No. 771,515. PATENTED OCT. 4, 1904.

F. J. WEISS.

CONDENSER.

APPLICATION FILED MAY 1, 1902.

NO MODEL. 3 SHEETS—SHEET 1.

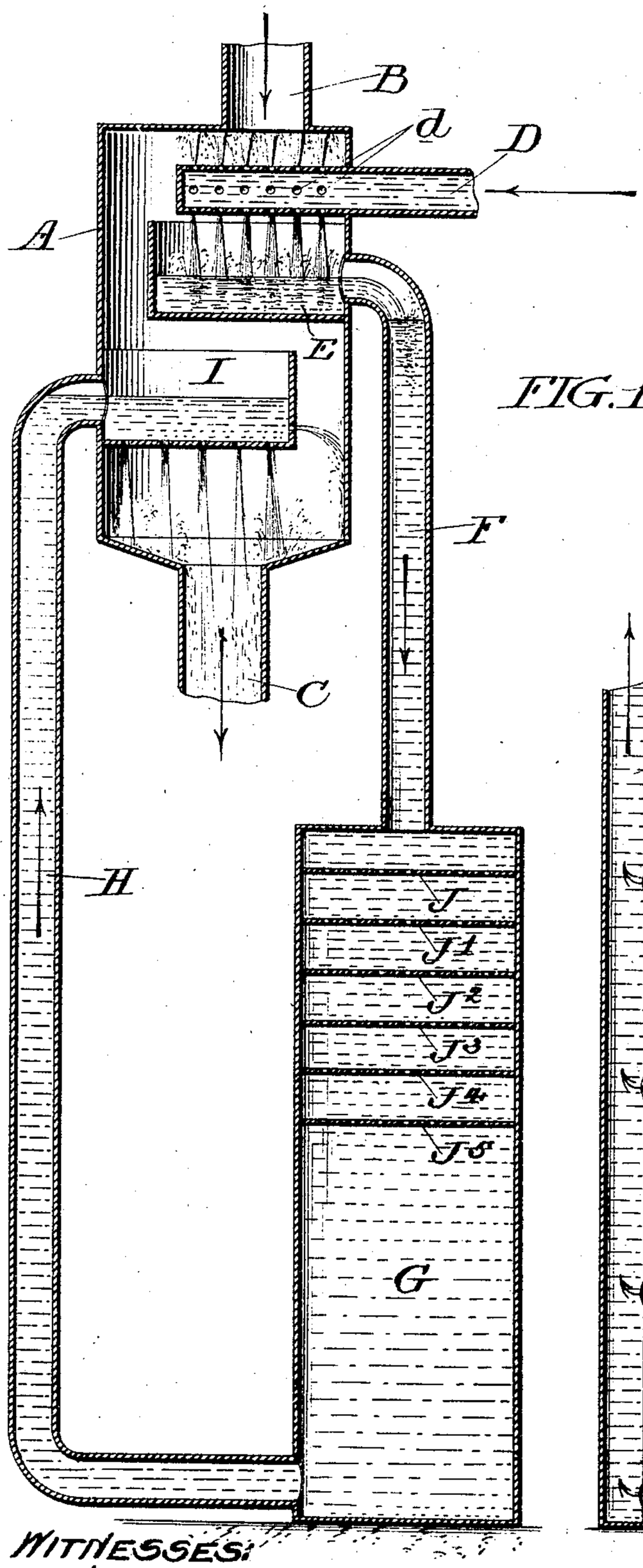
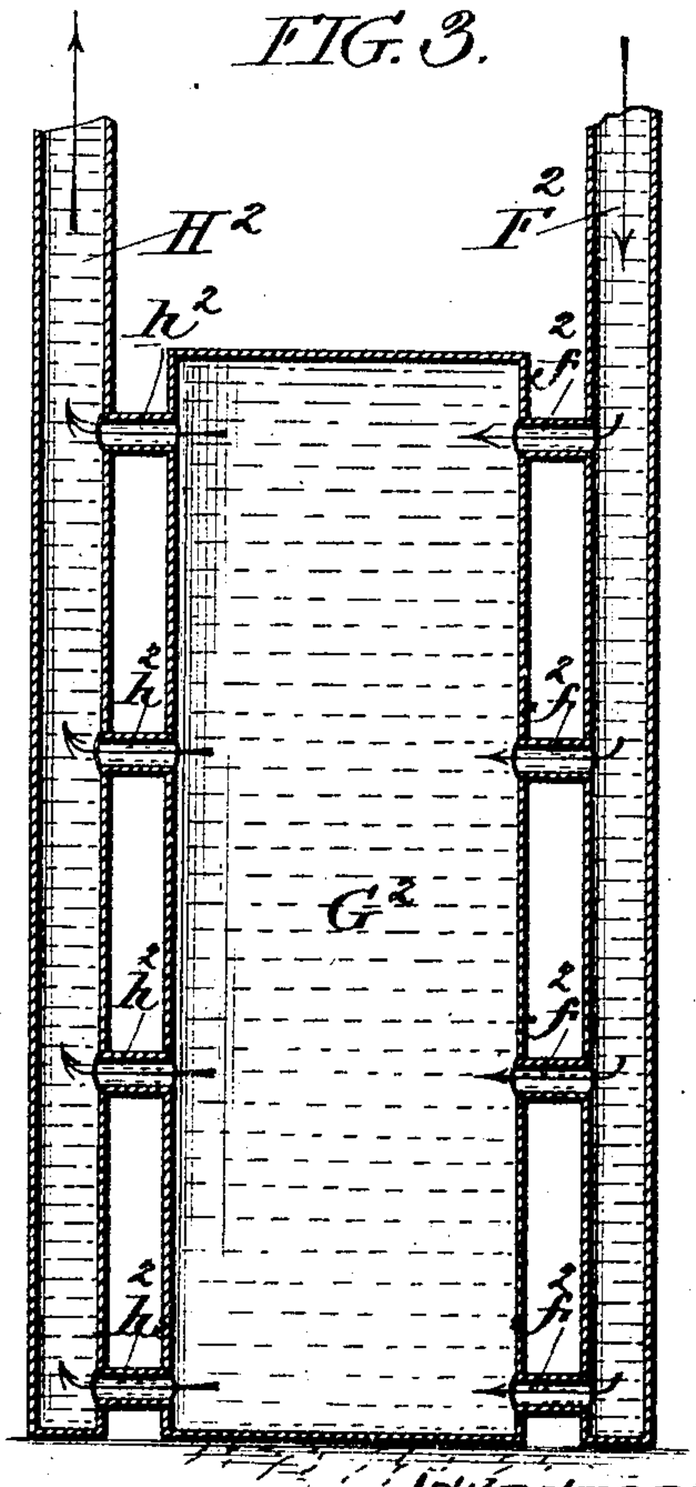


