

(No Model.)

2 Sheets—Sheet 1.

M. HIRSCHBECK.

Machine for Grinding and Polishing Stone.

No. 231,318.

Patented Aug. 17, 1880.

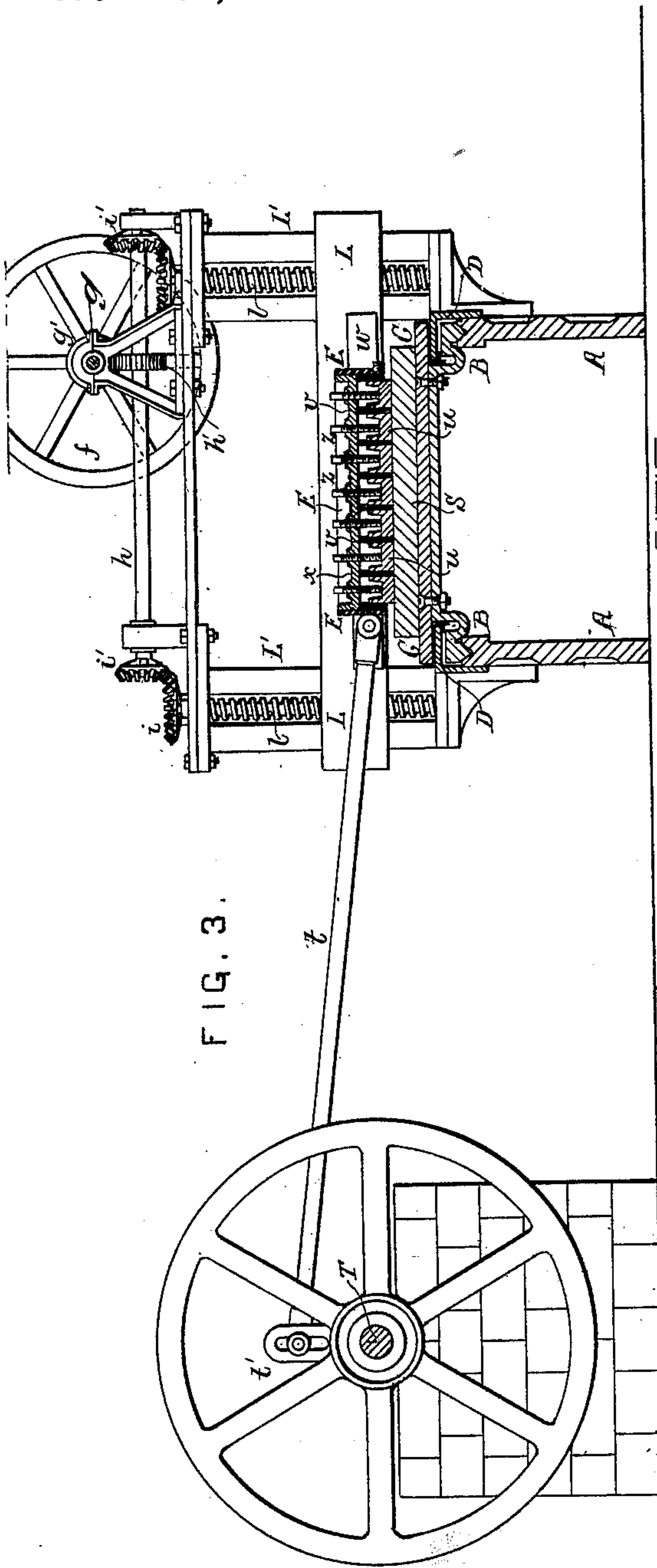


FIG. 3.

