

C. W. JUDD.
 APPARATUS FOR SEPARATION OF SILVER FROM FIXING SOLUTIONS.
 APPLICATION FILED OCT. 11, 1909.

951,372.

Patented Mar. 8, 1910.

Fig. 1.

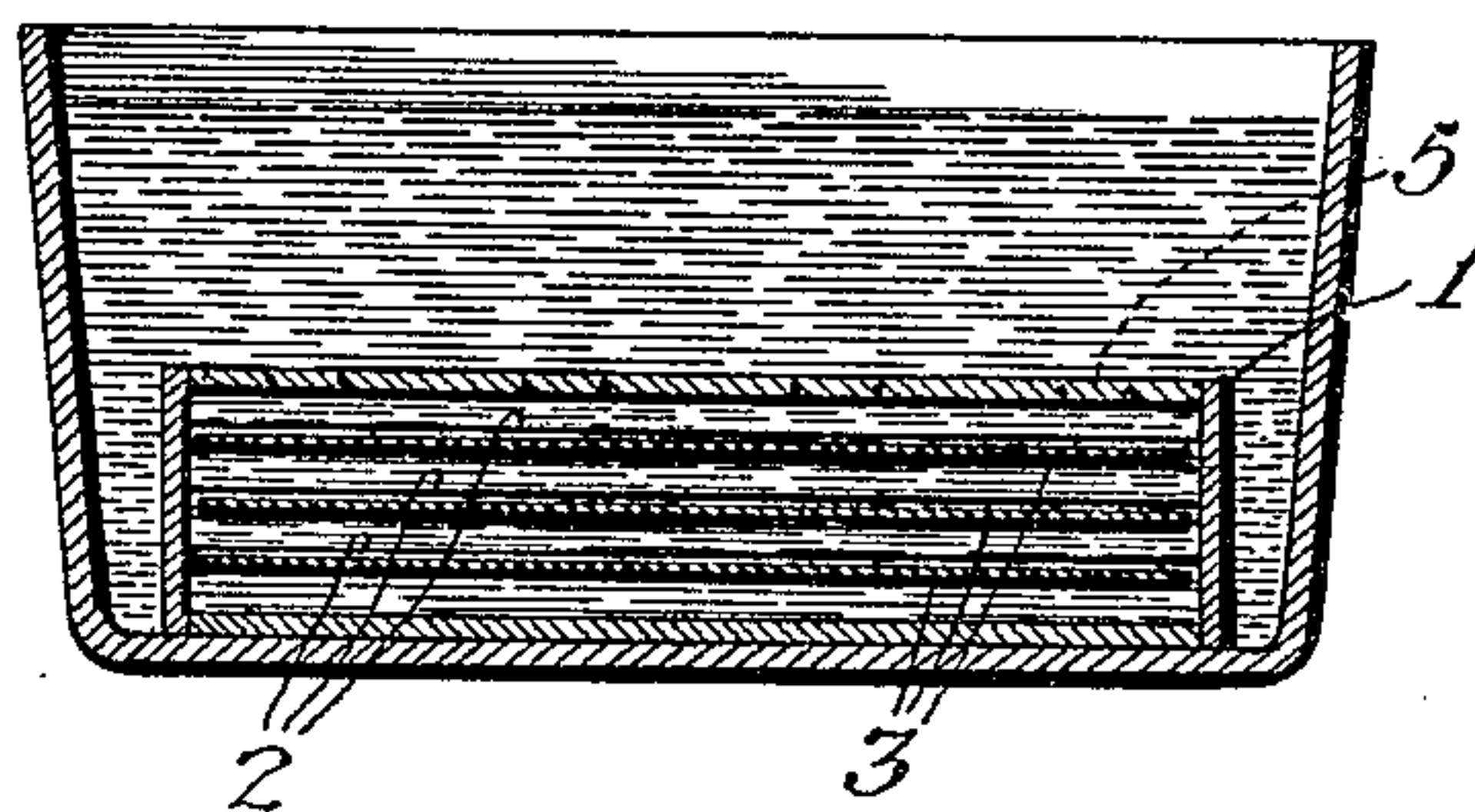


Fig. 3.

