

(No Model.)

2 Sheets—Sheet 1.

H. R. HOPKINS.

CLAY PULVERIZING ROLLERS AND ATTACHMENTS.

No. 350,744.

Patented Oct. 12, 1886.

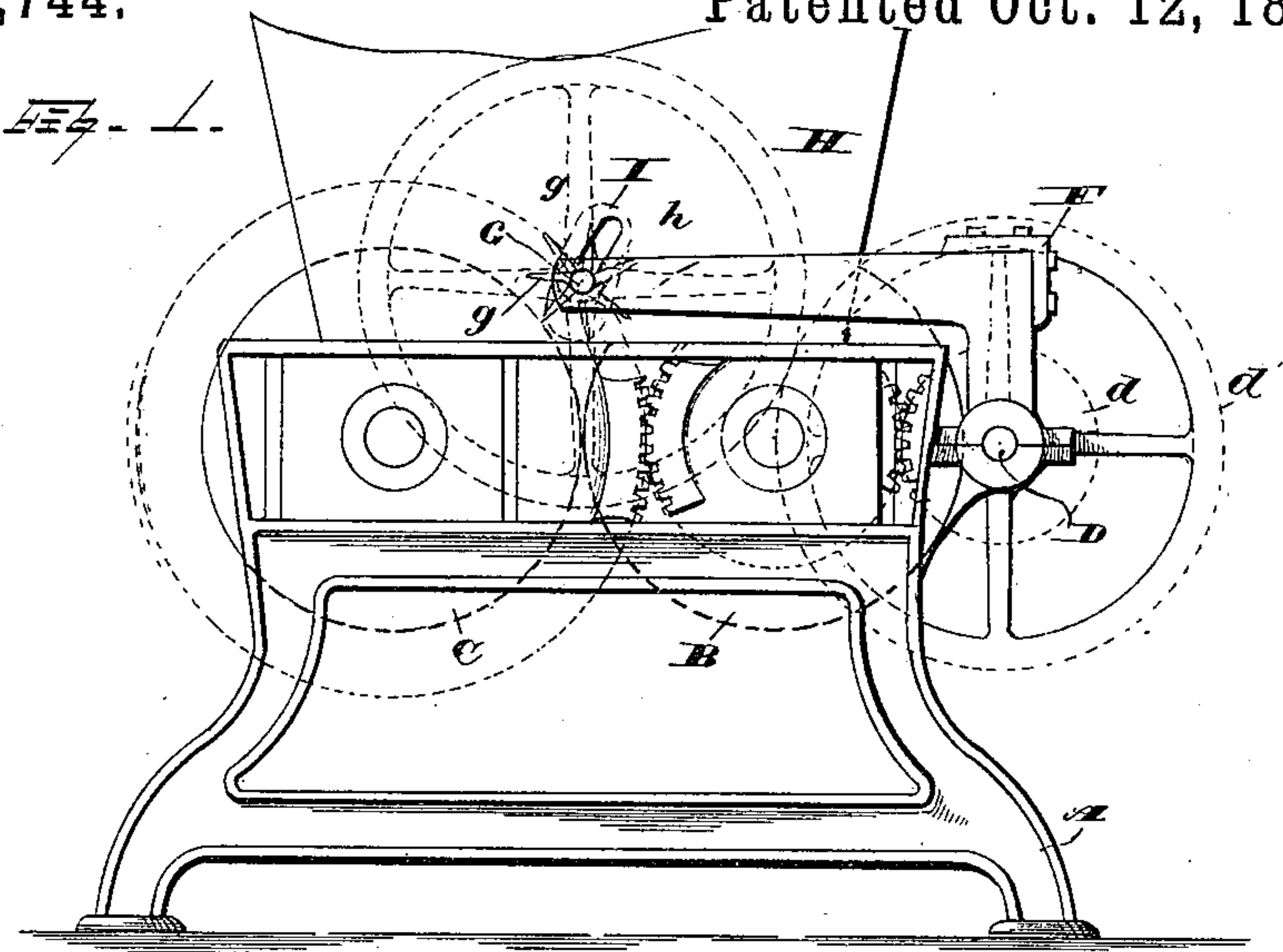


Fig. 2.

