• Commonwealth of Kentucky •

EDUCATIONAL BULLETIN

THE CLASSROOM AND SHOP FOR TEACHING VOCATIONAL AGRICULTURE

Published by

DEPARTMENT OF EDUCATION

JOHN W. BROOKER
Superintendent of Public Instruction

ISSUED MONTHLY

Entered as second-class matter March 21, 1933, at the post office at Frankfort, Kentucky, under the Act of August 24, 1912.

Vol. VIII • June, 1940 • No. 4

FOREWORD

With more than 250 departments of vocational agriculture in the high schools of our state, it seems fitting that we should have a publication on arrangement of the agriculture classroom and shop. This publication should be of direct service to superintendents and principals who may have or who are planning to have vocational agriculture in their schools, and to teachers of vocational agriculture, and should be of general public interest.

This bulletin has been prepared by the staff of the Division of Vocational Education.

JOHN W. BROOKER
Superintendent of Public Instruction

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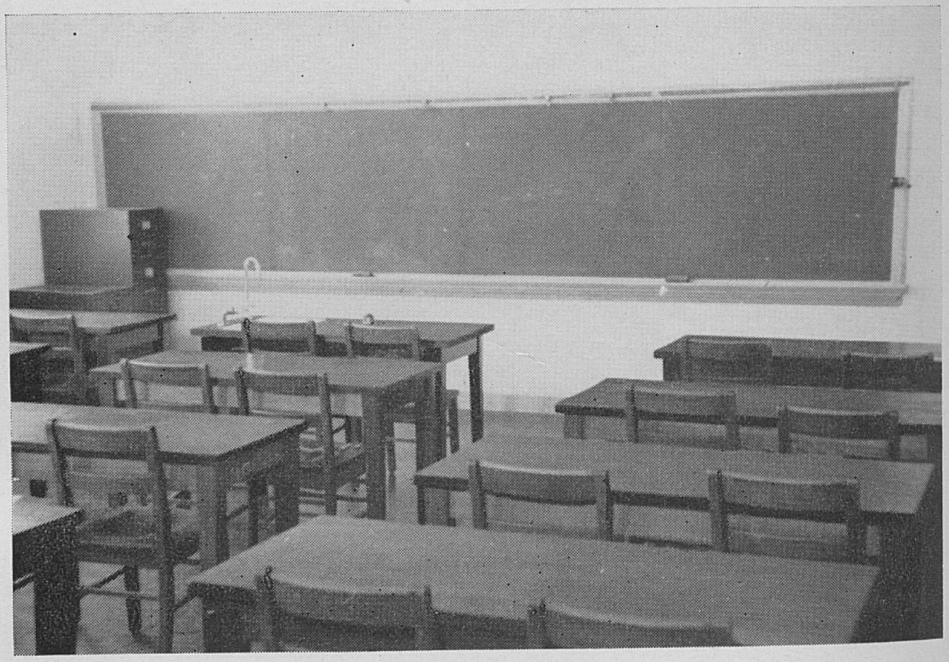
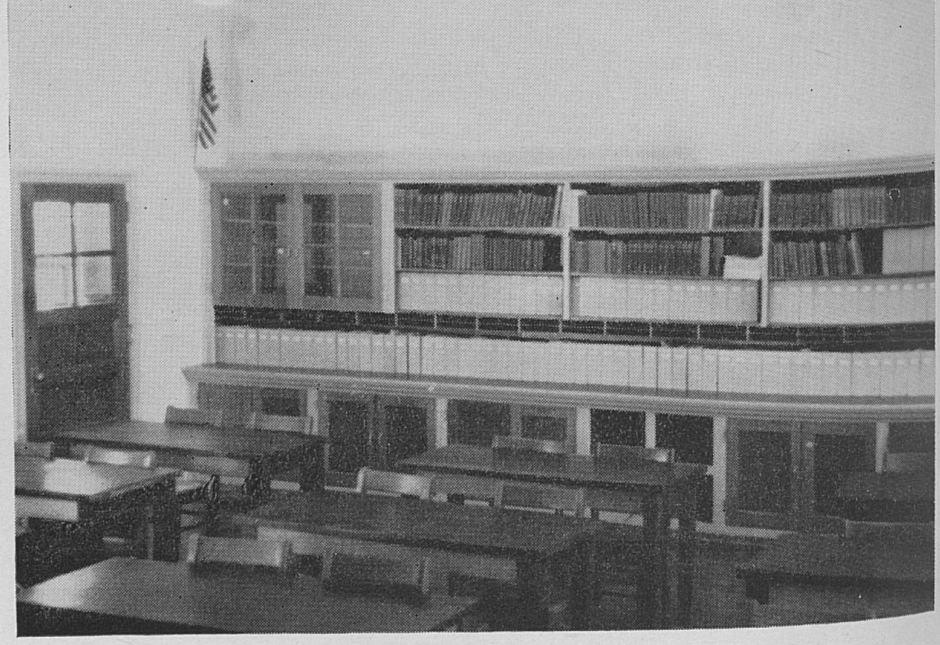




Front View and Rear View of an Agriculture Classroom

ARRANGEMENT OF THE CLASSROOM AND SHOP FOR TEACHING VOCATIONAL AGRICULTURE

In general, in teaching vocational agriculture in Kentucky, one room is used for all classroom work, and another room is used for farm shop. There is no separate laboratory room, as the flat tops of the tables provide level working space for the laboratory aspects of agriculture. Usually the classroom is in the main building. Any good classroom, desirably located, may easily be converted into a classroom for vocational agriculture. Many shop rooms are in the main building, and many are separate from the main building. In several school the agriculture classroom and shop room are in a building to themselves.

It is desirable that the classroom and shop room be close together, and be located so that the department can be entered without going through the rest of the building. It should be possible to enter the shop directly from the outside; and the entrance should be large enough to permit bringing in a mowing machine or removing a self-feeder for hogs.

This publication presents a discussion of lighting, as an understanding of certain principles of lighting is fundamental to securing good room arrangement. It presents the Kentucky standards for the agriculture classroom, library, and room equipment. The agriculture library belongs in the agriculture room. The publication also presents photographs and drawings showing classroom and shop room arrangement and room equipment. It does not include a discussion of what might be termed teaching equipment.

LIGHTING THE AGRICULTURE ROOM

Any recommendations on arrangement of the agriculture room must take into consideration certain principles of lighting. Much reading and written work is done in the classroom. This discussion attempts to list some of the simple things to be kept in mind in lighting an agriculture classroom, whether one has the planning of a room to be built or whether, as more usually will be the case, he has to make an old room conform to accepted standards.

