H. H. TRACY.

STEAM SEPARATOR.

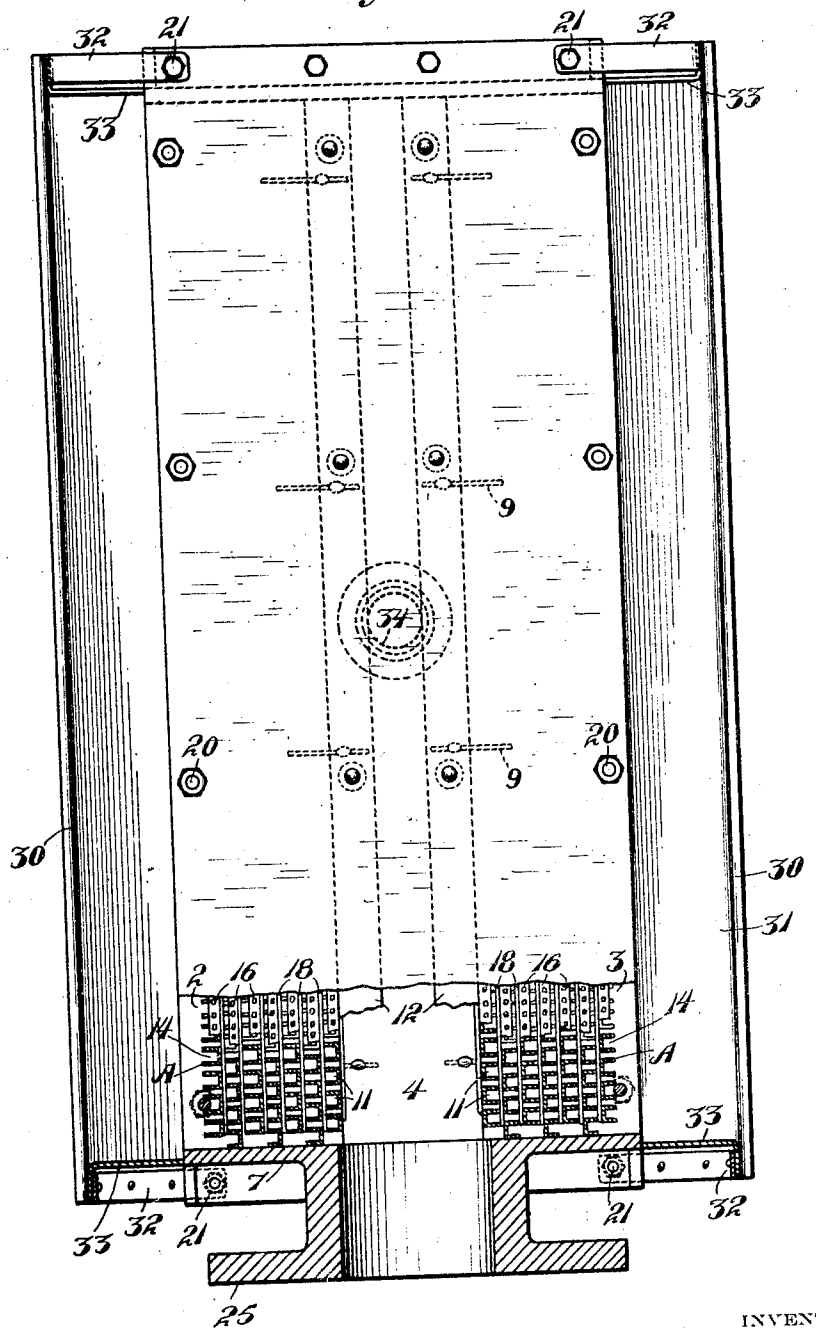
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1,381,767.

Patented June 14, 1921.

2 SHEETS—SHEET 1.

Fig. 1.



