

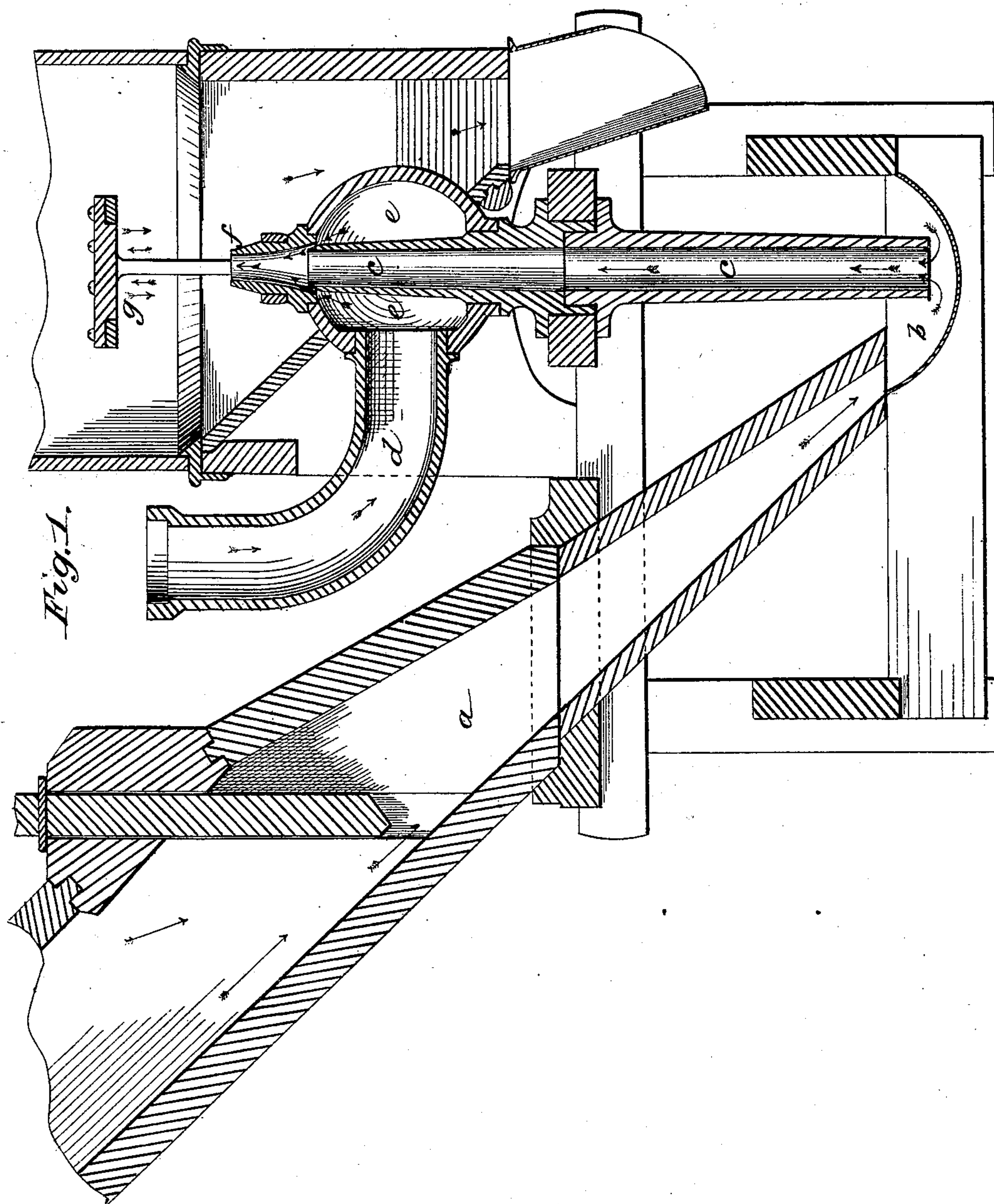
(No Model.)

2 Sheets—Sheet 1.

F. TAGGART.  
ART OF MANUFACTURING FLOUR.

No. 256,073.

Patented Apr. 4, 1882.



