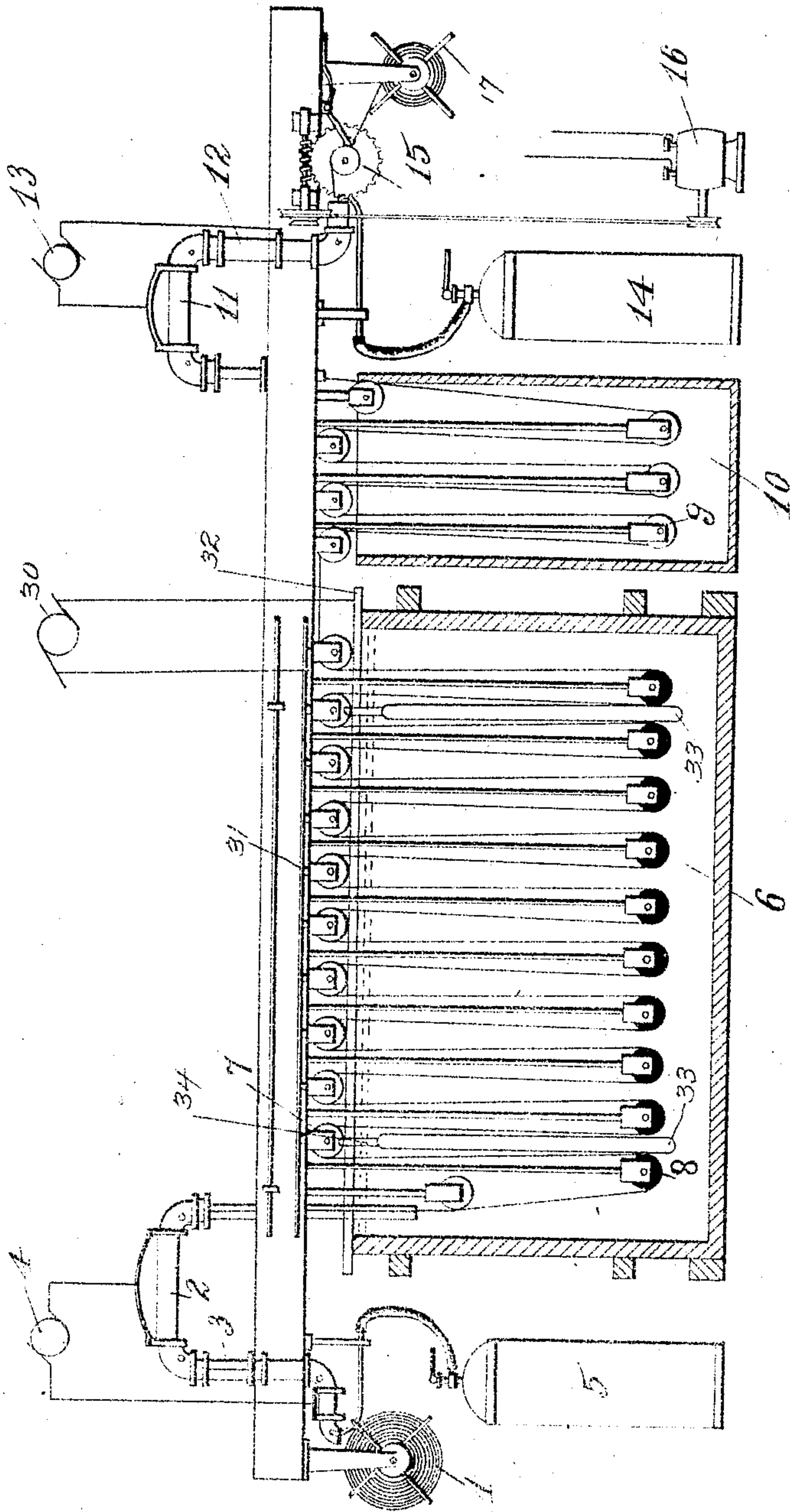


No. 765,371.

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J. W. AYLSWORTH.
PROCESS OF NICKEL PLATING.
APPLICATION FILED SEPT. 15, 1903.

NO MODEL.



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JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO
EDISON STORAGE BATTERY COMPANY, OF ORANGE, NEW JERSEY, A
CORPORATION OF NEW JERSEY.

PROCESS OF NICKEL-PLATING.

SPECIFICATION forming part of Letters Patent No. 765,371, dated July 19, 1904.

