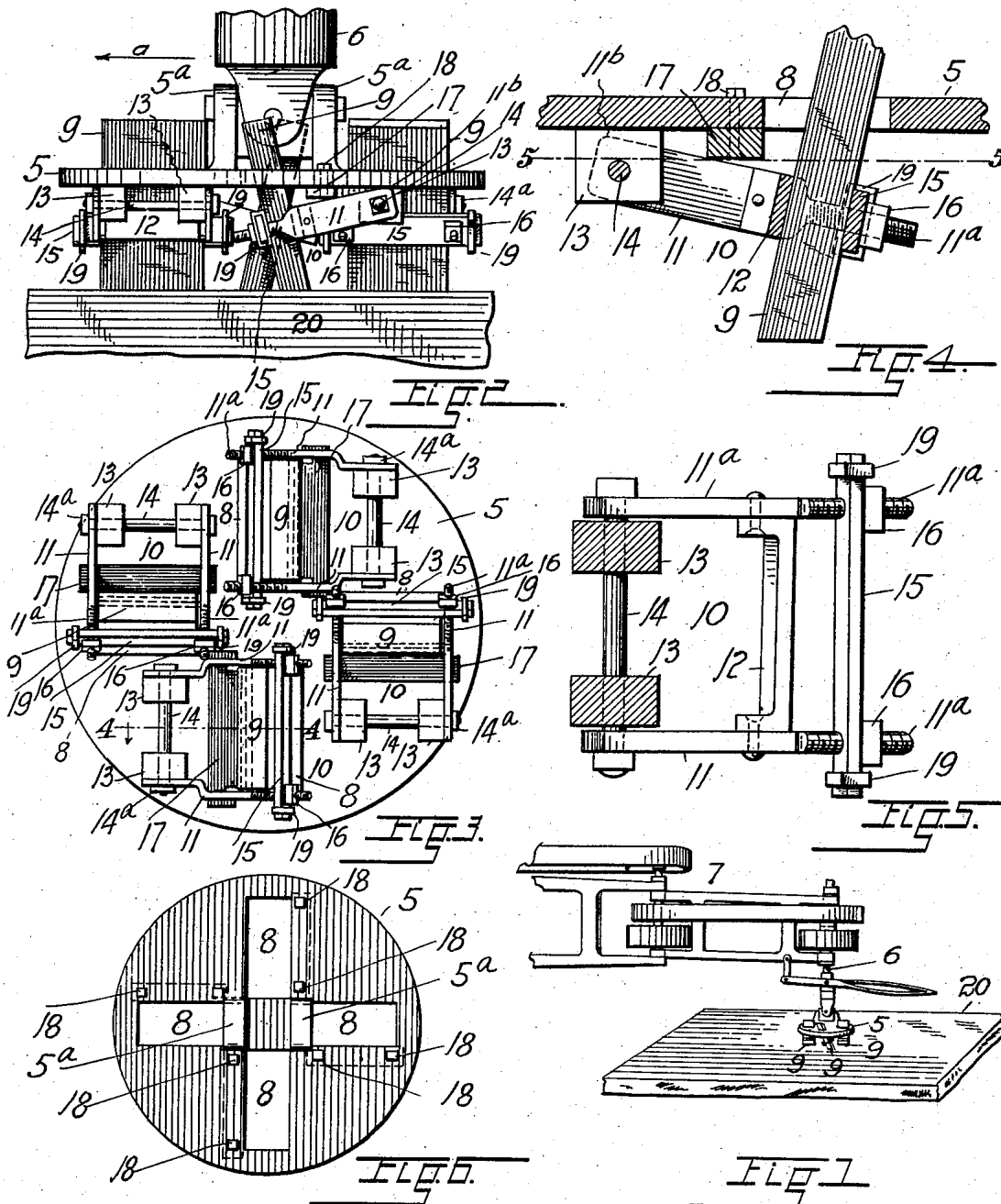


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HEAD FOR MARBLE OR GRANITE POLISHING MACHINES.

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NO MODEL.



Witnesses:

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## UNITED STATES PATENT OFFICE.

HARRY J. HIGGINS, OF DENVER, COLORADO.

## HEAD FOR MARBLE OR GRANITE POLISHING MACHINES.

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*To all whom it may concern:*

Be it known that I, HARRY J. HIGGINS, a citizen of the United States, residing at Denver, in the county of Arapahoe and State of Colorado, have invented a new and useful Head for Granite or Marble Polishing Machines, of which the following is a specification.