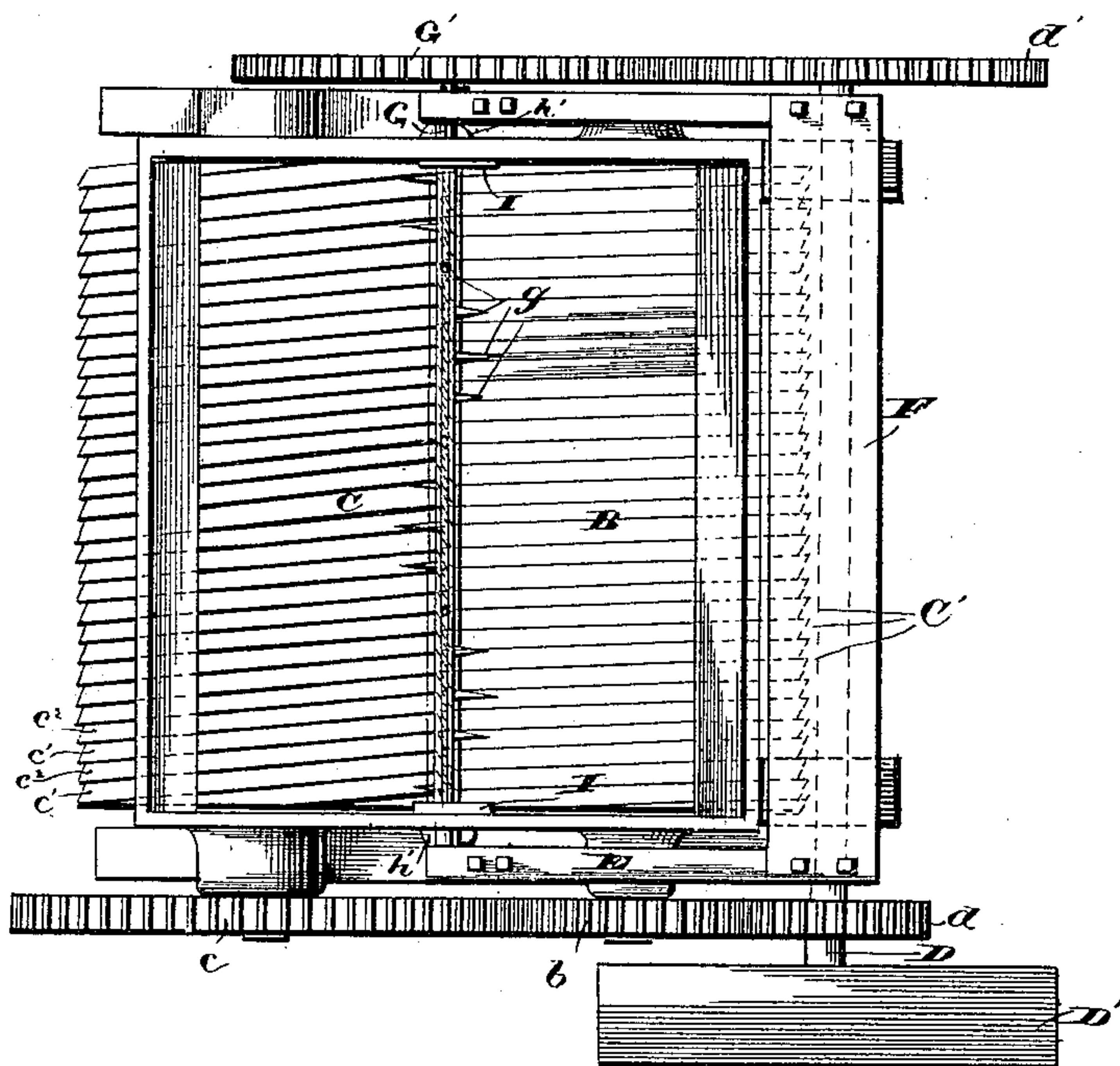
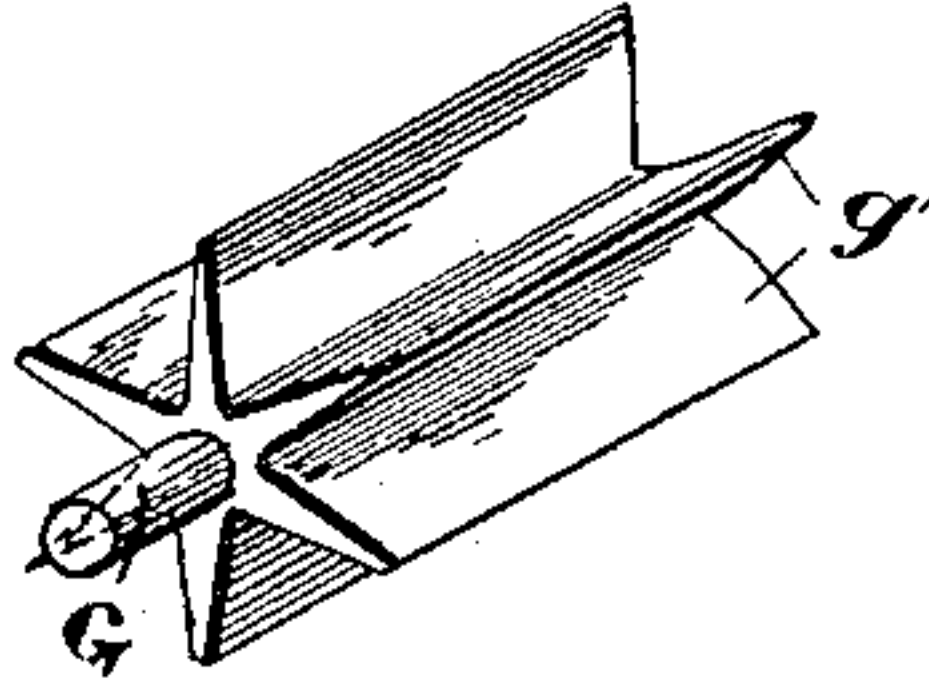


