

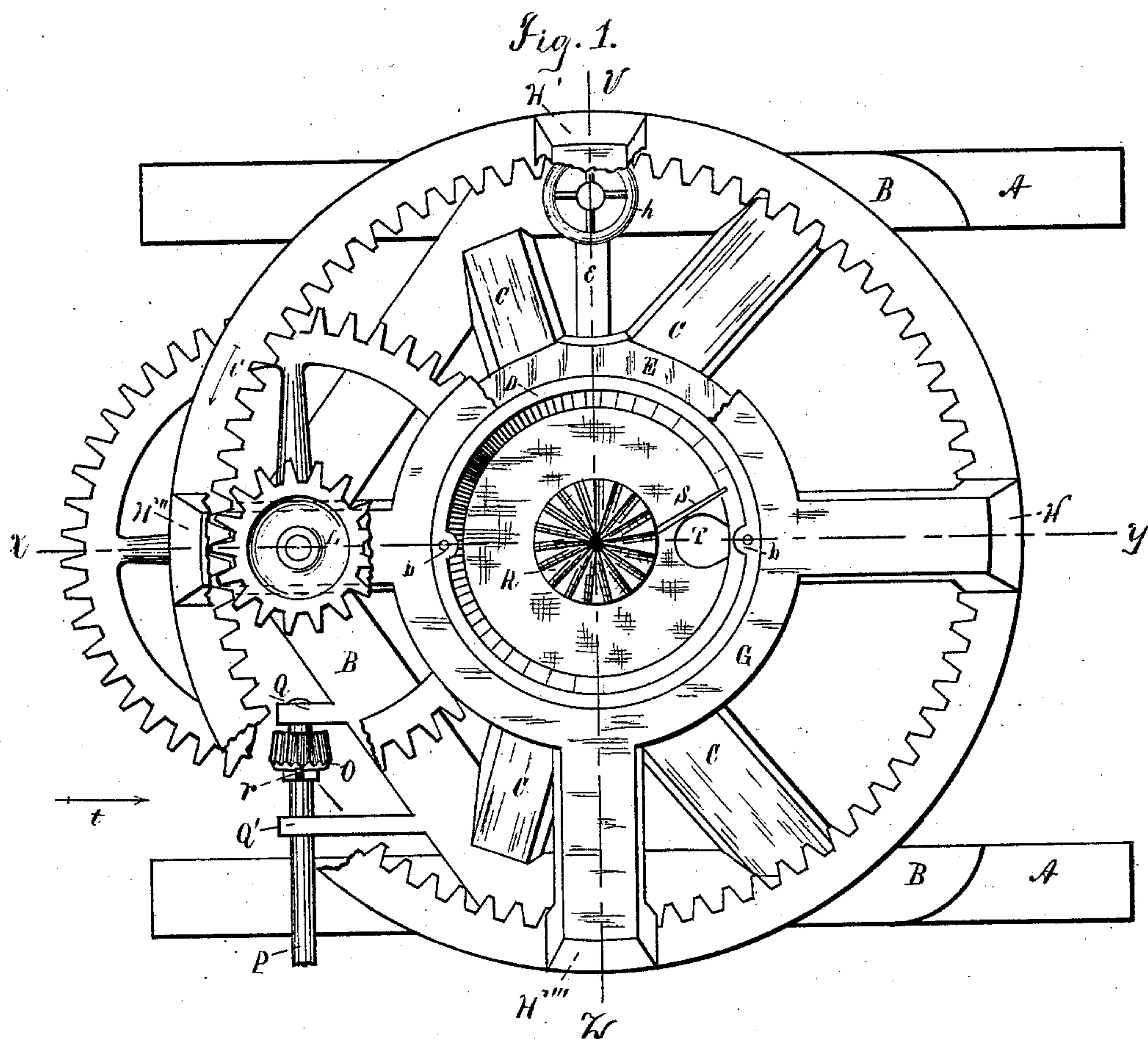
(No Model.)

3 Sheets—Sheet 1.

G. K. SMITH.  
GRINDING MILL.

No. 297,024.

Patented Apr. 15, 1884.