My invention relates to improvements in heads used on machines for polishing the surface of granite or marble slabs.

The machines referred to generally consist of a frame fastened to the wall or other suitable support and composed of a set of brackets into which a vertical shaft is journaled.

A swinging frame is pivoted at one extremity around a standard fastened to the before-mentioned brackets, while its other extremity is provided with a short vertical shaft or spindle, which receives a rotary movement from the first-mentioned vertical shaft by means of a belt passing over pulleys on said shafts. The polishing-head is secured to the lower end of the spindle and is brought in contact with the surface of the piece of granite or marble to be polished, the polishing being accomplished by the swift rotary motion of the disk, which previously has been provided with some suitable abrasive and smoothing agent. The swinging frame has a handle by means of

which the workman can raise or lower the revolving disk and move it over the surface of the stone. The marble or granite after having been sawed into slabs and coped up into sizes is rubbed on a rubbing-band with water and sand. After this operation, which squares the edges and gives the stone an even surface, has been performed the slabs are placed under the head, which, as heretofore explained, imparts to the marble a smooth surface by being swiftly rotated over the same. The surface of the slabs after this operation is finished, although being smooth and even, has not yet the high polish desired in marble or granite for decorative and other purposes, and another treatment of the stone is required before it is ready for the market. The finishing operation has heretofore consisted chiefly of rubbing the polished surface of the slabs by hand with sandstones, hone, rags, acid, and other substances until the required polish is obtained, which operation on account

of time and labor expended has ever been a lengthy and costly one.

The object of my invention is to reduce to a great extent this manual labor, and thus save time and money by producing a head for marble and granite polishing machines so constructed that by its use it will enable the operator to impart, by means of the polishing-machine to which the head is attached, a high polish to the flat surface of the stone. To obtain this object, I make use of the mechanism illustrated in the accompanying drawings, in which—

Figure 1 represents a side view of the outer extremity of the swinging frame of a granite and marble polishing machine, showing the head in place on a block of stone. Fig. 2 represents an enlarged side elevation of my improved head provided with blocks of polishing material. Fig. 3 represents an underneath view of same. Fig. 4 represents an enlarged section along the line 4 4, Fig. 3, looking in the direction of the arrow. Fig. 5 represents a section taken along the line 5 5, Fig. 4, looking downward; and Fig. 6 represents a top view of the head drawn to a smaller scale, the blocks of polishing material being removed.

Similar reference-numbers refer to similar parts throughout the various views.

Let 5 represent a disk made of iron or other suitable material and provided with lugs 5<sup>a</sup>, by means of which it may be secured to the lower extremity of the spindle 6, which is journaled in the extremity of the swinging frame 7 of the polishing-machine. Disk 5 is provided with four radial slots 8, through which extend the blocks of polishing material 9. Blocks 9 are composed of sandstone of various textures, hone, carborundum, carpet, or other abrasive substances and are held in place on the disk by means of pivoted clamps 10. Clamps 10 are composed of two parallel arms 11, in between which is secured a strap 12, which forms the fixed jaw of the clamp. The ends of the strap are bent at right angles to the main body of the same and are fastened to the arms 11 by means of rivets. Arms 11 extend beyond the strap in both directions, the shorter extensions 11<sup>a</sup> being round and provided with screw-threads

and serving as guides for the loose jaw or follower 15, which is provided with holes through which the ends 11<sup>a</sup> pass. By moving the follower 15 along the extensions 11<sup>a</sup> of the arms from or toward the fixed jaw 12 the mouth of the clamp may be adjusted according to the thickness of the blocks of polishing material 9 inserted therein. Blocks 9 are placed in between the extensions of the arms 11 and against the jaw 12, after which the follower 15 is moved toward the fixed jaw until it bears against the surface of the block, where it is held in place by means of nuts 16, which are screwed onto the threaded extensions of the arms 11 and against the follower 15, thus clamping the polishing-blocks 9 firmly between the jaws of the clamp. The parts of arms 11 extending beyond strap 12 in opposite direction from the threaded extensions are provided with holes in their outer extremities and are pivoted by means of bolts 14 to lugs 13, which are integral with disk 5, extending downward from its under surface, the extremities of the arms 11 being located against and on the outside of the lugs. Bolts 14 pass through the holes in the extremities of the arms and through corresponding holes in lugs 13 and are held in place by means of nuts 14<sup>a</sup>. The position of the lugs, of which there are two for each clamp, is such that the line of pivot of each of the clamps is parallel to one of the radial slots. They are situated back of the slots in relation to the direction of rotation, the pivoted clamps extending forward underneath the slots, the distances between the point of pivot and the radial slots and between the point of pivot and the jaws of the clamp being such that block 9 when confined between the jaws of the clamp will be in line with the radial slots, their upper ends projecting through and having free movement in the same. The arms 11 extend for a short distance beyond the pivoting-point, the extension being of such length that when the free ends of the clamps have reached a point a certain distance below the under surface of the disk the outer extremities 11<sup>b</sup> of the arms will engage the under side of the disk 5, thereby arresting the further downward movement of the clamps and of the polishing-blocks confined between their jaws.

