

## CHAPTER III

### SOLDERS, SOLDERING, FLUXES, ETC.

#### Care of Soldering Fluid

I have for thirty years tried many fluids and have come to the conclusion that raw muriatic acid is the only thing for soldering galvanized iron. The following are a few hints on how to use it:

Don't keep too much in the cup or vessel. Make it, say,  $\frac{3}{8}$ " deep or less. Don't make swab of copper; use bright tin and cowtail for swabs. Don't wipe off the soldering iron on the overalls or hands; dip it in salammoniac water. Keep the acid clean; throw it away if it is dirty. Use a damp piece of cotton waste and wipe off acid as soon as solder is set. In short, keep *everything* clean. By these means there will be no mess with muriatic acid.

J. K

#### Soldering Flux for Old Metal

Dissolve 1 lb. of zinc clippings in muriatic acid and add 24 oz. of salammoniac to the solution. Allow this to evaporate and crystallize. This will give over 2 lbs. of salt flux. By using this flux it

has the advantage that the metal to be soldered needs no previous cleaning or scraping, as its strength is sufficient when moistened and brushed on the metal to clean the metal. The solder will readily flow wherever the flux has been applied.

W. H.

### **Japan Dryer for Soldering Flux**

I use the cheaper Japan dryer for a soldering flux on tin roofing and valleys in place of rosin pulverized or liquefied.

L. O.

### **Formula for Aluminum Solder**

A solder which gives good results on aluminum is composed of zinc, tin, aluminum and sodium chloride. The proportions given are 12 parts tin, 2 parts zinc and 1 part aluminum. One per cent. chloride sodium is added to this alloy. By varying these proportions somewhat, the composition formed by them may be made harder or softer to suit the various uses to which it is to be put. The hardness can be still further increased by adding a small quantity of antimony. The alloy is pure white in color and takes a high polish. It is claimed that it will adhere firmly to brass as well as many metals other than aluminum, that no flux is required, and that it may be applied either with a soldering iron or a blowpipe.

M. S. P.

### White Brazing Solder

A white brazing solder which may be used with good results on iron or steel, consists of copper 45 per cent., zinc 45 per cent., and nickel 10 per cent. The use of the small quantity of nickel in the mixture gives the necessary whiteness and increases the melting point but slightly. In brazing steel or iron, silver solder, which flows readily without oxide and at a low temperature, is much preferred, but due to its expensiveness sometimes make a suitable substitute desirable.

B. W.

### Solder for German Silver

German silver may be readily united with "half-and-half" solder, but it is better to use a finer solder consisting of 2 parts tin to 1 part lead. This will make a firm joint, but if greater strength is required, one of the cheaper hard solders may be employed, say: Silver 7 parts, zinc 1 part, melted together. Or, if a still cheaper and softer solder will answer, use 2 parts silver, 1 part zinc and 3 parts copper.

J. F. H.

A good solder for copper consists of 10 pounds of copper to 9 pounds of zinc.

M. S.

### Mix Rosin With Turpentine

I have used this kink for the last ten years, and it is the best way to use rosin I have tried. Pulverize the rosin and mix it with turpentine to the

desired consistency. Place it in a good bottle and the turpentine will not evaporate if a glass stopper is used.

J. W. B.

### Dissolving Resin in Gasoline

I note that B. tells of having used turpentine to dissolve resin for soldering. This I know is good, but for 25 years I have used gasoline, and find it is better for several reasons. It is cheaper, cleaner, leaves no bad smell like turpentine, and, besides, all the gasoline in the resin evaporates as soon as the soldering iron hits it, leaving the tin free from surplus resin that otherwise usually has to be scraped off.

My method is to dissolve a half pound of powdered resin by letting it stand over the fire until it is nearly boiling. I then take it away from the fire and stir in one pint of gasoline. This forms a fine, clean syrup for any kind of tin work. I put this syrup in a Mason jar, screw down the top, and can keep it for a long time. A small, stiff paint brush is used to put the syrup on seams.

Three or four drops of turpentine added to the raw acid cup will keep the galvanized iron clean, and prevent the formation of the black color after soldering that is caused by the use of the raw acid alone.

J. D. R.

NOTE.—We would remind our readers that caution must be used in using gasoline around fires.

Gasoline when ignited makes a bad fire, and the gas from it when mixed with air in certain proportions forms a high explosive.—Editor.

### Making Roofers' Solder

I run a plumbing shop in connection with my sheet metal shop and make my own solder from old wiped joints which usually come back from repair jobs. The method of obtaining good solder from the wiped joints may interest others.

