AN EVALUATION OF SELECTED

WOODWORKING PROJECTS

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AN EVALUATION OF SELECTED WOODWORKING PROJECTS

DISSERTATION

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CHAPTER I

INTRODUCTION

Students in industrial arts courses traditionally begin with units in woodworking, whether in college or on the secondary level. Industrial arts teachers obtain projects for these woodworking units from scattered and sometimes unrelated sources. Most of these projects have not been evaluated as to their utility in meeting the objectives of industrial arts.

Statement of the Problem

The problem is to determine the relevance of selected woodworking projects to the commonly accepted objectives of industrial arts woodworking.

Purpose of the Study

The primary purpose of the study is twofold: first, to develop a set of criteria that can be used effectively to evaluate projects that will develop in students those skills and concepts emphasized in the goals and objectives of industrial arts; and second, to evaluate these projects by using evaluative criteria developed for that purpose. After the completion of the study, a convenient source book of projects for teachers will be compiled.

The evaluative criteria are based on the objectives of industrial arts as determined by a review of the literature in industrial arts.

Background and Significance of Study

Many industrial arts teachers contend that students should be allowed to choose and design their own projects; however, there are others who have found this procedure to be unsatisfactory. They find that students have difficulty developing ideas for use in designing and planning projects that will meet the minimum requirements for fulfilling designated objectives of the course. Most teachers find it difficult to locate projects that will develop in the students the desired outcomes as stated in many of the objectives of industrial arts. The available projects come from scattered and unrelated sources and in some cases are not adequate to meet the predetermined objectives. Some of the projects found in current periodicals are of unsound design; for example, students may have difficulty in interpreting working drawings, which would subsequently result in poor construction and joinery. Therefore, there is a definite need for a source book containing superior projects covering a wide range of styles and levels of difficulty.

The "project" as used in industrial arts is frequently quite different from the meaning given to the word in some areas of general education. Rather than referring to efforts

applied to any purposeful activity, the project in industrial arts results in a concrete object (6, p. 145). The use of the project in industrial arts was introduced over fifty years ago and is a combination of three methods of instruction used in the manual training era. The Russian System of manual training which was in use from 1876 to 1913 concentrated on the exercise method to develop a definite skill. In this system there was pronounced interest in the finished product resulting from the exercise rather than in the degree of skill exhibited. The Swedish Sloyd System introduced the idea of producing a completed object which would contain certain exercises to be taught. However, the exercise method was still used to develop a skill before the project was attempted. At the same time, the arts and crafts influence was gaining momentum and emphasized good design as well as a high degree of craftsmanship. The merger of these three ideas culminated in what was called manual arts (6, pp. 145-146).

The manual arts movement eventually encompassed a much broader area to become industrial arts. The exercise method is still used in a limited way; however, the project is recognized as the vehicle or the means to teach the meaning of industry (6, p. 146).

The student usually views the project as the most important part of his industrial arts course. The only opportunity some students have to experience the pride of accomplishments in their school work is through the

completion of a project in an industrial arts course. Even if the project is poorly constructed, the student frequently takes pride in the fact that it is something he has created. The primary purposesof the project should be (1) to encourage the acquisition of certain information concerning materials, tools, and processes of industry, and (2) to develop a degree of skill in using the materials, tools, and processes of industry (6, p. 147).

The study of the tools, materials, and processes of industry takes place at several levels in the schools. The junior high school industrial arts courses are usually introductory in nature. The students are provided varied opportunities for planning and constructing simple projects. Emphasis is placed on planning the project and making proper use of the basic materials and tools (4, p. 51).

In the high school, industrial arts provides for a variety of experiences in construction, maintenance, finishing, and repair experiences with wood and wood products. Attention should be given to acquiring skill in executing the above experiences. There should be an emphasis on the use of power tools by the students, but this should depend upon the maturity of the student. Approximately twenty per cent of the class time should be spent on demonstrations and related information (4, p. 68).

Some students in high school will spend time in the woodworking laboratory further developing their skills.

Students at this level should be allowed to select an area of woodworking that is of interest to them. Some of these areas might be furniture making, cabinet making, or some other area of the woodworking industry. At this level, the design, maintenance, and manufacture of wood products should be given special attention (4, p. 76).

There has been tacit approval of the project as the primary motivating force in the teaching of industrial arts. This, plus an opportunity to participate actively in the construction process, has been a principal technique of the industrial arts teacher in stimulating students (3, p. 111).

The project is important to industrial arts and because of this importance, it would be desirable to make an intensive study of what the project means to industrial arts (3, p. 112). This undertaking would require appraisal of the relationship between the project and the objectives of industrial arts.

The project as it is used in an industrial arts laboratory is often the object of criticism. Some of this criticism is justified, particularly when the teacher does not realize the importance and the true role of the project. When the project is used strictly for display purposes or strictly for the sake of fabrication, there is reason for criticism. When used properly, the project is of extreme importance in meeting the goals of industrial arts (2, p. 111).

According to Fales and Orendorf, "Industrial arts is known best for its most distinguishing characteristic, i. e. shop work. Take this away and it will be reduced to purely an abstract subject" (2, p. 14).

Welcome Wright presented a similar point of view when he stated:

> To de-emphasize the project would be nothing more than going against a rich and most important heritage. When and if we do place less emphasis on this project, industrial arts will be nothing more than another academic course, and we will very definitely be striving for recognition as well as survival. The place and function of the project in industrial arts are most important. By means of it, industrial arts can and does offer students educational experiences that are most important, distinct, and significant (5, p. 62).

One problem that confronts every teacher is determining the latitude the student should be given in selecting and planning his project. There are several ways that this problem can be solved or minimized. One solution is for the teacher to select several projects for use in the course and require that the student work on one or more of the selected projects. Another solution is to allow the student to make any project that he pleases. The latter practice is difficult to administer and does not lend itself to organizing a concrete body of instruction around the projects. Another practice is a combination of the above. The teacher can select a series of projects that incorporate the desired concepts and skills to be taught, then alternate projects

that entail the same learning experiences can be listed under each major concept and skill. This practice allows for the different interests of the students and at the same time charts the direction of the course (2, p. 27).

In the past, the writers in the field of industrial arts were not able to completely agree on any one set of objectives (2, p. 27). Many of the objectives that were listed for industrial arts were common to other areas of general education; for example, creative thinking, good citizenship, and healthy attitudes. Even though there is no common list of objectives, there are some objectives that are common to most lists. Through an analysis of these lists of objectives, an attempt will be made to develop a set of criteria for evaluating projects for use in an instructional program.

A set of criteria based on the objectives of industrial arts will be helpful in evaluating projects. Supposedly, the projects usually found in the current literature have not been formally evaluated for their relationship to the objectives of industrial arts. The development of a set of criteria will enable the teachers to be more objective in selecting projects. Furthermore, the evaluation of the projects as conducted in this study will make it possible to compile a source book of projects for teachers.

Limitations

All the woodworking projects used by industrial arts teachers were not available. This study was limited to those that were available to the investigator.

Delimitations

For the purpose of this study, the following delimitations were imposed:

1. The study was limited to 100 projects related to the woodworking area in industrial arts. The number of projects found was so large that it would have been difficult to evaluate all of them; therefore, similar projects were eliminated. Projects that involved the same skills and processes were not duplicated.

2. To select the projects for the study, the textbooks, handbooks, and periodicals used were limited to those published after 1955.

3. To determine what the commonly accepted objectives of industrial arts are, the survey was limited to periodicals, books, and reports.

4. The members of the jury were selected from industrial arts faculties of colleges and universities.

Basic Assumptions

The design of this study was based on these assumptions:

1. Projects are desirable and necessary in teaching woodworking in industrial arts.

2. The jurors, who are nationally known industrial arts educators, maintained a high degree of objectivity in their evaluation.

Procedure for Collecting Data

In order to determine what the criteria for the project evaluation should be, a survey of the current literature in the field was made to identify the presently accepted objectives of industrial arts and from these, criteria were developed by sub-dividing the objectives to their smallest components and having each project rated to ascertain how well it would meet each particular criterion.

To select projects for use in the study, a survey of textbooks, handbooks, magazines, and other literature in the field was made to determine those projects that were commonly listed and recommended. The periodicals surveyed were the Industrial Arts and Vocational Education, School Shop, and The Industrial Arts Journal. The textbooks and handbooks surveyed were limited to those books published since 1955. Other literature surveyed included material published by Rockwell Manufacturing Company, Pittsburg, Pennsylvania, and drawings of woodworking projects that were drawn by students of the Industrial Arts Department of North Texas State University. Also, teachers in the secondary schools and colleges were asked to contribute drawings of

projects. Only those teachers known personally to the investigator were contacted.

Selection of the Jury

The members of the jury were selected from colleges and universities listed in the 1968-1969 Industrial Teacher Education Directory (1) which had one or more full-time woodworking instructors. The jurors were chosen from colleges and universities that are recognized as outstanding, and as people who are leaders in the field of industrial arts woodworking. The selection was made by consulting the staff members of the Industrial Arts Department of North Texas State University to determine what schools they considered to have a strong woodworking program and which teachers were the outstanding teachers. Thirteen college teachers were suggested. Invitations were sent to thirteen people to participate in the study as members of the jury. Of this group, ten replied that they would be willing to participate. Seven of the ten returned the completed evaluation forms.

Procedure for Treating Data

The data collected were presented in table form. The projects were divided into five groups as determined by the jurors. The divisions included projects that were considered to be suitable for junior high school, high school, junior high and high school, high school and college, and projects

suitable for all levels. The level of suitability was reported as that level assigned to a project by more than one-half of the jury members.

The ratings were based on a five-point scale using excellent, good, average, below average, and poor. A numerical value was assigned to each rating in the following manner: five for excellent, four for good, three for average, two for below average, and one for poor. When the rating scales were returned, the mean was computed for the total value of each project as evaluated by each criterion. An overall rating was assigned to each project by reporting the mean rating of all the criteria.

Space was provided for any additional comments a jury member wished to make. These comments are reported in Chapter III.

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CHAPTER II

SURVEY OF RELATED LITERATURE

The first fifty years of the twentieth century produced the most spectacular technological growth in the history of the world. Fifty-eight per cent of the people employed in industry today are working at jobs that did not exist fifty years ago (19, p. 11). The products of this half century are so numerous that it would be impossible to list an adequate representation of them here. Industrial arts is a study of this industry, its products, and its changes. If industrial arts is a study of industry, then its objectives should reflect this fact.

Historical Background

The origin of industrial education is lost in the past, but the nations of old obviously depended upon forms of industry and upon craftsmanship for economic and civil survival. The products of the forge and the field brought wealth to these nations through commerce, and provided materials for war. The fact that craftsmanship was highly developed can be inferred from the artifacts that remain to identify these early cultures. For many hundreds of years, the process of teaching and learning industrial craftsmanship was a family affair, conducted largely through the father-son

and master-apprentice relationships. That this was the case seems to be quite clear from the records of Greece, Rome, and the Middle Ages.

During the Renaissance and the Reformation, something similar to formal industrial education came into being. The guilds had given a mark of respectability to craftsmanship and craftsmanship itself had grown concurrently with economic, geographical, and scientific advancement. Luther, in his educational plans, made provision for trade education. The general outlook of humanism, in recognizing the worth of the common man, further strengthened the position of industrial education (10, p. 21).

The education reforms of the sixteenth and seventeenth centuries, in theory, provided for industrial education and in some instances actually included industrial related instruction in their programs of formal education. Rousseau's Emile was destined to become not just a carpenter, but a craftsman of high distinction who was well educated in other areas. Mulcaster's school placed emphasis upon drawing as an element of instruction (10, p. 21).

During the nineteenth century, positive gains of lasting significance were made in the utilization of the elements of industry in education. With his homespun philosophy and practical ideas about education, Pestalozzi became a center of attraction for educators in Europe and America, and his

ideas proved fruitful in the United States. Aided by money and scientific evidence, Fellenberg, Froebel, and Hebart created educational environments that advanced the early Pestalozzian gains in the United States. Their influences were a supplement to the existing apprenticeship systems, the lyceums and mechanics institutes, and the many societies of craftsmen; these influences gave sustenance to the development of some special schools in which industrial education was given new emphasis (15, pp. 152-188).

In this manner a new education emerged in America in the late nineteenth century. Into the crucible went traditional educational ideas, social needs, economic needs, patterns of educational reform, and new ideas from the Russians and the Scandinavians to form the beginnings of manual and trade education (7, pp. 28-29).

As industrial development in America proceeded to become the dominant factor in the economic life, its implications for education commanded attention. For half a century the forces of manual labor schools, lyceums, mechanics institutions and associations of craftsmen placed an emphasis on the need for industrial education. These forces operated outside the mainstream of public education. Rather than being an integral part of the general social development, they were more of a convenience. Around 1870, the situation had reached a critical state in that the needs were great but the solutions were not adequate. From 1870 to 1906

discussions and actions were focused upon the general problem of industrial education. Out of this discussion came the foundation of a new era in education (8, pp. 48-49).

One of the first leaders in the industrial education field was Calvin N. Woodward. Around 1870 Woodward established the first manual training school in St. Louis, Missouri. Woodward combined theory and practice, indicating that things studied and taught had immediate and intrinsic value and that a student could not understand a process or an experiment until he had performed it. Woodward said, "It is the best aid towards securing a wholesome intellectual culture, and it is the only means for making that culture of practical use" (36, p. 256).

According to Robert Seidel, a Swiss educator, "Our present school exists on the presumption that it is the product of our present civil society" (23, p. 4). Since the present civil society was based on industry, it was necessary to teach industry in the schools. Seidel knew of the influence of the practical Pestalozzi and of the changes in education in Germany, France, and America. He believed the change was inevitable. He believed this so strongly that he predicted as follows:

> So surely as with civil society the ideas of the culture of mankind, natural development and observation made their way into the pedogagy of the time, so surely with the new order of society will its principle, labor, achieve its citizenship in the system of education. Struggling against it is in vain.

> The future in the state as well as in pedogagy, belongs to labor (23, pp. 10-11).

Charles H. Keyes, President of the National Education Association, Department of Manual Training, in 1900 made known that he had received many letters from different parts of the country concerning the need for more public trade schools. The letter also indicated that the schools should include more business, vocational or trade instruction, without sacrificing their general cultural aims. Keyes pointed out that manual training leaders had been steadfast in their point of view that manual training was completely educational and did not have economic or utilitarian aims.

Keys urged the National Education Association and Department of Manual Training to remember that a large number of the students in the manual training schools would go into the trades and that a year or two of manual training would increase the ability and general intelligence of the students headed in that direction. Also, it was the mission of the school to help the individual discover himself, and this mission could not be achieved better than in the area of manual training (8, p. 46).

George Henry Jensen advocated industrializing manual arts. In brief, his point of view was that, "A newer conception must vitalize the work and give the boys along with their manual arts the elements of practical training for industrial pursuits" (21, p. 23). Jensen had no intention of

making factories out of the schools, but he did believe that one of the weaknesses of manual training was the lack of attention to the technical side of the subject. Students knew little about the manufacture of the tools used and less about their material value (21, p. 23).

By 1922, shopwork had made gains that were significant enough to justify it on the basis of its educational value. Maintaining the program so that it did in fact continue to contribute valuable educational experiences depended to a large extent upon evaluation of the student and on good records (7, p. 245).

About 1910 the term industrial arts began to find acceptance. The term manual arts gave an improved design concept to manual training, and industrial arts represented a further refinement of purpose and direction (7, p. 240).

The Objectives of Industrial Arts

Few groups of educators have pursued quality in their instruction as relentlessly as have the industrial arts educators. It is quite possible at any point in time, from the beginning of manual training, to document the professional activities related to the improvement of instruction. Many critics have suggested that industrial arts educators could not agree concerning either acceptable objectives or content of their program. They also said they lacked a clear-cut view of the standards to be expected of students.

Warner, in 1920, made an extensive and lengthy study of the objectives of industrial arts to determine which objectives were used during the fifty year period preceding 1928. Fifteen objectives selected were as follows:

1. Exploration
2. Educational guidance
3. Vocational guidance
4. Consumer knowledge and appreciation
5. Household mechanics
6. Social habits and attitudes
7. Pre-vocational purposes
8. Avocational purposes
9. A degree of skill
10. The seven cardinal principles
11. Mechanical intelligence
12. Correlation with other subjects
13. Developing the "Faculties"
14. Coordinating the "hand and eye"
15. Vocational training (24, p. 34)

In 1927 at the American Vocational Association convention a committee was formed to develop standards of attainment in industrial arts teaching. The committee's initial report was based on a study of those things a boy should be able to do and know at the end of the junior high school period (7, p. 181).

Further study was done on the objectives, procedures, curriculum problems, practical applications of methods and materials and other related subjects. The final report was presented in 1934. The objectives as stated in 1934 are as follows:

1. To develop in each pupil an active interest in industrial life and in the methods of production and distribution.

2. To develop in each pupil the ability to select wisely, care for, and use properly the things he buys or uses.

3. To develop in each pupil an appreciation of good workmanship and good design.

4. To develop in each pupil an attitude of pride or interest in his ability to do useful things.

5. To develop in each pupil a feeling of self-reliance and confidence in his ability to deal with people and to care for himself in an unusual or unfamiliar situation.

6. To develop in each pupil the habit of an orderly method of procedure in the performance of any task.

7. To develop in each pupil the habit of self-discipline which requires one to do a thing when it should be done, whether it is a pleasant task or not.

8. To develop in each pupil an attitude of readiness to assist others when they need help and to join in group undertakings (cooperation).

9. To develop in each pupil a thoughtful attitude in the matter of making things easy and pleasant for others.

10. To develop in each pupil a knowledge and understanding of mechanical drawing, the interpretation of the conventions in drawings and the working diagrams, and the ability to express his ideas by means of a drawing.

11. To develop in each pupil elementary skills in the use of the more common tools and machines in modifying and handling materials, and an understanding of some of the more common construction problems (6, p. 12).

The great influence resulting from the Standards of Attainment in Industrial Arts Teaching (6) was evidenced in the statement in another American Vocational Association publication which is as follows: "It is probable that no

other publication in the field of industrial arts has been used by so many teachers. Certainly none has exercised equal significance upon the progress of industrial arts in public education in this country" (5, p. 7).

By 1939 it was recommended that a revision of the standards should be made. Some of the material in the 1934 report did not appear to be applicable to the major problems of 1939. Many suggestions had been made for revision due to new material. The revision was completed in 1946.

The revised list of objectives was stated as follows:

> These purposes or assumed outcomes of industrial arts work are stated in terms of teacher attempts rather than in the usual terms of departmental or field aims. They should be considered as cumulative and unified rather than as nine distinct ends or effects.
>
> 1. Interest in industry. To develop in each pupil an active interest in industrial life and in the methods and problems of production and exchange.
>
> 2. Appreciation and use. To develop in each pupil the appreciation of good design and workmanship, and the ability to select, care for, and use industrial products wisely.
>
> 3. Self discipline and initiative. To develop in each pupil the habits of self-reliance, self discipline, and resourcefulness in meeting practical situations.
>
> 4. Cooperative attitudes. To develop in each pupil a readiness to assist others and to join happily in group undertakings.
>
> 5. Health and safety. To develop in each pupil desirable attitudes and practices with respect to health and safety.

> 6. Interest in achievement. To develop in each pupil a feeling of pride in his ability to do useful things and to develop worthy leisure time interests.
>
> 7. Orderly performance. To develop in each pupil the habit of an order, complete and efficient performance of any task.
>
> 8. Drawing and design. To develop in each pupil an understanding of drawings, and the ability to express ideas by means of drawings.
>
> 9. Shop skills and knowledge. To develop in each pupil a measure of skill in the use of common tools and machines, and an understanding of the problems involved in common types of construction and repair (5, p. 51).

Twenty thousand copies of the bulletin, Improving Instruction in Industrial Arts, were distributed, which indicates the interest of the industrial arts educators in the improvement of their programs (7 , p. 183). These statements of objectives were something tangible, a foundation for future development. A program development based on a common set of objectives could produce standards of performance and become the basis for extensive evaluation (7 , p. 183).

In 1951 another revision of the bulletin published in 1946 was made. The objectives as stated in the 1946 revision were kept but a more detailed explanation was made of each objective (4, p. 3).

In 1938 the United States Office of Education published Industrial Arts: Its Interpretation in American Schools, which contains the following objectives for industrial arts:

In the Junior High School;

1. Provides information regarding industry and workers.

2. Reveals employment opportunities offered by industry.

3. Satisfies the boy's and girl's desire to create useful things.

4. Develops hobby and handyman interests and abilities.

5. Contributes to the tastes and judgment of the prospective consumer.

6. Develops interest and ability in home repairs and maintenance.

7. Affords practice in safety related to the school, home and industry.

8. Gives opportunity for cooperative effort in groups.

9. Illustrates and vitalizes the academic subjects.

In the Senior High School;

1. Develops an appreciation of design and quality in manufactured products.

2. Provides practice in the use of materials and tools for recreation and home utilization.

3. Samples a variety of industries, through advanced school courses, in preparation for entrance as a beginner into the skilled trades or into college courses in engineering and architecture (14, pp. 41-61).

In 1948, Gorden O. Wilber formulated the following objectives of industrial arts:

1. To explore industry and American industrial civilization in terms of its organization, raw materials, processes and operations, products, and occupations.

2. To develop recreational and avocational activities in the area of constructive work.

3. To increase an appreciation for good craftsmanship and design, both in the products of modern industry and in artifacts from the material cultures of the past.

4. To increase consumer knowledge to a point where students can select, buy, use, and maintain the products of industry intelligently.

5. To provide information about and, insofar as possible, experiences in the basic processes of many industries, in order that students may be more competent to choose a future vocation.

6. To encourage creative expression in terms of industrial materials.

7. To develop desirable social relationships, such as cooperation, tolerance, leadership, and followership and tact.

8. To develop safe working practices.

9. To develop a certain amount of skill in a number of basic industrial processes (25, pp. 57-83).

Comparing the objectives that were debated in 1928 with the objectives found in some of the state and local industrial arts publications may reveal the progress, or lack of progress, that has been made on this fundamental aspect of industrial arts education.

The following list of objectives was taken from a Mississippi bulletin on industrial arts:

1. Knowledge and Industrial Procedures. To develop an interest in and an understanding of representative industrial environments through information, observation, and study of methods, materials, and processes of industrial production and distribution.

2. Consumer Knowledge or Related Information. An evolutionary improvement in the knowledge and ability of prospective consumers in reference to appreciation, selection, care, and use of all industrial materials.

3. Skills and Techniques. The development of skills and techniques in the use of common tools and machines; a working knowledge of the qualities and characteristics of the most often used materials sufficient for the purpose of fulfilling the needs of an average citizen.

4. Exploratory Opportunities. Exploring and finding values through developmental shop or laboratory type experiences, revealing student interests and aptitudes for possible vocational pursuits, leisure time activities, or the selection of other courses in school.

5. Appreciation. Experiences leading to the development of a background which permits understanding and response to such problems as appropriateness of material to use, quality of workmanship, good design, taste, and function.

6. Leisure Time Interests. To develop within the student an awareness of the variety of tasks performed in our industrial environment, and the interesting possibilities of continuing with some form of the activity as a hobby.

7. Vocational Guidance. A program of study, visual aids, and field trips to various industries, and development experiences, affording opportunities to discover individual aptitudes, abilities, and interests.

8. Handyman Activities. To develop household mechanics or handyman abilities through dexterity in the use of tools and materials in making ordinary repairs to household equipment.

9. Planning. The development of a habit of orderly procedure in planning any task intelligently.

10. Desirable Habits and Attitudes. The development of desirable personal and social values through participation in a shop type organization where desirable work habits, attitudes, and social relations are a direct outcome.

11. Pride and Interest in Accomplishment. To develop in each individual an attitude of pride and interest in his ability to do useful things and a personal responsibility for property and its care.

12. Prevocational Purposes. A sampling of industrial training undertaken in advanced school courses with the intention of acquiring further training within a specific vocation.

13. Social Economic Cooperation. To inculcate each individual with a knowledge and realization of the interdependence of people, of the need and value of social harmony and cooperation through group activities, projects, and studies.

14. Self Expression and Problem Solving Attitudes. The stimulation of creative self expression and problem solving attitudes through encouragement and opportunities to plan and construct useful articles in suitable materials.

15. Vitalization of Academic Subjects. To unify learning and enrich the academic subjects by bringing theory and practices closer together through the use of creative work in the shop (17, pp. 15-16).

In 1958 the Texas State Board of Education authorized a curriculum study that included industrial arts. The curriculum committee made its report and released it in 1959. The recommendations were to have received further study by teachers, administrators and the general public. The objectives recommended for industrial arts are as follows:

1. Interest in Industry and Appreciation and Use of Industrial Products. To develop in each pupil an active interest in industrial life and in methods of production. To develop consumer knowledge about industrial products.

2. Self-realization, Initiative, and Cooperation. To develop in each pupil desirable attitudes of citizenship pertaining to self-reliance, resourcefulness, and cooperation.

3. Interest in Craftsmanship. To develop in each pupil a feeling of pride in achievement and in the orderly performance of any task.

4. Health and Safety. To develop in each pupil desirable attitudes and practices with respect to health and safety.

5. Technical Skills and Knowledge, Drawing and Design. To develop in each pupil a measure of skill in the use of common tools and machines as applied to construction and repair, as well as an understanding of drafting and design and the ability to express ideas with drawing.

6. Application of Science, Mathematics, and Language Arts. To provide opportunities for application of science concepts and mathematics and language skills. To communicate intelligently with others.

7. Leadership. To develop the pupil's talents in leadership through participation in class and laboratory personnel systems (9 , pp. 6-7).

In 1959 Florida published a guide for industrial arts that contained the following objectives.

1. Knowledge of the overall impact of industry upon society primarily through planning, design, and production in the laboratory.

2. Development of basic skills with tools and equipment commonly used by people in solving everyday problems of home living and also development of proper and safe attitudes and habits of work with tools, equipment, and materials.

3. Development of the interest and talents or discovery of the limitations of students through instructional shopwork in a variety of materials and processes which relate to future occupational choices.

4. Development of the ability to select, use, and maintain equipment and goods produced by industry and used in everyday living, such as tools and machines, motors and engines, and electrical and household appliances.

5. Promotion of wholesome and worthwhile interests and abilities in creative and constructive work with tools and craft materials for leisure time

> and hobby activities. All activities in industrial arts classes should promote social experiences in working with others and afford opportunities to share, lead, plan, take responsibility, and cooperate in group activities (13, pp. VI-VII).

Olson, in his Technology and Industrial Arts, gave the following functions of industrial arts:

> The functions of industrial arts are statements of the purposes for which industrial arts is intended and to which it is assigned; they together become its mission. They represent a crystallization of the aims, objectives, and goals of industrial arts. About the aims, purposes, objectives and goals for industrial arts there seems to be a rather general agreement throughout the profession; disagreement arises over implementation.
>
> The functions, also called "objectives and guiding principles," used by Olson, are: The Technical Function, The Consumer, The Occupational, The Recreational, The Cultural, and The Social (20, pp. 77-78).

In Robinson's study, "Trends in Industrial Arts Teacher Education," a survey was made of teacher training institutions and the following question was raised:

> Are the AVA objectives for industrial arts sufficient for our present program? Seventy-nine of the eighty-four respondents replied to this question. Fifty-two, or sixty-six per cent agreed that the objectives were sufficient, while twenty-four, or thirty per cent, thought some changes should be made (22, p. 33).

Those people who did not agree with the AVA objectives were quite definite in their opinions on how they should be revised. The belief was expressed that objectives should not be written by any one organization, but should be written by the people who teach the subject.

Industrial arts must offer something that is distinct, different, important, and significant to the education of every boy. If it does not, it is a failure. The major objectives must make distinct contributions to general education. The objectives of industrial arts cannot be the same general objectives that could be applied equally well to social studies, physical education, home economics, art or any other subject area. To say that we do a better job with these objectives than the other subject areas is not sound reasoning (12, p. 13).

According to Feirer, industrial arts can be a distinctive part of every boy's education (12, p. 13). It can contribute something to every boy that he cannot learn in any other area. Some may claim that to be an educated person today one must understand some of the components of an industrial society.

It is the responsibility of industrial arts teachers to help the youth understand the world in which they live and to help boys and girls discover and develop their talents. The most certain way to discover their talents is to provide experiences through which these talents may appear. In gaining these experiences through using tools and materials, there should be a relationship to problem solving, otherwise the project becomes sheer busy work. Technology is the dominant element in our culture and the social complexities which it brings will be of increasing importance

in deriving industrial arts objectives. A long list of objectives for industrial arts as a whole is meaningless. If agreement can be reached concerning the objectives and emphasis to which each phase of industrial arts should be responsive, progress can be made in determining what content and activities, methods, and facilities are appropriate for each.

Hostetler believes that in a total program of industrial arts, specific objectives should be derived for the various age levels. The various grade level objectives should be supplemental to the four major objectives. These four objectives are believed to be unique to industrial arts and should be emphasized in the public school programs. They are as follows:

1. To develop in each student an insight and understanding of industry and its place in our culture.

   No student can lay claim to being an educated person unless he has some understanding of the industrial society. It is the responsibility of the schools to help each student understand the world in which he lives. While this may be done through courses in economics, sociology, and physical sciences, these courses are often taught in such a way that the student studies about these phenomena rather than actively participating in them. Industrial arts, on the other hand, when organized to give significant learning experiences, enables the student to gain insights and understanding through active participation.

2. To discover and develop talents of students in the technical fields and applied sciences.

   One of our social responsibilities is to provide opportunities for the individual to develop to his fullest. Students in our schools

represent a diversity of talents. It is the school's responsibility to help students discover and develop the talents in technical fields and applied sciences. The best way to discover talents is to provide experience situations in which the talents may appear. Industrial arts provides experiences in technical education which provides the opportunity for the discovery of technical abilities.

3. To develop technical problem-solving skills related to materials and processes.

Teaching industrial arts shopwork should begin with a problem solving approach. Man had developed tools and machines to solve his problems, to get the job done more easily and quickly. As new problems arise, new tools are designed to meet these problems. To use tools and materials in industrial arts divorced from problem solving becomes busy work. The problem-solving approach, in industrial arts, when properly directed by the teacher, leads to creative thinking, the application of principles of science and mathematics, as well as technological developments.

If we oversimplify the total task of education and agree that the central purpose of education is to enable the student to solve all of his problems (emotional, social, communicative, vocational, etc.), we would then say that the purpose of industrial arts is to provide experiences which will enable the student to solve the technical problems of living in a highly industrialized age. The experiences provided should give the student an opportunity to apply science, mathematics, and other facets of his general education to the solution of practical problems in the industrial arts shop.

