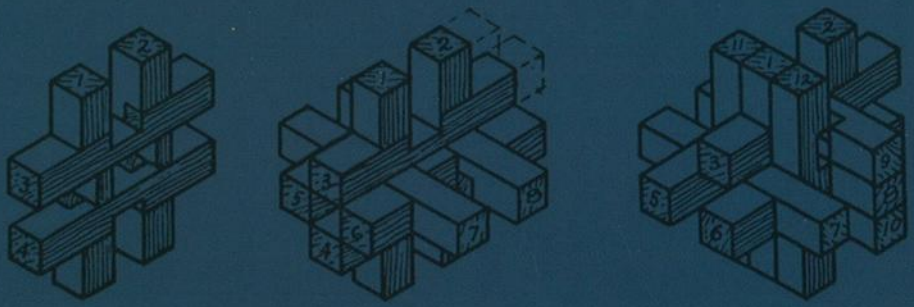
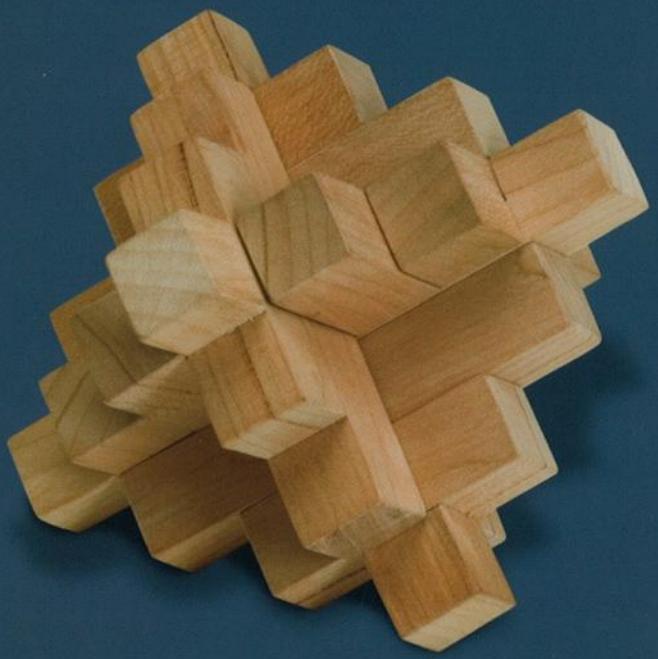
Puzzles in Wood

Simple Patterns for Creating 45 Classics





E. M. Wyatt

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Simple Patterns for Creating 45 Classics

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PUZZLES IN WOOD

INTRODUCTION

This collection of puzzling constructions in wood is offered to teachers of woodwork as a set of supplementary shop projects. It is in no sense a woodwork course. Almost any individual will respond to the challenge of a problem which arouses his curiosity, and teachers of woodwork can well utilize this interest factor found in puzzles in wood.

Puzzles make excellent manual-training projects for teaching many fundamental tool operations. Many an instructor, who began teaching in the old exercise days of manual training, fondly dreams of the days when a line was a *knife* line; an inch split the lines on a rule; and square was as square as the eye could detect against the light. But alas, exercises are now taboo, and students must make something practical from the start. Such teachers will find many valuable suggestions contained in these puzzles. Through puzzles, they can retain the desirable simplicity of the old exercises without incurring any supervisory criticism of their shop problems.

Most of the puzzles contained in this collection are simple in construction, and they can be varied in size to meet the skill of pupils of different ages. They not only have the requisite element of interest, but they call also for the maker's best in skill and accuracy.

The *Band-Sawed Square Prism* and the plug puzzles are especially good for teaching squaring up stock. The latter are excellent for teaching mortising. The burrs are all good

for teaching accurate sawing and chiseling to a line. The *Twelve-Piece Burr* is especially good as a class project as all the pieces are alike. The Cut-Up and Shuffle problems are excellent for teaching the use of the miter box. The teacher of wood turning will find that the band-sawed sphere will add intensely to the interest in the common chucked sphere problem.

The wise teacher always has before his students proofs of his own craftsmanship. The teacher who can exhibit a neatly worked up *Great Pagoda*, *Bottled Cross*, or any of the dovetail puzzles herein, will be assured of the respect of his pupils and of his fellow workmen. The secret locked boxes will be real challenges to his skill.

It is difficult for students to do accurate work on small pieces. For that reason, a wise teacher will often double or even quadruple the dimensions given on some of the drawings shown herewith.

The author claims to have improved or invented few of these constructions. It has taken him years to gather this material, and he would be glad to acknowledge the names of those who have contributed to this compilation. In fairness, however, to the many he would be sure to omit through forgetfulness or lack of record, he deems it wiser not to try to undertake any partial acknowledgement list. He will ever be pleased to receive from interested readers sketches of puzzles not herein contained, but which might be included in possible future editions of this modest booklet.

CUT-UP "T"

This is best made of three-ply veneer. If it is made from a single piece of 1½-in. strip, as suggested in the layout of the detail pieces, the direction of the grain will be no cue in working out the assembly.

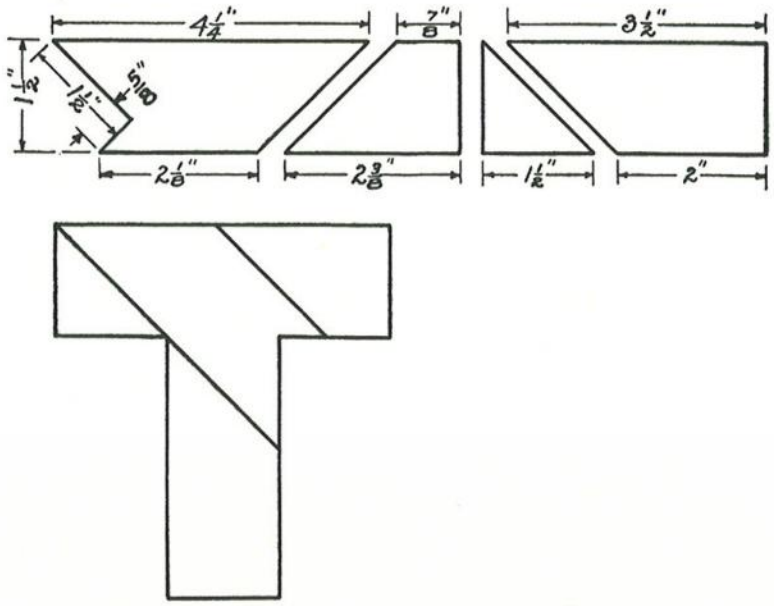


FIG. 1

CUT-UP CROSS

This is another good cut-up puzzle. Care should be taken that the direction of the grain will not aid in working out the assembly. It should not be made by making a cross and then cutting it up. Make the pieces first and then assemble them.

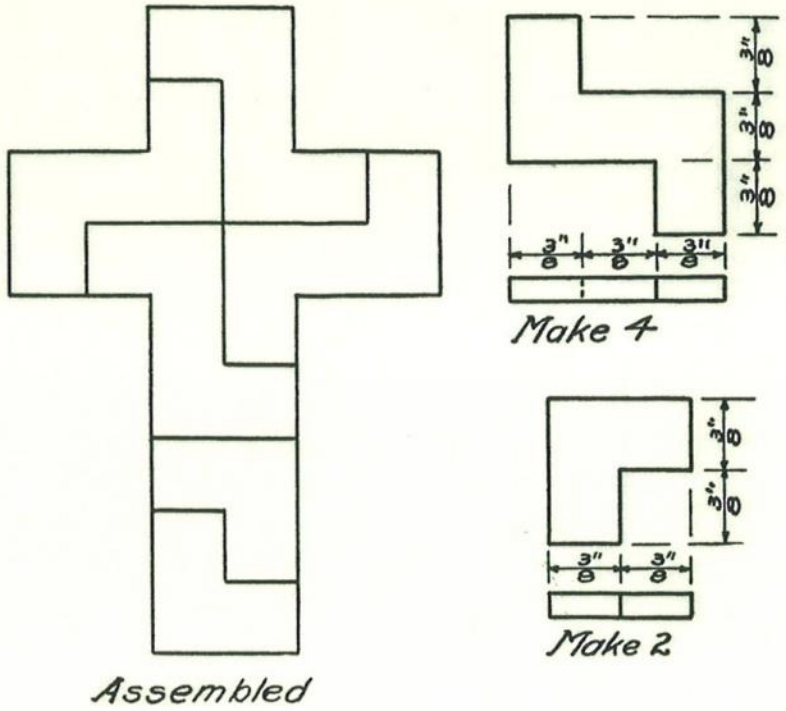


FIG. 2

CUT-UP SQUARE 1

This is a much better puzzle than may appear from the assembly shown. It is a nice miter-box job for the students. Its dimensions might well be doubled.

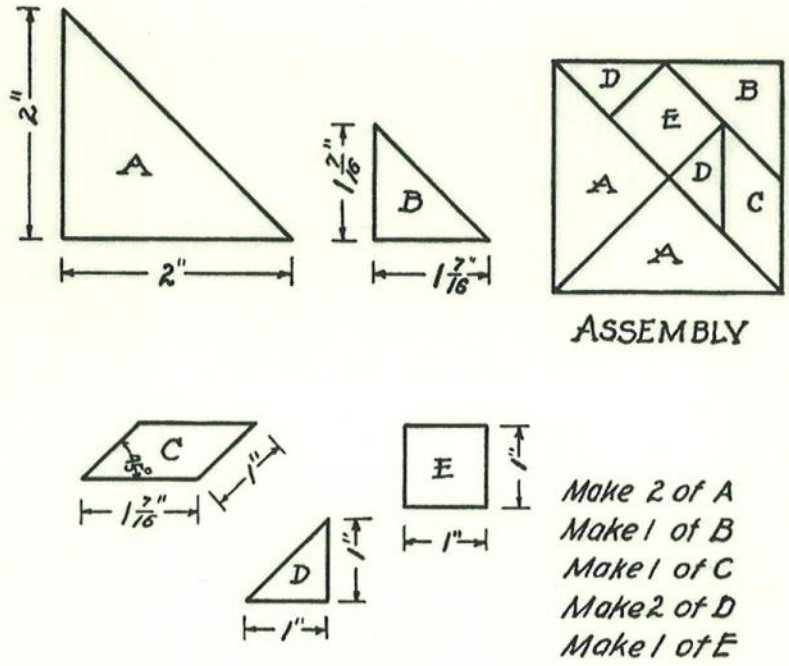


FIG. 3

CUT-UP SQUARE 2

The nice, yet perplexing feature of this cut-up puzzle is that all pieces are made alike. It is a good miter-box problem.

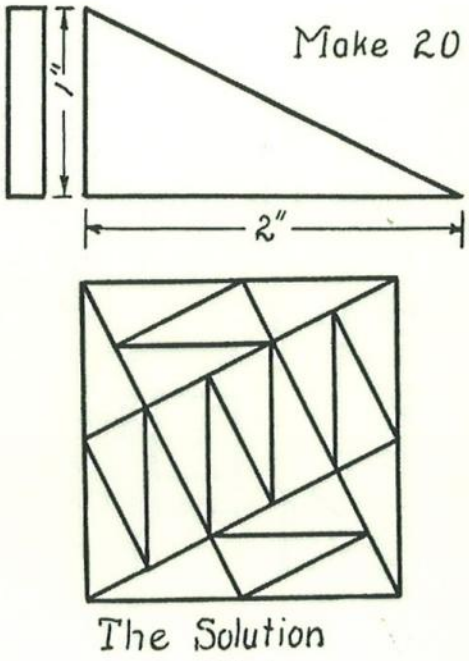


FIG. 4

IMPOSSIBLE AREA

This is one of the most mystifying cut-up puzzles ever brought out. When the blocks are assembled as shown at X, they form a square 8 by 8 in. When arranged as shown at Y, they form a rectangle 5 by 13 in. The product of 8 times 8 is 64, but the product of 5 times 13 is 65. How can it be possible that we gain an inch in area by simply rearranging the blocks?

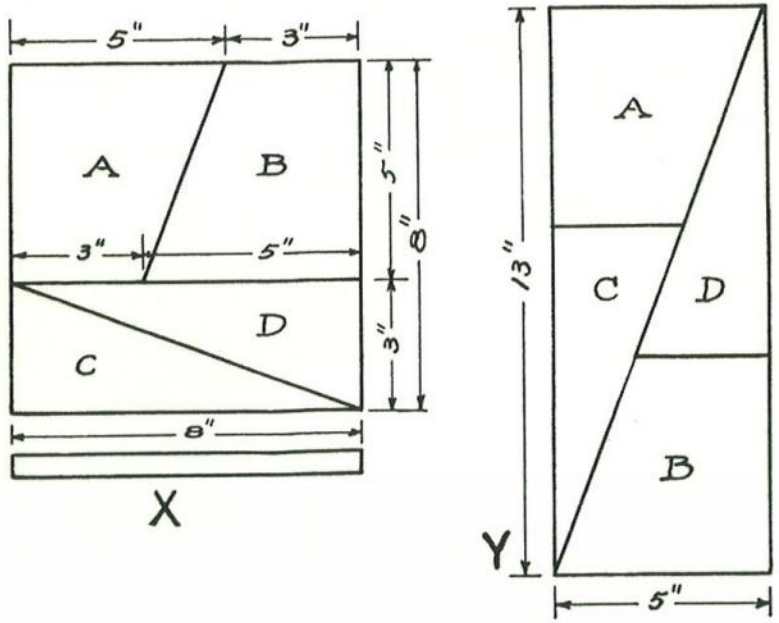


FIG. 5

BAND-SAWED SPHERE

This is truly the king of cut-up puzzles. The average person to whom this puzzle is given, disassembled, with the statement that it is an intelligence test and that a normal person should assemble it in one minute, will usually, at the end of a quarter of an hour, admit he must be feebleminded.

