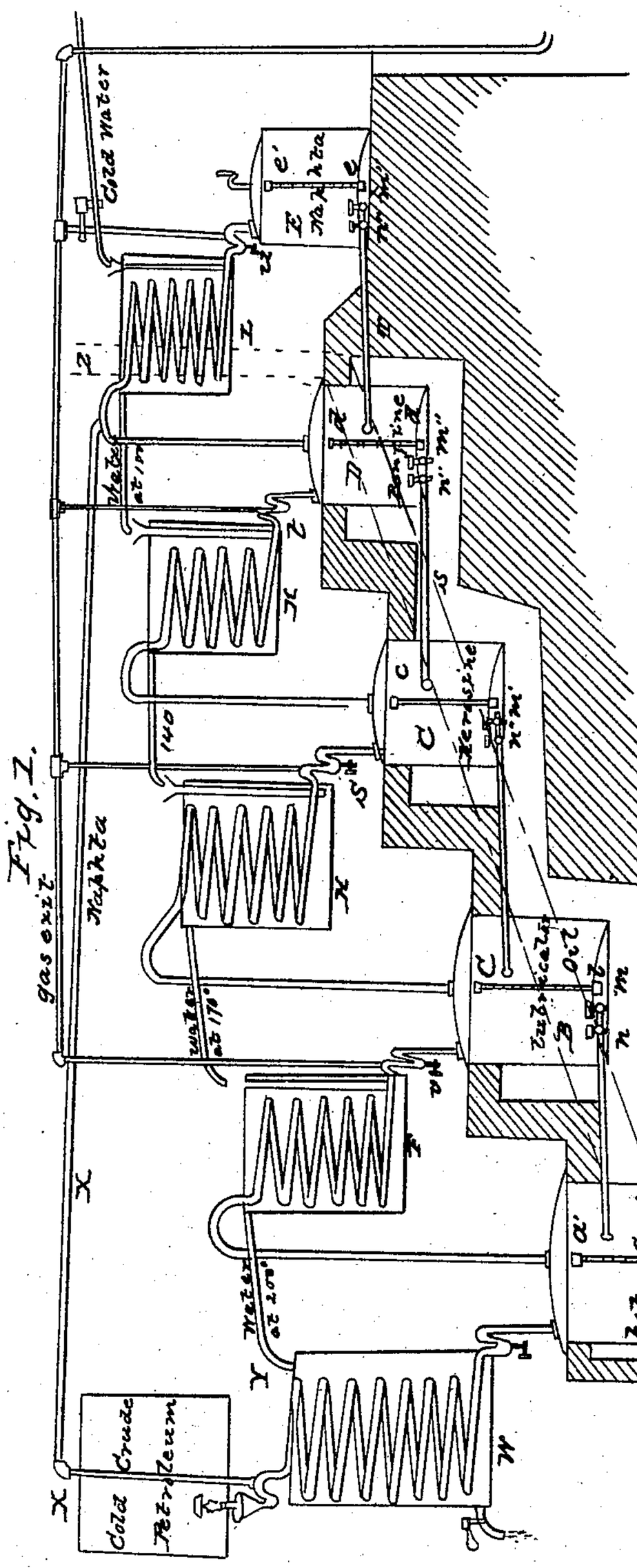
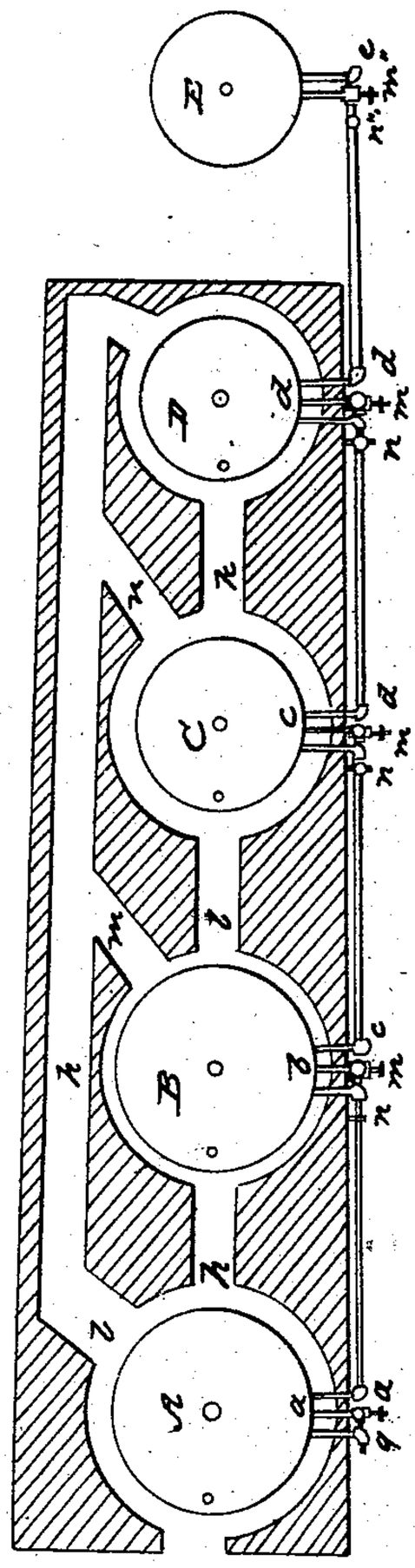
P. H. VANDER WEYDE.