*WITNESSES:*

— Wm. Greene —  
F. Wilcox

*INVENTOR*

George K. Smith  
by Robt. H. Wiles  
ATTORNEY

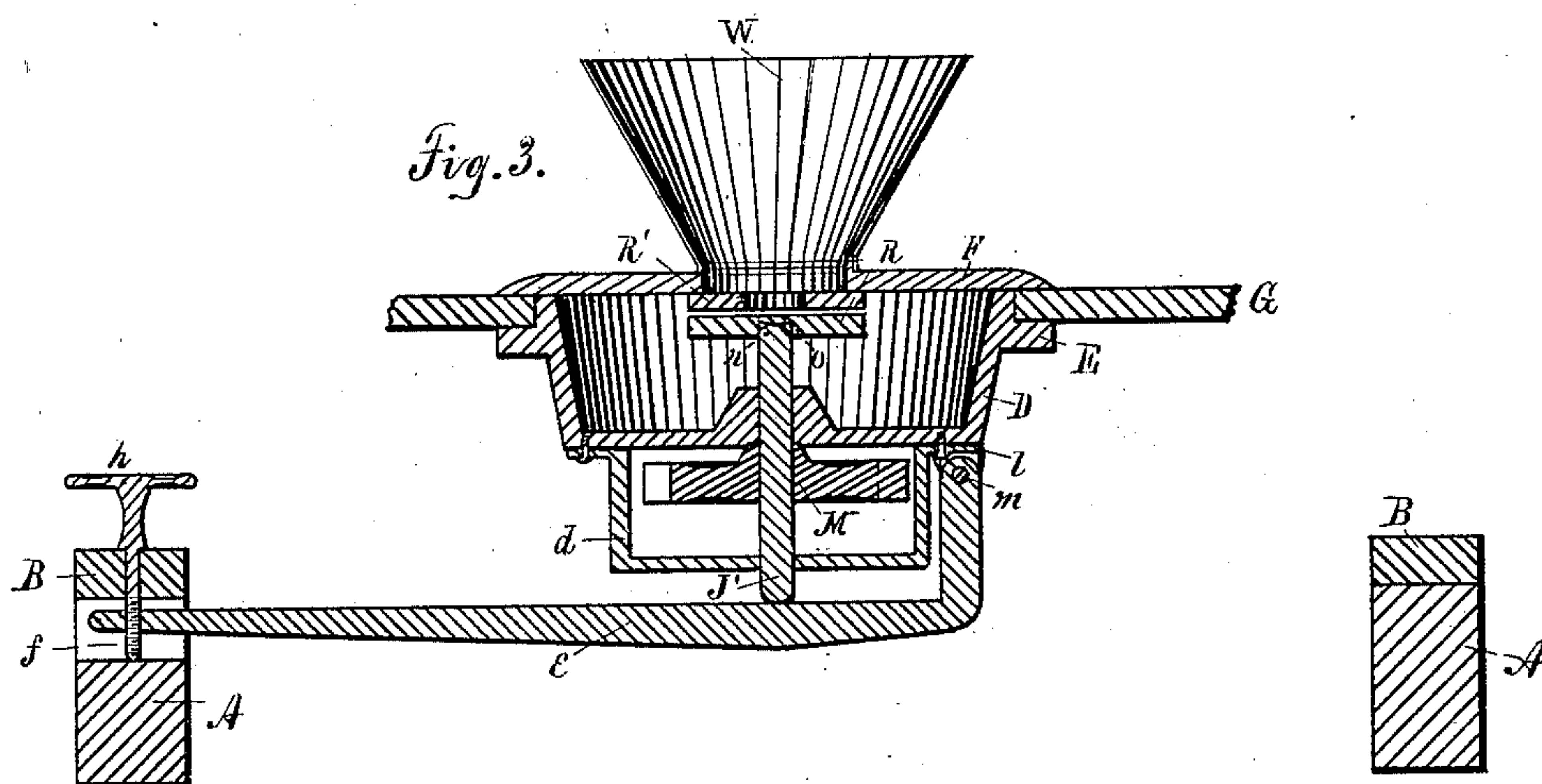
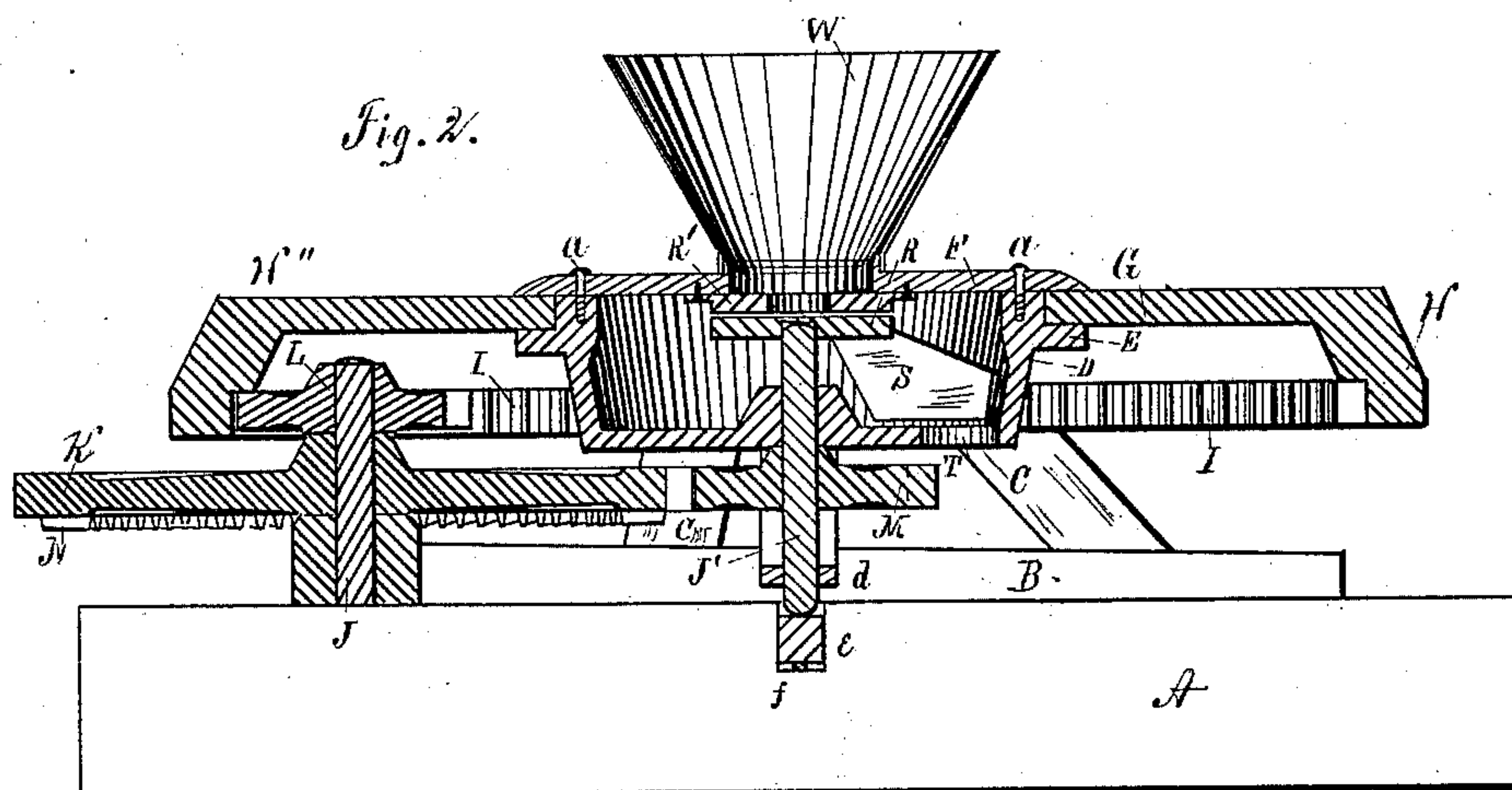
(No Model.)

