J. T. HEARD.

Alcohol Still.

No. 3,256. Patented Sept. 9, 1843.

Fig. 1,

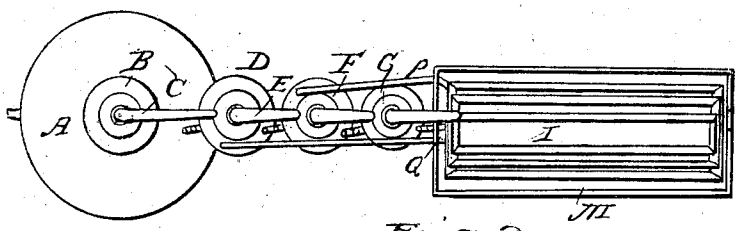


Fig. 2,

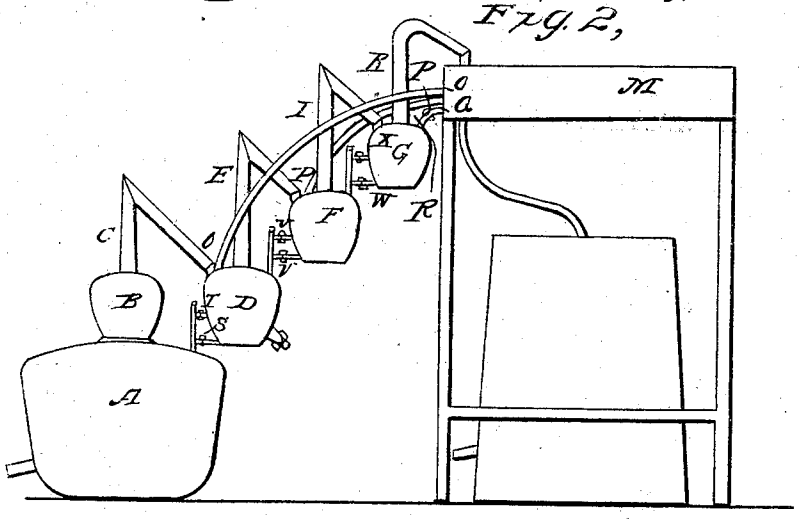
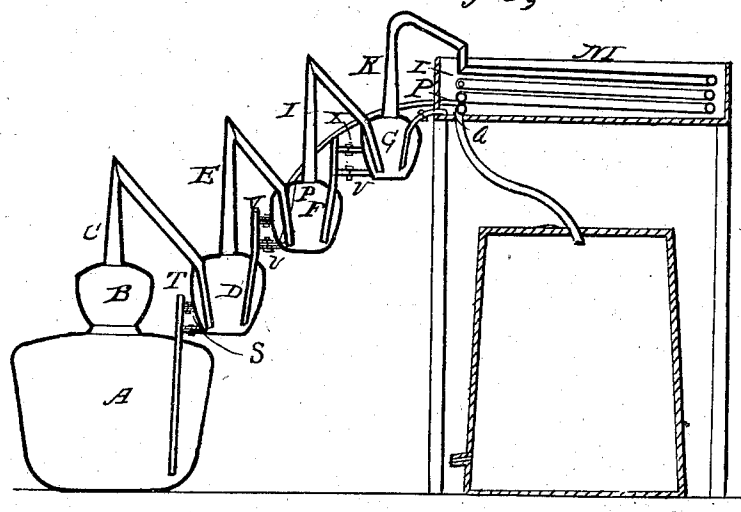


Fig. 3,



UNITED STATES PATENT OFFICE.

JOHN T. HEARD, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN DISTILLING ALCOHOL.

Specification forming part of Letters Patent No. **3,256**, dated September 9, 1843.

To all whom it may concern:

Be it known that I, JOHN T. HEARD, of Boston, in the county of Suffolk and State of Massachusetts, have invented a certain new and Improved Apparatus for the Distillation of Alcohol and Various other Liquids; and I do hereby declare that the following description, taken in connection with the accompanying drawings, constitutes a full and exact specification thereof.

Figure 1 of the drawings above mentioned is a top view of my improved apparatus. Fig. 2 is a side elevation of the same, and Fig. 3 represents a vertical and longitudinal section of the several parts.