4. To develop in each student a measure of skill in the use of the common tools and machines.

Skill is essential in every industrial arts program. If used properly it becomes the tool which the student uses to achieve his goals. It leads him to insights and understanding of industry, it helps him discover and develop his talents in the technical fields, and it aids in the development of problem-solving skills. If, on the other hand, it is used improperly, the student will become its slave. It becomes an end in itself, and

> a program of industrial arts interested primarily in developing manipulative skills can hardly be justified except for the slow learner.
>
> To be able to use the common hand and machine tools correctly, safely and skillfully is perhaps as important to the industrial arts student as the mastery of brush techniques is to the artist, or as the skillful use of the dissecting set and microscope is to the student of biology. In each case, skills and techniques are means to ends and not ends in themselves. However, some of these skills are important enough to teach them on purpose. Every student should be encouraged to perform every task skillfully to the best of his ability and time available. Pride in workmanship comes from a job well done (19, pp. 19-20).

Charles E. Shoemaker, Professor of Industrial Arts at State University of New York College, suggests nine objectives (1, pp. 19-33). These objectives by Shoemaker are similar in scope and content to Wilber's objectives that were previously stated.

Ericson and Seefeld list ten objectives which they say industrial arts must achieve if it is to justify itself. These objectives are

> 1. Self discovery by the pupil of his own abilities and aptitudes, leading toward maturing life interests.
>
> 2. Satisfying experience in self expression through creative effort leading to material accomplishments.
>
> 3. Understanding of industry and methods of production and of the influence of industrial products and services upon the pattern of modern social and economic life.
>
> 4. Appreciation of good design and good workmanship in their application to construction and to manufactured products.
>
> 5. Judgment and resourcefulness in selection, purchase, use and care of industrial products and services both in the home and in occupational life.

6. Ability to use tools and materials leading to household maintenance, leisure time pursuits, and in some degree to basic occupational skills.

7. Ability to read and make sketches and drawings used for illustrative and construction purposes, including the ability to read graphic and technical illustrations in books and magazines.

8. Development of maturing work habits, feeling of responsibility, and ability to plan and execute work alone and in cooperation with others.

9. Basic experience in the use of tools, machines, and materials of value in carrying on future educational and professional work in scientific and technological levels.

10. Development of safety habits and fundamental safety consciousness not only in the school but in the home and in future occupational lives (11, pp. 260-261).

Any fundamental consideration of objectives for industrial arts is fundamental only as it is based on a rather clear understanding of the kind of person needed for refining, advancing, and strengthening of the American way of life. The objectives must contribute to the individual's understanding of the culture in which he is growing, developing, and serving. They should enable him to gain a clear view of his own capacities as a human and charge him with a faith in human potential so that he can find increasing meaning for his own life as he interacts with his environment.

Industrial arts should endeavor to develop an understauding of the influences of technology on culture and assist the individual in finding and developing his own capacities for improving the culture. A person can best understand the technology when he becomes a part of it.

Most lengthy lists of objectives contain few objectives that are unique to industrial arts alone, but they are all quite similar in many ways. One might ask whether such statements show concern for the development of the total of industrial arts and of the total of the student. Such statements seem to imply an inanimate quality about industrial arts, so much so that neither the teacher nor the pupil can get very excited about it. There is not enough of a challenge in most lists of objectives to stimulate or inspire a teacher for his lifetime (20, p. 163).

Such statements of purposes do not lead to understanding technology and the role of the human being in it. They lead nowhere except to a dead-end street. Industrial arts teachers need statements of objectives that lead them along a broad avenue of human experience to a full view of technology (11, p. 163).

In a study reported in Improving Industrial Arts Teaching, a publication of the Office of Education, the objectives that received the highest degree of emphasis by both principals and teachers in public schools across the nation were: (1) to develop in each student a measure of skill in the use of common tools and machines; (2) to discover and develop creative technical talents in students; (3) develop problem-solving skills; and (4) provide all round technical knowledge and skills. The objective of developing an understanding of our technical culture, ranked higher among teachers than among principals (19, pp. 6-8).

The National Defense Education Act, Title III Guidelines, recommends objectives for industrial arts that are very similar to Hostetler's four objectives. These objectives were originally to be used to determine if the money available for industrial arts could be used for certain items (18, p. 35).

With the objectives of the past in mind, industrial arts teachers have a better perspective of the objectives that are the generally accepted objectives of today.

Criteria for Developing Objectives

According to the thinking of the leaders in the field, industrial arts should first stress overall objectives for industrial arts and these objectives should be unique to industrial arts. In developing any set of objectives there are certain considerations that must be met.

After the major objectives have been identified and there has been a consensus among the people involved, then the following ideas can be considered. These suggestions are to be considered as guidelines to follow in the preparation of objectives.

First, the objectives of industrial arts must contribute to and grow from the objectives of education. It seems essential that a strategy be developed whereby the contributions of education are identified and used as a guide in the development of the schools. Once such a statement has

been developed, each discipline could develop its objectives so that they in some way contribute to the total objectives of the school.

A second consideration should be the development of a heirarchy of objectives. It would be helpful to have a precise understanding as to the relative position of each of the objectives in our schools. The heirarchy should range from the overall objectives of our democratic society down to individual objectives of each structured activity that is used in the school.

Third, two types of evaluation should be considered when studying the objectives of industrial arts. An internal evaluation to determine if the objective has been accomplished as stated and an external evaluation to determine if there is any significant difference between the students enrolled in industrial arts classes and those students who have not been involved.

Fourth, educational objectives should be stated in terms of the types of change expected in a learner at the conclusion of instruction. Any objective, to be meaningful, should communicate the teacher's instructional intent. Mager says, "A statement of an objective describes a desired state in the learner. We also know that we have successfully achieved our objective when the learner can demonstrate his arrival at this state" (16, p. 10).

The fifth consideration in developing objectives is to be aware that objectives may be classified as to the different levels of expectations that are possible during the process of instruction. A taxonomy is an attempt to classify the behavior of students, the way individuals are to act, think, or feel as the result of some unit of instruction.

Sixth, and last, the objective must give a precise indication of how well the learner is expected to meet the specified objective. Mager states, "If we can specify at least the minimum accepted for each objective we will have a performance standard against which to test our instruction progress; we will have a means for determining whether our programs are successful in achieving our instructional intent" (16, p. 44).

Other more specific items might be suggested but, if the preceeding considerations are given thought as the objectives are being developed, then the statements of objectives will be reorganized and in order of their relative importance. They will be written in terms of expected behavior, classified as to the type of understanding required, and the criteria of accepted performance precisely and clearly stated. Objectives stated this way can be subjected to rigorous examination and should result in findings that will be useful as guidelines in evaluating the existing program and in developing new programs for industrial arts (2, p. 34).

In the past, many statements of objectives have been made. With these guidelines in mind, one can take a more objective view of the most recent objectives. At a time when new discoveries and developments in technology and the sciences are making the lag in education even greater, developing objectives for industrial arts needs real thinking and reasoning.

Many of the objectives and goals of industrial arts in the past were either repetitious or geared to the popular theories of the psychology of the time. The result of this thinking was that the program and its justification were open to criticism when such theories were either generally abandoned or simply discarded in favor of newer or more exciting theories of the learning process.

An analysis of industrial arts goals developed in the past reveals that many of the goals were unrealistic and untenable; others controversial. To provide a sound program of industrial arts, clear, realistic goals are essential. The following five are advocated by the American Vocational Association and are believed to be unique to industrial arts:

1. Develop an insight and understanding of industry and its place in our culture.

2. Discover and develop talents, aptitudes, interests and potentialities of individuals for the technical pursuits and applied sciences.

3. Develop an understanding of industrial processes and the practical application of scientific principles.

4. Develop basic skills in the proper use of common industrial tools, machines, and processes.

5. Develop problem-solving and creative abilities involving the materials, processes and products of industry (3, pp. 9-11).

Summary

The objectives, as developed by the American Vocational Association, are a refinement of the objectives of the past. The first objective develops an insight and understanding of industry and its place in our culture. This objective was implied by Robert Seidel when he said, "Our present school exists on the presumption that it is the product of our present civil society" (23, p. 4). In Warner's study (24, p. 34) this objective can be found by combining several objectives: exploration, consumer knowledge or appreciation, and prevocational purposes. The objectives of the American Vocational Association in 1934 list an objective that is very similar: "To develop in each pupil an active interest in industrial life and in the method of production and distribution" (6, p. 12). An objective of very similar wording was used by the American Vocational Association in 1946 (5, p. 51), Gorden O. Wilber in 1948 (25, pp. 57-83), a Texas bulletin, Report Number Thirteen (9, pp. 6-7), and by Hostetler (19, pp. 19-20).

The second objective, discover and develop talents, aptitudes, interests, and potentialities of individuals for technical pursuits and applied sciences, was advocated by

George Henry Jenson in his belief that manual training should concentrate more on the technical side of the subject (21, p. 23). One of Olson's functions of industrial arts was the technical function (20, pp. 77-78). Hostetler's second objective, "To discover and develop talents of students in the technical fields and applied sciences" (19, pp. 19-20), is very similar to the American Vocational Association's second objective.

The American Vocational Association's third objective, develop understanding of industrial processes and the practical application of scientific principles, was implied by Woodward (26, p. 256). Woodward combined theory and practice to develop understanding of processes and the practical application of principles. Keys implied this when he was encouraging the establishment of more manual training schools (8, p. 46). The objective can be found in Wilber's list of objectives (25, pp. 57-83). The first objective of the Mississippi school bulletin, Industrial Arts for Mississippi High Schools Grades 7-12, is similar in scope (17, pp. 15-16). The first and sixth objectives of the Texas Curriculum Studies, Report Number Thirteen (9, pp. 7-8), are similar in content to the third objective of the American Vocational Association. The third objective by Ericson and Seefeld is similar in scope to the third objective of the American Vocational Association (11, pp. 260-261).

The fourth objective of the American Vocational Association, develop basic skills in the proper use of common industrial tools, machines, and processes, is common to most lists of objectives. This objective or one very similar to it is advocated by Warner (24, p. 34); the American Vocational Association's 1934 list of objectives (6, p. 12); and their 1946 list (5, p. 51). It was also advocated in the Office of Education publication, Industrial Arts: Its Interpretation in American Schools; by Wilber (25, pp. 57-83); in a Mississippi bulletin on industrial arts (17, pp. 15-16); in the Texas bulletin, Report Number Thirteen (9, pp. 6-7); by Hostetler (19 pp. 19-20); and by Ericson and Seefeld (11, pp. 260-261).

The fifth objective of the American Vocational Association, develop problem-solving and creative abilities involving the materials, processes, and products of industry, is either quite clearly stated or implied in several other lists of objectives. The fifth objective of the 1934 report of the American Vocational Association (6, p. 12), and the third objective of the American Vocational Association's 1946 report (5, p. 51) implies this same concept. Wilber's sixth objective (25, pp. 57-83) is also similar. The fourteenth objective of the Mississippi bulletin, Industrial Arts for Mississippi High Schools, Grades 7-12 (17, pp. 15-16), is quite similar to the fifth objective of the American Vocational Association. Hostetler's third objective (19, pp. 19-20)

is almost identical to the fifth objective of the American Vocational Association. Ericson and Seefeld's fifth and eighth objectives combined involve a similar concept (11, p. 261).

These five objectives of the American Vocational Association are not new to industrial arts. They are quite common to many lists of objectives of the past. These objectives appear to meet the expectations of the writers in the field of industrial arts. They are short, concise statements that are unique to the field of industrial arts. In light of the objectives of the past, most of the people in the field of industrial arts should agree that these are indeed worthwhile objectives. They definitely contribute to the objectives of education. They are part of a hierarchy of objectives. They are the objectives for the overall program of industrial arts and are not intended to be the objectives for the overall school program. The objectives are stated in terms of the types of change expected in a learner at the conclusion of instruction. The objectives do not give a precise indication of how well the learner is expected to meet the specified objective. They do give some indication of this, but it is somewhat vague.

Overall, these objectives seem to meet the majority of the criteria set by writers in the field of industrial arts. All industrial arts teachers should scrutinize these objectives quite closely and try to improve them as has been done with objectives in the past.

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CHAPTER III

AN EVALUATION OF ONE HUNDRED SELECTED WOODWORKING PROJECTS

The projects selected for the study came from textbooks, handbooks, periodicals, and other literature in the field. Some of the projects were drawn and designed by students in the North Texas State University Industrial Arts Drafting courses, while other projects were submitted by teachers of industrial arts.

Two hundred and eighty-seven drawings of projects were found through this survey. Some of the projects were very similar. Those that were quite similar were eliminated. To determine which projects to use for the evaluation, the instrument that was developed for the project evaluation was applied to the remaining projects. One Hundred selected projects and rating scales were sent to ten jurors.

Development of Criteria

A rating scale was developed, based on the generally accepted objectives that are unique to industrial arts, in the following manner.

In Chapter II it was established that the five objectives of the American Vocational Association (2, pp. 9-11) are

unique to industrial arts and meet the criteria set by some writers in the field of industrial arts (1, pp. 31-34). These are generally accepted to be the broad concepts that should be taught in the industrial arts classes. Since these objectives depict the broad concepts to be taught, the students in the industrial arts woodworking classes should use projects involving the concepts to be developed. To determine if the projects involved the concepts necessary for the students to develop, these objectives were used as a basis for developing the evaluative criteria.

The first objective, "Develops an insight and understanding of industry and its place in our culture" (2, p. 9), involved two basic concepts. This objective was sub-divided into two parts. One concept emphasized the development of an insight into the processes of industry and the second pertained to developing an understanding of industry and its place in our culture. These concepts were used for the first and second criteria.

The second objective, "Discovers and develops talents, aptitudes, interests, and potentialities of individuals for the technical pursuits and applied sciences" (2, p. 9), involved two basic concepts. These are to help discover and develop talents in the technical fields, and to help discover and develop talents in the applied sciences. These parts were used for the third and fourth criteria.

The third objective, "Develops an understanding of industrial processes and the practical application of scientific principles" (2, p. 10), involved some similarity to the fifth objective. The part of the objective pertaining to industrial processes was removed and the remainder was used for the seventh criterion.

The fourth objective, "Develop a basic skill in the proper use of common industrial tools, machines, and processes" (2, pp. 10-11), involved one basic concept, develops a basic skill. The proper use of industrial processes is similar to the concept implied in the fifth objective, so this part was not used. The sixth criterion depicts the development of basic skills in the use of common tools and common machines, and was developed from the remainder of the fourth objective.

The fifth objective, "Develops problem solving skills and creative abilities involving the materials, processes and products of industry" (2, p. 11), was subdivided into one major part and three minor parts. These parts were developed into the fifth criterion. The fifth criterion was stated as follows: develops technical problem solving skills related to materials of industry, processes of industry, and products of industry.

The five objectives, having been subdivided in this manner, became the seven criteria used to evaluate the one hundred selected projects.

The seven criteria were placed on an instrument for use in evaluating projects and the instrument is as follows:

LEVEL OF SUITABILITY: ___Jr. Hi. ___H.S. ___College
The ratings will be based on your selected level of suitability.

Criteria for Determining Suitability of Projects	Excellent	Good	Average	Below Avg.	Poor
1. Develops an insight into the processes of industry.	___	___	___	___	___
2. Develops an understanding of industry and its place in our culture.	___	___	___	___	___
3. Helps discover and develop talents in the technical fields.	___	___	___	___	___
4. Helps discover and develop talents in the applied sciences.	___	___	___	___	___
5. Develops technical problem solving skills related to:					
A. Materials of industry	___	___	___	___	___
B. Processes of industry	___	___	___	___	___
C. Products of industry	___	___	___	___	___
6. Develops basic skill in the use of:					
A. Common tools	___	___	___	___	___
B. Common machines	___	___	___	___	___
7. Develops an understanding of the practical application of scientific principles.	___	___	___	___	___

Comments:

Fig. 1--Instrument Developed for Evaluating Projects

The jurors were asked to evaluate each project on the criteria designed to ascertain the extent to which it was suitable for use in achieving each stated objective. The rating scale developed was a five-point rating scale: excellent (abbreviated "E"), good (abbreviated "G"), average (abbreviated "A"), below average (abbreviated "BA"), and poor (abbreviated "P"). The five objectives were sub-divided into ten parts and the jurors were asked to rate the project drawings based on each part of the objective. On each rating scale a space was provided for comments by the jurors. Also, each juror was asked to rate each project for its level of suitability for use at the junior high, high school, college, or some combination.

To maintain uniformity in interpretation of the rating terms, a letter of explanation was sent to each jury member. The term "excellent" was construed to mean that the project met the criteria to a superior degree, the term "good" was interpreted to mean that the project met the criteria to a high degree, the term "average" indicated that the project basically met the criteria, the term "below average" was interpreted to mean that the project met the criteria in part, but was lacking in some respect, while the term "poor" was construed to mean that the project did not lend itself to involve even the basic concept of the criteria (3, p. 24).

When the rating scales were returned, they were tabulated on a common scale and assigned a point rating from one to five, and the means were computed. This gave a rating

for the project drawings based on each criterion as well as an overall rating.

Evaluation of Junior High School Projects

Table I gives the summary of the evaluation of the thirty-one projects rated to identify their suitability for the junior high school level. Drawings of these projects can be found in Appendix A.

Each criterion is restated, and the rating assigned by the jurors of the projects are as follows:

1. The project should help to develop an insight into the processes of industry. Twenty-four projects were rated average and seven below average.

2. The project should help to develop an understanding of industry and its place in our culture. Fourteen projects were rated average and seventeen below average.

3. The project should help discover and develop talents in the technical fields. Twenty-two projects were rated average, while nine projects were rated below average.

4. The project should help discover and develop talents in the applied sciences. Twelve of the projects were rated average and nineteen were rated below average.

5. The project should help to develop technical problem-solving skills related to materials, processes, and products of industry. There were twenty-six projects rated average and five projects rated below average.

TABLE I

DATA CONCERNING THE SUITABILITY OF THIRTY-ONE PROJECTS FOR USE AT THE JUNIOR HIGH SCHOOL LEVEL

Project and Number	Criteria: Develops Insight into Processes of Industry					Develops Understanding of Industry in our Culture					Discover and Develop Talents in Technical Fields					Discover and Develop Talents in Applied Sciences				
	Rating of Each Project																			
	E	G	A	BA	P	E	G	A	BA	P	E	G	A	BA	P	E	G	A	BA	P
2. Napkin Holder			X						X				X						X	
3. Book Rack			X						X				X					X		
4. Nut Scoop			X						X				X					X		
5. Gun Rack			X					X					X					X		
6. Scoop			X					X					X					X		
7. Memo Pad			X					X					X					X		
8. Kindling Box				X					X					X					X	
9. String Box			X					X					X						X	
10. Napkin Holder			X					X					X						X	
11. Match Box			X						X				X						X	
12. Tool Box			X					X					X					X		
13. Shoe Stand			X						X				X					X		
14. Step Stool				X				X						X					X	
15. Phone Stand			X					X					X					X		
16. Serving Tray			X					X						X				X		
17. Fork Box				X					X				X						X	
18. Planter			X					X					X					X		
19. Serving Tray			X						X					X					X	
20. Cutting Board			X						X				X						X	
21. Candle Holder			X					X					X					X		
22. Knife Holder			X						X					X					X	
23. Shine Box				X					X				X						X	
24. Child's Stool				X					X					X					X	
25. Step Stool			X						X					X					X	
26. Spice Rack			X						X					X					X	
27. Spoon Rack			X					X					X						X	
28. Secretary			X					X					X					X		
29. Step Stool			X						X				X						X	
30. Clip Board				X					X					X					X	
31. Magazine Rack				X					X				X						X	
32. Magazine Rack			X					X					X						X	

TABLE I--Continued

Criteria															
Develops Problem Solving Skills					Develops Skills Using Common Tools and Machines					Develops Understanding of Practical Application of Principles					
Rating of Each Project															
E	G	A	BA	P	E	G	A	BA	P	E	G	A	BA	P	Overall Rating
		X					X						X		Average
		X					X						X		Average
		X					X					X			Average
		X					X						X		Average
		X					X						X		Average
		X					X					X			Average
			X					X					X		Below Average
		X					X						X		Average
		X					X						X		Average
		X					X						X		Average
		X					X					X			Average
		X					X						X		Average
			X				X						X		Below Average
		X					X					X			Average
		X					X						X		Average
		X					X						X		Average
		X					X					X			Average
		X					X						X		Average
		X					X						X		Average
		X					X					X			Average
		X					X						X		Average
		X					X						X		Below Average
			X				X						X		Below Average
			X				X						X		Below Average
		X					X						X		Average
		X					X						X		Average
		X					X						X		Average
		X					X					X			Below Average
			X				Y						X		Below Average
		X					X						X		Average
		X					X						X		Average

6. The project should help to develop basic skill in the use of common tools and machines. Thirty projects were rated average and one project was rated below average.

7. The project should help to develop an understanding of the practical application of principles. Eight projects were rated average and twenty-three were rated below average.

In the overall rating, twenty-four projects were average, while seven were rated below average. There were no projects that were rated poor, good, or excellent.

Evaluation of Junior High-High School Projects

Table II summarizes the twenty-three project evaluations that are rated suitable for the junior high-high school level. Drawings of these projects can be found in Appendix B. The summary of ratings for the individual project drawings based on each criterion and an overall rating is indicated in Table II.

Each criterion is restated, and the rating assigned by the jurors are as follows:

1. The project should help to develop an insight into the processes of industry. Eighteen projects were rated average and five projects were rated below average.

2. The project should help to develop an understanding of industry and its place in our culture. Thirteen projects were rated average and ten were rated below average.

TABLE II

DATA CONCERNING THE SUITABILITY OF TWENTY-THREE PROJECTS FOR USE AT THE JUNIOR HIGH SCHOOL-HIGH SCHOOL LEVEL

Project and Number	Criteria: Develops Insight into Processes of Industry					Develops Understanding of Industry in our Culture					Discover and Develop Talents in Technical Fields					Discover and Develop Talents in Applied Sciences				
	Rating of Each Project																			
	E	G	A	BA	P	E	G	A	BA	P	E	G	A	BA	P	E	G	A	BA	P
33. Jewel Box			X					X					X					X		
34. Book Ends				X					X				X						X	
35. Wall Shelf			X					X					X					X		
36. Gun Rack			X					X					X						X	
37. Pipe Rack			X					X					X						X	
38. Cutting Block				X					X					X					X	
39. Candlestick			X						X				X						X	
40. Drafting Kit			X					X					X					X		
41. Plate Rack			X					X					X					X		
42. Mirror Shelf			X						X					X					X	
43. Secretary				X					X						X				X	
44. Bud Vase			X						X				X						X	
45. Pine Planter			X						X				X						X	
46. Wall Chest			X					X					X						X	
47. Spice Rack			X						X				X					X		
48. Plate Rack			X					X					X					X		
49. Valet				X				X					X						X	
50. Night Table				X					X					X					X	
51. Vanity Table			X					X					X					X		
52. Planter Table			X					X					X					X		
53. Wall Shelf			X					X					X					X		
54. End Table			X					X						X					X	
55. Wash Stand			X						X			X						X		

TABLE II--Continued

Criteria															
Develops Insight into Processes of Industry					Develops Skills Using Common Tools and Machines					Develops Understanding of Practical Application of Principles					
Rating of Each Project															
E	G	A	BA	P	E	G	A	BA	P	E	G	A	BA	P	Overall Rating
		X					X					X			Average
		X					X						X		Average
		X					X					X			Average
		X					X					X			Average
		X					X						X		Average
		X					X						X		Below Average
		X					X						X		Average
		X				X						X			Average
		X					X						X		Average
			X					X					X		Below Average
			X				X						X		Below Average
		X					X						X		Average
		X					X						X		Average
		X					X						X		Average
		X					X					X			Average
		X					X					X			Average
		X					X					X			Average
			X				X						X		Below Average
		X					X					X			Average
		X					X						X		Average
		X					X					X			Average
		X					X						X		Average
		X					X					X			Average

3. The project should help discover and develop talents in the technical fields. One project was rated good, seventeen projects were rated average, four projects were rated below average, and one project was rated poor.

4. The project should help discover and develop talents in the applied sciences. Ten projects were rated average; thirteen were rated below average.

5. The project should help to develop technical problem solving skills related to materials, processes, and products of industry. There were twenty projects rated average; three projects were rated below average.

6. The project should help to develop basic skill in the use of common tools and machines. One project was rated good, twenty-one projects were rated average, and one project was rated below average.

7. The project should help to develop an understanding of the practical application of principles. Ten projects were rated average; thirteen were rated below average.

In the overall rating, nineteen projects were rated average and four projects were rated below average. There were no projects that were rated poor, good, or excellent in the overall rating.

Evaluation of High School Projects

Table III summarizes the four project evaluations that were rated suitable for the high school level. Drawings

of these projects can be found in Appendix C. In Table III is shown the summary of ratings for the project drawings based on each criterion and an overall rating.

Each criterion is restated, and the ratings assigned by the jurors of each project are as follows:

1. The project should help to develop an insight into the processes of industry. Three projects were rated average; one project was rated below average.

2. The project should help develop an understanding of industry and its place in our culture. Three projects were rated average; one project was rated below average.

3. The projects should help to discover and develop talents in the technical fields. Three projects were rated average; one project was rated below average.

4. The project should help discover and develop talents in the applied sciences. Two projects were rated average and two projects were rated below average.

5. The project should help to develop technical problem solving skills related to materials, processes, and products of industry. One project was rated good; three projects received an average rating.

6. The project should help to develop basic skill in the use of common tools and machines. One project was rated good and three projects were rated average.

7. The project should help to develop an understanding of the practical applications of principles. Two projects

TABLE III

DATA CONCERNING THE SUITABILITY OF FOUR PROJECTS FOR USE AT THE HIGH SCHOOL LEVEL

Project and Number	Criteria: Develops Insight into Processes of Industry					Develops Understanding of Industry in our Culture					Discover and Develop Talents in Technical Fields					Discover and Develop Talents in Applied Sciences				
	Rating of Each Project																			
	E	G	A	BA	P	E	G	A	BA	P	E	G	A	BA	P	E	G	A	BA	P
56. Dresser Chest			X					X					X						X	
57. Spice Cabinet			X					X					X						X	
58. Cobbler's Bench			X					X					X					X		
59. Cedar Chest				X					X					X				X		

TABLE III--Continued

Criteria															
Develops Insight into Processes of Industry					Develops Skills Using Common Tools and Machines					Develops Understanding of Practical Application of Principles					
Rating of Each Project															
E	G	A	BA	P	E	G	A	BA	P	E	G	A	BA	P	Overall Rating
		X					X						X		Average
	X					X						X			Average
	X						X						X		Average
		X					X						X		Average

were rated average and two projects received a rating of below average.

In the overall rating, all four of the projects received a rating of average. There were no projects that received a rating of excellent, good, below average, or poor.

Evaluation of High School-College Projects

Table IV gives the summary of the thirty-nine project evaluations that were rated suitable for the high school-college level. The drawings of these projects can be found in Appendix D. In Table IV is shown the summary of ratings for the project drawings based on each criterion and an overall rating.

Each criterion is restated and the rating assigned by the jurors of the projects are as follows:

1. The project should help to develop an insight into the processes of industry. Twenty-seven projects were rated good; twelve projects were rated below average.

2. The project should help to develop an understanding of industry and its place in our culture. Sixteen projects were rated good, twenty-one projects were rated average, and two were rated below average.

3. The project should help to discover and develop talents in the technical fields. Two projects were rated excellent, twenty-three were rated good, and fourteen were rated average.

TABLE IV

DATA CONCERNING THE SUITABILITY OF THIRTY-NINE PROJECTS FOR USE AT THE HIGH SCHOOL-COLLEGE LEVEL

Project and Number	Criteria: Develops Insight into Processes of Industry					Develops Understanding of Industry in our Culture					Discover and Develop Talents in Technical Fields					Discover and Develop Talents in Applied Sciences				
	Rating of Each Project																			
	E	G	A	BA	P	E	G	A	BA	P	E	G	A	BA	P	E	G	A	BA	P
60. Stereo Cabinet		X						X				X					X			
61. Display Cabinet			X					X					X					X		
62. Night Table			X					X					X					X		
63. Table		X						X				X						X		
64. Spice Rack			X					X					X					X		
65. End Table		X						X					X					X		
66. Chest		X						X					X					X		
67. Cedar Chest			X					X				X						X		
68. Coffee Table		X					X					X						X		
69. Night Stand		X						X				X						X		
70. Stereo Cabinet		X					X					X					X			
71. Serving Cart		X					X					X						X		
72. Lady's Desk		X					X					X						X		
73. Office Desk			X					X					X					X		
74. Hutch		X						X					X					X		
75. Student Desk			X					X				X						X		
76. Bar Bed		X						X					X					X		
77. Triple Dresser		X						X				X						X		
78. Corner Hutch		X					X					X					X			
79. Desk		X					X					X					X			
80. Slant Desk		X					X					X					X			
81. Stereo Cabinet		X					X				X						X			

TABLE IV--Continued

Criteria															
Develops Problem Solving Skills						Develops Skills Using Common Tools and Machines					Develops Understanding of Practical Application of Principles					
Rating of Each Project																
E	G	A	BA	P		E	G	A	BA	P		E	G	A	BA	P	Overall Rating
	X					X								X			Good
		X						X						X			Average
		X					X							X			Average
	X						X							X			Good
		X					X							X			Average
	X						X							X			Good
	X							X						X			Average
		X					X							X			Average
	X						X							X			Good
	X						X							X			Good
	X						X						X				Good
		X						X						X			Good
	X						X							X			Good
	X						X							X			Good
	X						X							X			Good
	X						X						X				Good
	X						X							X			Good
	X					X							X				Good
	X						X							X			Good
	X						X							X			Good
X						X							X				Good

TABLE IV--Continued

Project and Number	Criteria: Develops Insight into Processes of Industry					Develops Understanding of Industry in our Culture					Discover and Develop Talents in Technical Fields					Discover and Develop Talents in Applied Sciences				
	Rating of Each Project																			
	E	G	A	BA	P	E	G	A	BA	P	E	G	A	BA	P	E	G	A	BA	P
82. Desk			X					X					X					X		
83. Dry Sink			X						X			X						X		
84. Chest		X					X				X						X			
85. Dry Sink			X					X					X					X		
86. Commode			X					X				X						X		
87. Clock		X					X					X					X			
88. Hutch		X					X					X						X		
89. Stereo Cabinet		X					X					X					X			
90. Modern Desk		X					X					X					X			
91. Chest		X						X					X					X		
92. Gun Cabinet			X					X					X					X		
93. Modern Cabinet		X							X				X					X		
94. Boston Rocker		X					X					X					X			
95. Chest		X						X					X					X		
96. Captain's Chair		X					X					X					X			
97. China Cabinet			X					X				X						X		
98. China Cabinet		X					X					X					X			

TABLE IV--Continued

Criteria															
Develops Problem Solving Skills					Develops Skills Using Common Tools and Machines					Develops Understanding of Practical Application of Principles					
Rating of Each Project															
E	G	A	BA	P	E	G	A	BA	P	E	G	A	BA	P	Overall Rating
	X					X						X			Good
	X					X						X			Average
X					X						X				Good
	X					X						X			Good
	X					X						X			Good
	X					X						X			Good
	X					X						X			Good
	X					X						X			Good
	X					X						X			Good
	X					X					X				Good
	X					X						X			Good
	X						X					X			Average
	X				X						X				Good
	X					X						X			Good
	X					X					X				Good
	X					X						X			Good
	X					X					X				Good

4. The project should help to discover and develop talents in the applied sciences. Thirteen projects were rated good and twenty-six were rated average.