Still for Petroleum.

No. 53,062. Patented March 6, 1866.





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UNITED STATES PATENT OFFICE.

PETER H. VAN DER WEYDE, M. D., OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN STILLS FOR PETROLEUM.

Specification forming part of Letters Patent No. **53,062,** dated March 6, 1866.

To all whom it may concern:

Be it known that I, P. H. VAN DER WEYDE, of Philadelphia, in the State of Pennsylvania, have invented a Multiple Still for the More Perfect Distillation of Petroleum; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The nature of this invention consists in using a succession of three, four, or more perpendicular stills heated to different degrees of heat by a single furnace arranged in such a way that the temperature of each may be regulated by the operator, and connected in such a way that the condensed vapor of each is collected in the next, and also may be run back to the first without being exposed to the air.

To enable others skilled in the art of distilling petroleum to make use of my invention, I will describe its construction and operation.

The four stills A, B, C, and D are connected by the distilling cooling-coils F, H, K, and L, in the usual way, and by the tubes P, R, S, and T, in such a manner that the contents of all may be run back in the former and even in the first still A. For this purpose they are placed in an ascending order, as indicated in the drawing, gaining by this the advantage of economizing the heat of the flue, which is sufficient to distill the most volatile constituents of the petroleum.

The arrangement of the flue is shown in Fig. 2, where a horizontal section exposes the channels *h*, *i*, and *k*, leading from one still to another, and the side channels, *l*, *m*, *n*, and *o*, leading directly to the chimney *z*, (indicated also by the dotted lines in the upper drawing, Fig. 1.) Each of those channels may be entirely or partially closed by sliding valves, so that by closing *h* the still A is alone heated; by closing *l* and *i* and opening *h*, A and B are heated, and so on, till, by opening *h*, *i*, and *k* and closing *l*, *m*, and *n*, all the stills are exposed to the heat.

To judge of the amount of oil present in each still the glass tubes *a a'*, *b b'*, *c c'*, *d d'*, and *e e'*, Fig. 1, are provided similar to those attached to steam-boilers, and the contents may be drawn off by opening the stop-cocks *m m' m'' m'''*, or run back by opening *n n' n'' n'''*. In the first still, A, the tar is drawn by the stop-cock *q*.

