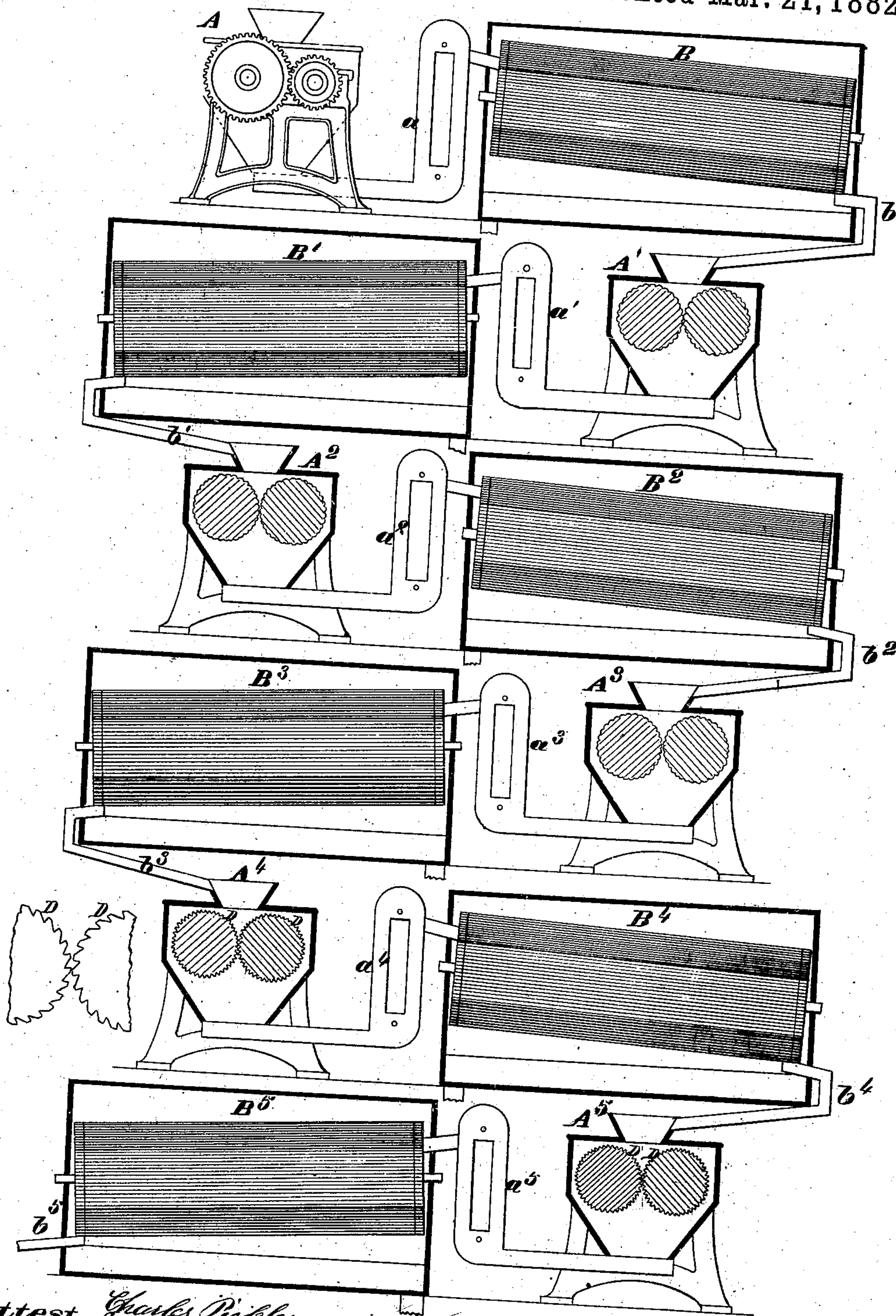


(No Model.)

R. L. DOWNTON.
MANUFACTURE OF FLOUR.

No. 255,150.

Patented Mar. 21, 1882.



Attest. Charles Pickles
Arthur M. Keith.

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UNITED STATES PATENT OFFICE.

ROBERT L. DOWNTON, OF ST. LOUIS, MISSOURI.

MANUFACTURE OF FLOUR.

SPECIFICATION forming part of Letters Patent No. 255,150, dated March 21, 1882.

Application filed November 6, 1880. (No model.)

To all whom it may concern:

Be it known that I, ROBERT L. DOWNTON, residing at the city of St. Louis and State of Missouri, have invented certain new and useful improvements in the manufacture of flour for the purpose of producing an increase in quantity and an improvement in quality of the high grade of flour; and I do hereby declare the following to be a full, clear, and exact description of my invention, which will enable others skilled in the art to which it appertains to make and use the same.

That my invention may be thoroughly understood and distinguished from the methods or processes heretofore or now used, I will give a description of the process upon which this is designed as an improvement, setting forth the objections thereto.

The wheat, after having been thoroughly cleaned, is passed between a pair of corrugated round or sharp fluted rolls revolving at differential speeds, where it is broken into small particles. The product of this grinding is then conveyed to a bolt or reel, there to be separated. The fine flour and middlings that pass through the meshes of the cloth are conveyed away, and such as pass over the tail of the bolt or screen are again passed between another pair of rolls, to be again reduced into finer particles, and so on through the entire process of reduction, by alternate crushing and bolting, and at each successive crushing the rolls are grooved successively finer, this crushing being accomplished by rolls that revolve at differential speeds, and in the same direction at the point of contact.

