



McGill University Athletic Association

ANNUAL FIELD MEETING,

FRIDAY, 23rd OCTOBER, 1891,

ON THE COLLEGE GROUNDS.

— — — — —
FIELD OFFICERS
— — — — —

Referee.

PROF. B. J. HARRINGTON, B.A., PH. D.

Time-Keepers.

PROF. C. H. McLEOD, MA. E.
" C. McEACHRAN.
W. A. CARLYLE, B.A. Sc.

Judges.

PROF. H. J. BOVEY, M.A.
" A. MCGOUN, B.A., B.C.L.
" J. WESLEY MILLS, M.A., M.D.
" J. COX, M.A.

Starter.

R. F. RUTTAN, B. A., M.D.

Clerk and Assistant Clerk of Course.

R. T. MCKENZIE, B.A.

W. L. BOND.

Measurers.

J. G. H. PURVES.
H. MOLSON.

Scorers.

V. HALLIDAY.
R. G. DYER.

Judges of Walking.

PROF. J. FORTIN, L.L.L.

PROF. J. WESLEY MILLS, M.A., M.D.

Programme.

MORNING, 9.30.

- | | | | |
|----|----------------------------------|------|-----|
| 1. | Kicking Football, | ft. | in. |
| | 1 | | |
| | 2 | | |
| 2. | Throwing Hammer, (16 lbs.) | ft. | in. |
| | 1 | | |
| | 2 | | |
| 3. | Running Broad Jump, | ft. | in. |
| | 1 | | |
| | 2 | | |
| 4. | Throwing Heavy Weight, (56 lbs.) | ft. | in. |
| | 1 | | |
| | 2 | | |
| 5. | Throwing Cricket Ball, | ft. | in. |
| | 1 | | |
| | 2 | | |
| 6. | Standing Broad Jump, | ft. | in. |
| | 1 | | |
| | 2 | | |
| 7. | Hurdle Race, (First Heat,) | sec. | |
| | 1 | | |
| | 2 | | |
| 8. | Putting Shot, (16 lbs.,) | ft. | in. |
| | 1 | | |
| | 2 | | |
| 9. | Tug of War, (First Heat.) | | |

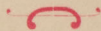
AFTERNOON, 2 O'CLOCK.

- | | | |
|-----|-------------------------------|-----------|
| 1. | High Jump, | ft. in. |
| | 1 | |
| | 2 | |
| 2. | 100 Yards, (First Heat,) | sec. |
| | 1 | |
| | 2 | |
| 3. | 880 Yards Run, | min. sec. |
| | 1 | |
| | 2 | |
| 4. | One Mile Bicycle, (Safety,) | min. sec. |
| | 1 | |
| | 2 | |
| 5. | Hurdle Race, (Final Heat,) | sec. |
| | 1 | |
| | 2 | |
| 6. | One Mile Walk, | min. sec. |
| | 1 | |
| | 2 | |
| 7. | 440 Yards Run, | min. sec. |
| | 1 | |
| | 2 | |
| 8. | Pole Leap, | ft. in. |
| | 1 | |
| | 2 | |
| 9. | 100 Yards, (Final Heat.) | sec. |
| | 1 | |
| | 2 | |
| 10. | Mile Race, | min. sec. |
| | 1 | |
| | 2 | |
| 11. | Sack Race, | sec. |
| | 1 | |
| | 2 | |
| 12. | One Mile Bicycle, (Ordinary,) | min. sec. |
| | 1 | |
| | 2 | |
| 13. | 220 Yards Run, | sec. |
| | 1 | |
| | 2 | |
| 14. | Tug of War, (Final Heat.) | |



McGill University A. A.

PRESIDENT,	- - -	SIR J. W. DAWSON, L.L.D., F.R.S.
VICE-PRESIDENT,	- - -	W. E. WALSH, MED.
SECRETARY,	- - -	W. GREGORY SMART, APP. SC.
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ASST.-TREASURER,	- - -	V. HALLIDAY, MED.



Committee.

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N. TAYLOR,	MEDICINE,	D. JACQUES.
H. MOLSON,	APP. SCIENCE,	J. G. H. PURVES.
R. E. DYER,	COMP. MED.	E. M. ROBB.



HANDICRAFTS SERIES No. 8

CUTTING AND POLISHING SMALL STONES

DOUGLAS LEECHMAN



McGILL UNIVERSITY
ADULT EDUCATION SERVICE

HANDICRAFTS DIVISION
MACDONALD COLLEGE, P.Q.

Macdonald College Handicraft Pamphlets

Edited by

IVAN H. CROWELL

Director of Handicrafts, McGill University

Macdonald College, P.Q.

The Principal Product of a Handicrafts Program should be Better People

Better people because of the greater knowledge of their own latent talents for creative work.

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Better homes because homes can be tremendously enriched by the innumerable articles that can be designed, knitted, woven, carved, thonged, moulded by the members of that home.

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Ample opportunities are also afforded for supplementing incomes through the sale of high quality handicraft products.

"Every rise in the quality of the work that men do is followed swiftly and inevitably by a rise in the quality of the men who do it."



The Officers and Members of the
McGill University Athletic Association
request the honor of
Miss Morgan & Friends'
attendance at their Annual Games,
to be held on the College Grounds,
Friday, 23rd October, 1891.

W. Gregory Smart,

Hon. Secretary.

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CUTTING AND POLISHING SMALL STONES

by

DOUGLAS LEECHMAN

Introduction

There are few of us who have not, at some time or other, picked up a handsomely coloured stone and wished that we could in some way enhance and perpetuate its beauty. We may have realized, rather vaguely perhaps, that stones can be cut and polished and that their hidden beauties may be revealed in this way, but we have not taken the next step, which is to find out how this may be done.

As a matter of fact, the craft of the amateur lapidary is a fascinating one, and it has many features to recommend it. The necessary equipment is simple and inexpensive; it is easily installed in the home workshop, and does not take up too much room. It is work which requires no great initial skill though practice in this, as in most other crafts, tends towards perfection. Furthermore, it is work which may be interrupted at any stage without injury to the job in hand, so the ringing of the telephone does not present an alternative between an unanswered summons and a ruined piece of work.

The raw materials for your cutting and polishing may be picked up on a country hike, on a planned collecting expedition, or bought from dealers. Many of the most attractive minerals, suitable for polishing, are quite inexpensive and, if you are interested in the possibility of financial rewards from your hobby, their value is often greatly increased by the work and skill expended upon them.

Paper Weights

Let us start our discussion of methods of cutting and polishing with the simplest of all jobs undertaken by the amateur lapidary. We shall assume that you have a stone which, by reason of its colouring or markings, has aroused your admiration and you wish to polish one side of it. When finished it will be suitable for use as a paper weight or as an ornament for your desk.

The first step is to bring the surface which you wish to polish to an approximately even level. In some cases this has already been done, either by nature or artificially; if not, you can frequently manage it with a hammer. The best tool for this job is a geological hammer (Fig. 1), which has an octagonal face at one end and a short pick at the other. The point of the pick, or one of the corners of the octagonal face, is used, striking light slanting blows, away from the body; this method will strike off small chips of the stone without breaking it in half.

Some kinds of stone will not tolerate such treatment and are likely to split along natural lines of fracture. Often such specimens may be intentionally broken along these lines and the flat surface thus obtained may then be polished.

Polishing is done in three steps: rough grinding, polishing, and buffing or finishing.

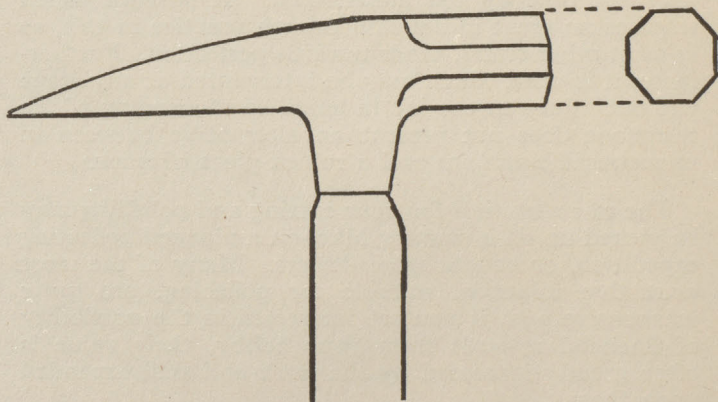


Fig. 1. Geological hammer, best for rough shaping of minerals.

Rough Grinding

This is usually done on a carborundum wheel, turned either by hand or by an electric motor. Carborundum is a trade name for silicon carbide, an artificial product of great hardness made by combining coke and sand in an electric furnace. Carborundum wheels are made in a variety of degrees of hardness and coarseness ('grits'). For rough grinding, wheels of 150 or 180 grit are usually suitable.

A carborundum turned by hand is slow but has the advantage of giving very good control; much more rapid progress will be made if the wheel is driven by an electric motor. One of $\frac{1}{4}$ horse-power will do for everything on

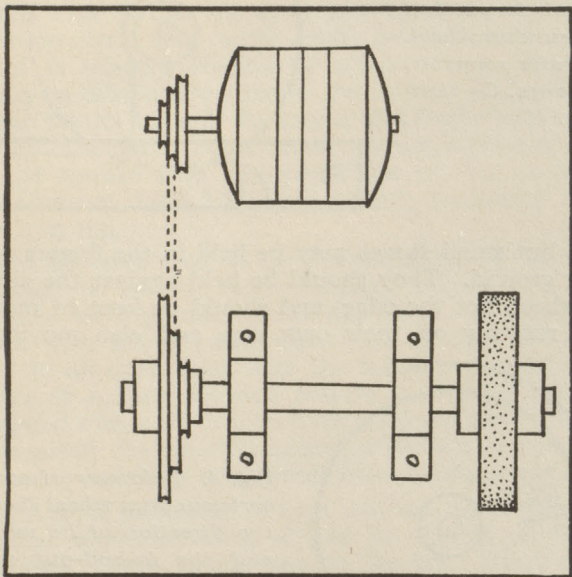
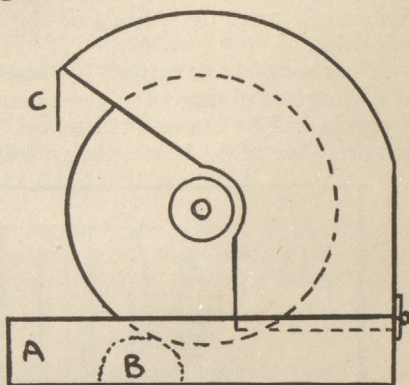


Fig. 2. Plan of vertical carborundum wheel, on spindle, driven by electric motor. Three speeds are provided for. The position of the motor on the bed should be adjustable.

an amateur scale in lapidary work. The speed of the wheel should be about 800 revolutions per minute, and the top of the wheel should turn towards the operator. (Fig. 2).

The wheel should be protected by a guard which will act also as a splash arrester, and the lower part of which is a water reservoir. Fill the reservoir with water to a depth just below the wheel, and wire a sponge into position so that it will rub against both sides of the wheel, and can thus keep the wheel continuously wet but not dripping. (Fig. 3).

Fig. 3. Guard, splash arrester, and water reservoir for vertical carborundum wheel. A—water reservoir. B—sponge. C—cloth apron.



All but small stones may be held in the fingers while being ground. They should be held against the side of the wheel, not the edge, and should be kept in motion, both rotating on their own axis and also moving in

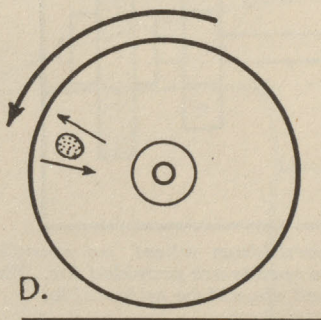


Fig. 4. Side view of vertical carborundum wheel showing the direction of its motion, and the in-and-out movement of the stone being ground.

towards the spindle and out again. (Fig. 4.) These two movements will produce a figure-eight motion, pre-

venting uneven grinding of the stone and grooving of the carborundum wheel from excessive use of one part of it. Continue the process till all irregularities have gone and a flat, evenly frosted surface is secured.

Horizontal Laps

Another means, usually employed by professional lapidaries only, is to use a horizontal lap which is driven in a clockwise direction by an electric motor. (Fig. 5). This is more efficient than the vertical carborundum wheel if much work is to be done. Care must be taken to see that the lap runs absolutely true, and that it has a dead flat surface.

The lap, about 12 inches in diameter, is generally made of soft iron though for some jobs copper, lead, pewter, or some other soft metal might be preferred. A soft metal is selected because it allows the carborundum grains to bite into the metal somewhat. This produces better results than if the grains slid freely between the lap and the stone. Some metal laps are hacked or scored on the surface with radiating lines to help in holding the abrasive, but this is not usually necessary with a soft iron lap.

The abrasive used on the horizontal lap for the rough grinding is usually carborundum. About 120 grit is suitable for beginning the work. It is made up into a paste with about equal quantities of clay and water, kept in an open bowl near the lap and applied with a brush or a little wooden paddle the end of which is wrapped with a bit of cotton rag. The abrasive is applied as required; the quantity needed is learned by experience. A steady swishing sound indicates satisfactory cutting.

The stone should not be kept still but, as in the case of vertical wheel grinding, should be twisted on its own axis and moved in and out on the lap. Exert enough pressure to ensure cutting. Keep a firm grip on the stone or it may be snatched out of your hand by the friction. The lap is surrounded by a bowl-shaped guard to protect the worker and to prevent splashing. One part of the side of the guard is cut down to allow the hand to reach the surface of the lap.

As soon as the work has made some progress, wash it off under running water and inspect it. While the stone is still wet, hold it about level and turn it in your hands till the light from an electric bulb or from the window is reflected from its surface to your eye. (Fig. 6.) If the work is flat, as it should be, the reflection will be seen to come from a single surface; if not, more than one surface, and uneven reflection of the light, will be seen.

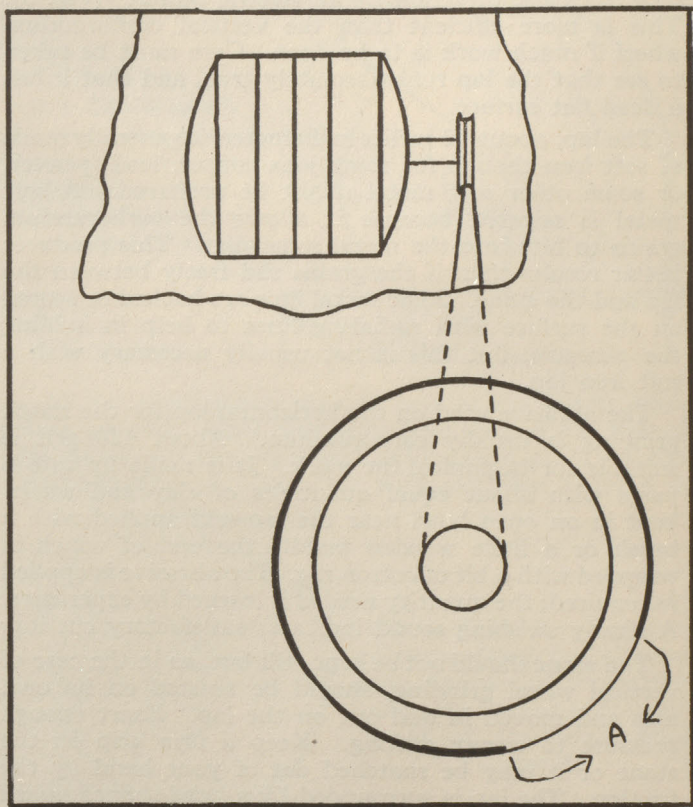


Fig. 5. Plan of a horizontal lap driven by an electric motor mounted under the table top (shown cut away). Note cut in outer guard, at A, to admit the operator's hand.

Rough grinding is finished as soon as the stone shows an even, frosted surface, free from scratches and quite flat.

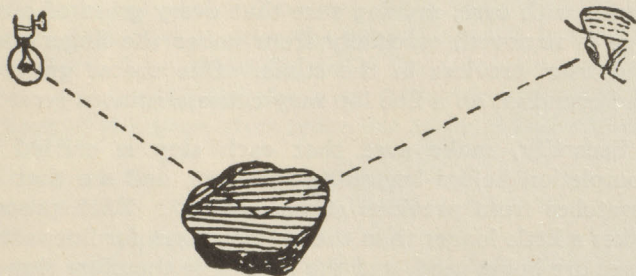


Fig. 6. The light reflected from the surface shows that one corner "runs off." Continue polishing till only one completely flat surface is seen.

Polishing

The next step is to polish this flat, but still dull, surface by means of a series of abrasive powders of ever increasing fineness. The actual abrasives used vary with different kinds of stone. A good series for general purposes is: coarse carborundum (220), fine carborundum (400), tin oxide, tripoli powder, and rouge. Others which are often used are pumice stone, rotten stone, whiting, and precipitated chalk. The carborundums are usually used with metal laps; the others may be used with cloth, felt, leather, or wooden laps. Either vertical wheels or horizontal laps may be used, the former being generally preferred for the softer laps and finer powders. Such a wheel should turn towards the operator at about 800 revolutions per minute. The soft materials are usually kept wet while working, water being applied with a brush as needed, with the abrasive mixed in, forming a thin paste or cream. Experiment will soon show which is the best series of abrasives for each kind of stone.

