(No Model.) 2 Sheets—Sheet 1

C. T. J. VAUTIN.

ELECTROLYTICAL PROCESS AND APPARATUS.

No. 541,465. Patented June 25, 1895.

FIG. 1.

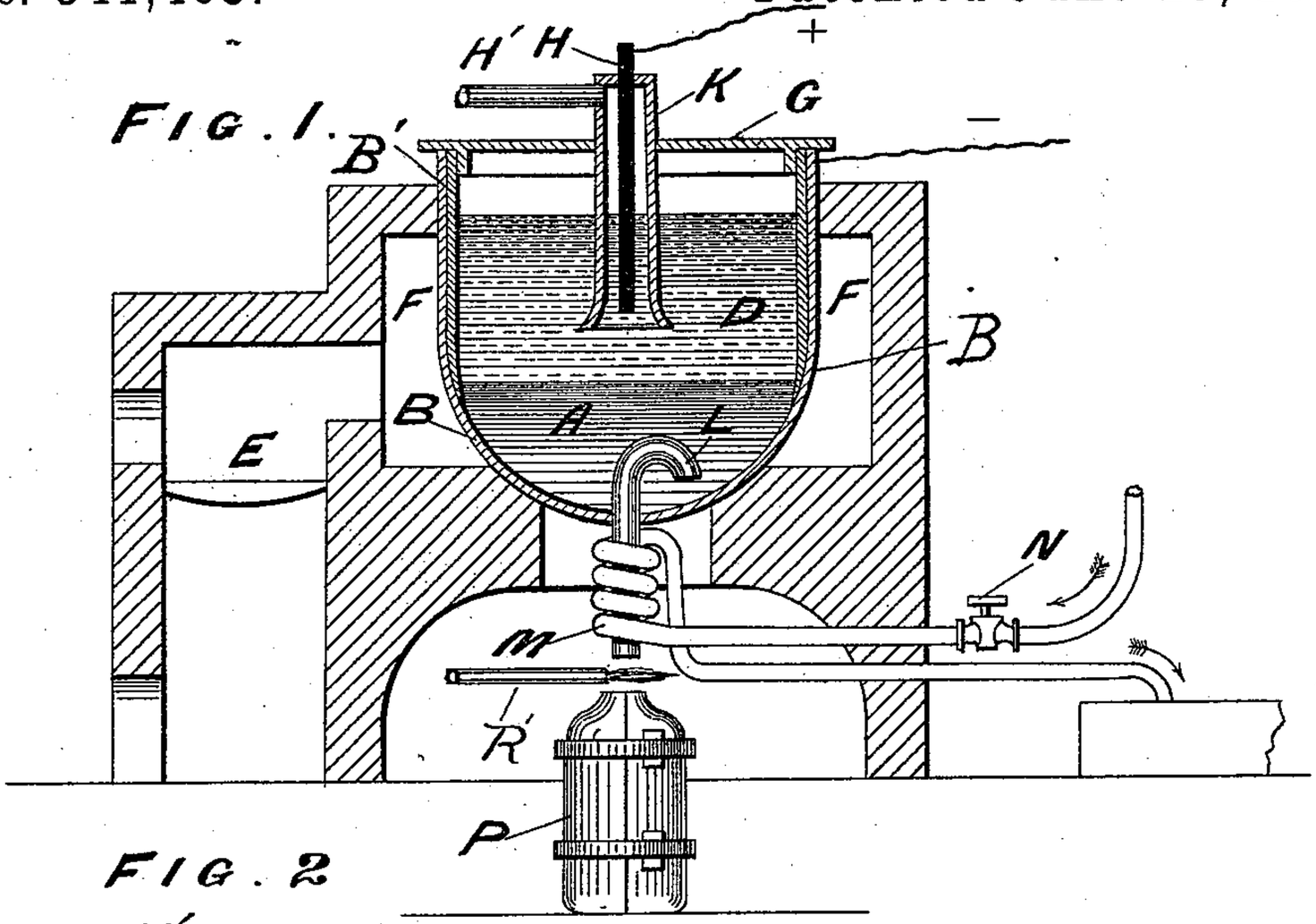


