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PATENTED AUG. 20, 1907.

E. A. SPINK & J. W. NORTON.

VINEGAR APPARATUS.

APPLICATION FILED DEC. 17, 1906.

3 SHEETS—SHEET 1.

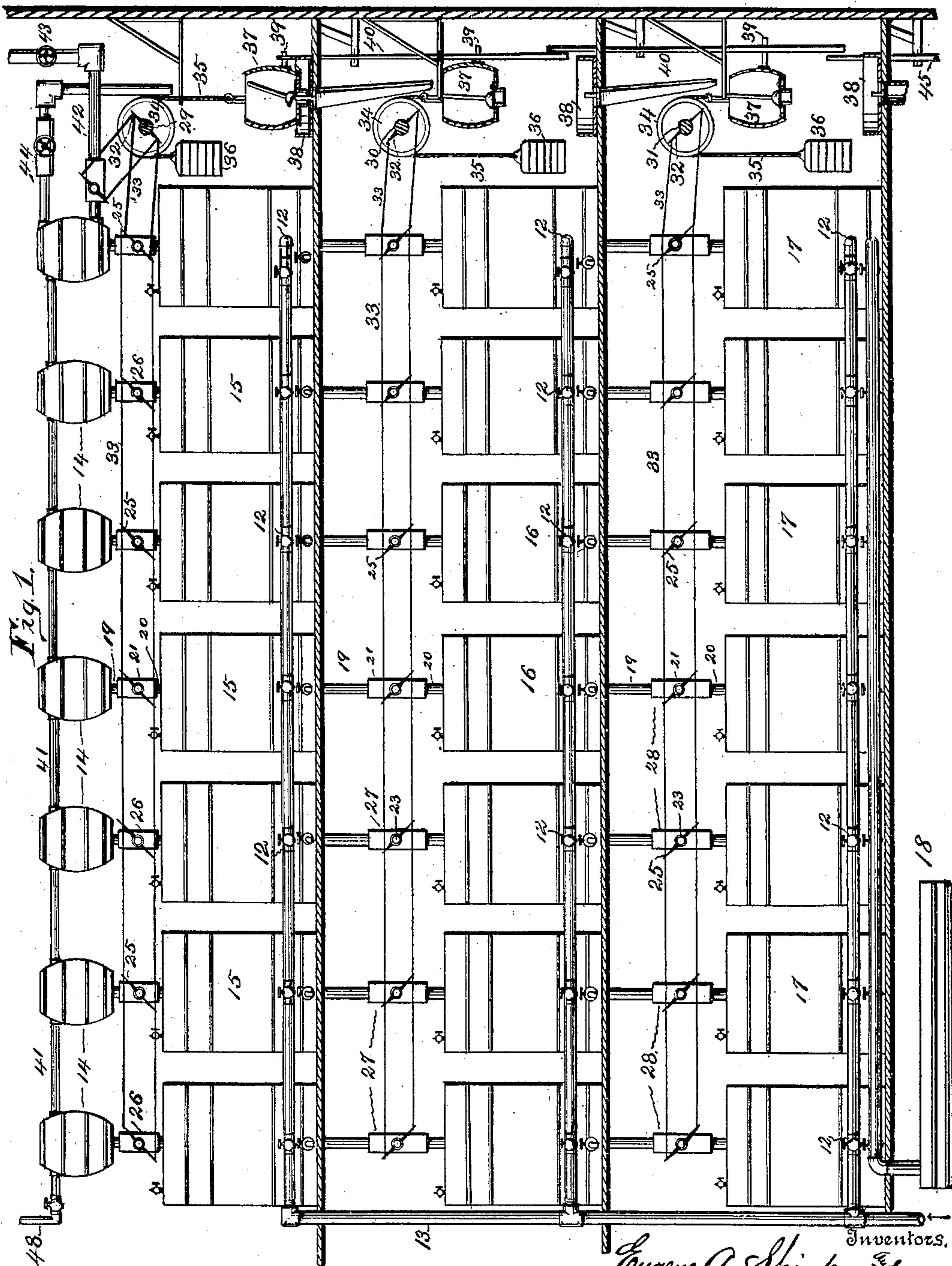


Fig. 1.

