3 Sheets—Sheet 1.

M. MARTIN.

Millstone Exhaust Apparatus.

No. 211,033. **Patented Dec. 17, 1878.**

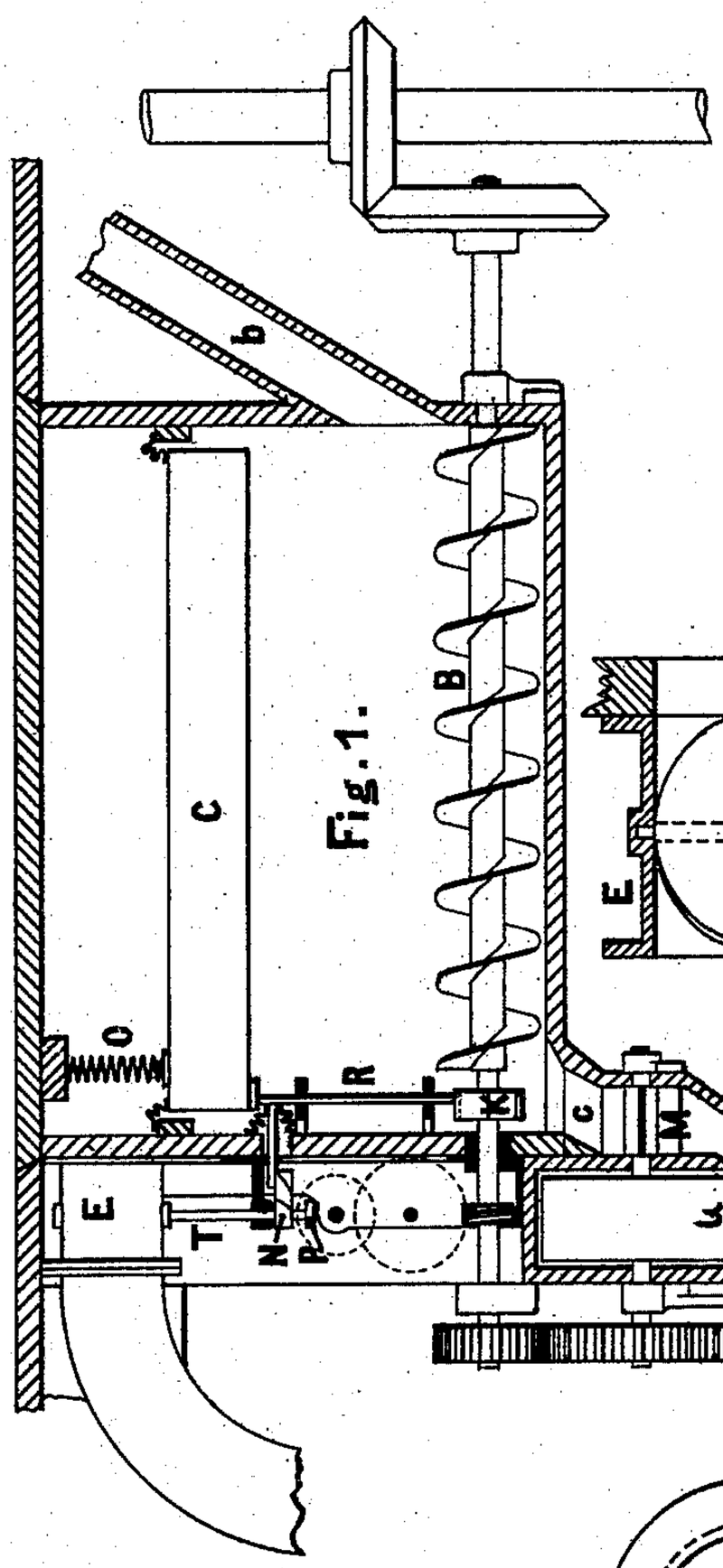


Fig. 1.

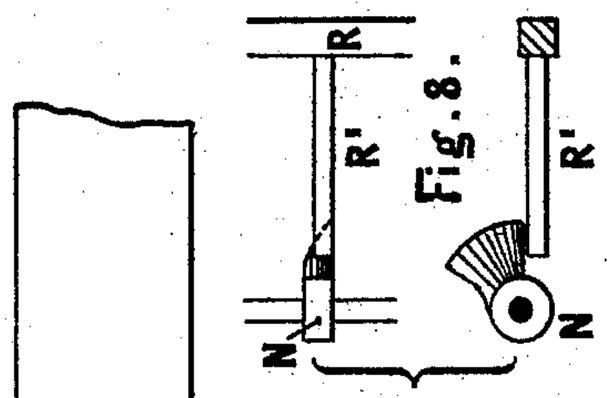


Fig. 8.

Fig. 3.