Fig. 3.



WITNESSES

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Fig. 3.

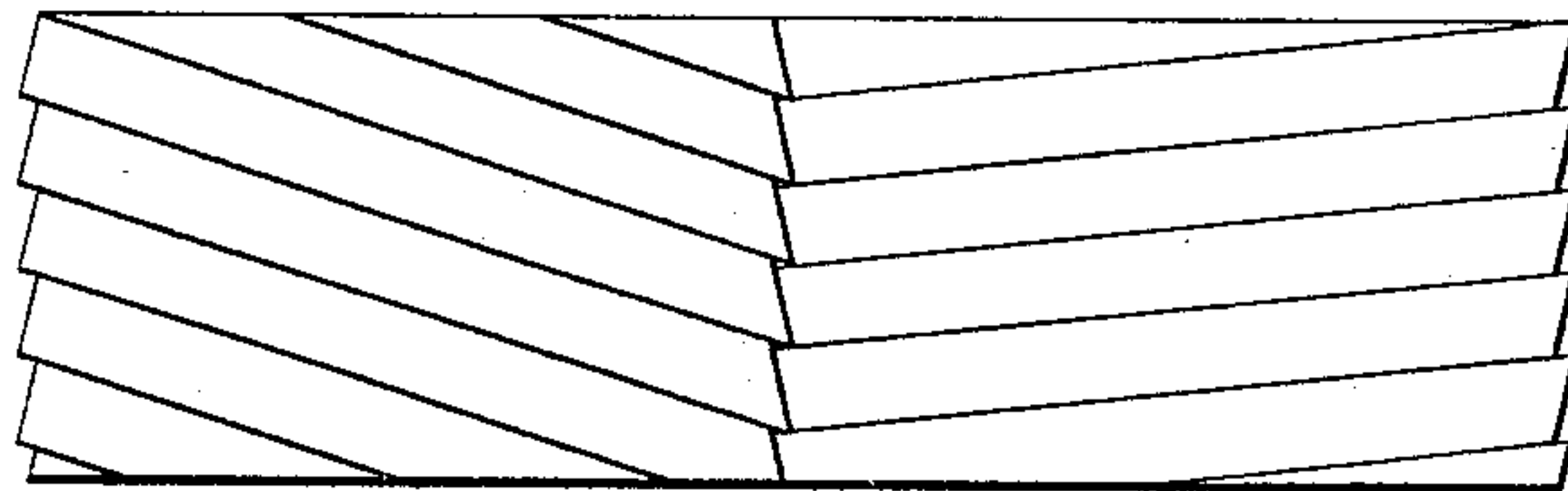
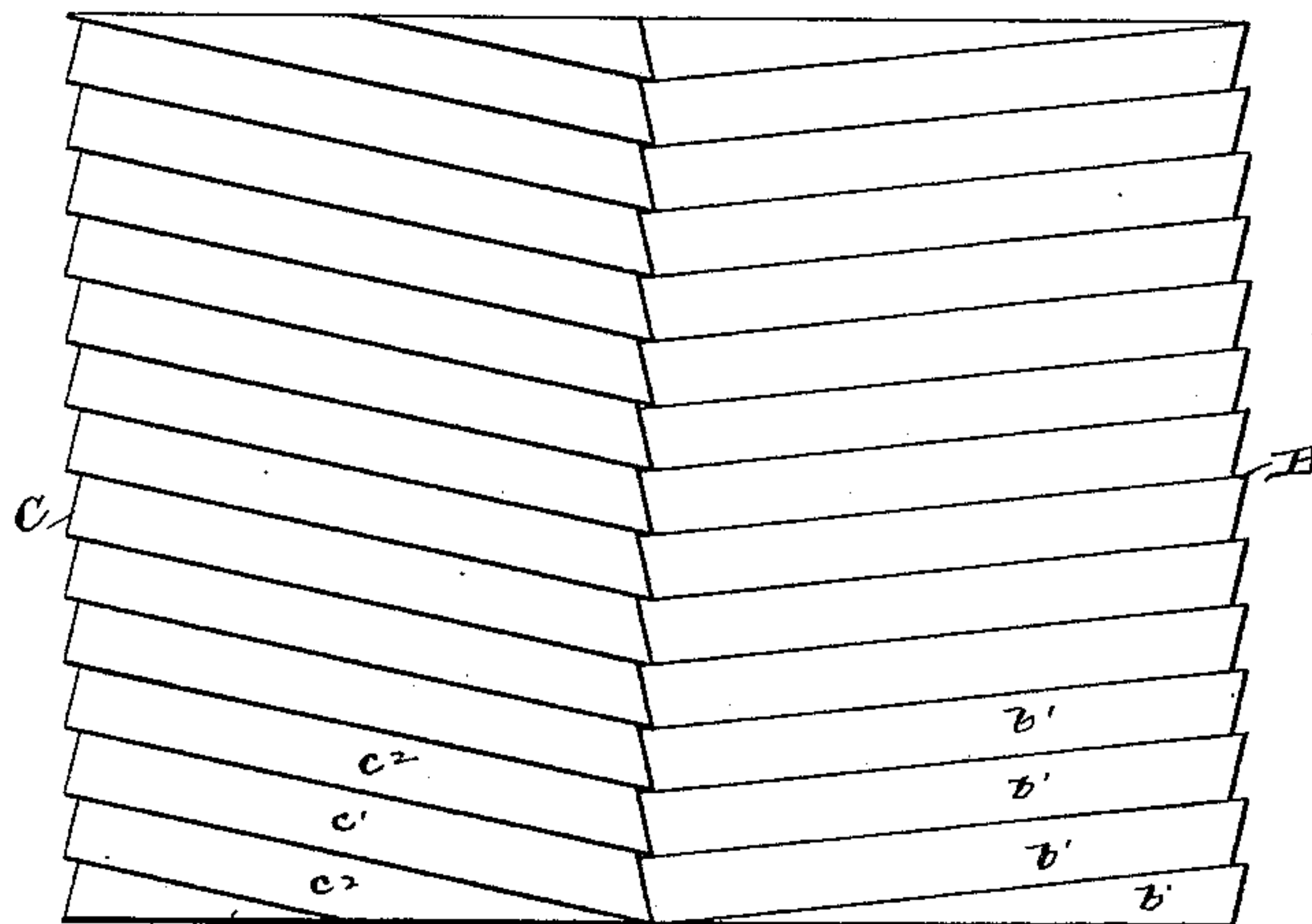


