

F. E. Hoffmann. Pulverizing Machine.

Nº 75,912.

Patented Mar. 24. 1868.
Fig. 1.

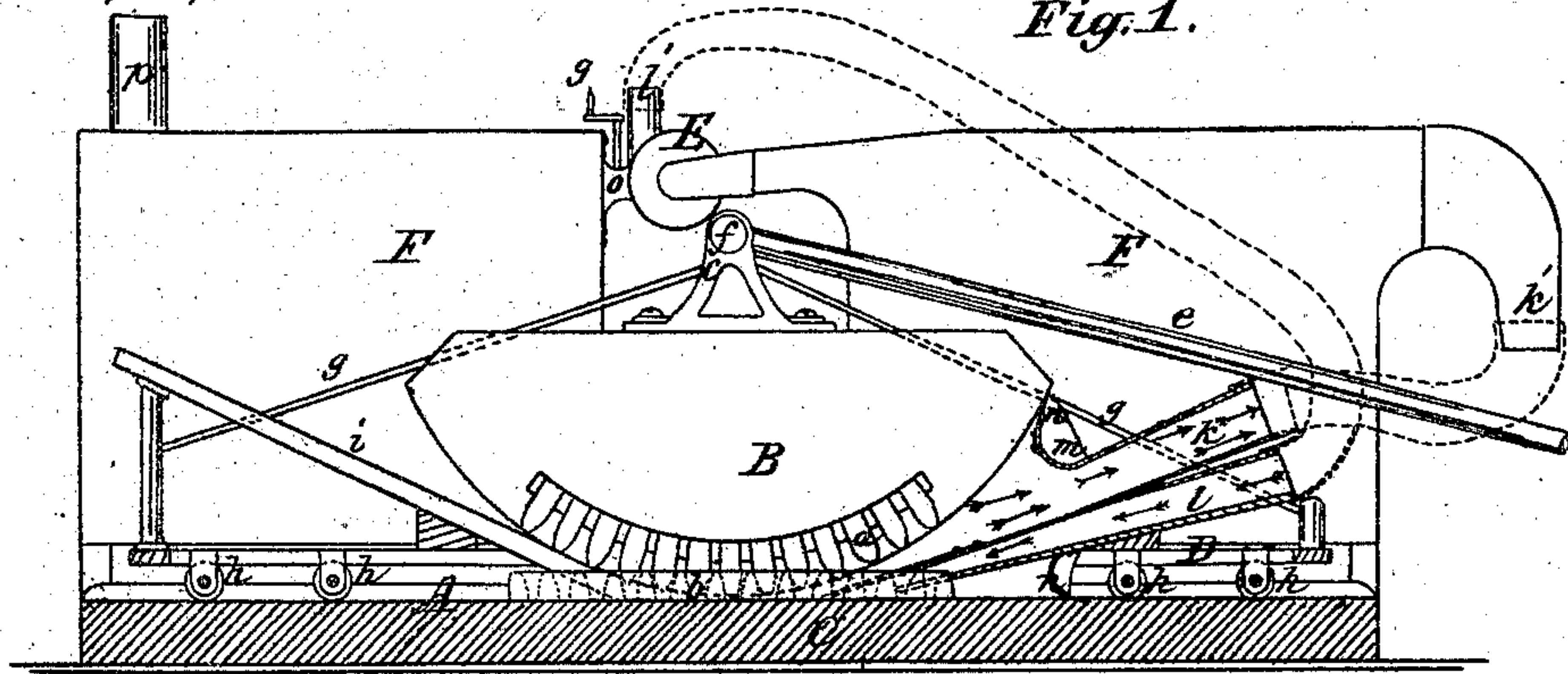


Fig. 2.

