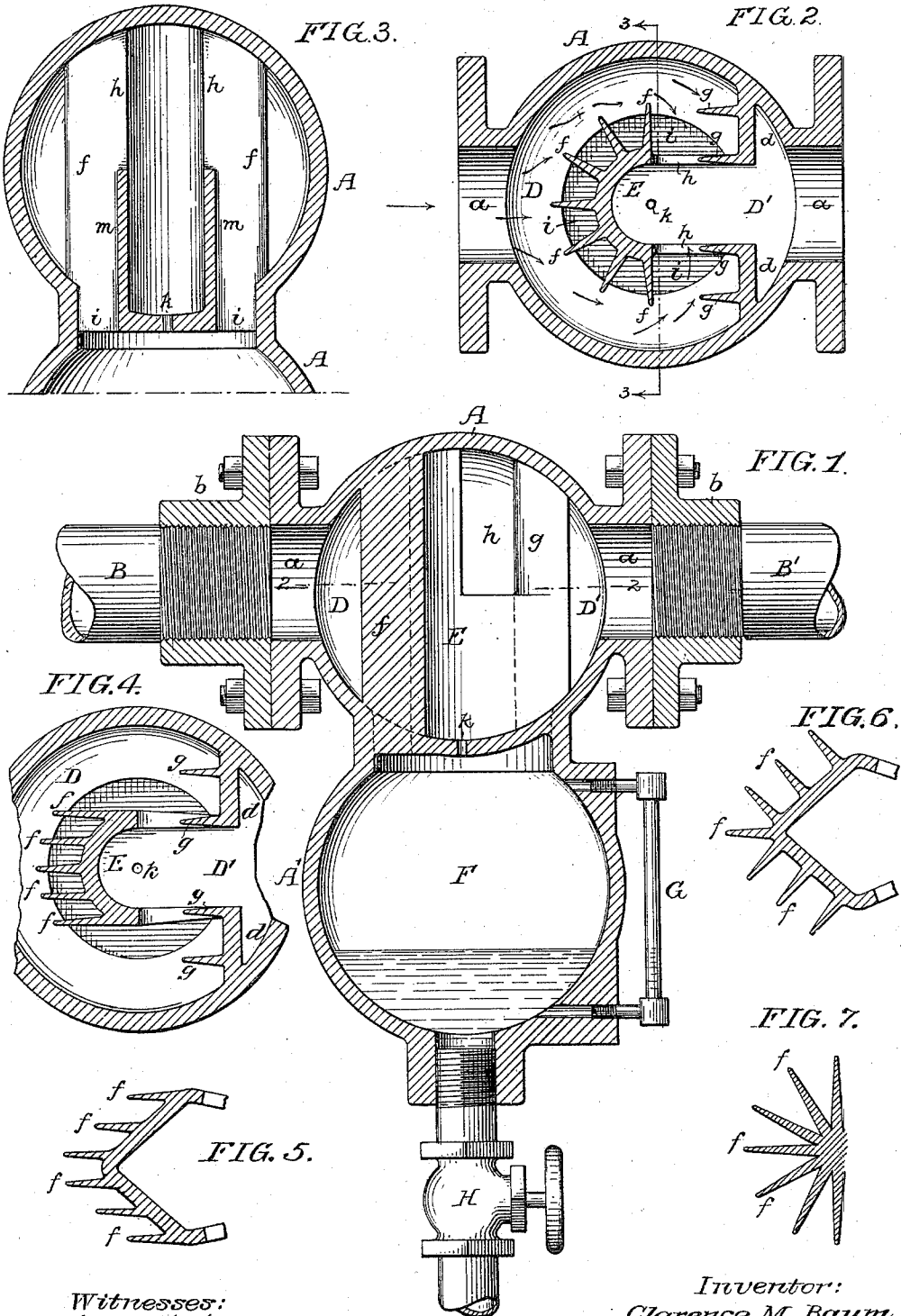


(No Model.)

C. M. BAUM.
STEAM SEPARATOR.

No. 579,377.

Patented Mar. 23, 1897.



Witnesses:
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UNITED STATES PATENT OFFICE.

CLARENCE M. BAUM, OF PHILADELPHIA, PENNSYLVANIA.

STEAM-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 579,377, dated March 23, 1897.

Application filed January 7, 1893. Serial No. 574,630. (No model.)

To all whom it may concern:

Be it known that I, CLARENCE M. BAUM, a citizen of the United States, residing at Philadelphia, Pennsylvania, have invented certain Improvements in Steam-Separators, of which the following is a specification.

My invention consists of certain improvements in the steam-separator for which I obtained Letters Patent No. 515,105, dated February 20, 1894, the object of my present improvement being to render the separation of the water, oil, &c., from the steam more complete than before, an object which I attain by so constructing the device as to prevent liquid particles from splashing back into or crossing the flow of the current of steam, thus obviating what has heretofore been a drawback to the efficiency of steam-separators in general.

In the accompanying drawings, Figure 1 is a longitudinal section of a steam-separator constructed in accordance with my invention. Fig. 2 is a sectional plan view on the line 2 2, Fig. 1. Fig. 3 is a transverse section on the line 3 3, Fig. 2; and Figs. 4, 5, 6, and 7 are views illustrating modifications of part of the invention.

The casing of the separator comprises the upper portion A and the lower portion A', both of which are of preferably spherical form, the two portions of the casing being joined by a short neck, and in the upper portion of the casing A are opposite flanged openings a, to which are secured the flanges b, carried, respectively, by the pipes B and B'.

The interior of the upper portion of the casing A of the separator is divided into two chambers D and D' by a partition structure E, which extends from the top to the bottom of the casing A and across the opening of the neck, said partition being arch-like in cross-section, as shown in Fig. 2, and terminating in straight-walled terminations d, which extend at right angles to the longitudinal line of the separator and are united to the casing A.

