G. RILEY.

Making Glucose.

No. 7,148. Patented March 5, 1850

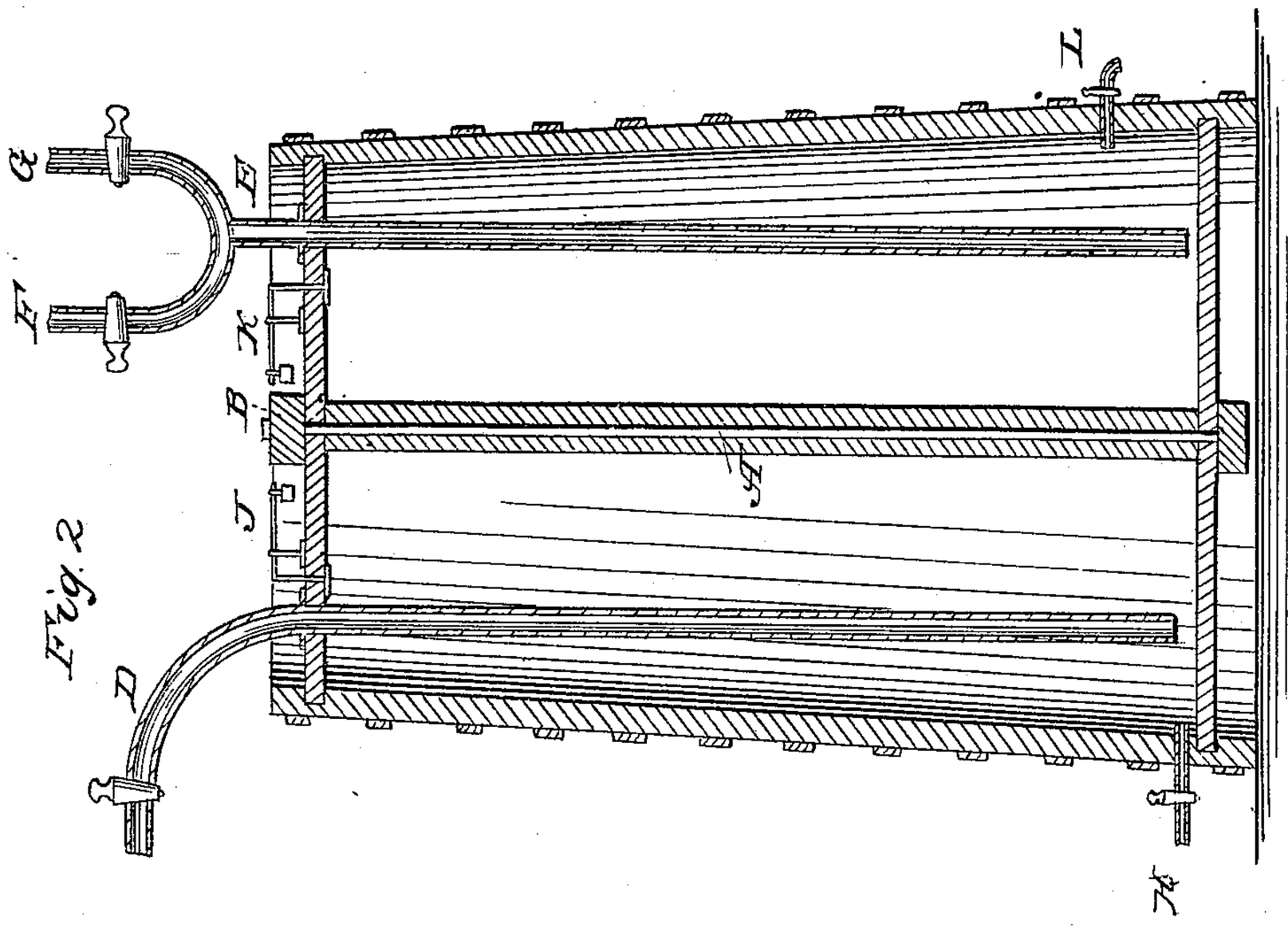

Fig. 2

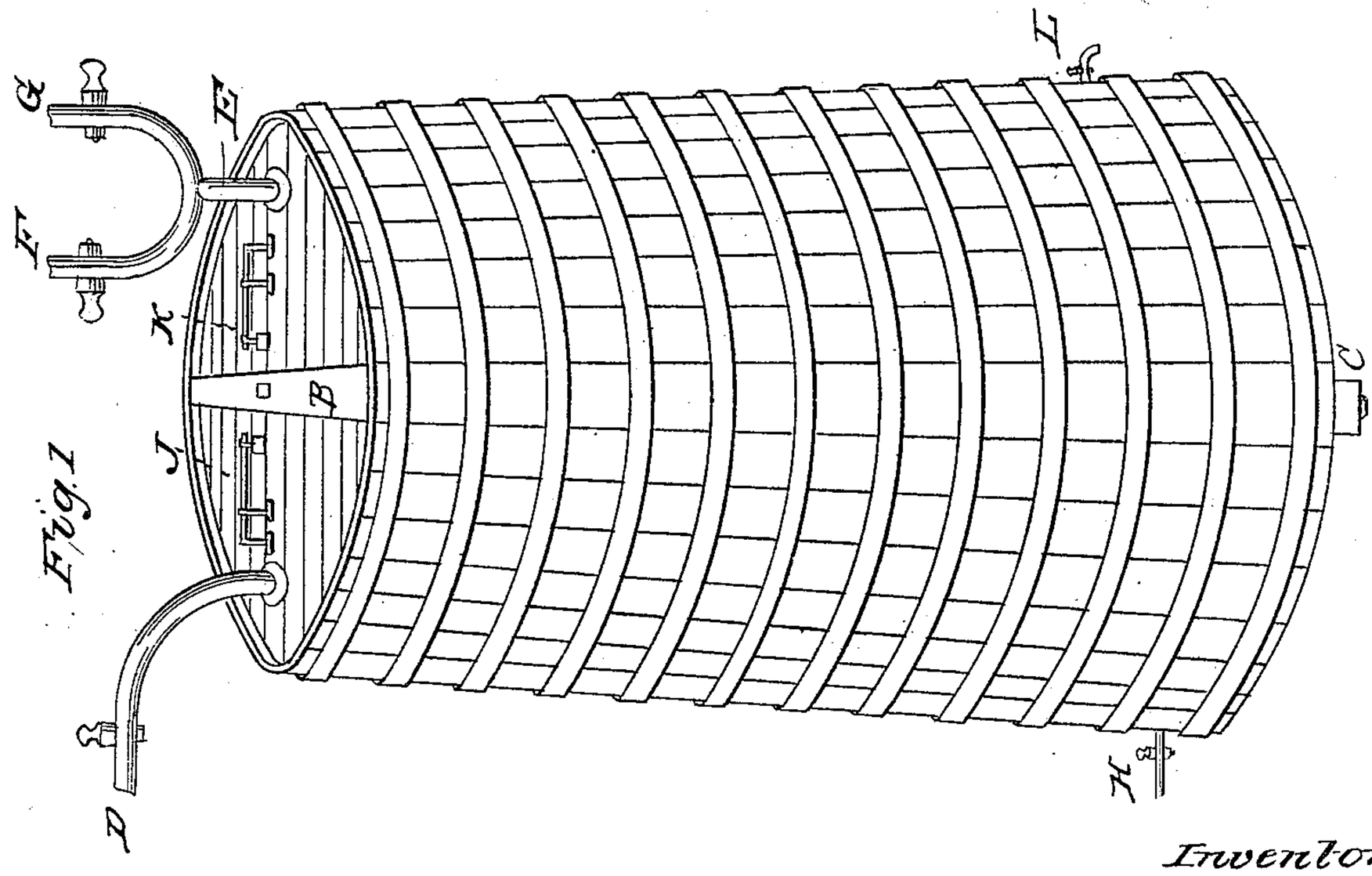

Fig. 1

Inventor

George Riley

UNITED STATES PATENT OFFICE.

GEORGE RILEY, OF NEW YORK, N. Y.

IMPROVED PROCESS IN THE MANUFACTURE OF GLUCOSE.

Specification forming part of Letters Patent No. 7,148, dated March 5, 1850.

To all whom it may concern:

Be it known that I, GEORGE RILEY, of the city, county, and State of New York, have invented a new and useful mode of manufacturing worts, mash, or beer from the meal of Indian corn for fermenting and other purposes; and the following I declare to be an exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 is an outside view of my apparatus, and Fig. 2 is the inside thereof.

The same letters indicate like parts in both figures.

