The HOME UNIVERSITY BOOKSHELF

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VOLUME V

THINGS TO MAKE AND THINGS TO DO

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*Swords and Hunting Knife (...hmmm)

*Merry-Go-Round

*Topsy-Turvy

*Wig-Wag

*Merry-Go-Round-Stock

strings through holes near the inner sides of the arms and legs, and to these two strings tie a longer string to reach below the feet. Jack is made to jump by pulling this string and one tied in his cap.

BLACKSMITH

The shaded part of Plate 5 is one piece. The upper leg is loosely fastened at C and D, as shown in the method of joining. This same method is used at A, B, E, F and G. If the squares are ¾-inch, the blacksmith will be about 9 inches tall; the long bars, 14¼ by ⅜ inch; and the short vertical bars 2¾ by ⅜ inch. After these parts are fastened together, nail the anvil and block to the upper bar in such a position that the blacksmith's hammer will strike what represents the iron on top of the anvil. By grasping the long bars at X and Y, the blacksmith can be made to hammer his iron in a lively fashion.

DINKEY-BIRD

The dinkey-bird (Fig. 10) should be cut out and assembled as shown in the drawing. Make one head and tail, and two pieces like the body, and two legs. Assemble by nailing the two parts of the body firmly to the legs. The joints at A and B should be extremely loose, and the space between the two parts of the body be such that the head and tail will work freely. This can be accomplished by nailing a small piece of wood slightly thicker than the head and tail parts between the two body parts. Such a piece is indicated by dotted lines at D. After attaching the strings as shown and assembling the bird, it is attached to a small piece of wood the end of which shows at E. This piece is long enough to be fastened to the edge of a table, using either a clamp or a weight. Now by swinging the lead weight like a pendulum our prehistoric bird ducks his head and tail alternately, owing to the fact that the weight of the lead is transferred from one branch to the other of the forked strings running to the head and tail. It may be advisable to run these two strings through holes in the base rather than to have them separated as widely as shown in the drawing. The length of the string from the fork down and the position of attaching it will offer some chance of experimentation in getting the best results. Our ingenious boy can easily make a donkey, duck, or parrot patterned after this bird. Plate 4 shows another dinkey-bird which has a somewhat different movement of head and tail.

THE BALANCING HORSE

The balancing horse (Fig. 11), if properly made, seems to defy the laws of nature. After you succeed in making him work well, ask some of your scientific friends to explain the principles underlying his action. To make this natural freak, first cut from some thin piece of wood the model of the size desired. Remember that an easy way of enlarging these drawings has been given under the description of the first

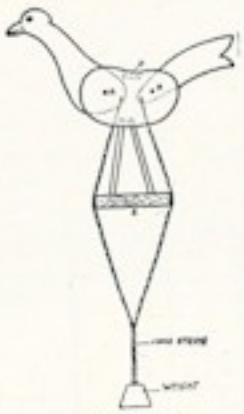


FIG. 10

FIGURE 11

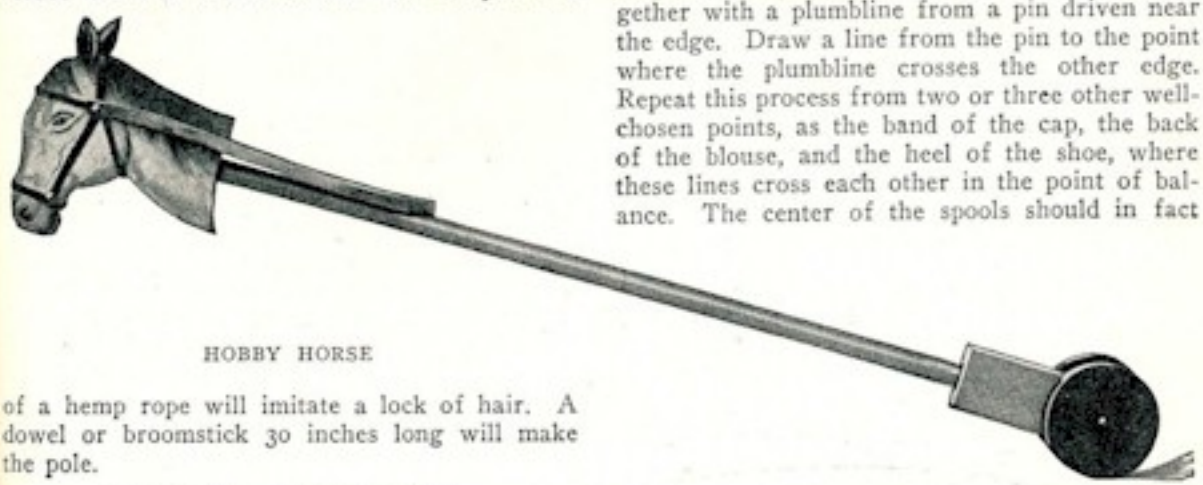
toys. The stiff wire which is attached to the body of the animal should have sufficient bend in it to clear the edge of the table or shelf on which he operates, and should terminate in a lead weight heavy enough to obtain the result desired. This weight can be cast by pouring some hot lead in a hole bored in a piece of wood. By holding the end of the bent wire in the hole while pouring, the weight can be cast fast to it. Free the lead from the wood by splitting the wood away.

The operator may have trouble in making his horse stay on the table while doing his prancing stunt. To avoid this, cut a piece of tin and fasten it in a fine saw-cut in the back leg.

