(No Model.) 2 Sheets—Sheet 1.

W. SCHELLHASE & W. STEINHORST.

Porcelain Millstone and Machine for Making the Same.

No. 239,401. Patented March 29, 1881.

Fig. 1.

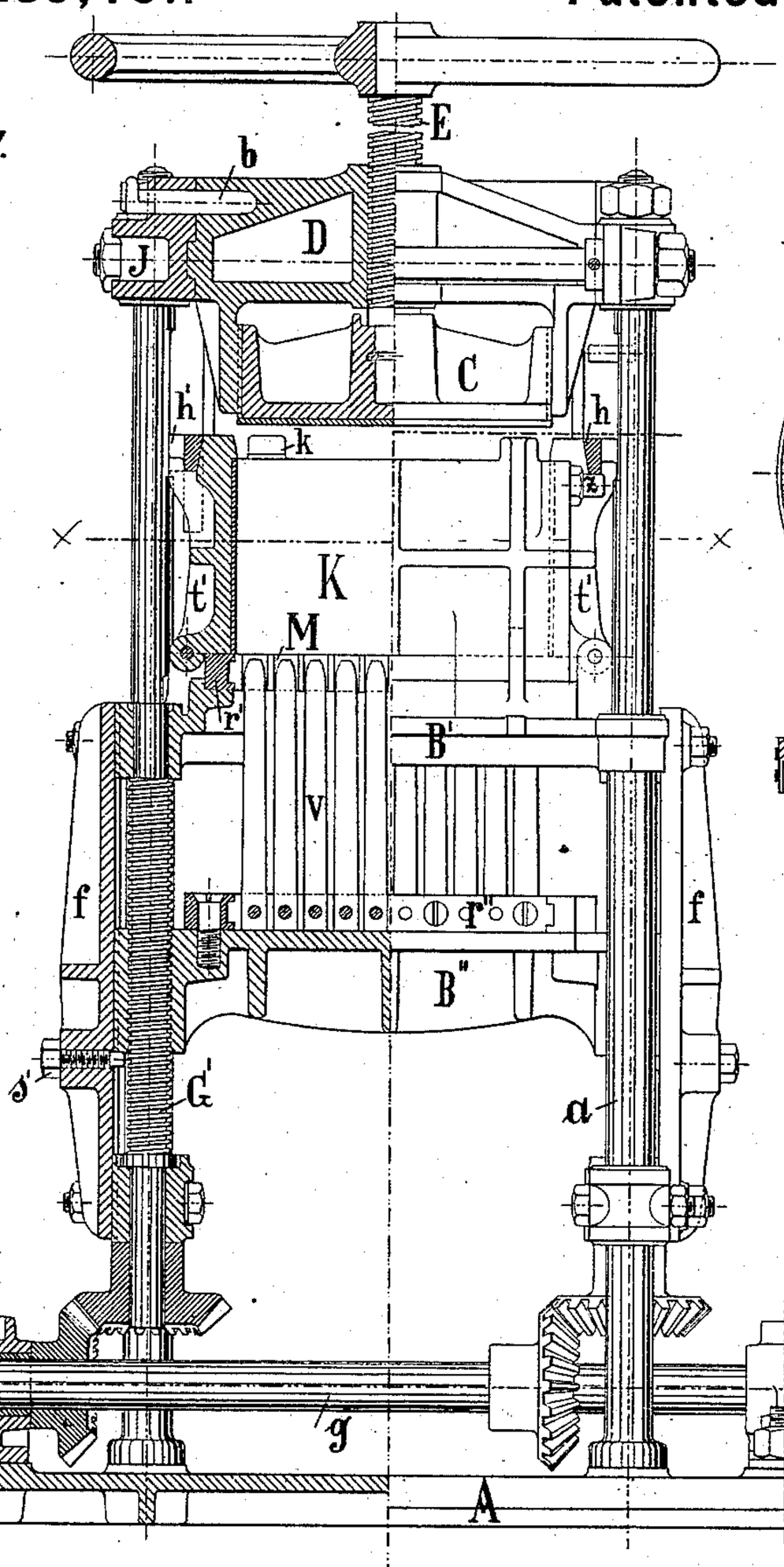


Fig. 8.