5. The project should help to develop technical problem solving skills related to materials, processes, and products of industry. There were two projects rated excellent, thirty-one projects rated good, and six rated average.

6. The project should help to develop basic skill in the use of common tools and machines. Five projects were rated excellent, thirty projects received a rating of good, and four projects were rated average.

7. The project should help to develop an understanding of the practical application of principles. Nine projects were rated good, twenty-nine projects were rated average, and one project was rated below average.

In the overall rating, thirty-two projects received a rating of good and seven projects received a rating of average. There were no projects rated excellent, below average, or poor in the overall rating.

Evaluation of Junior High School-High School-College Projects

Table V gives the summary of the project evaluations that were rated suitable for the junior high-high school-college level. The drawings of these projects can be found

TABLE V

DATA CONCERNING THE SUITABILITY OF THREE PROJECTS FOR USE AT THE JUNIOR HIGH SCHOOL-HIGH SCHOOL-COLLEGE LEVEL

Project and Number	Criteria																				
	Develops Insight into Processes of Industry					Develops Understanding of Industry in our Culture					Discover and Develop Talents in Technical Fields					Discover and Develop Talents in Applied Sciences				
	Rating of Each Project																			
	E	G	A	BA	P	E	G	A	BA	P	E	G	A	BA	P	E	G	A	BA	P
99. Mint Dish			X						X				X						X	
100. Coffee Table			X					X					X						X	
101. Water Ski			X					X					X					X		

TABLE V--Continued

Criteria															
Develops Problem Solving Skills					Develops Skills Using Common Tools and Machines					Develops Understanding of Practical Application of Principles					
Rating of Each Project															
E	G	A	BA	P	E	G	A	BA	P	E	G	A	BA	P	Overall Rating
		X					X					X			Average
		X				X						X			Average
		X					X					X			Average

in Appendix E. In Table V is shown the summary of ratings for the project drawings based on the criteria and an overall rating.

Each criterion is restated, and the rating assigned by the jurors of the projects are as follows:

1. The project should help to develop an insight into the processes of industry. Three projects were rated average. There were no projects under any other rating.

2. The project should help to develop an understanding of industry and its place in our culture. Two projects were rated average and one project was rated below average.

3. The project should help to discover and develop talents in the technical fields. Three projects were rated average. There were no projects under any other rating.

4. The project should help to discover and develop talents in the applied sciences. One project was rated average and two projects were rated below average.

5. The project should help to develop technical problem solving skills related to materials, processes, and products of industry. Three projects were rated average. There were no projects under any other rating.

6. The project should help to develop basic skill in the use of common tools and machines. One project was rated good and two projects were rated average.

7. The project should help to develop an understanding of the practical application of principles. Three projects were rated average. There were no projects under any other rating.

In the overall rating, three projects were rated average. There were no projects that were rated excellent, good, below average, or poor.

On the project rating scales sent to the jurors, a space was provided for any additional comments the jurors wished to make. Comments were made on several of the projects.

One juror indicated that if busy work was the objective, project number three was a good project. One juror commented that project number seven was of no practical use, project number ten did not meet modern needs, and number eleven was good to help teach the organization and care of tools. Other comments were that projects number six, thirteen, thirty-two, forty-eight, fifty-five, fifty-eight, sixty-six, and ninety-four were of poor design. One juror indicated project number forty-two should be eliminated. The remainder of the projects did not receive specific comments.

Some of the jurors felt that additional comments on the projects were warranted. One of the jurors was quite critical of the selection of some of the projects involved in the study. He felt that many of the projects were poorly designed and that some were so old that they would not be

used as furnishings in the homes of today. These impressions were reflected in the ratings this juror assigned to many of the projects.

Another juror felt it was conceivable that under the instruction of a capable teacher, any or all of the projects could rate high in fulfilling the objectives, while possibly under another teacher with less organization, imagination, and enthusiasm, all of the projects might fail in fulfilling the objectives. He went on to say that there were some excellent projects.

Two other jury members indicated that they thought the project drawings were generally quite good and represented a good cross section of the types of projects used in industrial arts woodworking.

CHAPTER BIBLIOGRAPHY

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2. American Vocational Association, A Guide to Improving Instruction in Industrial Arts, Washington, D. C., U. S. Government Printing Office, 1968.

3. McCain, Jerry C., "Textbook Suitability for the Industrial Arts Programs in Texas," Unpublished doctoral dissertation, Department of Education, North Texas State College, Denton, Texas, 1959.

4. Office of Education, Improving Industrial Arts Teaching, Conference Report, Washington, D. C., 1960.

CHAPTER IV

FINDINGS, CONCLUSIONS, INFERENCES, AND RECOMMENDATIONS

As a result of the investigation, important information was obtained that will help teachers of industrial arts in the selection of woodworking projects. At the same time, this study produced a resource of woodworking project drawings. However, the primary concern of this study was the evaluation of selected woodworking projects for use by industrial arts teachers in achieving the stated objectives of industrial arts. Recommendations of projects for specific needs was not a goal of this study. Because of varying demands and needs of individual teachers, each teacher must select specific projects to meet his needs.

Findings

The following findings are presented:

1. In a review of the literature of industrial arts, no research was found that specifically undertook the evaluation of woodworking projects by established evaluative criteria.

2. Sixty-five of the projects evaluated were found to be suitable for use at more than one level.

3. The jurors rated thirty-one of the projects as suitable for junior high school use. Four of the projects were rated as suitable for high school work, and twenty-three of the projects were rated as suitable for both high school and junior high school. Thirty-nine of the projects were rated suitable for use at the high school and college level; none of the projects were rated suitable for use at the college level only. Three of the projects were rated suitable for use at all levels.

4. Eleven of the projects, numbers eight, fourteen, twenty-three, twenty-four, twenty-five, twenty-nine, thirty, thirty-eight, forty-two, forty-three, and fifty, were rated below average. Thirty-two of the projects were rated good. These were number sixty, sixty-three, sixty-five, sixty-eight, sixty-nine, seventy, seventy-one, seventy-two, seventy-three, seventy-four, seventy-five, seventy-six, seventy-seven, seventy-eight, seventy-nine, eighty, eighty-one, eighty-two, eighty-four, eighty-five, eighty-six, eighty-seven, eighty-eight, eighty-nine, ninety, ninety-one, ninety-two, ninety-four, ninety-five, ninety-six, ninety-seven, and ninety-eight. None of the projects were rated excellent or poor. The remainder of the projects were rated as average.

5. Of the thirty-one junior high school projects, seven were rated below average and twenty-four average. The projects were also rated to ascertain their suitability

for use at both junior high school and high school levels. Nineteen were rated average and four below average, making a total of twenty-three projects. Of the projects rated suitable for high school and college, seven were rated average and thirty-two, good. All of the projects selected for all levels were given an average rating.

Conclusions

The following conclusions seem warranted:

1. Those projects rated below average are not suitable for use in achieving the overall objectives of industrial arts.

2. Those projects rated average or better are suitable for fulfilling the objectives of industrial arts.

3. Teachers of junior high school and high school should be more selective in their choice of projects. This is based on the fact that there were no projects at either level that received a rating of good or excellent.

4. The projects selected for the junior high and high school were not adequate for achieving the overall stated objectives of industrial arts at that level.

Inferences

On the basis of the findings and conclusions, the following inferences are drawn:

1. Since all of the jurors were college teachers or supervisors, their expectations for the junior high and high

school may have been too high. This may explain why none of the projects were rated excellent or good for use at the junior high school or high school level.

2. There are many new projects, such as plastics, and processes, such as finishing processes and man-made woods, used in industry today that may not have been involved in the selected projects. This could be due to the length of time that elapsed between the writing of the textbooks and other literature that was used, and the publication and use of those materials.

3. Many of the drawings of projects selected were used by junior high school and senior high school teachers. These projects may not have been their best projects, but rather the drawings of projects they had available.

4. The evaluative criteria may not have been explained to the jurors in adequate detail.

5. Owing to the volume of material to be evaluated, the jurors may have been fatigued and did not spend or have adequate time to evaluate each project.

Recommendations

The following recommendations are made:

1. It is recommended that those projects rated below average should not be used by an industrial arts woodworking teacher unless there is some specific objective not included in the evaluative criteria used that the teacher thinks can be reached by the use of those projects.

2. It is recommended that the teacher using those projects which were rated average should very carefully consider the students' needs and abilities before making a decision about using those projects.

3. The thirty-two projects rated good should be used more extensively because they involve most of the operations and concepts necessary to meet the objectives of industrial arts.

4. For teachers in the junior high school, it is recommended that the twenty-four projects rated average or better for use at the junior high school-senior high school level are suitable for teaching junior high school woodworking.

5. It is recommended that the nineteen projects rated average or better for use at the junior high-high school level and the four projects rated average at the high school level, or projects similar to these, are suitable for teaching high school woodworking.

6. Thirty-nine projects were recommended for use in either high school or college. It is further recommended that projects similar to the thirty-nine should be considered for use by advanced high school and college level students.

7. Three projects were rated suitable for all levels. These three projects were all rated average and it is recommended that they be considered for use at the junior high school, senior high school, or the college level.

8. Teachers should choose projects that have been evaluated according to the objectives of industrial arts.

9. Steps should be taken to make this study available to teachers of industrial arts woodworking. At the present time, there is no known publication available that serves as both a descriptive and an evaluative source of industrial arts woodworking projects.

10. Future studies should be made to evaluate projects for other areas of industrial arts.

APPENDIX A

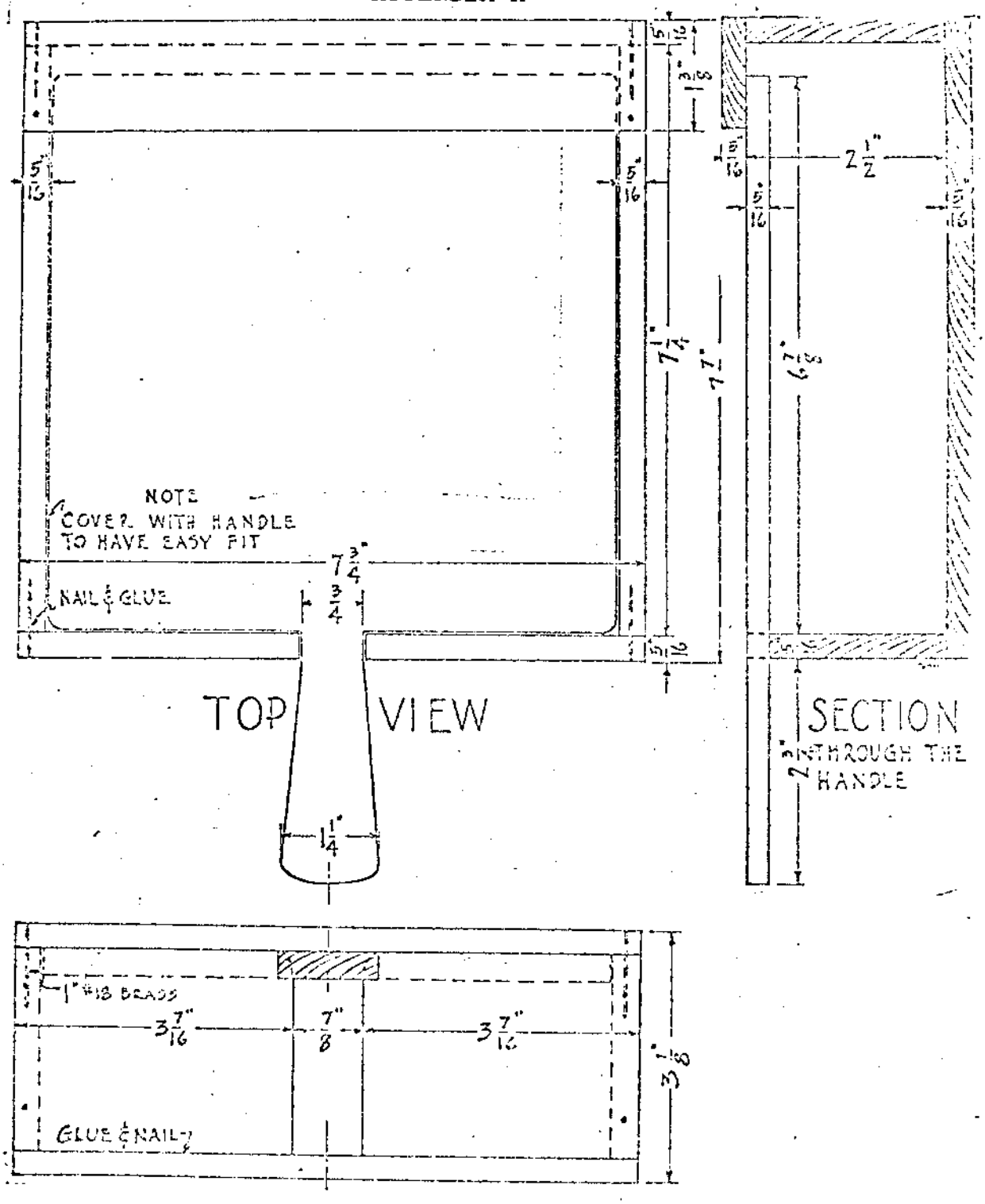


Fig. 2--Napkin holder, suitability considered average for junior high level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

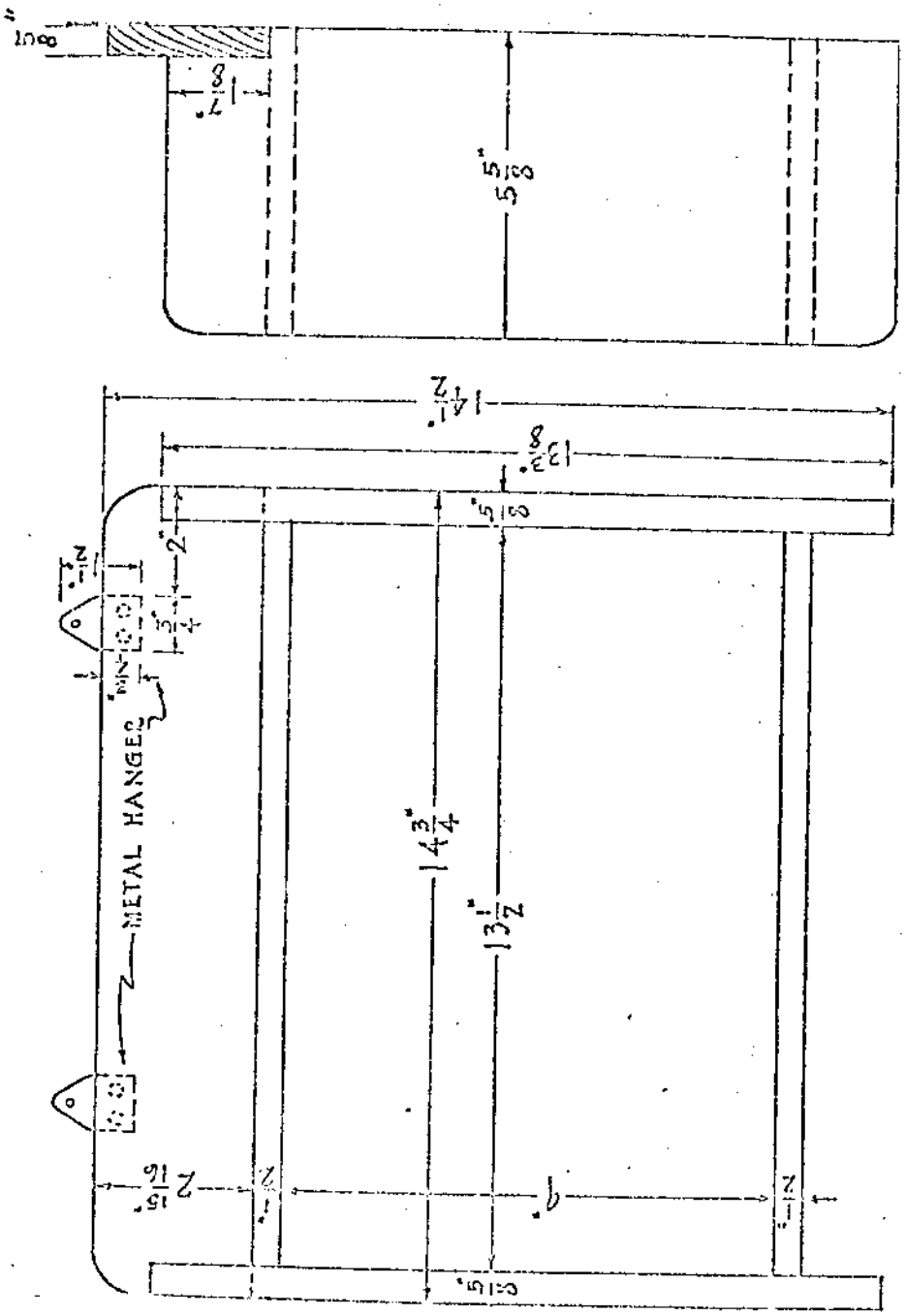


Fig. 3--Book rack, suitability considered average for junior high level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

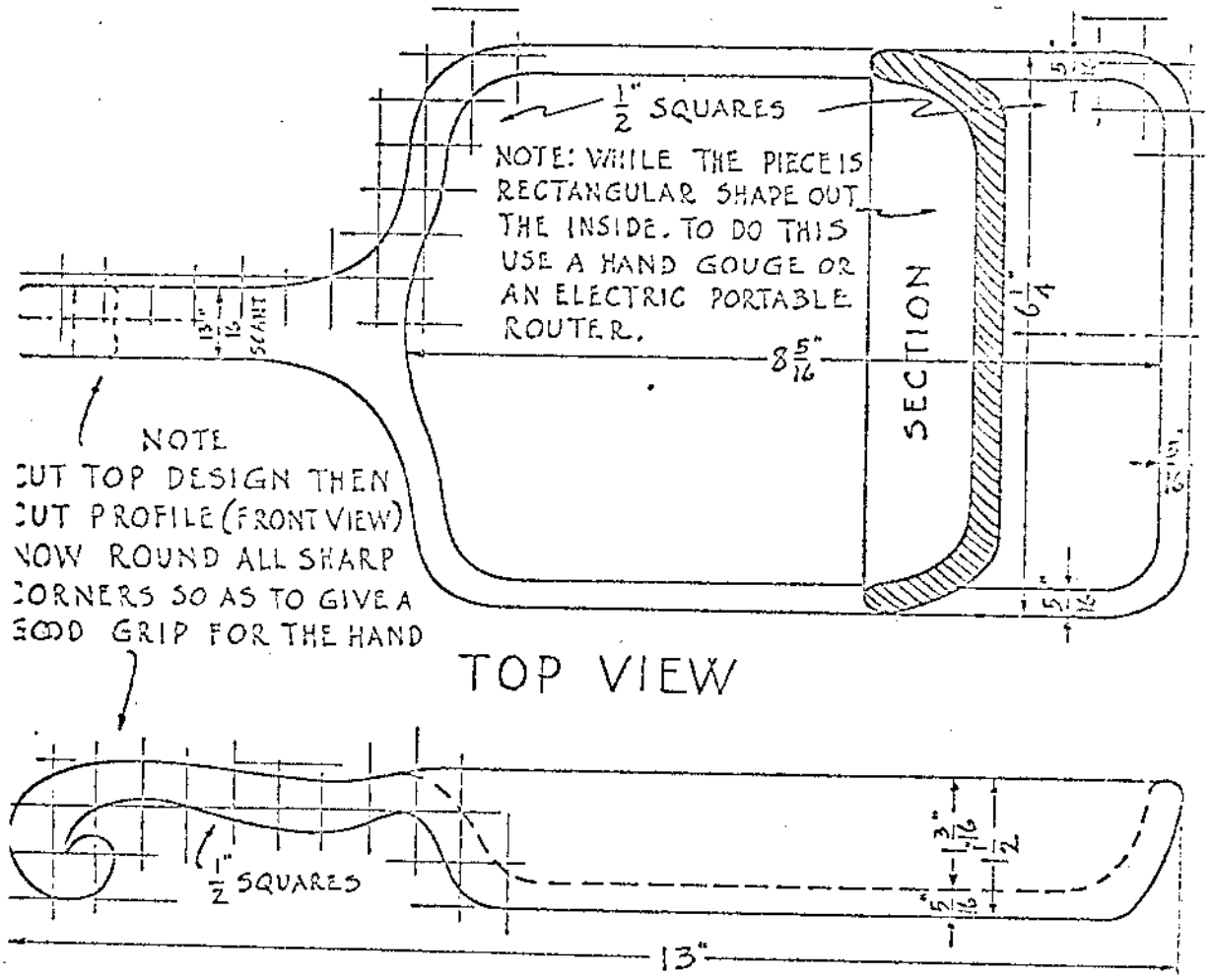
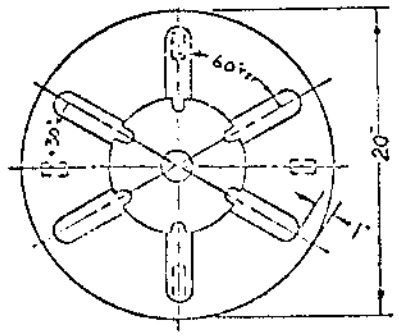


Fig. 4--Nut scoop, suitability considered average for junior high level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.



TOP VIEW

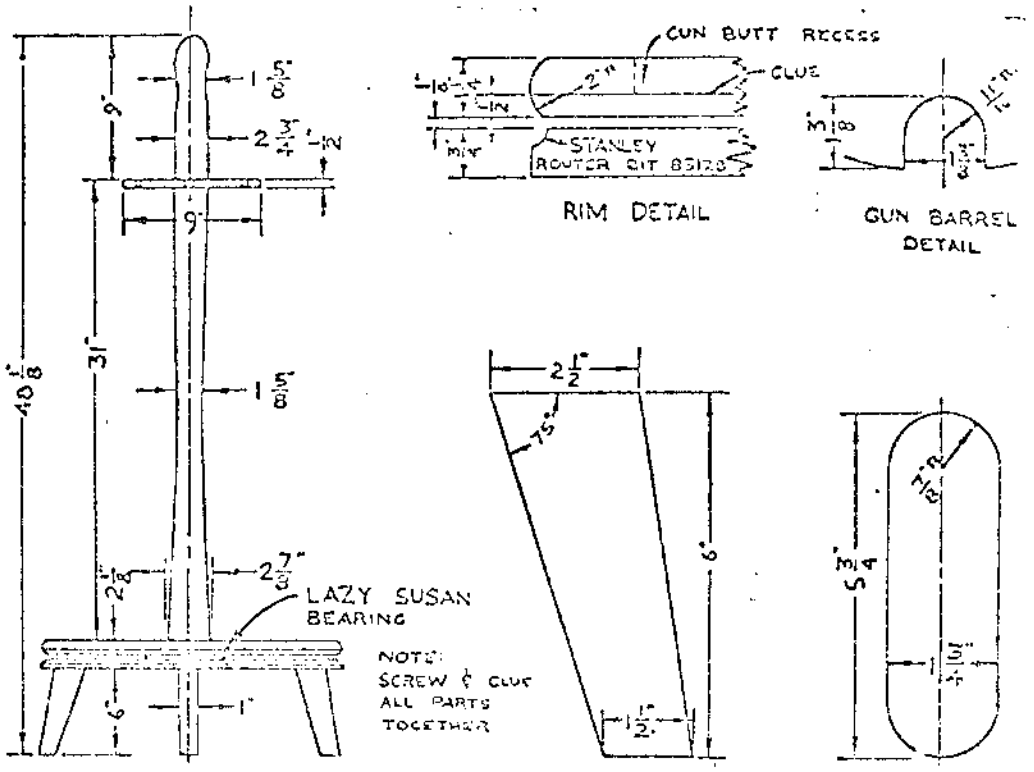


Fig. 5--Gun rack, suitability considered average for junior high level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

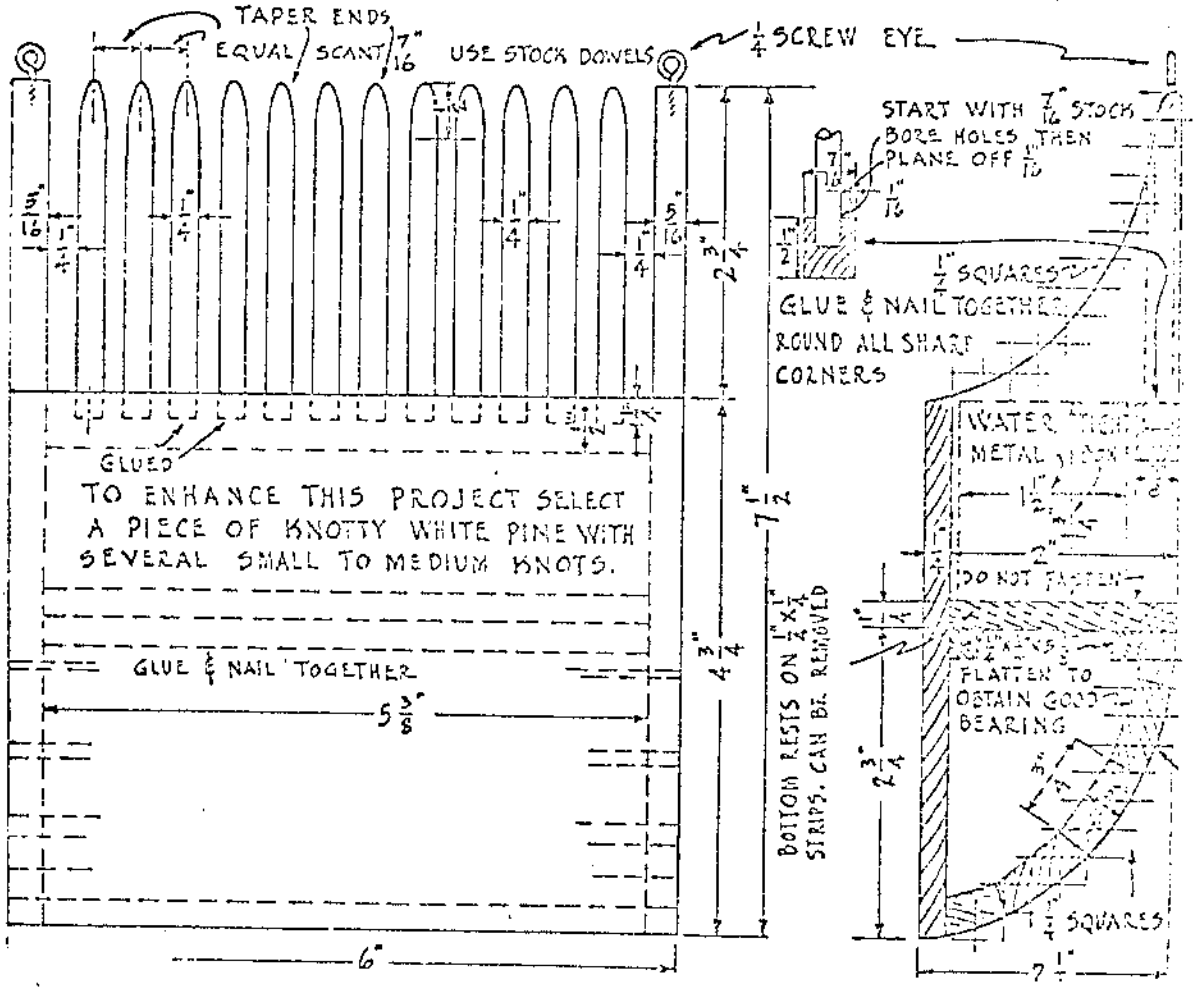


Fig. 6--Cranberry scoop, suitability considered average for junior high level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

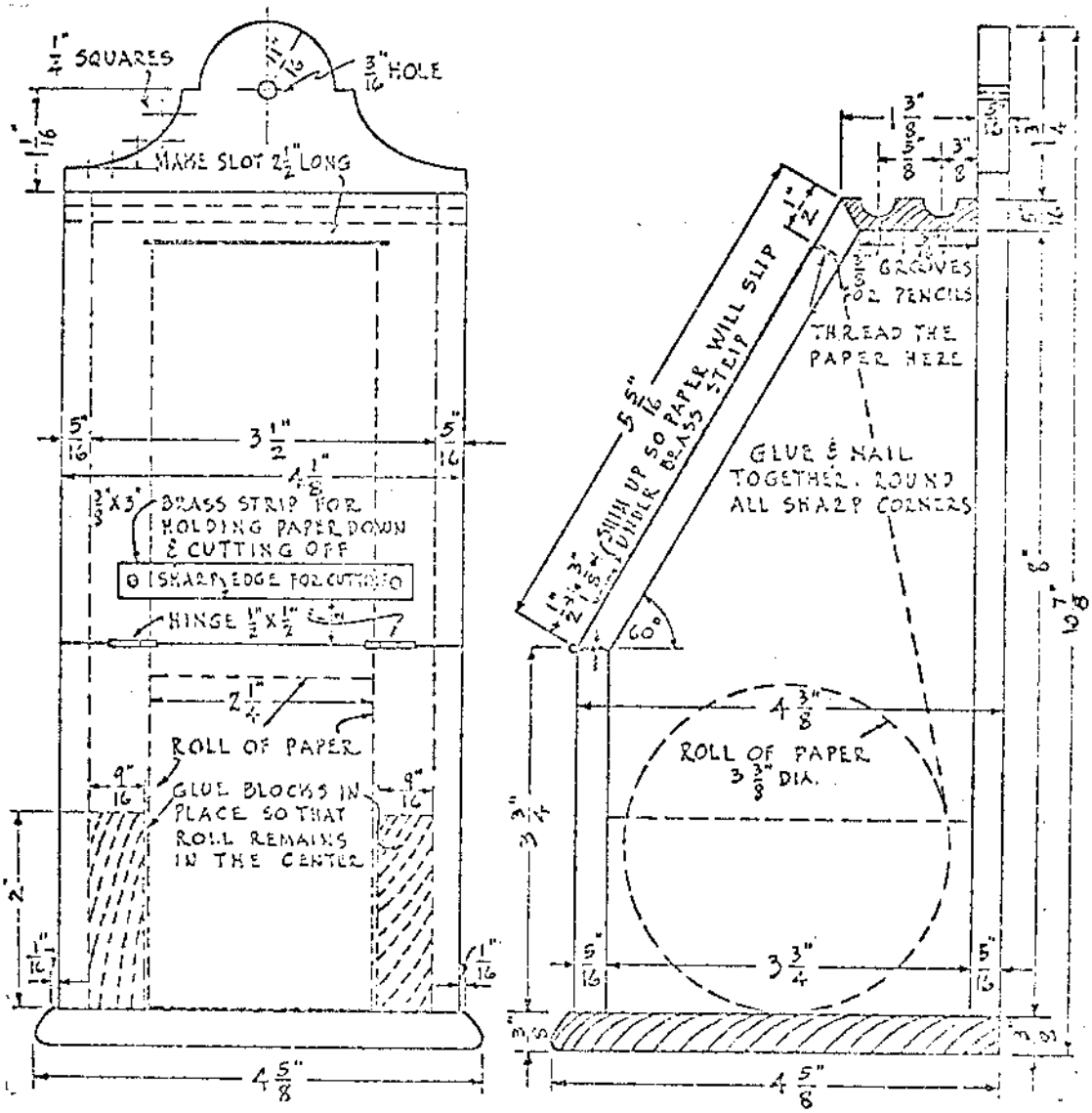


Fig. 7--Memo pad, suitability considered average for junior high level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

