Sheet 1, 2 Sheets.

L. W. Wright

Paper Making Mach.

No. 5,041. Patented Mar. 27, 1847.

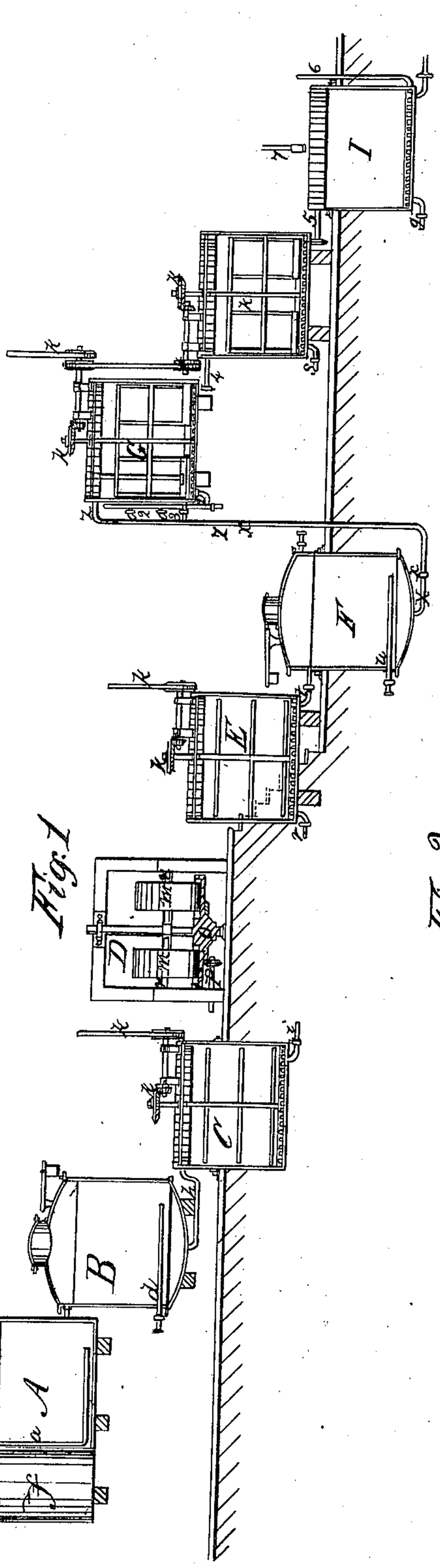

Fig. 1.

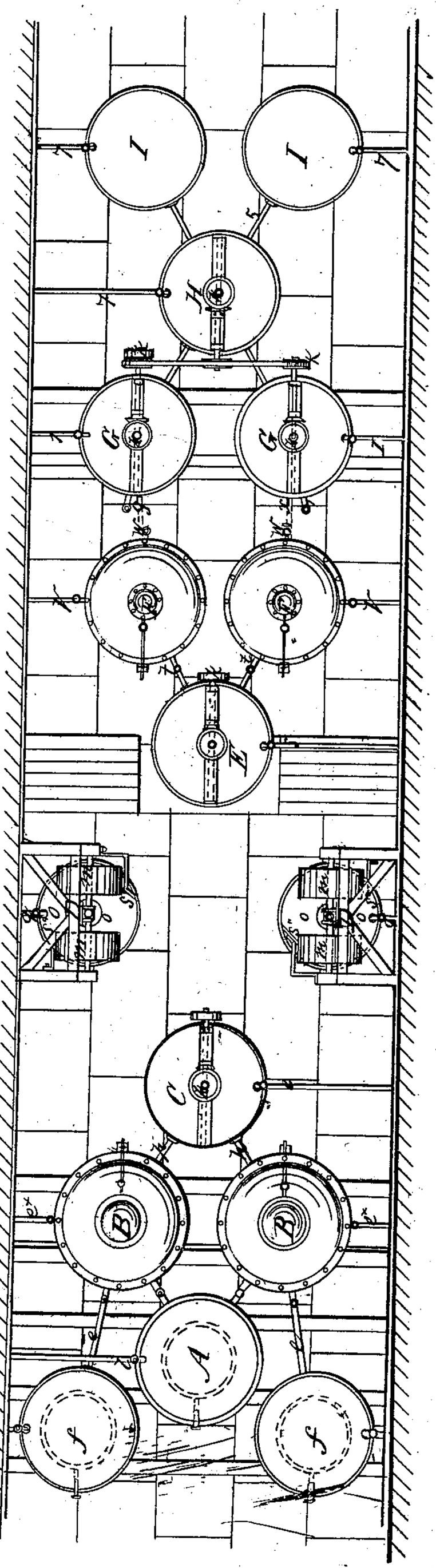

Fig. 2.