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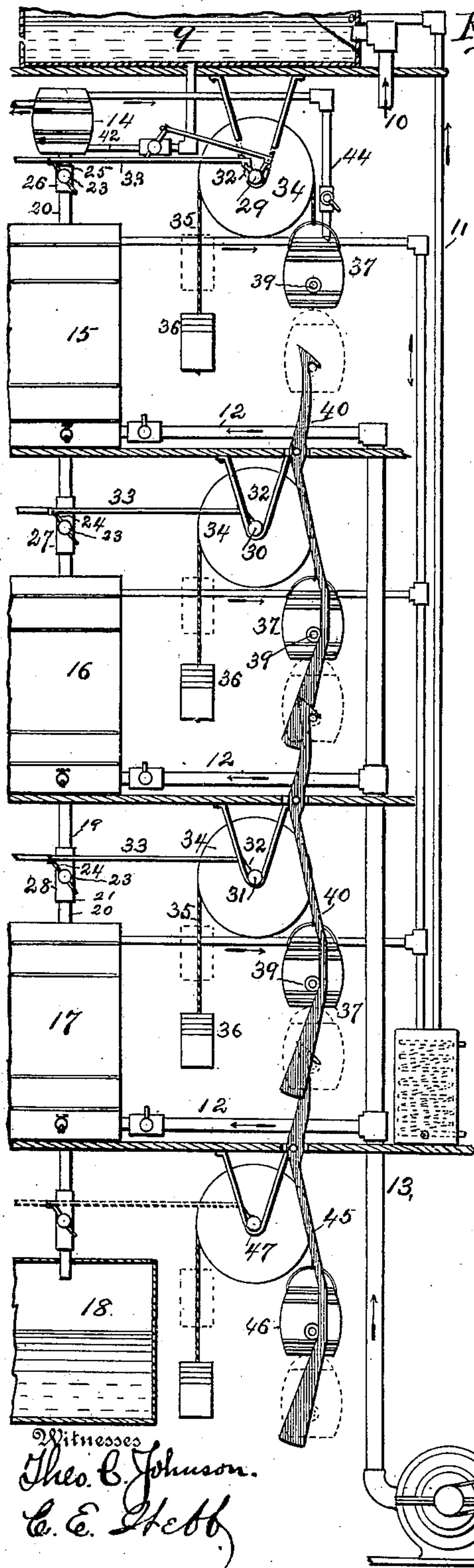


Fig. 2.

