No. 725,345. PATENTED APR. 14, 1903.

I. KITSEE.

PAPER MAKING MACHINE.

APPLICATION FILED JULY 16, 1902.

NO MODEL.

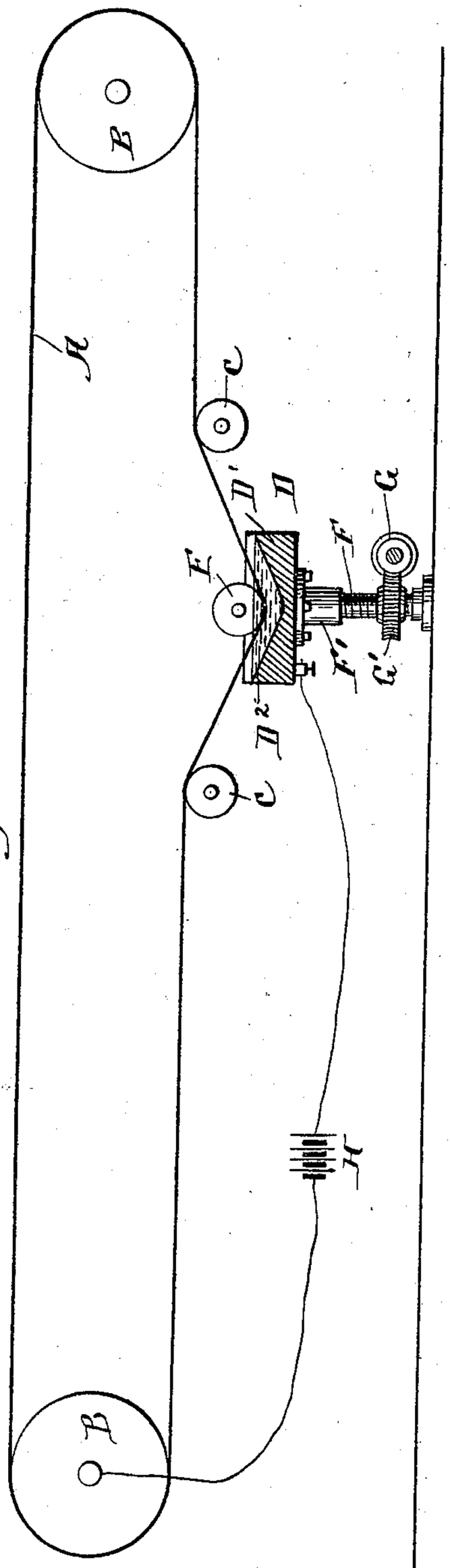

Fig. 1.

