(No Model.)

2 Sheets—Sheet 1.

J. D. McEACHREN.

STEAM BOILER CLEANER.

No. 507,030. Patented Oct. 17, 1893.

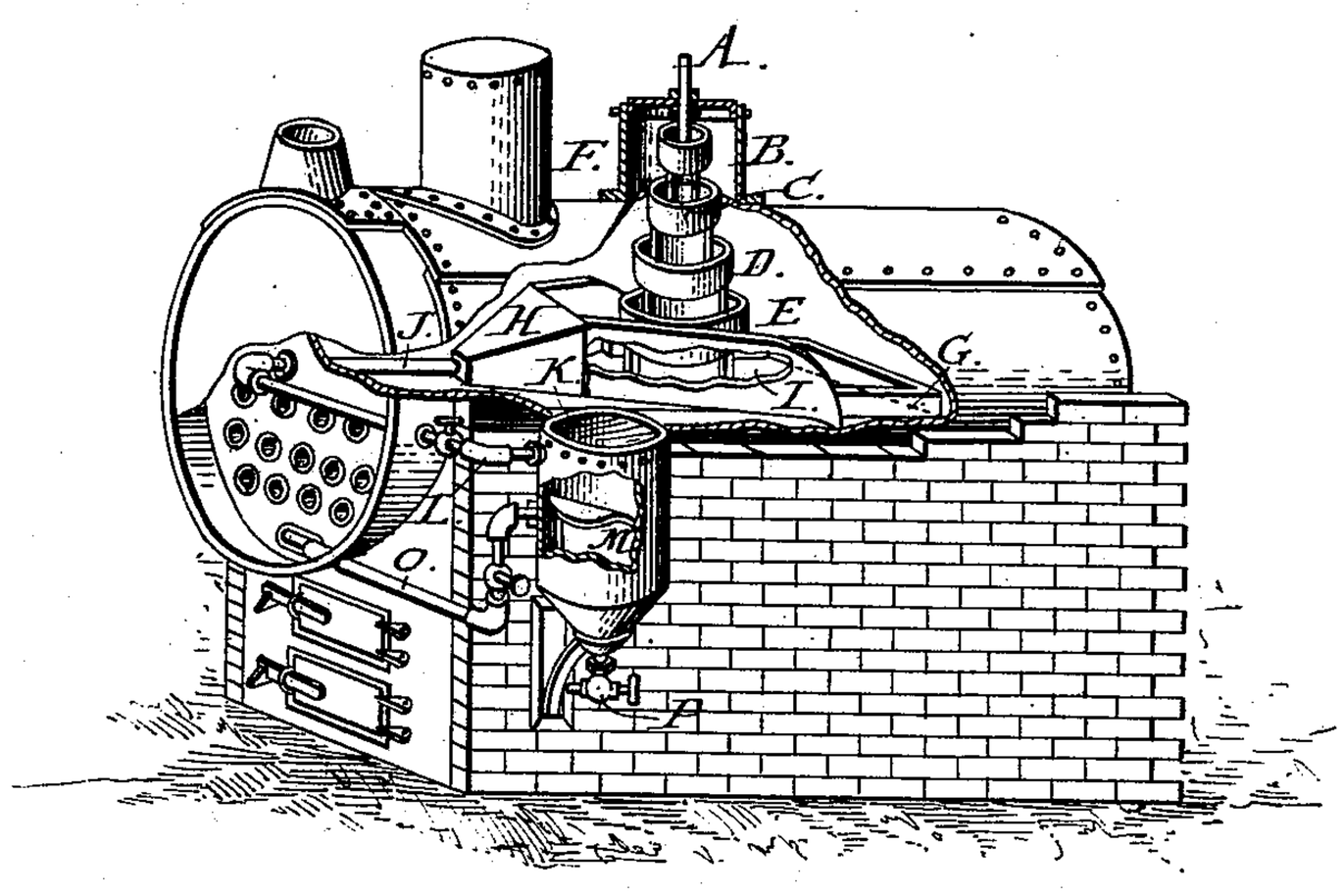