INVENTOR

Hayden H. Tracy

BY *Strong & Townsend*

ATTORNEYS

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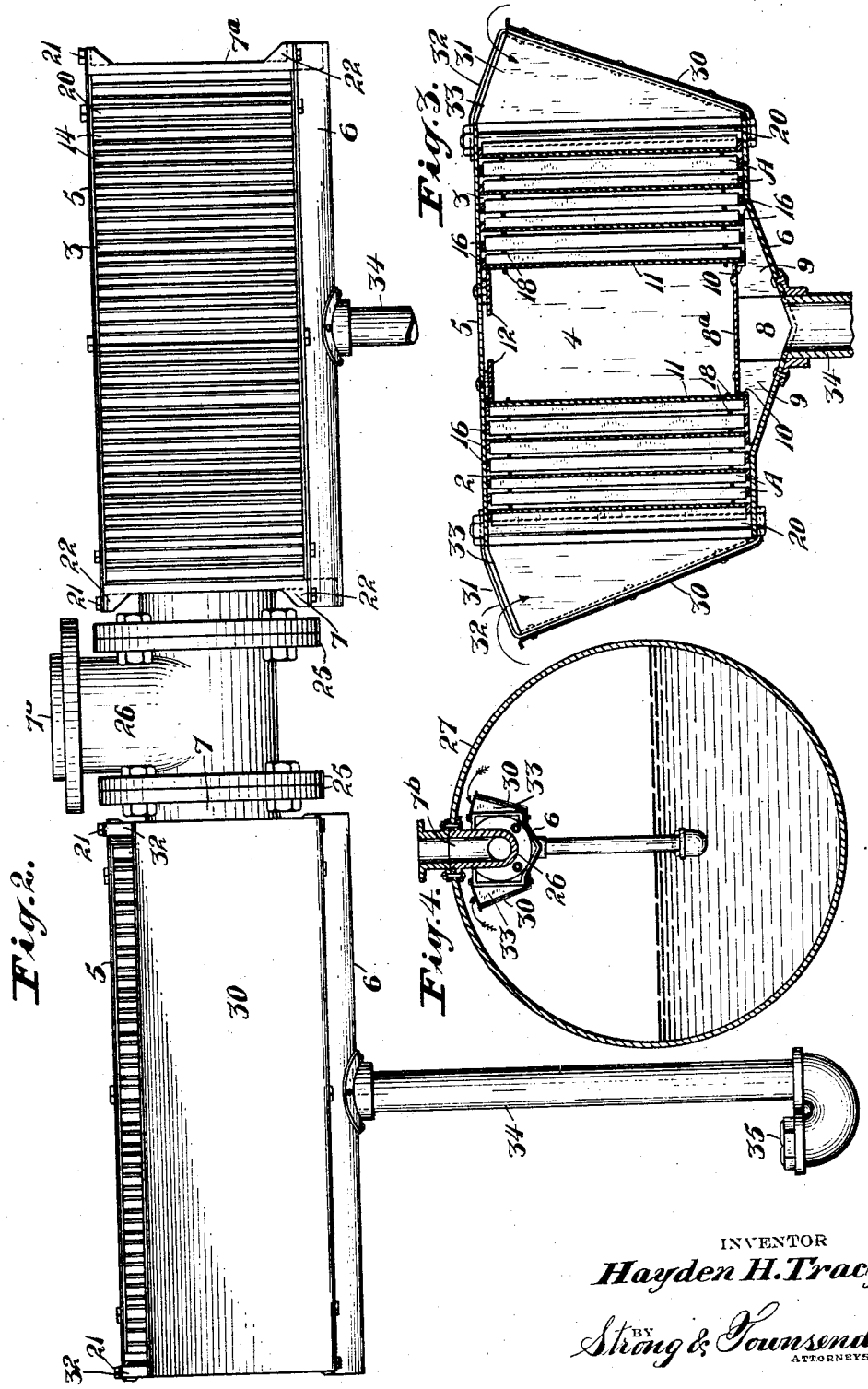


Fig. 2.

Fig. 3.

Fig. 4.

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UNITED STATES PATENT OFFICE.

HAYDEN H. TRACY, OF SAN FRANCISCO, CALIFORNIA.

STEAM-SEPARATOR.

1,381,767 Specification of Letters Patent. **Patented June 14, 1921.**

Application filed October 2, 1919. Serial No. 327,910.

To all whom it may concern:

Be it known that I, HAYDEN H. TRACY, a citizen of the United States, residing at the city and county of San Francisco and State of California, have invented new and useful Improvements in Steam-Separators, of which the following is a specification.

This invention relates to a steam separator and particularly to improvements on the structure shown in my co-pending application entitled "Steam separator," filed September 4, 1918, Serial No. 252,627.