Fig. 4.

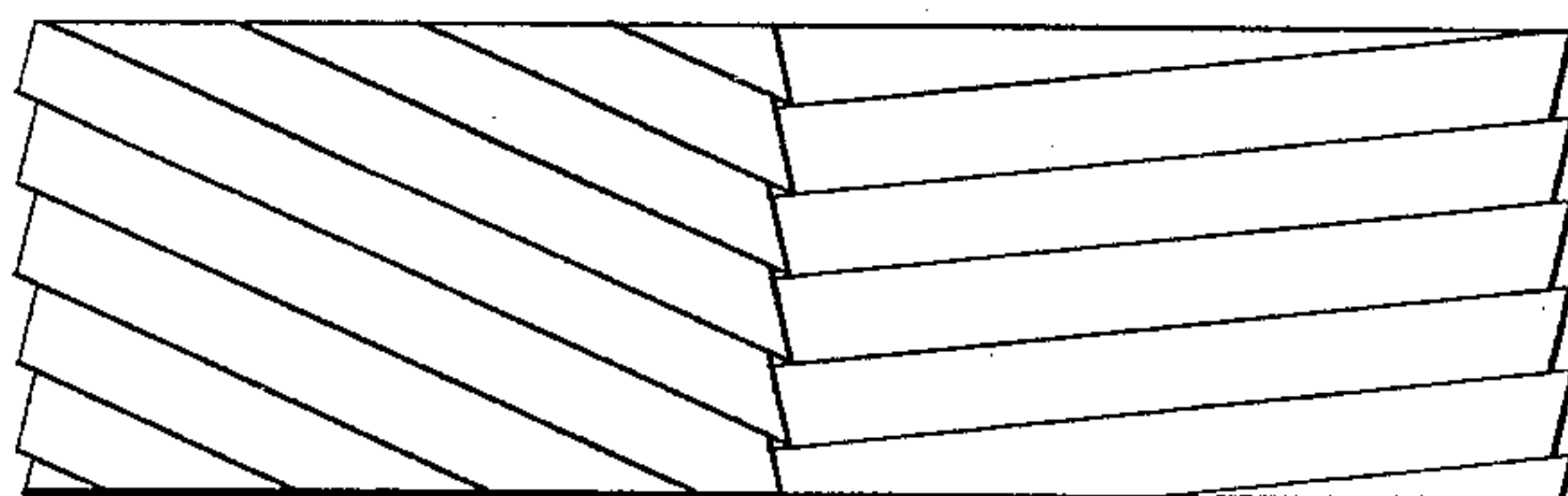


Fig. 5.