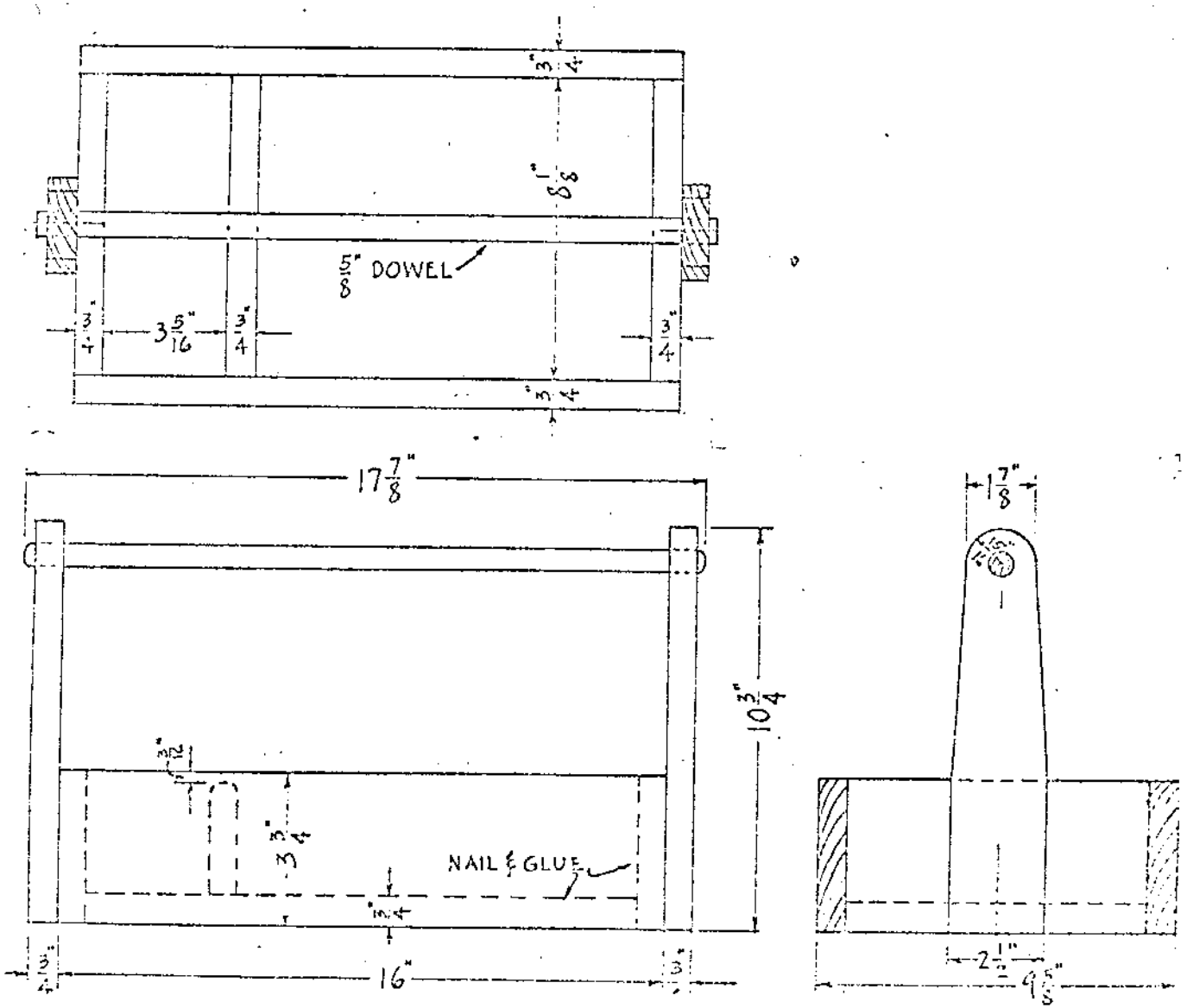


Fig. 8--Kindling box, suitability considered below average for junior high level, Stanley Tool Company, Project Plans for Woodworking, New Britain Connecticut.

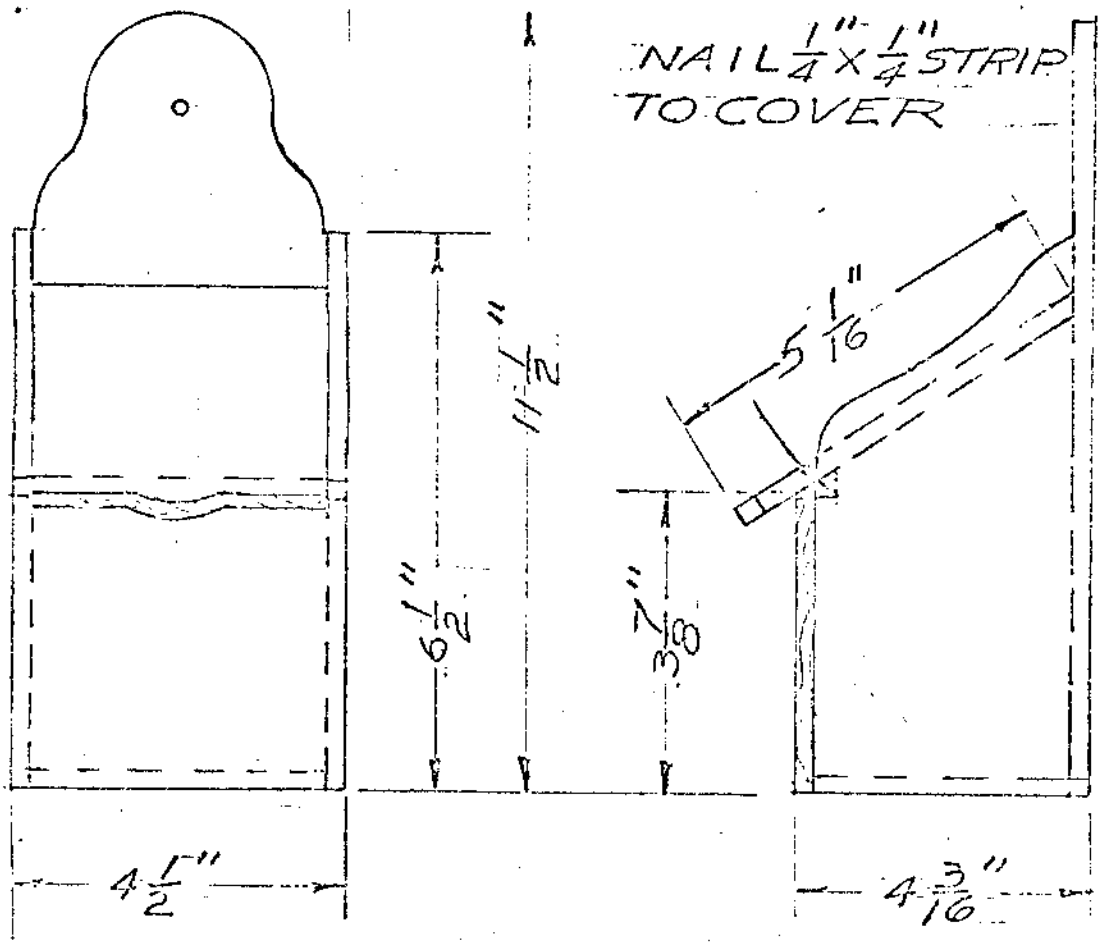


Fig. 9--String box, suitability considered average for junior high level.

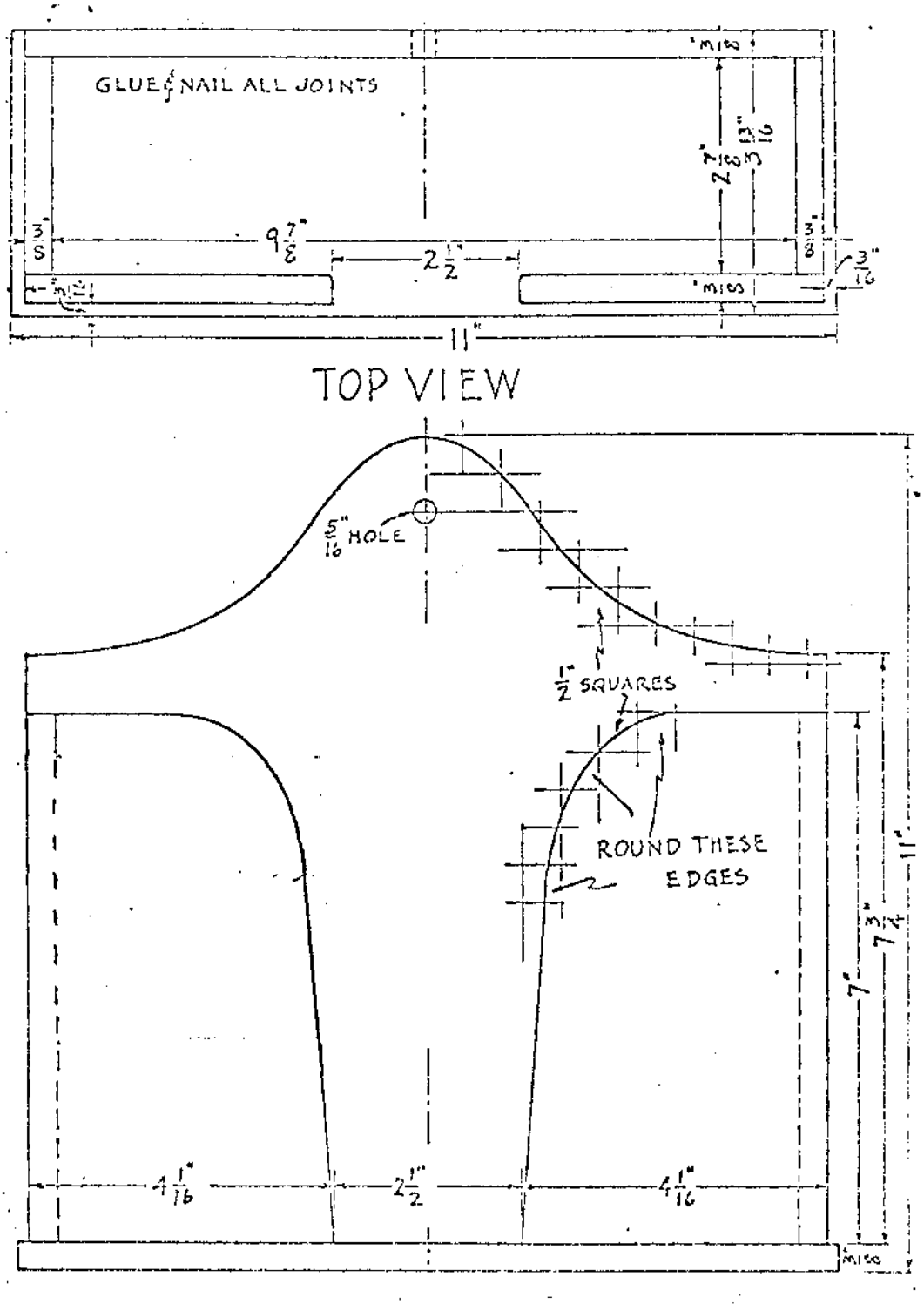


Fig. 10--Napkin holder, suitability considered average for junior high level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

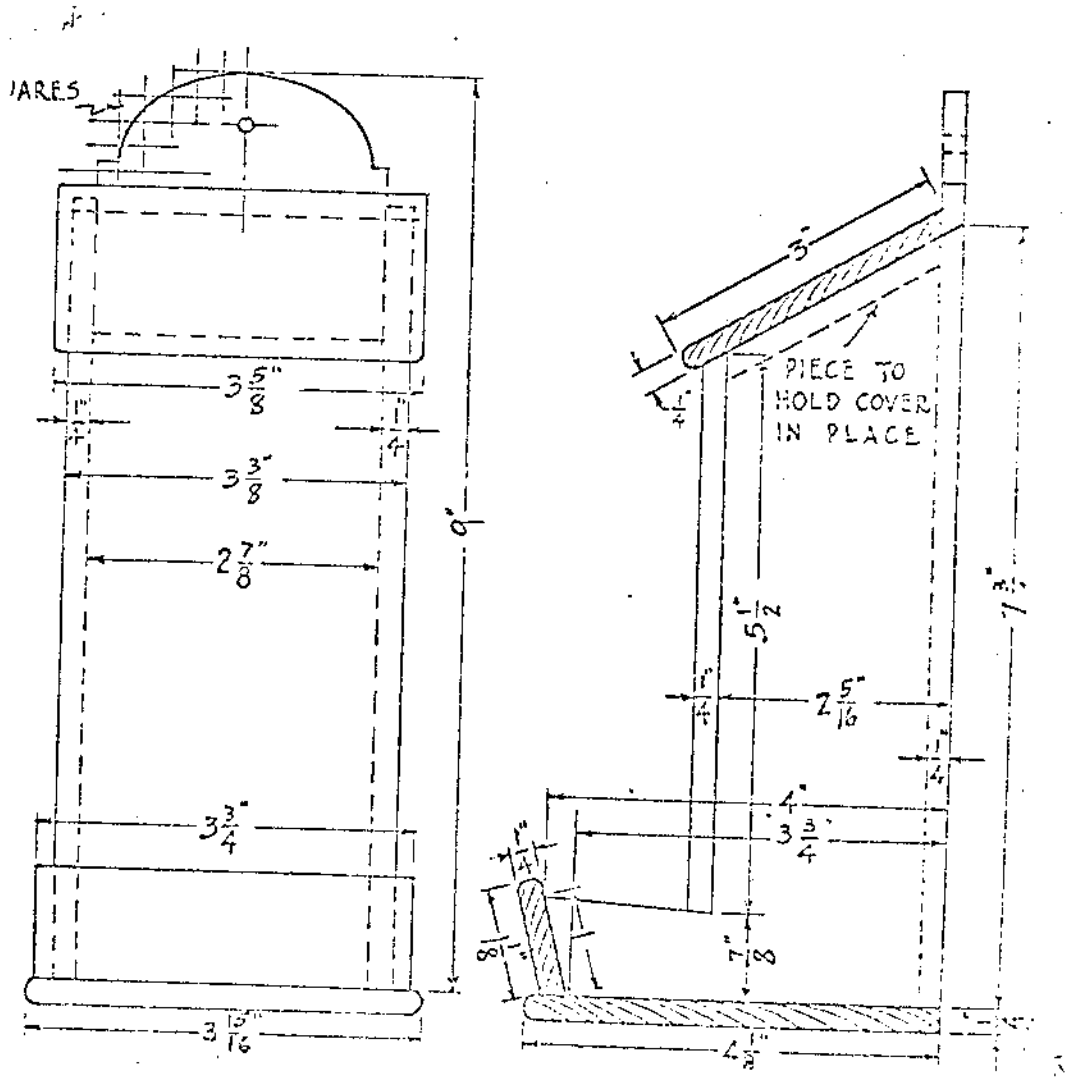


Fig. 11--Match box, suitability considered average for junior high level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

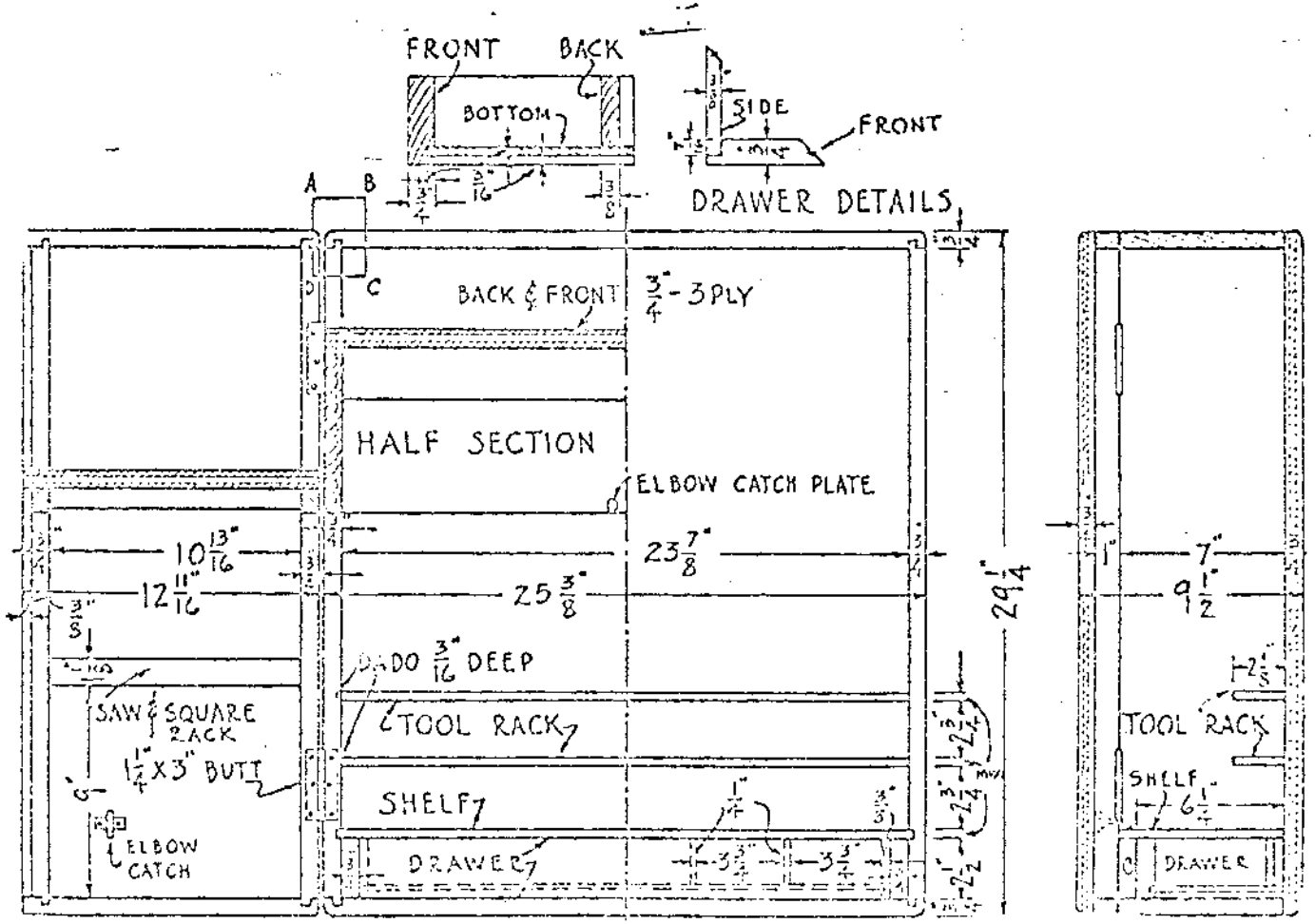


Fig. 12--Tool cabinet, suitability considered average for junior high level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

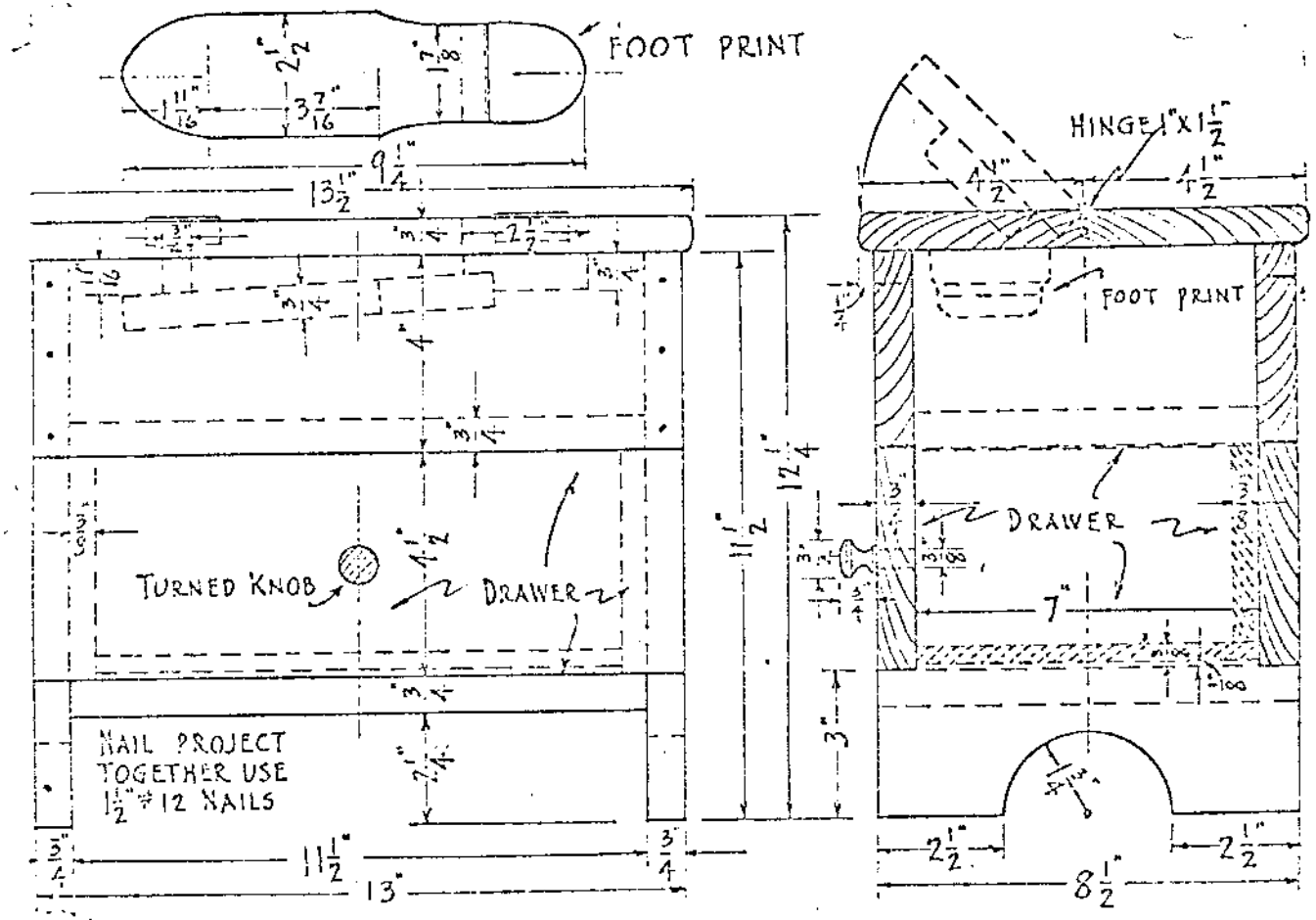


Fig. 13--Shoeshine stand, suitability considered average for junior high level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

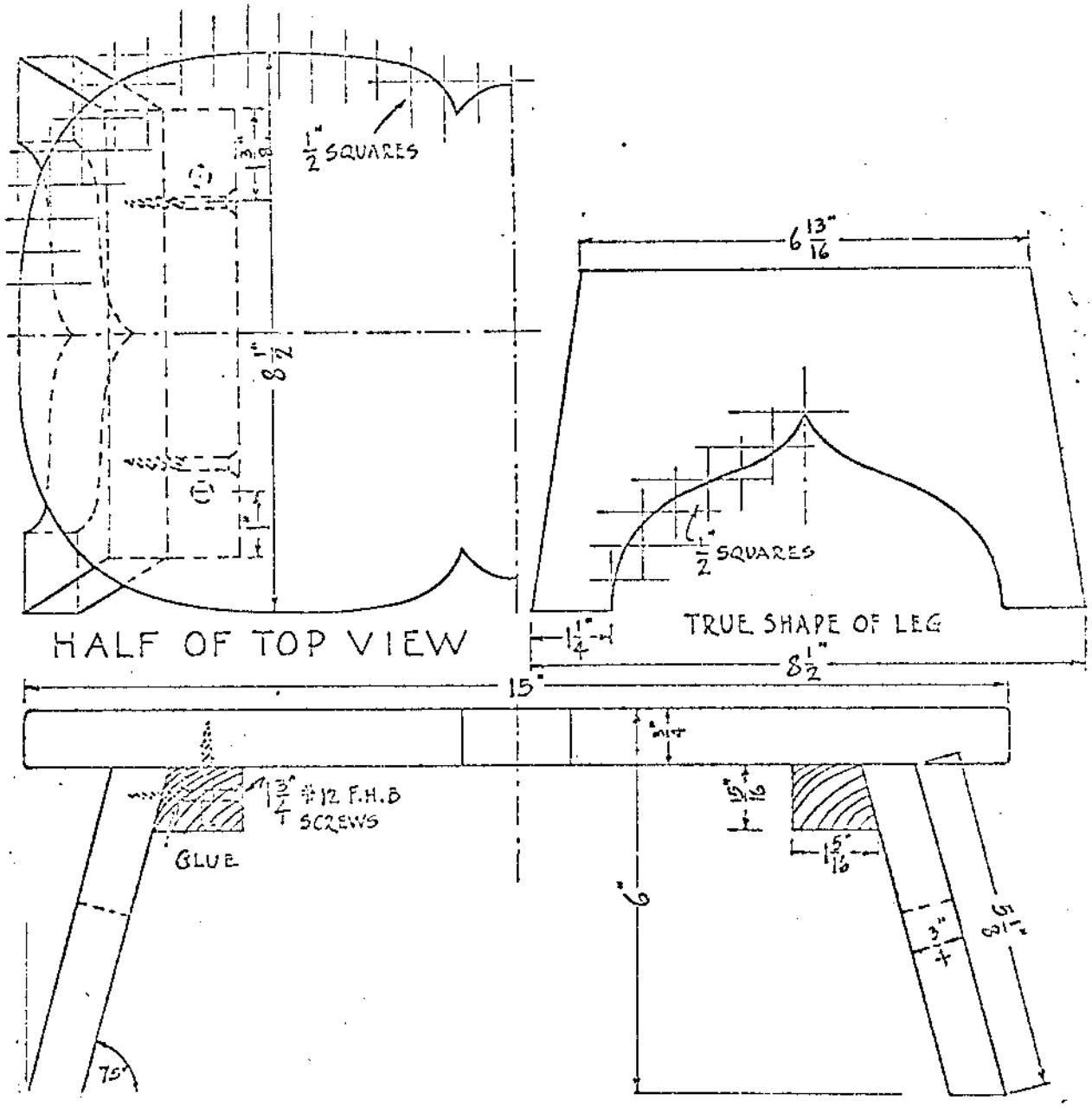


Fig. 14--Foot stool, suitability considered below average for junior high level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

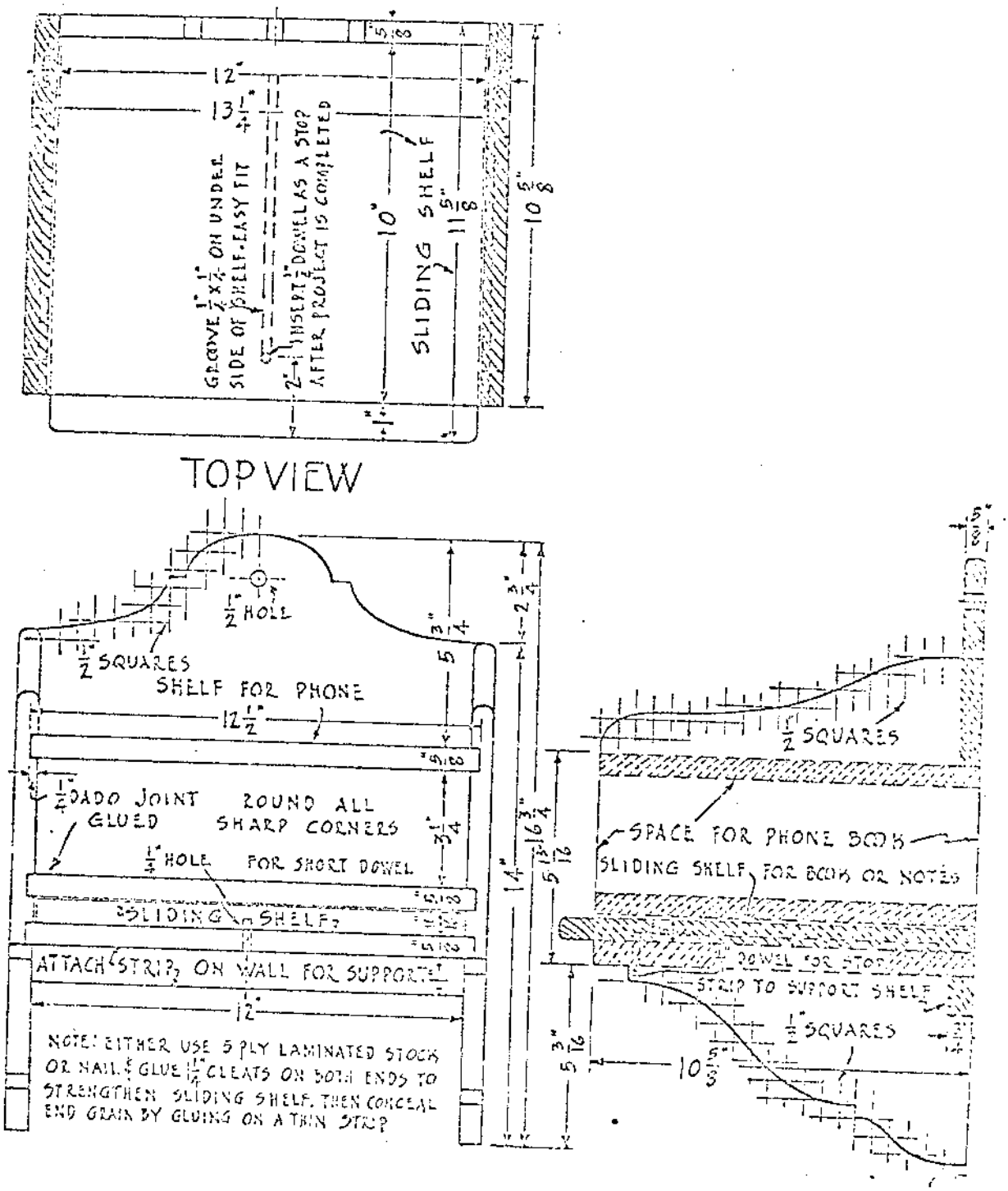


Fig. 15--Telephone stand, suitability considered average for junior high level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