Sheets, 2 Sheets.

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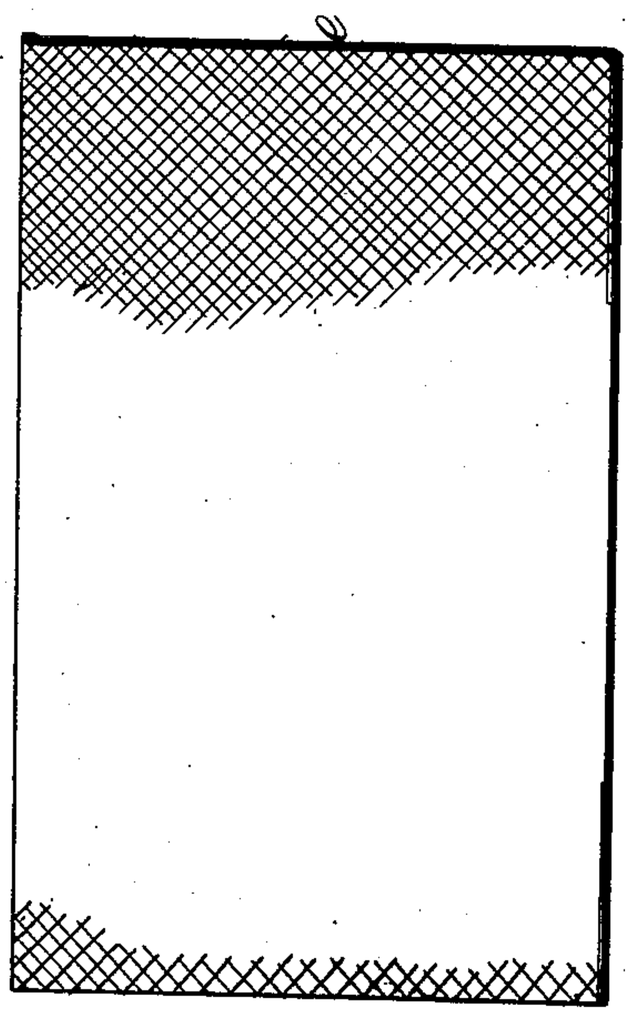
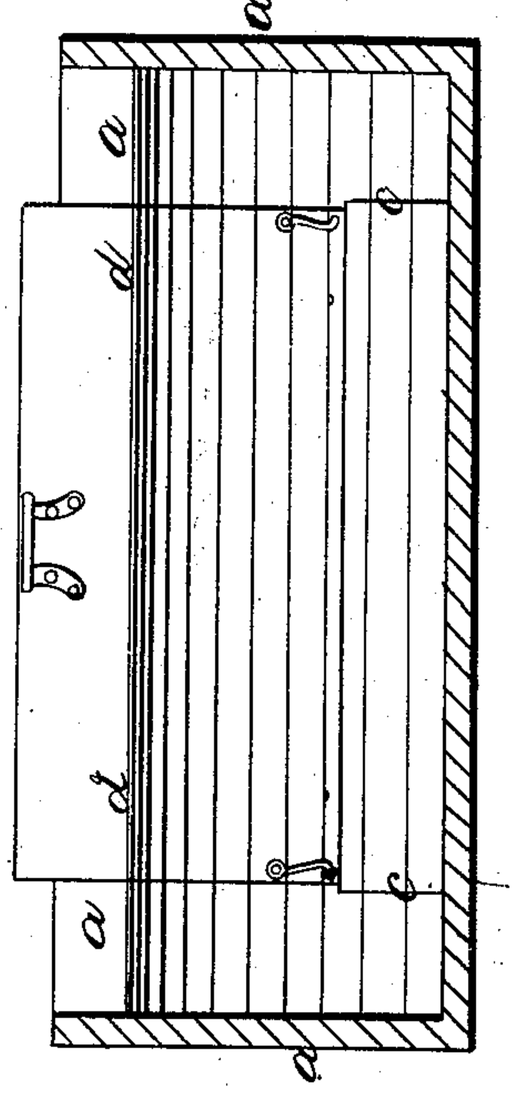




