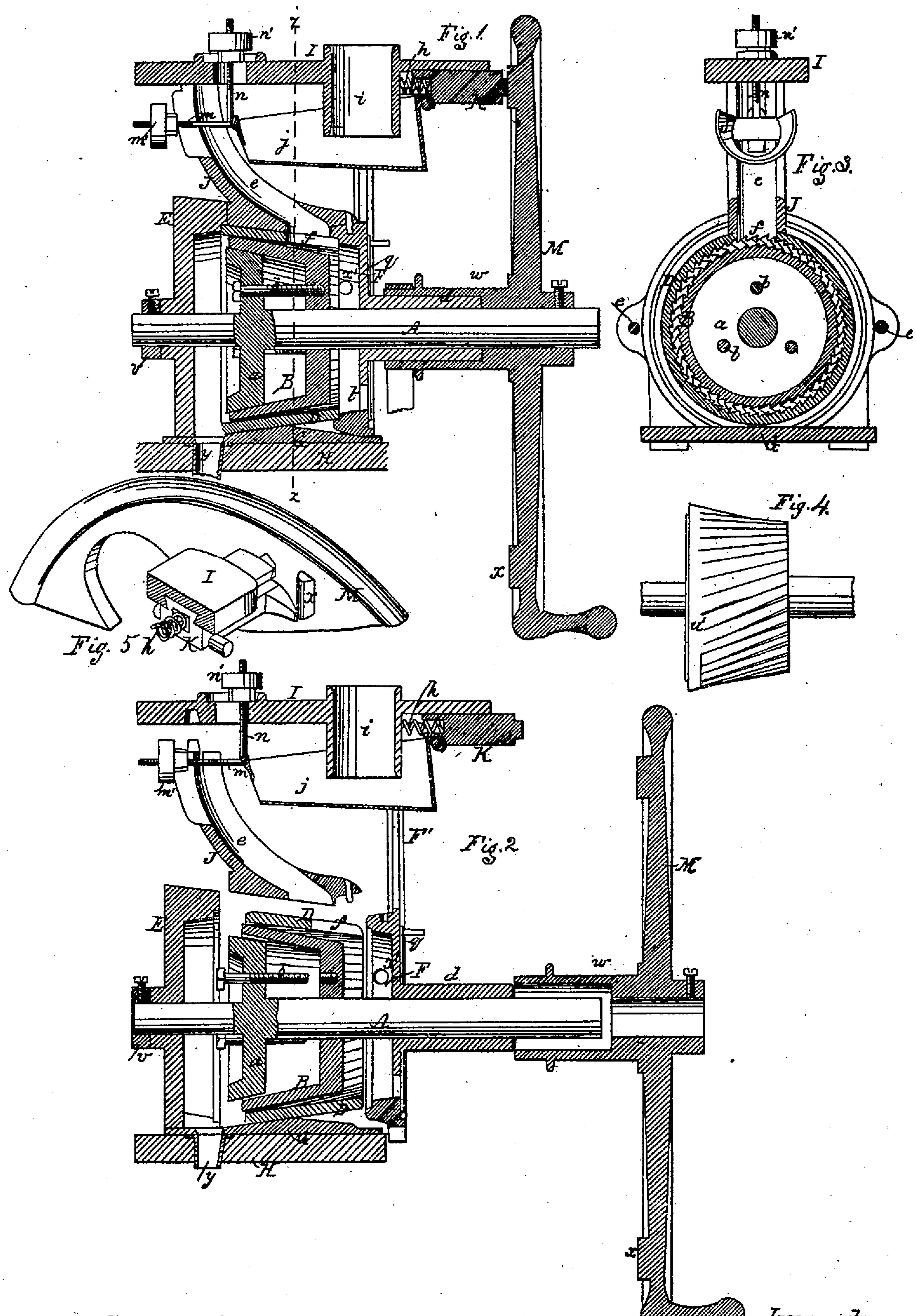
G. W. HUBBARD & S. A. SMITH.

GRINDING MILL.

No. 75,273. Patented Mar. 10, 1868.



Witnesses

Inventor

Hubbard & Smith
By their Atty
H. Howson

United States Patent Office.

GEORGE W. HUBBARD AND SCOTT A. SMITH, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO CRESSON & SMITH, OF SAME PLACE.

Letters Patent No. 75,273, *dated March* 10, 1868.

IMPROVEMENT IN GRINDING-MILLS.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that we, GEORGE W. HUBBARD and SCOTT A. SMITH, both of Philadelphia, Pennsylvania, have invented certain Improvements in Grinding-Mills; and we do hereby declare the following to be a full, clear, and exact description of the same.

Our invention consists of certain improvements, fully described hereafter, in what are known as portable grinding-mills.

In order to enable others skilled in the art to make and use our invention, we will now proceed to describe its construction and operation, reference being had to the accompanying drawing, which forms a part of this specification, and in which—

Figure 1 is a vertical section of our improved grinding-mill.

Figure 2 the same, showing the several parts detached from each other.

Figure 3 a transverse section on the line 1–2, fig. 1.

Figure 4 an exterior view of the burr; and

Figure 5 a perspective view of part of the fly-wheel.

