No. 832,469. PATENTED OCT. 2, 1906.

H. A. FLEUSS.

APPARATUS FOR THE SEPARATION OF OIL AND GREASE FROM WATER.

APPLICATION FILED DEC. 2, 1905.

4 SHEETS—SHEET 1.

Fig. 1.

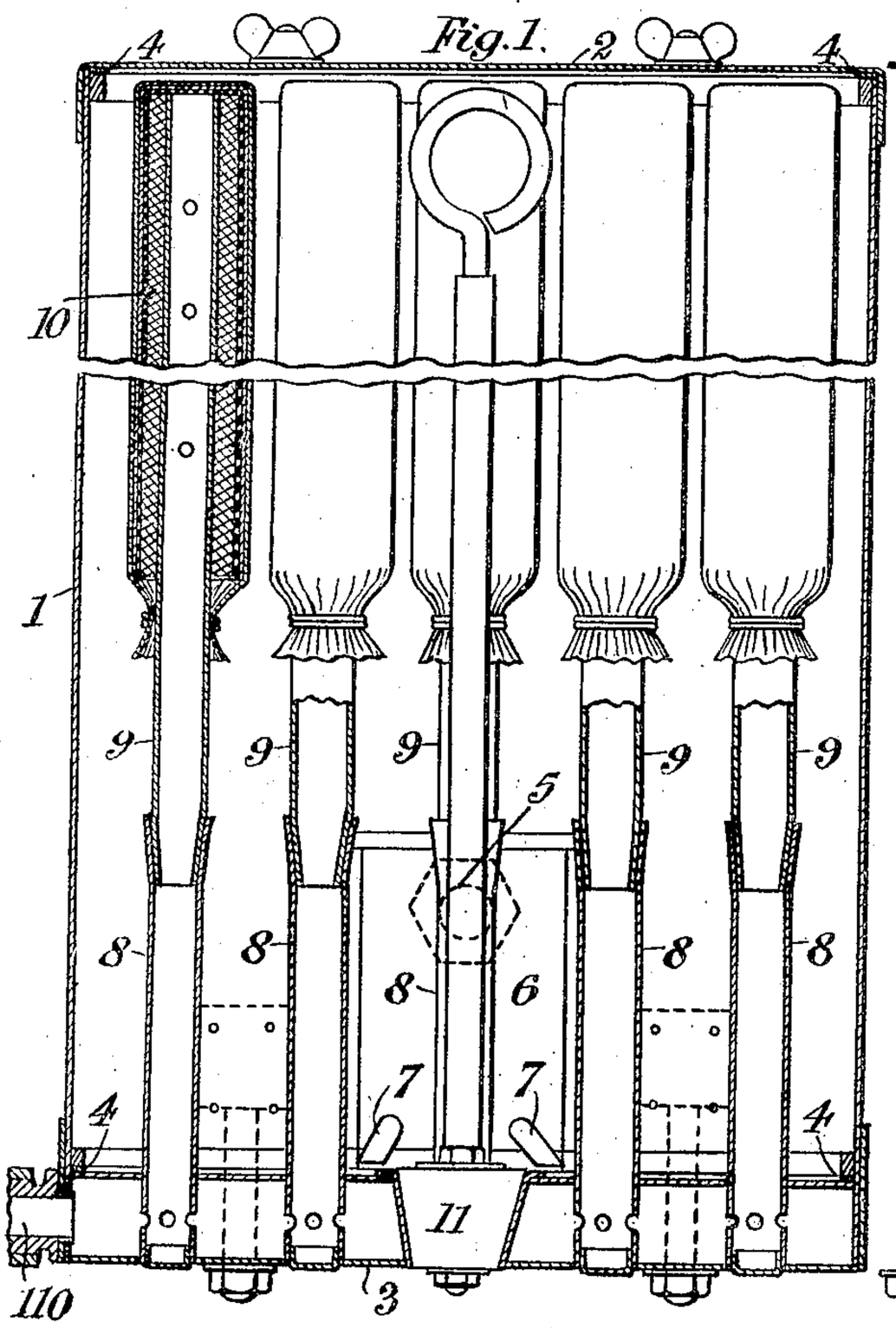


Fig. 2.

