No. 707,985. Patented Aug. 26, 1902.

C. H. TOLHURST & A. G. GOLDTHWAIT.

PROCESS OF MAKING LAUNDRY STARCH.

(Application filed Feb. 3, 1898. Renewed July 14, 1902.)

(No Model.) 2 Sheets—Sheet 1.

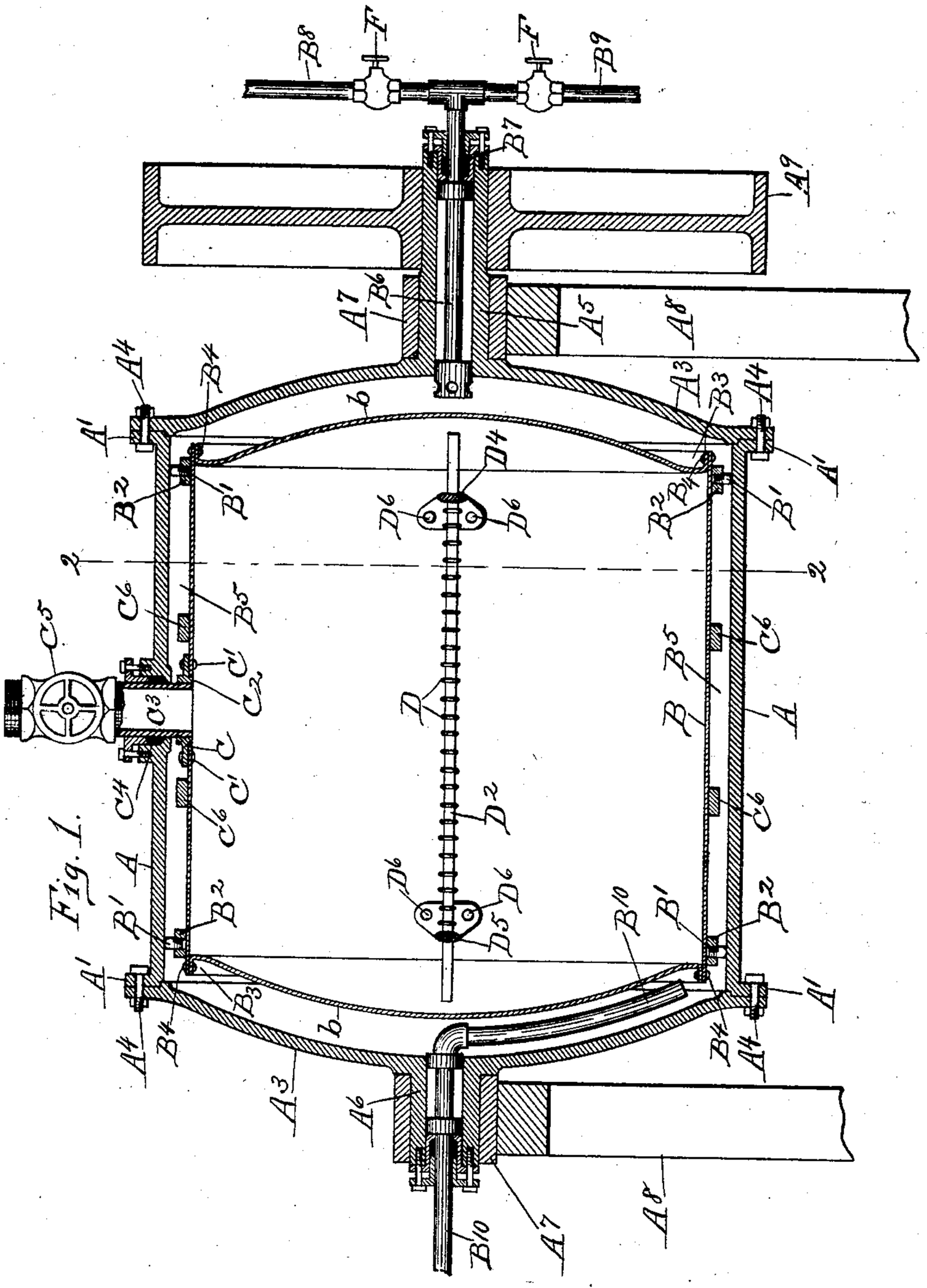

Fig. 1.

