No. 758,835. PATENTED MAY 3, 1904.

C. J. A. GRILLE.

STEAM BOILER CLEANER.

APPLICATION FILED DEC. 5, 1900.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

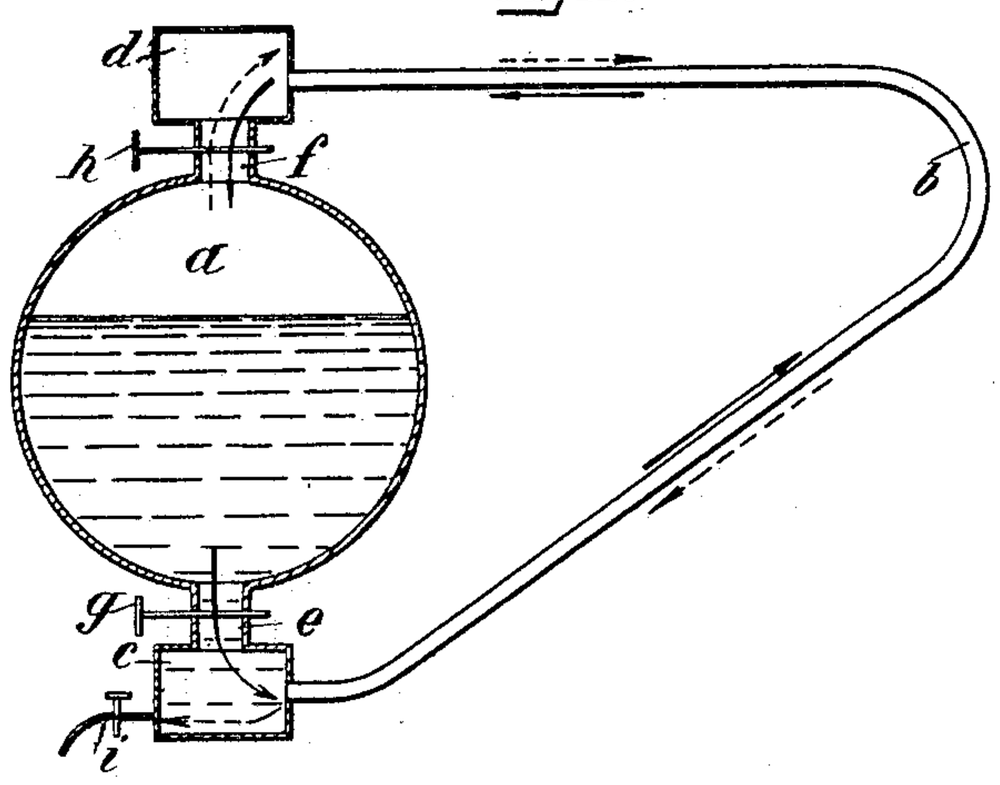


Fig. 3.

