

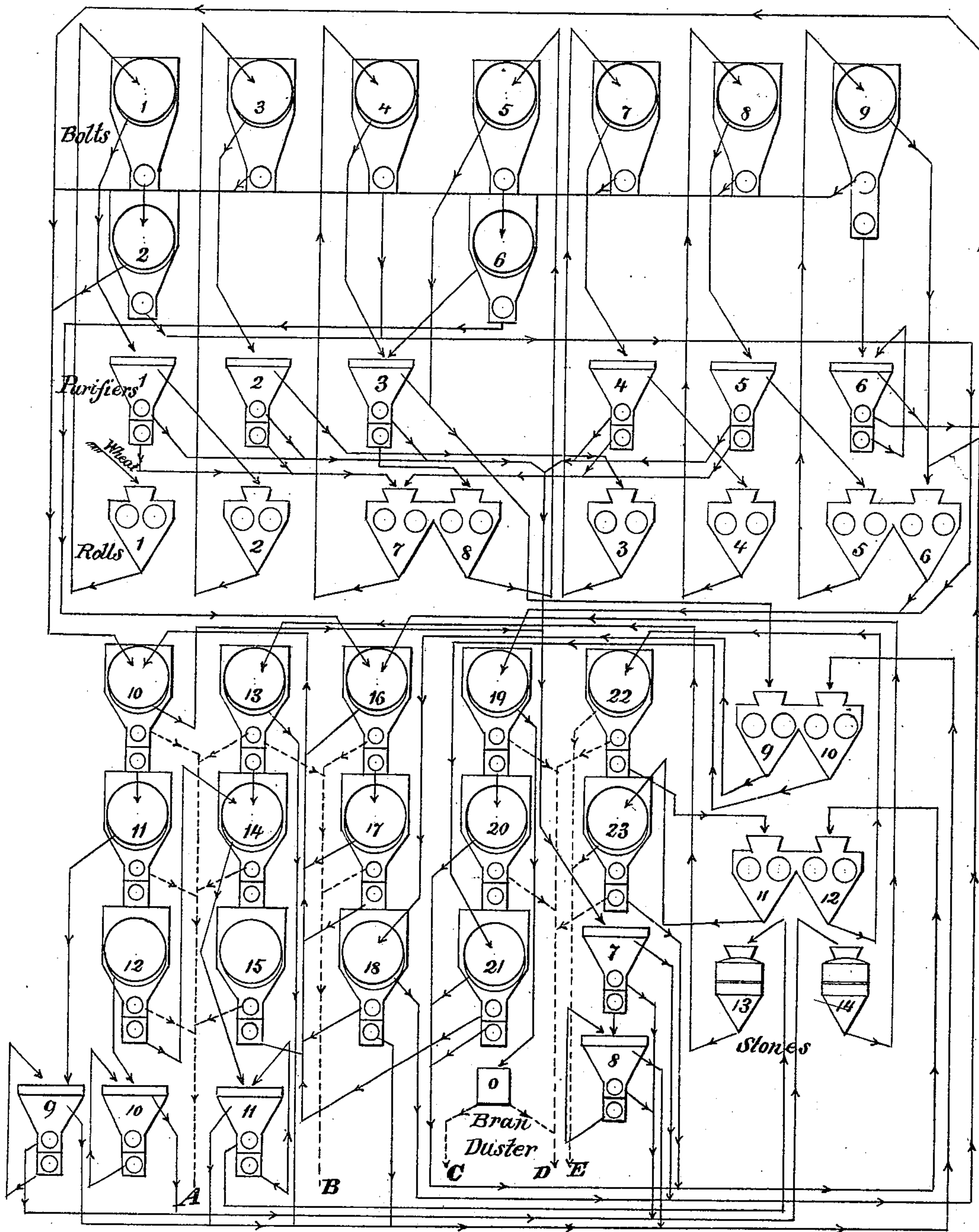
(No Model.)

M. HARMON.

ART OF MANUFACTURING FLOUR.

No. 249,725.

Patented Nov. 15, 1881.



Witnesses
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UNITED STATES PATENT OFFICE.

MILFORD HARMON, OF JACKSON, MICHIGAN, ASSIGNOR TO THE GEORGE T. SMITH MIDDINGS PURIFIER COMPANY, OF SAME PLACE.

ART OF MANUFACTURING FLOUR.

