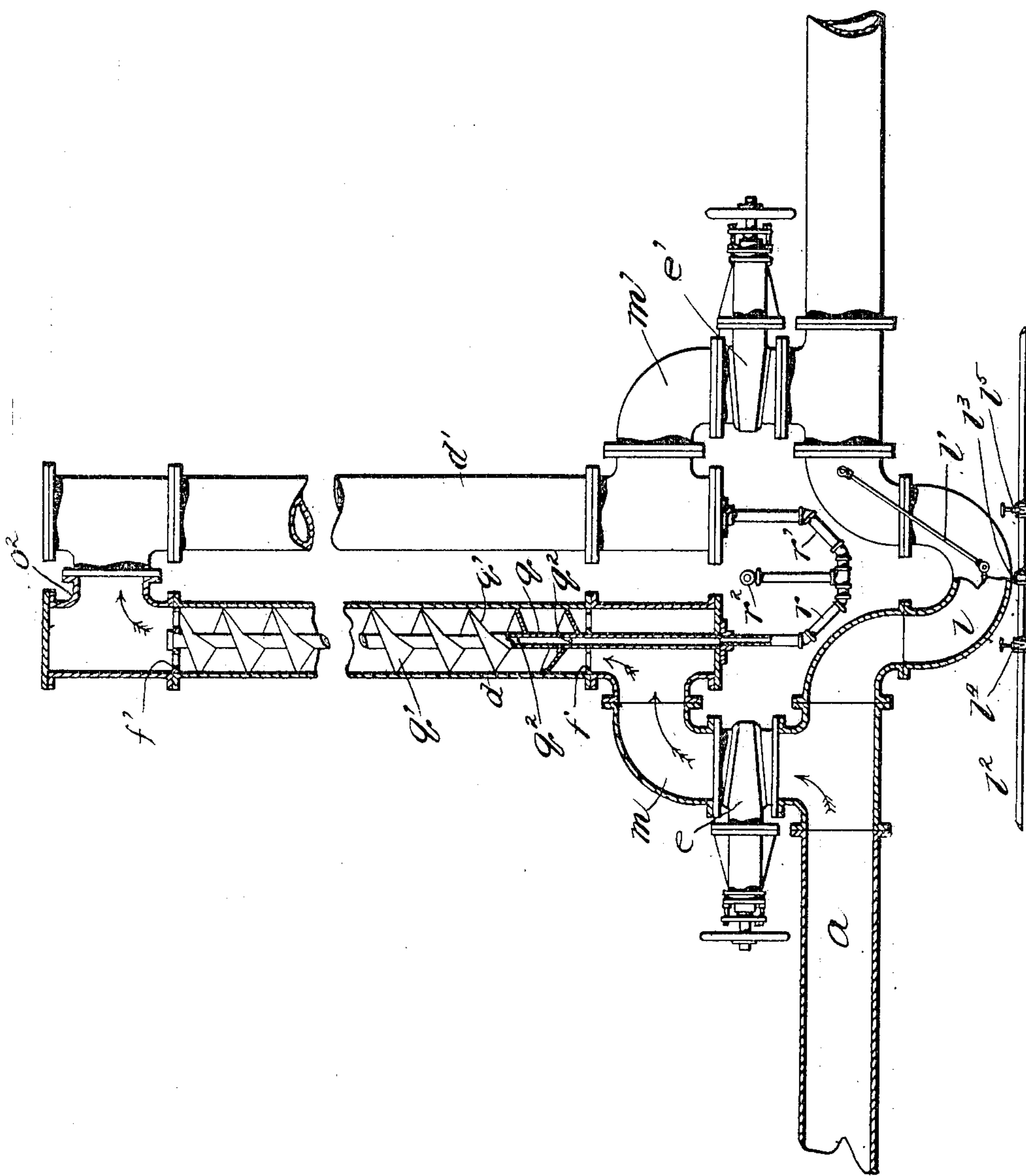


No. 798,667.

PATENTED SEPT. 5, 1905.

H. L. DOHERTY.  
TAR EXTRACTOR.

APPLICATION FILED FEB. 2, 1904.



Witnesses  
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# UNITED STATES PATENT OFFICE.

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## TAR-EXTRACTOR.

No. 798,667.

Specification of Letters Patent.

Patented Sept. 5, 1905.

Application filed February 2, 1904. Serial No. 191,670.

*To all whom it may concern:*

Be it known that I, HENRY L. DOHERTY, a citizen of the United States, residing at Madison, Dane county, and State of Wisconsin, have invented certain new and useful Improvements in Tar-Extractors, of which the following is a specification.

Crude gas as it passes through the main contains a great number of minute globules or vesicles of tar or oily matter, and some of these may or may not contain a small volume of gas. It is necessary that these tarry globules or vesicles be subjected to a considerable degree of friction, sufficient at least to break them up in order that the gas may be liberated and the tar liquefied and deposited. The deposition of the tar cannot be accomplished by merely passing the gas through a series of mains, extensive though they may be, as a considerable degree of friction is required in order that the tarry globules or vesicles be broken up.

My invention relates to an extractor for doing this.

Heretofore centrifugal tar-extractors have been used; but these revolve.

