

No. 773,783.

PATENTED NOV. 1, 1904.

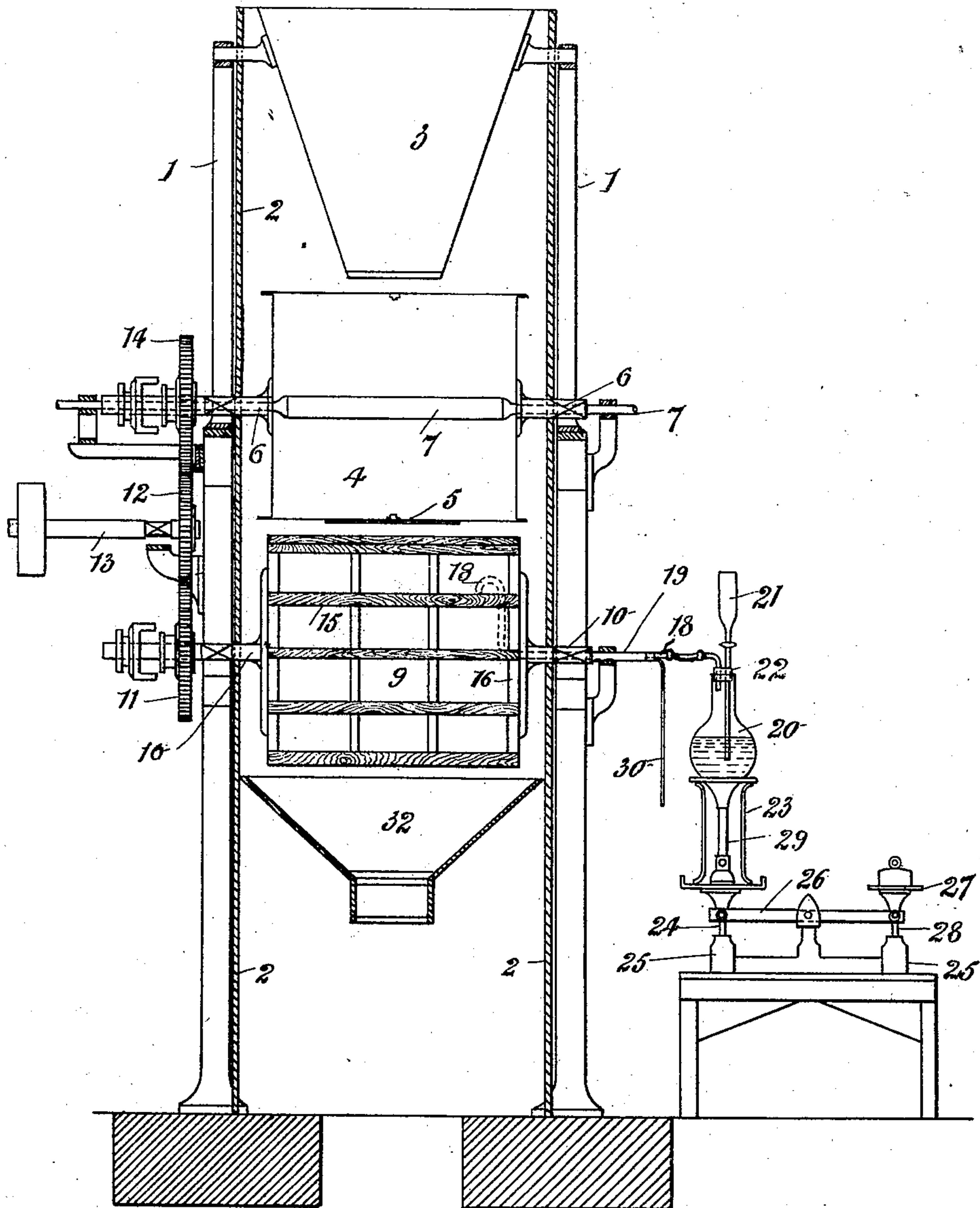
W. BROWNING & J. J. BARLOW.  
APPARATUS FOR MAKING SOLUBLE STARCH.

APPLICATION FILED NOV. 24, 1903.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