The first step is to melt the old wiped joints, which doubtless contains more or less brass filings or zinc from wiping joints on brass faucets and ferrules. All of this brass, zinc and dirt must be burned out of the solder.

In doing this care must be taken not to overheat the solder, which ordinarily melts at a temperature of 440 deg. As zinc melts at 773 deg., the metal should not be raised to a temperature above 800 deg. It should not be brought to a red heat that can be seen in the daytime, as that would indicate 1100 deg. and would change the tin to a putty powder and would be skimmed off with the zinc on the surface.

When the metal melts throw in a lump of sulphur and a piece of rosin and keep stirring to bring the impurities to the surface, where they can be skimmed. Repeat this and throw in a piece of tal-

low and more rosin, which will bring up the impurities in the solder. Then add enough pure new tin to bring the solder up to the quality desired.

H. G.

### **A Suggestion for Handling Rosin**

In filling my firepot, I spilled some gasoline on the bench. Underneath was a drawer of rosin, into which dripped some of the spilled gasoline. This caked up the rosin, giving me the idea of dissolving the rosin in gasoline, so as to make a fluid rosin. There are many advantages in this, as the fluid rosin can be put on more rapidly; it will stay on in any weather and it will not blow off or scale off. Such rosin is very valuable in the shop, as it can be applied to all the seams at once and the article can be turned and handled without the rosin coming off.

L. M.

### **Zinc Covering for Salamoniac**

While it is necessary to have salamoniac in your tool box it is not very pleasant to find it all crumbled when you need same. Take and saw the bar of salammoniack to a size about 2"x3"x4" or smaller or larger as you see fit, then make a zinc covering for same with the exception of the top. As you use this salammoniack you melt your zinc down and always have the salammoniack intact.

D. S.

### **An Improvement to Acid**

If others appreciate Kinks as I do, the following will be of interest in making up new galvanized work: To every 2 oz. of raw muriatic acid add 2 drops of turpentine. This will leave the soldered seam free from acid color, leaving the same smooth and clean, besides, it destroys the acid odor that so many tanners object to, giving off an odor similar to pine tar, which is healthful. I have used this for years and find it most satisfactory.

J. D. R.

### **Solution for Cleaning Iron for Soldering**

I am very glad to give the following information on a solution for cleaning iron for soldering:

The method I follow is first to scrape the piece to be soldered, then take raw muriatic acid and a piece of zinc and put on the place to be soldered. Then pour the raw acid on the zinc and let it cut the zinc on the place to solder. Now take an extra hot iron and put the solder on without waiting too long after putting on the acid. No other flux is needed.

C. A. R.

### **Cleaner for a Soldering Copper**

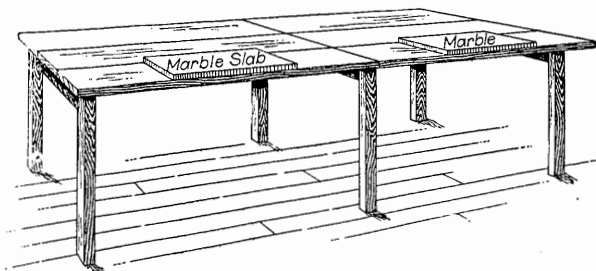
To keep the point end of a soldering copper clean use a 1 in. pipe cap for a cup and fill it a little above the rim with No. 0 steel wool for a wiper. The

threads in the cap will hold the wool in place, and by drawing the hot copper over it the point will always be bright and clean. After the exposed part of the wool becomes matted down it can be taken out and turned over. A hole can be bored in the center of the cap for fastening it to the bench.

A. L. D.

### Marble Slab for Soldering Purposes

When small work is being soldered in the tin or cornice shop a great amount of annoyance, lost time and poor work is caused by the burnt wood from the bench adhering to the metal work. This can be avoided by using any broken slab of marble, as shown in the accompanying illustration. These slabs



MARBLE SLAB FOR SOLDERING PURPOSE.

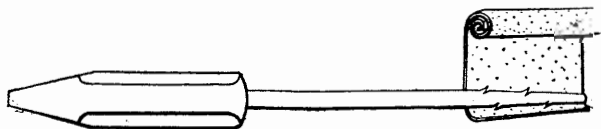
of marble or slate are smooth and clean. When the metal is laid on same and soldered, the wood from the bench will not burn on the metal, and should the

slab become wet with acid flux or rosin, it can be cleaned off at once and the metal work done on it always remains clean and smooth. This should give the hint to the tinner to watch out for broken slabs of marble or  $\frac{1}{2}$ -inch thick slate. F. E.

