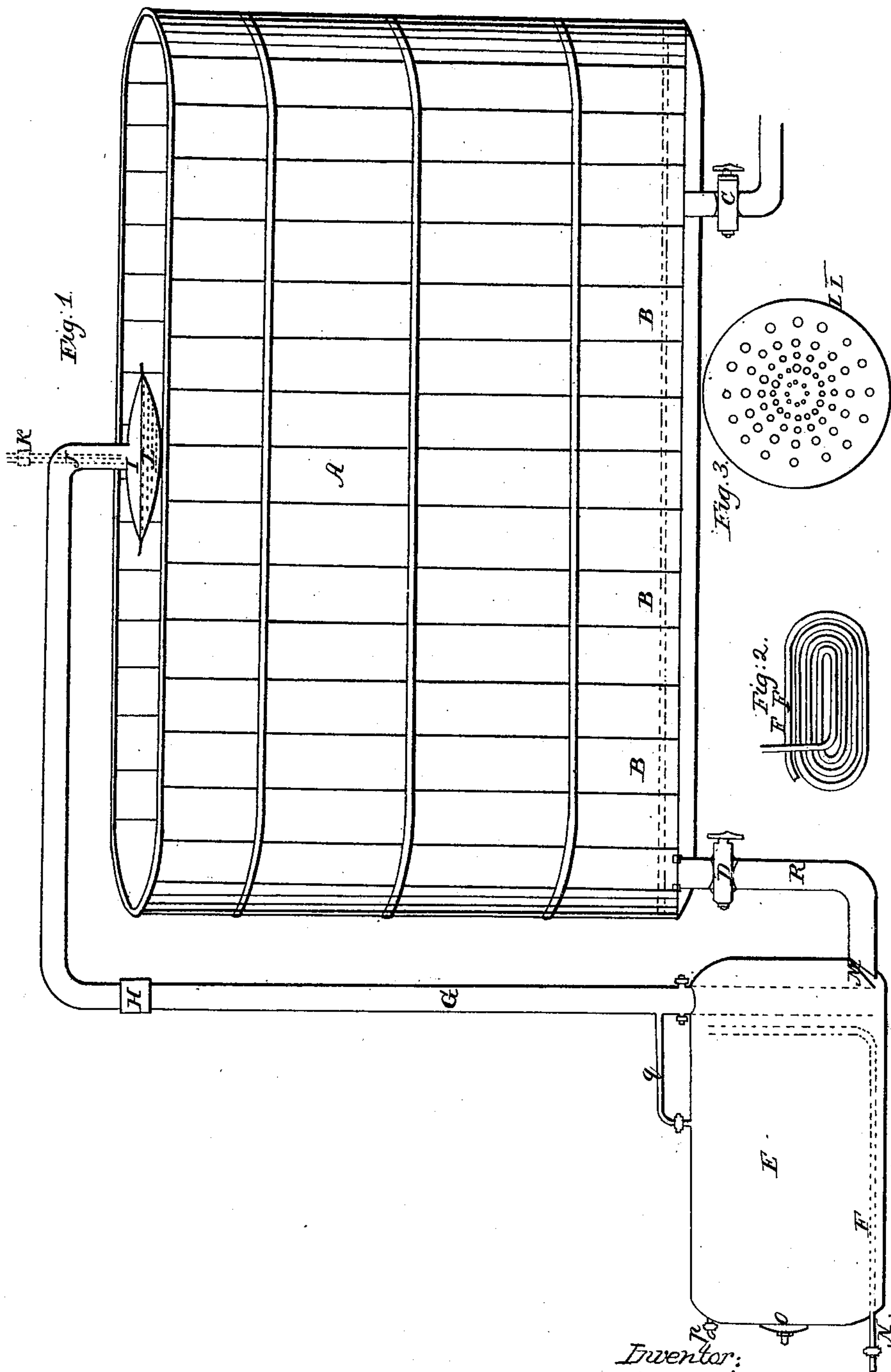


T. COUPIER & M. A. C. MELLIER.
PROCESS FOR MAKING PAPER PULP.

No. 9,910.

Patented Aug. 2, 1853.



Inventor:
M. A. C. Mellier
J. H. Couper

UNITED STATES PATENT OFFICE.