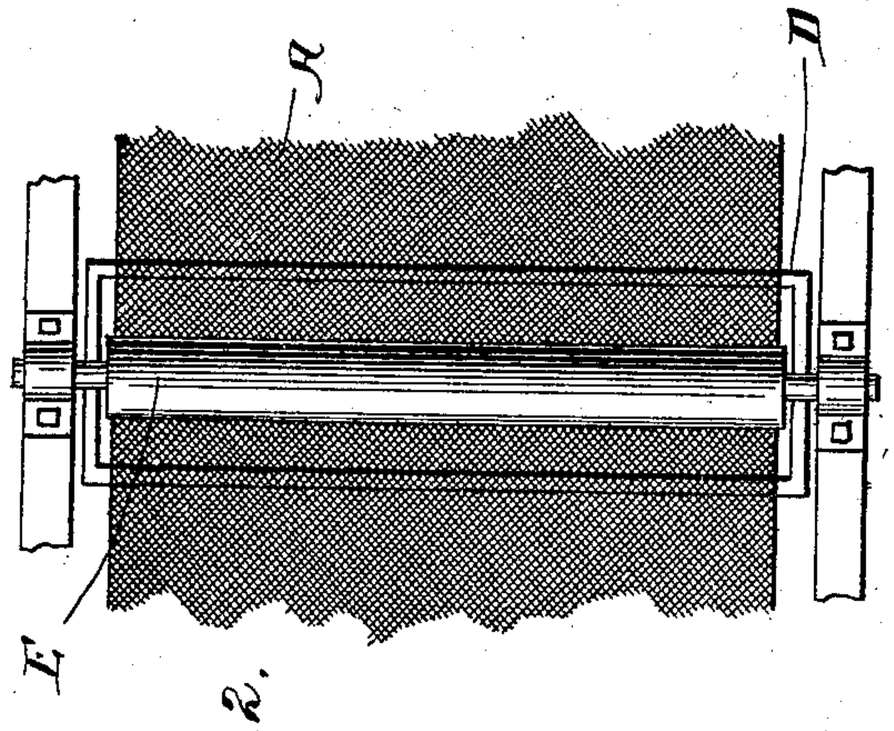

Fig. 2.

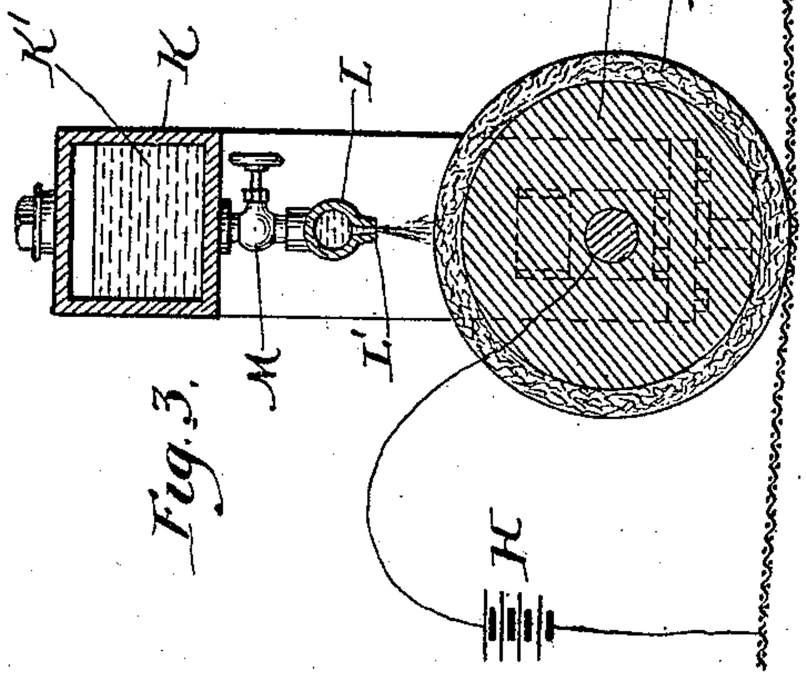

Fig. 3.

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ISIDOR KITSEE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO CHARLES L. HAMILTON, OF PHILADELPHIA, PENNSYLVANIA.

PAPER-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 725,345, dated April 14, 1903.

Application filed July 16, 1902. Serial No. 115,819. (No model.)

To all whom it may concern:

Be it known that I, ISIDOR KITSEE, of the city and county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Paper-Making Machines, of which the following is a specification.

My invention relates to an improvement in paper-making machines, and has more especial reference to an improvement in what is technically called in such machines the "wire," and which in reality is an endless band of wire cloth or screen employed to carry the fiber for the purpose of forming the necessary sheets. To persons versed in the art it is well known that the meshes of this wire or screen frequently become clogged up with the minute particles of fiber due to the shaking of the pulp on its surface. This clogged-up wire requires a cleaning every second or third day, and this cleaning is generally accomplished by a generous bath of sulfuric acid, often accompanied by scrubbing with brushes. Two great disadvantages arise therefrom—first, the loss of time, because the machine generally has to stop for this cleaning; second, the application of sulfuric acid, mostly undiluted or at a ratio of two to one, greatly weakens the thin wire, and therefore shortens the life of the same to an extent that in such mills where a fine mesh is employed this wire has to be renewed about every thirty days, or about every sixty days in mills employing a coarser mesh for a cheaper quality of paper. It is true that this endless band could be perfectly cleaned if taken off; but to persons employed in paper-mills it is also well known that the band once removed can hardly be replaced without detrimental effect to the production of sheets thereon, for the reason that it is well nigh impossible to entirely obviate the crimping of this band in the act of replacing. The cleaning of this wire has therefore to be done while the band is in position.