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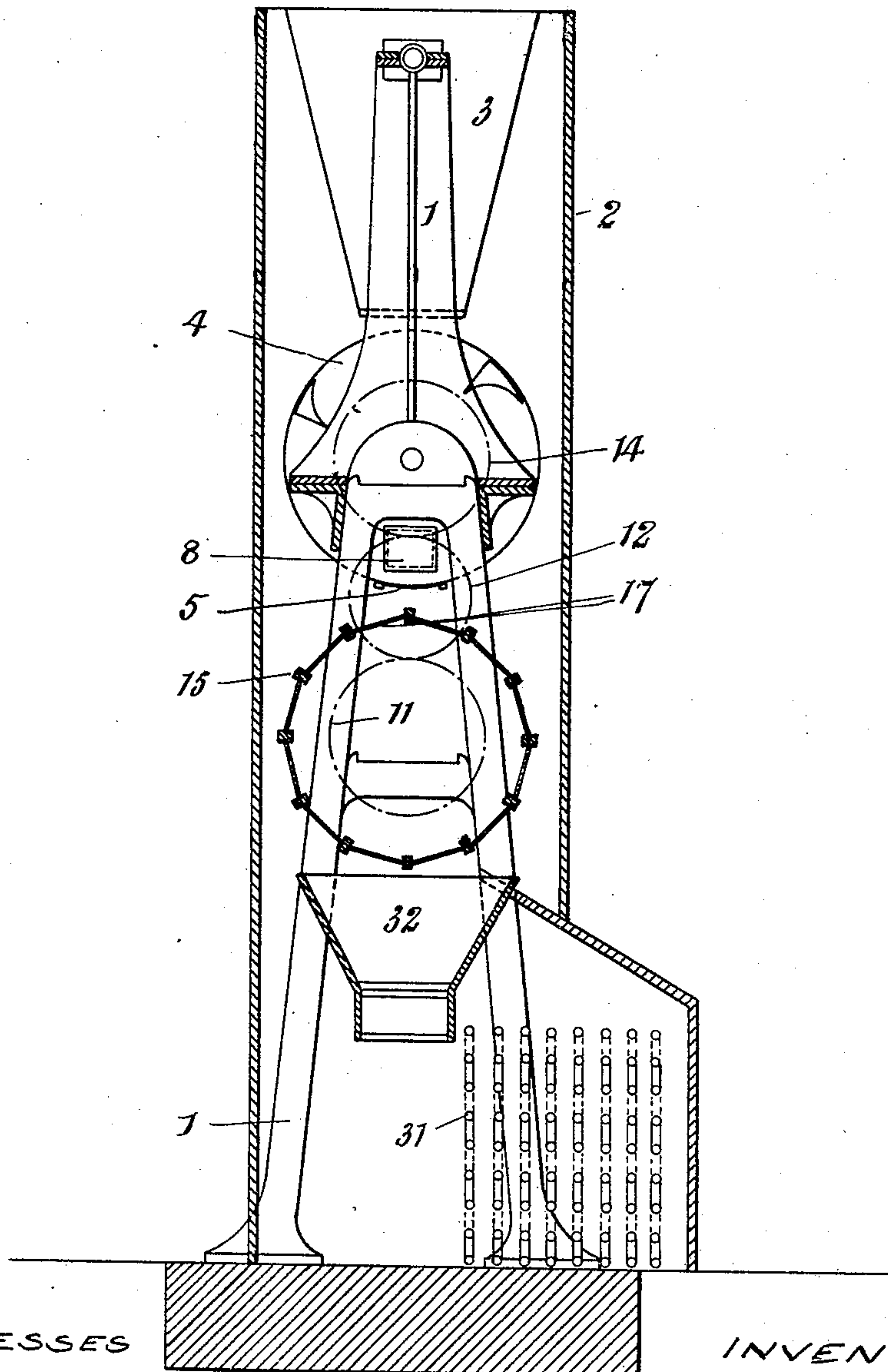
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APPLICATION FILED NOV. 24, 1903.

NO MODEL.

2 SHEETS—SHEET 2.

Fig. 2.



WITNESSES

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# UNITED STATES PATENT OFFICE.

WILLIAM BROWNING AND JOHN JAMES BARLOW, OF ACCRINGTON,  
ENGLAND.

## APPARATUS FOR MAKING SOLUBLE STARCH.

SPECIFICATION forming part of Letters Patent No. 773,783, dated November 1, 1904.

Application filed November 24, 1903. Serial No. 182,503. (No model.)

*To all whom it may concern:*

Be it known that we, WILLIAM BROWNING and JOHN JAMES BARLOW, of Broad Oak Works, Accrington, in the county of Lancaster, England, have invented certain new and useful Improvements in Apparatus for Converting Starch into Soluble Starch and Dextrine and for Like Operations, of which the following is a specification.

Our invention relates to improvements in apparatus for converting starch into soluble starch and dextrine and for like operations, and is particularly applicable to the process of converting starch described in the specification to our United States application of even date herewith.

The principal and essential feature of the above process lies in the treatment of ordinary starch in the form of powder with a suitable acid in the form of gas, vapor, or fine spray; and the object of our present invention is to construct an improved form of apparatus designed to simplify, expedite, and cheapen the process of conversion. We attain this object by the apparatus illustrated in the accompanying two sheets of drawings, in which—

Figure 1 is a front sectional elevation, and Fig. 2 is a side sectional elevation, of the machine.

In the views, 1 denotes the frame or standards, to which are secured boards or plates 2, forming a chamber, at the top of which is mounted a hopper 3, below which is mounted in bearings carried by the standards 1 a cylinder 4, made, preferably, of tin-plate, or it might be of other suitable material. The cylinder 4 is for heating the powdered starch, which is first charged into the hopper 3 and thence passed into the cylinder 4 through a sliding door 5. The trunnions 6 of the cylinder are hollow, and a steam-pipe 7 passes through them and the cylinder 4 to heat the powdered starch contained therein. A door 8 (see Fig. 2) is also fitted at one end of the cylinder 4 to facilitate examination and enable the contents to be stirred when required.