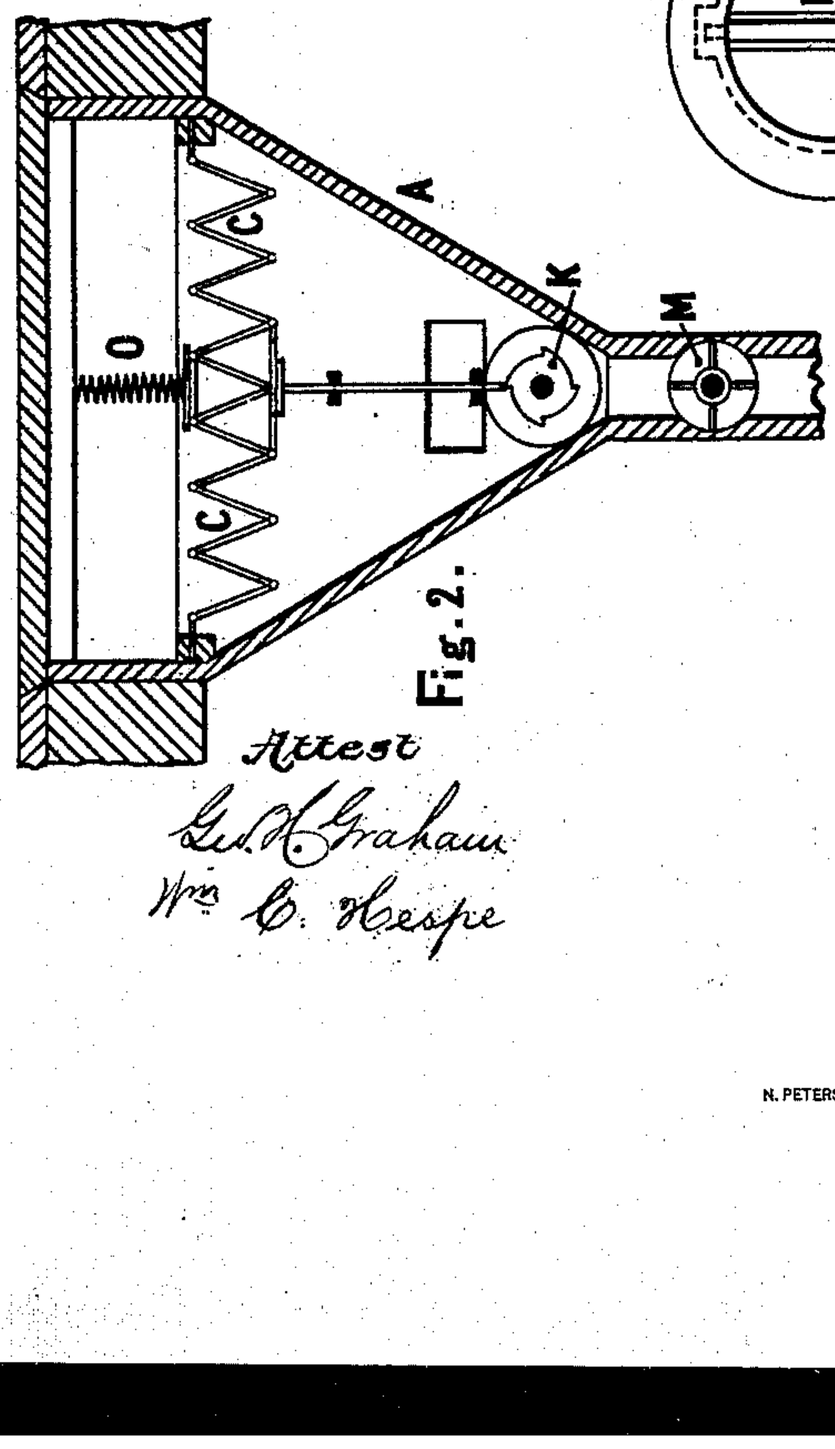


Fig. 2.

Fig. 4.

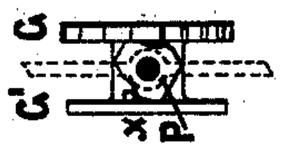


Fig. 5.

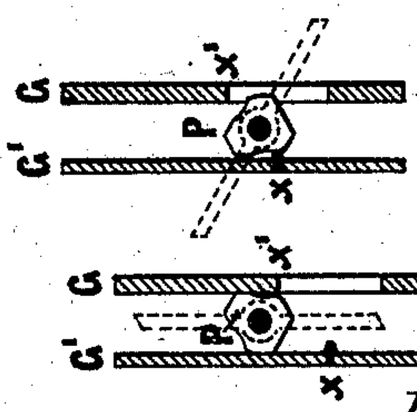


Fig. 6.

Fig. 7.

Attest
Geo. H. Graham
Wm. C. Hespe

Inventor,
Moritz Martin,
by Munson & Philipp
Attorneys.

3 Sheets—Sheet 2.

M. MARTIN.

Millstone Exhaust Apparatus.

No. 211,033. **Patented Dec. 17. 1878.**

Fig. 12.