There are two points which deserve special attention. The first is to make sure that abrasives of different

grades never get mixed. Before transferring a stone from one process to the next, wash both it and your hands with care, making sure that every grain of abrasive is removed, especially from under the finger nails and from crevices in the stone. One coarse grain of carborundum on a fine lap may cause a ruinous scratch.

Secondly, make sure that each step is carried to completion before beginning the next, and see that no scratches from previous stages are left. Each process takes a little longer than the previous one, for finer abrasives are being used, and the cutting is therefore slower.

Finishing

The final polish, obtained by buffing on a dry flannel wheel using rouge and very light pressure, should give you a flat, highly polished surface on one side of your original specimen, its colour brightened and its beauty increased. It is now ready for use as a paper weight or a desk ornament. However, you may find it desirable to rough grind another face parallel with the polished one and to cement a piece of green baize or felt to it so that your highly polished surface may be seen when the weight is in use. A celluloid cement gives good results. Apply the cement to the rough ground surface in a thin coat, right up to the edges, wait a moment or two for it to get tacky, then lay the stone down on the cloth with only its own weight to hold it. When dry, trim the baize to shape. Don't be in too much of a hurry, but give the cement several hours to dry if you can.

Cabochon Cutting

After you have gained some knowledge and control of your equipment and materials, you will probably want to go on to more elaborate cutting and polishing enterprises. Many stones, especially transparent and semi-

precious varieties, are frequently cut *en cabochon*. Literally, this means cabbage-shaped; in fact, the two words cabbage and *cabochon* come from the same source. In actual practice the term is applied to stones which have been "rounded off," like a cabbage-head, either in some regular shape or following the original outlines of the stone after removing minor irregularities.

Stones treated in this way may be set in rings or brooches; they may be used as insets in art metal work, or in any of many other ways. The use to which they are put will, to a large extent, determine their final shape, and whether the base is to be flat or rounded, polished or rough ground. If the stone is to be cemented into place as an inset, a rough ground base will give better results; for pendants, on the other hand, the stone is usually polished all over.

Lap Stick

Reasonably large stones may be held in the hand while working, but the method of mounting stones in a cement on the end of a lap-stick gives much better control, allows greater pressure to be exerted, and is in all ways preferable. There are a number of suitable cements available, among them chaser's cement, seal-engraver's cement, dental wax, sealing wax, and Canada balsam. Special prepared cements can also be bought from dealers.

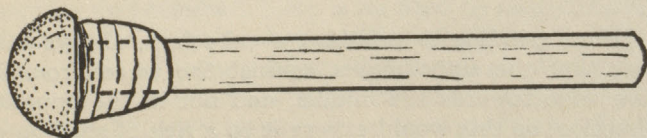


Fig. 7. Method of mounting stone on lap-stick with a blob of cement.

The lap stick should be of convenient length, about six inches, and of a diameter less than that of the stone to be polished, but large enough to fit the hand comfortably. Most people use a round stick, but some prefer a square one saying that it is easier to remember which parts of the stone have been worked on when using a square-handled lap-stick.

The cement should be warmed in a double-boiler until it is soft enough to form a thread or "hair" when it is touched with a lap-stick which is then pulled away from it. To cement the stone into position, first heat both it and the lap-stick; dip the end of the lap-stick in the hot cement, and smear some of it across the base of the stone, using tongs if the stone is too hot to handle. Then dip the end of the lap-stick in the cement again and press the stone into place. Mold cement round the base of the stone and the end of the lap-stick with wet fingers, working it as hot as possible, but not hot enough to risk splitting the stone. (Fig. 7). There should be a lump of cement connecting the stone and the stick, but it must not extend beyond the basal edge of the stone. Once you have armed a lap-stick with cement it is not necessary to add more each time a stone is cemented into place; heating the cement is all that is needed.

When polishing is finished, the stone may be removed from the cement by pressure sideways, or by warming the cement and prying the stone off carefully with a knife.

When grinding or polishing a cabochon, always take care that the stone moves against the wheel from its own edge towards the middle, and not in the opposite direction, as this would expose it to a risk of spalling or flaking off. (Fig. 8.) Whenever a sharp edge forms between two surfaces, grind it off as a bevel.

Over-heating from friction is another cause of flaking and spalling and may easily occur if you exert too much pressure on a high-speed wheel. Test the stone for heat occasionally with your finger tips if you think there is any danger of this, and keep the work wet.

As before, each step in the process must be brought to completion, and the stone must be washed free of every grain of abrasive, before the next step is begun. The stages are precisely the same as in the making of a paper-weight: rough grinding, polishing, and buffing.

Vertical laps are generally used for polishing; metal ones for the rough work; felt, cloth and leather for the finer grades of abrasives. The felt laps are specially cut from sheets of heavy felt an inch or more thick and very dense, and the edge should be used rather than the side.

Get your stone ground to the proper shape as soon as you can, thus avoiding much tedious grinding in the later stages.

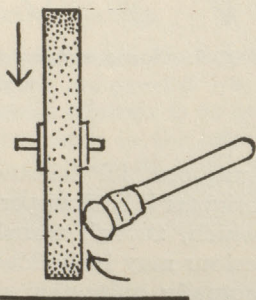


Fig. 8. When cutting a cabochon, the motion of the stone against the wheel must be in a direction away from the edge of the stone.

Cabochon Shapes

The number of possible cabochon shapes is very great. While regular forms, such as ovals and half-rounds, are popular and familiar, there is no need to restrict oneself to them, for irregular shapes, especially if they bring out some point of beauty about the stone, are often to be preferred. The more regular the shape geometrically, the more difficult it is to attain perfection of form. (Fig.9.)

Opaque stones often look best when cut with a flat base and a flat top, unless they are light in colour as is

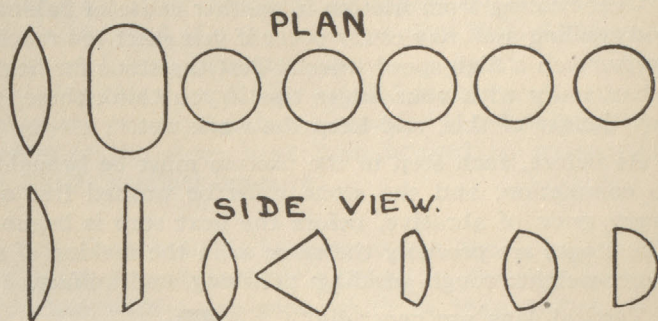


Fig. 9. Some suggested cabochon shapes. Any imaginable variation is possible.

turquoise for instance. Very translucent stones are brighter if both upper and lower faces are curved. Stones which, though translucent are very dense or dark in colour may be hollowed out in the base so that they are actually quite thin, but give an appearance of size and solidity, thus allowing a good deal of light to pass through them. Fairly deep hollows may be ground by means of hardwood sticks with rounded ends fastened in the chuck of a drill, using carborundum powder and water as an abrasive. (Fig. 10.) Do not use too much pressure, and do not let the stone become too hot from the friction. Let the abrasive do the cutting, without forcing.

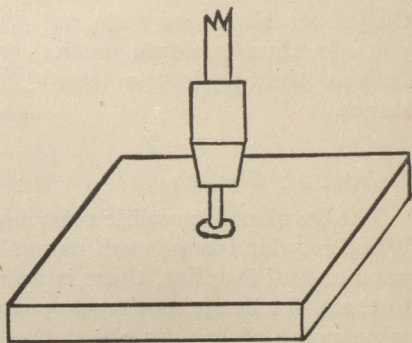


Fig. 10. Drilling a hollow in the base of a stone by means of a rounded hardwood stick in a drill chuck. The stone is cemented to a wooden base to hold it securely.

Book Ends

The method of making a pair of book ends is similar in all respects to the processes already described, except that two identical shapes are needed, preferably cut from the same block of stone and with similar bands or other markings showing in each piece.

A suitable block of stone might measure about four by five by eight inches and weigh perhaps fifteen pounds. These measurements will be less when the book ends are finished, but there should still be enough weight in them to hold books securely without slipping.

The first step, obviously enough, is to saw the block of stone into two equal parts. There are several ways in which this may be done. The most efficient is to use a diamond saw; less satisfactory, but safer in the hands of an amateur, is the mud saw. Neither of these is really necessary, unless one expects to do a great deal of sawing, and many amateurs will not feel like spending the money necessary to buy one.

Soft stones can be cut with a hack saw, or even with an ordinary wood saw. A thin strip of steel can be used as a toothless hack saw blade and will cut if used with carborundum and water mixed with clay. There are also carborundum wheels, made specially thin, to be used for slicing. For an occasional cut, it may pay you best to take the block of stone to a local stone mason or monument maker.

Having cut the stone, you proceed to shape each half. The design to which the block is to be reduced is drawn upon it in ink or pencil on all sides which will show it. (Fig. 11.) The base of the completed article should be flat and larger in diameter than the upper part, while the side that faces the books should also be flat and at right angles to the base.

In some designs, two different kinds of stone are used in each book end, the base being perhaps of granite with a vertical piece of marble rising from it. When designing your book ends remember that they should be

easy to handle and not of such a shape that they slip out of the fingers when picked up.

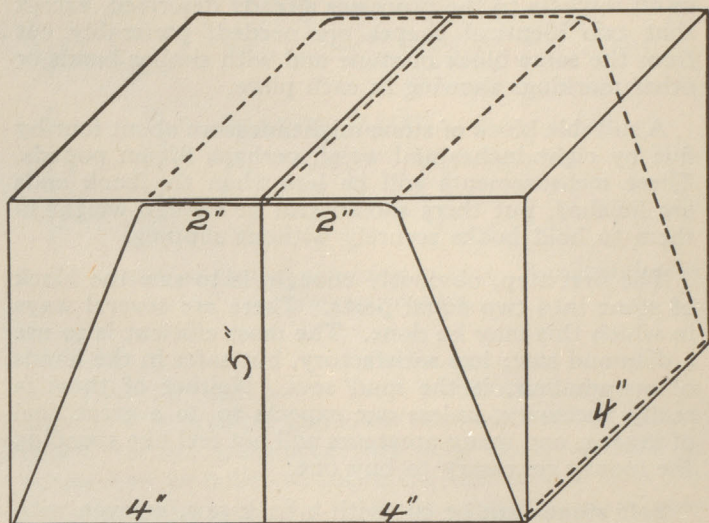


Fig. 11. Block of stone marked for cutting and shaping to make a pair of book ends.

Sharp edges are to be avoided; where they might occur the work should be beveled or rounded off smoothly. The base should be covered with felt or baize and, if so desired, the face next to the books may be treated in the same way, or finished with a thin piece of ornamental wood.

The work will go better if the two pieces keep step through the various processes, for then there is less trouble in changing from one grade of abrasive to the next and so on. There is also less risk of introducing an unintentional difference in the appearance of the two pieces.

Soft and Hard Stones

Stones vary greatly in hardness. Mineralogists use Moh's scale, which is divided into ten degrees; each of

these degrees is represented by a typical mineral of that hardness, as follows:

- | | |
|-------------|-------------|
| 1. Talc | 6. Feldspar |
| 2. Gypsum | 7. Quartz |
| 3. Calcite | 8. Topaz |
| 4. Fluorite | 9. Corundum |
| 5. Apatite | 10. Diamond |

Most minerals are of a hardness which lies between some two of these degrees, and may also vary in hardness through one or more degrees. Nephrite, for instance, will vary from 6 to 6½. All the degrees of hardness in the scale are not equidistant; diamond, with a hardness of 10 on the scale is actually about a thousand times as hard as quartz, which is 7, but talc (1) is only a little softer than is gypsum (2). Even the diamonds themselves vary considerably in hardness.

Among the softer stones in which the amateur lapidary is likely to be interested are: Alabaster, Gypsum, Malachite, Opal, Satinstone, Talc, and Turquoise besides many others. These all work very easily and quickly and many beautiful varieties of them may be obtained. While not many of them are apt to be found by the amateur collector, they are not expensive and may readily be obtained from dealers.

The harder varieties of stone are more numerous, and include such kinds as: Agate, Amethyst, Aquamarine, Beryl, Bloodstone, Carbuncle, Cat's-Eye, Chalcedony, Emerald, Feldspar, Fluorite, Garnet, Granite, Heliotrope, Jade, Jasper, Lapis-lazuli, Marble, Onyx, Peridot, Petrified Wood, Porphyry, Quartz, Sardonyx, Serpentine, and Topaz. There are, as you realize, hundreds of others.

Some of these may well occur in your own neighbourhood. For others you may have to arrange special collecting expeditions. Still rarer and choicer examples have to be obtained through dealers.

Very hard stones, such as topaz, are difficult for the beginner to handle, and diamonds are generally far beyond his skill.

A Permanent Collection

Many lapidaries, instead of making useful or ornamental articles, prefer to collect beautiful examples of minerals, cut and polished so as to show them to the best advantage. It is a rich field and a hobby which is certain to offer worth-while rewards to one who is interested in minerals from the scientific standpoint. Some collectors specialize in certain groups, such as fossil wood, agates, or some other material which may be specially abundant in their particular district. In forming such a collection careful records should be kept of the name of the mineral and the source from which it was collected, as well as any other data which may be relevant. A collection without such information is worth much less than one which has the essential facts carefully recorded.

PAMPHLETS SOON TO BE PUBLISHED

An Introduction to Pottery—(Equipment, Coil Method and Throwing.)—by Members of the Canadian Guild of Potters.

Clay Modelling—by Mrs. Dora Wechsler.

Finger Weaving— I — (A technique which requires no equipment whatever for making purses, shopping bags, tea cosies, hobo-bags, belts, etc. No seams are made in weaving.)—by Ivan H. Crowell.

Linoleum Block Printing — (This craft seems to reach a peak of activity before the Christmas season.)—by Margaret Austin.

PRICE LIST

(Prices are subject to revision)

Grinding wheel—Carborundum—	
6" diameter x 1" wide x $\frac{1}{2}$ " hole—120 grit...	\$3.00
6" diameter x 1" wide x $\frac{1}{2}$ " hole—180 grit...	3.00
Carborundum powders— 80 grit—2 oz. packages	.20
220 grit—2 oz. packages	.20
400 grit—2 oz. packages	.25
Rouge—polishing—per $\frac{1}{4}$ -pound block.....	.25
1-pound block.....	1.00
Tripoli powder, block form, per $\frac{1}{4}$ -pound block...	.15
Aluminum oxide—2 ounce package.....	.25
Cotton buffing wheels 6" diameter x $\frac{1}{2}$ " hole x $\frac{1}{4}$ " thick—each.....	.25
Felt lap wheel 8" diameter x 1" thick.....	7.00
Wooden lap, birch— 8" diameter.....	.70
10" diameter.....	1.00
Sealing wax—small stick.....	.15
large stick.....	.60
Canada balsam—1 ounce bottle.....	.60
Diamond Saw 8" diameter x $\frac{5}{8}$ " arbor (on special order only).....	7.50

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HANDICRAFTS SERIES No. 10

Linoleum Block Printing



McGILL UNIVERSITY
ADULT EDUCATION SERVICE

HANDICRAFTS DIVISION
MACDONALD COLLEGE, P.Q.

Macdonald College Handicraft Pamphlets

Edited by

IVAN H. CROWELL

*Director of Handicrafts, McGill University
Macdonald College, P.Q.*

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“Every rise in the quality of the work that men do is followed swiftly and inevitably by a rise in the quality of the men who do it.”

LINOLEUM BLOCK PRINTING

by

PEGGY JOHANNSEN AUSTIN

Are you looking for a hobby which is simple and fascinating, inexpensive and practical, yet which brings delightful results with a minimum of artistry and skill? Then try your hand at Lino-cuts.

The principle involved consists of drawing a design on a piece of linoleum, cutting away all parts of the surface not to be printed, inking the design, and transferring it by pressure on paper. Here, then, you will find the fundamental processes of Design, Engraving and Printing, with unlimited scope for originality and creative ability. The thrill that comes as you pull the first crisp black and white print is ample proof that your time has been well-spent.

EQUIPMENT

1. *Linoleum*: $\frac{1}{4}$ " Battleship Linoleum is best.
2. *Tools*: A set contains 5 steel-bladed tools with wooden handles; veiners with V-shaped ends of two widths for outlining the design; U-shaped gouges for gouging out the backgrounds; and a knife, for cutting sharp angles and corners. All tools must be kept sharp. Fine emery cloth or sandpaper will keep them in trim, but a small two-faced oil stone is necessary for re-sharpening. Grind the outside of the blade at the original angle in a rotating motion, first on the coarse side, then on the fine side of the stone. Use fine emery cloth to remove roughness from the inside of the cutting edge.
3. *Paper*: Black paper, good quality white paper or tracing paper are each useful in the original drawing, as will be shown later. Carbon paper is necessary for design transfer. Printing papers should be light-weight and absorbent, Japanese rice paper giving the best results, but a good substitute is ordinary blank newsprint. Rough typewriting paper or even toilet paper will

Editor's Note—The illustrations, except figure 20, were cut and printed by the author.

also do. Dampen heavier papers and smooth-surfaced varieties by pressing them between moist newspaper for several hours for better printing. Rough and mottled surfaces produce interesting results. Mount your finished print on stiff board.