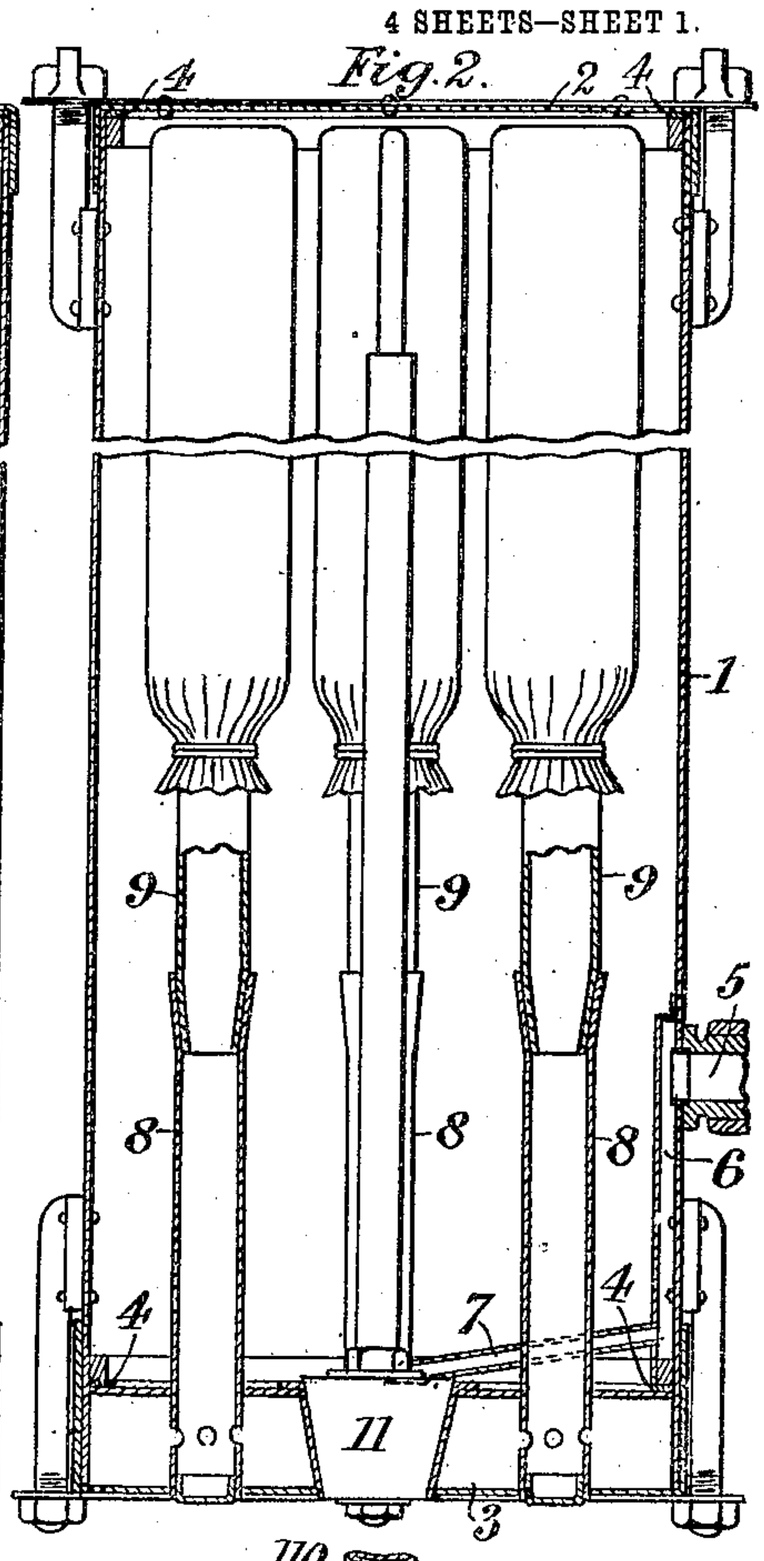
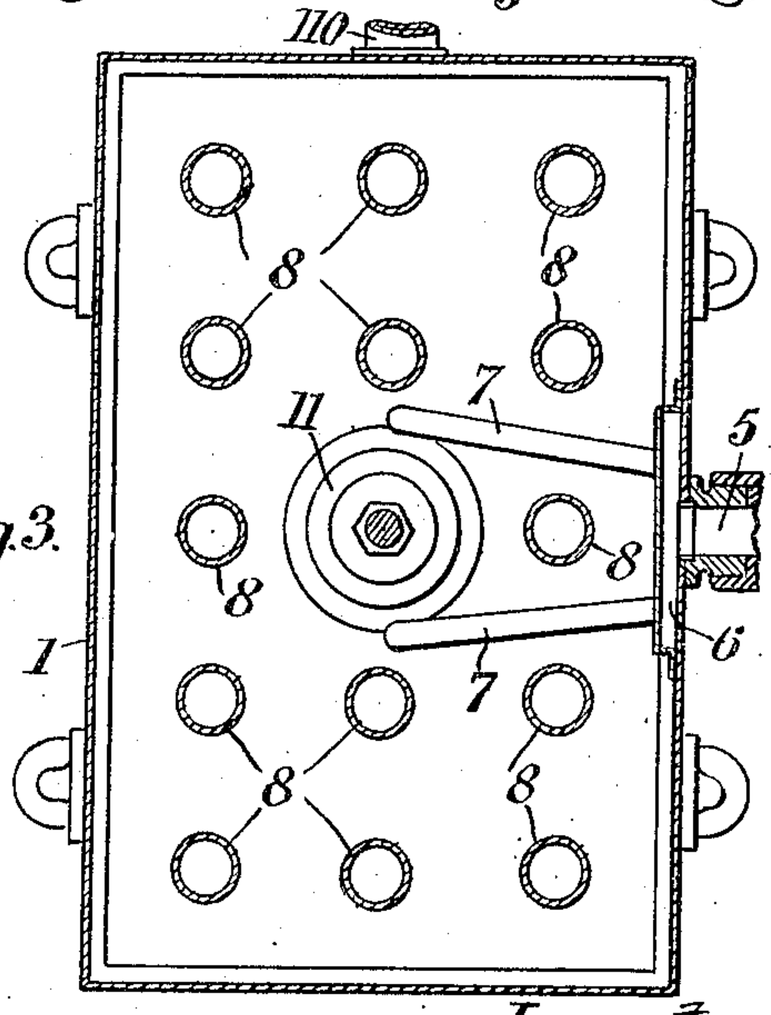


Fig. 3.



Witnesses
C. B. Burner.
K. Fanning

Inventor
H. A. Fleuss,
By his attorneys,
Baldwin Wright

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H. A. FLEUSS.