THEODORE COUPIER AND M. A. C. MELLIER, OF PARIS, FRANCE.

MANUFACTURE OF PAPER STUFF.

Specification forming part of Letters Patent No. 9,910, dated August 2, 1853; Reissued March 25, 1862, No. 1,295.

To all whom it may concern:

Be it known that we, THEODORE COUPIER and MARIE AMEDEVILLE CHARLES MELLIER, of Paris, in the Republic of France, have invented a new and Improved Method of Reducing Fibrous Vegetable Substances to Pulp Fit for the Purpose of Making White Paper, and that the following is a full and exact description thereof, reference being had to the accompanying drawings, which make part of this specification.

Our process consists in general in the treatment of straw and all crude or raw herbaceous matters, with a solution of hydrate of soda or potash of such strength and in such a manner as will together with the other means hereinafter described reduce them to pulp and thereby dispensing almost entirely with machinery as commonly employed for similar purposes. This process is simple, efficacious and economical, but the success depends entirely on the strength of the liquor employed and the purity of the hydrate of soda or potash, for we have discovered that usually in attempts hitherto made to obtain pulp from such materials and to bleach the same, the failure has been in part owing to the presence of lime (a very common occurrence) in the solution of soda and potash. Where lime is present the pulp will always retain a yellowish or dingy color.

We are aware that alkalis have been used before for treating vegetable fiber, but in such cases the alkalis have either not been employed in their caustic state or the lime which has been present has rendered every such attempt to make white paper from straw entirely unsuccessful.

Straw, or such like vegetable matter, is to be cut up by a chaff cutting machine before proceeding to operate according to our invention, and if bark, or such like vegetable matters are to be employed, the same is to be cut into chips or crushed, and such vegetable matters are then to be treated according to our invention; which commences with a process of employing or boiling solution of hydrate of soda or potash; and it is important that the solution should be of considerable strength, and we have found a solution of hydrate of soda or potash marking

from eight to ten degrees of Baumé to be the best strength, and we would state that a material departure from that strength, either above or below, will result in a failure to obtain the beneficial operation which is consequent on the use of such alkaline solutions as herein described.

The straw or vegetable matter is to be put into an open tub or vessel as seen in the accompanying drawing A with a false bottom shown in dotted lines B, B, B, B, perforated with numerous small holes. This tub or vessel is covered when the process is being carried on. Through the cover there is a pipe G, with a rose-head I and L thereon, the other end of such pipe descending into a close iron vessel E, and nearly to the bottom thereof. In this iron vessel which is capable of containing about 60 to 70 gallons, the alkaline solution is to be placed, and by means of high pressure steam from a suitable steam boiler passing through a worm or coil F in the iron vessel E, the liquor is boiled and by a slight escape of steam from the worm is to be forced up the pipe G and through the rose-head I and L by which streams of the boiling liquor will be forcibly thrown on the straw or vegetable matter lying on the false bottom of the tub A. When one filling of the iron vessel has been forced into the tub and distributed over the vegetable matter herein, the iron vessel is again to be filled, and such further quantity is to be forced over, and through the rose-head I and L by the steam, when the iron vessel is to be again filled and again emptied by the steam till the quantity of alkaline solution proper for the quantity of vegetable matter in the tub has been forced by the steam into the tub. It should be understood, that the steam is shut off from the iron vessel before running in fresh quantities of the alkaline solution.

When the whole of the liquor required has thus been forced into the tub containing the vegetable matter, a circulation of the liquor is to be caused to take place in the following manner: The stop cock D on the pipe R, hereinafter described, is to be opened and to remain open during the circulation. From the bottom of the tub A raised some few inches above the top of the iron vessel