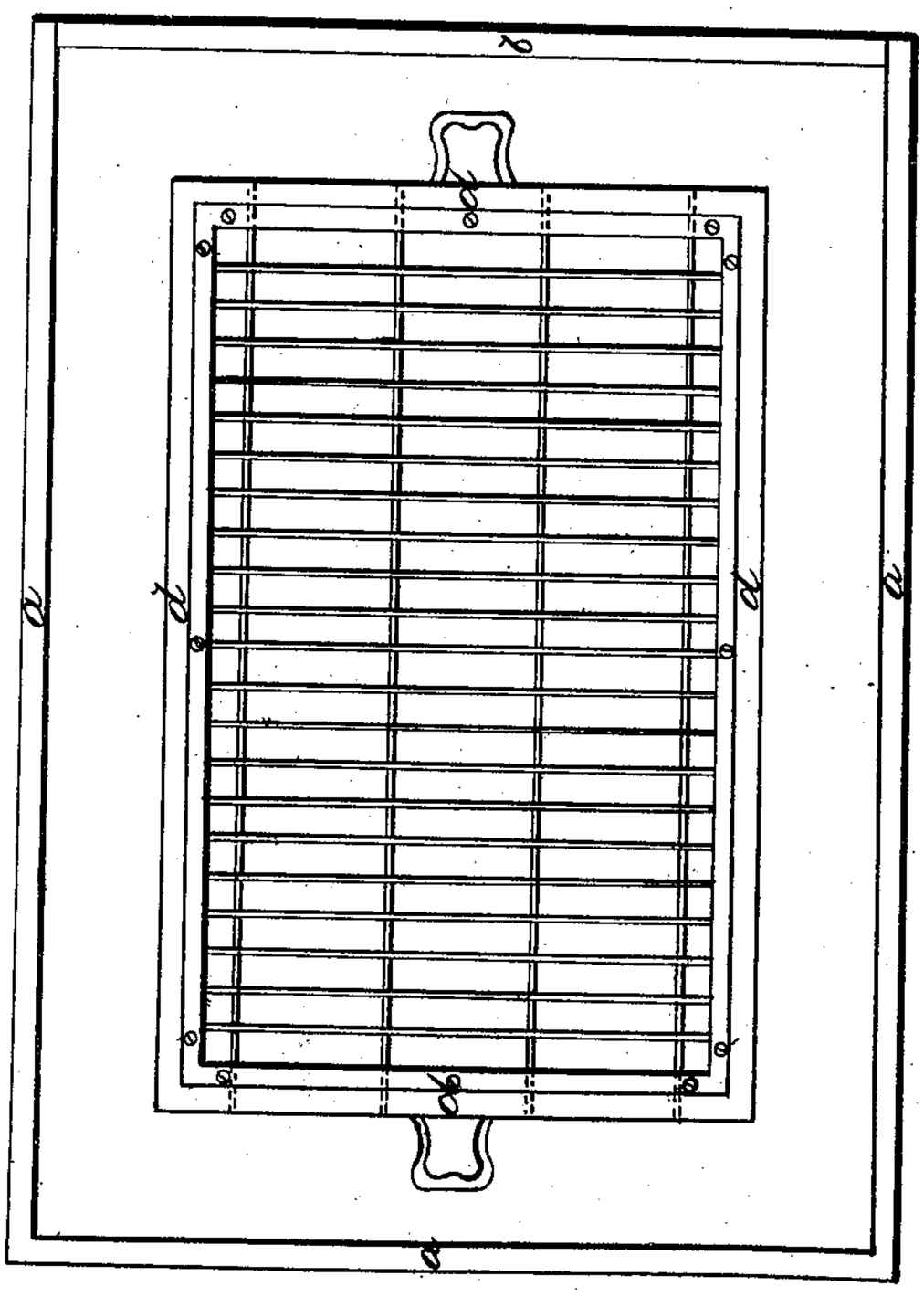
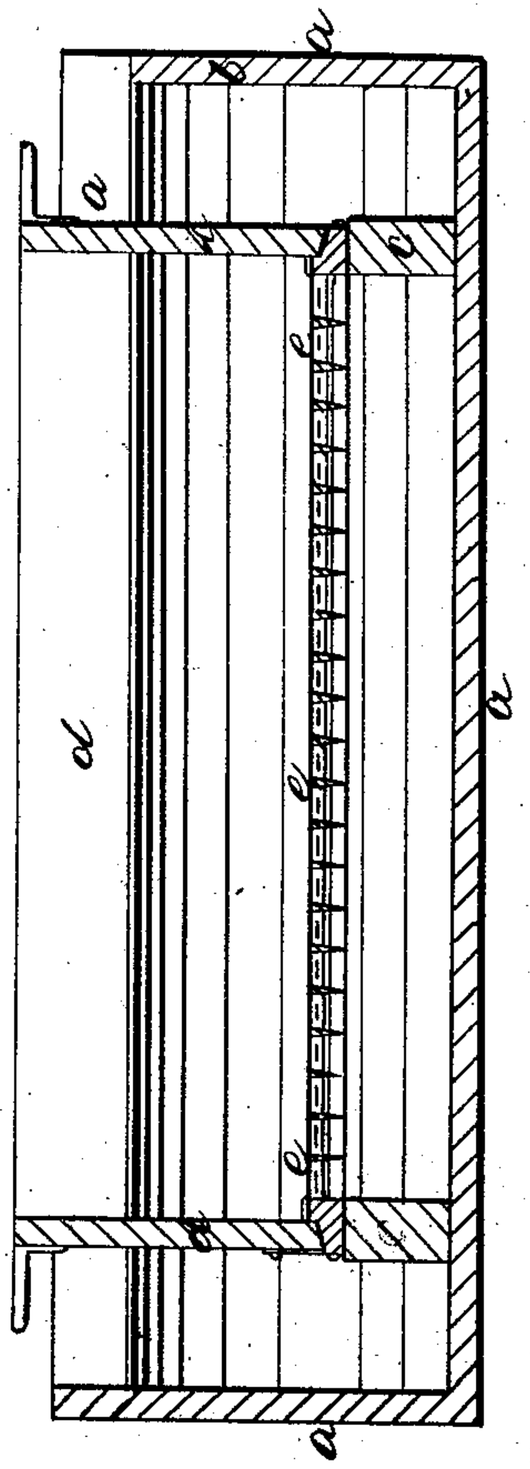