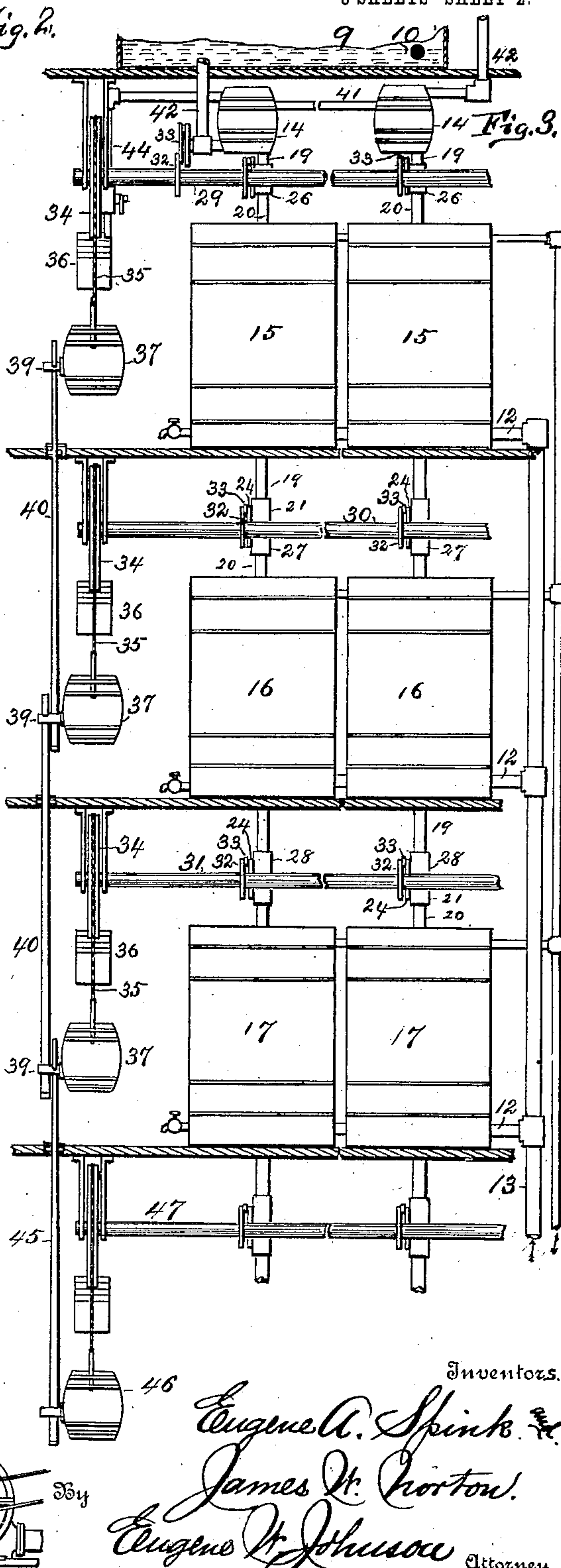


Fig. 3.

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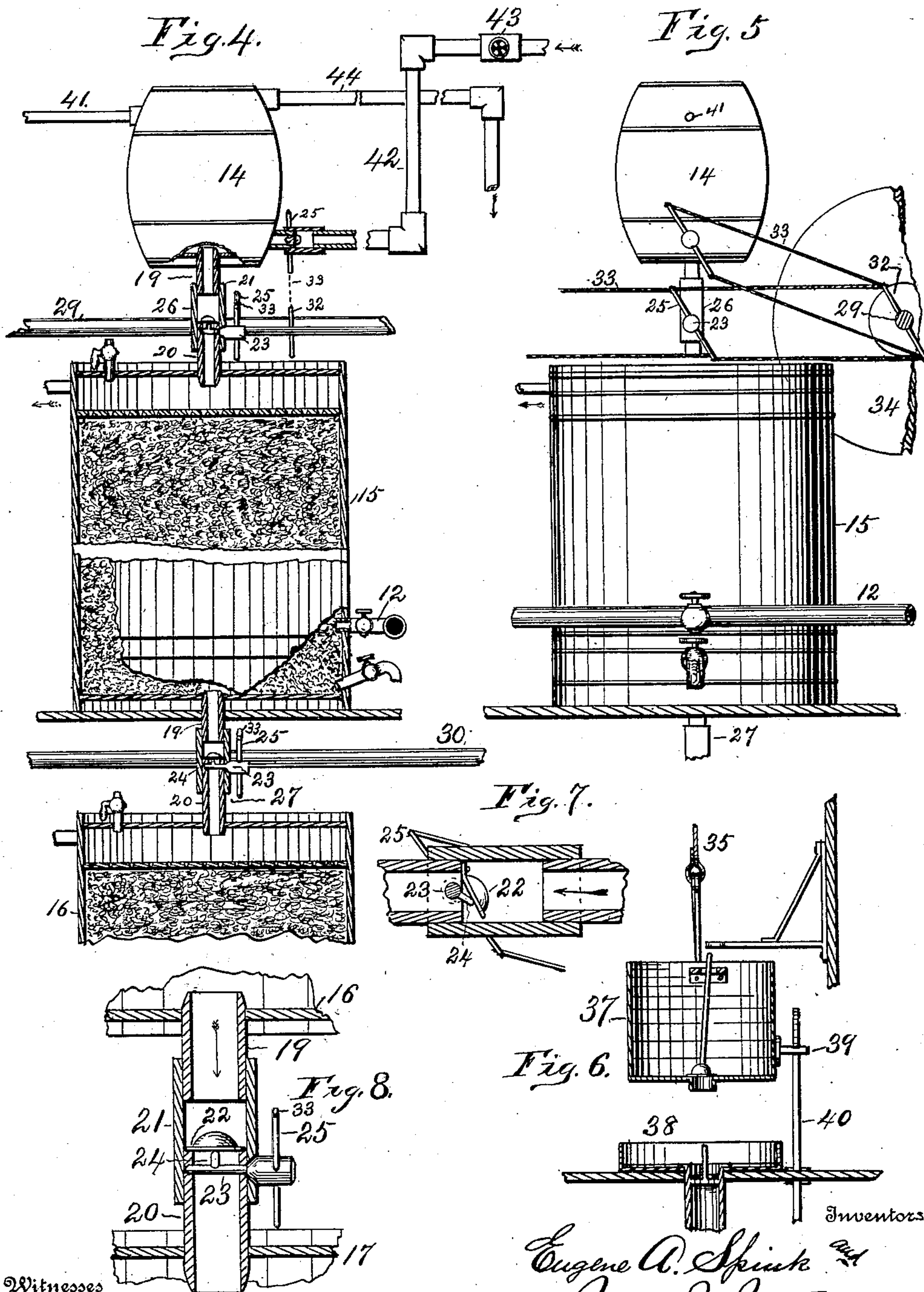
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3 SHEETS—SHEET 3.



