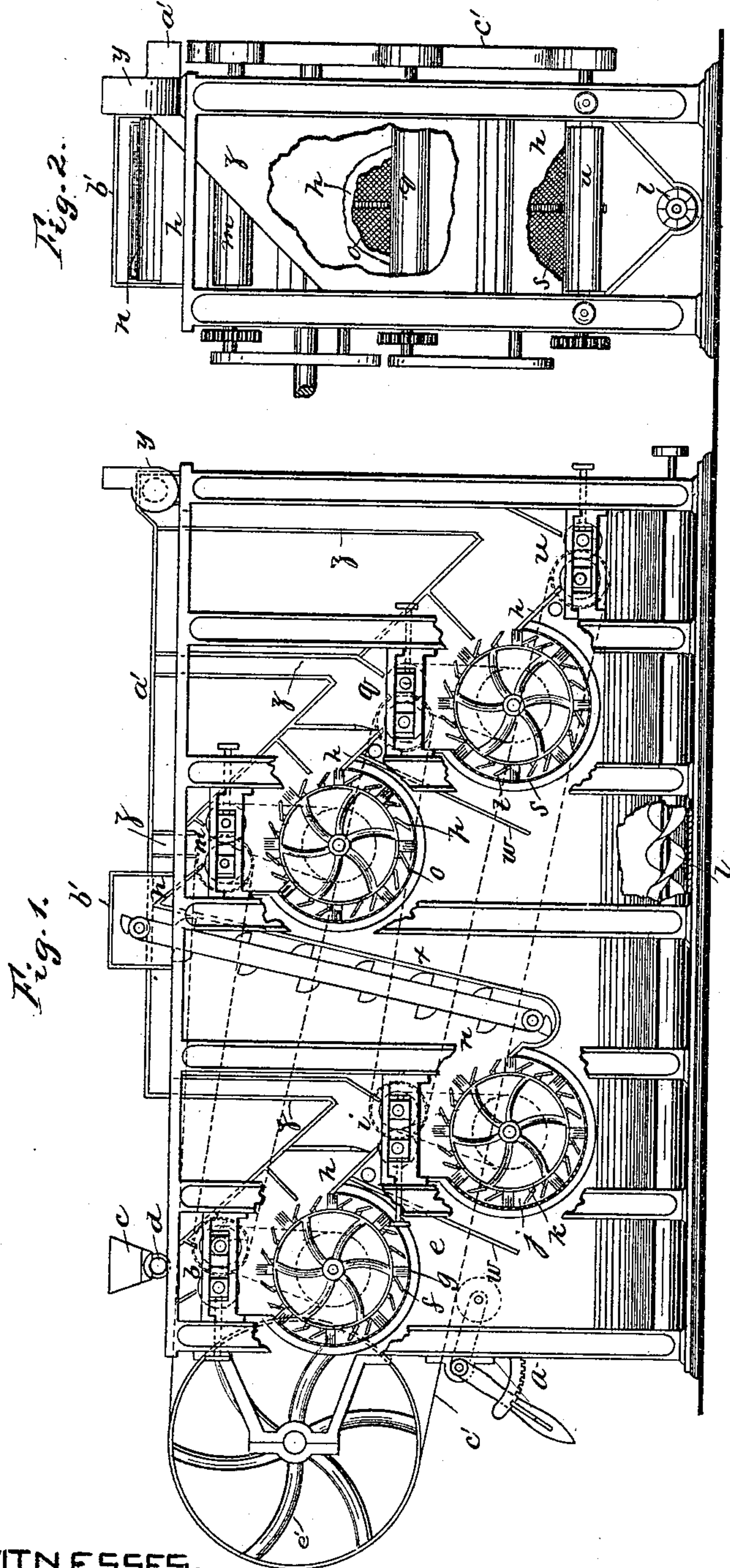


(No Model.)

R. MORRELL.
GRINDING MILL.

No. 344,490.

