

UNITED STATES PATENT OFFICE.

MORRIS L. KEEN, OF JERSEY CITY, NEW JERSEY, ASSIGNOR TO SAMUEL A. WALSH, OF NEW YORK CITY.

IMPROVEMENT IN THE MANUFACTURE OF PAPER PULP.

Specification forming part of Letters Patent No. 119,464, dated October 3, 1871.

To all whom it may concern:

Be it known that I, MORRIS L. KEEN, of Jersey City, in the county of Hudson and State of New Jersey, have invented an Improved Process of Making Paper-Stock or Pulp from Wood, Straw, Cane, and all other materials or plants adapted for that purpose, of which the following is a specification:

The shavings of wood, or chips, or cuttings of plants, or paper-stock materials are placed in a strong close boiler, (a rotary digester preferred, electrically protected.) I have found that, for the preparation of a cheap paper-stock or pulp for the manufacture of wrapping-paper or paper boards, it is a great economy of material to retain all the liberated and softened interstitial matter contained in the material and for the same into paper with the fibrous portions of the stock. It may be done in many ways, a few of which I will enumerate.

The crude paper-stock may be charged in the boiler in a thoroughly moistened condition; or water sufficient to thoroughly soak it may be blown in hot under pressure, or run in after the stock is charged, the stock in a dry condition requiring much more water than stock in a green condition. It is then subjected to the action of heat by direct external application, or by steam heat in a surrounding jacket, or through an inside coil fitted in the boiler, or by steam-heat through the trunnion, or by heat applied in any other convenient form to a temperature of from 212° to 400° Fahrenheit, according to the nature, condition, and kind of material under treatment and kept under the requisite temperature a sufficient time to thoroughly soften and dissolve the interstitial matter and disintegrate the material under treatment. Green materials or unmaturing plants are the easiest reduced, and can be effected at the lowest pressure named in a prolonged time from three to fifteen hours, while the same materials could be thoroughly pulped in thirty minutes at or near the highest temperature named. The materials can be sampled at a blow-cock to ascertain when they have been sufficiently treated; when done the boiler is artificially cooled down by means of cold water injected through coil or introduced directly into the boiler until the mass is cooled below the volatilizing point of the essential oil in paper-stock materials. The boiler is then opened, the contents discharged,

which retains all its original matter, and can be furnished in pulp-engine, the interstitial material coagulated and set into the stock by sizing agents ordinarily used by paper-makers, and the entire material made into paper.

I find, also, that a small percentage of alkali of from three to five per cent. of material under treatment may be advantageously used. The quantity of alkali should never be in excess of the neutralization point of the acids in the stock under treatment. I have also found that a small amount of naphtha of petroleum or turpentine is very beneficial as an assisting solvent of the resinous or gummy interstitial matter in some paper-stock and plants, when used in the manner specified, and retained with the essential oils until the whole mass is cooled down before the boiler is opened or contents discharged. From three to five per cent. of naphtha may be used to advantage for the production of crude paper-pulp.

I find in the treatment of paper-stock by boiling the same in water, or steaming while in a moist condition, with or without the addition of alkaline solvents or acid neutralizing agents, and with or without the use of naphtha or turpentine solvents or their equivalent solvents, that if, during treatment or subsequently after the mass of paper-stock has been thoroughly cooked, the steam is blown out preparatory to discharging the stock, a great portion of the interstitial in a volatile form escapes and is lost. Also, if the liquid extracts are blown out before the boiler has been cooled down below the volatilizing point of the essential oils of the resinous or gummy portion of the stock, a great loss results therefrom, and the resultant materials are not in as good condition to be made into paper because the remaining now volatile gummy matter adhering to the fiber having lost its essential solvents becomes hard, incrusts, and stiffens the fibrous portion of the stock, rendering it a poor felting material compared to what it is when all has been retained and cooled down to the point named before discharging it. I therefore cool down the stock preferably to the temperature 200° Fahrenheit, or, with some stock, much lower before discharging from the boiler.

To make white paper I have found that crude paper materials, treated in the manner described, can, after having been discharged from the boiler, be pressed clean of all the extracts. There re-

mains paper-stock easily washed, and treated subsequently by boiling in a minimum quantity of alkali about eight to ten per cent. for the production of good grey pulp, easily bleached and converted into white paper. The extracted matter as expressed is retained in a condensed form and can be converted into pyroligneous spirit or used in other arts and manufactures.

I am fully aware that all the materials employed by me have been used in the manufacture of paper-stock in various ways; but in no case has any one made use of them in the way, and so as to accomplish the specific purpose, set forth by me.

The great solvent properties of alkalies are injurious to the retention of the interstitial matter, and has to be neutralized by chemical agents so as to precipitate the extracted matter held by the alkali before the interstitial will be reabsorbed by the fibrous portion of the paper-stock.

I claim as my invention—

1. In the treatment of crude paper-stock thoroughly moistened or soaked in water, as described, heating the same in a close vessel until the gummy or resinous interstitial matter has been thoroughly softened or dissolved and the retention of the materials under treatment in the vessel with the volatile matter liberated during said treatment, until the mass has been cooled below the volatilizing point of interstitial matter in the materials treated or those used in the treatment, for the purpose substantially set forth.

2. The use of a neutralizing percentage of alkali equivalent to the acid of the stock treated, and the retention of same with the interstitial and fibrous portion of stock until chemically liberated at the time of coagulating and settling of the interstitial into the fibrous portion of the pulp, substantially for the purpose described, and as set forth.

3. The treatment of paper-stock in a close boil-

er with naphtha, turpentine, or equivalent essential oil or oils, at a temperature sufficient to soften and dissolve the resinous or gummy interstitial matter of the crude paper-stock under treatment, used alone or combined with steam or vapor, and then retaining intact the pulpy mass of materials after such treatment in the close boiler or vessel until the whole mass is cooled below the volatilizing point of the ingredients contained in stock or used in the process, substantially for the reason and purposes set forth.

4. The utilization of the crude pyroligneous spirit obtained as a concentrated extract by pressure of crude mass of materials after discharge from boiler, and the employment of the fibrous portion for the manufacture of white paper.

5. The manufacture of a cheap paper-stock by treatment, as described, by being, subsequently to its discharge from the boiler, pressed and freed from interstitial matter, and after treatment by alkali or other solvent for the manufacture of white paper-stock or pulp.

6. The treatment of paper-stock materials in a close boiler with a solvent or combinations of solvents with heat sufficient to soften some or all of the interstitial matter and tend to liberate gaseous vapors, the same being closely confined during the entire treatment and until they are cooled down below their volatilizing point, all substantially as and for the purpose set forth.

7. The retention of all interstitial matter in the treatment of crude paper-stock materials, the same being treated in the manner set forth or its equivalent, for the specified purpose designated.

In testimony whereof I have hereunto set my name in presence of two subscribing witnesses.

MORRIS L. KEEN.

Witnesses:

THOMAS D. STETSON,
CAMPBELL C. LIVINGS.

(81)