Similar letters refer to similar parts throughout the several views.

A is a horizontal spindle, secured to or forming a part of which is a disk, *a*, having a bevelled edge, adapted to the open end of the conical burr B, to which the said disk is confined by a suitable number of set-screws, *b*, the burr being fitted snugly at one end to the spindle. D is the tapering shell of the mill, and is confined between the front plate E and rear plate F, in which plates the spindle A turns, the two plates being connected together by bolts *e*, which also serve to confine the base-plate G to the plates, the said base being secured to a platform or table, H, or to the top of the box which contains the bolting-apparatus. Forming a part of the plate F is the frame F′, which serves to support the platform I, into the under side of which is fitted a projection on the upper end of the curved arm J, the lower end of the latter resting on the shell D, and being fitted between and secured to the plates E and F, and the channel *e* formed on one side of the arm communicating with an opening, *f*, in the shell. One end of a shoe, *j*, is connected by a screw-rod, *m*, and nut *m′* to the arm J, and by a screw-rod, *n*, and nut *n′* to the platform I, the opposite end of the shoe being hinged to a block, K, which is arranged to slide beneath the platform I, and which is acted upon by a spring, *p*. The spindle is maintained in its proper longitudinal position in one direction by a collar, *v*, bearing against a projection on the plate E, and in the opposite direction by the hub *w* of the fly-wheel M.

As the spindle A, with its burr, is caused to revolve, the grain falls from the hopper into the shoe *j*, which is agitated by projections *x* on the fly-wheel striking the block K. From the shoe the grain falls into the channel *e* of the arm J, and passes down the same into the opening *f* of the shell, to be ground by the combined action of the teeth of the latter and those on the burr, and finally passes off in a triturated condition through a spout, *y*, to the bolt.

There are several peculiar features in our improved mill, which we will now proceed to describe.

The first, and perhaps the most important, feature is the constructing of the shell and burr of malleable cast iron, case-hardened. The burr B is first cast with appropriate teeth on it, then annealed or made malleable, then turned (if necessary) inside for the reception of the disk *a*, and bored to fit the spindle, and subsequently case-hardened, so that its teeth partake of the character of hardened steel. Before the case-hardening, however, and while the disk *a* is in its place in the burr, a smooth portion, *a′*, fig. 4, is turned on the outer surface of the same, near the large end, for a purpose which will be rendered apparent hereafter.

During the above-mentioned processes of annealing and case-hardening, which take place in the absence of the disk, the burr is apt to become warped towards its open end. By reinserting the disk *a*, however, and tightening the same in its place, the burr is not only restored to its proper circular form, but the turned portion *a′* must be concentric with the disk and spindle.

In like manner the shell D is first cast with appropriate internal teeth, then rendered malleable, and afterwards case-hardened, after which the large end, which had been previously turned and fitted into a circular recess

in the plate E, is now driven into the same, so that the shell is freed from all distortions which it may have acquired during the annealing and case-hardening processes. The plate F is now applied to the small end of the shell, and secured to the plate E.

It will be understood that the modes described of rendering the burr or shell true, are applicable to mills which have burrs or shells made simply of cast iron, or other metal which is liable to become distorted with or without being case-hardened.

It will be observed that there is a hole, x', made in one side of the mill, in the present instance, by cutting away the flange of the plate F. If, on looking through this hole, it be observed that the space between the end of the burr and plate F is being filled up, or nearly so, it is a warning to the attendant to adjust the feed-apparatus and reduce the supply of grain. In hand-mills this is of great advantage, as it enable the operator to work the mill at a uniform speed, and to regulate the amount of grain ground, so that it shall be commensurate with the strength which he is capable of exerting.

Another feature of our improvements is the mode of maintaining the burr in its proper position within the shell. In ordinary grinding-mills the burr is forced into the shell by a screw acting on one end of the spindle, so that its duty is limited to the preventing of the burr from moving backwards, no precaution being taken to prevent it from coming in contact with the shell and injuring the grinding-surfaces of both, should a proper supply of grain be wanting in the mill, or should an undue longitudinal strain be imparted to the spindle while it is being driven.

These objections are obviated by the adjustable collar v on the spindle at one end of the mill, and by the hub of the fly-wheel, which acts as an adjustable collar, on the spindle at the opposite end of the mill.

Independently of the duty which these collars perform, of maintaining the burr in its proper position and preventing the grinding-surfaces from coming in contact, they afford facilities for making on the shaft marks, which, in connection with the collars, will serve as guides to restore the burr to its proper position in the shell after it has been changed. Graduated marks may be made on the shaft, to indicate the proper adjustment for different degrees of fineness in grinding.

We claim as our invention, and desire to secure by Letters Patent—

1. The lever B, combined with and trued by the disk a, substantially as described.
2. The shell D, with its inclined edge adapted to the plate E, substantially as set forth.
3. The spindle A with its burr, when confined in its place within the shell by two adjustable collars arranged upon the spindle, as specified.

In testimony whereof, we have signed our names to this specification in the presence of two subscribing witnesses.

GEO. W. HUBBARD,
SCOTT A. SMITH.

Witnesses:
ALFRED B. STOVELL,
A. B. WILLITS.