During the past twenty-five years practically all progressive communities and capable school architects have accepted unilateral lighting (light from the pupils' left side only) as the best type of natural lighting for the classroom. Any other arrangement in a building of modern size will be disturbing to the pupils or to the teacher. If teaching is to be a profession, the teacher must use his

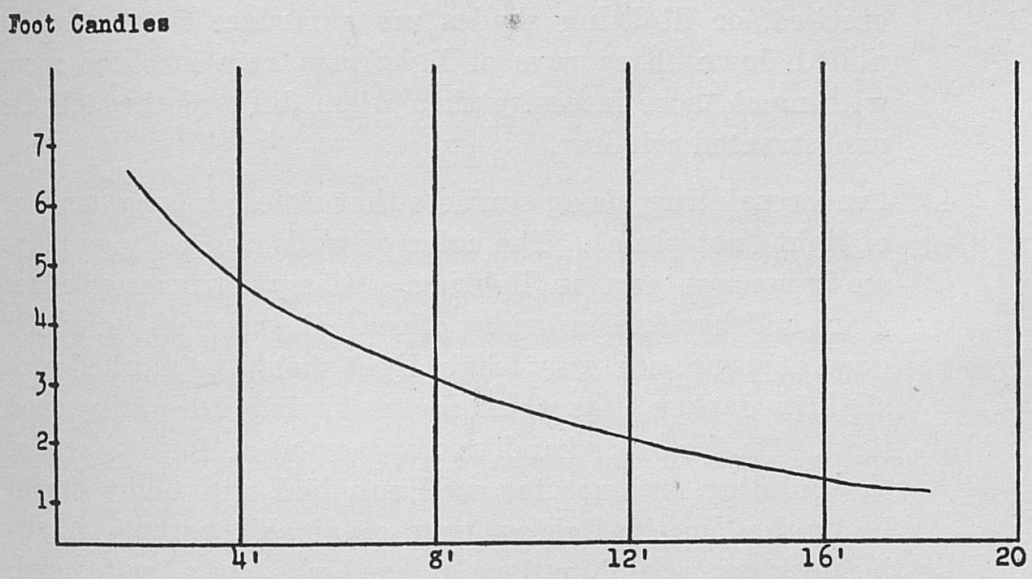
eyes for many years. The teacher can no more afford to face the light than can the pupils.

There should be one-fifth as much window glass area as there is floor area in the room. If, for example, the room is 30 feet long and 23 feet wide, it is necessary to place in the 30-foot wall to the left of the pupils 138 square feet of glass. This amount of glass area is easily possible. If the ceiling is 11½ feet high and the bottoms of the windows are 3½ feet above the floor and the tops extend within 6 inches of the ceiling (tops should always be near ceiling), the length of the windows would then be limited to 7½ feet. In order, therefore, to get approximately 138 square feet of window surface, 18 feet of wall space would be used for glass. This would leave 12 feet for mullions between windows, and the corner supports. At least 5 feet should be left in the wall to the front. The mullions should be as narrow as building safety will permit. Six windows 3 feet wide and 7½ feet long will give the standard glazing for this room. More glazing rather than less should be used, as it is easier to exclude excessive light than to increase a deficiency.

The importance of the windows' extending close to the ceiling should be emphasized. One foot of window area near the ceiling will do more to light the room than 2 or 3 feet near the bottom. A moderately high ceiling is necessary in rooms 23 or 24 feet wide, in order to insure sufficient light to those pupils seated farthest from the windows. The light for the inner portions of the room comes mainly from the higher openings. The distance from the floor to the top of the glass area of the window should be at least one-half the width of the room. One could easily increase glass area by extending the windows nearer the floor, but light entering so low really does more harm than good. Light falling upon the tables should come from above the level of the eyes of the pupil when seated at his table.

The unevenness in the illumination in the different parts of the room is the most difficult problem of lighting. The situation is presented graphically in the accompanying figure. (The figure is taken from the report of the N.E.A. Committee on School House Planning.)

This curve represents a typical case of illumination at successive two-foot intervals in a room lighted by windows on one side. It is seen that the illumination falls off in regular fashion. To move a table four feet from the window reduces the illumination about one third. The proportion, of course, varies with different factors, but this is a typical case. The big problem in lighting is to light



Curve of Illumination at Regularly Increasing Distances from the Windows.

the dark seats, to narrow the ratio betwen the illumination on the dark side and the brighter side of the room. Each of the following devices helps light the dark seats, helps avoid the falling off of illumination from the light row of seats to the dark row of seats:

1. Large amount of glass area (already discussed)
2. Increasing height of windows in proportion to width of room (already discussed)
3. Selecting proper shades (not blinds) and raising and lowering the shades from the middle of the window rather than pulling them down from the top. A double shade hung in the middle of the window, in a bracket made for this purpose, is better than a shade hung at the top. If the light in the far side of the room comes mainly from the upper sections of the windows, it is obvious that pulling the shade down over these sections will have the same effect as lowering the height of the windows. To lower the shade from the top is to reduce illumination at the wrong point. Lowering the shades from the top reduces illumination on the dark side of the room more than on the light side. A shade should be selected that will permit light to pass through on a bright day without admitting glare. A light buff tint is good. Bisque (a light sage) is good. Shades should never be drawn when unnecessary. Some teachers seem to have a mania for pulling down the shades "just so so." The primary function of a shade when drawn is to exclude excessive light and glare. Torn,

cracked, or ill-fitting shades are a menace in that when pulled down sharp rays of light penetrate into the room with much more intensity than when diffused through the unobstructed window.

4. Proper painting, using surfaces that reflect a large amount of light (not glare). The color of walls and ceilings plays an important part in lighting. Glossy surfaces produce glare and have an injurious effect. Rooms with unusually good exposure and very bright light should be finished with slightly darker tints than rooms having ordinarily good light. On the other hand, rooms located on inside parts of the building and not too well supplied with light should be finished in the lightest tints obtainable without resulting in glare. Combinations of ivory and gray are favored. Whichever color is used, the best practice is to employ at least two tones: the walls to within 2 feet or so of the ceiling the darker of the two tones; the rest of the walls together with the ceiling, in the lighter tone. If there is wainscoting, it should be finished in a darker tone than the walls above. The ceiling under all conditions should be a very light color, but only in rooms where the lighting is not adequate ought it to be white. Ceilings should have a reflection factor of at least 0.7 (a good white surface reflects as much as .85), and walls at least 0.5. All woodwork should be finished to a dull surface regardless of the color. Glossy surfaces will minimize the value of the best lighting system.