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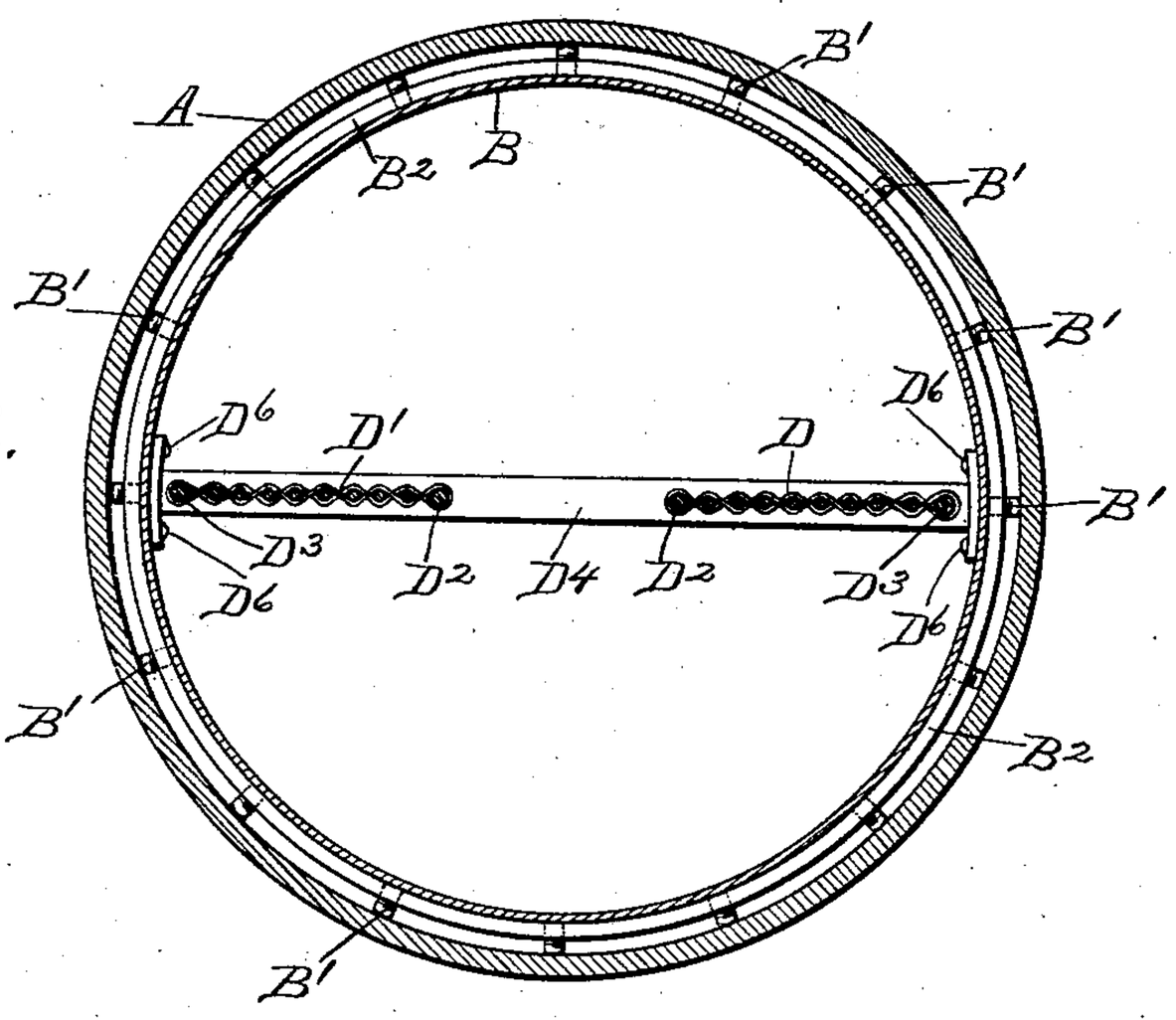
Fig. 2.