It is the aim of my invention to overcome the difficulties above referred to and to prolong the life of the wire by the process, as will hereinafter be described, and more specially pointed out in the claims following this specification.

Referring to the drawings, Figure 1 is a diagrammatic view of the traveling screen and rollers over which the same runs, showing the electrolytic cell in section and also means for raising and lowering said cell. Fig. 2 is a plan view of the electrolytic cell and a portion of the screen traveling through the same. Fig. 3 is a vertical sectional view through a portion of the screen and the felt-covered roller and also the reservoir containing the electrolytic solution adapted to be delivered upon the roller in a spray or sheet.

A represents the traveling screen. B represents the breast-rollers over which the same runs.

C represents guide-rollers.

D is an electrolytic cell.

E is a roller under which the screen runs, so as to cause the same to dip into the solution in the cell.

F represents vertical screw-threaded rods, threaded in the sleeves F′, secured to the bottom of the electrolyic cell.

G is a worm adapted to be turned either by hand or by power and meshing with the worm-wheel G′, secured to the screw-threaded rod F. Thus by turning the screw-threaded rod in one direction the cell is raised and in the opposite direction the cell is lowered, so as to remove the screen from the electrolytic solution.

H is a battery or other source of electric power, one terminal of which is connected to the electrolytic cell and the other terminal of which is connected to the screen through a roller-brush or other means.

In Fig. 3, I represents a metallic roller mounted in vertical sliding bearings. J is a felt or other absorbent covering surrounding said roller and adapted to be brought in contact with the screen when in its operative position. K is a reservoir located above the roller, which is connected with a header L, extending the full length of the roller, and this header is provided with a narrow orifice L′ along its lower edge for allowing a thin sheet or spray of the electrolytic solution to come in contact with the fiber cover J of the roller. M is a valve for controlling the outflow of the solution. The battery H in this instance is connected with one of its terminals to the metallic part of the roller I, and its other terminal is connected to the screen.

The electrolytic cell D consists of the containing vessel D'. This containing vessel is preferably of conducting material, and its inner surface should be of such a shape as to conform to the contour of the screen going through the electrolyte D^2. In this case the vessel D' can be used as the anode, and can, therefore, as illustrated in the drawings, be connected directly to the positive pole of the charging-circuit, the screen itself forming the cathode, and connected, therefore, either directly or, as illustrated in the drawings, through the conducting breast-roller B to the negative pole of the charging-circuit. The electrolytic cell, as illustrated in Fig. 3, consists of the conducting-roller I, forming the anode of the cell, the covering of which should be porous enough so as to absorb the electrolyte K', the cathode being formed by the screen A.

The *modus operandi* of my invention, as illustrated in Fig. 1, is as follows: The containing vessel D' is filled with a suitable electrolyte. If it is only the desire to clean the screen from the minute fibers adhering thereto and partially clogging the meshes, then the electrolyte may consist of diluted sulfuric acid at the ratio of about fifteen to one, or in such cases where even this diluted acid is of disadvantage then the electrolyte may consist of an alkali—such, for instance, as a hydrate of sodium or potassium or, as it is commonly called, "caustic soda" or "caustic potash." In my experiments I have used as an electrolyte solutions of the salts of aluminium, calcium, and, in fact, of all the alkaline metals and found that where it is not desired the metal radical should be deposited on the screen only the potassium and sodium salts are well adapted for the purpose, for the reason that if an aluminium or calcium salt is used the hydrated radical deposited on the cathode is not quickly enough dissolved, and therefore the screen becomes clogged up with the salts of these metals. Of the acid solutions sulfuric, nitric, and hydrochloric acids are best adapted for the cleaning process, and oxalic acid also serves the purpose well. I have had good results with an electrolyte consisting of chlorinated water, and as a substitute therefor a weak solution of chlorid of sodium (common table salt) is well adapted for the cleaning process, and in my experiments I have cleaned pieces of screen with an electrolyte consisting of one ounce of salt to one quart of water. The only drawback in the employment of this solution consists in the generation of chlorin.