Application filed September 15, 1903. Serial No. 173,222. (No model.)

To all whom it may concern:

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States, residing at East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Processes of Nickel-Plating, of which the following is a description.

My invention relates to an improved process for nickel-plating iron or steel articles, preferably in the form of long strips, and of the type described in patent to Thomas A. Edison, No. 734,522, of July 28, 1903, wherein the article after being plated is subjected to a welding temperature in a non-oxidizing atmosphere, so that the nickel-plated film will become practically homogeneous with the backing to which it is applied.

My object is to provide improvements by which the process in question may be carried on continuously, whereby when a part of the article or a portion of the connected series of articles is being plated another part or portion previously plated will be subjected to a welding temperature in a non-oxidizing atmosphere, so as to relieve the nickel film of any condition of tension, as well as to apply it more intimately to the article or articles on which it is plated.

My improved process is especially applicable and, in fact, has been especially designed for use in connection with the nickel-plating of a long thin perforated strip for use in connection with storage batteries of the Edison type; but the process may be obviously applied in connection with the plating of other articles as well as for the plating of a series of connected articles.

In an application for Letters Patent filed on even date herewith, Serial No. 173,221, I describe and claim the improved apparatus in which my process may be carried into effect.

In the accompanying drawing, forming a part of this specification, I illustrate a sectional partly diagrammatic view of so much of this apparatus as is necessary for the complete explaining of the process.

The apparatus in question has been designed

for the nickel-plating of long strips of thin perforated steel. In this apparatus the steel strip is carried on a reel 1 and passes through a heating-chamber 2, having a glass section 3 therein and provided with means for heating the strip electrically from a source of supply 4. A reducing atmosphere, such as hydrogen gas, is applied to the heating-chamber from a tank 5. In this heating-chamber any oxid on the steel strip will be reduced, so as to effectively clean the same. From this chamber the strip passes to the plating-bath 6, of any suitable type, and extends back and forth over pulleys 7 and 8 and thence passes over pulleys 9 in the wash-tank 10. The strip is electrically connected through the pulleys 7 with the conductor 31, which is supplied from any suitable source 30 of electromotive force. The strip forms the cathode. The anodes are preferably rectangular bars 33, suspended from conductors 32 along both sides of the tank by means of hooks 34. The conductors 32 are electrically connected to the source 30. From the wash-tank the strip passes through a welding-chamber 11, having a glass section 12 and arranged to permit the strip to be heated from a source of supply 13. A non-oxidizing atmosphere, such as hydrogen gas, is applied to the welding-chamber 11 from a tank 14. From the welding-chamber the strip passes to a feed-pulley 15, operated by an electric motor 16, so that the strip will be progressively passed through the apparatus and will be finally accumulated on the reel 17. In operation the strip will be electrically heated in the cleaning and welding chambers 2 and 11, respectively, while surrounded by a non-oxidizing gas. In the plating-bath 6 the nickel-plated coating will be applied, the plating of the strip being so timed as to permit a coating of the desired thickness to be secured. After leaving the plating-bath the strip enters the wash-tank 10 containing water, where it is washed, as is common in this art. In the welding-chamber 11 the strip is subjected to a welding temperature while surrounded by a non-oxidizing gas, so that the nickel-plated coating will be welded to the strip. Any con-

dition of tension will be removed and the strip and coating will be very intimately connected. After being raised to a welding temperature the strip is permitted to cool in the welding-chamber while surrounded by the non-oxidizing gas and is finally wound up on the take-up reel 17.

While I have described my improved process as being carried out in the nickel-plating of a strip-like article or of a connected series of separate articles, it will be understood that it may be carried out in connection with the electrolytic plating of any other metal the adhesion of which or whose character will be improved by subsequently subjecting the same to a welding temperature whether in a non-oxidizing atmosphere or not. It will be also evident that the continuous preliminary deoxidizing of the article or articles and the subsequent continuous electroplating of the same constitutes a process within the scope of my invention and which may be used effectively in connection with the plating of many different metals and wherein the final welding operation is dispensed with. Finally, it will be understood that continuous process of electroplating a strip-like article or a connected series of separate articles is also included in the scope of my invention with or without the preliminary deoxidizing and subsequent welding.

Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent, is as follows:

1. A process of electroplating a strip-like article or a connected series of separate articles, which consists in continuously passing the article or articles through a heating-chamber in the presence of a reducing gas so as to deoxidize the article or articles, in continuously progressing the article or articles through a plating-bath and in simultaneously electroplating a metal thereon in transit, substantially as set forth.

