The Returns

THE response to the referendum made the week before last has been very gratifying. The Editor wished to know whether Handy Man's Workshop should occupy two valuable pages of the SCIENTIFIC AMERICAN every two weeks, or whether he should return to the old schedule of running the Department but once a month, and he put the following questions: Does Handy Man's Workshop interest you? Do you find it of real practical value? Do you wish it were conducted differently? So far, Handy Man's Workshop has received a hearty indorsement, and not a single voice has been raised against it; but the returns are not yet all in, and the polls will not be closed until a much larger number of readers has been heard from. Do not fail to record your vote. The Editor will not be satisfied with anything but an overwhelming majority. Address Handy Man, SCIENTIFIC AMERICAN, New York.

A Home-made Valve Grinder

By F. E. Keller

A SIMPLE valve grinder is easily made from an old bit shank and a piece of metal about $\frac{1}{8}$ -inch thick. The shank should be sawed down through the center, the ends bent apart, and a hole drilled through the two parts, as shown in the drawing. The head or cross-piece can

A home-made valve grinder.

be made of suitable size to fit the valve, with the hole drilled so that the joint will come as close to the valve as possible. Rivet the two parts together as indicated and you will have a handy tool to use in a brace. The valve receives the pressure in its true center, so that a very smooth cut is obtained.

Squaring the Bottom of a Drilled Hole

DRILLS are usually pointed and leave a conical depression at the bottom of the hole. To be sure, the point of the drill may be ground down, but this takes time and shortens the life of the tool considerably. If you have not a reamer of the proper size, the quickest

Hastily-constructed reamer.

and easiest plan is to take a round piece of machine steel that will just fit the hole that you have drilled, say three-eighths of an inch in diameter. Square off one end and with a thin hack saw make a saw cut in it, as in Fig. 1, to a depth of three-eighths of an inch. Then take a piece of ordinary clock spring and drive into the saw cut tightly. The clock spring should project from the end of the round steel about one-sixteenth of an inch, as in Fig. 2, when ground off. The sides might be left one-hundredth of an inch larger on the two sides to form cut-

ting edges, if you desire to make the hole smooth along its walls. The clock spring steel will work in sizes up to three-quarters of an inch. A larger diameter would require thicker metal. A small nick can be filed along the sides of the reamer just in front of the cutting edges for clearance of chips. Fig. 3 shows the conical part of a drilled hole squared off at the bottom with the squaring-off tool in place.

Shortening Machine Screws

ON some work the workman is required to shorten quite a number of round-headed machine screws, but not enough to bring the hack saw into play. The file is the only tool. The round-headed screw does not hold well in the vise, as it easily tilts, thus bruising and marring the appearance of the head.

Take a piece of hard wood, making the right thickness for the length of the machine screw that you wish to file down. Drill a hole for receiving it, also saw a slit along the center of the piece of wood, as illustrated herewith. The machine screw is placed in the hole that is drilled in the wood. The wood is held in the vise, which pinches the screw tightly and secures it firmly, so that it may be filed.

The screws can all be filed to the same length without scratching the heads.

Shortening machine screws.

Aerating Apparatus for a Fish Tank

By John Y. Dunlop

A VERY simple device for driving air bubbles into a fish tank can be made as shown in the accompanying drawing. Place immediately above the fish tank a small

reservoir. Procure a siphon tube $\frac{3}{16}$ inch in diameter and a short tube of about $\frac{5}{8}$ inch in diameter, the latter is to serve as an air chamber. In the side of the chamber file a hole; fit each end of it with a cork. Through the upper cork pass a short length of glass tube, and connect this with the end of the siphon tube by a bit of rubber tubing. On this rubber tubing mount a regulator, which will govern the amount of water flowing through the siphon tube. The regulator may be made of two small pieces of wood arranged to be clamped together by means of a pair of screws, so as to squeeze the rubber tube, and thus reduce the flow of water through it. Through the lower cork of the air chamber run a glass tube, as indicated in the drawing, leading to the center of the fish tank. The upper end of this tube should be slightly flared, to form a funnel-shaped mouth directly under the upper tube. In operation, the regulator should be adjusted to cause the water to

Aerating apparatus for a fish tank.

drip slowly from the siphon. The dropping water will fall into the mouth of the lower tube, and the air between each drop of water will be imprisoned within the tube. The alternate drops of water and air spaces will then travel through the tube to the fish tank, spreading through the water of the fish tank and thoroughly aerating it.