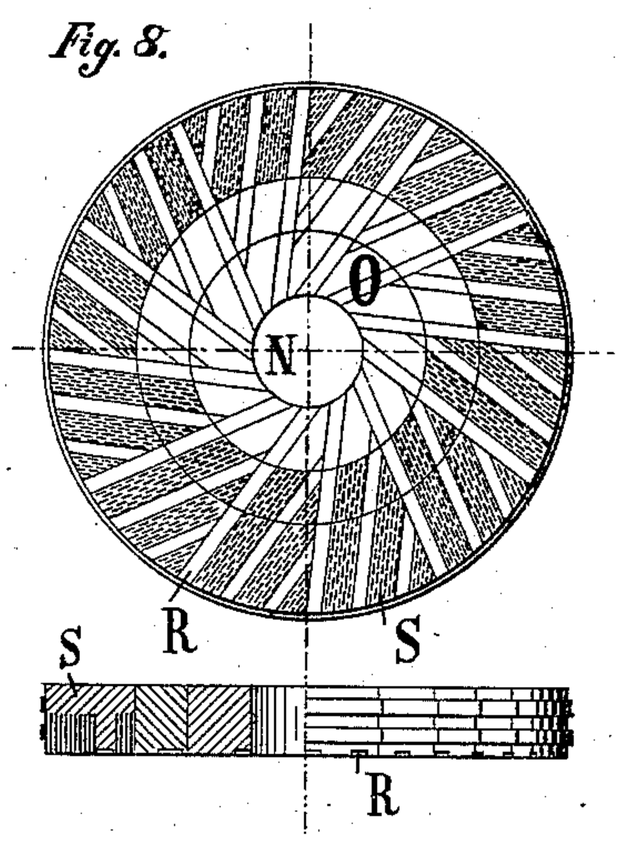


Fig. 9.

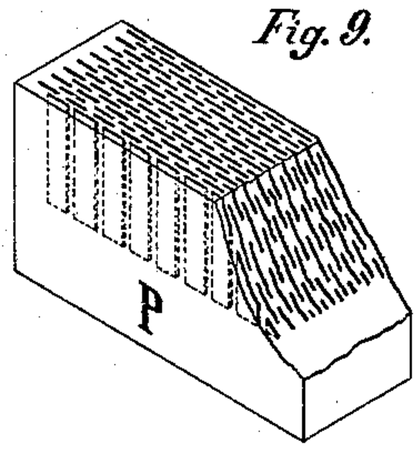


Fig. 10.