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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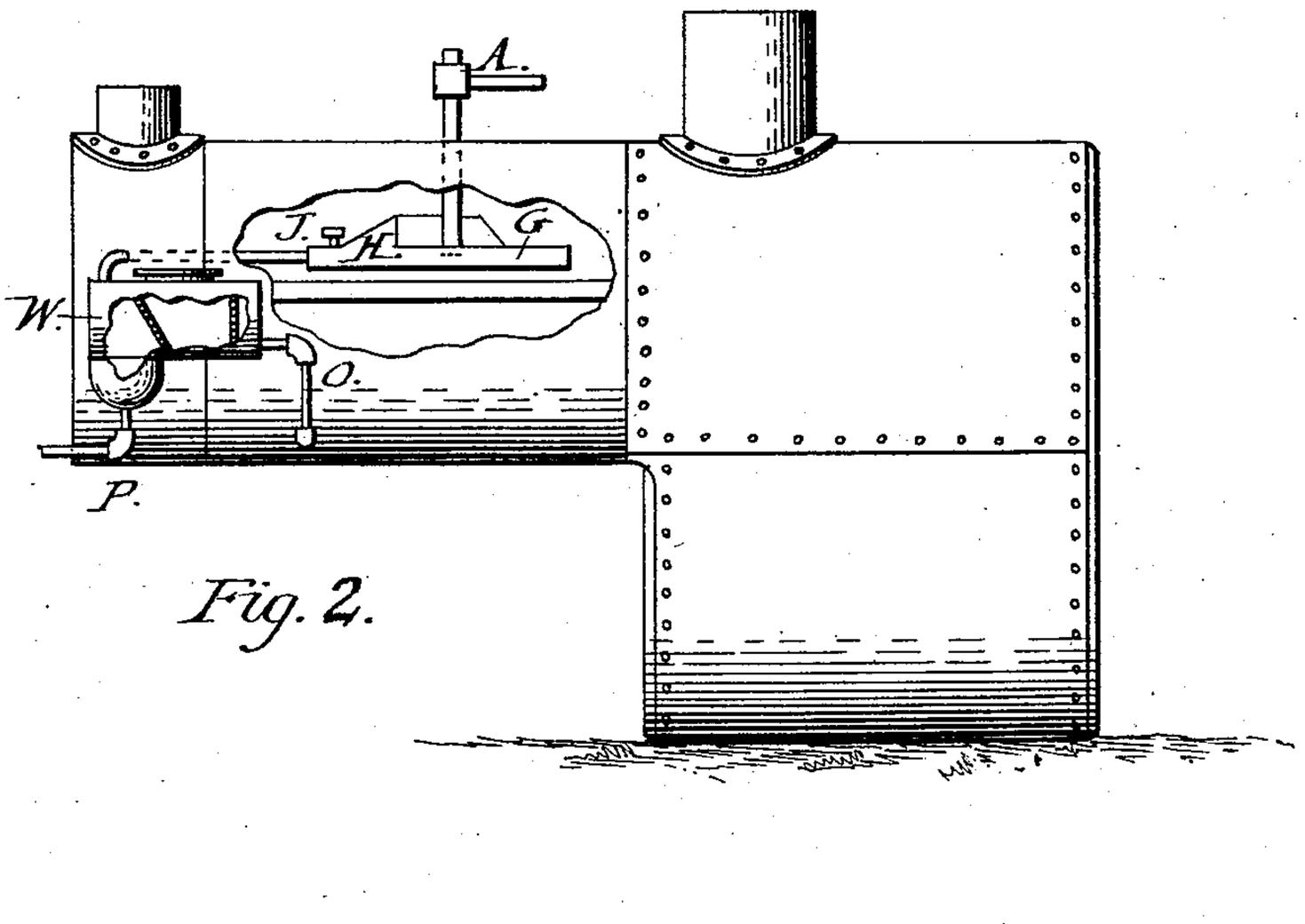

Fig. 2.