SPECIFICATION forming part of Letters Patent No. 249,725, dated November 15, 1881.

Application filed August 23, 1881. (No model.)

To all whom it may concern:

Be it known that I, MILFORD HARMON, of Jackson, in the county of Jackson and State of Michigan, have invented a new and useful
5 Improvement in the Art of Manufacturing Flour, of which the following is a specification.

This invention relates to that style of milling commonly known as the "gradual-reduc-
10 tion system," in which, instead of breaking the wheat down at once into a meal, from which a large proportion of flour can be taken on sub-
jection of the meal to the bolts, the wheat is slightly broken on the first action of the stones
15 or rolls, and then bolted to take out the small amount of middlings and flour produced, and the residuum sent back to the rolls or stones to be rebroken and again bolted, and so on by
repeated reductions until brought into the con-
20 dition of flour.

In the ordinary operation of the gradual-reduction system the successive "breaks," as they are called, are subjected to the bolters clothed with cloths of such coarseness as to permit the
25 middlings to pass through the meshes, and, as a matter of course, with them all the particles which are reduced to flour. The mingled middlings and flour are then passed over a finer cloth and the flour bolted out, and the mid-
30 dlings that are too coarse to pass through the meshes of this second bolt are then passed to a middlings-purifier of the ordinary form, where they are purified by the combined operation of sifting and blowing. The residuum
35 of the first bolting of each break, which contains the bran and the coarse pieces of the un-reduced grain, are without further treatment sent to the rolls or stones for further reduc-
tion. In some cases this residuum is subjected
40 to the action of atmospheric currents, not in conjunction with a sieve, as the work in purification, but to a simple operation of winnowing. In working the process in mills of moderate capacity all the flour and middlings taken out
45 after each successive break by the first bolting, without separation or separate treatment, are sent together into the second bolt for separating the flour and middlings. By this means the middlings, instead of being properly grad-

ed and the grades treated separately, each with 50 reference to its peculiar condition, are all taken out together and treated in a mass in the purifiers, and consequently with an imperfect result.

My improvement consists in subjecting the 55 product of the first and each succeeding break to the action of a bolter clothed with a cloth of such fineness as to take out only the flour and the finer middlings, leaving all the residue of the middlings, together with the bran and 60 broken grains, to go over the tail. This entire residuum I then pass onto a purifier clothed with cloths of such texture as to allow the middlings to pass through, the whole mass being subjected at the same time to the winnowing 65 action of the air. The material passing over the tail of the shaker is then sent to rolls or stones for further reduction, and the break is again treated in the same manner as at first. In each successive act of purification the puri- 70 fied middlings will fall through the finer cloths toward the head of the shaker, and the more impure middlings through the coarse cloth toward the tail. By this means the middlings are obtained in grades, which may be subse- 75 quently treated, each grade according to its condition.

In speaking of "rolls" or "stones" I desire to be understood as not being confined to either or any mode of reduction, but to include under 80 those general terms any and all machines which may be capable of being used for breaking down the material in the successive stages of reduction.

In the annexed drawings, making a part of 85 this specification, I have illustrated in a diagram an entire process of manufacturing flour which embodies my improvement. The lines with arrow-heads indicate the course of the stuff through all the machines, from the time 90 the cleaned wheat is delivered to the first set of rolls until the finished flour is sent to the packer.

In this diagram the figures marked rolls, and numbered 1, 2, 3, 4, &c., up to No. 14, will be 9 understood to indicate any kind of reduction mechanism.

The purifiers numbered 1, 2, 3, 4, &c., up to

No. 11, will be understood to indicate any form of purifiers in which the work is performed by the combined operation of screening and blowing. The purifiers are represented each with two conveyers. Lines leading from the upper conveyor indicate the course of the stuff from the head of the shaker. The lines leading from the lower conveyor indicate the course of the stuff passing through the cloths on the lower end of the shaker. The lines leading from near the top of the purifier indicate the course of the stuff passing over the tails of the shakers.

In the diagram of the bolts the upper lines indicate the material fed into the bolts. The lines leading from the conveyers indicate the course of the stuff which is sifted through the meshes of the bolters. The intermediate lines leading from the lower half-circles indicate the course of the tailings. In cases where lines are drawn from the upper conveyor of bolts provided with double conveyers they indicate the course of the stuff which passes through the cloth toward the head of the bolt, and the lines drawn from the lower conveyers indicates the course of the stuff which passes through the cloth toward the tail of the bolt.

