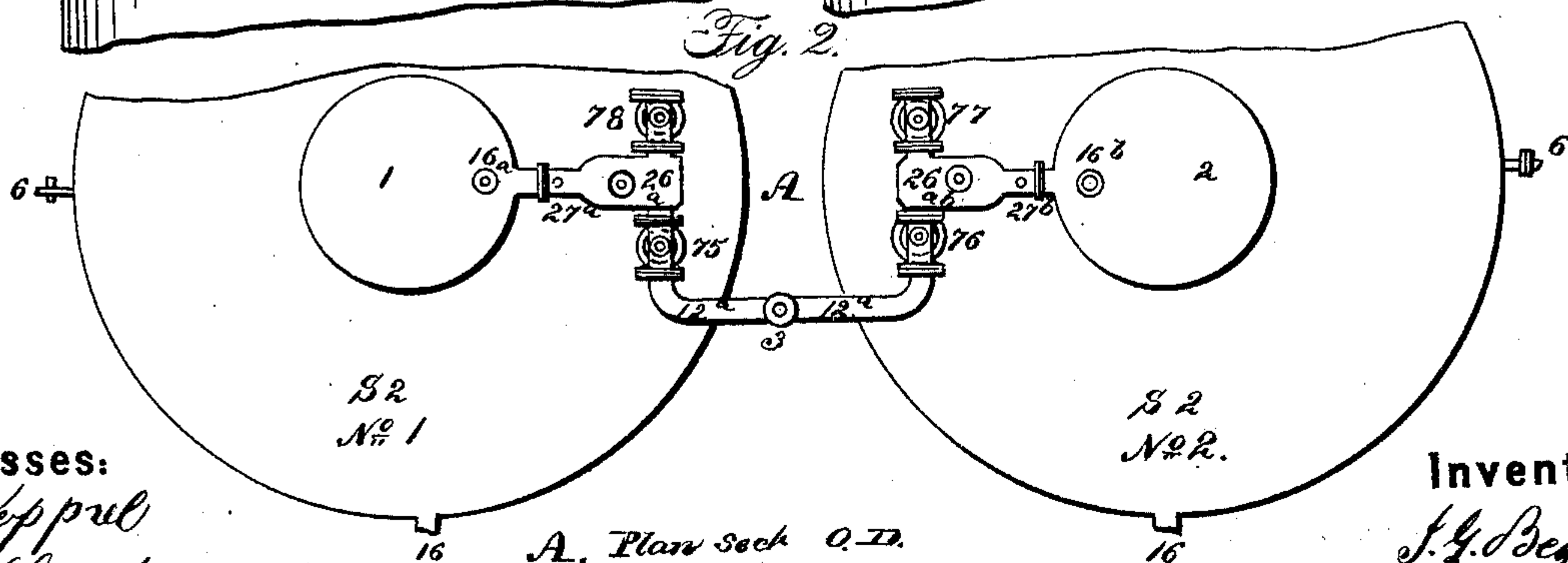
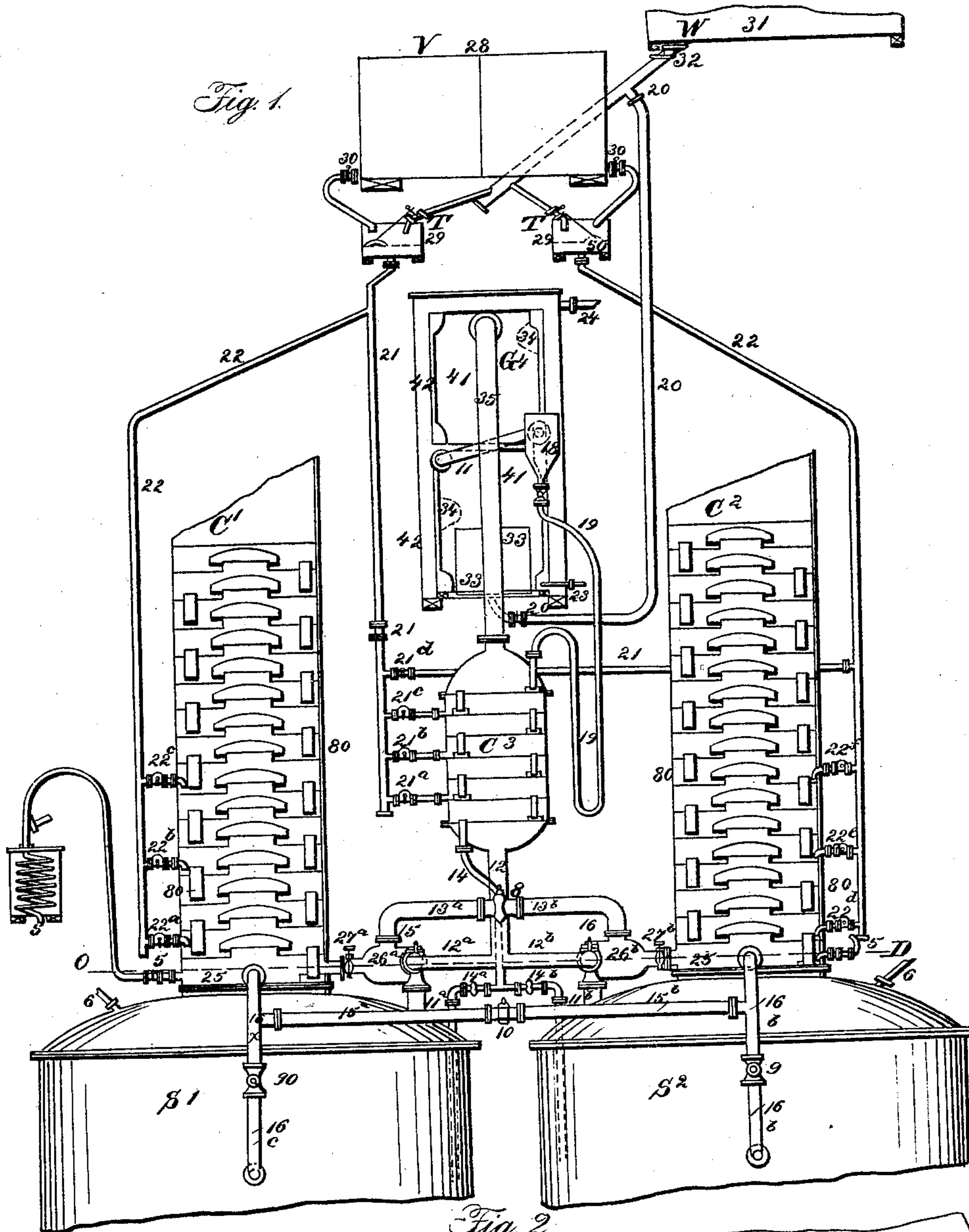