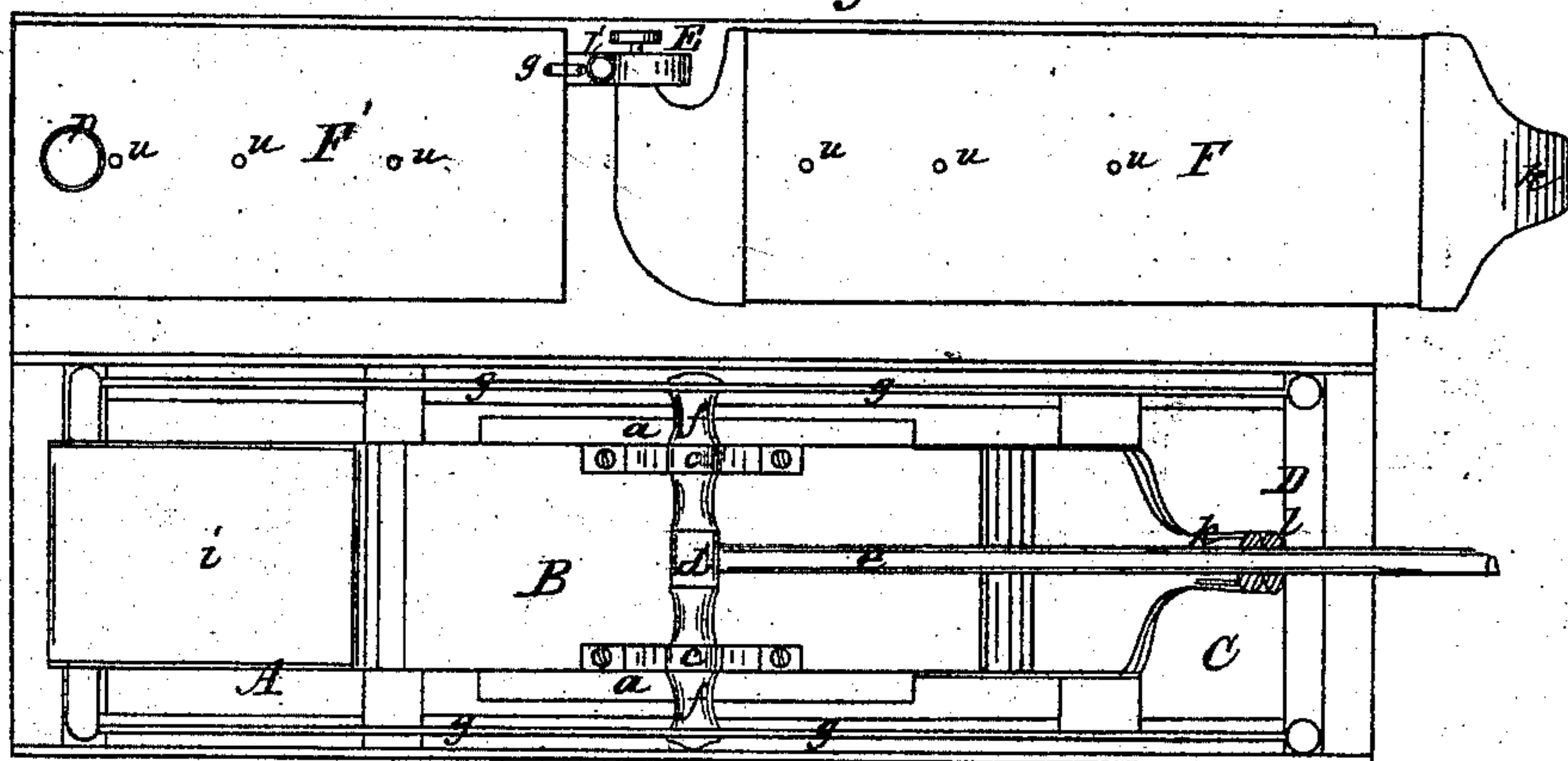


Fig. 3.

