FINE HAMMERED IRON WORK.

The ability to wield a hammer well, whether it be only to shape a horseshoe or effect a difficult forging, comes only by long practice. That a full blown rose, perfect in its form and detail, may be forged with an ordinary blacksmith's outfit, seems impossible. Yet the engraving on our first page represents a rose forged from a round piece of iron, without rivets or screws, and we will try and make it clear to the skilled workman how he may do similar work.

A piece of iron, 1¼ inches in diameter, of the toughest class of Swedish iron, is first drawn down on one end to form a spindle about 6 inches long and ½ inch in diameter. This is cut off from the bar, leaving a head about 3 inches long (Fig. 1). After heating the head to a low cherry red, "work" the metal by upsetting (Figs. 2 and 3), hammering out, and repeating, thus working the metal, by much kneading, into a thoroughly tough, homogeneous mass—that it will at a later period of the work endure bending and rebending when needed—finishing finally into the shape shown in Fig. 4, the head being left ½ inch thick. The next step is shown in Fig. 5, starting the dividing of the head into two layers, the metal being hot, and continuing the cut as true as possible until the two layers are held together by a thickness of metal corresponding to the diameter of the shank, ½ inch, as shown in Fig. 6. Reheat and rub a piece of lead in the cut (Fig. 7), touching every part of the cut; of course the lead will melt and run off, but its application will have the effect of keeping the two layers separable when hammered together (Figs. 8 and 9). Carefully heat and flatten these two layers with a heading tool upon the anvil until brought to about 3 16 of an inch thick, and finish by thinning the edges to about 1-16 inch thick. When cool mark with compasses a circle that will trim off the irregular edges to about ⅛ inch less than the material will cut (Fig. 10).

The first layer is trimmed to a smaller diameter than the second layer. In separating the two layers with a sharp chisel (Fig. 11) it will be found that, owing to the use of the lead, they will readily come apart. Now trim the outer layer round with a cold chisel, and mark into six equal divisions with a slate pencil (Fig. 12), cutting accordingly in a vise to the separating hub, making six leaves (Fig. 13). Trim the edges of these leaves, the metal being cold, rounding with a cold chisel (Fig. 14), and hammer the edges out quite thin to an irregular round, avoiding any formal curve in the edge of the leaves. With a round-headed hammer and a swage block, the metal still being cold, round out the leaves, and dish them (Fig. 15), and then, with a pair of pincers, bend them up out of the way of the second layer (Fig. 16). The second layer is divided into five leaves (Fig. 17). With the metal cold, the edges are rounded and made thin, and then dished with the round-headed hammer shown in Fig. 18, being bent up with pliers (Fig. 19). After heating, the shank is drawn down in irregular diameter for the stem of the rose, leaving sufficient metal at the outer end for break, and, near the rose (Fig. 20), for cutting the bud burrs with a chisel (Fig. 21) from the stock, holding the piece in a vise to do this work. Then with a half round file finish the bottom of the rose and round both it and the bud burrs as shown in Fig. 21.

The other end of the stem should now be forged with a bulb ending in a flattened wedge piece (Fig. 22). With a cold chisel divide the wedge piece into two parts (Fig. 23), which are to represent the wood as torn from the stem, and with a round-ended punch indent the bulb as shown in Fig. 24, forming the natural cavity that occurs in pulling a rose from the stem.

The leaves may be forged and cut into shape with cold chisel and marked with the same, but it is better to make a die in approximate leaf form and impress into a steel swage block, giving the further character of the leaf by indenting the leaf ribs, as shown in Fig. 25. Having such a swage block, it will be necessary only to forge a bulb on the end of a half inch iron, and flatten it out or drop forge it in the swage and forge down for the stem (Fig. 27), serrating the edges with a file (Fig. 28), giving them a dishing, twisted, natural contour. Weld two of them together (Fig. 29), and weld the end to the stem (Fig. 30). As many leaves may be welded (using only a small fire to accomplish this delicate operation) to the stem as will appear natural and graceful. In Fig. 31 are shown the rough bark producing tool, a serrated-headed hammer and block. By placing the stems in the block and striking with the hammer, turning the work in all directions, a good imitation of bark is the result. An iron scratch brush (Fig. 32) removes scale and gives a softening effect. Now that the rose is all together in one piece, with pliers bend the rose leaves out, making the six inner leaves to conform to the headed loop of a rose and surround with the outer layer of five leaves, bending the stem into natural curvatures, and twisting the bud burrs into a natural downward curve, and with the torn ends twisted.