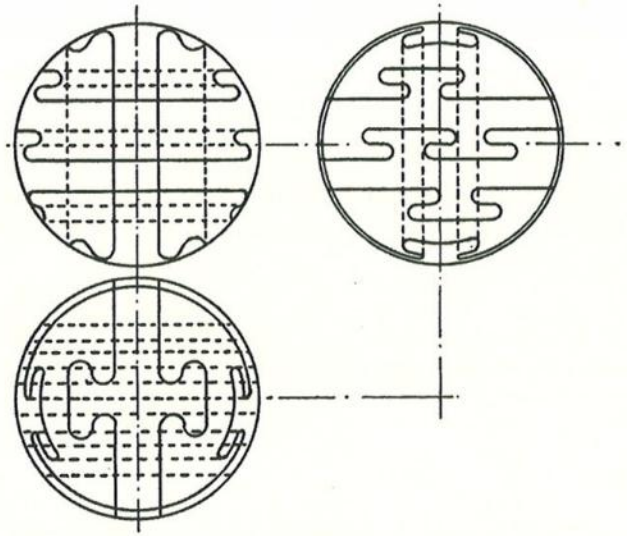


FIG. 6

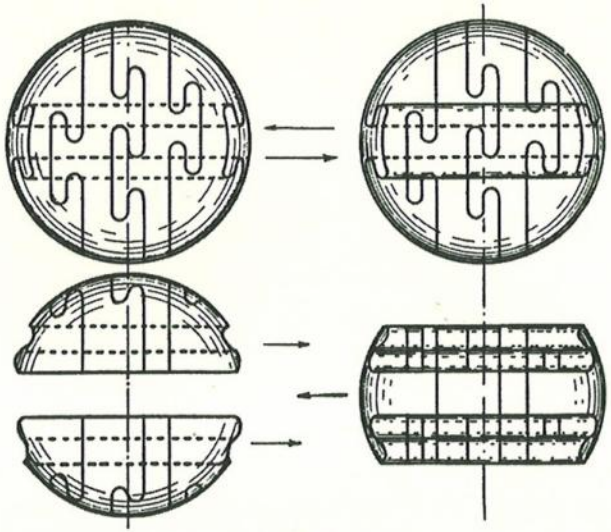


FIG. 6a

The solution, however, is easy if assembled in the three groups shown in Figure *6a*. The three groups are readily slid together, making the assembly complete. It cannot be assembled by fitting in one piece at a time.

A jig must be made to hold the sphere together under the band saw. Dimensions are not given, because one must necessarily fit the sizes to the limitations of one's band saw. (See Fig. 6.)

It could be made from a cube quite as well.

BAND-SAWED SQUARE PRISM

This is a much easier modification of the Band-Sawed Sphere. Like the sphere, it has to be assembled in three sets of three units, and the three sets slid together into the final assembly. The assembly should be ABC, DEF, GHI; or ADG, BEH, CFI.

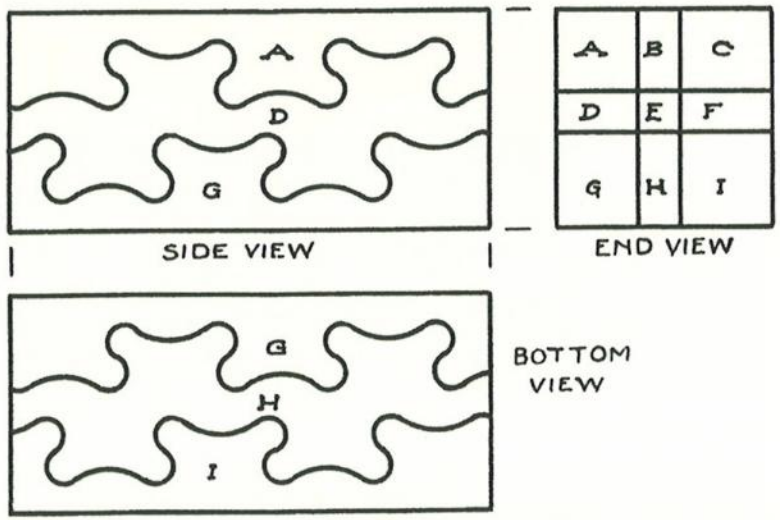


FIG. 7

TURNED BOX WITH COMBINATION LOCK LID

This is a turned box suitable for powder puff or jewelry. The lid may be locked on by simply turning the knob A, or the lid B. The parts A and C are glued together as a unit. The units AC, B, and D form the three units of a combination lock which may be turned to the unlocking position known to the owner. If the parts are made of wood

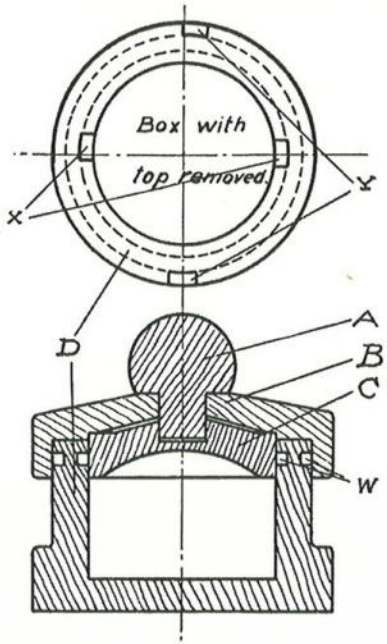


FIG. 8

with a conspicuous grain, the owner may not need to mark the positions but depend upon memorized marks in the grain of the wood itself.

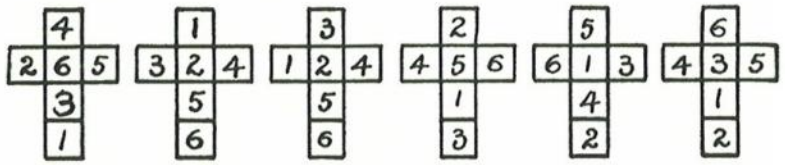
The cross-section view shows two grooves W, which extend near the top entirely around the box D. In the top view, X and Y show notches extending from the top down to these grooves. Two little cubes of wood, not shown in the

drawings, are glued to the outer rim of the piece C, so that when the lid is put on, one of these cubes will slide down through each of the notches X. These cubes are located at just the height that when the lid is rotated, they will slide around in the inner groove W, and secure the lid in place. Two more cubes are glued to the inner rim of the piece B, so that they will pass down the notches Y, and revolve into the outer groove W. When this is done, the lid cannot be removed until all four cubes are rotated into the proper position to pull up through the notches X and Y.

Notice that, though the notches X (also Y) are placed approximately opposite one another, they are not exactly so. If they were exactly opposite, the cubes that go through them could come up through either notch, and make two combinations by which the lock could be worked.

THE BEWITCHING CUBES

Six cubes are numbered according to the layouts illustrated. The puzzle is to so arrange the cubes in a row that the numbers 1 to 6 appear on the top, front, and other four faces. The numbers will not appear in their regular order, but all six numbers can be arranged so as to show on all six faces as shown in the lower figures.



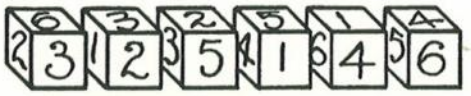


FIG. 9

SHUFFLE PUZZLE 1

This is an excellent shuffle puzzle with an infinite number of problems, several of which are listed below. These solutions are worked out by moving one block at a time, and without lifting the blocks.

Problem 1. Shuffle the blocks in the tray in any order, and then shift them about one by one until they occupy a 1, 2, 3, 4, 5 order, with the blank space in the lower righthand corner.

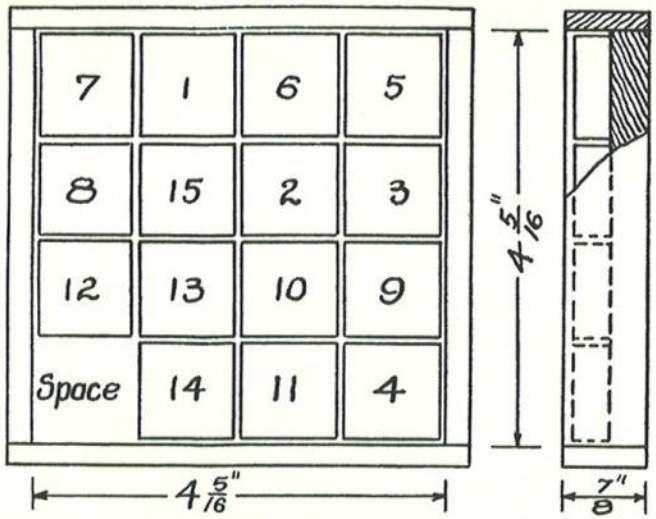


FIG. 10

Problem 2. Place the blocks in a 1, 2, 3, 4, 5 order, and change to a 15, 14, 13, 12 order.

Problem 3. Place in a 1, 2, 3 order, and change until the blocks are in the order 15, 2, 3, 4, etc., with block 1 in the position originally occupied by block 15.

Problem 4. Place in 1, 2, 3 order, and change until any two blocks, as 4 and 5, have exchanged places.

SHUFFLE PUZZLE 2

This is similar to Shuffle Puzzle 1, but consists of only one puzzle. The problem is to manipulate the blocks so that the two blocks, B and B, change places with the block A. This is not easily accomplished.

The path of the block A, shown in Figure 11a, is a hint that will he welcomed by most readers before they find the solution.

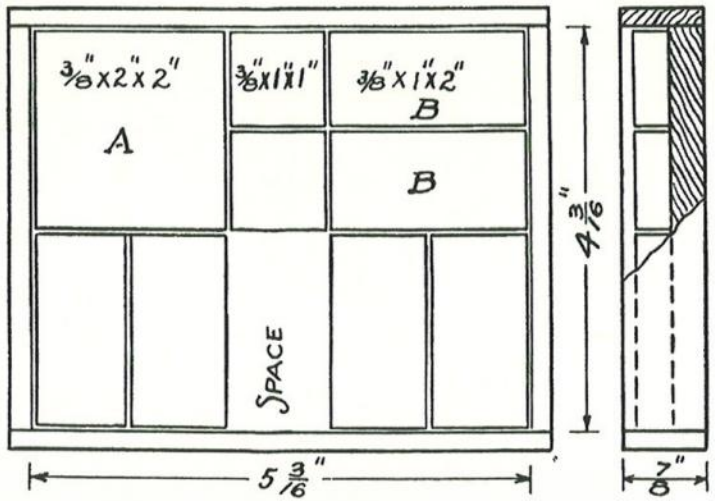


FIG. 11

The path of the block A, shown in Figure 11*a*, is a hint that will be welcomed by most readers before they find the solution.

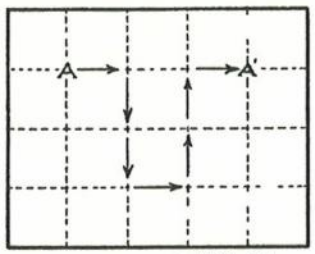


FIG. 11a

PEG AND DISC PUZZLE

The puzzle consists in transferring the seven discs from one spindle to another, one disc at a time, without at any time placing a larger disc on a smaller one.

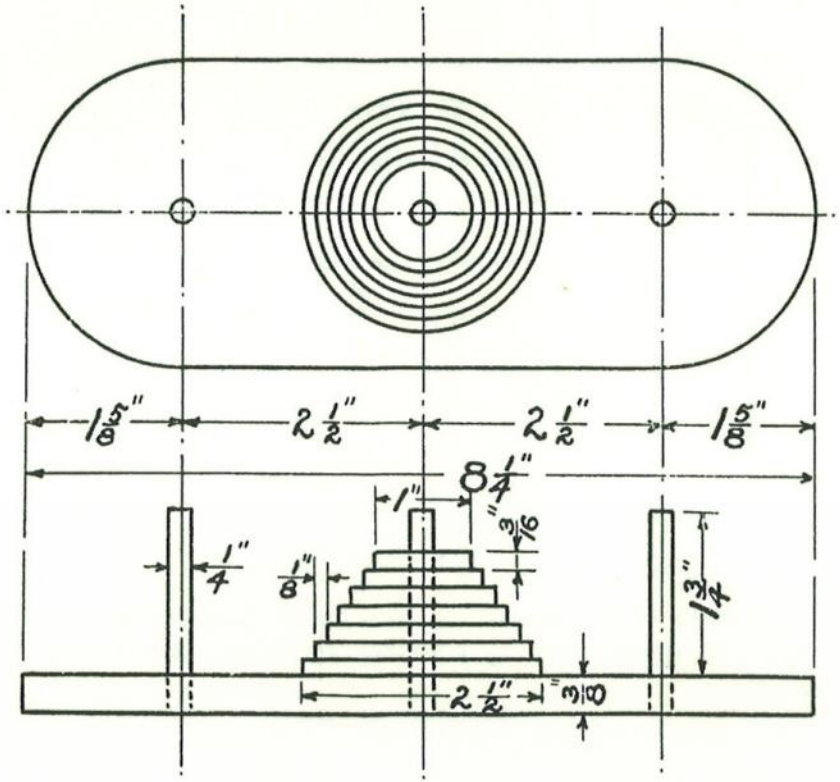


FIG. 12

THE "CROSS" PLUG PUZZLE

This is a construction puzzle consisting in making a plug which will effectively plug three holes; one square, one cross-shaped, and one round. At A, Figure 13, the holes are shown properly dimensioned, and the plug that is the solution is shown at B, Figure 13. This makes an excellent school woodwork problem, if interest is stimulated by the instructor withholding the design of the plug. For grammar-grade students it should have the dimensions doubled.

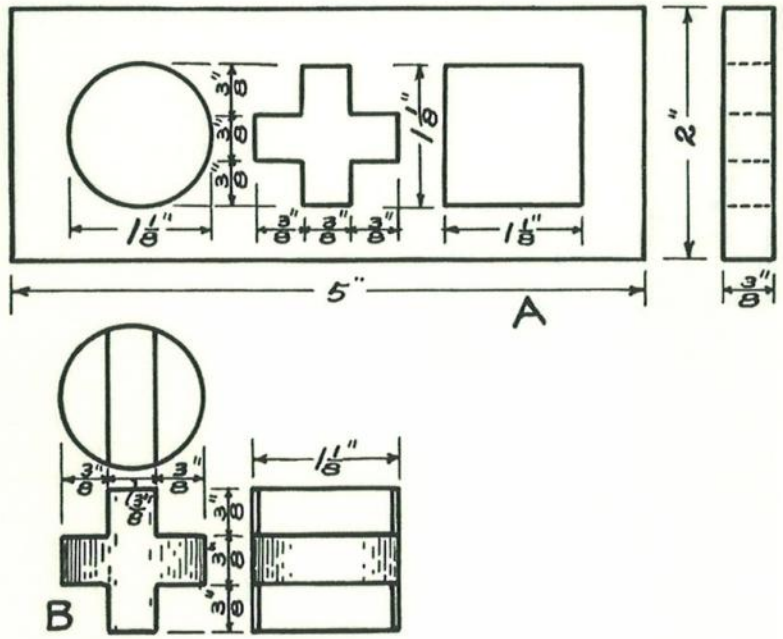


FIG. 13

THE "WEDGE" PLUG PUZZLE

This is similar to the "Cross" Plug Puzzle, except in the shapes. It needs no further description.