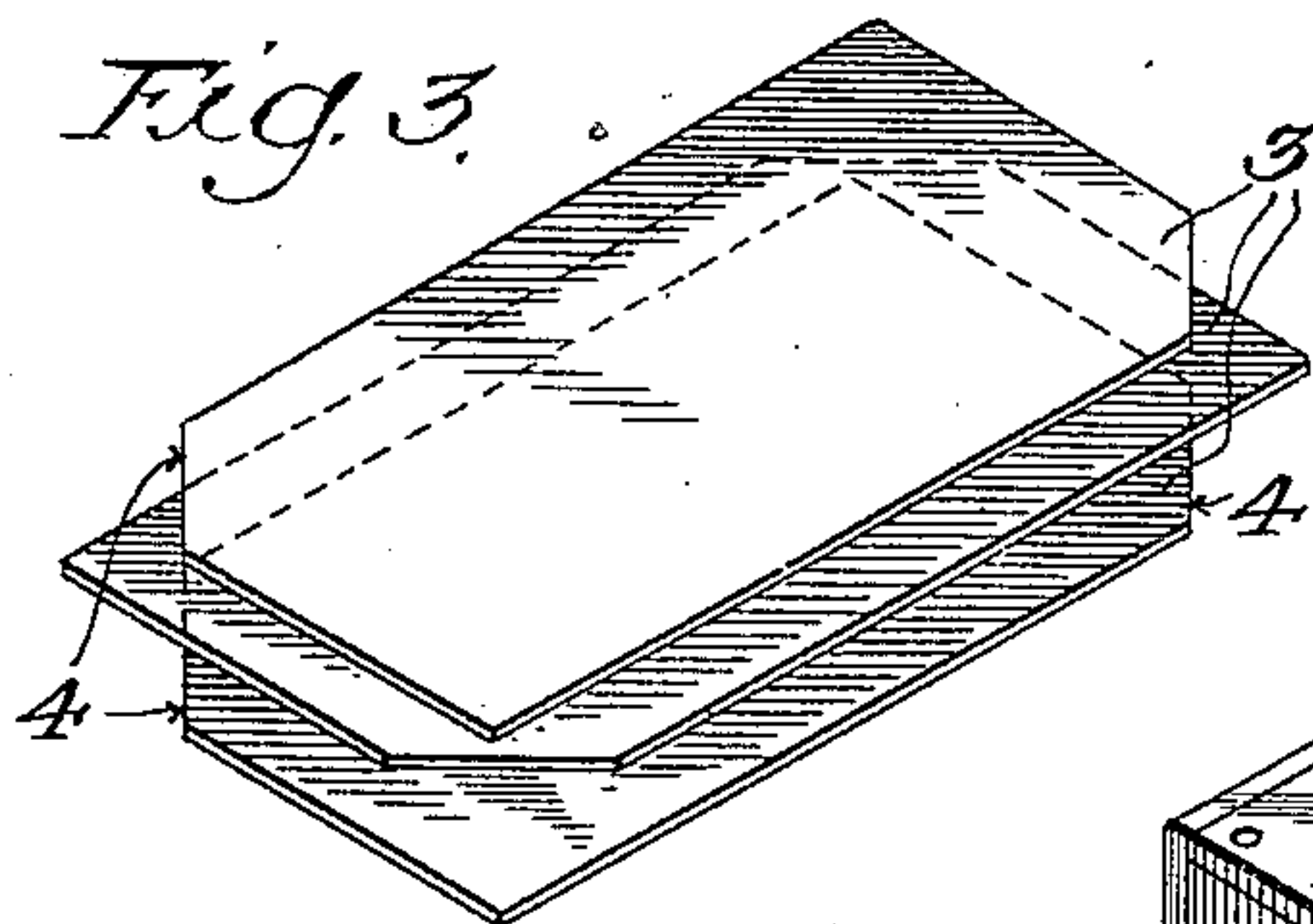


Fig. 2.