HOBBY-HORSE

The hobby-horse (Plate 5) will make a good gift to some smaller brother or friend. Boys sometimes find that toys they are able to make have been outgrown by themselves, but this gives them a good chance to play Santa Claus to some other boy. The head should be drawn on 1½ inch squares on a board 7½ by 6¾ inches. Such a thick board should be cut with a turning saw, or it may be sawed out approximately with an ordinary cross-cut saw, if many cuts are made, and then smoothed with spoke-

shave, knife, rasp, and sandpaper. To make the ears quite like real ears, the leather should be folded when it is tacked on. The frayed end



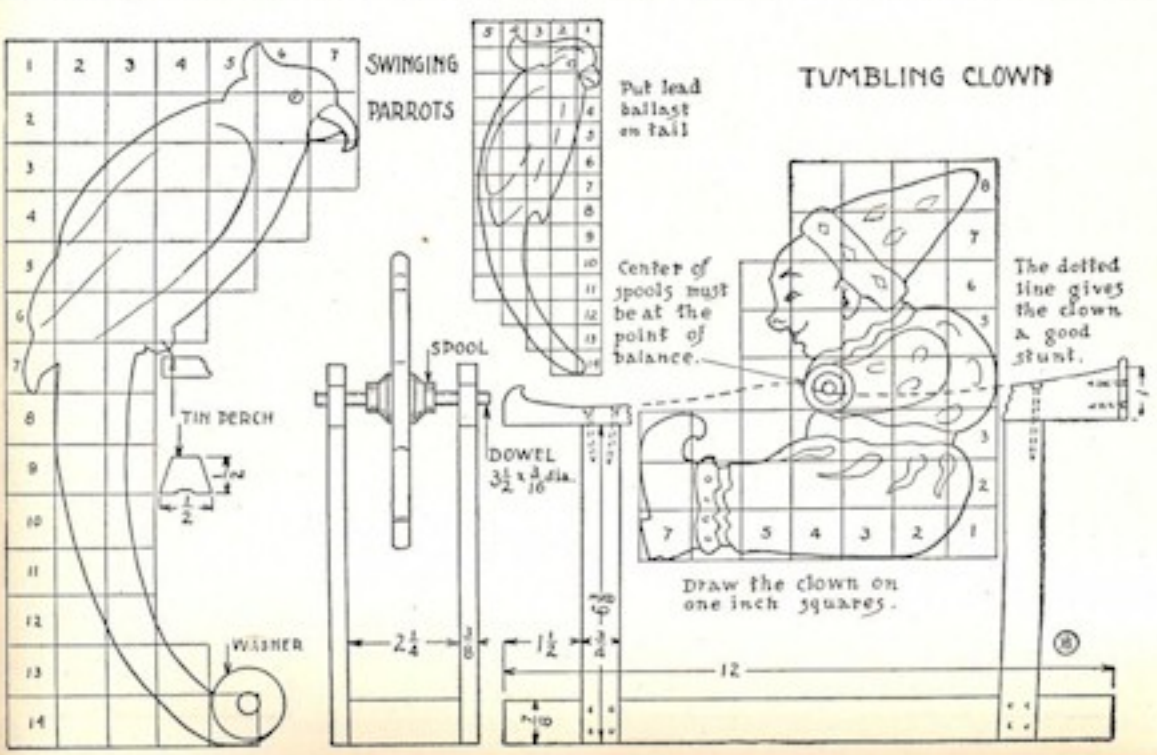
HOBBY HORSE

of a hemp rope will imitate a lock of hair. A dowel or broomstick 30 inches long will make the pole.

PARROTS AND CLOWN

Like the balancing horse, the parrots (Plate 6), can be made to balance on a shelf, table, or other perch by lead or other weights on the tip of the tail. They should be painted with bright colors.

The tumbling clown (Plate 6) should be sawed from wood about 5/16 inch thick. Heavy cardboard can be used. To find the point of balance (the center of gravity, a scientist would call it) suspend the clown, after it is sawed out, together with a plumbline from a pin driven near the edge. Draw a line from the pin to the point where the plumbline crosses the other edge. Repeat this process from two or three other well-chosen points, as the band of the cap, the back of the blouse, and the heel of the shoe, where these lines cross each other in the point of balance. The center of the spools should in fact be placed the least bit above this point (say 1/16 inch) so that when at rest the clown will sit upright. A skewer makes a good dowel. In the hole in the spool a peg must be glued, and a new hole bored to fit the skewer. Straight bars may be used for the clown to tumble on, but curved ones like a roller-coaster make him more interesting, for sometimes he cannot get over



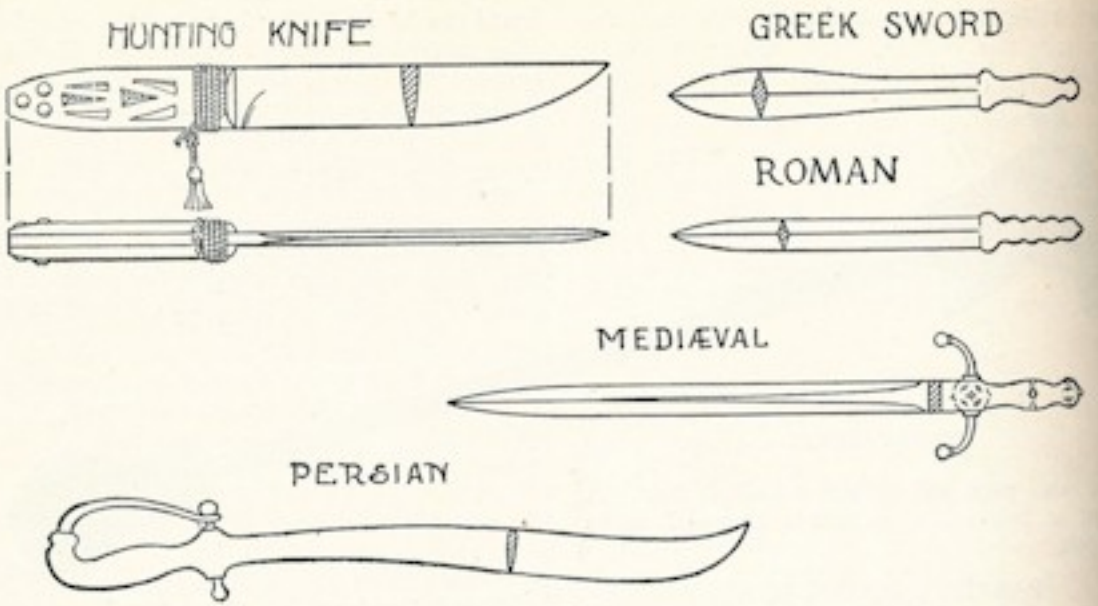


PLATE 7

the top, and will then roll backward. Curved bars should be fastened together while sawing or shaping them. A small block is nailed to the wide end of each bar to prevent the clown from rolling off. The face may be painted white, and the suit bright colors.