J. G. BEQUET.

Alcohol Still.

No. 61,388.

Patented Jan. 22, 1867.



Witnesses:  
J. Keppel  
A. Smith

Inventor:  
J. G. Bequet

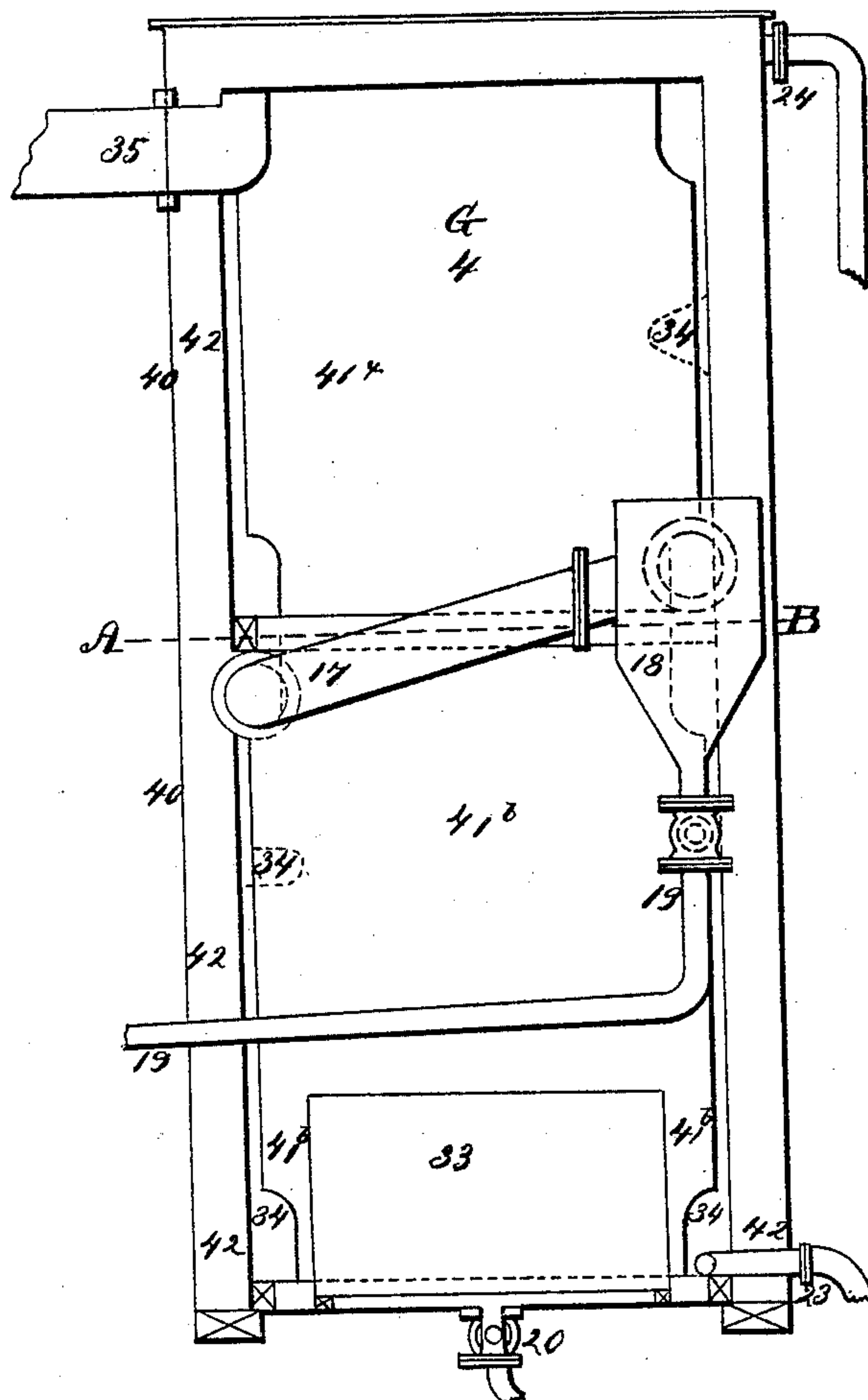
J. G. BEQUET.