The blocks of polishing material when placed in between the jaws of the clamps project upward through the radial slots in the disk and downward, their lower surfaces being intended to engage the stone which it is desired to polish. They form when secured in the clamps a right angle with the arms 11, and as the latter form an acute angle with the under side of the disk the polishing-blocks will make a similar angle with the surface on which they rest complementary to the first angle, thus preventing possible wedging between the blocks and the surface over which they move.

When the polishing-head has been put in place on the lower end of the vertical spindle

6, journaled in the swinging arm of the polishing-machine, the slab of marble or granite which is to be polished (indicated in Figs. 1 and 2 by numeral 20) is placed underneath the head, the lower end surfaces of the polishing-blocks bearing on the upper surface of the slab, while the distance between the under surface of the disk and the slab is made sufficiently small by lowering the disk to prevent the extremities 11<sup>b</sup> of the arm 11 engaging the disk. This arrangement allows the weight of the polishing-blocks, added to that of the clamps, to effect a pressure against the surface of the slab, said pressure when the head is being rapidly revolved being augmented by the pressure caused by the centrifugal force, which when the disk revolves in the direction of arrow *a* acts on the pivoted clamps, forcing their free ends, and consequently the polishing-blocks, against the surface of the slab. The friction between the ends of the polishing-blocks and the surface of the slab resulting from this total pressure, while gentle and even, is enough to produce the high finish of polished marble or granite.

As the surface of the slab prior to the application of my improved head is not perfectly smooth it is natural that the ends of the polishing-blocks will at times encounter irregularities and obstructions, which, no matter how small they be, will on account of the high speed with which the head revolves cause the free ends of the clamps to swing upward against the under surface of the disk. To limit and at the same time break the force of the upward movement of the arms, rubber cushions or buffers 17 are secured to the under side of the disk by means of bolts 18, which are countersunk in the rubber and secured by nuts on the upper side of the disk. The rubber cushions are placed at points in between the radial slots and the line of pivot of the clamps, being parallel to both and of sufficient length to allow the arms 11 of the clamps 10 to strike against them when forced upward. The yielding pressure of the cushions 17 will allow the polishing-blocks to move over the uneven places on the surface of the slab, at the same time allowing enough friction between the ends of the polishing-blocks and these places to smooth and ultimately remove them.

The polishing-heads are generally connected with the lower end of the spindle 6 by means of a universal joint, being free to tilt in any direction when not supported. On account of this in case one of the polishing-blocks breaks there is a possibility of the disk tilting downward, which might cause the ends of the clamp-arms or of the follower 15 to strike the surface of the marble, thereby injuring its polished surface. To prevent this, I have provided the extremities of the follower 15 with rubber bands 19, which are of sufficient thickness that when the disk tilts downward they will prevent the ends of the arms or followers coming in contact with the

surface of the slab and on account of their elasticity prevent injury to the polished surface of the granite or marble.

The continual friction between the lower ends of the polishing-blocks and the surface over which they are being moved will cause the blocks to wear off until the ends 11<sup>b</sup> of the arms 11 engage the under surface of the disk 5, and thus prevent further downward movement of the clamps. When this point is reached, the clamp-jaws are loosened and the blocks are lowered, thus raising the clamps to their original position.

The radial slots 8 besides allowing the upper ends of the polishing-blocks to project through the disk are also used as means for feeding water or other liquids used during the polishing process to the points of contact between the polishing-blocks and the slab when the disk is revolving.