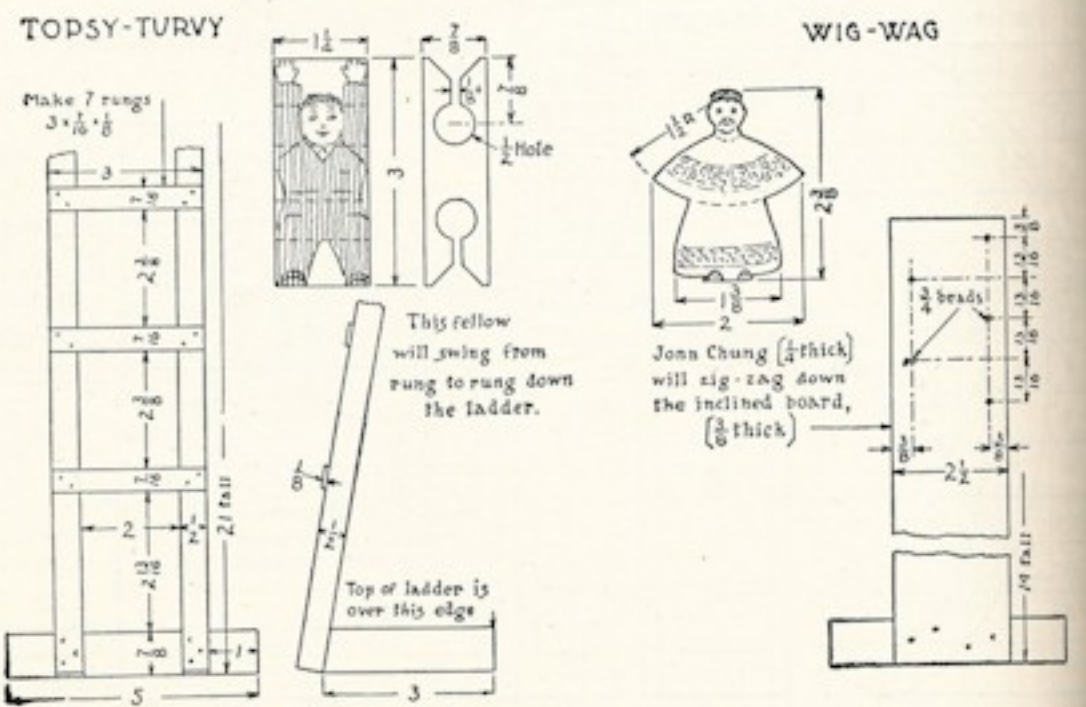


PLATE 8

AMUSING TOYS

WHICH CAN BE MADE BY MORE EXPERIENCED CHILDREN

SWORDS AND HUNTING KNIFE

The hunting knife (Plate 7) may well be made 9 by 1⅛ by 5/16 inch with two pieces 4 by 1⅛ by 5/16 inch glued to the handle. Shape the blade, and sharpen it with spoke-shave, file and sandpaper. Shape the handle pieces, and sandpaper the curved end nearest the blade before gluing. After the glue has dried six hours, or over night, round the handle somewhat before carving it

MERRY-GO-ROUND

and nailing it with brass tacks. The carving can be done with a knife, chisel or skew-chisel. A skew-chisel is a carving-chisel which, instead of being ground square across the end like an ordinary chisel, is ground slanting about sixty degrees to the longer edge of the chisel—"on the bias," as mother would say if dressmaking. The shaded portion (sections) in the blades shows how the various blades are to be sharpened.

A case for the knife and a scabbard for the swords may be made of enamel cloth or imitation leather.

Greek swords (Plate 7) should be about 16 by 2 by ½ inch; the Roman sword, 16 by 1½ by ½ inch; the Mediæval, 26 by 1¼ by ½ inch; and the Persian, 28 by 2½ by ½ inch. The curved guards on the Mediæval and the Persian swords can be made of lead, solder, or copper wire—some soft metal such as a boy can bend, hammer and file. If a boy wants to gild any of these swords with gold or silver paint, he will have a veritable shining sword, or he may spread some liquid glue on the wood and then cover it with tinfoil.

TOPSY-TURVY

This toy (Plate 8) requires considerable accuracy in its construction, especially in the following parts: The sides of the ladder must be exactly upright as seen from the front; the rungs must be square with the sides of the ladder and evenly spaced; the holes through the block must be square with the sides and their centers exactly ⅞ inch from the ends of the block. Perhaps father will bore these holes and plane a strip 22 by 5/16 by ⅛ inch out of which the rungs are made. A strip of wood can be planed thin if it is pegged to a flat board with wooden pegs. One way to get the slant of the front of the base is to set the ladder on the floor 3 inches from the wall and lean the top against the wall; then rest the base to this slant and test it again on the floor.

WIG-WAG

This toy (Plate 8) requires smooth edges on the figure and accurate location of the brads on the inclined board. It works better if the feet are cut off, and a piece of lead for ballast is tacked on instead. The board inclines practically the same as the ladder in Topsy-Turvy.

MERRY-GO-ROUND STOCK

Two boards 8 by 4 by 5/16 inch (cigar box).
Two boards 4¼ by 1½ by 5/16 inch (cigar box).
One block, 4 by 1⅝ by ½ inch.
Two blocks, 1 by 1⅝ by ½ inch.
Three arms, 10 by ¾ by ⅛ inch.
One dowel, 11 inches long, to fit in spool hole.
Two spools, 1½ inch long.
Six dowels, or wires, 6½ inches long.
Six animals and riders, about 2¼ by 2¾ by 5/16 inch.

Here is a toy (Plate 9) for a boy to set up in a toy circus and make it go by a crank and string belt, or by an electric toy motor belted to a larger wheel than the spool in the center. The dowel should be made first to fit tightly the central spool

Carts & Wagons

*Coaster

*Scooter

*Kid Car

*Pistol & Crossbow (...hmmm)