Fig. 3.



UNITED STATES PATENT OFFICE.

LEMUEL W. WRIGHT, OF CHALFORD, ENGLAND.

MAKING PAPER.

Specification of Letters Patent No. 5,041, dated March 27, 1847.

To all whom it may concern:

Be it known that I, LEMUEL WELLMAN WRIGHT, a citizen of the United States, residing at Chalford, in the county of Gloucester, England, have invented an improvement in machinery or apparatus for preparing and reducing various fibrous substances into a state of pulp and converting the same into millboard or paper, of which the following is a specification.

These improvements consists, first, in the novel arrangement and construction of the several parts of the machinery or apparatus employed and in the application of the same to the process of reducing and bleaching straw and other fibrous substances (such as wheat, oat, barley, rye or rice straw, wood and jute weed commonly called surat as well as various kinds of grass and Indian corn leaves or husks, &c., to be used for the manufacture of various kinds of paper, mill board, card board, button board, &c.; secondly, in the particular machinery or apparatus for washing and cleansing all the dirty and extraneous matter from the straw or other fibrous substances; thirdly, in the peculiar adaptation of the machinery or apparatus used or employed for reducing or grinding the same into a state of pulp by means of heavy rollers revolving on a plate as hereinafter described; fourthly, in the continuation of the washing of the fibrous substance in the pulpy state and in the peculiar apparatus or machinery employed for the purpose of boiling the same by steam; and, fifthly, in the machinery or apparatus for washing the pulp from the boiling process for performing the souring and chlorid processes and thus perfecting the operation of bleaching the pulp ready for use as hereinafter described.

In order that the present improvements may be fully described and shown in detail I have represented in the accompanying drawings my improved machinery or apparatus for bleaching and preparing the straw or other fibrous substances as hereinafter described.

The figures in Sheet I are drawn upon a scale of about one quarter of an inch to the foot.

Description of the drawings.—In Sheet I Figure 1 is a longitudinal elevation of the bleaching and pulping apparatus drawn mostly in section to show the working of the process more clearly and Fig. 2 is a plan view of the same in which I have shown a set of the apparatus arranged.

Similar letters of reference are marked upon corresponding parts of the machinery or apparatus in both the figures.