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VINEGAR APPARATUS.

No. 863,949.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, EUGENE A. SPINK, a citizen of the United States, residing at Chicago, in the county of Cook, State of Illinois, and JAMES W. NORTON, a citizen of the United States, residing at Washington, in the District of Columbia, have jointly invented certain new and useful Improvements in Vinegar Apparatus and Automatic Feeders Therefor, of which the following is a specification.

10 This invention relates to improvements in vinegar apparatus and automatic feeders or chargers therefor, the purpose of our invention being to provide means for delivering a charge or predetermined quantity of alcoholic solution to the generators at intervals, the
15 quantity of the charge and the time between the charges being under control of the operator, a second purpose of the invention is to provide means whereby the charges will not be exposed to the external atmosphere after being drawn from the supply tank, and to gener-
20 ally improve the mechanism so that friction will be reduced and leakage will be avoided.

Our invention in a preferred form is illustrated in the accompanying drawings, in which—

Figure 1 is a sectional elevation showing the several
25 floors of vinegar works, provided with the invention. Figs. 2 and 3 are front and side elevations. Fig. 4 is a view partly in section showing one of the chargers and the first and second generators. Fig. 5 is a side elevation. Fig. 6 is a sectional view of one form of the bucket
30 that operates the supply and cut-off valves when lowered. Figs. 7 and 8 are detail sections.

The supply tank 9, receives the alcoholic solution through a pipe 10 and during the process of making vinegar the liquefied aldehydic products are delivered to
35 the supply tank through the pipe 11, and air under pressure is delivered to the lower portion of the generators through branch pipes 12 that are coupled to the main air supply pipe 13. The generators are preferably arranged in both vertical and horizontal series, and a
40 charge container 14 is provided for each of the vertical series of generators, and in the present instance we have shown three generators, 15, 16 and 17 arranged in vertical series on different horizontal planes.

The charge containers 14 are connected to the upper
45 generators 15, and the lower end of the upper generator is connected to the second generator 16 such generator being connected to the lower generator that discharges into a receiving tank 18. The connections shown in detail by Fig. 8 of the drawings comprise sections of
50 wooden pipe 19 and 20 that are connected by a larger section 21, the lower pipe 20 has attached thereto a leather flap-valve 22 which opens upward and when closed will rest upon the upper end of the pipe, such valves have attached thereto blocks as shown. Below
55 the valves 22 the tubes are apertured to provide bear-

ings for spindles 23 that carry pins 24, the heads of the spindles project beyond the pipes 21 and carry an arm 25 to which the valve raising or opening mechanism is attached. By the arrangement shown the valves may be raised from their seats with very little effort, and
60 there is no liability of leakage or the spindles jamming by the wood swelling or contracting. The valves for the horizontal pipes are constructed in the same manner as the valves for the vertical pipes, see Fig. 7 of the drawings.

In horizontal alinement with the connections 26, 27 and 28 between the chargers and the generators, are shafts or rock-bars 29, 30 and 31 they being of sufficient length to extend across one of the horizontal series of generators, and each of the shafts carry arms 32, such
65 arms being connected to the arms 25 of the valves 26, 27 and 28 by rods 33 so that when the shafts are turned the valves will be opened. The shafts or rock-bars each carry a disk or wheel 34, about which passes a flexible connection 35, to one end of which a weight
70 36 is secured and to the other end is secured a receptacle 37, which when empty is overbalanced by the weight.

The receptacles 37 are provided with a valved outlet opening and below the receptacles there are pans 38
80 from which depend pipes or spouts, such pans having upward extending pins that are intended to engage the valves and raise the same when the receptacles are lowered so that any and all liquid contained in the receptacles will be discharged. Each receptacle 37
85 has an outward projecting pin or stud 39 that is adapted to engage a pivoted catch-and-release-bar 40 that is so constructed and positioned that the same will hold the receptacle 37 when it has been filled and lowered to turn the shaft and operate the valves.

The shafts may be rocked or turned by any suitable mechanical means and they can be coupled so that they will be turned successively or one after the other, the periods intervening between the operating of the valves being under the control of time mechanism, an
90 independent water supply, or an attendant, in practice we prefer to use the devices shown, as the pivoted catch and release bars 40 are simple and effective.