The same gradual rise of the stills is observed in the arrangement of the cooling-vessels F H K L, the uppermost of which, L, receiving the coldest water at its bottom, has an overflow at the top and delivers its slightly-warmed water to the next, K, where the same flow is repeated until the water, by flowing through the last or lowest condenser, F, has become heated enough to warm the little stream of petroleum flowing through the coil in W and feeding the first still, A, constantly. In this way we obtain the coldest water for condensing the most volatile products and economize the heat obtained by the successive condensation of the vapors. As by this heating of the petroleum in W some vapor of naphtha is set free, a tube, X, is provided to carry it to its proper condenser in L.

It is clear from this description that in the same way as the heat decreases from the stills A to D, so the heat of the water increases from the tanks L to F. At the lower end of each coil F, H, and K a double curve is attached to the attachment of the gas-pipe, and also to prevent the vapor of the still under it to ascend by the wrong channel.

To put the apparatus in operation the still A is filled to three-quarters of its contents with crude petroleum, and the sliding valve *h*, Fig. 2, closed, so that only A is heated. Soon all the volatile products will collect in B. These volatile products are lubricating-oil, kerosene, benzine, and naphtha or gasoline. When the still B is sufficiently filled the slide in *h* and *m* is opened and *l* and *i* closed. Now a lesser heat will act on B, and the more volatile kerosene, benzine, &c., will be driven in C, and leave the less volatile lubricating-oil behind in B, when the same operation with the sliding valves in the flue is repeated with the other stills, so that finally all the four principal volatile constituents of the petroleum will be separated in their respective receptacles, as indicated in the drawing, Fig. 1.

As the kerosene is by far the most valuable product of the petroleum many distillers mix afterward the benzine, naphtha, and lubricating-oil and subject it to a second distillation. In my still this may be done at one operation. When, namely, the kerosene has been found to satisfy the specific-gravity and fire test, it may be drawn off and the contents of D and E run back to B, or even A, to undergo a new

distillation, which breaks up part of the benzine and heavy oils and changes them into kerosene.

It must also be mentioned that as soon as the amount of petroleum diminishes in A the steady supply through the heating apparatus in W may be turned on to keep it to an almost constant level. From time to time, however, the supply is shut off and the still A almost emptied by distillation, in order to draw off the tar by the cock *q*.

During the operation samples may be drawn to see what kind of oil is in the stills through the cocks *m m' m'' m'''*, or, to see what kind of oil is coming in each still, through the cocks in the double bend *r s t u*. According to the result of those investigations the heat may be regulated by the slides in the flue or the contents run back by the tubes P, R, S, and T.

By this arrangement we overcome several objections to the old manner of distilling—for instance, that the most volatile ingredients, gasoline or naphtha coming first, are always contaminated with the lubricating-oil adhering to the interior of the tubes as remnant of the last product of the former distillation: but the principal objection to the manner thus far used is, that in the beginning of the operation nothing but naphtha comes over, and this naphtha, becoming heavier all the time, finally descends below 70°, (by the scale of the customary hydrometer,) and is called "benzine;" and when this runs below 60° it is called "kerosene." This kerosene in its turn, becoming during its flow in the course of the operation heavier all the time, finally reaches below 40°, is then not combustible enough for the purpose intended, and is called "lubricating-oil."

It is clear that by this manner of proceeding the last benzine distilled over contains considerable amounts of the much more valuable kerosene. This first kerosene, being contaminated with benzine, is too inflammable to be run in the kerosene, must be run with the benzine and be lost. It makes the benzine less pure and really less valuable, robbing it of part of its strong solvent properties, besides causing a direct loss of the most valuable kerosene.

What I claim as my invention, and wish to secure by Letters Patent, is—

1. The combination of three, four, or more stills, in the manner described, in order to obtain with a single fire and one single operation all the different volatile products of the petroleum—namely, lubricating-oil, kerosene, benzine, naphtha, or gasoline.

2. In order to increase, as far as possible, the quantity of kerosene or illuminating-oil, the manner of transferring the heated products of one still to another without exposing them to the air or losing by evaporation.

3. The peculiar manner of arranging the cooling apparatus so as to economize cold water and heat.

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Witnesses:

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