Sheet Metal Work

SHEET METAL WORK

BY

MARION S. TREW

Instructor in Sheet Metal Work
Washington Junior High School
Rochester, New York

AND

VERNE A. BIRD

Director of Industrial Arts
Rochester, New York

DRAWINGS BY

ROBERT H. BARNES

AFTER SKETCHES BY

MARION S. TREW

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SHEET METAL is a term applied to various kinds of metals rolled into sheet form. The commonest kinds are sheet iron, galvanized iron, tin plate, zinc, copper, brass and aluminum. We have also the more precious metals such as gold and silver in sheet form. A special line of tools and skilled workmen are required to work these different kinds of metals into forms to meet the requirements of a large and growing industry.

Sheet metal work is an important factor in the industrial world, especially in connection with the building trades which require the roofing, skylight, ventilating, heating and ceilings to be of sheet metal, and in large fire proof buildings the metal trim has even taken the place of the wooden casings and doors. Much furniture is now also made of sheet metal.

The tin roofing has been extensively used for a great many years. It was first imported from Europe about one hundred years ago and the first tin plate made in America was manufactured in Philadelphia in 1830. Records show that the roof laid in 1835 on the Horace Binney residence is still in place and there are many instances where roofs laid forty and fifty years ago are at present in a good state of preservation. It is economical on account of its lightness and durability and affords the best protection against fire, and is easily repaired. After it is once put on it requires but little attention excepting occasionally a coat of paint.

Then there is the automobile, aeroplane and sheet metal boat industries all of which offer a wide field of opportunity to the young men who possess the necessary training.

GALVANIZED IRON

Galvanized iron is black iron or steel coated with zinc or spelter, as it is called by manufacturers,—for the purpose of protecting it by a coating of metal that will not readily oxidize when exposed to the weather. The black sheets are dipped in great vats filled with a pickling bath of sulphuric acid solution that eats off the cinder and scale that remain on the sheets. They are then washed with clear water and taken to the galvanizing department, dipped into a bath of molten spelter, and passed while hot through squeezing rolls that removes superflous metal. As the sheet emerges from the hot spelter it presents a plain silvery surface, but the instant the cooling begins the spelter crystalizes.

A standard gauge is used for uncoated sheets. Add 2½ ounces per square foot for the weight of the coating to the finished galvanized sheet.

ZINC

Zinc, also commonly known as spelter, is a hard, bluish white metal. It is extracted from ores by a process of distillation. At ordinary temperatures it is somewhat brittle but becomes very malleable when heated above a temperature of 212 degrees, so that it may be rolled into thin sheets and easily worked in presses. It is extensively used in the manufacture of artistic work, such as making casts of statues, ornamental cornice, and other trimmings on buildings. Another important use of zinc is in the manufacture of electric batteries.

TIN

Tin is a soft rather malleable metal. It is white, crystalline, rather inactive, not readily uniting with the oxygen of the air.

Tin is mostly obtained from ore called tin stone, which is an oxide of tin. This ore is yellow, red, gray and black and

strikes fire with steel. The dressing of the ore is a difficult operation. It yields only from ten to eighty-five pounds of tin oxide to a ton of material, and it is so scattered through the ore that it has to be reduced to a powder and thoroughly washed to rid it of its impurities. It is then put through a process of smelting, after which it is drawn off and cast into bars called block tin. The largest supply of tin ore comes from the East Indies, Bolivia and Cornwall.

It must have been one of the earliest metals known as it was used in the bronze of which the oldest weapons and tools were made.

Since tin does not oxidize in air it is used as a protective coating on sheet iron. So long as this coating remains intact the iron is protected from rusting. If, however, the tin layer is damaged the iron rusts rapidly underneath.

Copper vessels used for cooking purposes are coated with tin to prevent the poison from the copper getting into the food. Some compounds of tin are often added to silk and various other fabrics to render them non-inflammable, and, in the case of silk, to give weight. It is also rolled into very thin sheets called tin foil.,

The manufacture of tin plate is about the same as that of galvanized iron. The base plate is made from ingots poured into a smaller size, then rolled into sheets and sheared to the desired size. These sheets must then go through the process of pickling, washing, annealing, and second pickling, then be thoroughly washed and covered with a coating of pure tin.

Tin plate is designated as IC or furnace tin, IX, IXX, IXXX, meaning one cross, two cross, etc.

Tern plate which is generally known as roofing tin is coated with an alloy consisting of approximately 75 per cent lead and 25 per cent tin. Tern plates are known by the amount of coating that is contained on a box of plates or 112 sheets. Thus 8 lb., 12 lb., 20 lb., or 40 lb., this meaning for a 20 lb. coated sheet, 20 pounds of coating was used on a box of 112 plates.

COPPER

Records show copper to have been one of the first metals brought into use by mankind.

It was known to the Romans as Cyprum, probably for the reason that the Phenicians found large mines of copper on the island of Cyprus and discovered the art of working it.

The primative smiths also discovered the art of making an alloy of copper and some other metal, generally assumed to be tin, of which weapons and tools could be made hard enough to cut the hardest rock. These tools have been found in the graves of some ancient Celtic races, and were probably used in the construction of their temples.

Copper is moderately hard and highly tenacious; takes a brilliant polish, and is about nine times heavier than water. It is the best known conductor of electricity.

The various weights of sheet copper are designated by the number of ounces contained in a square foot of the sheet, that is—14 ounce copper is of such thickness that it weighs 14 ounces to the square foot of sheet copper.

ALLOYS

An alloy is a combination of two or more metals. Alloys have additional properties which do not exist in either of the metals used in their making.

Copper and zinc are alloyed together in the manufacture of brass, a most common and useful metal. Soft solder is an alloy of lead and tin. Other hard solders are alloys of zinc, copper and silver, different proportions of which are used to make them the required degree of hardness.

Bronze is an alloy of copper and tin, a metal long used by the ancients for weapons and utensils; it is now widely used for statues, bells and machinery. An alloy called bronze is also produced by the combination of aluminum and copper. There are many other varieties of bronze having different proportions of metals,—lead, silver and zinc are sometimes added.

SOLDERING

Soldering is a process of uniting two pieces of metal by means of using an alloy having a lower fusion point than the metals to be joined. Broadly speaking the term soldering is applied to three processes known as soft soldering, hard soldering or brazing, and lead burning. Lead burning is not truly a soldering process as the edges of the metals are actually welded together by means of a blow pipe flame.

Soft soldering, or soldering as done by the sheet metal worker, is done by using the soldering copper (sometimes miscalled the soldering iron). The solder used is known as half and half and is composed of tin and lead, and is suitable for soldering galvanized iron, copper, brass, zinc, and iron. The melting point of solder varies according to the quality, usually between 400 and 500 degrees Fahrenheit.

The soldering copper before it can be used must be tinned. The first operation is to remove the oxide and dirt by using a file until the copper is smooth and bright; next heat the copper to a temperature a little more than required for soldering but not red hot; then clean the copper with a piece of salamoniac, at the same time applying a little solder to the cleaned surface which instantly adheres on coming in contact with it. Another method is to file the copper until it is thoroughly clean and bright; slightly hollow one side of a piece of soft brick; put some rosin in the hollow part; heat the copper to a point when it will just melt the solder (care must be used not to heat the copper too hot as it will instantly oxidize and then cannot be tinned with rosin until it has again been filed); melt a few drops of solder in the rosin and rub the copper briskly in the melted rosin and solder until the copper is thoroughly tinned. The copper must not be overheated or the tinning will be destroyed and will have to be retinned before it can again be used.

Fluxes are used to prevent the metals which are being soldered from oxidizing, and to clean the surfaces and aid the fusion of the solder to the metals. The most common flux is Hydrochloric (Muriatic) acid and rosin. Hydrochloric acid in the raw state is used in soldering galvanized iron and zinc.

Chloride of zinc, or cut acid as it is usually called by the sheet metal worker, is prepared by dissolving all the zinc in hydrochloric acid that it will hold in solution. It may then be diluted with water according to the strength required. A solution of equal parts of gylcerine, water, and chloride of zinc makes a very good flux for certain metals, the glycerine to some extent preventing corrosion which is likely to take place. In soldering metals with acid, or a flux which contains acid, the work must be thoroughly cleaned after soldering or corrosion will immediately take place. Rosin should always be used for soldering tin and it is much better to use rosin or a good soldering compound for soldering new brass and copper.

MEASUREMENT

There are two systems of measure used in this country, namely: The English system and the Metric system. The one most used at the present time is the English system, the metric system being used chiefly in laboratory work and in the manufacture of articles for export to countries using the metric system.

However, it is interesting to know that no standard of length for the English system has ever been formally legalized by our government, and the metric bar, the ultimate unit of comparison for the metric system, has been legally adopted by our congress.

This ultimate standard serves not only for divisions of the metric system but for the English foot and yard as well. Our standard yard is defined as 3600/3937 of a meter,—in other words a length equal to the standard meter is divided into 39.37 parts called inches and 36 of them equal our standard yard.

The fact that the English system was in general use in this country before the adoption of the metric system is no doubt responsible for its continued use.

The legal or standardized unit of comparison in the metric system for linear measure is the meter, which is divided into ten equal parts called decimeters. Each decimeter is then

subdivided into ten equal parts which are called centimeters and the centimeters are divided into ten parts called millimeters. The greatest advantage of the system is at once apparent from the method of subdivision which is known as the decimal system or division by tens.

In the English system the standard unit of linear measure is the yard, which is divided into three equal parts called feet. The next subdivision is the inch and there are twelve inches to the foot. The inch we find divided into halves, quarters, eighths and sixteenths on the common rules or instruments of measurement and down to thirty-seconds, sixty-fourths and one-hundredths of an inch on the steel scale. The steel scale is used mostly by machinists and other mechanics who are doing very accurate work. The principal difference between the two systems is in the method of subdividing the standard unit, one using the decimal and the other the fractional system.

THE YARD STICK is an instrument commonly constructed of one piece of hard wood about 3/16" by 1" with brass tips at the ends and usually graduated only to eighths of an inch. It is well proportioned for the measurement of a room in the home, or in the store where it is used in measuring dry goods.

THE TWO FOOT RULE is perhaps the most widely used instrument of linear measure where great accuracy is not required. It is usually made of boxwood and so constructed that it will fold up in a six inch length. Boxwood possesses a delicate yellow color and is much used in the manufacture of measuring rules, mathematical instruments and musical instruments because of its very dense structure and fine uniform grain. It is also hard and resists wear better than most woods. The edges of the rule, with the exception of the cheaper grades, are faced with thin strips of brass to prevent wear and inaccuracy. The rule has four different graduations, the difference being only in the subdivisions of the inch. The graduations are usually eighths, sixteenths and twelfths. The customary system of marking the graduations on the two foot rule is from right to left. The reason for this is that when marking off a distance the rule is generally held in the left

hand and the end of the rule is used as a stop for the pencil in marking the object.

The reducing scale on the two foot rule is used for getting dimensions from a blue print that has been drawn to scale.

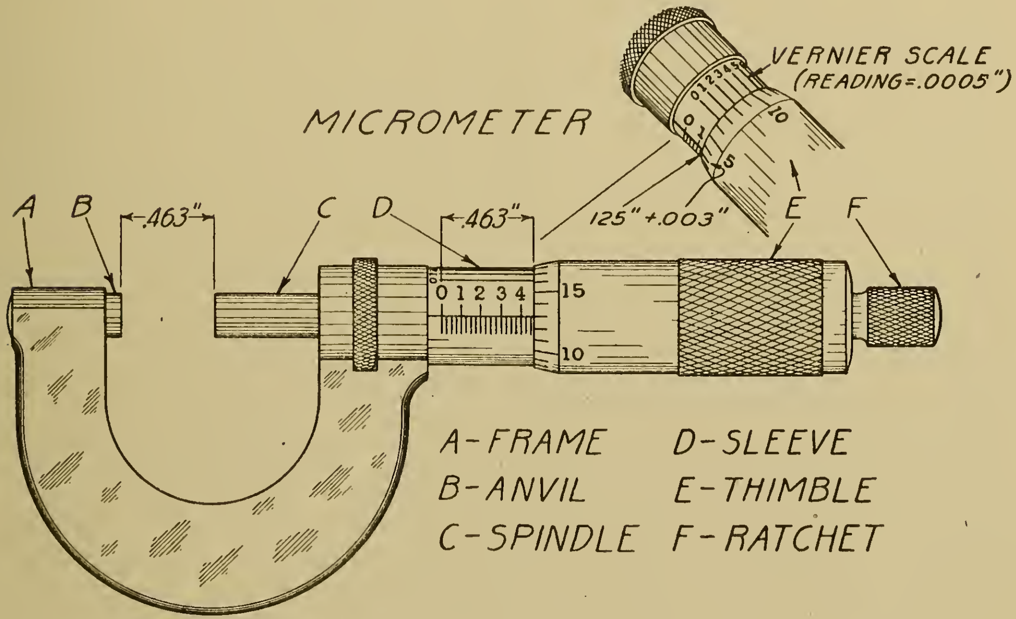
THE MICROMETER

The micrometer is an instrument which makes an application of the principle of the screw in measurement. Measurement by the micrometer depends upon the direct relation between the number of revolutions of the screw and the distance traveled by it. The object to be measured is placed between a fixed point called the anvil and a movable part called the spindle.

One end of the spindle is threaded with a fine thread having a pitch of 1/40th of an inch. That is, there are 40 of these threads to one inch. Attached to the threaded end of the spindle is a cup shaped piece called the thimble. This thimble is knurled on the outside so that it may be used to turn the spindle. When the instrument is assembled the thimble slides down over part of the frame which is threaded to match the thread on the spindle and acts as a guide for it. This part is called the sleeve and on it will be found a system of lines or divisions which when used in connections with a set of divisions on the beveled edge of the thimble, will indicate the longitudinal distance traveled by the spindle and the number of revolutions made by both the thimble and spindle. Now, knowing as we do, the pitch or lead of the screw, it is easy to determine the measurement or distance between the spindle and anvil for any setting.