One of the objects of the present invention is to provide a series of interspaced channel-shaped baffles for separating or removing foam and moisture from steam before it is permitted to escape from the boiler, said channel-shaped baffles being arranged in plate-like formation and staggered with relation to each other to constantly change the path or flow of the steam as it passes through the baffle plates and to break up foam and to trap and carry away the moisture contained.

Another object of the invention is to provide a light, substantial housing for the reception of the baffle plates, said housing being so constructed that it may be readily dismantled, if necessary, to pass it through the man-hole of a boiler or steam drum and to assemble it after insertion.

Another object of the invention is to provide means for automatically draining and returning the water separated from the foam and the steam and furthermore to provide guard plates which will, to a large extent, prevent the entrance of foam between the baffling plates.

Further objects will hereinafter appear.

The invention consists of the parts and the construction, combination and arrangement of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a plan view of a steam separator, partly broken away and partly in section.

Fig. 2 is a side elevation of a double unit separator, showing the guard plates removed from one of the units.

Fig. 3 is a cross section of one of the separating units.

Fig. 4 is a cross section of a boiler or steam drum, showing the position of the separator and the guard plates employed, with relation to the discharge opening in the steam drum or boiler.

Referring to the drawings in detail, A indicates in general a series of baffle plates which in this instance are arranged in two groups, as shown at 2 and 3, to form a central steam passage 4. The baffle plates contained in each group extend from end to end of the housing, which consists of a top plate 5, a bottom plate 6 and a pair of end plates 7 and 7^a, respectively. The bottom plate 6 is V-shaped along the central portion, as shown in Figs. 2 and 3, to permit the formation of a water-collecting chamber 8. The water-collecting chamber is separated with relation to the central steam passage 4 by an intermediate plate 8^a, said plate being secured with relation to the bottom plate 6 by means of a series of lugs 9. The plate 8^a is riveted or otherwise secured to the upper faces of the lugs while the lugs proper may be formed integral with the bottom section or otherwise secured thereto. The lugs 9 are offset, as at 10, to form a stop or shoulder for the innermost series of plates 11 and also to form a seat for said innermost rows of plates, as shown in Fig. 3, the offset portion of the lugs being on a plane with the outer edges of the bottom plate 6 so as to maintain all the baffling plates in each group in direct alinement in a vertical plane. A stop or shoulder is also formed in the upper part of the housing by securing thereto a pair of strips. These strips extend from end to end of the housing and thereafter serve the function, in conjunction with the intermediate plate 8^a, to support the innermost baffling plates 11 in parallelism with relation to each other and interspaced to provide a central steam passage 4.

The construction of each baffling plate is more clearly shown in Fig. 1. It will here be seen that each baffle plate consists of a series of channel-shaped members such as shown at 14. These channel-shaped members are interspaced with relation to each other and are secured by means of upper and lower strips 16 to which they are secured in any suitable manner.

Each baffle plate therefore consists of a series of interspaced channel-shaped mem-

bers vertically disposed and secured in alinement by the strips 16. The baffle plates thus constructed are placed between the top and bottom plates of the housing, one plate outside of the other, until as many rows of the same are obtained as desired. The channel-shaped members in each plate are staggered with relation to each other, as shown in Fig. 1, thus constantly changing the direction of flow of steam, as will hereinafter be described. The individual plates forming each group are interspaced with relation to each other on a longitudinal plane by wire rods 18, as described in my co-pending application, the diameter of the rods being comparatively small so that the spacing between the individual plates will not be too great.

The top and bottom plates between which the baffling plates are supported are secured together by means of bolts 20 passing through the outer edges of the plates, as shown in Figs. 1, 2 and 3, the heads 7 and 7ª being similarly secured by bolts or cap screws 21. The heads are flanged, as at 22, to form substantial seats for the top and bottom plates and also to permit cap screws such as shown at 21 to be employed. The housing thus assembled may be provided with a single or double outlet, if desired, a single outlet for each housing being shown in Fig. 2; that is, two independent steam separating units are here shown, both provided with single outlets as at 7ᵇ. That is, the end plates 7 are provided with central openings in communication with the steam passages 4. They are furthermore flanged, as at 25, to permit the same to be rigidly secured to a T-fitting 26 which passes through the shell of the drum shown at 27.