3 Sheets—Sheet 2.

G. K. SMITH.  
GRINDING MILL.

No. 297,024.

Patented Apr. 15, 1884.



WITNESSES:

*A. W. Greene*  
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(No Model.)

3 Sheets—Sheet 3.

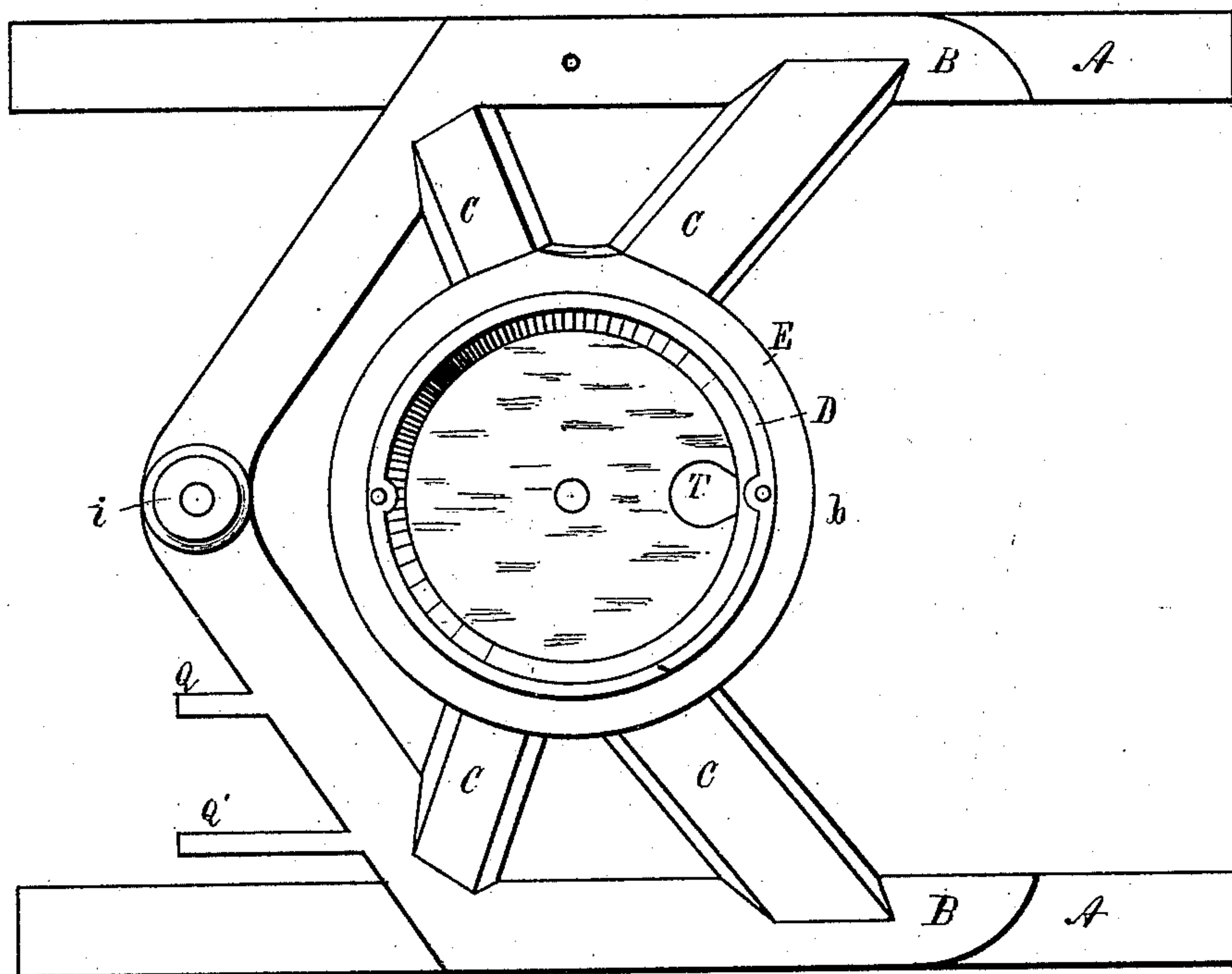
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*Fig. 4.*



WITNESSES:

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# UNITED STATES PATENT OFFICE.

GEORGE K. SMITH, OF FREEPORT, ASSIGNOR TO H. C. STAVELAND & CO., OF CHICAGO, ILLINOIS.

## GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 297,024, dated April 15, 1884.

Application filed June 4, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE K. SMITH, a resident of Freeport, in the county of Stephenson and State of Illinois, have invented certain new and useful Improvements in Grinding-Mills; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

My invention is an improved grinding-mill, in which the power is applied by means of sweeps to a train of gearing, through which it is transmitted to the grinding-burrs, the train of gearing constituting a horse-power, by means of which motion may be communicated either to the grinding-burrs or to any independent mechanism, and means being provided whereby the horse-power may be readily connected with or disconnected from any machinery which it may be desired to run.

The construction and operation of the machine is fully described and explained in the following specification, and its details are shown in the accompanying drawings, in which—

Figure 1 is a plan of the mill with hopper W, top plate, F, and upper grinding-burr, R', removed, the arms H' H'' being partly broken away to show the parts beneath; Fig. 2, a central vertical section of the entire mill, through line *xy*, Fig. 1; Fig. 3, a central vertical section of the entire mill, through the line *vz*, Fig. 1, looking in the direction indicated by the arrow *t*; and Fig. 4, a plan of the rigid frame of the mill, all the other parts being removed.