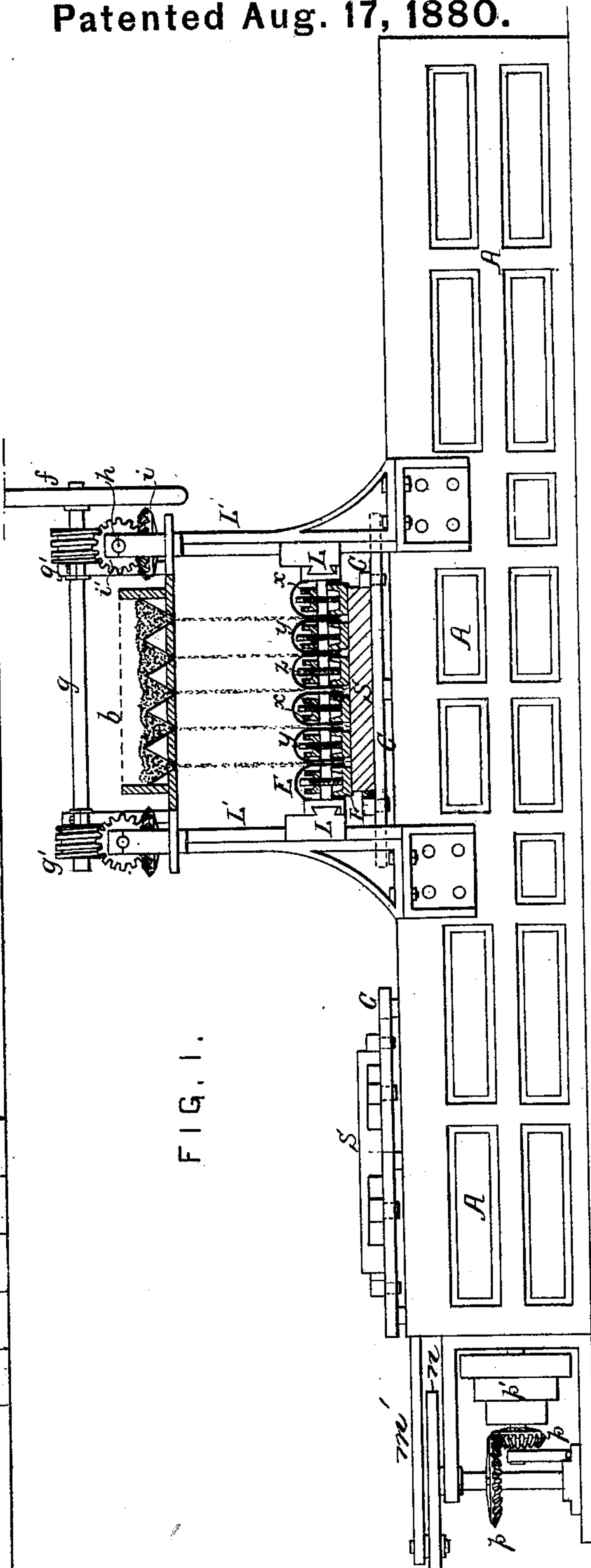


FIG. 1.

WITNESSES

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Henry Howson Jr.

INVENTOR

Michael Hirschbeck
by his Attorneys
Howson and Son

(No Model.)

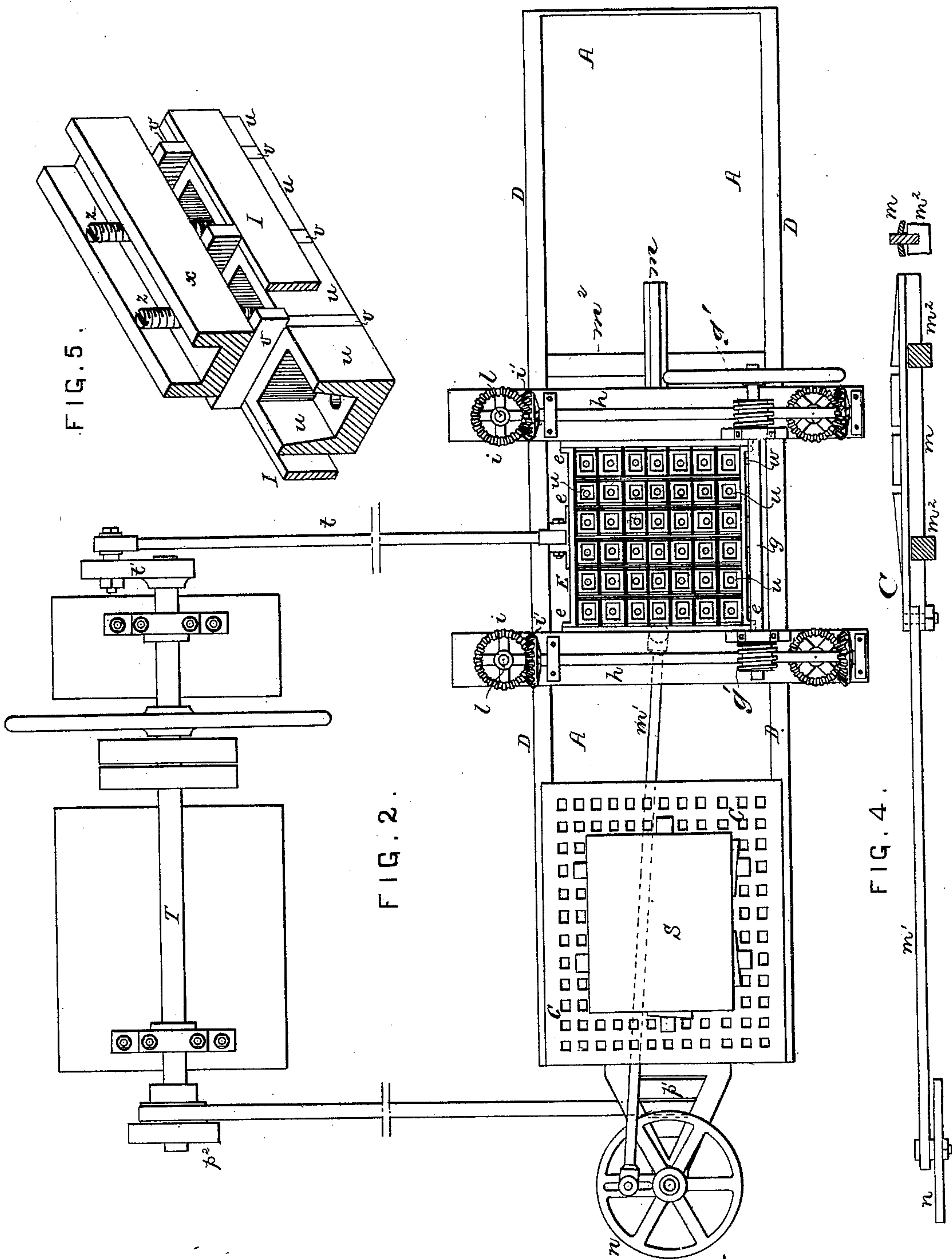
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Henry Howson Jr.