The rose from which our engraving was made is the handwork of Henry Sticht, a pupil of Armbrusters Brothers, Frankfort-on-the-Main, now in the employ of Winslow Brothers Company, art metal workers, Chicago, Ill. It was by this firm that the large hammered iron gateway was constructed that formed so striking an American exhibit at the Chicago World's Fair, and which has found so fitting a home at the entrance to the grounds of General Jos. T. Torrence, on the Lake Shore drive, in Chicago. The illustration which we present of this gateway will convey but partial idea of its beauty and richness of detail, as a good example of fine hammered iron work. For protection from exposure to the elements, all such work should be subjected to the Bower-Barff process after completion, this giving a good protective and lasting enamel to the surface.

A HAMMERED IRON GATEWAY ON THE LAKE SHORE DRIVE, CHICAGO.

The Horseless Vehicle Contest.

Electricians are studying with a good deal of interest and doubt their chances in the horseless vehicle contest that the Chicago Times-Herald has organized, to take place next November between Chicago and Milwaukee, a distance of about eighty-five miles, with two relay stations, one at Kenosha, Wis., and one at Waukegan, Ill., where renewal of power is permitted. Already, says the Evening Post, over seventy-five entries have been made for this race, but it is said that the electrical competitors are comparatively few. The main reason for the lack of prominence of electricity is that the batteries hitherto in use and on the market have been altogether too heavy and have had too limited a storage capacity. Hence, with the increase in strength of the frame to bear the burden has come a further drain on the insufficient power, and nobody seems able to reconcile these qualities. Yet another reason for the absence of electrical carriages is the rareness of charging stations, although the condition in this respect is steadily improving all the time. It is believed by electricians that not many years will pass before trolley systems penetrating into rural districts will allow their circuits to be tapped for lines to run over roads in such a way that any cart can hitch on by its trolley pole and get all the current it needs.

Our Insect Friends and Foes.

According to Professor Panton, of the Ontario Agricultural College, there are nearly 100 species of insects that prey on grain and forage crops; upward of 40 attack vegetables; no less than 50 menace the grape; and 5 threaten the apple. The pine has 125 species as enemies; the oak, 300; the elm, 80; the hickory, 170; the maple, 75; the beech, 150; while the unfortunate willow battles against some 400 species of insect foes. Some idea of the immense loss that is sustained by the human race from insect pests may be imagined from the fact that in 1884, in the United States alone, the amount is estimated to have been $400,000,000, but in 1891 it was $300,000,000, and, thanks to the investigations of German scientists, it is believed to be annually decreasing. It is not to be supposed, however, that the fullest knowledge available to man will suffice absolutely to prevent these losses; but these figures are so enormous that the reduction of them within smaller dimensions becomes a matter of very great importance. All insects are not our foes; and just what birds are most fond of beneficial insects it would be interesting to be informed. But we are somewhat in the dark about this even yet. Professor Panton gives a list of a few insects which are our friends:

Syrphus fly, trachina fly, tiger beetles, ground beetles, ladybirds, reduvius, soldier bugs, lace-winged flies, wasps, cuckoo flies, and ichneumons.

These insects are said to be of great importance in keeping the mischievous species under, the ichneumons being especially good at this business. They prey on certain grubs by depositing eggs on their living bodies. When these eggs hatch, the young worms feed upon their host till the latter can stand the strain no longer and forthwith dies. About this time the ichneumons are ready to fly as perfect insects. It is no uncommon thing to find upon a tomato or tobacco plant one of the large green worms which infest these plants, with a dozen or so small whitish thorns sticking into its hide. These are the ichneumon eggs which eventually kill the worm. Ladybirds feed upon plant lice; ground beetles are said to prey upon the potato beetle and various kinds of caterpillars; while the tiger beetle will eat almost anything in the insect line. —Public Opinion.

Cycle Notes.

At the shops of the Pittsburg, Cincinnati, Chicago and St. Louis, in Columbus, O., there are about 150 employes who come to their work on bicycles, and of course this number of machines standing around in the way all day became quite a nuisance. The master mechanic has therefore built two "stables," one to hold 25 machines and the other to hold 60. These stables consist simply of light posts, with rafters along and against a tight board fence or building, and covered with some cheap form of roof. There is a tie from each post to the fence which forms the partition between the stalls and also serves as a support for the wheels. The stalls are about 2 feet wide and 6 feet deep. Each stable is in charge of some office boy or other employe, who gives out checks to the owners of the machines, each stall being numbered.