4. *Ink*: Printer's ink in small tubes is available in black and various colours, and may be mixed to any desired shade. Thick ink is thinned with linseed oil or turpentine; ink, stiff with cold, may be liquefied by warming.

5. *Roller*: Rollers for inking the design to the carved linoleum block, should be cleaned when not in use by rolling over newspaper. Rubber rolls can be cleaned with turpentine or gasoline, and composition rolls with coal oil, but only when necessary, because of deterioration. A dauber made from a small pad of absorbent cotton covered with strong cloth is a good substitute if rollers are unobtainable. A piece of window glass is necessary to mix and spread ink on the roller.

6. *Press*: A teaspoon, stocking darning, or tooth-brush with bristles removed can be used for hand-printing, and a pile of old newspapers and books for foot-printing. A letter press, if available, is excellent.

See catalogue at end of manual for cost of equipment.

DESIGN

The first step in making a linoleum block print is a design. Aim at simplicity. Choose a silhouette of broad masses or a study of a few simple lines. Start with subjects around you—animals, boats, an old barn and fence, or children in action. Try sketching your ideas first with white chalk on a blackboard, or with white pencil on black paper (use a sheet from your photo album). This will give you the same effect as your finished print, for during the process of engraving the white lines of the pencil or chalk become the cutting strokes of the tool. Now draw your design on smooth white paper, complete to the last detail, and fill in the parts to be printed. After much experience you may be able to draw mere outlines and leave detail to be done freely on the block with the tool. If your drawing must be reversed,

as in the case of lettering or people doing things, place it on a piece of carbon paper with the blackened side up, and trace; or you can avoid this extra step by making your original design or lettering on thin transparent paper.

Next prepare your linoleum. Trim the block to about one inch larger than the drawing. If the block has been waxed, clean with turpentine. Rub fine emery paper or pumice powder over the surface to remove all trace of roughness, wash with soap and water and dry thoroughly. A perfectly smooth surface will make a big difference in the printing results. Pin the drawing and carbon paper to the linoleum, placing the pins or thumb tacks in parts which are to be cut away. Use carbon paper because the lines are more permanent than pencil and are black enough to avoid coating the block with ink, paint or chalk. Fill in with pencil the areas to be printed—this may avoid mistakes in cutting.

ENGRAVING

Figs. 1 and 2 show one method of holding the tool and steadying the block as cutting proceeds. This is used for accurate firm strokes and deep cuts where much pressure is needed, as in clearing backgrounds.

Another method, not illustrated, is to hold the tool like a pencil and is better for fine delicate lines where

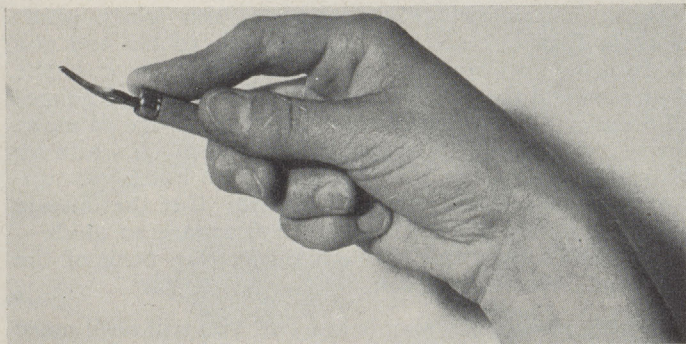


Fig. 1.—Holding the cutting tool. C.P.R. Photo



Fig. 2.—Cutting the block.

C.P.R. Photo

freedom of movement is essential. Try various positions and adapt the most comfortable one to the type of stroke you are cutting.

Single line cutting, or white line on a black background (figs. 8 and 9), is the easiest to do and will give the quickest and best results for a first attempt. Either of the V-veiners may be used for outlining but remember to work carefully because the slightest nick or unevenness in the lines will show prominently in the print.

Black line work and silhouettes with white backgrounds (figs. 10 and 11) take longer to do and the effect is not always as striking. Work first with the V-veiners and then clear away with the U-shaped gouges all areas not to be printed, using the wider gouge to make deep cuts in the large areas. Avoid too much white by distributing the lines, and always have a border to support the block equally under pressure. Cut the outside border with the knife, using a steel square as guide—cut straight down and through the burlap back of the linoleum. Wash the block.

Having mastered a simple line cut, you will need more than outlining for a good print. Shading and texture and background techniques should now be developed.

Half-tones result from the breaking up of large areas by lines of contrasting mass (fig. 14). Experiment using different strokes with various shapes and you will gradually develop a technique which will suit all your needs. Avoid mechanical exactness—never use a ruler but rather a freehand stroke and apply it with freedom. Fig. 13 shows various background techniques. See how their application in figs. 14 to 19 not only adds interest to the subjects but helps to suggest a mood.

In your effort to develop techniques and fine workmanship, don't overlook the essentials of good design. There must be an effective balance of black and white. Borders help to maintain an equal distribution of masses and can be varied to suit the composition. Aim at simplicity in design and boldness in pattern and you will always have a good linoleum block print. *A simple original creation will bring you much further along the road to success than an intricate and finely executed copy.*

PRINTING

There are two simple methods of printing—by hand and by foot pressure. The method used depends largely on the type of paper selected. Light-weight absorbent papers print better by hand, while heavier papers, requiring more pressure, print better by foot.

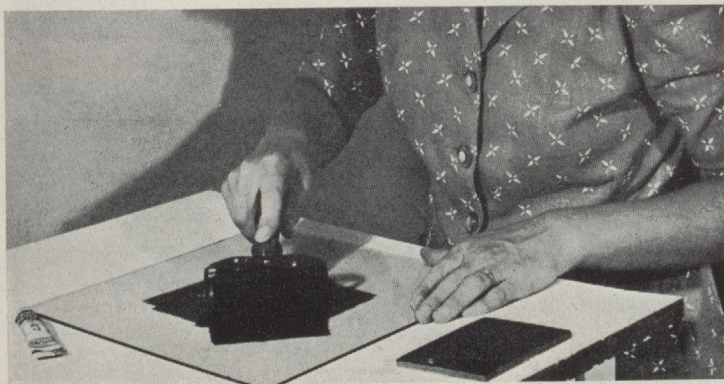


Fig. 3.—Inking the roller.

C.P.R. Photo



Fig. 4.—Inking the block.

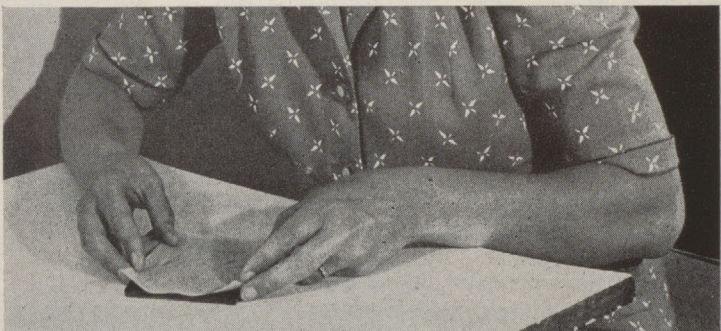


Fig. 5.—Laying the print paper on the block.

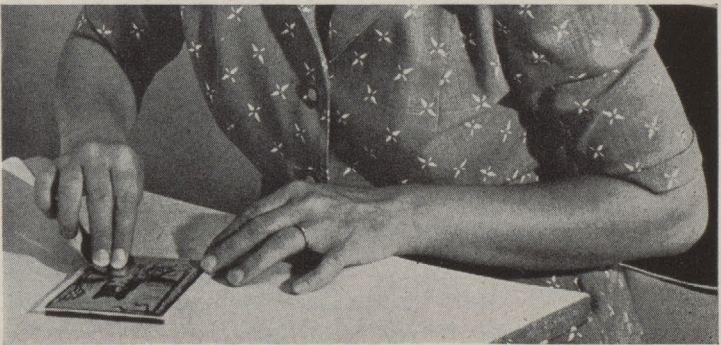


Fig. 6.—Hand printing with a spoon. C.P.R. Photos



Fig. 7.—Peeling off the finished print. C.P.R. Photo

Hand Printing: Figures 3-7 illustrate the different stages of this process.

1. Roll the printer's ink on the glass until it is evenly and thinly distributed. (Fig. 3.)
2. Charge the block, by rolling the ink over the linoleum first one way and then at right angles. (Fig. 4.) Experience will determine how much ink to use to get the right "tacky" sound. Blocks that are too heavily inked will smudge.
3. Lay the paper (cut slightly larger than the block) carefully over the inked surface. (Fig. 5.)
4. Rub the paper with the back of a spoon until the ink can be seen adhering evenly over the printed surface (Fig. 6.)
5. Peel off the finished print. (Fig. 7.)

If the first proof shows the white grain of the paper through the solid parts it is due to one of the three following causes: (1) insufficient ink on the block, (2) ink too thick, (3) insufficient pressure.

Foot Printing: The inking of the block remains the same in both methods, but printing by foot pressure is done as follows:

Pile several newspapers flat on the floor, and lay your print paper on top. Holding the block a half-inch high, drop it carefully face-down upon the paper. Place a book or other hard flat surface of larger area, directly upon the block and stand on top of all. Pick up the block and paper together, then peel off the print.

The foregoing procedures are suggestions for ways of obtaining a successful print. Each craftsman, with experience, will develop additional techniques in cutting and printing to suit his own needs.

POSSIBILITIES

The practical applications of linoleum block printing are unlimited. Paper prints can be used for framing, greeting cards, posters, book covers, book plates, monograms, letter-heads, programmes, tickets, place cards, gift wrapping paper, illustrations for school annuals, in fact wherever a printed subject is required. The commercial printing of linoleum blocks is much cheaper than other types. In many of these uses lettering will be necessary. Fig. 12 offers suggestions of various styles from which you can work out your own type most suitable to the character of your subject. Bold firm legible letters are always the most effective.

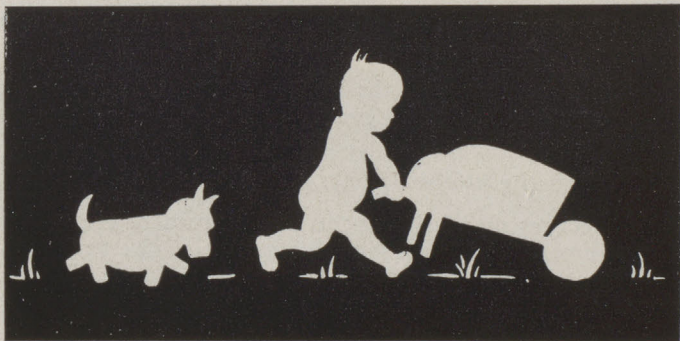


Fig. 8.—White silhouette.

Now consider the possibilities when printing is applied to textiles. The processes and equipment are precisely the same as described above except that any fabric may be used for the printing surface instead of paper. Textiles ranging from smooth-surfaced cotton sheeting to fuzzy Viyella flannel have been successfully printed and are washable provided the ink has been allowed to dry several days. There is no end of fun in arranging your



Fig. 9.—White line.

Note.—This pamphlet is a modification and enlargement of the one originally written for the Canadian Legion Educational Services, which has graciously given permission to use parts of the text and illustrations.

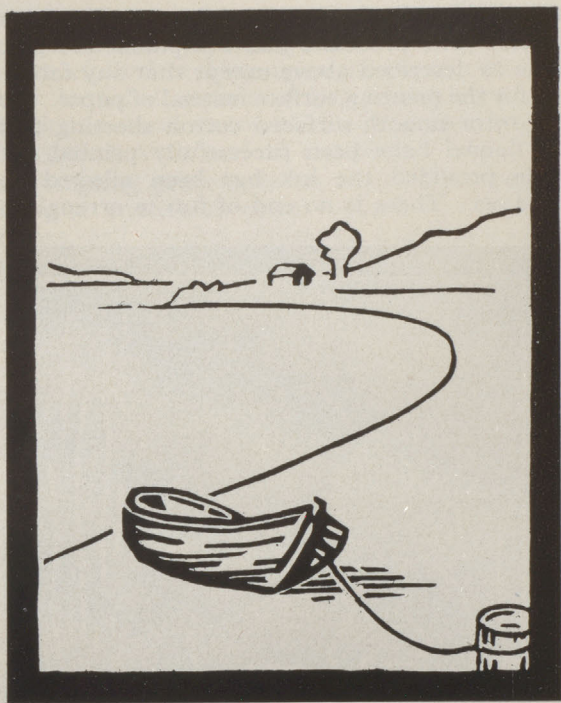


Fig. 10.—Black line.

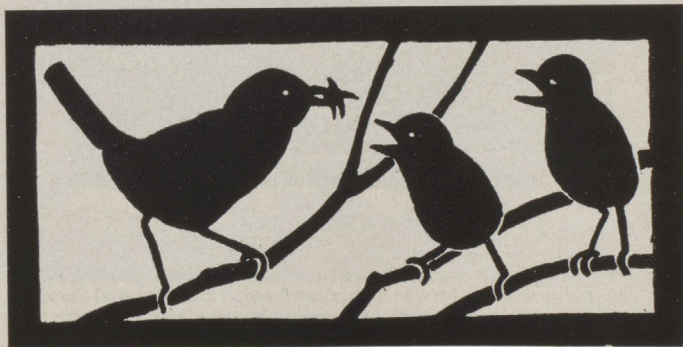


Fig. 11.—Black silhouette.



*Fig. 12.—1. Single stroke letters are easiest to do.
2. Single stroke shaded letters are more solid.
3. Block letters are most effective.*

blocks to form repeat designs and the same print may be combined in numerous ways to give quite different all-over effects. Fig. 20 is a striking example of textile printing by a 15-year-old school girl. Print your own textiles and make them up into curtains, bedspreads, smocks, aprons, cushion covers and dresses. Pennants, flags, and badges offer more possibilities. Oilcloth mats for luncheon sets may be strikingly printed, but care must be taken to prevent the block from slipping and smudging.

Even the linoleum block itself can serve a purpose. Paint with enamel, oil paint or poster paint, shellac it, mount on wood, and you have a wall plaque. Apply the blocks to book-ends, or use them as hot plate protectors.

These are the fundamentals. Now go ahead on your own and share the thrill of accomplishment that may be had from this fascinating and creative hobby.

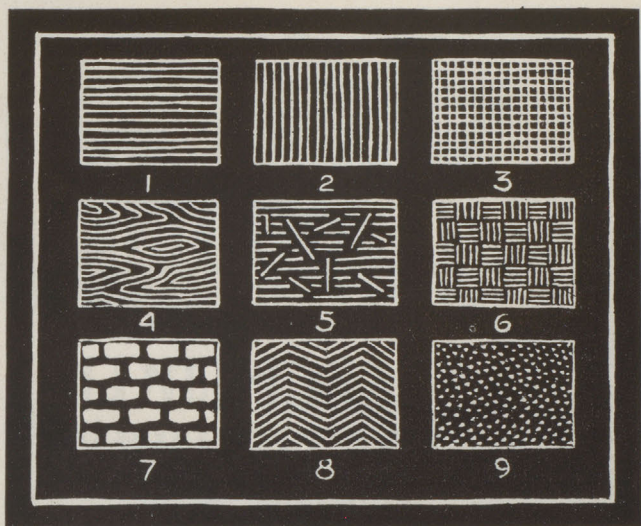


Fig. 13.—Background techniques:

- | | | |
|---------------|----------------|-----------------|
| 1. horizontal | 2. vertical | 3. cross hatch |
| 4. grain | 5. broken line | 6. basket weave |
| 7. brick | 8. herringbone | 9. stippled |

Application of background techniques:

See the following illustrations for some examples in the application on the above techniques:

- | | | | |
|--|---|---|---------|
| 1. Horizontal | - | - | Fig. 16 |
| 2. Vertical | - | - | Fig. 15 |
| 3 & 6. Cross-hatch and basket weave | | | Fig. 14 |
| 4 & 7. Are examples to show textures of wood and brick | | | |
| 5 & 8. Make suitable backgrounds for portraits and still life. | | | |
| 9. Stippled | - | - | Fig. 18 |



Fig. 14.—Textures, shading and half-tones are simulated by closely related lines of black and white.



Fig. 15.—Vertical lines in the sky suggest height.

