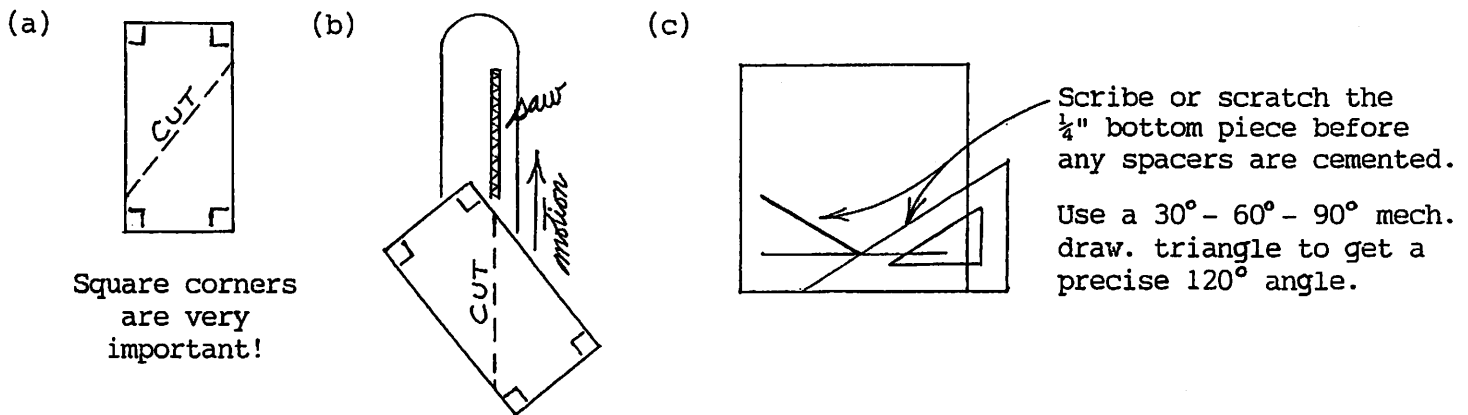


Crystal packing and dislocation - is the close arrangement of molecules in crystals and metals for compactness and strength. On an OHP, this apparatus provides a dramatic visualization of certain aspects of crystal packing and dislocation via 3/32" dia. dry steel ball bearings as molecules. Since the shape of a parameter or container is highly relevant to the amount of dislocation, I have combined two different shapes, a square and a hexagon, into one piece of apparatus. By merely tipping one end and then the other, the apparatus can show two different patterns of packing and dislocation. By carefully rapping its side (annealing?), you can eliminate much of the dislocation, especially in the hexagon where maximum packing occurs.

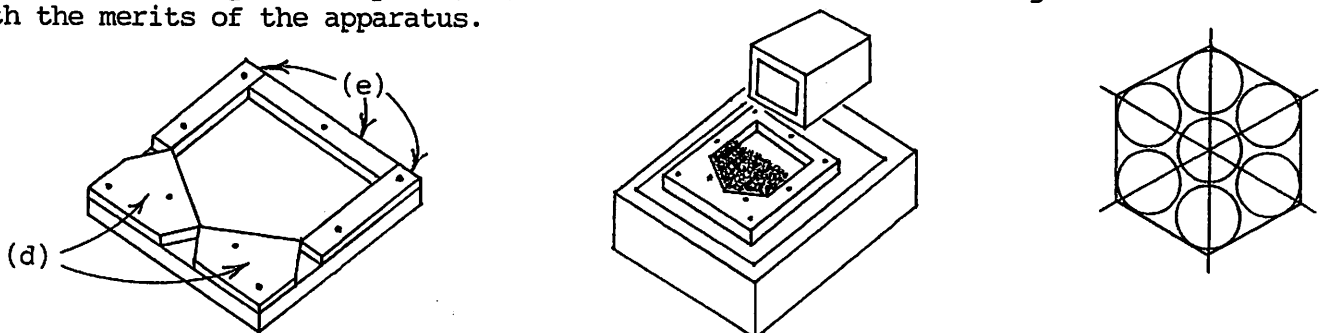
Note: However interesting, this is not a high priority topic and demo for H.S. physics. Also, although its design is simple, it requires experience working with acrylic plastic sheets (Plexiglas). A special 80-tooth, 10" dia. table saw blade is required for smooth edges. All of the pieces are simple squares and rectangles. Someone with experience and the right saw blade could cut the pieces in a few minutes.

Construction: The diagram (template) on the back is full scale, especially for hole drilling and tapping. The 1/8" top and 1/4" bottom pieces are squares; all 1/8" spacers are rectangles. You need 125 gm (about 2,200) ball bearings for the apparatus. The 1/8" spacers should be cemented to the 1/4" bottom piece. The two "angled" spacers come from a single rectangle that can be hand-guided slowly through a table saw if you are careful. (See illustrations a and b below.)



With all of the pieces precut, follow the illustration (c) using the main template layout. (d) Place and cement each "angled" spacer first. (e) Line up the remaining 3 sides and cement. Leave any "overhanging" material until the end of assembly when it will be easily trimmed off. (f) Drill clearing holes in the 1/8" top piece for the #6 - 32 brass screws. (g) Line up the top and bottom pieces and carefully mark the bottom drill holes. Drill the tap holes and tap them all the way through the bottom piece. Have the four feet already made and cement them on the bottom of the bottom piece. (Eliminate scratches!) (h) Carefully add ball bearings to the "container" of bottom and sides (spacers). Put the top on and use the screws. Saw off and grind down carefully the edges all the way around. The outside edge doesn't have to be perfect.

Presentation: When presenting, you must keep the apparatus nearly flat so the bearings don't pile up (go 3-D). You'll learn to rap the side just right (the touch!) to get or remove the patterns that you want. You might start the discussion on the OHP with just seven pennies spread out over the stage. Slowly push them together to show that nature's closest packing results in a hexagon (honeycomb). (Never underestimate the "intelligence" of the bees!) Finish with the merits of the apparatus.



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