FIG. 2

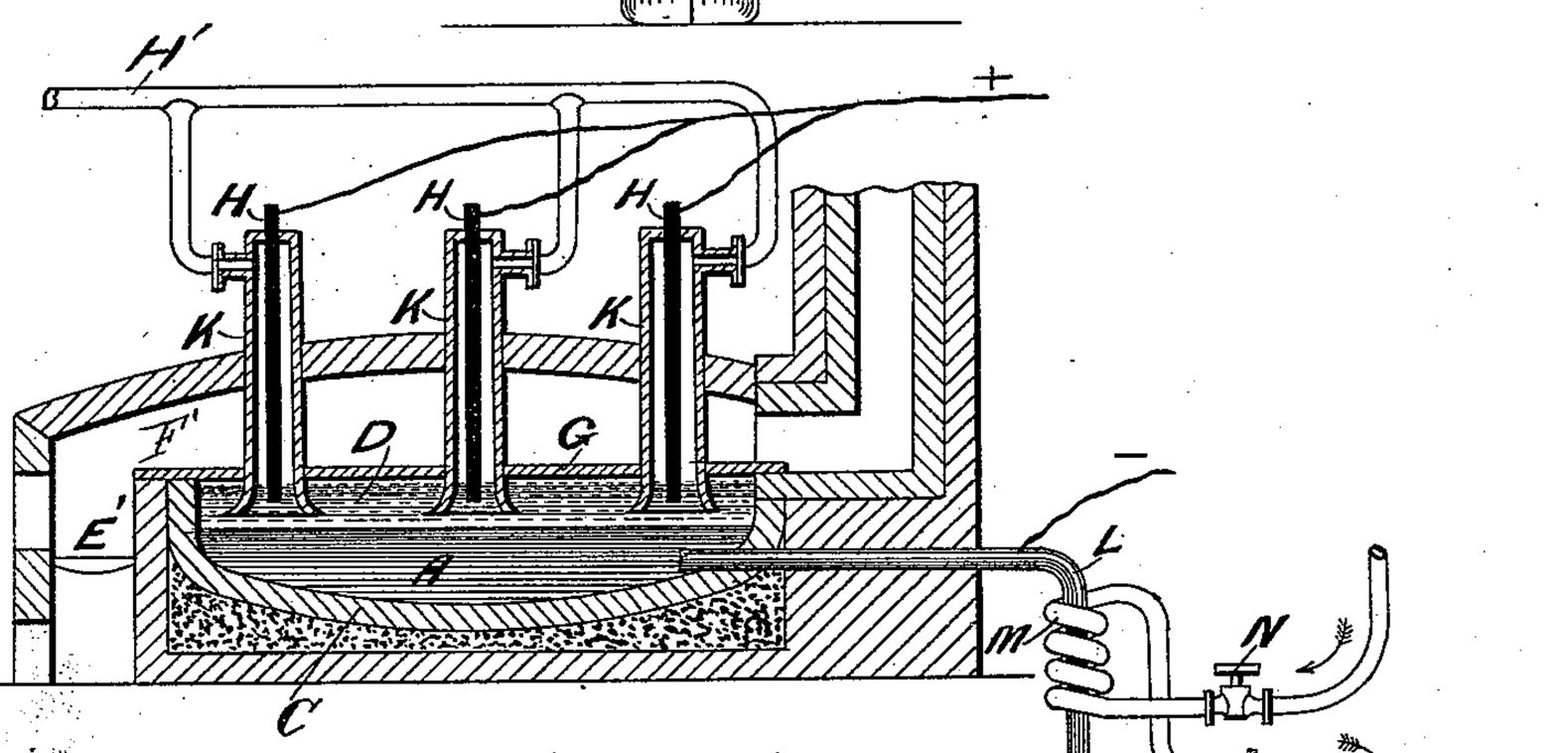
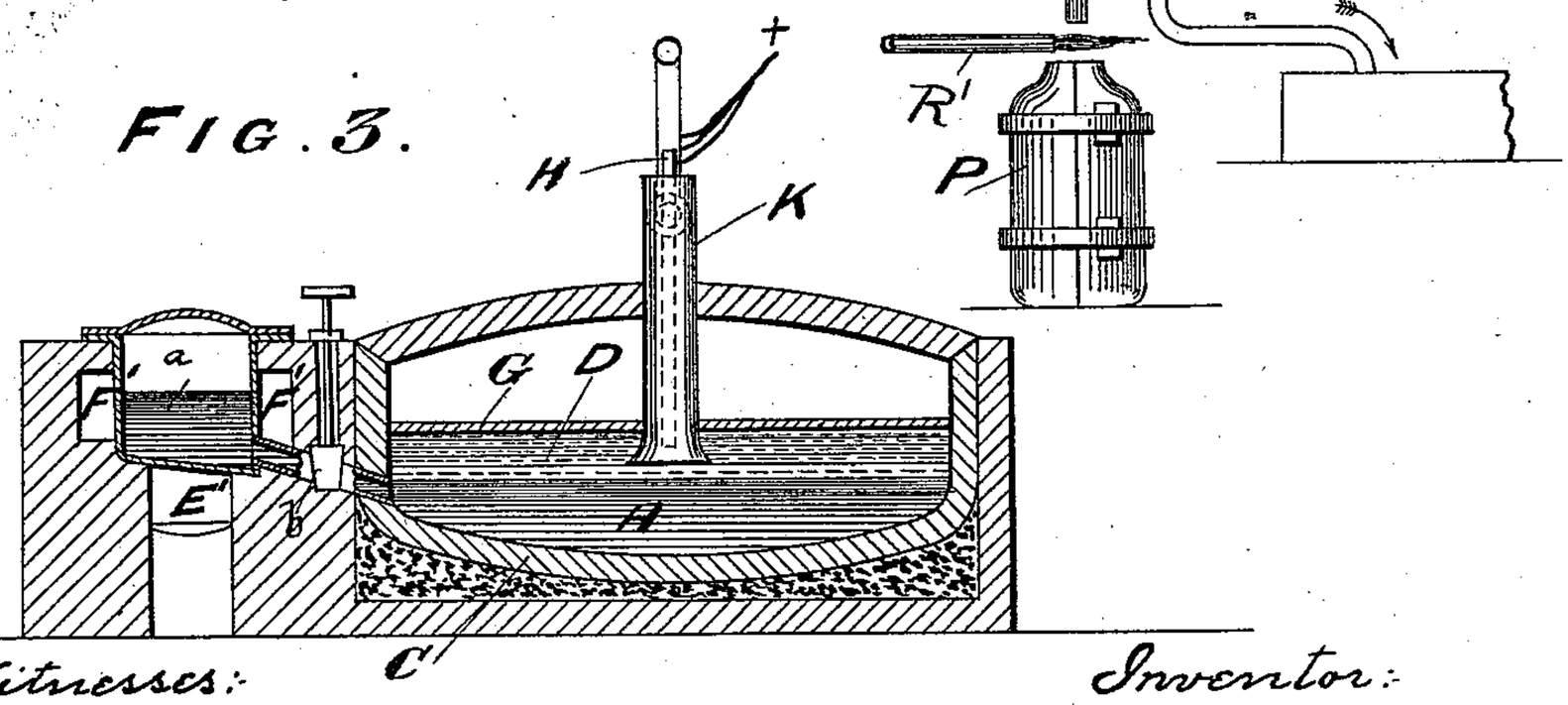