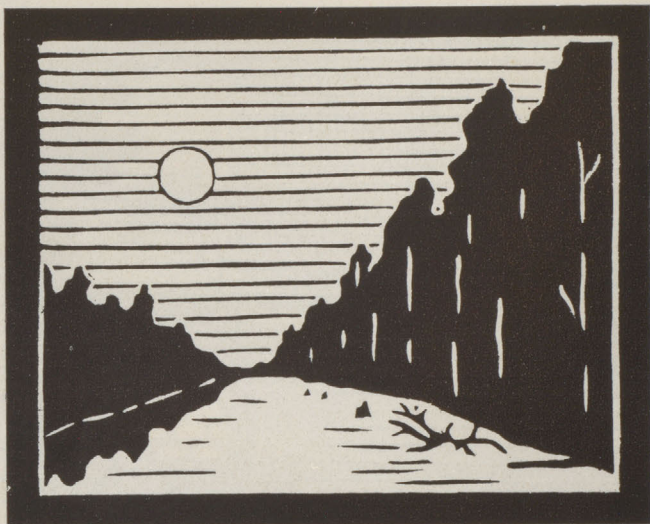


Fig. 16.—Horizontal lines in the sky suggest quiet.



Fig. 17.—A sunburst effect produces the impression of brightness.



Fig. 18.—A stippled sky produces a cold and snowy effect.



Fig. 19.—Slanting and curving lines suggest movement and action.



Fig. 20.—Textile design by a 15 year old girl of the Verdun High School. The original lino-cut of factories, bridge and canal against a mountain background has been combined to form a most effective and well-integrated repeat design.

MACDONALD COLLEGE HANDICRAFTS STORE

Through the Macdonald College Handicrafts Store, a co-operating organization of the Canadian Handicrafts Guild, various supplies and tools described in this pamphlet may be purchased in kit form or separately.

Everyone will understand the difficulties of obtaining adequate supplies of best quality materials. Substitutions may sometimes be necessary.

If a money order or cheque accompanies your order any balance due you will, of course, be returned. Otherwise kits must be sent C.O.D. postage extra.

PRICE LIST (Prices are subject to revision)

Linoleum $\frac{1}{4}$ " battleship 9" x 12".....	.40
Lino cutting tools, set of five blades with wooden handles.....	.50
Newsprint sheets 8" x 10", per 100 sheets.....	.10
Lino printing ink, medium sized tubes, black, red, yellow, blue, green, each per tube.....	.35
Rollers, as available.....	.40 to .60
Pumice powder per 2 oz. package.....	.05
Turpentine per 2 oz. bottle.....	.10
Carbon paper $8\frac{1}{2}$ " x 11", 2 sheets.....	.05

PRICES OF THIS PAMPHLET

1 to 5 copies.....	10c. each post paid
6 to 25 copies.....	9c. each post paid
26 to 100 copies.....	8c. each plus postage

Other prices on request.

Address: Handicrafts Division, Macdonald College, P.Q.

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HANDICRAFTS SERIES No. 9

Finger Weaving

Part I

IVAN H. CROWELL



Creative
HANDICRAFTS

McGILL UNIVERSITY
ADULT EDUCATION SERVICE

HANDICRAFTS DIVISION
MACDONALD COLLEGE, P.Q.

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FINGER WEAVING - PART 1

by

IVAN H. CROWELL

Introduction

Finger Weaving is the answer to the problem of a great many would-be weavers. Any individual, school, church, hospital or club can do finger weaving without any investment whatever in equipment; the basic methods are extremely simple and they can be quickly learned. The design possibilities of finger weaving are quite limitless. In this pamphlet the simplest types and designs of finger weaving are introduced.

The articles that can be woven include purses, tea cosies, shopping and hobo-bags, belts and sashes. In weaving the former articles no seams whatever are made. In weaving belts, one may start directly on the buckle; in sashes with the fringe.

One or more additional pamphlets are planned for other types of finger weaving. They will present a greater range of design possibilities including pictorial designs, and discuss a wider range of articles that can be created by finger weaving techniques.

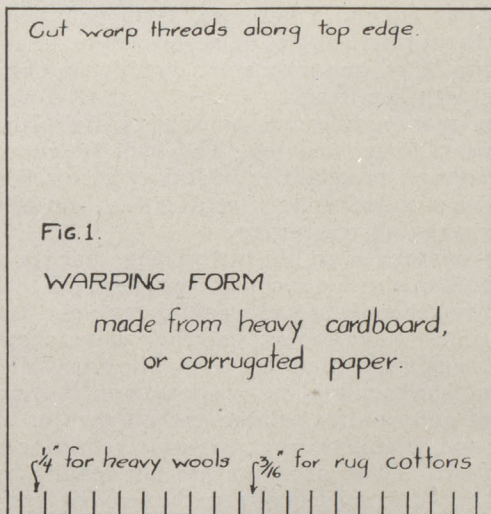
Finger weaving is so old historically that its origin is lost. Canadian and American Indians used the techniques both for basket making and weaving textiles. Years ago, Indians didn't have looms, yet they wove shopping or carrying bags, rugs, blankets, etc. The story of this sort of weaving has been told many times over. A tremendous wealth of information about techniques for weaving baskets and blankets, etc., is scattered in numerous publications. These accounts are not readily available nor do they deal specifically with weaving the sort of articles we care for now.

In this pamphlet some of the information already published has been adapted to descriptions of making articles of interest and use today, while some of the data presented are entirely new. As the technique for weaving purses and the like is quite distinct from that of weaving belts, the data are presented separately.

A. WEAVING PURSES, TEA COSIES, SHOPPING BAGS

The Warping Form

The only equipment required for this type of finger weaving is a piece of heavy cardboard or corrugated paper from which a *warping form* can be made. It should be cut to the desired width and about 3" longer than the necessary length of an article. Thus to weave a purse that measures 7" wide by 5" high, the warping form should be 7" wide by 8" high. Slits should be cut all along the lower edge of the form as shown in fig. 1. The slits at the edge should be only half as wide as the others.



Yarns

Almost any kind of wool or cotton yarns can be used in finger weaving. Heavy types as rug yarns are especially valuable in beginning as the weaves can be easily followed. Knitting yarns are also excellent and very beautiful effects can be obtained from these finer materials.

A Few Terms Defined

Three terms, new, so far as I am aware, are introduced in this pamphlet. *They are;* 1. *Warping Form*—Fig.

1. This is a notched piece of cardboard or heavy paper around which the warp threads are wound for weaving purses, tea cosies, etc.

2. *Warping Plan*. The warping plan is the arrangement or sequence of colors, kinds and lengths of threads on one side of a warping form (the other side is exactly the same) or in the upper series in a belt (again the other side is exactly the same). In discussing a warping plan it must be borne in mind that threads are doubled.

3. *Circuit*—A circuit refers to weaving purses. A circuit is made by weaving once completely around the warping form.

Two additional terms need explanation:

Warp—These are the threads that run lengthwise of an article. In purses they are wrapped around the warping form, while in belts they are the lengthwise threads.

Weft—In weaving purses, weft threads are used in pairs and twisted around the warp threads. In weaving belts the weft threads run crosswise and bind the warp threads together.

Setting up the Warping Form

Since warp threads do not show in finger weaving any color may be used. It is usually best, however, to use the same kind of yarn for the warp as for the weft.

To set up the warping form, wrap yarns around the board, catching a warp thread in each slit. When this is completed, cut the threads across the top edge. Weaving may start on any warp thread, but one at the edge is preferred. Tie the ends of the weft threads together and put them over a warp thread near the slits and weaving is ready to be started.

The method of holding the warp and weft threads while weaving is very important. Fig. 2 shows a method that has proven satisfactory. The right hand holds the two weft threads, gives the twist with the index finger

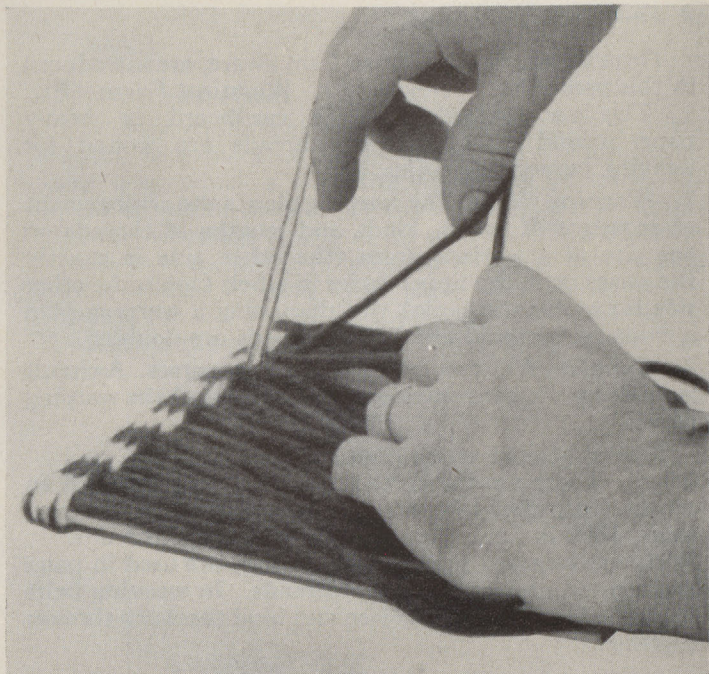


Fig. 2

and thumb and picks up the warp thread. The left hand draws each warp thread through the loop and holds all warp threads flat.

One of the problems of finger weaving is the proper tension. It is very difficult to say just how much tension should be used but the weaving should be firm and uniform.

Successive rows of circuits must be pressed together sufficiently so that the warp threads are completely covered by the weft. This can be done simply by holding each warp thread with one hand while pushing down on the weft threads with the other. It is not necessary to compact each circuit, six to eight may be pushed together at once.

You will find that as weaving progresses the weft threads become twisted around one another. A simple means of untwisting them is to unwrap a yard or so of yarn and pin the thread to the ball and allow it to hang over the edge of the table. The twists in the yarn are pushed over the edge of the table where the balls will rotate and untwist the thread while you can go merrily on with your weaving.

Basic Weaves

Only two basic weaves are described in this pamphlet. One is produced by a half twist of the pair of weft threads around the warp thread. The other is a full twist of the weft threads around the warp thread.



Figs. 3, 4 and 5 illustrate the two basic weaves. It will be seen that the half twist, figs. 3 and 4, results in a change of the color of the weft thread over each warp thread, while the full twist, fig. 5, retains the same color of weft thread. For the purposes of this pamphlet, the full twist is used only to change the sequence of colors, i.e. if a circuit is running red, white; red white; a full twist will make it run white, red; white, red.

A description of some of the patterns that can be produced by the half twist weave gives an indication of

the creative design possibilities. These are only a few of the pattern possibilities. They can be combined to form an infinite variety of designs.

1. *Upright Lines*—Fig. 6.

Since a warping form contains an even number of threads, weaving round and round it with the half twist weave brings the same colors of weft threads above one another, thus forming upright lines of alternating colors. This weave is shown in the upper and lower part of figure 6.

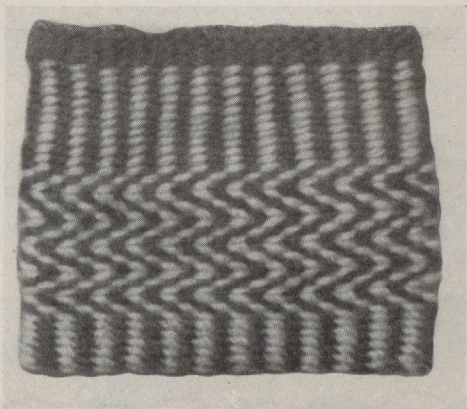


Fig. 6

2. *Sloping Lines*—Fig. 6.

Lines sloping to the right are produced by using a clockwise half twist weave. After completing one circuit, the weft threads are given a full twist at the beginning of the next circuit, fig. 5. This shows least when done at the edge and should be done at the same place each time. The result of this full twist is to change the sequence of colors. Successive rows of such changes produce sloping lines.

3. *Arrows*—Figs. 6 and 7.

The arrow pattern is composed of rows of lines sloping together. Two changes must be made when reversing the direction of slope of lines.

(a) The direction of the half twists must be reversed from that used in the former circuits. Thus, if a clock-

wise half twist was used in weaving sloping lines, counterclockwise half twists must be used to reverse the direction of slope of the lines.

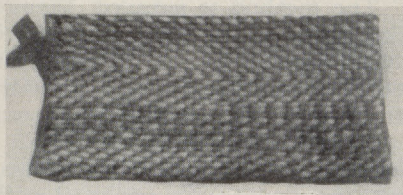


Fig. 7

(b) The first circuit in the reverse direction should have the same colors above one another. This forms the points of the arrows. Only a half twist is given to the weft

threads instead of the usual full twist required to make sloping lines. Successive circuits, however, require a full twist at the starting point in order to make sloping lines.

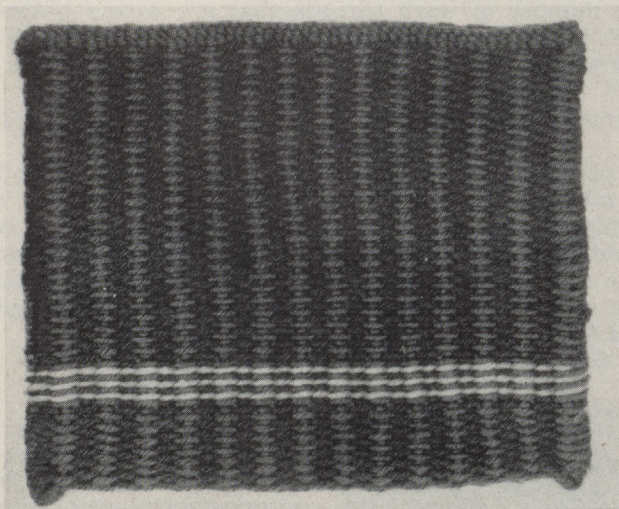


Fig. 8

4. *Herringbone*—Fig. 6.

Herringbones are made simply by weaving tiers of arrows. It is interesting to note that herringbones in finger weaving are formed across the warp while in loom weaving, herringbones run lengthwise of the warp.

5. *Four-color Combinations*—Figs. 8 and 9.

Thus far only two colors of weft threads have been used. With two sets of two colors of threads many interesting variations of upright and sloping lines and arrows can be woven. The method is simple. Weave around once with two contrasting colors. Next, start at the beginning warp thread with another pair of colored weft threads and weave around once. Then alternate with the original pair of weft threads. An example is shown as a band in the lower part of the bag in fig. 8.

Many interesting designs can be created with two, three, four or even more pairs of contrasting colored weft threads.

6. *Dot and Dash Weave*—Fig. 8.

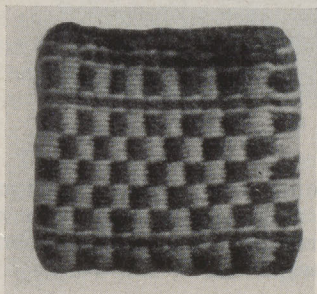
This weave is composed of upright bands of contrasting color. The pattern may be written (the figures indicate the number of warp threads that are woven between each half twist of the weft thread):

first and all odd circuits—1-3-1-3-1-3-1-3-1-3-1-3 = 24 warp threads

second and all even circuits—2-1-3-1-3-1-3-1-3-1-3-2 = 24 warp threads

In planning this pattern it is essential that the number of warp threads be in multiples of four so that the 1-3 combinations can always be formed completely. It is a rapid weave and many colorful combinations can be made. The shopping bag shown in fig. 8 is composed of blue and sand with lines of a four color combination of gold and fawn.

7. *Geometrical Patterns*



Squares—Fig. 9.

By weaving over two or three warp threads at a time with two colors and forming short upright lines of four or five rows, then changing the colors and forming a similar number of upright lines, tiers of squares are developed.

Fig. 9

8. *Diamonds*—Fig. 10.

The plan for weaving the diamond pattern requires that the weft threads cover one, two or three warp threads according to a definite plan. The plan may be written with figures which indicate the number of warp threads that are covered at each twist of the weft threads:

odd numbered rows—1st, 3rd, 5th, 7th—2-2-2-2-1-2-2-2.

even numbered rows—2nd, 4th, 6th—1-2-2-2-3-2-2-2-1.

After a series of circuits has been completed with the lines directed outward, the slope of the lines is reversed and directed inward, thus forming the diamond. Five circuits are required to form the lower half of a diamond while seven circuits are needed to form a diamond within a diamond as shown in fig. 10. Five or seven circuits with the lines pointed in the opposite directions are required to complete the upper half of the diamond pattern.

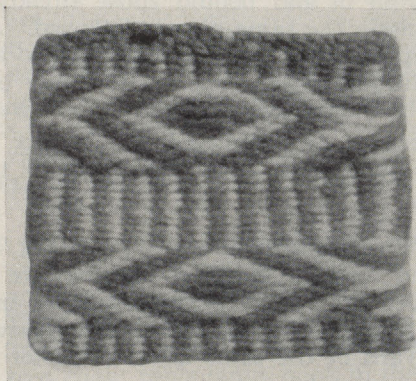


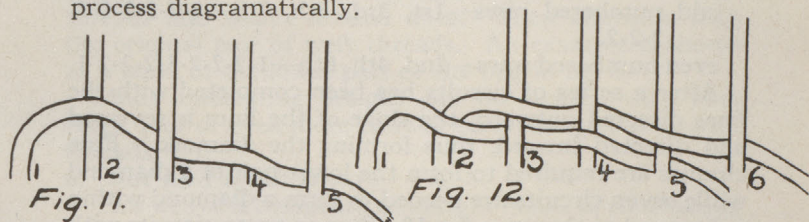
Fig. 10

Finishing

When the desired height of a purse or bag has been reached, the weft threads are cut and tied on the inside. About three inches of warp threads will be needed for binding the top edge. Two types of binding have proven satisfactory. The warping form should be removed before the finishing is begun.