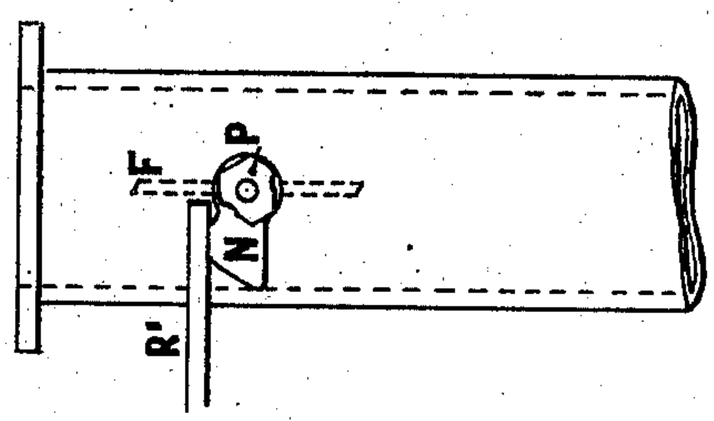


Fig. 13.

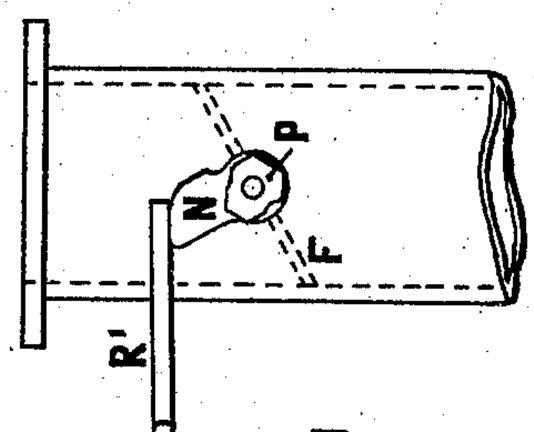


Fig. 10.

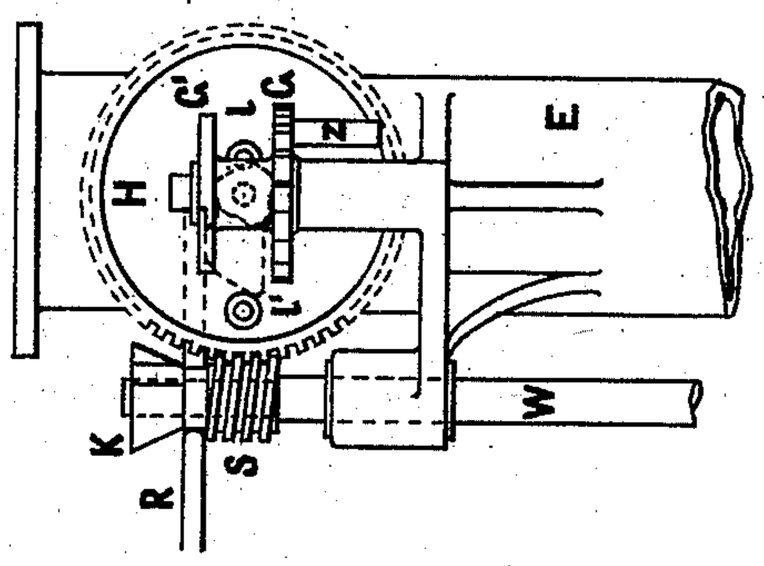


Fig. 11.