FIG. 1.

FIG. 3.



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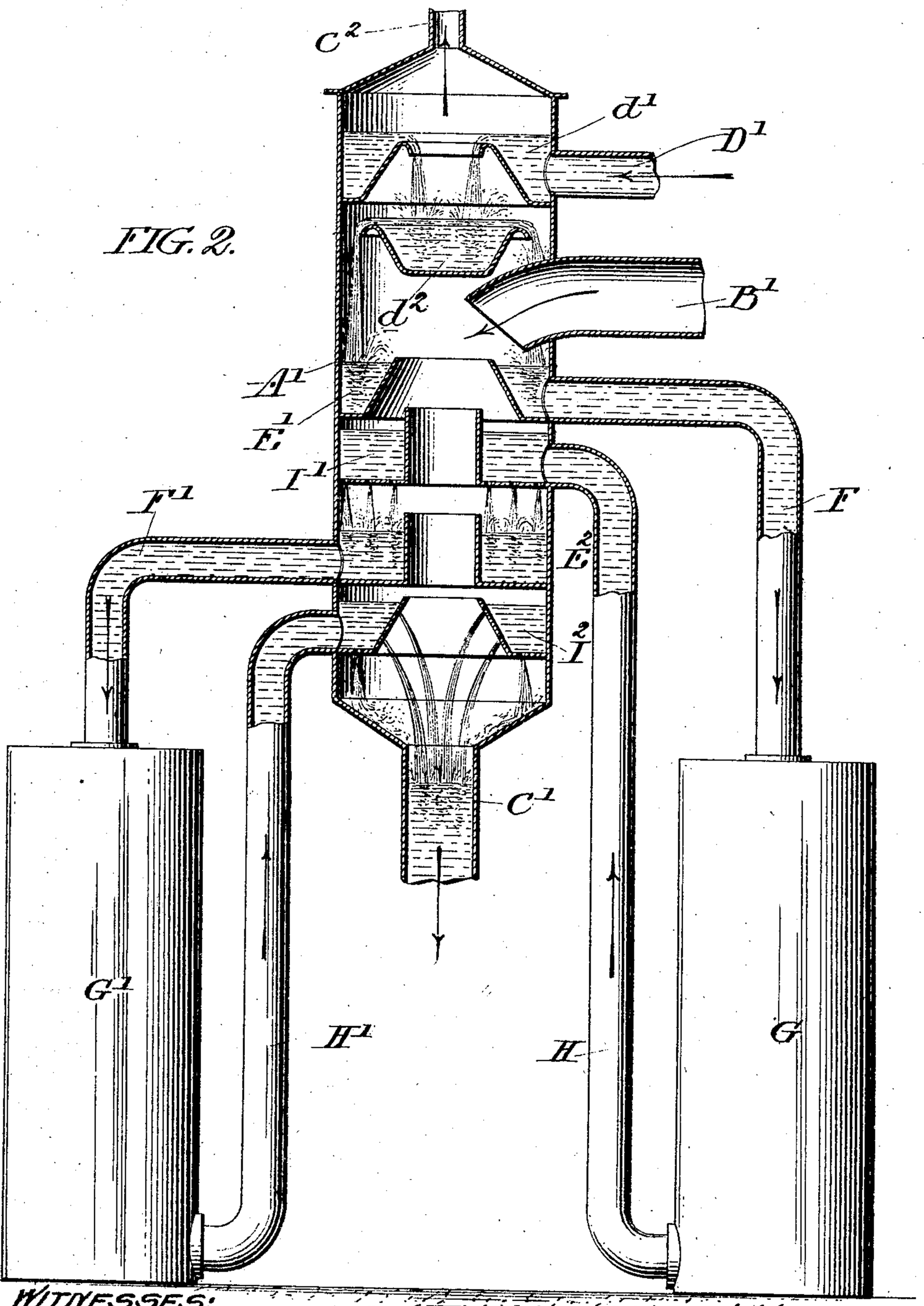
NO MODEL. 3 SHEETS—SHEET 2.

FIG. 2.



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NO MODEL. 3 SHEETS—SHEET 3.

FIG. 4.

