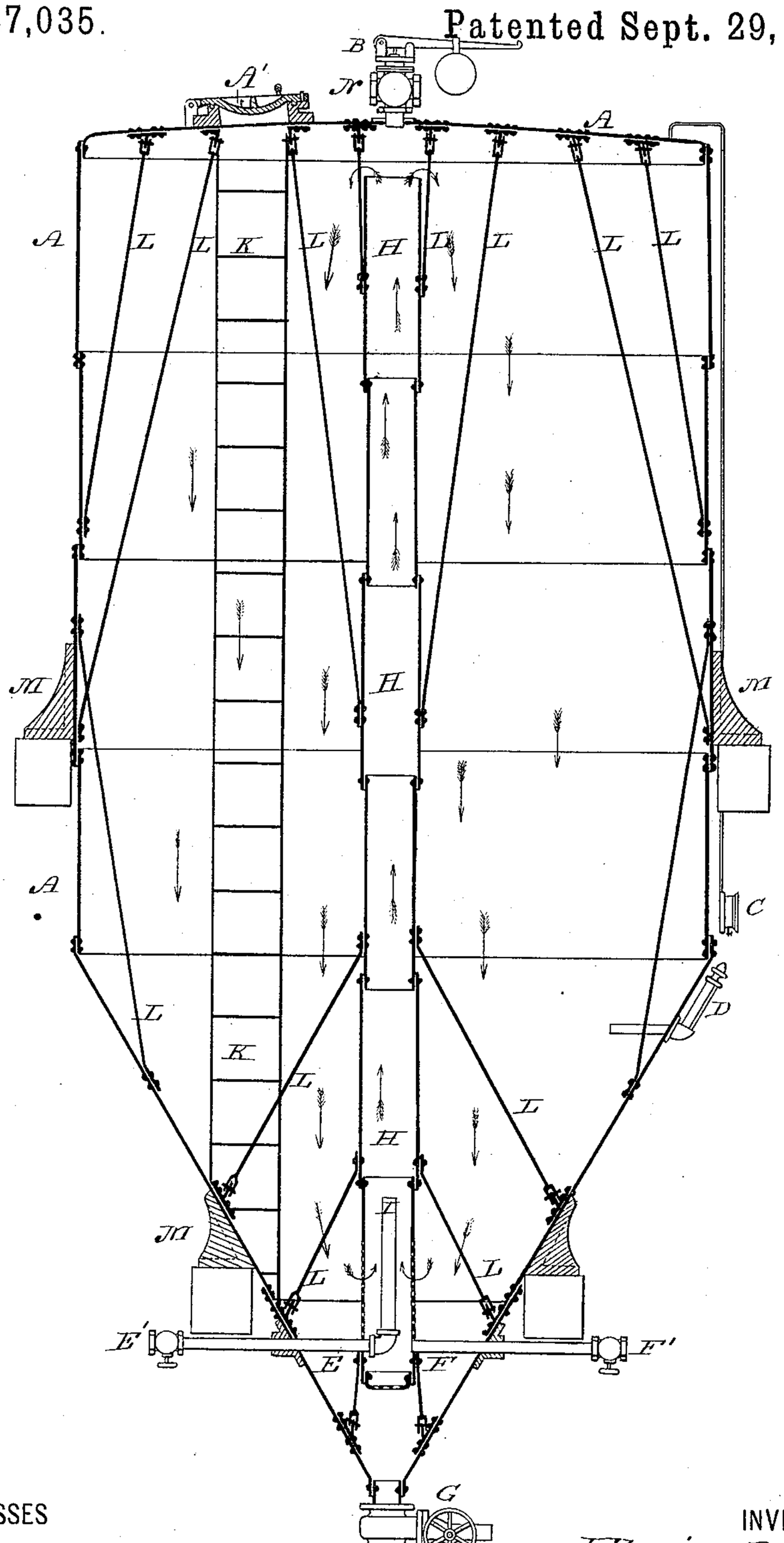
(No Model.)

F. P. STIKER.

ART OF MANUFACTURING STARCH.

No. 327,035. Patented Sept. 29, 1885.



WITNESSES

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ART OF MANUFACTURING STARCH.

SPECIFICATION forming part of Letters Patent No. 327,035, dated September 29, 1885.

Application filed July 22, 1885. (No model.)

To all whom it may concern:

Be it known that I, FLAVIUS P. STIKER, of Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in the Art of Manufacturing Starch, of which the following is a specification, reference being made to the accompanying drawing.

In the manufacture of starch from grain it is necessary to soak or steep the grain until it becomes soft and swollen, or in such condition, for example, that it may readily be mashed between the thumb and finger. It is not desirable, however, that its kernels be broken or disintegrated, but merely softened. This has heretofore been accomplished by soaking in tepid water or other suitable liquid in open or covered vessels under ordinary atmospheric pressure. The objection to this method is that it takes a long time and is too expensive. Grain has also been steeped under pressure in a closed vessel and agitated so as to rapidly soften and disintegrate it, making a pulpy mass or mash—as, for example, is set forth in the patent of Fox, No. 257,930. This is also very objectionable in the manufacture of starch, although not objectionable for some other purposes, such as the production of beer-wort or alcoholic mash.

