2 Sheets—Sheet 1.

E. SMEETH & G. P. HARRIS.

Still-Column.

No. 204,919. **Patented June 18, 1878.**

Fig 1.

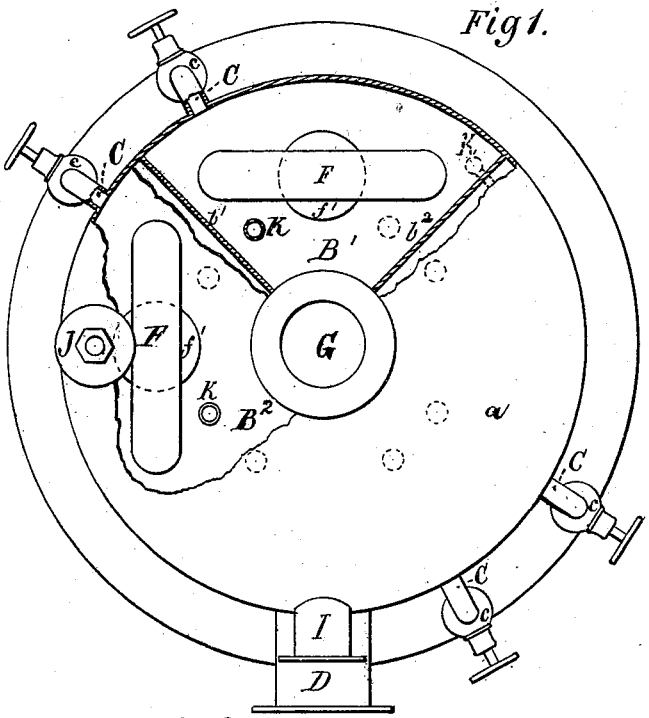
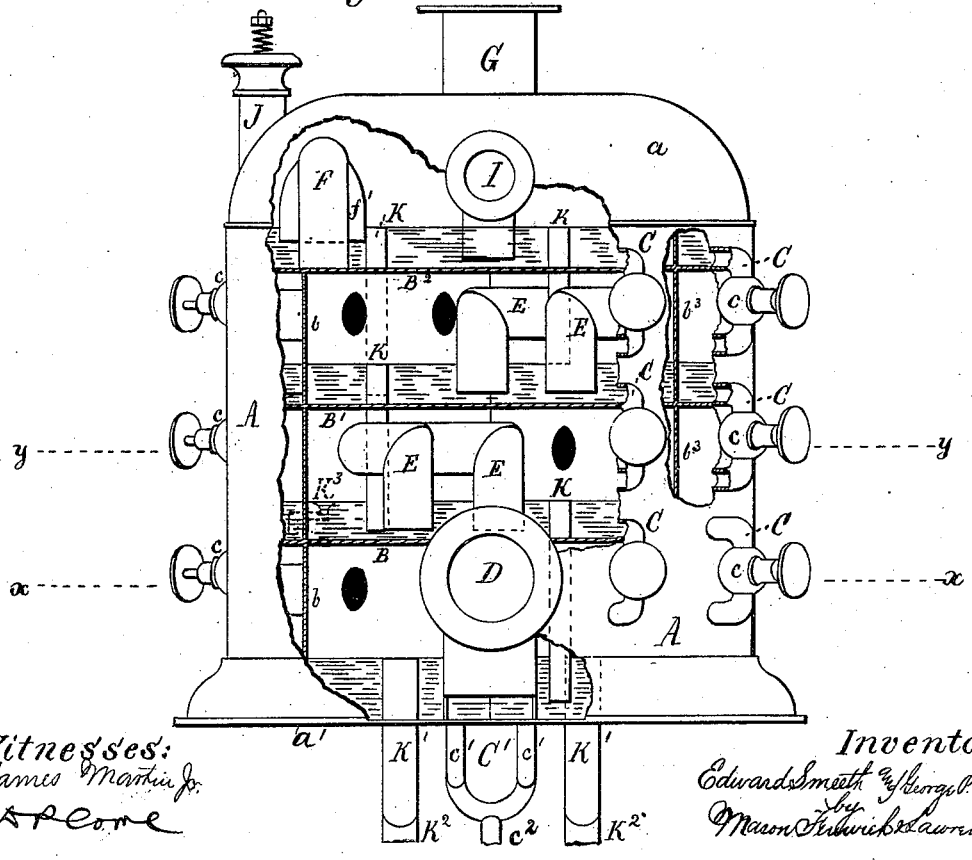


Fig 2.