FIG. 3.



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(No Model.) 2 Sheets—Sheet 2.

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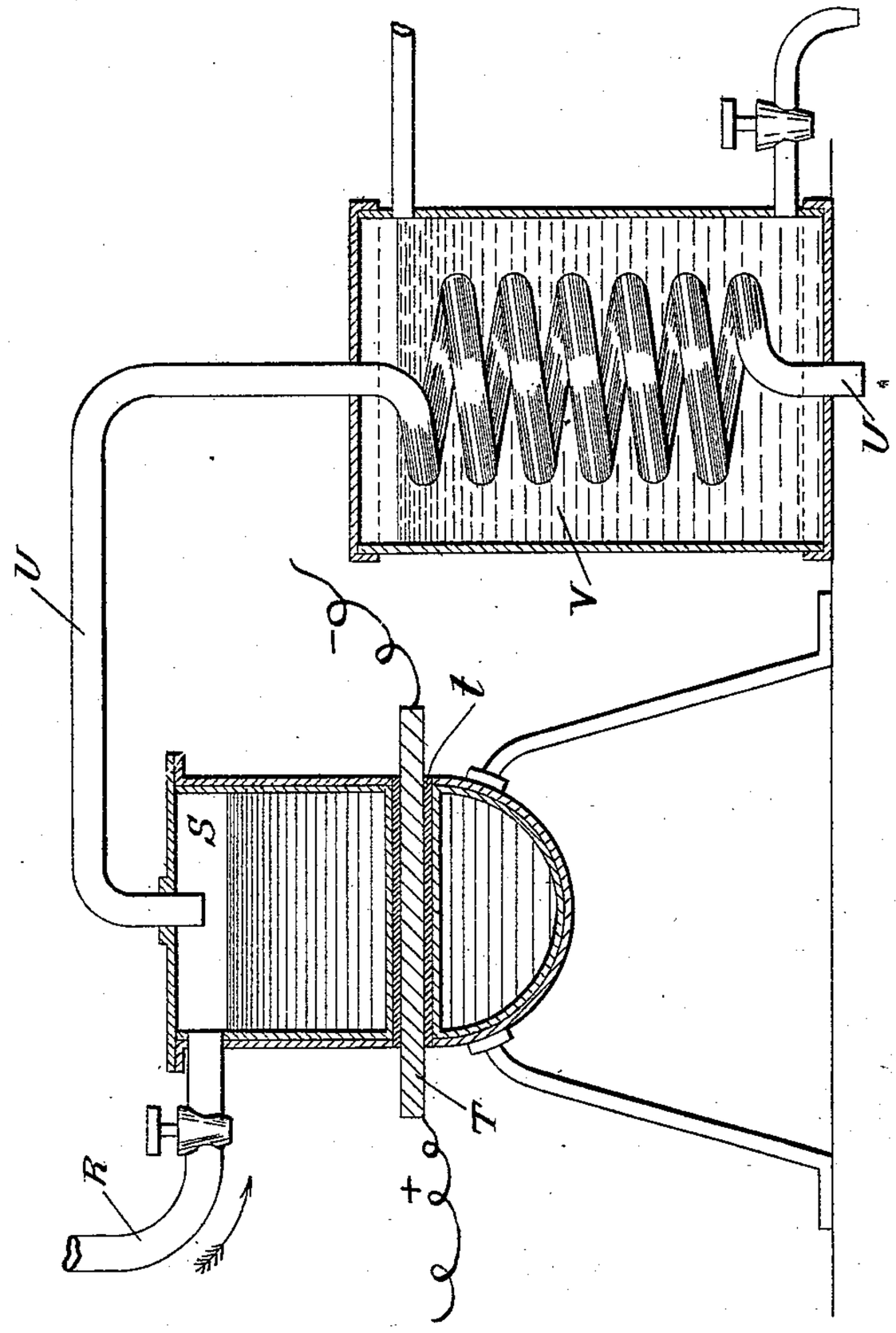

FIG. 4.

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UNITED STATES PATENT OFFICE.

CLAUDE THEODORE JAMES VAUTIN, OF LONDON, ENGLAND.

ELECTROLYTICAL PROCESS AND APPARATUS.

SPECIFICATION forming part of Letters Patent No. 541,465, dated June 25, 1895.

Application filed June 26, 1894. Serial No. 515,767. (No model.) Patented in England July 12, 1893, No. 13,568.

To all whom it may concern:

Be it known that I, CLAUDE THEODORE JAMES VAUTIN, residing at London, England, have invented an Improved Electrolytical Process and Apparatus used therein for the production of an alloy of lead and tin with the alkaline metals, (for part of which invention application for Letters Patent has been made in Great Britain, under No. 13,568, on the 12th day of July, 1893,) of which the following is a specification.

My invention relates to the economical production of an alloy of lead and tin with the alkaline metals as hereinafter specified and consists of an electrolytical process for that purpose, and of the arrangement and character of the cathodes, and means employed in an internally or externally heated furnace or vessel, for carrying the same into effect.

Figure 1 is a sectional elevation of a vessel or pot adapted to carry out my process. Fig. 2 is a longitudinal section of a furnace of large size adapted to carry out my process. Fig. 3 is a transverse section of the same. Fig. 4 is a sectional elevation of a convenient distilling apparatus to treat the alloy.

I find that the alkaline metals, such as sodium, potassium, calcium, strontium, and barium, may be quickly and economically reduced from their respective salts, preferably chlorides, when in a fused condition by an electrolytical current passing through the furnace or vessel containing the said fused electrolytes, and having as a cathode a molten bath of lead or tin supporting the said electrolyte, the reduced metal forming an alloy with either the lead or tin cathodes from which some of the alkaline metals can be afterward easily recovered by distillation as hereinafter described; or the alloys produced as hereinafter described are of commercial value from their cheapness for use in other metallurgical and chemical processes, in substitution for the use of the pure alkaline metals in such processes.

