No. 682,342. Patented Sept. 10, 1901.

A. H. RADELL.

FILE SHARPENING APPARATUS.

(Application filed June 24, 1901.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

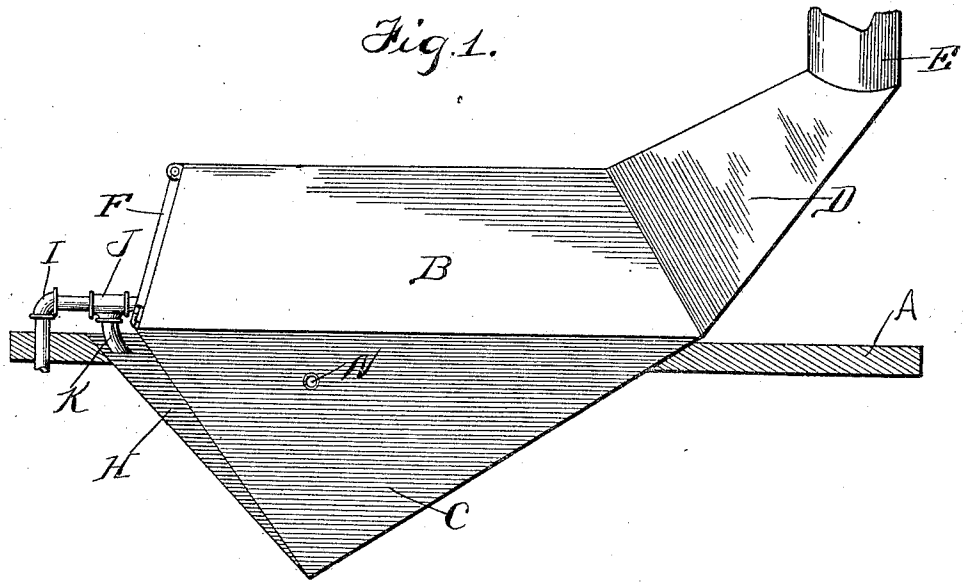
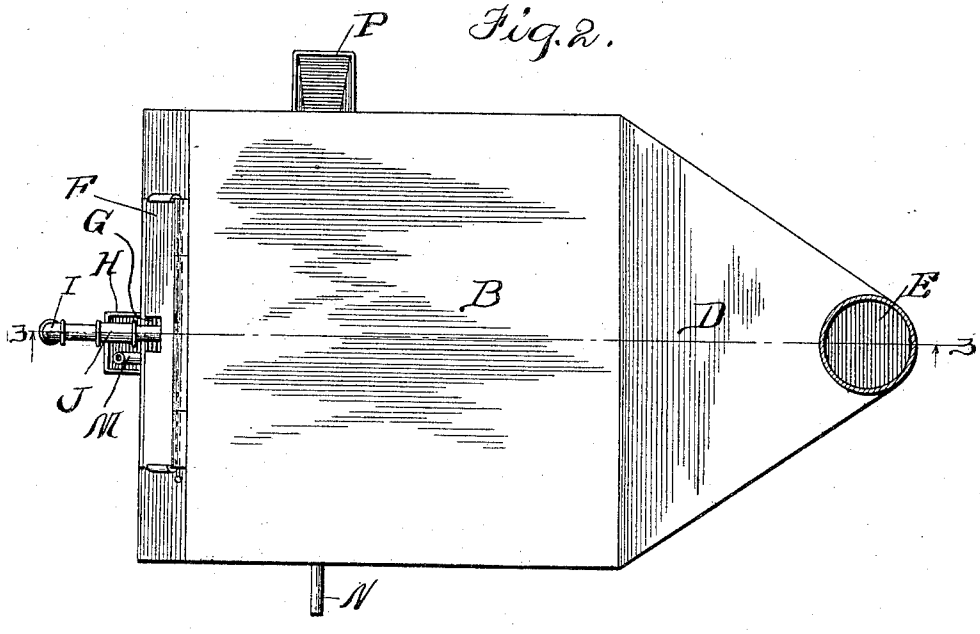


Fig. 2.



Witnesses:
J. B. Weir
Chas. D. Perry

Inventor
A. H. Radell
By Raymond H. Barnett
Attorneys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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Fig. 3.