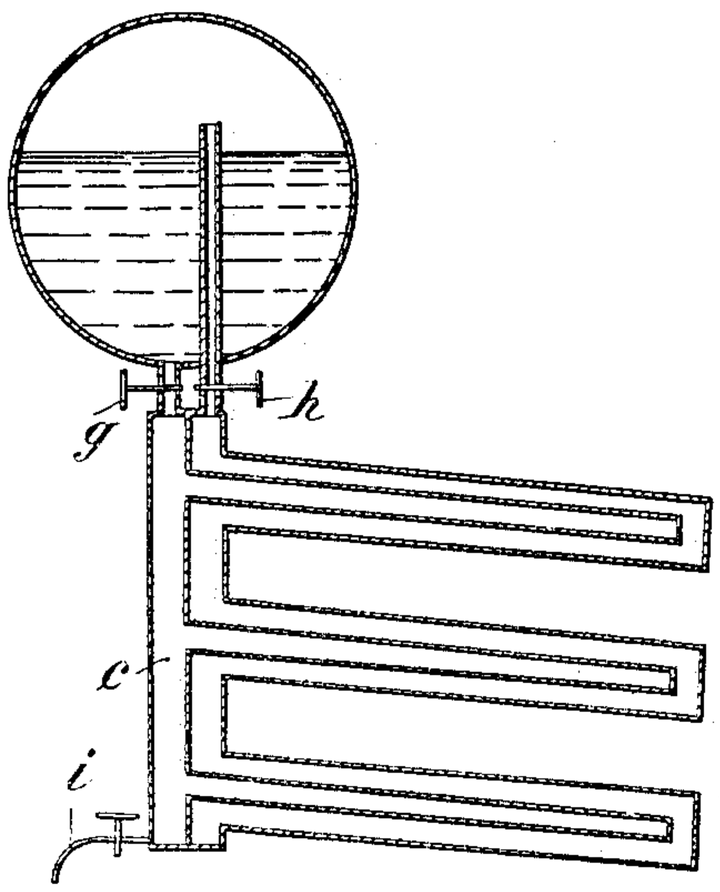
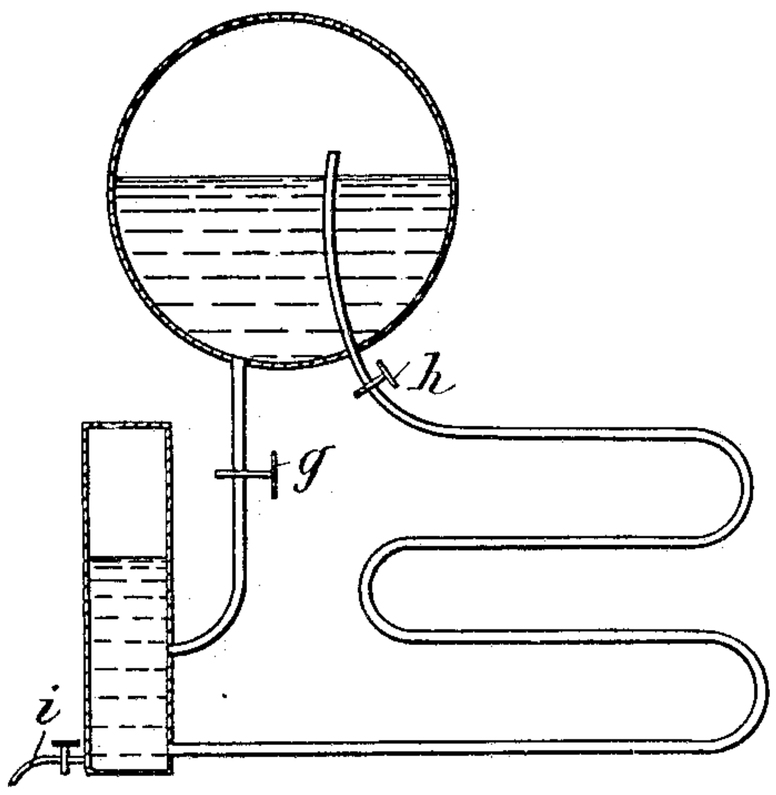


Fig. 4.



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APPLICATION FILED DEC. 5, 1900.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