In this latter figure several of the distilling-vessels are in sections, although, strictly speaking, a vertical plane passing through the central part of the main boiling-vessel or cucurbit would not cut through all the said vessels.

A, Figs. 1, 2, 3, denotes the alembic or vessel which is charged with the liquor from which the alcohol is to be separated. This vessel is placed over a proper furnace, by which its contents are heated or boiled during the process of distillation. The alembic A has a capital or still-head, B, erected upon it in the ordinary manner, from the top of which a conical pipe, C, ascends vertically a short distance, and then descends in the inclined manner seen in drawings, and enters into and through the top of a second cylindrical and close vessel, D, which is elevated above the alembic A, or stands about on a level with the still-head. The pipe C enters the interior of the vessel D and continues down nearly to the bottom of the same, and at its termination it is left open, as seen in Fig. 3. The receiver D is likewise connected by a pipe, E, to another and similar vessel, F, elevated above it, or whose bottom is about on a level with the top of the vessel D, the pipe E being like the pipe C and extending from the top of the vessel D, through that of the vessel F, and terminating just above bottom of the latter. One more close vessel or receiver, G, is raised above the vessel F, or so placed with regard to the same that its bottom shall be about on a level with the top of that last named. The receivers F G are connected by a vertical and inclined pipe, I, inverted and opening into the top of the former, and extending through that of the latter, and terminating near its bottom. From the top of the last receiver, G, of the series a bent pipe, K, extends to and connects with a condensing apparatus, L, situated in a bath or cistern of water, M, the said apparatus consisting of a long tube coiled or extending around in the cistern, with a gradual declination or slope from its upper to its lower extremity, the latter of which is connected or joined to an ordinary distiller's worm or refrigeratory apparatus, generally used for condensing vaporized spirits. A pipe, O, extends from a convenient part of the lower side of what may be termed the "end" of the first coil of the tube L to and through the top of the first receiver, D, and terminates near the bottom thereof. The lower side of what may be considered as the end of the second coil of the pipe L is connected with the second receiver, F, by a pipe, P, extending nearly to the bottom of the receiver, and the lower part of the third or last coil of the pipe L, at or near the extremity thereof, has a pipe, Q, extending from it to the lower part of the third receiver, G. Each of the pipes O P Q should have a stop-cock, R, inserted in some convenient part of it, and each of the receivers D F G should be connected to the top one that precedes it by means of two pipes, S T, or U V, or W X, one of which extends from or near the bottom of each receiver, while the other projects from the receiver at some distance above the first, as seen in the drawings, the said pipes having suitable stop-cocks adapted to each, to cut off or open the communication between the receivers at pleasure. The peculiar object of the lower pipes, S U W, is to enable me at any time to discharge the contents of one of the receivers into the one next below it, or all of them into the cucurbit; while the object of the upper pipes, T V X, is to prevent the receivers becoming too full of the condensed spirits. The intention of the back pipes, O P Q, is to carry back or return into their respective receivers the condensed vapors produced in their respective coils of the pipe of the water bath. The heavier and more watery vapors will condense in the upper coil and pass down through the pipe O into the receiver D; those of greater alcoholic strength will be condensed in the second coil, and will run down through the pipe P into the second receiver, and those of increased strength will

pass from the lower coil through the pipe Q and into the third receiver; such as may be of the required degree of strength, or those approaching the nearest to pure alcohol, will pass out of the coiled pipe and into the worm or refrigeratory apparatus, where they will be condensed and discharged into a suitable receptacle in the ordinary manner.

The alembic or still being charged with the fermented liquor or wash from which we desire to separate the alcohol and the fire lighted under the still, it will be evident that the spirituous vapors will ascend from the cucurbit, and pass from thence into the first receiver, D. The weakest vapors, or those the least charged with alcohol, or those of a certain degree of strength, will be condensed in the first receiver, while those of a stronger character will pass out of the first receiver and thence into the second, where a portion thereof will be condensed, and the remainder will pass over into the third receiver, in which latter a part will be condensed, while the remainder enters the coiled pipe of the water-bath.

