(No Model.)

F. C. HALL.

GRINDING MILL.

No. 396,559. Patented Jan. 22, 1889.

Fig. 1.

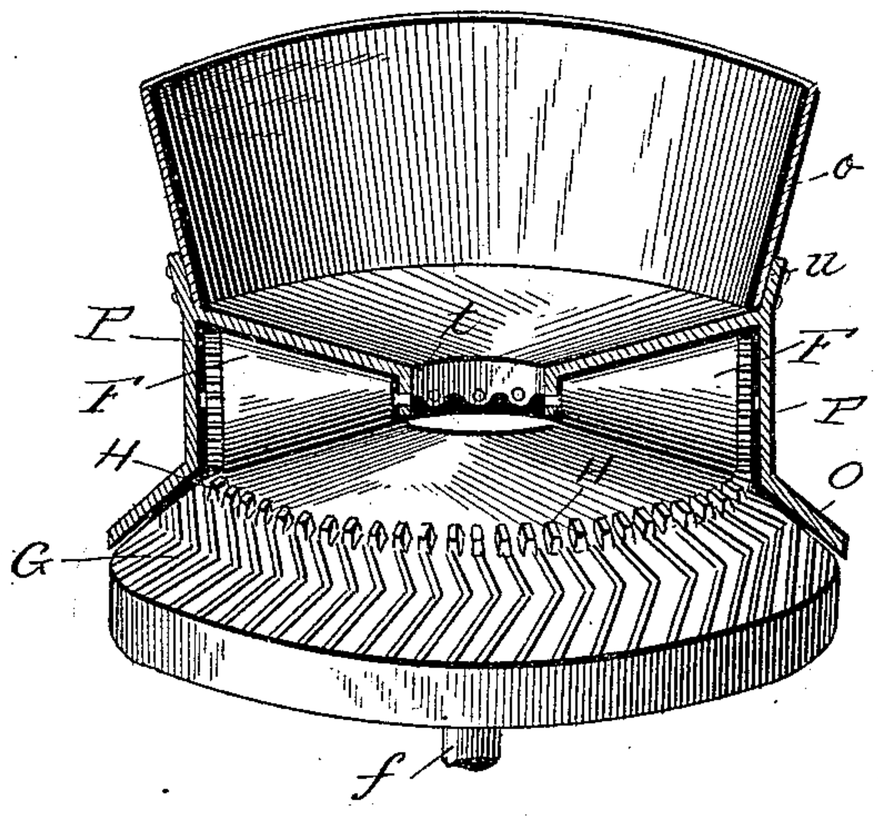


Fig. 3.

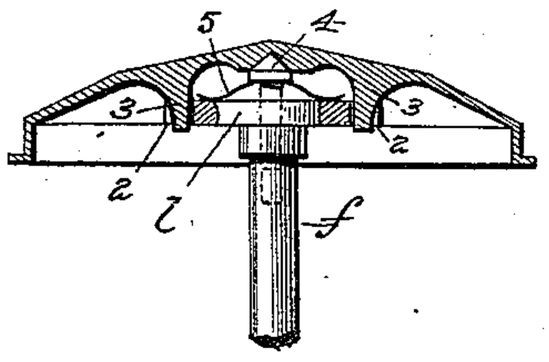
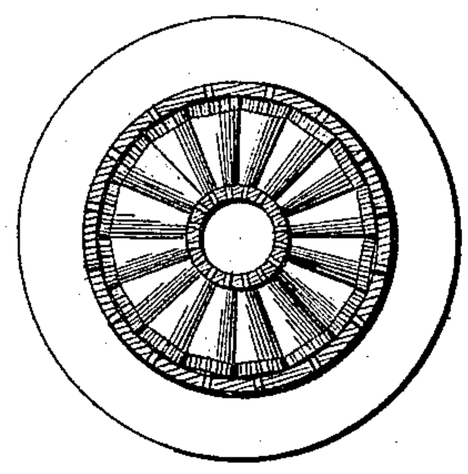


Fig. 2.