As explained above, the polishing-blocks may be composed of any suitable substance, sandstone having been found to be the best suited to my purpose, while the polishing may be finished by means of blocks made of car-pet soaked in acid.

Blocks made of emery or other gritty substances may also be employed, depending on the condition and texture of the material which it is desired to polish.

It will be observed that in the drawings two of the radial slots are longer than the others, which feature is caused by my desire to obtain as much rubbing surface as possible. The length of the shorter slots being limited by the lugs 5<sup>a</sup>, the other slots have been extended as near to the center of the disk as possible. The arms of the clamps extending underneath the longer slots have been bent outward to admit the placing of the polishing-blocks, which are wider in proportion to the length of the slots.

Having thus described my invention, what I claim is—

1. In heads for machines of the class named a disk, having means for securing it to a spindle of the machine and provided with one or more lugs on its under side, one or more arms pivoted at one extremity to said lugs, suitable clamping devices secured to the other extremities of said arms and polishing-blocks secured in said clamping devices, substantially as described.

2. In heads for machines for polishing granite and marble, a disk, having means for fastening it to a spindle of the machine and provided with one or more radial slots, one or more arms extending underneath said disk, one extremity of each arm being pivoted to lugs on the under side of the disk, while the other or free extremity of each arm is provided with a suitable clamping device, and blocks of polishing material secured in said clamping devices and extending in both directions therefrom, the different parts being so arranged that the upper extremities of the polishing-blocks are in line with the radial

slots, being free to extend and move through the same, substantially as described.

3. In heads for machines for polishing granite and marble, a disk, having means for fastening it to the spindle of the machine, one or more arms pivoted to lugs on the under side of said disk, the arms extending underneath and forming acute angles with the under surface of said disk, polishing-blocks secured to the free extremities of said arms and suitable means for limiting the up or down movement of the free ends of said arms substantially as described.

4. In heads for marble and granite polishing machines, a disk, having means for fastening it to a vertical spindle of the machine, one or more sets of parallel arms pivoted at one of their ends to lugs on the under side of said disk, the outer extremities of said arms being provided with screw-threads, connecting-straps placed in between and fastened at right angles to each set of arms at a point in between their pivoted and threaded extremities, follower-plates designed to be moved and guided along said threaded extensions toward and from the connecting-strap and nuts on said threaded extremities for locking said follower in any desired position for the purpose specified.

5. In heads for machines of the class described, a disk, having means for fastening it to a spindle of the machine and provided with lugs on its under side, arms pivoted to said lugs, clamping devices secured to the free ends of said arms, blocks of polishing material secured in said clamping devices, and extensions on said arms beyond the pivoting-point designed to engage the disk when the free ends of the arms have reached a certain point below the disk, substantially as described.

6. In heads for granite and marble polishing machines, a disk having means for fastening it to a spindle of the machine and provided with lugs on its under side, one or more sets of arms pivoted at one of their ends to said lugs, a clamping device secured to the free ends of each set of arms, polishing-blocks adjustably secured in said clamps and flexible cushions or buffers secured to said disk so as to be engaged by the arms when the latter are moved toward the disk substantially as described.

7. In heads for machines of the class described, a disk, having means for fastening it to a spindle of the machine, one or more sets of arms pivoted at one of their ends to lugs on the under side of said disk, blocks of polishing material secured in a clamping device on the outer extremities of each set of arms and suitable elastic substances secured to the extreme ends of the clamps or parts thereof for the purposes specified.

8. In heads for machines for polishing marble and granite a disk, having means for fastening it to a spindle of the machine and provided with one or more radial slots, lugs on

the under side and forming part of said disk  
and located back of said slots in relation to  
the direction of rotation, one or more sets of  
parallel arms pivoted to said lugs, the line of  
5 pivot of each set of arms being parallel to  
one of the slots, the arms extending forward  
underneath the slots, clamping devices se-  
cured to and forming part of the free ends of  
said arms, polishing-blocks confined between  
10 the jaws of said clamps, forming right angles  
with said arms and extending in both direc-  
tions therefrom, the upper extensions pass-

ing through said slots, and suitable means  
for limiting the up-and-down movement of  
the arms and the polishing-blocks substan- 15  
tially as described.

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

HARRY J. HIGGINS.

Witnesses:

W. R. THOMPSON,  
K. M. STUMP.