My object is to speedily and thoroughly steep grain for the manufacture of starch without agitating it, or disintegrating it, or highly heating it, but simply to bring it quickly to the same condition it has after having been soaked a sufficient time in tepid water under ordinary atmospheric pressure.

My improvement in the manufacture of starch therefore consists in immersing grain in a steeping-liquor in a closed vessel and applying artificial pressure within the vessel to such a degree as to greatly speed the softening operation. The result is the grain will be quickly steeped without disintegration, and so economically prepared without waste or deterioration of starch-producing qualities for the subsequent steps in the manufacture of commercial starch. In order to accomplish such steeping and softening most advantageously, I employ a steeping-tank of peculiar construction in some respects, which I will describe by aid of the accompanying drawing, showing a vertical central section of my improved steeping-tank.

In the drawing, A indicates my improved steep-tank, preferably made of sheet-iron; but any other material may be used which will stand the required pressure, which pressure may vary according to the nature, kind, and quality of grain to be steeped. This tank is preferably made cylindrical with a conical bottom and closed top.

A′ indicates a man-hole for introducing the grain; but any other convenient arrangement with a cover for closing the opening may be used.

B indicates a safety-valve of ordinary construction, whereby any excess of pressure may be relieved.

C indicates a pressure-gage, also of ordinary construction, to indicate the degree of pressure.

D indicates a thermometer, of ordinary construction, for indicating the temperature of the contents of the tank.

E indicates a pipe, with a valve, E′, for introducing the steep-liquor, or for the introduction of steam or warm air to keep up the desired temperature.

F indicates the outlet-pipe, with a valve, F′, for drawing off the steep-liquor.

G indicates the discharge-valve for removing the steeped grain.

H indicates an internal tube extending from near the top of the tank to near its bottom, this tube being open at its top and perforated near its bottom for obtaining a thorough circulation of the steep-liquor, which enters through the pipe E and passes out at the top I of the tube, causing a circulating current in the direction indicated by the arrows—that is to say, up in the interior of the tube H, in which there is no grain, and out of its top, thence downward through the grain in the tank, and again through the perforations near the bottom of the tube, thus accomplishing a thoroughly even mixture with the grain in the tank.

Instead of the steep-liquor, which is usually tepid water, air, or various moist gases or steam may be introduced at E for the same purpose.

K indicates a ladder for descending into the tank, when desired, for the purpose of cleaning or repairing it.

L L indicate stays for strengthening the tank and bracing the tube H.

M M indicate brackets resting on cross-beams or any suitable frame-work (not illustrated) for supporting the tank.

N indicates an opening, to which may be attached a pipe with an ordinary valve (not illustrated) for introducing the fluid for causing pressure, which may be employed instead of the pipe E, if desired.

In operation it is convenient to partly fill the tank with the steep-liquor and then introduce grain, and then add more steep-liquor through the pipe E, thus causing the desired circulation; but the operation of filling may be varied at will. After the man-hole has been closed pressure may be applied either at N or at E by means of air, sulphurous acid, carbonic acid, or other suitable gases, or even steam or liquids may be used for the purpose. Pressure may also be obtained by chemical reaction inside of the tank itself. After the grain is sufficiently steeped, which with my apparatus will usually occupy about ten hours, more or less, the steep-liquor is drawn off at F, and the steeped and softened grain discharged at G, which is an opening provided with an ordinary valve at the bottom of the tank. By means of this closed tank and internal tube open at the top, but closed against the admission of grain at the bottom, and the application of pressure by artificial means the steep-liquor is caused to more rapidly penetrate the interior of the kernels of grain, thereby greatly reducing the time required for steeping and softening, and also preventing the escape of unwholesome or deleterious emanations in the atmosphere, and preventing the disintegration of the kernels of grain or injury of the starch-producing qualities of the grain or waste.

I am aware that grain has been treated in closed vessels under pressure in the presence of steam or warm liquor—as, for example, for certain purposes in the above-mentioned patent, which seeks to extract starch from grain; but such treatment is not adapted and is on the contrary destructive in a large measure to the manufacture of commercial starch; hence

What I deem to be my invention, and seek to secure by Letters Patent of the United States, is—

1. As an improvement in the art of manufacturing starch, the method of steeping grain herein described, which consists in confining it in a steeping-liquor within a closed tank and applying artificial pressure, so as to speedily soften but not disintegrate it, substantially as set forth.

2. The combination, with a closed tank, A, provided with appliances for admitting grain, steep-liquor, and fluids for exerting artificial pressure, of an internal tube, H, open at its top and perforated at its bottom and arranged so as to exclude grain and aid in the circulation of steeping-fluids, substantially as set forth.

In testimony whereof I have hereunto subscribed my name.

FLAVIUS P. STIKER.

Witnesses:
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