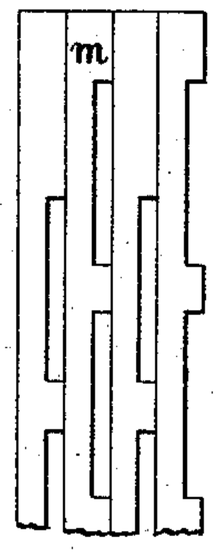
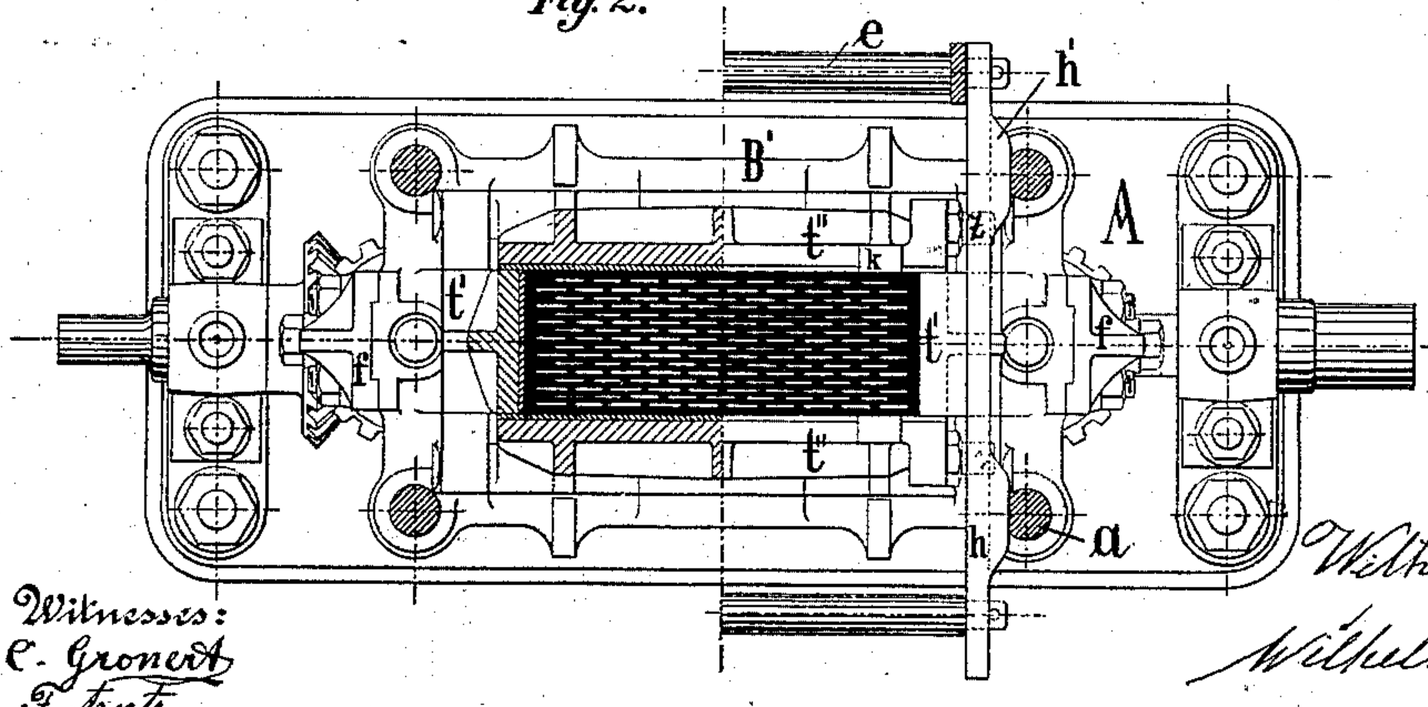