Alcohol Still.

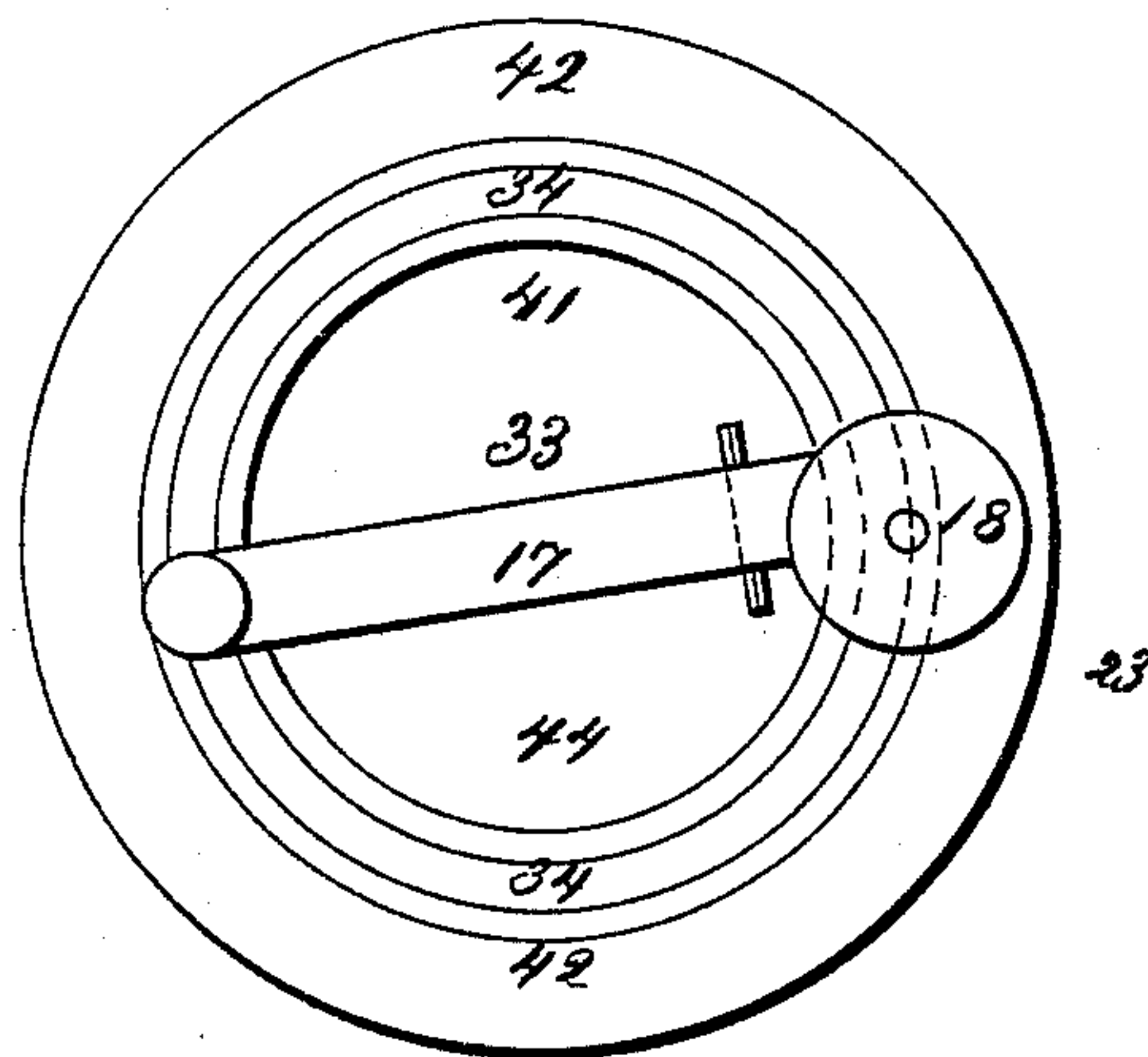
No. 61,388.

