

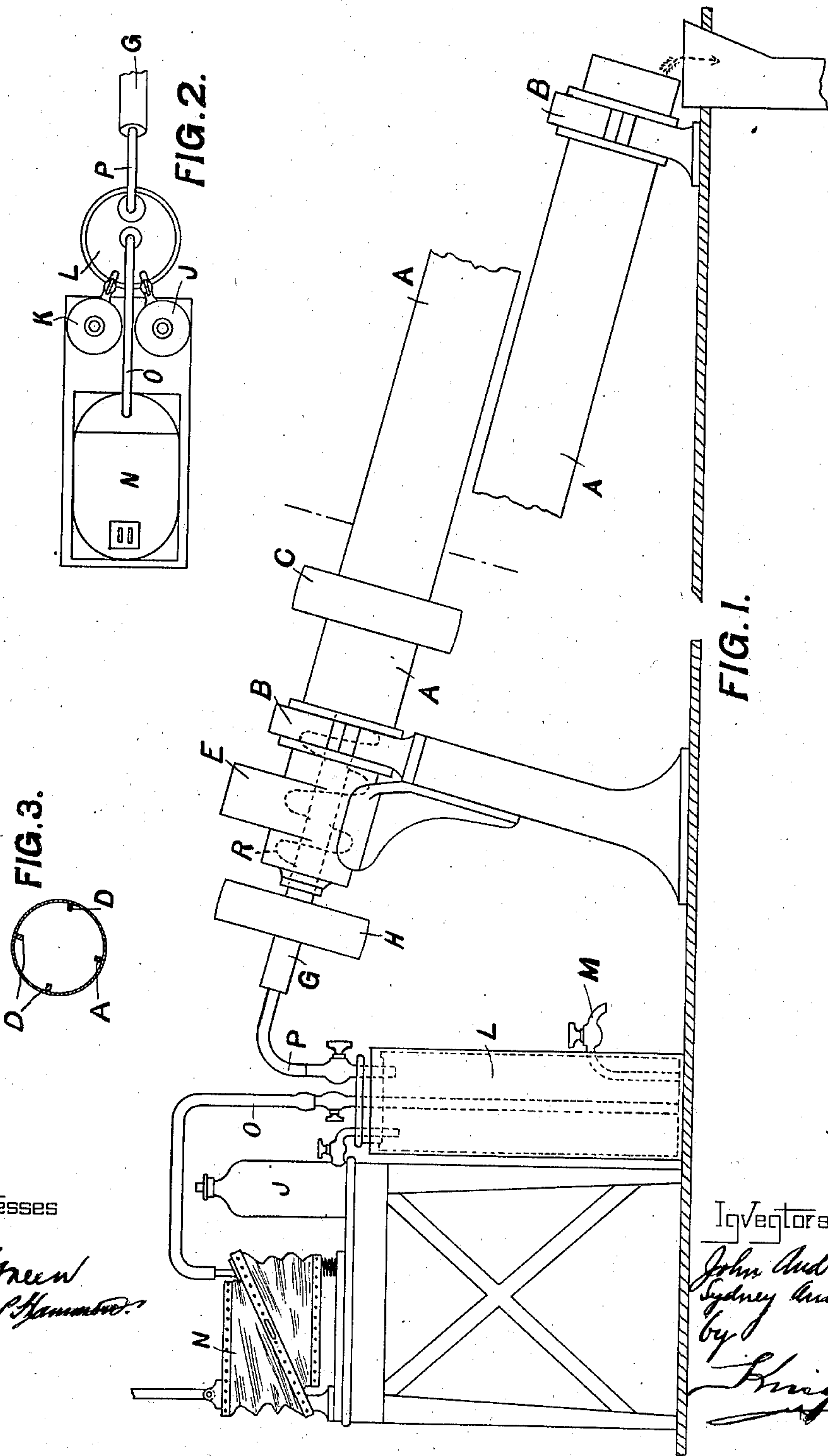
No. 693,207.

Patented Feb. 11, 1902.

J. & S. ANDREWS.
PROCESS OF AGING AND BLEACHING FLOUR.

(Application filed Sept. 21, 1901.)

(No Model.)



Witnesses

J. Green
Chas. P. Hammond

Inventors

John Andrews and
Sydney Andrews
by *Knight Bros.*
Atty

UNITED STATES PATENT OFFICE.

JOHN ANDREWS AND SYDNEY ANDREWS, OF BELFAST, IRELAND.

PROCESS OF AGING AND BLEACHING FLOUR.

SPECIFICATION forming part of Letters Patent No. 693,207, dated February 11, 1902.

Application filed September 21, 1901. Serial No. 76,038. (No specimens.)

To all whom it may concern:

Be it known that we, JOHN ANDREWS and SYDNEY ANDREWS, subjects of the King of Great Britain, residing at Belfast, in the county of Antrim, Ireland, have invented certain new and useful Improvements in Treating Flour, of which the following is a specification.

It has long been known that flour, semolina, and the like, hereinafter spoken of under the generic name of "flour," if kept for some time after grinding are greatly improved in quality. This improvement does not increase after a certain period, a deterioration then beginning.