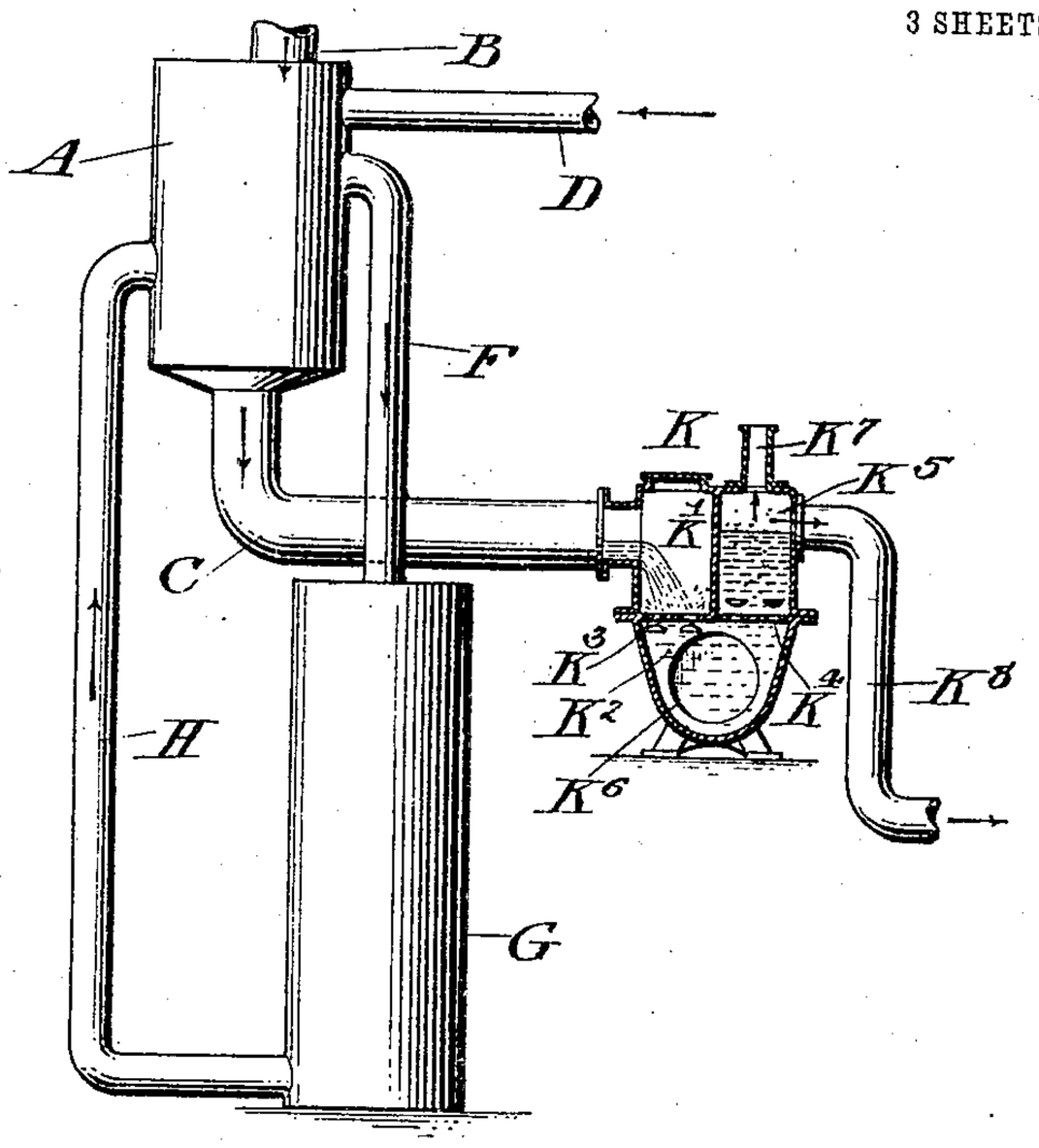