Patented Jan. 22, 1867.

*Fig. 3.*



*Fig. 4.*



Witnesses:

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*A. Smith*

Inventor:

*J. G. Bequet*



# United States Patent Office.

JEAN GUSTAVE BEQUET, OF PARIS, FRANCE, ASSIGNOR TO MORITZ PINNER AND GUSTAV BEQUET, OF NEW YORK CITY.

*Letters Patent No. 61,388, dated January 22, 1867.*

## IMPROVEMENT IN APPARATUS AND PROCESSES FOR RECTIFYING ALCOHOL AND OTHER SPIRITS.

The Schedule referred to in these Letters Patent and making part of the same.

### TO ALL WHOM IT MAY CONCERN:

Be it known that I, JEAN GUSTAVE BEQUET, of Paris, in the Empire of France, have invented "A New and Improved System of Rectifying Alcohol and Other Spirits or Liquids;" 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. Like letters or numbers denote like parts in all the figures.

The nature and object of my invention consist in the following, to wit:

1. To produce alcohol or alcoholic spirits purer and of a better quality than has been produced heretofore.
2. To provide such alcohol cheaper than alcohol has been produced heretofore, saving in its production particularly time, labor, fuel, and space.
3. To provide special means for continuing, without interruption, the process of obtaining high wines and of rectifying alcohol, oil, and other liquids.
4. To provide special means for keeping so-called high-wine columns at work warm, clean, and free from bad taste of any kind as long as desired, obtaining all these advantages at one and the same time, and avoiding thereby the necessity of occasionally interrupting the rectifying process for the purpose of washing such columns.
5. To analyze and rectify so-called low wines, or oil and other liquids, in such a manner as to make them purer and more valuable than they have been produced heretofore, and yet not increase their cost of production.

My invention could properly be divided into two parts or sections, to wit, one that would embrace the improvement in the system of rectifying alcohol and other liquids; and another one that would embrace the apparatus, or series of apparatus, by means of which I at present effect that improvement. But as the one part of my invention can conveniently and advantageously be described and explained by and in connection with the other, I prefer in this specification to speak of both those parts alternately.

To enable others skilled in the art to make and use my invention, I will now proceed to describe the construction and operation of the apparatus and its parts, by means of which I at present realize the objects above named; and to that I will then add a description of the improvement in the system of rectifying which I effect thereby.

Figure I in sheet No. 1 of the accompanying drawings represents a perpendicular longitudinal section of my apparatus, with the lower part of the stills S 1 and S 2, as well as the upper part of the columns C 1 and C 2, and the condensers required for those columns, cut off.

Figure II on sheet No. 1 represents a plan-section on line O D of the stills S 1 and S 2, as well as of the connecting pipes 12<sup>a</sup> and 12<sup>b</sup>, the return pipes 16<sup>a</sup> and 16<sup>b</sup>, the steam chambers 26<sup>a</sup> and 26<sup>b</sup>, the steam-regulating dampers or valves 27<sup>a</sup> and 27<sup>b</sup>, the stop-cock 3, and the three-way stop-cocks 75, 76, 77, and 78.

Figure III on sheet No. 2 represents a perpendicular longitudinal section of my analyzing condenser, G 4 and one, which on sheet No. 1 in Fig. I, is attached to column C 3.

Figure IV on sheet No. 2 represents, on line A B, a plan-section of that analyzing condenser, G 4, which plan-section indicates how the cylinders or tubes constituting that analyzing condenser are placed within each other and form spaces between each other.

S 1 and S 2 in Fig. I represent two stills or boilers and the place they occupy in the apparatus. In the drawing the lower part of those stills is represented as cut off. These stills are built in the ordinary manner, and are easily altered for my purpose by attaching to them the return pipes 16<sup>a</sup> and 16<sup>b</sup> and the steam passages 11<sup>a</sup> 11<sup>b</sup> 11<sup>c</sup> and 11<sup>d</sup>. C 1 and C 2 on sheet No. 1 represent two high-wine columns, with the upper part of such columns cut off, and C 3 represents a low-wine column. These columns are all built in the ordinary manner, and are easily altered for my purpose by attaching to either of them a bottom-plate, 25, which separates them from the sills underneath, and steam chambers, 26<sup>a</sup> and 26<sup>b</sup>, which, in combination with the steam passages 11<sup>a</sup> 11<sup>b</sup> 11<sup>c</sup> and 11<sup>d</sup>, gives each of the columns C 1 and C 2 a new connection with the stills, while column C 3 receives its new connection with the stills by means of pipes 12 12<sup>a</sup> and 12<sup>b</sup>, in combination with the aforesaid steam passages 11<sup>a</sup> 11<sup>b</sup> 11<sup>c</sup> and 11<sup>d</sup>. W 31 on sheet No. 1 represents a reservoir for supplying the columns C 1 C 2 and C 3, as well as the analyzing condenser, G 4, with water. Other means for supplying such water could



