Y. NAKAMURA.

PROCESS OF REMOVING MINERAL MATTER FROM PAPER.

APPLICATION FILED JULY 9, 1918.

1,318,902. Patented Oct. 14, 1919.

Fig. 2.

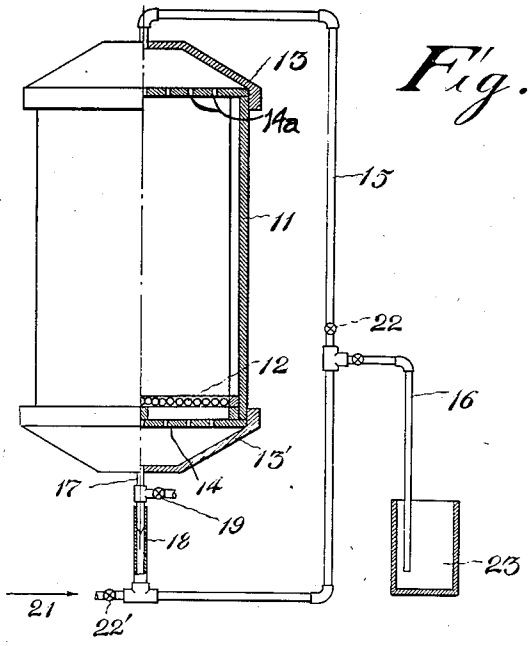
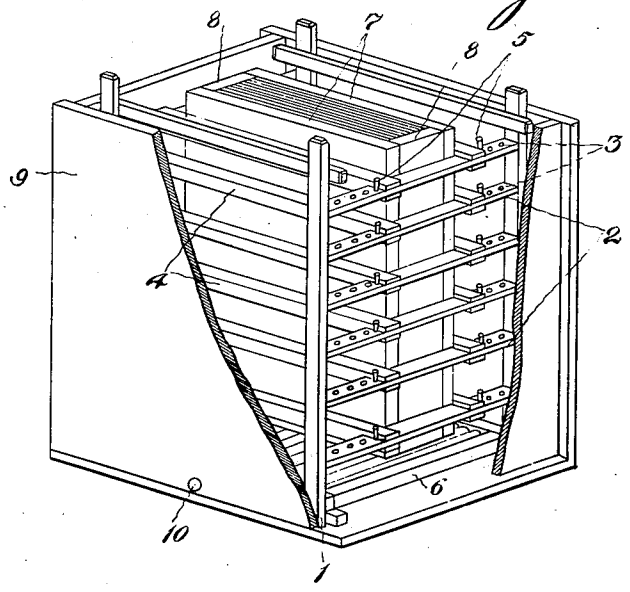


Fig. 1.



Witness

Inventor

Yoshizumi Nakamura.

By B. Singer, Attorney

UNITED STATES PATENT OFFICE.

YOSHIZUMI NAKAMURA, OF TOKYO, JAPAN, ASSIGNOR TO NIPPON SEN-I KOGYO KABUSHIKI KAISHA, OF TOKYO, JAPAN, A CORPORATION OF JAPAN.

PROCESS OF REMOVING MINERAL MATTER FROM PAPER.

1,318,902. Specification of Letters Patent. Patented Oct. 14, 1919.

Application filed July 9, 1918. Serial No. 244,131.

To all whom it may concern:

Be it known that I, YOSHIZUMI NAKAMURA, a subject of the Emperor of Japan, and a resident of No. 19 1-Chome, Motozono-Cho, Kojimachi-Ku, Tokyo, Empire of Japan, have invented a new and useful Process of Removing Mineral Matter from Paper, of which the following is a specification.

This invention relates to improvements in processes for removing mineral matter from paper, such as is used in the manufacture of filter paper for use in chemical treatment, etc., and has for its object to render the process more expeditious and considerably cheaper.

These objects I have accomplished by placing the material in vertical position and treating it with a special solvent consisting of a mixture of hydrofluoric acid and aqua regia containing excess quantity of nitric acid, that is, aqua regia consisting of 2 parts of nitric acid and 3 parts of hydrochloric acid.

In the practical carrying out of the invention, several sheets of paper, put together in layers of suitable thickness to form a batch, are first packed in a structure which I will call a casing which allows the treating liquid or solvent to be circulated in the manner hereinafter described when the said casing with its contents is positioned vertically upon a screen placed within the treating chamber.