Witnesses:

W. H. N. Wright  
D. Lloyd Norris

Inventor:  
Francis Taggart  
by Johnson and Johnson  
Attys

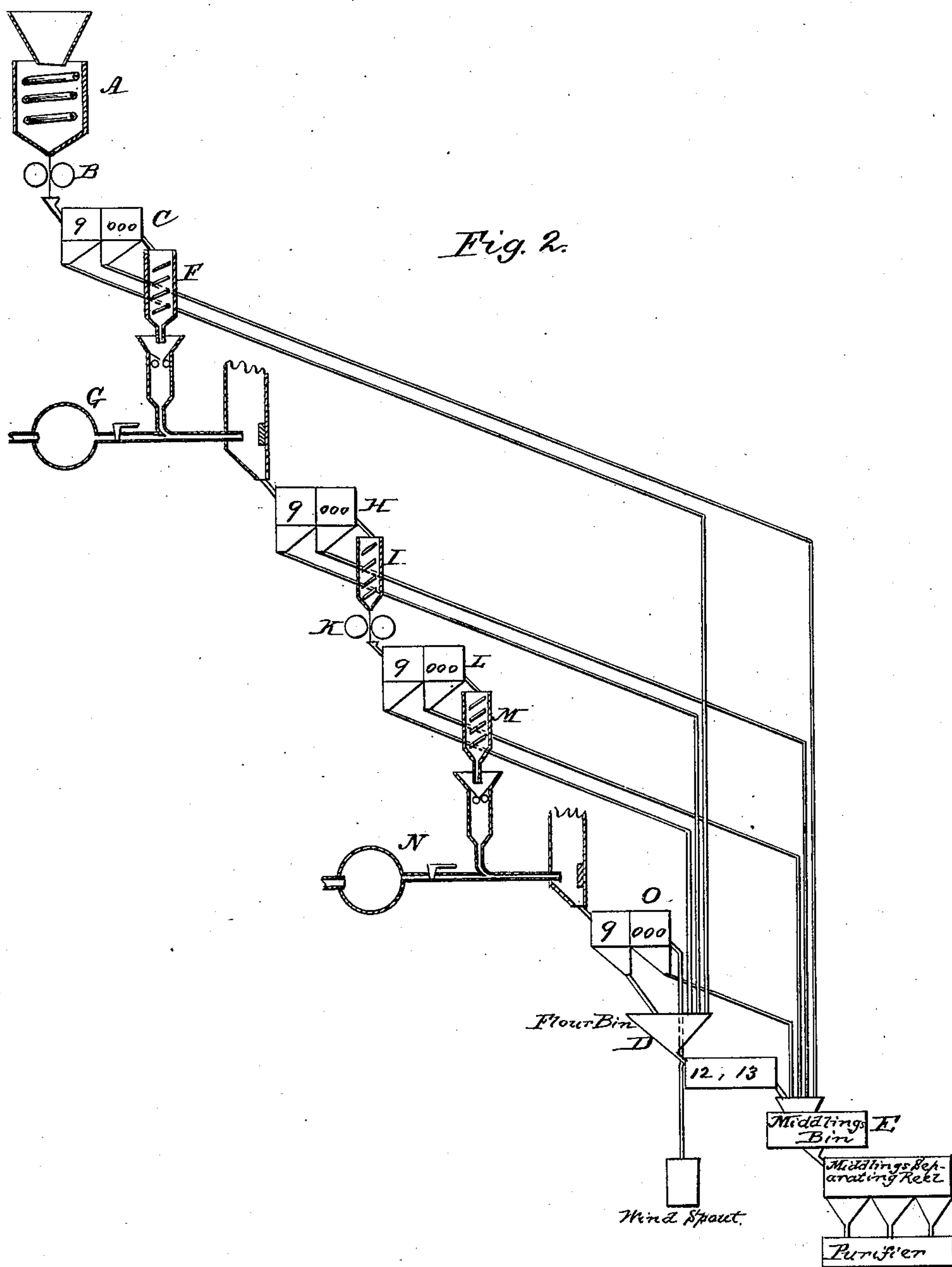
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# UNITED STATES PATENT OFFICE.

FRANCIS TAGGART, OF BROOKLYN, NEW YORK, ASSIGNOR TO CHARLES R. KNICKERBOCKER, TRUSTEE.

## ART OF MANUFACTURING FLOUR.

SPECIFICATION forming part of Letters Patent No. 256,073, dated April 4, 1882.

Application filed December 3, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, FRANCIS TAGGART, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented new and useful Improvements in the Art of Manufacturing Flour, of which the following is a specification.

