No. 725,877. PATENTED APR. 21, 1903.

A. ROMMENEY.

MIXING AND BLEACHING ENGINE.

APPLICATION FILED JULY 21, 1902.

NO MODEL.

Fig: 1.

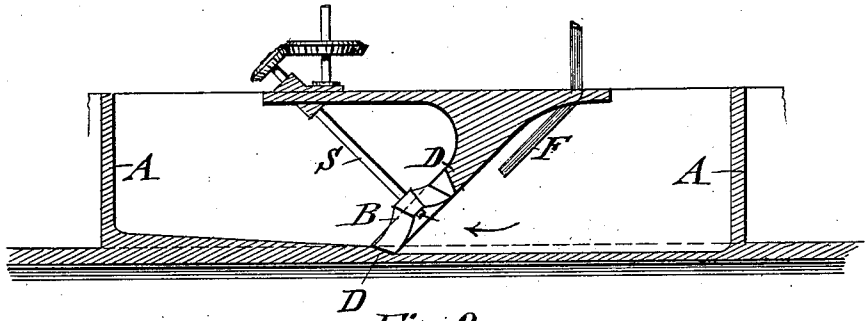



Fig: 2.

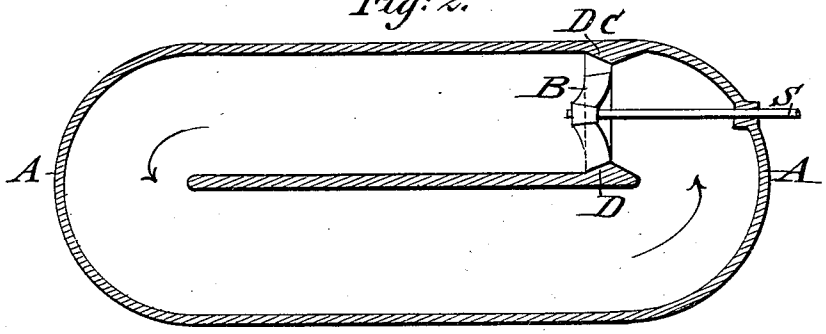
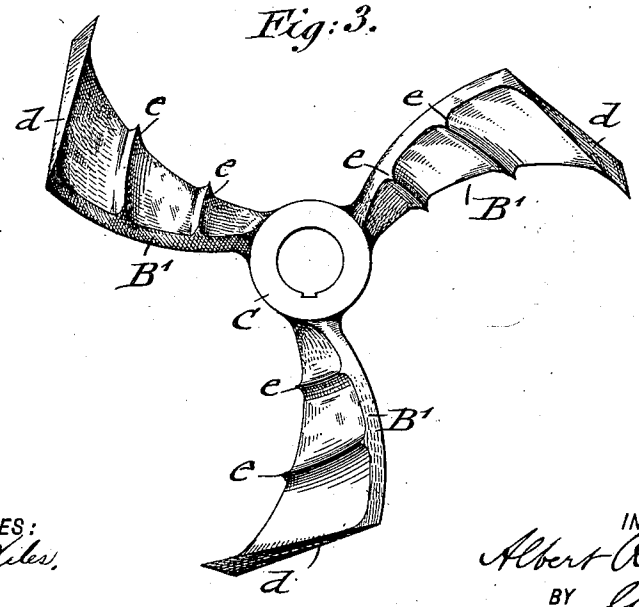



Fig: 3.




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# UNITED STATES PATENT OFFICE.

ALBERT ROMMENEŸ, OF MUSKEGON, MICHIGAN.

## MIXING AND BLEACHING ENGINE.

SPECIFICATION forming part of Letters Patent No. 725,877, dated April 21, 1903.

Application filed July 21, 1902. Serial No. 116,403. (No model)

*To all whom it may concern:*

Be it known that I, ALBERT ROMMENEŸ, a citizen of the Empire of Germany, residing at Muskegon, in the county of Muskegon and State of Michigan, have invented certain new and useful Improvements in Mixing and Bleaching Engines, of which the following is a specification.