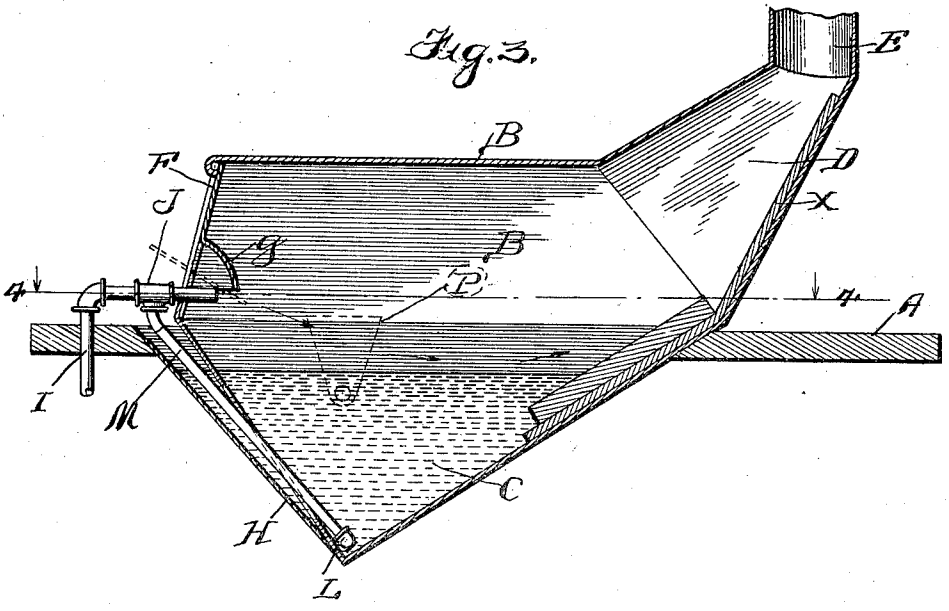
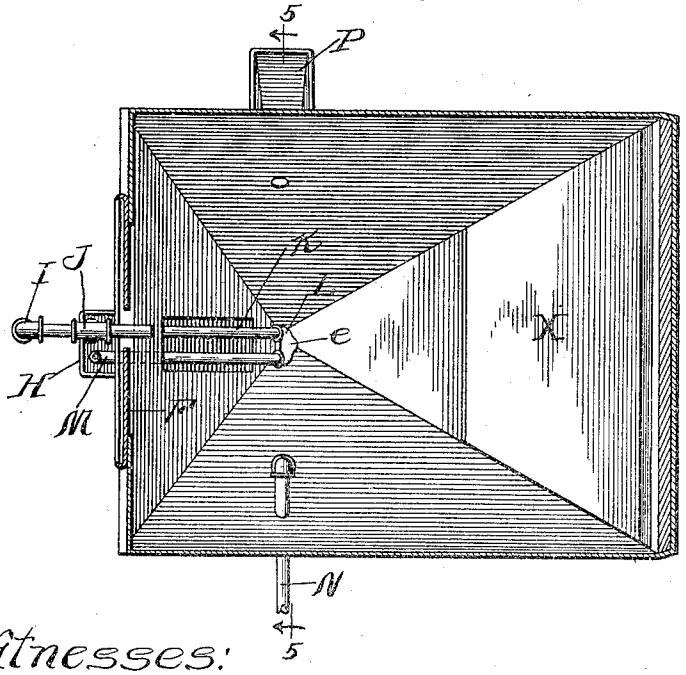


Fig. 4.



Witnesses:
J. B. Weir
Ira D. Bussey

Inventor
A. H. Radell,
By Raymond & Barnett
Attorneys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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A. H. RADELL.

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(No Model.)

3 Sheets—Sheet 3.

Fig. 5.

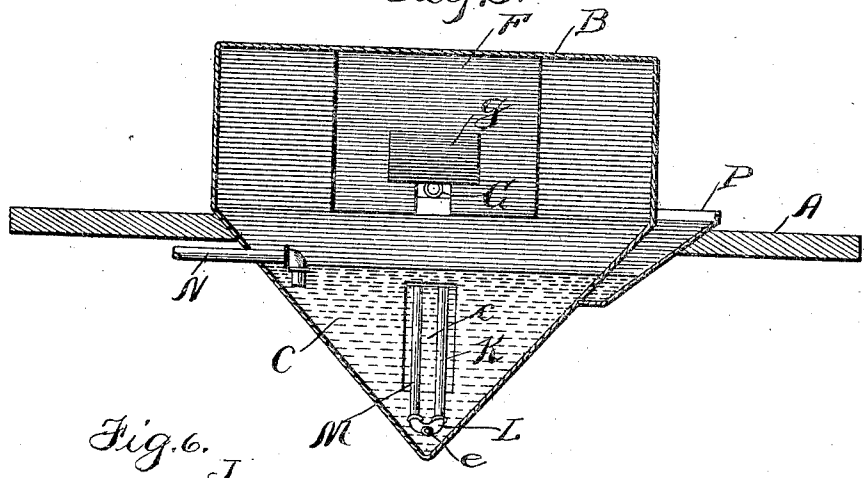


Fig. 6.

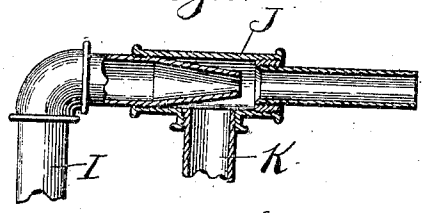


Fig. 7.