In manufacturing flour as heretofore practiced various mechanical devices have been employed for reducing the grain—such as stones, rollers, and disintegrating machines of various kinds—by means of which the grain is reduced to a meal of a greater or less degree of coarseness. In practicing the art in the form of what is commonly known as “new process milling” the more advanced millers have aimed their efforts to the reduction of wheat by repeated breaking, by means of which it is brought gradually to that degree of fineness which characterizes flour.

I have contrived a machine, which is fully described under various modifications of form set forth in several applications now pending in the United States Patent Office, to which reference is herein made for a more full description in matters of detail than is necessary in this specification, which is not intended to cover or include any particular form of machinery, but is distinctively an improvement in the art, independent of any form or special construction of machine used in working any step of the process.

The improvement in the art which I have invented consists in breaking the wheat by projecting it, either in its unbroken condition or after subjecting it to a preliminary action by rollers, by means of a strong current of air or other elastic fluid, against a solid abutment with such force as to break the grains or particles thereof, and then separating by screens the fine particles first, and then taking out the finer middlings, which are sent to a middlings-purifier to be treated in the usual manner by screens and air currents, and then subjecting the coarser particles to a further reduction upon a similar pneumatic apparatus for further breaking and reduction, and so on, repeating the operations of reduction, separation, and purification until the particles are brought into the condition of flour or into a condition proper

for their reduction into flour by stones or rollers.

In the annexed drawings, making a part of this specification, Figure 1 is a vertical section of a pneumatic apparatus suitable for effecting the work of reduction by blowing. Fig. 2 is a diagram indicating successive steps followed in carrying out the complete process.

The wheat having been cleaned by any of the means in common use for the purpose, may be subjected to the operation of heating or steaming in an apparatus (indicated at A, Fig. 2) designed for the purpose, such as is well known in the art, and may then be run between smooth rolls, (indicated at B,) such as are in common use, placed near enough together to crush the wheat and break up its internal organization. It is then passed through a reel—such as is commonly known in the trade as a “scalping-reel”—(indicated at C,) which may be clothed at the head with—say, a No. 9 cloth on the first half and with a No. 0 0 0 cloth on its lower half.

Particles of flour passing through the No. 9 cloth may be carried to a flour-bin, indicated at D. Particles of middlings falling through the coarser cloth may be carried to a middlings-bin, indicated at E. The tailings passing out of the reel C may be then carried to a wind-spout, F, of a construction well-known in the art, for the purpose of blowing out the dust, and thence the material passing out of the bottom of the wind-spout is fed into the pneumatic apparatus, (indicated at G,) one form of which is shown in Fig. 1, and will be herein after particularly described. The material will be thrown by the escaping current of air or other aeriform fluid against an abutment with such force that the frangible particles will be broken. It is not expected, however, that this force will be sufficient to reduce it at once to the fineness of flour, and the material produced by this breaking will then be passed into a scalping-reel, H, clothed with, say, cloths similar to those used in reel C. The flour passing through the finer cloth may be carried to the flour-bin D, the middlings to the bin E, and the tailings, being the coarsest of all, may then be passed through another wind-spout, I, and thence passed between the rolls K, and then



passed through another scalping-reel, L, clothed, say, with cloths similar to those used on reels C and H. The flour passing through the finer cloth may then be carried to the flour-bin, and the middlings passing through the coarser cloth may be carried to the middlings-bin, and the tailings, being the coarsest of all, may then be run through another wind-spout, M, and subjected to the action of another pneumatic apparatus, N, to be further reduced. The product of this reduction may then be carried to another scalping-reel, O, clothed with, say, cloths similar to those used on reel C. The flour taken out through the finer cloth may be taken to the flour-bin, and the middlings passing through the coarser cloth may be taken to the middlings-bin, and the tailings, if necessary, subjected to further similar reduction until the work is complete. The flour which has been collected in the flour-bin should then be bolted on reels clothed with fine cloths, such as are in common use in the manufacture of flour clothed with, say, Nos. 12, 13, &c., cloths. The middlings which have been collected in the middlings-bin should then be run into a separator-reel and graded in the usual manner, and then treated on middlings-purifiers, such as are in common use in mills.

I have thus described what I regard as a complete process for manufacturing flour; but I do not desire to be limited to the details as herein set forth, which may be varied according to the judgment of millers, or part of them may be omitted. Thus the steps of the process anterior to the subjection of the wheat to the pneumatic apparatus may be omitted. I believe, however, that the preliminary treatment herein suggested will be found to be advantageous as facilitating the work of reduction by means of a pneumatic apparatus.