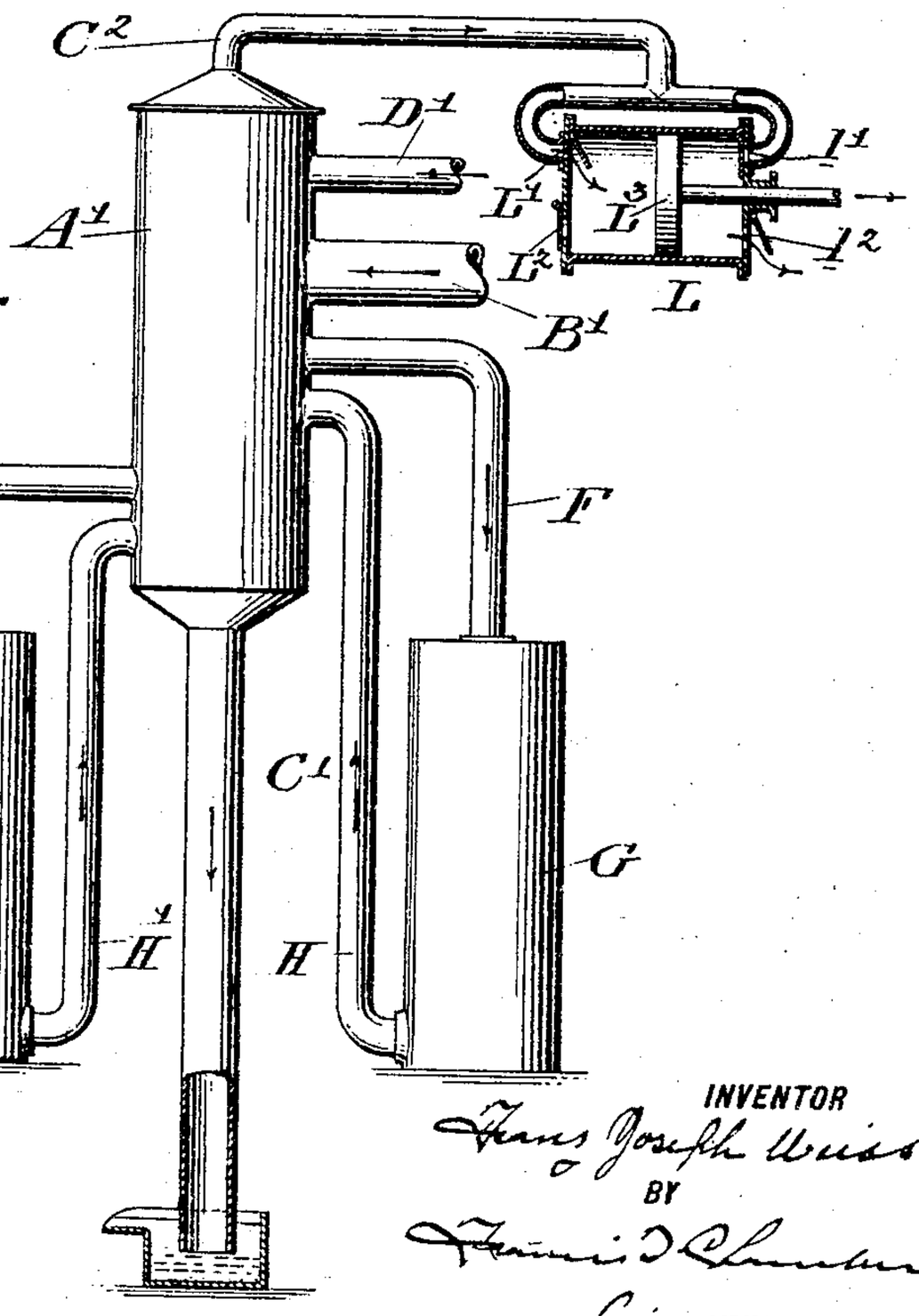