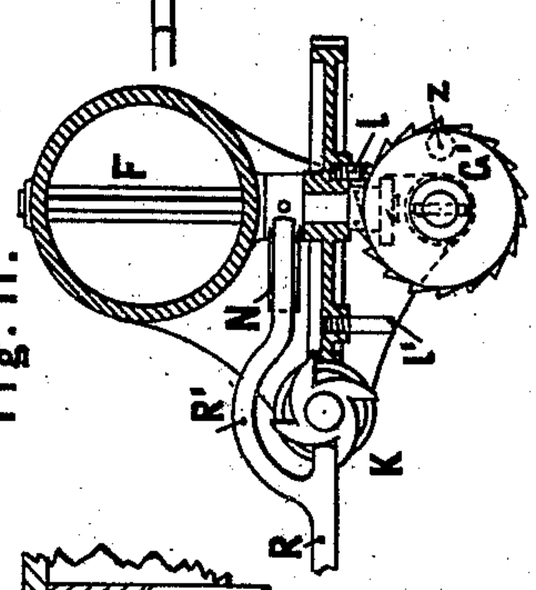
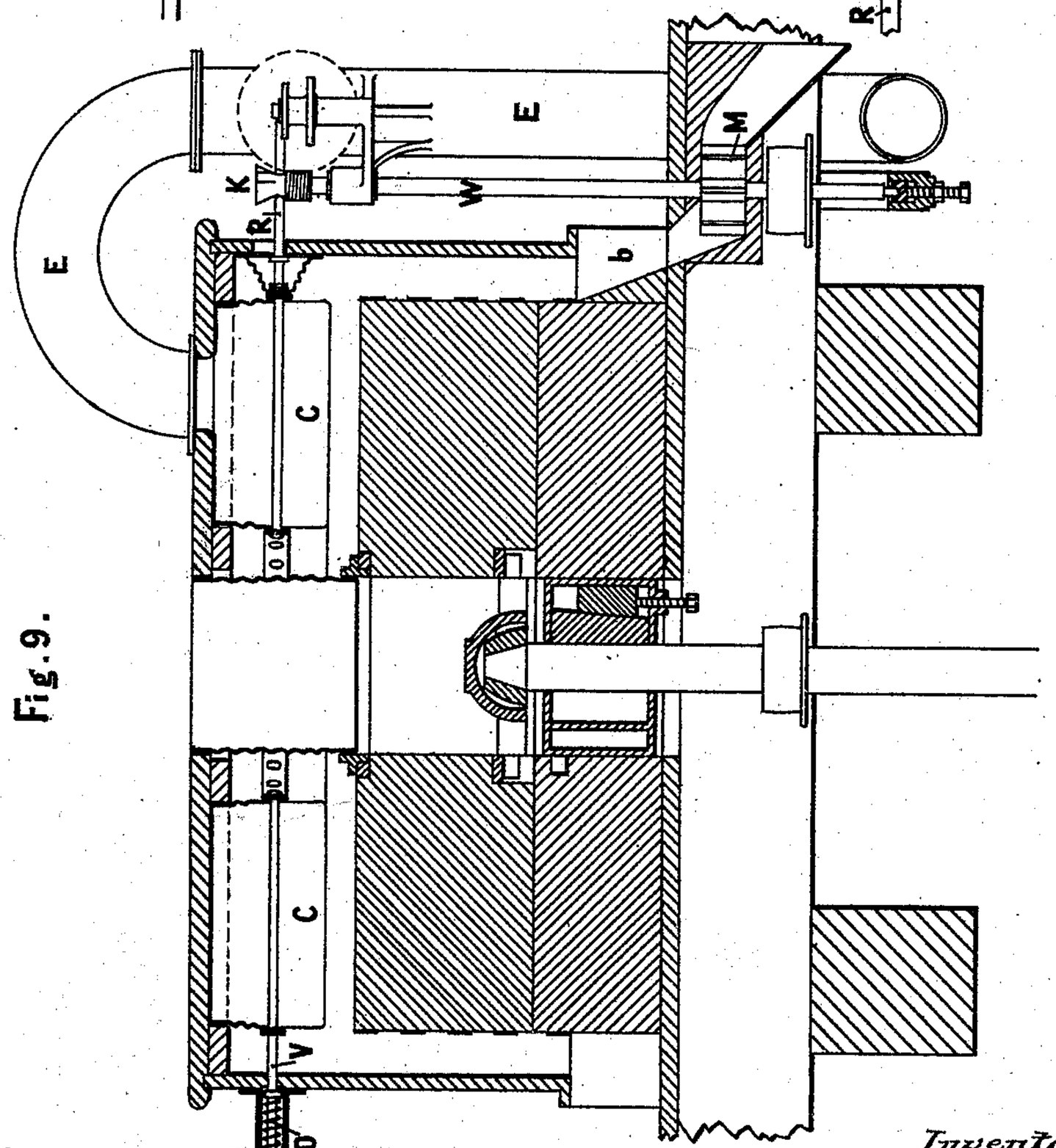


Fig. 9.



Attest,
Geo. H. Graham
Wm. C. Hespe

Inventor,
Moritz Martin
by Munson & Philipp
Attys

3 Sheets—Sheet 3.

M. MARTIN.

Millstone Exhaust Apparatus.

No. 211,033. Patented Dec. 17, 1878.

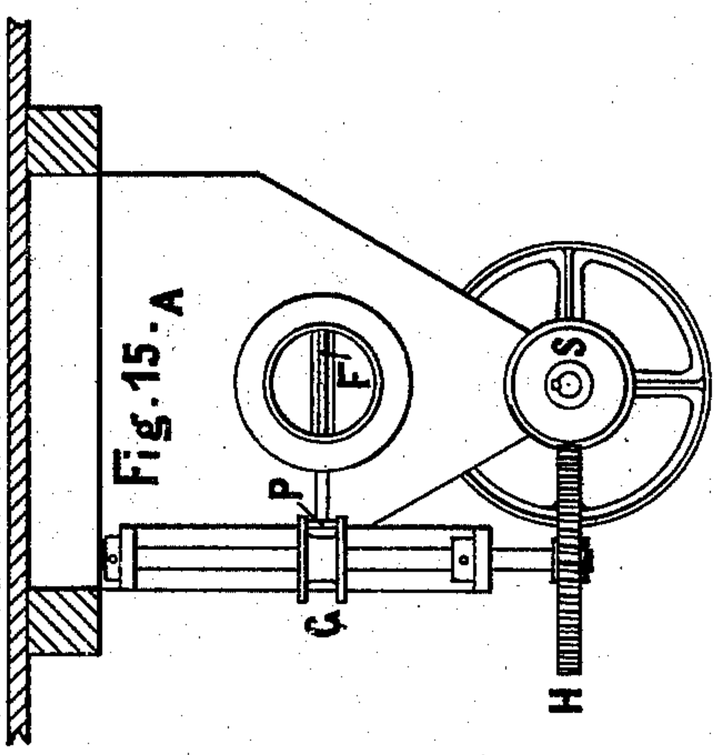


Fig. 15.