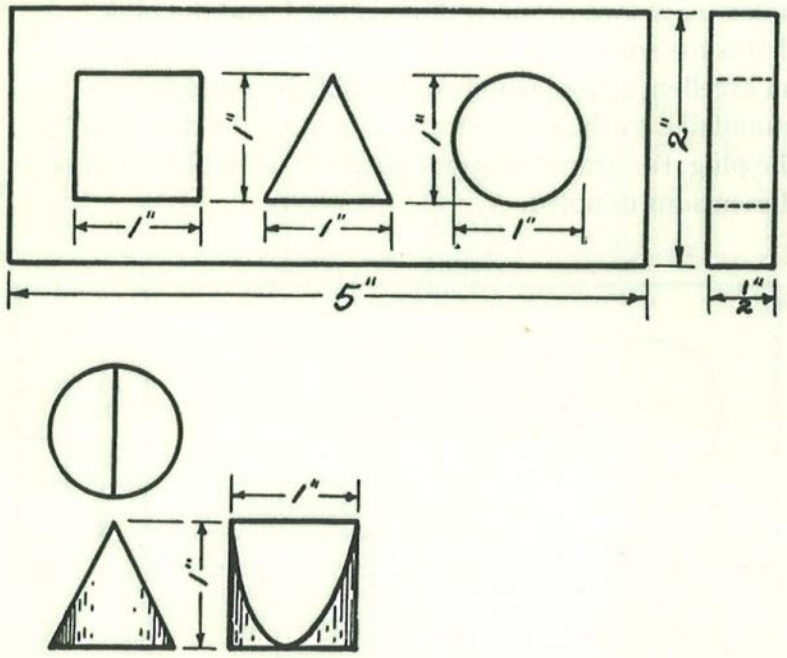


FIG. 14

A STEAMED-WOOD PUZZLE

This apparently impossible construction depends for its solution on the compressibility of steamed softwood. The piece A should be of firm wood such as maple. B should be of soft white pine. The pine piece is first cut to shape and then thoroughly steamed, after which it is compressed in a vise, or simply driven through the hardwood piece A.

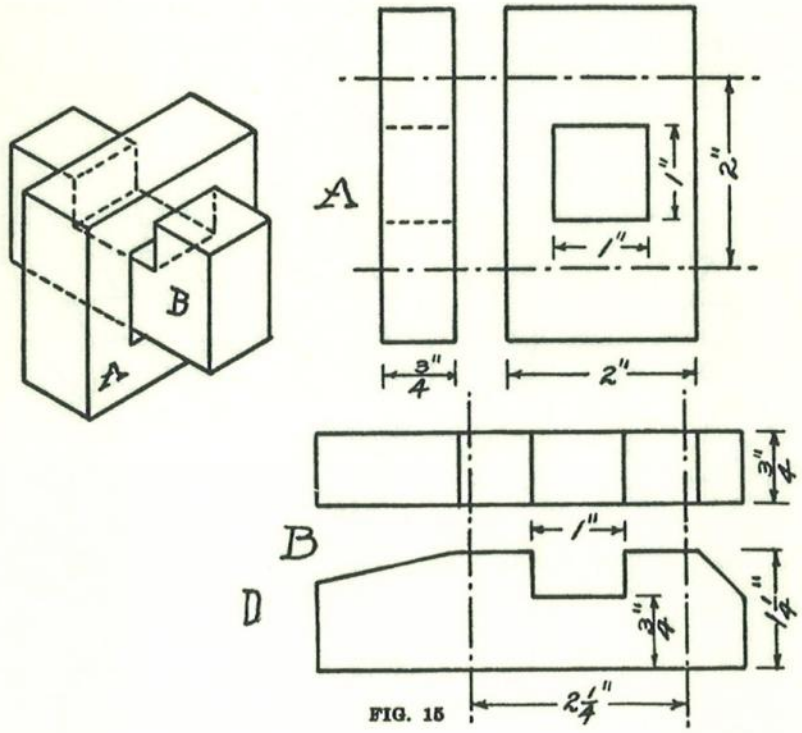


FIG. 15

After it is in place, the soft steamed piece can be mashed back into its original shape by pressure on the sides. When it has dried out, it will show no evidence of the distortion it underwent while it was in the soft condition. Both pieces are cut off at the dot-and-dash lines after they are put together.

A pleasing modification of this is to make the pieces in the forms of a heart and an arrow. If the arrow is made thin, it can be rolled into a cylinder and put through a round hole in the heart.

WOOD FAN

The Wood Fan is a beautiful example of what can be accomplished with wood when it has been softened and made pliable by steam. The best material for such a piece is cork pine often found in packing boxes. White pine is nearly as good, and will do if it is quite clear of rosin. Figure 17

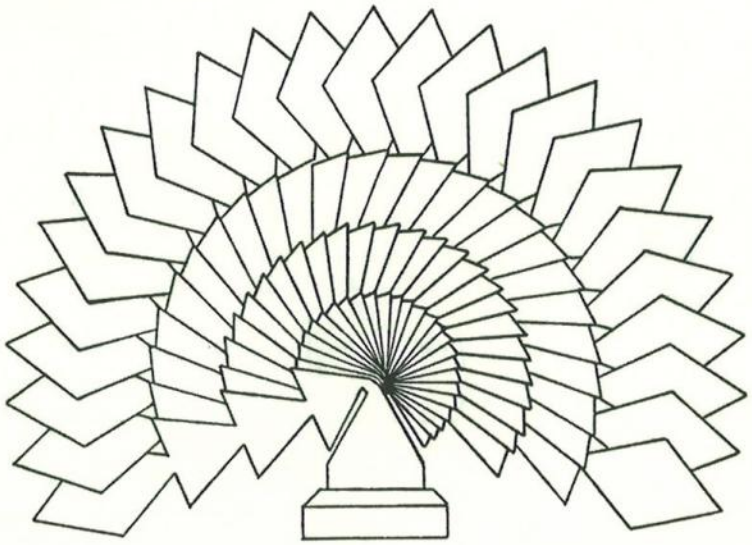


FIG. 16

shows the layout of the piece of stock. The profile can be varied, but the one shown will be as effective as any, and is easy to work out. The sawing of the many saw kerfs requires patience and considerable care, if one does not want the completed piece to look bulky. After the piece has been worked up as in Figure 17, the piece should be steamed until

the thin pieces are thoroughly softened. This can be easily done by suspending the piece in the upper part of a boiling teakettle. After the wood has been softened, the pieces can be woven as shown in Figure 16. If the pieces are cut quite thin, it is possible to roll the spread-out fan into a cylinder which can be inserted into a bottle, where, when it is unrolled and dried out hard, it will puzzle most people both as to how it was made and how it was put into the bottle.

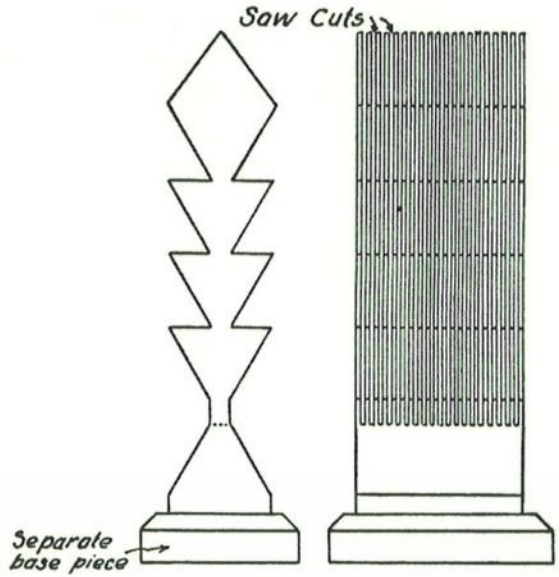


FIG. 17

BOTTLED CROSS

The making of a mortised-and-tenoned cross inside of an ordinary bottle, with the main piece of the cross forming a snug plug to the opening, seems so utterly impossible, that it is a sure proof of craftsmanship on the part of one who can prove that it can be done by producing the cross.

The drawing shows the construction. The sizes must he made to suit the bottle. The main piece can be turned on a

lathe. After the piece is turned to fit the neck of the bottle, it should be chucked, and the hole shown by the dotted lines bored through to where the mortise is to be cut. Do not bore it through the bottom end. The cross arm or tenon can be made with a knife. It should be made to fit as snugly as possible without requiring any forcing.

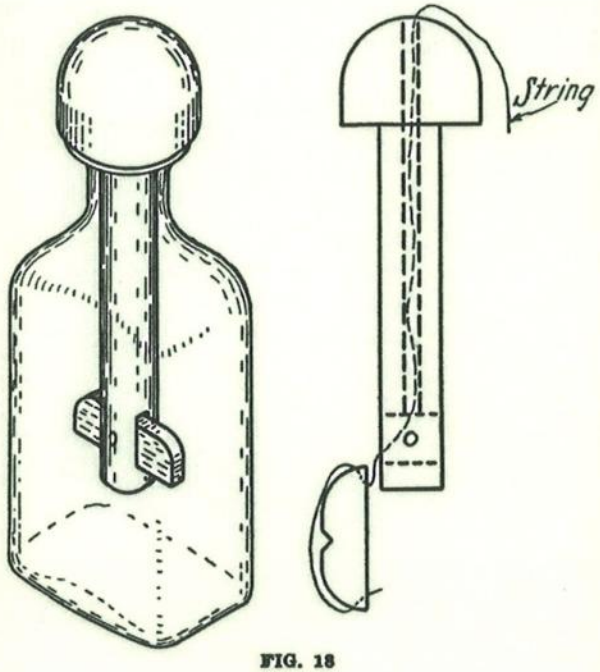


FIG. 18

The little wooden pin which apparently goes through both pieces to hold them together is false. It only sticks in the round piece, and has nothing to do with holding the arm piece in place.

To assemble, draw a heavy piece of thread down through the long hole and out one end of the mortise. With a knife, make a little split in each end of the arm piece, and draw the thread through these splits as shown in the drawing. With a little patience the arm can be drawn into the mortise.

After one end is in a little, the thread will pull out of the notch in that end, and the arm can be pulled in farther. When it is halfway in, a long hat pin is thrust down the hole and into the arm piece, to hold the latter in place while the thread is pulled out.

A long slender pencil of wood, that will snugly fill the hole, is then pushed down the hole until its pointed end seats in the notch in the middle of the arm. It holds the arm firmly in place and closes up the telltale hole. Of course, it should be of the same kind of wood as the rest, or it will be detected. If a little glue is put around this piece as it is put in, and if the end is battered down slightly and left a little rough, it will never be detected.

Better try assembling the pieces outside of the bottle before attempting to do it with them inside.

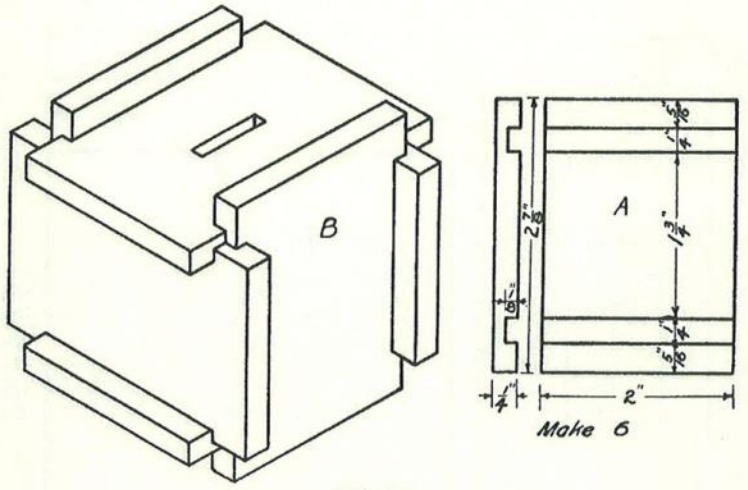


FIG. 19

SAVINGS BANK

The Savings Bank is made of six pieces, dimensioned as shown at A, and assembled as shown at B. A coin slot is cut in one piece. If properly made, the bank is difficult to assemble, and impossible to open without destroying it.

Three small cabinet clamps and a block of wood, two inches long, will be found helpful in assembling the pieces. Begin by fitting four pieces about the slotted piece. Hold them together with clamps, and force the sixth piece into place by using the two-inch block to spring the clamped pieces outward. Theoretically, the pieces cannot be assembled if made to the exact width specified, so one may have to shave a stroke or two off each piece with a plane before the last piece can be sprung into place. After assembling, the pieces may be a little loose, but they will not come apart. This looseness may be eliminated by soaking the assembled bank in linseed oil, like farmers swell their wagon wheels during dry weather.

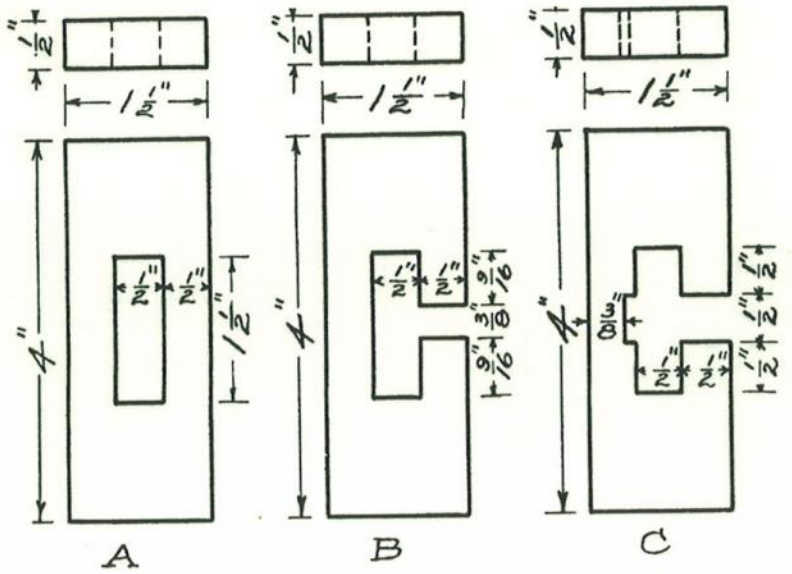


FIG. 20

THREE-PIECE CROSS

This consists of three flat pieces which, when assembled, form a cross as shown in Figure 21. It makes an excellent school woodwork piece. The three pieces should he worked up in one long piece, and not cut apart (Fig. 20) until the mortises and notches are all cut.

The assembling is in the order shown at *a*, *b*, *c*, *d*, and *e*, Figure 21.