1. *Woven Binding*—Figs. 11 and 12, also figs. 6, 8, 9 and 10.

A warp thread near the middle side is a good one to choose for beginning. One may weave either to right or left. The plan is to weave a thread over its neighbor, behind the next, over the next and leave it behind the fifth thread inside the purse. Each successive warp thread is woven similarly. Figs. 11 and 12 show the process diagrammatically.



Considerable care will have to be given to completing the border. The last few warp threads will have to be woven in front of and behind those already woven in place. Precisely the same plan is followed. A pencil or awl will help separate the border threads to allow insertion of additional ones. The tension may be adjusted by pulling the ends of the completely woven warp threads.

After weaving is completed the border should be stitched or hand sewn as a precaution to the threads pulling out.

2. Cloth Binding and Sewn Types—Fig. 13.

Any good quality cloth of appropriate color can be sewn over the folded warp threads as indicated in figure 13. Still another method is to oversew the warp ends with yarn of the same kind and color as used in the weft.

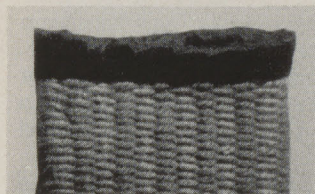


Fig. 13

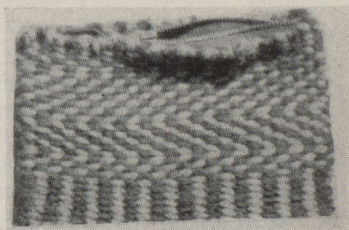


Fig. 14

Zippers and Handles—Fig. 14.

Zippers may be sewn in purses. No special precautions are needed. Handles for shopping bags may be braided, the end threads fanned out and sewn on the inside of the bag, an inch or so below the top.

Pull handles for hobo-bags can be threaded through the material.

B. WEAVING BELTS AND SASHES

The techniques of weaving belts and purses are direct opposites in some respects. In weaving purses the weft threads form the designs and the warp threads are covered. In weaving belts, the designs are developed in the warp threads while the weft threads are covered except at the edges of the belt.

Setting up the Warp

The length of threads for weaving belts is very important. They are cut double length because they are folded. In the weaving process, the threads shorten about 2 inches for each foot of length. Thus if a belt 3 feet long is wanted, the threads must be cut twice as long as 3 feet plus 2 inches for each foot of length (3 feet plus 6 inches) $\times 2$, which equals 84 inches. When folded the threads are 42 inches long and when the belt is woven it becomes 3 feet long. Belts are usually made 1 to 2 inches wide.

In setting up the warp, the threads are folded to equal length over a buckle, if a belt is being woven, or over a piece of cardboard about 4 inches wide, if a sash is to be woven. The 4 inches of thread becomes a fringe when the sash is finished. The warp may be held for weaving by a string to a chair, table lamp, hook in the wall or by a heavy book placed on top of the buckle or cardboard.

Weaving

Only one technique, with minor variations, is used to weave belts described in this pamphlet. After the warp is set up, it is separated into 2 series, an upper and a lower, figure 15. These threads are held in one hand, usually the right, with the index finger between the two series, fig. 18.

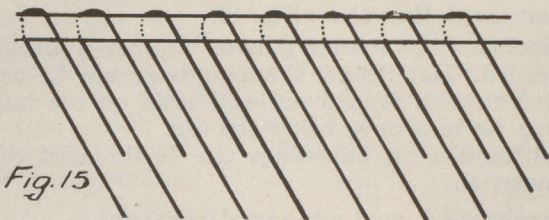


Fig. 15

The weaving technique is simplicity itself. With the left hand move the outermost top thread a little to the left and let it fall, fig. 16; then, lift the outermost lower thread and hold it on the left index finger. Continue by dropping the next upper thread and lifting the next lower one. This technique of dropping the upper thread and lifting the corresponding lower thread is the basic weaving plan for belts and sashes, fig. 17 and 18.

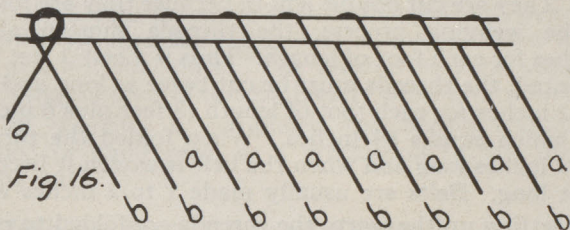


Fig. 16.

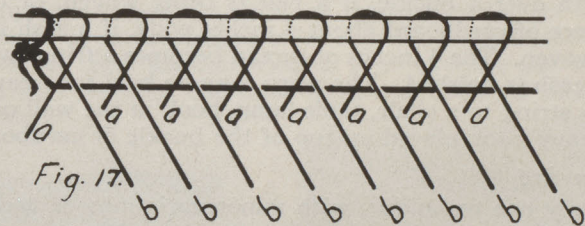


Fig. 17.

After weaving once across the belt, a weft thread is inserted between the two series. The end is tied to the buckle or cardboard. The weft thread is pressed snugly against the crossed warp threads. The second crossing

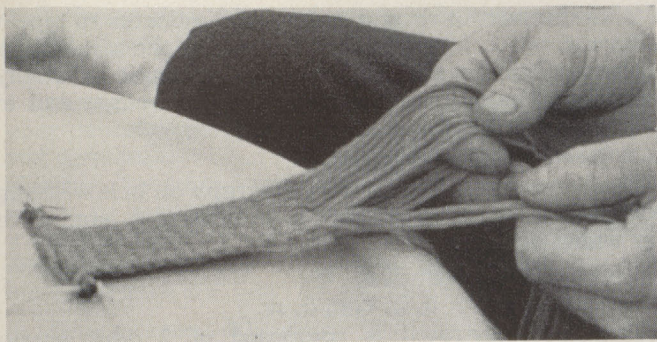


Fig. 18

is woven in exactly the same way as the first. After the weft thread is inserted between the newly crossed series, it is pulled firm so as to compact the warp threads and the warp threads are also pulled so that the weft thread is held firmly in place and straight across the belt. Be sure to insert the weft thread after each crossing and pull it just tight enough to keep the width of the belt uniform!

Each pair of warp threads is given a half twist in weaving the belt. They are also crossed below in the free ends. It is desirable to untwist the threads after each crossing. This may be done simply by running the hand downward between the two series of threads. For the first few times they tend to tangle a bit, but by keeping the ends free of knots and snarls the threads easily slip by one another.

Some Belt Patterns.

Innumerable patterns for belts and sashes can be devised. A few of them will be described. By combining these and inventing new ones an unlimited number of them can be woven.

A simple method of writing patterns is to indicate the arrangement of threads in the upper series from left to right. For example, a, b, b, c, c, c, a, rr means one thread of color 'a', followed by two of 'b', three of 'c' and one

of 'a' and repeat in reverse order. 'rr' indicates to repeat in reverse order, 'r' indicates to repeat in the same order as the pattern is written. In weaving belts, it is usually desirable to have the same color along the edges and to use this color for the weft thread.

1. *Lines of Color*—Fig. 19.

These were described in the paragraph on belt weaving technique. The pattern reads a, b, a, b, a, b, etc., a, to any width desired.

2. *Bands of Colors*—Fig. 20.

Pattern—a, a, b, b, b, c, d, rr.

The belt illustrated is composed of 2 dark green, 3 light green, 2 fawn, 2 sand, 2 fawn, 3 light green and 2 dark green in each series. In weaving, each corresponding color of thread in the series is dropped and lifted. For example, begin by dropping the outer dark green and lift the first lower dark green; drop second upper dark green, lift second lower dark green; drop first upper light green, lift first lower light green and so on. The

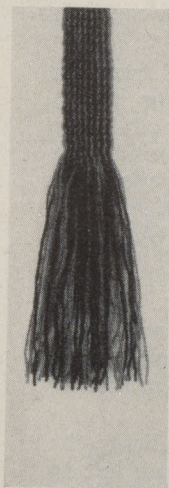


Fig. 19

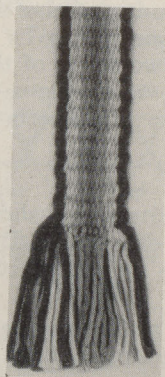


Fig. 20



Fig. 21

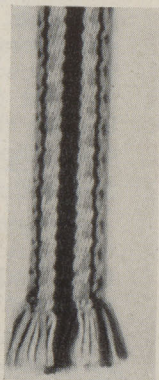


Fig. 22

weft thread should be dark green, the same as the color of the border threads.

With these variations of the belt weaving technique a tremendous range of possibilities is open to you to do your own designing. Various kinds of materials, colors and combinations can be experimented with. How many pleasing designs can you make? I'm sure you can design a belt to harmonize or contrast beautifully with every dress you have or ever will have. Try it. And after designing some line and stripe belts, here are some more patterns for you.

3. *Cross Lines*—Fig. 21.

Pattern—a, a, a, b, c, b, etc., a, a, a.

To make this design set up threads of two alternating colors and include one to three additional threads on each side for the border. The weaving plan for the border is to drop and lift alternate threads. For the interior portion, drop all threads of one color and lift all threads of the other color.

Numerous variations can be made of this interesting pattern. The cross lines may be broken in the middle by a narrow stripe; or the cross lines may carry half-way across in one color and continue the rest of the way with the other; again, the cross lines may be broken into squares by single threads of contrasting color.

4. *Blocks*—Fig. 22.

Pattern—a, a, b, b, a, a, b, b, etc., a, a.

In setting up the warp, arrange the threads in pairs of colors similar to that for weaving bands of color. If the set up reads:

2 gold, 2 blue, 2 gold, 2 blue for each of the upper and lower series, then the weaving procedure to form blocks would be:

Drop gold, lift blue; drop gold, lift blue, then: drop blue, lift gold, drop blue, lift gold and so on. For the next crossing the weaving plan is drop blue, lift gold, drop blue, lift gold then drop gold, lift blue, drop gold, lift blue, etc.

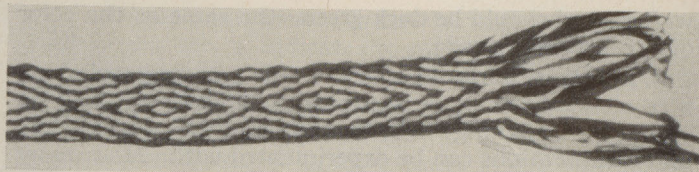


Fig. 23

5. *Arrows and Diamonds*—Fig. 23.

The warp for these patterns should be set up:

A/W B W B W B W B // B W B W B W B W /A
 Left Middle Right
 Portion Line Portion

The order of colors for the left portion of the belt or sash reads, white, blue, white, blue, etc., while for the right portion the order is blue, white, blue, white, etc. This results in two blue threads (or any other color) occurring on each side of the middle line of the belt. As the weaving plan is slightly different for each portion, the middle is of much importance. An outside border color, A, of one or a few threads, may or may not be used. Before weaving begins, the threads must be separated into an upper and a lower series as usual.

The weaving plan is as follows:

First crossing and for successive odd numbers of crossings

Left Portion

Lift lower A—drop upper A
 Lift lower B—drop upper W
 Lift lower W—drop upper B
 Lift lower B—drop upper W
 Lift lower W—drop upper B,
 etc., to the middle line

Right Portion

Drop upper B—lift lower W
 Drop upper W—lift lower B
 Drop upper B—lift lower W
 Drop upper W—lift lower B,
 etc., to border
 Drop upper A—lift lower A

For the second crossing and for successive even number of crossings

Left Portion

Lift lower A—drop upper A
 Lift lower W—drop upper B
 Lift lower B—drop upper W
 Lift lower W—drop upper B
 Lift lower B—drop upper W,
 etc., to middle line

Right Portion

Drop upper W—lift lower B
 Drop upper B—lift lower W
 Drop upper W—lift lower B
 Drop upper B—lift lower W,
 etc., to border
 Drop upper A—lift lower A

This plan looks very imposing in print, but it is simply directions for changing the colors blue and white in a certain order to cause them to slope together to form an arrow pattern. It is very important to observe that on the first crossing two B's, one on each side of the middle line are dropped, while on the second crossing, two W's are dropped. These two threads of the same color coming together form the points of the arrow.

These directions are intended to give you a start. As soon as you can see the pattern developing continue your weaving by observation to keep the threads in their proper order. When an error is made—as will occur, especially at the beginning, the weaving must be undone and corrected.

Diamond Pattern—Fig. 23.

This pattern is formed by reversing the direction of the arrows at certain crossings. In the sash shown in fig. 23, the reversals are made at each fourth crossing. To make the reversal, simply turn over the belt or sash, i.e., the upper series of threads is turned to become the lower series. After this, the weaving plan given above is followed.

Finishing the Ends.

Various plans can be chosen for finishing the ends of belts and sashes. Pairs of threads may be tied in hard knots, fig. 21. The end of the weft thread may be tied to the outside warp thread and the other warp threads left hanging, fig. 18. Upper and lower series of warp threads may be tied together in a neat knot, fig. 20. You doubtless can think of other attractive ways of finishing belts and sashes that you weave.

MACDONALD COLLEGE HANDICRAFTS STORE

Through the Macdonald College Handicrafts Store, a co-operating organization of the Canadian Handicrafts Guild, various supplies and tools described in this pamphlet may be purchased in kit form or separately.

Everyone will understand the difficulties of obtaining adequate supplies of best quality materials. Substitutions may sometimes be necessary.

If a money order or cheque accompanies your order any balance due you will, of course, be returned. Otherwise kits must be sent C.O.D. postage extra.

PRICE LIST

Because of the difficulties in furnishing satisfactory colors and color combinations, it is suggested that yarns be purchased locally. We are, however, supplying 2 kits so that finger weaving may begin with a minimum of delay.

<i>Purse kit</i> —heavy wool or cotton yarns in 2 colors to weave a purse 5" x 7"60
<i>Sash kit</i> —heavy wool or cotton yarns in 2 colors to weave a sash 1 $\frac{1}{4}$ " wide x 48" long50

The investigational work for this pamphlet was made possible in part through the kindness of the Canadian Pacific Railway.

HANDICRAFTS SERIES No. 7

How to tie trout flies

STEPHEN GREENLEES



McGILL UNIVERSITY
ADULT EDUCATION SERVICE

HANDICRAFTS DIVISION
MACDONALD COLLEGE, P.Q.

Macdonald College Handicraft Pamphlets

Edited by

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“Every rise in the quality of the work that men do is followed swiftly and inevitably by a rise in the quality of the men who do it.”

HOW TO TIE TROUT FLIES

by

STEPHEN GREENLEES

(*Courtesy of Field & Stream*)

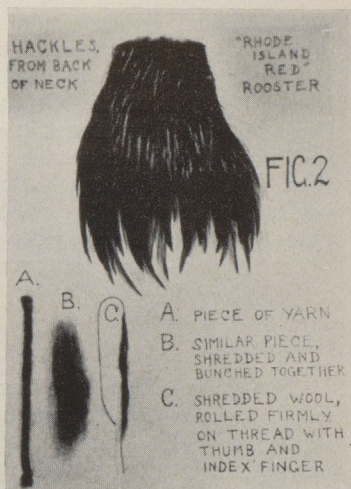
There is a particular satisfaction in taking fish on flies of your own make, and certainly the technique of an accomplished fisherman should include the ability to dress a fly in imitation of the food upon which the fish are feeding at any given time. You don't need double-jointed fingers or the patience of a setting hen. Nor is there any need to invest in expensive equipment in order to find out whether or not you can enjoy tying your own flies. The following instructions outline a standard method of dressing the ordinary type of dry and wet fly. Once learned, the principles can easily be adapted to tying other types of flies, using a variety of different materials.

Materials

To tie your first fly, here are the materials you will need, most of which you can probably find around the house: A pair of small, pointed scissors; two ordinary sewing needles; two clothes-pins (the kind with a metal spring); a little waterproof varnish; an eyed hook not so small as to hinder your first attempt (size 6 or 8); and a monkey wrench, which will serve well enough in place of a fly-tying vise to start with.

For the body of the fly: A couple of feet of fine silk sewing thread; a few inches of crewel wool (the thick yarn of which heavy sweaters are made); and for the ribs of the fly, two or three inches of tinsel, which can be bought by the spool or taken from Christmas tree decorations, or from the fancy cord used for wrapping Christmas parcels.