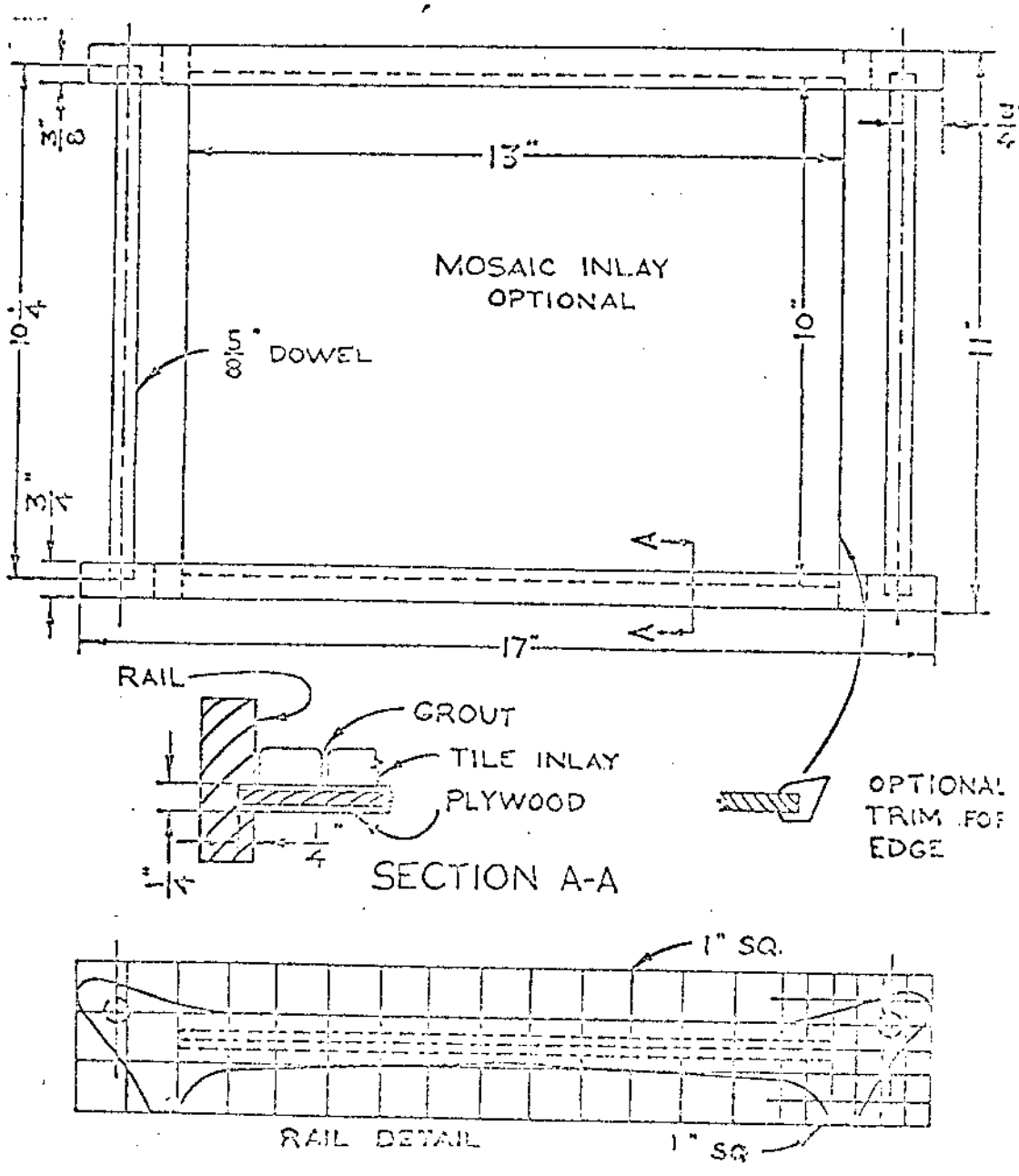


Fig. 16--Serving tray, suitability considered average for junior high level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

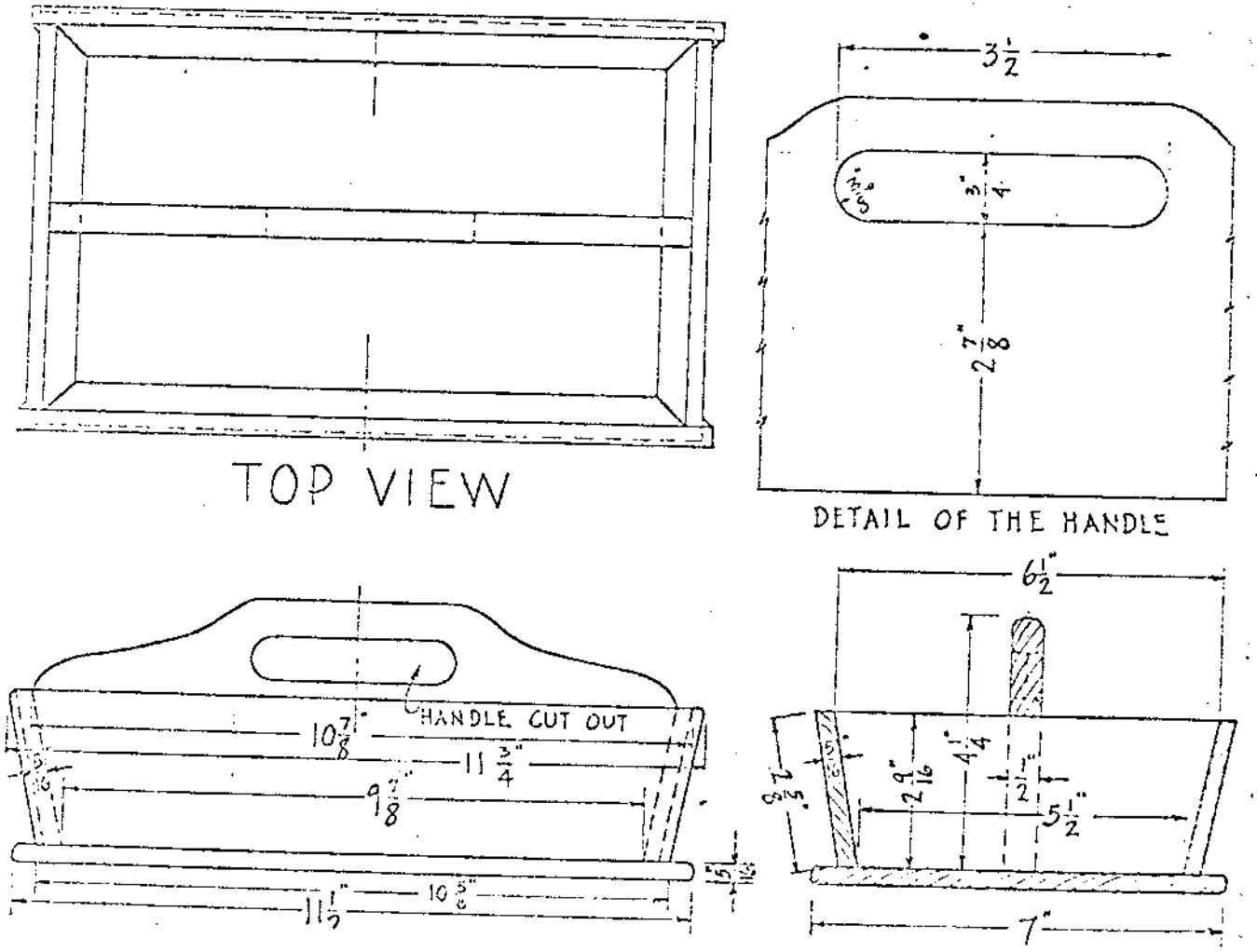


Fig. 17--Knife and fork box, suitability considered average for junior high level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

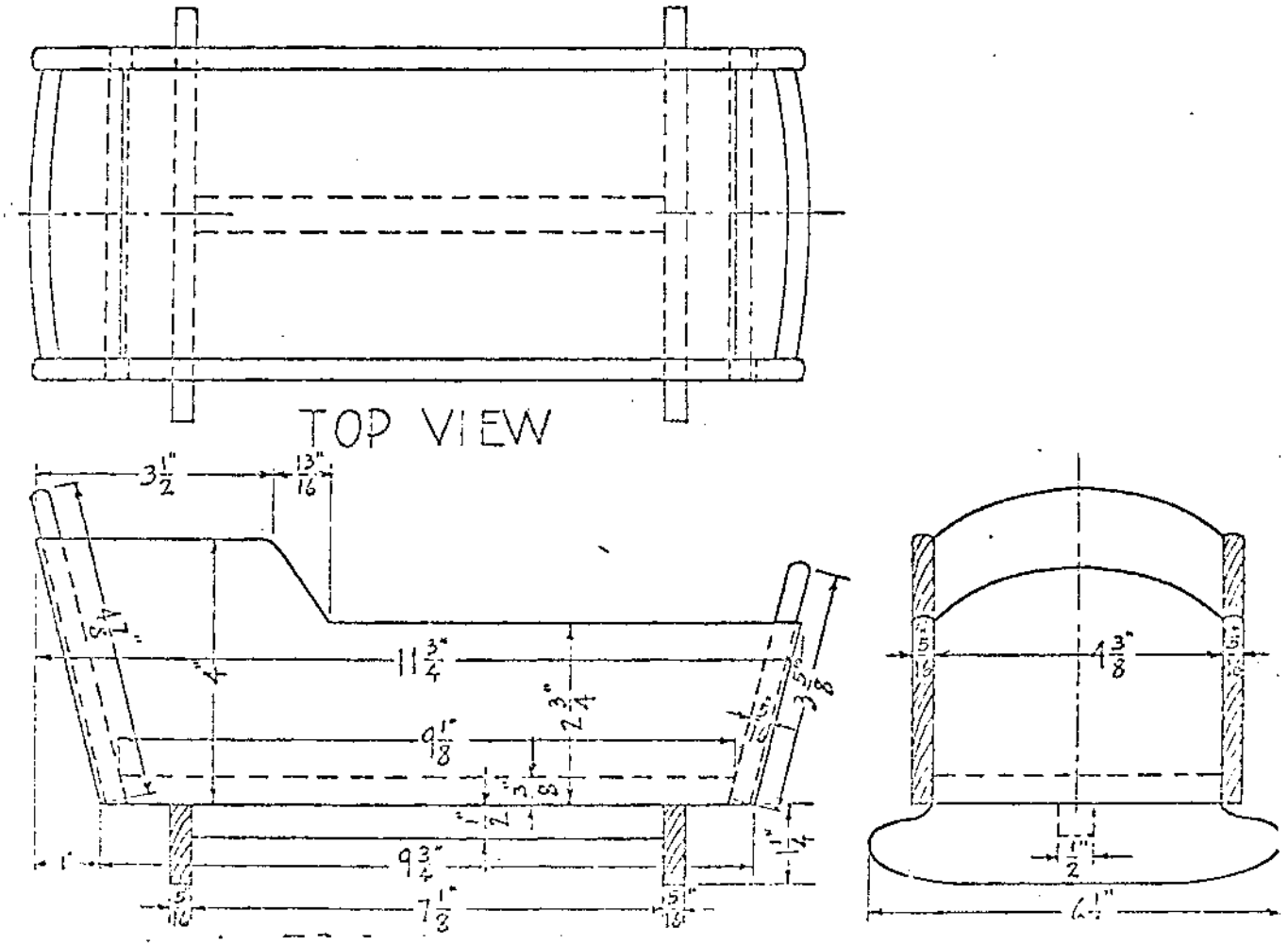


Fig. 18--Planter, suitability considered average for junior high level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

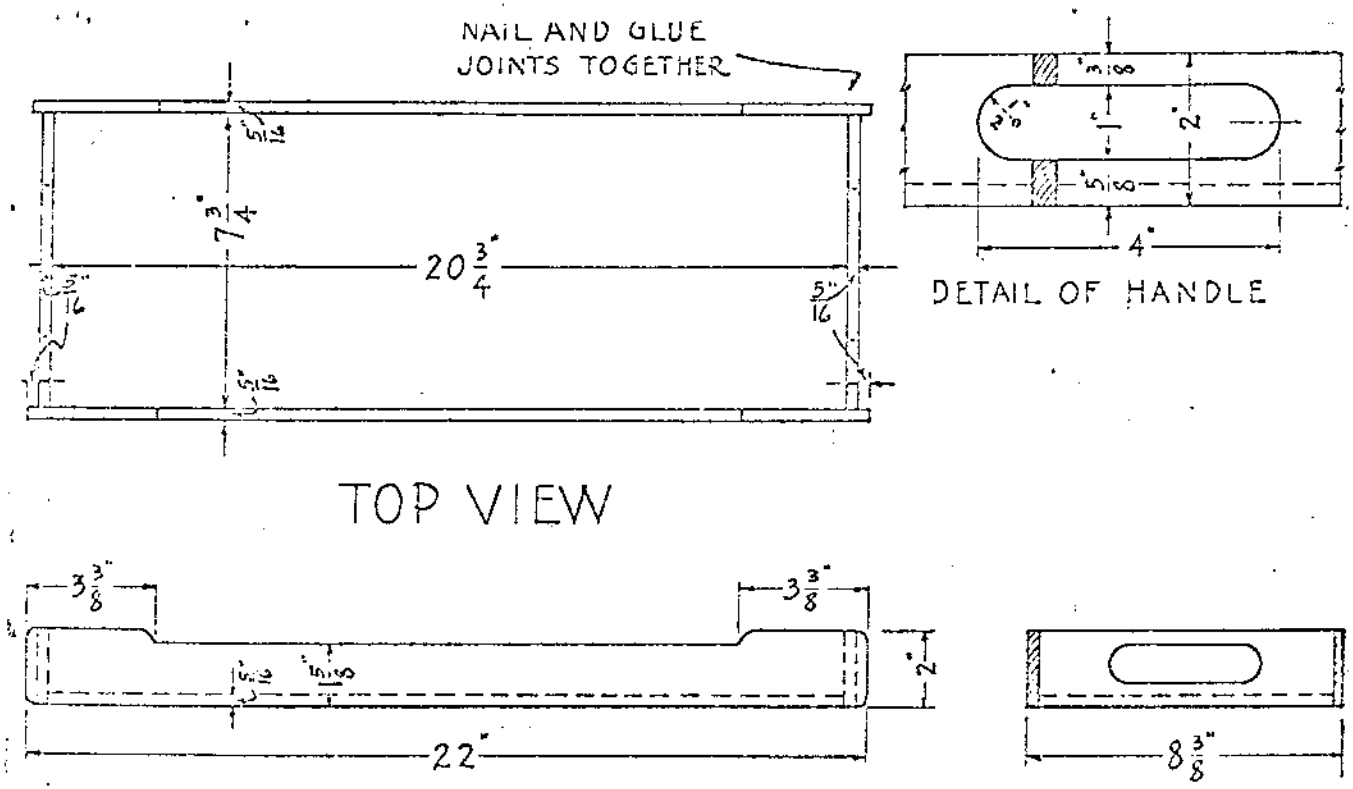


Fig. 19--Serving tray, suitability considered average for junior high level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

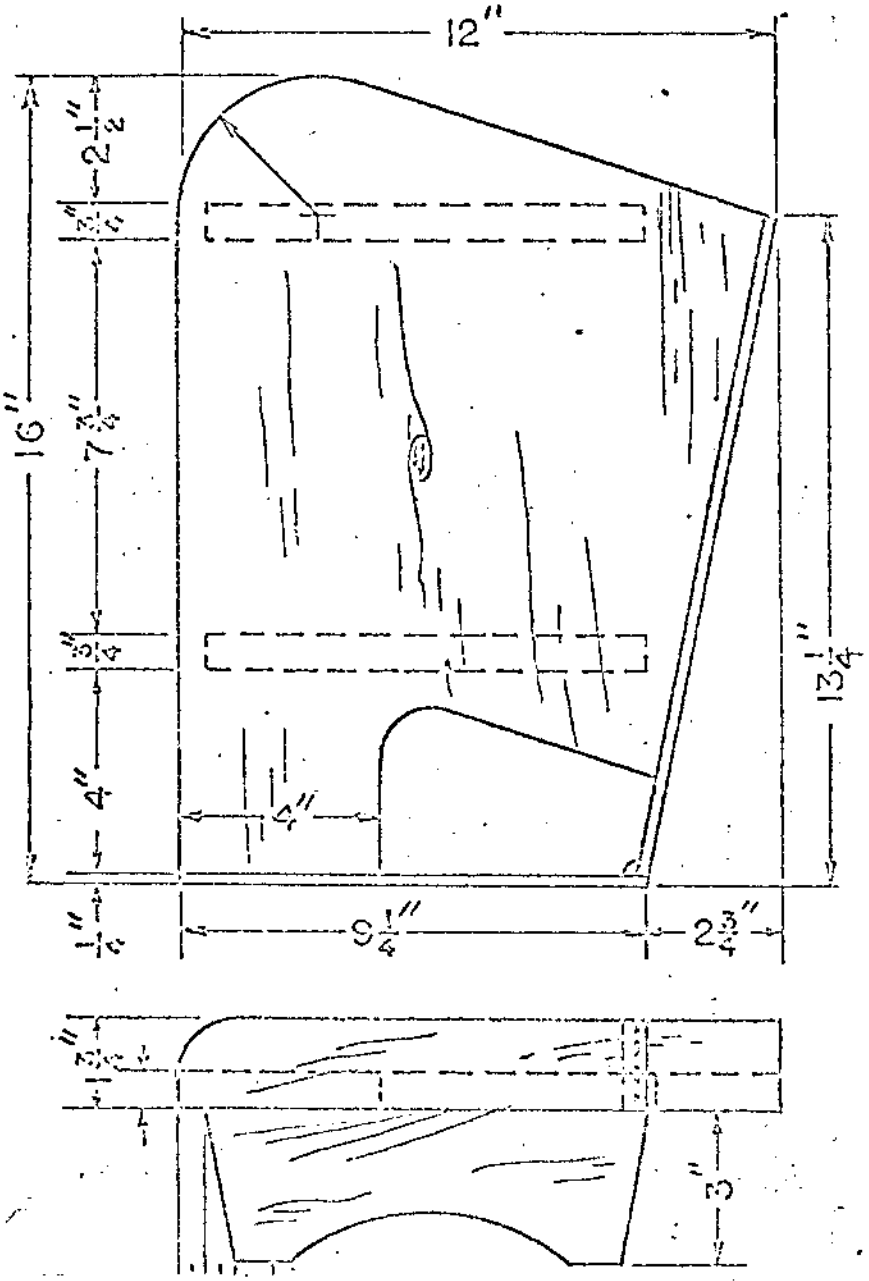


Fig. 20--Chef's cutting board, suitability considered average for junior high level.

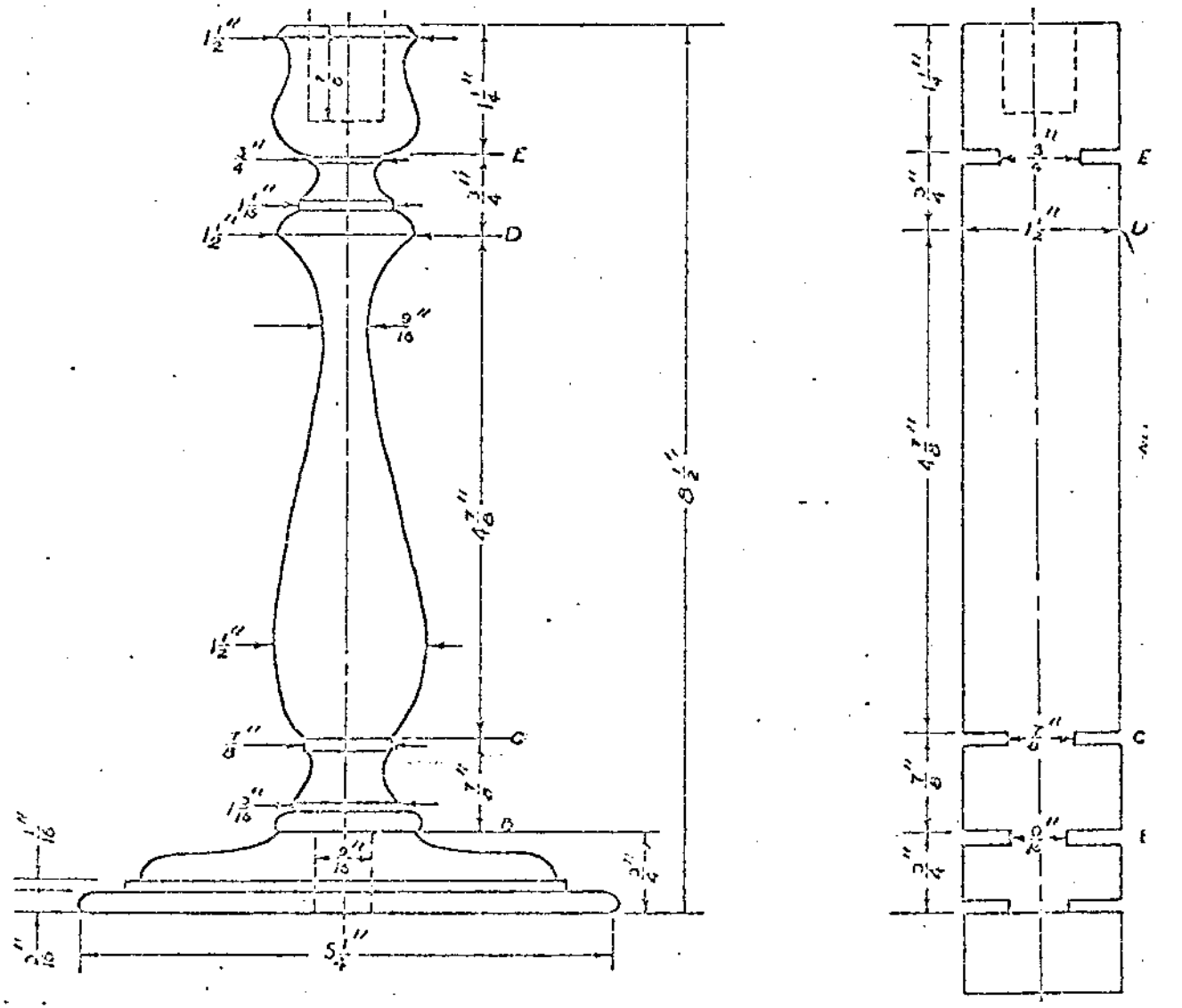


Fig. 21--Candle stick, suitability considered average for junior high level.

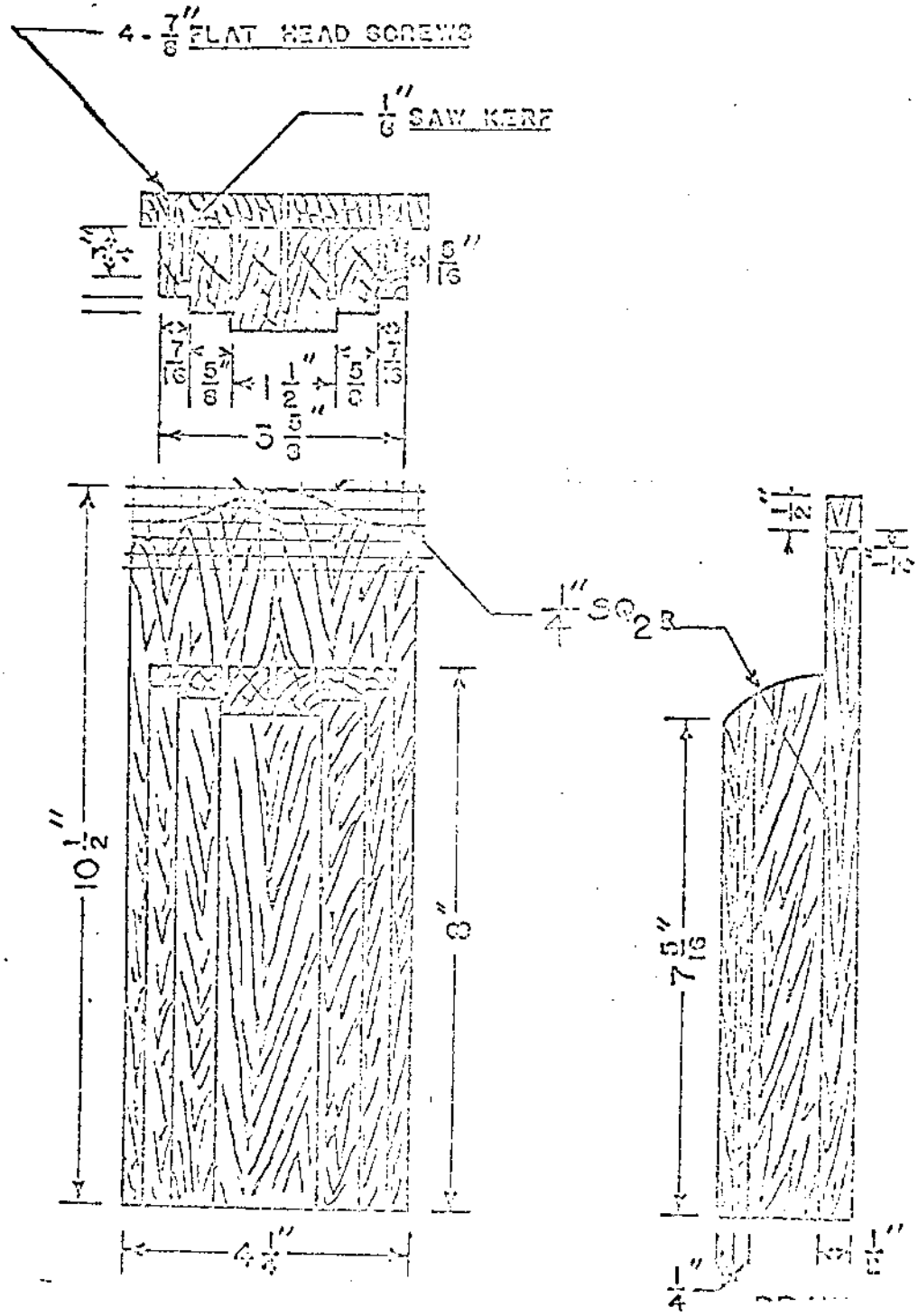


Fig. 22--Knife holder, suitability considered average for junior high level.

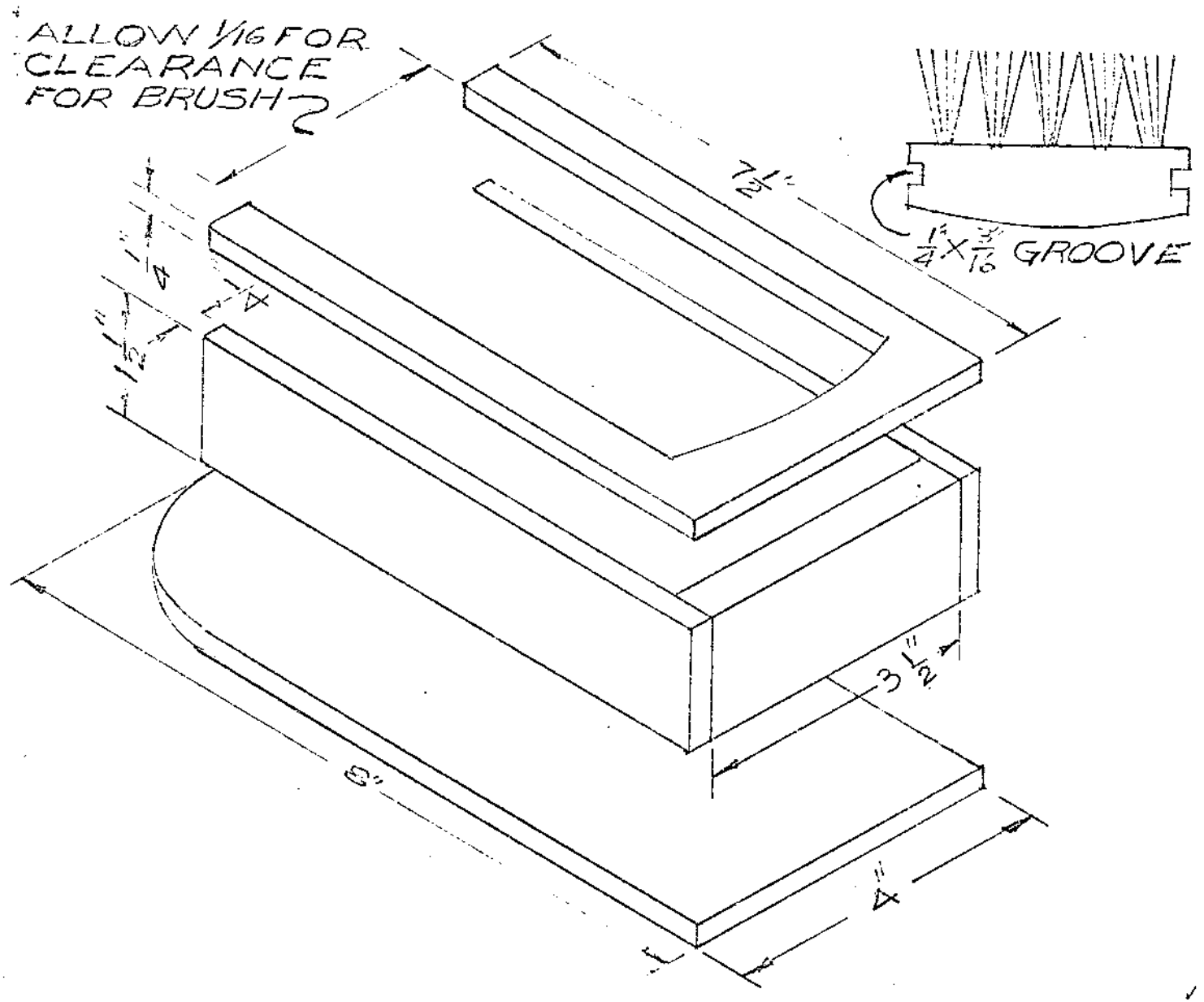


Fig. 23--Shoe shine box, suitability considered below average for junior high level.

