A Referendum

The Editor of Handy Man's Workshop is in a quandary. At his earnest solicitation, this department, which was formerly published but once a month, is now appearing every other week. But his colleagues are conspiring against him. They are trying to make him think that his department is far more interesting to him than to his readers. It may be that this is so, and if it be so, it is hardly fair for Handy Man to occupy two valuable pages of the SCIENTIFIC AMERICAN every two weeks. But is it so? The Editor is not by any means convinced. He lays the question before his readers. Does Handy Man's Workshop interest you? Do you find it of real practical value? Do you wish it were conducted differently? Sit right down and tell the Editor all about it. Send him your suggestions. Tell him what you want, because, after all, the department is yours, and not his. If you have profited by the ideas of others, give others the benefit of your ideas. The Editor is always glad to receive useful workshop kinks, and pays promptly for such as are available. Address Handy Man, SCIENTIFIC AMERICAN, New York.

Miter Box for Odd Angles

By W. D. Graves

WHILE a miter joint seems to be the only practicable one for many jobs, it is one of the weakest and most unstable jointures used in wood work. Wood is an unstable material, swelling or shrinking with every change of moisture conditions to which it is exposed, and no two pieces act just alike. For this reason pieces of it should be so joined that their change in size may make as little change as possible in the joint; but the slightest swelling will cause the miter joint to open on the outside, while shrinkage opens it on the inside. Hence, it is always best to use some other method of joining unless the material is thoroughly dry and will be well protected from changes of moisture conditions. Even

Layout for an obtuse-angled miter joint.

then its only excuse is its looks, but as the only reason for most moldings is ornamentation, and as the miter is the most practicable and comely method of joining them, it will continue to be used.

There are on the market many good devices for cutting miters which are far more durable and accurate than anything one can make for one's self, but the really good ones are apt to be rather expensive, for one who has but an occasional joint to make; and no wood worker will ever have reason to regret having learned how to make a miter box for himself. First select stock which is absolutely dry, preferably straight-grained, and of such available wood as is least affected by atmospheric conditions. The bottom should be thick enough to give ample strength and stability. The side of this which is intended to go uppermost should first be planed straight and true; and, using this as the "work side," the edges made square and parallel with each other. Next the side pieces are made true on what is intended for the inside, and the top edge of each is carefully squared with it. Having trued up and squared the side pieces as stated, gage down from the top edge of each to a distance which shall be the inside depth of the box; then nail or screw the sides to the bottom, using care to have the gage marks come exactly in line with the upper side thereof. Care should also be taken to so place the nails or screws that they will be well out of the way of the saw.

Set a bevel at the desired angle, with the blade projecting on both sides of the stock, and with a sharp knife point mark across the top edges, always working from the inside. With a steel square resting on the bottom, square up to each of these marks on the inside of the side pieces. Take the saw which is to be used in the box, being sure that it is in the best possible condition, and saw down carefully to these marks.

The stress laid upon the necessity for working from the inside is not intended to imply that the outside should be left rough; but, however nicely that is finished, dependence for accuracy should be solely upon the inside, for divided responsibility in mechanics, as in everything else, tends to trouble.

Though a miter, as the unqualified term is used among mechanics, is usually understood as the bisection of a right angle, it is not necessarily so; for pieces may be mitered at any angle. To set a bevel at the proper angle for a square miter, i. e., 45 degrees, place the stock against one side of a steel square, and swing the blade till its edge exactly coincides with corresponding graduations on the two blades thereof; that is, so that it shall be exactly the same distance from the corner on each side.

Of course, we all know how to bisect an angle geometrically, by the use of the dividers; but as it is handier to set a bevel by the edge of a board, and as it is somewhat difficult to handle dividers with the point on such an edge, it is better to get miters other than those of right angles in the manner illustrated in the accompanying sketch. Having carefully squared and jointed the edge of the piece of board, *A*, gage a line parallel with that edge and at any convenient distance therefrom, as *a, b*. Then, having set the bevel at the angle to be mitered, mark by it the lines *cb* and *de*, at the same distance apart as are the edge of the board and the line *ab*. If the blade of the bevel is now set to touch the points *c* and *b*, it will be at the proper angle for the desired miter. The miter for pieces of different widths may be thus obtained by making the distance between the edge of the board and the line *ab* equal to the width of one piece, while that between *de* and *bc* equals the width of the other. In case the pieces are narrow, it may tend to accuracy to increase these distances, which may be done if care is taken to have them the same relatively to each other.