FIG. 5.



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UNITED STATES PATENT OFFICE.

FRANZ JOSEPH WEISS, OF BASLE, SWITZERLAND.

CONDENSER.

SPECIFICATION forming part of Letters Patent No. 771,515, dated October 4, 1904.

Application filed May 1, 1902. Serial No. 105,441. (No model.)

To all whom it may concern:

Be it known that I, FRANZ JOSEPH WEISS, a citizen of the Republic of Switzerland, residing in the city of Basle, canton of Basle, in the Republic of Switzerland, have invented certain new and useful Improvements in Condensers, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to the construction of condensers—such, for instance, as are used in connection with steam-engines—and has for its object to equalize as far as possible the efficient operation of the condenser by equalizing the vacuum when the steam consumption of the engine connected with the condenser is variable.

I accomplish the above results by providing the condensers with water-tanks, the larger the better, which in all cases should and in my preferred construction must be closed and which are so arranged in connection with the condenser as to receive the cooling-water after it has condensed a portion of the steam, while at the same time the said tank supplies an equal amount of water to the condenser to condense a further quantity of steam. Any convenient number of such tanks may be connected with the condenser-body, and by preference their connections with the condenser are such as to make their operation automatic, the amount flowing from the tanks into the condenser being equal to the amount received by the tanks from the condenser.

The efficiency of the apparatus depends upon the fact that the temperature of the water drawn from the tanks will always be lower than the temperature of the water supplied to the tanks during the periods when the engines are consuming and exhausting the greatest quantities of steam. Consequently the condenser will work with much greater efficiency and maintain a lower vacuum during these periods than would be the case if reliance for condensation were placed solely upon the initial supply of cold water.

For the best operation of my invention it is desirable that the water in the storage-tanks should be mixed, so that the hot water coming from the condenser and the comparatively cold water in the tanks shall be brought to a more or less average temperature before its return to the condenser; but while this is necessary for the best results it is compatible with a special mode of mixing, by which during the period of higher steam consumption the very hot water from the condenser is not immediately mixed with the colder water in the receiving-tanks and the supply for the condenser during such period is much colder than the average temperature of the contents of the tank, and a convenient device for effecting this mode of mixing is to arrange in the top of the tank to which the hot water is delivered one and preferably a series of perforated plates, through the perforations in which the water must pass to reach the bottom of the tank, the supply for the condenser being drawn from said bottom. With a tank so provided when the incoming supply of water is hotter than that contained in the tank the hot water will remain on top of the cold water, so that the supply drawn from the tank will be colder than the average temperature of the entire contents. When, on the contrary, the supply to the tank is colder than the water contained therein, the cold water being heavier than the hot water and being divided by the perforated partitions into jets will sink through and mix thoroughly with the hot water, so that the supply drawn from the tank will be of about the average temperature.

