

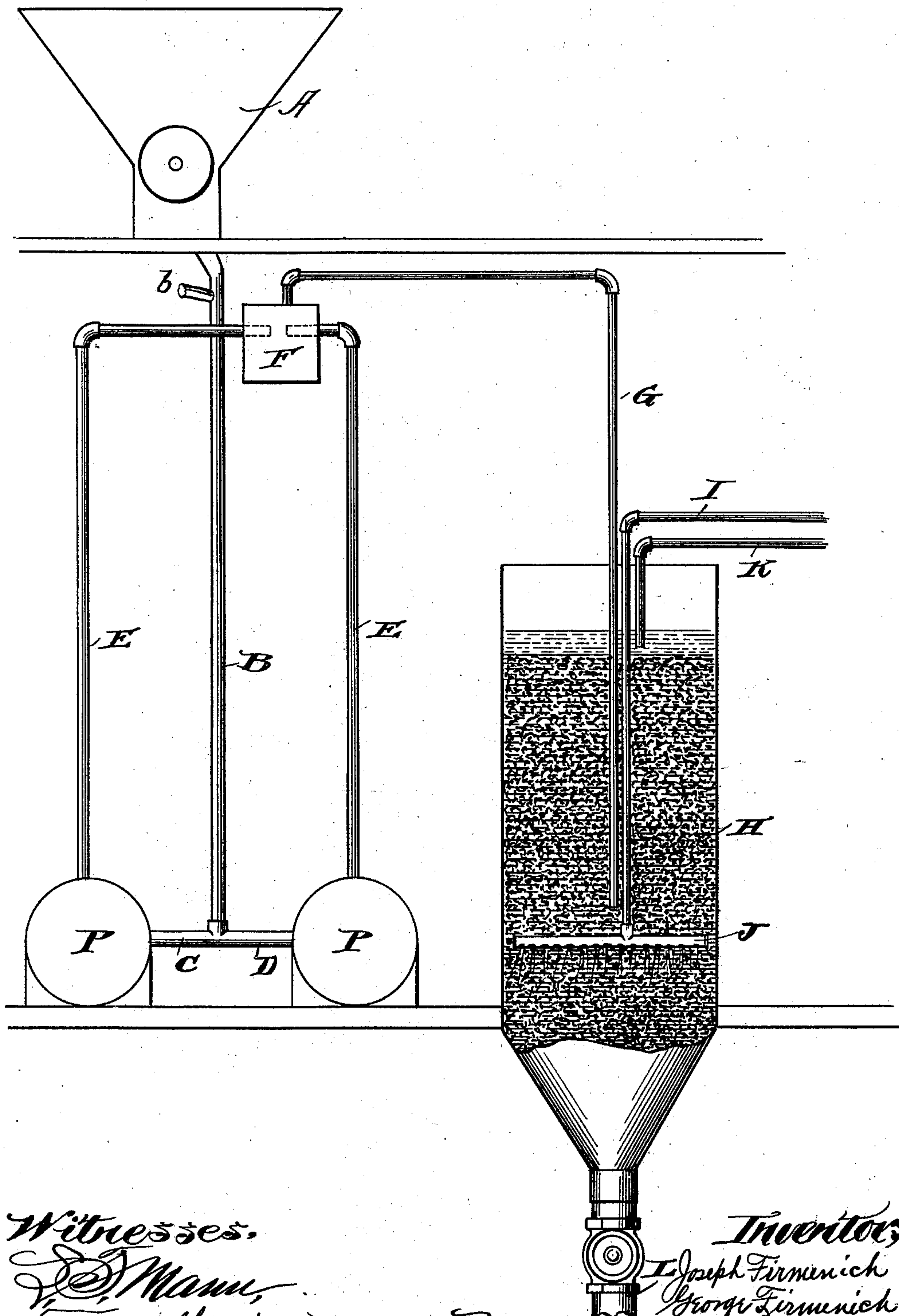
(No Model.)

**J. & G. FIRMENICH.**


# APPARATUS FOR PREPARING GRAIN IN MANUFACTURING STARCH.

No. 560,699.

Patented May 26, 1896.



Witnesses,  
J. Mann,  
Frederick Goodwin

 *Inventors,*  
Joseph Firmenich  
George Firmenich  
*By* Official. *Swiss* *Patent*  
*Attys.*



# UNITED STATES PATENT OFFICE.

JOSEPH FIRMENICH AND GEORGE FIRMENICH, OF CHICAGO, ILLINOIS.