Case for Phonograph Records

By Ralph C. Davison

ALL those who own a phonograph know how fast the records accumulate and how necessary it is to provide a proper place for their safe keeping in order to avoid their being knocked over and becoming cracked or broken. The regular cases one can buy for the above purpose are expensive, but a cheap and useful one can be

Sectional view, showing location of runners.

Front view of case with drawers removed.

Plan and side views of the record case.

made at home by any one who is handy with tools by following the directions as given below.

Any kind of wood can be used. The writer made a very effective case of black walnut, using glass knobs as drawer pulls or handles. The case shown in the illustration has two drawers. Any number of drawers, however, can be provided, depending upon the number of records one has on hand or may be likely to accumulate.

The first thing to do is to make a box, the inside dimensions of which must correspond to the size of the outside dimensions of the drawers which it is decided to use. The box should be made of at least 1/2-inch material, and should be provided as shown with top and bottom runners for the drawers to slide between. The sizes of the drawers in the case shown are 14 inches x 18 inches. This provides room for 24 records. The drawer proper consists of a flat board with the front piece firmly attached as shown. Then instead of using pegs upon

which to place the records, as is usual, the regular record boxes in which they are bought are used. This the writer finds is a much better scheme than using pegs, as in removing the records from the pegs they are very apt to be scratched by one's finger nails, whereas in using the boxes there is no fear of injury from this cause, as the sides of the records are always completely protected by the flannel lining in the cardboard boxes.

To secure the boxes in their proper places first mark the location of their centers on the bottom of the drawers shown. Then with an awl make holes at each of the

The empty case with upper drawer removed.

centers thus marked, large enough to receive the points of the screws. The next thing to do is to punch a hole through the center of the bottom of each box, large enough for the screws to pass through easily. Now drop a washer down into the bottom of the box and center it over the hole. Owing to the small openings in the boxes one will find it hard to get the screws into the holes without using some special device.

The simplest way to get these screws into place, I found, was to take a thin piece of wood and to split it at one end, as shown in the illustration. By placing the head of the screw in this slot, as shown, they were held tight enough to allow of passing them through the hole in the bottom of the box and to give them a turn or two in the hole already made to receive them in the bottom of the drawer. The wood holder was then released from the screw and it was driven home with a long screwdriver, thus securing the box firmly in position. When complete this box made a most convenient and safe place in which to keep the records—especially convenient for the reason that the regular serial numbers of the records were discarded, and in their stead good sized numbers, cut from an old calendar, were pasted on the top of each of the record boxes. These numbers were placed in regular order, the first drawer containing numbers from 1 to 24 and the second drawer from 25 to 48. A list containing the names of the records, with their new numbers placed opposite to them, was then made out. In this way when a certain record is wanted, by referring to the list and getting its number, it can be picked out of the case in an instant, thus doing away with the annoyance of looking over a lot of record boxes before finding the desired record one wishes to play.

The material list for making the above case is as follows:

Pieces.	Size.	Location.
2	14" x 19 1/2" x 1/2"	Top and Bottom.
2	13" x 19 1/2" x 1/2"	Sides.
1	14" x 12" x 1/2"	Back.
1	15" x 1" x 1/2"	Strip Between Drawers.
6	18 1/2" x 1/2" x 1/2"	Running Strips.
2	18" x 14" x 1/2"	Drawer Bottoms.
2	14" x 5 1/2" x 1/2"	Drawer Fronts.
4	4" x 6"	Triangular Braces.
48	1 1/2" dia.	Washers.
48	1/2"	Screws.
2		Draw Pulls or Handles.

The Handy Man's Furnace Ashpan

By C. F. A. Siedhof

TO the man who takes care of his own furnace (and to his wife perhaps more so) the removal of the ashes with the accompanying dust, is a decided bugbear. As a result the ash removal is done as infrequently as possible, thereby endangering the grate, by allowing the ashes to accumulate in the ash-pit. If this same man will make, or have made, a pan to fit the ash-pit of his furnace, he will be surprised that he never had one before. I have had one made and in use for some time, and have not only overcome the dust nuisance, but have also saved much time in handling the ashes.

The pan was made a close, but by no means a tight fit, enabling it to be easily removed. The pan should be rounded at the inner end to conform to the shape of the ash-pit. If the pit within the ash door is circular, as is

The furnace ashpan.

generally the case, it will be found that the few ashes that fall outside the pan will not interfere with taking the pan out and replacing it. These ashes need be removed only occasionally. The end of the pan toward the front of the furnace should be square across, and provided with a handle. A bail should be attached at the balancing point, so proportioned that when down, it will rest on the sides of the pan, and will not fall down into the ashes. Have the bail hinges of the kind to stop the bail from moving beyond the upright position. Remove and empty the pan before shaking down the furnace,