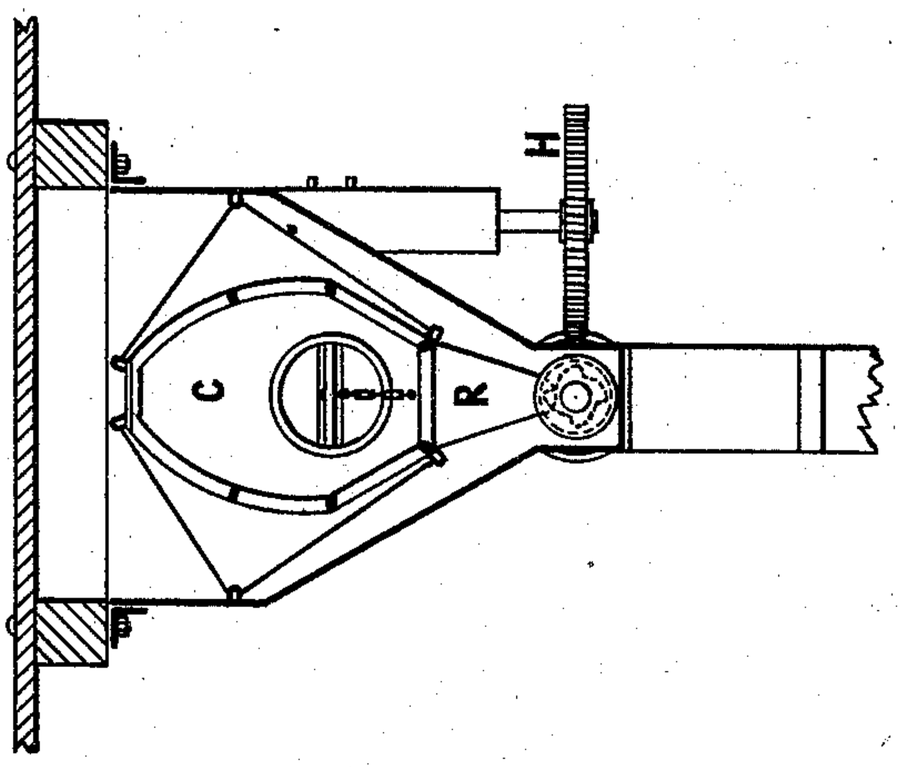


Fig. 17.