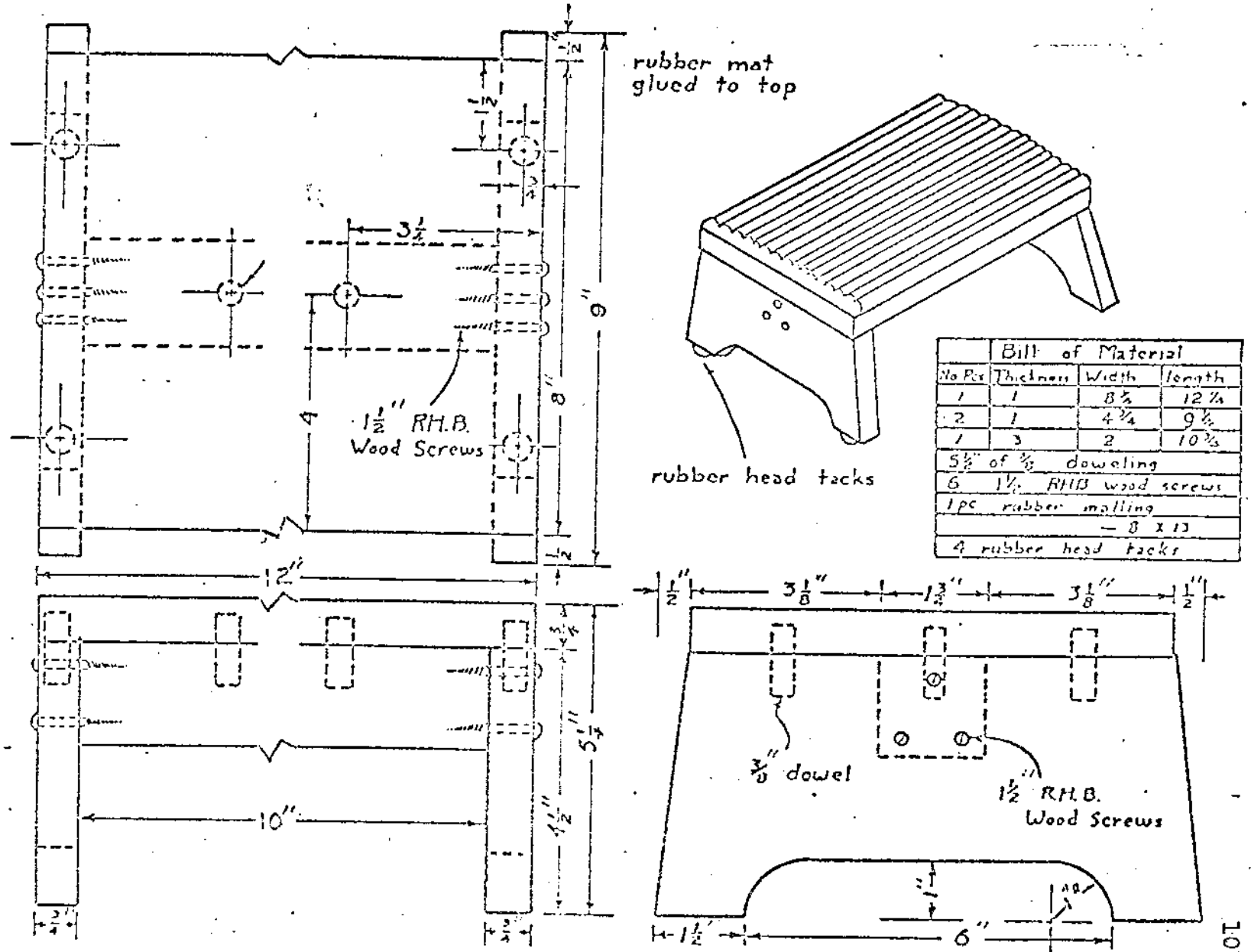


Fig. 24--Child's washing stool, suitability considered below average for junior high level.

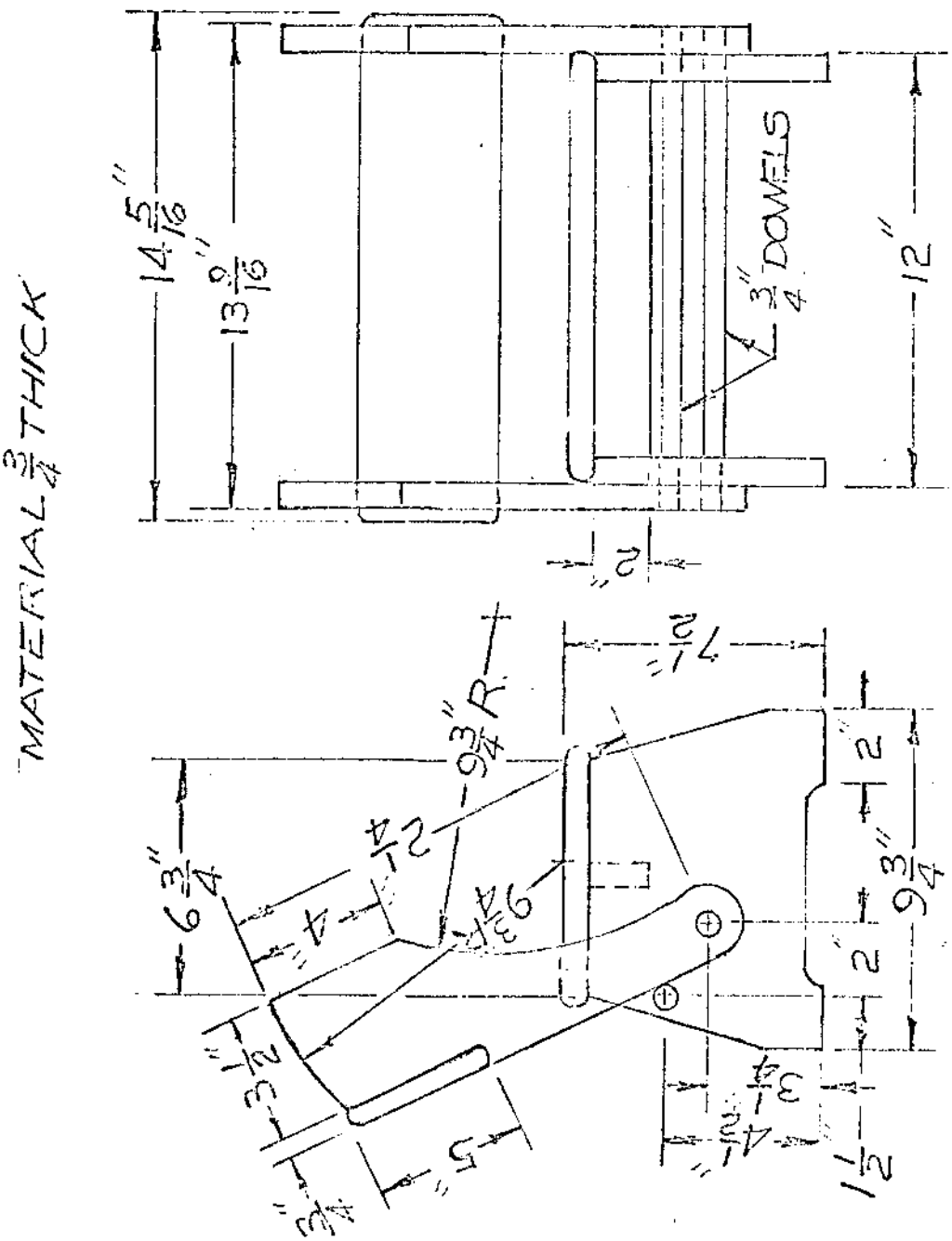


Fig. 25--Step stool, suitability considered below average for junior high level.

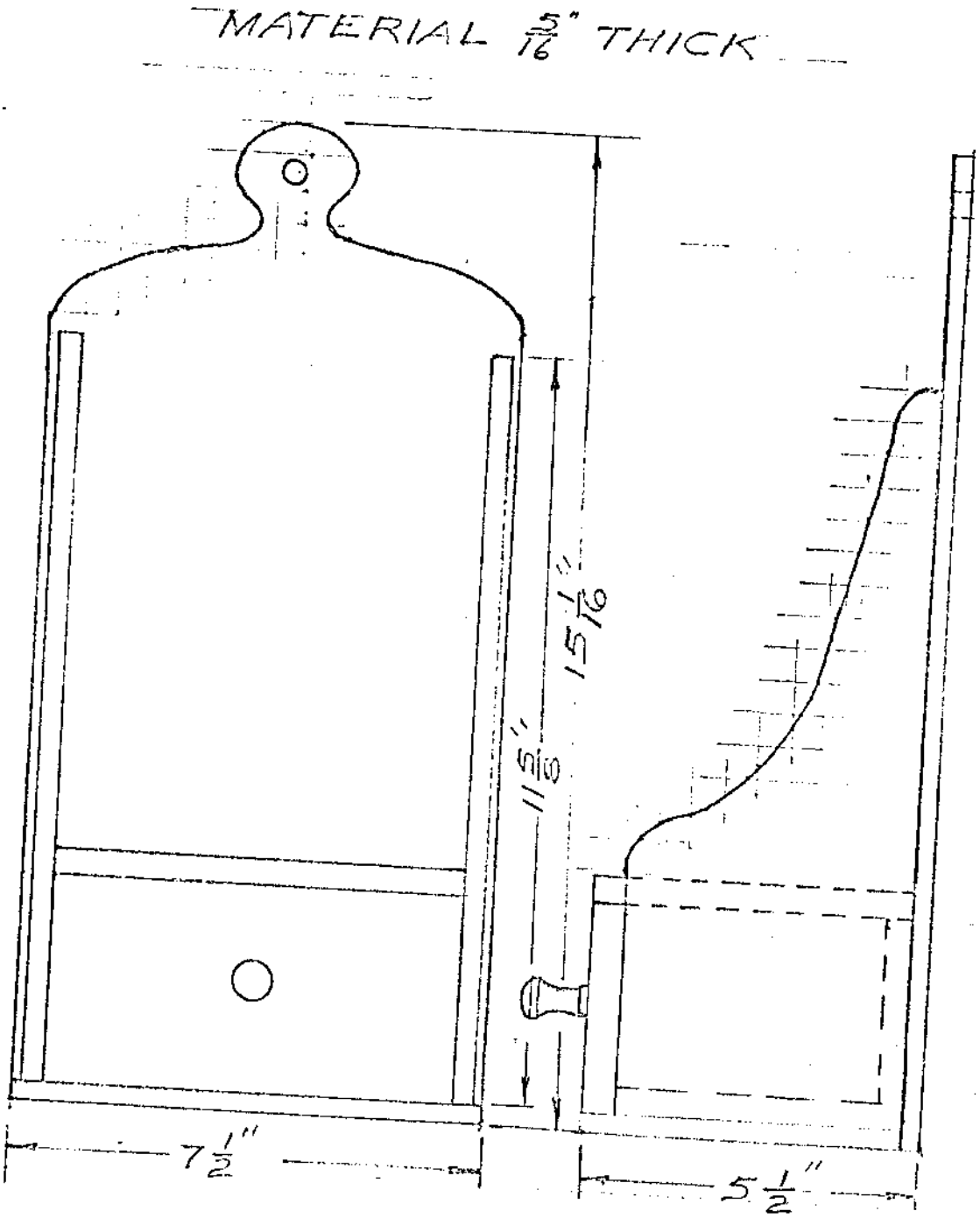


Fig. 26--Spice box, suitability considered average for junior high level.

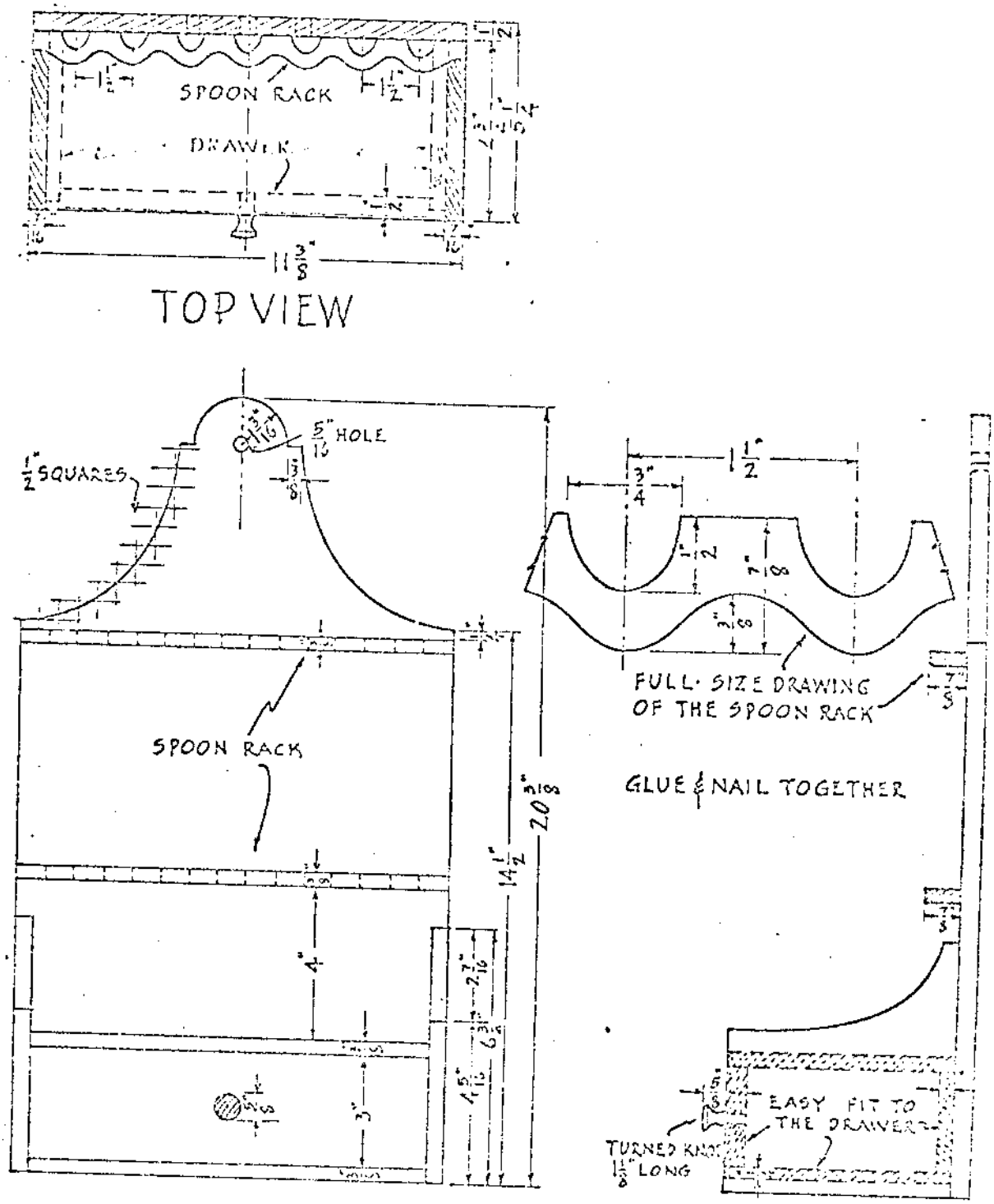


Fig. 27--Spoon rack, suitability considered average for junior high level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

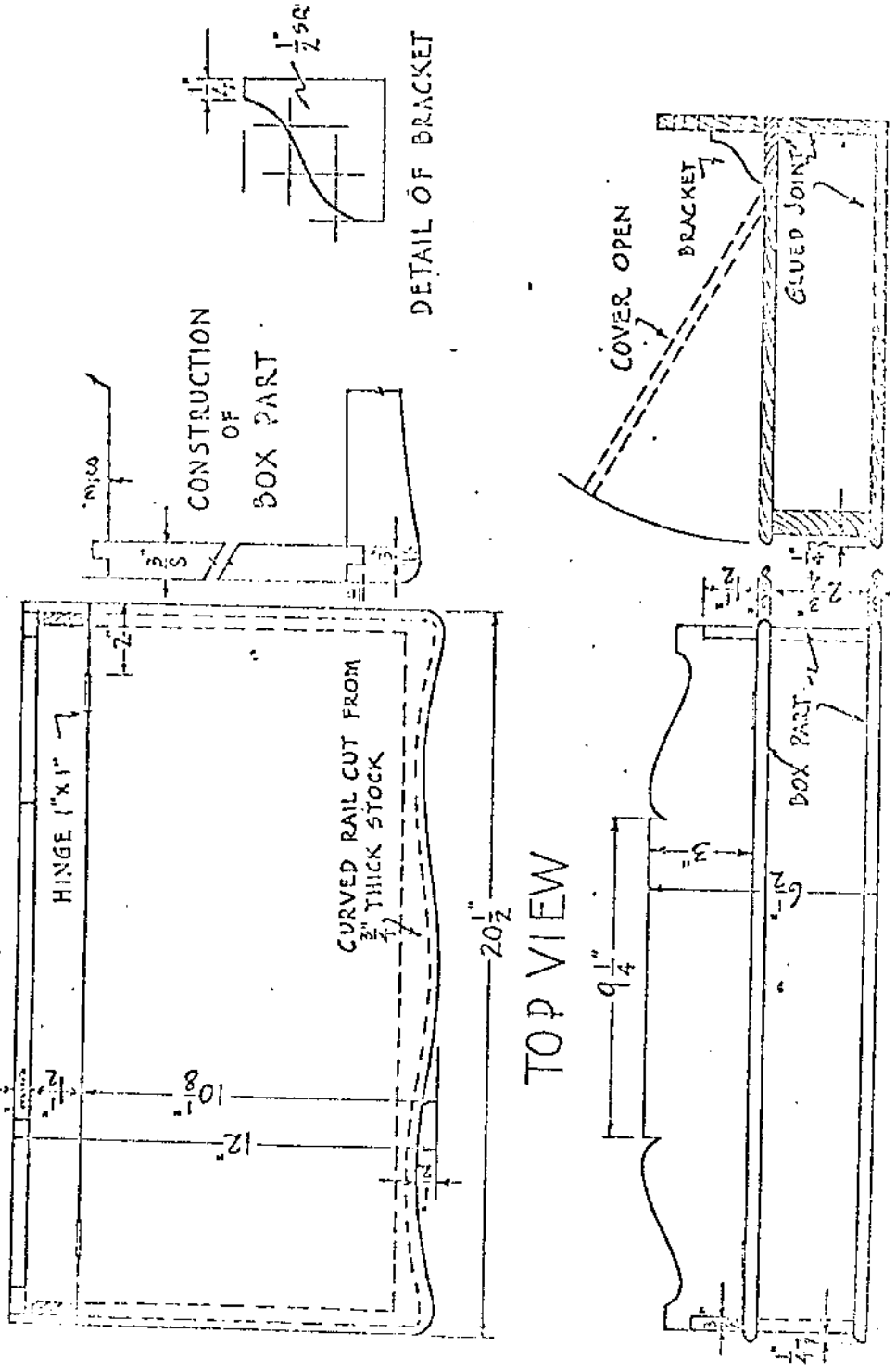


Fig. 28--Secretary, suitability considered average for junior high level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

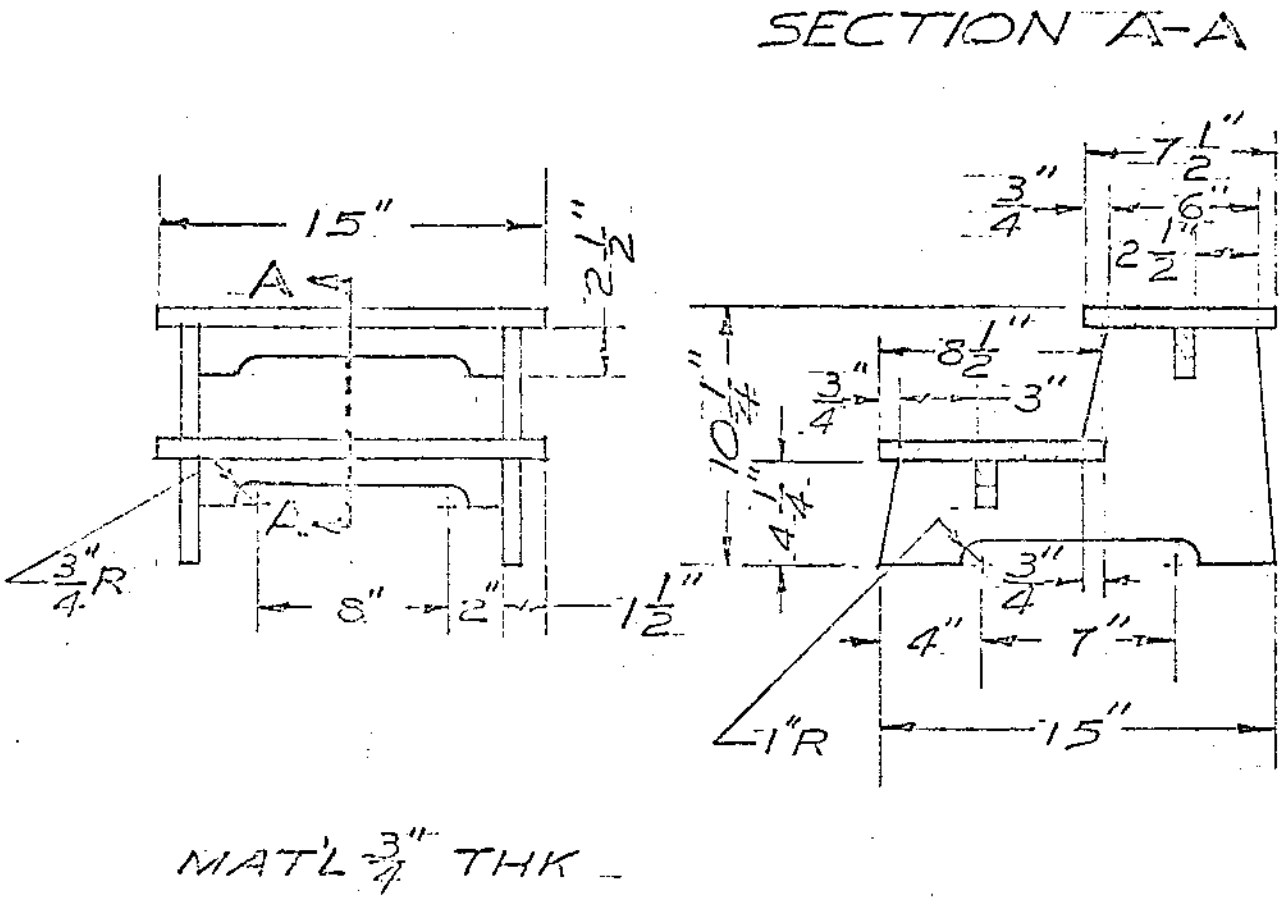


Fig. 29--Step stool, suitability considered below average for junior high level.

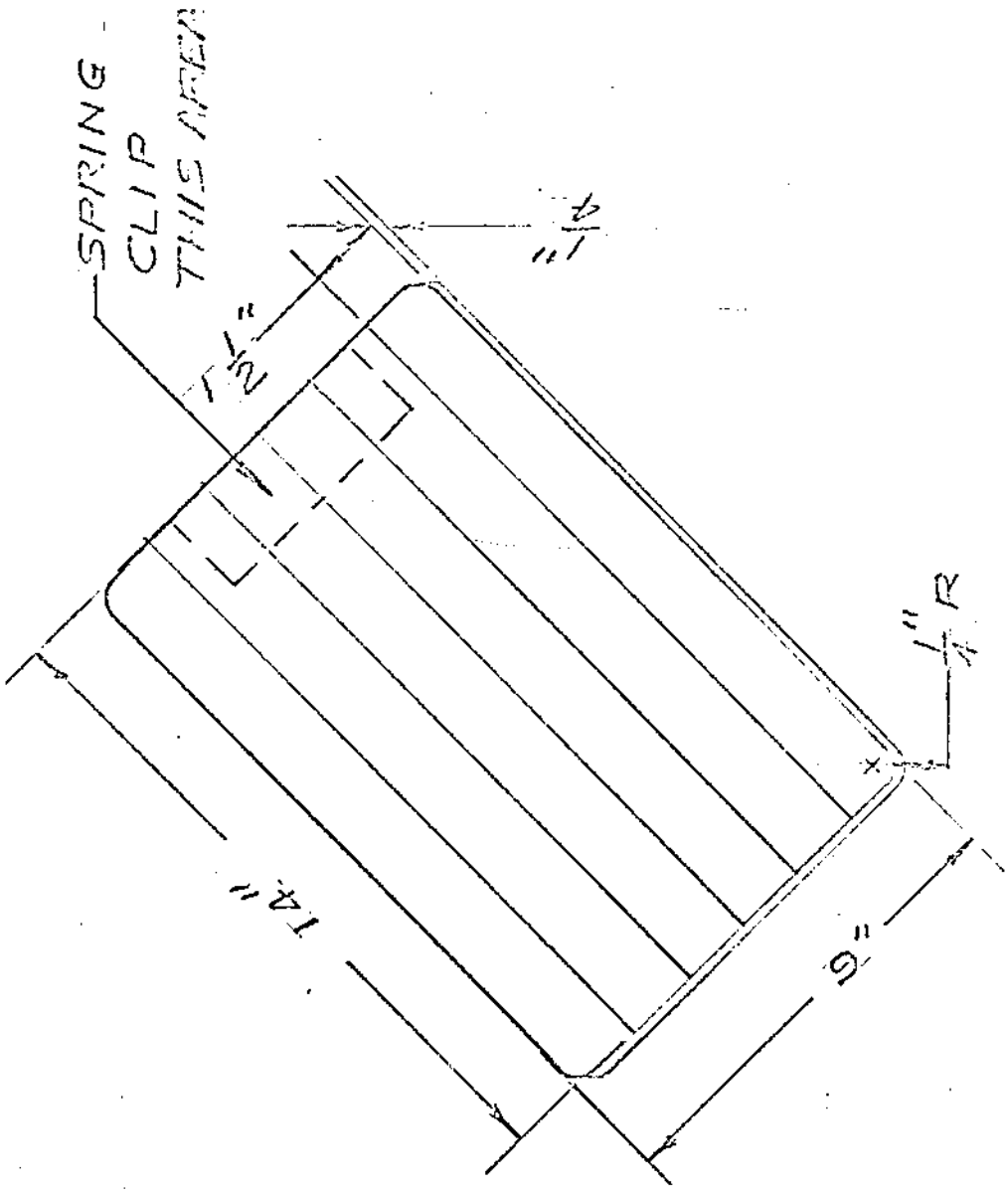


Fig. 30--Clip board, suitability considered below average for junior high level.

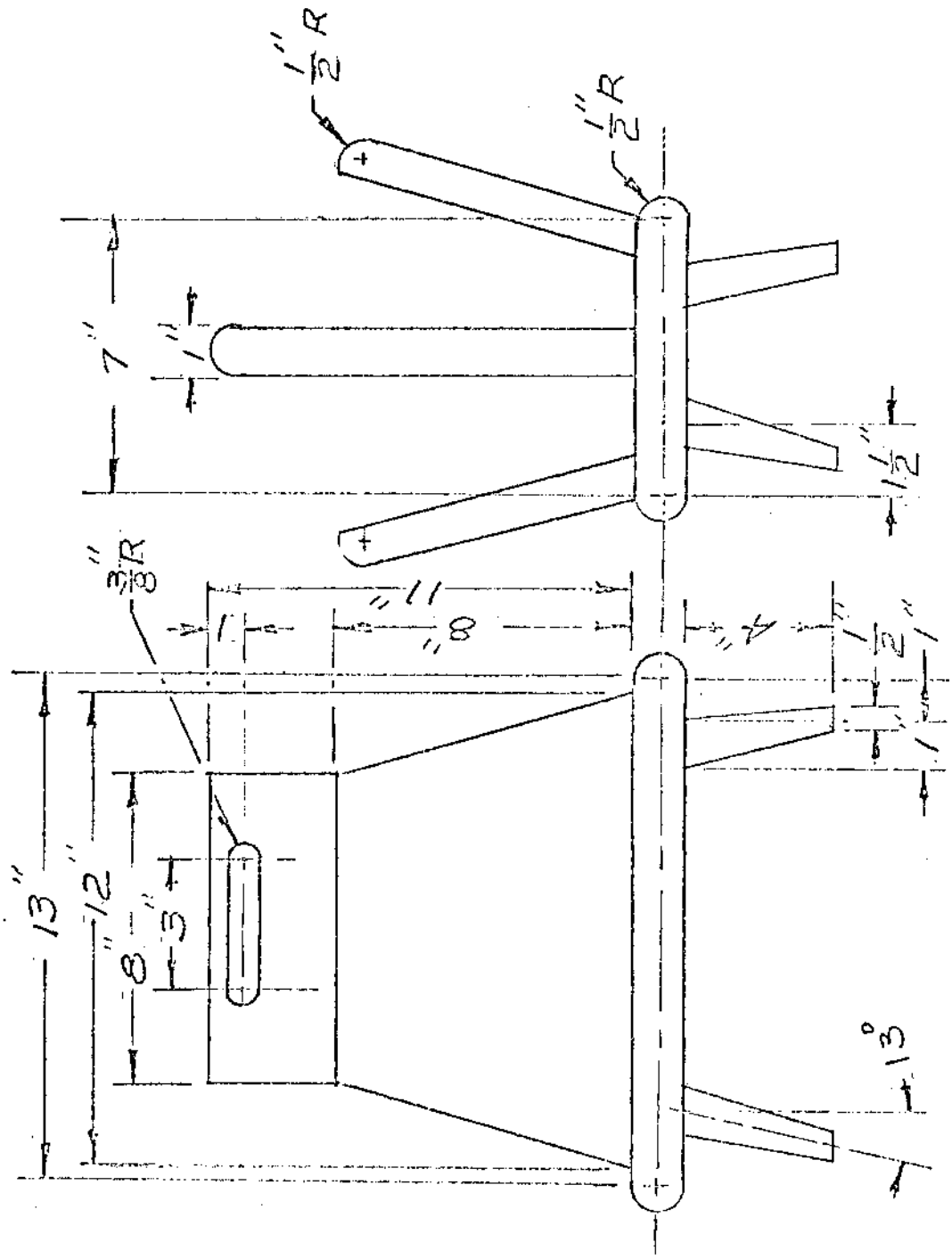


Fig. 31--Magazine rack, suitability considered average for junior high level.