In adjusting the micrometer for a measurement first open until the jaws are far enough apart to admit the object to be measured, then close by turning the small ratchet head on the end of the thimble. This ratchet is so adjusted that it will slip when too much pressure is applied. The use of the ratchet will also insure a uniform pressure on all measurements. When the ratchet is not used it is easy to turn the

spindle up so tightly that it will spring the jaws enough to cause an error in the measurement, if not to ruin the instrument.



To Read the Micrometer.

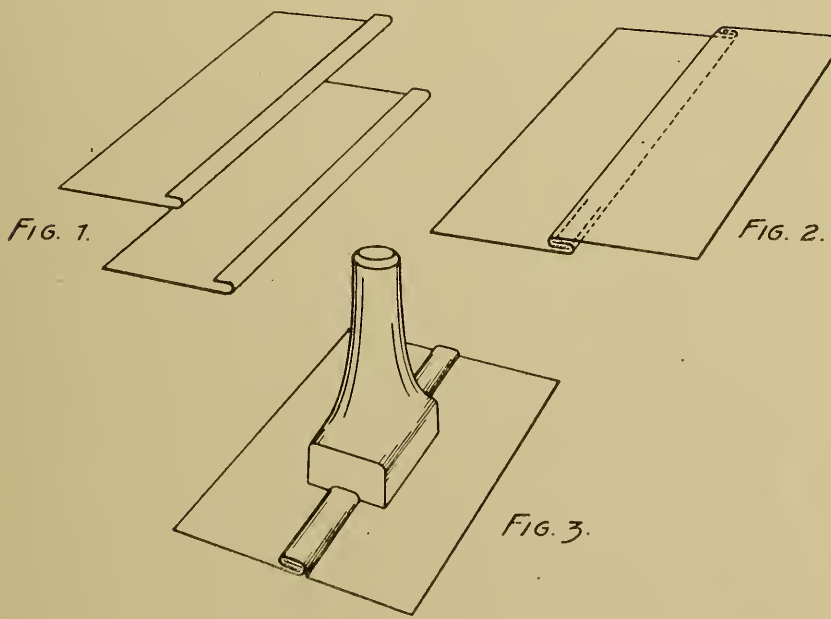
(See drawing of micrometer). The vertical divisions on the sleeve are divided into 1/40th parts of an inch, which in the decimal form is .025. There are also 40 threads to the inch on the spindle so that one complete revolution of the thimble causes the spindle to travel just one scale division. Every fourth line is made longer, and starting from zero there are ten of these lines to the inch, so in taking a reading they indicate tenths of an inch. Now it is plain that if one revolution of the thimble moves the spindle .025 of an inch, 1/25 of a revolution or one division on the thimble will move it 1/25 of .025 or one one-thousandth part of an inch. Thus if the position of the thimble is as shown in drawing we have 18 divisions showing on the horizontal scale and the thimble is 13 divisions past the zero position, and our reading would be $18 \times .025$ plus the .013 on the thimble or $18 \times .025 = .450$ and $.450 + .013 = .463$ of an inch.

If the instrument has a VERNIER scale in addition to the one mentioned above it will read to a ten-thousandth part of an inch. You will notice that there are ten longitudinal divisions on the sleeve and that they are smaller than the divisions on the thimble, the ten on the sleeve being equal to nine on the thimble, making the difference between the length of one of the ten and one of the nine divisions equal to one-tenth of a division on the thimble. We found the thimble divisions to be one one-thousandth of an inch so 1/10 of 1/1000 will be 1/10000 making the reading taken from the vernier or longitudinal scale in the ten-thousandths of an inch. Thus if there were five divisions showing on the horizontal scale and a little over three on the thimble scale you would have $5 \times .025$ or $.125 + .003$ on the thimble or .128 inches. But the reading on the thimble was, in this case, a little more than three so we must add to the .128 the vernier reading which is found by following along the thimble until you come to a line which exactly coincides with one on the vernier scale. In this case it is line five, which since the divisions are in ten-thousandths, is .0005 of an inch. This reading we must add to the above reading, making it $.128 + .0005$ or .1285 of an inch for the final reading.

LOCKED SEAM

Specifications

Exercise in seaming, using scrap stock. Two pieces of galvanized iron each 2″ x 6″ are to be seamed together with a 1/8″ lock.



Standard Practice Instructions

Watch carefully the instructor's demonstration, showing correct use of the squaring shears, hand groover, and folding machine.

1. Cut two pieces of galvanized iron, each 2″ x 6″.
2. Set folding machine so as to turn a 1/8″ sharp lock. Turn one long edge of each piece. (Fig. 1.)
3. Lock pieces together (Fig. 2), and groove with a No. 4 hand groover. (Fig. 3.)

Questions for Oral Discussion

1. How much stock is used in making this seam?
2. Why is a No. 4 hand groover used in making a 1/8″ seam?

CLIPPED SEAM

Specifications

Exercise clipping seam. Seam is to be clipped on one end for wiring and the other end clipped for burr. After having determined the amount of stock used in making the locked seam clip the two corners for the wired end of the seam ¾" down and in enough so that clipped edges will meet without overlapping. (Figs. 1-2.)

Make about a 60 degree cut for the burred end of the seam so the corners will meet without overlapping. (Figs. 1-2.)

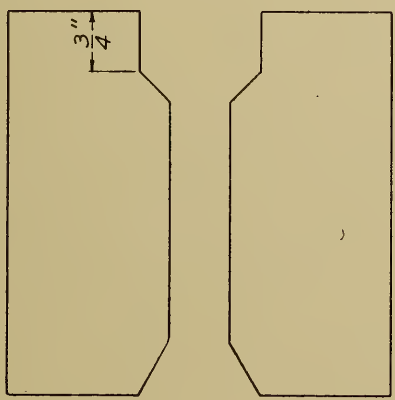


FIG. 1

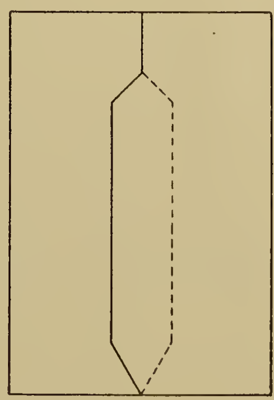


FIG. 2

RIVETED SEAM

Specifications.

Exercise in riveting, using scrap stock. Two pieces of galvanized iron 3″ x 12″ are to be riveted together, lap to be ¾″, 1½ lb. rivets are to be used and placed 2″ apart.

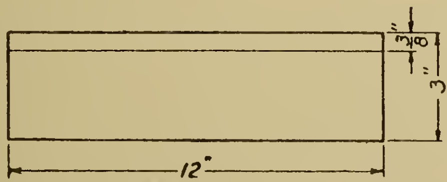


Fig. 1.

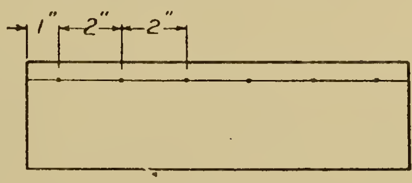


Fig. 2.

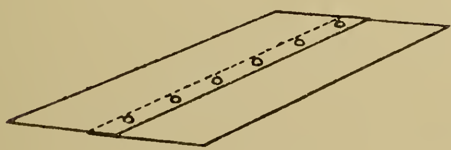

Finished Joint.


Fig. 3


Finished Rivet.

Standard Practice Instructions

1. Cut two pieces of galvanized iron 3″ x 12″ having all corners square.
2. Mark a line ⅜″ in along one long side of each piece (Fig. 1).
3. Mark off with prick punch as shown in (Fig. 2).
4. Punch holes with solid punch at the prick marks, using a piece of wood to punch on.
5. Place pieces together with burr side of holes up (Fig. 3), and rivet as shown by instructor by beginning at the ends and finishing at the center.

RIVETED SEAM

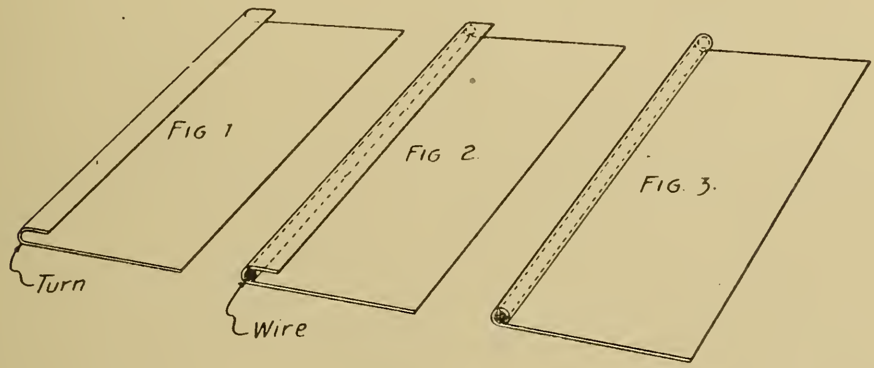
Questions to be Answered in Note Book

1. What is the thickness of No. 26 galvanized iron in decimal parts of an inch? (Use Micrometer.)
2. What is the meaning of the term 1 lb. rivets?
3. What are the sizes of rivets generally used in sheet metal shops?
4. How is a Micrometer read? (Show by sketch.)
5. In what parts of an inch is a two foot rule usually divided?
6. What is the difference between a Solid punch and a Prick punch? For what purpose should each be used?
7. Why do we use a No. 4 rivet set on this model?

WIRED EDGE

Specifications

Exercise in wiring, using scrap stock. One piece of galvanized iron 2″ x 6″ is to have a piece of No. 11 wire 6″ long rolled in one long edge. Wire is to be entirely covered by the galvanized iron.



Standard Practice Instructions

1. Cut a piece of galvanized iron 2″ x 6″ having all corners square.
2. Set folding machine so that it will turn over an edge of the metal sufficient to cover a No. 11 wire.
3. Place the long edge of the metal in machine and turn the edge, (Fig. 1) as shown by instructor in demonstration.
4. Cut piece of No 11 wire 6″ long.
5. Place wire in the turned edge of the metal, (Fig. 2) and finish covering the wire, using wiring machine. (Fig. 3.)

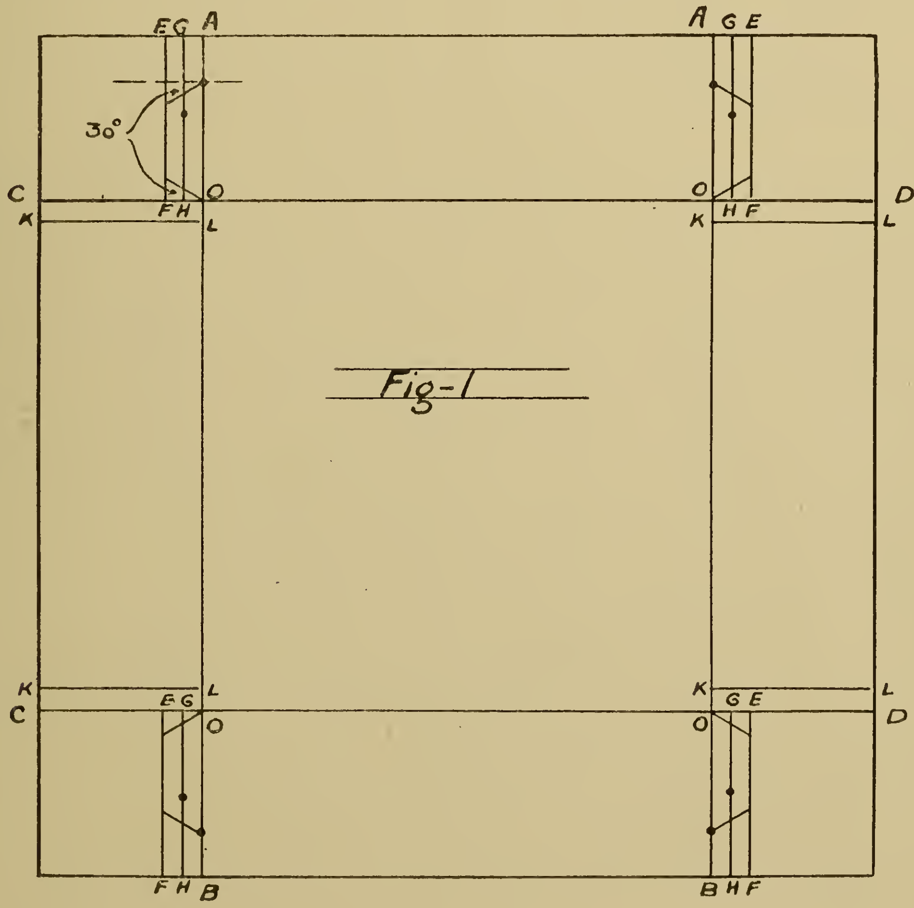
Questions to be Answered in Note Book

1. Why is wire placed in the edge of sheet metal?
2. Find the diameter in decimal parts of an inch of No. 11 wire.
3. How much stock is used in covering No. 11 wire?
4. Can any other machine be used beside the wiring machine in rolling the metal over small wire?
5. What tool do we use to find the size of wire?
6. How is the folding machine set to turn the edge for wire?

SEED BOX

Specifications

Seed box is to be made of No. 26 or No. 28 galvanized iron; corners are to be riveted with 1 lb. rivets; No. 13 wire is to be placed around edge of box; corners are to be soldered.