5. Proper placing of blackboard. Blackboards of the most approved type are of themselves a light-reducing element. This is unavoidable. However, the blackboard can be placed so as to minimize its effect in darkening the room. Obviously, the blackboard darkens the last row of seats most when it is placed to the right of these seats. Formerly in general school work when pupils did much work at the board, boards were placed to the front and also to the right of the pupils. Cheap paper has made the pupils' board less necessary. Both experience and experimental evidence show that pupils use the board very little. The blackboard today is largely the teacher's board. This is not to say that pupils should not "go to the board." If the pupil goes to the board he usually does so to assist in teaching. The agriculture teacher, especially in using the

problem method, makes much use of the board. With unilateral lighting, the teacher's board should be at the front end of the room, with preference given to the center and right half if the board does not extend all the way across the front.

There are other important factors in the use of the board, besides the saving of light in the room. It is usually more convenient for the teacher to use the board at the front end of the room rather than at the side. If the teacher uses the board at the side he must face the windows when he faces the pupils. The pupils who sit on the inner back seats often have difficulty in reading the material on the side blackboard if it is near the front; the pupils can get but a slanting view of it. Deterioration of blackboard surfaces is a common eye hygiene evil. Often the surface is streaked and chipped, making the writing difficult if not impossible to see. The bottom of the board should be placed high enough from the floor that the pupils at the back tables may read.

Of course, almost anything placed to the right of the last row of seats absorbs light. This would be true of a library case. The books and many bulletin boxes are darker than the wall, besides there are the shelves and pockets which interfere with light reflection.

It should not be inferred from any of these statements that a blackboard should never be placed to the right of the pupils. With the amount of window surface here recommended, it is possible to place a blackboard to the right and still have good light. If the blackboard extends only a part of the way across the front of the room, it may be desirable to have a supplementary blackboard to the pupils' right.

6. If light cannot be taken to the pupils, the pupils may sometimes be taken to the light. If the windows are placed at the proper height from the floor and if shades are properly used, there is no excuse for having a wide aisle between the tables and the windows. Sometimes the inner row of tables may be moved several feet nearer the light, which helps tremendously.

7. Supplement with artificial light. Every agriculture room should have electric light if electricity is available. Regardless of the care that may be taken to secure natural

light, artificial light is needed to supplement the daylight on dark days. On cloudy days and in the winter during early morning and late afternoon, daylight is not sufficient for comfort to the eyes when reading. The increasing use of agriculture rooms for evening and part-time schools is alone sufficient to require a lighting system that will measure up to modern standards.

One of the biggest problems in artificial lighting, as in natural lighting, is to prevent glare. Eyestrain may be caused from glare as well as from insufficient illumination. Electric lights exposed cause marked glare. The glare from unscreened lights in the schoolroom is a menace to the vision and a direct cause of eyestrain. Artificial lighting should be indirect or semi-indirect. In the indirect system the light is diffused throughout the room. In the semi-indirect system the bulbs are enclosed in translucent glass. The latter system may be preferred from the standpoint of maintenance.

Lights should be placed so that there will not be annoying shadows. Spacing of units should not be more than one and one-half times the distance that the units are mounted above the working plane. An agriculture room 23x30x11½ feet should have at least four lights if the lights are placed against the ceiling, and at least six lights if the lights are dropped appreciably.

This discussion on light has held to accepted standards in simple ways. Considerable experimental work has been done with skylighting as a means of securing eveness of illumination. Obviously, there is no dark side of a room with skylights. Glare is hard to overcome in skylight lighting. Some use has been made of ribbed glass in the upper sash of the windows as a means of diffusing light to the back of the room. One difficulty with ribbed glass is the keeping of the glass clean so that it will work.

If one already has the room, his problem then becomes making the most of what he has. Ordinarily, one cannot raise the ceiling, but usually there are things he can do to provide more and better light. It is often possible and practical to cut new windows. The halls and ceilings may be done over in light colors. Unnecessary blackboards may be removed. Dark shades that pull down from the top may be replaced by proper shades rightly attached. Electric lights may be properly installed. The tables may be shifted into better position so as to make use of the light. Where buildings are

close to each other, the darkening of the rooms may be alleviated by painting the outer opposite walls white.

Of all equipment we furnish the child in order that he may receive an education, light is one of the cheapest. But good light costs something. School boards often begrudge the little cost. Industry has come to appreciate the value of high levels of illumination as a factor in increasing production. Teachers are engaged in a more important kind of production, the production of desirable changes in the learners. Proper lighting in the school is of even greater importance than in industry as it involves the eyesight, health, and progress of the pupil.

AGRICULTURE CLASSROOM, LIBRARY, AND ROOM EQUIPMENT STANDARDS

I. Classroom

1. Size—23′x30′ (approximately)
2. Natural light
   a. All windows at pupils' left
   b. Glass area of windows equal to 1/5 floor area
   c. Window shades tan or buff
   d. Shades adjustable from both top and bottom
   e. Walls and ceiling painted to reflect a large amount of light, but not glossy
   f. No blackboard on the right side of the room
   g. No serious outside obstructions to light
3. Artificial light
   a. Light fixtures near the ceiling
   b. Frosted globes, semi-indirect or indirect lighting fixtures
   c. Lights on two circuits, left side and right side of room
   d. Four light fixtures in smaller rooms, six light fixtures in standard-size rooms
   e. Twelve to eight foot-candles of light on table tops
   f. Fixtures spaced so that distance apart will not be more than 1½ times the distance from the light to the working plane
4. Arrangement
   a. Library and equipment case on right side or in rear
   b. Tables arranged in three rows if room is wide enough
   c. Tables spaced 24″ to 27″ apart
   d. Aisles not less than 18 inches

e. Aisles between tables and walls, and tables and cabinet
f. Suitable teacher's desk or table in front of room
g. Blackboard on front wall

II. Room Equpiment

1. Library and equipment case
   a. Size—20 to 24 feet long
   b. Design—according to standard plan (See page 17)
   c. Finish—stained and varnished or painted to harmonize with the room

2. Bulletin boxes
   a. Number—100 or more
   b. Size—3½″x10″
   c. Design—according to standard plan (See page 18)
   d. Finish—to harmonize with library and equipment case
   e. Where kept—in library and equipment case
   f. Labeled according to standard library key

3. Pupils' tables
   a. Size—24″x56″ to 60″ (approximately) top, 30″ high
   b. Number—one for each two pupils in class
   c. Design—according to standard plan or equivalent (See page 16)
   d. Finish—Stained and varnished with black or brown top
   e. Securely fastened to floor

4. Blackboard
   a. Size—3½′x20′ (approximately)
   b. Location—front center of room 36″ (approximately) from floor
   c. Type—solid slate or composition board properly finished

5. Bulletin board
   a. Size—3½′x3′ (approximately)
   b. Construction—cork board or Celotex, molding same as blackboard
   c. Location—preferably near entrance door to classroom

6. Filing cabinet
   a. Size—four-drawer standard letter
   b. Construction—steel, preferably with Universal lock
   c. Location—convenient to teacher's desk