In practice the closed charge containers 14 are connected together by pipes 41 located slightly below the
100 upper ends of the kegs or chargers 14, the last of the series of chargers having an air outlet pipe 48, that extends upward above the normal level of the liquid in the supply tank. The kegs or chargers are filled through a pipe 42, the pipe having a valve 43 that may
105 be adjusted so that the chargers may be filled within a certain period of time, and when the chargers have all been filled from the supply tank 9, the overflow will pass from the first charger through the pipe 44, that leaves the same at a higher level than the pipe 41, the
110

overflow being discharged into the receptacle 37. When the amount of liquid in the receptacle 37 is sufficient to overcome the weight and the friction of the parts the receptacle will be lowered, its downward movement turning the shaft so that the valve from the supply tank will be closed and all of the valves between the chargers and the upper generators will be opened, to admit a predetermined quantity of alcoholic solution to each of the upper series of generators.

When the first receptacle falls or is lowered its outward projecting pin 39, will engage the upper end of the catch-and-release-bar 40 pushing the same out of its path, so that the hook will engage the pin and hold the receptacle lowered. When the contents of the upper receptacle has flowed therefrom and passed into the receptacle below such receptacle on its downward movement will engage the catch-and-release-bar below its pivot to disengage the hook from the upper receptacle, which is then raised by the weight to turn the shaft to its initial position opening the supply and cutting off the chargers from the generators. The action is repeated so that the shafts 30 and 31 are operated to successively connect the generators 16 and 17. The receptacle that engages the disk or wheel on shaft 31 engages a catch-and-release 45 and when the contents of the receptacle 46 is discharged the weight will return such receptacle to its normal position. The shaft 47 may be connected to the outlet pipes of the lower generator, when the same have valves, but in practice such pipes are usually open as they lead directly into the storage tank. The receptacles may be suitably guided and the pins 39 not only engage the hooks but also serve as a stop to limit the swing of the catch-and-release-bars in one direction. The overflow that is used to operate the automatic valve opening mechanism is usually discharged into a waste pipe or sewer but if desired it may be collected in a tank and returned to the supply tank 9.

The outlet openings for the receptacles 37 may be of such construction that the out-flow may be regulated to hold the receptacle down for the period of time desired, for instance the upper receptacle may have a comparatively small discharge opening so that the valves will be held open for quite a long period of time while the chargers are emptying themselves into the upper generators, and the counter weights on the second and third receptacles may be varied so that less liquid will be required to cause the receptacles to descend, and as to such details our invention may be modified or varied to meet such requirements as may arise.

In practice the generators which contain shavings are charged with an alcoholic solution to saturate the shavings, and vinegar cultures are introduced, they propagating on the shavings, and as air is introduced into the generators the alcohol before becoming vinegar is converted into aldehyde, and it is upon the aldehyde that the bacteria feed. The generators are closed in order to prevent the introduction of bacteria not essential in converting low wines into vinegar. When the generators are in condition for use the alcoholic solution is pumped or fed from a still into the supply tank 9, and such solution contains not more than 25% of alcohol. When the generators have been charged air at the proper temperature is forced into the generators and the

temperature therein will be raised and aldehydic vapors will be given off, these vapors being condensed and pumped back into the supply tank instead of being allowed to escape into the atmosphere; the saving of the aldehydic vapors not only results in enriching the low wine with aldehyde which is a desirable element in the manufacture of vinegar, but avoids contamination of the atmosphere about the generators, and incidentally the propagation of germs that are not necessary or helpful in the conversion of alcohol into vinegar.

Referring to the drawings, particularly Figs. 2 and 3, the tank 9 is supplied with an alcoholic liquid through the pipe 10, and with aldehyde or condensed alcoholic vapors that arise from oxidation of the alcohol, the vapors being expelled from the generators by the air that is forced therein, the vapors being condensed and then carried from the condenser to the supply tank.