INVENTOR.

Michael Hirschbeck
by his Attorney
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UNITED STATES PATENT OFFICE.

MICHAEL HIRSCHBECK, OF SOLNHOFEN, BAVARIA, GERMANY.

MACHINE FOR GRINDING AND POLISHING STONE.

SPECIFICATION forming part of Letters Patent No. 231,318, dated August 17, 1880.

Application filed April 26, 1880. (No model.) Patented in Germany July 19, 1879.

To all whom it may concern:

Be it known that I, MICHAEL HIRSCHBECK, a subject of the Emperor of Germany, and a resident of Solnhofen, Bavaria, in the Empire of Germany, have invented certain Improvements in Stone Grinding and Polishing Machines, (for which I have obtained German Letters Patent No. 9,122, dated July 19, 1879,) of which the following is a specification.

10 The object of my invention is to construct a machine for the rapid and even grinding and polishing of stones, glass, and similar materials, and this object I attain in the manner which I will now proceed to describe, reference being had to the accompanying drawings, in which—

Figure 1, Sheet 1, is a longitudinal side elevation, partly in section; Fig. 2, Sheet 2, a plan view; Fig. 3, Sheet 1, a transverse section; Fig. 4, Sheet 2, a side view and section of the sliding rod for giving reciprocating motion to the sliding table, and Fig. 5 a detached perspective view of the grinding-blocks drawn to an enlarged scale.

25 The frame A of the machine is provided with two longitudinal grooves or ways, B, Fig. 3, on which a table or tables, C, are arranged to slide, as in an ordinary planing-machine, the ways, however, being provided 30 with protecting angle pieces or flanges D throughout their whole length, to prevent the access thereto of sand, dust, or small pieces of stone. There are two tables C shown in the present instance, so that when one carrying a stone, S, is placed under the grinding-plate the other can be drawn out and the finished stone removed and a new one substituted therefor, so as to be ready when the stone now being ground is withdrawn, the frame A 40 being extended on each side of the grinding portion sufficiently for this purpose. The stone may be secured to its table in any suitable manner.

In the present instance I have shown the 45 tables as provided with a number of openings, and pins are then inserted vertically into two or more of these openings at the sides of the stone S, and wedges are then driven in between the stone and pins where necessary. 50 The openings in the table also permit the water and slime from the grinding operation to es-

cape through. Additional devices can be secured to the table in the same way to permit the grinding and polishing of special forms.

A longitudinal reciprocating motion is imparted to the table C on the ways on the frame at right angles to the movement of the grinding and polishing frame or plate E by means of a rod, *m*, adapted to slide in recesses in the cross-beams *m*² *m*², Fig. 4, below the table, 60 and connected by the rod *m*¹ with the crank-wheel *n*. The table can be connected to the rod *m* by fitting a number of projections or ribs on the under side of the table into corresponding notches in the upper edge of the rod 65 *m*, or the table may be provided with suitable bolts, which, when the table has been slid into position, will fall into the notches in the rod *m*.

The crank-wheel *n*, which has a radial slot 70 in which the end of the connecting-rod can be adjusted to vary the length of stroke of the table, receives its motion through the bevel-gearing *p* and pulleys *p*¹ and *p*² and belting from the driving-shaft T, Fig. 2. 75

The frame E, Fig. 2, which carries the grinding-blocks immediately above the stone, is adapted to slide at right angles to the movement of the table C and stone on dovetailed guides on the cross-beams L, Figs. 1 and 3, 80 the necessary reciprocating motion being imparted to the grinding-frame from the driving-shaft T through the rod *t*, connected to the slotted crank *t*¹ on the said shaft. The length of stroke can be varied by adjusting the end 85 of the rod *t* in the slot in said crank, Figs. 2 and 3.