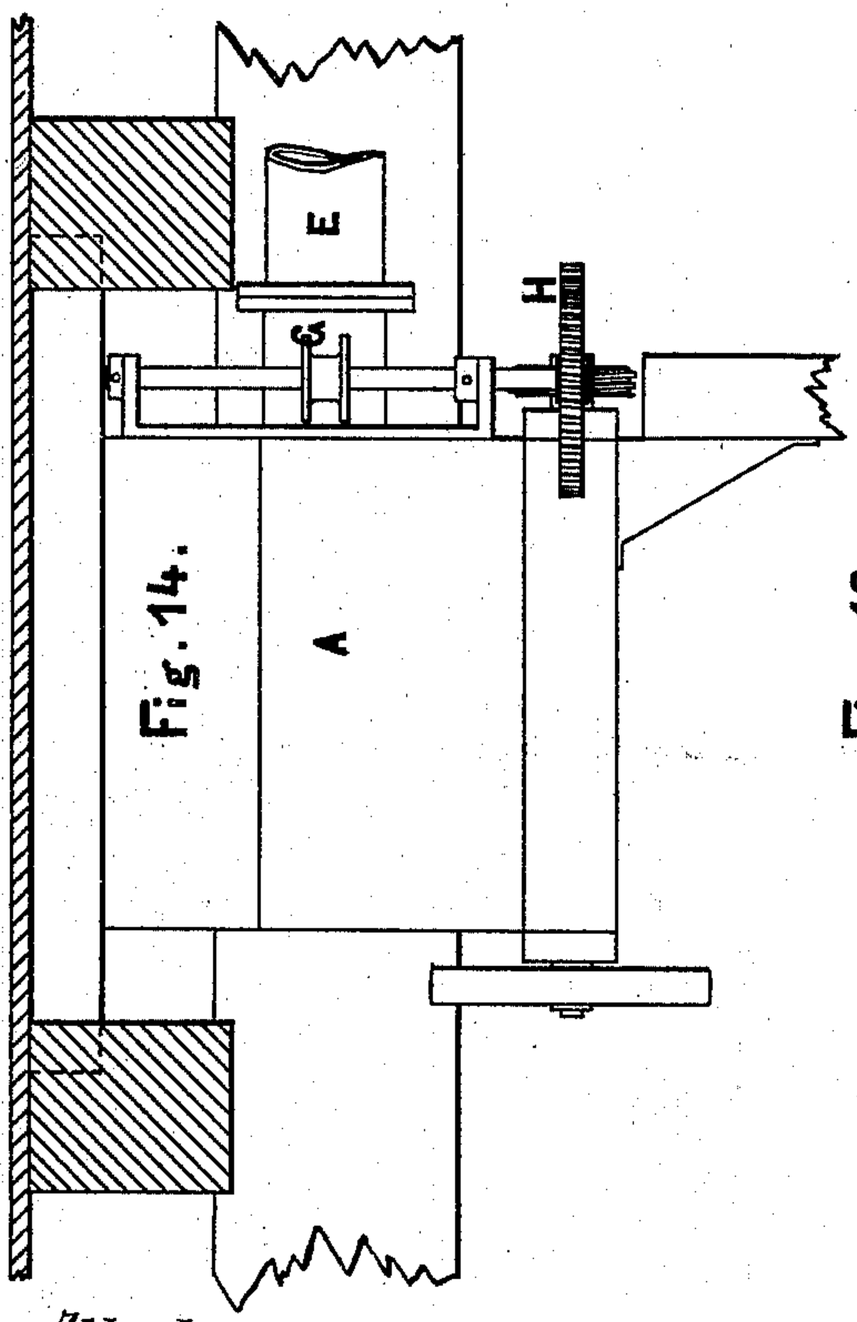


Fig. 14.

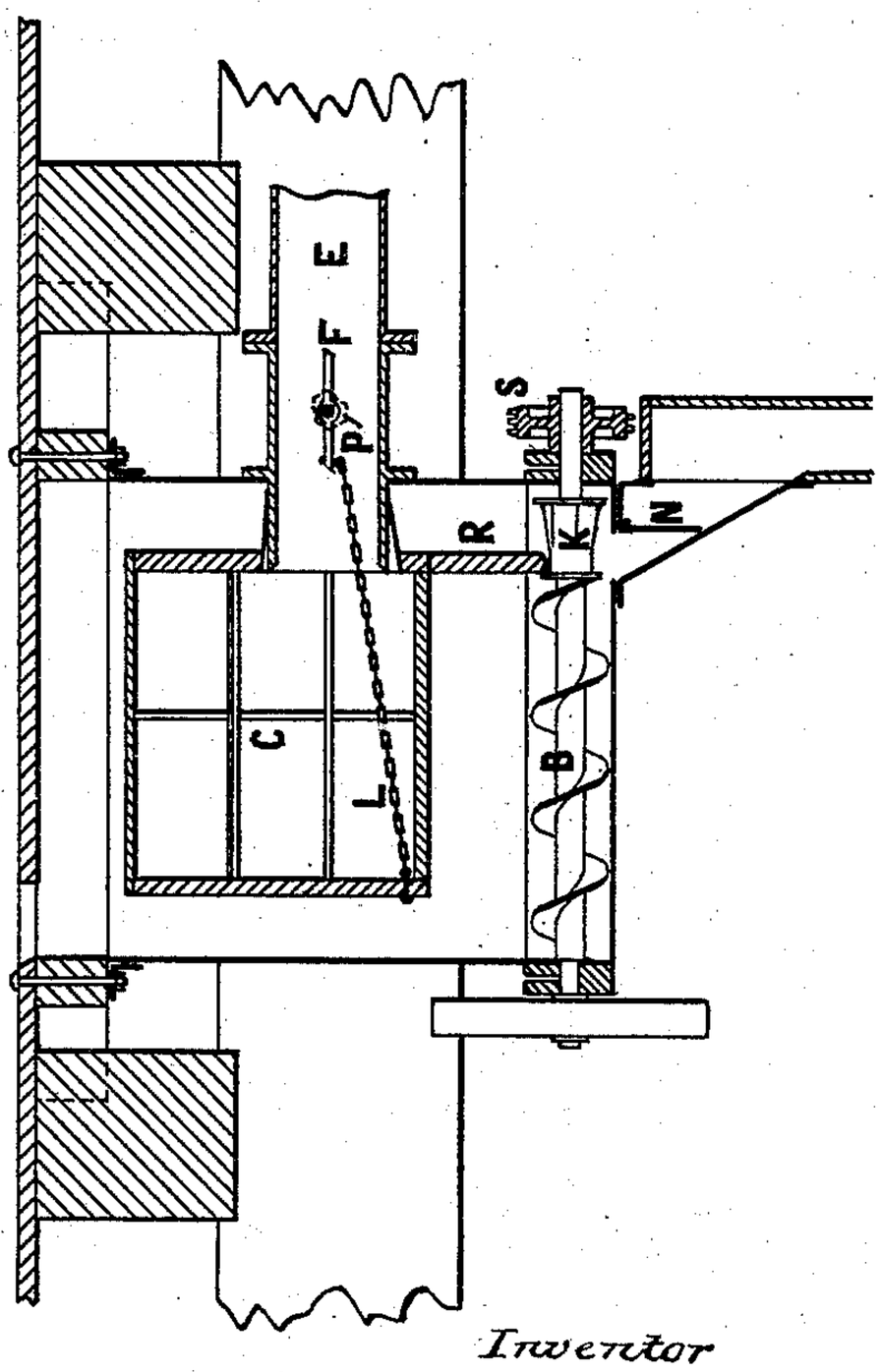


Fig. 16.

Attest,
Geo. H. Graham
Wm. C. Hespe.

Inventor
Moritz Martin,
by Munson & Philipp
Attorneys.

UNITED STATES PATENT OFFICE.

MORITZ MARTIN, OF BITTERFELD, PRUSSIA.

