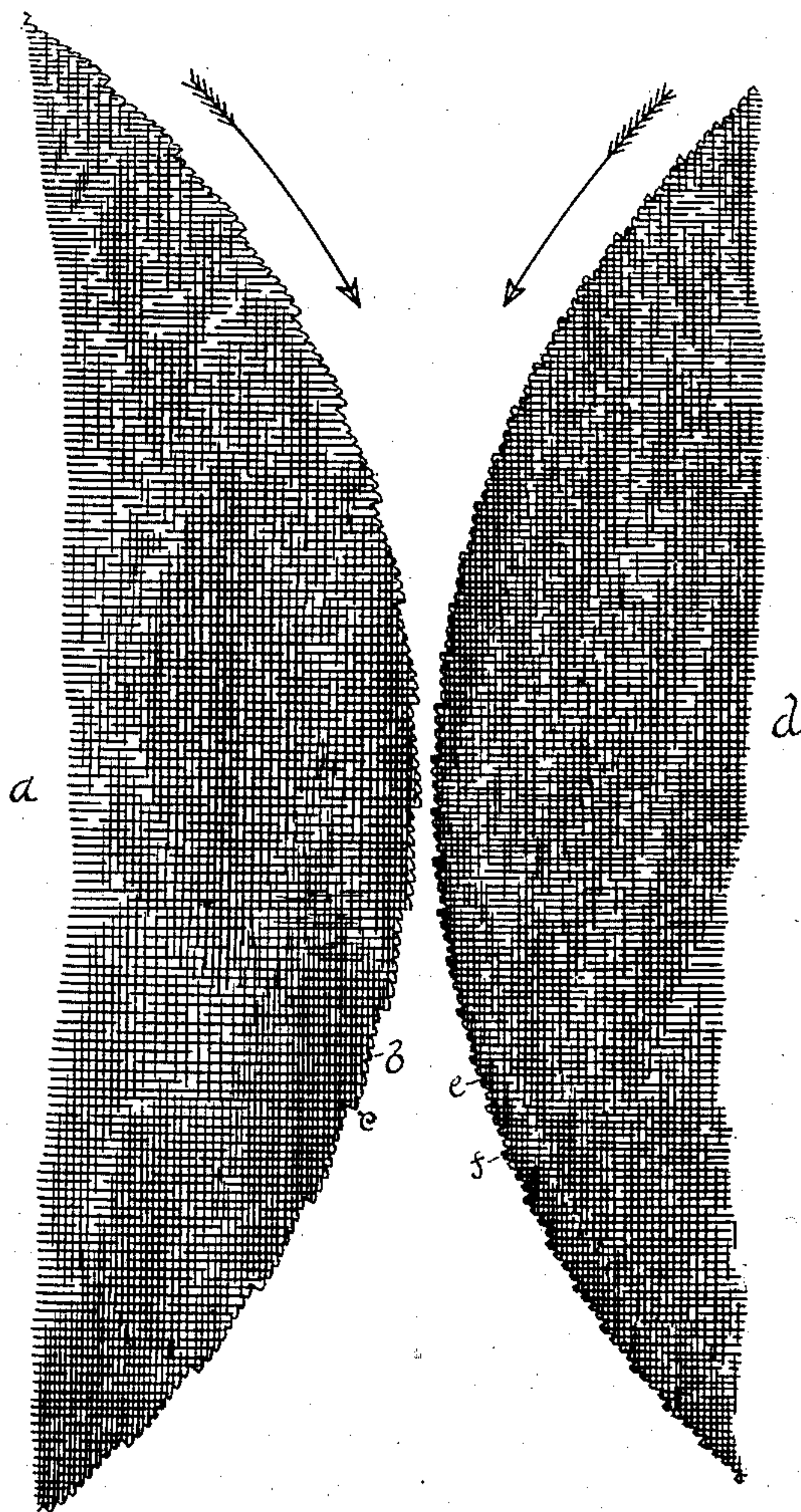


(No Model.)

F. BEALL.  
GRINDING MILL.

No. 341,546.

Patented May 11, 1886.



ATTEST

*L. D. Walker.*  
*A. W. Waggoner.*

INVENTOR

FRANK BEALL.

By *L. P. Graham*  
*att.*



# UNITED STATES PATENT OFFICE.

FRANK BEALL, OF DECATUR, ILLINOIS, ASSIGNOR OF ONE-HALF TO JOHN HATFIELD AND JAMES W. HATFIELD, OF SAME PLACE.

## GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 341,546, dated May 11, 1886.

Application filed December 21, 1885. Serial No. 186,316. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK BEALL, of the city of Decatur, county of Macon, and State of Illinois, have invented certain new and useful Improvements in Grinding-Mills, of which the following is a specification.