Below the cylinder 4 is mounted in bearings in the standards 1 a second cylinder 9, which forms the converter. One of the trunnions

10 may be solid, while the other is hollow, and on the solid trunnion is fixed a spur-wheel 11, which receives motion from a spur-wheel 12, fixed on the driving-shaft 13. The spur-wheel 12 also gears into a spur-wheel 14, fixed on one of the trunnions 6, and so gives motion to the drying-cylinder 4; but instead of the arrangement shown and above described any other suitable driving-gear for rotating or oscillating the cylinders 4 and 9 may be employed. The converter 9 is preferably made of wood only or of wood lined with glass, slate, earthenware, or other acid-resisting material. In the drawings it is shown made up of twelve sides or panels fitted in grooves in longitudinal ribs or rails 15, which are carried by the ends 16 of the converter, and two of the panels are fitted as doors 17 to slide out endwise when required to transfer the heated starch powder from the cylinder 4 to the converter 9 and to enable the soluble starch or dextrine to be removed from the latter after the operation of conversion has been concluded.

Through the hollow trunnion 10 of the converter 9 passes a pipe 18, of glass, earthenware, or other suitable material, which inside the converter is bent upward into the form of a swanneck and may either have an open end or be perforated with small holes. The straight part of the pipe 18 outside the bearing is held firm and prevented from rotating by a clamp 19, and the pipe may be supplied with acid-vapor from any suitable source of supply. For example, as shown, we may employ the device of a balanced flask for convenience in regulating the supply and ascertaining by weight the amount of acid consumed. In this arrangement the flask 20 is supplied with acid through a filling-tube 21, and the end of the pipe 18 is bent downward and passes into the flask through the cork or stopper 22, which also supports the filling-tube. The flask 20 rests on a metal stand 23, the stem 24 of which is fitted to slide in a guide-block 25, and to the sliding stem 24 is pivoted one end of the balance-arm 26 of a weighing appliance, the weight-tray 27 of which is pivoted to the other end of the balance-arm and has a stem 28 fitted to slide in



a second guide-block 25. In the metal stand 23 is placed a gas-burner 29, supplied with gas by means of a flexible or telescopic pipe, (not shown,) and this burner supplies the necessary heat for distilling the acid in the flask 20 and driving it in the state of gas or vapor through the swanneck-pipe 18 into the converter 9, where it is absorbed by the heated starch powder. The pipe 18 is not made of glass throughout, but is divided about mid-length between the pipe 30 and the flask, and its two parts are coupled together by an india-rubber or other flexible tube to give the necessary freedom of movement.

Any acid-gas condensing in the pipe 18 is carried away by a small drain-pipe 30 connected thereto.

The chamber formed by the standards 1 and the boards 2, which incase the hopper 3, heating-cylinder 4, and converter 9, may be provided with doors at certain points to give access to certain parts of the apparatus where necessary, and the chamber is heated by an arrangement of steam-pipes 31 suitably placed near the bottom of the chamber, as shown in Fig. 2.

In operation the powdered starch is charged through the hopper 3 into the cylinder 4 while the sliding door 5, Fig. 1, is open. Then the door 5 is closed and the cylinder 4 rotated until the starch has been heated to the required temperature. The machine is then stopped with the sliding door 5 at the bottom of the heating-cylinder and immediately over the sliding panels 17, which will then be at the top of the converter 9, so that by sliding out the panels 17 and opening the door 5 the heated starch-powder can be transferred from the cylinder 4 to the converter 9. Then the doors 5 and 17 are closed, the machine restarted, and acid-vapor from the flask 20 is allowed to enter the gently-rotating converter 9 and act upon the starch-powder therein, which is maintained at the required temperature, and the

treatment continued until the starch is converted into soluble starch or dextrine, as required, and which is determined by the temperature. At the end of the process the material in the converter 9 can be discharged through the sliding panels 17 into the hopper 32 below the converter and thence into any convenient receptacle.

The amount of acid consumed can be determined and regulated by weighing the amount in the flask at the beginning and at the end or at any intermediate stage in the process of conversion.

We do not limit ourselves to the arrangement of steam-pipes herein shown and described, as any other suitable arrangement and means for heating the chamber and its vessels may be employed.

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

1. In combination, a rotary heating-cylinder, a steam-pipe extending through the same, a rotary converter, means for heating the same, a pipe extending through one of the trunnions thereof for introducing acid in the form of gas, vapor or fine spray into the converter and means for charging and discharging the cylinder and converter, all substantially as and for the purposes herein set forth.

2. In combination, a rotary heating-cylinder, a rotary converter, means for heating the cylinder and converter, a pipe entering said converter for introducing acid thereto, said pipe ending in a swanneck in the converter and means for charging and discharging the cylinder and converter.

In witness whereof we have hereunto set our hands in presence of two witnesses.

WILLIAM BROWNING.  
JOHN JAMES BARLOW.

Witnesses:

HENRY BOMOULLI BARLOW,  
HERBERT ROWLAND ABBEY.