SCIENTIFIC AMERICAN

SUPPLEMENT

Scientific American Supplement, Vol. I., No. 11.
Scientific American, established 1845.
New Series, Vol. XXXIV., No. 11.

NEW-YORK, MARCH 11, 1876.

Scientific American Supplement, \$5 a year.
Scientific American and Supplement, \$7 a year.
Postage free to Subscribers.

FILE-HOLDING APPLIANCES.

By JOSHUA ROSE.

It requires a great deal of practical experience to enable an artisan to use a file so as to file work level and not rounding, and any appliance that will enable the inexperienced to accomplish that object is a valuable adjunct. In Fig. 1 we present such an appliance. A is a handle, to the underneath side of which the file is screwed, and in the ends of which are the four screws BB. Attached to the handle A, on its underneath face, are the springs CC. The work, which is represented in our illustration as being the string of nuts D, is held in the piece of wood E, which latter may have cut in it a recess slot or groove of such shape as may be required to receive the particular pieces of work to be operated upon, and is then fastened to the vice-bench by nails or screws. The operation is to move the handle back and forth in the usual manner, relaxing the pressure during the back stroke so that the springs CC may, during that stroke, lift the file off the work and prevent any undue abrasion of the file-teeth. The amount of metal the file will cut off is determined by the distance the ends of the screws BB project through the handle, since it is obvious that so soon as they contact with the surface of the springs CC, the file can not descend any lower, and hence can perform no more duty. The whole appliance is easy to make, easy of application, and for many special kinds of work exceedingly useful, since, in addition to insuring that the work be filed straight, it renders the filing of the work too small impossible after the screws BB are once properly adjusted.

In Fig. 2 we have a file-handle for use in narrow spaces, such as the steam-chests of inside cylinder locomotives. A represents a wooden handle, square at one end to receive a file, and round at the other to be grasped in the hands. The file is fastened by countersink head-screws to the underneath face of the handle, while upon the back of the latter is the strip of steel B which rests at each end upon the spiral springs DD, and which is retained in its position by the screws E, passing an easy fit through it, and screwed into the handle. F is a roller or revolving tube passing over a stem provided with a cube at each end, and being adjustable by a screw, as shown at G, at the other end—this roller F being used as a support or fulcrum on which the strip of steel B slides when the file is in use. The only objection to this form of file-holder is that it places as much pressure on the file during the backward as during the forward stroke, and hence soon wears the file-teeth dull. It has, however, the advantage that one man can use it, and is, therefore, in the end as economical as any other form of the same kind of appliance. It is obvious that either end of the file can be made to cut the most by using the handle with that object in view.

In Fig. 3 we have an appliance also used for the same purposes, and where it is an object to take off as small an amount of metal as possible, this form of handle is decidedly advantageous. A is a wood handle, having the file screwed on one side, and a roller-path B screwed on the opposite side or face. D is a wooden lever with a roller attached to the extreme end. In our illustration this apparatus is shown in operation upon the valve-seat of an inside cylinder locomotive, the edge of the steam-chest serving as a fulcrum for the lever D. In the absence of such an existing fulcrum, one must, of course, be provided. The pressure on the file and the exact spot on the work to be filed can be very finely and exactly determined by using this appliance, and, furthermore, the rapidity with which it can be changed from one spot to another of the work renders it exceedingly useful for the finishing part of the file-surfacing.

INSTRUMENT FOR MEASURING DISTANCES AND HEIGHTS OF MOUNTAINS.

By EDWARD C. PICKERING, Professor of Physics in the Massachusetts Institute of Technology.

It is designed for measuring the distances and heights of mountains. It consists of a common telescope, with a level attached, a scale of equal parts in the eyepiece, and with a mirror of plate-glass fastened to the object, so that it can be set at any angle. Two images are seen, one through the glass, and the other by reflection from its surface, and any two objects may be made apparently to coincide by turning the mirror through the proper angle. Selecting as our object the mountain whose distance is to be measured, and as the other any convenient, well-defined point, the telescope is moved through a known distance, and the apparent change of position of the two images is measured by the scale. From this the distance may be determined with all the accuracy needed for an ordinary map. It is, in fact, equivalent to the *stadia*, with the advantage that an assistant need not be sent up the mountain to be measured, and with the same accuracy that would be attained if he could carry a pole a hundred or a thousand feet long. The altitude is then determined by levelling the telescope and reading the apparent elevation

from the graduated scale which is now turned round. By a second inclined level, higher mountains may be measured. It will probably equal in accuracy a large theodolite, with the advantage that it does not involve a finely graduated circle or delicate mounting. It is therefore inexpensive, light and easily used. It could be carried by any traveller, and would give the height of a mountain much more accurately than a barometer. Further, a whole range of mountains might be measured in a few hours by this instrument, while with the barometer a single ascent often occupies several days.