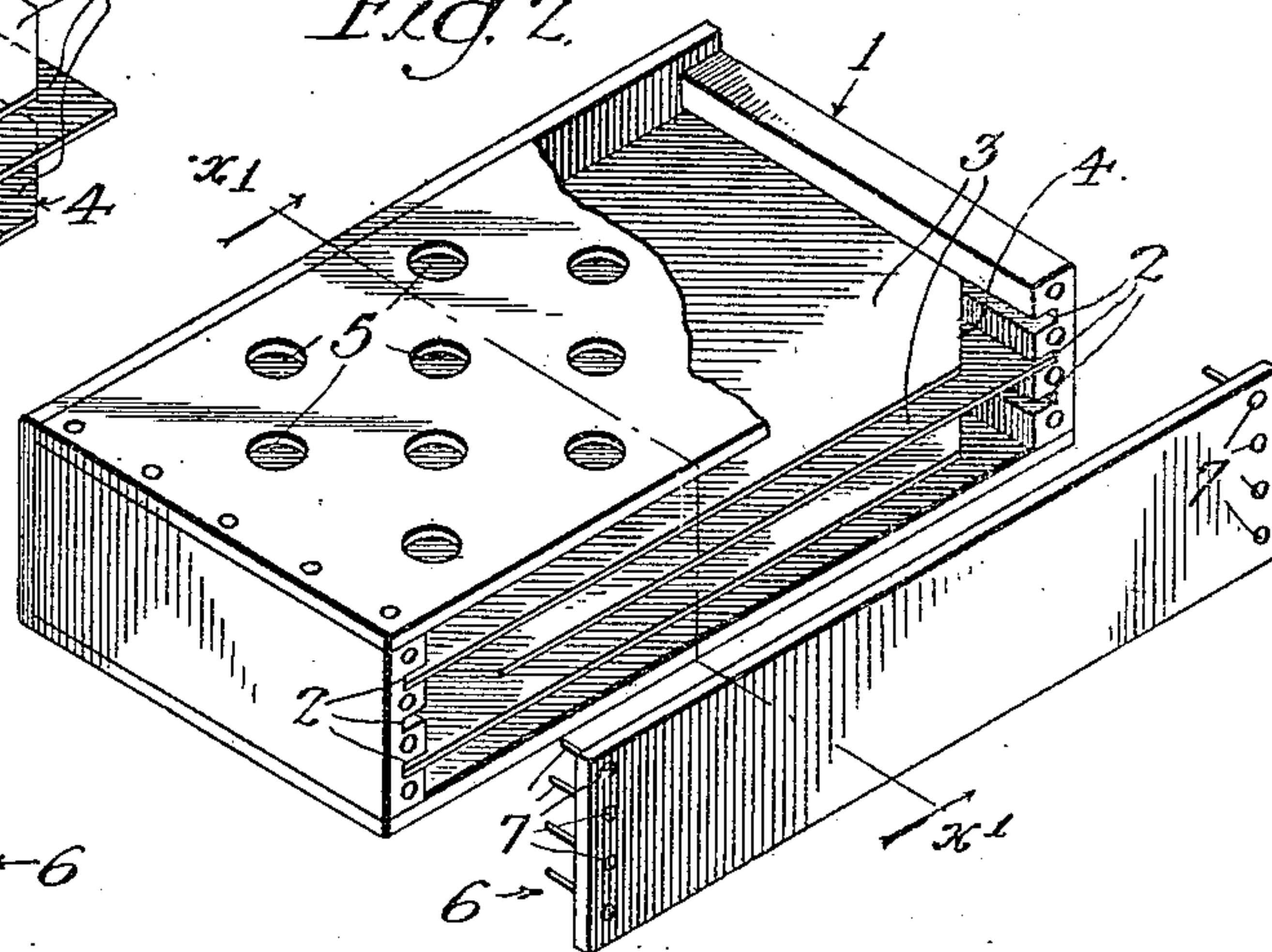
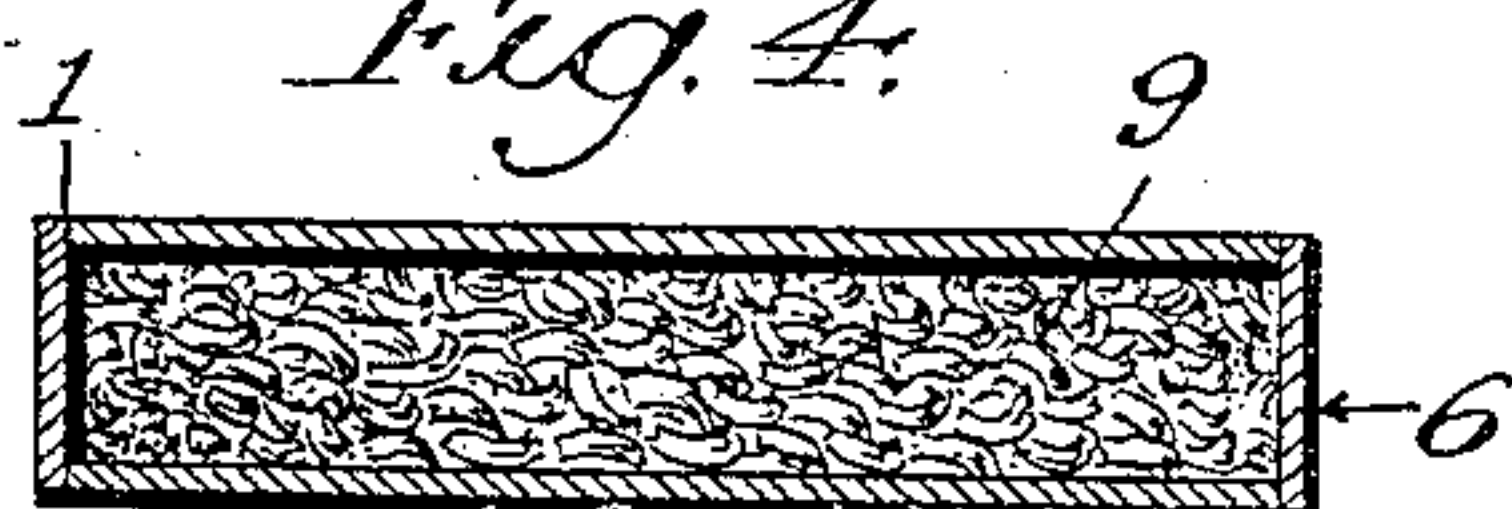