Reference being now to the drawings in which my invention is illustrated, Figure 1 is a diagrammatic sectional elevation showing the application of my invention to a parallel-current condenser. Fig. 2 is a similar elevation showing the application of my invention to a counter-current condenser. Fig. 3 is a view showing a modification in the receiving-tank and the mode of perfecting a mixture therein. Fig. 4 is an elevation of the condenser shown in Fig. 1 with a wet-air pump shown in section in connection therewith, and Fig. 5 is an elevation of the condenser shown in section in Fig. 2 with a dry-air pump shown in section in connection therewith.

Referring first to Fig. 1, A indicates the

body of the parallel-current condenser, B indicating the steam-supply pipe by which the exhaust-steam from the engines (not shown) enters the condenser, and C indicating the exit-pipe for the water and air, which in this construction would be connected with a so-called "wet-air" pump, as shown in Fig. 4.

In the drawings, D is the supply-pipe for the cold condensing-water, which, as shown, has the portion extending into the condenser-body *d* perforated, so that the water issues from the pipe in a series of jets. E is a water-intercepting receptacle placed in the condenser-body in position to intercept the water thrust out in jets from the pipe D, which water of course has condensed a portion of the steam and become proportionately warmer. F is a pipe leading from the receptacle E to the tank, (indicated at G.) H is a pipe leading from the said tank to a distributing-receptacle I, which, as shown, is formed with a perforated bottom and sides, so that the water will issue therefrom into the lower part of the condenser in the form of jets. J J′ J², &c., indicate a series of perforated partitions extending across the upper end of the tank G.

K, Fig. 4, indicates the wet-air pump, having a chamber K′ to receive the hot water and steam from the conduit C. This connects through ports K³ with pump-chamber K² and this chamber through ports K′ with the chamber K⁵, from which the air and steam escapes through passage K⁷, the water being run off through pipes K⁸. K⁶ is the pump-plunger.

In operation the steam entering through the pipe B is partly condensed by the water entering through the pipe D, which water, heated to a corresponding degree, is caught in the intercepting-receptacle E and delivered to the upper part of the tank G, mixing therein with the water already contained in said tank, which is at a temperature not greater than the average temperature to which the water is heated when it is caught in the intercepting-receptacle. Practically the water in the tank will under ordinary conditions be at a considerably lower temperature, because, *inter alia*, it is subjected to the cooling influence of the surrounding atmosphere. The water is drawn from the lower part of the tank G through the pipe H into the receptacle I, from it issues again into the condenser, acting to further condense the steam, the hot water and air being finally drawn off through the conduit C and pump K. As shown, the receptacle I being situated below the receptacle E the flow of water from the tank into the receptacle I will be automatic and due simply to the head. Of course any extraneous means may be used, if desired, to effect the delivery of water from the tank G to the condenser-body; but the simple gravity automatic arrangement illustrated is efficient and satisfactory.

It will be obvious that the use of my apparatus will materially increase the efficiency of the condenser when the supply of steam to be condensed is excessive or above the average, and it will be obvious also that where the supply of steam is materially below the average my apparatus may have temporarily the effect of increasing the pressure in the condenser. This, however, will only happen at times when the full efficiency of the condenser is not called for and will therefore not seriously interfere with the condensation.

It will be obvious that the water supplied to the tank G through the pipe F will necessarily pass through the perforations in the plates J J′ J², &c., on its way downward to the bottom of the tank. When the water supplied to the tank is materially hotter than that already contained in it, the perforated plates will not tend materially to mix the hot and colder water together, and this is an advantage, because it insures a supply of comparatively cold water to the pipe H at the time when it is most necessary and efficient. On the other hand, when the water supplied to the tank is colder than that already contained in it the heavier cold water being broken up into jets by the perforated plates will sink more rapidly through and mix more rapidly with the hot water, so as to equalize the temperature of the tank and cool its lower portions, so that when the steam-supply increases the apparatus will be in the best attainable condition for effective condensation.