7. Pupils' chairs
   a. Number—one for each pupil
   b. Size—seat, 16″x16″ (approximately)
      seat height, 17″ from floor
      back height, 32″ from floor
   c. Construction—solid oak
      seat—full saddled
      back—two slats curved to fit lumber curve of back
      finish—school brown or light oak

III. Library
   1. Reference books
      a. At least one set on each enterprise in course of study for group teaching (where available)
      b. Size of sets—at least one book for each two boys in class
      c. Additional reference sets:
         Feeds and Feeding
         Soils
         Farm Management
         Today's Agriculture

   2. General reference books—one or more copies of each for general reference, as:
      a. Diseases of Farm Animals
      b. Principles of Plant Growth
      c. Field Crops (as Hughes and Henson)
      d. Animal Breeding
      e. Feeds and Feeding (unabridged)
      f. Judging Farm Animals

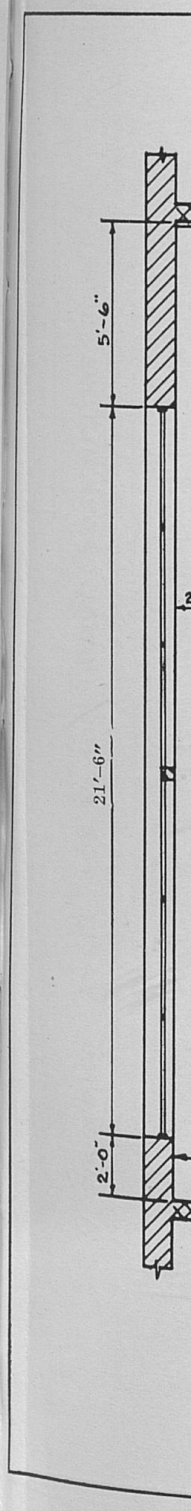
   3. Reference bulletins
      a. One bulletin of a kind for each two boys in class on enterprise subjects dealt with by the group
      b. Three to five bulletins of a kind on enterprise subjects very likely to be dealt with in individual work
      c. One bulletin of a kind on enterprise subjects which may possibly be dealt with in individual work
      d. All bulletins numbered and filed according to standard key
      e. Bulletin files kept up to date

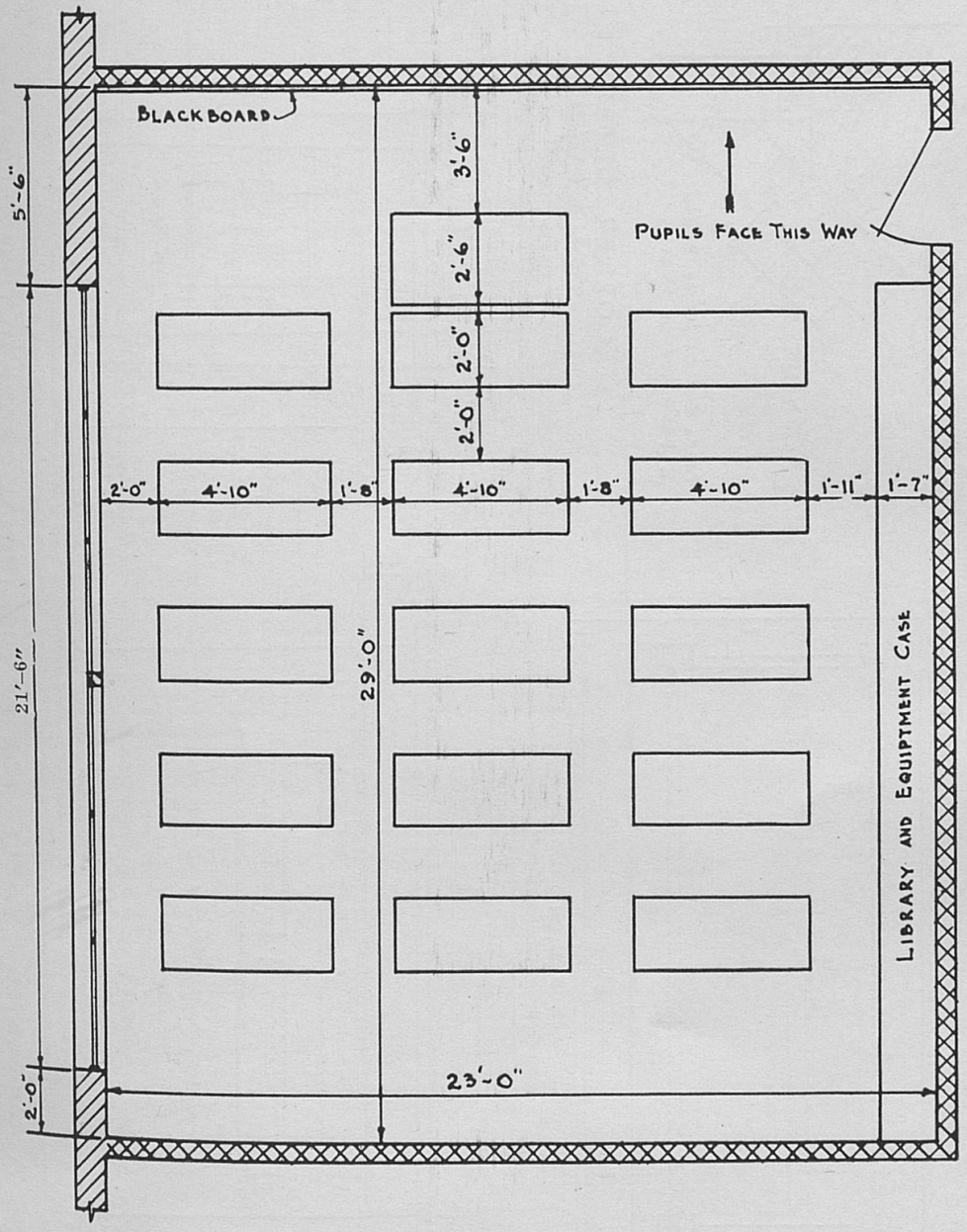
IV. Teaching Equipment

1. Laboratory equipment—sufficient to reach the teaching objectives
2. Visual aids—sufficient to reach the teaching objectives

V. Room Accessories

1. Future Farmer regalia (appropriately arranged)
    a. Charter (attractively framed)
    b. Creed (attractively framed)
    c. Purposes (attractively framed)
    d. Picture of George Washington
    e. Picture of Thomas Jefferson
    f. Flag of the U.S.A.
    g. Miniature plow
    h. Ear of yellow corn
    i. Mounted owl
    j. Rising sun
2. A picture or two, such as a print of a work of art appropriately framed
3. Illustrative teaching materials in view only when being used in class work
4. Future Farmer Hall of Fame
5. Future Farmer trophies, etc.
6. Accessories—appropriately arranged and hung or placed at eye level