The tub or vessel A is for the purpose of mixing lime and water together commonly called solution of lime or "milk of lime." *b* is a pipe and cock for admitting water. Steam is admitted into the bottom of this tub A by a circular pipe *a* as seen by dotted lines in plan view for the purpose of boiling this solution which is to be admitted as required by the pipe *c* into the boilers or keirs B, B which must be filled half full of straw or other material previously cut in a chaff engine about an inch long. The remaining space in the vessel or keir must be nearly filled with lime water or milk of lime, an agitator may if required be adapted to the vessel A in the manner shown in vessels C, E, G and H. The boiling vessels B, B and F F are made of wrought or cast iron and are intended to contain the straw or other material which is to be boiled with the lime liquor previously prepared, the said vessels are to be covered with lids and made steam tight with safety valves, and the boiling process should continue about 12 hours. *d* are the circular steam pipes for boiling the contents of the vessels B, B.

e, *e* are the pipes for admitting water previously heated in the two auxiliary vessels *f* and *f*, which is to be used for washing the fiber between the lime processes when repeated.

The pipes *e**, *e** are for the admission of cold water if required into the vessels or keirs B, B and *h*, *h* are the pipes and valves for drawing off the straw or fibrous material and liquor into the washing tub C when sufficiently boiled.

The tub C is for the purpose of washing the lime and coloring matter from the straw or fibrous material and is provided with a false bottom covered with wire gauze or cloth of about No. 12 mesh (in order that the fiber may be retained in the tub). When the water is drawn off by the pipe *i* and it is also furnished with an agitator which is kept in continued motion, by means of its driving gear drum and strap *k*, *k* which will prevent the wire cloth from being choked or filled up by the lime powder as well as to keep the whole mass in action during the washing process. Water is admitted

as required by the pipe *l* and drawn off by the pipe *i* after being well washed and cleansed the straw or fibrous material has to be removed from this vessel and submitted to the grinding machine or pulping apparatus D, D.

Each machine or apparatus D, D is composed of two large cast iron rollers *m*, *m*, *m*, *m*, of about five feet diameter and about five tons weight each. The surfaces of these rollers must be correctly turned and they revolve on a stationary axle *n*, *n*, *n*, *n* properly secured in the framework and bearing or rolling by friction of contact upon the bottom circular iron plate bed or trough *o*, *o*, *o*, *o*, which must also be turned to fit the surfaces of the rollers. This bed plate is caused to revolve by means of the beveled teeth cast or fixed in segments upon the under sides. The pinion and shaft *p*, *p* gears into and drives the teeth on the bottom of the plate which is supplied with water as required by the pipe *q*. *q*. The boiled straw or fibrous material from the tub C is now to be thrown into this trough or bed *o*, *o*, *o*, *o* and under the rollers to which it is conducted by guides *s**, *s**, *s**, *s**, and is allowed to remain under the grinding action of the rollers about 15 minutes more or less as the nature of the material may require until the pulping process is completed, when the pulp may be taken out from under the rollers and placed in the tub E, which is of the same construction and used for a repetition of the same purpose as the tub C with this exception only that the wire cloth constituting the false bottom of this tub must be of a finer texture that is about No. 60 mesh and made of wire cloth. The pipe and tap *r* from this tub are intended for drawing off the waste water with the coloring matter that passes from the pulp during the process of washing, the pipe S at the same time admitting pure water. After this second washing the pulp is to be passed through the pipes and cocks *t*, *t* into the close iron vessel or keirs F F wherein it is to be boiled again for about 6 hours in the lime water as afore described mixed with an alkaline solution of specific gravity of about 2° to 4° Baumé's hydrometer for salts according to the nature of the material to be bleached.

The keirs F F have steam tight covers, safety valves and man holes. *u* is the circular pipe as before described in vessels A and B B admitting steam for boiling and *v*, *v*, water pipes for admitting water into the keirs. When the pulp has thus been boiled for 6 hours the steam must be shut off from the circular pipe *u* and introduced above the liquor by the steam pipes *w*, *w* which will bring the pressure of the steam upon the top of the pulp and when the cock *x* is opened in the bottom pipe *y* the pulp and liquor will be forced up the pipe *z* and discharged into the tubs G, G, where it is to be washed again and in the way before described, excepting in this case the false bottoms of the tubs are covered with sheet lead perforated with small holes to retain the pulp and let the water through. The pulp now being in the tubs G G must in this stage be well washed and agitated with water constantly running in at the pipes 1, 1, and drawn off as required at the pipe 2. When sufficiently agitated in this vessel the pulp must be submitted to the action for two hours more or less (still kept in motion) of a solution of sulfuric, muriatic or other acids of the ordinary strength used for bleaching purposes, then washed as before until the acid is all removed from the pulp when it is to be returned through the pipes 3 *z*, *y*, and *x*, into the close keirs F F when it must be boiled again in a solution of alkali of about 2° to 4° hydrometer which should be continued for about 4 hours or until the strength of the alkali is spent, when the pulp and alkaline liquor is forced back into the tub G again and washed as before described.

