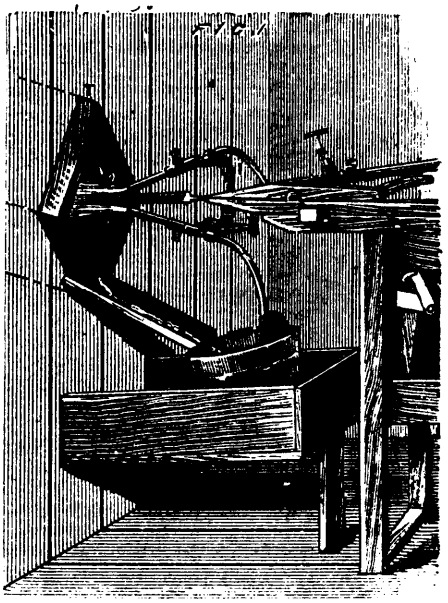
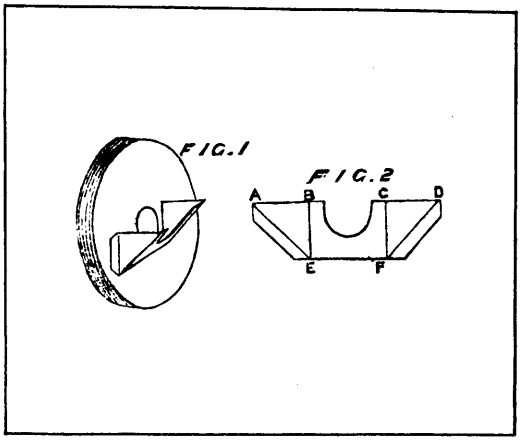


SHARPENING FILES BY THE SAND-BLAST.

A method of utilising the sand-blast for the sharpening of files has been recently devised, and promises to become of no little value in engineering workshops. The patentee in the United States is, we believe, Mr. M. A. Richardson, of Bridgeport, Conn., but the invention is understood to be that of Mr. Tilglumann, the original introducer of the sand-blast. Various methods of re-sharpening new files have been tried, including pickling in acid, but the only satisfactory method is to have them re-cut, and from an economical point of view it is doubtful whether any advantage is obtained by those who send files to be re-cut, over those who either sell or utilise them for other purposes when worn out. In Fig. 1 the general arrangement of the sand-blast re-sharpening process is shown, the bench or table or carriage on which the file is secured, and which supports the gear for moving the file to and fro, and at the same time imparting a side to side motion, being omitted. S is the steam-pipe connected to the branch supplying the injectors, which draw up the sand from the pail and force it against the file held in a clamp, as shown. The steam, sand, and water are received in the tube, T, shown passing through the partition or wall, whence they fall down to the pail or other receptacle. The sand is fine, and is specially prepared for the purpose by washing. It is mixed with sufficient water to form a very thin mud, and after a time must, of course, be entirely renewed. Before describing the results of experiments made with the process, it will be advisable to examine a file as a cutting instrument. No process has yet been devised for cutting the teeth of files theoretically perfect, the tools employed for the purpose invariably producing a burr or backward curve in the teeth, which speedily wears or breaks off in the rough work to which a file is put. Figs. 2 and 3 show the form of teeth actually found in files, and that which is theoretically perfect. In Fig. 2, which is slightly exaggerated, the cutting faces of the teeth, instead of looking straight to the point of the file, appear to be studying the ceiling, as if afraid of looking at the piece of iron they are called upon to scratch. In Fig. 3, on the contrary, the teeth face the work, and are evidently strong-backed. It will be readily understood the teeth of Fig. 2 are more liable to break than those of Fig. 3, but it is not so obvious why the impinging of a jet of sand upon the teeth should improve even a new file. It might be supposed at first sight that the sand would abrade the teeth equally all over, and so leave the file in much the same condition as before; but those who have worked the sand-blast, and know what a very slight covering serves to protect glass from its influence, will readily understand that the angles at which the particles of sand strike the file and the elasticity or resistance of the latter are important conditions in the satisfactory working of the process. The jet of steam and sand is directed against the backs of the teeth at an angle of from 10° to 15° from the face of the file, and the effect is represented with but little exaggeration in Fig. 3, the tops of the teeth being cut away, leaving a sharp firmly-supported edge. The wear of these might be represented by drawing a straight line just below the points or edges of the teeth, and it will then be easily discerned that the effect of a second application of the sand-blast will be to remove the metal from the backs of the teeth until the flat places have given place to a sharp edge. Many workshops in New England, especially in Connecticut, have adopted it, and at least one large manufactory has obtained a license to apply it in the finishing of their files. In a trial of the cutting power of the sharpened files as compared with the ordinary tool, one side of a 10in. bastard was used to file a piece of clean weighed wrought iron, care being taken to make the strokes equal in every respect. The number of strokes and the weight of metal removed were then noted, and the other side of the file, which had meantime been submitted to the sand-blast, was employed to make an equal number of similar strokes. The result was that double the weight of metal was removed by the sand-blasted side. In further experiments, after several re-sharpenings, the one side of the file demonstrated its superiority by cutting as much metal as six sides of files to which the blast was not applied, cutting at the same time about half as fast again. A few seconds suffice to re-sharpen a newly-worn file; but as the file is successively worn down and re-sharpened, the duration of the sharpening process increases, until the blast fails to be effective. The file can then be re-cut in the usual manner. The new process has already attracted some attention, and we shall, no doubt, soon hear of its adoption in this country, with details of further experiments.—*English Mechanic.*



AN EASILY-CONSTRUCTED CAMERA LUCIDA.

For the benefit of those with whom, as with myself, expense is a consideration, I send the following description of an easily-constructed camera lucida, which I made in about ten minutes. I first procured a pill-box lid which just fitted on to the eye-piece of my microscope, and in the centre of it made a circular aperture about the size of the top lens of the eyepiece. I then cut a piece of card to the shape of Fig. 2, in which the angles A E B and C F D are both 45°, just nicked with a penknife along the lines A E, B E C F, and D F, and with a little gum affixed to the lid, as in Fig. 1. A piece of thin covering glass attached to B E C F, and therefore inclined at an angle of 45°, completed the apparatus, which answered remarkably well. G. G.—*English Mechanic.*

THE latest novelty in Paris is reported to be the handkerchief barometer. A design, usually a man with an umbrella, is printed on the handkerchief with chloride of cobalt. The figure in fine weather appears blue; in changeable, gray; and in rainy weather, white. The first washing removes the salt. The idea is the same as that of the flower barometers lately described.

NOTWITHSTANDING the prodigious rapidity with which sensation is transmitted by the nerves to the brain, if a man's arm were long enough for him to touch the sun, it would require more than three years before he would be made aware that his fingers were hot.