be adopted, and the construction and placing of such reservoir can vary with circumstances. V 28 on sheet No. 1 represents a tub or other vessel, for the reception of chemicals for purposes hereinafter specified. Said vessel is perpendicularly divided into compartments in such a manner that each such compartment, through a hole in its bottom or side, can supply with the desired chemicals any column with which it is connected. T 29 on sheet No. 1 represents two tubs or other vessels, (one for each column,) through which the water or other liquid, or the chemicals, or both mixed, pass before they enter the columns through pipes 22 and 21, as hereinafter explained. G 4 on sheets No. 1 and No. 2 represents an analyzing condenser, constructed and operated on an entirely novel plan. It consists of two compartments, an upper one and a lower one, the upper one constituting an analyzer, the lower one a condenser or cooler. Each of those two compartments consists of two tubes or cylinders, placed within about half an inch of each other; and in the drawings that half-inch space between those two cylinders is designated as 34, while the space formed inside of the circle of the inner cylinder is designated as 41. At the top and the bottom of each of those two compartments those two cylinders, forming each such compartment, are hermetically closed or connected by a flange or plate, and the only connection between those two compartments is by means of pipe 17. Those two compartments, placed upon one another, are surrounded by one common cylinder or tube, 40; and between that cylinder 40 and those compartments the additional space 42 is formed. The narrow space 34 is designed for the vapors under treatment, while the large spaces 42 and 41 are being filled with water through pipe 20, and form large, powerful, and quick-acting condensing surfaces. To increase the rapidity of the cooling process, a tub-shaped vessel, indicated by the line around 33, is placed upon the bottom, inside the lower compartment, in such a manner as to force at once against the wall around the space 41 the water that enters through pipe 22. To prevent the overflowing of the analyzing condenser G 4, the surplus water entering spaces 42 and 41 runs off through discharge pipe 24, provided for that purpose.

And the following parts are in the drawings also, indicated by figures, to wit: Pipes for conducting water, 20; pipes for conducting chemicals, 30; pipes for conducting chemicals and liquids separately or mixed, 22 21 22<sup>a</sup> 22<sup>b</sup> 22<sup>c</sup> 22<sup>d</sup> 22<sup>e</sup> 22<sup>f</sup> 21<sup>a</sup> 21<sup>b</sup> 21<sup>c</sup> and 21<sup>d</sup>; pipes for returning condensed oily substances into stills, 19 14 14<sup>a</sup> 14<sup>b</sup> 16<sup>a</sup> 16<sup>b</sup> 16<sup>c</sup> 16<sup>d</sup> 15<sup>a</sup> and 15<sup>b</sup>, and passages, 80; pipes for conducting vapors into the condensers, 35; pipes for testing the contents of the stills or columns, 5 and 6; pipes for discharging condensed alcohol, 23; pipes for discharging surplus water, 24; pipes for connecting the high-wine columns with each other, 13<sup>a</sup> 13<sup>b</sup> 12<sup>a</sup> and 12<sup>b</sup>; steam chambers entering the high-wine columns, 26<sup>a</sup> and 26<sup>b</sup>; three-way stop-cocks, for directing the high wines or alcoholic vapors from the stills into the columns, or from one column into another, 75 76 77 78; passage for the vapors from the stills into the three-way stop-cocks, 11<sup>a</sup> 11<sup>b</sup> 11<sup>c</sup> and 11<sup>d</sup>; valves for regulating the volume of vapors required for the high-wine columns, 27<sup>a</sup> and 27<sup>b</sup>; stop-cocks, 3 8 10 9 and 90; bottom-plates in the columns, 25.

It is well known that even the purest of alcohol heretofore produced has retained certain quantities of essential oils, and to a corresponding extent has remained impure; and this was and is owing to the fact that oily vapors, mixed in with the alcoholic vapors or high wines, rise into the columns, and thence into the condensers, where they are being condensed with (instead of being extracted from) those alcoholic vapors. In my invention, however, this is done away with. By introducing into the columns water or chemicals, or both, I arrest and condense those oily vapors nearly all; and what little of them by chance still escapes into the condensers is there arrested and condensed by an improved apparatus for analyzation and condensation. Those condensed oily vapors, which nearly always carry with them some alcoholic vapors, I conduct back into the stills for re-rectification. There is no danger of producing a vacuum in or a collapse of the columns by the introduction of the water referred to, for the quantities introduced are but very small compared with the volume and force of the vapors in a column; and besides there is always air enough present in a column to prevent such accidents, such air entering through the ordinary test pipes, which are never completely filled with the liquid that passes through them. Different qualities of matter passing from the same still—as, for instance, high wine, low wine, fusel oil, ether—I pass through separate columns, partly to keep such qualities separate, and thus more ready for use, and partly also to keep the so-called high-wine columns sweet, and prevent them from contracting and imparting the taste of the impurities, were such impurities to pass through them. In my rectifying process it matters not how poor and low-proof the whisky is with which I charge my stills, nor whether such whisky is made of grain, molasses, potatoes, beet-roots, or otherwise; the result remains the same—I produce from it the purest alcohol thus far produced. I also construct my apparatus in such a way that I can work at option either one still, with one or more columns, or two stills, with two columns, or any desirable number of stills in connection with any desirable number of columns. The expenses and facilities for working my apparatus in those various manners remain proportionately the same, and the arrangement and manipulation of the parts of my apparatus are very simple, and therefore readily acquired. As a partial illustration of the various modes in which my apparatus can be worked, I shall now describe the operation of the following modes, to wit:

a. Using one still (S 1) in connection with one high-wine column (C 1) and one low-wine column, (C 3); and, after that—

b. Using two stills, (S 1 and S 2,) in connection with two high-wine columns (C 1 and C 2) and one low-wine column, (C 3.)

And I begin with a; that is to say, with the mode of using one still (S 1) in connection with one high-wine column (C 1) and one low-wine column (C 3.) This operation I begin in the ordinary manner; that is to say, I charge my still S 1 with whisky, and heat the same; but before the ethers from that still begin to rise I make sure that the three-way stop-cock 75 is turned in such a way that no ethers can pass through it into the column C 1, while I at the same time open a passage from the still S 1 into the low-wine column C 3 through steam



passage 11<sup>a</sup>, three-way stop-cock 75, and pipes 12<sup>a</sup> and 12. Through this passage I allow the ethers and the fusel oil to pass into and through that column C 3; and as soon as the test pipe 23 shows that the high wine begins to flow, I shut this last-named passage by turning the three-way stop-cock 75 once more. This last-named turn, while it shuts the one passage, opens at the same time another one, for the now ready high wines or alcoholic vapors to pass from still S 1 into column C 1 through steam passage 11<sup>a</sup>, three-way stop-cock 75, steam chamber 26<sup>a</sup>, and valve 27<sup>a</sup>. In that column C 1 those alcoholic vapors are permitted to rise until they reach the condenser, (supposed to be attached to such column C 1, and supposed also to be constructed like my analyzing condenser, shown in G 4, sheets No. 1 and No. 2.) But while I allow, as usual, the alcoholic vapors to rise, I do not allow the oily substances they contain to rise and condense with them. On the contrary, I arrest all, or nearly all, of those oily substances or essential oils in the column C 1, and condense them near the bottom of that column by introducing into that column, through pipe 22 and its branches, either water or chemicals, at option, mixed with some suitable liquids. The branch pipes 22<sup>a</sup> 22<sup>b</sup> 22<sup>c</sup>, &c., have each a stop-cock and a dial attached to it, by which to regulate the quantity of water or chemicals passing through them into that column C 1. The introduction of that water or those chemicals begins through branch pipe 22<sup>a</sup>, *i. e.*, through the pipe nearest to the bottom of the column; and after that branch pipe 22<sup>a</sup> is put into use to its fullest extent, if wholly or partially in vain, additional branch pipes 22<sup>b</sup> 22<sup>c</sup> 22<sup>d</sup>, &c., are successively put into use, until the test pipe shows the alcohol in its desired purity. The water from the reservoir W 31 is used for that column C 1; it descends into the vessels T 29, (where, at option, it is caused to meet and mix with the chemicals coming from a compartment in the vessel V 28,) and thereupon it passes through pipes 22 into the column. The vessels T 29 have each a self-acting float or stop-cock, 50, placed within them, whereby the pressure and the quantity of the liquid required for pipe 22 are regulated. The condensed oily substances, on account of their being generally mixed with some condensed alcoholic vapors, I conduct back into still S 1 through passages 80, pipe 13<sup>a</sup>, stop-cock 90, and pipe 16<sup>a</sup>. Thus those alcoholic vapors are caused to rise again and are being saved, while the condensed oily substances fall to the bottom of the still, and at the end of the charge are in the usual manner taken out and utilized. The alcoholic vapors, thus purified, now rise into the analyzing condenser, which, as aforesaid, is supposed to be attached to that column C 1, and is supposed to be constructed like the one shown at G 4 in sheets No. 1 and 2. Through pipe 35 those alcoholic vapors or high wines enter the analyzer, (which, as aforesaid, constitutes the upper compartment of the analyzing condenser G 4) and there they are at once forced into the narrow space 34, and are exposed to the quick and powerful condensing action of the two volumes of water contained in the spaces 41 and 42. But that water in spaces 41 and 42, being heated in part by the vapors in space 34, is not cold enough to condense the alcoholic vapors, but does condense the less volatile and few oily parts that might have escaped into the analyzer. A perfect and final analyzation and separation of oily parts from alcoholic vapors does here take place. The condensed oily substances are discharged through a pipe provided for that purpose near the bottom of the analyzer, while the alcoholic vapors escape into the lower compartment or condenser through pipe 17, and are there finally condensed and discharged through pipe 23. As soon as the high wines have all left the still S 1, and the test pipe 5 shows that the low wines begin to flow, I turn again the three-way stop-cock 75; but this time I turn it in such a way that, while I shut the passage just used, from still S 1 into column C 1, I open at the same time the passage used for the ethers at the start, and leading from still S 1 into column C 3. The low wine thereupon begins to rise into that column C 3, and there I treat it with water or chemicals, through pipe 21 and its branches, in a manner similar to that in which I have treated the high wine in column C 1. From that column C 3 the low wines rise into the analyzing condenser G 4, through pipe 35, much purer than low wines generally rise into condensers; and in that analyzing condenser G 4 the low wines undergo a similar analyzing process as the high wines have undergone, in a similar condenser, only that in analyzing the low wines I cause the condensed oily substances to pass through the hopper-shaped receptacle 18, thence through pipe 19, back again into column C 3, and thence, through passages 80 and pipes 14 and 14<sup>a</sup>, back into the still S 1 for re-rectification. If no re-rectification of the low wine is desired, I can discharge it from the analyzing condenser G 4 through discharge pipe 23; and in like manner can I discharge the oily substances from the analyzer through a special pipe, if desired, instead of returning them into the still, as aforesaid. The low wines I produce in the above manner are, after re-rectification, to all intents and purposes as pure and good as the superior alcohol from the high wines which I produce, and practical distillers and rectifiers will at once perceive the great advantage of thus improving and more advantageously utilizing their low wines.

