

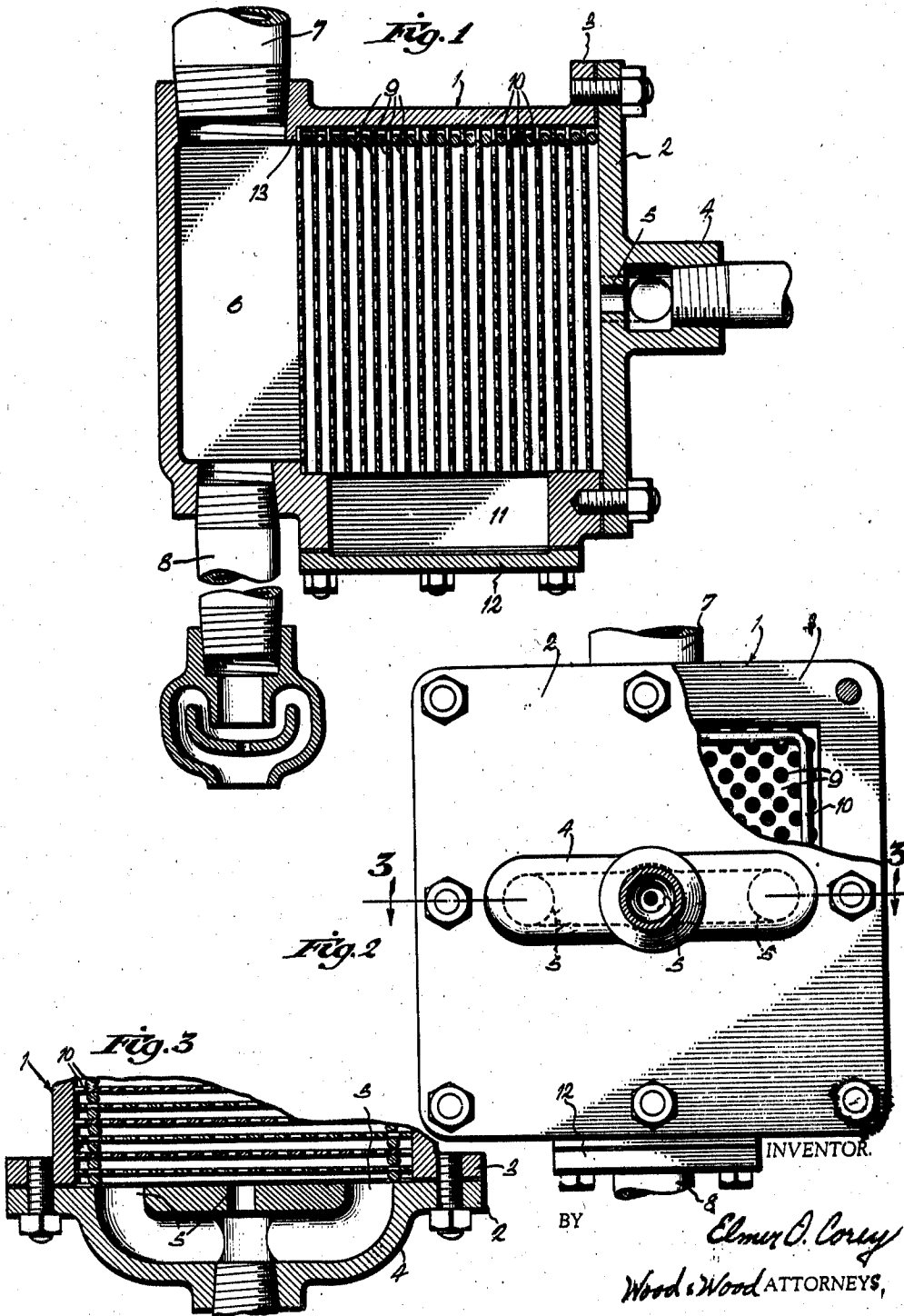
Aug. 3, 1937.

E. O. COREY

2,088,994

SEPARATOR

Filed July 9, 1936



UNITED STATES PATENT OFFICE

2,088,994

SEPARATOR

Elmer O. Corey, Norwood, Ohio, assignor to The
Edna Brass Manufacturing Company, Cin-
cinnati, Ohio, a corporation of Ohio

Application July 9, 1936, Serial No. 89,855

4 Claims. (Cl. 183—109)

This invention relates to improvements in separators, particularly adaptable for use in installations or systems known as "blow-downs" on locomotive or stationary boilers, for discharging foreign matter generally designated as sludge, carried or contained in the water supplied in the boiler.