*Doll's Bed

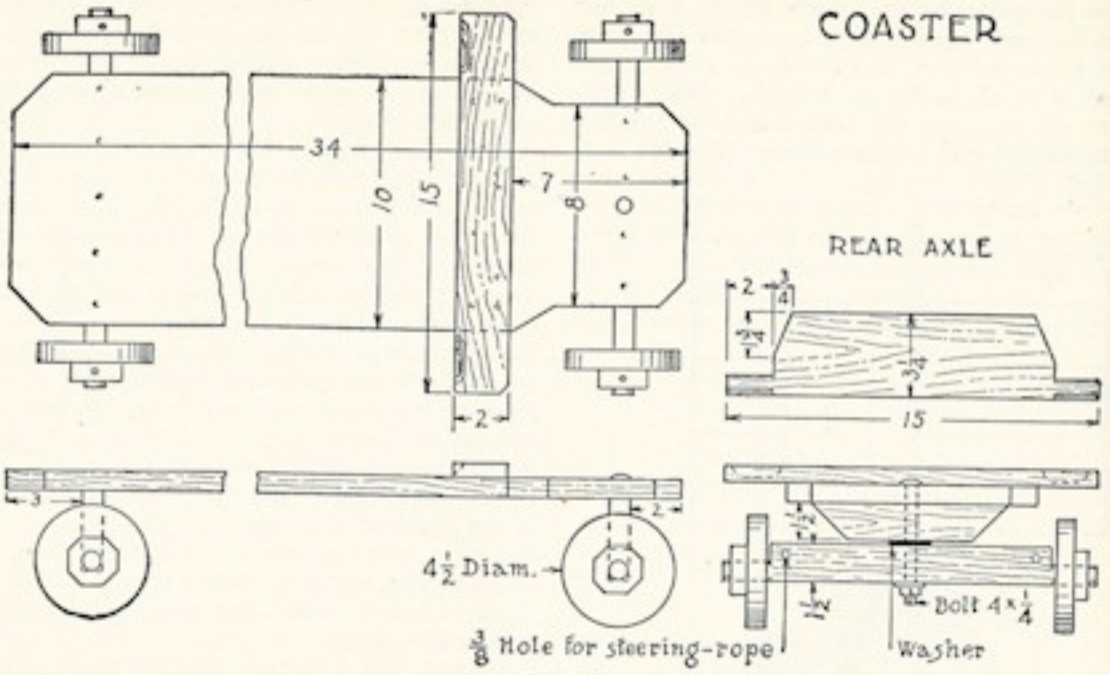


PLATE 15

ter and longer, the axles and hole in wheels should be greased with hot paraffine. This will soak in farther if the wood is hot also. The stock:

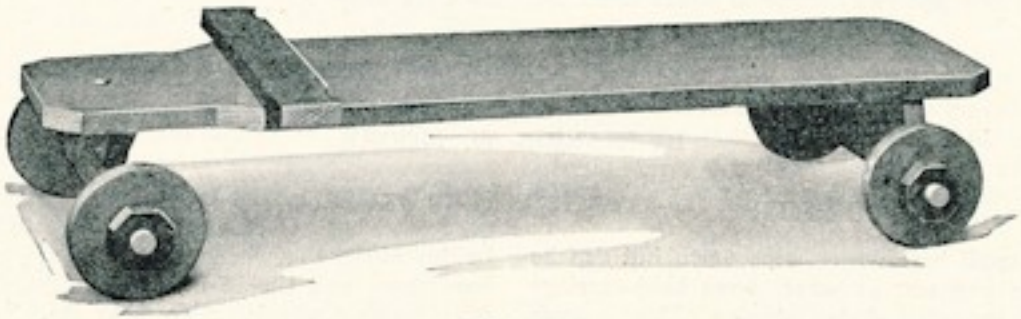
Board, 34 by 10 by ⅞ inch.
Foot rest, 15 by 2 by ⅞ inch.
Rear axle, 15 by 3⅛ by ⅞ inch.
Front axle, 15 by 1½ by ⅞ inch.
Front block, 8 by 1½ by ⅞ inch.
Four wheels, 4½ inch diameter by ¾ inch.
Four washers, 2 octagon.

Other methods may be used to keep the wheels on the axles, but this one is suggested as a strong method, though somewhat difficult to make. The wooden washers help to keep the wheels from wobbling. They are screwed to the axle. A cotter pin (see Plate 5) or heavy brad outside a big iron washer is a good method. The king-bolt should be fast in the board and axle block, but loose in the front axle. To prevent the nut from coming off, the end of the bolt can be hammered, and the threads injured.

SCOOTER

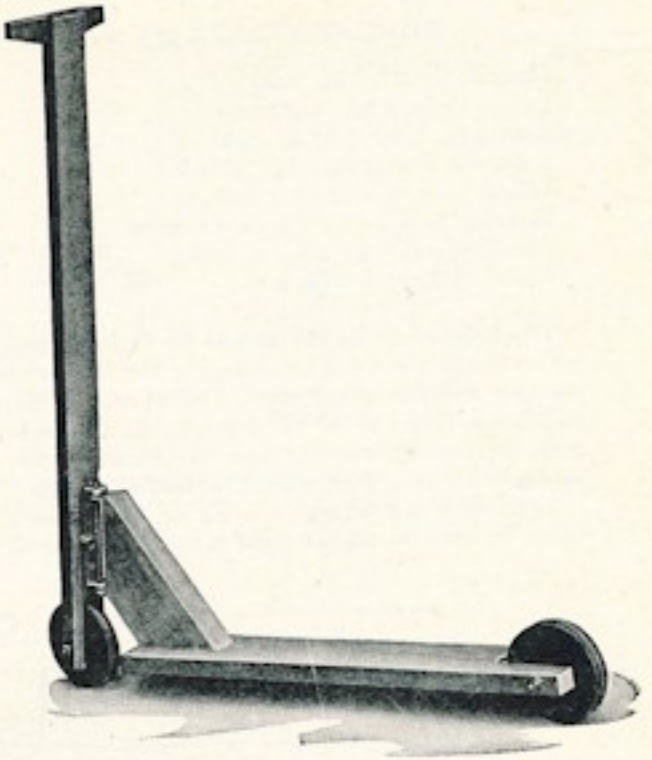
Stock: All hard wood.
Steering post, 30 by 2 by ¾ inch.
Foot board, 22 by 3½ by ¾ inch.
Handle, 6 by 1 by 1½ inch.
Two wheels, 4 inch diameter by ¾ inch.
Bracket, 8½ by 3½ by ¾ inch.

