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A. G. BETTS.

PROCESS OF EXTRACTING ZINC FROM ITS ORES.

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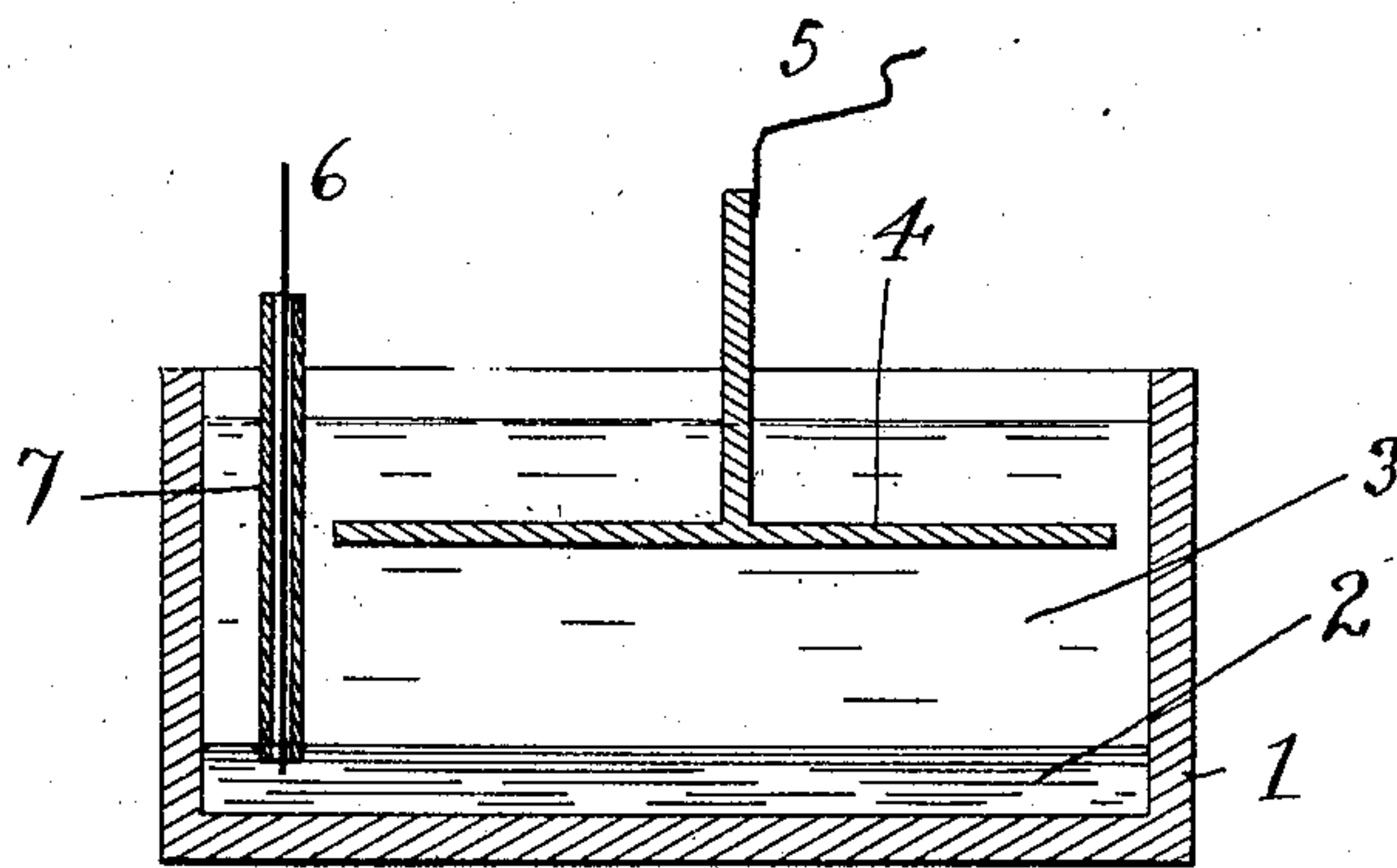