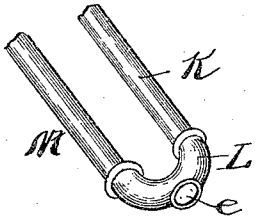
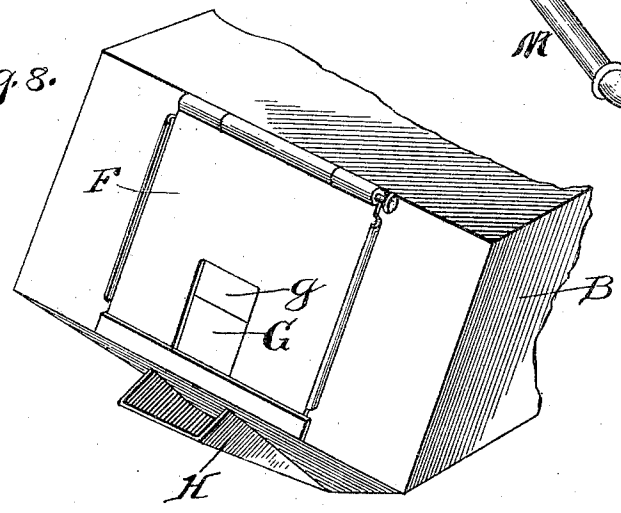


Fig. 8.



Witnesses:
J. B. Weir
Isa D. Perry

Inventor
A. H. Radell
By Raymond & Barnett
Attorneys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ANTHONY H. RADELL, OF CHICAGO, ILLINOIS, ASSIGNOR TO BENJAMIN M. FREES, OF SAME PLACE.

FILE-SHARPENING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 682,342, dated September 10, 1901.

Application filed June 24, 1901. Serial No. 65,858. (No model.)

To all whom it may concern:

Be it known that I, ANTHONY H. RADELL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in File-Sharpening Apparatus, of which the following is a specification.

My invention relates to improvements in that class of machines in which files are sharpened by a stream of abrasive material mingled with water and discharged into a suitable closed receptacle by a jet of steam, the steam escaping through a suitable opening and the mixed water and abrasive material returning by force of gravity to a receptacle, from which it is again drawn and discharged into the box by the steam-jet over and over again.

One object of my invention is to provide such a device which shall be compact, durable, and effective.

Another object of my invention is to provide means for automatically preventing the stoppage of the apparatus by the settling of the abrasive material.

Another object of my invention is to so construct the box that the steam may escape therefrom without carrying off any substantial quantity of the abrasive material, that the abrasive material after being discharged into the box will automatically return to a central point, from which it may be readily redrawn for further use, that the supply of abrasive material may be readily renewed from time to time without interfering with the operation of the apparatus, and that the depth of abrasive material and water within the device may be automatically prevented from exceeding a fixed limit.

These and such other objects as may hereinafter appear are attained by the devices illustrated in the accompanying drawings, in which—

Figure 1 shows a longitudinal elevation of my device. Fig. 2 is a plan view thereof. Fig. 3 is a longitudinal section on the line 3 3 of Fig. 2. Fig. 4 is a horizontal section on the line 4 4 of Fig. 3 looking in the direction indicated by the arrows. Fig. 5 is a cross-section on the line 5 5 of Fig. 4 looking in the direction indicated by the arrows. Fig. 6 is a detail of the injector. Fig. 7 is a detail showing the coupling between the supply and air pipes, and Fig. 8 is a detail in perspective of the injector end of the box.

Like letters of reference indicate the same parts in the several figures of the drawings.

Referring by letter to the accompanying drawings, A is a table or other suitable support, within an opening in which rests the box B, formed, preferably, of metal, the lower portion of which is formed in the shape of a hopper carrying the upper portion of any suitable form, one end of which is provided with a funnel-shaped portion C, having square walls D, leading to the discharge-pipe E. The opposite end of the upper portion is provided with a removable door F, containing a file-opening G, over the hopper portion of which opening depends a shield *g*. An opening *c* in one end of the hopper-shaped portion C communicates with a channel H, attached to the outer surface of one side of the hopper-shaped portion and extending above the desired water-level.

I is a steam-pipe connecting with any suitable source of steam-supply and leading to an injector J, the nozzle of which is located to discharge through the opening G below the shield *g* into the interior of the box B and against wooden impact plates or boards X, located in the interior of the box B. The suction-chamber of the injector J is in free communication with the supply-pipe K, which extends downwardly within the channel H through the opening *c* into the bottom of the hopper C, at which point it connects with one end of a yoke L, the other end of which yoke is connected with an air-pipe M, which extends upwardly from said yoke through the opening *c'* within the channel H and opens at its upper end into the atmosphere. The yoke L is provided with an inlet-opening *e*, which is in free communication with the bottom of the hopper C.