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

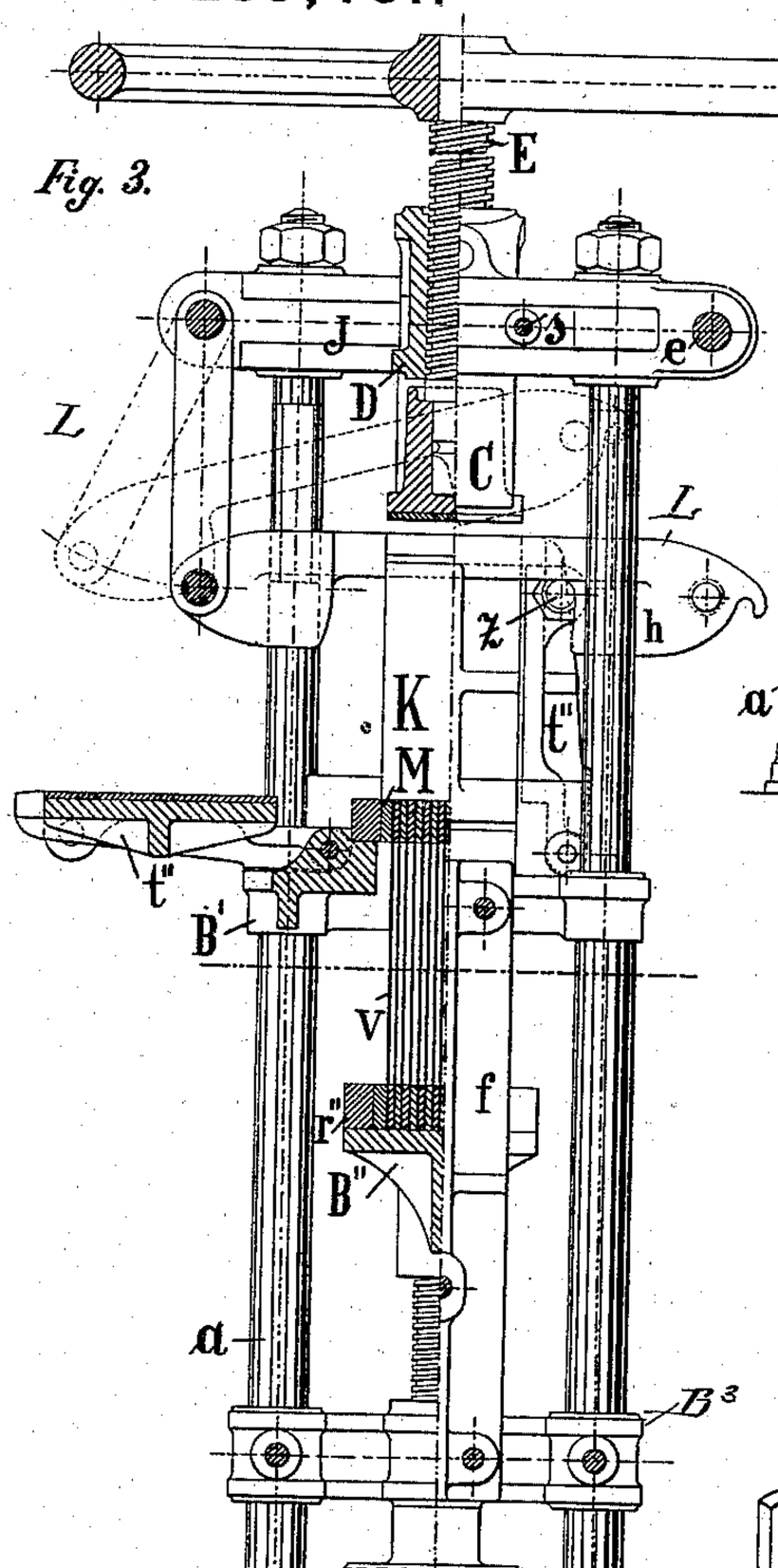


Fig. 4.

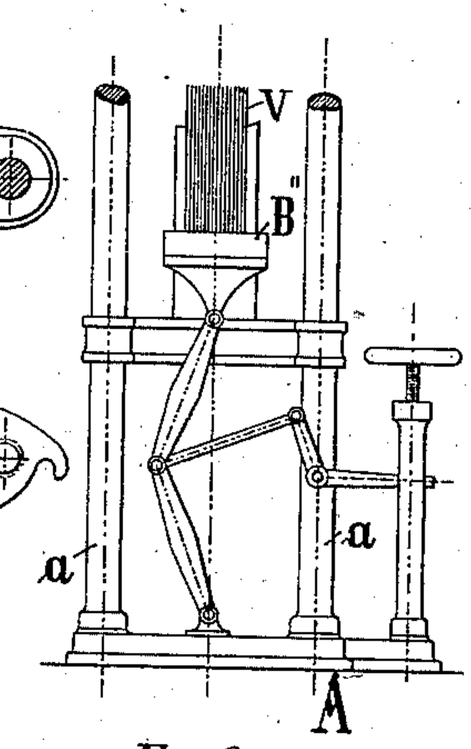


Fig. 6.

