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APPARATUS FOR DISTILLING OILS OF THE PETROLEUM, TAR, AND LIKE INDUSTRIES USING A HIGH VACUUM.

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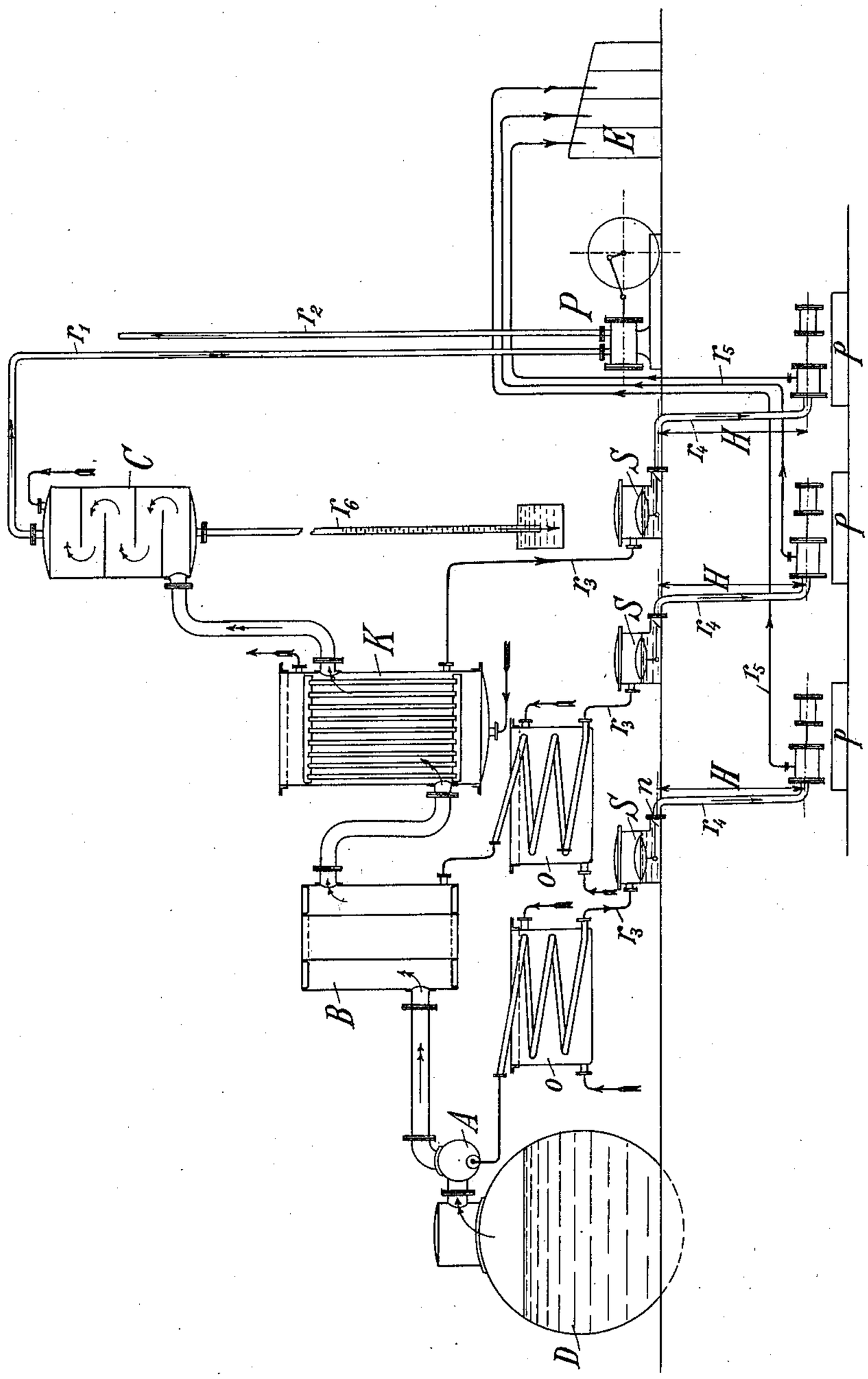
981,953. **Patented Jan. 17, 1911.**



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APPARATUS FOR DISTILLING OILS OF THE PETROLEUM, TAR, AND LIKE INDUSTRIES USING A HIGH VACUUM.

981,953. Specification of Letters Patent. **Patented Jan. 17, 1911.**

Application filed August 9, 1910. Serial No. 576,375.

To all whom it may concern:

Be it known that I, LEO STEINSCHNEIDER, engineer, a citizen of Austria, residing at Brünn, Province of Moravia, Austria-Hungary, have invented a new and useful Improvement in Apparatus for Distilling Oils of the Petroleum, Tar, and Like Industries Using a High Vacuum; and I do hereby declare the following to be a full, clear, and exact description of the same.

The subject matter of my invention is an improved distillation plant, for distilling oils of the petroleum, tar and like industries, using a high vacuum.

