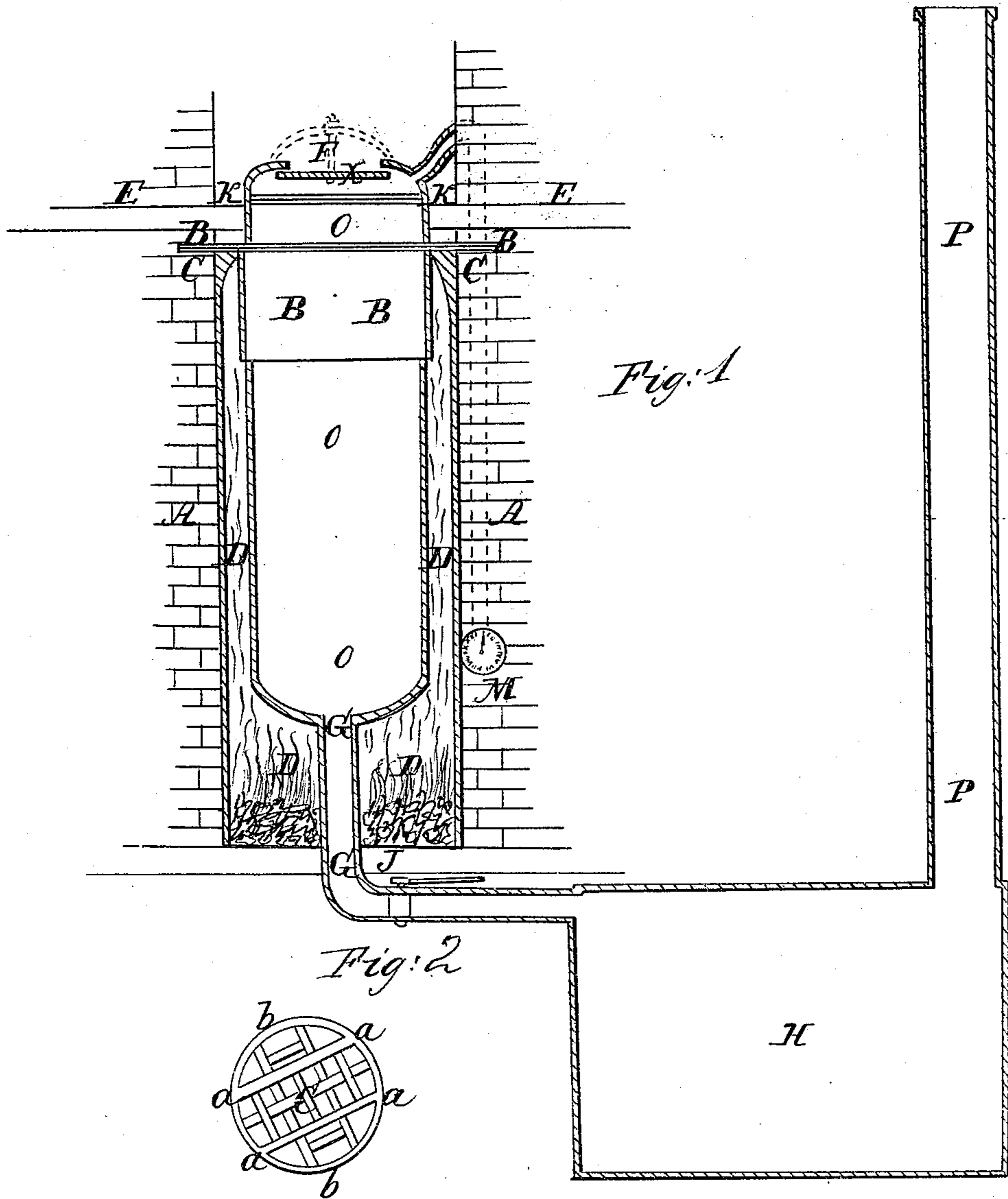


H.B. Meech.

Paper Making.

N^o 44,209. Patented Sept. 13, 1864.



Witnesses
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HARRISON B. MEECH, OF FORT EDWARD, NEW YORK.

IMPROVED MODE OF TREATING VEGETABLE SUBSTANCES FOR THE MANUFACTURE OF PAPER-PULP, &c.

Specification forming part of Letters Patent No. 44,209, dated September 13, 1864.

To all whom it may concern:

Be it known that I, HARRISON B. MEECH, of the town of Fort Edward, in the county of Washington and State of New York, have invented a new and improved process for treating straw and other vegetable fibrous substances for the purpose of converting them into a state suitable for making pulp for the manufacture of paper, and for other purposes for which pulp may be used; and I hereby declare the following to be a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The object of my said invention is to prepare vegetable fibrous substances, and particularly straw, for the manufacture of paper-pulp, in a manner most economical as to time employed, expense in material used, and saving of material treated, as well as producing a superior quality of pulp, so that in all the aforesaid respects there may be the greatest economy secured and the best results obtained.