Having thus fully described the manner of using in my apparatus one still, in connection with one high-wine column C 1 and one low-wine column C 3, I will now proceed to describe the above-named manner of—

b. Using two stills, (S 1 and S 2,) in connection with two high-wine columns (C 1 and C 2) and one low-wine column, (C 3.)

This process is begun in a manner similar to the one in which the process described in the foregoing has been begun; that is to say, still S 1 is charged and heated, and the ethers and fusel oils from it are directed into column C 3, and the high wines into column C 1, all as aforesaid. As soon as the high wines from still S 1 begin to enter column C 1, I charge and heat still S 2, permit the ethers or fusel oils from that still S 2 to enter column C 3, (through steam passage 11<sup>b</sup>, three-way stop-cock 76, and pipes 12<sup>b</sup> and 12,) and thereupon I direct the high wine from still S 2 into column C 2 through steam passage 11<sup>b</sup>, three-way stop-cock 76, steam chamber 26<sup>b</sup>, and valve 27<sup>b</sup>. Upon this both columns C 1 and C 2 are at work on high wines, and each of these columns receives its high wines from the still placed underneath it. Supposing the two columns C 1 and C 2 to be of equal dimensions, and the stills S 1 and S 2 to be likewise of equal dimensions, and supposing also that in the process just being described still S 1 had been charged and heated some twenty-four hours before still S 2, it would follow that the high wines from still S 1 would be discharged sooner than those from still S 2; or, in



other words, that still S 1 would be discharging low wines while still S 2 is still discharging high wines. The low wines from still S 1 are then directed into column C 3 and treated all as in the preceding process; but, for all that, I do not allow the column C 1 to be idle and cooling in the mean time. On the contrary, I keep column C 1 warm and at work on high wines, without any interruption whatever; and I effect this by now directing a current of high wines or alcoholic vapors from still S 2 into column C 1 through a passage I now open, and which leads through steam passage 11<sup>a</sup>, three-way stop-cock 77, pipe 13<sup>a</sup>, stop-cock 8, pipe 13<sup>b</sup>, steam chamber 26<sup>a</sup>, and valve 27<sup>a</sup>. (Steam passage 11<sup>a</sup> is not visible in the drawings, and is supposed to be placed underneath the three-way stop-cock 77, and to resemble 11<sup>a</sup> and 11<sup>b</sup>.) By these means the still S 2 is discharging high wines into the two columns C 1 and C 2 at the same time, keeping them warm and at work while still S 1 is discharging low wines, as aforesaid, or is being cleaned and recharged. After that still S 1 is recharged and reheated, the ethers and fusel oils from it are once more directed into column C 3 in the manner already described, and as soon as the high wines from that new charge begin to flow I shut the last-named passage, (through which I conducted high wines from still S 2 into column C 1,) and in its stead I open once more the passage already described in the preceding as well as in an earlier stage of this process, and used for conducting high wines from still S 1 into column C 1. And in consequence of all this, and by this time, each of those two columns C 1 and C 2 is again supplied with high wines from the still placed underneath it. But as the still S 2 has for a time been supplying with high wine both columns C 1 and C 2, and as still S 1 has in the mean time been recharged, it follows that still S 2 will in turn have discharged all its high wines before still S 1 will have done it; and to prevent then column C 2 from being idle or getting cold, I simply reverse the former proceeding; that is to say, I now supply column C 2 with high wine from still S 1 through a passage opened for that purpose, and leading through steam passage 11<sup>a</sup>, three-way stop-cock 78, pipe 13<sup>a</sup>, stop-cock 8, pipe 13<sup>b</sup>, steam chamber 26<sup>b</sup>, and valve 27<sup>b</sup>, (and steam passage 11<sup>a</sup> is supposed to be attached to three-way stop-cock 78 like 11<sup>a</sup> to 75.) Thus passages are provided from any one still into all the columns, or from any one column into all the stills or into other columns employed, and the process of rectifying or distilling can thereby be continued without any interruption whatsoever. The condensed oily substances can also be directed from any one column into any given still; as, for instance, directing such oily substances from column C 1 into still S 2 through pipes 16<sup>a</sup> and 15<sup>a</sup>, stop-cock 10, pipes 15<sup>b</sup> and 16<sup>b</sup>, stop-cock 9, and pipe 16<sup>a</sup>. The quantity of low wine produced in my process is but very small compared with the quantity of high wine produced, and thus one low-wine column is enough for three high-wine columns, and, even at that, only needs to be of two-thirds the dimension of either of those high-wine columns; or, in other words, the low wines of three stills have time enough to pass through one and the same low-wine column without interrupting operations and without crowding upon one another. My improving of the quality of the low wines I have mentioned before. But I not only improve their quality, but I also lessen their quantity, and add in their stead to the quantity of high wines; and thus I additionally cheapen the production of alcohol.