To more thoroughly understand the need and performance of the present invention, it must be realized that many boilers have a tendency to foam. The condition known as foaming may be described as a mass of bubbles, practically filling the steam space of a boiler, said bubbles being so durable that they remain a considerable time without breaking; therefore, instead of only steam leaving the boiler the discharge will be composed of foam which becomes broken up in its journey to the engine, said bubbles, when broken, precipitating water in such quantities that it not only reduces the efficiency of the engine but often causes serious damage. Another difficulty or objection is that scum or mineral matter is often carried out on the bubbles or possibly inside of the same. This scum deposits as a scale in the superheaters, the steam piping and on the blades of the steam turbines, thereby interfering with their proper and efficient performance.

The steam separator here shown is provided with an exceedingly large separating surface which will not only remove the scum referred to but will also serve the function of thoroughly breaking up the foam, thereby precipitating the water contained and returning the same to the boiler. It, however, happens that the function of a separator such as here shown is materially impaired if foam in considerable quantities is permitted to enter between the baffling plates. This objectionable feature has practically been overcome in the present instance as I provide a pair of guard plates 30. These plates are secured on the exterior sides of each group of baffling plates, as shown in Figs. 1, 2 and 3, and are inclined, as shown in Fig. 3 to form a pair of upper openings 31 one on each side of each separating unit, through which the steam may be admitted to the baffling plates. Foam, when rising to a considerable height within the steam drum or boiler, might reach a point where it would enter between the lower ends of the baffling plates. Such foam would be entirely excluded in the present instance and it would be impossible for any foam to enter except through the openings 31, which could only happen where excessive foaming takes place. The guard plates 31 are secured to the top and bottom plates by top straps 32 and the ends of the guard plates are turned in, as at 33, beneath the straps 32, to form end plates, thereby preventing admission of steam or foam except through the openings formed at 31.

Any moisture in the form of globules or foam is in the present instance entirely broken up by impact of the steam against the channel-shaped members, of which each baffling plate is constructed. This moisture drains down through the channels, and collects in the chamber 8, from where it is returned to the boiler or drum by means of a pipe 34, on the lower end of which is mounted a check valve 35. The steam, after escaping through the baffling plates, discharges through the end plate 7 and enters the T-fitting 26, which is connected with a main steam line in the usual manner.

The construction of the housing supporting the baffling plates is exceedingly simple and such that it may be readily dismantled; that is, removal of the bolts permits separation of the guard plates, the end plates and the top and bottom plates, thereby permitting the parts to be passed through a comparatively small man-hole, if required, the parts being just as readily assembled, once inserted. The separator is furthermore convertible as each separator may be provided with single or double end outlets. It is furthermore light and substantial in construction as the channel baffles forming the several plates are constructed of thin sheet metal and secured between the top and bottom plates 5 and 6, which themselves may be constructed of comparatively thin plates, the only castings required in the whole as-

sembly being the T-fitting and the heads 7 and 7a.

The general construction shown in the present instance is identical to that as shown in my co-pending application previously referred to, the real invention involved in the present application being the provision of the guard plates 30 and the means for securing and mounting the same with relation to the baffling plates.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. A steam separator including a housing, a series of interspaced baffling plates interposed from end to end within the housing and disposed in two parallel groups interspaced to form a central steam passage, a discharge passage for steam connecting with said central passage, angularly disposed bottom plates forming a concave collecting chamber for water and scum and a connecting pipe and trap, and guard plates on each side of the housing disposed on converging inclines secured to the top and bottom plates and provided with end plates to prevent the admission of foam except to the upper part of the baffle plates.

2. A steam separator comprising a cover and a bottom section, end plates connecting the same, a series of channel shaped interspaced and vertically disposed baffling plates secured between the cover and bottom sections and arranged in two groups to form a central passage, a steam outlet connection communicating with said passage, a drain connection also communicating with said passage, and an inclined plate on each side of the bottom section extending from end to end thereof, and secured thereto, said plates having their upper edges approximately on a level with the cover section and forming an elongated steam inlet opening on each side of the cover section.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

HAYDEN H. TRACY.

Witnesses:
WM. H. BAUER,
JOHN H. HERRING.