From the above it will be perceived that alcohol of different degrees of strength, or of lower proof than that which is discharged from the worm, is collected in the receivers, the highest receiver containing the strongest spirit, while the lower contains the weakest, or that which is next in strength to the charge of the cucurbit. Thus, instead of suffering the alcoholic vapors in strength below them condensed in the worm to be conducted directly back into the still and then be mixed again with the water and wash therein, from which they must be separated again by heat, as in the ordinary processes of distillation of alcohol, they are retained in the receivers above the cucurbit, while the water and residuum remain in the still. The water so separated may be drawn out of the still and the condensed spirit of the remains let down into the still to supply its place, where they are heated and still further divested of water by passing through the several receivers and worm, until they are converted into alcohol of the required degree of strength. The hot vapors which arise and pass through the receivers convey heat to the condensed vapors therein, which thereby become more or less reconverted into an aeriform state and pass off through the coiled pipe, and thus the distilling operation is carried on through all the vessels at the same time. By thus retaining the condensed vapors in vessels elevated above the still and one another, as set forth, not only is a very great saving of fuel effected in the course of distillation, but a saving of time also in the process of separating the alcohol from the wash. Besides the above advantage, another and very material one is the prevention, to a great extent, of impregnation of the alcohol with the essential oils and other matters of the wash or liquor in the alembic, to which the ordinary distilling process is so liable.

The practical manner of operating the apparatus will be understood by the following instructions: The still being filled with proof-spirit or fermented wash, excepting a sufficient space for boiling-room, and all the necessary and usual precaution being taken, the fire is to be lighted. Before the vapor rises from the still, or at the time the fire is kindled, the cocks to the back pipes leading to the first and second receivers should be open. The cocks of the pipes S U and the cock of the pipe T should also be open. The cock to the back pipe leading to the third receiver should be kept closed at this stage of the operation, as at the commencement of it. Alcohol can be produced without using more than two of the receivers. As the vapors ascend from the still they pass through the capital or still-head, and by its vertical and angular pipe into the first receiver. Ascending from the mouth of the angular pipe, they pass in a similar manner into the next receiver, and so on, until they reach the coiled pipes of the water bath. The cocks being adjusted as above mentioned, all the vapors that condense in the first two turns of the inclined pipes in the water bath will find their way into the first receiver, as those that are carried from the second turn of the pipes descend from the second receiver to the first through the lower connecting-cock.

When the liquor in the first receiver has attained the level of the outlet-pipe T, which is ascertained by a tell-tale cock inserted in the side of the receiver, the cock of the lower pipe between the first and second receivers should be closed. The condensed vapors of the first turn of the pipe of the water bath will thus be conveyed to the first receiver, and those of the second coil to the second receiver. When those in the second receiver have attained the level of the outlet or upper pipe connecting the first and second receivers, they will flow down into the first receiver. If the still is charged with "proof-spirit," two-thirds of the whole product may be worked off at a proof of eighty-two to eighty-five per cent. by means of the first two receivers only, after which the proof of the alcohol will generally decline to eighty per cent., and under, when it becomes necessary to use the third receiver, which may be done by opening the cock of its back pipe and closing that of its lower connecting-tube. The receiver will then fill up to the outlet of its upper connecting-tube.

I do not claim the combination of several receivers with an alembic; but

That which I do claim consists in—

1. My peculiar manner of arranging the receivers with respect to the alembic and each other—that is to say, in placing the said receivers at different altitudes in regard to each other—in combination with the particular manner of connecting them with the alembic and with each other, the whole being substantially as described, and for the purpose of retaining the condensed spirituous or alcoholic

vapors of different degrees of strength, and preventing their return into the still, as specified.

2. The combination, with a series of receivers, arranged as described, of a coiled pipe and water bath or condensing apparatus having its coils connected with the different receivers, as set forth.

3. The peculiar arrangement of the several pipes which connect the said condensing apparatus and receivers—viz., connecting the lower part of the end of the first coil of the pipe with the first or lower receiver, and that of the second coil with the second or middle receiver, and that of the last coil with the upper receiver—the whole being constructed and operating substantially in the manner and for the purposes as hereinabove specified.

In testimony that the above is a correct specification of my said invention I have hereto set my signature this 24th day of August, of the year 1843.

JOHN T. HEARD.

Witnesses:

R. H. EDDY,

CHAUNCY PECK.