FLOOR PLAN OF AN AGRICULTURE ROOM

SCALE: 1/4" = 1'-0"

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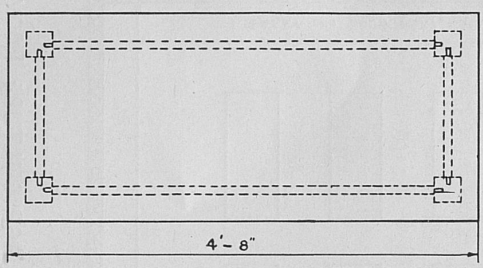
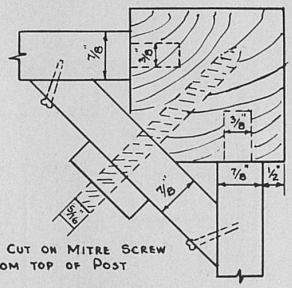
TABLE TOP - 3 PIECES 4'-8" x 8" x 7/8"
YELLOW PINE - DOWELED AND GLUED

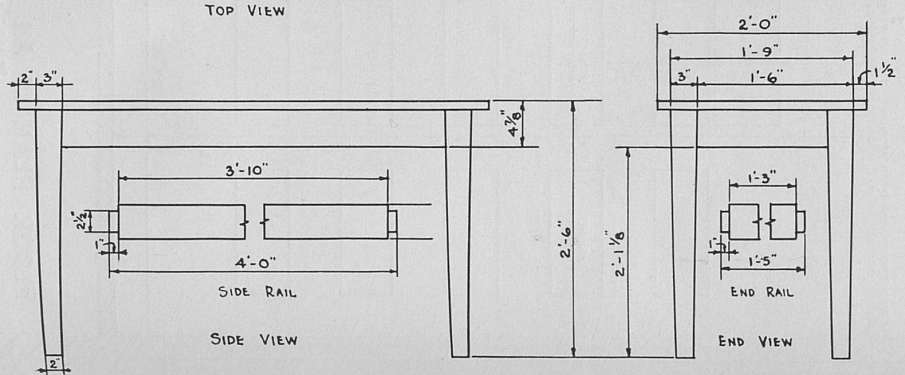


TOP VIEW



BRACE CUT ON MITRE SCREW
2" FROM TOP OF POST

CORNER DETAIL
SCALE: 1/2 FULL SIZE



A SUGGESTED TABLE FOR A VOCATIONAL AGRICULTURE ROOM
SCALE: 1" = 1'-0"

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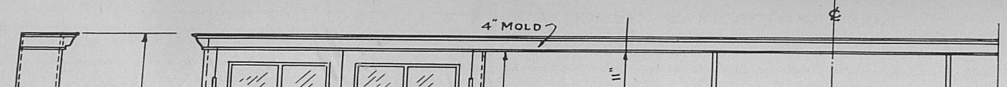

A SUGGESTED TABLE FOR A VOCATIONAL AGRICULTURE ROOM

SCALE: 1" = 1'-0"

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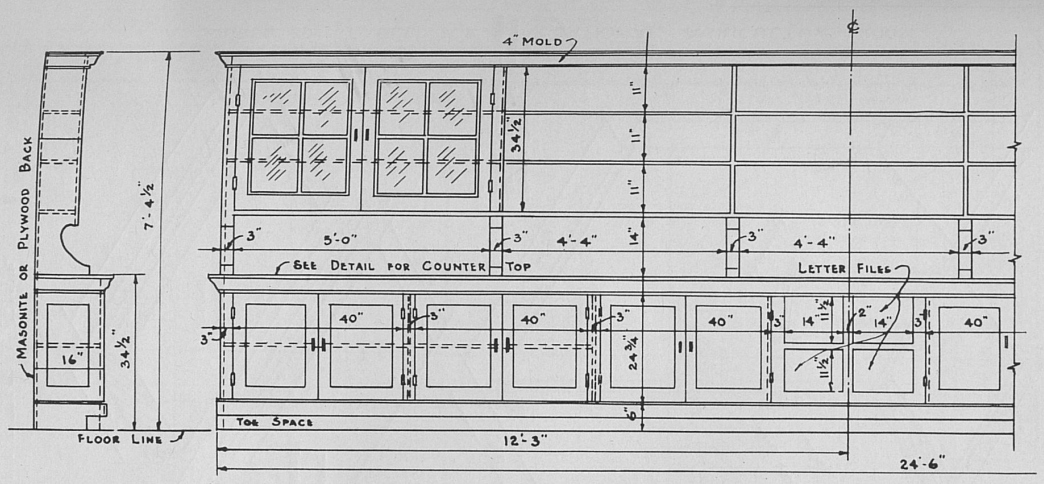
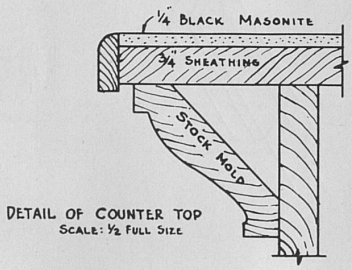


END VIEW

HALF FRONT VIEW



DETAIL OF COUNTER TOP
SCALE: ½ FULL SIZE

LIBRARY AND EQUIPMENT CASE

SCALE: ½" = 1'-0"

