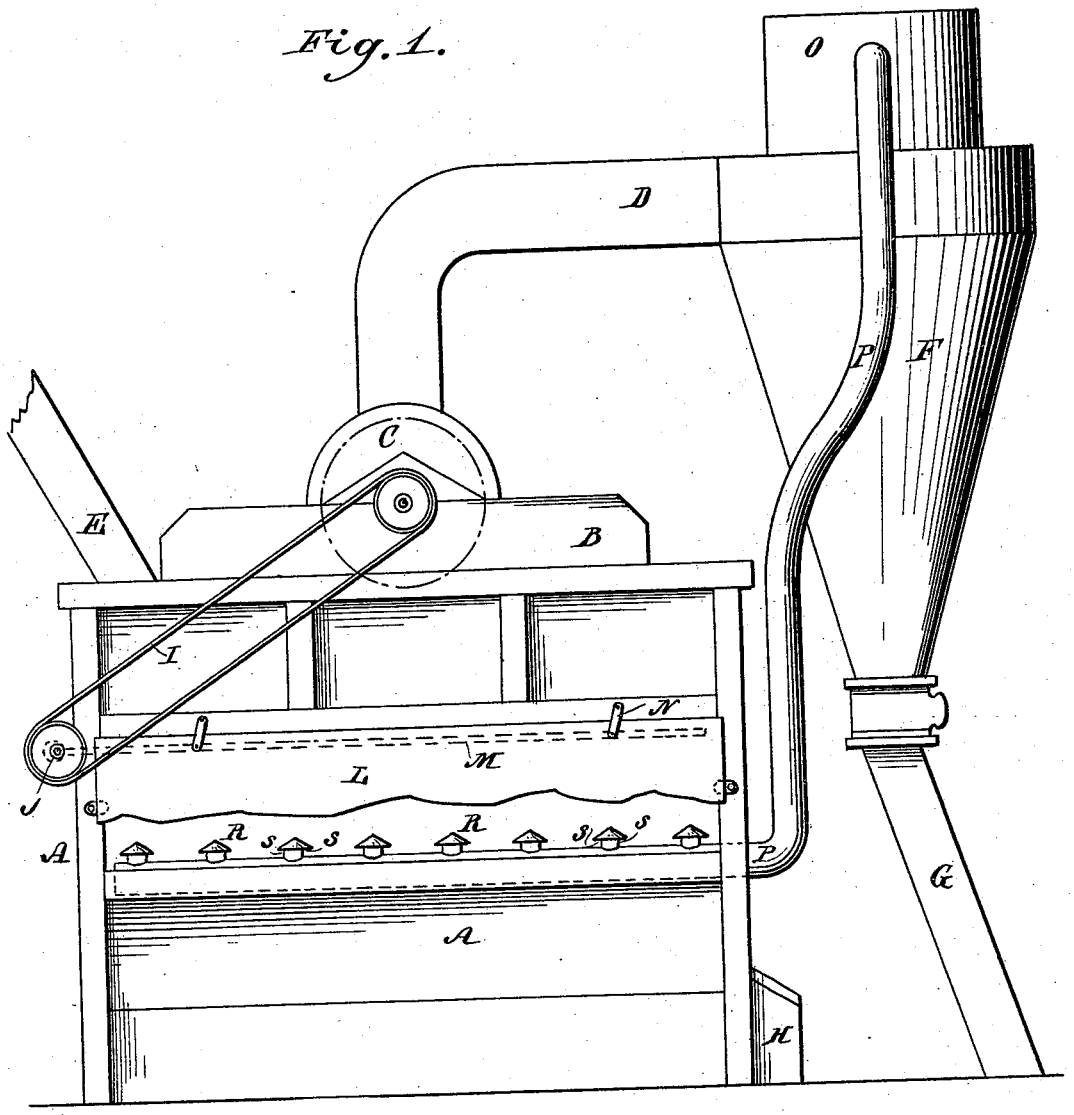
(No Model.) 2 Sheets—Sheet 1.

H. J. WOOLCOTT.

MILLING MACHINERY.

No. 456,231. Patented July 21, 1891.

Fig. 1.



WITNESSES:
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his ATTORNEY

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Fig. 2.