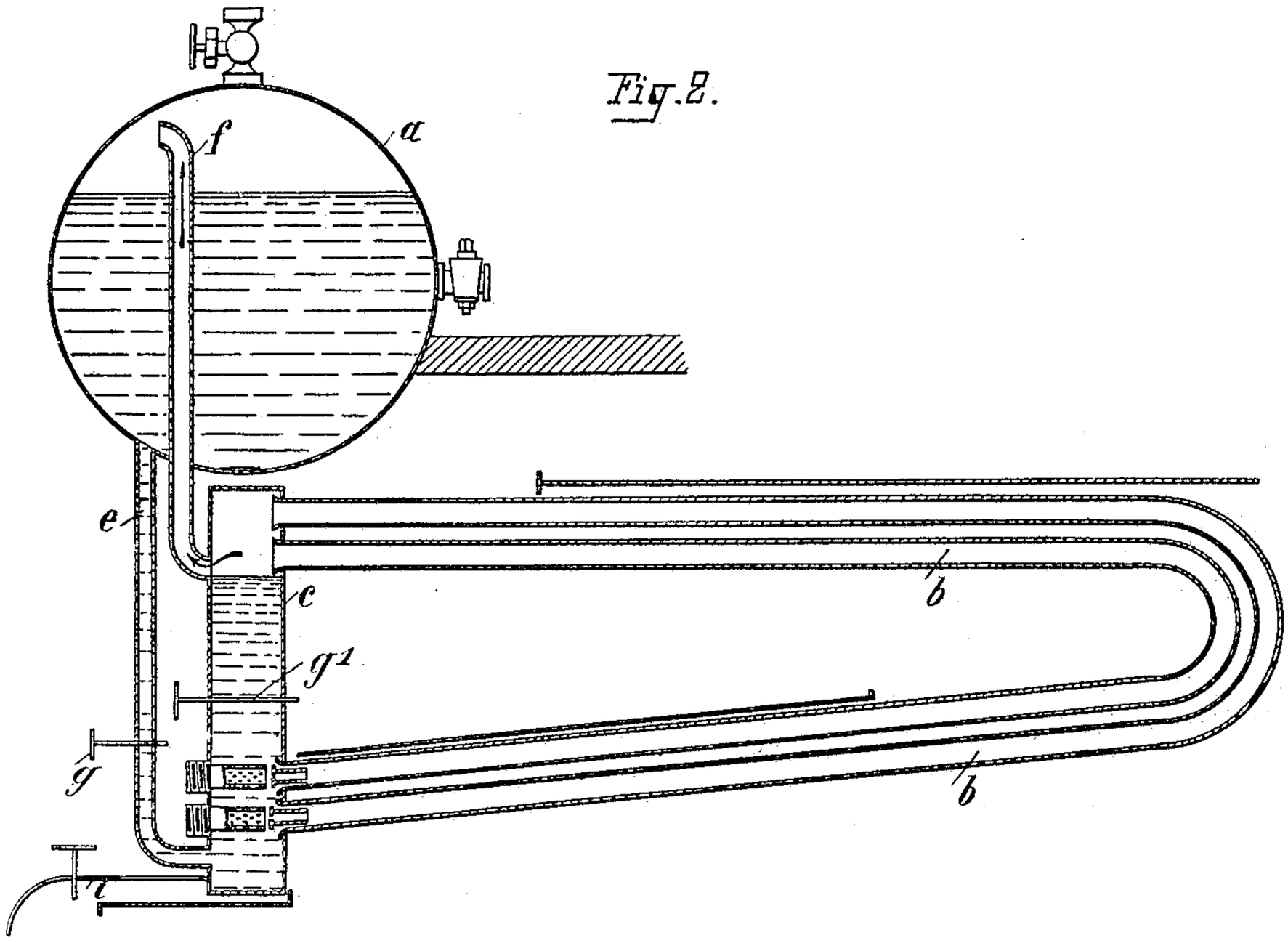


Fig. 5.

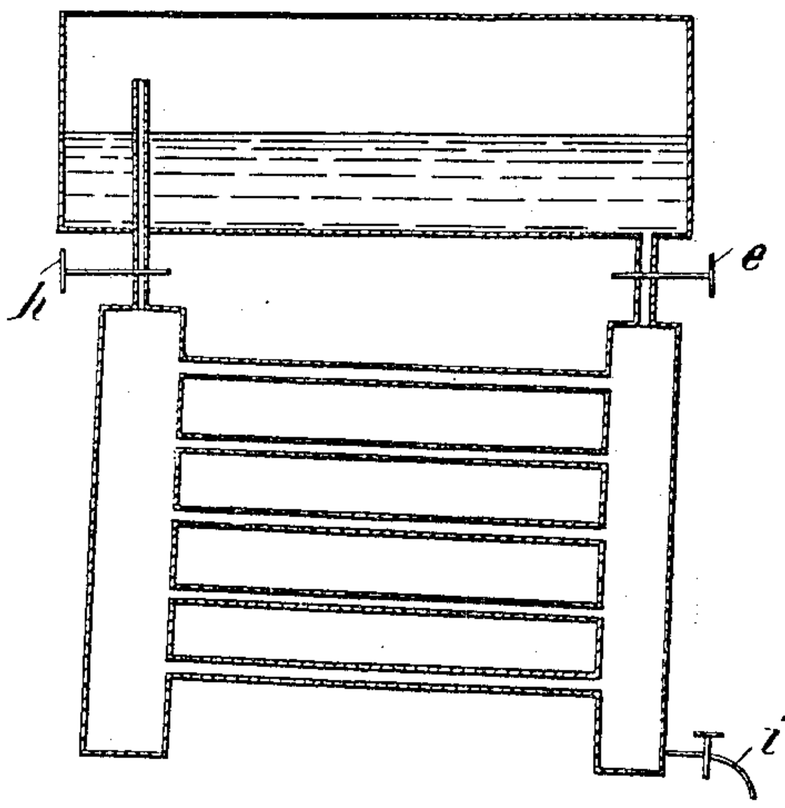
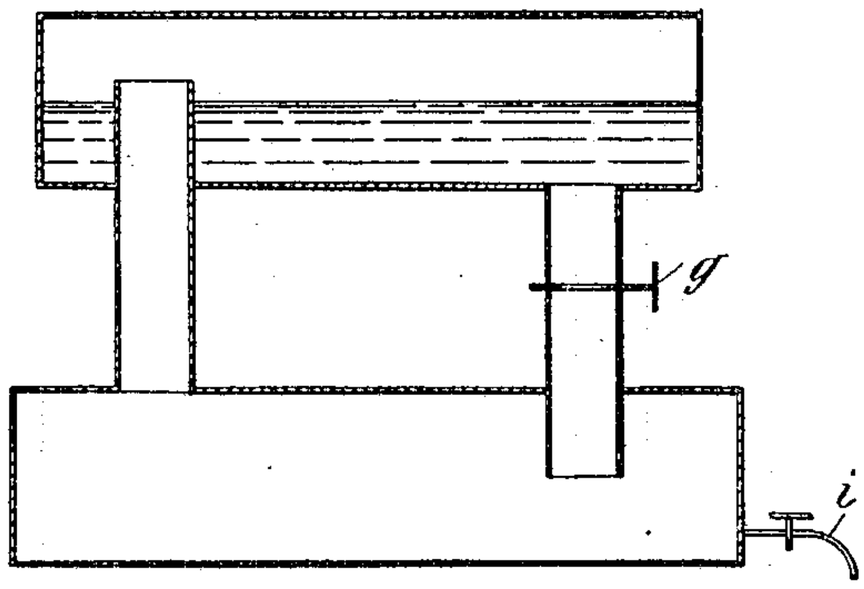