Fig 1

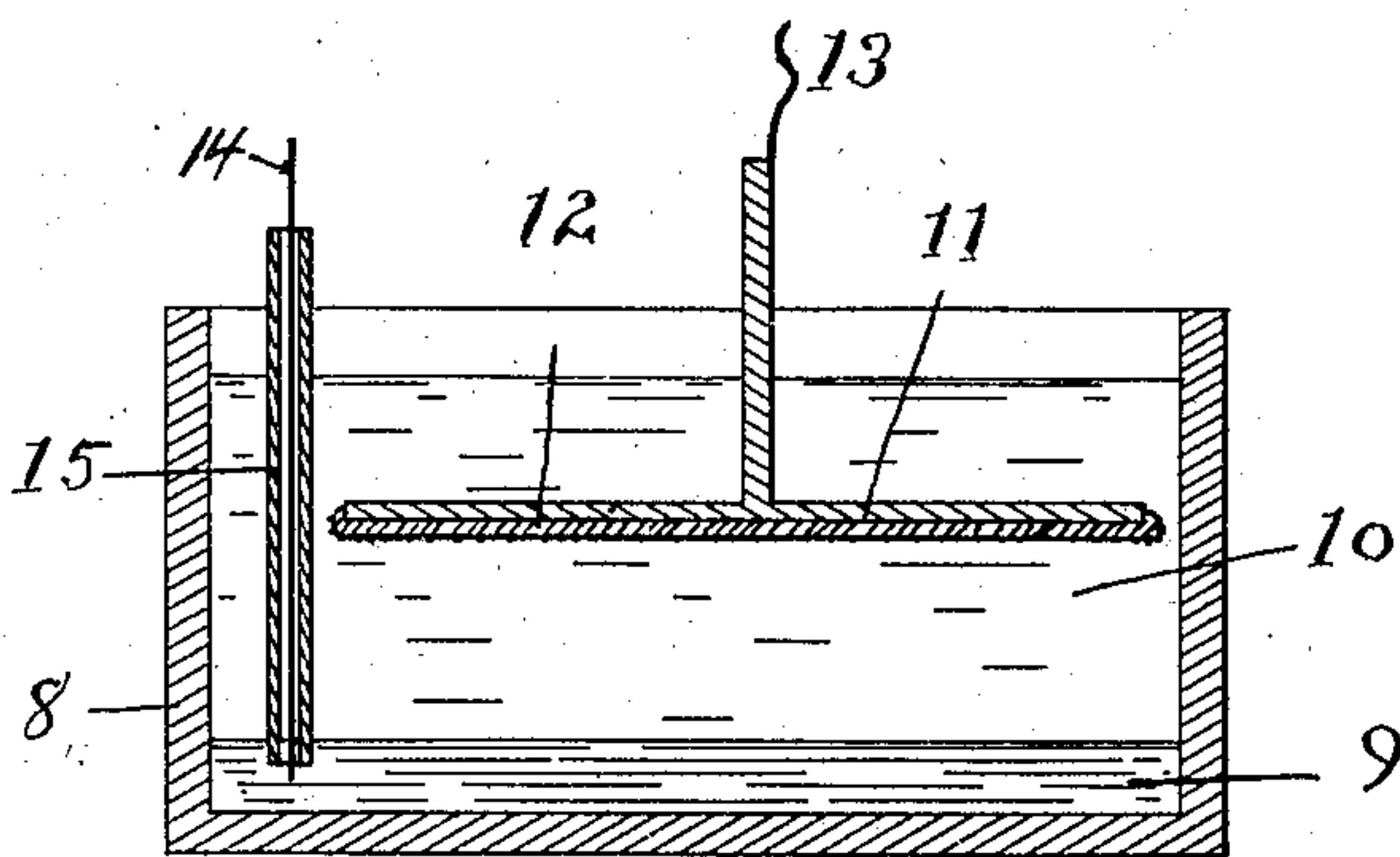


Fig 2

WITNESSES

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PROCESS OF EXTRACTING ZINC FROM ITS ORES.

SPECIFICATION forming part of Letters Patent No. 791,401, dated May 30, 1905.

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To all whom it may concern:

Be it known that I, ANSON GARDNER BETTS, a citizen of the United States, residing at Troy, county of Rensselaer, and State of New York, have invented certain new and useful Improvements in Processes of Extracting Zinc from its Ores, of which the following is a specification accompanied by drawings.