In the manufacture of paper, cellulose, and strawboard and in the textile industries various devices were heretofore proposed for the bleaching of the different materials. One of these devices was a plain wooden paddle-wheel which moved the dissolved bleaching substances around in an ordinary rag-engine, or the diluted mass was passed continuously through several tanks in which it was placed in contact with the bleaching solution. In all these cases not only a long time was required for producing the proper bleaching, but none of them combined properly the motion of mixing and bleaching in a satisfactory degree. Constructions were therefore devised by which the mass was moved quicker and mixed more intimately with the bleaching substances; but all these constructions required considerable power and propelled the pulp either too quickly or the dimensions of the mixing parts were too contracted or other objections to the pulp propelling and mixing mechanisms were found.

Heretofore calcium chlorid was almost exclusively used as the bleaching medium. It is well known that calcium chlorid itself exerts a bleaching action; but this action is much more effective and energetic when the same is brought together with an acid. An acid produces the immediate decomposition of the calcium chlorid, so that the chemical action of the bleaching process is a double one. Though the chemical constitution of calcium chlorid has not been exactly fixed, the formula of Balard has been generally accepted, according to which it is composed of a mixture of calcium chlorid and calcium hypochlorite. By the action of an acid chlorin is liberated from the calcium hypochlorite according to the formula:

$$CaOCl_2.H_2O+H_2SO_4=CaSO_4+Cl_2+2H_2O,$$

which shows that a direct bleaching action is effected on the substance to be bleached. Almost simultaneously, however, an oxidation process takes place, as by the influence of the acid on the calcium chlorid hypochlorous acid is liberated according to the formula:

$$Ca\begin{matrix}OCl\\OCl\end{matrix}+CaCl_2+2HCl=2CaCl_2+2HOCl,$$

which under formation of HCl liberates oxygen

$$2HOCl=2HCl+O$$

or forms chlorin with hydrochloric acid according to the formula:

$$2HOCl+2HCl=2H_2O+4Cl.$$

This chlorin forms *in statu nascendi* with the hydrogen of the water hydrochloric acid and secondarily oxygen

$$2H_2O+4Cl=4HCl+2O,$$

so that in both cases by the formation of oxygen that is produced *in statu nascendi* a quick oxidation of the dyestuff results. This decomposition is produced by every acid, even by the carbonic acid of the air. This liberated hypochlorous acid is decomposed under formation of hydrochloric acid, while the further decomposition of the calcium chlorid is produced according to the formulæ referred to. In most of the bleaching plants this fundamental course of the bleaching process has not been considered. It was attempted to produce the decomposition of the calcium chlorid by adding to the bleaching solution an acid, and for the sake of cheapness sulfuric acid was used, so as to accelerate the bleaching action. This, however, was done to some extent to the injury of the substance to be bleached, as even with a sufficient addition of acid it could not be mixed quickly and intimitely enough with the substance to be bleached for producing the chemical combination with the calcium chlorid and prevent at the same time any destructive action on the fibers. To prevent this, the addition of acid was made so small that it was rendered ineffective. The use of weak acids, on the other hand—such as acetic acid, carbonic acid, &c.—was given up on account of the expense and on account of the impossibility of producing a direct and effective mixing with the substances to be bleached and a quick action on the same.

The object of this invention is to overcome the effect of the bleaching process before used and to furnish a bleaching and mixing engine by which all conditions required of a perfect bleaching and mixing process are completely met and for this purpose to supply an engine which produces the suction and force part of the work simultaneously with the mixing of the pulp without compressing the same and which at the same time is actuated in such a manner that pasteboards, &c., are gradually broken up, comminuted, and finally dissolved.

My invention consists, therefore, of a mixing and bleaching machine in which the driving power is supplied by a turbine-wheel provided with a multiple of radial wings having circumferential flanges and intermediate flanges between the hub and circumferential flanges, said intermediate flanges being parallel with the circumferential flanges, said turbine-wheel being placed within the casing that is located in the turbine of the engine, so that the pulp, with the bleaching substances applied to the same, is forced rapidly through the openings between the wings of the turbine-wheel while it simultaneously mixes the bleaching substances.