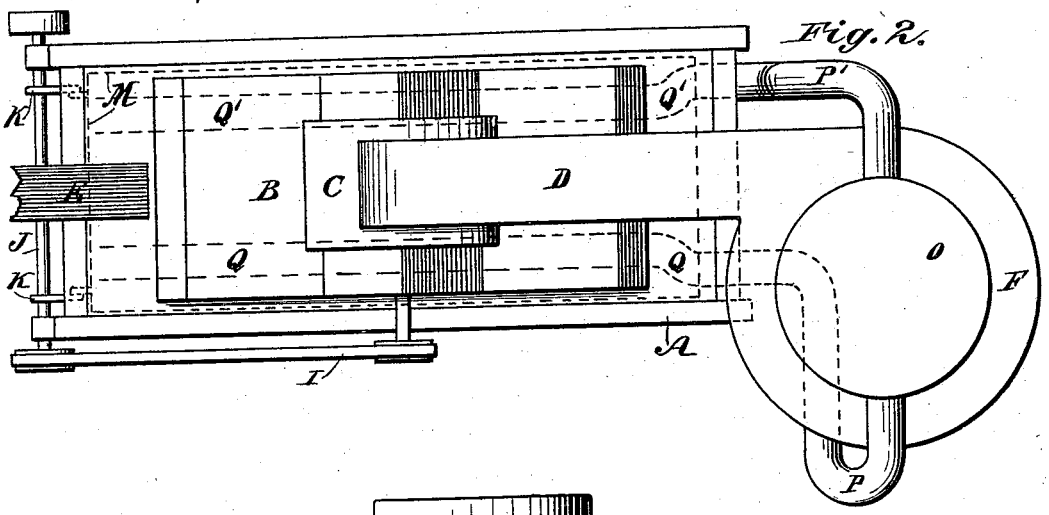
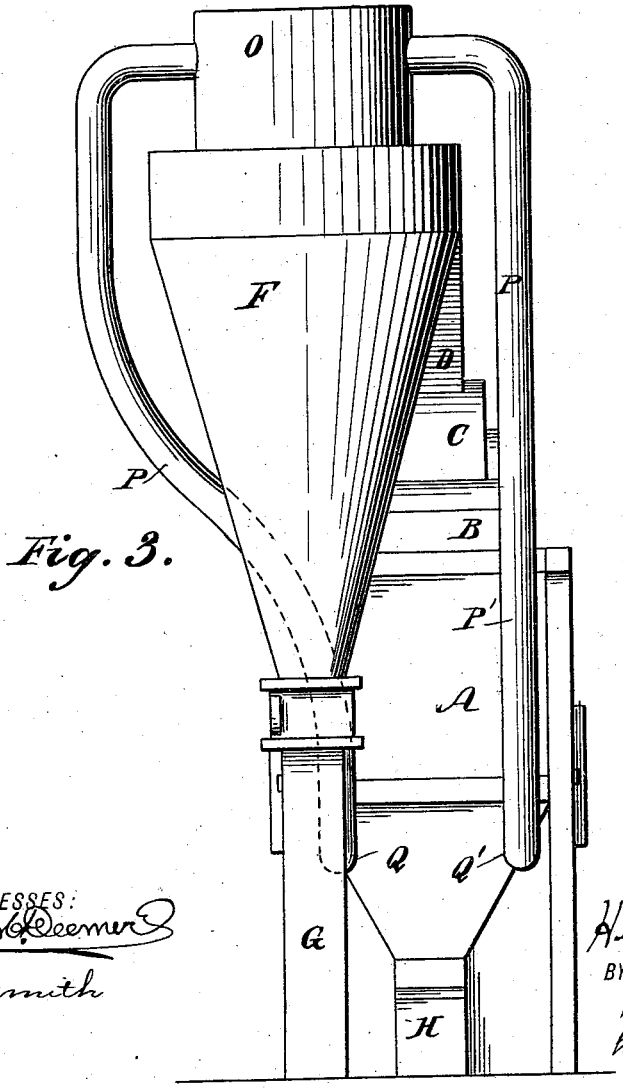


Fig. 3.



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UNITED STATES PATENT OFFICE.

HENRY J. WOOLCOTT, OF STATEN ISLAND, NEW YORK, ASSIGNOR OF ONE-HALF TO BENJAMIN B. STEWART, OF SAME PLACE.

MILLING MACHINERY.

SPECIFICATION forming part of Letters Patent No. 456,231, dated July 21, 1891.

Application filed September 24, 1890. Serial No. 365,992. (No model.)

To all whom it may concern:

Be it known that I, HENRY J. WOOLCOTT, a citizen of the United States, and a resident of Staten Island, in the county of Richmond and State of New York, have invented certain new and useful Improvements in Milling Machinery, of which the following is a specification.