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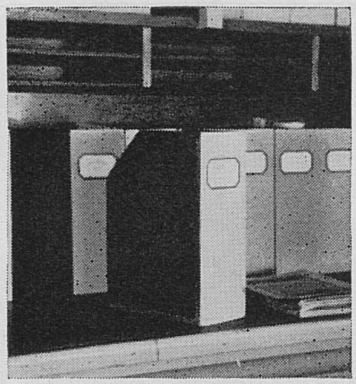
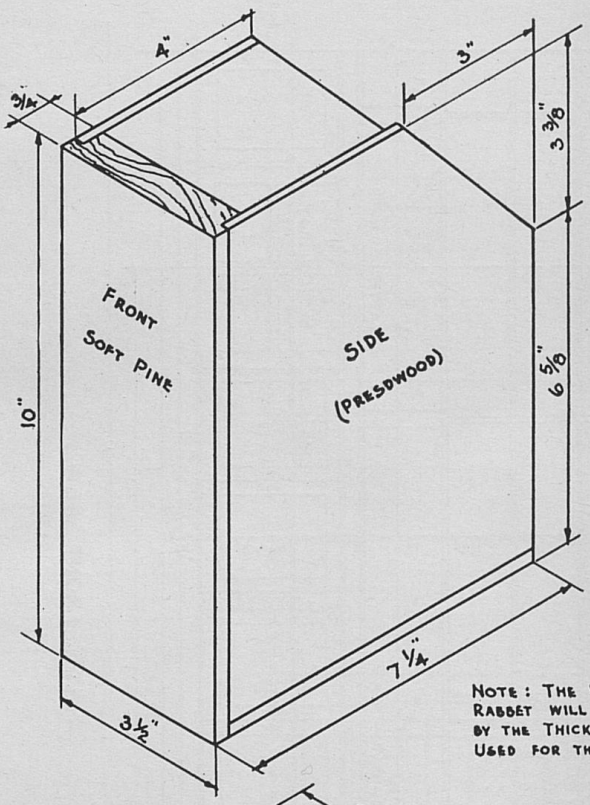
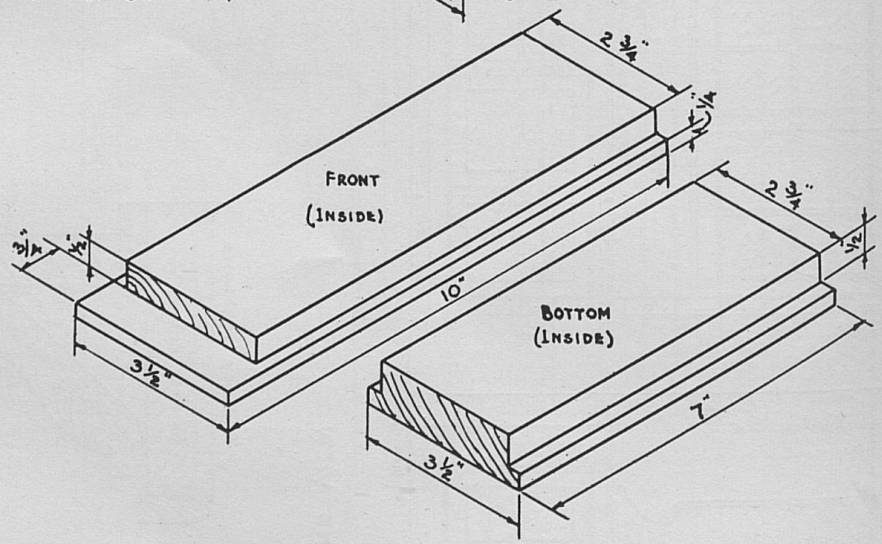




BILL OF MATERIALS

1 Pc. Pine 3/4" x 3 1/2" x 10"
1 Pc. Pine 3/4" x 3 1/2" x 7"
2 Pcs. Presdwood 1/8 x 7" x 9 3/4"

NOTE: THE WIDTH OF RABBET WILL BE DETERMINED BY THE THICKNESS OF BOARD USED FOR THE SIDES



BULLETIN FILE

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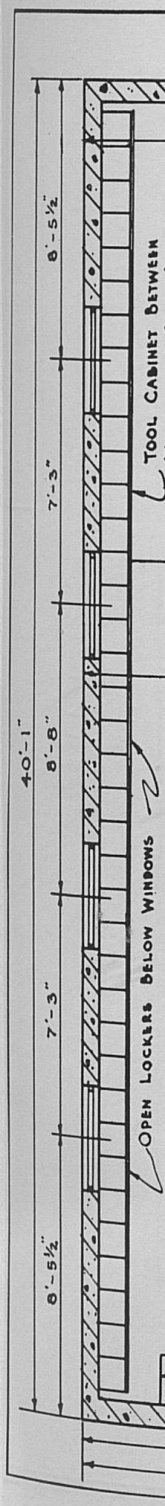

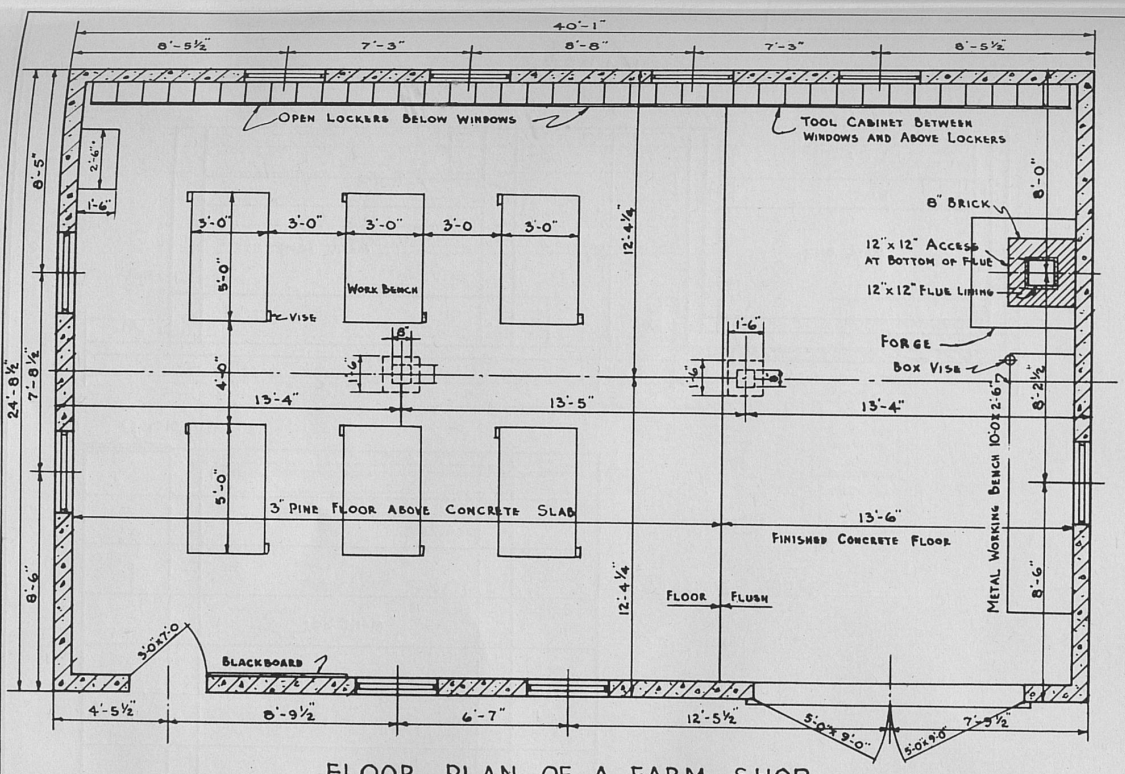

FLOOR PLAN OF A FARM SHOP

SCALE: ¼"=1'-0"