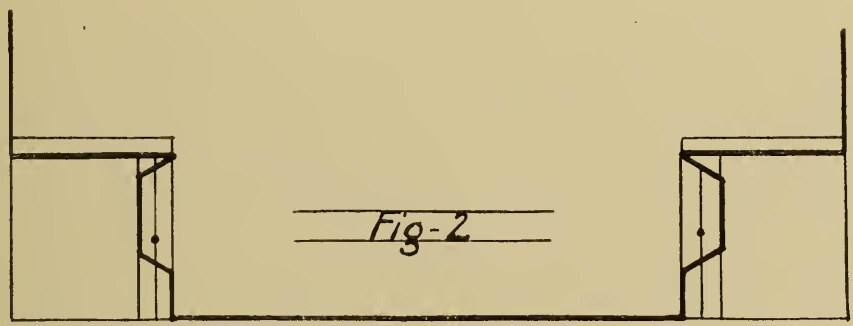
Standard Practice Instructions

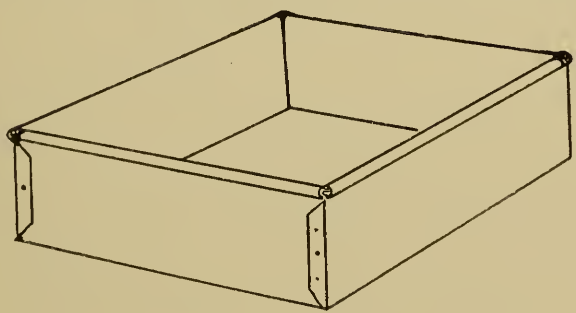
1. Cut blank 10″ square.
2. Draw lines A-B and C-D 2″ from each edge.
3. Draw line E-F ½″ from line A-B in each corner as shown. (Fig. 1.)
4. Draw lines G-H half way between lines AB and EF. (Fig. 1.)
5. Draw lines K-L ¼″ from CD (Fig. 1).

SEED BOX

Standard Practice Instructions—Continued

6. Make prick mark in center of the lines G-H and K-L. (Fig. 1.)
7. Measure in ½″ from A and B and make dots. (Fig. 1.)
8. From these dots draw short oblique lines at an angle of 30° to the horizontal to meet the lines E-F. (Fig. 1.)
9. Draw similar oblique lines at an angle of 30° to the horizontal from the corners O. (Fig. 1.)





10. Cut out corners. (Fig. 2.)
11. Punch holes for rivets at prick marks in the center of the lines G-H and L-K.

    Break sides at 45° along lines A-B and C-D.
12. Turn all edges for No. 13 wire, having edges so that wire will be on outside of finished box, using folding machine.
13. Finish forming on square stake using hands and mallet.
14. Form laps around sides and rivet.

SEED BOX

Standard Practice Instructions—Continued

15. Cut wire 1″ longer than the distance around the top of box.
16. Bend wire to exact size of top of box using vice and hammer. The joint in the wire should come about 1″ from a corner.
17. Turn edge over wire using mallet and pliers.
18. Set wire down with machine.
19. Solder corners.

Questions to be Answered in Note Book

1. Find the thickness of No. 28 galvanized iron in decimal parts of an inch.
2. By referring to Follansbee Bros., or Apollo shop card find the weight per sq. ft. of No. 26 and No. 28 galvanized iron.
3. Which size of hand shears did you use in cutting the metal?
4. About how much are shears of this size worth?
5. By what other name are shears somtimes called?
6. Why are rivets tinned?
7. How many sheets are there in a bundle of No. 28 galvanized iron?
8. How many sq. in. of metal are there in this model?
9. What is the average weight per bundle of No. 28 galvanized iron?
10. Make a freehand drawing of this model.

QUART MEASURE

Specifications

Quart measure is to be made of No. 28 galvanized iron; top edge is to be wired with No. 13 wire; bottom is to be seamed on. Bottom and side seams are to be soldered.

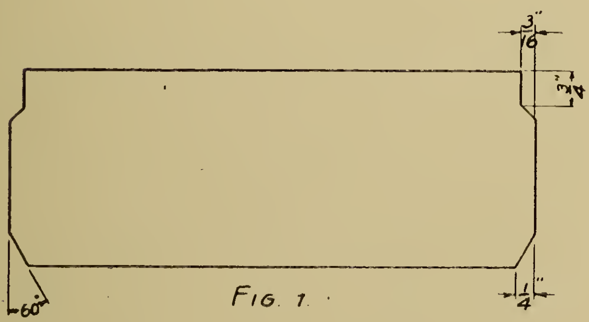


Fig. 1

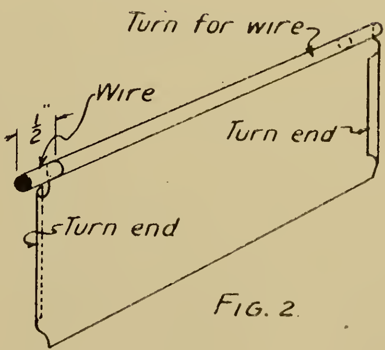


Fig. 2

Standard Practice Instructions

1. Cut stock 3⅞" wide, 16¼" long.
2. Clip upper corners for wire and lower corners for burr. (See Fig. 1.)
3. Set folder ⅛" for lock and place piece in machine with side clipped for wire toward left and turn lock in opposite directions on ends of piece. (Fig. 2).
4. Set Folder for turning edge for wire. (Fig. 2). See instructor.
5. Cut wire to required length.
6. Put wire in place and finish with wiring machine; drive it through ½", (See Fig. 2), from the end on which the lock is turned toward the wire.
7. Form to shape, having wire on outside, by placing wired edge in grooves at right hand end of rolls.
8. Groove seam with No. 4 Groover or as otherwise directed.

Standard Practice Instructions—Continued

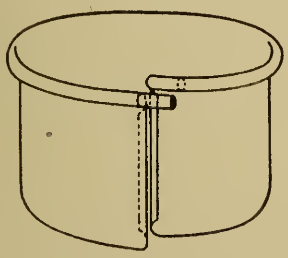


Fig. 3.

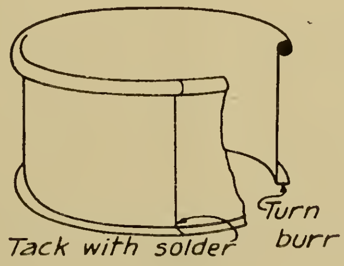


Fig. 4.

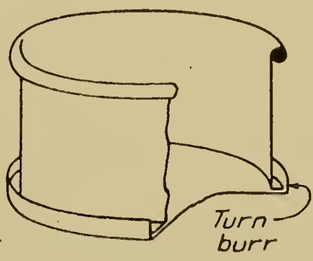
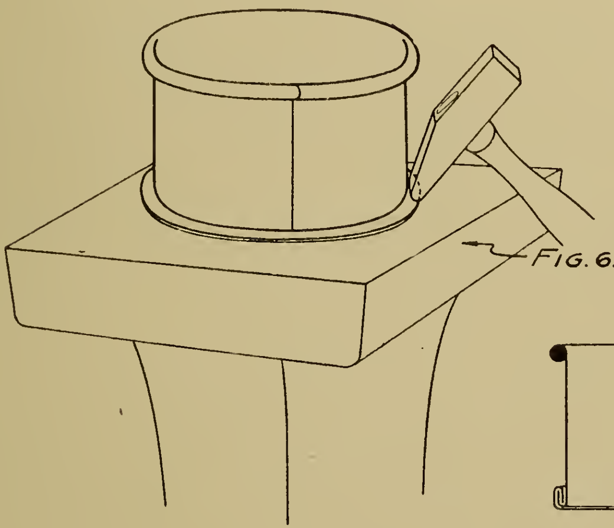


Fig. 5.



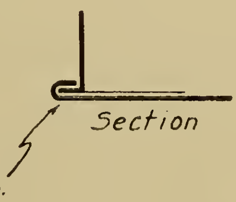


Fig. 6.

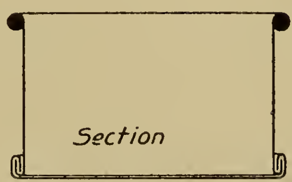


Fig. 7.

9. Turn 1/8" burr on bottom and tack seam with solder near bottom to keep seam from slipping apart. (Fig. 4.)
10. Cut circle for bottom 1/4" larger in diameter, than diameter over burr.
11. Turn burr on bottom with burring machine. (Fig. 5.)
12. Set down bottom with setting down machine.
13. Seam bottom up on seaming stake using mallet. (Fig. 6.)
14. Solder bottom seam with bottom soldering copper and side seam with pointed soldering copper, using clear muriatic acid.

QUART MEASURE

Questions to be Answered in Note Book

1. How is a soldering copper tinned?
2. Why is it tinned?
3. What kind of acid is used in soldering galvanized iron?
4. Of what metals is solder composed?
5. By what firm are the burring machine and the forming machine made?
6. What are the lengths of the rolls in the forming machine?
7. What is the diameter and depth of a quart measure?
8. Which end of the double seaming stake is used in seaming a quart measure?
9. What kind of a soldering copper is used in soldering the bottom?
10. Make a free hand sketch of the quart measure.

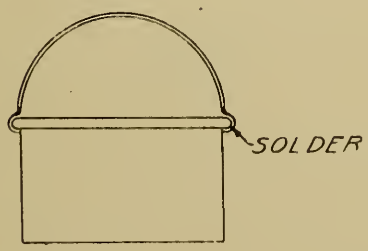
BISCUIT CUTTER

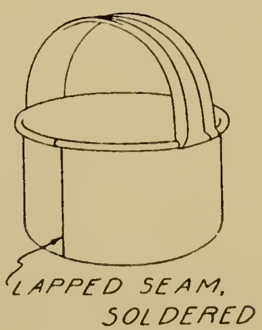
Specifications

Biscuit cutter is to be made of IC or IX bright tin and to be 2½" in diameter and 1½" in height, having seam lapped ¼" and handle double hemmed. Top edge to be wired.

Standard Practice Instructions

1. Cut stock 8 3/16" x 1¾".
2. Clip corner on one end for wire. (Fig. 1.)
3. Place wire in long side clipped for same.
4. Form to shape and solder lapped seam.
5. Cut handle 1½" in width and equal in length to one-half of the circumference of cutter, allowing ¼" extra in length for soldering under wire. (Fig. 2). Clip ends of handle. (Fig 2).
6. Turn double hem on sides of handle.
7. Form handle to shape and solder to cutter as shown in sketch.





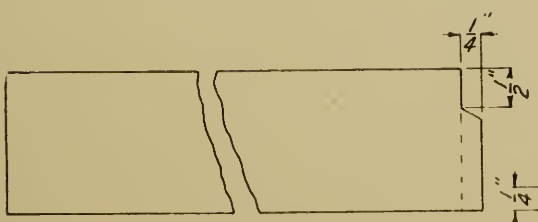


FIG 1

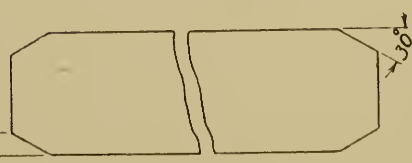


FIG 2

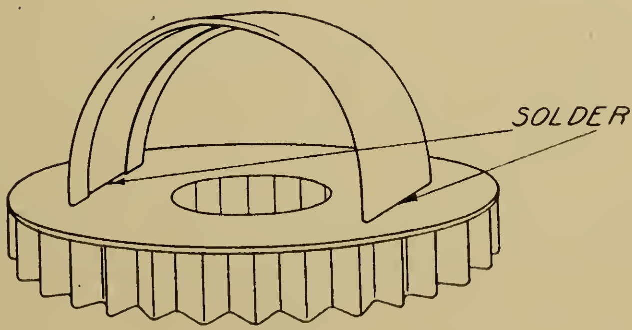
COOKIE CUTTER

Specifications

Cookie cutter is to be 3½″ in diameter and to have rim ⅞″ wide. The rim is to be corrugated and handle to be double hemmed.

Standard Practice Instructions

1. Cut circle for top 3 11/16″ in diameter and turn small burr on same.
2. Punch a 1″ hole in center of top.
3. Cut piece for rim and corrugate it by running it through gears of forming machine. (See instructor.)
4. Fit rim to top; solder ends together and fasten in place by soldering in several places.
5. Cut piece for handle 5½″ long by 1½″ wide.
6. Double hem sides of handle.
7. Form handle to a semicircle and solder to top.



DUST PAN

Specifications

Dust pan is to be made of No. 26 galvanized iron. Corners are to be riveted with 1 lb. rivets. Handle is to be seamed and riveted to bottom of pan.

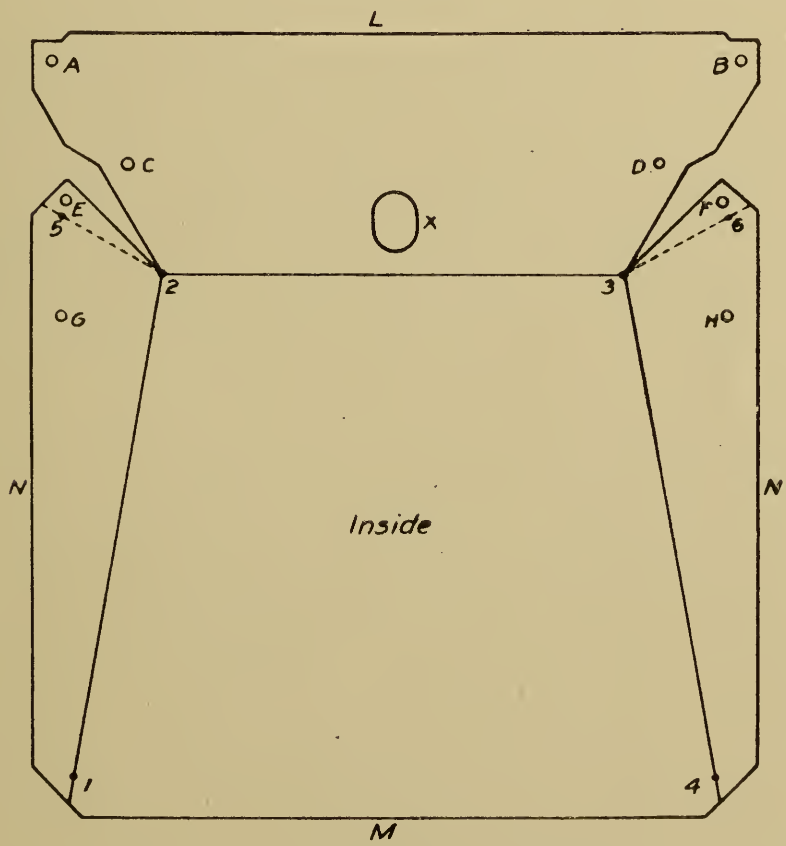


Fig. 1.