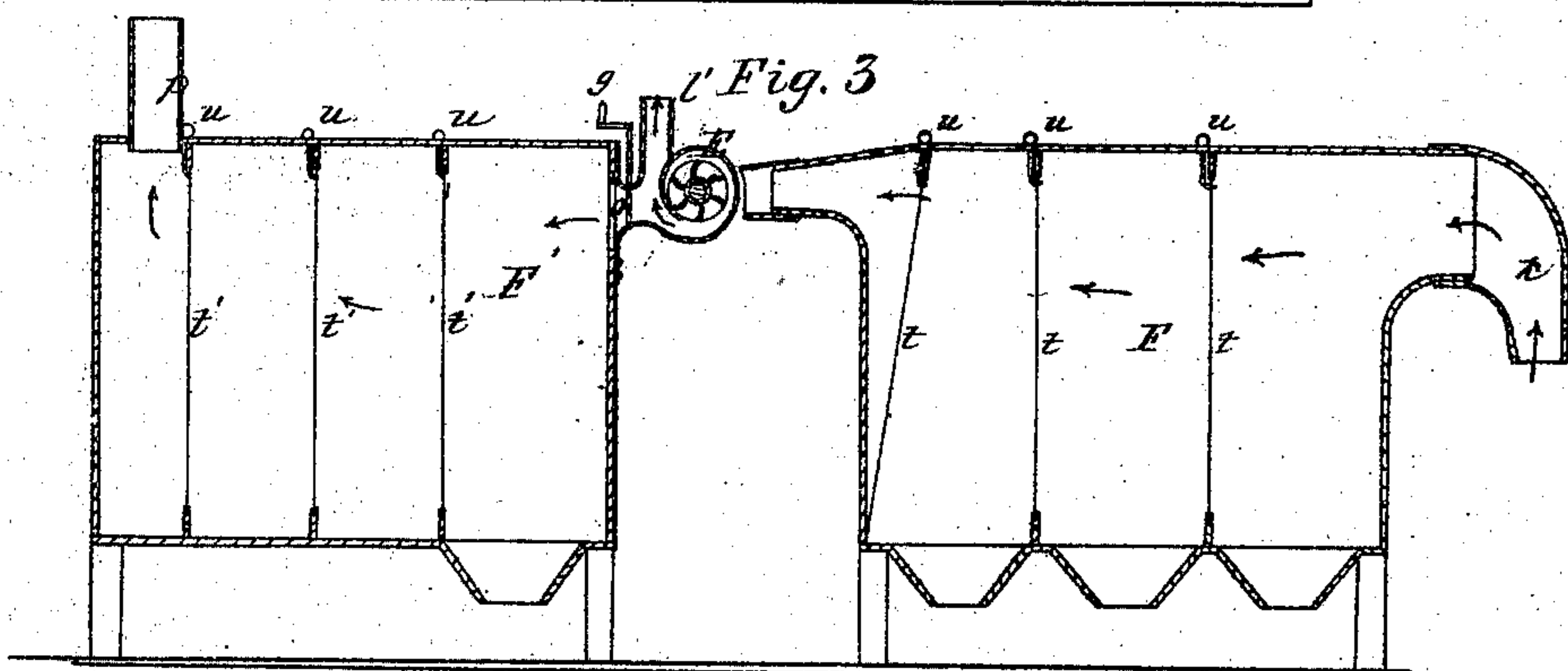
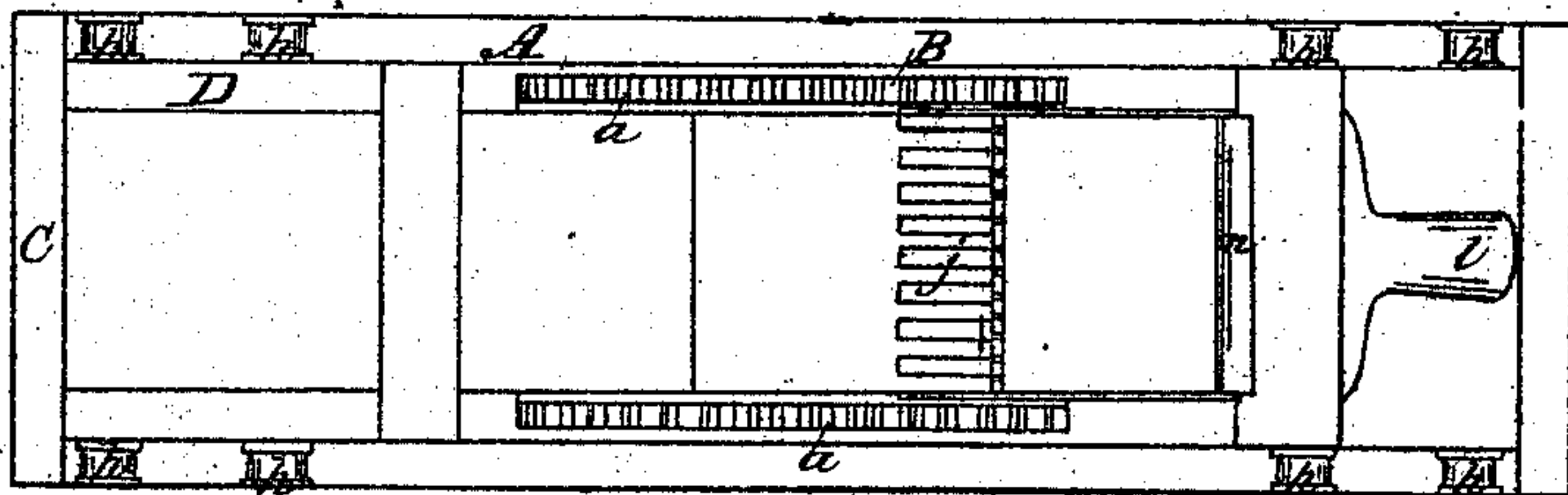