### A Cool, Durable Soldering Handle

I am using a soldering iron handle which I make myself, and as it has so many advantages I think many readers might be interested in it. I am therefore sending it along for publication.

To make this handle I take a chisel and burr the iron handle as shown in the illustration. Next I



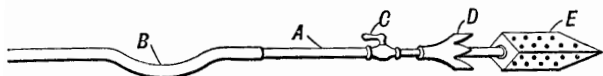
A COOL, DURABLE SOLDERING HANDLE.

cut a strip of asbestos paper about  $5\frac{1}{2}$  inches wide and 3 feet long. After covering one side of this strip with a good paste I roll it on the handle of the soldering copper until the desired size is reached. This makes a handle that will never come loose from the iron, will never burn and is very economical.

F. G.

## A Home-Made Gas Soldering Iron

I have made for myself a gas soldering iron which has given me such good results that I want other readers to know about it. It can be made in a few minutes as follows: Take a  $\frac{1}{2}$ -inch gas pipe, *A*, 6 inches long. A gas hose, *B*, connecting to the gas



A HOME-MADE GAS SOLDERING IRON.

cock, may be connected to the one end. Connect to the other end of the gas pipe the lever gas cock *C*, as shown. To this connect an ordinary Welsbach incandescent burner, *D*. Now take a soldering iron 1 inch square and bore a  $\frac{3}{4}$ -inch hole into it up to the point where it starts to taper. Bore the sides full of  $\frac{1}{8}$ -inch holes where shown by the dots. Slip this point on where the mantle should go.

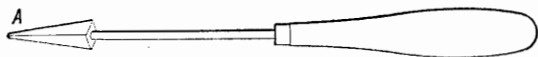
When you wish to use it simply turn on the gas, light at the little holes and the iron is ready for use almost instantaneously.

G. W. C.

## Producing Soldering Coppers for Small Work From Scrap Coppers

In every shop there is found small work to be soldered, and mechanics forge their coppers to the required shape for the work at hand. Sometimes

pointed coppers are required, again blunt coppers, so that the constant changes of forging wastes time



REMADE SOLDERING COPPER FOR SMALL WORK.

and material. Every shop has scrap soldering coppers so worn down that they are usually thrown in the junk pile. On going over these coppers it will be found that one or more pairs can be heated to a cherry red color and forged or shaped with a heavy hammer to a small point shown in the illustration at *A*. We have a number of pairs of such coppers which are laid aside and used when occasion demands, and they come in very handy.

A. L. C. Co.

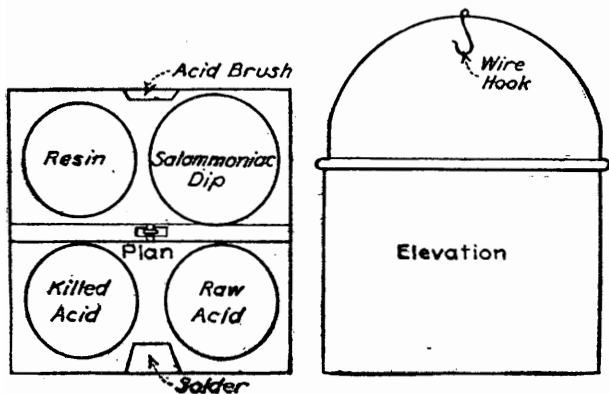
### A Handy Holder for Soldering Accessories

I have made a box, a holder or whatever one may choose to call it, for caring for the acid, rosin, etc., used in soldering work, and will describe it as best I can in the following:

The accompanying drawing shows that it has a place for the muriatic acid, cut acid, rosin, sal-ammoniac dip, solder and acid brush. I have found it very handy, as it can be hooked to the side of the firepot when one is walking short distances or go-

ing up a ladder. When at work it can be hooked on to the eaves trough or gutter or on to the rung of the ladder with no danger of upsetting.

I have known of cases where acid has been carried around in a bottle and has been upset, with resulting injury to the metal and to the man's temper as well. I have occasionally climbed up a ladder, and on reaching the top have found that I had forgotten my acid brush. With this holder you have all these things right at your finger's ends. I have also found it very handy in the shop.



A HANDY HOLDER FOR SOLDERING ACCESSORIES.