DUST PAN

Standard Practice Instructions

1. Cut stock for dust pan 12¼″ x 13¼″.
2. Mark corners and holes and cut as per pattern. (Fig. 1).
3. Indicate holes A - B - C - D - E - F - G - H as shown on sketch and punch with a solid punch for rivets.
4. Indicate marks 1 - 2 - 3 - 4 - 5 and 6 with sharp prick punch and punch hole X with ¾″ hollow punch for handle.
5. Mark lines 1 to 2, 2 to 3, and 3 to 4, as shown on sketch.
6. Make a light crease on lines 1 - 2 - 3 and 4 with beading machine.
7. Place word "inside" as shown on sketch.
8. Place word "outside" on opposite side of metal.
9. Turn 3/16″ hem on edge M towards back with folding machine set for a sharp edge. (Fig. 2) - (1).
10. Turn 3/16″ hem on edge L towards inside. (Fig. 2) - (2).
11. Turn edges N-N (Fig. 1), 3/16″ on folding machine set for wired edge and place No. 13 wire in same edges (Fig. 2) - (3).

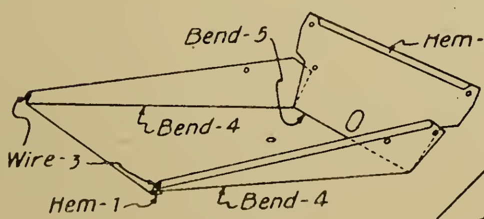


Fig. 2.

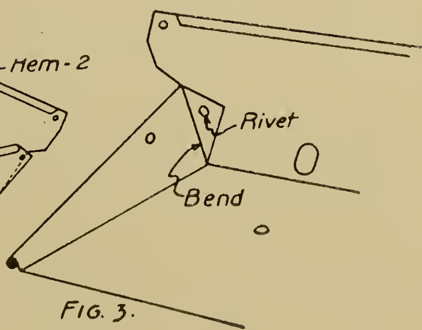


Fig. 3.

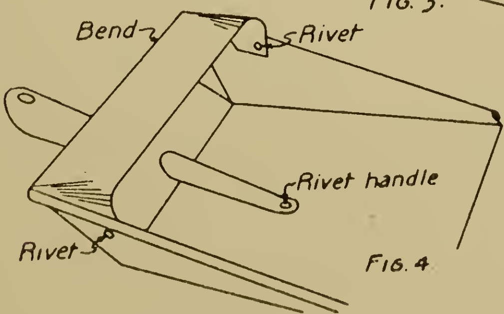


Fig. 4

DUST PAN

Standard Practice Instructions—Continued

12. Bend up sides at 60 degrees on lines 1 - 2 and 3 - 4 using cornice brake. (See instructor.) (Fig. 2)-(4).
13. Bend on line 2 - 3 using hands, square stake and mallet. (Fig. 2)-(5).
14. Bend laps on prick marks 5 and 6 and place inside. (Fig. 3).
15. Rivet corners together. (Fig. 3).
16. Bend top piece to place using cornice brake and pliers. (See instructor.) (Fig. 4).
17. Rivet top piece to sides. (Fig. 4).
18. Make handle like pattern and rivet in place. (Fig. 4).

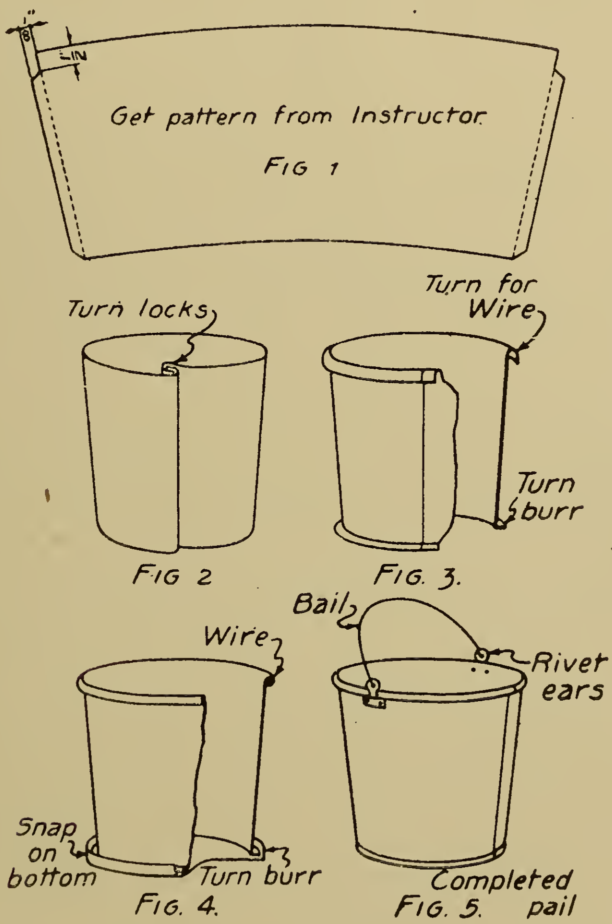
Questions to be Answered in Note Book

1. How many sheets of No. 26 galvanized iron are there in a bundle?
2. What is the average weight per bundle of No. 26 galvanized iron?
3. What machines were used in making this model that were not used in making the quart measure?
4. Where were these machines made? Give the approximate cost of them.
5. How long a piece of metal can be put in the cornice brake?
6. How long a piece of metal can be put in the folding machine?
7. Are there longer folding machines and cornice brakes made?
8. What is the length and cost of the cutting nippers used in this shop?
9. Of what kind of wood are tinners' mallets made?
10. Make a free hand sketch of dust pan.

TEN QUART WATER PAIL

Specifications

Pail is to be made of No. 26 galvanized iron; top edge is to be wired with No. 6 wire; handle is to be of No. 6 wire; pail is to be thoroughly soldered.



Standard Practice Instructions

1. Get out stock for body according to pattern.
2. Clip upper corners for wiring and lower corners for burr. (See Fig. 1).
3. Turn $\frac{1}{8}''$ locks for side seam in opposite directions. (Fig. 2).
4. Form to shape on forming machine. (Fig. 2).
5. Groove seam on grooving machine.

WATER PAIL

Standard Practice Instructions—Continued

6. Turn burr on bottom edge. (Fig. 3).
7. Turn upper edge for wire. (Fig. 3).
8. Form wire on forming machine.
9. Place wire in top and wire with wiring machine. (Fig. 4).
10. Solder side seam on the inside.
11. Cut out bottom ¼" larger than diameter over burr and turn ⅛" burr on it. (Fig 4).
12. Snap on bottom. (Fig. 4).
13. Set down bottom with setting down machine.
14. Seam bottom on double seaming machine.
15. Solder bottom and side seams.
16. Rivet on ears directly opposite each other. (Fig. 5).
17. Form bale and put in place. (See instructor.) (Fig. 5).

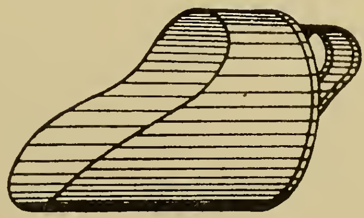
Questions to be Answered in Note Book

1 What are the diameters of No. 6 and No. 10 wire?
2. In what divisions is the scale on the circle shears marked?
3. How does this scale compare with the actual scale on a rule?
4. What are the largest and smallest size circles that this machine will cut?
5. What is the heaviest gauge iron this machine is made to cut?
6. What is the thickness in decimal parts of an inch, and how many pounds per sq. foot does this gauge iron weigh?
7. What is the cost of the circle shears?
8. What machine do we use in turning the edge of the pail for the wire?
9. About how much is this machine worth?
10. Make in note book a freehand drawing of the pail turned upside down.
11. How many bottoms can be cut from a sheet of iron............ x............?
12. How many sq. ft. of iron in .... bottoms?
13. How many sq. ft. of iron in a sheet of iron............ x ....?
14. How much waste in cutting .... bottoms from a sheet ....x............?
15. What % of waste in cutting .... bottoms from a sheet ....x............?

FLOUR SCOOP

Specifications

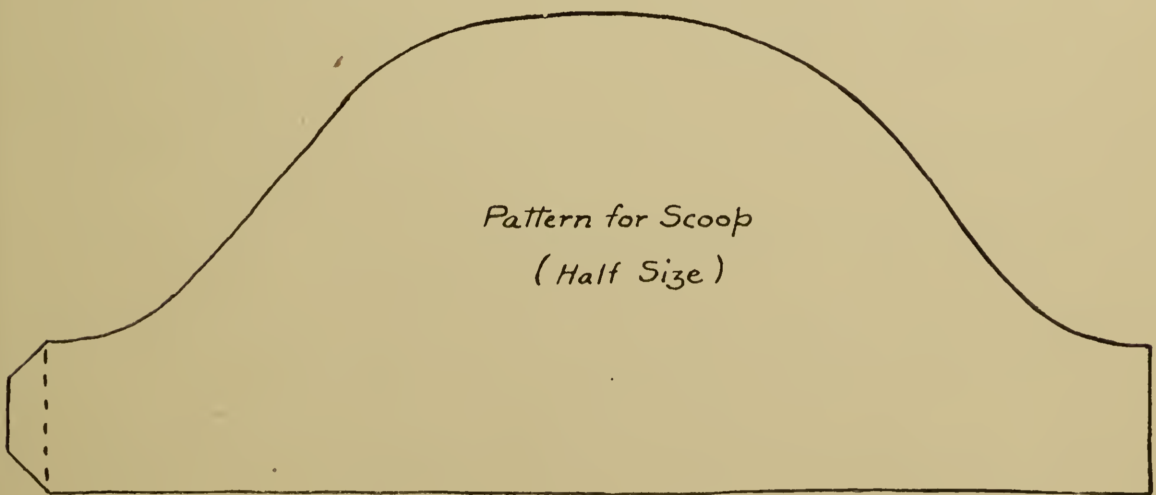
Flour scoop is to be made of IC bright tin. Back is to be burred and snapped on body of scoop and neatly soldered. Handle to have a false wire edge.



Standard Practice Instructions

(Watch carefully the instructor's demonstrations of soldering on tin.)

1. Get out stock for body of scoop according to pattern.
2. Form to shape on forming machine. (Fig. 1).
3. Solder body together with ends lapping ¼". (Fig. 1).
4. Cut back 3/16" larger than end of body.
5. Turn 3/32" burr on back. (Fig. 2).
6. Snap back on body. (Fig. 3).
7. Solder on outside. (Fig. 3).
8. Cut out handle according to pattern.
9. Turn edges 3/16" for false wiring.



FLOUR SCOOP

Standard Practice Instructions—Continued

10. Turn down false wire with turning machine.
11. Form handle on stake. (Fig. 4).
12. Solder handle on back of scoop. (Fig. 5).

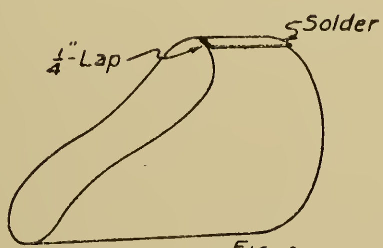
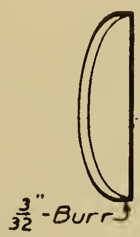


Fig 1.



Cross section of back

Fig 2

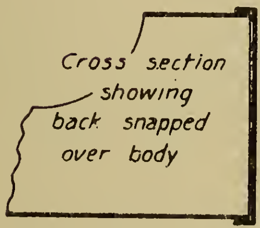


Fig 3

Fig 4

Form handle to this shape

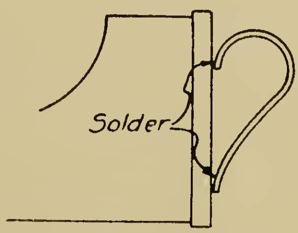


Fig 5

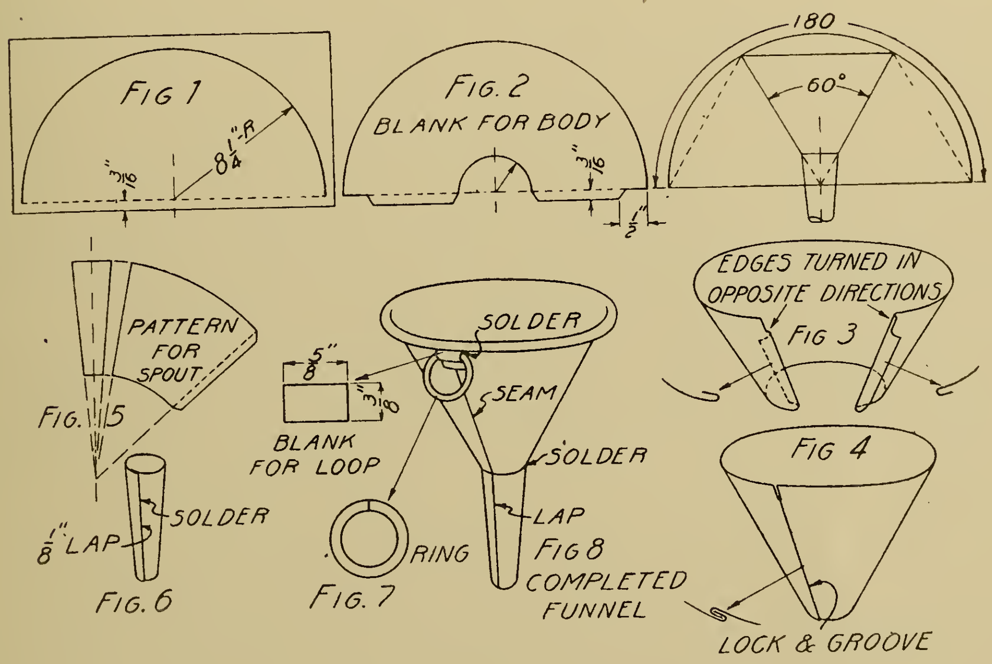
Questions to be Answered in Note Book

1. What is the size of a sheet of tin plate and how many are there in a box?
2. Of what is tin plate composed?
3. Would the term "a sheet of tin" be correct in referring to this metal?
4. How many flour scoops of the small pattern can be made from a sheet of tin?
5. What is the current price of IC bright tin per box?
6. From what sources can we find out the current price of tin?
7. What flux is used in soldering the tin?
8. How is this flux prepared?
9. What is the thickness of IC tin in decimal parts of an inch?