IMPROVEMENT IN MILLSTONE-EXHAUST APPARATUS.

Specification forming part of Letters Patent No. **211,033,** dated December 17, 1878; application filed June 1, 1878; patented in Belgium, December 5, 1876.

To all whom it may concern:

Be it known that I, MORITZ MARTIN, of Bitterfeld, Prussia, have invented certain Improvements in Apparatus for the Ventilation of Millstones, of which the following is a specification:

This invention relates to certain improvements in the ventilating apparatus of millstones; and the object of the same is to provide for simple and effective means for separating from the air-current the flour-dust carried along by the same.

The accompanying Sheet 1 of drawings illustrates one form of the invention, the arrangement of the mechanisms being represented by Figures 1 and 2 in a longitudinal and transverse section, respectively. Figs. 3 and 4 represent the chief mechanism on a larger scale; and Figs. 5, 6, 7, and 8 show details.

A is a box, into which the flour is discharged from the case of the millstones by the spout *b*. B is a creeper, which conveys the flour to a channel, *c*, communicating with the elevator Q. Within the channel *c* a shaft revolves, provided with a number of ribs or vanes, two or more of which constantly close the channel, so as to prevent air from entering into the box while they deliver to the elevator the flour falling on them. E is a pipe connecting the box with an exhaust-fan.

Within the box A a flour-dust separator, C, is suspended, consisting of a light frame-work, by preference made of iron, over which a sheet of cloth or felt or other suitable material is stretched in a zigzag line, as may be seen to advantage from Fig. 2. The edges of the cloth or felt are attached to ledges fixed to the sides of the box A; but the attachment is effected in such a manner as to allow the said separator to be moved up and down within narrow limits. The air which has served for cooling the millstones, and which enters into the box A by spout *b*, is thereby forced to pass through the meshes or pores of the cloth on the separator before it can leave the box through tube E, the flour-dust being retained on the under side of the cloth. By this flour-dust, however, the pores of the cloth are gradually filled up, so as finally to prevent the air from passing freely. The separator has, therefore, either to be made very large, or the cloth of the same must be cleaned repeatedly for keeping up the efficiency of the apparatus.

The special object of my invention is, now, the construction of a mechanism by which the flour-dust is shaken off automatically from the separator after certain intervals of time.

To one end of the frame of the separator C a leg or rod, R, is attached, which is of such a length that it is acted upon by a cam-disk, K, fixed on the shaft of creeper B or any other suitable rotating shaft, whenever the separator C is allowed to descend sufficiently by other parts of the mechanism. For the greater part of the time, however, the rod R is kept out of contact with cam-disk K by means of the cam N, keyed on shaft T, and acting on the rod R by its arm R′, so that meanwhile the separator C is at rest. During this state of the mechanism the throttle-valve F, fixed on the same shaft, T, as cam N, is open, so that the exhaust-fan may freely draw air through the apparatus. After a certain period the shaft T is partially turned, whereby throttle-valve F is closed for the purpose of stopping the air-current, and cam N brought into a position (shown by Fig. 8) to allow arm R′ to descend, so that the cams K can now act on rod R. A shaking motion, which is yet made more effective by the spring O, is thereby imparted to the separator C. In consequence, the flour adhering to the cloth, but which, on account of the stoppage of the air-current, is not any more sucked into the pores of the cloth, is detached. After the shaking has continued for a few seconds the shaft T is turned back into its original position, whereby rod R is lifted out of contact with cam-disk K and throttle-valve F reopened, so that the ventilation and, at the same time, the separation of flour-dust from the air may go on again.

The mechanism for causing the shaft T to be turned backward and forward at the desired intervals is specially represented by Figs. 3, 4, 5, 6, 7, and 8.

S is a worm keyed on the creeper-shaft and gearing into worm-wheel H, provided on its two faces with the pins *l* and *l′*. The wheel H, may, however, be driven by any other suitable mechanism.

G and G′ are two disks fixed to each other, and freely rotating on a bolt. The disk G is

provided with ratchet-teeth, on which the pin *l* acts, so as to cause the former to be turned by one tooth at every revolution of the wheel H. The disk G′, which in Fig. 3 is behind G, has an arm, *z*, on which the pin *l′* acts during its rotation whenever the disk G has been turned far enough by pin *l* to bring *z* within reach of *l′*. While disk G is being slowly moved onward by pin *l* no alteration of position of shaft T takes place; but when pin *l′* comes into contact with arm *z* the two disks G and G′ are rotated by a greater angle than otherwise, and at the same time the tooth *x* of disk G′ (see Fig. 5, which is a top view of G and G′) acts on the small cam-disk P, keyed on the end of shaft T.

Fig. 5 represents the position in which *x* begins to act, the throttle-valve being yet open. Fig. 6 (in which figure, as also in Fig. 7, the acting circles of the disks G and G′ appear developed into a plane) shows the cam-disk P turned by an angle of about sixty degrees, and the throttle-valve F closed. When this position is attained the cam-disk N is in the position of Fig. 8, so that the rod R is under the influence of cam-disk K. Very soon after this the edge *x′* of a slot in disk G (see Fig. 6) returns cam-disk P into its original position, Fig. 7, so that the throttle-valve F is reopened and rod R lifted again by cam N, Fig. 3.