2. A process of electroplating a strip-like article or a connected series of separate articles, which consists in continuously passing the article or articles through a chamber in which a reducing atmosphere is maintained, in electrically heating the article or articles therein so as to deoxidize the same, in continuously progressing the article or articles through a plating-bath and in simultaneously electroplating a metal thereon in transit, substantially as set forth.

3. A process of electroplating a strip-like article or a connected series of separate articles, which consists in moving the article or articles through a plating-bath and applying an electrically-deposited coating of metal thereon, and in passing the plated article or articles continuously through a heating-chamber in which the article or articles are maintained at a welding temperature while sur-

rounded by a non-oxidizing atmosphere, substantially as set forth.

4. A process of electroplating a strip-like article or a connected series of separate articles, which consists in moving the article or articles through a plating-bath and applying an electrically-deposited coating of metal thereon, then in passing the plated article or articles continuously through a heating-chamber in which the article or articles are maintained at a welding temperature while surrounded by a non-oxidizing atmosphere, and in permitting the article or articles to cool while subjected to such atmosphere, substantially as set forth.

5. A process of electroplating a strip-like article or a connected series of separate articles, which consists in continuously passing the article or articles through a plating-bath and in electrically depositing a metal coating thereon, in continuously passing the article or articles through a wash-tank to wash the same, and in finally passing the article or articles through a chamber in which the article or articles will be maintained at a welding temperature while surrounded by a non-oxidizing atmosphere; substantially as set forth.

6. A process of electroplating a strip-like article or a connected series of separate articles, which consists in moving the article or articles through a plating-bath and in electrically depositing a metal coating thereon, in continuously passing the article or articles through a wash-tank to wash the same, then in passing the article or articles through a chamber in which the article or articles will be maintained at a welding temperature while surrounded by a non-oxidizing atmosphere, and in permitting the article or articles to cool while still surrounded by such atmosphere, substantially as set forth.

7. A process of electroplating a strip-like article or a connected series of separate articles, which consists in passing the article or articles through a heating-chamber in which the article or articles are heated while surrounded by a reducing atmosphere so as to deoxidize the same, in then passing the article or articles through a plating-bath in which an electrically-deposited coating is applied thereto, and in finally passing the article or articles through a heating-chamber in which the article or articles is or are subjected to a welding temperature while surrounded by a non-oxidizing gas, substantially as set forth.

8. A process of electroplating a strip-like article or a connected series of separate articles, which consists in passing the article or articles through a heating-chamber in which the article or articles are heated while surrounded by a reducing atmosphere so as to deoxidize the same, in then passing the article or articles through a plating-bath in which an electrically-deposited coating is applied there-

to, then in passing the article or articles through a heating-chamber in which the article or articles is or are subjected to a welding temperature while surrounded by a non-oxidizing gas, and in permitting the article or articles to cool while surrounded by such atmosphere, substantially as set forth.

9. A process of electroplating a strip-like article or a connected series of separate articles, which consists in passing the article or articles through a plating-bath and in electrically depositing a coating of metal thereon, and in finally electrically heating the article or articles to a welding temperature in the presence of a non-oxidizing gas, substantially as set forth.

10. A process of electroplating a strip-like article or a connected series of separate articles, which consists in passing the same through a plating-bath and in electrically heating the article or articles to a welding temperature in the presence of a non-oxidizing gas, and in permitting the article or articles to cool while surrounded by said gas, substantially as set forth.

11. A process of electroplating a strip-like article or a connected series of separate arti-

cles, which consists in heating the same electrically in a reducing gas to deoxidize the article or articles, then in passing the article or articles through a plating-bath in which a metal coating is electrically applied thereto, and in finally electrically heating the article or articles to a welding temperature while surrounded by a non-oxidizing gas, substantially as set forth.

12. A process of electroplating a strip-like article or a connected series of separate articles, which consists in heating the same electrically in a reducing gas to deoxidize the article or articles, then in passing the article or articles through a plating-bath in which a metal coating is electrically applied thereto, then in finally electrically heating the article or articles to a welding temperature while surrounded by a non-oxidizing gas, and in permitting the article or articles to cool while surrounded by such gas, substantially as set forth.

This specification signed and witnessed this 14th day of September, 1903.

JONAS W. AYLSWORTH.

Witnesses:

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