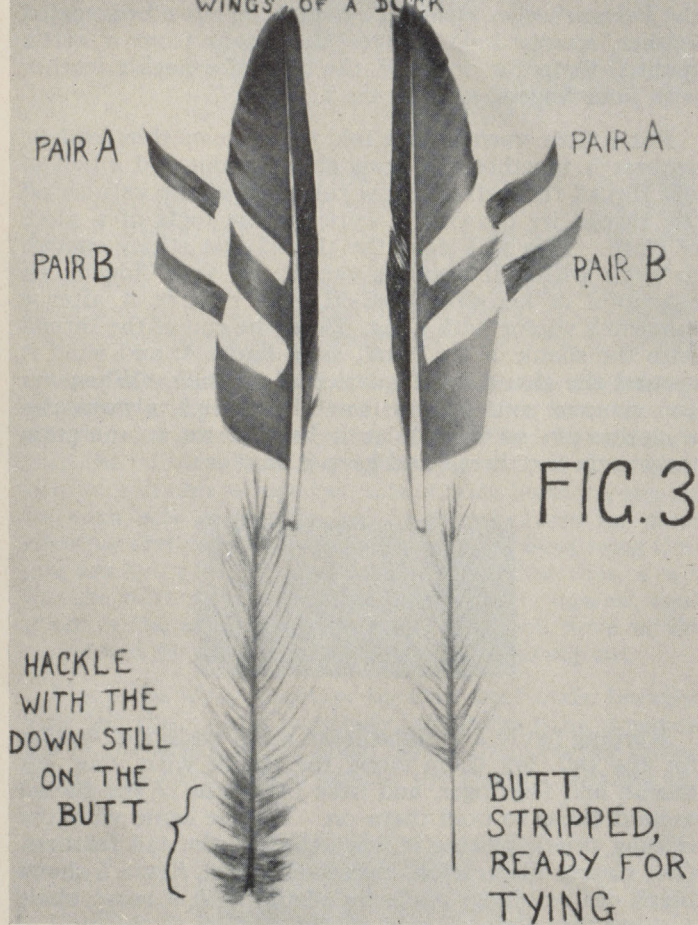
For the wings, hackle and tail: A pair of duck wings (failing these, hen wings will do as a makeshift); and the hackle feathers from the nape of the neck of a hen, if you are tying a wet fly, or the stiff hackles from a rooster's neck if the fly is to be dry. Figure 1 shows a duck wing, indicating the proper feathers for the wings of the fly. You will need another wing from the opposite side of the bird. Figure 1 also shows the wet and dry types of hackle feathers. In figure 2 you will see the stiff, dry-fly, rooster hackles.



Tying

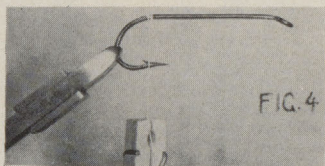
Now for the tying. Shred a piece of crewel wool into fibres with your fingers and roll it firmly around a few inches of silk thread, as in figure 2. Taking a pair of opposite feathers, one from each wing of the bird, separate out four bits with a needle and cut them off, as shown in figure 3. (Whenever the whisks, or individual strands of feather, split away from each other, they can easily be

THE TWO FEATHERS ARE FROM OPPOSITE
WINGS OF A DUCK

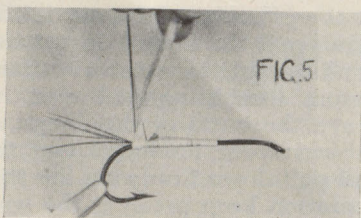


smoothed together again with your fingers, since each whisk has little teeth along its edges which mesh into the teeth of the next whisk. This is the way to blend feathers of different colors, as in making the wings of the Parmacheenee Belle. To straighten out a bedraggled feather, simply hold it over the steam from a kettle spout.) Strip the down off the butt of a hackle feather with your fingers, as in figure 3.

Put a little varnish in a fold of paper or thin leather, squeeze it together and draw about a foot and a half of silk thread through it. Now rub most of the varnish off the thread by drawing it between the folds of a piece of cloth. This will leave the thread just sticky enough to work with. If you get varnish on your fingers, an eggcupful of kerosine (coal-oil) will remove it after a moment's wiping with a rag. Bend the end of the thread onto the shank of the hook, as in figure 4, and wind it around the shank for a quarter of an inch. Whenever you remove your fingers from the thread, always clip a clothes-pin on it and let it hang down to maintain tension on the thread and keep it in place.



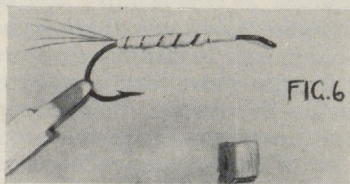
Keeping figure 5 in mind, take a few whisks of feather for the tail, lay them along the shank with your left thumb and forefinger, and take two turns of the thread around them to hold them on. Do the same with the ribbing tinsel, placing it just ahead of the tail feathers. (For clearer illustration, instead of tinsel, figure 6 shows black quill ribbing, made by slicing with a razor blade a paper-thin strip of quill off the surface of the quill of a wing feather.) Then perform the same operation with the wool which you have already rolled onto a piece of thread, placing it just ahead of the ribbing. Now wind



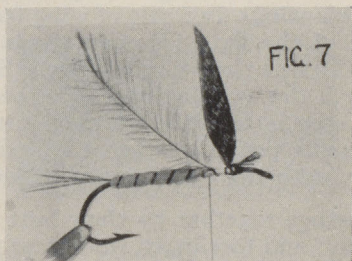
the tying thread two-thirds of the way up the shank. Clip the other clothes-pin onto the free end of the wool, wind it around the shank and tie it down with two turns of the tying thread. Wind on the ribbing next, tying it down also, and then wind the tying thread farther up the shank to serve as a base for the wings, as in figure 6. This completes the body, and you are ready for the wings.

Now take the four bits of feather from the duck wings as shown in figure 3. Place the two bits from the left wing feather evenly one on top of the other. Do the same with the two bits from the right wing feather. This gives you your double wings, two sets of wing feathers, one set for each side of the fly. (Double wings are far more effective and durable than single wings.) Supposing that you are tying a dry (or floating) fly rather than a wet fly, the next step is to place the two sets against each other in the same position which they will have in the completed fly, with the concave curves facing out.

Pinch the wings together by their butt ends, between your left thumb and forefinger, and press them down on top of the shank of the hook, laying them on the thread which you have wound around the shank. Holding the

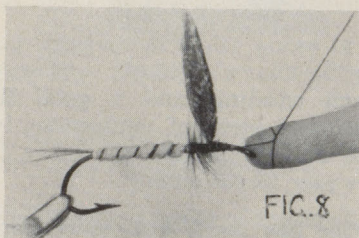


paired whisks there firmly, with your left thumb on the side nearest you, pull the thread up between the ball of your thumb and the side of the shank against which the thumb is pressing, then bring the thread over the top of the shank above the butts of the wings and down the other side between your forefinger and the far side of the shank, and pull down firmly on the thread. During this whole operation keep pressing the wing butts very firmly on the shank with your finger and thumb. Bring the thread around under the shank and take another turn around it in the same way, and then yet one more turn. Now you can remove your thumb and finger from the wings. Take two or three more turns of the thread around the shank in front of the wings, but slanting the top of each turn backward behind the wings so you can then draw the thread forward and thus make the wings sit upright as in figure 7. (A length of black thread has been attached to the white here simply for clearer illustration.) Snip off the protruding butts of the wings which show in figure 7, to make room for the head.



Take a hackle feather with the butt stripped as in figure 3 (stiff hackle, as this is a dry fly), place it against the shank as in figure 7 and take three turns of the thread around it to hold it on. In the dry fly the concave curve of the hackle feather must face toward the eye of the hook. Now bring the thread forward so that it hangs down in front of the wings. Snap your second clothes-pin onto the top end of the hackle feather shown in figure 7 and wind it around the shank, going forward toward

the wings. Four turns of the hackle behind the wings and two or three turns between the wings and the eye of the hook will be about right. Snip off the protruding ends of the hackle feather and anchor as in figure 8, sliding the hitch off your finger onto the shank. Snip off the thread and apply a drop of varnish to the hitches with a needle, to cement them in place, and the job is done.



Tying Wet Flies

When tying the wet fly the procedure differs in the following respects: Use a soft hackle feather so that it will absorb water; place the hackle on the shank so that its concave curve faces away from the eye of the hook instead of toward it; wind the hackle on before you set on the wings, then set the wings on in front of the hackle; place the wings together with the concave curves facing inward instead of outward; and omit the extra turns of thread used to make the wings sit upright. The finished wet fly is shown in figure 9.

A complete kit for the man who intends to tie more than the occasional fly would include the following additional items of equipment: A supply of silk thread and wool of different colors; silk floss in various colors, this being more commonly used for fly bodies than crewel wool and also used for ribbing; a stock of feathers, which can be bought inexpensively from a dealer in fly-tying supplies (and, incidentally, *white feathers can be dyed in the same way as cloth*); rabbit or squirrel underfur for fly bodies, which is rolled on a

thread in the same way as wool (*white rabbit fur can be dyed any color*); a pair of hackle pliers to take the place of a clothes-pin in holding the end of the hackle



and wool when winding; and a good fly-tying vise. This last-mentioned piece of equipment is well worth, in convenience and efficiency, the extra few dollars it will cost. (See page 16, for prices.)

When practice has made you more expert, you can save time by rolling the body-wool onto the main tying thread, instead of using an extra piece of thread as shown in figure 2. And you may find that drawing a thread through a lump of beeswax (obtainable at a druggist's) will make it stiff enough without resorting to varnish at all, although the stickiness of the varnish helps a great deal in keeping the thread in place in spite of the possibility of getting the varnish on your fingers.

In Canada wet flies are more commonly used than dry flies, the wet fly usually being a satisfactory tempter for speckled trout, which do a great deal of their feeding on or near the bottom. However, in mid-summer when the water is warm and trout are eating very little they often rise to the surface about sunset to feed on floating flies such as gray drakes, and this is the time when a dry fly angler using the right fly will take trout while the wet fly fisherman comes home empty-handed. Dry flies should be dipped in dry fly oil to make them more water-resistant. Your back-casts will flick the water off the oil-coated feathers. A satisfactory dry fly oil can be made by dissolving a lump of angler's line-grease the size of a raspberry in an eggcupful of carbon tetrachloride, which may be obtained inexpensively at a druggist's.

Formulae for Tying Flies

Here is a short list of popular and effective flies and the materials needed for tying them. They may be tied either wet or dry:

PARMACHEENEE BELLE. *Tail*—scarlet and white whisks of wing feathers, two whisks of each color.

Body—yellow wool or silk floss, with silver tinsel rib.

Wings—wing feathers of white goose or duck, some of them dyed scarlet. Blend a streak of scarlet into the centre of each wing.

Hackle—scarlet and white. Wind two hackles on simultaneously, one of each color.

MONTREAL. *Tail*—whisks of scarlet hackle.

Body—claret-colored wool or silk floss, with gold tinsel ribs.

Wings—turkey tail, dark and mottled. One feather will do, as you get two opposite curves, one on each side of the quill.

Hackle—dark claret color.

PROFESSOR. *Tail*—whisks of scarlet hackle.

Body—yellow wool or silk floss, with gold tinsel ribs.

Wings—mottled gray feathers from the breast of the mallard duck.

Hackle—light brown.

ROYAL COACHMAN. *Tail*—whisks of golden pheasant tippet.

Body—peacock herl, with a wide band of scarlet floss or silk thread around the middle. (The herls are the glossy, dark-green, fuzzy tail-feathers.)

Wings—wing feathers of white goose or duck.

Hackle—reddish brown.

BROWN DRAKE. (Also called March Brown.) *Tail*—whisks of mahogany-colored hackle.

Body—Brown fur (or wool), with ribs of light-brownish-yellow floss or silk thread.

Wings—wing feathers of partridge, dark brown and mottled.

Hackle—mahogany, and barred Plymouth Rock. Wind two hackles on simultaneously, one of each color.

SILVER DOCTOR. *Tail*—whisks of Golden Pheasant tippet.

Body—silver tinsel, sometimes with a narrow band of red silk just before the tail.

Wings—blended streaks of red and yellow, and mottled gray from the breast of the mallard duck. A streak of green is also sometimes blended in.

Hackle—light blue. Barred Plymouth Rock may be used instead.

PALMERS AND BI-VISIBLES. These are variations of the dry fly type. The Palmer floats the best, is the "driest," of all the types of dry flies, since the body is surrounded by stiff hackle throughout its entire length. Very often the Palmers are tied without wings. Using the Montreal pattern as an example of a Palmer-tied fly, first tie the body and tail as previously described but without the ribs. Then tie on the hackle feather, this time at the base of the tail instead of near the eye of the hook. And tie the tip end of the hackle feather, instead of its base end, onto the shank of the hook. The concave side of the hackle feather should face towards the eyed end of the hook as in an ordinary dry fly. Now wind the tying thread up the body, letting it hang down near the eye of the hook. Then—and hackle pliers will come in handy here—wind the hackle around and around the body, working up towards the eye of the hook. Just before you reach the eye, tie down the hackle with the

tying thread, snip off the protruding base end of the hackle feather, and you have a Montreal Palmer.

You can easily add wings to the Palmer if you prefer, tying them on in the usual way, if you allow enough room for them between the hackle-wound body and the eye of the hook. In this case you should add another hackle, wound on in front of and behind the wings, as in the conventional dry fly pattern. A Palmer-tied fly is often one of the regular fly patterns with a hackle feather taking the place of the ribs, although in many cases the wings and the hackle which goes with them are omitted altogether.

The Bi-visible is a dry fly in which the wings are left out and a white hackle of the stiff, dry-fly variety substituted instead. Dress the fly as usual, omitting the wings but tying on whatever color of hackle is supposed to go with the wings. Tie this hackle on a bit farther back from the eye of the hook than it would ordinarily be, and then, in front of it, wind on a white hackle between it and the eye of the hook. Many anglers favor the Bi-visible type because it is easier for the fish to see on the surface of the water. Palmers can be tied bi-visible by adding a white hackle just back of the eye of the hook.

STREAMER FLIES. These large flies, dressed on long-shanked hooks, are fished deep, jerked along by the action of a "whippy" rod-tip to imitate the action of a minnow. Although some patterns of streamer flies have hackles, and many have tails, numerous patterns of these flies omit both. The streamer, which in these flies takes the place of wings, consists sometimes of a pair of long soft hackle feathers, but more often of hairs from an inch to an inch and a half long. Polar bear hair bleached white (since the natural hair has a yellowish tinge) is favored for this purpose because it is stiff enough to stay straight and yet supple enough for the water to impart movement to it, and can be dyed any color. Goat hair, however, can be quite successfully used, and also bucktail hairs (the white hairs from the underside of the tail of a deer.)

If a hackle forms part of the pattern of the streamer fly you are tying—meaning not a hackle feather used as a wing but wound on as in the case of an ordinary wet fly—wind it on near the eye of the hook before adding the hair streamer. The hackle should be of the wet variety, a soft hackle. When you have tied it on, wind enough turns of the silk thread on the shank between the hackle and the eye of the hook to act as a foundation upon which to lay the base of the hairs when tying them on. You will need between a hundred and two hundred hairs for the streamer, depending on the thickness of the hairs, although of course it is not necessary to count their number when estimating the size of the bunch to be used. Now tie on the bunch of hairs to the foundation of silk which you have wound on the shank, keeping them in place while you work by pinching the bunch together between the thumb and first two fingers of your left hand near the base of the hairs. Get all the hair on top of the shank, that is, on the side farthest away from the barb of the hook, so that the body of the fly will not be hidden from beneath by the hair—except in those patterns, particularly those which call for bucktail, in which the hair is tied all around the shaft.

As you tie the base of the hairs to the shank of the hook add a drop of varnish with your needle to keep the hairs from pulling out when seized by a fish's teeth, and wind tightly. Keep winding the thread around the base of the hairs until you have formed a symmetrical head, which should be coated with head lacquer of whatever color the pattern calls for and will give the head a glossy finish. In those cases in which the pattern requires that a hackle be wound on before the streamer is tied, the hackle imitates the action of a minnow's fins when the fly is jerked through the water. Or, if the hackle is red, it may represent the opening and closing of the minnow's gills. At the same time it is perfectly true that many streamers, like numerous flies of all types, do not resemble anything this side of Never-Never Land, but results are what count, and if the fish go for an impossible-looking fly then obviously that's the thing to offer them. The following are three popular patterns of streamers:

MICKY FINN. No tail, no hackle. The head is coated with red lacquer.

Body—silver tinsel.

Streamer—an approximately equal number of red hairs and yellow hairs, the yellow lying on the shank and the red on top of the yellow.

RED AND WHITE. The head is coated with black lacquer.

Tail—five whisks of wing feather, red, blended together.

Body—silver tinsel.

Streamer—white hair.

Hackle—red.

RED SOLDIER. No hackle. The head is coated with black lacquer.

Tail—five whisks of wing feather, red, blended together.

Body—red crewel wool, with silver wire ribs.

Streamer—white hair.

NOTES and SUGGESTIONS.

Fish are said to be color blind, but if this is the case they certainly have very definite reactions to different colors in flies, whether they recognize them as separate hues or not. A hackle intended to imitate the red of a minnow's gills may not be recognized as a distinct color by a trout, but he can distinguish the difference between it and a hackle of another color, and prove his incredulity by refusing to take the fly which has the wrong hackle. When a trout is really on the feed he is quite likely to snap up the most bizarre creations. The list of time-tested fly patterns includes flies which imitate actual fish foods and flies which will tempt hungry trout when the angler does not happen to have in his fly box an imitation of the food on which the trout are feeding.