With a scooter like this (Plate 16) what boy would not like to go on errands with his knap-



COASTER

sack on his back to carry packages? To cut the slots for the wheels, first bore a hole 3 inches from the end of the steering post and the foot board, then carefully saw straight to the sides of the hole. Care must be taken to bore the ¼-inch hole for the axles of the wheels straight, especially in the foot board. Large screws fasten the foot board to the bracket. To lay out the bracket, measure from the upper end of the board 3½ inches (3⅛ by ⅜ inch), and draw a line square across, then connect the upper corner with the end of this cross line; ⅜ inch from the upper end draw another line square across. Where it crosses the starting line is the upper end of the curve of the bracket. The lower end is made by a line which slants 2⅜ inches. Screws ¾ inch are long enough to hold the angle irons to the bracket and the post. Two short stone bolts can be used in place of the one long bolt. To locate the place to screw the irons to the post, the parts will have to be held together in such position that the foot board will be level. The handle should be rounded on all edges which do not touch the post. The wheels will last much longer if a tin or hoop-iron tire is nailed on, and if a bushing (a short length of metal pipe) can be forced tightly into a hole in their centers.



SKATEMOBILE

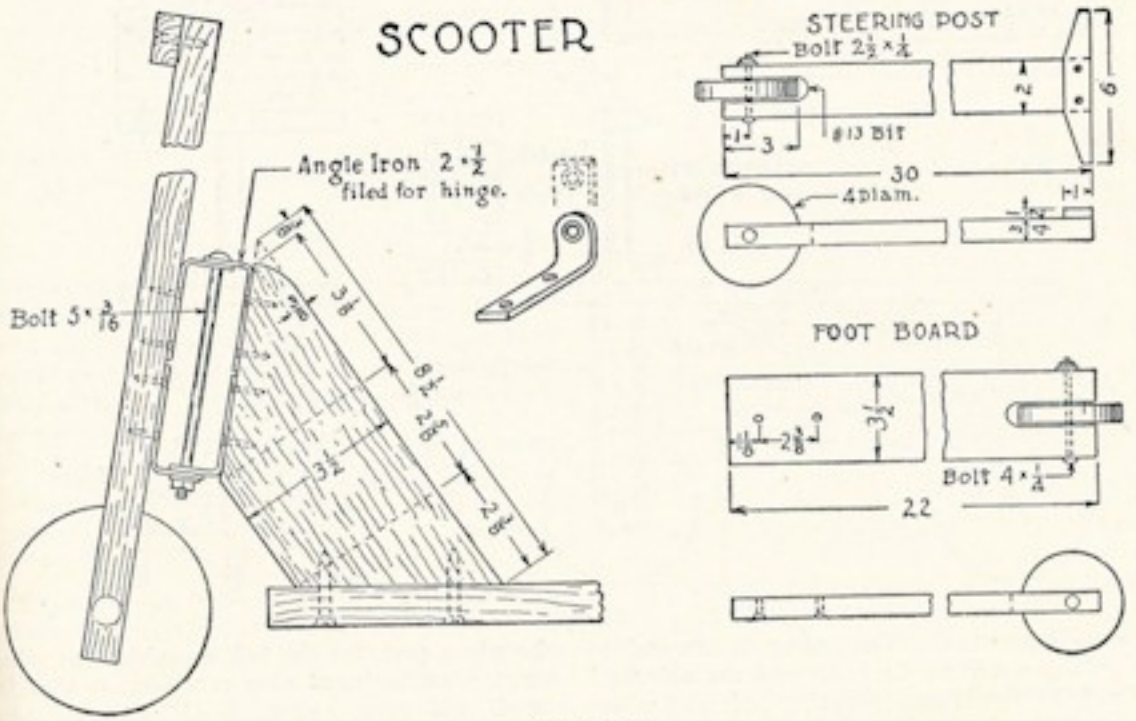
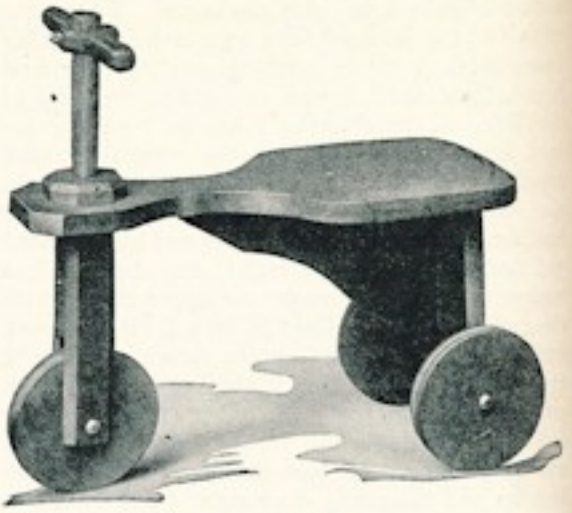


PLATE 16

KID-CAR (PLATE 17)

Seat, 20 by 9 by ⅞ inch.
Brace, 12 by 7 by ⅞ inch.
Rear axle, 9 by 7 by ⅞ inch.
3 wheels, 6 diameter by ⅞ inch.
Wheel post, 9 by 2 by 2 inches.
Steering post, 10 by 1 inch diameter.
Steering bar, 9 by 2 by ⅞ inch.
Collar, 3 by 3 by ⅞ inch.



KID-CAR

The height of this car should be varied somewhat to suit the rider by changing the length of the axle and the wheel post. The wheels, collar, and posts should be of hard wood. If a broomstick is used for steering post, the various holes through which it goes should be made to fit it.

Few boys are strong enough to bore 1-inch holes in hard wood, so some strong helper will