FUNNEL

Specifications

Sixty degree funnel is to be made out of IC or IX tin or No. 26 galvanized iron. Top of funnel is to be wired with No. 11 or No. 13 wire.



Standard Practice Instructions

1. Watch carefully the demonstration by instructor of the turning of the locks for the seam, also the fitting of the body and the forming of the wire ring.
2. Set dividers for the radius of the semicircle to diameter of the top of the required funnel, plus ¼" for No. 13 wire. (Fig. 1).
3. Place dividers 3/16" from the edge of blank and strike semicircle, this 3/16" allowing for locks. (Fig. 1).
4. Set dividers to the diameter of the hole required for the spout of the funnel, and using the same center as before strike small semicircle on pattern. (Fig. 2).
5. Cut out blank for body and clip upper corners for wire and lower corners for spout. (Fig. 2).

FUNNEL

Standard Practice Instructions—Continued

6. Turn edges for locks in opposite directions. (Fig. 3).
7. Form to shape on blow horn stake. (Fig. 4).
8. Lock edges together and groove, using No. 4 hand groover. (Fig. 4).
9. Turn top edge for wire and place wire in top of funnel. (Fig. 8).
10. Develop pattern for spout as shown in (Fig. 5) and cut out same.
11. Form spout to shape having edges lap 1/8", using blow horn stake, and solder lapped edges together. (Fig. 6).
12. Solder spout to body of funnel, having seam of spout in line with the seam of the funnel. (Fig. 8).
13. Form 3/4" ring of wire (Fig. 7) (See instructor), and fasten to funnel by loop placed under wire at the seam. (Fig. 8).

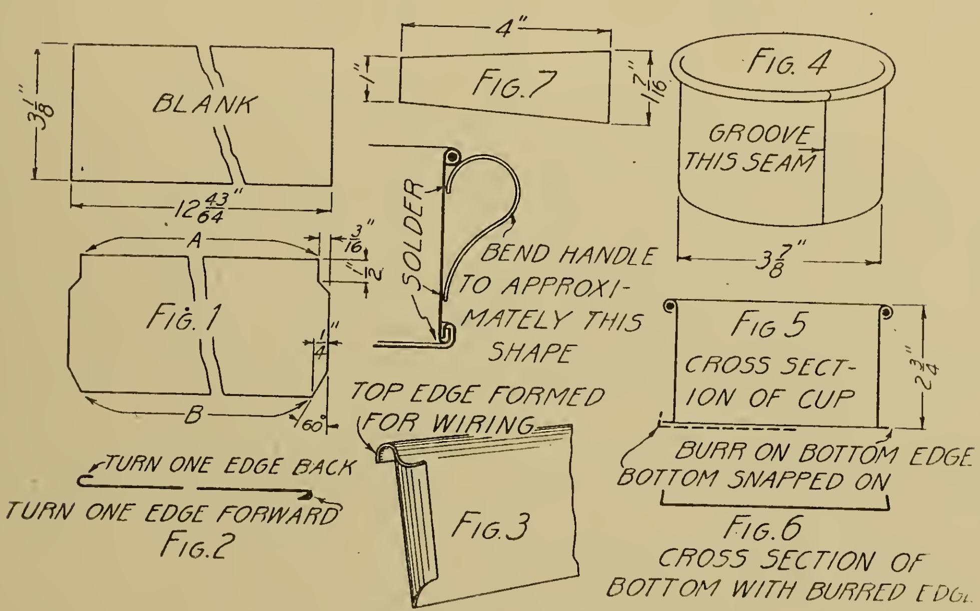
Questions to be Answered in Note Book

1. What is iron ore?
2. Is it usually found pure?
3. What are the common impurities that are most harmful to the finished material?
4. Where are the largest deposits of iron ore found in this country? How many tons are mined yearly?
5. How is the ore mined in this district?
6. How is the ore shipped from the mines?
7. Where is it sent?

TIN CUP

Specifications

Tin cup is to be made of IC bright tin. Bottom is to be double seamed. Top is to be wired with No. 13 wire.



Standard Practice Instructions

(Watch carefully the instructor's demonstration of the method of turning a false wired edge on the handle and the forming of same.)

1. Get out stock for body of cup allowing ¼" on top edge for wiring, ⅛" on bottom for double seam and ½" more than circumference for lock. (Fig. 1 or sketch of blank).
2. Cut upper corners of blank for wire. (Fig. 1-A). Cut lower corners of blank for seam. (Fig. 1-B).
3. Turn ⅛" sharp lock on ends of piece in opposite directions for side seam. (Use folding machine).
4. Turn 3/16" round edge on upper edge for wire and put wire in place, having wire project ½" beyond the end on which the lock is turned from the wire.

TIN CUP

Standard Practice Instructions—Continued

5. Place wired edge in small grooves at right hand end of forming tool and form to shape having wire on outside.
6. Lock ends together and groove with a No. 4 hand groover.
7. Pound down seam with mallet and solder seam on the inside.
8. Turn burr on bottom edge for seam.
9. Cut bottom 3/16" larger than diameter over burr.
10. Turn burr on bottom with burring machine. (Fig. 6).
11. Snap bottom on side piece and set down with setting down machine.
12. Seam up bottom with seaming machine or by hand.
13. Cut stock for handle according to sketch. (Fig. 7).
14. Turn edges for false wiring on handle and form to shape in small rolls.
15. Solder bottom on inside of cup.
16. Solder handle on cup at the side seam.

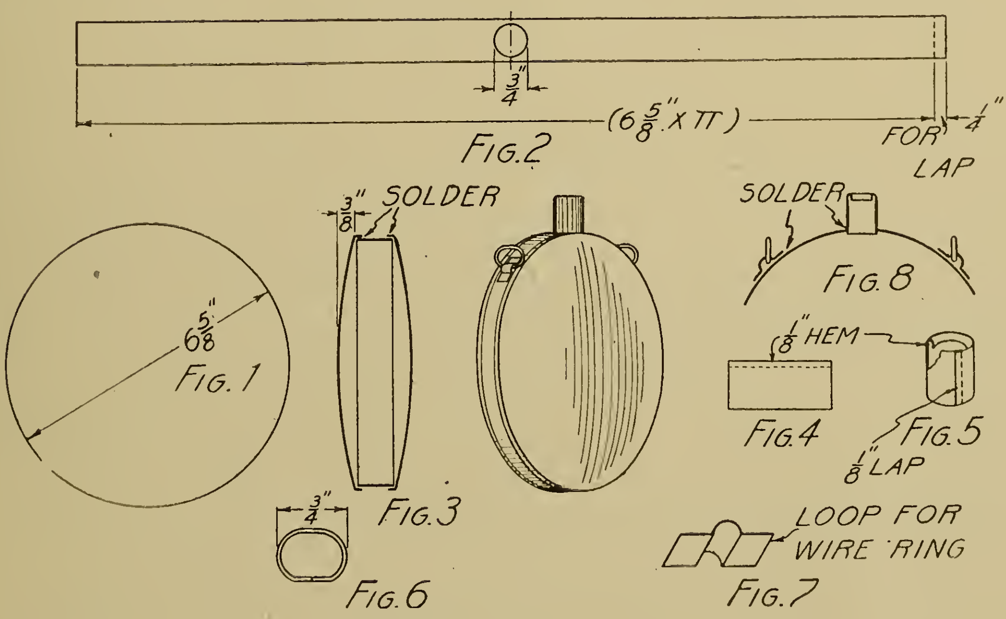
Questions to be Answered in Note Book

1. How many of these completed cups can be made from a sheet of IC tin 20" x 28"?
2. What is the meaning of the term IC tin?
3. When are other terms used?
4. How is acid prepared to solder on tin?
5. For what other purpose is this acid used?

CANTEEN

Specifications

Canteen is to be made 6⅝″ in diameter, of IC bright tin. Sides are to be raised and burred and carefully soldered to a 1″ rim.



Standard Practice Instructions

(Watch carefully the demonstration by instructor as to the proper use of the raising hammer.)

1. Cut two circles for the sides. (Fig. 1).
2. Using the raising hammer and block, raise the sides about ⅜″.
3. Turn 3/32″ burr on sides.
4. Cut piece for rim 1″ in width and equal in length to the circumference of the sides, allowing ¼″ for lap. Punch ¾″ hole in center of piece for spout. (Fig. 2).
5. Form rim to shape and solder ends together.
6. Solder sides on rim. (Fig. 3).
7. Cut piece for spout 1″ in width and equal in length to the circumference of a ¾″ circle allowing ⅛″ for lap. (Fig. 4).

CANTEEN

Standard Practice Instructions—Continued

8. Turn 1/8" hem on one side of piece and form to shape, having hem on inside. (Fig. 4 and 5).
9. Solder seam of spout and solder spout to canteen.
10. Make 2 wire rings (Fig. 6) and 2 loops (Fig. 7) and solder to rim on opposite sides of the spout about 3" from the spout.

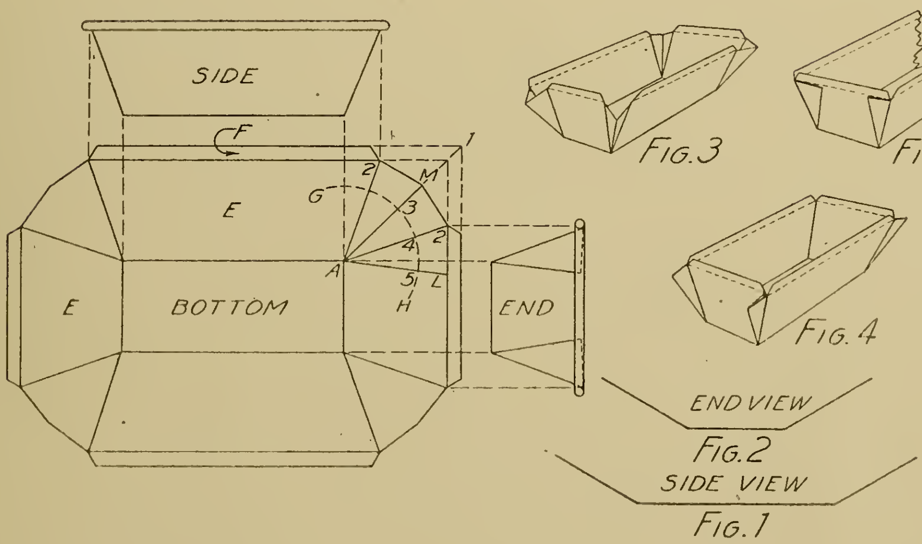
Questions to be Answered in Note Book

1. What is a blast furnace?
2. For what purpose it is used?
3. Describe the stove of the blast furnace and its use.
4. What materials are used in connection with the ore and how is it reduced to a liquid state?
5. What is the use of the limestone?
6. What is slag?
7. How is molten iron released and how much at one filling?
8. Describe the manner in which the slag and the molten iron is removed.
9. What is the product of the blast furnace called?

BREAD TIN

Specifications

Bread tin is to be made of IC bright tin. The corners are to be folded around the ends and a No. 13 wire is to be placed in the top edge.



Standard Practice Instructions

1. Cut stock for bread tin equal in length and width to the bottom plus height (E) for sides and ends, allowing ¼″ (F) for wire.
2. Mark size of bottom and draw line A-1.
3. Make lines A-2. These lines determine the flare of the pan.
4. Set dividers at a radius less than the height of the pan and using (A) for a center strike arc G-H.
5. On arc G-H make the distance between 4 and 5 equal to that between 3 and 4.
6. Draw line A-L through point 5.
7. Make the distance A-M equal to the distance A-L.
8. Repeat this layout on other corners.
9. Cut out corners 1 - 2 - M.