The nature of my invention consists in combining a suitable boiling liquor with a stationary boiler and high temperatures, for the reasons and purposes hereinafter set forth, and the advantages of such combination are also hereinafter described.

To enable others skilled in the art and trade to construct and use my said invention and improvement, I now proceed to describe particularly the construction, operation, and use of the same.

In the first place, the straw or other vegetable fibrous material to be treated may be particularly prepared for such treatment by any process which shall cut, break, or tear it into small fragmentary parts, for the purpose of exposing a large surface of the material to the immediate action of the boiling liquor, or the straw may be used in its natural state without cutting, breaking, or tearing the same into fragments. Where the means are at hand or can readily be commanded, it is better first to prepare the straw by the usual methods of cutting it into short lengths, and also by crushing the same by means of heavy iron rollers, for the purpose of reducing the joints and knots of the straw; or the straw may be passed through pickers similar to those used for reducing woollen rags, &c.; secondly, the stationary boiler, in which the material is to

be treated by being boiled or cooled should be of great strength, to resist an internal pressure equal at least to one hundred and fifty pounds to the square inch. I would recommend that the vessel or boiler be made in diameter from five to six feet, and in length from eight to ten feet. The boiler may be set in a horizontal or a perpendicular position. I would recommend, however, that it be set in a perpendicular position, and be set in an arch or chimney, suspended by means of a collar or strap passing around the same near its upper end—say within two feet thereof—for the purpose of so suspending the boiler as to expose the largest amount of its surface to the action of the naked fire.

The following is a representation and description of the construction and position of the boiler I would recommend:

Figure 1 in the accompanying drawings represents a sectional view of the boiler in its perpendicular position in the arch or chimney. O O O represent the boiler. A A represent the sides of the arch or chimney in which the boiler is set. B B B B represent the collar or strap with its projecting flange for the purpose of suspending the boiler, the flange resting upon the masonry C C, and thereby suspending the boiler within the arch and over the fire, as seen at D D D D. E E represent the floor nearly even with the upper part of the boiler, on which is to be placed the material for charging the boiler. At F, in the upper end of the boiler, is an opening known to the art and trade of paper-making as the man-hole, through which the boiler is to be charged with the material to be treated, and it should be large enough to permit a man to enter the boiler for the purpose of packing the material in the boiler when it is being charged. At X is seen the man-head in its place for closing the boiler after it has been charged and ready for the boiling process to be commenced. In the upper end of the boiler and above the liquor, a pipe, L, passes out into or along the chimney or masonry to a steam-gage at M, for the purpose of determining the amount of internal pressure within the boiler. At the bottom of the boiler is a large pipe, G G, about six inches in diameter, running from the bottom of the boiler through the fire and connecting with a large tub or vat, H, of at least double the capacity of the

boiler. This pipe G G is for the purpose of discharging the contents of the boiler as soon as sufficiently boiled or cooked into said tub or vat H. At I is seen a stop-cock or faucet in the pipe G G, for the purpose of opening or closing said pipe at pleasure. H is a large tub or vat, which should be made to contain double the capacity of the said boiler, and should be of great strength to resist the force of the discharge into the same, which would be great if made while the internal pressure in the boiler was at one hundred pounds to the square inch or upward. P P represent a large pipe leading out of the tub or vat for the purpose of conducting the steam therefrom out of the building, and the tub or vat should otherwise be tightly covered to prevent the escape of steam or smoke into the building. In the bottom of the tub or vat H should be openings covered with net-work, as a sieve or strainer, for the purpose of permitting the liquid material therein to drain off.

Fig. 2 in the accompanying drawings represents a surface rack or grate, the use of which is to keep the material being treated beneath the surface of the liquor in the boiler. In its construction it has the diameter nearly of the interior of the boiler. The segments thereof, *a b a*, are fastened to the center-piece C by hinges at *a a a a*, so that the segments can be turned back upon the center-piece C for the purpose of permitting the rack or grate to enter the boiler through the man-hole F. This rack or grate should be covered with a net-work of wire-gauze, to prevent the finer material from rising to the surface of the liquor in the boiler. This rack or grate is seen in its place when the boiler is charged, as at K K, in the upper part of the boiler.