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4 SHEETS—SHEET 2.

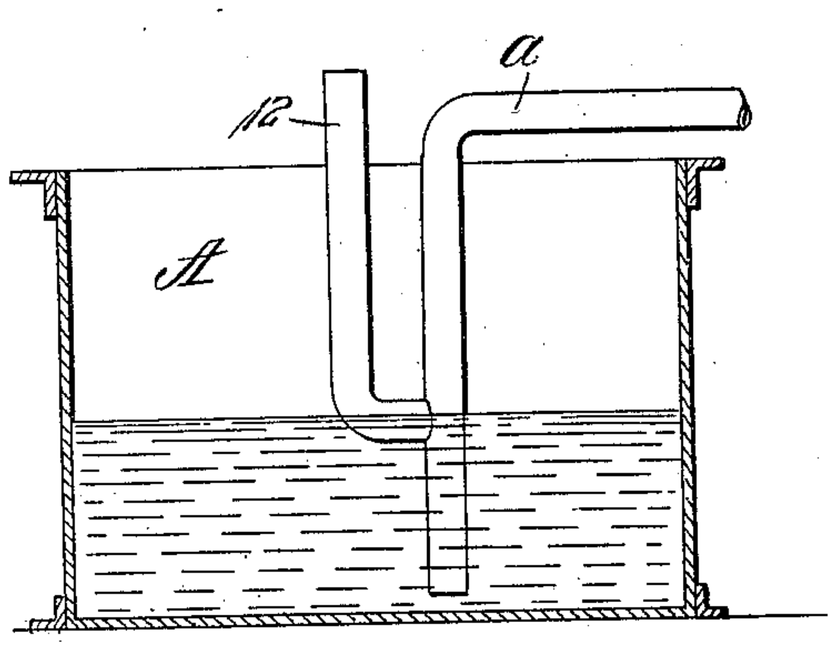


Fig. 4.

Fig. 5.

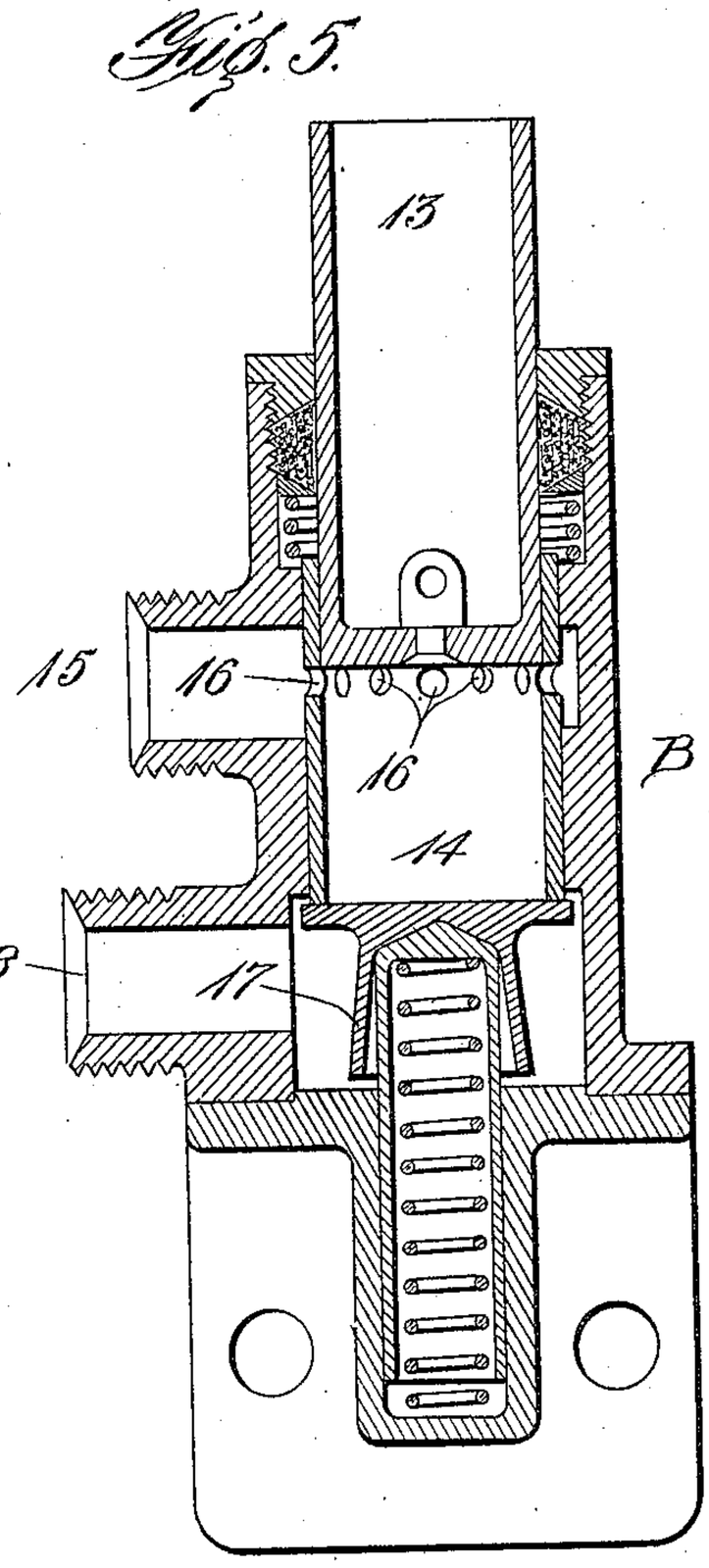
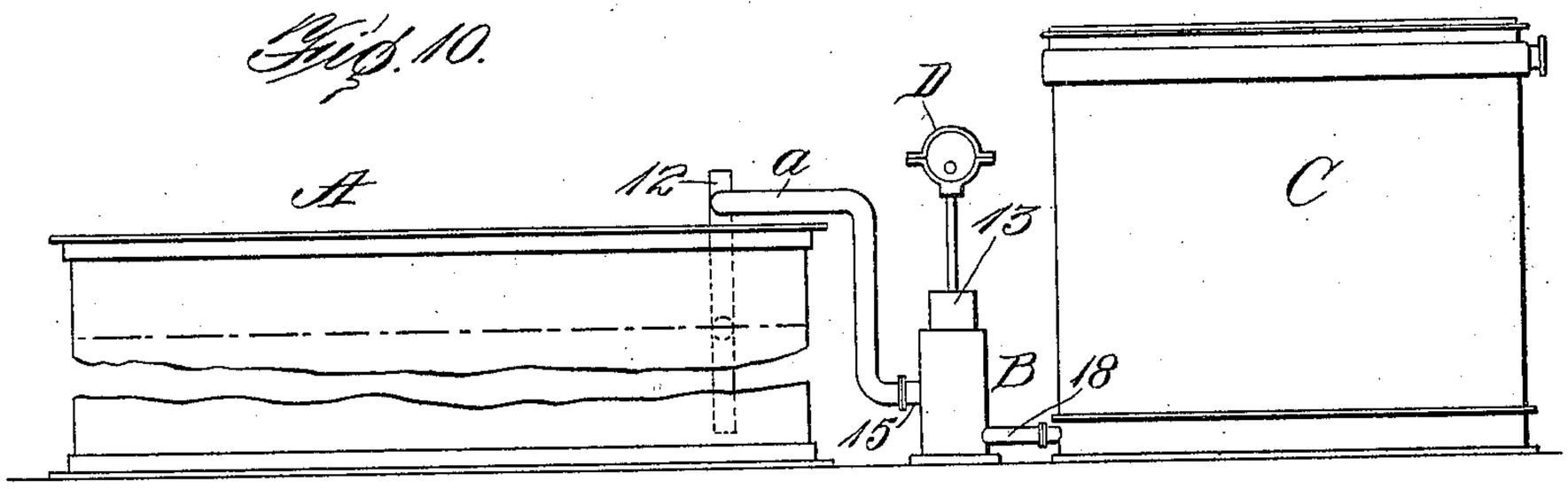