WITNESSES

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UNITED STATES PATENT OFFICE.

HENREY R. HOPKINS, OF WILLOUGHBY, OHIO, ASSIGNOR TO JAMES W. PENFIELD AND RAYMOND C. PENFIELD, BOTH OF SAME PLACE.

CLAY-PULVERIZING ROLLER AND ATTACHMENT.

SPECIFICATION forming part of Letters Patent No. 350,744, dated October 12, 1886.

Application filed December 9, 1885. Serial No. 185,126. (No model.)

To all whom it may concern:

Be it known that I, HENREY R. HOPKINS, of Willoughby, in the county of Lake and State of Ohio, have invented certain new and useful Improvements in Clay-Pulverizing Rollers and Attachments; and I do hereby declare the following to be 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 relates to improvements in clay-pulverizing rollers and attachments in which spirally-corrugated differentially-moving rolls are employed, the corrugations running, respectively, right and left handed and continuous from end to end of the respective rolls, said corrugations interlocking or meshing into each other. The rolls are intergeared to give the desired differential movement, two to one, or three to one, or four to one, &c., as the case may be, it being essential that the number of revolutions of the fast roll shall be a multiple of the number of revolutions of the slow roll. The fast roll has usually, but not necessarily, a single spiral corrugation, and the number of the spiral corrugations of the slow roll, as compared with those of the fast roll, will be inversely as the differential movement of the rolls. The object of the spiral grooves, ridges, threads, corrugations, or whatever name may be applied to the same is to remove stones and discharge them at the end of the rolls. The object of the differential movement is to grind as well as crush the clay, so as to more effectually pulverize the latter. The double, triple, or quadruple grooves, as the case may be, on the slow roll are a necessity in order to have the grooves mesh so as to grind the clay fine. A clay breaker and feeder is mounted on arms that are journaled on the driving-shaft, to the end that the breaker and feeder may have a vertical movement to enable the same to mount and ride on stones without changing the meshes of the gears that drive the breaker and feeder.

In the accompanying drawings, Figure 1 is a side elevation of my improved clay-pulverizing machine. Fig. 2 is a plan view of the same. Figs. 3, 4, and 5 are diagrammatical views showing a single spiral corrugation on the fast roll, and, respectively, two, three,

and four spiral corrugations on the slow roll. Fig. 6 shows in perspective, detached, a winged roll working within the hopper.

A represents the supporting-frame provided with suitable boxes in which are journaled the trunnions of the pulverizing-rolls B and C and the driving-shaft D. The shaft D has mounted thereon the driving-pulley D', the pinion *d*, and the gear *d'*, and has journaled therein the arms E. The pinion *d* engages the gear *b* of the roll B, and the gear in turn engages the gear *c* of the roll C. The gears *b* and *c* in size are "two to one," consequently the roll B makes two revolutions to one revolution of the roll C. The roll B has a spiral ridge, *b'*, running like a screw-thread from end to end of the roll, either right or left handed, according at whichever end of the machine it is most convenient to discharge the stones. The roll C has corresponding ridges, *c'* and *c''*, made the other handed from that of the roll B. These rolls are designed to set so close together that the ridges of the rolls interlock or mesh.

As the roll C only turns half as fast as the roll B, the lead of the ridges on the former must be twice as great as those of the latter, so that the lead of the ridges on the roll C for a half revolution will equal the lead on the roll B for a full revolution. The ridges on the roll C are therefore made double, like a double-threaded screw. With this arrangement the rolls may be set so close together that the respective ridges come in actual contact.

If the gears *b* and *c* were made "three to one," there would be three ridges on the roll C, and so on. If for any reason small ridges are desired, it might in such case be necessary to have two spiral ridges on the roll B, to make the lead "quick" enough to discharge the stones freely, and with such arrangement the roll C would have four, six, and eight spiral ridges, according to the differential movement of the rolls. The form of the ridges in cross-section is not essential. The angular ridges shown in the drawings, and shown and described in United States Letters Patent to J. W. Penfield, dated February 12, 1884, No. 293,270, give good results.