When choosing your hooks for fly tying bear in mind that the off-set type, in which the barbed end is bent to

one side, should be avoided for use with dry flies. They tend to make the fly turn over on its side when floating, although with wet flies this drawback does not arise. Snelled hooks for wet flies—eyeless hooks which are sold with a short length of gut leader already whipped on—are still popular with many anglers who buy their flies, since the loop on the gut can easily be slipped onto the loop of the main leader which is attached to the angler's line. But eyed hooks, without gut attached, are steadily gaining favor. With a snelled hook the gut is very prone to break off at the end of the shank, and if it is necessary to change to a lighter or heavier main leader the size of the gut on the snelled hook cannot, of course, be changed.

Moreover, flies last longer than gut does, and a fly tied on an eyed hook can be used again and again on different leaders. If you want to use more than one fly on your leader at the same time, it is easy enough to tie a short length of gut to an eyed hook so that it can be attached to one of the loops farther up on the type of main leader which is furnished with extra loops. In the case of dry flies, the delicate casting of the fly so that it will drop onto the surface gently pretty well eliminates the desire to cast with more than one fly on the leader. Tapered dry fly leaders are often made with no loops whatever.

Hooks made for flies have the eye bent somewhat inwards, towards the barb of the hook. This is done so that when the leader is tied on it will extend out in the same direction as the shaft of the hook and not tend to upset the fly on the water or turn it at an undesirable angle. If at any time you should find it impossible to obtain hooks with bent eyes, you can bend in the eye of an ordinary small-sized bait-fishing hook so that it will serve your purpose. Do this carefully, as the shaft is liable to break if handled incautiously. The bait-fishing type of hook, however, while it will do for wet flies in an emergency, is too heavy for dry flies.

While it is true that most fish are taken on the old approved patterns, you should bear in mind that if you are temporarily unable to obtain the exact materials

which a pattern calls for, you can often take fish with a fly which differs in some details from the standard pattern. If you have not got the particular type of body material called for, for instance, use whatever you have that comes nearest to it. The fly may still prove quite successful. And there is no reason why you should not try patterns of your own invention. These experiments are interesting and they sometimes yield unexpectedly satisfying results.

For your first attempts it is not necessary to tie flies of any particular patterns. Practice on easy combinations of feathers, bodies and ribs, then go on to the more involved patterns. When you bring the first fish to net taken on one of your own flies, the time you have spent in learning the craft of fly tying will be amply repaid.

PAMPHLETS SOON TO BE PUBLISHED

An Introduction to Pottery — (Equipment, Coil Method and Throwing.)—by Members of the Canadian Guild of Potters.

Clay Modelling—by Mrs. Dora Wechsler.

Finger Weaving—I—(A technique which requires no equipment whatever for making purses, shopping bags, tea cosies, hobo-bags, belts, etc. No seams are made in weaving.)—by Ivan H. Crowell.

Linoleum Block Printing—(This craft seems to reach a peak of activity before the Christmas season.)—by Margaret Austin.

Cutting and polishing small stones—by D. Leachman.

MACDONALD COLLEGE HANDICRAFTS STORE

Through the Macdonald College Handicrafts Store, a co-operating organization of the Canadian Handicrafts Guild, various supplies and tools described in this pamphlet may be purchased in kit form or separately.

Everyone will understand the difficulties of obtaining adequate supplies of best quality materials. Substitutions may sometimes be necessary.

If a money order or cheque accompanies your order any balance due you will, of course, be returned. Otherwise kits must be sent C.O.D. postage extra.

PRICE LIST

(Prices are subject to revision).

Fish fly tying kit for beginners (Equipment or materials may be purchased separately).

Equipment

1 fly vice.....	\$2.50	
1 hackle pliers.....	.50	
		————— \$3.00

Materials—ample for several flies:

Lacquers, 1 vial each black and clear.....	\$.20	
Tinsel, 2 yards silver 5 s F.....	.15	
Chenille, 1 yard each red, orange, yellow and black or a very dark color.....	.30	
Thread, 1 spool "wartime silk".....	.08	
Wool dubbin, available shade.....	.12	
Crewel wool, assorted colors and lengths, about 2 yards total.....	.10	
Hackles, 1 doz. Badger.....	.15	
1 doz. each red, blue, furrness, brown....	.40	
Quills, 1 each red, yellow black.....	.15	
Peacock herl, one.....	.15	
Hair for streamers, 1 piece each red, white, golden brown.....	.45	
		————— \$2.25

Complete kit for beginners, equipment and material..... \$5.00

(The supplier of these kits reserves the right to make essential adjustments and substitutions).

(Fishing Hooks cannot be obtained until after the war.)

THE PURPOSE OF THIS SERIES OF PAMPHLETS

About 90% of our boys and girls will earn their livelihood, after they leave school, by the skilful use of their hands. Because they have had little experience with which to guide them in selecting work suitable to their talents, many of them take the first job that they can get. Under such conditions this job is usually a short one. By a trial and error method, often covering a period of years, they find positions which they hold for life. In many cases the work is not really suited to their natural abilities.

Handicrafts offers one means of meeting this great problem. The opportunity to learn a range of crafts provides a means of discovering natural talent. This talent may be in woodwork, metalwork, leatherwork, weaving, pottery, or in design. A person who has talent in a certain craft or phase of a craft will find greatest pleasure and productiveness in a position where that talent can be used to advantage. The nation needs all the natural talents available for its Industries, Arts and Sciences. Hence all will profit when talent finds its useful outlet. Handicrafts in the schools, churches, homes, scout rooms, etc., will give to young people an opportunity to find the sort of work in which they will produce best and be happiest. This pamphlet is one of the arrows pointing the way.

2015-0067-02.5

HANDICRAFTS SERIES No. 5

SMALL ANIMAL SCULPTURING



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HANDICRAFTS

McGILL UNIVERSITY
ADULT EDUCATION SERVICE

HANDICRAFTS DIVISION
MACDONALD COLLEGE, P.Q.

Macdonald College Handicraft Pamphlets

Edited by

IVAN H. CROWELL

*Director of Handicrafts, McGill University
Macdonald College, P.Q.*

The
Principal Product of a Handicrafts
Program should be Better People

Better people because of the greater knowledge of their own latent talents for creative work.

Better families because mother and daughter, father and son and whole families can plan and work together on individual or joint handicraft projects.

Better homes because homes can be tremendously enriched by the innumerable articles that can be designed, knitted, woven, carved, thonged, moulded by the members of that home.

Better communities because an active handicrafts program encourages a community handicrafts centre where people can work together, use equipment in common, exchange ideas, hold exhibitions and become better acquainted.

Ample opportunities are also afforded for supplementing incomes through the sale of high quality handicraft products.

"Every rise in the quality of the work that men do is followed swiftly and inevitably by a rise in the quality of the men who do it."

SMALL ANIMAL SCULPTURING

by

JOHN L. BRADFORD

Founder-President, Atlantic Wood Carvers Guild

Introduction

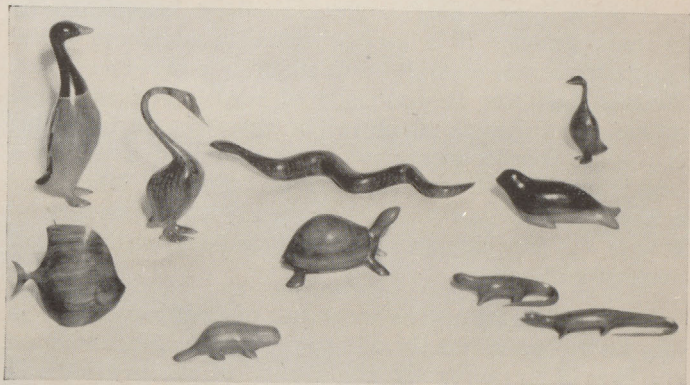
A living tree is one of Nature's most beautiful gifts to man. Indeed, it is hard to visualize a treeless world. Quite frequently a single adult shade-tree provides home, food and shelter for myriads of birds, reptiles, small animals and insects which might otherwise perish. But the point that concerns us is the fact that a tree is a beautiful thing, living or dead, standing, or felled and converted into grain-traced timber, with its knots and whorls, its lace-like grain designs, and its variations of density and colour.

But the beautiful tree we speak of need never die, so long as the artist has the will to prolong its life, and even the lives of its numerous inhabitants. From its dried and seasoned wood, each of its birds, reptiles, animals, and insect associates may be brought to life with the aid of a common jackknife, a little patience and determination on the part of the hand that wields it.

This pamphlet deals with wooden thought-pictures and how to bring them into being. It strives to show you how you may hold a memory or a dream in your hands and watch it take form. If you are interested in carving tropical creatures, unusual butterflies, snails, or microscopic animals, numerous illustrations will be found in Natural History books which you can get from your nearest library. Your objective, however, should be to carve from life. Doubtless, it will be some time before you can do this, but the objective should always be borne in mind.

Equipment

The principal materials needed for small wood sculpture include a jackknife, a small water stone and a small "medium" oil stone; three grades of sandpaper known as Nos. 1, $\frac{1}{2}$ and 2/0—for our purpose, coarse, medium and fine; shellac or a suitable substitute; industrial alcohol; any available varnish or oil stains; boiled linseed oil; powdered pumice; several soft water colour brushes and a few squares of cotton and flannelette.



*Plate 1. A collection of wooden animals, fish, and fowl beautifully carved by the author.**

While the items listed are necessary to complete this type of highly finished work, a knife, a block of wood and a piece of sandpaper comprise a complete working kit for a day's activity. This simple, clean and inexpensive outfit may be carried in one's pocket.

Woods

Canadian white pine is one of the best and most easily obtainable carving woods for the beginner. Your local woodworking plant will probably give you all the waste ends and strips you need. If not, buy various lengths

**Captions were written by the editor.*

for making birds, penguins, beavers, turtles, snakes, fish, lizards, elephants, etc. See the price list of various kinds of woods on page 16.

In arranging your sketch on wood, much attention should be given to the grain and its direction. The grain of the wood should run lengthwise of a figure to be carved. In a snake, it should run along the body from nose to tip of tail. In a bird, elephant or similar upright figure, the grain should run up and down. There are cases where the grain is not perfectly straight but slightly diagonal or wavy or even knotty. This is sometimes an advantage; study the figure you wish to carve and the wood from which to carve it. Can you take advantage of peculiarities of the grain, and knots and color?



Plate 2. Another collection of exquisite carvings. Study the individual sculpturings in these plates for they are masterly pieces.

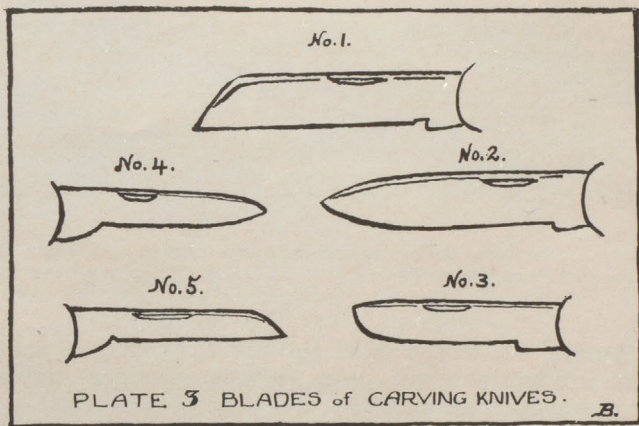
Among the woods most suitable for jackknife sculpture are various soft pines, spruce, hemlock, poplar, whitewood, bass, walnut, mahogany, Tennessee red cedar, butternut, gum, apple and other soft to medium-hard kinds. For fancy grain effects and color contrasts, red cedar and butternut are recommended. Apple, which runs from white to yellows and browns, is fairly hard, and is one of our most beautiful woods. Yellow and white birch are difficult to cut but take a splendid finish. Red cedar offers wonderful color contrasts when a white beak or breast for a bird, or white fins or belly for a fish are sought in combination with its purple-red heartwood. Knots and similar irregularities can suggest eyes and other features. Striking feather effects in natural wood

can be obtained from dry rot in pine, and moderate to brilliant color formations appear in blue stained pine and spruces.

Hard woods will soften in water over night, and should be carved while wet. Boiling newly cut or "green" wood for a few hours permits drying without the usual scoring or cracking which otherwise occurs.

Knives and their care

Plate 3 shows five types of jackknife blades that are very useful in wood carving. If blade No. 1 cannot be obtained, blade No. 2 can be ground down from the top surface to meet the cutting edge, forming a fairly sharp



point. Blade No. 3 has its cutting edge all around its end and is useful for gouging and similar purposes. Blade No. 4 is handy for reaching difficult places and for smoothing off bumps before sanding, or for work on delicate carvings. Blade No. 5, though rarely found in standard knives, is especially useful for making deep, clean cuts, for reaching difficult places and for boring. The most useful blades are Nos. 1 and 2, the former for general chipping and deep cutting, the latter for heavy surface chipping.

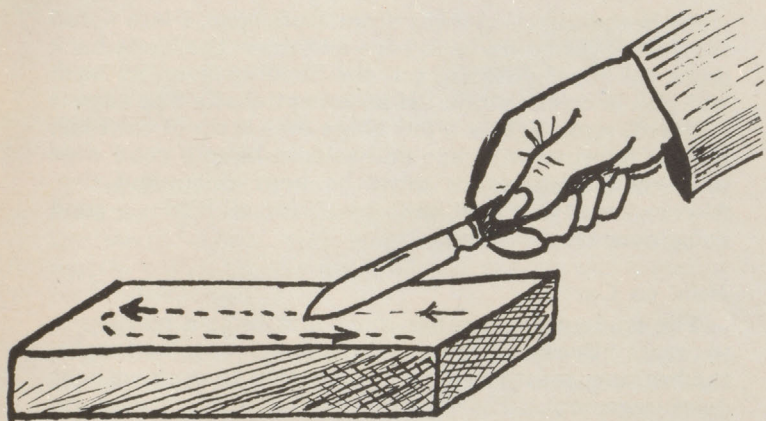


PLATE 4.

SHARPENING THE KNIFE.

The Macdonald College Handicrafts Store has obtained sets of the types of knife blades shown in plate 3. They are made of heavy saw steel. Holes are drilled so that you may attach your own handles directly to the solid flat steel shaft which runs the full length and width of the handle. (See page 16.)

Heavy rigid blades do the best work and retain the edge longest. Light flexible blades are hard to manage and seldom cut deep. Avoid deep sweeping cuts at first, however, because any wood that is removed cannot be replaced. Allow your work to take form slowly and gradually by carefully removing smaller and smaller chips as the carving nears completion.

Blades must be kept *keenly sharp at all times*. Use a medium or fine carborundum oil or water stone. The back of the blade should be tilted slightly on the stone. Holding it obliquely across the face of the stone, use light pressure and rub the blade straight back and forth. Now turn the blade over and repeat.

Another way to produce a good edge is to rub the blade on both sides alternately. Start upward along the

stone in the direction away from knife edge, Plate 4, roll the knife over on its back edge and draw the blade back down the stone. Again, roll the blade over on its back edge and pull it up the stone. If an exceptionally fine edge is required, strop lightly a few times on a strip of cowhide. Knives improve with age and seldom have a good edge when new, but blades must be kept clean and dry. Always break in a new knife by giving all blades a good going over on the stone.

How to Carve

The student woodcarver must first have a real desire to create. Because it is easier to learn than to be taught, the beginner must have a determination to work without discouragement. He must keep at it until articles are made to his or her satisfaction.

In choosing a subject, remember that you are a beginner and wish to avoid complicated or difficult cuts. Suppose you choose a small animal or fish. If you can't retain a mental picture while carving a subject, make a



Plate 5. The graceful bird carvings show the skilful selection of the grain of the wood and application of stain.

rough sketch on a sheet of paper, leaving out small details as eyes, ears, nose and toes. Imagine your subject some distance away and that you see it in outline only. Decide how large your finished carving should be, and choose a piece of soft pine, about a quarter inch larger each way from which to carve.

The direction of the grain is an important factor in carving. If your animal is low and long, the grain of the wood should run lengthwise or horizontally; if narrow and high, the grain should run up and down or perpendicularly.

Sketching on the block is usually unsatisfactory because the sketch lines are soon cut away; but sketches are useful to make outlines for cutting straight through the wood, in subjects as snakes and fishes. After that, refer to your sketch on paper or your imagination, adding details or making corrections as your carving progresses.

Go slowly and cautiously. Make your cuts shallow and chips small, allowing your subject to take form gradually. At the beginning, make three cuts of what you are tempted to do in one. Avoid cutting against the grain if possible, but if the knife blade is as sharp as it should be, it will cut up-grain at an angle, upwards, downwards, or sideways. If the cut leaves scratches or streaks on the wood, the blade is dull. The carver soon learns that proper handling of grain is a matter of *feel* or *touch*.