Fig. 10.



Witnesses:
Paul J. Gathmann.
M. Silian Adams.

Inventor:
Henry A. Fleuss.
By his Attorneys:
Baldwin Wight.

No. 832,469. PATENTED OCT. 2, 1906.

H. A. FLEUSS.

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4 SHEETS—SHEET 3.

Fig. 6.

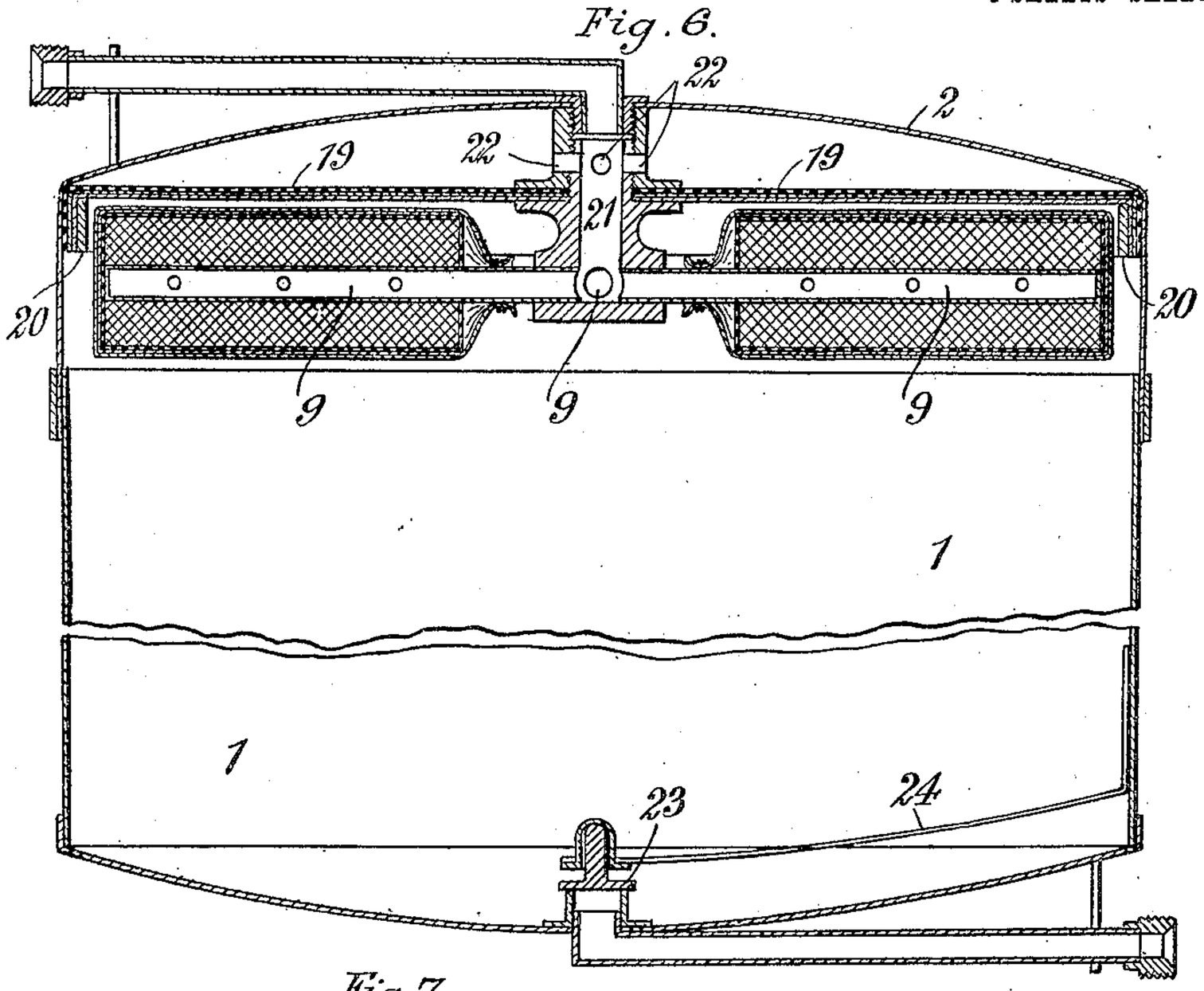
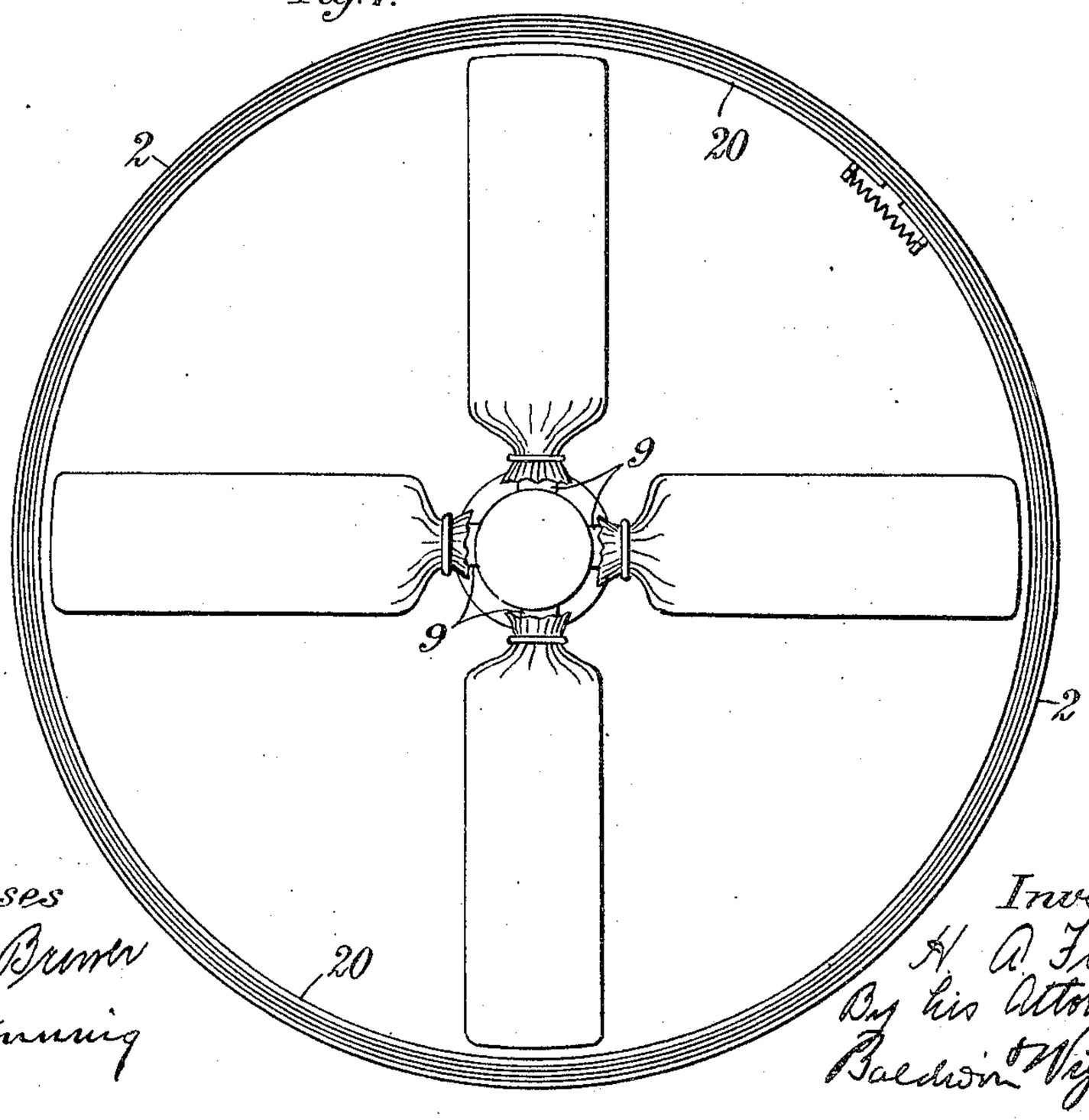


Fig. 7.