In these views, A A are the side pieces of a timber frame which supports the mill. This frame may, if desired, be in the form of a meal-box, or may consist merely of the two parallel timbers shown, the meal being allowed to fall on the ground or a suitable floor, or to run into suitable measures or other movable receptacles.

On the upper surface of the timbers A A is bolted a rigid iron frame, B, provided with a series of arms, C, formed integrally with it and extending obliquely upward and inward, and also with two parallel horizontal arms, Q Q', which form the bearings of a horizontal

shaft, P, as hereinafter set forth, said arms Q Q' being also formed integrally with the frame B. The converging arms C support a pan, D, provided with an annular flange, E, which is formed integrally with the pan, and also with the arms C at their inner ends. It will thus be seen that the frame B, arms C, pan D, and flange E form a single rigid casting. The rim of the pan D extends vertically above the annular flange E, and the open hub G of a large master-wheel encircles the vertical rim and rests on the horizontal flange. The pan thus forms the shaft of the master-wheel, and the rim and flange constitute the bearings on which it revolves. A circular plate, F, is bolted to the upper edge of the pan and extends out beyond the inner edge of the hub G, thus securing the latter in position. A grinding-burr, R', is rigidly attached to the lower face of the plate F at its center, the burr having grinding-teeth on its lower face. A central opening in the plate and burr permits the feeding of grain, and a rim surrounding the opening in the plate receives a hopper, W. The hub G of the master-wheel is provided with four radial arms, H H' H'' H''', which connect it with the internally-gearied rim I. The geared rim I engages with a pinion, L, rigidly mounted on the vertical shaft J, which is journaled in a boss formed integrally with the rigid frame B. On the same shaft J is rigidly mounted a spur-gear, K, provided with beveled teeth N on its lower face. The spur-gear K meshes with a pinion, M, rigidly mounted on a vertical shaft, J', coincident with the central axis of the master-wheel. The shaft J' rotates freely in two bearings, the lower one being in a stationary stirrup, *d*, bolted to the bottom of the pan D, while the upper one is in a boss formed on the upper surface of the bottom of the pan. The upper end of the shaft J' is squared, and enters a square socket in the lower face of the grinding-burr R, which rests on the shaft, and is formed with grinding-teeth on its upper face. The top of the shaft is slightly convex, and the surface of the grinding-burr is also convex at the point where it rests upon the shaft. The rotation of the shaft, therefore, causes the burr to rotate; but at the same time the burr has a rocking motion independent of



the shaft, whereby it adjusts itself to the stationary burr R'. The lower end of the shaft J' rests on a regulating-lever, e, one end of which is suspended on a pivot, m, passing through the end of the lever and through two ears, l, on either side of the lever, the ears being formed integrally with the stirrup d, Fig. 3. The other end of the regulating-lever is raised or lowered by means of a hand-wheel, h, and screw f, passing through the frame B, and through a screw-threaded hole in the lever. The pin m, which sustains one end of the lever, is of wood, of such strength as to stand the ordinary strain of the mill, while, if any hard body of considerable size enters the space between the burrs, the pin breaks, releasing the lever, and allowing the shaft J' and burr R to drop down, and thus prevent the destruction of the grinding-faces. If the pin be removed, the lever will drop down and the shaft J' will follow it until the pinion M reaches the stirrup d, when it will be completely out of mesh with the spur-gear K, and the latter may be rotated without moving any part of the grinding mechanism.

The beveled teeth N on the lower face of the spur-gear K mesh with a beveled gear, O, mounted on a shaft, P, journaled in the bearings Q Q', already mentioned. A tumbling-rod, connected with the outer end of the rod by means of a universal-joint coupler, transmits the motion of the shaft P to any machinery outside the mill whenever desired. The beveled gear O is fastened on the shaft by means of a set-screw, r. The screw may be loosened and the beveled gear moved on the shaft in the direction of the bearing Q' until it no longer meshes with the teeth of the wheel K, when the mill may be rotated without rotating the shaft P or any machinery connected with it.