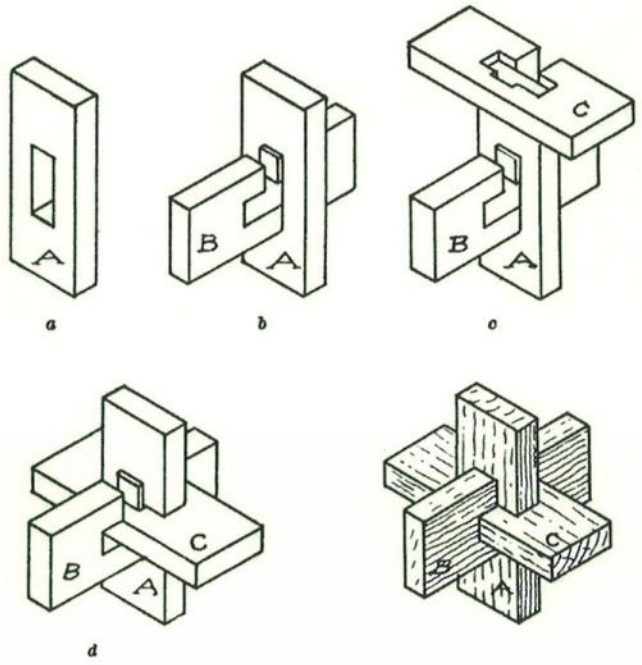


FIG. 21

THREE-PIECE BURR PUZZLE

The woodwork teacher who began his teaching in the "joint" days of manual training, and sometimes wishes he dared teach some exercise pieces again, may find the Three-Piece Burr a way to get what he wants without paying the price of supervisory criticism.

The details of the component pieces are ample. The first step in assembling is shown at *a*. When all three pieces are

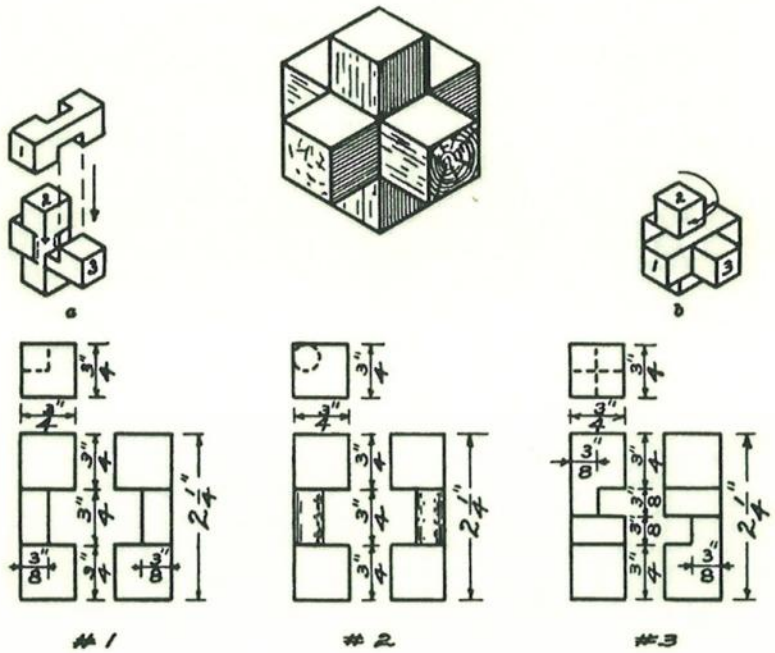


FIG. 22

slid together they will appear as at *b*. The final step is to turn piece No. 2 one-fourth turn to the right, which will assemble the pieces as shown at *c*.

To make this puzzle more striking, have each piece made of a different kind of wood.

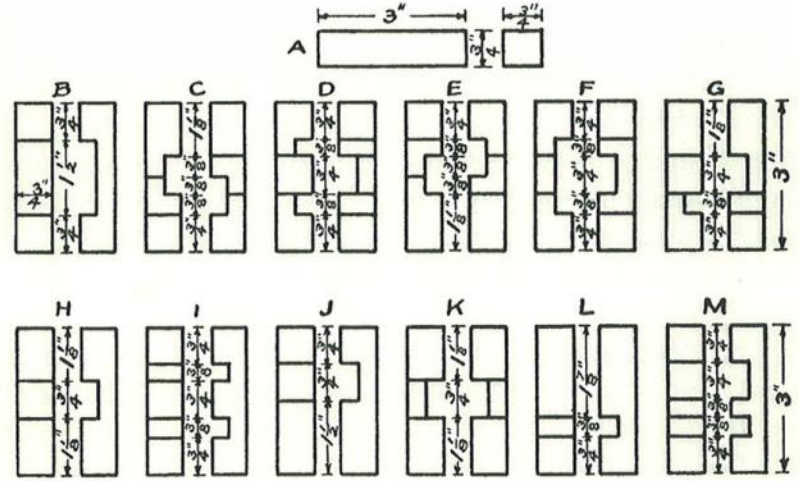
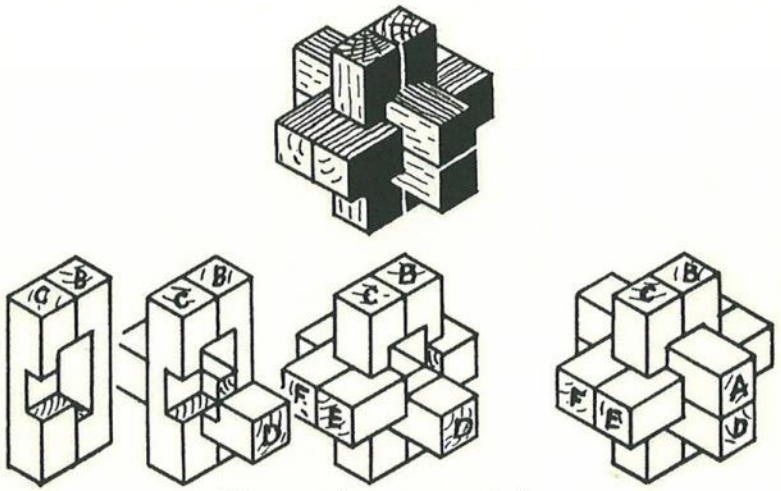


FIG. 23

SIX-PIECE BURR

The Six-Piece Burr is the best known of the burr puzzles. There are many forms of it. At least seventeen combinations have been worked out, using pieces from the thirteen detailed



Steps in assembling.

FIG. 24

in Figure 23. Some of these combinations require that two or even three of the pieces are alike. The steps in assembling (Fig. 24) show the building up of the first combination listed below—B, C, D, E, F, and A. The piece A is without notches, and is always the key piece in the combinations where it is used.

Known combinations:

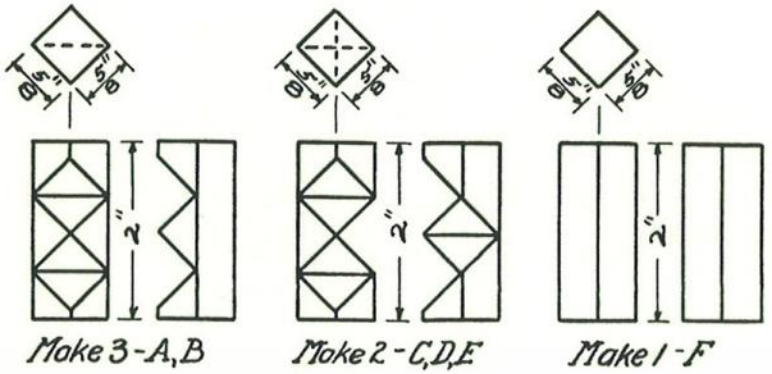
Combinations	*Up and down*	*Left to right*	*Front to back*	
1.	CB	FE	DA	
2.	FC	EG	FA	
3.	JM	FF	FA	
4.	BB	FD	MA	
5.	BB	FF	IA	
6.	JB	FF	DA	
7.	FF	KF	IA	
8.	FF	HD	BA	
9.	FF	HD	J J	J and D go in together.
10.	*B*J	GL	F*F*	Put in B and F by a ¼ turn.
11.	*B*J	B*F*	IG	Put in B and F by a ¼ turn.
12.	FF	HF	JL	

With invisible void inside:

13.	EF	JF	FA	
14.	FF	BB	MA	
15.	JB	FF	FA	
16.	FB	FE	MA	
17.	BB	FF	MA	

DIAGONAL SIX-PIECE BURR PUZZLE

This is one of the easiest burr puzzles to make, if it is made as small as shown by the drawing. For the small pieces, the most practical way is to cut the notches, by the cut-and-try method, with a knife. If the pieces are made larger, the laying out for sawing becomes an interesting bevel-and-square problem. If the burr is made with a knife, it may be made more interesting by rounding off the ends of the pieces so that the assembled burr is spherical.



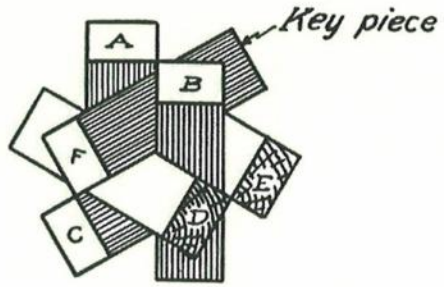


FIG. 25

NINE-PIECE BURR

This burr has for its key, a piece that turns. If the pieces are snugly made, it is quite difficult to disassemble the burr, unless one is familiar with puzzles of this type. It looks well to make the square pieces of a kind of wood different from the others.

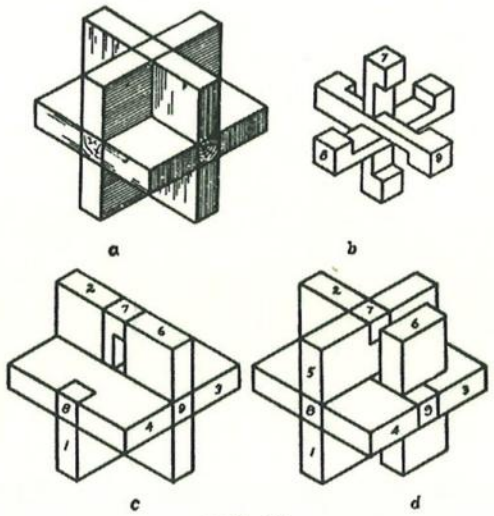


FIG. 26

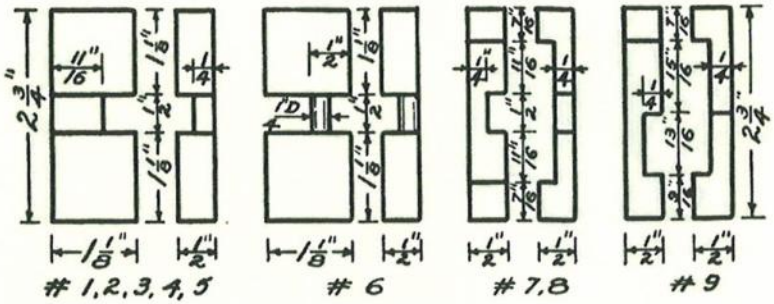


FIG. 26a

At *b*, *c*, and *d*, are shown the steps which must be followed in assembling. The key piece, No. 6, is turned at the completion of the step shown at *c* to the position it occupies at *d*. After all pieces are in place, piece No. 6 is turned back to the position it occupied at *c*. Then the burr will appear in its final form as shown at *a*.

THE CROSS BURR

This is an interesting twelve-piece burr puzzle, involving no great difficulties in construction or assembling. At G, the first steps in putting the pieces together are shown. Like

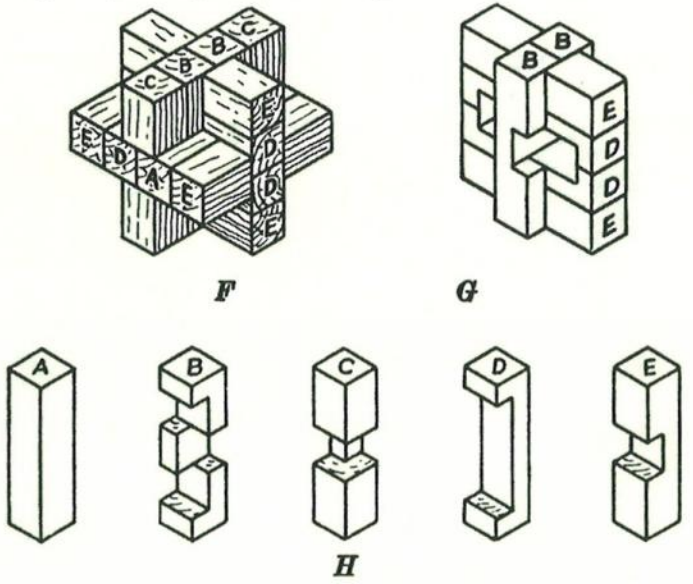


FIG. 27

most burrs, the key piece is a plain unnotched piece A. The proportions of the notches are so obvious that they are not dimensioned in the details at H. One A, three D's, and two each of B, C, and E are required.

TWELVE-PIECE BURR PUZZLE

This burr puzzle differs from others herein in that all pieces are alike. Like the Six-Piece Burr, it makes an excellent manual-training problem, but lends itself better to being made a class project. If used for such a purpose, it should be made larger than dimensioned in the drawings.

The assembling of this puzzle is an almost hopeless task to one not knowing the trick. If it is made with snug joints, the disassembly is almost as difficult. Note carefully, in step 1, that pieces 1 and 2 are not assembled as are 3 and 4. In the second step, pieces 5 and 6 are assembled symmetrically like 3 and 4, and 7 and 8 are parallel like 1 and 2. This arrangement of pieces 1 to 8 leaves them so that pieces 1 to 4

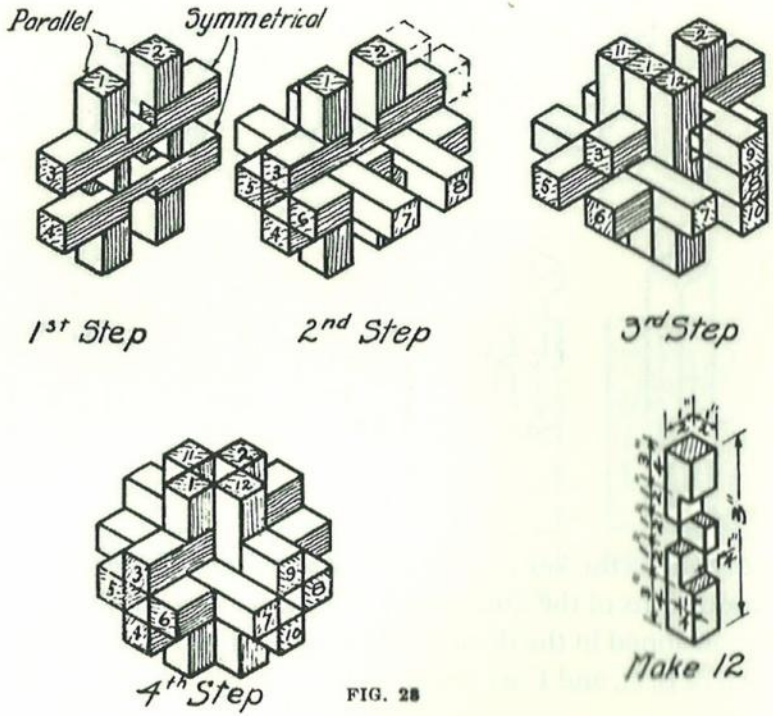


FIG. 28

can be slid ½ in. in pieces 5 to 8. This sliding is the key to the whole assembly. The other four pieces, when assembled as in step 3, must be so placed that all there is to step 4 is to move six pieces—1, 2, 3, 4, 9 and 10—½ in. into place against the other six. There is no key piece as in other burr puzzles.