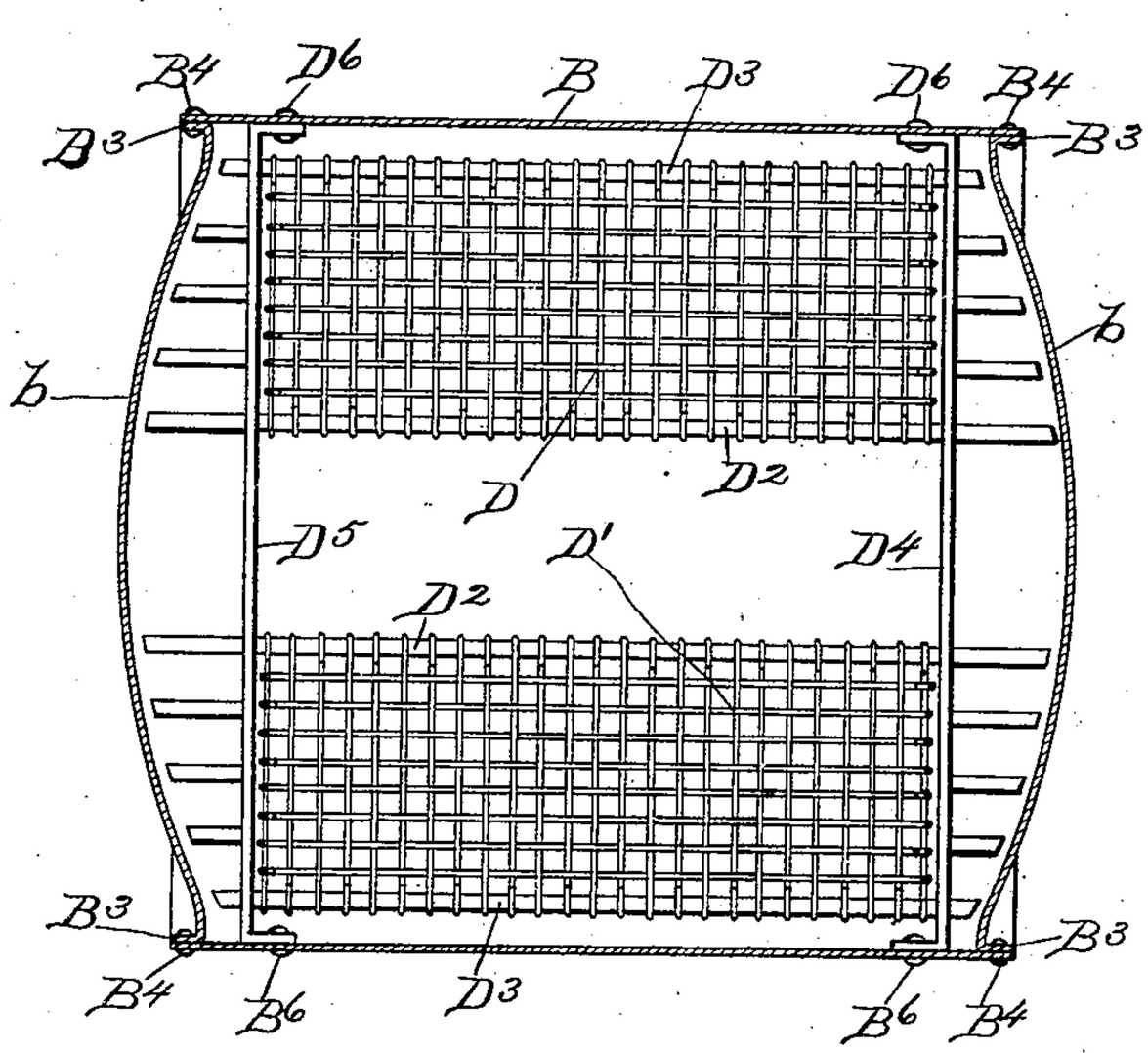


Fig. 3.

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UNITED STATES PATENT OFFICE.

CHARLES H. TOLHURST AND ABEL G. GOLDTHWAIT, OF TROY, NEW YORK, ASSIGNORS TO WILLIAM H. TOLHURST & SON, OF TROY, NEW YORK, A FIRM.

PROCESS OF MAKING LAUNDRY STARCH.