Fig. 6.



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No. 758,835. Patented May 3, 1904.

UNITED STATES PATENT OFFICE.

CHARLES JOSEPH ANTOINE GRILLE, OF PARIS, FRANCE, ASSIGNOR TO THE SOCIÉTÉ SOLIGNAC, GRILLE & COMPAGNIE, OF PARIS, FRANCE.

STEAM-BOILER CLEANER.

SPECIFICATION forming part of Letters Patent No. 758,835, dated May 3, 1904.

Application filed December 5, 1900. Serial No. 38,827. (No model.)

To all whom it may concern:

Be it known that I, CHARLES JOSEPH ANTOINE GRILLE, engineer, of 67 Rue de la Victoire, in the city of Paris, Republic of France, have invented an Improved Steam-Boiler Cleaner, of which the following is a full, clear, and exact description.

In steam-boilers the principal difficulty encountered is mostly due to the formation of incrustation and the obstruction of the steam-passages thereby and by the mud formed of salts precipitated by the heat. When these matters are due to carbonate of lime, they are not generally very adherent, and even when they proceed from the sulfate they only become adherent after remaining for a more or less lengthened period and successive heatings of the parts of the boiler exposed to the fire.

This invention relates to a method of cleaning boilers which will enable the complete expulsion of the sediment and mud deposited without the necessity of dismounting or opening the boiler or even requiring the pressure to be reduced.

The invention consists, essentially, in injecting into the parts of the boiler to be cleaned a current of steam generated in the boiler itself and directed oppositely to the flow of the water and steam in normal working. This mode of cleaning thus consists in isolating the part to be cleaned from the mass of water in the generator, completely emptying the part thus isolated, and causing a current of steam from the boiler to circulate therein in the reverse direction to that followed in vaporization.

The invention is carried out in practice by means of cocks or other equivalent means so disposed as to permit of isolating the tubes to be cleaned from the mass of water, of emptying the tubes, and of regulating the admission of steam thereto.

The invention is illustrated diagrammatically in the accompanying drawings as applied to various types of boilers.

Figures 1 and 2 show the invention as applied to boilers of the Solignac type. Fig. 3 shows the invention applied to a boiler of the Niclausse type, and Fig. 4 shows it applied to a Belleville boiler. Fig. 5 shows the application of the invention to a boiler of the Allest, Babcock, or Roser type. Fig. 6 shows a French boiler adapted for being cleaned by the method of this invention.

The same letters of reference denote like parts in the several figures.

The method of cleaning is more particularly adapted for use in connection with the Solignac type of steam-generator forming the subject of previous Letters Patent.