The operation of the mill is as follows: Power is applied to the master-wheel by means of sweeps bolted thereto, which rotate it in the direction indicated by the arrow t' on the rim of the wheel. The pinion L, which meshes with the master-wheel, rotates in the same direction, carrying with it the spur-gear K, while the pinion M, meshing with the spur-gear K, is rotated in the opposite direction, carrying with it the shaft J' and grinding-burr R. As the mill turns, grain placed in the hopper W passes downward through the opening in the stationary burr R', is ground between the two burrs, and passes out at their outer edges. A scraper, S, attached to the rotating burr R, carries the meal in the pan to an opening, T, in the bottom thereof, where it is discharged into the meal-box or other receptacle below. The fineness of the meal may be regulated at any time by turning the hand-wheel h, and the connection of the shaft J' and burr R renders the latter self-adjusting with reference to the stationary burr R'. At the same time that the spur-gear K meshes with the pinion M, the bevel-teeth N on the lower face of said spur-gear mesh with the bevel-gear O and rotate the shaft P at a high rate of speed, thus driving

any suitable machinery outside of the mill. The power applied to the master-wheel may be divided between the grinding mechanism and any other machinery which it is desired to run simultaneously therewith; or the entire power may be expended either in grinding or in running other machinery. If it be desired to run the mill alone, the set-screw r, which holds the beveled gear O in position on its shaft, is loosened, and the beveled gear is then moved on the shaft until it strikes the bearing Q'. (See Fig. 1.) The gear is then entirely out of engagement with the beveled teeth of the spur-gear K, and the motion of the train of gearing no longer affects the gear O or shaft P, while if it be necessary to use the mechanism as a horse-power only, the pin m is withdrawn and the pinion M dropped down out of mesh with the spur-gear K.

I wish to call attention to one detail of the construction and operation of the gearing in its function of a horse-power. The motion of the master-wheel, at its point of contact with the pinion L, is toward the beveled gear O. Consequently that side of the wheel K which meshes with the beveled gear O, presses downward upon the gear, and it is practically impossible to throw them out of engagement when in operation. I am thus able to dispense with a traverse roller or any other device for holding down the rim of the wheel K. The working of the horse-power is also greatly improved by the fact that the bearings of all the shafts, including the shaft of the beveled gear O, are in a single casting, so that the relative positions of the parts making up the train of gearing are not liable to accidental variation.

The grinding mechanism hereinbefore described resembles, in many particulars, the one shown in my Patent No. 258,817, bearing date May 30, 1882, and many of its features are covered by the claims which form a part of that patent. I desire, therefore, to claim in this application only such elements as are novel, and are improvements on said patented mill, including, especially, the means whereby the motion of the master-wheel is communicated either to the grinding mechanism or to independent machinery. I am also aware that some of the devices shown and described in this application are not new, but have been used in other constructions of the same class. They are, however, shown and described here as forming necessary parts of the working machine which includes my invention, and not with any intention of claiming them as novel. Without specifically naming the parts so admitted to be old, I hereby disclaim any novelty for the mill shown, except so far as is set out in the following claims; but,

Having now described my invention and explained its operation, what I claim as new, and desire to secure by Letters Patent, is—

1. In a grinding-mill, the combination of suitable grinding mechanism, a train of gearing connected with said grinding mechanism,



and adapted to propel the same, a power-transmitting shaft connected with said train of gearing, and adapted to transmit the motion thereof to machinery other than said grinding mechanism, and means whereby said grinding mechanism and power-transmitting shaft may be thrown out of engagement with said train of gearing, substantially as shown and described, and for the purpose set forth.

10 2. The combination of the master-wheel G, pinion L, spur-gear K, pinion M, mounted on the shaft J', lever e, supporting said shaft, and removable pin m, supporting said lever and adapted by its withdrawal to throw said pinion M out of engagement with the spur-gear K, substantially as shown and described, and for the purpose set forth.

15 3. In a grinding-mill of the class described, the combination of an internally-gear-

zontal master-wheel, a vertical shaft rotating 20 in the center of the master-wheel, and independent thereof, a horizontal grinding-burr, and a horizontal pinion rigidly mounted on said vertical shaft, a suitably-journaled horizontal shaft, adapted to transmit motion to 25 mechanism other than said grinding-burr, a beveled gear mounted on said horizontal shaft, and a spur and bevel gear connecting said master-wheel with said horizontal pinion and said beveled gear, substantially as shown and 30 described, and for the purpose set forth.

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

GEORGE K. SMITH.

Witnesses:

R. H. WILES,  
O. TAYLOR.