In the accompanying drawings, Figure 1 is a vertical section of a bleaching and mixing engine, showing one form of arrangement of my improved turbine-wheel in the same. Fig. 2 is a plan view showing another arrangement; and Fig. 3 is a perspective view, drawn on a larger scale, of my improved turbine for bleaching and mixing engines.

Similar letters of reference indicate corresponding parts.

In the drawings, A represents the tank of my improved bleaching-engine, which is made of the usual dimensions and construction, and B a turbine-wheel which is provided with a multiple number of radial wings B′, that extend radially from the hub C, said wings increasing in width from the center of the hub toward the outer circumference of the same. At the outer circumference of the wings B are arranged circumferential flanges *d*, that are arranged concentrically with the hub and which project in the direction of the motion of the pulp. On the wings B are arranged a number of additional flanges called "wing-flanges" *e*, which are arranged concentrically with the circumferential flanges *d* and which, like the same, are made tapering, so as to form transversely-curved ribs on the wings B. These wings, with their circumferential and wing flanges, impart the required motion to the pulp and liquid that is to be mixed in the tank and force them through the cell-shaped portions formed between the flanges, so as to exert a suction and force action on the pulp, liquids, and gases—such as atmospheric air, carbonic acid, sulfuric acid, &c.—and mix them thoroughly with the pulp to be bleached and the bleaching liquid in such a manner that but a small percentage of the gases can escape, while by the intimate mixture of the parts the most favorable condition for the formation of the chemical combinations is obtained. The flanges have the additional advantage that they act mechanically on sheets or boards in the pulp and gradually break up, comminute, and dissolve the same. The entire turbine-wheel is located in a casing that fits closely around its circumferential flanges, so that none of the mass to be bleached can pass through the circumference of the wheel and the casing. The shaft of the turbine-wheel is supported in suitable neck-bearings on the tank of the bleaching-engine and is rotated by any suitable transmission. The bleaching liquid is supplied through a supply-pipe that passes downwardly into the tank and the end of which terminates in the turbine-wheel, as shown in Fig. 1. The direction of motion of the mass to be bleached is indicated by arrows in Figs. 1 and 2, the flanged wings of the turbine-wheel acting by their transverse cells that are open in the direction of the motion of the mass in the nature of a pump that produces by the suction action and centrifugal motion imparted to the mass a propelling motion to the same, which is resisted by the flanges on the wings, so as to force the liquids and gases permanently forward while simultaneously mixing the same.

The turbine-wheel may be made in any size required without impairing its efficiency. By its motion it sucks in from the atmosphere a sufficient quantity of air and mixes thereby the carbonic acid contained in the air with the mass to be bleached, so as to mix it intimately with the same and to gradually combine chemically therewith. It permits the use of tanks of comparatively large size, which is another advantage for the bleaching action. The rechanges which are supplied in the liquid or gases formed are similarly sucked in and mixed with the mass to be bleached without permitting the escape of the same into the atmosphere, so that they are utilized to their fullest extent. All bleaching substances are introduced through the supply-pipe below the cover arranged over the tank above the turbine-wheel and are thus effectively drawn in and mixed with the mass, so as to be placed into chemical combination therewith by the before-mentioned suction and mixing action of the wheel.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, with a mixing and bleaching engine the tank of which is provided with a casing, of a rotary turbine-wheel the radial wings of which are provided with tapering circumferential and intermediate flanges, substantially as set forth.

2. The combination, with a mixing and bleaching engine the tank of which is provided with a casing, of a rotary turbine-wheel the radial wings of which are provided with

tapering circumferential and intermediate flanges, and means located near said turbine-wheel for supplying the bleaching substances to the tank, substantially as set forth.

3. A turbine-wheel for mixing and bleaching engines, consisting of radial wings increasing in width from the hub toward the circumference and provided with circumferential and intermediate tapering flanges extending transversely to the wings, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

ALBERT ROMMENEY.

Witnesses:
R. PAGENSTECHER,
E. J. GEDDES.