On the shaft D are mounted the arms E. These arms are preferably of the angular or

bell-crank form, (shown in Fig. 1,) so that the lateral portions thereof are above and out of the way of the supporting-frame. These arms are connected by a heavy angle-bar, F, so that the arms and angle-bar form a rigid frame. The free ends of the arms have suitable boxes in which are journaled the shaft G, the latter having fingers *g*, or other suitable device, for breaking the clay and feeding the latter to the pulverizing-rollers.

Large stones sometimes find their way into the hopper, and if the shaft G were held in stationary boxes a general breakdown would occasionally occur. With the construction shown the breaker can mount upon and ride over stones without doing any damage, and the frame may be tilted up to remove stones that are too large to be discharged through the opening (not shown) in the end of the hopper through which the smaller stones pass.

When the clay is dry and it is only necessary to break the lumps, the fingers *g* serve a good purpose. If the clay is wet, tough, and sticky, so that it has a tendency to ride on the rolls without passing between them, the winged roll *g'*, (shown in Fig. 6,) or other similar device, is preferable to push down and force the clay into the pulverizing-rollers.

The hopper H has curved openings *h*, through which the shaft G passes, that admit of the shaft being elevated some distance. Plates I are arranged on the inside of the hopper, that embrace the shaft G, and consequently rise and fall with the shaft. The plates cover the opening *h* and prevent the clay from passing out thereat. At the lower side of the opening *h* half-boxes *h'* project laterally from the hopper, that receive the shaft G when from want of clay in the hopper the shaft is depressed as far as may be without the breaker colliding with the pulverizing-rollers below. The gear *d* engages the gear G', the latter being secured to the shaft G. It will be seen that the elevation or depression of the breaker does not change the mesh of the gears.

The gears *d'* and G' are not essential. Sprocket-wheels and endless chains or other mechanism may be employed for driving the breaker.

For large machines and heavy work it is better to have gears *b* and *c* and pinions *d* on each side of the machine.

What I claim is—

1. In clay-pulverizing apparatus, the combination, with rolls intergeared to revolve two to one, of a single spiral groove or ridge on the fast roll and a double ridge or groove running spirally on the slow roll, said grooves or ridges being arranged right and left handed on the respective rolls, substantially as set forth.

2. In clay-pulverizing apparatus, the combination, with rolls intergeared so as to revolve two to one, of a single spiral ridge or groove on the fast roll and two spiral ridges or grooves on the slow-roll, said ridges or grooves being arranged right and left handed on the respective rolls, and made of such form in cross-section that the ridges of one roll will mesh with the ridges of the other roll, substantially as set forth.

3. The combination, with clay-pulverizing rolls, of a hopper, a revolving breaker and feeder operating in the hopper, said breaker and feeder being mounted on a swinging frame that is pivoted to the driving-shaft, and suitable mechanism for transmitting power from the driving shaft to the breaker and feeder, the parts being arranged substantially as set forth.

4. The combination, with clay-pulverizing rolls and a revolving breaker and feeder mounted on a swinging frame, of a hopper having slots for the passage of the trunnions of the breaker and feeder, and plates mounted on said trunnions and arranged to close the slot in the hopper, the parts being arranged substantially as set forth.

5. The combination, with clay-pulverizing rolls, a hopper, and a revolving breaker and feeder mounted on a swinging frame and operating in the hopper, of segmental boxes extending from the hopper and located in position to receive the trunnions of the breaker and feeder when the latter are in their depressed position, substantially as set forth.

In testimony whereof I sign this specification, in the presence of two witnesses, this 19th day of November, 1885.

HENREY R. HOPKINS.

Witnesses:

W. W. WALLACE,
J. W. PENFIELD.