Witnesses:
James Martin Jr.
A. P. Come

Inventor:
Edwards Smeeth & George P. Harris
by
Mason Fenwick & Lawrence

2 Sheets—Sheet 2.

E. SMEETH & G. P. HARRIS.

Still-Column.

No. 204,919. **Patented June 18, 1878.**

Fig 3.

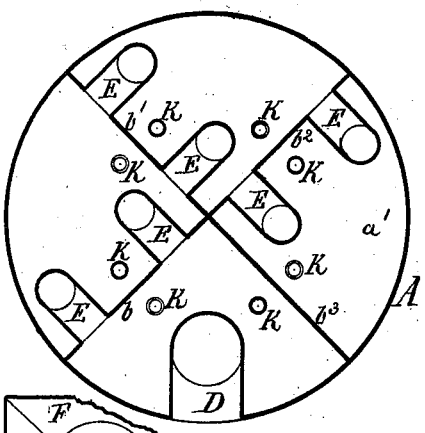


Fig 4.

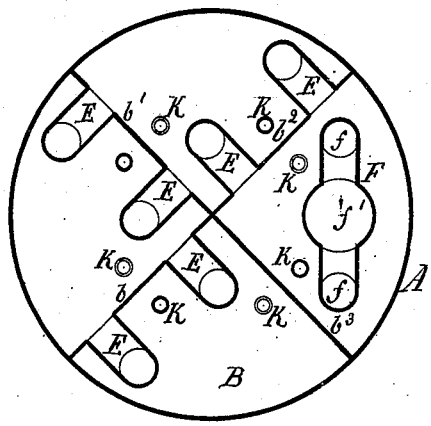


Fig 5.

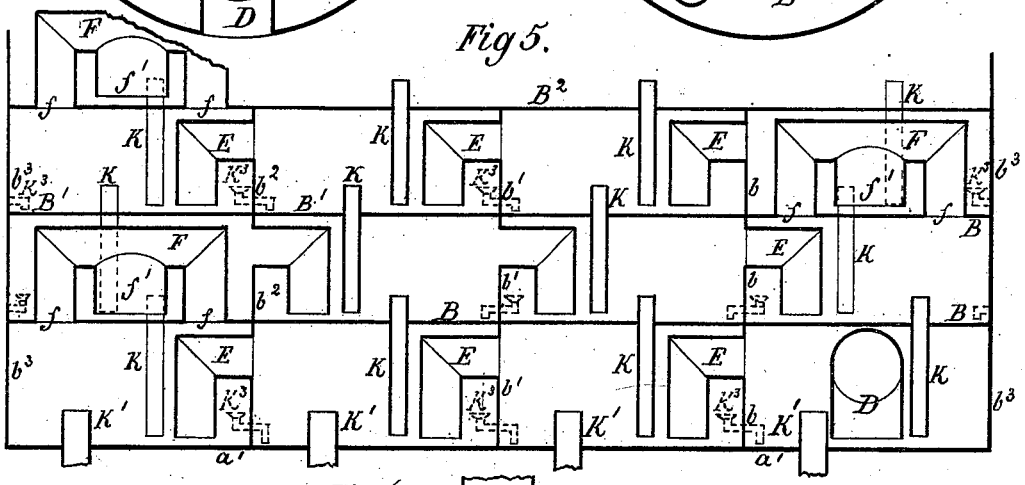
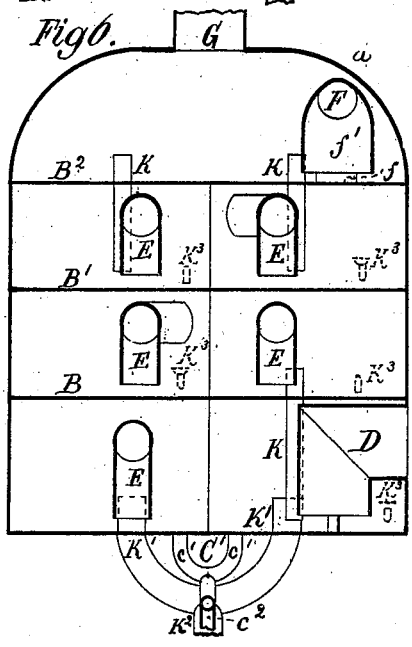


Fig 6.