The Solignac generator shown in Fig. 1 comprises a feed-drum *a*, forming a store of heat energy, and steam-chamber and a nest of vaporizing-tubes *b* of ⊃ form, connected at their opposite ends with headers *c d*, communicating with drum *a* by means of pipes *e f*. The latter are provided with stop-cocks *g h* or other equivalent device, the lower header *c* being also provided with a purge-cock *i*. In normal working the circulation is in the direction indicated by the arrows in full line—that is to say, the water in drum *a* passes down into the header *c*, circulates in the tubes *b*, where it becomes vaporized, the steam produced passing into header *d* and thence into the upper part of drum *a*.

When it is desired to clean out the boiler, the stop-cock or other device *g* is closed and the purge-cock *i* is opened. The steam contained in drum *a* and header *d* then blows off through the nest of tubes *b*, as indicated by the arrows in dotted line, and detaches and drives out before it the mud or incrustation in course of formation, which is expelled at the purge-cock *i*. The amount of steam thus blown off may be regulated by means of the stop-cock *h*.

It is preferred to divide the nest of tubes into a number of elements or groups in order that the generation of steam may not be interrupted during the cleaning, since were the nest of tubes comprised in a single element, which may sometimes be the case, there would be expenditure and non-production of steam, so that the steam-space could be emptied, and in order to repeat the operation it would be necessary to wait until pressure is again raised, and it is of advantage to effect the

cleaning at the highest possible pressure. On the other hand, if the nest of tubes be divided into several elements the boiler may remain at the same pressure, as during the cleaning of one of the elements the remainder would be still producing steam. This improved method thus affords a means of cleaning boilers by means of steam without the necessity of dismounting or opening any part of the boiler or of reducing the pressure.

Although this improved method of cleaning is more particularly applicable to my type of boiler, it may also be applied to the different types of boilers, feed-water heaters, and superheaters now in use. Fig. 2 shows the invention applied to another of my type of boilers. In this arrangement the water is shut off from the tubes to be cleaned by means of a stop-cock or equivalent device *g* in the pipe *e*, which connects the drum *a* with header *c*, and by another cock, *g'*, in the header *c*, the latter being also provided with a purge-cock *i* at bottom.

In applying this method of cleaning boilers by means of steam to other types of boilers, such as the Niclausse boiler, Fig. 3, the Belleville boiler, Fig. 4, or the Allest, Babcock, or Roser types, Fig. 5, it is only required to provide a stop-cock or equivalent closing device *g* in the water-supply pipe to the header *c*, a stop-cock *h* or equivalent closing device in the pipe by which the steam is conducted to the steam-space of the drum, and a purge-cock *i* at the lower part of header *c*.

The invention may also be applied to French boilers, as shown in Fig. 6, in which case a stop-cock *h* or its equivalent would be placed upon the legs by which the water is conducted to the water-heating drums, which would be provided with a purge-cock at the lower part, and a stop-cock or its equivalent may be placed upon the leg by which the steam is conducted to the steam-space of the boiler.

It is to be understood that the above arrangements are given merely by way of example and that the stop-cocks or shutting-off devices and the accessory arrangements may be varied to suit the particular construction of boiler to which this improved method of cleaning is to be applied, such as traction, stationary, or marine engine boilers.

I claim—

1. In combination with the boiler having a drum to contain a comparatively large volume of water, the vaporizing tubes or passage extending therefrom and connected therewith, a purge-cock and a cock by which the course of the circulation is reversed from said drum through said vaporizing tube or passage, substantially as described.

2. In combination in a steam-generator with its drum to contain a large body of water and with vaporizing-surfaces, means for cutting off the parts to be cleaned from one side of the mass of water in the drum and means whereby a current of steam may be caused to pass through the said parts from the drum in a direction contrary to the normal circulation of water and steam through the said parts, substantially as described.

3. In combination in a boiler with a drum adapted to contain a large body of water, vaporizing-tubes connected with the drum and of ⊃ form, means for cutting off one end of the said tubes from one side of the drum and a purge-cock whereby circulation may be caused through the said tubes in a direction contrary to the normal circulation, substantially as described.

The foregoing specification of my improved method of cleaning steam-generators, superheaters, and feed-water heaters signed by me this 20th day of November, 1900.

CHARLES JOSEPH ANTOINE GRILLE.

Witnesses:
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MAURICE H. PIGNET