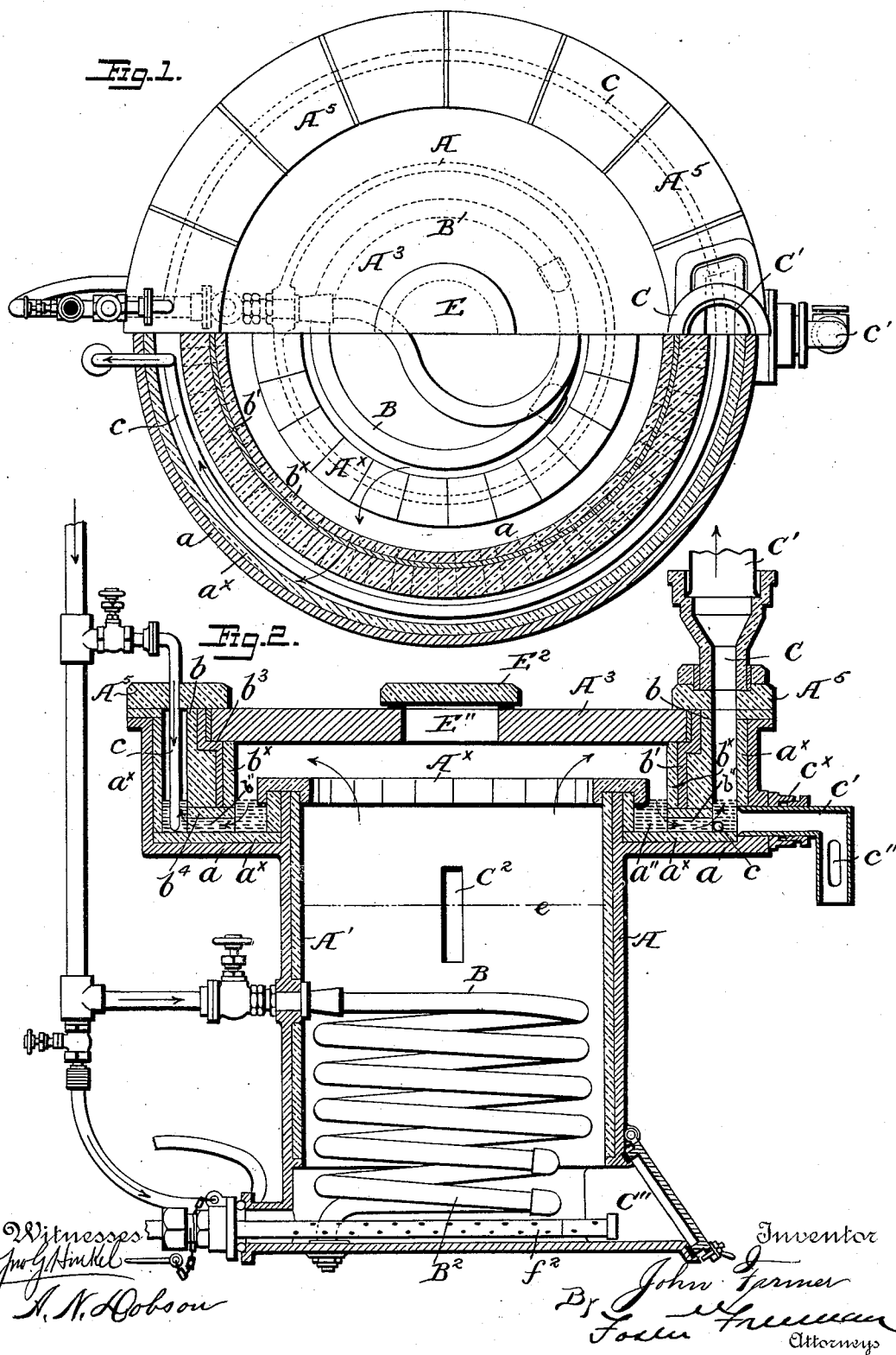


(No Model.)