It will be perceived that the period during which the throttle-valve is closed and the shaking mechanism in operation is but short in comparison to the time allowed for the free passage of the air-current.

While in the arrangement described the flour-dust separator is placed in a box below the millstone-floor, Fig. 9, Sheet 2, represents a modified design, in which the separator C is contained within the stone-case. Figs. 10, 11, 12, and 13 show the mechanism to a larger scale, analogous parts being marked by the same letters of reference as in the different figures of Sheet 1.

The frame of the separator C consists of an outer and an inner ring connected together by radial rods, to which the separating-cloth is attached in any suitable manner, and, by preference, in radiating zigzag folds, so as to present the largest surface possible within the given space. The frame is supported at one side by a rod, V, passing into a socket, U, containing a spring, O, which pushes the frame toward the shaking mechanism. The edges of the cloth are attached all around to a wooden frame-work fixed to the stone-case, so that the air drawn by the exhaust-fan through tube E is forced to pass through the pores of the cloth. The meal-spout *b* is kept closed against an entrance of air by the rotating vanes M in a similar manner as has been described with regard to Figs. 1 and 2.

The mechanism used for simultaneously closing the throttle-valve F and for putting the shaking-gear into action is, in principle, the same as in the first arrangement. The worm S, which is keyed on a shaft, W, driven from the millstone-spindle by a strap, gears into a worm-wheel, H, having on its front face the two pins *l* and *l′*. The short pin, *l*, at every revolution of the wheel H meshes the disk G forward by one of its teeth, but without causing any operation of the mechanism. As soon, however, as the arm *z* on the bottom side of G has come into the reach of the long pin, *l′*, the latter causes the disks G and G′ to turn by a greater angle, whereby, as in the first case, the cam-disk P (shown in full lines in Figs. 12 and 13) is turned forward and backward within a short space of time, so as to bring the shaking apparatus into action for a few seconds.

The cam-disk P, cam N, and throttle-valve F, not being plainly visible in Fig. 10, have been represented in two different positions in Figs. 12 and 13 without the parts of the gear lying in front of them. Fig. 12 shows the position of non-activity of shaking-gear. As soon as disk P is turned into position shown in Fig. 13, in the same manner as described above, the valve F is closed, and the cam N (which differs in shape from the analogous cam of the first arrangement) lifts the arm R′ of rod R. The end of R is, in consequence, exposed to the action of the conical cams K, fixed on shaft W, so that a to-and-fro jumping motion is imparted to rod R, and also to the separator C, with which R is connected. After the flour has been shaken off from the cloth the disk P, and with it cam N, valve F, and rod R, are returned to the position of Fig. 12, so that the action of the shaking-gear is stopped again and the passage for the air reopened.

Another modification of this apparatus is represented by the Figs. 14, 15, 16, and 17 on Sheet 3. The worm S, worm-wheel H, disks G and G′, and cam-disk P require no explanation, as they are similar to the analogous parts of the foregoing mechanisms, though somewhat simpler in detail. The separator consists of a cage, C, to which the separating-cloth is attached, this cage being suspended in a closed box, A, communicating with the stone-case. The interior of the cage communicates by pipe E with the exhaust-fan. For the purpose of bringing the leg R of the cage under the action of the cam K, the cage is connected by a chain to the throttle-valve F, so that when the latter is closed the cage is pulled forward, whereby its leg R is brought over the higher parts of the cam K, which thereupon shakes off the flour adhering to the cloth.

By the application of the described shaking mechanism, in combination with the separating-cloth and its frame or cage, the great advantage is attained that the surface of the said cloth may be made very small in comparison with other arrangements of the kind, and that consequently the size of the flour-separating apparatus, as well as its cost, is considerably reduced, while its efficiency always remains the same.

The arrangements of devices as shown in the figures of Sheets 1 and 3 yet present the special advantage that the flour-dust is more speedily extracted from the stone-case, so that no inflammation of the same can take place by sparks accidentally thrown out by the stones.

I claim as my invention—

1. The combination, with a millstone exhaust or ventilating apparatus, of a flour-separator and mechanisms for automatically stopping the air-current and simultaneously shaking said separator, all substantially as described.

2. The combination, with the separator C, its rod R, having arm R′, and the cam-disk K, of the controlling-cam N, substantially as described.

3. The combination, with the separator C, its rod R, having arm R′, actuating disk, and controlling cam, of the throttle-valve F, substantially as described.

4. In combination with the flour-dust-separator C, the rotating cams K, the rod R, having the arm R′, the wheel H, provided with pins or studs *l* and *l′*, the disks G and G′, the arm *z*, the cam-disk P, cam N, and throttle-valve F, substantially as and for the purpose specified.

5. In combination with the flour-dust-separator C, the rotating cams K, the leg or rod R, the rotating disks G and G′, cam-disk P, throttle-valve F, and chain or rod L, substantially as and for the purpose described.

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

MORITZ MARTIN.

Witnesses:
H. HAEDER,
H. PIEL.