P is a feed-channel extending above the support A and communicating with the interior of the box B.

N is an overflow-pipe leading from the interior of the box B.

The operation of my device is as follows: A suitable amount of abrasive material mixed

with water having been put into the interior of the box B and steam being turned on in the pipe I the jet of steam discharged through the injector J, operating on the well-known principle of the injector, tends to create a vacuum within the vacuum or suction chamber of the injector, and so within the supply-pipe K, in communication therewith. This in turn tends to draw the abrasive mixture through the opening *e* in the yoke L and upwardly through the supply-pipe K into the injector, from which it is discharged with great abrasive force into the interior of the box B and against the surface of a file (indicated in dotted lines in Fig. 3) held between the shield *g* and the nozzle of the injector.

Obviously any material having sufficient hardness to abrade steel effectively possesses a high specific gravity, and so the tendency is for the abrasive material to settle to the bottom of the box and to the bottom of the water in the box, whereas for the effective operation of the apparatus it is highly desirable that the abrasive material shall be held in suspension as thoroughly as possible, thus insuring a free flow of the abrasive material into the pipe K and out through the nozzle of the injector. One of the principal difficulties met with in the practical operation of devices of this sort arises from this settling of the abrasive material and consequent clogging of the pipes and stopping of the operation of the apparatus. Various means have been devised for overcoming this difficulty, most of which have sought to bring this about by insuring a rapid return of the abrasive material to the supply-pipe K after the discharge of the material through the nozzle, and thus by keeping up a rapid circulation to prevent the settling of the abrasive compound.

By the arrangement shown in the drawings, I have succeeded in making an apparatus which cannot be clogged by the settling of the material and which may be started without preliminary agitation, even after the material has settled quite solidly in the bottom of the box, as is always the case when the machine is started in the morning after having been out of use during the night. It has been found in practical operation that as the steam-jet is discharged from the injector J the partial vacuum created thereby tends not only to draw abrasive material through the inlet *e* of the yoke L, and so into the pipe K, but also freely draws air downward through the pipe M, thence through the yoke L, and upward into the pipe K, and so on. This not only prevents the settling of the material in the box from clogging the pipe K, and thus interfering with the operation of the injector and of the whole apparatus, but if the material has become settled, so as to not flow freely, the current of air drawn into the pipe M through the yoke L and up into the pipe K tends to draw and carry with it abrasive material through the inlet *e* in the yoke L, and the active circulation of air through the pipe M, the yoke L, and the pipe K will always quickly result in starting a circulation of the abrasive material through the yoke L, the pipe K, the injector, and back into the box. In fact, while I prefer with my device to use abrasive material mixed with water or other suitable liquid it is adapted for use with dry abrasive materials, if so desired. Owing to the hopper shape of the bottom of my box the abrasive material as it is discharged through the injector into the box is promptly returned to a point immediately adjacent to the inlet-opening *e* in the yoke L. As the abrasive force of the jet of abrasive compound and steam is very great, the impact-block X is very rapidly worn away thereby. I therefore provide a portion of the inner surface of the box B with comparatively thin permanent blocks *x*, upon which the large impact-block, preferably a block of wood from two to three inches thick, is loosely laid, the shape of the box and the inclination at which the box is laid serving to hold the block in place and yet allowing it to be readily and quickly removed and replaced by a new block.

While the attached drawings show my invention embodied in its preferred form, my broad invention of using the supply-pipe, together with an air-inlet pipe substantially as shown, is capable of being embodied in many different forms of apparatus of this nature, and, of course, is not limited to a device in which the supply of material is drawn by the supply-pipe from the interior of the same box into which the material is discharged, and said pipes may be entirely within or entirely outside of the box, and various like modifications and adaptations of my invention may be made without departing from the spirit thereof.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a device of the class described, the combination with an injector, of a supply-pipe connected with the suction-chamber thereof and also connected both with a source of supply and with an air-inlet pipe, substantially as described.

2. In a device of the class described, the combination with an injector, of a supply-pipe connected with the injector and leading to a source of supply, and an air-inlet pipe leading to a point adjacent to the supply-opening in said supply-pipe, substantially as described.

3. In a device of the class described, the combination with a casing having a hopper-shaped portion, of an injector arranged to discharge into said casing, a portable impact-plate arranged within said casing and opposite to the point of discharge from said injector, substantially as described.

4. In a device of the class described, the combination with a casing having a hopper-shaped portion, of an injector arranged to discharge into said casing, a hood arranged within said casing and adjacent to the discharge-nozzle of said injector, and a portable impact-board arranged within said casing opposite to the point of discharge from said injector, substantially as described.

ANTHONY H. RADELL.

Witnesses:
F. H. DRURY,
E. Y. GRIDLEY.