J. FARMER.
MANUFACTURE OF ACETIC ACID.

No. 507,895.

Patented Oct. 31, 1893.



UNITED STATES PATENT OFFICE.

JOHN FARMER, OF GLASGOW, SCOTLAND, ASSIGNOR TO THE CHARLES
LENNIG & COMPANY, LIMITED, OF PHILADELPHIA, PENNSYLVANIA.

MANUFACTURE OF ACETIC ACID.

SPECIFICATION forming part of Letters Patent No. 507,895, dated October 31, 1893.

Original application filed June 28, 1892, Serial No. 438,286. Divided and this application filed June 17, 1893. Serial No. 477,965. (No model.) Patented in England August 22, 1889, No. 13,264.

To all whom it may concern:

Be it known that I, JOHN FARMER, a subject of the Queen of Great Britain, residing at Glasgow, Scotland, have invented certain new and useful Improvements in the Manufacture of Acetic Acids, for which I have obtained a patent in Great Britain, No. 13,264, dated August 22, 1889, of which the following is a specification.

My invention has for its object to produce an acetic acid still having certain novel features of construction whereby the efficiency of the apparatus is increased and whereby the acid produced is purer than is that produced by any apparatus of which I have knowledge.

The invention consists of a still or apparatus for the distillation of acetic acid having the novel arrangement and combination of parts to be hereinafter pointed out.

The preferred form of my invention is illustrated in the accompanying drawings, although I do not wish to be limited to all the details of construction and arrangement therein shown, as it will be evident that certain parts of the invention could be modified or changed without departing from the essential principles and features thereof.

Referring to the said drawings:—Figure 1 is a sectional plan view, and Fig. 2 is a sectional elevation of an acetic acid still embodying my improvements.

In the said drawings, A represents the lower body of the still which is preferably formed of cast iron, cylindrical in shape, and lined internally, as at A', with segmental pieces of fire-clay, tile, or bricks, or other equivalent material which is adapted to resist the action of the material which is charged into the still. It is especially important that the lining to the upper part of the still should be as perfect as possible, as the gases which pass off from the charge are especially destructive.

B, B³ represents a steam pipe arranged in the lower portion of the still and adapted to heat the material which is being treated. The lower portion B³ of this steam pipe is arranged in horse-shoe shape; and opposite to the open portion or the end of this horse-shoe shaped part of the heating pipe is arranged the opening C'' which is closed by a

suitable door. The opening C'' serves as the draw off opening for the contents of the still after such contents have been properly treated, and it also serves as a man-hole through which an attendant can enter the still for the purpose of cleaning it out or making any necessary repairs. The lower portion B³ of the heating pipe as described, that is, in horse-shoe shape with the open portion opposite to the said opening permits a person to enter the still as will be understood.

C, C' represents the conduit leading from the upper portion of the still and through which the purified vapors are conducted away to a suitable condensing apparatus not shown in the drawings.

In the upper portion of the still A, I make a cavity, recess, or gutter, *a* which is adapted to contain a suitable trapping and purifying liquid through which the vapors which are passed off from the contents of the still are caused to pass before they can escape through the conduit C, C'. The gutter or trapping chamber is preferably formed by an angular extension *a* of the body A, such extension being cast with or properly secured to the body of the still. The inside walls of this trap chamber are properly lined with material which resists the action of the gases which are passed off from the still A, such lining being represented by *a*^x. The upper edge of the still is covered and protected by the segmental blocks A^x of fire-clay or other resisting material, which blocks are so shaped that they straddle not only the edge of the still but also the upper edges of the lining A' of the still proper and *a*^x of the trapping chamber. This construction is best illustrated in Fig. 2 of the drawings.