APPARATUS FOR PREPARING GRAIN IN MANUFACTURING STARCH.

SPECIFICATION forming part of Letters Patent No. 560,699, dated May 26, 1896.

Application filed July 13, 1895. Serial No. 555,828. (No model.)

*To all whom it may concern:*

Be it known that we, JOSEPH FIRMENICH and GEORGE FIRMENICH, of Chicago, Illinois, have invented a certain new and useful Improvement in Treating Grain in the Manufacture of Starch, &c., of which the following is a specification.

Our invention relates to a method or process of treating grain whereby to separate the heavier and lighter particles, and is particularly applicable to the treatment of corn in the manufacture of starch and glucose.

Our invention includes two novel steps or features of the treatment. The first consists in projecting two streams of the crushed or ground grain against each other, so as to mechanically loosen, break, and separate the heavier and lighter particles which have escaped separation in the preliminary crushing or grinding.

The second novel step of our process consists in liberating a body of air within a tank or receptacle in which the crushed grain is charged, so as to assist and insure the rising of the lighter particles to the surface of the mass. The air, which is under pressure, being thus liberated in the mass of grain, not only renders such mass specifically lighter or buoyant, but acts in the nature of a blast to lift the lighter particles to the surface.

A variety of forms of apparatus may be employed in the carrying out of our process, and we have shown one simple form of apparatus in the accompanying drawing, which is a broken elevation, most of the parts being simply indicated.

The grain is first steeped or soaked in warm water and is then ground in a suitable mill or crusher (indicated at A) and is discharged through the hopper bottom of the latter by way of the pipe B, which has branches C D delivering to the pumps P. Water is introduced into the discharge-pipe B through the pipe b. The pumps are the usual type of centrifugal pump, and serve to agitate and lift the grain, discharging it through the pipes E into the separating-chamber F. It will be observed that the ends of the pipes E, which enter the separating-chamber F, are disposed with their open ends opposite to each other, so that the streams of grain delivered up-

wardly through said pipes will be discharged in violent impact against each other. This impact can be made with sufficient force to thoroughly separate the germs and hulls from the heavier portion of the kernels of grain. The products thus forcibly separated or loosened are discharged through a common pipe G into the receiver H, the discharge-pipe extending preferably to some distance below the upper end of the receiver. Within this receiver H the second novel step of the process is performed.

Air under pressure is admitted through the pipe I, and is discharged preferably through a perforated head J into the body or mass of the crushed grain. Preferably the air is discharged below the discharge end of the pipe G, so that the discharging mass of grain is subjected immediately to the action of the air-blast. This liberating of the air under pressure in the mass of the grain renders such mass buoyant, and therefore tends to lift the lighter particles to the surface, while the escaping air-currents carry up with them the lighter particles. These are withdrawn from the surface through a pipe K, or they may overflow the top of the vessel or through a notch or spout in its wall. The heavier portions being thus separated and freed from the lighter, fall by gravity and are withdrawn through the valved discharge-spout L at the bottom of the receiver, which is preferably made conical.

It will be seen that the separating-chamber F is small as compared with the other chambers through which the grain passes, and this is preferably so because a greater pressure can be maintained in the small chamber with a corresponding improved effect upon the grain. It will also be seen that the open ends of the pipes E E are disposed opposite each other. They may have their discharge ends inclined, so that streams of grain will meet at an angle instead of in a line.

The advantages of this invention are that a complete separation of the germs from the hulls and heavier particles of the grain is effected, and hence the germs, which are detrimental to the manufacture of starch and spirits, are removed for separate treatment.

Having thus described our invention, we

wish to be understood that we do not limit ourselves to any particular form of apparatus, except as hereinafter specifically stated.

We claim—

5 1. The herein-described apparatus to be used in the treatment of grain for the separation of its particles, comprising a means for crushing or grinding the grain, pumps for separating the grain into two separate streams  
10 a separating-chamber into which said pumps deliver the streams in impact and a discharge-pipe leading from said receiver, substantially as described.

2. The combination with the crusher or

grinder of two centrifugal pumps receiving 15 the grain therefrom and separating it into two streams, a chamber wherein said streams are delivered in impact with each other, a discharge-pipe, a receiver into which said discharge-pipe opens and a means for delivering 20 air into said receiver below the entrance of the discharge-pipe from the pumps, substantially as described.

JOSEPH FIRMENICH.  
GEORGE FIRMENICH.

Witnesses:

FREDERICK C. GOODWIN,  
G. I. HARBRIDGE.