The present-day plants for distilling oils by means of a vacuum, those plants being always herein referred to which are for treating large quantities of material and not insignificant amounts, do not deserve the name vacuum distillation applied to them. Properly speaking, they are only plants for distillation at a diminished pressure, and the reduction of pressure amounts in the tar industry, as a rule, to not over 250 mm., so that the vapors are really only sucked out of the still, decomposition of the vapors being thereby avoided. Further, one defect of present-day vacuum plants is the difficulty of maintaining a certain minimum pressure and simultaneously allowing the fractions to issue freely. In distilling plants known heretofore which work with a high vacuum the receiver for the distillates is likewise evacuated and thereby indirectly brings about the evacuation of the still. Such a plant for tar products is described in the work "*Die Industrie des Steinkohlenteers und Ammoniaks*" by Dr. Lunge. Apart from the considerably more troublesome separate arrangement the vacuum receiver must be continuously supervised or checked partly to prevent the same running over and partly, if a still "spits" or "goes black," to reverse into another receiver. Such a control is impossible in practice. It is therefore unavoidable that in these apparatus the contents of one entire distillate receiver is spoiled by the above mentioned incidents, so that redistillation is necessary, or the overflow or entraining of the contents of the still lasting frequently only a few moments is not very evident and is only noticed while refining the distillates owing to the desired type of color being able to be obtained only by increased use of acid. Frequently, however, even when considerably more acid is used only a reddish or brown distillate can be obtained and redistillation cannot be avoided. Therefore a vacuum distillation plant which admits of perfectly free visible issue of the distillates is a long-felt want. In addition, a vacuum distillation plant in which evacuation takes place through the distillate receiver is wrong in principle, because the non-condensable gases remain too long in contact with the distillates and are therefore partially reabsorbed by the same. The non-condensable gases must be removed as quickly as possible. All these defects would be done away with at once if the distillation could be so arranged that between issuing from the cooling vessel and entering into the receiving box that height were provided which corresponds to a certain vacuum, *e. g.* one of 8 m. column of water. Such plants have been constructed in which, however, we meet with the unavoidable constructive difficulty of having to make the distillation plant exceedingly high in order to be able to arrange the discharge above ground. The substructures for the distilling plant are exceedingly expensive, and raising the fuel and attendance are very disadvantageous.

Now a primary object of my invention is completely to remedy the above mentioned defects.

In the accompanying drawing a distilling plant according to my invention for high vacuum is represented diagrammatically in elevation.

Referring to the drawing, the distillate vapors pass from the still D through a system of air-cooled dephlegmators A and B of any suitable construction to the tubular cooler K and thence to the elevated condenser C. The distillates condensed in the dephlegmators A and B pass away to the tubular coolers O and thence through pipes r_3 to collectors S which may preferably be provided with floats for regulating the level of the liquid contained in them.

The liquid distillates formed in the tubular cooler K may, if desired, pass directly to a similar collector S. The separate liquid fractions collected in this manner pass from the vessels S by means of pipes r_4 to suitably low fraction pumps P, each fraction having its own pump. These pumps force the fractions through separate pressure pipes r_5 into the higher receiving box E. The non-con-

densable gases are sucked out of the elevated condenser C by the dry air-pump P by means of a suction pipe r_1 and pass through a pipe r_2 into the open air.

The tubular coolers O and K and the condenser C contain cold water, whose path of flow is shown by the arrows; in the condenser C the cold water contacts directly with the vapors which are to be condensed and is led away to the sewer or drain by a tall fall pipe r_6 corresponding to the vacuum.

Now whereas in plants for low vacuum the condensed liquid can run out freely into the receiving box after leaving the cooler and passing a suitable siphon, because a small height of liquid corresponding to the vacuum suffices in the vertical pipe r_4, the present arrangement enables work to proceed under a high vacuum without its being necessary to make the height H of the discharge pipes r_4 correspond to the vacuum and consequently to have to maintain the considerable difference in level mentioned above as a drawback.

By employing the pumps P it is possible to make the height H of the fall pipe r_4 such that the column of liquid in this pipe requires to have merely that height which this pump is able to maintain when evacuating. In order to give an actual example, if the pump P is able to suck liquid to a height of 6 m., with an absolute vacuum and a specific weight equal to 1 of the distillate the height H between the discharge n of the collector S and the suction socket of the pump P would have to be merely 4 m.

The considerable expense of elevating the entire distillation plant for the purpose of obtaining the difference in level requisite for the vacuum is avoided by my arrangement, and in this case merely the barometric condenser requires to be elevated.

I claim:—

The combination, with distilling plant working with a high vacuum comprising dephlegmators, coolers connected therewith, and an elevated condenser, of a receiving box, a plurality of pumps below said coolers and said receiving box, suction pipes connecting a pump with each cooler, and pipes connecting each pump with the receiving box, the height of said suction pipes being such that pumps of small suction power can be employed for pumping away the fractions from the coolers.

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

LEO STEINSCHNEIDER.

Witnesses:

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