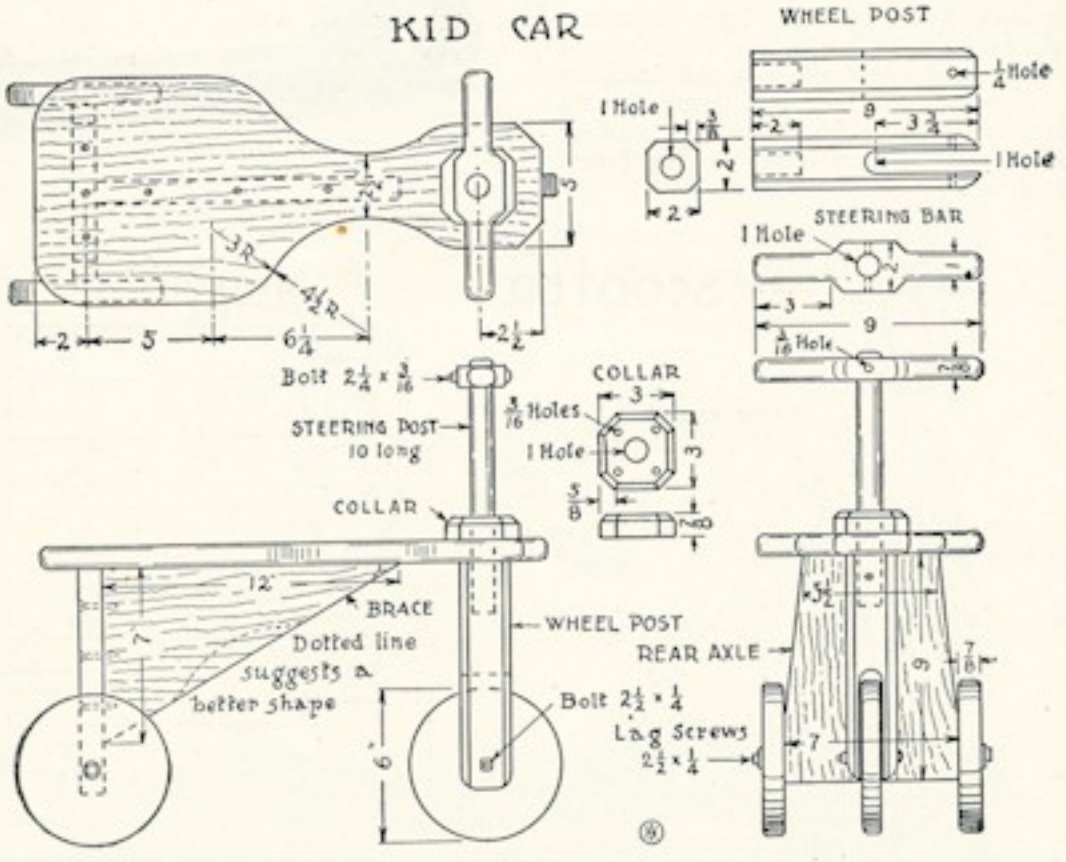


PLATE 17

have to bore them. The collar is screwed to the seat, the seat to the brace and the axle, and the axle to the brace. Steering post and wheel post are glued together, and a screw put part way through them. The ¼-inch hole through the wheel post, for the bolt on which the wheel turns, must be bored very carefully, so that the wheel will turn without wobbling against the sides of the slot in the post. Holes must be bored in the axle for the lag screws which hold the

rear wheels. A No. 7 gimlet bit is the right size to bore the holes for these screws. The seat can be cut out with a turning saw, or to a large extent with cross-cut saw, if cuts enough are made (see Clappers, Plate 12). The edges should be rounded and quite smooth. The steering-bar also should be rounded and smooth.

PLATE 18

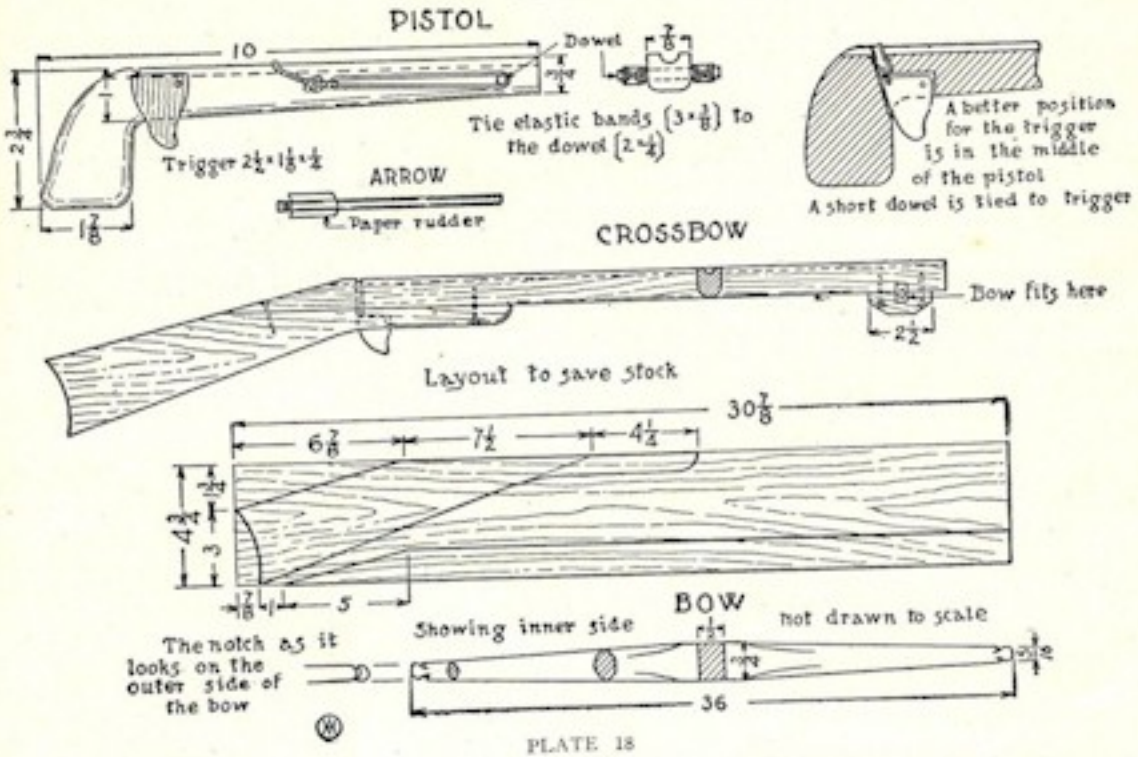


PLATE 18

PISTOL-CROSSBOW

What boy does not like to shoot? But with these (Plate 18), as with any weapon, a boy must be careful as to how he shoots. In some places it is against the local law to use an air-rifle, sling-shot, or bow on the streets. Stock for pistol:

Pistol, 10 by 2¾ by ⅜ inch.
Trigger, 2½ by 1⅛ by ¼ inch.
Dowel, 2 by ¼ inch diameter.
Two elastic bands, 3 by ⅜ inch.