While carving, the knife should be held between the palm and the middle joints of the fingers, when the blade is moving toward the body, plate 6. This swings the blade in an arc, thus avoids cutting the thumb which is just below it. Furthermore, the strain of carving is placed on the knuckle and hand muscles rather than on the wrist. This is less tiring and reduces danger of cuts. As the skin and muscles harden and control improves, the carver can easily make desired cuts with precision.

When cutting away from the body, hold the knife in the crotch of the thumb, plate 7. Never face anyone at close quarters while cutting, thus you will avoid injuring your neighbor. Another word of warning: never leave blades lying about with blades open, close



Plate 6. Holding the knife for making inward cuts.

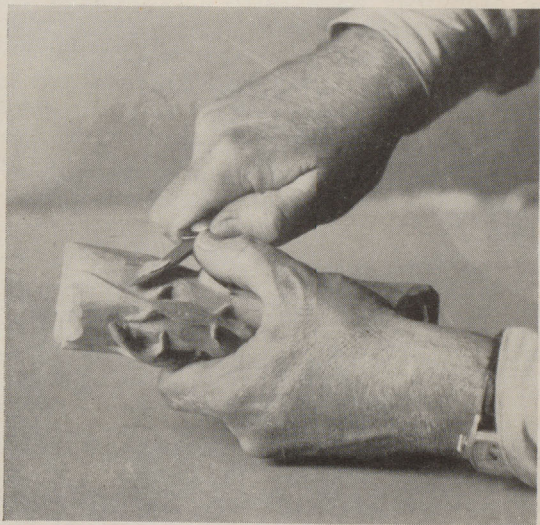


Plate 7. Holding the knife for making outward cuts.

Courtesy Canadian Art Magazine.

them as soon as the work is finished. If you are using solid knives as supplied by Macdonald College keep them in a leather sheath or box when they are not in use. As a further precaution, it is also desirable to keep iodine, absorbent cotton, bandage and adhesive or Band-aids within easy reach. Should the skin chafe or blister, adhesive tape will give excellent protection.

If a sculpture breaks or cracks, as they will from time to time, do not throw it away. A thin application of glue to separated surfaces often knits them stronger than the original. If the surface glue is carefully wiped from a joint when pressure is applied, the union is scarcely visible. Gluing may be done at any stage of the work, and the glued section may be safely chipped or cut, but only after it is thoroughly set. Fish glues are best; mucilage and paste should never be used. If cracks appear in your carving, fill them by working glue well into the crevices with a knife blade.

When starting to carve the three simple illustrated objects, the snake, the penguin and the tropical fish, study the drawings and photographs, and refer to them frequently as your work progresses. This is an invaluable guide for you.

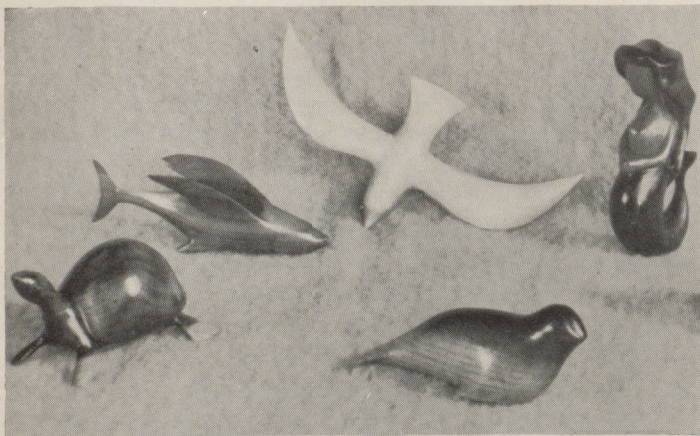


Plate 8. These carvings demonstrate the importance of carefully formed lines.

Finish

It is a pity to cover the natural beauty of wood with paint. On the other hand, stains can be applied to such colorless woods as pine, spruce, hemlock, and still leave the fine grain effect clearly visible.

Varnish or oil stains or water colors may be applied to wood carvings. When stains are thoroughly dry, follow by light sanding with fine sandpaper or rub the finish lightly with boiled linseed oil and pumice. To do

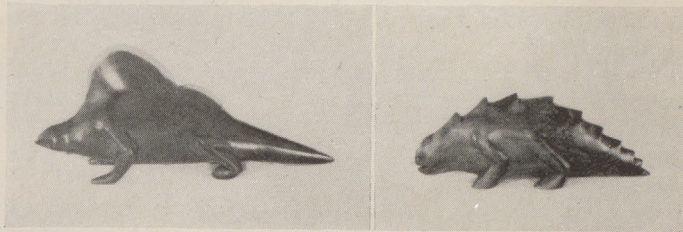


Plate 9. Lizards like these are found only in Natural History books. You can find pictures of many other kinds of prehistoric animals, butterflies and snails in books in your library.

this, place a bit of cloth over the end of the index finger, dip lightly in oil and then let some pumice powder adhere to it. Rub the oil and pumice well into the wood. Leave it half hour and remove excess pumice with a dry cloth. Now apply a coat of shellac or substitute. When dry (in about 2 hours) repeat the pumice treatment. Follow with an application of 50-50 mixture shellac and alcohol. Let dry and give a light oil and pumice rubbing. Repeat several times, polishing briskly with a flannelette each time the pumice is removed. Remember that your last operation will *always* be a light pumicing followed by prolonged polishing. The sculpture is now finished.

As stains would kill the natural beauty of red cedar, butternut, mahogany, walnut, gum, apple and choice pieces of such woods as basswood and whitewood, these should be given a natural finish.

To do this, first apply a coat of *boiled* linseed oil, taking care to cover uniformly the entire surface. Wipe dry until there is no sign of oiliness, then brush the entire surface with very fine sandpaper. Clean with a dry cloth and apply a coat of white shellac, followed in rotation by pumicing, and the same process of 50-50 shellac and alcohol, pumicing between each coat, as described for stained pieces. Finish as usual, by pumicing and polishing.

Floor wax produces a soft, velvety finish. Apply a coat directly to the wood and after allowing it to dry for a few minutes, polish with a flannelette cloth. Apply

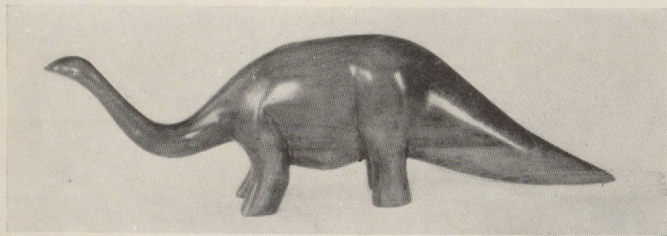


Plate 10. This dinosaur, too, is a creature of the past but he is a fine subject for wood sculpturing.

additional coats at 2 to 6 hour intervals until a fine polish is obtained.

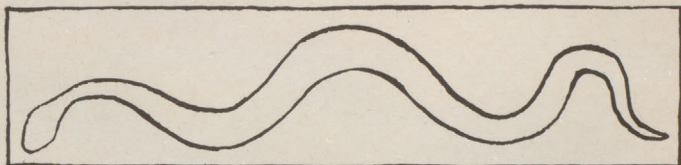
You can make your own polish by shaving beeswax into a glass jar, adding enough turpentine to cover the shavings and placing the jar in the sun until the ingredients form a paste. The density of this polish is controlled by the amount of turpentine added. It should be applied like floor wax.

Carving a Snake

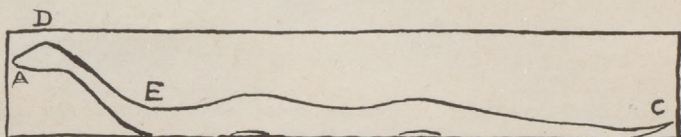
The snake in plates 1 and 12 is really very simple to carve. It is suggested that you make several of these and become thoroughly familiar with all types of cuts before moving on to the next subject.

Block No. 1, plate 11 shows a snake $8\frac{3}{4}$ " long x $1\frac{3}{4}$ " across its widest point, traced on a piece of pine 9" long x 2" wide x 1" thick. Block No. 2 shows the elevation of head of the same snake.

The first step in carving it is to cut away the wood along the sides of the sketch in block No. 1. The snake now appears like a silhouette when seen directly from above. The next step is to shape the body. Cut from the back of the head (D) to thickest part of the body (E) and gradually taper the body to a point at extreme tip of tail (C). Now cut upwards from point (B) (underneath



Block No. 1.



Block No. 2.

PLATE. II. TOP and SIDE VIEWS of a SNAKE.

Plate 11.

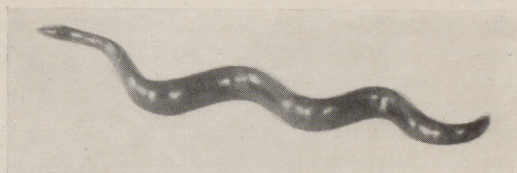


Plate 12. A polished wood carving of a snake.

the head where the body first touches the ground) in a sloping direction towards (A) to form the underside of head. Carefully round off the body to a slightly oval shape. Shave down all bumps and smooth with No. 1

sandpaper, then No. $\frac{1}{2}$, finishing off with No. 2/0. Your snake may be stained to lifelike reality as suggested on page 10.

Carving the Penguin

The blocks shown in plate 13 are $5\frac{1}{2}$ " high by $2\frac{1}{2}$ " x $2\frac{1}{4}$ ". The finished penguin would measure $5\frac{1}{2}$ " tall, $2\frac{1}{4}$ " from wingtip to wingtip, $1\frac{3}{4}$ " thick through centre and 2" from tailtip to toetip.

Block 3. The angle or corner of the block is used as a centre line passing down through the tip of the beak, the centre of the breast and midway between the feet. Sketch in lines K-N-O and P-Q-R on either side of the corner line A-B. Make cuts K-N, O-N (slightly curved), P-Q and R-Q, removing the shaded portions. You will note from the drawing that the cut P-Q is steeper than the cut R-Q.

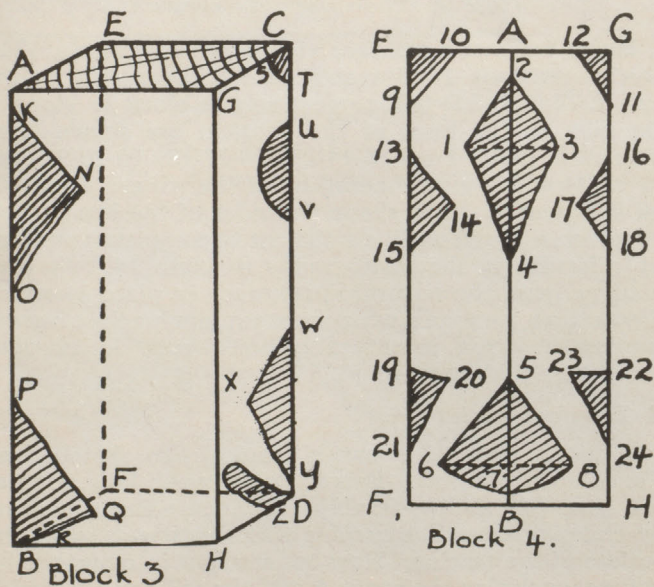


PLATE 13. THE PENGUIN.

Sketch roughly the straight and curved lines S-T, U-V, W-X-Y and Z the "U" shaped cut below Y, on both sides of the centre line C-D. Remove the shaded portions. This forms the back of your penguin; T-U is the back of the head, V-W its back; and X-Y and Z make the shaped cuts which form the tail.

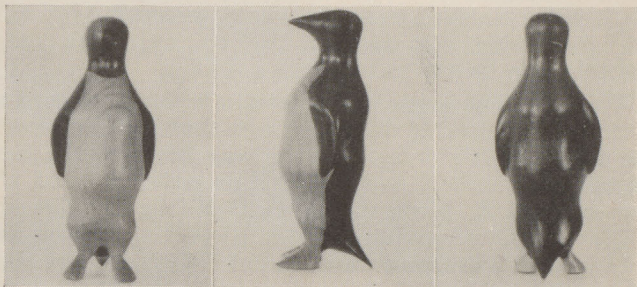


Plate 14. Three views of a penguin.

Block 4 shows a full-face view of your penguin. The shaded portions 1-2-3-4 and 5-6-7-8 correspond to the cuts K-N-O and P-Q-R respectively in block 3. None of the cuts in the back of the penguin are shown here. You now make cuts 13-14-15, 16-17-18, 19-20-21 and 22-23-24 which give the outline of the wings. Next cut off 9-10 and 11-12 to shape the sides of the head. You now have a rough outline sufficient to complete your bird by referring to the photographs in plate 14. To give your penguin the natural appearance in plate 14 which shows three views of a penguin, stain him black or brown, leaving the breast in natural colored wood. Polish your carving as told on page 10.

A Tropical Fish

Block 5, plate 15 shows a tropical fish sketched on Canadian white pine. It is 4" wide by 4" long and not less than $\frac{1}{4}$ " and preferably $\frac{1}{2}$ " thick. Begin carving by chipping away the surplus wood until you reach the outline of the tracing. Now cut straight in along the fin outline, enclosing the space A and the gill line 1-2, which are the same on both sides of the fish. Cut inward along

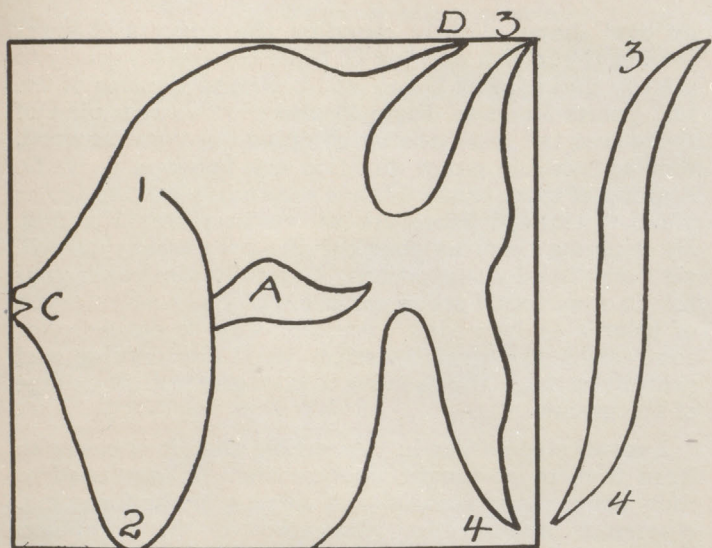


PLATE 15.

OUTLINE of TROPICAL FISH.

these lines to give form to the gills and fins. Next chip away the edges from both sides so as to give your fish

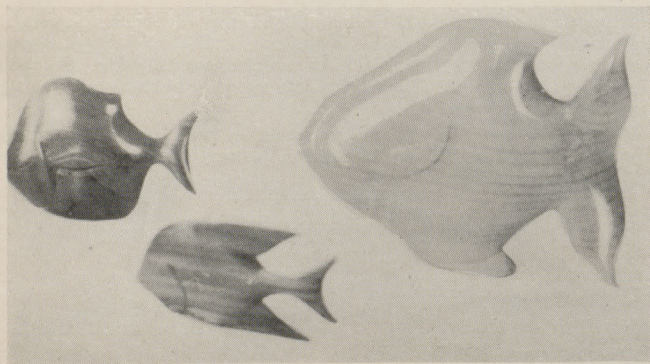


Plate 16. These three types of tropical fish are made of different woods.

an oval shape, slightly rounding the upper and lower jaws at the mouth opening C, taper the top fin gently to a fairly thin edge at D and do likewise to the tips of the tail, points 3 and 4. Plate 15 also shows a rear view of the curved tail 3-4 made by chipping away excess wood. Similar twists in either direction can be given to fin D. A group of three tropical fish is shown in plate 16. Other views of tropical fishes are shown in plates 1 and 2. By studying them as your carving progresses, you will get many helpful suggestions. Carefully sandpaper your fish to a smooth flowing surface. If you wish, a touch of color may be added. Another way to obtain color contrasts is to carefully select wood for carving and skilfully arrange the drawing to take greatest advantage of the grain.

I mentioned earlier in this article that it is easier to learn than to be taught woodcarving. I have tried to show some of the principles of carving in the foregoing. Numerous animals are illustrated in the pamphlet. They will furnish you with many ideas for carving. Of course each undertaking will introduce new techniques and present problems which are to be overcome. The fascination of sculpturing in wood is never ending.

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10 blades No. 1.	12 pieces sandpaper (4 each of Nos. 1, 1/2 and 2/0).
20 pieces white pine for snake.	1/2 pint boiled linseed oil.
15 pieces white pine for penguin.	1/2 pint shellac or substitute.
15 pieces red cedar for tropical fish.	1 oz. pumice powder.

Prices of wood

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Fish	4 x 4 x 3/8	.03	.05
Birds	4 x 3 x 3	.12	.18
Cow			
Elephant	3 x 3 x 3	.10	.15
Dinosaur			
Turtle	3 x 2 x 2	.05	.08
Beaver	6 x 2 x 2	.09	.14
Seal			
Lizard	6 x 3 x 3	.15	.22
Penguin			
Gull	4 x 4 x 3/4	.05	.08

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