The advantages of the stationary over a rotating boiler in the treatment of straw are many, but particularly there are three advantages: first, where the boiler is stationary and is suspended as above recommended, a much larger surface of the boiler can be exposed to the action of the naked fire, and consequently can be more rapidly heated; second, when the material being treated is submerged in the boiling liquor, it is desirable that there should be as little mechanical agitation as possible, because by mechanical agitation parts of the material being treated become thereby detached from the mass in the shape of fine fiber during the early part of the boiling process, and, being subject to the continued action of the alkali for a long time in that state, they are liable to be reduced to a pasty condition which in the washing process is washed away and lost; third, the machinery and attachments necessary for hanging and rotating the boiler are dispensed with, and much expense is saved in the construction and operation of the same.

The boiling liquor used in my process is composed of water, soda-ash, or other alkaline substance, lime and oleaginous substances,

as oil or grease, or, instead of oil or grease, soft soap or other substance containing the oil or grease as a constituent thereof. In the constitution of the liquor I would recommend the use of the following proportions: Take soda-ash, or its equivalent in other alkali, testing at about ninety-five per cent. in quantity equal to from sixteen to twenty per cent. in weight of the material to be treated. Take common unslaked lime, in quantity equal from one-third to two-fifths in weight of the soda-ash or other alkali. Dissolve the soda-ash and lime in a quantity of water, which, when ready for use as a boiling liquor, shall be in quantity, equal to about seventy gallons of the liquor to the one hundred pounds of material treated, and testing at 3° to $3\frac{1}{2}^{\circ}$ Baumé. Add to this liquor when well settled, so as to be free from the visible presence of lime, either in fine particles or in a milky state, about one pound of grease or oil to the one hundred pounds of straw, &c., to be treated, or, instead of the grease or oil, add about one and one-third gallon of soft soap to the one hundred pounds as aforesaid. Instead of adding the grease, oil, or soap to the liquor, as above directed, you may put them into the boiler and onto the straw, &c., therein, before running in the boiling liquor.

The process of charging the boiler is as follows: Let a person enter the boiler soon after commencing to put in the straw, for the purpose of packing it tightly therein, as it is put into the boiler through the man-hole. When the boiler is thus filled to within one foot of the man-hole, let the grease, oil, or soap be put onto the straw. Next, put in the surface rack or grate and spread it out upon the surface of the straw, after which run in the boiling liquor in the proportions above described, and close the man-hole by means of the man-head in the manner well known to the art and trade of the paper-maker. The next step in the process is to apply the fire by kindling the same underneath the boiler, raising the temperature within the boiler as quickly as possible to that indicated by an internal pressure in the boiler of one hundred pounds to the square inch, after which proceed cautiously until a temperature indicated by a pressure of one hundred and thirty pounds to the square inch is attained. Continue boiling at a temperature ranging from one hundred and ten pounds to one hundred and thirty pounds to the square inch for about three hours or three and half hours, when the material will be sufficiently cooked or boiled and may be at once discharged by means of the stop-cock or faucet I in the pipe G G into the tub or vat H, where, after draining, it is ready for the subsequent treatment of the paper-maker, such as washing, scouring, bleaching, &c.

Having thus fully described my method of treating straw, &c., I will further state what appears to be the advantage gained by using grease, oil, or soap in the composition of my

boiling liquor for the treatment of straw, &c. The effect is seen in protecting the finer fiber of the material treated, which is first separated from the mass, from the too great action of the alkali converting it into a paste, as before stated, and thereby causing a loss of material in the subsequent washing of the same. A second effect is seen in imparting to the product a whiter appearance and a softer feel, leaving it in a state much more readily reducible to pulp, by the ordinary processes used by the paper-maker, than when the grease, oil, or soap have not been used.

I do not claim the use of a stationary boiler, nor do I claim the particular form of its construction, as above described, nor do I claim the constitution and particular composition of the boiling liquor as above set forth and described, nor do I claim the use of high temperatures in the treatment of straw or other fibrous substances; but

What I do claim, and desire to secure by Letters Patent as my invention and improvement as a means of reducing straw and other fibrous vegetable substances to a pulpy condition, is—

1. The use of a stationary boiler, constructed substantially as above described, in combination with a boiling liquor, including grease, oil, or soap, constituted substantially as above described, and a high temperature ranging from that indicated by an internal pressure in the boiler of sixty pounds to the square inch to that indicated by the like pressure of one hundred and fifty pounds to the square inch in the manner substantially and for the purpose above described.

2. The combination of a stationary boiler with the use of the above-described boiling liquor, and the use of any and all temperatures ranging from that indicated by an internal pressure in the boiler of sixty pounds to the square inch upward, for the purposes above described of reducing straw and other vegetable fibrous substances to a pulpy condition.

In testimony whereof I hereunto set my signature this 16th day of April, 1864.

HARRISON B. MEECH.

Witnesses:

L. G. BANCROFT,
JOEL TIFFANY.