In order that this invention may be clearly understood and more readily carried into practice, reference may be had to the appended explanatory sheet of drawing, upon which:—

Figure 1 is a perspective view of an apparatus in which my process may be carried out, partially broken away to show the interior.

Fig. 2 is a half sectional side elevation, illustrating an alternative arrangement of the apparatus.

Referring to Fig. 1, the paper to be acted upon is held in upright position and arranged with its sheets in layers of suitable thickness in a detachable structure consisting of two packer boards 7 and two side boards 8, to form an open ended casing. The two opposing packer boards 7 are pressed toward each other by means of a clamp bar 4 in the manner hereinafter described.

In order to support the casing normally in vertical position I employ a pair of frames each of which consists of two posts 1 connected by a plurality of spaced cross bars 2. These cross bars 2 are provided with series of small holes 3 to receive pins 5 which engage the clamp bars 4. This construction enables the casing to be adjusted as may be required and also serves to keep the packer board pressed tightly against opposite sides of the layers of paper and enables the paper to be treated by the liquid.

The whole structure including the casing with its contents supported by the frame is then taken into a suitable treating reservoir 9 and placed in vertical position upon a screen 6, preferably made of bamboo or other like material of circular cross section, whereupon the solvent consisting of 3% of aqua regia containing excess quantity of nitric acid and 3% of hydrofluoric acid is allowed to enter from the upper open end of the casing.

The liquid passes downwardly between the sheets of the paper and goes out through the screen 6 into the discharge opening 10 leading to a suitable source of liquid not shown in the drawing, thence it is conducted back into the casing again so that the liquid may be circulated through the system repeatedly, say from forty to fifty times, until practically all mineral matters contained in the paper are dissolved and removed. The papers are then thoroughly washed with distilled water and finally dried.

In treatment, approximately 50 liters of the solvent is required for every 10 pounds of the paper. The solvent is diluted by adding about 5 liters of distilled water thereto after each complete circulation of the liquid through the system.

I have found that more efficient results can be obtained by interposing between alternate pairs of the sheets of the paper a sheet of felt, which, by reason of capillary action, not only facilitates the passage of the liquid but at the same time has the advantage of making the product coarser.

In an alternative arrangement I employ as an economizing element a jet of steam for conducting the liquid into the treating chamber. This is illustrated in Fig. 2 in which the numeral 11 indicates a filter chamber, of any suitable form and construction floored with bamboo screen

12. The upper and lower ends of the chamber are provided with heads 14, each of which has openings 14ª. The said chamber is also provided at the upper and lower ends with steam chamber heads 13, 13′. The batch of paper for treatment in accordance with my improved process is placed in said filter chamber 11 and rests on the bamboo screen 12.

From the upper steam chamber 13 extends a steam pipe 15, to a suitable source of steam, not shown, from which the steam is to be drawn in the direction of the arrow 21. 16 is a suction pipe extending from middle portion of the steam pipe and leading at other end to the liquid tank 23.

From the lower steam chamber 13′ dependingly extends a nozzle 17 by means of which the steam remaining in the chamber 11 is conducted through the connecting pipe 18 into the steam pipe 15.

It is obvious that by manipulating the valves 19, 22, 22′, the circulation of the liquid through the system can be effected as effectively as in the first case.

What I claim is:—

1. The process of removing mineral matter from paper, consisting in subjecting paper to the action of a solvent consisting of aqua regia containing an excess quantity of nitric acid, and hydro-fluoric acid.

2. The process of removing mineral matter from paper, consisting in repeatedly subjecting paper to the action of a solvent consisting of aqua regia containing an excess quantity of nitric acid, and hydro-fluoric acid.

3. The process of removing mineral matter from paper, consisting in holding sheets of paper in mutual contact, and at the same time subjecting the same to the action of a solvent consisting of aqua regia containing an excess quantity of nitric acid, and hydro-fluoric acid.

In testimony whereof I affix my signature and seal in presence of two witnesses.

YOSHIZUMI NAKAMURA. [L. S.]

Witnesses:

HARVEY F. OLTMANS,

N. CHAMURA.