From all of the foregoing it will readily be perceived that I gain all the objects I aimed at in my invention, as I have named them at the beginning of this specification; and yet, while I do gain those objects by the means just described, it does by no means follow that I need to confine myself, or that I do confine myself, to any particular details. On the contrary, any practical man can easily see that I can gain the objects aforesaid without confining myself to constructing my apparatus in the manner just described. I can connect and use stills, columns, analyzers, condensers, &c., of varying dimensions; I can place at option the various parts of an apparatus, and do not even confine myself to any particular number of parts, or to any particular mode of connecting them. Even old apparatus could easily be altered, and their parts so connected, as to produce the results which form the objects of my invention; and in the apparatus described in the foregoing I only intended to show—

- a. The new parts, and their operations, as invented by me;
- b. Some modes of effecting my improvement in the system of rectifying or distilling alcohol or other liquids; and

- c. A compact and cheap mode of placing or constructing such an apparatus.

Having now fully described my improved system of rectifying, and the apparatus to effect it with, I claim as my invention, and desire to secure by Letters Patent, the following, to wit:

1. Introducing chemicals into a rectifying or distilling column, for the purpose of analyzing or purifying in whole or in part the contents of such column.
2. Introducing such chemicals at option, either in their natural state or mixed with water or other suitable liquids.
3. Introducing water into a rectifying or distilling column in such a manner as to cause the mixing of such water with all or part of the contents of such column, for the purposes herein set forth.
4. Introducing such chemicals (pure or mixed) or such water into such column substantially by the means or in the manner herein described.
5. Constructing a rectifying or distilling apparatus in such a manner that one boiler or still can supply and keep at work two columns, or at option more, at a time.
6. Constructing a rectifying or distilling apparatus in which two columns, or at option more, are connected with each other in such a manner that thereby the contents of one column can in whole or in part be passed into another column without interrupting the process of rectification, distillation, analyzation, or condensation.
7. Constructing an analyzer of a series of tubes or cylinders, substantially like the upper compartment of the analyzing condenser G 4 herein described.
8. Constructing a condenser of a series of tubes or cylinders substantially like the lower compartment of the analyzing condenser G 4 herein described.



9. Constructing the analyzing condenser G 4 of a series of tubes or cylinders, and dividing the same into compartments, substantially as described and for the purposes named.

10. Providing a rectifying or distilling apparatus with a vessel, V 28, for the reception or distribution of chemicals, substantially as described and for the purposes set forth.

11. Providing a rectifying or distilling apparatus with one or more tubs or vessels, T 29, for the mixing of chemicals with liquids, substantially as described and for the purposes set forth.

12. Supplying each or all of such tubs T 29 with a float or self-acting stop-cock, 50, for the purpose of regulating the quantity of liquid required in each tub.

13. The three-way stop-cocks 75 76 77 78, or any desirable number of the kind, constructed substantially as herein set forth, and used as described.

14. Connecting such three-way stop-cocks with steam chambers or pipes, substantially in the manner or for the purposes herein set forth and described.

15. The pipes 15<sup>a</sup> and 15<sup>b</sup>, in connection with pipes 16<sup>a</sup> 16<sup>b</sup> 16<sup>c</sup> and 16<sup>d</sup>, and stop-cocks 90 10 and 9, the whole substantially arranged in such a way as to enable the condensed impurities of any given column to be returned or directed into any given still, substantially as described and for the purposes set forth.

16. Regulating, by means of valves 27<sup>a</sup> and 27<sup>b</sup>, the quantity of vapors required in any given column for rectifying or distilling purposes, all substantially as described.

J. G. BEQUET.

Witnesses:

F. KOPPEL,

A. SMITH.