Fig. 4.



Witnesses

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FREDERIC E. HOFFMANN, OF BERLIN, PRUSSIA.

Letters Patent No. 75,912, dated March 24, 1868.

IMPROVED APPARATUS FOR CRUSHING AND PULVERIZING STONES AND OTHER HARD SUBSTANCES.

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

TO ALL WHOM IT MAY CONCERN:

Be it known that I, FREDERIC E. HOFFMANN, of Berlin, in the Kingdom of Prussia, have invented a new and improved Apparatus for Pulverizing Stones and Other Hard Substances; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawing, forming part of this specification, in which—

Figure 1 represents a sectional side elevation of this invention.

Figure 2 is a plan or top view of the same.

Figure 3 is a longitudinal vertical section of the pneumatic chamber, detached.

Figure 4 is an inverted plan of the crusher.

Similar letters of reference in these views indicate corresponding parts.

This invention relates to an apparatus for pulverizing stones or other coarse or granulated materials, in which the crusher or pulverizer is combined with a pneumatic apparatus in such a manner that by the action of one or more currents of air the fine powder formed between the crushing-surfaces is removed, and the crushing-surfaces are free to act with their full force on the coarse particles to be pulverized. With the pneumatic apparatus is connected a closed chamber, which is furnished with a series of perforated partitions or sieves, whereby the fine particles of the pulverized substance are prevented from being carried off by the currents of air, and all waste is avoided. The action of the crushing-apparatus is further facilitated by a scraper, which acts on the crushing-surfaces, and keeps them clean and in proper working order.

A represents a crushing-apparatus, which is composed of a rocking-crusher, B, working on a stationary bed, C, or which may be constructed in any other desirable manner, as will be hereinafter more fully explained. The crusher B is provided with two toothed segments, *a*, the cogs of which gear into racks *b*, which are attached to the bed C, so that the curved surface of the crusher is compelled to roll on the bed, and prevented from sliding or slipping thereon.

From the upper surface of the crusher rise two lugs, *c*, which form the bearings for a rock-shaft, *d*, and from this rock-shaft extends a rod, *e*, which connects with a steam-engine or other motor, whereby the desired rocking motion is imparted to the crusher. From the outer surfaces of the lugs *c* extend studs *f*, to which are attached rods *g*, extending to the ends of a carriage, D, which is supported by wheels *h*, and travels on the bed C, motion being imparted to it from the rocking-crusher. On one end of this carriage is secured the inclined chute *i*, over which the material to be pulverized is fed to the crushing-surfaces, and to its other end is fastened the scraper *j*, and two tubes *k l*.