Witnesses
C. B. Burns
K. Fanning

Inventor
H. A. Fleuss,
By his Attorneys
Baldwin & Wight.

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H. A. FLEUSS.

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4 SHEETS—SHEET 4.

Fig. 8.

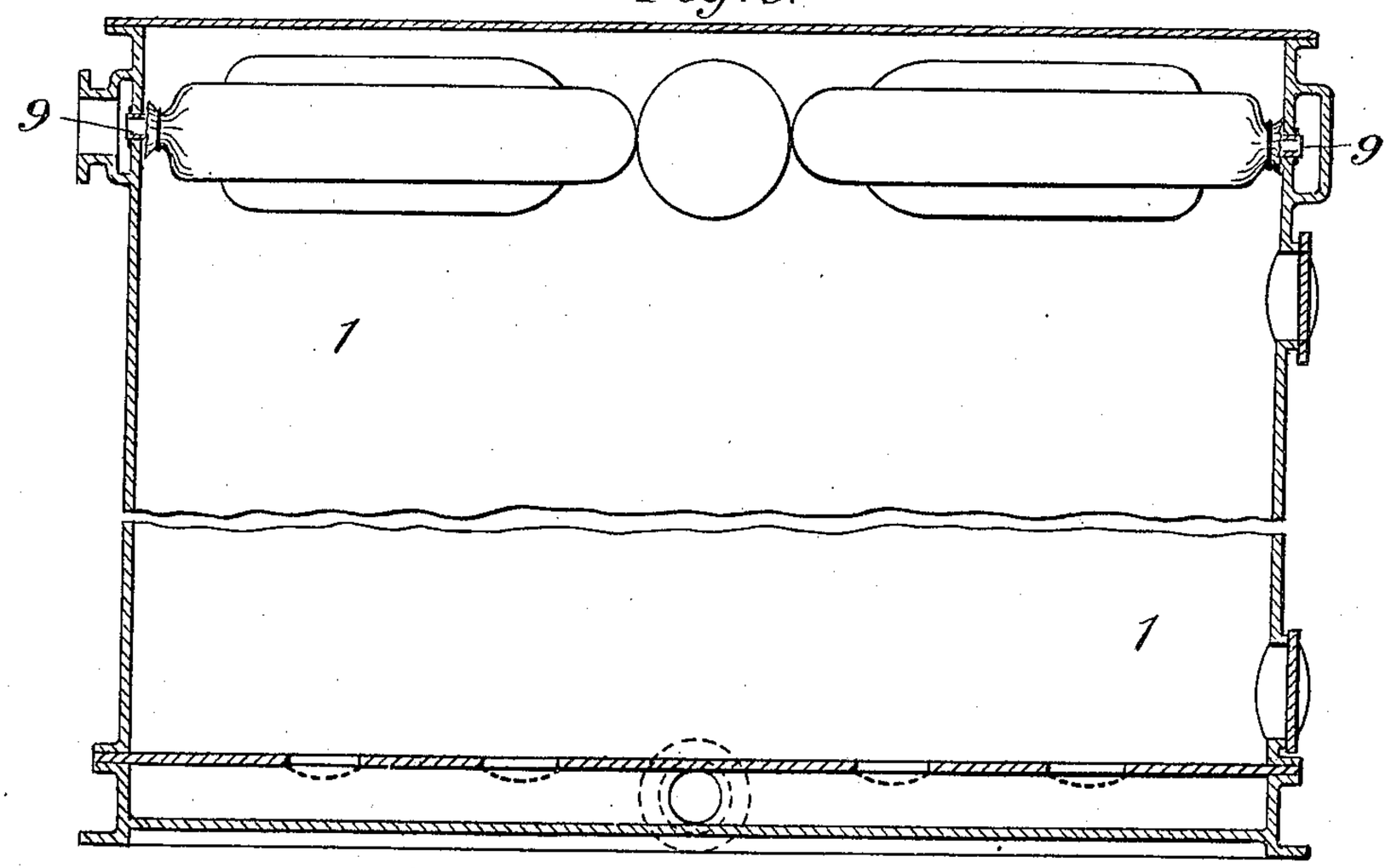
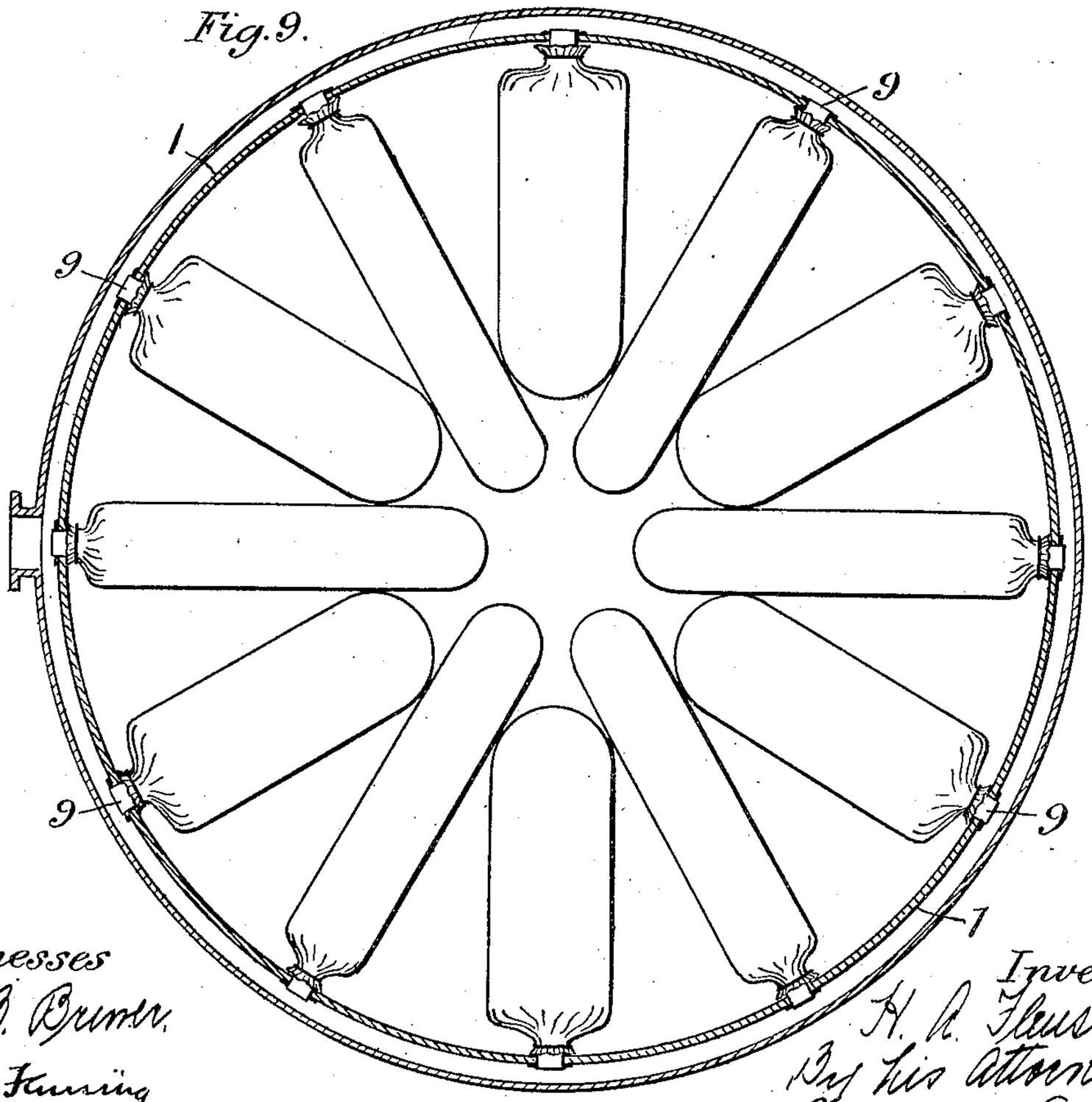