E proceeds the pipe R with the stop cock D; this pipe has on its end which enters the vessel E a self-acting valve M, opening into the iron vessel, by which a quantity of the liquor is run back into the said iron vessel E, the steam being turned off for a time to allow the entering of the liquor, and to be again turned on to drive over the liquor; the valve closing by the pressure of the steam and preventing the liquor being forced under the false bottom while it is being forced up through the pipe G upon the straw; and this process of circulation is to be continued for about eight or ten hours, when the stop cock D on the pipe R is shut and the liquor is to be drawn off by another pipe C at the bottom of the tub A. Water is then to be run into the close iron vessel, and is to be forced out therefrom by steam through the pipe G and rose-head as explained, and onto the straw or vegetable material in the vessel, and such processes of wash waters are to be repeated till the water coming off through the pipe C does not indicate a greater strength than one degree of Baumé; cold water is then to be run into the tub from any convenient source till it comes off clear. The quantity of alkaline solution employed by this means is at the rate of about thirty to forty gallons of the strength above mentioned, for each cwt. of vegetable matter. The vegetable material being well washed, as above described, is then put into a bath of hypochlorite of alumina (in order that it may be bleached and the fibers loosened), where it remains from twelve to eighteen hours being stirred from time to time. The hypochlorite is used at the rate of about twenty-five per cent. by weight of the vegetable matter, using about seventy gallons of water for each cwt. of vegetable matter; the solution of hypochlorite of alumina will therefore be of a strength of about three degrees of Baumé, and we prefer to employ a stronger solution rather than a weaker one. This degree of strength we have determined after many experiments, as being the only one which will produce a uniformly white pulp, from the material prepared as above described, and to our knowledge this solution of hypochlorites was never used at the degree as we have invented above, for bleaching pulp from straw and other vegetable matter. In all patents which have been granted for making paper from said vegetable matters, the bleaching liquor has never been mentioned at such a high figure, as it is used by us. The strength at which bleaching liquor is employed in the ordinary mode of making paper varies from $\frac{1}{4}$ to $\frac{1}{2}$ of a degree, when it is diluted in the necessary quantity of water contained in the engine. We would also remark, that although we prefer to use hypochlorite of alumina, a so-

lution of other hypochlorites of like strength may be used. The vegetable matter which is now reduced into what is called half stuff, and of good color, is to have the liquors strained off. This pulp is to be well washed (by preference in boiling water, in order completely to remove the hypochlorite, and complete the disaggregation of the fibers) and there it remains to beat it in the ordinary beating engines and to make it in paper alone or in combination with the pulp obtained from rags.

In order to carry out our invention as economically as may be, we cause the alkaline liquor drawn off and the first wash waters to be evaporated, a resinous soap is thus obtained which, being mixed with charcoal dust, or saw dust or alone produces a fuel from which gas may be obtained by destructive distillation in the ordinary manner, or the same may be burned as fuel, and from the ashes by lixiviation, a considerable part of the alkali will be obtained for further use.

We must observe that the above described process is also applicable to flax waste, cotton waste, tow of hemp, jute, or surat, but this does not dispense with reducing them in half stuff by the means usually employed.

The important features of our invention are, first, the employment of the pure hydrates of soda or potash in the reduction of the straw and similar vegetable matters into pulp, for the special reasons set forth above, and using such hydrates at or about the degree of strength mentioned, viz. 8° to 10° Baumé. Second, the manner of using such hydrates upon the straw or other similar vegetable matters by means of the apparatus above described or any other substantially the same, and, third, the employment of the hypochlorites of the degree of strength, viz. 3° Baumé, for bleaching the pulp obtained by our process.

We do not claim as our invention the use of alkalis in the treatment of vegetable fiber for the preparation of paper pulp, nor do we claim the individual parts of the apparatus employed in our process, but,

What we do claim is—

1. The process herein described of reducing straw and other similar vegetable matters into pulp for making paper, said process consisting in applying and circulating the solution of the hydrate of soda or potash in the manner above mentioned, and at or about the strength indicated in combination with the apparatus substantially as described, by which means we are enabled to effect the reduction of a very large amount of pulp with a comparatively small quantity of liquor and preserve also the requisite strength in the liquor and also obtain facility for its evaporation.

2. We do not claim the use of hypochlo-

rites for bleaching pulp, but what we do
claim is the employment of the hypochlo-
rites in the process of bleaching straw or
similar vegetable matter when prepared as
5 above for the purpose of making paper sub-
stantially as herein set forth, that is to say
using them at or about the strength set forth
in the specification, viz, 3° Baumé, and we

claim this degree of strength only when em-
ployed upon such materials.

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M. A. C. MELLIER.

Witnesses:

S. G. GUDRUL,
W. S. CHASE.

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