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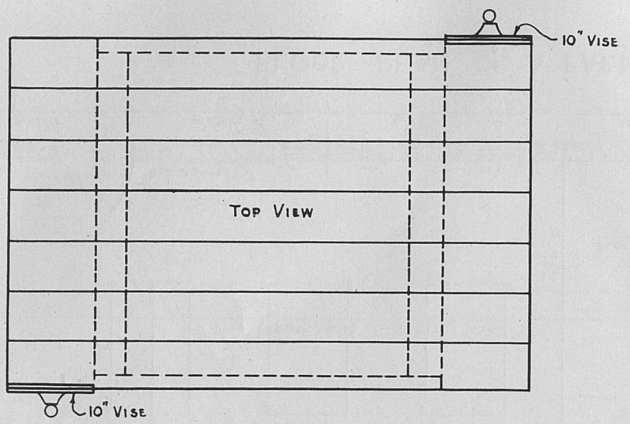

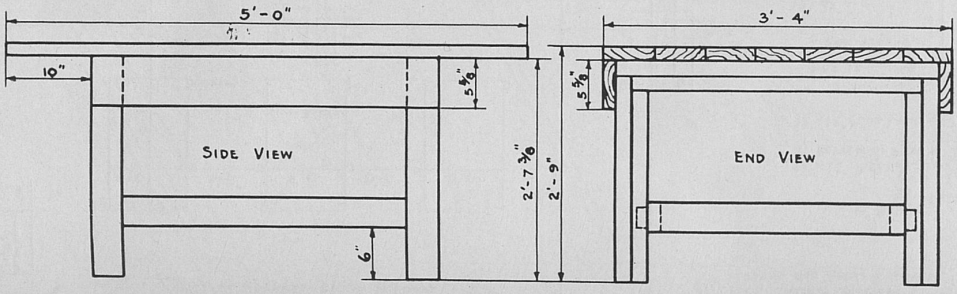

FARM SHOP WORK BENCH

SCALE: 1" = 1'-0"

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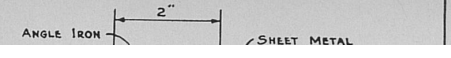

FARM SHOP WORK BENCH
SCALE: 1" = 1'-0"

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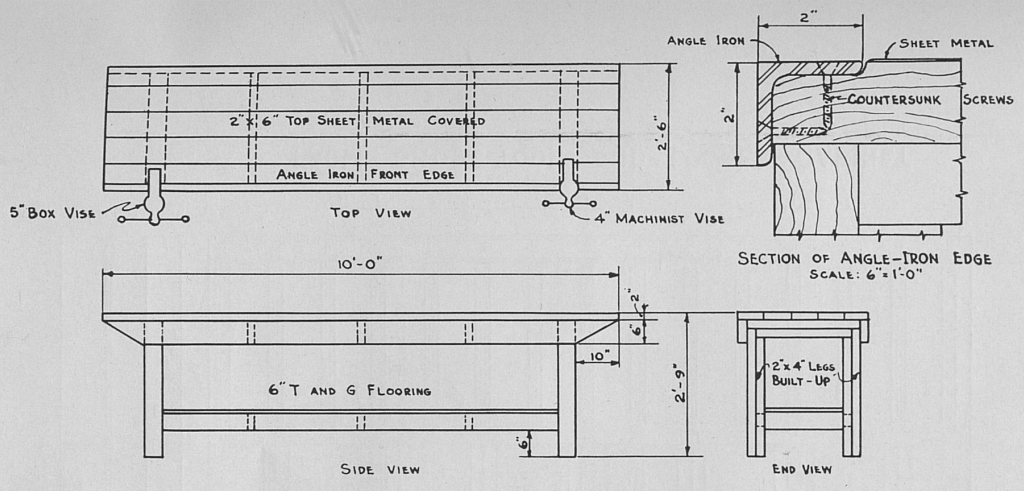

FARM SHOP METAL-WORKING BENCH
SCALE: ½" = 1'-0"

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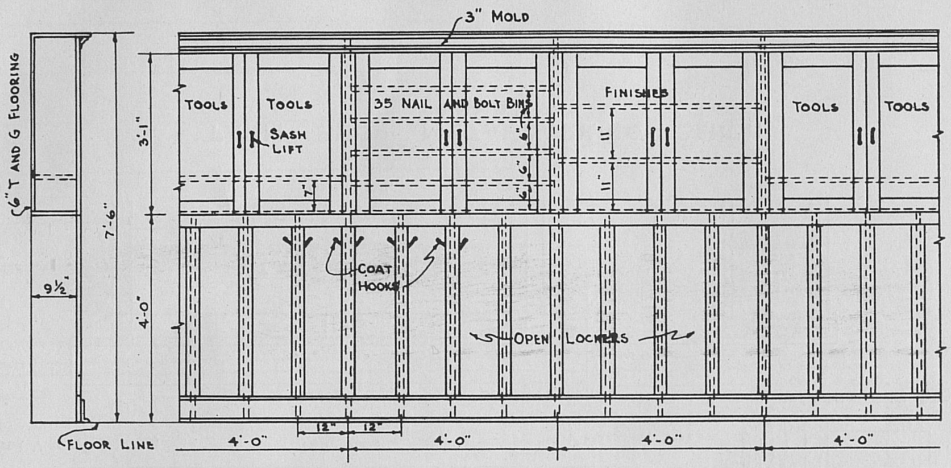

FARM SHOP TOOL AND LOCKER CABINET

SCALE: ½"=1'-0"

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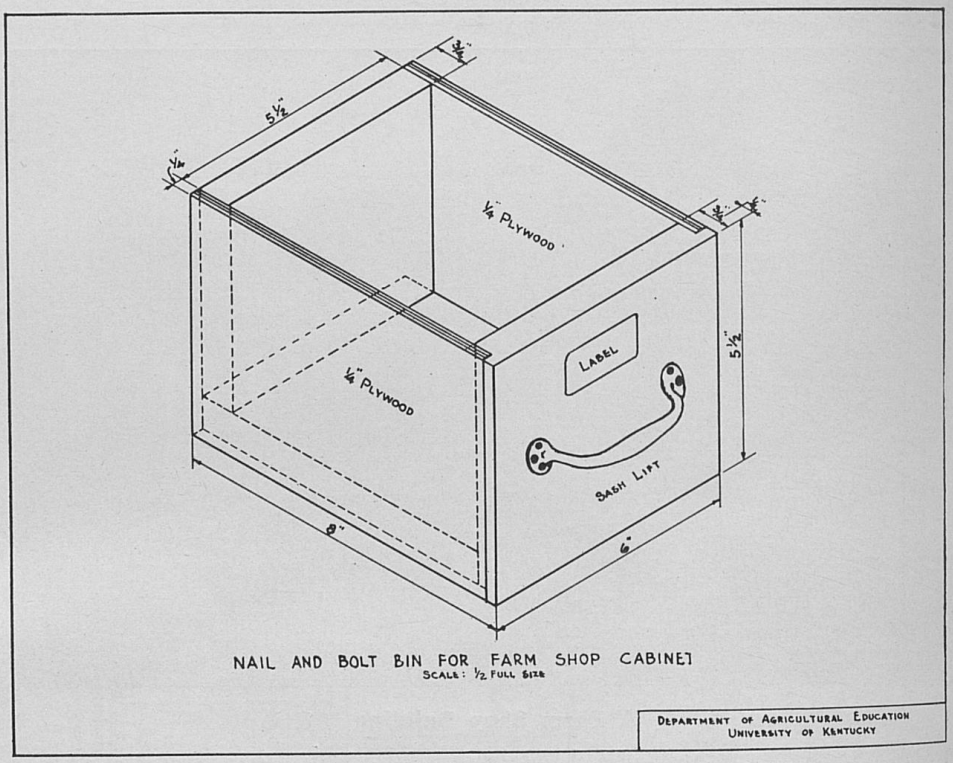
A Farm Shop Building