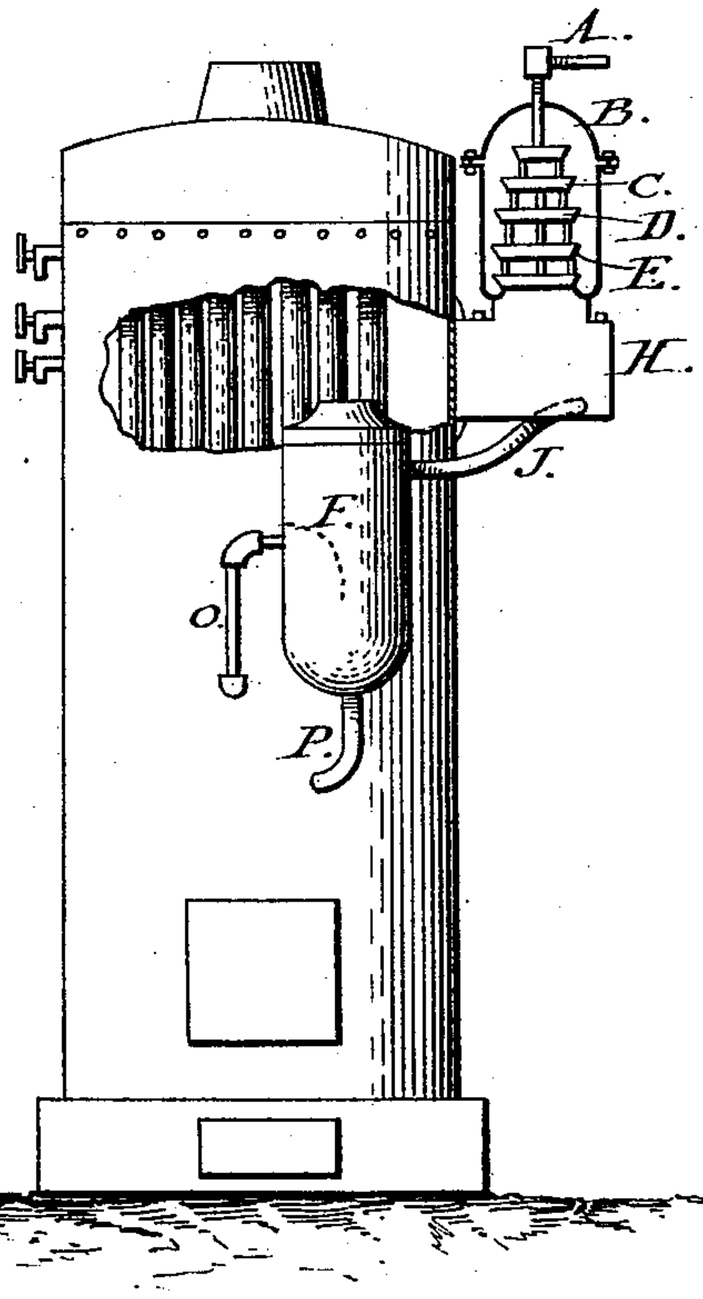

Fig. 3.

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UNITED STATES PATENT OFFICE.

JOHN D. McEACHREN, OF GALT, CANADA.

STEAM-BOILER CLEANER.

SPECIFICATION forming part of Letters Patent No. 507,030, dated October 17, 1893.

Application filed March 27, 1893. Serial No. 467,877. (No model.) Patented in Canada September 1, 1891, No. 37,261.