To make one of these, first form a box of galvanized iron, 5 in. x 5 in. and  $3\frac{1}{2}$  deep, and wire it at the top in the usual way. Then solder on a

solid handle, with a loose hook attached, as shown. Next form a piece of metal large enough so that a bar of solder will fit in easily, and attach it as shown. On the other end attach in a similar manner another piece for the acid brush. These compartments extend to the bottom of the box and should be soldered snugly to the sides.

In making mine I procured two wine glasses for the acids, a medium-sized tumbler for the dip, and a small bottle with a screw top for the rosin. I set these in their proper places and filled in around with Plaster of Paris.

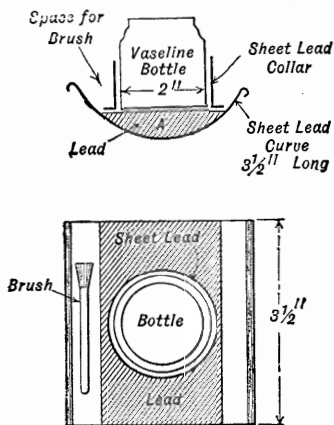
Then I gave two good coats of asphaltum paint to all the galvanized iron exposed, so that it would the better resist the acid fumes and other corrosive elements.

C H. W.

### **Non-Tipping Acid Cup**

A trouble usually experienced with acid cups is tipping and spilling, either when they are used on the bench, on the roof or when set in round or moulded gutters. The accompanying plan and section shows how a non-tipping acid cup can be made. Experience has proven that sheet lead is the best material for the purpose, as it outlasts other materials. The cup is constructed as follows: The lower curved pan is made  $3\frac{1}{2}$  inches long and as wide, to accommodate a 2-inch diameter vaseline jar with a wide mouth. The sheet lead pan is filled

with lead at the bottom, as shown at *A*, and on this a lead tube is soldered to hold the bottle securely. The space at the sides of the bottle may be utilized for holding the brush as shown. This cup, if accidentally pushed, will not tip, but quickly right it-



PLAN  
A NON-TIPPING ACID CUP.

self by virtue of the lead weight in the center. Placed on an inclined surface it will right itself in the same way. For to use in gutters either round, square or moulded, it may be recommended.

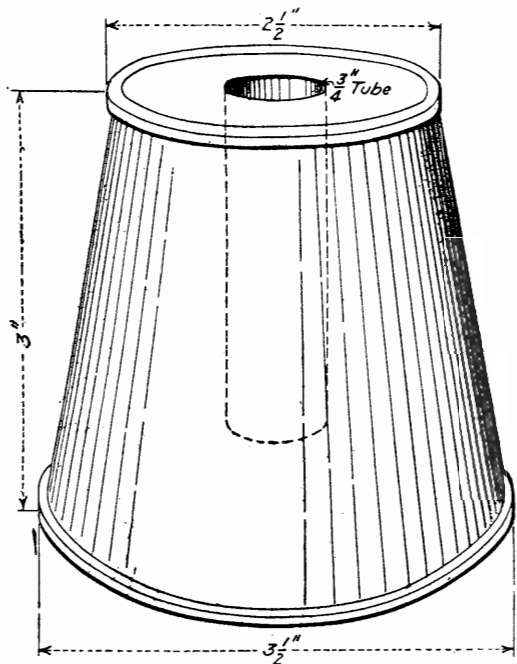
P. R.

### A Non-Spilling Acid Cup

I have been using a non-spilling acid cup for

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some time and believe a description of it is likely to prove of advantage to many readers. I am sending a sketch of it in the hope that it will save the



A NON-SPILLING ACID CUP.

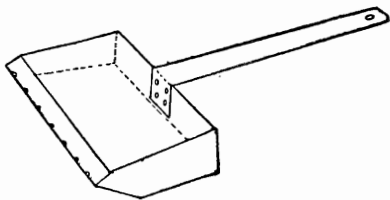
boys some trouble and hard words. It can be knocked over without spilling the acid. For cut acid it should be made of copper; for raw acid use

sheet lead. I have found a cup made to the dimensions shown in the accompanying illustration to be most convenient. The  $\frac{3}{4}$ -in. tube should extend down to within  $\frac{1}{2}$  in. of the bottom. The top of the cup should be slightly dished. If desired a bail may be soldered on as a convenient way of carrying the cup.