Fig. 1

Fig. 2

Fig. 3

[Iron.]

RATCHET-BRACE SUPPORT.

WHAT fitter of ironwork has not been puzzled how to apply his ratchet for drilling a hole? If it is not always a matter of perplexity, it, at any rate, very frequently involves great waste of time and is exceedingly troublesome; if the brace can not be strutted or held by men, a hole has not seldom to be cut with a chisel in order to bolt on the pillar. The apparatus which we illustrate, the invention of Mr. H. J. H. King, will overcome that difficulty, and in such cases be found highly useful, since the support can be attached to any regu-

RATCHET-BRACE SUPPORT.

lar surface by the simple pressure of the atmosphere, a vacuum being produced by means of an air-pump.

The illustration, Fig. 1, shows a pillar (1) cast in one piece, with the disc (2) also shown in the plan, Fig. 2, in a groove, on the outer edge of which is fitted an india rubber ring (3), which will make an air-tight joint with any tolerably even surface (5) intended to be drilled. A small air-pump (4) is fitted inside the top of the column (1), and by means of this the air is exhausted from the interior of the pillar, the tap (6) having been shut off previously, but quickly opened again after a dozen strokes or so have been made with the pump, and thus the space under the disc is in communication with

the interior of the column itself, and the vacuum will be equalized.

If the latter is 10 lb. to the inch, the disc will be pressed against the surface with a total pressure or holding-down weight, equal to the area of the disc, multiplied by the vacuum, or in the case of a 12-inch disc—the usual size—1130 lb., or over half a ton. This weight would be ample to support an ordinary ratchet, if it could be applied directly over it. As, however, it has to be put sideways of the disc (2), an additional support (9) becomes necessary to counteract the leverage thus created on the bar (7), or else the disc would be lifted on the side on which the ratchet were applied. Provision is made, by a screw-joint, to place the supporting-rod (9) anywhere on the bar (7), as well as for adjustment in height; but, of course, as regards position, it is always best at the end of the bar as shown.

A modification as to how this arrangement can be applied is shown in dotted lines—namely, with an extra vacuum disc (10). This arrangement is preferable, being more convenient and universally applicable. If this plan is adopted, a ring about 7½ inch diameter in the groove (11) on the disc (2) is used, and the vacuum produced under (10) by an india-rubber communication as illustrated, the ratchet being then always best situated in the centre of the two supports. Instead of the separate air-pump, the apparatus could be connected with that of a steam-engine, and appears to us a means of support, which might be made generally useful.

COMPETITION OF DRY-PLATE PROCESSES.

THE French Photographic Society has issued the following regulations in respect to this competition:

A prize of five hundred francs will be awarded to the author of the best process of obtaining clichés by means of dry films.

The desideratum will be a preparation capable of keeping good as long as possible, and which, poured upon a glass or less weighty and fragile support, will permit of obtaining, by simply drying, and without washing, a film as sensitive and perfect as that of wet collodion.

In case the conditions may not be perfectly fulfilled, the prize will be given, either in one sum or in parts, to those who approach nearest to the object desired.

The competition is international; the only exclusions made will be the members of the jury, the president, vice-presidents, and council of the French Photographic Society.

The jury charged with the award of the prize will be chosen by the French Photographic Society at their November or December meetings, 1876, and any intending competitors may withdraw if elected.

The competition will commence at the date of the election of the jury, and close on the 1st of January, 1877. All communications must be forwarded before this date to the Secretary of the Society, 20 Rue Louis-le-Grand, Paris.

All contributions must be composed of at least six prepared plates, not less than eighteen by twenty-four centimetres, together with 250 cubic centimetres of the product which has served for their preparation. Further written directions must be sent respecting the mode of operating and preparation; the whole in a sealed packet, bearing the name and address of the candidate.

The opening of all packets, boxes, etc., will be made in the presence of the candidates or their agents, or after a fortnight's notice has been given by a letter sent by the Secretary of the Society.

The candidates must themselves operate in the presence of the jury under certain fixed and similar conditions previously determined, or if it is impossible for them to be present, they must communicate in respect to any experiments that the jury may desire to have carried out.

The jury will have the right of demanding supplementary materials or information, but the candidate has no right to insist upon any further tests they may desire made.

The work of the jury shall not commence before two months have elapsed after the closing of the competition, and the report shall be made in the month following that in which the last experiment was made.

The nature of the process chosen, and the explanation of the jury, shall be published at the same time that the decision of the jury is made known.

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