My invention relates to milling apparatus; and it consists in improvements in the "middlings-purifier" and "dust-collector," so called, whereby, first, the fine flour and "fluff" or "dust," as it is sometimes called, are more thoroughly removed from the middlings; second, all dust or dirt floating in the atmosphere of the mill is excluded from both the middlings and the fine flour or fluff, and, third, the escape of the fine powdered flour from the dust-collector into the building, it being carried over the dust-collector by the exhaust from the fan, is prevented.

Heretofore it has been customary to provide adjustable slats near the base of the purifier, through which the air entered underneath the bolting-cloths to supply the blast induced by the fan for the removal of the fine flour and fluff from the middlings, and also it has been the custom to leave the top of the dust-collector open for the exhaust of air from the fan. These features of construction are open to the following objections: First, the air drawn into the purifier necessarily came from the interior of the building, and any specks of dirt light enough to float in the air, such as dust from belting, chimney-smoke from neighboring chimneys, and also the dust generated in the building itself incident to the manufacture, were necessarily drawn in with the air into the purifier, and of course reduced the color of the middlings and also of the fine flour or fluff, because much of it could pass through the bolting-cloths with the air-blast; second, the air-currents were supplied more strongly at the sides of the purifier where the air-slat inlets were than at the center thereof. Thus the middlings on the central portions of the bolting-cloths were not so thoroughly cleansed of the fine flour and fluff as that at the sides, and some of these impurities passed through the cloths into the middlings; third, the exhaust from the open top of the dust-collector carried out with it into the building a part of the almost impalpable powder found in the fine flour and fluff, which was not only wasted, but also fogged the air, and constitutes those deposits which occasionally explode in flouring-mills.

By my invention I obviate all of the foregoing defects, and also secure additional advantages, hereinafter set forth.

In the drawings hereof I show a well-known form of purifier and a dust-collector of the "cyclone" variety; but I wish it to be understood that I do not limit myself to these special forms of apparatus, because my invention is equally applicable to many other forms, as will be readily understood by those who are familiar with this art.

In the drawings I show the parts only that are desirable for an understanding of my invention.

Figure 1 illustrates an elevation of my invention, partly broken away, showing the interior arrangement. Fig. 2 illustrates a plan of the same. Fig. 3 illustrates a front view.

A is the purifier.

B is the wind-chest.

C is the fan.

D is the wind-trunk.

E is the feed-spout.

F is the dust-collector.

G is the delivery-spout from the dust-collector.

H is the delivery-spout for the tailings.

I is the belt which drives the fan.

J is the shaft for the agitators. They may be of any preferred form and operation.

K K are the agitators.

L is a side door or shutter, in which the slats are placed as heretofore made; but in my apparatus they are solid, excluding the air.

M is the frame which supports the bolting-cloths.

N N are the rocking arms which support the bolting-cloth frame.

O is a cap or cover, which closes the upper end of the dust-collector and is placed on the top of it, and P P′ are two large air-ducts, together having about the capacity of the wind-trunk D. They extend from the cap O back to the purifier and enter it below the bolting-

cloths, and Q Q′ are two extensions of the ducts P P′ within the purifier, in the upper side whereof are openings covered with hoods R R, supported on rods S S, &c., to prevent the middlings from dropping into the ducts, and yet allow free exit of the air from them. The openings may be of different sizes, if desired, the smaller ones being nearest the end of the purifier at which the duct enters, so that the distribution of the air-blast shall be uniform throughout the purifier, and the ducts may be curved, as shown in Fig. 2 in dotted lines, so as to discharge air under such portion of the bolting-cloths as preferred. The hoods will deflect the air-currents somewhat, so that it will be equally distributed throughout the entire under surface of the bolting-cloths.

I wish it to be understood that I do not limit myself to two return-ducts P P′, because I can use one only, or more than two, if desired, and may use any number of interior or distributing ducts Q Q′, and the air returned by the ducts P P′ may be subdivided and caused to discharge within the purifier through several ducts connecting with the return duct or ducts on the outside of the purifier.