The scraper *j* is best shown in fig. 4 of the drawing. It is composed of a series of flat prongs, which bear on the surface of the bed C, and as the carriage D travels back and forth on said bed, said prongs agitate the material to be pulverized, and prevent it from adhering to the surface of the bed.

The tubes *k l* are provided each with a broad, flat mouth, extending over the entire width of the crushing-surfaces, and the tube *k* connects with the suction-spout *k'* of the pneumatic apparatus E, while the tube *l* is connected with the exhaust-spout *l'* of said pneumatic apparatus, as indicated in fig. 1 of the drawing. The pneumatic apparatus consists of a fan-blower or an air-pump, or other equivalent device, which may be used in combination with or without one or more chambers F F'. When said fan-blower or equivalent device is set in operation, a current of air is driven in through the spout *l* and sucked out through the spout *k*, and by the action of these currents the fine dust or powder formed under the crusher is sucked out from between the crushing-surfaces, and these surfaces are free to act with their full force on the larger particles still remaining between them.

To prevent any waste of air, the spouts of the air-tubes *k l* are provided with lips or flanges *m*, projecting over the sides of the crusher B; and pieces, *n*, of leather or other flexible material, are attached to said spouts, so that a tight and yielding joint is formed at the edge of each of the spouts. The dust or finely-powdered material which is carried off through the pipe *k* by the current of air, passes with said current into the first chamber, F, and after having passed through this chamber, the current returns to the fan-blower, where it divides, one part being driven into the second chamber, F', while the other part is forced back to the crushing

surfaces through the pipe *l*. By this arrangement all waste or loss of the powdered material is as much as possible avoided, since the largest quantity of dust or powder still floating in the current of air is driven back to the crushing-surfaces.

In the interior of the chambers *F F'* is a series of screens, *t t'*, made of gauze, or other suitable material, and extending clear across the chambers at suitable intervals. By these screens the current of air is compelled to spread uniformly throughout the chambers, and the dust suspended in the air adheres to the meshes of the screen, from which it is caused to separate by imparting to said screens a shaking motion. This motion is produced by means of hooks *u*, which pass down through the tops of the chambers and catch in the screens, as shown in fig. 3.

While passing through the chamber *F* the air is almost entirely freed from dust, and as this air enters the case of the fan-blower, a portion of it is forced back to the crusher through the pipe *l*, while the balance passes through the pipe *o* into the chamber *F'* where it is completely freed from dust, and whence the air escapes through the pipe *p* in the open atmosphere. If it should be found that the air thus escaping in the atmosphere still carries with it some of the dust, a third chamber may be added. The small quantity of dust carried back through the pipe *l*, between the crushing-surfaces, does not interfere with the crushing operation, and it is sucked out again through the pipe *k*.

From this description it will be seen that the air is made to circulate through the apparatus, and the quantity of air escaping from the last chamber, *F'*, in the open atmosphere, is equal to the quantity sucked in through the joints at the working-surfaces of the crushing-apparatus, which, of course, depends upon the condition of the packing-pieces applied to keep said joints tight. Since this quantity of air cannot be determined in advance, the pipe *o* is provided with a valve, *q*, whereby the area of its effective cross-section can be regulated to correspond to the quantity of air admitted through the joints. If these joints could be made perfectly air-tight, all the air would circulate through the apparatus in a continuous current, and no portion thereof would be permitted to escape in the open air.

It is obvious that the pneumatic apparatus hereinbefore described, together with the chambers, can also be connected to a crushing-apparatus of any other construction besides that shown in the drawing, such, for instance, as stampers, crushing-rollers, cylindrical or conical crushing-wheels, and so forth, and it will be found that in all cases the working capacity of such crushing-apparatus will be materially improved.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination of the rake or scraper *j*, carriage *D*, crusher *B*, bed *C*, and the pneumatic apparatus, constructed and operating substantially as and for the purpose described.
2. The lips or flanges *m n*, extending over the surfaces of the crusher *B*, and bed *C*, substantially as and for the purpose described.

The above specification signed by me, this 31st day of January, 1867.

F. E. HOFFMANN. [L. S.]

Witnesses:

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