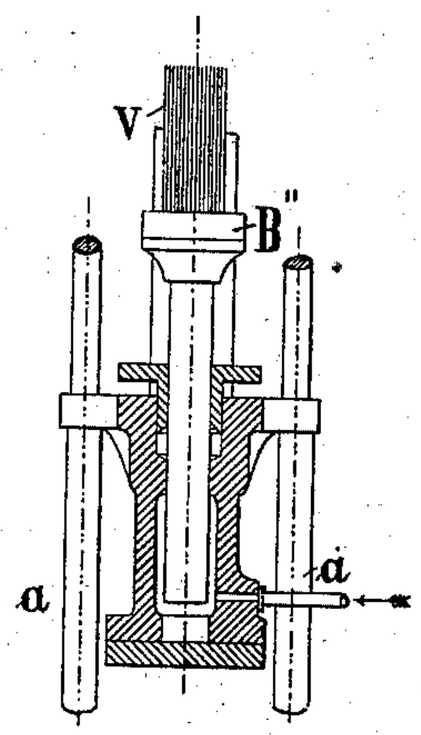
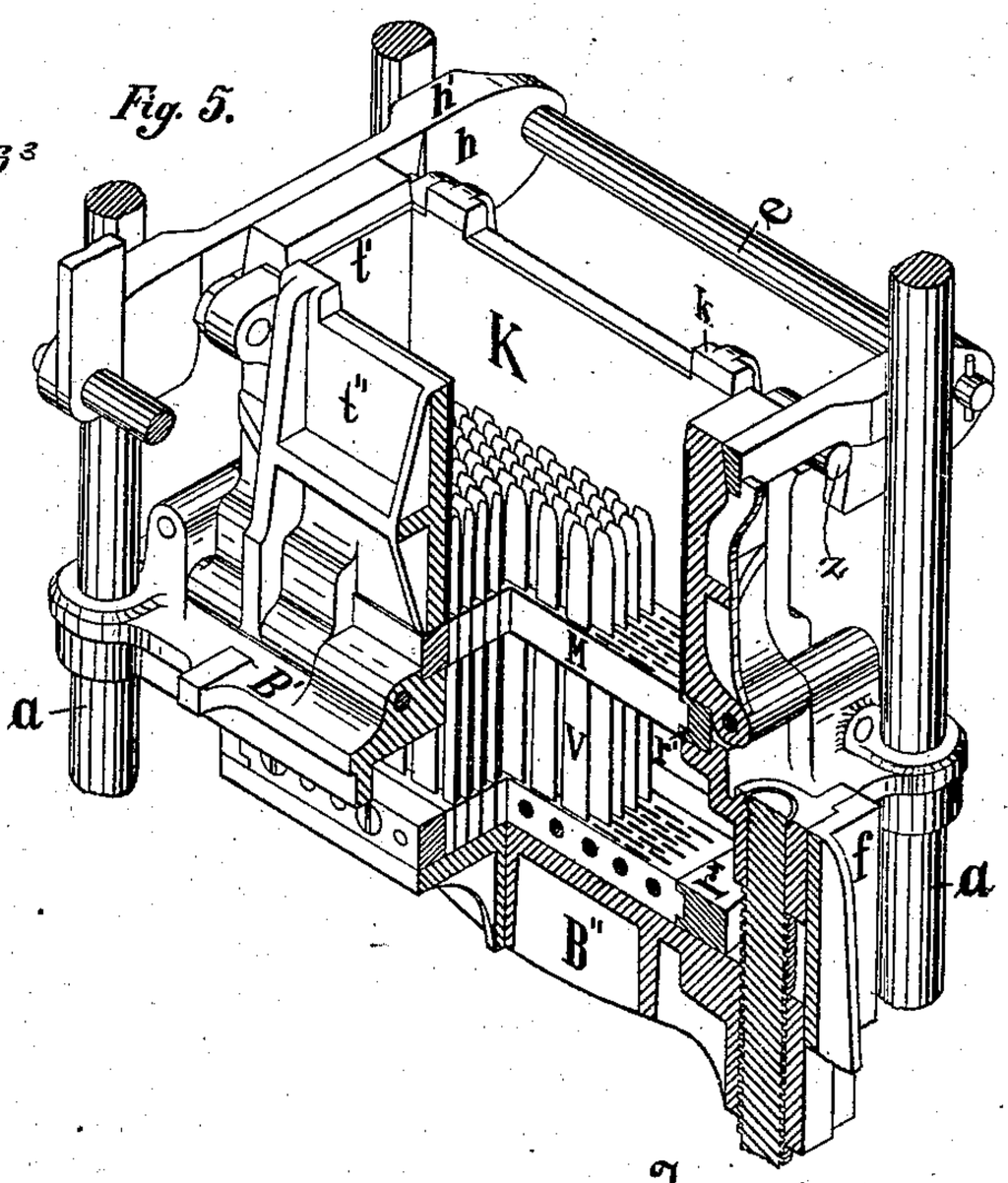


Fig. 7.