From the foregoing it will be seen that my purifier is substantially air-tight, except, of course, the spouts and ducts opening into it, which are themselves closed, as usual, and that the top of the dust-collector is closed by the cap O, and that the return-ducts P P′ are also substantially air-tight. Thus the fan does not draw air into the purifier from the room or building, but simply gives continuous circulation to the air within the purifier and dust-collector. Of course there is inevitably a little suction of air from the building through the crevices and joints of the apparatus at the commencement of the operation; but that very soon practically ceases. Thus I avoid mixing with the middlings or with the fine flour and fluff any particles of foreign matter which may be floating in the atmosphere of the mill; also, I avoid the scattering of the impalpable dust or powder through the mill by the exhaust from the fan; also, that I can distribute and apply the air-blast to the under side of the bolting-cloths as I desire, and I secure the further very considerable advantage that the fan not only exerts a sucking action from the upper side of the bolting-cloths, but also the ducts Q Q′, being placed somewhat near to the under side of the bolting-cloths, exert a direct blast effect against it. Thus the middlings on its upper side are kept in a condition of greater agitation than formerly, and thereby are much more efficiently cleaned. I have found by actual test that I remove about fifty per cent. more of the fine flour and fluff than by the old process, and the middlings are consequently proportionately improved, and both the middlings and the fine flour and fluff are improved in color. Of course some portion of the impalpable powder which formerly escaped from the open upper end of the dust-collector into the mill is caught in the return air-drafts and carried back to the under side of the bolting-cloths; but they do not remain there among the purified middlings. On the contrary, being very light and fine, they are carried upwardly by the air-currents passing through the bolting-cloths, and finally find their way down through the dust-collector and out through its delivery-spout, and although there may be a small percentage of it in circulation at all times, still the result of the whole process is, as I have stated, a gain in the purity of the middlings of about fifty per cent. as compared with any process heretofore practiced, as I believe.

It will be observed that my return-ducts P P′ connect with the uppermost part of the dust-collector, and are above the point where the wind-trunk D enters it. The construction of these dust-collectors, as is well known, is such, there being an interiorly-arranged shield or deflecting plate, that the impurities discharged into it by the wind-trunk are almost immediately given a vortex-like movement downwardly, the suction being in that direction. This therefore leaves the upper portion of the dust-collector, or, in other words my cap or hood O, practically free from impurities, and it is from this practically clear or free portion of the dust-collector that I take my return air-currents through the ducts P P′. Thus I do not draw back again into my purifier the impurities which have already been removed from the middlings, or at least a very small portion of them only, and that which is taken back is of the lightest character, and, as before stated, readily passes up through the purifier again and ultimately finds its way down through the dust-collector to the discharge. In this respect my apparatus is essentially different from certain other forms which have been heretofore attempted, and which have, as I understand, been not decidedly successful, to say the least, if not practically failures. In them the purifying has been done within the dust-collector, and the return-drafts have been from the medial or lower portion of the dust-collector, or at least below the point, not above it, as in my case, at which the impurities are discharged into the dust-collector by the fan. To this difference in construction, together with other important features which need not be recited, I attribute largely the very great advantages which I have found to exist in my construction.

I do not limit myself to the details of construction shown and described, because it will be evident to those who are skilled in this art that many modifications may be made therein and still the essentials of my invention be employed, and it will also be appar-

ent that my invention is applicable to other milling operations aside from the purification of middlings.

I claim—

1. The combination, with a middlings-purifier having a substantially air-tight chest, of a closed dust-collector, a fan and wind-trunk, and a return-duct connecting the stop of the dust-collector above the wind-trunk with the purifier below the bolting-cloths, substantially as set forth.

2. The combination, with a middlings-purifier having a substantially air-tight chest, of a closed dust-collector, a fan and wind-trunk, and a return-duct opening into the upper end of the dust-collector and entering the purifier and extending below the bolting-cloths and provided with a series of openings within the purifier, substantially as set forth.

3. A closed dust-collector provided with a return air-duct connecting its upper part above the wind-trunk with the middlings-purifier opening into the same below the bolting-cloth, substantially as set forth.

4. The combination, with a purifier having a substantially air-tight chest and a sieve or bolting-cloth, of a closed dust-collector, a fan and wind-trunk, and a plurality of return air-ducts connecting the upper part of the dust-collector above the wind-trunk with the purifier below the bolting-cloth or sieve, substantially as set forth.

5. The combination, with a purifier having a substantially air-tight chest and a sieve, of a closed dust-collector, a fan and wind-trunk, and a return-duct connecting the upper part of the dust-collector above the wind-trunk with the purifier passing into the same below the bolting-cloth or sieve, said duct having a series of hooded openings within the purifier, substantially as set forth.

6. The process described, consisting in continuously circulating substantially the same body of air from the interior of a purifier through the wind-trunk into a dust-collector and from the part of the dust-collector which is above the wind-trunk back again to the purifier below the bolt-cloth or sieve and through it to the place of starting, substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 22d day of September, A. D. 1890.

HENRY J. WOOLCOTT.

Witnesses:
PHILLIPS ABBOTT,
FREDERICK SMITH.