# UNITED STATES PATENT OFFICE.

JOHN PRIESTLEY, OF NEW YORK, AND THOS C. BRADBURY, OF POUGHKEEPSIE, N. Y.

## IMPROVED PROCESS OF PREPARING PAPER-PULP FROM STRAW.

Specification forming part of Letters Patent No. **55,706**, dated June 19, 1866.

*To all whom it may concern:*

Be it known that we, JOHN PRIESTLEY, of the city, county, and State of New York, and THOS. C. BRADBURY, of Poughkeepsie, in the county of Dutchess, in said State, have invented new and useful Improvements in the Process of Preparing Pulp and Making Paper from Straw and other similar Vegetable Substances; and we do hereby declare that the following is a full and exact description thereof.

The straw or other vegetable fibrous material is first cut into pieces of about three-quarters of an inch in length, by means of any suitable cutting-machine, and the pieces are then passed through a grain cleaner or separator, which removes all the grain that may have remained in the straw and most of the knots of the straw. After the stock is thus broken and cleaned, it is passed between two heavy iron rollers, which are so placed with regard to each other that their surfaces are nearly in contact, and are moved at an unequal speed, so as to produce both a rolling and sliding motion. The pieces of straw are by this operation split and flattened and any remaining joints crushed, so that the pieces are opened to the influence of the chemical agents to which they are to be subjected.

The stock thus prepared is then packed as closely as possible in a rotary boiler revolving horizontally. A solution of soda made caustic by lime, in which Baumé's hydrometer stands at from 2½° to 3°, is prepared in a separate vessel by dissolving about one pound of soda-ash in three gallons of water, and is introduced in the boiler in the proportion of about sixty gallons of the alkaline solution to each one hundred pounds of straw, and in quantity sufficient to fill the boiler about half full. The boiler is then closed and the heat applied so as to raise the temperature of the contents of the boiler gradually to a degree of heat corresponding with a pressure of about sixty pounds. The straw remains in the boiler for about seven hours, and the temperature is usually raised to the required degree within the first three hours, and the boiling is then continued at that degree, or thereabout, for the remaining period. The boiler is then allowed to cool down, and its contents are discharged into an open tank and washed in clear water, so as to separate the alkali from the stock. At this stage of the process the fibers are not perfectly separated from each other, but some will adhere in small knots or bunches after the alkali is removed.

For the purpose of effecting a complete separation of the fibers the stock is next passed through a pulping-engine (that which is known as "Kingsland's" being preferred) into a drainer or tank with openings at the bottom or sides, or both. The pulp is then fitted to be manufactured into a strong brownish or yellowish paper, without mixing it with pulp derived from rags or other material of long fiber, and if it is desired to produce good white paper the pulp is bleached in the usual manner of bleaching paper-stock. It is then put into a mixing-engine for the purpose of mixing with it the bluing and sizing, and then run a second time through a pulping-engine (the Kingsland being preferred) to the Fourdrinier or other machine. This second use of a pulping-engine is not essential, but is desirable for the purpose of removing knots or bunches that may have been formed in bleaching.

By the above-described process we are able to produce a paper entirely from straw, superior to any paper made from straw with the admixture of fibers from rags or other fibrous material, and to dispense altogether with any portion of paper-stock more costly than that derived from straw.

We are aware that pulp suitable for the manufacture of paper has been derived from straw and other vegetable substances by a chemical process merely, by using a higher degree of heat than that used by us in our boilers, as in what is known as the "Mellier" invention, patented in this country on the 26th day of May, A. D. 1857, antedating to the 7th day of August, A. D. 1854, and by the Watt and Burgess invention, patented in this country on the 18th day of July, A. D. 1854, and antedated August 19, 1853; and also that an imperfect pulp was produced by a combination of a chemical process at a lower degree of heat than that used by us with a previous mechanical operation, as in what is known as the "Montgolfier" process, patented in France in the year 1838; but we are not aware that paper has ever been made from pulp wholly

produced from straw by the use of a mechanical process following the chemical process, and in combination with it and with a previous mechanical process, in the manner we have described.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The process effected by a crushing-machine used for the purpose of opening, splitting, or flattening the straw, with a rotary steam-boiler, as described.

2. The process effected by a crushing-machine, used for the purpose aforesaid, with the rotary steam-boiler containing the paper-stock operated at about sixty pounds pressure, substantially as described.

3. The process effected by a crushing-machine, used for the purpose aforesaid, with the rotary steam-boiler containing the paper-stock, and with a pulping-engine (Kingsland or other) for the purpose of disintegrating the fibers, substantially as described.

4. The combination of the rotary-boiler containing the paper-stock, operated at a pressure of about sixty pounds for the period described, with a pulping-engine, (Kingsland or other,) substantially as described.

5. The combination of a crushing-machine and boiler containing the paper-stock, operated at a pressure of about sixty pounds, and with a corresponding temperature for the period described, with a pulping-engine (Kingsland or other) for the purpose of disintegrating the stock and producing a fiber suitable for the manufacture of paper without the addition of other stock, substantially as described.

JNO. PRIESTLEY.
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Witnesses:
JNO. R. OFFLEY,
FRANK W. FOLK.