FIFTEEN-PIECE BURR

This is an unusually good burr puzzle, as the key piece unlocks by turning rather than by pushing out endways as with most such puzzles. It also has an unusually large number of pieces.

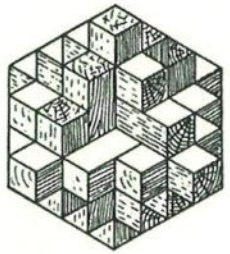


FIG. 29

The details of construction of the various pieces are fully shown in Figure 30.

The first steps in assembling are shown in Figure 31, using the three long pieces. The next step is to put in place three medium-length and three short-length pieces (the short key piece not included), all as in Figure 32. Be careful to put them in the three places shown—against backs (not fronts) of initial pieces. The key piece K, and a medium piece Y, are next placed as in Figure 33, and after them a medium and small piece on top of these. In the drawing, the medium piece X, is shown with the end broken off, so as to show clearly how the key piece K, is put in. This is not the position it is to finally occupy, however. Neither is the medium piece

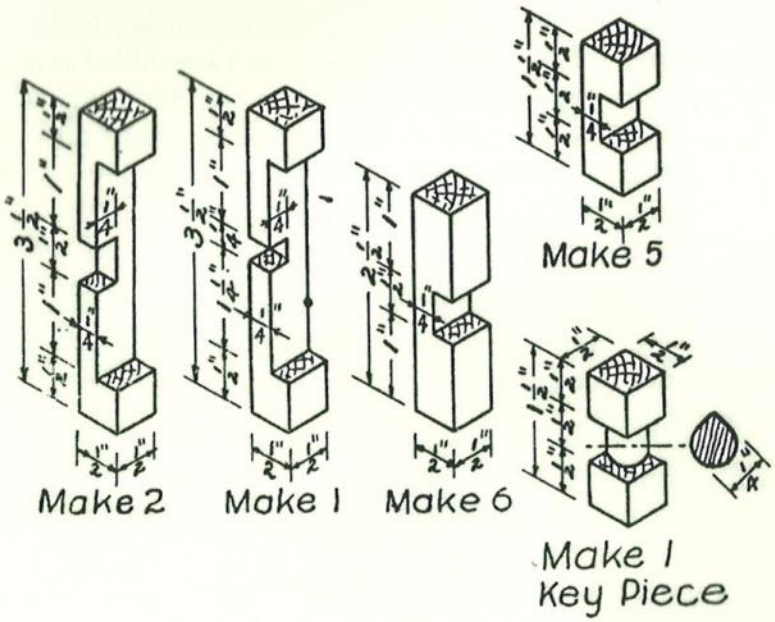


FIG. 30

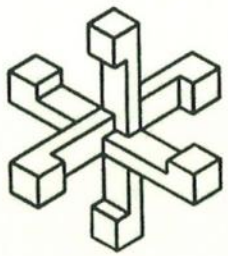


FIG. 31

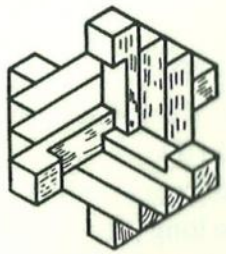


FIG. 32

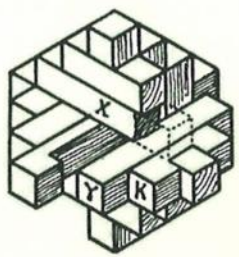


FIG. 33

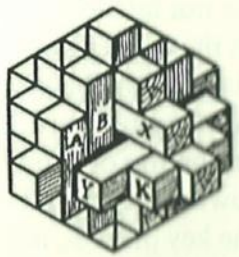


FIG. 34

piece Y, in its final position. The position K and Y occupy in Figure 33 leaves an opening through which the two remaining pieces A and B can be put in place. (Fig. 34.) Now Y is pushed snugly against A and B, and the assembly is all locked in place by turning K one-quarter turn, to the right, as shown in Figure 34, when all pieces will occupy the locked position shown in Figure 29.

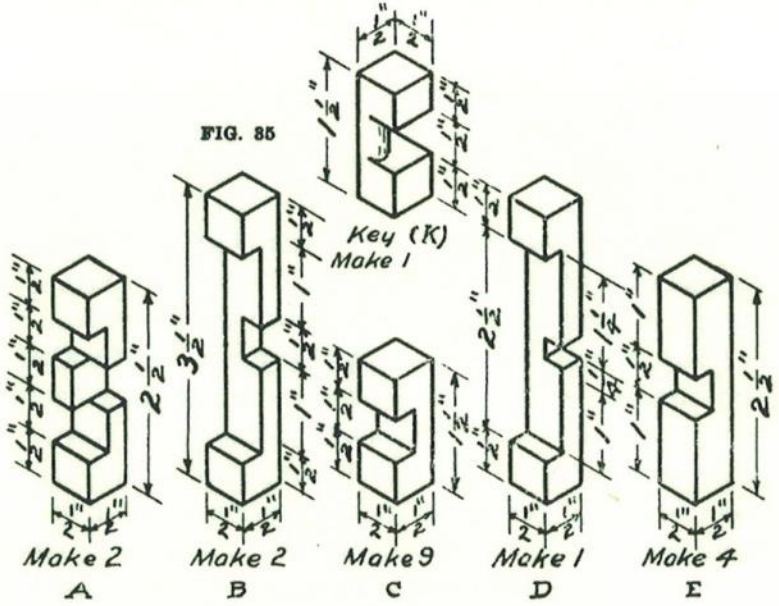
It may require a little loosening up of pieces by shaving off the sides, to provide the necessary clearance to turn K.

To unlock, the key piece must be found by trial from among six similar appearing small pieces and turned the right way. Even knowing the secret, one has but one chance in twelve of unlocking it without hunting.

THE GREAT PAGODA OR NINETEEN-PIECE BURR

This is undoubtedly the king of burr puzzles, as it consists of nineteen pieces. It is really a modification of the fifteenpiece burr. When made of well-polished hardwood, the

FIG. 35



thirty-eight cubes that show on the surfaces make a strikingly beautiful object. It is especially effective when the pieces B, B, D, and the four centrally located C's are made of a wood contrasting with the others in color.

The drawings in Figure 35 are detailed enough to need no text explanation.

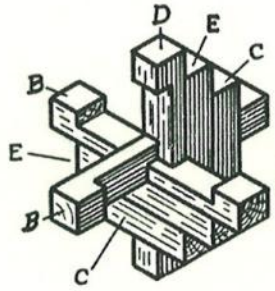


FIG. 36

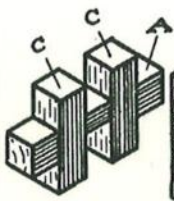


FIG. 37

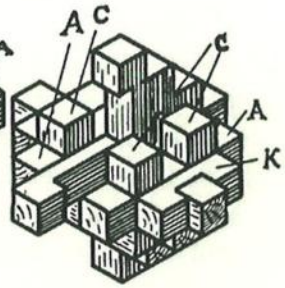


FIG. 38

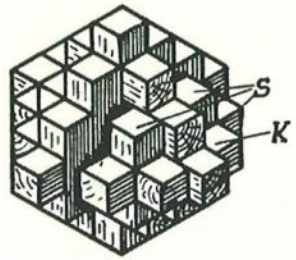


FIG. 39

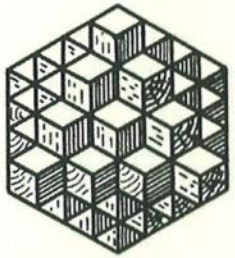


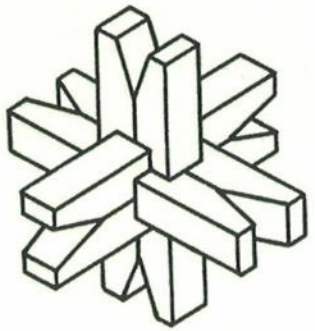
FIG. 40

The steps of assembling are shown in Figures 36 to 40. Assemble first the pieces B, B, D, as in Figure 36. Notice carefully how these three pieces intersect; especially that the backs, or uncut faces, are turned away from the worker. Next, add the two E's and two C's shown in this same figure, being sure to add them to the *back* of D and one B. Next, make two assemblies C, C, A, as in Figure 37. These two assemblies are placed straddling the B piece as shown in Figure 38. Add a C piece behind the rear straddle assembly and the key piece K, in front of the nearer straddle. Notice

very carefully that K is placed so it *does not* push the front straddle against D, but leaves it with an intervening ¼ in. space. This is so that the two remaining pieces C and E, can be slipped lnto place, Figure 39. The assembly is now ready to lock. Push the front straddle S, back toward the center, and rotate the key K, one-fourth turn. This will lock the whole assembly so that it presents the appearance shown in Figure 40.

JACKSTRAWS

Theoretically, wooden Jackstraws like these can be made by a modification of any of the six-piece burr puzzles. From a practical standpoint, however, they would be so weak in the joints as to break. The design shown, theoretically cannot be assembled, but with pieces as small as one would use in Jackstraws, it is perfectly practicable to force the pieces into place, if the notches are made a trifle long. Jackstraws such as these can be cut from square match stems with a pocket knife, if the length of the notch is adjusted to the size of the stock. A drop of glue worked into the joint will greatly add to the life of the straws, if one intends to use them as playthings rather than as puzzles.



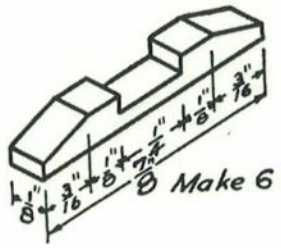


FIG. 41

POLYBURR

The Polyburr is a rather ambitious project in appearance, but would not prove so to one who had made the Six-Piece Burr. If he studied the drawing of the Polyburr, he would doubtless recognize that each corner of the Polyburr is a simple six-piece burr. The pieces are all made double so that each one makes a part of two burrs. These are made around a central six-piece burr whose pieces are lengthened, so that the whole assembled Poly burr is made up of nine simple burrs. Often the piece is made without the central core burr, in which case it consists of twenty-four pieces made double. The detailed piece in Figure 42 shows how the piece B in Figure 23, in the drawing of the Six-Piece Burr, is modified for the Polyburr. If the core burr is made, the pieces are simply made longer than detailed in the Six-Piece-Burr drawings. The Polyburr can be made up of any of the forms for the Six-Piece-Burr.

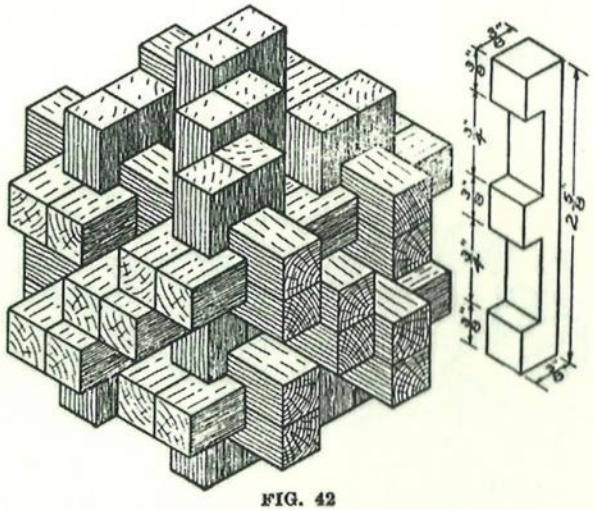


FIG. 42

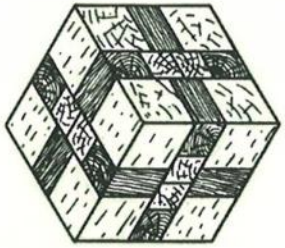


FIG. 43

BUILT-UP CUBE

This is one of the best of the built-up puzzles. Its puzzle qualities are more in how to build it up than in taking it apart. Even one who has carefully taken it apart, will have

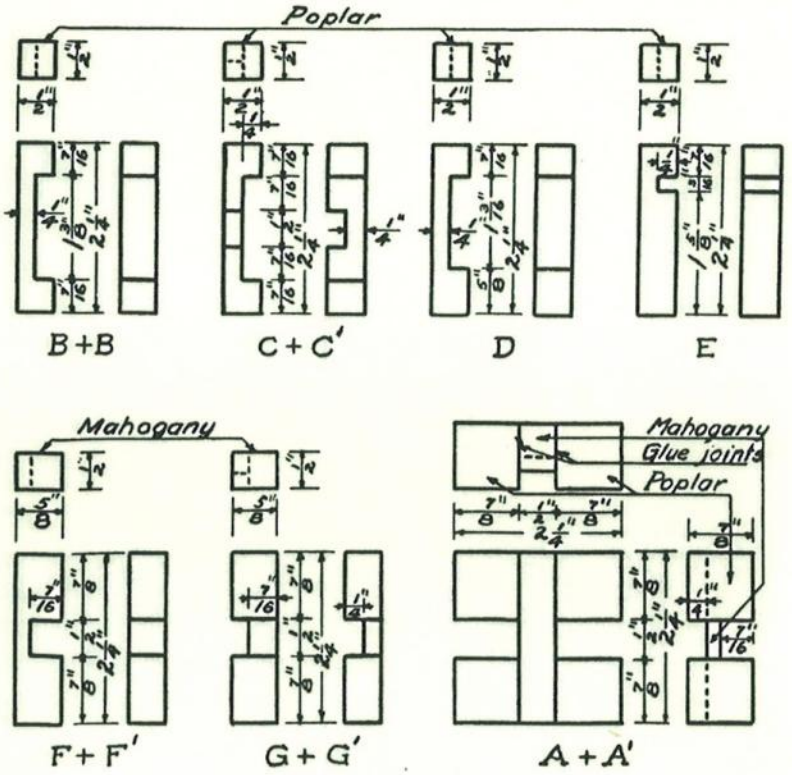


FIG. 44

difficulty in getting it together, unless he has very carefully memorized the position of each piece.