Fig. 9.



Witnesses
C. B. Burdett.
K. Fanning

Inventor
H. A. Fleuss.
By his Attorneys.
Baldwin & Wight.

UNITED STATES PATENT OFFICE.

HENRY A. FLEUSS, OF READING, ENGLAND.

APPARATUS FOR THE SEPARATION OF OIL AND GREASE FROM WATER.

No. 832,469. Specification of Letters Patent. Patented Oct. 2, 1906.

Application filed December 2, 1905. Serial No. 290,014.

To all whom it may concern:

Be it known that I, HENRY ALBERT FLEUSS, engineer, a subject of the King of Great Britain, residing at 14 Trebor Terrace, London Road, Reading, in the county of Berks, England, have invented certain new and useful Improvements in Apparatus for the Separation of Oil and Grease from the Condensed Water of Steam-Engines and the Like, of which the following is a speeification.

In apparatus constructed according to this invention for separating oil and grease from the condensed water of steam-engines and the like by bringing the water into contact with finely-divided oil or grease absorbing or retaining substances these substances and the water are kept in a state of agitation and the water is separated from such absorbing or retaining substances without arresting the agitation.

The absorbent materials I prefer to employ are either ashes of coal, coke, or wood or powdered coke on account of cheapness; but carded asbestos or the sweepings of an abestos factory act very efficiently. Chalk or even lime, either alone or admixed with other materials, such as ashes, can also be used if the water contains no carbonic acid; but any absorbing material which is appreciably soluble and would carry back into the boiler a chalky or earthy deposit or other matters which would be injurious to steam-boilers should be avoided.

The drawings annexed show apparatus suitable for separating oil and grease from condensed water by the above process.

The apparatus shown at Figs. 1, 2, and 3 is adapted for being used on a steam motor-car. Figs. 1 and 2 are vertical sections, and Fig. 3 a horizontal section. Figs. 4 and 5 are sections of the pump-suction and pump which I prefer to employ for enabling the impure water and the oil or grease absorbing or retaining substances with which the water is brought into contact to be kept in a state of continuous agitation by pumping in compressed air together with the impure water into the separator. Fig. 6 is a vertical section, and Fig. 7 a plan, of a modified form of the separator in which the filter-tubes used to prevent the oil or grease absorbing or retaining substances from being carried away along with the water are mounted horizontally within the upper part of the separator. Fig. 8 is a vertical section, and Fig. 9 a horizontal section, of another modified form of the separator in which horizontal filter-tubes at the top of the separator open into an annular outlet-passage by which the upper part of the separator is surrounded. Fig. 10 is a diagram (with parts broken away) illustrating a hot-well, a pump, and an oil-separator in series.