In order to cause the vapors which pass off from the contents of the still to dip under and pass through the liquid *a*' which is placed in the trap chamber *a*, I cause a rim *b*' which is connected with the cover of the still to dip into the said liquid. This rim is preferably of metal and of the angular form, in cross section, shown in Fig. 2, and upon either side of the said rim, I place blocks or sections of fire-clay or other suitable resisting material, this material being indicated at *b*, *b*^x. It is very

necessary that the bottom edge of the rim b' should be protected, as the vapor from the still passes with considerable force and velocity beneath the said rim, and unless the rim is thus protected, the said vapors will attack and eat away the rim at this point quite rapidly. For this purpose I use a protecting covering b^4 of suitable resisting material which preferably not only covers the edge of the rim, but also lies over the edges of the lining b , b^x . In order to properly support this rim which causes the vapors to dip under the surface of the trapping liquid, I preferably support it upon bricks b'' so that between them are passage ways for the vapors. The upper surface of the angular portion b^3 of the rim b' forms a suitable support for the cover A^3 of the still. This cover may be formed of a single block of stone or equivalent material, and through it is formed the opening E'' through which material can be charged into the still. E^2 represents the cap or cover which is placed over the opening E'' . The outer portion of the trapping chamber a , that is the portion which is outside the rim b' , is covered by the segmental blocks A^5 of fire-clay or other suitable material. These blocks are supported upon the upper outer edge of the flange or extension a which forms the trapping chamber, and upon the upper edge of the rim b' , and they may if found desirable overlap the outer edge of the cover A^3 , as shown in Fig. 4. By making the cover for the trap of comparatively small segmental pieces which are separate from the main cover of the still, I provide a ready means of access to the said trapping chamber whereby it can be cleaned when found desirable without having to uncover the entire still. The trap can be charged through an opening formed by removing one of the sections A^5 .

For the purpose of keeping the trapping liquid at the proper temperature, and of boiling it down in order to maintain it at a uniform level if this be found desirable, I introduce a steam pipe c to the bottom of the said trap. This pipe can be arranged in one or more coils as found desirable, and the steam which passes through said pipe can be taken from any suitable source.

c' represents a draw-off pipe connected with the trapping chamber a . It is represented as being an angular pipe which passes through a stuffing box c^x , and has its outer or open end bent at an angle to the portion which passes through the stuffing box, and is free to be turned therein. When the draw-off pipe is turned to the position shown in Fig. 2, then the contents of the still will be drawn off through the same. If the pipe be given a half turn so that its outer member or end is turned upward, then the contents of the trap will be retained therein. By more or less inclining the outer member of the draw-off pipe, the height to which the liquid within the trap can ascend before it overruns, through the draw-off pipe, can be accurately regulated.

C''' — indicates a sight opening through the outer member of the draw-off pipe. When the draw-off pipe is so turned that its outer member turns up, the said sight opening forms a ready means for ascertaining the height of the liquid within the trap, and I have found that this is a very desirable arrangement. It will be understood that the trap can be filled through this draw off pipe, and by means of the sight opening, the proper amount of liquid can be introduced without having to open the trap or to in any wise interfere with the operation of the still.

For the purpose of inspecting the contents of the still during the operation thereof, I prefer to provide the still body A with one or more sight openings C^2 , in which are arranged glass, mica, or other transparent material.

To expedite the process of distillation toward the end, it is a common practice to inject live steam directly into the still as near the bottom as is practicable; f^2 represents a steam pipe through which live steam may be injected into the still. As this, however, does not form a part of the present invention, I do not deem it necessary to describe in detail the construction, arrangement, and operation of this steam pipe.

