In cases in which the cyanide solution contains mercury along with gold or silver or both, the mercury is precipitated with the other metals, and, although not impeding the chemical action, is inconvenient physically as it forms an amalgam, rendering it difficult to separate the gold and silver from the precipitating metal by chemical or mechanical means. To remove the mercury from the solution, I apply metallic lead, preferably in the form of shot or finely divided. The mercury, and possibly a little silver, become precipitated on the lead, and the precipitation of the gold and remainder of the silver proceeds without inconvenience.

In ordinary solutions containing little else than gold and silver, the zinc or aluminium is economized, and the action facilitated by means of lead, preferably in the form of shot or finely divided, the gold and silver being deposited on the lead as well as on the zinc or aluminium. It is the action of the lead, when in direct or indirect contact or connection with the zinc or aluminium, which is advantageous, the action of lead alone being unsatisfactory.

I wish it to be understood that I do not claim the use of either zinc or aluminium, *per se*, as a precipitant, but only the use of same in connection with lead.

Instead of lead, any suitable chemically inert substance which is a good conductor and negative to zinc or aluminium may be used, such, for example, as tin, iron, or carbon. I believe, however, that lead will be found most convenient in practice.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

1. In precipitating precious metals from cyanide, or similar solutions, by means of zinc or aluminium, applying lead, or a specified substitute therefor, substantially in any of the modes and for the purposes hereinbefore described.

2. In precipitating precious metals from cyanide or similar solutions containing mercury, in addition to such precious metals, the use of lead for precipitating mercury prior to the precipitation of the precious metals, substantially as hereinbefore described.

Dated this 21st day of November, 1894. JOHN STEWART MACARTHUR.

IMPROVEMENTS IN THE METHOD OR PROCESS OF TREATING GOLD AND SILVER ORES, AND A COMPOSITION OF MATTER FOR THE SAME PURPOSE.

I, Edward D. Kendall, of Brooklyn, in the County of King and State of New York, United States of America, chemist, do hereby declare the nature of my invention for "Improvements in the Method or Process of treating Gold and Silver Ores, and a Composition of Matter for the same purpose," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

In treating ores I usually grind them until a fine division is obtained. I then prepare two solutions in water, one of sodium di-oxide (Na_2O_2) and the other of a suitable cyanide. I prefer to use potassium cyanide (KCN) because of its cheapness. I then unite these two solutions, and mix them with the ore in a divided condition. Suitable proportions would be sodium di-oxide, 4lb. dissolved in 20 gallons of water; potassium cyanide, 14lb. dissolved in 80 gallons of water; divided ore, 2 tons, more or less, as the character of the ore may vary. But I do not limit myself to these proportions; the proportions will vary with the quality of the ores to be treated. I may also accomplish my process by mixing the sodium di-oxide and potassium or other cyanide and ore together in a dry condition and adding water thereto. But the constituents of my composition may be brought together in any required order. I prefer to dissolve the sodium di-oxide in cold water, and the cyanide in a separate portion of water, cold or hot, mixing the two solutions as required in any desired relative proportion. Gold and silver ores and tailings may be treated with any composition by lixiviation, with or without the application of heat, and with or without agitation of the mass. Any suitable receptacle may also be used, or an ordinary leaching-tub or rotating cylinders of wood, arranged so that the contents may be discharged into a filtering tank.

A portion of the pulverised ore may be treated with my composition containing a relatively small quantity of sodium di-oxide, and another portion of the ore may be treated with the lixivium after having added to this another small quantity of sodium di-oxide, or a corresponding solution thereof. As many as five such portions of certain ores may so be successfully treated with intermediate additions of sodium di-oxide, provided the composition was first provided with a sufficient excess of cyanide. The small portion of the composition which remains with the ore after filtration may be washed away with water, and the washings used to prepare fresh portions of the composition. Gold and silver contained in the lixivium may be separated therefrom by electrolysis or other suitable means.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is,—

1. The method of treating gold or silver ore, which consists in mixing di-oxide and a suitable cyanide and water, with the ore in a finely-divided condition, substantially as described.

2. The method of treating gold or silver ores, which consists of uniting a solution of sodium di-oxide and a solution of a suitable cyanide, and treating the finally-divided ore therewith, substantially as described.

3. The method or process of treating gold or silver ores, which consists in uniting a solution of sodium di-oxide and a solution of a suitable cyanide, and mixing the finely-divided ore therewith, then drawing the solution from the ore, and separating the metal therefrom, substantially as described.

4. A composition of matter consisting of sodium di-oxide and a suitable cyanide in solution, to be used in treating gold and silver ores, substantially as described.

Dated this 16th day of March, 1894. GEO. J. DUNCAN.
Agent for the Applicant.