1 is a vertical casing closed at top and bottom by top and bottom lids 2 and 3, held in place by bolts and nuts, as shown, and the joints made fluid-tight by interposed washers 4. The water to be acted on is supplied to the lower part of the casing 1 through the inlet 5, passage 6, and downwardly-extending distributing-pipes 7.

The bottom lid 3 is, as shown, made hollow and has pipes 8, which open into and extend upward for a distance from it. At the top they are formed into sockets to receive the lower ends of tubes 9, the upper ends of which are perforated and each surrounded by a wire-gauze cylinder 10, around the exterior of which is lapped asbestos cloth and outside this a wrapping of flannel, as shown. The water filters through these wrappings and descends by the tubes 9 and pipes 8 into the hollow bottom 3 and passes away by the outlet-pipe 110. The casing 1 is filled with the ashes of coal, coke, or wood or with finely-powdered coke or chalk, so as to practically surround and embed the filtering-cylinders.

11 is a plug closing a passage through the double bottom 3. The absorbent material can be let out from the casing through this opening and fresh material filled in by removing the upper lid.

The condensed water from which oil and grease is to be separated I supply to the separator by a pump from a hot-well or tank, into which the condensed water is delivered from the condenser. In order that the condensed water delivered into the separator may be kept in a state of continuous agitation together with the absorbent or grease retaining material which the separator contains, I lead the pump suction-pipe downward nearly to the bottom of the tank, and, as illustrated in Fig. 4, I lead out from it at some distance above the bottom a branch pipe 12, led upward and left open at the top.

The pump for drawing off water from the tank I make capable of drawing off water from the tank faster than condensed water is delivered into it. When the water-level in the tank gets below the lower end of the branch pipe 12, air is drawn into the pump instead of water and is delivered by it into

the lower part of the separator and keeps the absorbing material in the separator constantly agitated.

Any form of pump capable not only of pumping water but also of compressing and delivering air in a compressed state may be used for the purpose.

Preferably I form the pump in the way shown at Fig. 5 in order that it may with certainty pump either water or air, according as either one or the other passes to it. This pump is formed of a plunger 13, worked to and fro in a barrel 14. When the plunger is at the top of its stroke, the barrel fills with water or air passing into it from the suction-inlet 15 through openings 16, which are then uncovered. The opposite end of the barrel is closed by a spring-loaded valve or end cover 17. As the plunger makes its forward stroke the end cover or valve moves away from the end of the barrel and the contents of the barrel are delivered to the outlet 18. This arrangement insures that if air is being delivered from the barrel no residual of compressed air shall remain in it at the end of the forward stroke of the plunger, as at this time the forward end of the plunger comes against the valve.

In Fig. 10 I have shown a hot-well, a pump, and an oil-separator in series. In this figure, A indicates a settling-tank or hot-well, in which condensed water from an engine is delivered. B indicates a pump of the construction shown in Fig. 5 and which may be driven from the engine, and C indicates an oil-separating apparatus of the kind shown in Fig. 8. In the tank A a large proportion of oily matters contained in the condensed water rises to the surface and there remains, but can be skimmed off from time to time. The pump B, operated by eccentric D, driven by the engine, sucks water from the bottom of the tank A or air through the pipe 12 and delivers the water and air into the vertical casing of the oil-separating apparatus C. The suction-inlet 15 of the pump is connected by a pipe *a* with the tank A, and the air-pipe 12 is connected with the pipe *a* in the manner indicated in Fig. 4. The outlet 18 of the pump is connected by a pipe with the bottom of the separating apparatus C.

In the arrangement shown in Figs. 6 and 7 the filter-tubes 9 are mounted within the upper lid 2, and additional filtering-surface is provided through a porous diaphragm extending across the interior of the lid. The porous diaphragm I form of a disk of wire-gauze 19, soldered across the interior of the lid. Below this is placed a disk of asbestos cloth and below this a disk of flannel of somewhat larger diameter. The edges of the flannel disk are bent downward and are kept pressed against the interior of the sides of the lid by a divided spring-ring 20. The inner ends of all the filter-tubes 9 open into an outlet-passage 21 in a block formed in two parts screwed together, one part extending up through the center of the porous diaphragm and the other part screwed onto it above the diaphragm, so that the center of the diaphragm is nipped between them. Any water passing up through the diaphragm enters the outlet-passage through openings 22. The water to be purified is shown to be delivered into the lower part of the separator through a valve 23, held down onto its seat by a spring 24.

In the construction shown in Figs. 8 and 9 the outer ends of all the filter-tubes open into an annular outlet-passage formed around the exterior of the upper part of the casing 1. The water to be treated enters at the bottom of the casing below a perforated false bottom. The absorbing material placed in the casing may be kept from passing down through the perforations by wire-gauze placed below them.

What I claim is—

1. The combination of a receptacle containing oil or grease retaining or absorbing material, an inlet by which oily or greasy water is supplied to the bottom of such receptacle, means by which the absorbing or retaining material is kept agitated with the oily water, and filtering mechanism at the upper part of the receptacle through which water is drawn off, while the grease-retaining material is kept within the vessel.

2. The combination of a receptacle containing oil or grease absorbing or retaining material, an inlet at the bottom of this receptacle, means for forcing oily or greasy water alternately with air into the receptacle through this inlet and filtering mechanism at the upper part of the receptacle through which the water is drawn off subtantially as described.

HENRY A. FLEUSS.

Witnesses:
R. B. RANSFORD,
JOHN H. WHITEHEAD.