To prepare the still A for starting the distillation, a charge, say of, acetate of lime and muriatic acid is introduced into the still through the opening E'' . This charge should be sufficient in quantity to cover the upper coil of the steam pipe D , D^2 , the dotted lines e being about the height to which the still should be filled. A purifying liquor composed preferably of a mixture of very pure acetate of lime and muriatic acid and having the tar carefully removed therefrom is run into the trap or gutter a . If now, steam be passed through the pipes B' , B^2 , the contents of the still will be heated and the impure acetic acid will pass off in the form of vapor and collect in the top of the still, that is, between the cover A^3 and the top of the charge. When the pressure is sufficient—and very little pressure will be required,—such vapor will be forced through the trapping liquid a'' and escaping into the outer portion of the trapping chamber a , will escape through the conduit C , C' , and thereafter be properly treated as is usual in the manufacture of acetic acid.

As this application forms a division of my application, Serial No. 438,286, filed June 28, 1892, I do not consider it necessary to point out in detail all the steps of the process, which is fully described in the said application.

I do not in this present application claim the combination of the still body having its upper end open, means for heating the contents of the still, a liquid trapping chamber surrounding the open end of the still proper and containing a purifying liquid, a cover and rim b , extending over the top of the still and dipping into the trapping liquid, and a chamber surrounding the said trap, the said chamber being provided with an escape pipe

for the vapors which have passed through the trap, as this forms the subject matter of a claim in my said application of June 28, 1892. Neither do I claim the combination of a still provided with a stuffing box near its lower portion and a perforated steam pipe adapted to slide longitudinally through said stuffing box into and out of the still, as this also forms the subject matter of a claim in my aforesaid application. Neither do I claim a still the charge-containing portion of which is provided with a steam pipe for heating the charge and with an opening in its lower portion through which an attendant can enter the still, the steam pipe opposite to the said opening being not continuous, but of substantially horse-shoe shape, as this also forms the subject-matter of a claim in my aforesaid application.

While I have described the apparatus as shown in the drawings as being especially adapted for the manufacture of acetic acid, it will be evident that the still might be used for other purposes.

What I claim is—

1. In a still, the combination with the body provided with a trap surrounding its upper end, of a rim dipping into the trapping liquid and dividing the trapping chamber into two parts, means for supporting the rim, a cover for the still, and the inner portion of the trapping chamber, and a separate cover for the outer portion of the trapping chamber, substantially as set forth.

2. In a still, the combination of the body provided with a trapping chamber surrounding its upper end, a rim dipping into the trapping liquid in the said chamber, means for supporting the rim, a cover for the still and the inner portion of the trapping chamber, and the separate cover sections A^5 for the outer portion of the said trapping chamber, substantially as set forth.

3. A still consisting of the body A provided with the angular extension a surrounding its upper end, and constituting a trapping chamber in combination with a cover for the still,

a rim adapted to dip into the liquid in the trapping chamber, means for supporting the rim, a means for heating the contents of the still, and an escape pipe for the vapors which pass off from the still communicating with that portion of the trapping chamber which is outside the said rim, substantially as set forth.

4. The combination with a still provided with a trapping chamber surrounding its upper end, of a rim b of angular form adapted to dip below the surface of the liquid in the trap, and the cover A^3 for the still and the inner portion of the trap resting upon the angular portion of the said rim, substantially as set forth.

5. The combination with a still provided with a trapping chamber surrounding its upper portion, and the cover therefor of the rim b' adapted to dip into the liquid in the trapping chamber, the said rim being angular in cross section, resisting material of fire-clay or the like applied to the opposite side of the said rim and the blocks b'' upon which the said rim is supported and arranged at distances apart to form spaces between which the vapors from the still can pass, the said blocks being situated in the liquid of the trap, substantially as set forth.

6. The combination with a still provided with a trapping chamber surrounding its upper end, and the cover therefor of the lining A' of suitable resisting material for the body of the still, the lining a^x of resisting material for the trapping chamber, and the blocks A^x of suitable resisting material which cover the upper edge of the still and straddle the lining A' , a^x of the still and the said trapping chamber, respectively, substantially as shown and described.

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

JOHN FARMER.

Witnesses:

R. C. THOMSON,
D. MACDOUGALL.