Fig. 5.



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UNITED STATES PATENT OFFICE.

WILHELM SCHELLHASE, OF BORNSTADT, AND WILHELM STEINHORST,
OF POTSDAM, PRUSSIA, GERMANY.

PORCELAIN MILLSTONE AND MACHINE FOR MAKING THE SAME.

SPECIFICATION forming part of Letters Patent No. 239,401, dated March 29, 1881.

Application filed June 4, 1880. (No model.) Patented in Belgium November 21, 1879.

To all whom it may concern:

Be it known that we, WILHELM SCHELLHASE and WILHELM STEINHORST, citizens of the German Empire, and residents of Bornstadt and of Potsdam, respectively, both near the city of Berlin, Prussia, have invented certain new and useful Improvements Relating to Perforating-Machines for Restoration of Sharpened Porcelain Stones into Grinding-Bodies for Grain, &c.

Since several inventors have tried to put in porcelain grinding-bodies (millstones) for grinding grain, by which the putting up is done in such a manner that the sharpening of the porcelain millstone is never needed, while the sharpening and brittleness of the porcelain is hardly possible, several methods have been in practice by which the millstone is to be furnished thoroughly sharpened. All the methods known and used till now striving to attain this end consist substantially in this: that in those for the employment of the bulk of porcelain various sorts of clay, such as flintware, chamotte, &c., one mixes or lays in regularly combustible substances, which, by the burning of the porcelains, separated simultaneously by that burning, become annihilated and leave the stone in a porous condition. This manner of putting up is, however, connected with many defects. These defects consist in that by the burning of the combustible material—such as wood, coal, vegetable stuff of all kinds, strips of paste or paste-board—the holes in the stone become of unequal sizes and do not appear equidistant; that by it many holes are so close to each other that they afterward, or by the grinding, merge in one hole, which brings forth loss in the grinding, and that these entire methods and manipulations appertaining thereto, when experimented with convenient care, take much time and working-wages, and nevertheless give little satisfactory results. By our method, in putting up artistically porcelain millstones these inconveniences are completely avoided. We put up the millstones from separate small stones equisized like building-brick stones, and we place these separate stones upon one machine or presser invented by us especially for that purpose. This machine and the method of fabrication by the same of the separate small stones, as well as the aggregation of the latter into a mill-body, are described as follows:

Figure 1 is a vertical section of the machine for forming the stone. Fig. 2 is a cross-section on line *x x*. Fig. 3 is a vertical section of a slightly modified form. Fig. 4 is a top view of plate through which the cutters pass. Fig. 5 is a perspective of the box and cutters, partly in section. Fig. 6 shows a modified means of operating the cutters. Fig. 7 is another view of a modification. Fig. 8 is a view of the stone. Fig. 9 is a view of one of the blocks. Fig. 10 is an enlarged portion of the bed through which the cutters pass.

The machine is represented in the Figs. 1 to 5. A foundation-layer, A, bears four columns, *a*. These columns support the plate B′, to which it is solidly fastened, and provided on its four sides with doors *t′ t″*, moving on hinges. These doors form in a perpendicular way the box K, in which are placed the material—porcelain, clay, blage, &c.—from which stones are to be manufactured. The doors so erected are maintained together in all directions by two levers, L, while the noses *h h′* of these levers join closely around the peg Z with the doors *t″*, and the levers with the rollers (*wulsten*) lean on their back side against the columns erected at that place. This close shutting of the doors is necessary because the mass of porcelain in the box K is subjected to an enormous pressure. The bottom M of the box K is formed of separate brass rods, disposed in such a manner that the same form regularly to each other at half-division transposed slits *m*, as shown in Fig. 10, and the rods are for this purpose in defined places where the slits at their connections are to protrude. (It should not be excluded to figure otherwise these slits in the bottom M and in the corresponding bottom B″. However, the inventors have found until now this kind of figure to be the best and most practical.) These brass rods are set in together solidly in the frames *r′*, the same being close fitted with the slides of the bottom M. The bottom, called "cutting-bench," (*messer-bank*,) *r″*, which is fastened upon the glide-piece or traverse B, only with the difference that in these slides the cutters are solidly inlaid, and by means of bolts fast-