The washing being completed the pulp is to be agitated in a solution of chlorid of lime or bleaching liquor (of the ordinary bleaching strength) for about two hours and then the solution is to be brought to the boiling point by the admission of steam through a pipe *j* into the tub and kept to that point until the chlorid or bleaching liquor is entirely spent, the pulp and liquor is to be let down through the pipe and valve 4 into the tub H when the washing process must again be performed therein and when the chlorid or bleaching liquor is all washed out it must be submitted to the process called souring, consisting of a solution of acid and water of the usual strength for bleaching, and after being agitated therein for about 4 hours the whole is to be let off through the pipes and valves 5, 5, into the tubs I I below where it may remain until the next batch is ready for "souring."

The false bottoms of the tubs H and I are covered with perforated lead similar to tub G, G. The souring liquor is to be pumped up the pipe 6 into a tub above to be ready for use again as required. The pipe 7 is for a supply of fresh water when wanted; and the pipes 8 and 9 are for drawing off the "souring" liquor when spent and of no further use.

After the working of the whole of this improved bleaching machinery or apparatus as above described the straw pulp or other fibrous material will be perfectly bleached and fit for the subsequent manufacture of white paper but I would here remark that when the pulp is intended to be used for making brown paper, mill board, &c.,

the preparing process may be discontinued after the first boiling of the pulp in the close keirs F F prior to its being carried into the tubs C C. And also that after the pulping and bleaching processes have been completed as above described the pulp may be submitted to the ordinary rag engine for an hour or so for the purpose of washing, bluing and clearing the stuff prior to its introduction to the paper machine.

Fig. 3 Sheet 2 represents the machine or apparatus for making mill board or paper, which consists of a water tight box *a*, *a*, *a*, shown in section with one end or side *b* lower than the other three sides. Upon the bottom of this box are two or more supports or rests *c*, *c*.

d, *d*, represent a four sided frame or pulp box having fitted upon its bottom an ordinary laid or woven wire mold *e*. The outer box *a*, *a*, *a*, is filled with water to the top of the overflow or waste side *b*. The pulp box *d*, *d*, must then be lowered into the box *a*, *a*, *a*, upon the rests or supports *c*, *c*, which will cause the water in the box *a*, *a*, *a*, to pass through the mold *e* until it fills the pulp box *d*, *d*, to the water level of the water box *a*, *a*, *a*. The pulp box *d*, *d*, must be of a depth proportionate to the thickness of the paper or mill board required and the mold *e* may be attached to the bottom of this box *d*, *d*, by means of small hooks or by any other convenient means.

The figures in Sheet 2 are drawn on a scale of about three inches to the foot.

The apparatus is now ready for making paper or mill board which is to be performed by first having the pulp prepared in a fluid state to a proper consistency. A quantity of this pulp according to the thickness of the paper or mill board required is now to be poured into the pulp box *d d* in such a manner as to diffuse itself equally through the mass of water contained within the pulp box *d*, *d*. Immediately after pouring in the pulp as before described the pulp box *d*, *d*, is to be raised perpendicularly out of the water by which the water will pass through the mold *e* and leave the pulp deposited thereon in a fit state for laying upon the felts, the frame *d*, *d*, having been previously removed from the mold *e* for that purpose in the manner usually adopted by hand mold paper makers.

Now whereas it is obvious that this my invention above set forth may be varied in detail according to circumstances I desire it to be understood that I do not claim the employment of any of the parts of the machinery or apparatus separately, but

I do claim my invention—

1. The combination and arrangement of the respective parts of the apparatus as described, by which the straw or other material is subjected in succession to the boiling, washing and bleaching processes, the respective vessels the tubes for the conveyance of water and steam, and for the transference of the material, and the apparatus for reducing it to pulp, being arranged and operating substantially as herein set forth, by which means the complete preparation of the paper pulp is effected more economically than heretofore.

2. I likewise claim the construction of the apparatus for converting the pulp into paper, or mill board; said apparatus consisting of a water tight box, and of a deep frame the movable bottom of which constitutes the paper mold; said box frame and mold being in the arrangement of its parts, and in its operation, such as is herein described and represented.

In witness whereof I the said LEMUEL WELLMAN WRIGHT have hereunto set my hand this first day of November one thousand eight hundred and forty-four.

LEMUEL W. WRIGHT.

Witnesses:
J. W. MOFFATT,
FRED WALKDEN.