Patented June 29, 1886.



WITNESSES.

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UNITED STATES PATENT OFFICE.

ROBERT MORRELL, OF SUMMIT, NEW JERSEY.

GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 344,490, dated June 29, 1886.

Application filed March 25, 1885. Renewed December 3, 1885. Serial No. 184,601. (No model.)

To all whom it may concern:

Be it known that I, ROBERT MORRELL, a citizen of the United States, residing at Summit, in the county of Union and State of New Jersey, have invented new and useful Improvements in Grinding-Mills, of which the following is a specification.

My invention relates to grinding-mills, in which a series of pairs of grinding-rolls for treating the grain by successive reductions are used alternately with a series of concave screens, having revolving brushes and fans to run the chop through successively to each reduction for separating the fine material from that which requires further reduction; and it consists, essentially, of a plan of construction in which mills of four or five "break" capacity—that is, having four or five pairs of rolls and the complement of screens therefor, which is the preferred arrangement in the trade, because these numbers of breaks and separators give much the best results practically—can be comprised in a single machine, of which the height will be within the limits of the usual height between the floors of ordinary mill-buildings, without material increase of longitudinal dimensions, for greater simplicity of construction and setting up, and particularly for greater convenience of the miller, besides the advantages of having the mill wholly contained in one story or on one floor as compared with the present construction of these mills of like capacity, which extend through one floor to the height of two stories of the building, and sometimes more, in which form the necessary frequent inspections of the working of each pair of rolls and attentions to the bearings and the like require constant laborious climbing up and down, whereas by the improved construction which I propose the attendance may be almost wholly given from the floor on which the mill stands, the climbing of stairs being at the most limited to say three or four steps.

My invention also consists of an improved contrivance of the exhaust apparatus for drawing off the fine dust from the chop, and also of a simpler contrivance of the driving-gear for the rolls than is required in the mills as now constructed, all as hereinafter fully described and claimed, reference being made to the accompanying drawings, in which—

Figure 1 is a side elevation of my improved mill with the casing removed and portions of some of the parts broken out, also with some of the parts in section. Fig. 2 is an end elevation with some parts in section.

In a case, *a*, of about nine or ten feet high, a little greater length, and the usual width, I arrange the first pair of break-rolls, *b*, in the upper corner of one end, under the usual feed-hopper, *c*, and its roll *d*, and directly under said rolls I arrange the first concave screen, *e*, with its fan *f*, and brushes *g*, for brushing the fine flour through the screen and discharging the coarse chop down the chute *h* to the next pair of break-rolls, *i*, which, together with the screen *j* and fan *k* therefor, I arrange below and a little to one side of the first screen, as they are now arranged in the mills of this kind as at present constructed, except that in my plan the screens all turn the same way, while in the present mills the screen *j* and fan *k* are adjusted for the revolving of the fan in the opposite direction to that of fan *f*, to discharge into the next pair of rolls, located under screen *e*, and the whole series of rolls and screens is continued vertically in this zigzag form, the height being, as above stated, equal to or greater than two stories of the building. In some cases the screens have been placed in a direct line, one below another, with the rolls located in about the same relations as rolls *i* are to screen *e*, with all the fans turning in the same direction; but this requires greater height than the zigzag arrangement. Now, as two pairs of rolls and the screens therefor, with the feed mechanism above and the conveyer *l* below, can be well and conveniently bestowed between two floors, with economy of space and without any part being out of reach of the miller on a stand of two or three steps or so, I construct the mill in two of these inclined ranges of rolls and screens, located side by side in a case having corresponding longitudinal extension, and I locate the third pair of rolls, *m*, in the upper part and near about the middle of the case, and provide an elevator, *n*, in suitable relation with screen *j* and fan *k*, to receive the chop from them, and deliver it to rolls *m*, under which I arrange the screen *o* and fan *p*, belonging to them, with the fourth pair of rolls, *q*, and the screen *s* and fan *t* for them below and in the same inclination as the