In the production of vinegar with our apparatus, and with proper cultures upon the shavings in the generators, and with a supply of filtered air, the temperature in the upper generator will be about 90° F., and in the next generator below about 80° F., and in the last or lower generator about 76° F., the largest amount of aldehyde being recovered from the first generator, and by using closed generators and saving the products that are usually lost by evaporation we are able to convert the alcoholic solution into very strong and pure vinegar. The pipe 42 having a valve 43, enters the first of a series of charge containers, and as each of the containers are being filled the air therefrom escapes through a vent or air outlet pipe 48. When all of the chargers are filled the liquid will flow out of the first container into the upper bucket or receptacle 37. The time required to fill the receptacle depends either upon the adjustment of the valve 43 or upon the size of the bucket 37. The receptacle or bucket is held raised by a counterweight 36, and when such weight is overcome the receptacle will be lowered and its downward movement actuates a rock-shaft 29 that has an arm, movement of the arm in the proper direction closing a valve in the supply-pipe that enters the chargers, movement of the rock-shaft and other arms thereon opening the valves in the connections between the charge containers and the upper generators. As the liquid flows out of the charge containers, air will be drawn into the chargers through the vent-pipe, and such air will be forced out of the chargers when they are refilled.

When the first or upper receptacle descends it is held down by the catch 40 and when its contents is discharged into the next receptacle beneath, such receptacle descends and releases the catch from the upper receptacle, the downward movement of the second receptacle opening the previously closed valves in the connections between the generators 15 and 16. The downward movement of the second receptacle or bucket releases the catch that holds down the first bucket, and when the rock-shaft 30 is turned the valves between the generators 15 and 16 are opened to allow the low grade vinegar to pass from the first generators, on the upper floor, to the generators on the next lower floor, the operation being repeated the third or lower of the vertical series of generators discharging the finished product into a receiving tank 18.

The generators are of the closed type, and filtered air is forced into each generator through pipes 12, such

pipes being connected with an air supply pipe 13. The vapors that are given off by the oxidation of the alcohol and the air that is forced into the generators pass out of the generators through pipes that lead to a condenser, and the condensed products are pumped into the supply tank. The quantity lost by evaporation when open generators are used amounts to about 15%, and this waste is saved by the use of the apparatus shown.

The valves between the chargers and the generators are opened and closed successively or one after the other, and when the supply valve to the chargers is properly adjusted the process is practically automatic.

We claim,

1. In an apparatus of the character set forth, a supply tank, a plurality of charge containers connected therewith, a plurality of generators connected to the charge containers, a valve or cut-off in the connection between each of the charge containers and each of the generators, means for connecting the valves or cut-offs to each other, and means for actuating the connection when a charge has been admitted to the containers.

2. In a vinegar apparatus, a supply tank, a horizontal series of charge containers connected to the supply tank, a vertical series of generators connected with the charge containers, valves in the connections between the charge containers and the upper generators of a series, rock-shafts connected to each of the valves, an overflow pipe from one of the charge containers and receiving means for the overflow operatively connected with the rock-shafts.

3. In a vinegar apparatus, a supply tank, a plurality of charge containers connected with the supply tank and to each other so that the charge containers will be filled successively, a vertical series of generators, valved pipes for connecting the charge containers and the upper generators, valved pipes between each of the generators constituting a vertical series, a series of rock-shafts one for each horizontal series of valves, connections between the rock-shafts and the valves, and automatic means for successively opening the horizontal series of valves, substantially as shown and for the purpose set forth.

4. In a vinegar apparatus, a plurality of generators, closed chargers maintained above the generators, a supply tank, a pipe leading from the supply tank to one of the chargers, pipes connecting the chargers so that they will be filled successively, an overflow through which liquid passes from the chargers when all have been filled, and means operated by such overflow for establishing communication between the chargers and the generators.

5. In a vinegar apparatus the combination of a receptacle that is adapted to receive a predetermined quantity of liquid in a certain time, means for operatively connecting such receptacle with valve operating mechanism, means for holding the receptacle in its lowered position, and means for releasing the holding means when the contents of the receptacle have been discharged therefrom.

6. The combination with a supply tank, a series of chargers and generators that are supplied therefrom, means for connecting valves in the connections between the generators and the valves between the chargers and the upper series of generators, a rock shaft for each horizontal series of valves, receptacles connected with each of the rock shafts, an overflow connected with one of the chargers and adapted to discharge into the upper receptacle, means for holding the receptacle lowered and other means for releasing the receptacle when the contents thereof has been discharged.

7. In a vinegar apparatus, a supply tank, a series of charge containers in communication with the supply tank, an air-outlet pipe attached to one of the charge containers, an overflow pipe from one of the charge containers, a vertical series of generators below each charge container, valved connections between the charge containers and the upper series of generators, valved connections between the generators constituting a vertical series, a series of rock-shafts, connections between such rock-shafts and the valves, and means for turning automatically the rock-shafts to open the valves when the charge containers have been filled, substantially as set forth.

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Witnesses:

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