The beams L, which carry the grinding-frame, are adapted to vertical guides L¹ L¹, Fig. 3, on the frame, and can be adjusted on 90 said guides by means of the screws *l* *l*, passing through threaded openings in said beams. The upper ends of these screws are provided with bevel-wheels *i* *i*, gearing into wheels *i*¹ on the horizontal shafts *h*. Each of the two 95 shafts *h* carries a worm, *h*¹, operated by a worm-wheel, *g*¹, on the shaft *g*, carrying the hand-wheel *f*, by operating which the beams L and the grinding-frame can be raised or lowered, as will be readily understood. 100

The frame E carries a number of chilled-metal grinding-blocks, *u*, arranged in rows *e*,

Fig. 2—six in the present instance—and in the drawings are shown seven blocks in each row. Each row of blocks is retained in place laterally between two flat bars, *l*, extending across the frame, and between each pair of adjoining blocks in each row is a division-board, *r*, supported on the bars *l*, as shown in the enlarged detached perspective view, Fig. 5. Each row of blocks, when once adjusted, is retained in place by a tightening-screw, *w*, passing through one end of the frame *E*, Figs. 2 and 3. To the frame *E*, above each row of blocks, is secured a flanged metal bar, *x*, through which pass a number of adjusting-screws, *z*, one for each block, as shown in Figs. 1, 3, and 5, the bars and screws being shown removed in Fig. 2.

When the parts of the grinding-frame are put together for the first time, or the blocks have for any reason become uneven, they are regulated in the following manner: One or other of the tables with its stone having been moved into position under the grinding-frame, the latter is lowered until all the blocks rest on the stone, the screws all being loosened. The vertical screws are then gradually tightened, so that all the blocks are held down flat on the stone. Then the end screws, *w*, are carefully tightened up, and the machine is ready for operation. The chilled-metal blocks need not be worked or smoothed down in any way before they are used.

On the top of the frame, between the shafts *h*, is arranged a sand box or receptacle, *b*, with as many longitudinal hopper-shaped divisions as there are divisions between the rows of grinding-blocks underneath. The bottoms of these divisions terminate in slots, through which the sand, emery, or other grinding material can fall into the spaces between the rows of grinding-blocks, the flow of the sand being regulated by a suitable cut-off slide at the bottom of the receptacle.

In order to prevent the sand from getting into the screws, sheet-metal covers *y* are arranged over the rows of blocks, as shown in Fig. 1.

A proper supply of water may be provided by means of rubber or other tubes having regulating-valves, and arranged to terminate above the divisions between each row of blocks.

If it is desired to make the operation of the machine automatic, the wheel *f* should be so weighted as to have a continuous tendency to operate the worm-wheels and gearing, so as to keep the grinding-plate continuously pressed on the stone.

Owing to the fact that the stone and the

grinding-frame are worked at right angles to each other, an even surface and an equal grain is produced over the whole surface of the stone, the sand being worked evenly over the stone, and not drawn into a ring or thrown out, as in machines with rotary or eccentric movements.

If very thin edges have to be ground, the movement of the grinding-plate should be quite, or almost, stopped, while the table and stone are worked quickly, so as to produce a longitudinal draw-cut. The edges will then remain quite sharp, and can be cut at any desired angle.

If very long pieces are to be worked, two tables, *C*, can be coupled together and worked as one. The tables may be worked by ratchet-wheels and gearing or screws, if desired, especially if heavy work is to be done.

The condition of a stone being ground, can be observed at any moment during the operation of the machine, or a table with its stone can be removed from under the grinding-frame and another substituted, by simply operating the wheel *f* so as to raise the grinding-blocks from contact with the stone.

If the stone is to be polished after it has been ground, the stone on its table is withdrawn from beneath the grinding-blocks and well cleaned from sand. A sheet of felt saturated with rouge is then placed under the frame *E*, to which a quick movement is then imparted, while a slow reciprocating movement is imparted to the table and stone, so as to quickly obtain a good polish.

I claim as my invention—

1. A stone-grinding machine provided with a grinding frame or plate, two tables carrying stones to be ground, and a frame having ways on which the tables can traverse, and which extend more than the length of each table beyond the grinding-plate, as and for the purpose set forth.

2. The grinding-frame provided with blocks *u*, plates *l* and *x*, and adjusting-screws.

3. In a grinding-machine, the combination of the grinding-frame, having rows of grinding-blocks, with the sand-box divided into a corresponding number of slotted hoppers.

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

MICHAEL HIRSCHBECK,
Manager of the Solnhofen Actien Verein in Solnhofen, Bararia.

Witnesses:

H. F. G. GEISSE,
CARL ENGERELY.