In locomotive installations it is imperative to direct and reduce the pressure of the discharge to avoid the escaping steam from clouding the atmosphere, below an elevation that would interfere with the visibility of the train crew or endanger life or property along the roadside. It is therefore expedient to conduct the hot liquid sludge or discharge forced from the boiler by the pressure of the steam therein, through a separator to impede and reduce its pressure for dispensation under a harmless force and a separation of the steam emitted from the liquid sludge for conduction and exhaust into the atmosphere at a definite elevation above the boiler and drain the liquid sludge to the ground, preferably beneath the locomotive.

The separator is in pipe connection with the boiler, the pipe having a control valve interposed therein and in entry connection with the boiler at a suitable point or location, and of determined size to permit a stream of water to be drawn or forced out from the boiler under internal boiler pressure, carrying therewith sludge and foreign matter contained in the boiler feed water, which usually is injurious to the metal of the boiler structure and boiler operation when permitted to unduly accumulate therein.

The separator is of baffle type and constitutes a closed shell having an inlet, preferably axially in one end, a pair of outlets at or toward the opposite end, and is interiorly partitioned by a plurality of spaced, perforated or foraminous plates with the perforations or apertures in the adjoining plates relatively in staggered arrangement for dispersing the fluid conducted there-through and compelling its passage in an irregular course through and between the baffles, thereby reducing its force to approximately that of the atmosphere and separating the steam emitted from the hot liquid sludge for a divisional and separated discharge of said products.

An object of the invention is to provide a separator, primarily for steam boiler sludge removal systems, whereby foreign matter present in the water supplied in the boiler is discharged from the boiler while it is in operation and under the pressure developed therein, for draining the liquid sludge or discharge at a reduced pres-

sure and reduced temperature to the ground, and separately escaping at a highermost elevation the steam and vapor emitted from the liquid sludge within the separator for dissipation into the atmosphere.

Another object of the invention is to provide a separator for steam boiler sludge removal, in the nature of a closed receptacle, for mounting upon a side of the locomotive preferably below the elevation of the boiler, into which the liquid sludge from the boiler is injected and then dispersed to reduce its temperature and pressure, with the steam and vapors emitted therefrom exhausted through a conductor extending above the boiler, and draining the liquid sludge by gravity to the ground.

Various other features and advantages of the invention will be more fully set forth in a description of the accompanying drawing, in which:

Figure 1 is a central vertical section through the improved separator.

Figure 2 is an end elevation thereof, when viewed from the inlet end or head.

Figure 3 is a section on line 3—3, Figure 2.

Referring to the drawing, 1 indicates a drum or shell, open at one longitudinal end, which is sealed by a closure plate or cap 2, marginally bolted or otherwise secured to a rim or flange 3 extending about the shell. The exterior side of the cap 2 is provided with a crosswisely extended hub 4, interiorly passaged to constitute a manifold providing a plurality of inlet ports 5, leading into the interior of the shell, distributing the flowing liquid against the baffle plates within the shell at a plurality of scattered points.

As shown in Fig. 3 of the drawing, the central or intermediate port, which is axial with the intake opening of the hub or manifold to which the supply pipe connection is made, is of reduced bore or diameter from the ports toward the outer extremities of the manifold. This constricts the influx of the liquid sludge at a point in direct line with the manifold intake to decentralize the input and divert the same for distribution in a plurality of streams against the baffle plates, facilitating separation of the products and pressure reduction, and reducing the number of plates over that which would otherwise be required, particularly when the charge is injected under exceedingly high boiler pressure.

Each of the baffle plates is of plate or sheet metal, provided with an extensive number of apertures, preferably arranged in horizontal and vertical rows with the apertures of one row rel-

actively staggered or offset from those of a next adjoining row. This is optional, however, and may follow any other layout, but preferably one that will permit duplicate construction of plates and adapting the same to be assembled so that the apertures in one plate are out of line or staggered from the apertures in the next adjoining plate to avoid a straight line passage through the series and effect undulating or serpentine paths or passages for the purpose of dispersing the material in its flow therethrough toward and into a chamber 6 at one end of the shell, from which the vapor products are exhausted through an upwardly extending pipe 7 connecting with the shell for dissipating the vapor into the atmosphere and the liquid sludge drained from the chamber through a downwardly extending pipe 8 connecting with the lower side of the shell to communicate with the base of said chamber 6.