The two figures marked 13 and 14 in the lower right-hand corner of the diagram indicate stones, which I prefer to use at that part of the operation. The square marked O at the middle of the bottom of the diagram indicates the bran-duster. The lines marked A B D lead to the flour-packers. The lines marked C and E lead to the feed-packers.

I prefer to use in performing the work of purification of the breaks purifiers so constructed that the tailings are passed through a strong current of air which rises through the tailings as they fall from the sieve.

The wheat, having been thoroughly cleaned by machines proper for the purpose and in common use, is fed into the rolls or other reducing-machine, marked 1. The break which is there produced is only sufficient to slightly crush and disintegrate the berry. The broken grains are then elevated to bolt No. 1, which is clothed preferably with a wire-cloth equivalent to, say, a No. 2 silk cloth. (The reels No. 1 to No. 9 are preferably short reels, about six feet long.) The material passing through the meshes of bolt No. 1 passes into the head of bolt No. 2, clothed with silk, say No. 12, and is rebolted. The flour passing through this cloth is impure, and is carried to head of bolt No. 19, and goes into the low-grade packer D. The middlings which pass over the tail of bolt No. 2, are sent to bolt No. 10, passing to bolts Nos. 10 to 15, in which, having been dusted in bolt No. 2, they are distributed to fine middlings-purifiers Nos. 9 10 11. The residuum of bolt No. 1, passing over its tail, is carried to the head of purifier No. 1, where the entire mass is subjected to the operation of winnowing and screening. Particles too large to pass through the cloths of purifier No. 1 go over the tail, fall through

the aspirator, and are carried to rolls No. 2 for further reduction. Middlings falling through the cloths toward the head of purifier No. 1 are carried to purifier No. 7 and repurified. The coarse particles, falling through the cloths toward the tail of purifier No. 1, are carried to rolls No. 7, which is a smooth roll used for the purpose of sizing the middlings and flattening the germ. The second break is performed on roll No. 2, and the product is carried to the head of reel No. 3, clothed the same as reel No. 1. The material which passes through the cloth of reel No. 3 is carried to reel No. 10 and disposed of by bolting out the flour and distributing the middlings, as before described. The tailings of bolt No. 3 go to purifier No. 2; the tailings of that purifier to roll No. 3. The siftings of the finer cloths go to purifier No. 7 and the siftings of the coarser cloths to roll No. 7. The break of roll No. 3 goes to reel No. 7, the siftings of the reel to bolt No. 10, and the tailings to purifier No. 4. The tailings of purifier No. 4 go to roll No. 4, the finer middlings to purifier No. 7, and the coarser middlings to roll No. 7. The break of roll No. 4 is disposed of in precisely the same way, except that the tailings of purifier No. 5 go to roll No. 5, the distribution being made in reel No. 8. By this time the work of reduction has been carried so far that the residuum is principally bran, and the further treatment may be advantageously changed. Break No. 5 is carried to bolt No. 9. The product of the head of this reel goes to reel No. 10. The product of the last section of this reel (No. 9) goes to purifier No. 6, the reel being preferably clothed with two or more grades of cloth—say a No. 8 silk cloth at the head and No. 00 at the tail. The tailings of reel No. 9 go to roll No. 6, to which also passes the tailings of purifier No. 6. The residuum being now bran, after passing through rolls No. 6, is all carried into reel No. 19, where it is bolted, the flour going into low grade and the bran to the bran-duster.

The further details of finishing the products can be readily understood by an examination of the diagram, in which the course of the stuff in every part of the operation is carefully and correctly indicated; but as my invention does not relate to this part of the process, it is not necessary to set it out herein.

While I have described what I regard as the best manner of working my process as adapted to the working of a mill having capacity to produce about one hundred and fifty barrels of flour per day, I do not desire to have it understood that my invention is limited to the precise details as set forth, for machines of different kinds may be employed for working the different steps of the process, and the clothing of the bolters may be modified without departing from the spirit of my invention, and the number of reductions may be varied according to the judgment of the miller, my invention not being limited to the precise details herein set forth.

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

5 As an improvement in the art of manufacturing flour by gradual reduction, first taking from the successive breaks only the flour and finer middlings, and then subjecting the entire mass of the residuum to the conjoint opera-

tions of sifting and winnowing before rebreaking, substantially as set forth.

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Witnesses:

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