BREAD TIN

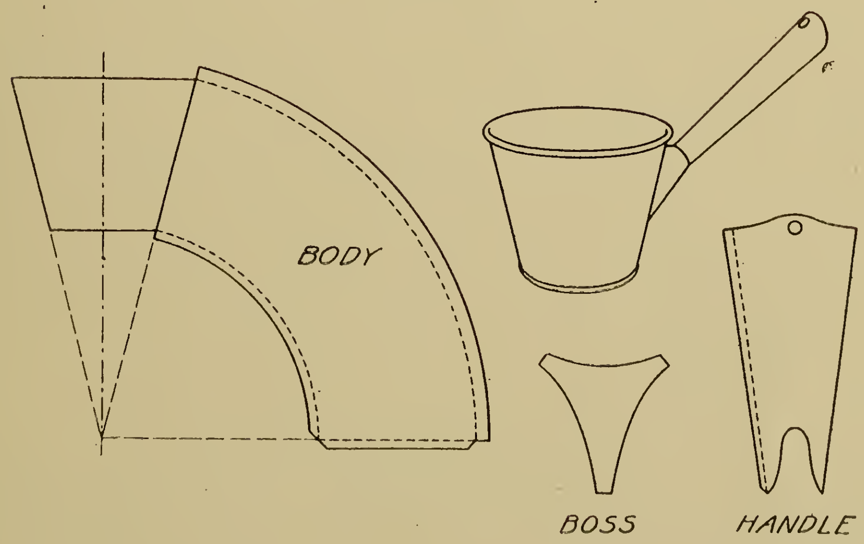
Standard Practice Instructions—Continued

10. Bend up sides slightly with hand folder (see instructor). (See Fig. 1 end view).
11. Bend ends in like manner. (Fig. 2 end view).
12. Crease corner on hatchet stake, using hands only. (Fig. 3).
13. Draw up sides and ends until corners are formed. (Fig. 4).
14. Fold corners around ends, using mallet. (Fig. 5).
15. Turn upper edge for wire, using edge folder.
16. Bend wire to shape and size of pan top.
17. Put wire in place and finish with wiring machine.

DIPPER

Specifications

Dipper is to be made of IX bright tin. Capacity one quart.



Standard Practice Instructions

1. Develop pattern for body to size required. Refer to table for size. (See page 56).
2. Cut stock as directed and clip upper corners for wire and lower corners for burr.
3. Form to shape and groove seam.
4. Place wire in top and turn 1/8″ burr for bottom.
5. Cut bottom and turn burr.
6. Seam bottom on, and solder dipper.
7. Make handle to size as directed by instructor and solder to dipper.

LARGE SIZE WATER PAIL

Specifications

Water pail is to be made of No. 26 galvanized iron; top edge to be wired with No. 6 coppered market wire; bottom edge to be wired with No. 10 wire; bottom to be set ¾" up from bottom edge; handle to be made of ¼" rod.

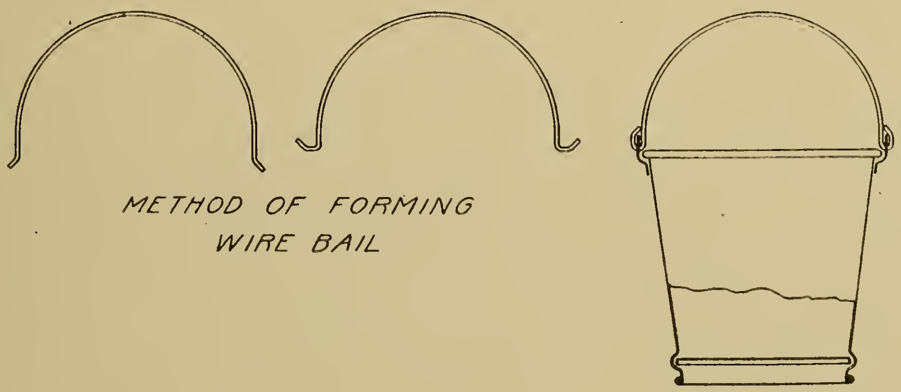


FIG. 1

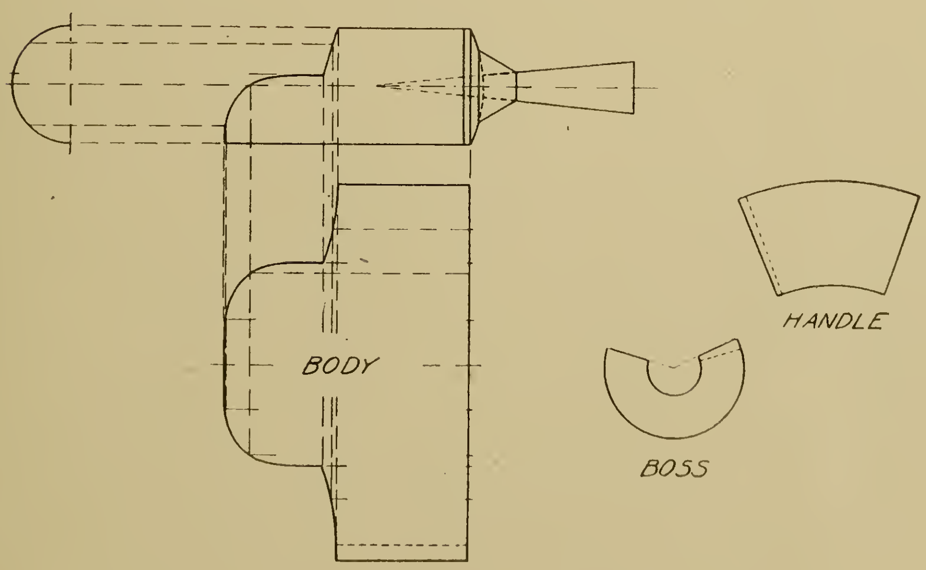
Standard Practice Instructions

1. Cut stock for body according to pattern.
2. Clip upper corners for No. 6 wire and lower corners for No. 10 wire.
3. Turn locks in opposite direction.
4. Form to shape in forming machine.
5. Groove seam on grooving machine.
6. Turn upper edge for No. 6 wire and lower edge for No. 10 wire.
7. Cut and form wires and place in top and bottom edges.
8. Run a swedge in the proper place; also run a 3/16" bead on outside of pail ¾" from the bottom edge. (Fig. 1).
9. Cut bottom ¼" larger in diameter than diameter at extreme part of pail in the bead.
10. Turn ⅛" burr on bottom and force bottom in place in bead and solder pail.
11. Rivet ears over seam at top of pail.
12. Cut bail; form to shape, and put in place. (See cut for forming bail).

GROCERS HAND SCOOP

Specifications

Scoop is to be made of No. 26 galvanized iron. The back is to be raised. It is to have a well proportioned handle soldered to back.



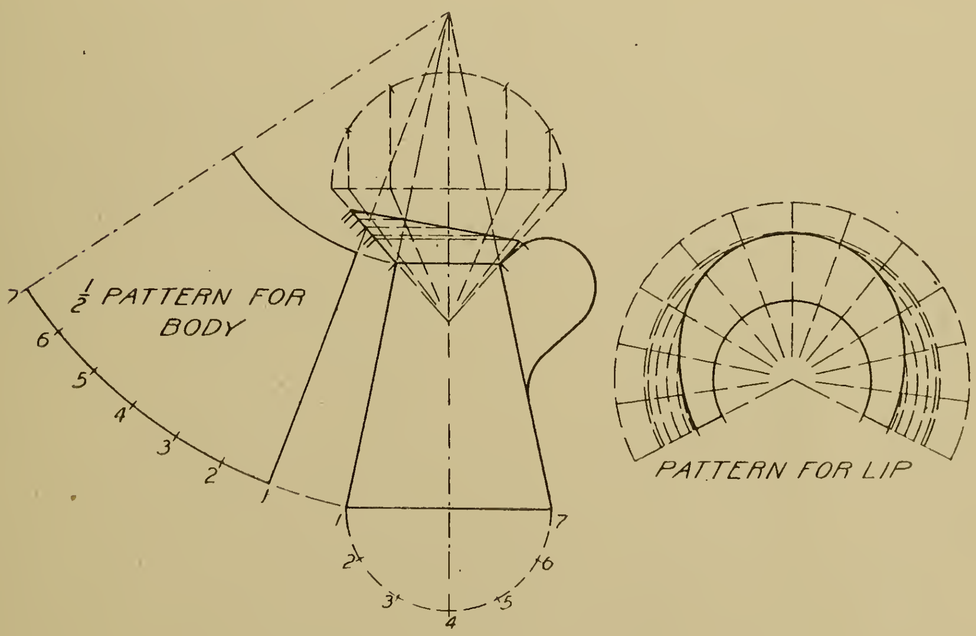
Standard Practice Instructions

1. Cut out body and handle for scoop according to pattern developed.
2. Turn 1/8″ locks on ends; form to shape and groove seam.
3. Cut circle for back 7/16″ larger in diameter than diameter of scoop. This allows for the raising of the back.
4. Raise the back to about 1/2″ in height.
5. Turn 1/8″ edges on back and snap on body of scoop.
6. Solder on back; form handle and solder in place.
7. Make boss for handle as per pattern, and solder to scoop.

FLARING LIQUID MEASURE

Specifications

Measure is to be made of IX bright tin or material selected by instructor. The measure is to hold one-half gallon. The upper edge is to be wired with No. 13 wire and the bottom double seamed to the body. The handle and lip must be in good proportion to the body. The handle is to have wired edges.



Standard Practice Instructions

1. Develop pattern for body and lip measure by referring to drawing and table for method and size.
2. Cut stock, properly clip corners for wire and burr.
3. Place wire in upper edge and form to shape.
4. Groove seam together, turn burr for bottom and solder side seam.
5. Cut bottom, turn burr and double seam to body.
6. Make handle and lip to size as directed by instructor.
7. Hem upper edge of lip (using burring machine) and wire edges of handle.
8. Solder handle and complete measure by soldering bottom.

WINDOW BOX

Specifications

Window box is to be made of No. 26 galvanized iron. It is to have an inside false bottom for ventilating and drainage and ½" double edge projecting around top of box. Corners are to be mitered and stayed.

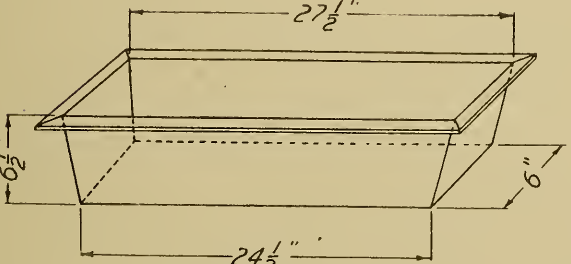


FIG 1

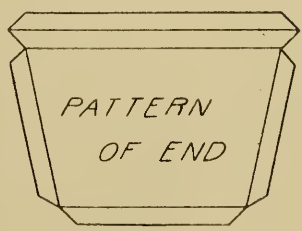
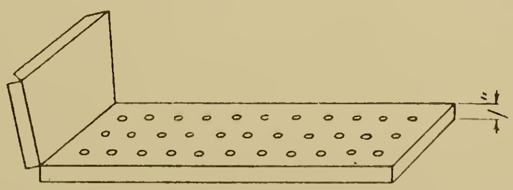


FIG 2


INSIDE BOTTOM - FIG 3

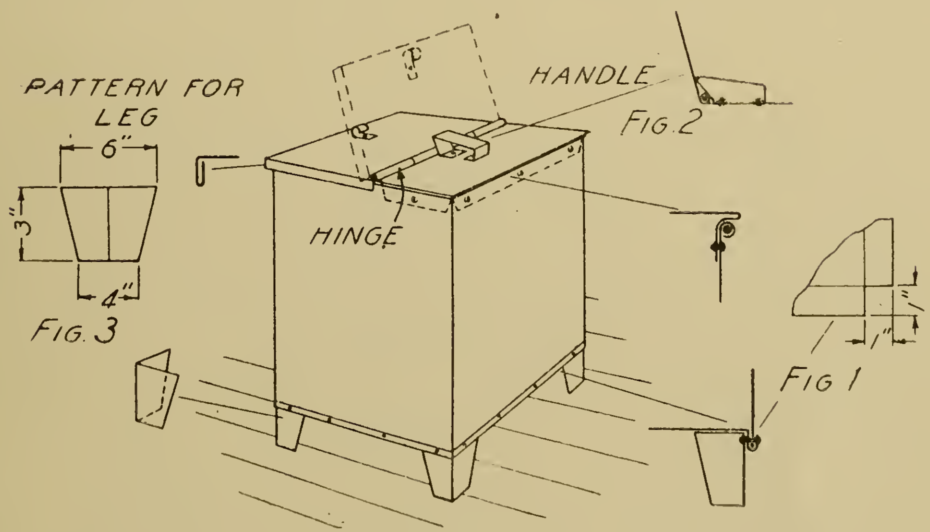
Standard Practice Instructions

1. Cut stock for sides and bottom in one piece allowing for top edge. (See Fig. 1 for dimensions).
2. Form to shape in cornice brake.
3. Cut out ends to pattern developed. (Fig. 2).
4. Tack ends in place with solder and finish by riveting.
5. Make inside bottom according to sketch. (Fig. 3).
6. Solder box water tight.

OILY WASTE CAN

Specifications

Waste can is to be made 12″ x 12″ x 14″. 14″ is the height. It is to be made of No. 26 galvanized iron; it is to have four legs; the cover is to close automatically.