SPECIFICATION forming part of Letters Patent No. 707,985, dated August 26, 1902.

Application filed February 3, 1898. Renewed July 14, 1902. Serial No. 115,548. (No specimens.)

To all whom it may concern:

Be it known that we, CHARLES H. TOLHURST and ABEL G. GOLDTHWAIT, citizens of the United States, residing at Troy, county of Rensselaer, and State of New York, have invented certain new and useful Improvements in Processes of Making Laundry Starch, of which the following is a specification.

The invention relates to such improvements; and it consists of the novel construction and combination of parts hereinafter described and subsequently claimed.

Reference may be had to the accompanying drawings, and the letters of reference marked thereon, which form a part of this specification.

Similar letters refer to similar parts in the several figures.

Figure 1 of the drawings is a central vertical section of our improved apparatus, taken longitudinally of the axis of rotation. Fig. 2 is a vertical cross-section of the same, taken on the broken line 2 2 in Fig. 1. Fig. 3 is a central horizontal section of the inner cylinder or receiver detached and showing the radial agitator in plan.

A is a cylinder or drum, preferably made of cast-iron and comprising a barrel provided at each end with an annular flange A′, to which the heads A^3 are secured by means of the bolts A^4. The heads are provided with trunnions A^5 and A^6, rotary in suitable bearings A^7 in the supports A^8. Before the heads are secured to the barrel another smaller cylinder or receiver B is inserted in the barrel and held centrally therein by means of the screw-studs B′, inserted in screw-threaded apertures in the annular hoops or rings B^2, which encircle the receiver. Before the heads of the outer drum are secured to the barrel these screws are so adjusted as to support the two cylinders concentrically with each other. The inner drum or receiver is preferably made of copper, and its heads *b* are provided with edge flanges B^3, which are secured to the cylindrical part by rivets B^4. Both the drums are steam-tight and separated from each other by a considerable space B^5, which is also steam-tight and forms a steam-chamber surrounding the receiver. Steam is admitted to this chamber through the trunnion A^5, which contains a pipe B^6, passed through a stuffing-box B^7 to make a tight joint in the usual manner. This pipe B^6 is provided exteriorly of the trunnion with branches B^8 and B^9, one leading to a steam-supply and the other to a cold-water supply and each having a valve F. The other trunnion A^6 contains a pipe B^{10}, also passed through a stuffing-box and extended down nearly to the lower side of the chamber B^5 for the purpose of taking off the exhaust and water of condensation. The trunnion A^5 is also provided with a drive-pulley A^9, fixed thereon. The receiver is also provided with a metal plate C, secured by rivets C′ to the cylindrical part, which is apertured to receive the annular flange C^2, and the plate is apertured and interiorly screw-threaded to receive the inlet and outlet nipple C^3, which is inserted through a stuffing-box C^4 and aperture in the wall of the outer drum. The exteriorly-projecting end of the nipple is screw-threaded to receive a valve C^5, which is not shown in section, as it may be of any known construction. When desired, the receiver may be strengthened by hoop flanges or rings C^6. The receiver may also when desired be provided with means for stirring, screening, or agitating its contents, as the screens D and D′, occupying interior radial planes. The screens are preferably composed of open-meshed wire-netting secured to the cross-rods D^2 and D^3, supported by the radial arms D^4 and D^5, secured to the receiver-wall at their ends by rivets D^6.

The inner drum or receiver being about half filled with a mixture of starch and cold water through the valved inlet and the valve closed, the operation of the apparatus is as follows: Power is applied to slowly rotate the drums and live steam is admitted to the steam-chamber until the spheroidal particles containing the amylaceous matter burst and the farina forms with the heated water a mucilaginous paste adapted when cooled for laundry purposes. The water of condensation is forced from the steam-chamber by the steam-pressure through the eduction-pipe, as

before explained. After the spheroidal particles have burst and the entire mass has entered into solution the steam is shut off and when desired cold water admitted into and run through the steam-chamber to cool the mass to the desired temperature, the rotation of the drum being continued, after which it is drawn off into a tub or other receptacle ready for use.