As in most built-up puzzles, woods of contrasting color add to the appearance. This is one where three kinds of wood

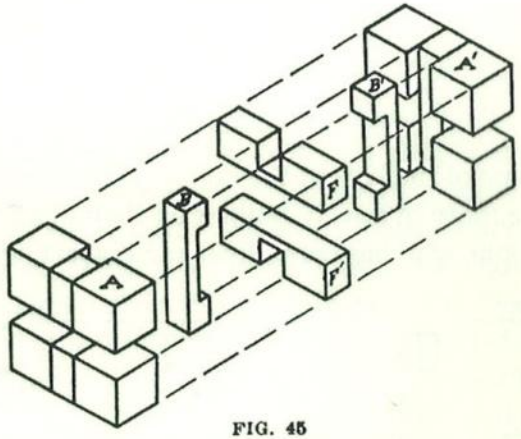


FIG. 45

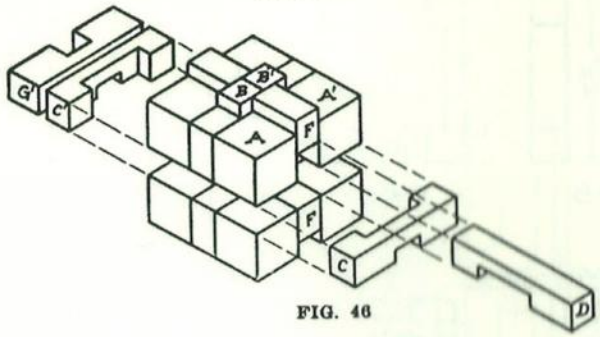


FIG. 46

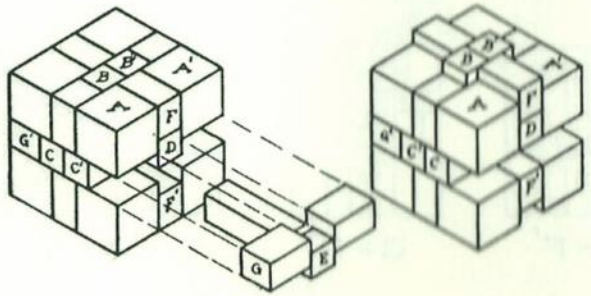


FIG. 47

FIG. 48

can be effectively used, though the assembly drawing, Figure 43, indicates but two. Notice in the detail drawing of pieces A and A', Figure 44, that these are built-up units which are permanently glued together.

The first steps in assembling are shown in Figure 45. When the parts A, B, F, F', B', and A' are closed together, they will form a loose, incomplete cube, which must be carefully held together in the hand until these parts are all locked together by pieces C and C', as shown in Figure 46. Before any additional parts can be added, parts B, B', F, and F', must all be pushed up to the position they occupy in Figure 46. This position opens up a place to insert part D. Be careful which end you insert first. G' is next inserted. This will give

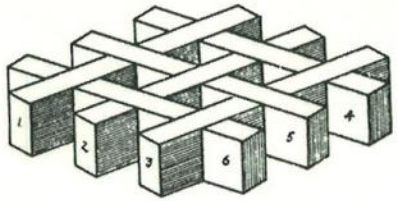


FIG. 49

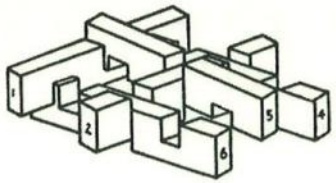


FIG. 50

the positions shown in Figure 48. Now push B, B', F, and F', down to the position they occupy in Figure 47. Put G and E together as in Figure 47, and slide them together into the position they occupy in the assembly.

THE GRILL

The assembly drawing of The Grill, Figure 49, is another of those drawings of what are apparently impossible constructions. The Grill is composed of six rigid pieces woven together with cross-lap joints. Since the gains in the pieces alternate from side to side, the pieces are truly woven. If the gains were all on one side of the individual pieces, it would be easy to assemble them, but they are not. This problem is just as intricate to disassemble as to assemble.

Figure 51 shows the details of the individual parts. The gains are cut at an angle so that the investigating novice will not try to disassemble the parts by twisting them, a process that would likely break a piece.

Figure 50 shows how the last two pieces are assembled. The drawing shows No.1 being slipped over one end. When it is seated in its place, the piece No. 5 can be tipped back the other way, and No. 3 slipped on the same way. The pieces must be assembled just as shown, as the gains are made only deep enough to permit the final pieces to go on as planned.

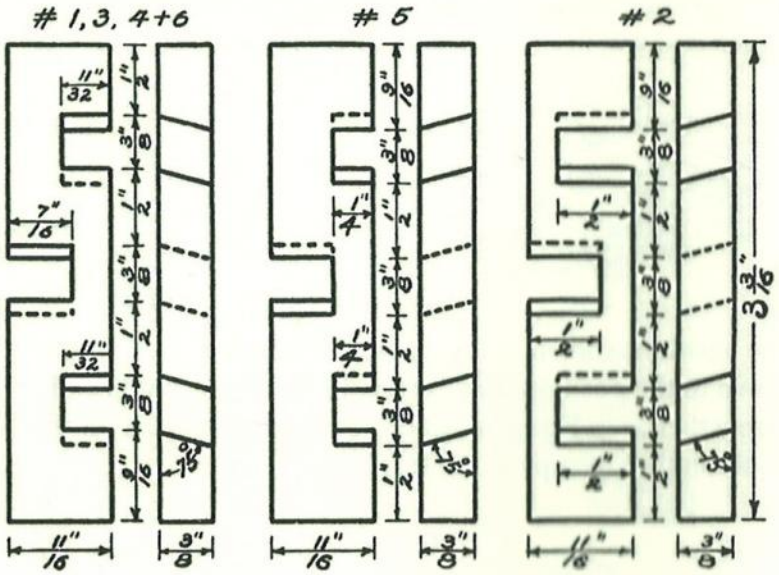


FIG. 51

LOCKED LINKS

This is an attractive-looking piece, especially if the two links are made of woods of contrasting colors. It is quite an impossible-looking construction to one not knowing its secret. However, having eight key pieces, it must be very snugly and accurately made, or one of these key pieces will give its secret away because of its looseness.

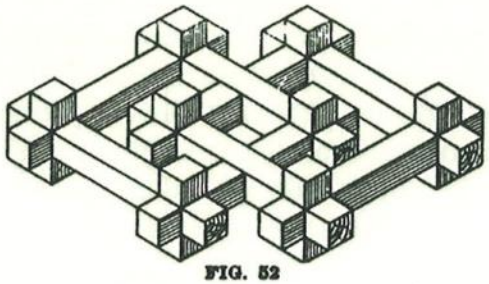


FIG. 52

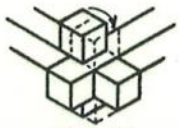


FIG. 53

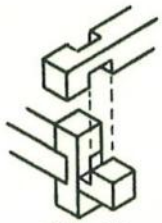


FIG. 54

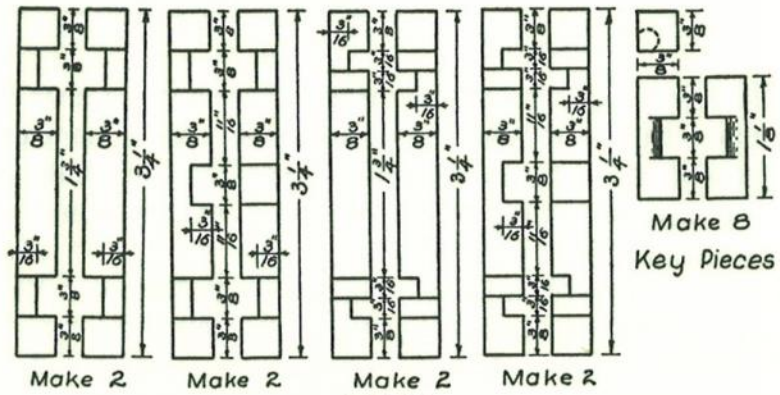


FIG. 55

To unlock and take the pieces apart, turn the key pieces (see Fig. 55) a quarter turn as shown in Figure 53. The dotted lines in Figure 53 show the locked position from which the key has been turned. When the key is properly turned, the parts can be easily disassembled. (See Fig. 54.)

To assemble, study Figure 54 carefully.

THE DOUBLE (?) DOVETAIL

The isometric assembly of this piece, Figure 56, looks like an impossible construction. It is easy to dismiss the drawing as an impossible construction, but not two pieces of wood actually joined in this way. Apparently the tongue can neither be pulled backward nor upwards out of the mortised piece,

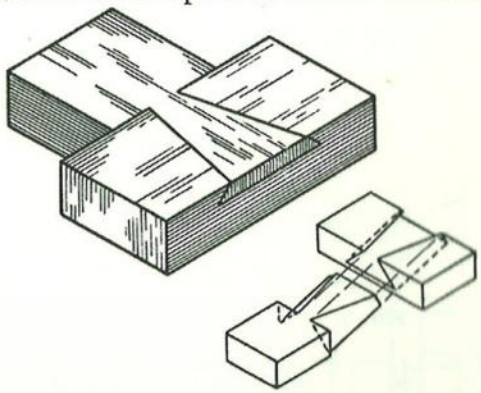


FIG. 56

FIG. 57

because it would have to go through smaller spaces than it now occupies. Impossible as it may appear, many manual-training students, in the old "joint" days of manual training, used to make these very joints as a part of their manual-training course.

The pieces really form a simple dovetail, but set at an angle with the faces of the wood, and only *look* like a double dovetail on the surface. The tongue is slid in and up at an angle, and not straight as one would naturally suppose. (Fig. 57.)

The pieces should be made of woods of contrasting colors as this will help to show that they form a real joint. They should be glued, filled, and varnished so that the joint cannot be taken apart, or its secret will be discovered. If well made, it will stamp the maker as a real craftsman in the eyes of all workers in wood.

Dimensions for the two pieces are given in Figures 58 and 59.

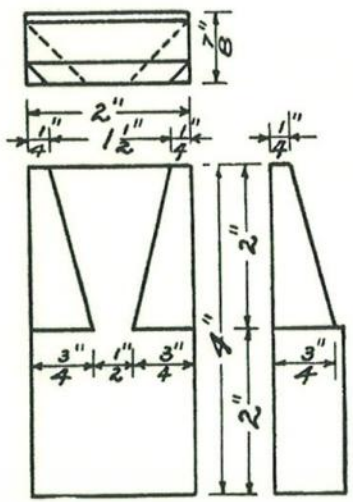


FIG. 58

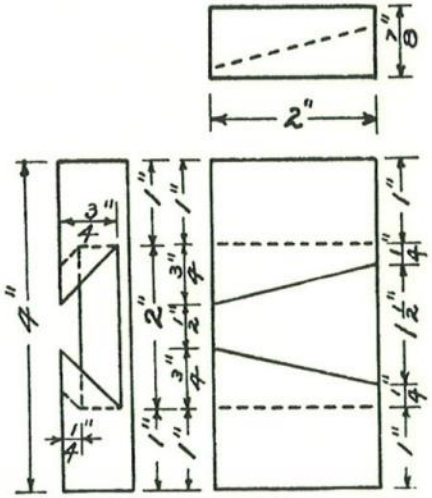


FIG. 59

THE "IMPOSSIBLE" DOVETAIL JOINT

When neatly and accurately made, this presents the outward appearance of being two through dovetail joints crossing each other on the inside—an evidently impossible joint. In reality, it is a simple two-tail dovetail joint, extending cornerways through the faces, instead of square with the faces. It is most effective when made of two contrasting woods, since that proves that it is a real joint. It should be glued and varnished so that the solution cannot be detected by inspection. Few people will explain how this joint is made. If well made, it will enhance the reputation of the maker as a craftsman.

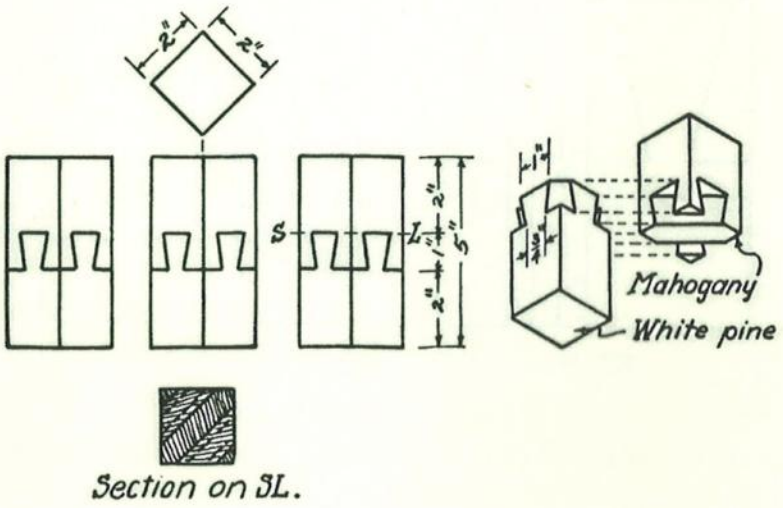


FIG. 60

DOUBLE-LOCK DOVETAIL JOINT

The woodworker who has made dovetail joints, will be pretty sure to declare the joint shown in Figure 61 to be a draftsman's dream creation. However, it is a real and entirely practical joint that can be made in at least three ways.

The easiest and best known solution is that shown in Figure 63. In this, the pieces are slid together down a 45-deg. incline cut in the mortise piece, as indicated in the figure. It is, therefore, but a simple dovetail from the inside, and only *appears* double from the outside. This solution leaves an unsightly hole on the inner corner that must be plugged up with a triangular patch-piece. However, when the hole is patched up, the joint becomes a true double-locked joint that cannot be pulled apart by direct pulls on either piece.

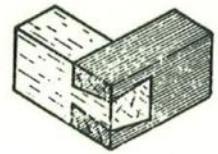


FIG. 61

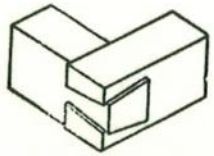


FIG. 62

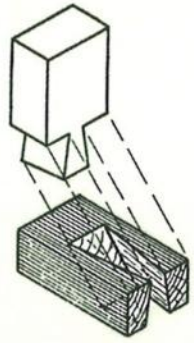


FIG. 63

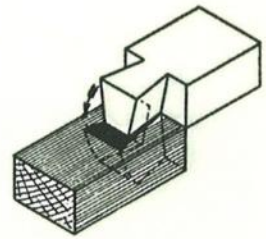


FIG. 64

Another solution is the one shown in Figures 64 and 65. In this, the pieces are placed corner to corner as shown in Figure 64, and rotated on these corners into the position shown in Figure 65. This way of putting the pieces together requires a much smaller hole to be left at the back to be plugged, but is not quite as "honest" a joint as the first, in that the contact faces of the mortised piece have to be warped in a way that leaves half of these surfaces out of actual contact with the

corresponding surfaces on the tenon. This lack of contact can be seen in the drawing, Figure 65.