Witnesses:
James Martin Jr.
D. R. Cone

Inventor:
Edward Smeeth & George P. Harris
by
Mason, Fenwick & Lawrence

UNITED STATES PATENT OFFICE.

EDWARD SMEETH AND GEORGE P. HARRIS, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN STILL-COLUMNS.

Specification forming part of Letters Patent No. **204,919**, dated June 18, 1878; application filed March 9, 1878.

To all whom it may concern:

Be it known that we, EDWARD SMEETH and GEORGE P. HARRIS, of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Still-Columns, which improvement is fully set forth in the following specification and accompanying drawings, in which latter—

Figure 1 is a top view of our improved still-column, having part of its cover and upper floor broken away to expose certain interior parts to view. Fig. 2 is an elevation of the same, having part of its outer cover broken away to expose the inner parts. Fig. 3 is a diagram in shape of a horizontal section in the line *x x* of Fig. 2. Fig. 4 is a similar diagram at the altitude *y y* of Fig. 2. Fig. 5 is an evolutionary diagram of the several chambers and connections constituting our still-column. Fig. 6 is a diagram in elevation, illustrating the horizontal connections of the said chambers.

The nature of our invention consists in certain constructions, combinations, and arrangements, hereinafter fully described and specifically claimed, whereby a still-column for refining high-wines is produced which occupies less height, the construction of which costs less for material and labor, and which requires less fuel to operate than the refining-stills in use at the present time.

In the drawings, A represents the shell of a still-column; *a*, the top of it, and *a'* its bottom. B B^1 B^2 are horizontal partitions, whereby the still-column is vertically divided into a number of large chambers, which are subdivided by vertical partitions *b* b^1 b^2 b^3 in a great number of small chambers. The said small chambers are vertically connected in pairs by means of exterior return-pipes C, having cocks or valves *c*, whereby the contents of the upper chamber may be at pleasure drawn off into the lower one, and so on until they arrive at the lowest row or group of chambers, which are provided with a head, C', of coupled discharge-pipes c^1, finally uniting in one pipe, c^2, provided, in practice, with a draw-off cock. D represents an elbow-pipe, to which the goose-neck of an ordinary still is connected. The vertical part of the pipe D opens into one of the bottom chambers of the still-column, and extends down to within a small distance from the bottom *a'*.

A number of elbow-pipes, E, are attached to the partition of the adjoining chamber, near the top of it, where they open into the chamber containing the pipe D. The vertical parts of the elbow-pipes E extend down near to the bottom of the adjoining chamber. All the adjoining chambers on the bottom *a'* are in succession provided with elbow-pipes E, except the last one, adjoining the chamber with the inlet D. The said last chamber communicates with the one above by means of a double elbow-pipe, F, the two vertical branches *f* of which open into the lower chamber, while a central bell or hood, *f'*, connects with the horizontal part of the pipe F, and extends to within a short distance from the horizontal partition B. The adjoining chambers upon the partition B are successively connected by elbow-pipes E, of the same construction as those previously described and in a similar manner. The last chamber is connected, by means of a double elbow-pipe, F, and bell *f'*, with the chamber above it on the partition B^1, and so on until the space above the partition B^2 is reached, which, in order to effect a rapid cooling of the heavy vapors mixed with the alcoholic vapors, is not subdivided. A pipe, G, on the top of the still-column serves to draw off the alcoholic vapors. A pipe, I, which may be closed by a valve, serves to facilitate the filling of the still-column with liquid. A spring vacuum-valve, J, prevents collapse of the still-column by cooling down.