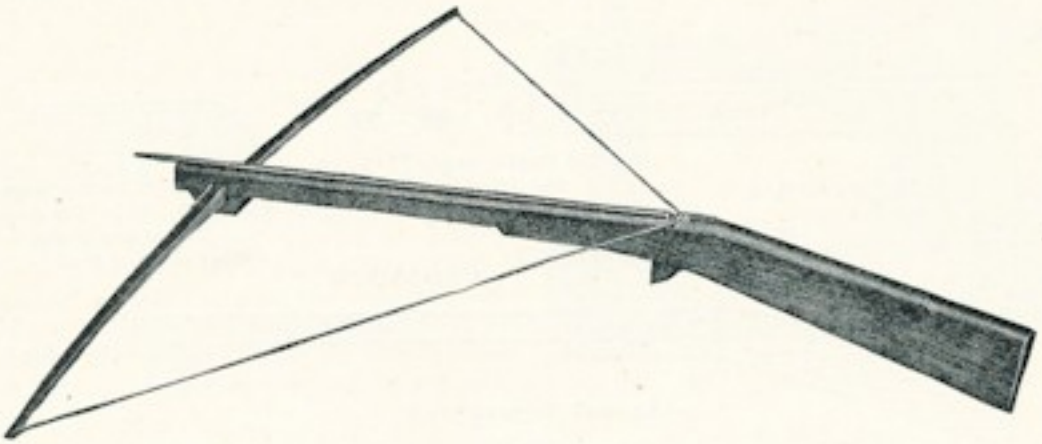
To make a groove in the barrel of the pistol a round plane is best; but a boy can make it with a gouge and round file if he takes time enough. To make it this way a straight groove (of rectangular shape) in the center of the edge of the board is a great help. A tool made of a nail which has been filed like a chisel, as shown in Fig. 11, will be a good aid in making the groove straight: and a gun with a crooked barrel—who wants it? The groove should be well sandpapered by wrapping some sandpaper around a pencil or dowel. The stock and the barrel should have well-rounded edges. The cord used to stretch the elastics back to the trigger should be large and firm, like a fishline or top string. The trigger is of hard wood well smoothed. After it is screwed to the barrel so that it moves just easily enough, a notch is cut in the barrel so that it will hold the cord, and still allow the trigger to push it up when ready to shoot. To be sure of making this notch correctly, a boy had better cut some in the edge of a board and see if they will hold the cord just right. Small arrows are best for shooting straight. They can be made of dowels, skewers, or lolly-pop sticks.

CROSSBOW

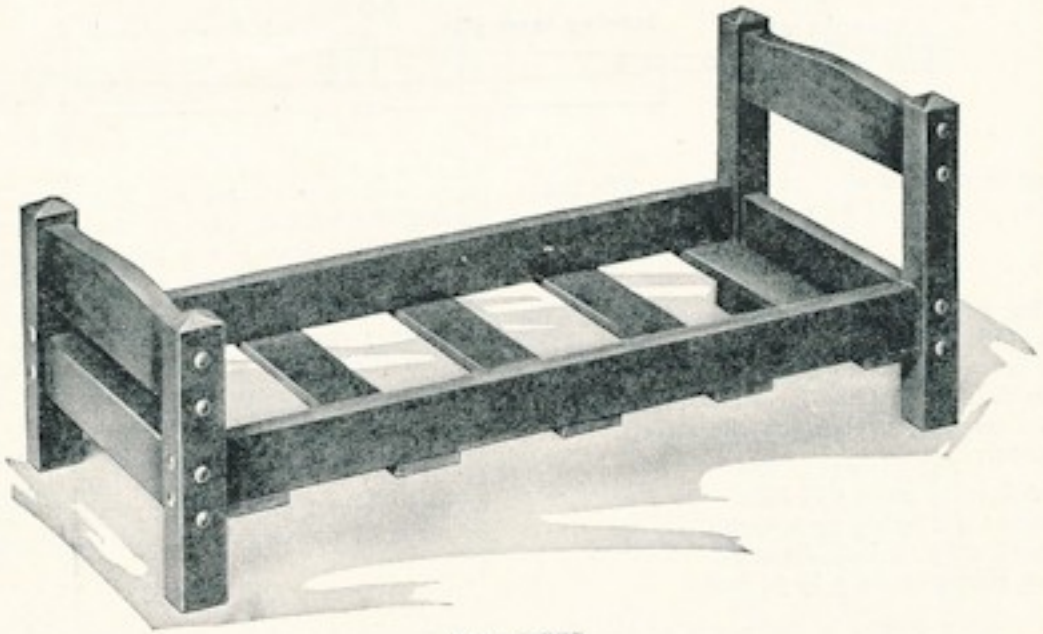
Some wonderful crossbows are still preserved for us in the museums. Have you ever seen one? If a boy has a board 6 inches wide to use for this gun (Plate 18), he will not need to use two pieces as suggested in the lay-out. The trigger should let into a pocket (mortise) in the center of the gun stock. To make the pocket,

bore first a ¼-inch hole down from the groove, and then bore a row of holes close together in front of this one long enough to admit the trigger. These holes should be bored upward about ½ inch. A chisel is used to smooth the walls of this pocket. The trigger should be about 1½ by 1¼ by ¼ inch, and should have a small dowel tied to its corner, as shown in the sectional drawing of a pistol. The notch must be made with great care just opposite the center of this dowel.

White ash and hickory are good woods for bows. The wood should be tough, and of straight grain. Hoe and rake handles are usually made of white ash. Eskimos, who can get no better wood than dry, brittle driftwood, still make strong bows by wrapping the whole length of the bow with sinew. A bow should be shaped first with a plane to a tapering stick with rectangular section, as shown in Plate 18, directly under the word "bow." Next the inner or nearer cor-