Now our present invention is designed to bring about this improvement or conditioning immediately after grinding, without having to wait, as above stated, and, further, not merely to bring about an improvement equal to that caused by keeping it for a long period, but a much greater improvement.

The invention consists, essentially, in subjecting the flour to the action of a suitable gaseous oxidizing agent, whereby nascent oxygen or its equivalent is produced or comes in contact with the flour. A very small quantity of the oxidizing agent suffices, so little, indeed, that the actual composition of the flour, as shown by analysis, is hardly perceptibly altered. The plan we prefer is to pass the flour through various conveyers, whereby it is brought in contact with the gaseous oxidizing agent, and the drawings we herewith append show the apparatus which from long experience we have found to act best with air carrying a small quantity of gaseous peroxid of nitrogen, (N_2O_4 .) We do not, however, limit ourselves to the use of nitrogen peroxid, as we have found that chlorin, bromin, and other gaseous compounds capable of liberating oxygen will act with more or less efficiency. Besides the above reagents, ozone might be suggested; but we have found it is practically unworkable and its results unsatisfactory or *nil*, while it is more costly than peroxid of nitrogen, which we prefer to use. The difficulty, too, of generating it in a mill where electric sparking is especially dangerous puts it beyond the range of ordinary practice, and therefore in

speaking of "suitable oxidizing agents" we do not include ozone, though in some chemical processes it does act as an oxidizing agent on certain materials. Sulfuric and sulfurous acid have also been suggested for bleaching grain and for disinfecting warehouses, ships' holds, granaries, &c., which may contain flour. These two chemicals are, however, useless for flour, as they would spoil the taste without improving it, and we also disclaim the use of such.

In our practice any of the other oxidizing agents mentioned, but preferably peroxid of nitrogen, is caused to act upon the flour by forcing a current of air over or through the oxidizing agent employed, which current of air becomes impregnated with the oxidizing agent and is then brought in contact with the flour to be improved. With regard to the quantity, a very small amount of the oxidizing agent is sufficient.

We herewith append drawings of an apparatus which we have found most suitable for use with nitrogen peroxid, the cheapest and most preferable reagent.

Figure 1 is a front elevation of the apparatus; Fig. 2, a plan of part thereof; Fig. 3, a cross-section of the cylinder on the dotted line Y Z.

In the drawings, A is an inclined hollow cylinder mounted in bearings B and rotated by means of a pulley C. In the interior of this cylinder are longitudinal ribs D, which agitate the flour, inserted at E, while assisting its passage down the cylinder. Each rib in succession as it leaves the bottom during the rotation of the cylinder carries up a small amount of flour, which when it has risen to about three-fourths of the height drops through the air in the cylinder to the bottom again. The flour is conveyed into the interior of cylinder A through feed-hopper E, secured to the fixed worm-box F, inside which is a worm conveyer R, mounted on a hollow shaft G and rotated by a pulley H.

J is a jar or receptacle containing nitric acid, and K a similar receptacle containing ferrous sulfate dissolved in water. These are arranged to deliver a regulated supply of nitric acid and ferrous sulfate, respectively, into a glass or other vessel L, the liquid in which

is maintained at a constant level by a siphon-pipe M.

In a fifteen-sack-per-hour plant we use in practice commercial nitric acid, specific gravity 1.42, an eighty-ounce bottle; ferrous sulfate, two and one-fourth pounds, dissolved in about three pints of water, so as to make about eighty ounces. We now feed one of these into the other drop by drop and proportion it so that they will last about sixty hours. In our first experiments we used the nitric acid without the ferrous sulfate, and using commercial nitric acid and iron pipes we were enabled to get to some extent the same result as we now get with peroxid of nitrogen; but the iron pipes were soon corroded, and when we used earthenware instead of iron the effect was almost *nil*. Almost any material, however, that will withdraw one atom of oxygen from nitric acid can be used instead of ferrous sulfate; but we find that salt is very convenient and cheap.

In thus describing our invention we wish to point out that it is based upon the principle of exposing the flour to a material which will give out nascent oxygen in the pores of the flour, which nascent oxygen instantly attacks the coloring-matter of the flour. Ordinary oxygen passed through has not this effect, but only substances which, coming in contact with the flour, give out free oxygen to it, which had previously been in the combined state.

We declare that what we claim is—

1. The improvement in the process of aging and bleaching flour, which consists in passing the same in a state of fine division through an atmosphere containing a small regulated quantity of gaseous nitrogen peroxid.

2. The improved process of aging and bleaching flour which consists in bringing it into intimate contact with and uniformly exposing it to an atmosphere containing a small quantity of gaseous nitrogen peroxid, substantially as set forth.

3. The improvement in the process of aging and bleaching flour which consists in gradually supplying to nitric acid, a material capable of taking from it one atom of oxygen and bringing the resulting gas into intimate contact with the flour, substantially as described.

4. The improvement in the process of aging and bleaching flour, which consists in gradually adding nitric acid and ferrous sulfate together in solution, and bringing the gas which results therefrom into intimate contact with the flour, substantially as described.

In witness whereof we have hereunto signed our names, this 7th day of September, 1901, in the presence of two subscribing witnesses.

JOHN ANDREWS.

SYDNEY ANDREWS.

Witnesses:

SIDNEY W. DOD,

ALBERT C. B. HENRI.