Each of the chambers described is provided with at least one overflow-pipe, K, which extends as high from its bottom as the liquid therein should be, and which extends to within a short distance of the bottom of the chamber below, so as to prevent the vapor-current of the still from passing through it. The uppermost chamber, which is not subdivided, has as many overflow-pipes K as there are chambers below, so that the said chambers may be provided with liquid from above when the still-column is to be started.

The lowest group of chambers is provided with pipes K^1, which conduct the overflow into pipes K^2, by which it is delivered back into the still.

Operation: The still-column is charged with liquid or high-wine of a distillery. This is done by introducing the liquid through the pipe I into the highest chamber, where it rises, and finally passes through the overflow-pipes K into the chambers below, which become provided with liquid to the height of their overflow-pipes K, when it passes on to the chambers below, and so on until the lowest group of chambers is provided with liquid, when the surplus is conducted through the pipes K^1 K^2 to the ordinary still. The ordinary still is now heated, and its vapors enter the pipe D of the still-column. There they are conducted down into the liquid of the first chamber, through which they pass, vaporizing some of its alcoholic parts. They then pass through the pipes E into the liquid of the next chamber, which is also freed of some of its alcohol by vaporization, and so on until the last chamber of the lower group, from the liquid of which the vapors pass up through the pipe F and down through the bell f' into the liquid of the first chamber of the group next above. The vapors now make the circuit through all the following chambers of the said group, and so on until they finally arrive at the highest chamber very highly charged with alcohol. From there they are conducted through the outlet G to a coil or other suitable condensing apparatus, to be condensed into liquid alcohol. While this is going on the pipes K K^1 K^2 continually convey down the surplus liquid created by condensation of the vapors, thereby keeping the ordinary still continually supplied with liquid, which, by degrees, becomes poorer until it does not give up any more alcohol.

We are aware that still-columns have been constructed with horizontal partitions subdivided by concentric walls into concentric chambers. This construction is objectionable, as it only admits the use of a very small number of such chambers within a given diameter. Our improved construction enables us to use at least double the number of chambers. As by the number of vaporizing-chambers the distilling capacity of the still-column is determined, it is evident that a comparatively small column of our improved construction will do the work of a large one of old construction, thus securing a saving of material for making them and a saving of fuel for operating them.

The device for conducting the overflow through and from the still-column may be modified by conducting it through the adjoining chambers of the same horizontal group by means of elbow-pipes K^3, (shown in dotted lines and marked with dotted letters in the drawings,) and connecting the last chamber of such group with a chamber of the lower group by means of a straight overflow-pipe, K. When this device is used the pipes K^1 K^2 are omitted, and a single overflow-pipe in the bottom of the last chamber of the lowest group of chambers will serve in their place.

We are aware that prior to our invention it was not new to make still-columns with laterally-adjoined chambers, the partitions of one column of chambers being on different horizontal planes from those of the other column of chambers; nor, to make still-columns with chambers one above another and connected by hooded pipes; nor, to employ draw-off pipes, having cocks, connecting sections or chambers, one above another; nor, to employ overflow-pipes; and therefore we do not broadly claim these as our invention; but

What we claim is—

1. In a distilling apparatus or column, two or more chambers formed in the same section of the column on the same horizontal plane, and connected together by elbow-pipes, or other similar device, substantially as and for the purpose described.

2. The combination of a series of many-chambered horizontal sections of a still-column, elbow-pipes E, angular pipes F *f f*, each pipe F having a bell or hood, *f'*, between its vertical portions *f f*, whereby the circulation of the vapors of the still is through a number of horizontal chambers on the same plane in one section, then through vertical passages, and then again through a number of horizontal chambers on the same plane in another section, and such circulation being in a spiral or zigzag course, substantially as and for the purpose set forth.

3. The still-column provided with the angular pipes F *f f f'*, substantially in the manner and for the purpose set forth.

Witness our hands in the matter of our application for a patent for an improved still-column this 5th day of March, A. D. 1878.

EDWARD SMEETH.
GEORGE POLHILL HARRIS.

Witnesses:
JAMES KEATS,
C. E. SMEETH.