CROSS-BOW



DOLL'S BED

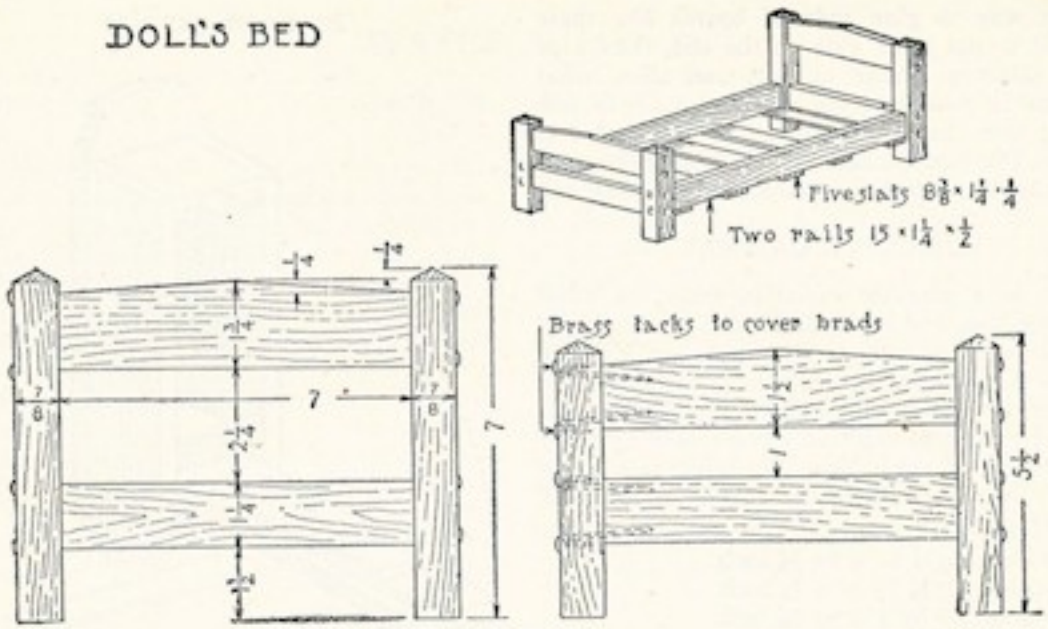
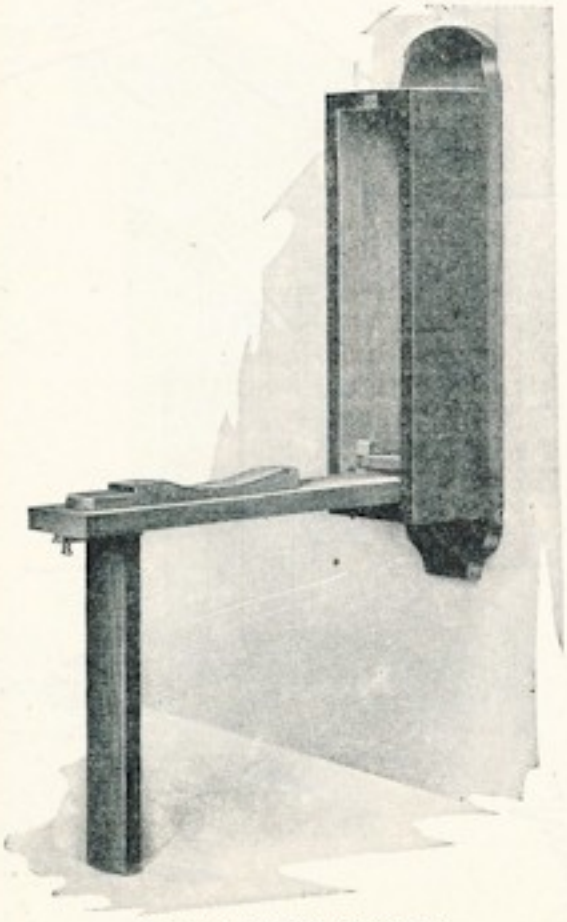


PLATE 19



SHOE-POLISHING CABINET

ners are planed, then the outer ones, and the shape gradually made like the other two sectional drawings. The bow should be filed and sandpapered smooth, and then oiled with linseed oil, paraffine, or tallow, or other grease. A bow when well shaped bends somewhat more toward its tips than in its center. A bow for archery can be made like this in general, except that the center is not made rectangular, but somewhat egg-shaped, like the section under the word "side" Plate 18. A hard, strong, cord must be used for the bow-string.

DOLL'S BED

The bed suggested in Plate 19 is simple in its construction, but if made of wood with a good grain, like oak or chestnut or hard-pine, and stained a mission color, it looks well. Unless the ends of the rails are flat and exactly square, and the corresponding members exactly the same length, this construction will not go together well. A miter box is recommended for cutting the ends true, and the corresponding parts the same length. A boy should learn to plane the end of a board, especially a small one like these parts, true and square by using a block plane and bench hook or shooting board. Short boards can be planed true on their edges in this same way. To locate the holes for the 2-inch brads, place a rail where it belongs, and trace a line around it, then drill small holes from near the ends of the oblong thus traced outward, and somewhat slanting. The

MOST AWESOME DISCLAIMER EVER WRITTEN

SAFETY

In the UNITED STATES more people are killed and injured *as a result of accidents which could have been prevented* than from any other cause.

It is encouraging to note, at present, that due largely to the excellent work of the National Safety Council in warning us against carelessness, we are becoming more aware of the need to be careful.

Most accidents occur because people don't think ahead. Young people are particularly blameworthy in this regard. How foolish it is just to rush ahead without giving any thought to what damage you may be inflicting on other people, not to mention yourself!

Think of it this way: How would you feel *for the rest of your life* if, through lack of just a little forethought, you accidentally killed another person or injured him seriously, perhaps for life? That happens every day, because of someone's carelessness.

(...LOVE this part)

How would you feel if, because you "didn't think", you injured *yourself* so that you became a cripple in one way or another? Suppose it were something less serious than that: suppose your carelessness were responsible for someone's losing merely time or money or some precious or necessary object difficult or expensive or impossible to replace. Even that would make you feel pretty terrible; wouldn't it? And if a human being were involved, it might make you suffer from regret and remorse for the rest of your days.

Some accidents can not be prevented. But many can. It is so much better to think ahead for a minute beforehand than to be sorry for a lifetime *afterwards*.

Many of the experiments and projects in this book, especially those for older children in the latter part, require care. Be sure you give them that care — *beforehand*. Think ahead about what you are going to do. Splinters, cuts, burns, and injuries of many other kinds are possible if you are careless or reckless. But if you are careful, they are quite unlikely.

It is no fun to hurt yourself or to hurt others. Doing things and making things are fun only if you do them well—and doing them well includes doing them with forethought—carefully and *safely*.

Don't, please, go at things without *looking* ahead as well as *thinking* ahead. Look to the right and to the left of you, too; don't be like a horse with blinders on.

Think about the accidents which occur as a result of carelessness. Think about yourself in connection with such possible accidents. Think of those you love . . .

Think of what you can do to avoid and to prevent such accidents. Think of what you, yourself, can do to make the world a safer place to live in. The safety of the world is dependent upon the safety of smaller places — *your* community, *your* school, *your* play places, *your* home. Safety *begins* in the hearts and the minds of people like *you*.