The nature of my invention consists in the making of a saccharine substance known as "glucose" or "grape-sugar" from the meal of Indian corn for fermenting and other purposes by boiling the same under a pressure greater than that of the atmosphere in water accidulated with sulphuric acid. My mode of doing so is as follows:

I construct a very strong wooden boiler or vessel, Fig. 1, of such dimensions that it will contain nearly twice the quantity of liquor that I propose to operate upon at one time. The drawings represent one ten feet high and six feet in diameter in the clear, and is capable of converting about twenty-five bushels of meal at one time. This vessel I have made of white pine six inches thick and very strongly hooped. In the center of the tub or boiler between the top and bottom I place a pillar, A, of pine eight inches in diameter, through the center of which I have previously had a two-inch hole bored, and across the top and bottom of the boiler on the outside I have two pieces, B and C, of good oak ten inches square placed in a contrary direction to the length of the plank forming the top and bottom. I now take a strong iron rod two inches in diameter, provided with a good head at one end and a strong nut and screw at the other and with suitable washers. I insert this through holes made in the center of the cross-pieces and the top and bottom of the boiler and through the bore of the pillar, and screw all up tight. This pillar and rod are for the purpose of strengthening the top and bottom of the boiler against both inward and outward pressure. I have a lead pipe, D, two inches in diameter provided with a stop-cock and connected with a high-pressure steam-boiler. This is secured to the head of the tub or boiler with a strong flange and goes down to near the bottom thereof. This is for the purpose of admitting steam. I have another lead pipe, E, of the same size for charging and discharging the boiler. This pipe goes through the head, to which it is secured with a strong flange and down to within half an inch to the bottom thereof. This pipe just above the boiler is divided into two branches, F and G, each branch being provided with a stop-cock. The branch F leads from an ordinary distiller's mash-tub, and is for charging the boiler. The branch G leads to the filtering-tub, and is for discharging the boiler. There is another pipe, H, of one inch in diameter, provided with a stop-cock and connected with an ordinary force-pump, (not shown in the drawings,) and is for the purpose of admitting the chalk and wort for neutralizing the acid, as hereinafter described. I have a safety-valve, J, in the head of the boiler, which I load with a weight of from six to ten pounds to the inch. K is a vacuum-valve, and L is a try or sample cock.

The process of conversion or operation of this apparatus is as follows: I mash or mix together in the mash-tub twenty-five bushels of corn-meal with nine hundred and fifty gallons of water at a temperature of 175° Fahrenheit. When thoroughly mixed, I add twenty-five pounds of the strongest sulphuric acid and let the whole down through the pipe F into the boiler. I rinse the mash-tub with fifty gallons of water, which I also let down into the boiler. I now close the cock of the pipe F and open that of the pipe D, which admits steam into the boiler, which soon causes the contents thereof to boil, and when the heat rises to a height corresponding to the pressure on the safety-valve J it rises and allows the surplus steam to escape. From time to time I take a sample of the contents of the boiler by means of the sample-cock L and drop into it a few drops of the tincture of iodine, which as long as there is any starch in solution turns the mixture of a dark purple. When no change is effected by iodine (which by boiling with a pressure of eight pounds to the inch will be in about six or seven hours) the greater part of the meal is converted into a mixture of gum and sugar. I now continue the boiling about four hours longer, by which time the whole of the starch contained in the meal will be converted into glucose or grape-sugar. I now draw off,

by means of the sample-cock L, about ten gallons of the wort and well mix it with thirty-five pounds of ground chalk or whiting, and this mixture I pump slowly through the pipe H into the boiler, and continue the boiling for about fifteen minutes longer in order to perfectly neutralize the acid, having used an excess of chalk for that purpose. I now open the cock of the pipe G and the pressure in the boiler forces the contents thereof into a vessel provided with a false bottom perforated with holes and covered, first, with coarse hair-cloth, and then a layer of four inches thick of coarse sand, through which I allow it to filter into the cooler if for distilling or vinegar; but if for ale or porter I let it into the ordinary brewer's boiler with the necessary quantity of hops, and concentrate, by boiling, to the strength required, and then cool and ferment in the ordinary way.

What I claim as my invention, and desire to secure by Letters Patent, is—

The conversion of corn-meal into a solution of grape-sugar or glucose by boiling the same under a pressure greater than that of the atmosphere in water acidulated with sulphuric acid, substantially in the manner described.

GEORGE RILEY.

Witnesses:
JNO. WM. MOORE,
C. W. VAN VOORHIS.