My invention relates to granulating-rolls; and it consists in certain details of construction of said rolls, as hereinafter set forth and claimed.

Under the present system of granulating or high milling it has been necessary to provide a pair of rolls for each "break" in the wheat, from six to eight pairs of rolls being used to complete the reduction; and it is the object of my invention to greatly reduce the number of rolls and increase the efficiency of their operation.

In the drawing, accompanying and forming a part of this specification, the opposing surfaces of my rollers are shown. *a* is a section of a roll having rotation in the direction indicated by the contiguous arrow, its speed approximating one hundred revolutions per minute. *d* is a section of a roll having rotation in the direction indicated by the contiguous arrow, its speed approximating three hundred revolutions per minute. Roll *a* is provided with furrows having the corrugated approximately tangential surfaces *b* and the abrupt surfaces *c*, approximately radial with the roll. Roll *d* is provided with furrows having the corrugated approximately tangential surfaces *e* and the abrupt surfaces *f*, approximately radial with the roll. The abrupt radial surfaces *c* of the roll *a* are presented in the direction of the rotation of said roll. The abrupt radial surfaces *f* of roll *d* are presented in the direction opposed to the rotation of said roll.

In operation the radial surfaces *c* act as a positive feed, the grains ordinarily resting in the deepest parts of the furrows, close to surfaces *c*, and as the said grains pass between the rolls they are subjected to the successive action of several of the surfaces *e*. The action of the first surface *e* will have the effect to break the grain very slightly, and the operation of the succeeding surfaces will continue and complete the reduction to the capacity of the rolls as the grains are carried nearer to

the roll *d*. The granulated product of the complete operation presses into the deepest parts of the furrows of roll *a*, passes roll *d*, and is discharged or fed to another pair of rolls in any suitable manner. The inclination of surfaces *b*, together with their rotation, carries the grain gradually in contact with the more rapidly revolving surfaces *e*. The furrows in roll *d* are shallower than the furrows in the opposing roll, in order that they may carry no imperfectly-reduced grains between the rolls, and are more numerous, in order that the required reductions may be made without any excessive degree of speed in roll *d*. The grain in the furrows of roll *a* is carried constantly nearer roll *d* while being subjected to its action, and a complete operation is effected in each of the furrows of said roll *a*, the grain being reduced to a degree equaling the action of from three to four sets of ordinary rolls.

From the above it will be understood that the grain carried by one furrow of the slow roll is entirely reduced in said furrow, and that the complete operation of the rolls is but a repetition of this process in succeeding furrows, each furrow also effecting its own discharge.

The effect of the construction of the furrows in the different rolls, as heretofore specified, and as illustrated in the drawing, is to break the grain instead of to cut it, and the recesses formed by surfaces *b*, inclining upwardly and away from roll *d*, assist the granulating process by furnishing rotating room for the partially-granulated grain.

The corrugations in the furrows are of utility in agitating the particles, and thereby effecting a more thorough granulation, as, if the particles are permitted to lie undisturbed, they will become worn by attrition, instead of being broken and granulated.

The result of the above-specified operation of my rolls is to produce a quality of middlings peculiarly adapted for the finer grades of flour, and to leave the entire product in an excellent condition for separating and purifying.

The furrows in the fast roll are shown of one-half the width and depth of the furrows in the slow roll; but this proportion may be varied to some extent without affecting the principle of my invention.



I claim as new and desire to secure by Letters Patent—

1. In a roller-mill, a pair of opposing rolls having differential rotation in opposite directions, the slow roll having longitudinal furrows formed each of an approximately tangential surface longitudinally corrugated and of an abrupt surface approximately radial with the roll, and the fast roll having longitudinal furrows formed each of an approximately tangential surface and of an abrupt surface approximately radial with the roll, the furrows in the fast roll approximating in width and depth to one-half the width and depth of the furrows in the slow roll, the radial surfaces of the furrows of the slow roll being presented in the direction of the rotation of said roll, and the radial surfaces of the furrows of the fast roll being presented in the direction opposed to the rotation of said roll.

2. In a roller-mill, a pair of opposing rolls having differential rotation in opposite directions, each roll having longitudinal furrows formed each of an approximately tangential surface longitudinally corrugated and of an abrupt surface approximately radial with its roll, the radial surfaces of the furrows of the slow roll being presented in the direction of the rotation of said roll, and the radial surfaces of the furrows of the fast roll being presented in the direction opposed to the rotation of said roll.

In testimony whereof I sign my name in the presence of two subscribing witnesses.

FRANK BEALL.

Attest:

C. C. CLARK,

W. H. WARREN.