In working the process the essential operations are, first, the compression of air or other aeriform fluid by mechanism and according to methods of compressing and cooling well known and in common practice, and then projecting the wheat borne upon the continuous stream of escaping and expanding air against an abutment, by which it is reduced, then separating the particles produced by such reduction by machinery well known and in common use for such purpose, and then repeating the reduction of the larger particles by similar blowing against an abutment with re-separation and re-reduction of the coarser particles until the work of reduction is sufficiently performed.

I have shown in Fig. 1 a pneumatic apparatus adapted to work that part of the process. The wheat or other grain is introduced through a feed-pipe, *a*, into a box, *b*, from which a pipe, *c*, extends, and through which the grain is drawn or forced by the action of a current of cool compressed air or other aeriform elastic fluid, creating a partial vacuum, into which air from behind rushes through the tube *c*, carrying with it the grain. The compressed air is

inducted through a pipe, *d*, opening into an air-chamber, *e*, surrounding the pipe *c*, and escapes in an annular jet around the mouth of the pipe *c*, thus creating a draft on a well-known principle sufficient to draw the grain into the nozzle *f*, whence it is blown with great violence against a solid steel abutment, *g*, against which it is shattered by the percussion. This abutment is inclosed in a chamber from which the expanded air escapes freely, while the broken particles and light products fall to the bottom, whence they are taken to be separated, as hereinbefore set forth.

In this process there will be less disadvantage from pulverizing or reducing of the bran-skins to fine impalpable dark-colored dust and less deterioration of the quality of the flour from rubbing or wearing surfaces than in other processes of milling, and which are caused by repeated action upon the same material substance. In my process the grain is not heated in the reducing operation, and from a given quantity of grain so reduced and treated I obtain a greater yield of flour than by other processes.

In my process as set forth the grain is used as projectiles to effect their reduction against a fixed hard abutment by an impinging blow not repeated upon the same substance upon the same surface at the same operation, and within a collecting-chamber provided with suitable pervious fabric for retaining the flour-dust and allow for the escape of the spent compressed air, and an opening for the passage of the products of disintegration from said chamber.

I have stated that the rolls *B* are placed near enough together to crush the wheat and break up its internal organization, and I mean by this that these rolls are not set, as in the ordinary roller mills, so as to break the grains as one step in their reduction, but so as to squeeze them through a space slightly less than their diameter for the purpose of breaking up their organization, and so loosening the particles that they can be broken by blowing with much less force than is required for their reduction when in a whole state. This step in my process differs from the old high-milling system, and it differs from the roller system, in all of which cases the first breaking operates to reduce the wheat into particles, whereas the present object is to disorganize without breaking the wheat, an object for which there would be no motive in any other system of which I have knowledge.

While the object of the preliminary subjection to rollers is, as I have stated, the mere disintegration of the parts, and I believe that any reduction beyond that is not desirable, I am aware that some of the grains will inevitably be broken in any subjection to the action of rollers, and that the preliminary step may be worked to some advantage with greater reduction than I have recommended, and I therefore do not desire to be limited in my claim to



the precise degree of reduction which I regard as best.

I claim as my invention as improvements in the art of manufacturing flour—

5 1. The process of manufacturing flour which consists in reducing the grains or particles of grain by projecting them with force against a solid abutment or obstacle by means of a current of compressed air or other aeriform fluid  
10 escaping in a continuous stream from a storing-chamber, then collecting the broken particles while the spent air or other aeriform fluid is permitted to escape, then separating the particles so collected, and again subjecting the  
15 coarser particles to further similar reduction and separations, and so on by successive operations of reduction and separation until the necessary degree of reduction has been obtained, substantially as set forth.

2. The process of manufacturing flour which 20 consists in first breaking up the organization of the grains by passing them between rollers, and then reducing by blowing the same by means of a continuously-flowing current of air or other aeriform fluid against a solid abut- 25 ment, and then separating the particles produced thereby and subjecting the coarser to further breaking by blowing and successive separations and breakings, if necessary, until sufficiently reduced, substantially as set forth. 30

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

FRANCIS TAGGART.

Witnesses:

A. E. H. JOHNSON,

J. W. HAMILTON JOHNSON.