In the bottom of the chamber D of the upper portion of the casing A and affording free communication through the neck with the lower chamber F is the opening i.

On the convex portion of the before-mentioned arch-shaped partition structure E are formed a series of blades or ribs f, which pro-

ject radially from the convex curve of the said structure and are preferably tapered from their bases outward, as shown in Fig. 2, and similar ribs or blades g are formed upon the lateral walls d of the partition structure E. In the upper part of the side walls m of the partition structure are formed openings or ports h, affording communication between the chambers D and D'.

The receiving-chamber F has a water-gage G, whereby the level of the liquid therein may be readily observed, and the outlet from said chamber F is through a globe-valve H, which can be so set as to provide for a flow of any desired volume from the said chamber F, the latter serving as a reservoir for the accumulation of the liquid in excess of such flow, the aim being to so regulate the flow that there will always be more or less liquid in the chamber F in order to prevent the blowing off of steam.

The steam, loaded with water, oil, &c., entering the separator through the inlet-opening a is brought forcibly in contact with the ribs or blades f, projecting from the rounded end of the partition structure E, and owing to the angles at which these radially-projecting blades or ribs are disposed in respect to the natural course of the incoming current of steam, water, &c., no abutting surface directly opposed to the line of incoming flow is presented by said blades. Hence liquid particles striking the same are directed inward toward the bases of the blades, and consequently are not caused to splash or be thrown backward into the onflowing volume of steam, as is the case when the latter is thrown directly against an abutting surface at right angles to the line of flow. By reason of this construction, therefore, the liquid is separated from the steam more readily and effectively than in prior devices with which I am familiar. The main separating action is effected by the radially-projecting blades or ribs on the rounded or convex surface of the partition E of the separator, as these blades, with the rounded or convex surface to which they are attached, receive the steam when it first enters the separator, and consequently is most heavily loaded with water, oil, &c. The steam thus deprived of its extraneous matter flows around the projecting blades or ribs f, through

the passages between the outer ends of the said blades and the casing A, and impinges against the blades or ribs *g* and the lateral walls *d*, said blades and lateral walls effecting the complete separation of any remaining liquid particles. The purified steam finally passes through the ports or openings *h* into the chamber D' and thence through outlet-pipe B'. The liquid separated from the steam in the chamber D falls by gravity through the opening *i* into the receiving-chamber F, and any steam condensing in the chamber D' will likewise reach the chamber F through the small opening *k*, formed in the bottom of the casing of said chamber.

The openings *h* are confined to the upper portion of the partition structure E, so that only the lightest and consequently dryest steam can pass through the separator.

Various modifications of the deflecting-surface and its projecting ribs may be adopted without departing from the main features of my invention. For instance, the ribs *f* may project directly forward from the deflecting-surface toward the inlet-opening, as shown in Fig. 4, instead of projecting radially, as shown in Fig. 2, and the deflecting-surface may be used without the addition of side walls *m*, as also shown in said figure. The shape of the deflecting-surface may also be varied, if desired, Fig. 5 showing a deflecting-surface of reversely-inclined form having forwardly-projecting ribs and presenting its apex to the incoming flow of steam, while Fig. 6 shows a deflector of like form having ribs projecting therefrom at right angles to the opposite inclined surfaces of the deflector, and Fig. 7 shows a deflector in which the ribs join each other at the bases. In all cases, however, the deflector is such as to divide the incoming flow of steam, so as to direct part of it to one side of the casing and part to the other, thereby enabling me to use comparatively narrow channels for the flow of steam and to correspondingly contract the size of the casing of the separator.

In my previously-patented separator I used a deflector which divided the incoming flow of steam, but the face of said deflector was not ribbed. Hence liquid particles forcibly projected against it by the steam were likely to flow around the deflector and to be projected across the path of the escaping steam where the latter flowed around the ends of the deflector, a result which is effectually obviated by providing the deflector with ribs of the character shown in the drawings, for these ribs catch and retain the liquid particles pro-

jected against them by the steam, and as the ribs are upright they direct these liquid particles to the bottom of the deflector, so that once having left the flow of steam they are never again brought into contact with it in such a way as to be caught up and carried forward. There is also a class of separators through which the steam flows vertically instead of laterally and in which vertical deflectors with transversely-ribbed surfaces are used, but in such separators the steam, in order to escape, is compelled to pass through the volumes of liquid flowing from the bottom of the deflector. Hence a large percentage of said liquid is again caught up and carried off by the steam.

Without claiming broadly, therefore, a separator having a ribbed deflector interposed in the path of the steam, I claim and desire to secure by Letters Patent—

1. A steam-separator having lateral inlet and outlet for the steam, and a deflector presenting a convex or diverging face located so as to divide the incoming flow of steam, said deflector being provided with projecting ribs or blades disposed as described in respect to the line of flow of the steam, whereby liquid particles contained in the latter will be caught by the ribs and directed to the outlet without crossing the flow of steam in its escape, substantially as specified.

2. A steam-separator having lateral inlet and outlet for the steam, and a deflector presenting a convex or diverging face to the incoming steam and provided with projecting ribs or blades on its convex or diverging faces whereby the liquid particles are caught and directed to the outlet without crossing the flow of escaping steam, substantially as specified.

3. A steam-separator having lateral inlet and outlet for the steam, and a deflector presenting a convex or diverging face to the incoming flow of steam and having on each side of the center ribs or blades projecting therefrom at a right angle to the face from which they project, whereby they are adapted to catch the liquid particles projected by the steam, and to direct the same to the outlet without crossing the flow of escaping steam, substantially as specified.

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

CLARENCE M. BAUM.

Witnesses:

MURRAY C. BOYER,
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