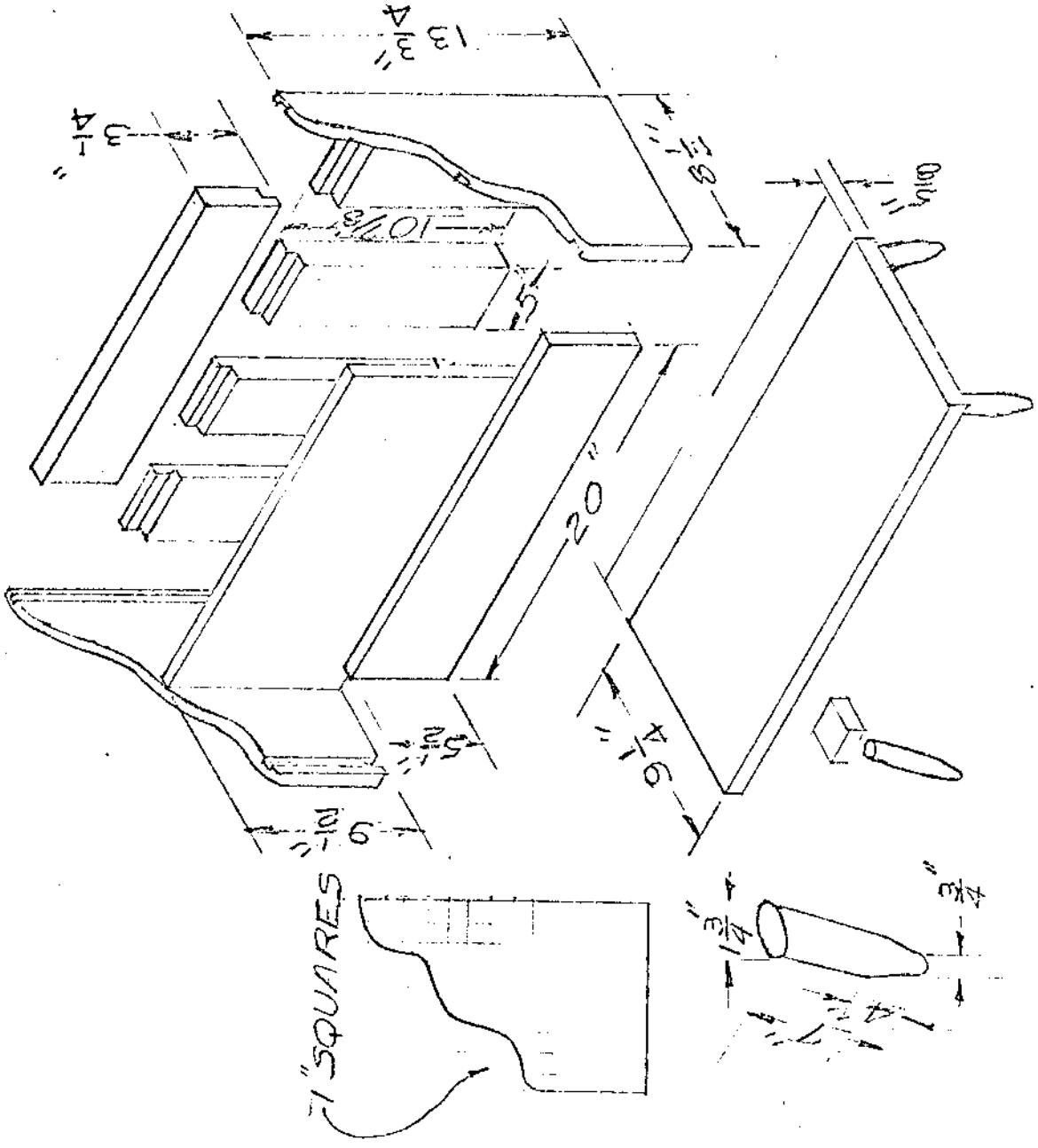


Fig. 32--Magazine rack, suitability considered average for junior high level.

APPENDIX B

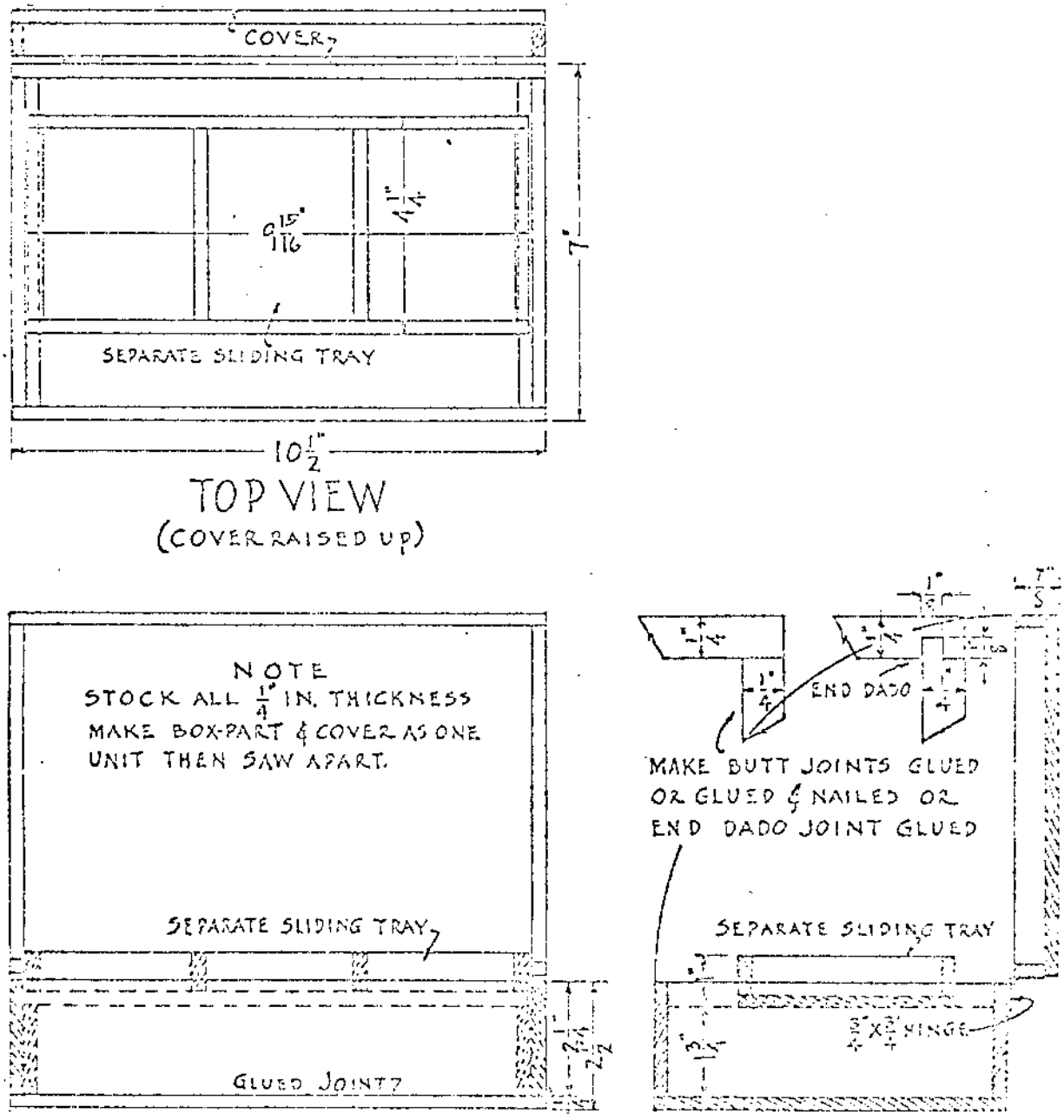


Fig. 33--Jewel box, suitability considered average for junior high-high school level.

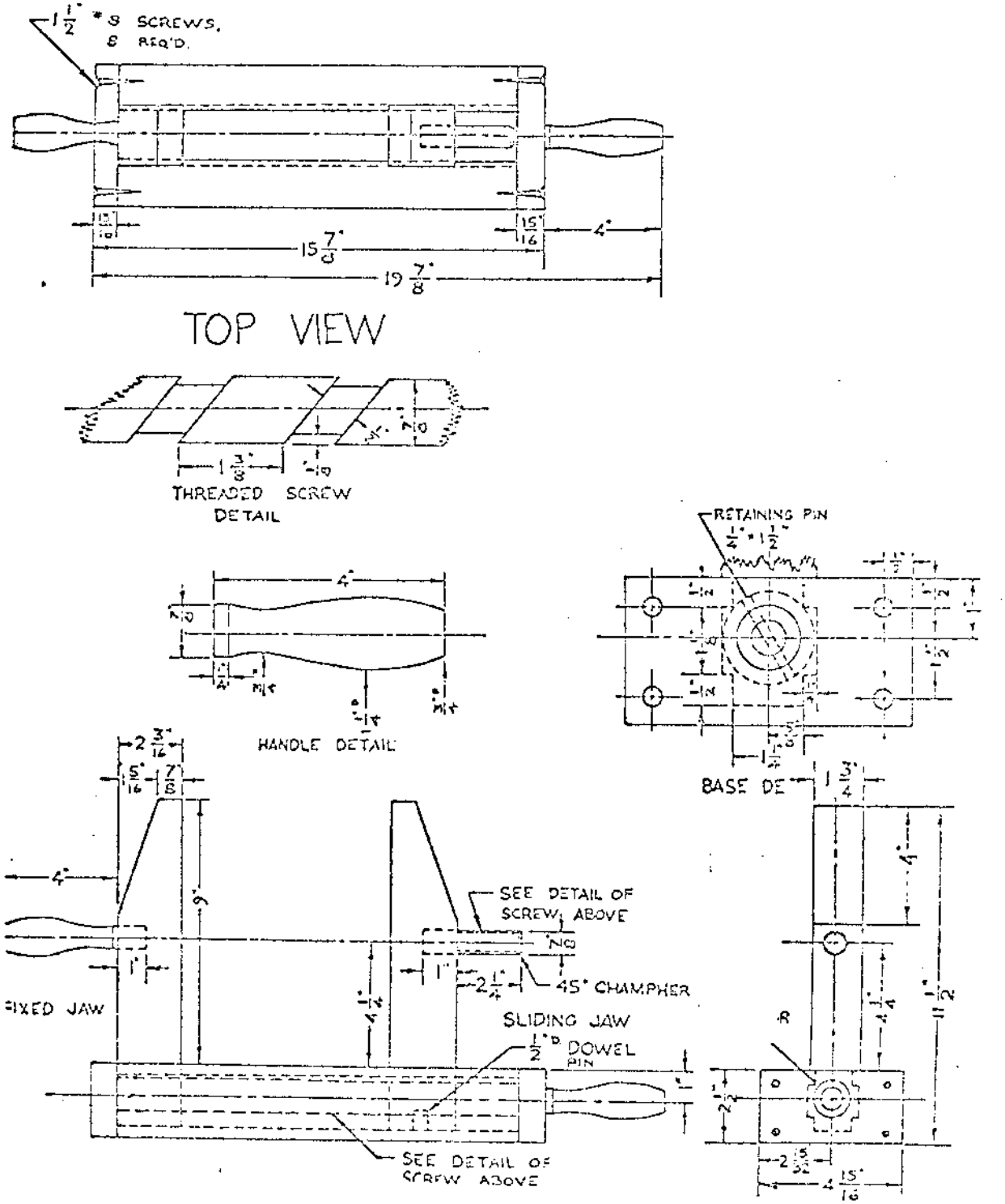


Fig. 34---Book ends, suitability considered average for junior high-high school level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

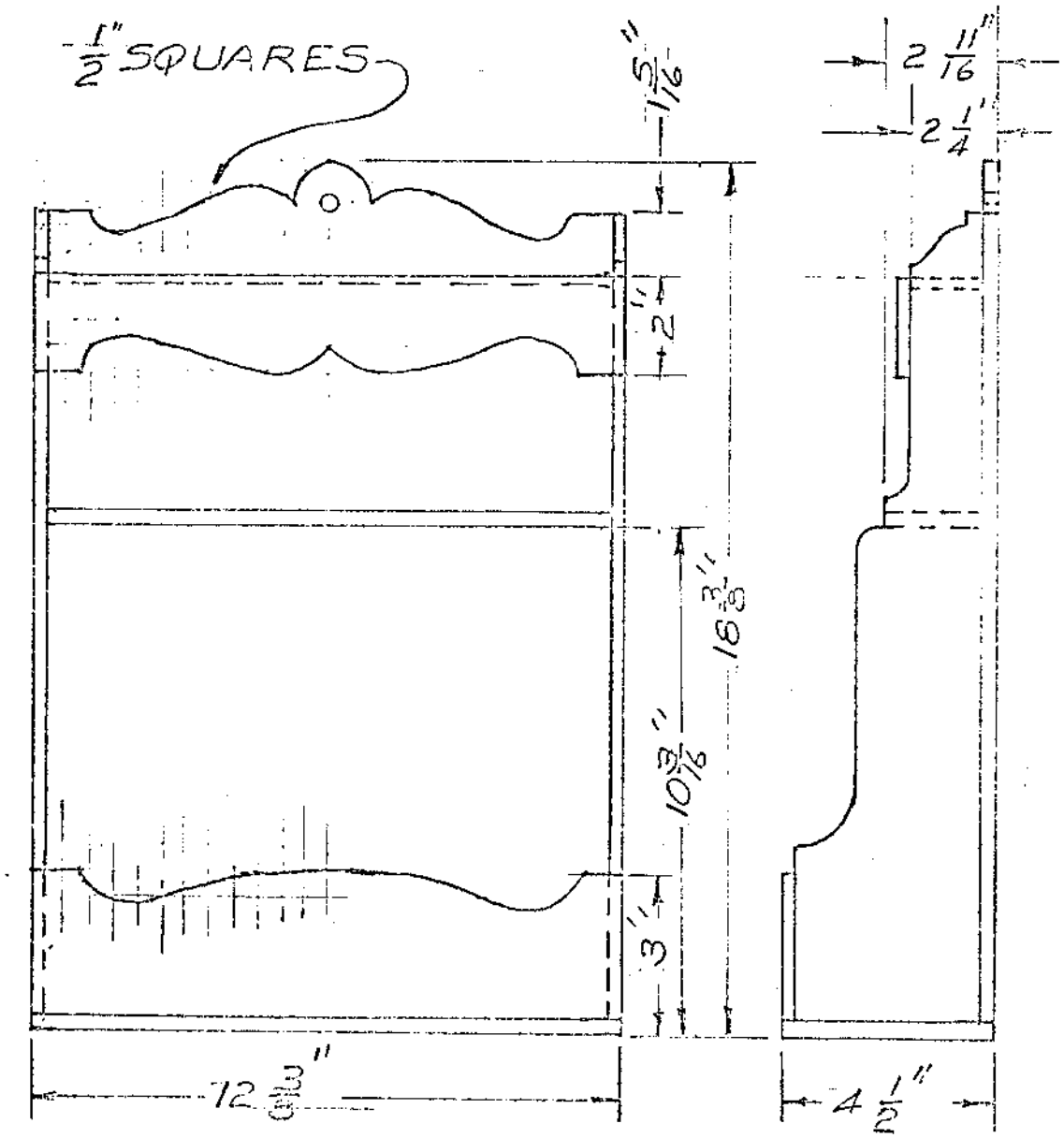


Fig. 35--Wall shelf, suitability considered average for junior high-high school level.

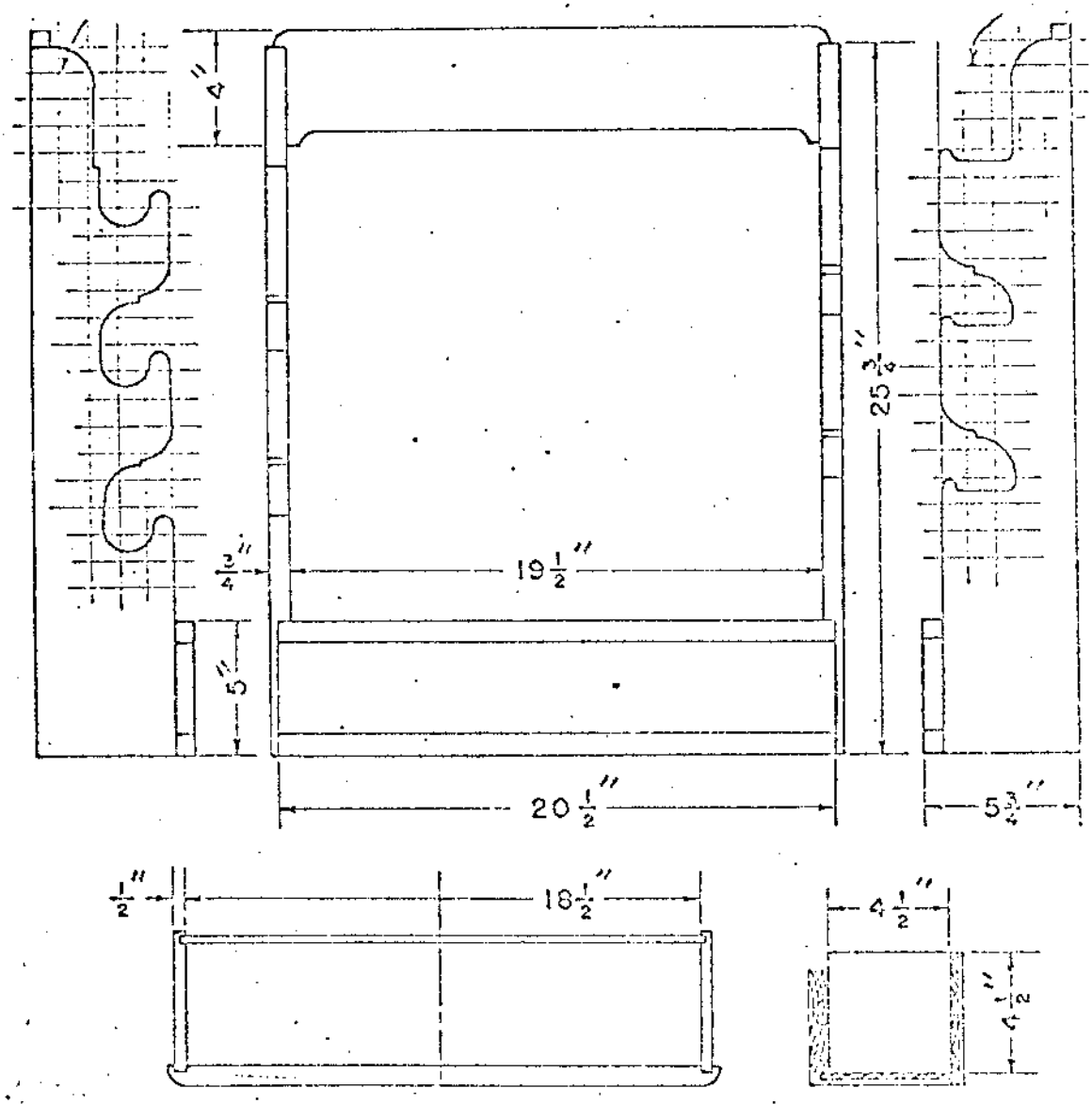


Fig. 36--Gun rack, suitability considered average for junior high-high school level.

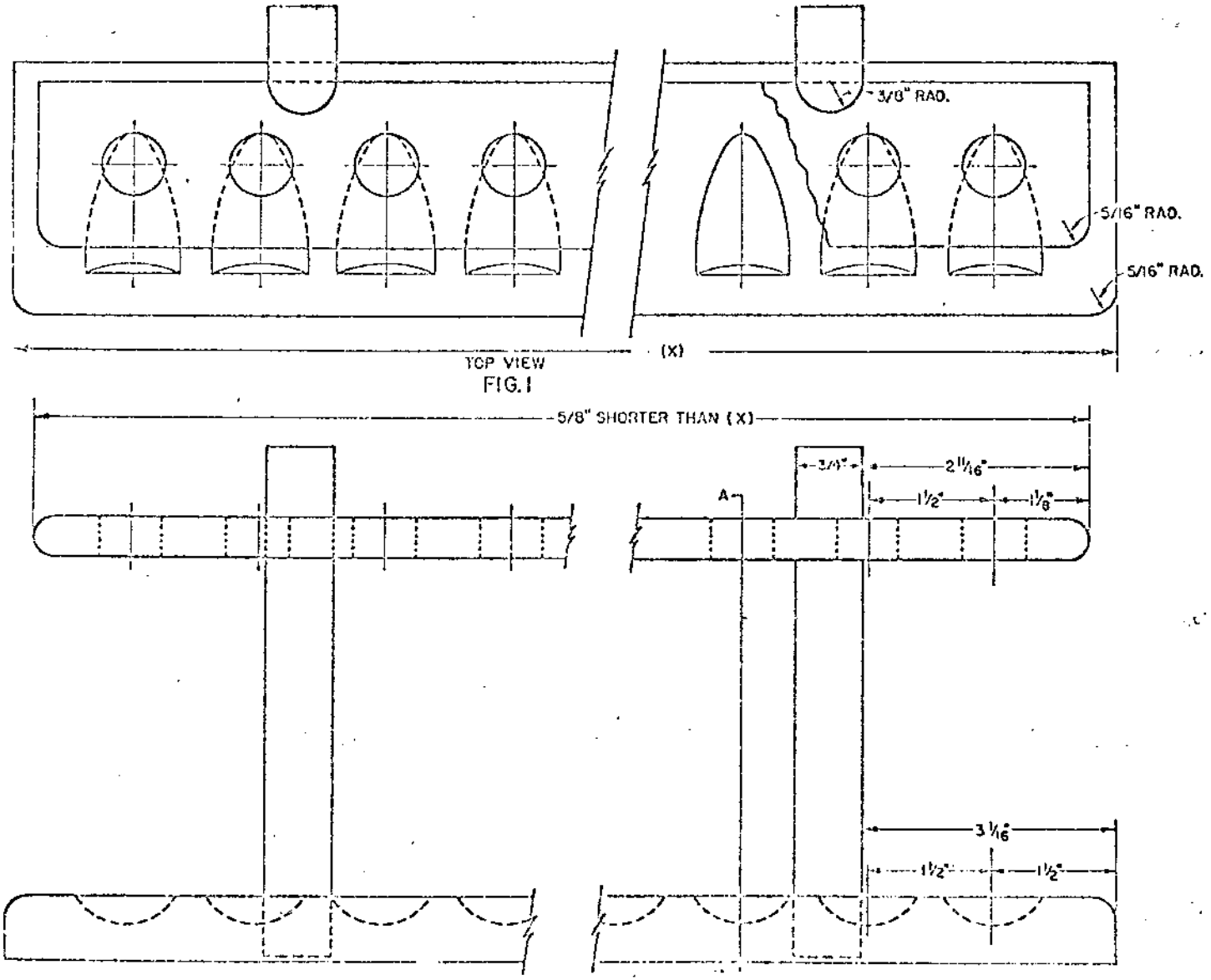


Fig. 37--Pipe rack, suitability considered average for junior high-high school level.

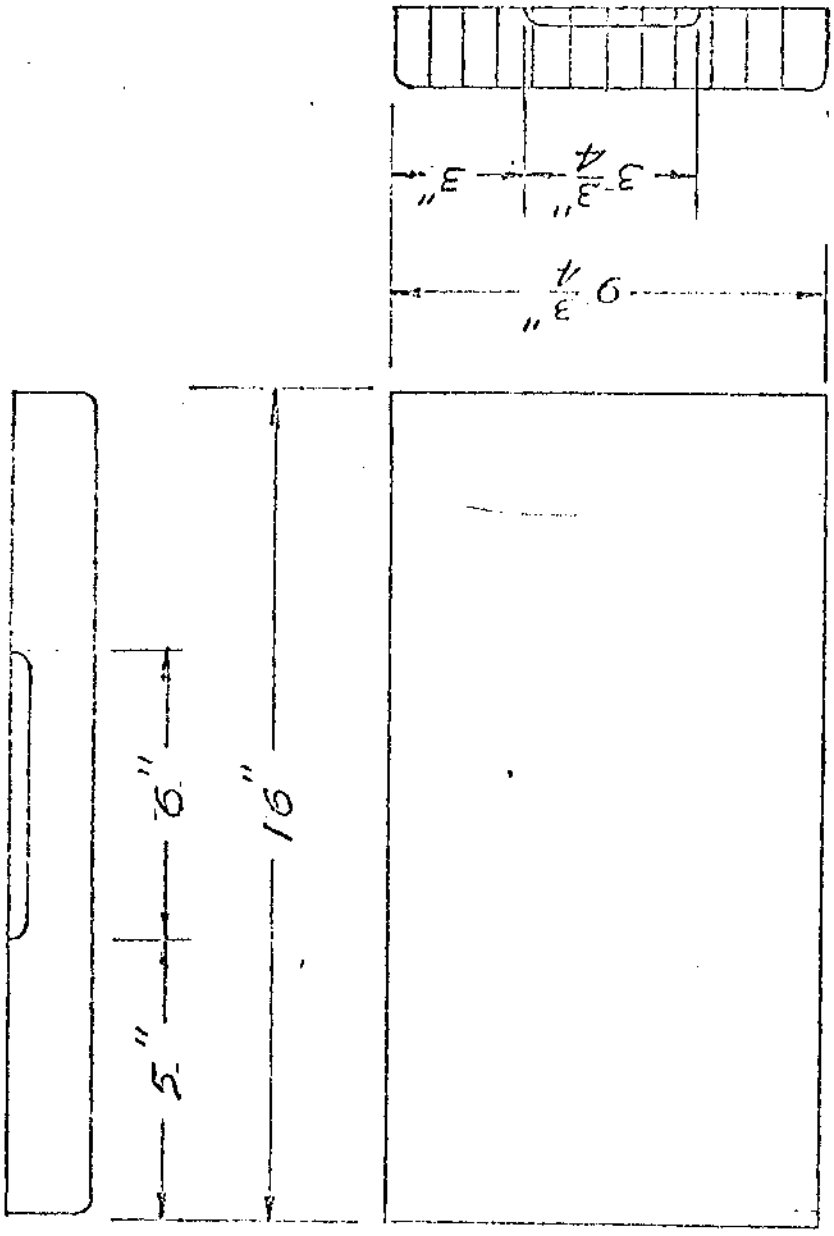


Fig. 38--Cutting board, suitability considered below average for junior high-high school level.

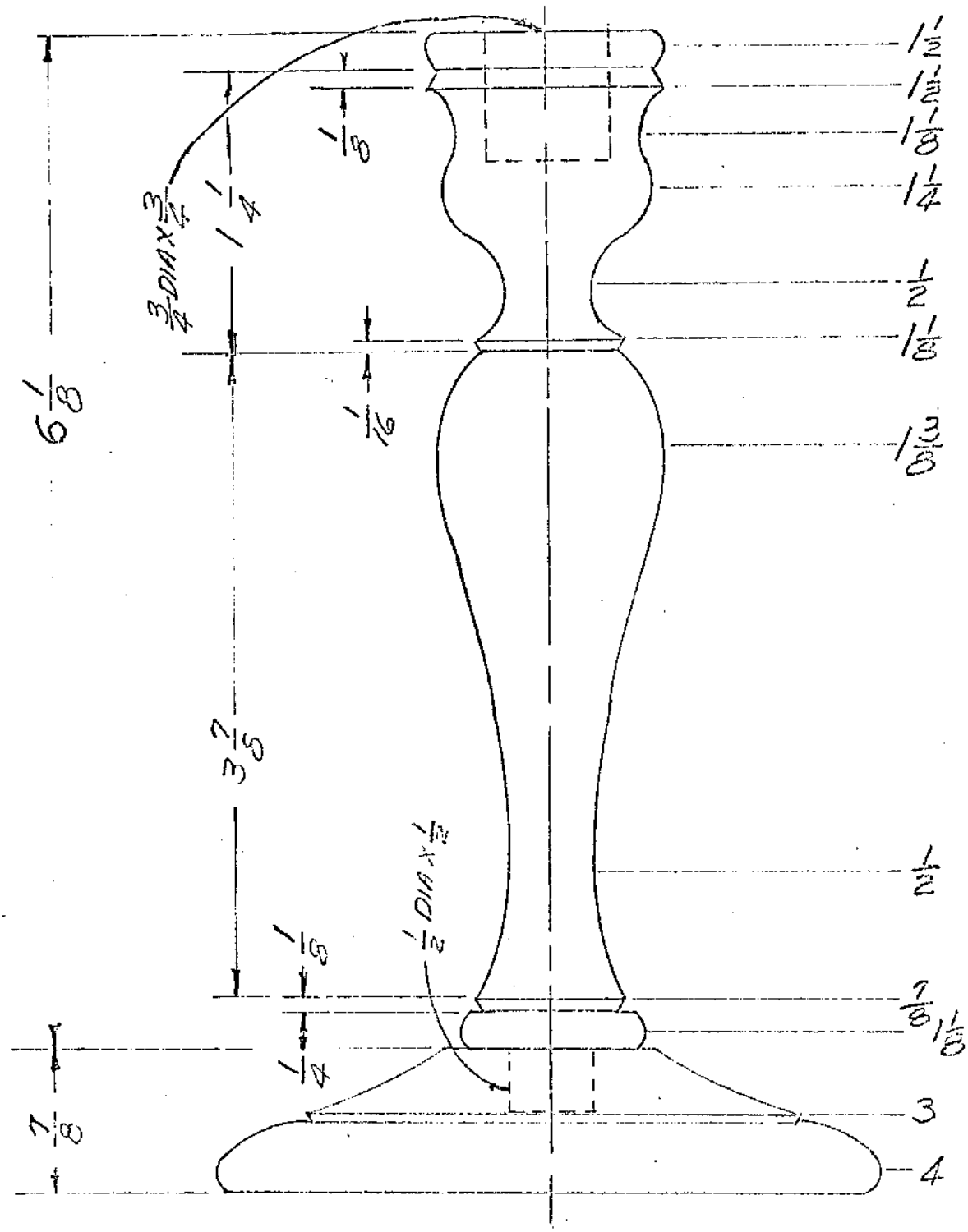


Fig. 39--Candlestick, suitability considered average for junior high-high school level.

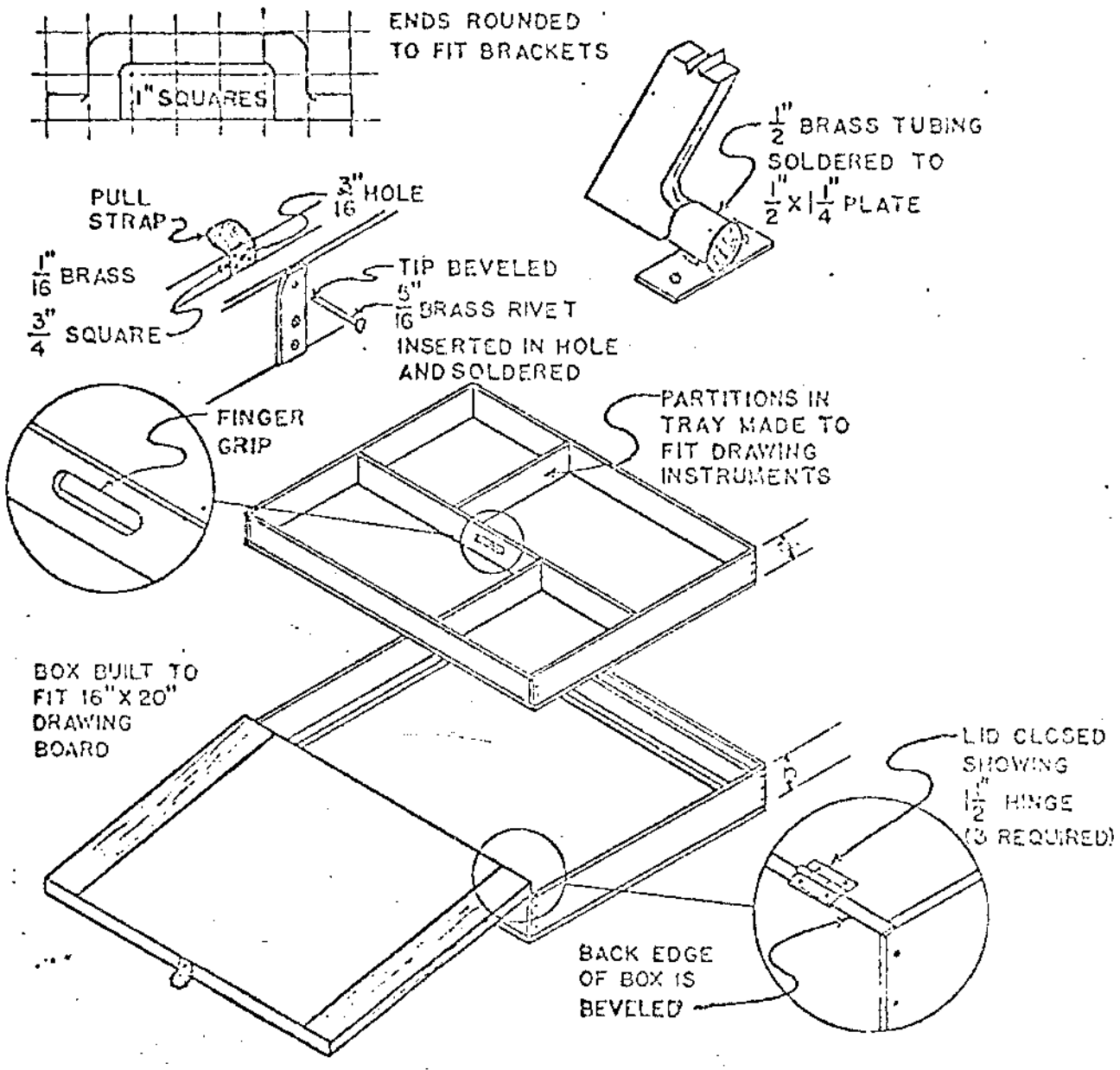


Fig. 40--Drafting kit, suitability considered average for junior high-high school level.