ened with the brass rods and the frames. These cutters V stay, therefore, close and in corresponding numbers below the bottom M, and so lead themselves (*führen sich*) by the working of the slides of this bottom. The cutters V and the bottom may therefore be considered as stamp and matrix. The cutters V are made of steel, strictly in straight line, and polished. The same run from bottom to top on all four sides in a slightly conical form, in order to prevent them from weighing too heavily upon the mass of porcelain.

Above the box the pressure-plate C is placed, which exactly fits in the box K, and by means of screws to the spindle or dress-screw E may be moved up and down in it. As long as the press-plate has not penetrated enough into the box it is moved by two leading-splints cast to the traverse D. Outside this the noses K protrude above the doors *t' t''*, in order that the press-plate C be lead exactly into the box. The traverse D is not solidly bound with the traverses T, which form a binding of the column-heads, but is conducted therein by a spring and rabbet, so that it can be moved forward and backward as well as the spindle E, the plate C, and the swinging wheel. This is necessary in order to make place to pour the porcelain matter from above into the box K. The position of the plate C exactly above the middle of the box K is fixed by the bolts *b*, fitted in. The traverses J are bound to each other by the poles *e*.

s is an adjusting-screw, which, by the shifting of the traverse D, being, as a rule, only shifted on one side, takes it back toward the cross-stay and stops it exactly upon this cross-stay. Hereupon the bolt *b* may fix solidly the traverse D.

In order to have the cutters penetrating into the box K filled with porcelain material they have to be drawn over the traverse B'' under high pressure. As it explains by itself, this may be done in several manners. Figs. 1 to 5 show the high winding by means of two screw-spindles, G', which, from the axle-tree *g* and by means of conical wheels, are put in regular rotation. The axle-tree is herewith lying in two layers upon the bottom plate, and is put in motion by the crooked handle F with the hand or by machinery or wheels, (here not figured,) by which, according to the turning direction, the cutters are wound up or downward. By this means the traverse B'' is moved to the straight ways *f*, which are affixed to the plate B' and the traverses B^3, that support the screw-spindles G'. *s'* is a stop-screw in each straight way, which regulate the lift of the cutters in such a manner that the same in the corresponding position stay about one-quarter of an inch under the surface of the bottom M, Figs. 1 and 2. Fig. 6 shows in another form systematically how it is possible to wind high the cutting-bench (*messer-bank*) by means of a system of knee-levers. Again, Fig. 7 shows another method—by hydraulic pressure. Which of these systems is to have the preference must be learned by experience. All the systems have to fulfill the condition to bring forth a great pressure by human power, to be used in slow progresses, but with a somewhat quicker back motion, for the sake of saving time; as, besides, toward the end of the work, on account of the conical form of the cutters, the pressure is ever progressing, it seems to the inventors that the knee-lever system, which corresponds the best to that progressing resistance, is to be employed successfully in the future.