Fig. 4.



Witnesses:

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR SEPARATION OF SILVER FROM FIXING SOLUTIONS.

951,372.

Specification of Letters Patent.

Patented Mar. 8, 1910.

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To all whom it may concern:

Be it known that I, CHAUNCEY W. JUDD, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Apparatus for the Separation of Silver from Fixing Solutions, of which the following is a specification.

This invention relates to means for recovery or removal of silver from the hyposulfite or thiosulfate solution generally used for fixing photographic plates.

The invention comprises a device adapted to be placed in the hyposulfite bath and to take up the silver from the bath as fast as it is dissolved from the plate by the bath, thereby at once recovering the silver and maintaining the bath in perfect condition for use. In the usual operation of a hyposulfite bath, the working power of the bath gradually deteriorates by reason of continual absorption of silver by the hyposulfite solution, and the bath eventually becomes so charged with silver that it is incapable of effectually fixing the plates. By providing for continuous removal of the silver as fast as it is deposited, uniform and effective operation is secured on all the plates in substantially the same period of time, whereas with the usual process longer time is required as the solution becomes older, and the results become less satisfactory.

The accompanying drawings illustrate the apparatus.

Figure 1 is a perspective of the fixing bath, showing the silver removing device in place therein. Fig. 2 is a perspective of the device partly broken away. Fig. 3 is a perspective of the several plates used in the device. Fig. 4 is a cross section of a modified form of the device.