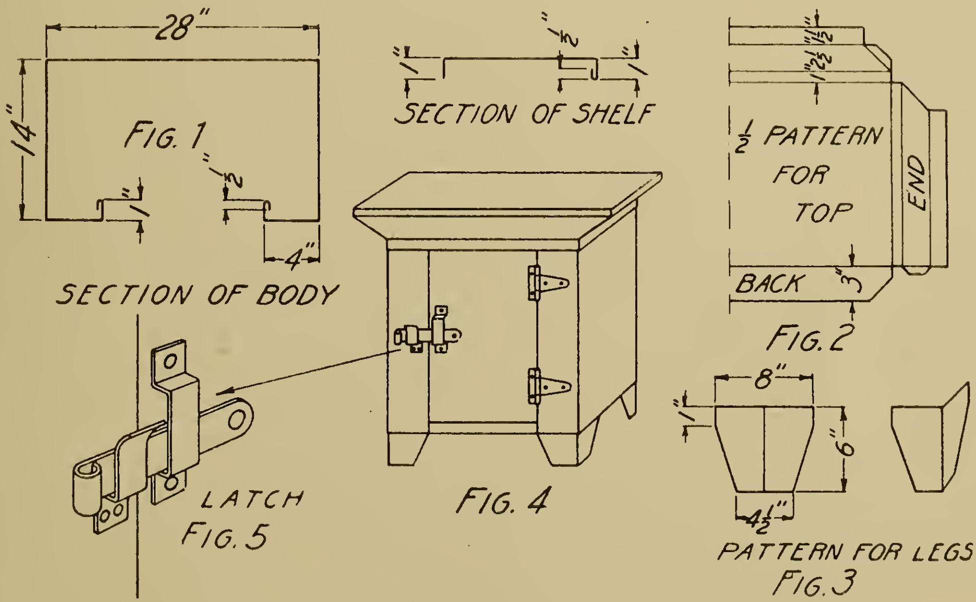
Standard Practice Instructions

1. Cut stock for body of can equal to dimensions given in specifications allowing for No. 6 wire on top and on seam.
2. Form to shape; lock seam and place wire in top edge.
3. Cut bottom 1″ larger all around than size of can.
3. Cut corners as shown in sketch and fold edges to shape. (Fig. 1).
5. Place bottom on can and fasten with solder and rivets.
6. Make hinged cover and handle as shown in sketch. (Fig. 2).
7. Fasten cover to can using 3/32″ x ½″ round stove bolts.
8. Make four legs and rivet to each corner of can. (See Fig. 3 for dimensions.)

STAIN CABINET

Specifications

Stain cabinet is to be made of No. 26 galvanized iron; to be 28″ high, 28″ wide, and 14″ deep; to have two shelves; door to be made double and riveted to cabinet with two 3″ Tee hinges; also to have a latch fastener. The top is to project 1½″ beyond cabinet on front and ends; back to be straight.



Standard Practice Instructions

1. Cut stock 28″ in width and equal in length to the sum of the lengths of the back, ends, front plus inside projections for the door. (Fig. 1).
2. Make bottom with front edge double, projecting down 1″; back and ends to be made 1″ single edge.
3. Lay out top for mitered corners; form to shape and solder corners. (Fig. 2).
4. Make shelves same as bottom excepting 1″ narrower to allow for inside projection for door.

Standard Practice Instructions—Continued

5. Cut legs to the dimensions as shown in sketch. (Fig. 3).
6. Assemble cabinet, using 3/32″ x ½″ stove bolts or metal screws.
7. Make door as shown in sketch (Fig. 4), having it lap ½″ all around on cabinet; rivet on hinges and bolt hinges to cabinet.
8. Make door latch as shown in sketch. (Fig. 5).

GARBAGE CAN

Specifications

Capacity 8½ gallons. Diameter 14″. Sides of can are to be made of No. 26 galvanized iron; bottom is to be made of No. 24 galvanized iron, to be set up 1″ with edge turned over a band (1″ x 1/16″) iron, band to be riveted to body of can. Handle is to be of ¼″ rod. Pitched cover is to be made with a 1½″ pitch, rim of cover to be finished 1¼″ deep with a No. 10 wire in edge.

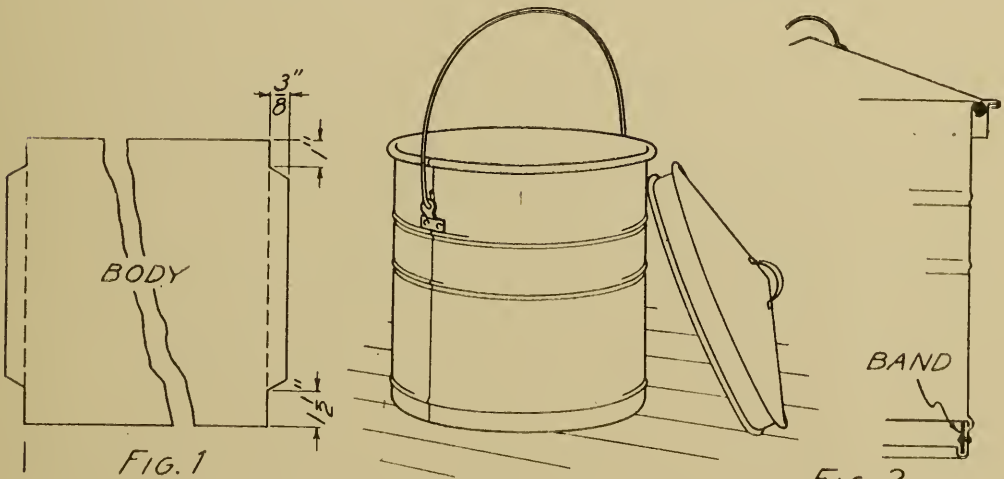


FIG. 1 FIG. 2

Standard Practice Instructions

1. Cut stock to required dimensions and clip corners as shown. (Fig. 1).
2. Turn locks in opposite directions on pipe folding machine, having edge clipped 1″ placed to the right.
3. Turn edge ½″ at right angles on side clipped 1″ and place 3/16″ rod or No. 6 wire in edge, rod to project 1″ beyond the end on which the lock is turned from the rod.
4. Form to shape in forming machine with rod on outside.
5. Lock together and groove with a No. 1 groover.
6. Run two swedges in the proper place in the can. (Fig. 2).

Standard Practice Instructions—Continued

7. Run small bead on outside of can 1⅜″ from bottom. (Fig. 2).
8. Cut bottom ⅜″ larger in diameter than diameter of can at inside of bead.
9. Turn 3/16″ edge on bottom and snap into can with burr side down; solder sides and bottom.
10. Cut 1″ band for bottom; clamp into can and mark for proper length.
11. Rivet band in place and turn metal extending below over band.
12. Cut rim for cover 1¾″ in width, and 3″ longer than circumference of can outside of wire.
13. Form rim to shape and make it ¾″ longer than circumference outside of wire, allowing 2″ for lap.
14. Clip one end for wire and burr; rivet ends together; place wire in one edge and turn 3/16″ burr on other side.
15. Refer to drawing for pitch cover, and finish cover with handle. (See page 55).

OIL FILTER

Specifications

Oil filter for the purpose of filtering engine oil through water and cotton waste. It is to be made of No. 26 galvanized iron. Size: 10″ in diameter and 14″ high. A 1/8″ faucet is to be placed 5″ up from the bottom to drain off the oil. Cover is to be made with a 1″ pitch. 1/4″ mesh screen is to be placed in bottom of waste receptacle.

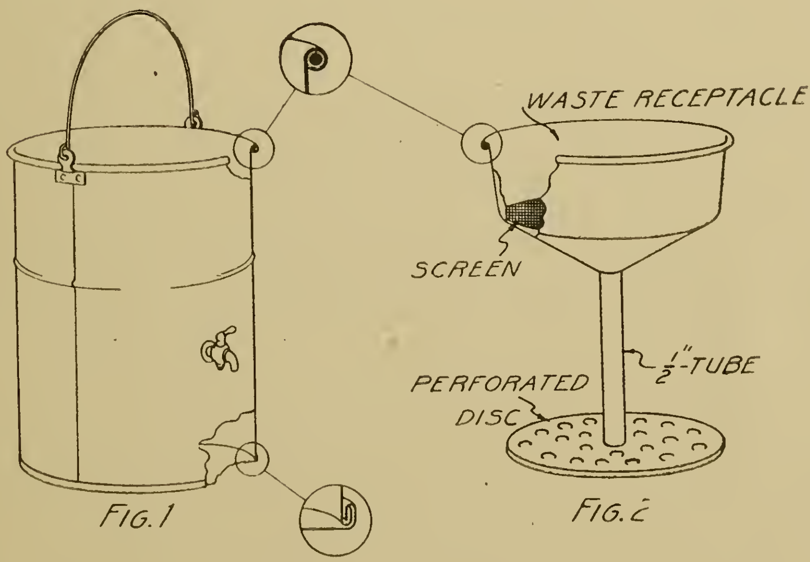


FIG. 1 FIG. 2

Standard Practice Instructions

1. Cut stock for body of pail equal to the circumference of a 10″ diameter and 14″ in height, allowing for No. 6 wire on top and all seams. (Fig. 1).
2. Cut upper corners for wire and lower corners for burr.
3. Turn 1/8″ locks on end of piece and place No. 6 wire in top, wire to project 1″ beyond the end on which the lock is turned from the wire.
4. Form to shape and groove seam.
5. Turn 1/8″ burr on bottom edge.

OIL FILTER

Standard Practice Instructions—Continued

6. Cut circle for bottom; turn burr and seam in place.
7. Develop patterns for receptacle to hold the waste. (Fig. 2).
8. Turn locks; form to shape; place No. 10 wire in top and seam on cone shaped bottom.
9. Make ½″ tube long enough to reach from waste receptacle to within ¼″ from bottom of pail.
10. Cut disc 9½″ diameter and perforate with ⅛″ holes.
11. Turn burr on edge of disc.
12. Cut ½″ hole in bottom of receptacle and solder tube in place.
13. Cut ½″ hole in center of disc and solder on lower end of tube having burred edge of disc down.
14. Cut hole in side of pail 5″ from bottom and solder faucet in place.
15. Rivet ears on pail; form bail and put in place.
16. Make cover by referring to drawing for pitched covers on Page 55.

MINNOW PAIL

Specifications

Minnow pail is to be made double, of No. 26 galvanized iron. Inside pail is to have an air chamber for floating the pail. Lower part of inside pail is to be made of 1/8″ mesh galvanized screen secured to a galvanized iron bottom.

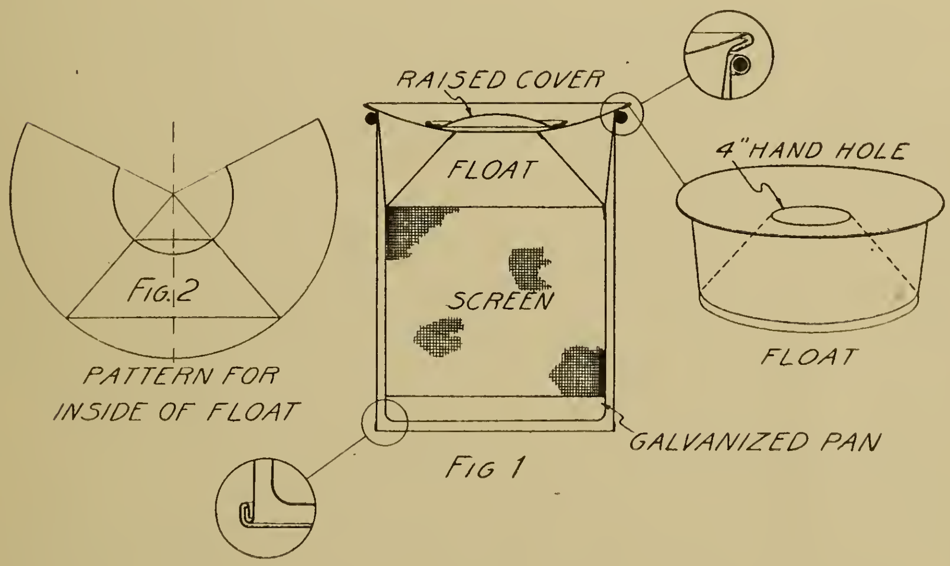


FIG 1

Standard Practice Instructions

1. Cut stock for body of pail equal to the circumference of a 10¾″ diameter, and 11″ in height allowing for a No. 7 wire on top and all seams. (Fig. 1).
2. Refer to oil filter for instructions for making pail.
3. Develop pattern for air chamber according to sketch. (Fig. 2).
4. Solder seams together air tight.
5. Make pan with a 1″ rim for bottom equal in diameter to the bottom part of air chamber.
6. Cut screen to required size and solder in place.
7. Make cover and bail for top of inside pail and fasten in place.

ASH CAN

Specifications

Ash can is to be made of No. 24 galvanized iron. Bottom is to be set up 2″ with the edge turned over a band 2″ x ⅛″ iron, iron band to be riveted to body of can and to project ½″ below can bottom. Body of can is to have a ¼″ rod around bottom and a No. 6 wire around top. A 1½″ x ⅛″ band to be placed around inside of top edge and to project ½″ above top. Top band is to be riveted to can. Bottom is to be soldered inside. Handles are to be properly placed on sides of can.

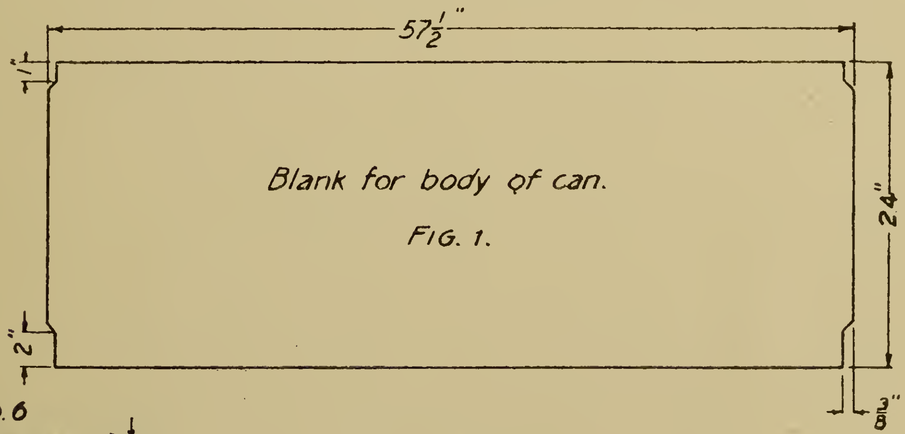


FIG. 1.