The putting up of sharpened porcelain stone with said machine is proceeded with in the following manner: Porcelain mass well dried, containing at the utmost ten to fifteen per cent. of water, is put in the box K, after shifting back the traverse D with the plate C layerwise, and with the cover *c* so much pressed as to produce a very consistent mass, according as the porcelain mass is to be more or less solid. So may the box K at once be filled up and this mass in the whole be pressed hard by the cover C. Then the cutters V are pressed in this so-composed mass according to either system of motive power, (therefore, in this case, by turning the crooked handle F,) and by this the mass is furthermore pressed to the utmost, so that all the water remaining in it is pressed out and the produced stone becomes thick and compact. During the winding up of the cutters it is well understood that the plate C remains pressing the mass. The cutters penetrate about two to three inches deep into the mass, Fig. 5, and then are at a distance of some two inches from the plate C, so that the stones are perforated but partially, Fig. 9. After this the cutter-bench is again screwed down, the sides *t'* and *t''* of the box are clapped down, and the stone now stands free on all sides, is taken away, and allowed to dry. The process is repeated in exactly the same manner for each stone. The dimensions of the box K are chosen in such a way as to allow the shrinking of the stone by the burning. Such facet of the stone as was in contact with the matrix M forms the grinding-surface of the running stone, while the part not thoroughly perforated being of about forty millimeters force, the upper face connecting with the inferior face of the stone becomes the bottom stone. The separate stones so manufactured, Fig. 9, are then gathered, in a dry or solid state, into furrows of soft fusible clay and burned. Then furrows and stones P, after the burning, appear to be as if one in piece. These pieces are bound together in eccentric rows directed toward the center by means of cement of any kind, as shown in the drawings, Fig. 8, as well between themselves as with the center O. The millstones produced in this way are then hemmed with iron bands, and may be considered as each of one piece.

The center O consists in an amalgam of divers clay sorts, such as gritstone, porcelain, powered chamotts, &c., which, through the burning, takes a lower grade of hardness than

the porcelain mass of the stones P. Likewise the clay forming the furrows R is ground in such a way as to acquire less hardness than the mill-track stones themselves.

N represents the eye of the stone.

The stones of the center O may, furthermore, also be sharpened by the above-described machinery in the same fashion, but coarser—that is to say, perforated with stronger and more distanced cutters. The grinding-body has then the aspect like lower half of Fig. 8. Otherwise one omits completely the sharpening of the center U, as shown in the upper half of the figure 8. Finally, the stone-trough N comes in the center O, which receives the mill-iron in the ordinary manner. These intervals of fusible clays form the so-called "flour furds" (*mehe furden*) or channel R, and the same are running through the center into the stone-trough.

The adherence of the millstones to each other may be obtained also in such a manner that the separate stones P, after being burned separately, are grouped in the above-described proceeding around the center U, which has been likewise previously burned, and then are bound in one whole mass to the center O by means of a cement material which forms again the flour-furrows. The grinding-surfaces of the stones so disposed, on account of the eccentric directions of the oblong holes, operate, scissors-like, against each other in a high degree of sharpness and remain, despite the shrinkage, constantly sharpened, on account of the perpendicular holes or slits, which are driven almost through the whole height of the stone P. At last the stones, by their exact likeness and their great sharpness, (by a great many perpendicular holes,) bring forth products, flour, &c., valuable in quality and in quantity.

We claim—

1. The millstone described, consisting of blocks of porcelain punctured as described and bound together with suitable cements.

2. In combination with the box K, supported as described, the pressure-plate C, screw E, traverse D, horizontal traverse J, and adjusting-screw *s*, as shown, and for the purpose set forth.

3. The box K, having the sides formed by the hinged doors *t' t''*, held in place by suitable binding means L, and bottom M of open brass-work *m*, in combination with the cutters V and press-plate C, substantially as set forth.

4. The levers L, provided with the noses *h h'*, in combination with the hinged sides *t' t''*, as set forth.

5. The stationary box K, having the hinged sides *t' t''* and bottom M, composed of open metal strips *m*, held in the frame *r'* B', in combination with the cutters V, mounted in the moving platen B^2, as set forth.

6. The combination of the screw-spindles G', moving platen B'', straight ways *f*, and set-screw *s'*, substantially as set forth.

In testimony whereof we have hereunto set our hands, at Berlin, Prussia, this 17th day of April, 1880, in the presence of two subscribing witnesses.

WILHELM SCHELLHASE.
WILHELM STEINHORST.

Witnesses:
C. GROUERT,
BERTHOLD ROI.