The device comprises a box or case 1 which may be made of any material resistant to the solution, preferably nonmetallic, and which is adapted to contain the reacting agent for removing the silver from the solution. For this purpose the box may be formed internally with means, such as grooves 2, to receive and support the silver removing means, said silver removing means consisting in that case of plates 3 sliding into said grooves, said plates being of material capable of causing the release of the silver from its solution in or combination with the hyposulfite. For this purpose I

have found that iron is a suitable material, said plates consisting, preferably, of sheet-iron, and being cut away, as at 4, at opposite corners with the cut-away portions in alternate relation in adjacent plates so as to provide a tortuous path for circulation of the liquid between the plates. The top of the case 1 is perforated, as indicated at 5, for access of the liquid therinto, and one end of the case, indicated at 6, may be removably attached to the case as by means of fastening pins or nails 7 to enable the plates to be inserted or withdrawn when required.

Instead of being in the form of plates the iron may be in the form of filings as indicated at 9 in Fig. 4, or may be otherwise divided in any suitable manner.

The operation is as follows: The device is placed in the bath with the perforations 5 exposed so that the liquid can enter the box or case 1. So long as there is no silver in the hyposulfite solution, the iron is substantially without action thereon, but when the bath has been used for fixing photographic plates, thereby causing silver to enter into the composition of the bath, the iron becomes effective in causing the silver to become separated from the solution and to be deposited within the box or case 1 where it forms a sludge in contact with the iron plates. This operation proceeds until all the silver is removed or deposited, whereupon the iron ceases to have any effect upon the liquid. In this operation, the iron is slowly attacked, but the amount of iron taken up by the bath is extremely small in comparison with the amount of silver deposited, much smaller in fact than the molecular equivalent. It, therefore, appears that the reaction is in part at least a contact or catalytic effect rather than one of chemical substitution. When the iron eventually becomes exhausted, the device may be removed from the bath and the box cleaned out, the silver being washed out and recovered in the usual manner, and new iron plates being inserted.

By the above described operation, the silver is recovered and there is also a large saving in the use of the hyposulfite as the same hyposulfite may be used indefinitely. A more important advantage, however, is found in the fact that the fixing bath is maintained continually in condition of maximum efficiency so that rapid and clear fix-

ing is always secured in practically the same length of time, so that the photographer can depend on the fixing bath for operation within a stated time, and the danger of plates being insufficiently fixed is practically eliminated. Moreover, the solution being kept clear from silver salts, the plate or paper is also kept clear.

It is essential that the agent for separation of the silver should be of such nature that it is without action on the hyposulfite solution itself. Sodium hyposulfite is somewhat unstable in its nature and it is preferable to avoid the use of reducing agents which have the property of decomposing the hyposulfite solution with deposition of sulfur when there is no silver present. The iron plates have no such effect as they have no action on the hyposulfite itself.

The process is of especial advantage in connection with the use of the usual hardening solution system, for example, of sodium sulfite, potash alum and acetic acid. With this solution the iron reacts more rapidly on account of the presence of the acetic acid and has the effect of bleaching or clearing the negative or film. In this connection also the iron has the effect of assisting in the washing, subsequently to the fixing bath,

to remove the hyposulfite, as I have found that when the iron is used the hyposulfite can be washed from the film much more rapidly.

What I claim is:—

1. An apparatus for separation of silver from hyposulfite baths, comprising a case adapted for immersion in the bath and perforated for access of the liquid of the bath thereinto, and a body in said case consisting of material adapted to cause deposition of the dissolved silver from the bath on contact therewith, said body consisting of an iron plate.

2. A device for separation of silver from hyposulfite baths, consisting of a case adapted for immersion in the bath and perforated for access of the liquid of the bath thereinto, and a plurality of iron plates supported in the case and separated from one another for passage of liquid therebetween.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 29th day of September, 1909.

CHAUNCEY W. JUDD.

In presence of—

ARTHUR P. KNIGHT,
FRANK L. A. GRAHAM.