I have above referred to the destruction of the screen through the cleaning-acid used today; but the screen is also weakened through the incessant friction caused by its constant revolution in contact with the different rollers, the pressure of the suction device, and the pulp on its surface. The screens are today made of copper or brass, and the individual wires are of such a fineness and pliability that even the friction exerted by the rollers greatly weakens the same, and it may be said that through each revolution—speedy as they have to be—the surface of this wire becomes slightly worn off. In such mills where the speed is very great or where through abrasion the wire is greatly weakened it is advantageous that this continuous destruction should be met or equalized through a continuous replacement. In other words, in places where the wire continually loses metal it is profitable to replace this metal, and this replacement can best be accomplished through the process of electrodeposition.

I have in the description of the drawings made mention that the receptacle containing the electrolyte may consist of a conducting material, and in such cases wherein the deposition of the metal is required in conjunction with the cleaning of the screen then the containing vessel shall consist or be lined with the metal desired to be deposited, and the electrolyte should consist of a solution wherein such metal is dissolved; but in some cases it may be more advantageous that the anode should be separate from the containing vessel, as thereby the same can be easily replaced. In this case, as it is obvious, the charging-circuit should be connected to this anode and not to the containing vessel itself.

Having placed the containing vessel, with its electrolyte, in the necessary position, so that that part of the screen which goes under the roller E dips into the solution, and having connected the anode with the positive pole of the charging-circuit and having connected the screen either directly or through the intervention of one of the conducting-rollers to the negative pole of the charging-circuit, the screen is then slowly revolved in a manner well known to persons versed in the art. Through this act of revolving there will be brought in contact with the electrolyte successively successive parts of the screen in a manner so that through each revolution of the whole screen each part of said screen passes through said solution and becomes thereby the active cathode of the electrolytic cell, and if the solution or electrolyte consists only of what I call "cleaning solution"—that is, one of the aciduous or caustic liquids—then the screen will be cleaned more or less according to the amount of current flowing and the speed of the screen itself, and if the electrolyte consists of what I call a "cleaning and depositing solution"—that is, the electrolyte into which a salt of the metal to be deposited is dissolved—then through the revolving of the screen there will be successively successive parts of said screen not only cleaned, but they will also be reinforced through the slight deposition of the metal dissolved in the electrolyte. In all these cases it is a *sine qua non* that the cleaning and depositing shall be done in a manner so that it is unnecessary to remove the screen from the machine.

The *modus operandi* of my invention as illustrated in Fig. 3 is substantially the same as that illustrated in Fig. 1, with the exception that the screen does not pass through the electrolyte, but comes only in contact with the non-conducting body moist with the electrolyte. The action in this case does not need further explanation, as persons versed in the art of electrical deposition are well aware of the fact that there is no radical difference between the electrolytic cell as illustrated in Fig. 1 and the electrolytic cell as illustrated in Fig. 3. In both cases the action of the electric current is to cause the "ion" to travel from one pole to the other—that is, from the anode to the cathode.

In such cases where the cleaning or electrodeposition is accomplished at one and the same time, as the screen travels at the usual speed—that is, from three to five hundred feet per minute—then it is advantageous to provide the containing vessel of the electrolytic cell as illustrated in Fig. 1 with a device so as to prevent the carrying over of the liquid due to the speed of the screen.

I have illustrated my invention as being applied to a "Fourdrinier" machine; but it is obvious that this my invention is applicable also to such machines wherein the screen is wound around the drum, and, in fact, this my invention is applicable also to what is technically called "dandy-rollers" or like parts wherein screens or perforated sheets are employed.

I have not illustrated the manner in which the screen may be freed from the electrolytic moisture adhering to the same, because this freeing of the screen can be accomplished in the same manner as the freeing of the screen from the acid is accomplished to-day—through a thorough douching with water.