F. A. W.

### Making Strip Solder Quickly

A quick way to make strip solder is by the use of a pan such as is shown in the accompanying sketch. This pan is made of 24 or 26 gauge sheet iron, about 3"x3"x1 $\frac{1}{4}$ " high. Punch  $\frac{1}{8}$ " holes from in-



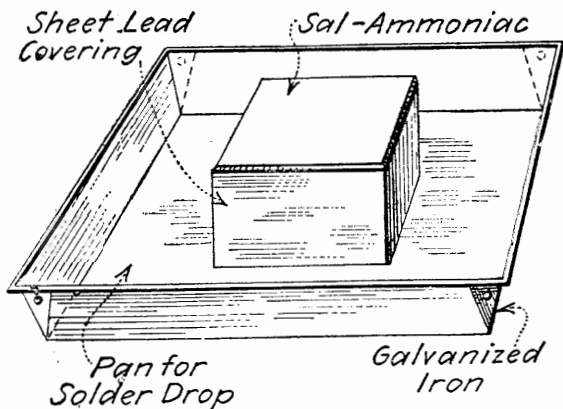
MELTING PAN FOR MAKING STRIP SOLDER.

side with prick punch in the position shown in sketch. The handle is 1"x $\frac{1}{8}$ " band iron. Melt solder in the pan and draw pan held in an inclined position over a sheet of iron or a cement floor.

T. S.

## Save the Solder Drops

Many years ago while having charge of a shop employing some 30 to 40 men, I noticed a considerable loss of solder every time the men tinned their soldering coppers, for the solder drops would fall on the bench or splash on the floor. To save this loss we made up some 50 pans of galvanized iron as shown in the accompanying illustration.



PAN FOR SAVING THE SOLDER DROPS.

These pans were made 5 in. square,  $\frac{3}{4}$  in. high and in the center a cake of salammoniac was encased with sheet lead and soldered to the bottom of the pan. Then every time the coppers were tinned the surplus solder would fall into the pan, and as

the salammoniac was used up the lead casing could be melted down as the tinning of the copper was done. At the end of every month each man had at least  $\frac{1}{2}$ -lb of solder in his pan. This was melted out, when a new piece of salammoniac was soldered in position so that the pan was good indefinitely.

J. B.

### Avoiding Pittings in Soldering Coppers

Has the sheet metal worker ever noticed the small pittings in his soldering coppers? Often the men will come to me and say: "These coppers are no good; the copper is full of holes." Some mechanics are under the impression that old copper has been used in making such soldering coppers, but the pittings are caused by the careless manner in which the coppers were cleaned before forging. Pittings are small holes in the soldering copper which come to light after the coppers are filed, ready for tinning. They cause a poor tinned surface and retard soldering. To prevent them treat the coppers as follows: Before forging the copper file off all scale and tinned surface until clean copper shows. Then heat to a cherry red color and forge to the desired shape. Do not forge the coppers when cold for that will crack them. If the coppers are not cleaned well before forging the scale and surplus tinning is forged in the copper so that when the copper is

heated this dross burns into the copper and the small holes and pittings are the result. F. M.

### Soldering Bottom Seam in Milk Cans

To make a neat job in soldering the bottom seam of a milk can is rather difficult if bar solder is used. By taking wire solder and laying it around the seam in the bottom of the can and tacking it in four or five places you can then solder the bottom so smoothly that a person would think it to be machine work. Use very little rosin flux in doing this and do not have the copper too hot.

E. W. R.

### A Suggestion On Soldering Radiators

Here is a suggestion on soldering radiators that will procure satisfactory results. You will have a lot of trouble if the water comes out through the holes to be soldered, and it is likely to pinhole after the work is done. When you have to work under such conditions it is hard to sweat the solder in, especially on a cold day. If you lay the radiator on two horses, take the top off an old gas stove and put it about 8 in. under the radiator, light it and let the heated air go through the radiator, it will dry the radiator out. This will make the work considerably easier. When soldering, the flame should be kept low.

J. K.

### Soldering Overhead

I have found it a hard matter to keep solder on a copper when soldering overhead. I have learned by filing and tinning the copper well and taking a rubber (any kind of rubber) and rubbing along the edges, the solder can be held nicely. F. A. W.

In regard to the kink describing how to solder overhead, will say that when I do this work I file and tin one side of the soldering copper and experience no difficulty. E. G.

### Tinning Copper and Brass

A good recipe for tinning copper and brass is as follows: Boil 3 lbs. of cream of tartar, 4 lbs. granulated tin or tin shavings, and 2 gallons of water. After boiling, place the articles to be tinned in the mixture, and continue boiling until the tin is precipitated upon the copper or brass object.