To all whom it may concern:

Be it known that I, JOHN D. McEACHREN, a citizen of Canada, residing at Galt, in the county of Waterloo and Province of Ontario, Canada, have invented certain new and useful Improvements in Steam-Boiler Cleaners, (a patent for which was granted to me in Canada September 1, 1891, No. 37,261;) and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to certain improvements in means for removing impurities from water used in steam boilers and it has for its object to deprive the water of such impurities as sulphate of lime, chlorate of lime, magnesia, salt, clay, decomposed vegetable matter, dirt, &c., either before, while said water is entering the boiler, or after it has remained a time within the same.

It consists essentially of a series of pans arranged one above another, and, in upper part of the boiler, a dome above said pans, a pipe extending from the upper of said pans through said dome, extension plates beneath the pans previously mentioned, a funnel extending in front of said extended plates, a receiver connected with the boiler and a blow-off pipe from said receiver, together with certain valves or cocks for operating the pipes and suitable fastenings for the several parts, all of which will be fully described hereinafter.

In the drawings illustrating my invention: Figure 1 is a perspective view with parts broken away to illustrate the construction of the interiors of the devices. Fig. 2 is a sectional view of my cleaner with its filtering receiver as applied to a fire box of a locomotive boiler. Fig. 3 is a sectional view of the cleaner as applied to an upright boiler wherein the extension plates are omitted, their places being supplied by the boiler's surface.

Similar reference letters in my drawings and specification refer to like parts in all of the figures.

Referring to the drawings A is the pipe through which the boiler is fed with water which enters the pan B, when the series of pans B, C, D, E, is used. When the pans B, C, D, E are not used the pipe A passes through the shell of the boiler to a point below the water line and above the pan G. In cases where the said series of pans is used the water overflows the pan B, falls into pan C, thence into pan D, thence into pan E and thence to the main body of water in the boiler. The pans may be of any desired number, though in some cases one or two only are sufficient, depending upon the quantity and kinds of mineral matter in the water used. The pans extend from a point a little above the water line through the steam space up near to the top of the boiler and in cases where very hard or salt water is used I prefer and use a dome F, mounted on the boiler provided with an adjustable cover that may readily be removed. The object of this dome is to give additional room for pans as well as to facilitate the placing and removing of the same in cleaning. This dome also answers the purpose of a manhole but never as a steam dome for engine driving, heating, &c., as the entrance of cold water into the same would be objectionable in such case.

As the water passes from one pan to another through the steam space, the lime, salt and other heavy matter is precipitated on the bottom of said pans and adheres to them so that when the feed-water reaches the main body of water in the boiler it is free from all mineral matter. In case any of this mineral matter falls beyond the pan E it is caught by a larger pan G set below the water line to provide against this possibility. This pan G is connected to a funnel H, the top of which is above the water line. Extending from each side of the funnel H is a plate I, touching the boiler's sides. The flow of the current of water is from the back of the boiler toward the front in my arrangement. See Fig. 1.

In the fire box or locomotive boiler, as shown in Fig. 3 of the drawings, the top current is from the front toward the back of the same.

In an upright boiler, such as is shown in Fig. 3, the top current is from the center to the circumference. The purpose, in my arrangement of boiler, is to have the water flow from the hottest parts of the boiler toward the coolest, carrying with it the scum and light

floating matter and to place the funnel and extension plates so as to collect and hold such floating dirt.

In the instance illustrated in Fig. 1, plates I, I, are shown, which serve to arrest the scum floating from the back toward the front, the same being forced into the funnel H.

J, is a pipe connected at one end to the funnel H, the other end passing through the shell of the boiler to the open air or connected to the mud-receiver K, as the case may be.

The scum and mud collected by the funnel H and pan G passes along with the current of water through the pipe J to the open air or the mud receiver K as the case may be.

The mud-receiver K is divided into two compartments by the diaphragm M, which extends from a point below the entrance of the pipe J toward the bottom of the receiver.

O is the pipe leading from a point in the compartment of the receiver K, formed by the diaphragm M, to a convenient point in the boiler for the return of the water flowing through pipe J. The scum, mud, oil, &c., entering the receiver K through pipe J, floats on the water in the receiver until it becomes sufficiently heavy to settle. In settling, the water has to pass the diaphragm M below the pipe O, and in this way the sediment is precipitated to the bottom of the receiver K while the clean water returns through the pipe O to the boiler again.