In the best form of the present invention relating to tar-extractors there are no moving parts whatever, as such motion is imparted to the gas as to cause the tarry particles, globules, or vesicles which have a greater density than the gas to be immediately forced against the interior surfaces of the apparatus, and thus be subjected to the necessary friction and impact.

Not only is it the object of the present invention to remove the tar, which in its pure state is composed entirely of a number of hydrocarbons of varying density, but also to remove any solid matter suspended in or carried by the gas in the shape of impurities.

The present invention consists of certain features of construction and combinations of parts to be hereinafter described and then particularly claimed with reference to the accompanying drawing, which shows three desirable forms of the invention, and in which drawing the figure is a view partly in elevation and partly in vertical section, its right-hand side being in elevation and its left in vertical section.

Referring to the figure, the gas-main *a* has inserted within its length a trap *b*, to be hereinafter described, while at opposite sides of the trap and connected with the main are elbow-couplings *m m'*, which are controlled by

means of suitable valves *cc'*. From the couplings *m m'* extend branch pipes or conduits *d d'*, which at their outer ends are connected at *o*. By means of the valves *cc'* the by-pass- 60 ing of the gas around the columns *d d'* is controlled. Suitably secured within the ends of the pipe *d* are spiders or skeleton frames *f f'*, in central sockets of which are inserted coincident with the axis of the pipe or conduit *d* 65 the tubular shaft *q* of the screw *q'*. This shaft is closed at its upper end and is open at its lower end, where it communicates, by means of branches forming a tar seal *r r'*, with a discharge-pipe *p*. The screw-blade slants to- 70 ward the center, forming inverted-cone-shaped surfaces over which the liquid may run in all directions toward the center, and the edge of the blade is in contact with the inner cylindrical surface of the pipe or conduit *d*. Small 75 holes or perforations *q''* are made in the tubular shaft or axis of the screw, so that the tar which is deposited on the blade and the inside surface of the pipe or conduit may after first flowing down to the tube pass through 80 the said holes or perforations and down the interior of the tube. A suitable dam is formed behind each hole for the purpose of causing the tar to dam up, and thus be forced into the holes. As there is a differential pressure in 85 the gas between the top and bottom parts of the screw, a small amount of gas will leak into the tube *q* through the holes or perforations *q''* at the bottom and out of the holes at the top.

The water seal *l* referred to is provided with 90 two water-gage glasses to show the different heights of the water in the seal. But one of the glasses *l'* is shown at the right-hand side of the figure, the other being omitted from the left-hand side, for being a section it is im- 95 possible to show the left-hand glass. A pipe *l''* at the bottom of the water seal is connected at *l'* with the same and is provided at opposite sides of the said connection with valves *l' l'*. One valve—say *l'*—is to be connected 100 to water-supply under pressure, while the other valve—say *l'*—is connected to waste. By opening valve *l'*, for instance, the water in the seal can be entirely withdrawn, while by closing said valve and opening the valve 105 *l'* the water-level in the seal can be increased. The object of the described water seal is to prevent any undue back pressure of gas in case the pipe should become stopped up, and it therefore forms an automatic by-pass. 110

The described apparatus can be employed either with coal-gas or water-gas plants for



the purpose of removing tar and other solid matter in the shape of impurities.

Having thus described my invention and without limiting myself to details or enumerating equivalents other than those illustrated, what I claim as new, and desire to secure by Letters Patent, is—

1. In a tar-extractor, the combination of a gas-conduit, a column or branch pipe connected thereto, and a screw or helix in the column having a pitch downward and inward forming inverted-cone-shaped surfaces.

2. In a tar-extractor, the combination of a gas-conduit, a column or branch pipe connected thereto, and a screw or helix in the column provided with a tubular shaft open at the bottom and having apertures for drawing off tar, the screw-blade having a pitch downward and inward forming inverted-cone-shaped surfaces.

3. In a tar-extractor, the combination of a gas-conduit, a column or branch pipe connected thereto, and a screw or helix in the column, means for passing the gas around said column, and a water seal for said by-pass.

4. In a tar-extractor, the combination of a gas-conduit, a column or branch pipe connected thereto, a screw or helix in the column, and a tar seal connected to said column.

5. In a tar-extractor, the combination of a gas-conduit, columns or branch pipes connected thereto, screws or helices in said columns,

and pipes connecting the lower portions of the columns forming a tar seal.

6. In a tar-extractor, the combination of a gas-conduit, a column or branch pipe connected thereto, spiders or skeleton frames secured in the upper and lower portions of said column, a screw or helix in the column provided with a tubular shaft, supported by said spiders and closed at the top and open at the bottom, said shaft having apertures in its sides for drawing off tar, and the screw-blade having a pitch downward and inward forming inverted-cone-shaped surfaces.

7. In a tar-extractor, the combination of a gas-conduit, a column or branch pipe connected thereto, spiders or skeleton frames secured in the upper and lower portions of said column, a screw or helix in the column provided with a tubular shaft, supported by said spiders and closed at the top and open at the bottom, said shaft having apertures in its sides for drawing off tar, and the screw-blade having a pitch downward and inward, and means for by-passing the gas round said column.

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

HENRY L. DOHERTY.

Witnesses:

R. B. SULLIVAN,  
EUGENE Y. SAYER.