Shop Notes

One Cause of Difficult Welding.—Has any mechanic ever tried to weld a stay-rod or some ordinary easy job, and found that the pieces simply flattened out without going together, just as though a thin film prevented the union? If so, he should have gone on a still hunt for some brother mechanic about the shop, and he would have probably found that this fellow had been heating his soldering copper at the forge. Such work puts a quietus on welding every time, until the coals are renewed from bottom to top. The trouble is easily remedied if the cause is known, otherwise it results in an exasperating loss of time.

Soldering a Radiator.—The removal of an automobile radiator to permit of soldering may be obviated by the

following method, provided the leaks are not too numerous. The parts to be soldered will afford no difficulty to being well tinned with a hot iron, but solder in quantity sufficient to close a leak drops off or flows away. After tinning with the hot iron, allow the soldering iron to cool until it will just melt the solder, and then the solder can be "smeared" over the leak without dropping off. Small holes are easily "wiped" over in this way, or a piece of cardboard held close under the leak will retain enough solder to close the leak successfully.

Removing Stud-bolts Without an Alligator

By R. C. D.

STUD-BOLTS are often hard to remove, and when using an alligator wrench one is apt to cut them up pretty badly. Two methods of removing them, without injuring them in any way, are shown in the accompanying illustration. The first method, that of using a jam nut, may not be new to all, but the second method I have only seen used but once. It consists of a hexagon nut, the threads of which have been bored out, leaving a hole just

Two methods of fixing stud-bolts for easy removal.

large enough for the bolt, which is to be removed, to pass through it easily. A tapered slot or key-way is then cut in one side of the nut, as shown, and a wedge-shaped key of hard steel is made to fit snugly into it. This nut is then placed over the plain part of the stud-bolt, the key is driven home and grips the bolt firmly, thus when the wrench is applied it cannot slip and the bolt can be removed with but little or no disfiguration.

Handy Pipe-puller

By H. T. Peterson

IT often happens when driving a well that the pipe breaks, making it necessary to drive a new hole and to dig down for the point, as this part of the well-driving mechanism is expensive and worth recovering. Not long ago, in an emergency of this kind, it occurred to the writer to devise a simple pipe-puller. The device was constructed as shown in the accompanying engraving. A piece of $1\frac{1}{2}$ -inch pipe, 10 or 12 inches long, was procured, and four slots were cut in it for about half its length. Then a piece of round iron was secured, and formed into a wedge that would spread out the slit end of the pipe. This was made fast to a rod of sufficient length to run up to the top of the pipe which was to be pulled. The upper end of the rod was threaded to receive a handle, and by turning this handle on the rod, the wedge was drawn up, spreading the split pipe so that it jammed against the lower end of the pipe that was being driven, and thereafter the pipe was drawn up.

Home-made pipe-puller.

Suggestion for Foundry Ladles

By M. W. G.

EVERYONE who has watched the work in a foundry must have noticed the strain on the muscles of the men while trying to bring the ladle with its heavy contents to a sufficiently horizontal position to make the molten metal run out of the spout. If the spout were disposed at an angle of 120 degrees, the handle, as in the accompanying drawing, instead of lying at an angle of

Suggestion for foundry ladles.

90 degrees, as it generally does, the ladle could be discharged without any effort. Any one can verify this statement by filling a common saucepan to the brim with water, and then, while holding it by the handle in one hand, trying to pour the water out by the spout. It will be found far easier to let the water flow over the rim at about 120 degrees from the handle.