In cases where the water is charged with very light vegetable matter, oil, &c., which will not settle in the given time, or in cases of locomotives, steamboats, &c., where the receiver K can not be at rest I use a horizontal filtering receiver W (see Fig. 2) which is preferably cylindrical in form and composed of the settling chamber V, into which the scum pipe J discharges, and from which the mud is blown out through the pipe P.

b, *b*, are perforated plates or sieves through which the water passes readily. The space *a*, between the plates *b*, *b*, is filled, through the lid *d*, with hay, gravel, sponge, or other filtering materials G through which the water passes from the settling chamber V, to clean the water chamber V′. The pipe O carries the water from the chamber V′ back again to the boiler. A valve or cock *p*′ is placed in the pipe at the bottom of the receiver K or W by the occasional opening of which the mud collected in the bottom of said receiver is blown out. The work of this cleaner is similar to the hot water system used in heating houses. The water in the receiver, K or W, becomes a few degrees lower in temperature, through its exposure to the air, and its specific gravity is greater than the water in the boiler. The receiver is so placed that the water flows downward, through the pipe O, to the boiler and the water from the boiler flows through the pipe J to supply its place. In this way a continuous circulation of hot water is obtained from the funnel H, to the receiver K and from the receiver back to the boiler again depositing foreign matter either by a settling or filtering process, as described. When the settling process serves to clean the water the filter need not be used, as by the latter process circulation is slow.

I do not, in practice, confine myself to the whole of the arrangement, shown in the drawings and described, under all conditions; as for instance, when it is only necessary to remove mud and other light substances which will float for a considerable time the pans B, C, D, E may be dispensed with. When the removal of only such heavy mineral matter as will quickly separate from the water and form into solid masses by exposure to heat is desired the pans B, C, D, E and G and supply pipe A will do the work. In some cases the receiver K is omitted; the pipe J, in such cases, passes to the open air, the scum or floating matter held by the funnel H, and plates I, I being discharged from the boiler by way of the valve provided for the purpose. In all cases, however, where there is much floating matter, it is advisable to use the receiver K, as by this arrangement the mud is removed from the boiler constantly and particular attendance is dispensed with.

In case the boiler is too small to admit the funnel H extension plates I, I, &c., there may be omitted the pipe J which enters the boiler at or near the water line connecting with receiver K.

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

1. In a boiler cleaner, the combination with the boiler of a series of independent pans, of various sizes, as to diameter or width, arranged in a pile one above another, each provided with supporting legs, the smallest of the series at the top and increasing in size gradually downward, the supporting legs of the bottom one resting in a large permanently fixed pan, as specified.

2. In a steam boiler cleaner, the combination with the boiler and the series of pans constructed and arranged as described, of the elevated dome provided with a removable cover as set forth.

3. In a steam boiler cleaner, the funnel H, plates I extending backward, outward and against the sides of the boiler, pan G connected to plate I and the pipe J, all combined as set forth.

4. The combination with funnel H, scum-pipe J, plates I and pan G of the receiver K, provided with diaphragm M, dividing the upper from the lower part of the said receiver in the manner described to compel the impure water to pass down below the said diaphragm leaving the deposit to settle to the bottom while the water rises on the opposite side of said diaphragm thence passing through return pipe and into boiler, as set forth.

5. In a steam boiler cleaner the combina-

tion of parts as follows: a series of pans of various sizes, independently adjustable to place within the boiler, a large pan—forming a base to the series of pans—extending forward, a funnel attached to said large pan having side plates extending backward and outward to opposite sides of the boiler, the scum-pipe attached to said funnel extending forward and discharging outside of the boiler, as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

J. D. McEACHREN.

Witnesses:

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W. E. V. KELLEHER.