A STATUE of Siemens and his friend Helmholtz, after the model of that of the brothers Humboldt in front of the Berlin University, is to be set up in Charlottenburg before the Technical High School.

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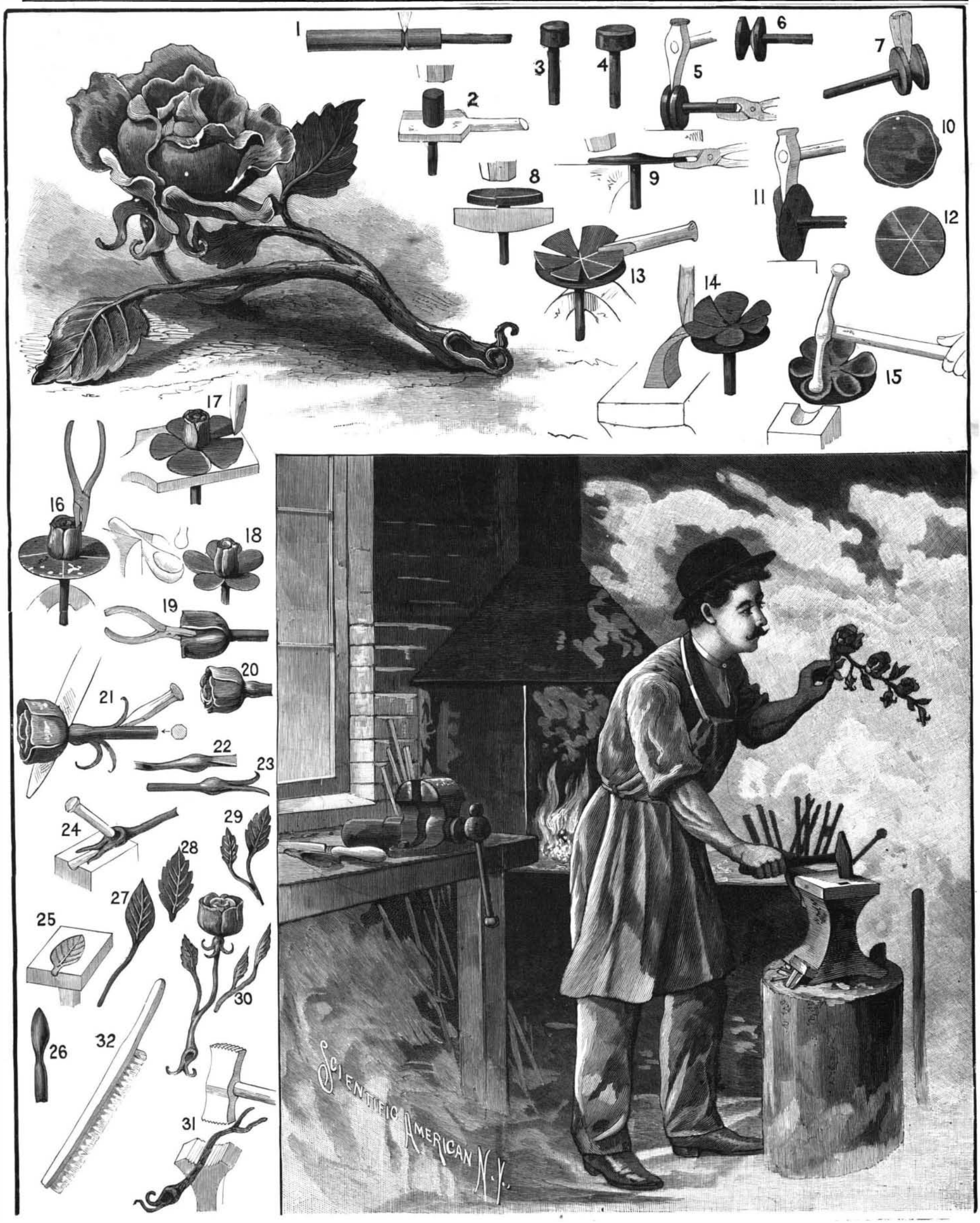

FINE HAMMERED IRON WORK—HOW TO FORGE A ROSE.—[See page 188.]