To carry my process into effect, I provide a bath A of heavy molten metal which is capable of alloying with the alkaline metals and is not volatile at the temperature of the molten electrolyte such as lead and tin in the bottom of a vessel or pot B, or on the hearth of the furnace C, and place thereover a salt of an alkaline metal or of a metal of the alkaline earth, such as the chloride of sodium, potassium, calcium, strontium, and barium, as an electrolyte D.

The vessel B, which may be of iron, internally lined with a neutral lining B′ such as magnesia extending beneath the surface of the electrolyte, but bare at the bottom in contact with the cathode, is mounted so that the lead or tin bath and the superposed electrolyte may be fused by heat externally applied from a grate E, and flues F, while the furnace C is also provided with a grate E′ and flues F′ to melt the bath and electrolyte as a reverberatory furnace, volatilization of the electrolyte being prevented by a shield or cover G made of tiles of fire clay or other refractory material.

In Fig. 3 the supply vessel is shown at *a* and the valved conduit at *b*.

The electrolyte and the cathode may be kept in a molten condition by an excess of the electrolytical current passing therethrough and the heat is thus maintained internally.

The bath of molten metal A is made the cathode of an electrolytical current and an anode or anodes H preferably of carbon and protected by a refractory tube or cylinder K (which may also serve for the collection of gaseous anions being provided for this purpose with an outlet pipe H′) are placed in the electrolyte D as shown.

When the current passes, the base of the electrolyte is reduced therefrom, at or on the surface of the metal cathode with small expenditure of electrical energy, and is alloyed with the said cathode which can be removed from the vessel or furnace as follows:

I provide an open exit pipe L from the metal cathode and turn the inner end of the pipe over as a siphon, so as always to leave a small portion of the cathode in the pot or furnace.

About the exterior of the exit pipe I apply a coil of cold water piping M outside the heating flues, in which the flow of cold water is controlled by a cock N. When the water is allowed to circulate in the coil of piping the cathode alloy is sufficiently cooled to be arrested and the outward flow is stopped. When the circulation of the water is stopped, the alloy melts and is discharged. This arrangement of exit pipe is found very preferable to

an ordinary cock or valve. The molten alloy is thus run into a divided mold P held together by clamps and preferably of an elongated form to expose as small a surface as possible of the alloy to oxidation, and as a further precaution against oxidation while tapping, I apply a jet of reducing gas R′ in the vicinity of the exit pipe and the mouth of the mold.

The alkaline metals from the above alloy may be readily distilled by treatment in a heated retort lined with magnesia or carbon or any suitable retort and the heavy metal of the cathode is thus freed for further use as a cathode.

The alloy when discharged in a molten condition from the pot B or furnace C is received by the pipe R into the retort S lined with magnesia or carbon.

It is found that sufficient further heat can be conveniently applied to effect the distillation of the volatile metal from the alloy, by means of the carbon T rendered incandescent by an electric current and inserted into a tube *t* passing through the retort.

The distilled volatile metal passes by the pipe U to the condenser V and is there condensed and can be collected in its pure metallic condition from the lower end of pipe U.

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

1. The hereinbefore described process for the production of alloys of lead, tin and alkaline metals, consisting in supplying lead and tin intermittently to an electrolytical furnace, supplying a fused alkaline salt thereto, superposed thereon, and discharging intermittently alloys of lead and tin with volatile metals when formed electrolytically, treating said alloys by distillation while still molten, condensing the pure distilled volatile metals, and returning the non volatile metal to the reducing furnace, substantially as described.

2. An apparatus for carrying out the described process comprising in combination,—a metallurgical receptacle, adapted to contain a melted cathode; a grate and flues therewith to fuse salts superposed upon said cathode; an anode protected by annular refractory tube, immersed in said fused salts; a shield or cover G, protecting surface of said fused salts; a discharge exit for the molten alloyed cathode, controlled by external coil of water piping; and a distilling apparatus for reception and continued distillation of molten alloyed cathode while hot, substantially as described.

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

CLAUDE THEODORE JAMES VAUTIN.

Witnesses:

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