From a puzzle standpoint, the best solution is that shown in Figures 66, 67, and 68. In this solution, no telltale hole is left at the back, though this is probably less "honest" than the preceding solution. Notice that the neck of the tenon, Figure 66, is not dovetailed crossways, but is the same thickness

FIG. 65

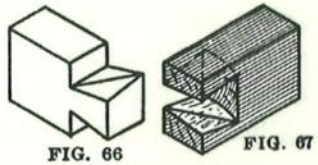


FIG. 66 FIG. 67

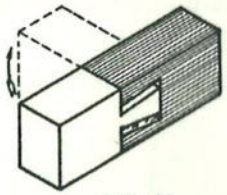


FIG. 68

clear across; likewise, the wide part of the mortise, Figure 67, is made the same width clear across. As a result, when these two pieces are so cut out, they will fit together endways, as in Figure 68. Notice that though the mortise and tenon fit perfectly at the back, their sides do not touch each other at the front. Also notice in Figure 67, that the inner surface is not flat but concave. It is by cutting this surface concave that it becomes possible to rotate the two pieces as indicated by the arrow, Figure 68, into the position shown in Figure 61. This solution makes by far the more puzzling joint, but is probably least valuable from the construction standpoint, as it has three hidden void spaces on the inside, and the tenon and mortise are in contact but a very little ways inside the surface.

In making all such joints, it is well to lay out and cut the parts, so that the ends protrude a little as shown in Figure

62. This makes it possible to batter the ends after gluing, and tighten the outside surfaces of the joints.

TWO-WAY FANNED HALF-LAP JOINT

The Two-Way Fanned Half-Lap Joint is an entirely practicable cabinet joint, but one that looks at first sight as impossible as the Double Dovetail Joint. If it is well made, and the ends are battered down as recommended in the suggestions for making the Double-Dovetail Joint, it will not be at all necessary to glue it to keep those who inspect it from solving how it is assembled. Figure 69 shows the parts assembled; Figure 70 shows them pulled apart in the only way that they will come apart. The parts are shoved together or apart by moving them along the dotted lines. This explanation makes the solution so simple that one might doubt if the joint is much of a puzzle after all;

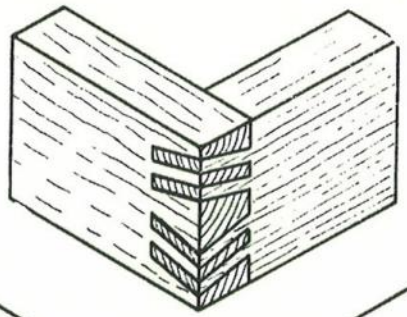


FIG. 69

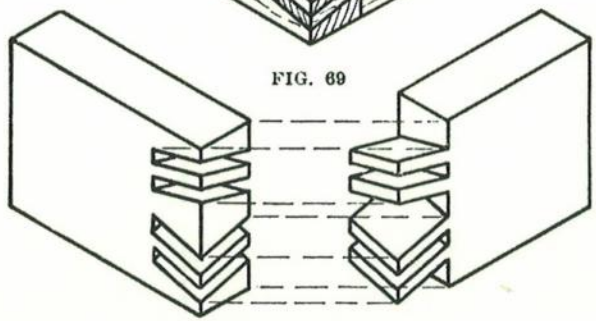


FIG. 70

however, this explanation seldom occurs to one looking at Figure 69, or at two pieces of wood put together with this joint.

WOODEN LOG CHAIN

A chain made from one piece of wood and without gluing the links together seems at first thought to be an impossibility. Study of Figures 72, 73, and 74 will show that it is quite

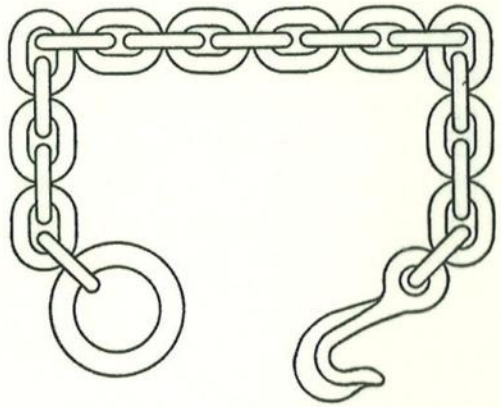


FIG. 71

possible. Figure 72 shows good dimensions for laying out a chain. The first step is to square up a piece and then cut out the corner rabbets. Saw cuts, as shown in Figure 72, block out the links. A plane can be used to partly round the links at this stage, or after rounding the link ends with a chisel or knife, Figure 73. The links are separated, one from another, by drilling holes as shown at A and B, Figure 73. The holes shown at B are drilled diagonally crossing from groove corner to groove corner. The links are roughed out on the inside with a coping saw. When free from one another, they are rounded up with a pocket knife or woodcarving tools.

Some workmen make the chain of white pine and finish with black paint. Pine is an easy wood to work, and the paint

makes the chain look like iron. One made of black walnut will look better, and if simply varnished, will show that the work is all of one piece of wood.

The hook and ring shown in Figure 71 so interfere with machining the rabbets, that they are usually made separate and glued on after the chain is made.

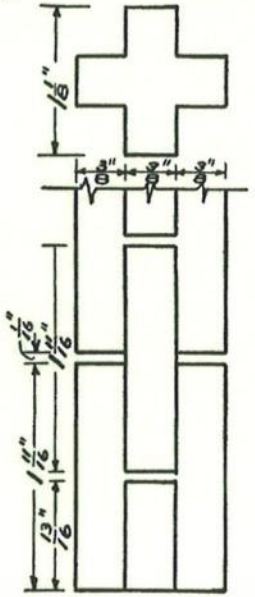


FIG. 72

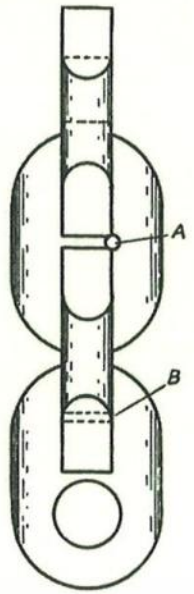


FIG. 73

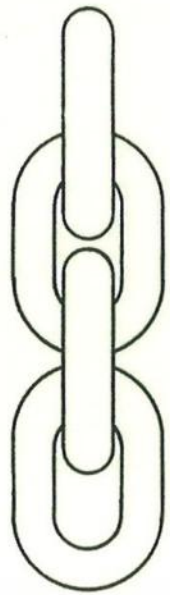


FIG. 74

CAGED BALLS

Most people have seen ball-and-cages similar to Figure 75, which have been carved out of a single piece of wood. It is a favorite whittling stunt. The one shown, however, has a black-walnut ball in the middle cage, while all the rest is made of white pine.

To make it, the central cage is cut out by mortising through from all sides as the first step. Then the piece is thoroughly steamed to make the cage bars pliable. After steaming, two cabinet clamps are firmly clamped over the ends of the cage to prevent splitting when the bars are

sprung, and a turned walnut ball is forced between the bars into the cage. The wood is now thoroughly dried out again and the end cages mortised out. In doing this, a centrally located section is left in each cage from which the balls are to be worked. This section is first worked to a cylindrical form which separates it from the bars of the cage, leaving it inside, however. With a knife, the cylinder is carefully worked into a sphere.

FIG. 75

It is well to leave an extra inch or two of stock on each end to be cut off as late in the construction work as possible. This will serve to hold the piece in a vise, and also reduce the danger of splitting out the ends.

THE MAGIC DRAWER

The incased drawer has the virtue of making a coin placed in it disappear or appear at the will of the person who exhibits it. Notice by the cross section that the drawer bottom is loosely held in place by protecting strips on the drawer sides at the top and bottom. This leaves the bottom to flop to the lower side if the drawer is turned over. That fact is the key to the mysterious quality of the cabinet. The magician pulls out the drawer, and induces someone to deposit a coin in it. He closes it, passes the case behind his back (and turns it upside down) and, presto change, the coin is no longer in the drawer! When the owner of the coin demands his money, the case is passed back in the opposite direction, and lo, there is the coin. Of course, when the magician turns the case over behind his back, the coin drops out on the case cover *under* the drawer, and as the loose bottom changes position at the same time, the spectator does not realize that the drawer has been reversed in position.

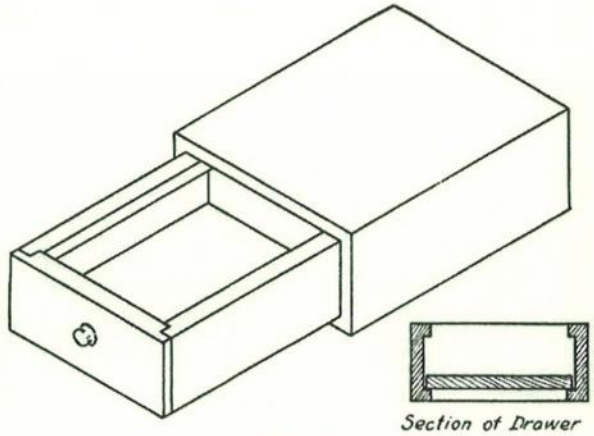


FIG. 76

THE MYSTERIOUS COIN PURSE

This purse has the mysterious virtue of opening readily enough to the initiated, but stubbornly refusing to work for the one who does not know its secret whims. Figure 77 shows the purse with its three pieces, A, B, and C, both assembled and partly disassembled. The partial disassembly is with the purse turned upside down—the only position in which it will unlock. After turning upside down, the piece A is revolved on the screw toward the left. When this is accomplished, B can be slid backwards away from the nail, and also turned on the screw, opening up the coin pocket in C.

The solution of the secret of why the purse will not open when right side up, calls for a study of the details of pieces A and B, Figure 78. Notice that at the ends of both A and B are

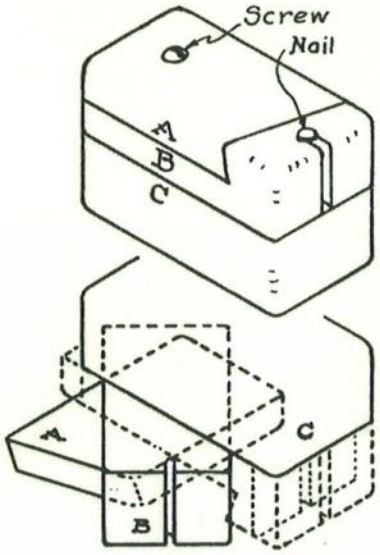


FIG. 77.

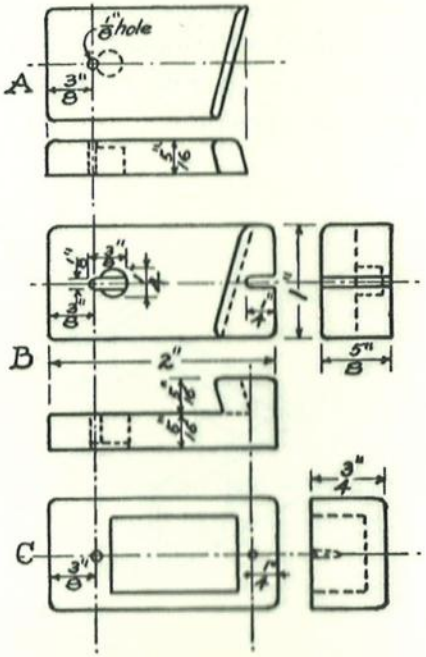


FIG. 78.

circular holes approximately ¼ in. in diameter and bored about ¼ in. into each piece. When A and B are placed together in their normal position, these two holes come together directly opposite each other. When the pieces are assembled, a 7/32-in. steel ball or marble is placed in these holes. When the purse is right side up, the ball will be in B, and when upside down, in A. When the ball is in A, the piece B can be slid back and forth on the screw, with the screw in the ⅛ by ⅜ in. slot cut into the bottom and side of the ball socket in B; but when the ball is in the socket in B, it holds the piece from sliding. Without sliding, the piece cannot be cleared from the nail. Hence, the purse must be turned upside down when the unlocking process is started. After B has been slid, it can be righted and unlocked right side up.

If a coin is kept in the purse, it will rattle around and keep the ball from being heard. As the ball cannot be seen when the purse is properly made, even when the purse is open, it seems entirely inexplicable that in the hands of one operator it will open and in the hands of another it will not.

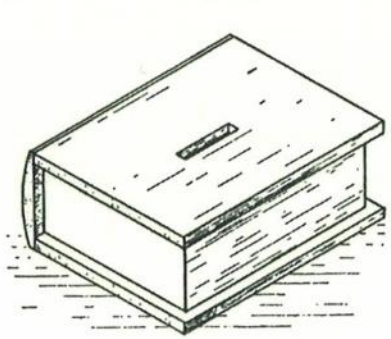


FIG. 79

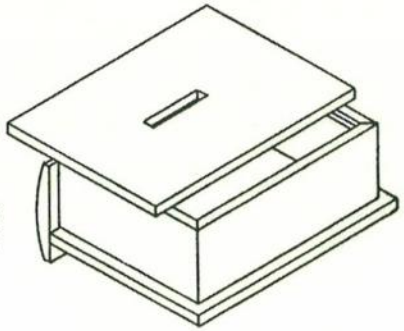


FIG. 80

THE COIN BANK

Most persons who inspect this bank will conclude that the easiest way to get the coins out will be to shake them out, but the initiated will simply push *downward* on the curved

back piece, and then *backwards* on the top, and help themselves to the contents. The owner can make this a money maker by requiring inspectors to make a "deposit" before being permitted to conduct an investigation.

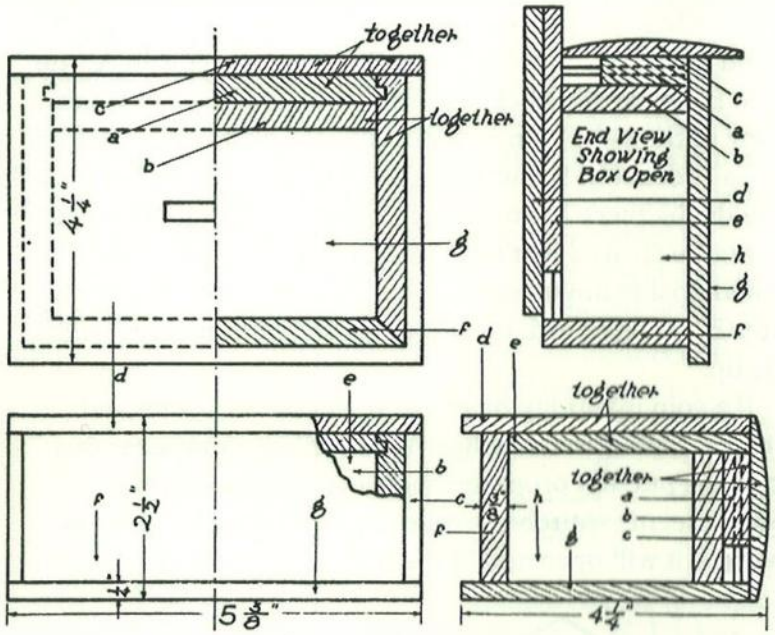


FIG. 81

This bank will require careful study and workmanship, but all the necessary details are shown in the working drawing. The section views in Figure 81 must be carefully studied.