Any convenient mixing device may be used, it being understood that some means for equalizing the temperature of the water in the tank is always advantageous and should always be supplied.

A further excellent arrangement is shown in Fig. 3, where the tank G is connected with the pipe F², leading from the condenser through pipe connections *f*² *f*², &c., leading to various levels of the tank, while a pipe H², leading back to the condenser, is connected to the tank by similar pipe connections *h*², also distributed at various levels. It will be obvious that in this arrangement the pipe H² will be supplied with water having practically the average temperature of the water in the tank G².

Referring next to Fig. 2, which illustrates my invention as applied to a counter-current condenser, A′ indicates the body of such condenser; B′, the steam-supply pipe; C′, the take-off pipe, which may be a barometric column, such as is familiar in connection with such condensers, or may be connected with a hot-water pump. C² indicates the passage connected with an air-pump through which the air is drawn from the condenser. Such an air-pump is shown in Fig. 5 at L, consisting of a cylinder having a piston L³, entrance-ports L′ *l*′, with which pipe C² connect, and exhaust-pipes L² *l*². D′ indicates the cold-water-supply pipe, which, as shown,

connects with an annular chamber d', over the inner edge of which the water falls in a cascade into a receptacle d^2, from the outer edges of which it again falls in a cascade into the annular intercepting-receptacle, (indicated at E',) from which the heated water passes through the pipe F to the tank G and thence through pipe H to the annular distributing-chamber I', from which it falls in jets into the second annular intercepting-receptacle E^2, from which receptacle it passes by the pipe F' to the tank G' and thence through the pipe H' to the distributing-receptacle I^2, from which it falls in jets through the lower portion of the condenser-body and finally into the take-off pipe C'.

The operation of this condenser so far as it presents any features of novelty is precisely as described in connection with Fig. 1 except that two tanks are employed, and obviously any convenient number may be used and material increase in efficiency gained by the multiplication.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a vacuum-condenser body having means for exhausting the air therefrom independent of the water-supply and having a cold-water pipe leading into its upper part of one or more water-intercepting receptacles, tanks connected with such receptacles and means for delivering the water from said tanks again into the condenser-body.

2. The combination with a vacuum-condenser body having means for exhausting the air therefrom independent of the water-supply and having a cold-water pipe leading into its upper part of one or more water-intercepting receptacles, tanks connected with such receptacles and means for delivering the water from said tanks again into the condenser-body at successively lower levels.

3. The combination with a vacuum-condenser body having means for exhausting the air therefrom independent of the water-supply and having a cold-water pipe leading into its upper part of one or more water-intercepting receptacles, tanks connected with such receptacles, means for mixing the water drawn from the condenser with the water in said tanks, and means for delivering the water from said tanks again into the condenser-body.

4. The combination with a vacuum-condenser body having means for exhausting the air therefrom independent of the water-supply and having a cold-water pipe leading into its upper part of one or more water-intercepting receptacles, tanks situated below and connected with said receptacles and conduits leading from said tanks into the condenser-body at a lower level than that of the intercepting receptacle by which the tank is supplied.

5. The combination with a vacuum-condenser-body having means for exhausting the air therefrom other than the jet action of the condenser-water, and having a cold-water pipe leading into its upper part, of one or more water-intercepting receptacles, closed tanks situated below and connected to receive the water from said receptacles, and means for causing the water from the closed tanks to be again delivered to the condenser.

6. The combination with a vacuum-condenser body having means for exhausting the air therefrom other than the jet action of the condenser-water, and having a cold-water pipe leading into its upper part, of one or more water-intercepting receptacles, closed tanks situated below and connected to receive the water from said receptacles, and conduits leading from said tanks to points in the condenser below the receptacles connected therewith, so that a gravital flow from and to the condenser is maintained through the tanks.

7. The combination with a condenser-body having a cold-water pipe leading into its upper part of one or more water-intercepting receptacles, tanks connected with such receptacles, one or more perforated partitions extending across the upper end to the tank or tanks and means for delivering the water from said tank or tanks again into the condenser-body.

FRANZ JOSEPH WEISS.

Witnesses:
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ALBERT GRAETER.