Now, to fully describe my process, I use rolls revolving at differential speeds, and revolving in the same direction at the point of nearest approach to contact or breaking, said rolls being fluted either parallel to the axis of the roll or at an inclination to the axis, the configuration of the flutes on the rolls being round, oval, ogee, or sharp, in the form of serrations, or of any other suitable form.

Now, my invention relates, not particularly to the configuration of rolls or their general construction, but is confined to the arrangement of each series of round or oval fluted rolls, with relation to the sharp-fluted rolls.

By use of the round-fluted rolls in the early

stage of reducing, the grain is broken into particles sufficient to liberate a large portion of the fine flour and middlings. This operation may be continued through several grindings on round-fluted rolls, when the sharp fluted rolls are substituted for the round flutes. The degree of fineness of the flutes increases from the first operation of reducing throughout the whole process, varying in number from eight flutes to the inch on the first to twenty-eight or thirty on the last, though I prefer twenty, as being fine enough. The advantage of my use of round flutes in the early stage and sharp in the finish is that the grain is mashed or crushed into particles of sufficient fineness to liberate the middlings and fine flour, and by so crushing a large amount of the flour is crushed into the body of the hull and branny particles, which, when brought in contact with the sharp flutes on the rolls used in the last stage of the operation, are cut or scraped off, owing to there being a sharp or cutting edge presented to said particles, instead of a round or crushing surface. Thus it may be seen that by this arrangement a large amount of flour that has heretofore been thrown away is saved. The flutes on the first series of rolls may be parallel with or at an incline to the axis. The result will be the same; but on the last series of rolls it is necessary that the flutes be at an incline to the axis.

To enable one skilled in the art to perform my process, I refer to the accompanying drawing, in which there are six sets of rolls and six bolts shown, the first four sets of rolls having rounded flutes, and the last two sharp flutes, D. This arrangement need not be adhered to, as the quality and condition of the grain may require more round-fluted rolls and less sharp, or the reverse—less round and more sharp fluted rolls—under all circumstances the sharp-fluted rolls being the last in the series.

In the drawing, A is the first set of rolls, showing a manner of driving the rolls at differential speeds, as desired. Arranged beneath these rolls is a suitable hopper, opening into a conveyor, *a*, leading to the bolt B, from the tail of which leads the spout *b* to the second set of rolls, A', and so on through alternate conveyers *a'* *a''* *a'''* *a''''*, bolts B' B² B³ B⁴ B⁵, and spouts *b'* *b''* *b'''* *b''''* to each set of rolls A² A³ A⁴ A⁵, the

product from the tail of the last bolt passing off to the bran-room, or to any desired location. The product from the tail of the bolt B³, passing between the sharp-fluted rolls A⁴, is there again reduced, and the bran scoured and cleaned, and afterward passed through the bolt B⁴. The product from the tail of this bolt is again reduced between the rollers A⁵, and the product bolted.

I do not confine myself to this number of sharp-fluted rolls, as one set might be sufficient to answer all requirements of one quality of wheat, while another quality of wheat would require two or perhaps three sets, owing to the nature or condition of the grain.

I am aware that spiral-fluted rolls have been used of successively-increasing fineness from the first stage of the reduction through the entire process. There are objections to this construction and arrangement, as the reduction is entirely accomplished by pressure—that is, the grain is compressed between the opposite flutes on each roll. This reduction will answer for the first breaking up, when the objection becomes apparent. As the grooves are progressively finer in the successive pairs of rolls and the particles of wheat are becoming smaller in the successive reductions, the floury particles and middlings are compressed on and into the hulls or bran, and cannot be removed by the use of rolls with rounded flutes, and the rolls wear faster. To the entire use of sharp or serrated flutes there are objections, such as by their continued use cannot be obviated. The grain, in passing between the rolls, is cut up, not crushed, and by a continued use of rolls with flutes of increasing fineness the grain is cut into finer particles at each reduction, each particle being part hull and part flour, some of which being of such fineness as to pass through the meshes of the bolts and deteriorate the quality of the flour, or leave it part middlings and part bran.

By the use of sharp edged fluted rolls through the entire process of reduction the sharp edges of the flutes become dull—that is, worn off by

continued use—and are then of no more advantage than when round-fluted rolls are used throughout. These obstacles are all overcome by my arrangement of rolls—round-fluted first, to mash or crush the grain, and sharp-fluted last, to remove the floury particles from the bran.

I understand the construction of the mechanism and the process described in the patent of Gustav A. Buchholz, No. 97,038, November 13, 1869, and the patent of John Stevens, No. 228,001, May 25, 1880. Such I do not claim; but What I do claim is as follows:

1. The herein-described process of reducing grain to flour and middlings, consisting in passing it through a series of sets of rolls revolving at differential speeds and in the same direction at their point of nearest approach to contact, and of successive degree of fineness of dress, the first part of said series of rolls having a dress of round or oval flutes, and the latter part of said series having a dress of sharp or serrated flutes, arranged at an inclination to the axis, and through bolts arranged intermediate of each set and the succeeding set of rolls, substantially as and for the purpose specified.

2. In the manufacture of flour and middlings, a series of sets of rolls of successive degrees of fineness of dress, arranged to revolve in the same direction at their point of nearest approach to contact and at differential speeds, the first part of said series of rolls having a dress of round or oval flutes, and the latter part of said series of rolls having a dress of sharp or serrated flutes, arranged at an inclination to the axis, in combination with bolts arranged intermediate of each set and the succeeding set of rolls, substantially in the manner as and for the purpose herein shown and described.

R. L. DOWNTON.

Witnesses:

JOHN G. BUTLER,
GEO. W. SMALL.