Open Lockers Below, and Tools Above



NAIL AND BOLT BIN FOR FARM SHOP CABINET
SCALE: ½ FULL SIZE

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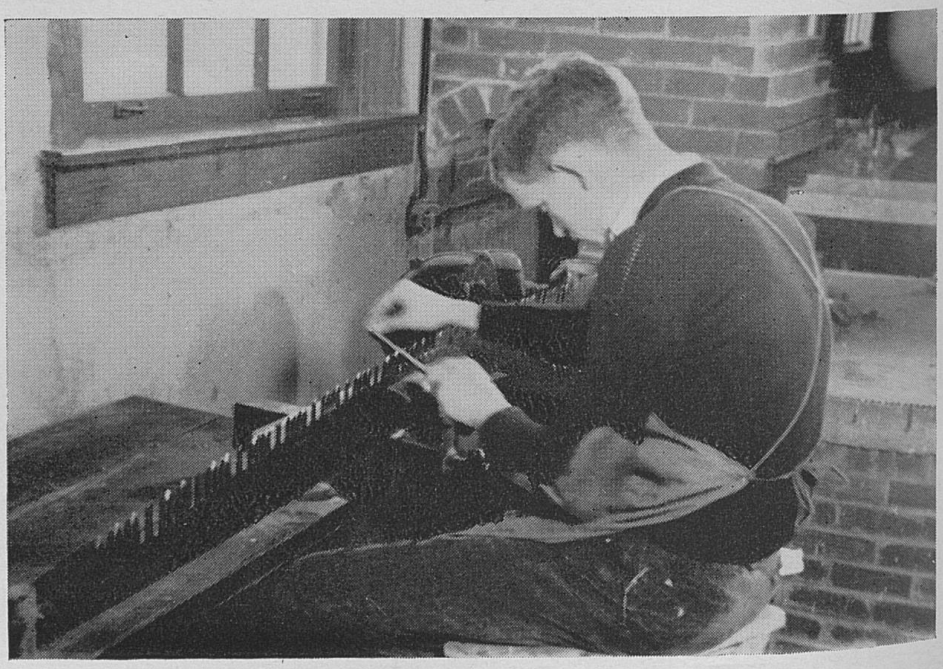
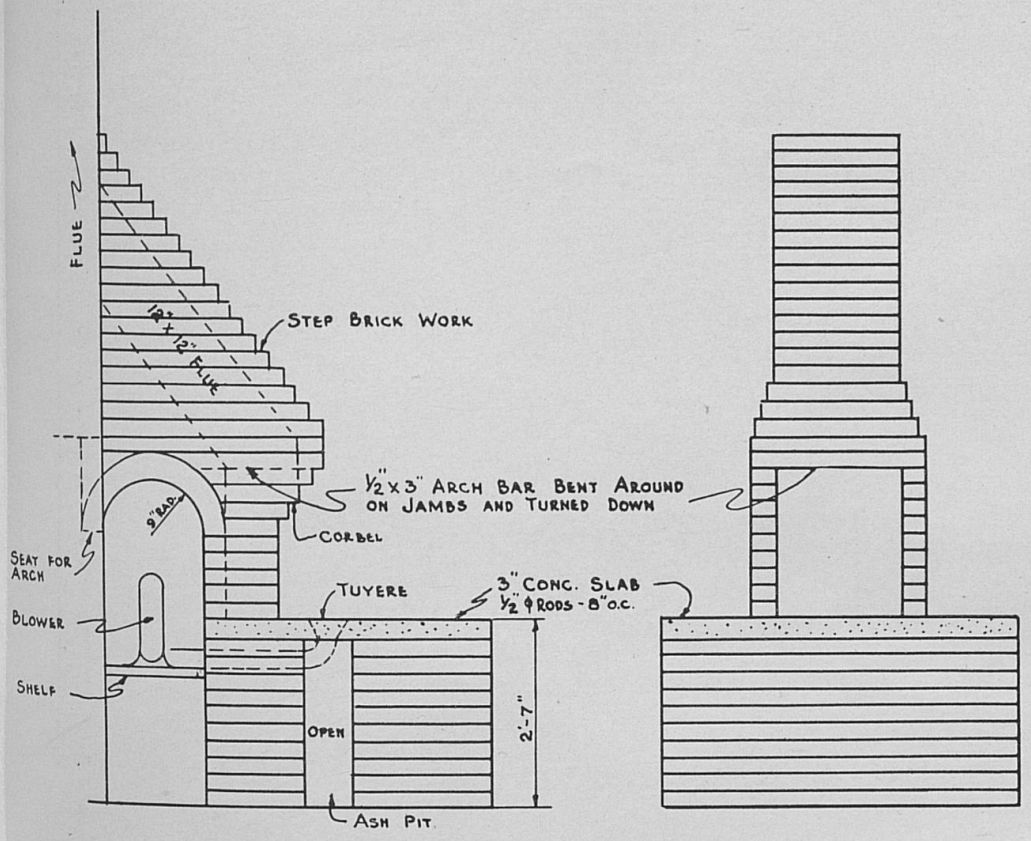
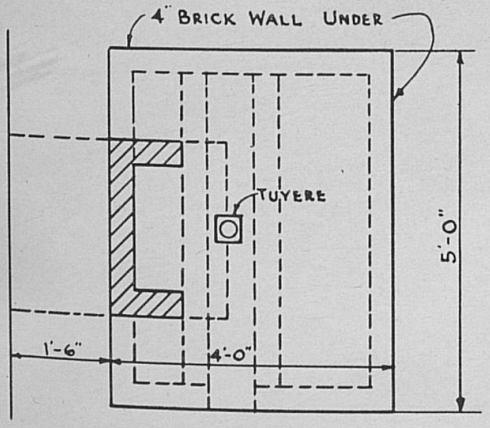


Sharpening a Crosscut Saw in the Shop



SIDE VIEW

FRONT VIEW



PLAN

BRICK FORGE

SCALE: ½" = 1'-0"

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