The material as it is dispersed, in striking against the solid portions of the plates about the apertures, causes the heavy matter to descend and the vapor emitted therefrom to ascend. The steam and vapor exhaust pipe, when the separator is applied upon a locomotive, is shaped to fit around a side of the boiler and is secured thereto, and extends upwardly therefrom to the highest point permissible so that the steam is dissipated in the atmosphere at an elevation where it is not objectionable and where it will not cloud the horizontal visibility of the atmosphere from the cab in the locomotive. The discharge line 8 conducts the liquid sludge downwardly to the lowest point permissible, preferably underneath the locomotive, for discharging the sludge with harmless force to the ground, without endangering life or property at the roadside, the lower end of the discharge line being provided with a non-freezable vapor trap to protect any vapor or steam from discharging at the lower end of the sludge discharge.

The baffle plates 9 are compactly assembled within the shell and are uniformly spaced apart, preferably by spacers 10 of rod form, bent to U shape for engaging the margins of the plates, leaving the lower side open so that the spacing between the plates is in communication with a pocket or chamber 11 formed in the lower side of the shell, having a closure cap 12 forming the base of the chamber, bolted exteriorly to the shell.

The pocket or chamber 11 serves as a sump for the collection of any sediment descending from the plates. The sediment can be periodically removed upon removal of the closure cap 12, without uncoupling or dismantling the separator, and at the same time the plate can be flushed for cleansing by a nozzle spray through the pocket, to which a majority of the plates are exposed.

The baffle plates and spacers for the number required are compactly engaged, a plate for the inner end of the series marginally engaging a shoulder 13 formed in the shell, and a spacer for the outer end engaging with the inner side of the cap 2. There is no opportunity for displacement of the parts while in use, and the parts are readily disassembled or reassembled for cleansing or renewal upon removal of the cap 2.

The organization is simple and sturdy in structure and highly efficient for locomotive use, and

can be readily and conveniently flushed without disturbing any of the pipe connections by merely removing the closure or cap plate 12.

The separator, constituting a completely closed receptacle, can safely be mounted on a side of the locomotive and located below the elevation of the boiler so that the entire course for the liquid sludge discharged from the connection with the boiler is downward, to drain itself when the control valve is closed and also to provide for convenient accessibility by an attendant for flushing.

Having described my invention, I claim:

1. In a device of the nature disclosed, a shell having a conductor inlet at one end and a plurality of conductor outlets at an opposite end, one for discharge of material passing through the shell for treatment upwardly and a second downwardly, and a plurality of foraminous baffle plates assembled in spaced relation within the shell, each in a plane transverse to the axis of the inlet, the apertures in one plate relatively staggered from those in a next adjoining plate for dispersing the material injected thereagainst, and a flow through the separator in serpentine paths.

2. In a device of the nature disclosed, a shell having a conductor inlet and a plurality of conductor outlets at relative opposite ends thereof, a plurality of foraminous baffle plates removably assembled in spaced relation within the shell, each in a plane transverse to the axis of the inlet, the apertures in one plate relatively staggered from those in a next adjoining plate, and the spacing between the plates, at a lower side, communicating with a collector chamber in the shell below the plates, the shell having an opening for exterior access into said chamber, and a closure cap for said opening.

3. In a device of the nature disclosed, a shell having a conductor inlet and a plurality of conductor outlets at relative opposite ends thereof, a plurality of foraminous baffle plates assembled in spaced relation within the shell, each in a plane transverse to the axis of the inlet, the apertures in one plate relatively staggered from those in a next adjoining plate the shell provided with a sediment collecting chamber open to the spacing between the plates, spacers of U-bend rod material, each respectively removably interposed between a pair of adjacent plates and leaving the spacing developed thereby open to said sediment chamber, the shell provided with an opening for plate installation, and a closure cap for said opening.

4. In a device of the nature disclosed, a shell having a conductor inlet and a plurality of conductor outlets at relative opposite ends thereof, a plurality of foraminous baffle plates assembled in spaced relation within the shell, each in a plane transverse to the axis of the inlet, the apertures in one plate relatively staggered from those in a next adjoining plate, spacers, each respectively removably interposed between a pair of adjacent plates, the shell provided with an opening for plate installation, and a closure cap for said opening, said closure cap formed to provide an intake manifold for plural point admission of fluid into the shell and injection against the plates.

ELMER O. COREY.