ORIENTAL JEWEL BOX WITH SECRET LOCK

This is a jewel box of the drawer type which is locked with a catch operated by sliding certain parts that have apparently been put on only for the sake of appearance. The box from which the drawings were made was built up of two

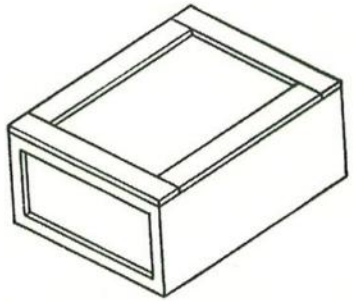


FIG. 82

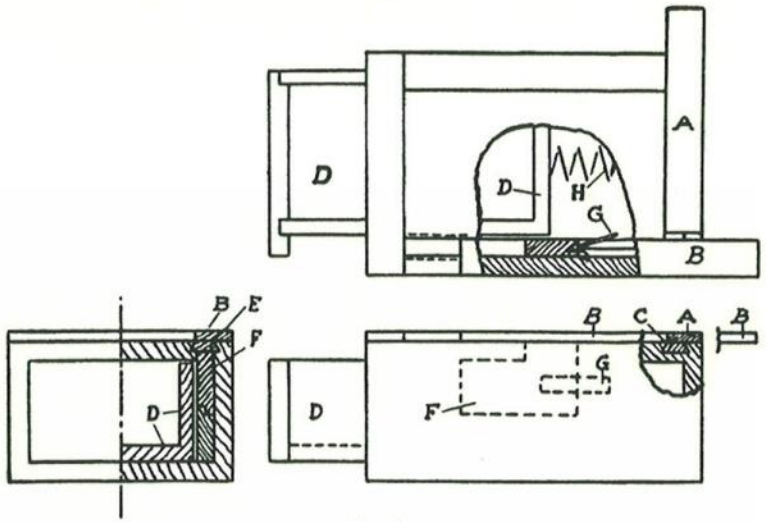


FIG. 83

thicknesses of ⅛-in. veneer. The dovetail ways for the sliding parts were built into the outer layer of veneer. No dimensions are given on the drawings; the box may be made any size desired.

A and B are the two movable slides which unlock the drawer D. A is first slid from the position it occupies in Figure 82 to that it occupies in Figure 83. After A is slid out of the way, B is slid back. B, with its parts E and F, Figure 84, is the real releasing part. The drawer is locked by the

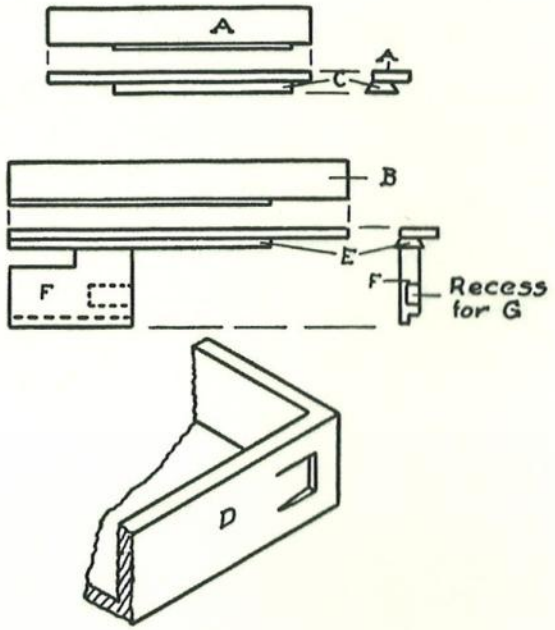


FIG. 84

spring G, Figure 83, catching in a recess in the side of the drawer. (See D, Fig. 84.) When B, with its parts E and F, is pushed backwards, the part F compresses the spring and pulls it from and the recess in D. The spring H, at the rear of the drawer, pushes the drawer open. B has to be pushed back in place before the drawer locks again.

SECRET LOCK TOOL BOX

The tool box shown in Figure 85 is of a size convenient to hold the tools of most mechanics, whether boys or men, and has the mysterious virtue of stubbornly refusing to open except to the owner or his trusted pals. However, if one has the observation faculties of a detective, he will observe that

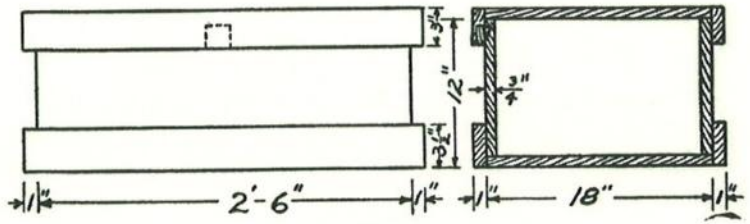


FIG. 85

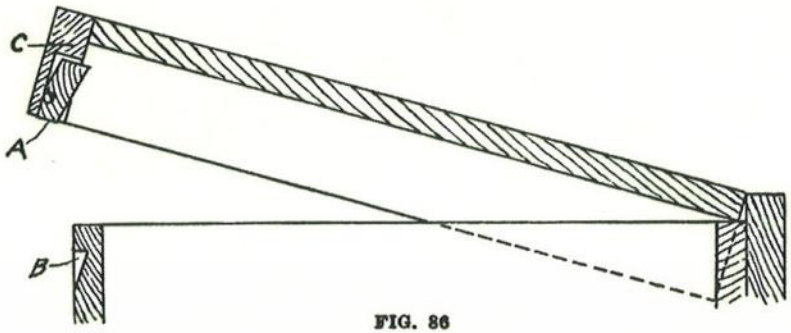


FIG. 86

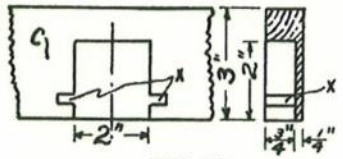


FIG. 87

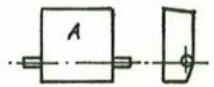


FIG. 88

the owner always lifts the lid from a point exactly in the center (where the dotted lines are in Figure 85), and that he gives a little push with his fingers as he lifts the lid. Study of Figure 86 will show that the owner pushes on the little block A, which normally drops into the notch B and locks the box.

Pushing on A, makes it swing back out of the notch, and permits the lid to swing up unobstructed. Figure 87 shows an inside view of the piece C, with the piece A removed. Figure 88 shows the details of the piece A. The notches X, in Figure 87, are plugged after A is in place.

DESK COMPANION WITH SECRET STAMP COMPARTMENT

Generally a locked desk is the means necessary to protect postage stamps. That is not always desirable nor effective. The owner of a desk equipped with this desk companion never worries about his stamps. He knows that

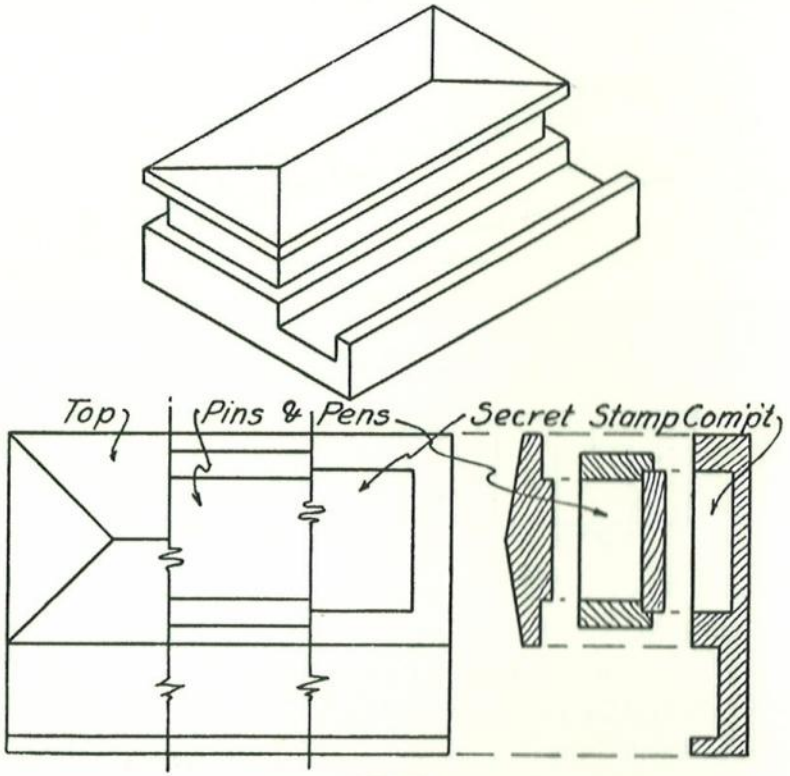


FIG. 89

they are safely hidden away under the floor of the pin and pen-point tray of his desk companion. If he were to open it in the presence of others, few would observe that he lifted off the whole tray instead of the tray top.

The drawings are self-explanatory, except that the top-view drawing, by the break lines, shows successive levels of removal from top down to the base piece, as is emphasized by the sections shown pulled apart.

The pen-rest groove can be omitted for use on desks supplied with other pen-holding devices.

The dimensions can be varied, but the basis of the size of the stamp compartment is the stamp size, ⅞ by 1 in.

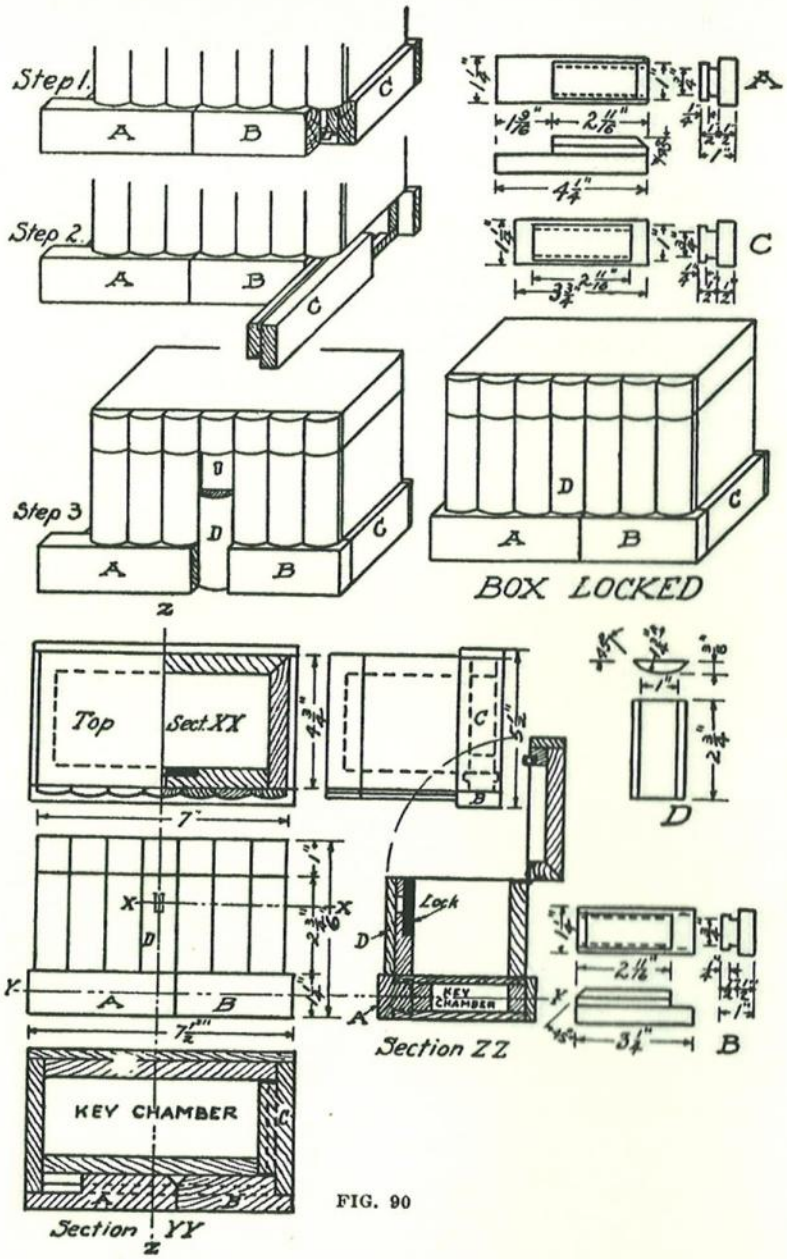


FIG. 90

HIDDEN-KEY-AND-LOCK JEWEL BOX

This is a quite mysterious jewel box of oriental manufacture. It has a hidden compartment in which the key is kept. This compartment must be found, and the proper slide moved to open it. Then the keyhole must be found by sliding pieces back and forth, all of which should be quite discouraging to a would-be pilferer.

The jewel box is made to represent a set of seven books standing on a rectangular base. This book design is used because the lines representing the books serve to hide the boundaries of the movable parts. To simplify the already complicated drawing, some of these purely design lines are omitted. Scribed lines should be run across the top and back of the box to separate the "books." The box looks best with the "books" and the base made of wood of different colors.

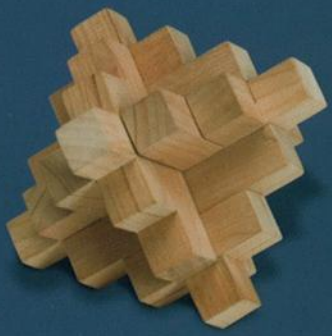
Step 1 shows the first step in unlocking the box, which is to open up the key chamber. A and B are slid to the left so as to release C, which is the real door to the key chamber. Step 2 shows C slid back, revealing the hiding place of the key. Study Sections YY and ZZ.

Now that the key is secured, the place to use it must be uncovered. Step 3 shows that B and C are slid back into place but A is left. This makes a way for D to be slid down and uncover the keyhole. Now the key can be inserted and the box unlocked like any other jewel box. When the lid is lifted, a large jewel chamber is revealed. See Sections ZZ and XX.

The details are quite carefully worked out, but the drawings will have to be studied very carefully. Some of the pieces shown as one piece of wood, will be made more easily by building and gluing up two or three pieces.

None but an A-1 workman should undertake to make this piece.

$9.95 US



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