S. W.

### Marking Fluid for Galvanized Iron, Copper, Zinc or Tin

A marking fluid which may be used for either galvanized iron, tin, copper or zinc can be made by taking a teaspoonful of copper filings (usually obtained from the filings of soldering coppers) and placing this in one-quarter glass of muriatic acid. Allow this mixture to stand for 24 hours, when the

acid will turn to a black color ready for use. In a few days green crystals will creep along the inside of the glass. These are loosened and left to drop into the fluid where they dissolve. In applying the acid use a stick cut to the size of a pencil and pointed the same way. The name or number required may then be written on the metal. The feature of this fluid is that when once it dries no heat or water will erase it, since it is like an enamel. The writer has used it for many years. E. S.

### **Preparing Galvanized Iron for Painting**

Before galvanized iron is painted its surface should be first prepared so as to make the paint adhere, otherwise there will be continual peeling of the paint. This is accomplished by dissolving two tablespoons of common baking soda in a gallon of water. Use this solution to wash off the entire surface of the metal which, when dry, give one coat of pure zinc paint. Then paint over it any desired color. Never use a wash that contains salammoniac or muriatic acid, for this will destroy the zinc coating.

### **Brightening Tin Ware**

When tin ware becomes tarnished, a simple way to brighten same is to use common soda applied with a moistened newspaper, and then polish with a dry piece; this will make it look like new.

### Brightening Zinc Work

Zinc work can be kept bright and free from tarnish by rubbing it with a piece of cotton cloth dipped in kerosene and ground chalk, after which polish it with a dry cloth.

W. R.

### Soldering Black Iron

The tinner who has trouble in soldering black iron must bear in mind that the iron must be made bright. But there is a whole lot in making the iron come bright, and it may be done in a dozen different ways. When there is but a small amount of soldering to be done, the best way is to scrape the black iron until the portion to be soldered is bright and clean.

But where there is a considerable amount of soldering to be done, the scraping method is insufferable. It is too costly, and too slow, and quicker means must be provided. If a sand-blast is available, the black scale can be removed quickly and at very little expense. But without the sand-blast, a small emery wheel, mounted upon a flexible shaft, may be made to do the work neatly and cheaply. It requires a great deal of close application and no mean amount of skill to brighten black iron with an emery wheel for soldering, for there are apt to be small spots left unbrightened which do not take solder as they should, hence the work is defective.

There remains the acid method of brightening black iron, and this method must be worked in a manner much the same as when the iron is to be galvanized. First, the surface must be cleaned thoroughly of all grease and dirt. This may be best done by first washing or dipping it in a strong alkali solution—potash, for instance, which will “cut” all the grease, when a subsequent washing and brushing will remove the grease completely, leaving the iron in shape to have the surface coated with chloride of zinc. This will enable the solder to adhere, and complete the necessary “tinning” operation, without which it is not possible to solder black iron.

The grease removing solution may be applied by brushing it over the surface to be cleaned. A local application by means of a brush will answer very well, when it is not practical to dip the entire surface of the articles. Clean water should be applied after the potash has had time to act and then the metal is ready for a bath of acid and water which will quickly eat off every vestige of the black oxide with which “black” iron is coated. Two methods are open here. The iron may be treated with any acid which will “cut” the oxide, as sulphuric, nitric, etc., and then it may be dipped in, or brushed with pure muriatic acid, after which it is washed and dipped or flowed with a zinc solution made in the

usual way, that is by dissolving in hydrochloric (muriatic) acid, as much zinc as it will consume. A quantity of water must be added to the acid to make it act readily upon the zinc.

The above described method of treating black iron directly with raw acid, permits the scale to be removed much quicker than when the "killed" acid is applied in the manner usually followed by the tinner. But it must be remembered that the iron cannot be tinned readily unless it is given a subsequent treatment with the zinc-acid solution. The zinc-acid treatment may be modified by treating the parts to be soldered with pure zinc immediately after they come from the pure acid bath. This may be done by flowing the acid treated surfaces with molten zinc, but this method is not always convenient or desirable, hence the usually followed method of covering the surface of the iron with zinc chloride direct.

The pure acid and melted zinc method has the advantage of forming a heavy zinc surface over the parts to be soldered which is not affected afterwards by the acid which may remain in the metal or upon its surface after treatment. It is sometimes desirable to add a little sal-ammoniac to the acid bath, either pure, or cut with zinc.

J. F. H.