first range, with the fifth pair of rolls *u* below screen *s*, with which the final reduction is effected, and from which the fine flour discharges into the conveyer *l* along with that from all the screens to be conveyed to such other dressing-machines as may be employed. Thus it will be seen that with the employment of but a single elevator of simple form and small size I am enabled to bring these elements into much more desirable and convenient form, both for space and attendance, than they are now arranged, and, besides, I effect considerable simplification of construction as to the internal arrangement of partitions and chutes, also as to the arrangement of the exhaust apparatus for drawing off the particles of light matter from the chop, and also as to the arrangement of the driving-belt for working the rolls, as follows:

Under the screens the space is all free for the fine flour forced through them to fall directly into the conveyer *l* without any chutes, except it may be preferred to employ the chutes *w* between the two screens of each range to prevent any of the flour from the upper screen lodging on the lower one; but these may not be required. For the rest the chutes *h*, together with the screens and the rolls and the partition *x*, back of the elevator, prevent the escape of the chop into the flour-space below, and for drawing off the light matters from the chop by the suction-fan *y* the arrangement of the rolls and the form of the case enable the arrangement of a vertical air-tank, *z*, from directly over each pair of the rolls to the top of the case, where they connect with a horizontal trunk, *a'*, extending along one side of the top of the case to said fan, so as to pass the elevator-cup *b'* at one end, in consequence of which I make the vertical tanks *z* with the slant represented in Fig. 2; but they may extend in full breadth to the top of the case, if preferred, and the one over the rolls *m*, located near the top of the case, may extend up through the top of the case for the requisite vertical dimensions that is prevented below the top of the case by the height of said rolls.

For the driving-gear of the rolls the belt *c'*, from the driving-pulley *e'*, located near the top of the end of the case where the first pair of rolls, *b*, are, is made to drive all the rolls without any idlers by passing first around the pulley of one of rolls *m*, thence back around the pulley of one of rolls *b*, thence around the pulley of one of rolls *q*, thence around the pulley of one of rolls *i*, thence around the pulley of one of the last pair of rolls *u*, and thence back onto the driving-pulley, thus saving the cost, wear, and attention of idlers or

duplicate driving-gear that have to be employed in the single vertical range arrangement.

The rolls of each pair are geared together in the usual manner for turning one by the other, and are differently speeded. The fans may be belted separately to the rolls, as indicated, or be otherwise geared, as preferred.

In my improved mill the rotating portion of the separators may consist of brushes and fans, as herein shown, or be otherwise constructed, and I am not limited by any particular construction of the same.

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

1. In a grinding-mill consisting of a series of grinding-rolls and separators in the alternate arrangement described, the said series of rolls and separators arranged in two inclined ranges located side by side, in combination with an elevator intermediately arranged there-with, substantially as described.

2. In a grinding-mill consisting of a series of grinding-rolls and separators in the alternate arrangement described, the said series of rolls and separators arranged in two inclined ranges located side by side, in combination with an elevator intermediately arranged there-with, the partition *x*, and the chutes *h*, substantially as described.

3. In a grinding-mill consisting of a series of grinding-rolls and separators in the alternate arrangement described, the said series of rolls and separators arranged in two inclined ranges located side by side, in combination with an elevator intermediately arranged there-with, the partition *x*, chutes *h*, and the vertical air-trunks extending up from above the rolls to the top of the case, substantially as described.

4. In a grinding-mill consisting of a series of grinding-rolls and separators in the alternate arrangement described, the combination of the said rolls and separators arranged in two inclined ranges located side by side, the driving-pulley, the belt running directly from one set of rolls to another of the two ranges alternately throughout the whole series, whereby one of the rolls of each pair is driven, and connecting-gearing whereby the other roll of each pair is driven, substantially as described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

ROBERT MORRELL.

Witnesses:

W. J. MORGAN,
S. H. MORGAN.