Figure 1 of the drawings is a view in vertical section of an apparatus by means of which I electrolytically deposit zinc from its solutions in a liquid-metal cathode. Fig. 2 of the drawings is a view in vertical section of an apparatus by means of which I electrolytically extract zinc from a substantially fluid alloy and deposit it on a cathode.

This invention relates to a process of making pure metallic zinc from zinc ores.

The object of my invention is to reduce the costs and losses incident to extracting zinc from its ores.

Most zinc ores contain the zinc as sulfid and are accordingly roasted before lixiviation to convert the zinc into basic sulfate or oxid. I may use any of the usual methods for extracting the zinc, as a solution of a soluble zinc salt, but prefer to use sulfuric acid in lixiviating, producing a solution of zinc sulfate. I then electrolyze the solution with an insoluble anode and with a liquid-metal cathode, preferably of mercury or mercury containing zinc. Oxygen is produced at the anode and sulfuric acid remains in the solution, or in case a solution of zinc chlorid is being electrolyzed chlorine is given off at the anode.

In practicing my invention in its preferred form I remove practically all the zinc from the solution, for economical reasons which are readily understood, and have left a solution of sulfuric acid, which may be used in the lixiviation of a fresh amount of ore. The zinc-mercury alloy, containing, preferably, less than five per cent. of zinc, I remove to another electrolytic cell containing a solution of a zinc salt, preferably one of zinc chlorid, into which solution a suitable cathode is introduced, suitably one of zinc. The mercury-zinc alloy is electrically connected as anode and an electric current is passed, whereby

zinc is dissolved from the alloy and deposited on the cathode. The mercury left after the removal of a large part of the zinc is returned to go through the same process over again.

Having reference to the accompanying drawings, Fig. 1 shows a tank 1 containing a layer of mercury 2 and a solution 3 of zinc sulfate or other zinc salt. An insoluble anode 4 is suspended in the solution and electrically connected by the wire 5 to a source of electric energy. An iron wire 6, surrounded by an insulating-sleeve 7, connects the mercury electrically as cathode to the same source of electric energy. When the current is passed, the zinc in the solution deposits in the mercury and alloys therewith.

Fig. 2 shows a tank 8 containing zinc-mercury alloy 9 and solution 10 of zinc chlorid. In the solution is suspended a cathode 11, with its electrodeposit of zinc 12, connected electrically to a source of electric energy by the wire 13. The mercury-zinc alloy is connected as anode to the same source of electric energy by the iron wire 14, surrounded by an insulating-sleeve 15. When the current is passed, zinc dissolves from the alloy and deposits on the cathode.

What I claim as new, and desire to secure by Letters Patent, is—

1. The process of extracting zinc from ores which consists in extracting the zinc therefrom as a soluble salt in solution, electrolyzing the solution with a liquid-metal cathode for the production of a zinc alloy, and electrolytically extracting zinc from said alloy and depositing the zinc on a suitable cathode.

2. The process of extracting zinc from ores which consists in dissolving the zinc therefrom as a solution of zinc sulfate, electrolyzing the solution with a liquid-metal cathode for the production of a zinc alloy, and electrolytically extracting zinc from the alloy and depositing the zinc on a suitable cathode.

3. The process of extracting zinc from ores which consists in dissolving zinc therefrom as a solution of zinc sulfate, electrolyzing the solution with a mercury cathode for the production of a zinc-mercury alloy, and electrolytically extracting zinc from the alloy and depositing the zinc on a suitable cathode.

4. The process of extracting zinc from ores
which consists in extracting zinc therefrom as
a solution of zinc sulfate, electrolyzing the so-
lution with a mercury cathode for the produc-
5 tion of a zinc-mercury alloy, and extracting
zinc from the alloy and depositing zinc on a
suitable cathode by electrolysis of a solution
of zinc chlorid.

In testimony whereof I have signed my name
to this specification in the presence of two sub- 10
scribing witnesses.

ANSON GARDNER BETTS.

Witnesses:

EDWARD F. KERN,
WILLIAM VALENTINE.