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

1. The method of removing particles of fiber from a paper-machine screen, which consists in making said screen the cathode of an electrolytic cell and carrying successively successive parts of said screen through the electrolyte of said cell.

2. The method of cleansing the screen used in paper-machines which consists in carrying successively successive parts of said screen through an electrolytic cell, making said parts the cathode of said cell.

3. The method of cleansing an endless conducting-band consisting of wire screen which consists in electrically connecting said band with the negative pole of a charging-circuit, revolving said band in a manner so that part of said band dips into an electrolyte contained in a vessel provided with a conductor connected with the positive pole of said charging-circuit.

4. The method of cleansing an endless band of wire screen which consists in bringing in contact successively successive parts of said band with the moisture serving as an electrolyte in an electrolytic cell, the charging-circuit of which is connected with its negative pole to said endless band and with its positive pole to a conductor also contacting with said moisture.

5. The method of cleansing the "wire" or screen of a paper-machine which consists in making said screen the cathode of an electrolytic cell and revolving said screen in operative relation to said cell.

6. The method of cleansing and reinforcing the "wire" or screen of a paper-machine which consists in connecting the wire or screen electrically with the negative pole of a charging-circuit, and connecting the positive pole of said charging-circuit with a metal designed to be deposited on said wire or screen, said metal contained in a receptacle containing as an electrolyte a solution of the salt of the metal to be deposited and causing successively successive parts of said screen to dip into said electrolyte.

7. The method of cleansing and reinforcing the "wire" or screen of a paper-machine, operatively placed thereon, which consists in causing, during the revolution of said "wire" or screen, parts of said "wire" to dip into the electrolyte of an electrolytic cell containing in solution a salt of the metal to be deposited, said "wire" or screen connected electrically to the negative pole of a charging-circuit, the positive pole of which is connected to a metal contained in said electrolyte.

8. The method of cleansing parts of a paper-machine operatively connected to said machine, which consists in connecting said parts to a negative pole of the charging-circuit and carrying successively successive parts of said parts of the machine through the electrolye of an electrylytic cell, the second conductor of which is connected to the positive pole of said charging-circuit.

9. The method of cleansing and reinforcing an endless band consisting of wire-gauze which consists in carrying successively successive parts of said endless band into operative relation to an electrolytic cell adapted to cleanse and deposit the metal designed to reinforce, the endless band being made the cathode of said electrolytic cell.

10. In a machine, the method of cleansing and reinforcing parts operatively connected to said machine, said method consisting therein that successively successive parts of said parts of the machine are brought into operative relation to an electrolytic cell during the period that said parts are made the cathode of said cell, said cell adapted to cleanse and to deposit the metal designed to reinforce.

11. The method of cleansing parts of a machine which consists therein that during the period that said parts are operatively connected to said machine, said parts are made the cathode of an electrolytic cell and carried through their operative relation to said machine into operative relation to the fluid of

said cell, thereby removing the matter deposited thereon.

12. The method of cleansing and reinforcing parts of a machine which consists therein that said parts are made the cathode of an electrolytic cell during the time that said parts are operatively connected with said machine, and that parts of said parts are through their operative relation to said machine brought into contact with the electrolyte of said cell, said cell adapted to cleanse said parts and to deposit thereon the metal required for reinforcing.

13. The method which consists in cleansing the "wire" or screen of a paper-machine from the particles of fiber adhering thereto by bringing successively successive parts of said "wire" or screen into operative relation to an electrolytic cell, the cathode of which is formed through said successive parts.

14. The method of cleansing parts of a paper-machine of the fiber accumulated on the surface thereof, which consists in making said parts an electrode in an electrolytic cell, and sending at the same time currents of electricity through said cell.

15. In the art of cleansing parts of a paper-machine of the fiber adherent thereto, the process which consists in removing the adherent fiber with the aid of electric currents passing through an electrolytic cell of which the parts to be cleansed form a part.

In testimony whereof I hereby sign my name, in the presence of two subscribing witnesses, this 28th day of June, A. D. 1902.

ISIDOR KITSEE.

Witnesses:
EDITH R. STILLEY,
CHAS. KRESSENBUCH.