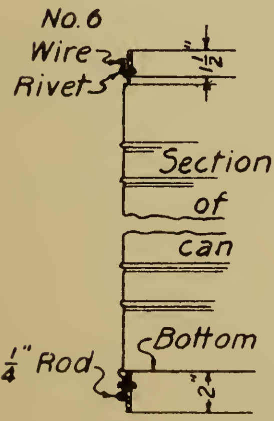


FIG. 2.

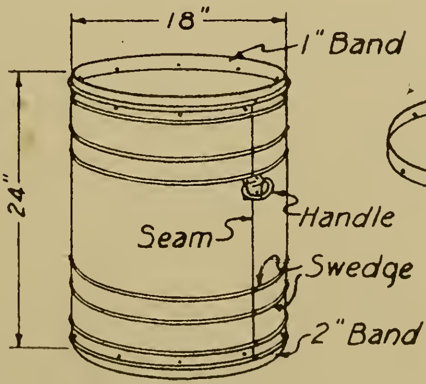


FIG. 3.

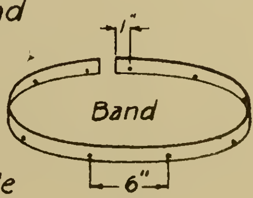


FIG. 4.

Standard Practice Instructions

1. Cut stock 24″ x 57½″ and clip ends as shown. (Fig. 1).
2. Turn locks in opposite directions on pipe folding machine, having side clipped 2″ placed to the right.

ASH CAN

Standard Practice Instructions—Continued

3. Turn edge 11/16″ at right angles on side clipped 2″ (using cornice brake) and place a 1/4″ rod in same edge. Rod is to project 1 1/2″ beyond the end on which the lock is turned from the rod.
4. Form to shape in forming machine with rod on the outside. (Fig. 3).
5. Lock together and groove with a No. 1 had groover.
6. Turn edge for No. 6 wire in large turning machine and form wire to size and place in same edge. (See Instructor). (Fig. 2).
7. Run 4 swedges in the proper places in the can. (Fig. 2).
8. Run small bead on the inside of the can 1″ from the top edge. (Fig. 2).
9. Run small bead on the outside of the can 1 1/2″ from the bottom edge. (Fig. 2).
10. Cut piece for the bottom 19″ square and cut a 18 3/8″ circle from this piece, and turn burr on same.
11. Cut two bands for can 57″ long, one band 1 1/2″ x 1/8″ for the top and one band 2″ x 1/8″ for the bottom. (Fig. 4).
12. Clamp bands in can and mark to proper length.
13. Take bands and cut on mark for length and punch holes about 6″ apart near one edge of band. (Fig. 4).
14. Place bands in can and rivet in place. (Fig. 2).
15. Rivet handles under second swedge from top of can, one on the seam and other on the opposite side. (Fig. 3).

Questions to be Answered in Note Book

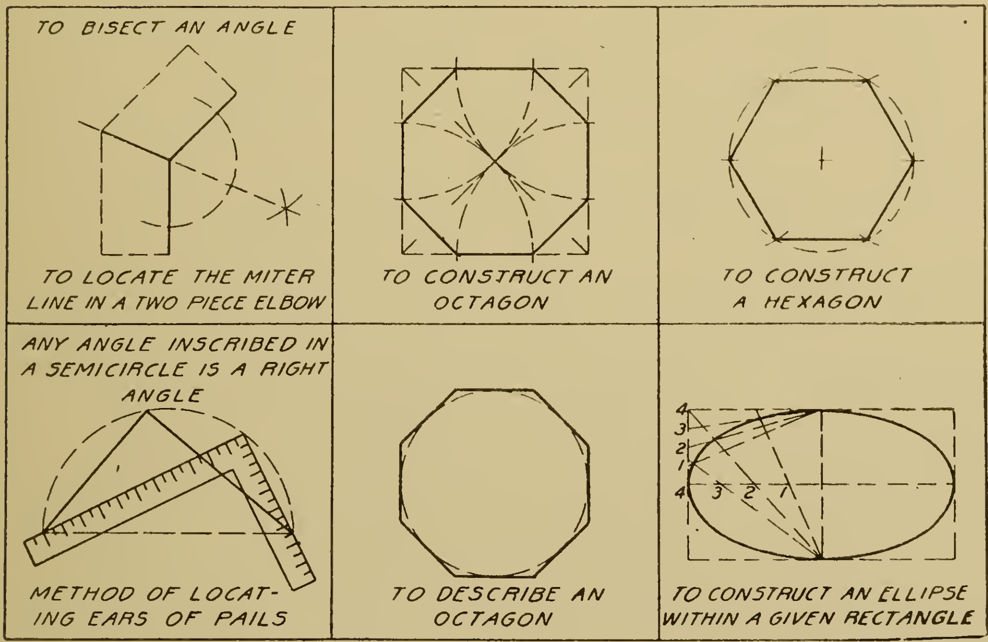
1. How many square feet of metal used in making this can?
2. What is the weight per foot of 1 1/2″ x 1/8″ and 2″ x 1/8″ band iron?
3. Using table weights of galvanized iron and band iron, find weight of this can.
4. What is the melting point of the following metals—Solder, Lead and Tin?

ASH CAN

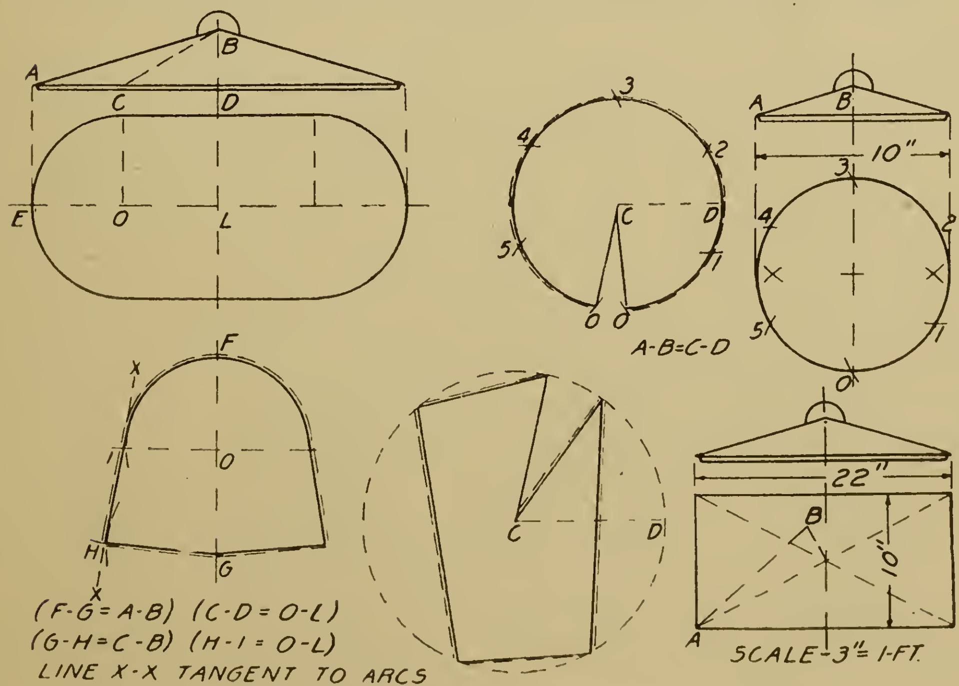
Questions to be Answered in Note Book—Continued

5. Of what is galvanized iron composed?
6. What is a tinner's rule?
7. For what purposes can it be used?
8. About what is the retail price of ash cans?
9. What is the cost at current prices of the material used in making an ash can?

SOME PRACTICAL GEOMETRICAL PROBLEMS USED IN SHEET METAL WORK



DEVELOPMENT OF PATTERNS FOR PITCHED COVERS



DIMENSIONS FOR FLARING PAILS, DIPPERS AND LIQUID MEASURES

In making liquid measures it is necessary that care be observed as to accuracy in the dimensions and the development of the patterns. Before they can be used for commercial purposes they must be sealed by the proper officials.

The following schedule gives dimensions commonly used by sheet metal workers:

Liquid Measures

Size	Top Diameter Inches	Bottom Diameter Inches	Height Inches
1 Gallon	5.	6.50	8.875
½ Gallon	3.45	5.18	7.78
1 Quart	2.75	4.12	6.18
1 Pint	2.14	3.75	4.25
½ Pint	2.	2.50	3.625

Dippers

Size	Top Diameter Inches	Bottom Diameter Inches	Height Inches
1 Quart	5.25	4	3.75
2 Quart	7.	5	4.75

Pails

Size	Top Diameter Inches	Bottom Diameter Inches	Height Inches
17 Quarts	12.50	10	10
14 Quarts	11.50	8	10.875
10 Quarts	10.125	7.875	9.25
8 Quarts	10	6.50	8.50
6 Quarts	8	6	8.93
4 Quarts	7.50	5.25	7.25
2 Quarts	6	5	5

APPROXIMATE GAUGE NUMBER FOR COPPER

Ounces per Square Foot	U. S. Gauge Number	Thickness Inch	Ounces per Square Foot	U. S. Gauge Number	Thickness Inch
5	38	.00685	28	20	.03835
6	35	.00821	30	19	.0412
7	33	.00958	32	19	.0438
8	31	.01095	34	18	.0465
9	30	.01232	36	18	.0494
10	29	.01370	40	17	.0549
11	28	.01547	44	16	.0604
12	27	.01693	48	15	.0658
13	26	.01780	52	15	.0712
14	26	.01917	56	14	.0767
15	25	.02052	60	14	.0822
16	25	.02185	64	13	.0876
18	24	.02465	72	12	.0984
20	23	.02748	80	12	.1095
22	22	.03015	88	11	.1205
24	22	.03290	96	10	.1315
26	21	.03551			

GAUGES AND WEIGHTS OF SHEET ALUMINUM

No.	Thickness Inch	Weight per Square Foot	No.	Thickness Inch	Weight per Square Foot
0000	.46	6.406	19	.036	.5
000	.41	5.704	20	.032	.445
00	.365	5.08	21	.028	.396
0	.325	4.524	22	.025	.353
1	.289	4.029	23	.023	.314
2	.258	3.588	24	.02	.28
3	.229	3.195	25	.018	.249
4	.204	2.845	26	.016	.222
5	.182	2.534	27	.014	.197
6	.162	2.256	28	.013	.176
7	.144	2.009	29	.011	.157
8	.128	1.789	30	.01	.14
9	.114	1.594	31	.009	.124
10	.102	1.418	32	.00795	.1107
11	.091	1.264	33	.00708	.0985
12	.081	1.126	34	.0063	.0877
13	.072	1.002	35	.0056	.0782
14	.064	.892	36	.005	.0696
15	.057	.795	37	.00445	.062
16	.051	.708	38	.00396	.0552
17	.045	.63	39	.00353	.0491
18	.04	.561	40	.00314	.0429

U. S. Standard Gauge.

WEIGHT AND LENGTH OF WIRE

Diameter Inches	Wire Gauge No.	Diameter Inches	Weight of 100 Ft. Lbs.	Feet in 63 Lbs.
9/32	1	.283	21.23	296
	2	.263	18.34	343
1/4	3	.244	15.78	399
7/32	4	.225	13.39	470
	5	.207	11.35	555
3/16	6	.192	9.73	647
	7	.177	8.03	759
5/32	8	.162	6.96	905
	9	.148	5.08	1,086
	10	.135	4.83	1,304
1/8	11	.120	3.82	1,649
	12	.105	2.92	2,158
	13	.092	2.24	2,813
	14	.080	11.69	3,728
	15	.072	1.37	4,598
	16	.063	1.05	6,000
	17	.054	.97	8,182
	18	.047	.58	10,862
	19	.041	.45	14,000
	20	.035	.32	19,687
	21	.032	.27	23,333
	22	.028	.21	30,000
	23	.025	.175	36,000
	24	.023	.140	45,000
	25	.020	.116	54,310

APPROXIMATE GAUGE AND WEIGHT OF ZINC

Illinois Zinc Company's Standard Gauge

Gauge Number	Weight per Square Foot in Pounds	Thickness Inch	U. S. Gauge Number
3	22	.00587	38
4	30	.008	35
5	37	.011	32
6	45	.012	30
7	52	.014	29
8	60	.016	28
9	67	.018	26
10	75	.020	25
11	90	.024	24
12	1.05	.028	23
13	1.20	.032	22
14	1.35	.036	20
15	1.50	.040	19
16	1.68	.045	19
17	1.87	.050	18
18	2.06	.055	17
19	2.25	.060	16
20	2.62	.070	15
21	3.00	.080	14
22	3.37	.090	13
23	3.75	.100	12
24	4.70	.125	11
25	9.40	.250	3
26	14.00	.375	00

WEIGHT OF BLACK SHEET IRON

For galvanized sheet iron add 2½ ounces per square foot.

Thickness of Gauge	Thickness in Fractions and Decimal Parts of an Inch		Weight per Square Foot in Ounces	Weight per Square Foot in Pounds
10	9-64	.1406	90	5.625
11	1-8	.125	80	5.
12	7-64	.1093	70	4.375
13	3-32	.0937	60	3.75
14	5-64	.0781	50	3.125
15	9-128	.0703	45	2.812
16	1-16	.0625	40	2.5
17	9-160	.0562	36	2.25
18	1-20	.05	32	2.
19	7-160	.0437	28	1.75
20	3-80	.0375	24	1.50
21	11-320	.0343	22	1.375
22	1-32	.0312	20	1.25
23	9-320	.0281	18	1.125
24	1-40	.025	16	1.
25	7-320	.0218	14	.875
26	3-160	.0187	12	.75
27	11-640	.0171	11	.687
28	1-64	.0156	10	.625
29	9-640	.0140	9	.462
30	1-80	.0125	8	.5
31	7-640	.0109	7	.437
32	13-1280	.0101	6½	.406