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UNITED STATES PATENT OFFICE.

FRANK C. HALL, OF PHILADELPHIA, PENNSYLVANIA.

GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 396,559, dated January 22, 1889.

Application filed May 8, 1888. Serial No. 273,181. (No model.)

To all whom it may concern:

Be it known that I, FRANK C. HALL, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Grinding-Mills; and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention is an improvement in mills designed more especially for grinding paint. My object is to render the mill effective for grinding paint skins and generally to simplify and improve the construction and operation of the mill.

In the drawings, Figure 1 shows a perspective view of the mill. Fig. 2 is a plan view of the crushing-rollers and the runner. Fig. 3 is a detail sectional view of the lower grinding-surface and a yielding bearing therefor.

Heretofore paint-grinding mills, so far as I am aware, have not been available for grinding paint skins, which, though containing the best portions of the paint, have been practically waste material in the manufacture of paint. These skins are thin and tough and somewhat resemble in quality sheets of india-rubber. In order to render the mill capable of grinding these sheets, I provide supplemental crushing-rollers F in connection with the runners for reducing these skins before they are operated upon by the grinding-surface proper of the mill. These crushing-rollers are conical in form, as shown, and are contained in an upper extension, P, of the casing O. This casing has a central opening with a central circular wall, *t*. The conical rollers have their bearings in the outer circular wall of the extension P and in the wall *t*. The upper part of the runner is conical, but at a lower angle than the grinding-surface G, and the center or top of the runner is horizontal, as in Fig. 1, or is of the same inclination as the crushing-rollers, as in Fig. 3, as may be preferred. The wall *t* extends downwardly only far enough to afford bearings for the rollers F, leaving a space between its lower end and the upper surface of the runner to allow the material to be ground to pass in under the rollers. The outer or larger ends of the rollers are provided with cogs, which mesh with an annular rack, H, on the runner and on the margin of the grinding-surface G. The engagement between the teeth of the rollers and those of the rack is sufficiently long to maintain their connections with slight vertical movement of the runners, which should be slightly lowered when the mill is started in order to allow the material to be ground to pass under the rollers. For convenience of construction I form an annular flange, *u*, with an interior bevel on the upper part of the casing-extension, and to this is riveted the sheet-iron hopper *o*. I provide a yielding support for the runner, so as to allow of the passage of any obstruction which may be found in the paint. This is shown in Fig. 3. The spindle *f* carries on its upper end a ring, 1, having openings 2, which receive projections 3 on the under surface of the runner, which thus receives support, and the full movement of the spindle. A pin, 4, is loosely seated in the head of the spindle *f*, terminating in a conical point, which fits a corresponding recess in the under central part of the runner, and between the under part of the conical head and the ring 1, I interpose a spring, 5, which thus forms a yielding bearing for the runner.

The first effect of the operation of the mill consists in crushing the skins under the rollers F, which destroys their integrity. The material thus crushed passes down in the spaces in the teeth of the rack, which may be beveled on the inner edges to prevent lodging. The material then passes to the grinding-surface, and is ground in the ordinary manner.

What I claim is—

1. In combination, the runner of a mill having a grinding-surface, a crushing-surface above the grinding-surface, the shell or casing, and a series of crushing-rollers arranged around and bearing upon said crushing-surface.

2. In combination, the revolving runner, the casing O, having the central feed-opening, *t*, and the series of conical crushing-rollers arranged around said opening, the said casing having the bearings for the rollers, substantially as described.

3. In combination with the casing and the runner of a mill having an annular rack upon the upper margin of its grinding-surface and a conical surface above the said rack, a series of conical crushing-rollers having teeth en-

gaging with said rack, and bearings in the casing, substantially as described.

4. In combination, a suitable hopper, a runner arranged beneath the same, having a grinding-surface and a crushing-surface above the grinding-surface, a shell or casing, rollers adapted to bear on said surfaces, and a yielding support for the runner.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANK C. HALL.

Witnesses:
FRANK H. MASSEY,
AUGUST WEBER.