By our improved method the steam is not brought into contact with the starch, as heretofore commonly practiced, thereby preventing excessive water and fluidity due to condensation, and by confining the mixture in a tight vessel or receiver and rotating the receiver a constant rolling motion is imparted to the confined mass, which brings all the spheroids gradually and successively into close proximity to the heated wall of the receiver, and no part of the receiver being subjected to greater exterior heat than that contained in the surrounding steam none of the spheroids are burned and all are heated to the bursting-point, so that we are able not only to secure a superior quality of starch, but to complete the operation in less time than required by the usual method. It is also of great importance that we are able to secure uniformity of product in successively repeated operations of the apparatus. Uniformity of mixture and speed of rotation are always obtainable, and the proportions of the mixture are not affected by condensation in the steam-chamber.

Good results are obtained without the agitator; but with it the operation may be fully accomplished in a comparatively short time.

The treated solution can be kept in the closed receiver for a long time without evaporation or deterioration. When the solution is left in an open tub in a laundry, it soon sours and becomes worthless. Being treated in a closed receiver, all germs are killed by the heat and others cannot reach the interior of the receiver. The rotary movement of the receiver gives the inclosed mixture a uniform and constant agitation favorable to the conversion of the entire mass from a simple mixture into a solution, as already explained, and, further, it insures the uniform and equal heating of every particle, all the particles being subjected on every side to heat transmitted through the circumferential wall of the receiver with which they have a rolling contact, and this equally-distributed heating effect is of the substance of the improvement.

While the described apparatus is especially adapted for use in treating starch, it is also adapted for use in treating farinaceous foods and other articles.

When desired, the receiver may be provided with two or more valved inlets, one serving as an inlet and another as an outlet.

Our improvement in the art of treating starch contemplates cooling the hot solution as well as dissolving the insoluble starch. It is well known to laundrymen that better results can be obtained by applying starch to fabrics in a cold rather than a hot condition; also, that a hot starch solution allowed to cool in the usual manner forms when cold a semi-solid mass, which can be inserted in fabrics only with great and persistent effort. Its characteristics are that it will not flow readily and if discharged from one receptacle into another drops in large irregular lumps, and in preparing it for use laundrymen have practiced breaking up this mass by forcing it while cold through a cloth strainer. We have discovered that if a hot solution of starch is cooled while isolated in a closed vessel and at the same time thoroughly agitated it assumes a condition when cold such that it will flow like a thick fluid and can be inserted in fabrics as easily as strained starch. In carrying out this feature of our improvement we employ cold water and apply the water while the hot solution is still isolated in the closed vessel, using the same apparatus that was employed to dissolve the starch, forcing the water through the chamber between the two drums and at the same time rotating the drums, as hereinbefore described, to agitate the solution. The heating and cooling are successive steps in a continuous operation. The mixture and the solution contained in the inner drum or receiver are wholly isolated and cut off from all other substances during the whole operation of heating as well as cooling. Not even steam is admitted to weaken the solution, and no germs or other foreign substances can enter the receiving-drum until after the operation is complete and the receiving-drum opened for the purpose of discharging the cold starch.

The particles of starch are not only thoroughly stirred by the screens D and D′ before bursting to secure a uniform distribution of the applied heat throughout the mixture, but after these particles have become hydrated and swollen the screens serve to cut and finely subdivide these swollen particles and free the soluble part from the inclosing tissue or sac, thereby effecting a uniform solution of the soluble portion of the particles and destroying all structure.

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

1. That improvement in the art of making laundry starch which consists in heating starch with water until it becomes hydrated, and then cutting and finely subdividing the mass until all structure is destroyed.

2. That improvement in the art of making laundry starch which consists in heating starch with water until it becomes hydrated, and then simultaneously cutting, finely subdividing and cooling the mass until all structure is destroyed.

3. That improvement in the art of making

laundry starch which consists in simultaneously isolating from external contamination, agitating and superheating a mixture of insoluble starch and water until the starch becomes soluble and is partially dissolved, and then while so isolated simultaneously cutting, finely subdividing and cooling the isolated mass.

In testimony whereof we have hereunto set our hands this 26th day of January, 1898.

C. H. TOLHURST.
A. G. GOLDTHWAIT.

Witnesses:
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