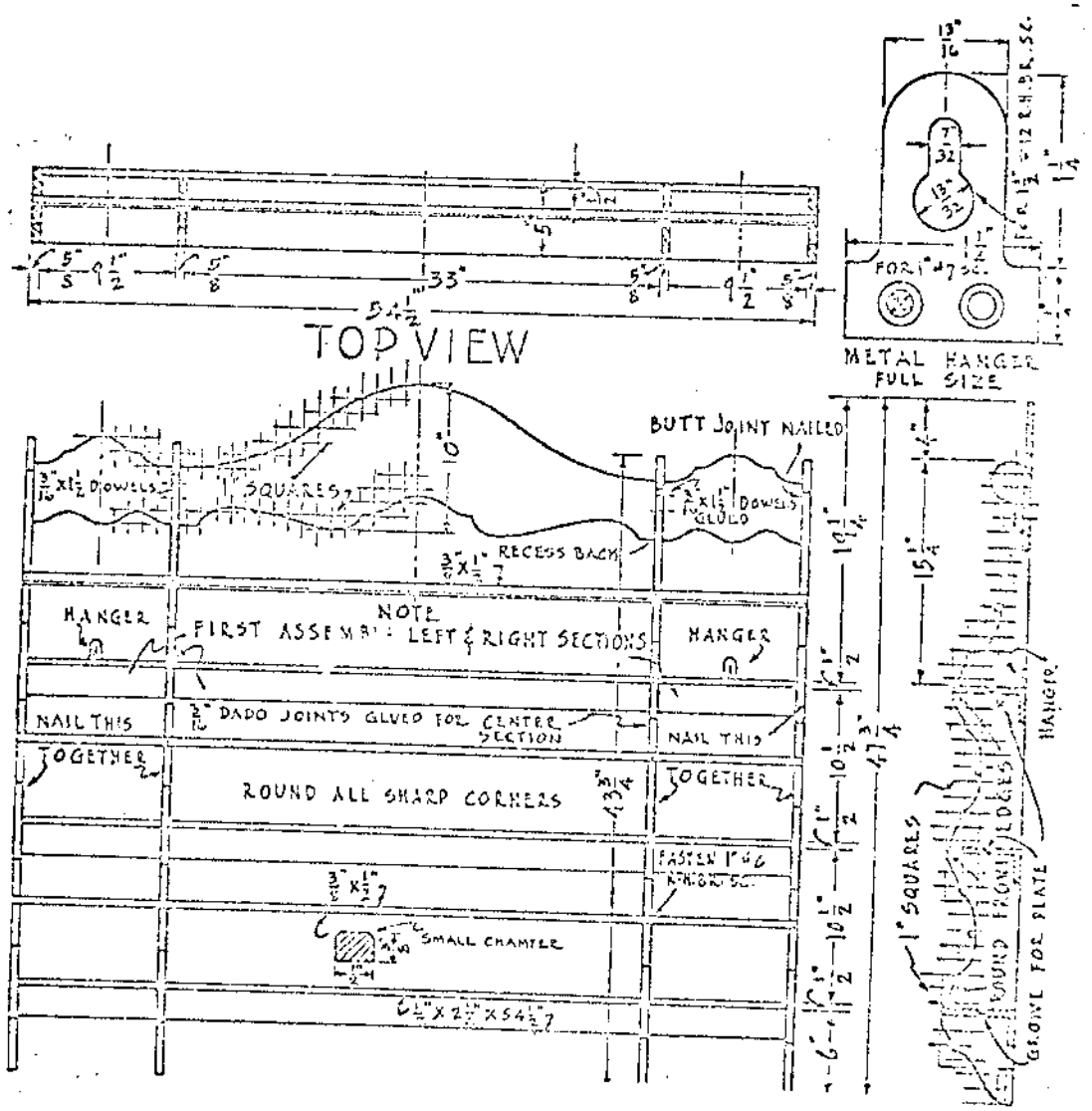


Fig. 41--Plate rack, suitability considered average for junior high-high school level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

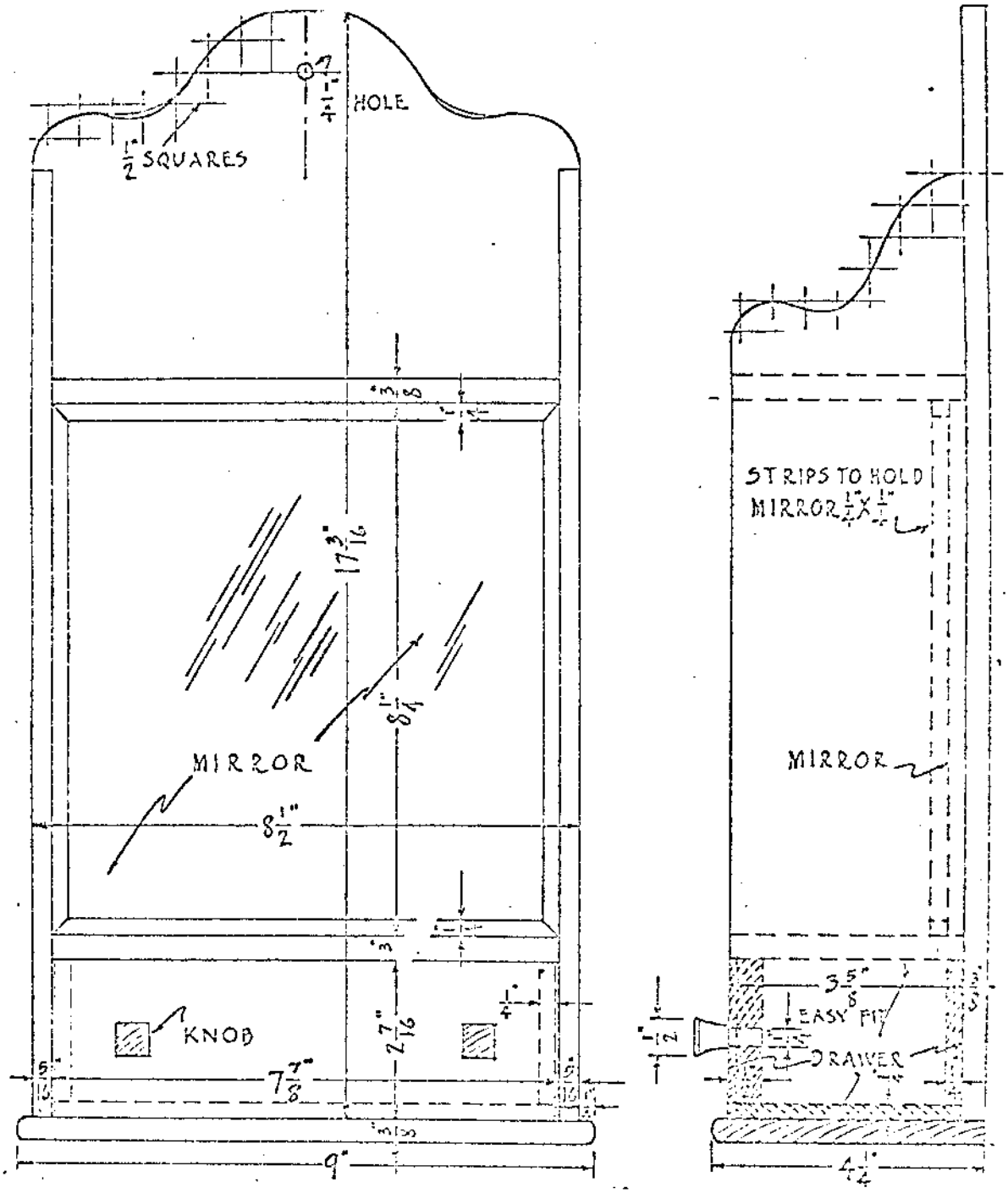


Fig. 42--Mirror, suitability considered below average for junior high-high school level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

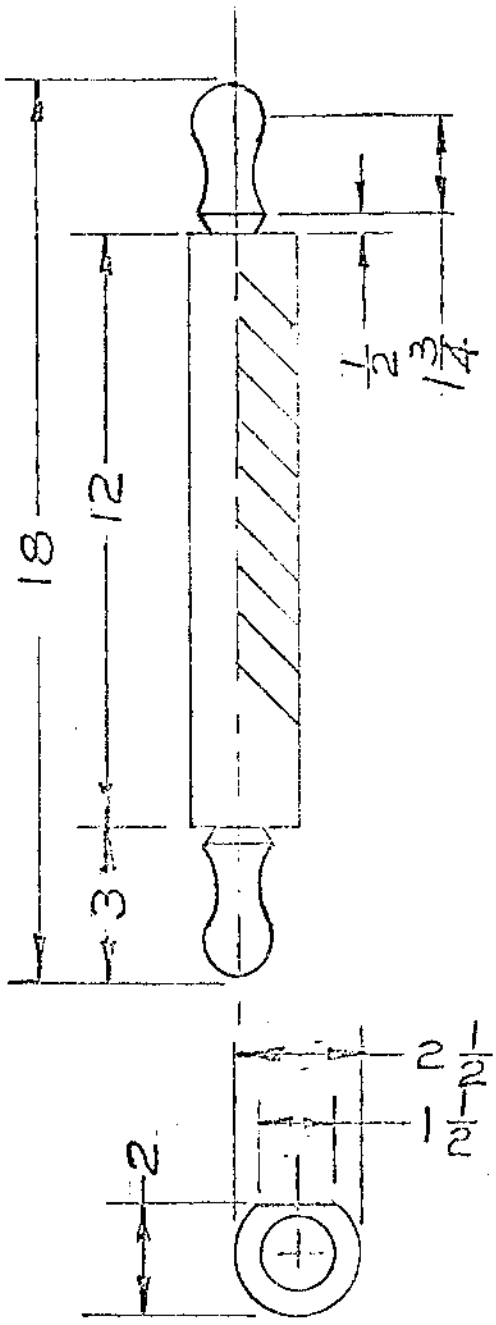


Fig. 43--Private secretary, suitability considered below average for junior high-high school level.

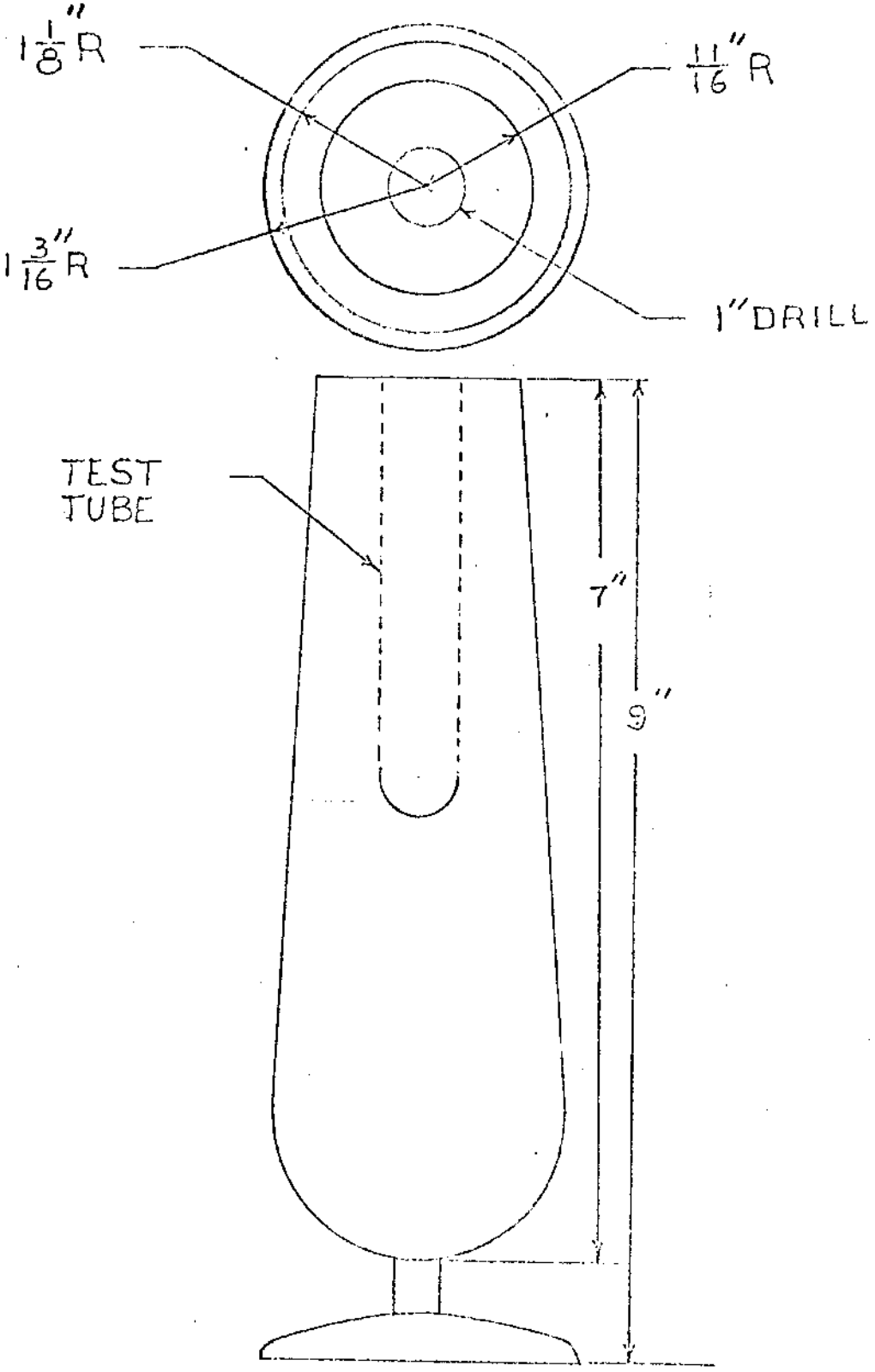


Fig. 44--Bud vase, suitability considered average for junior high-high school level.

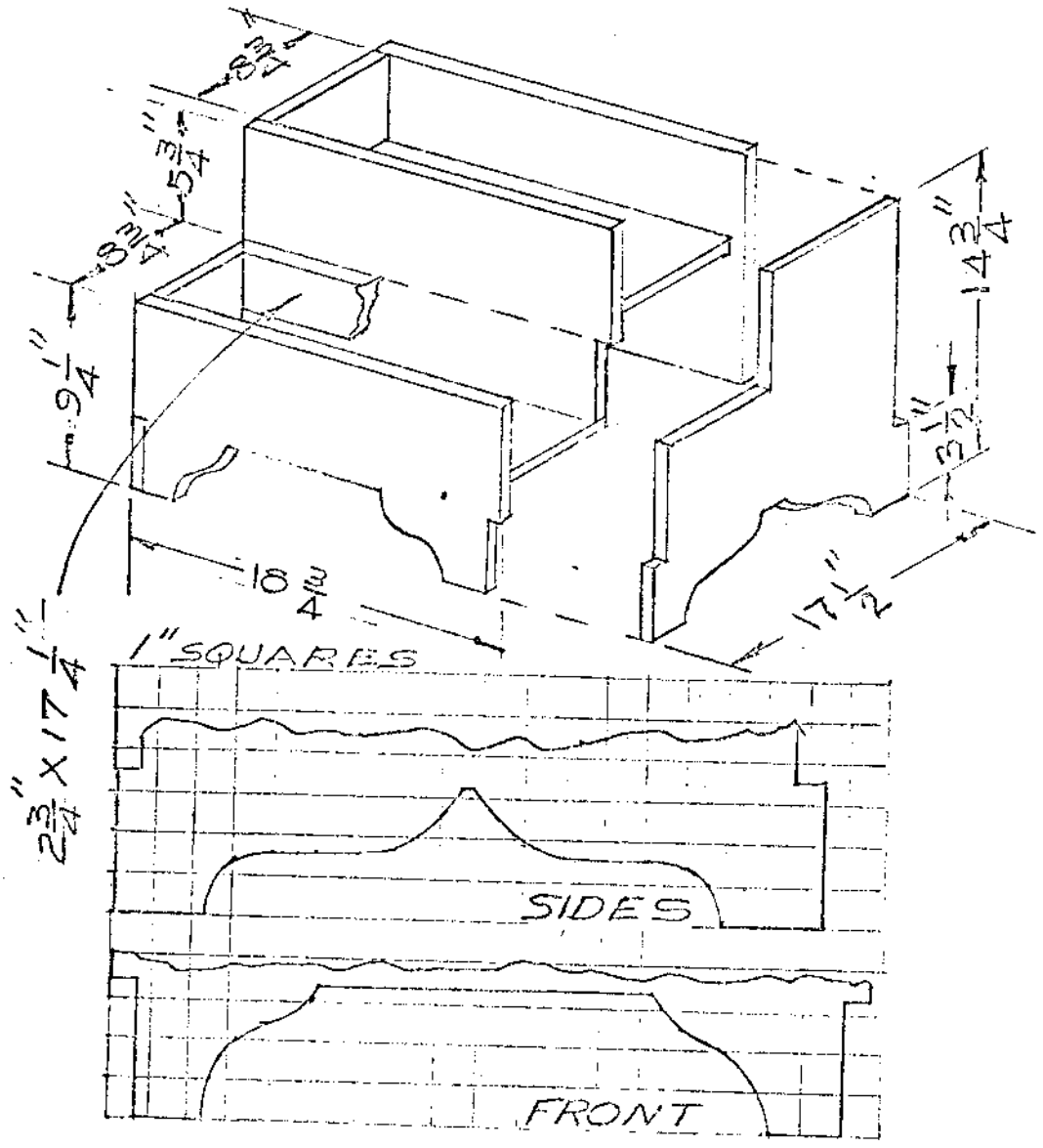


Fig. 45--Pine planter, suitability considered average for junior high-high school level.

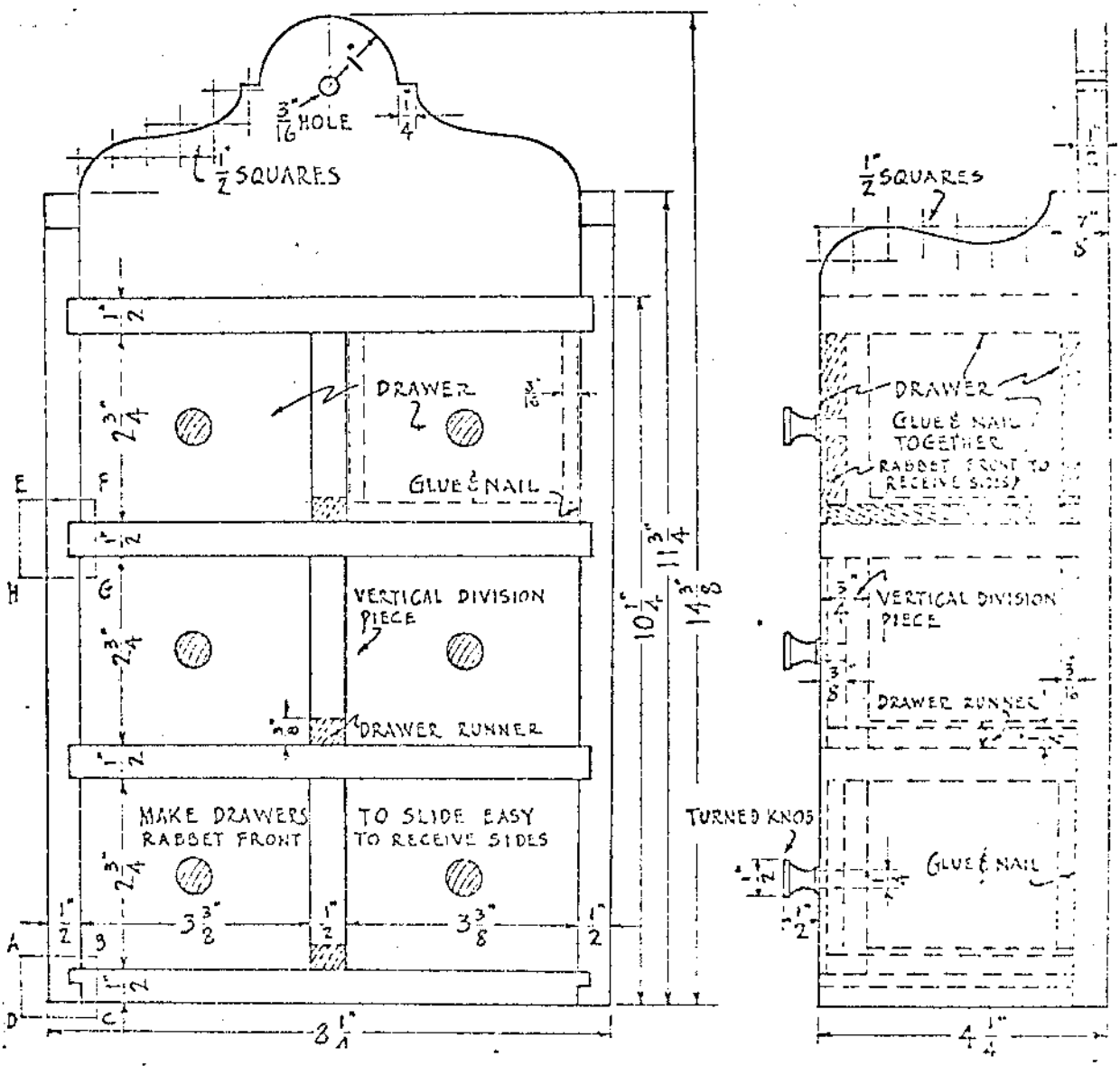


Fig. 46--Wall chest, suitability considered average for junior high-high school level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

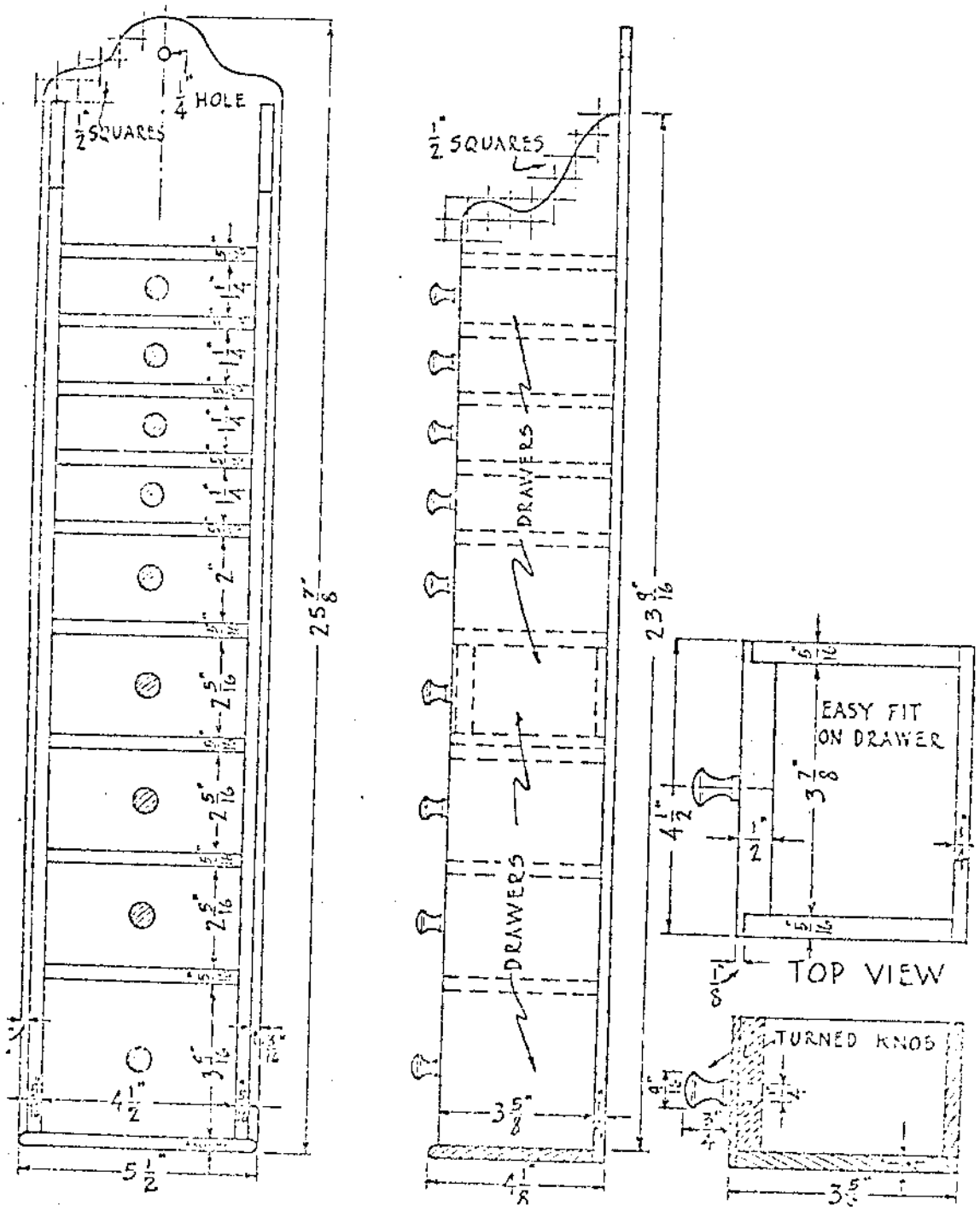


Fig. 47--Spice rack, suitability considered average for junior high-high school level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

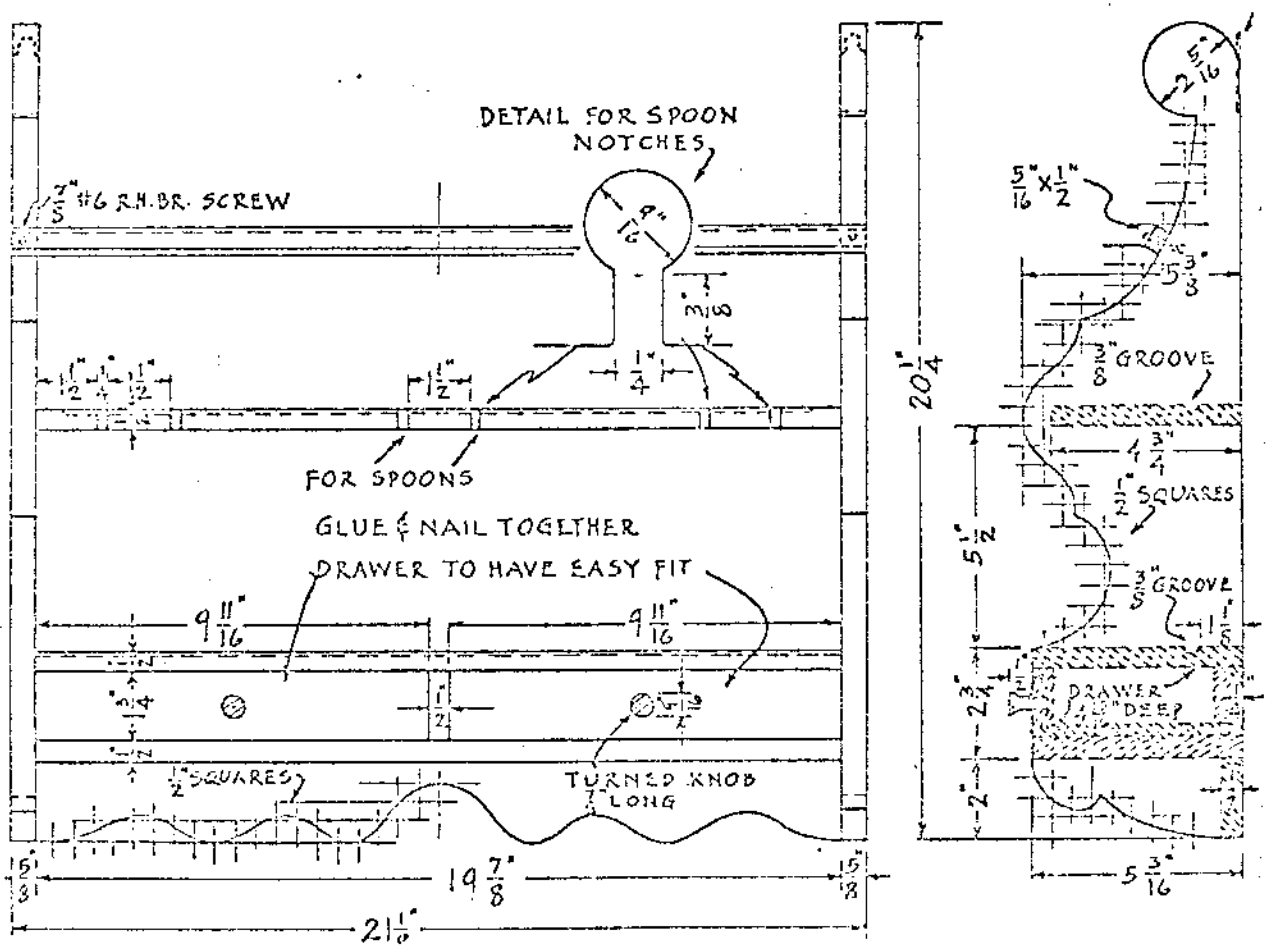


Fig. 48--Plate and spoon rack, suitability considered average for junior high-high school level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

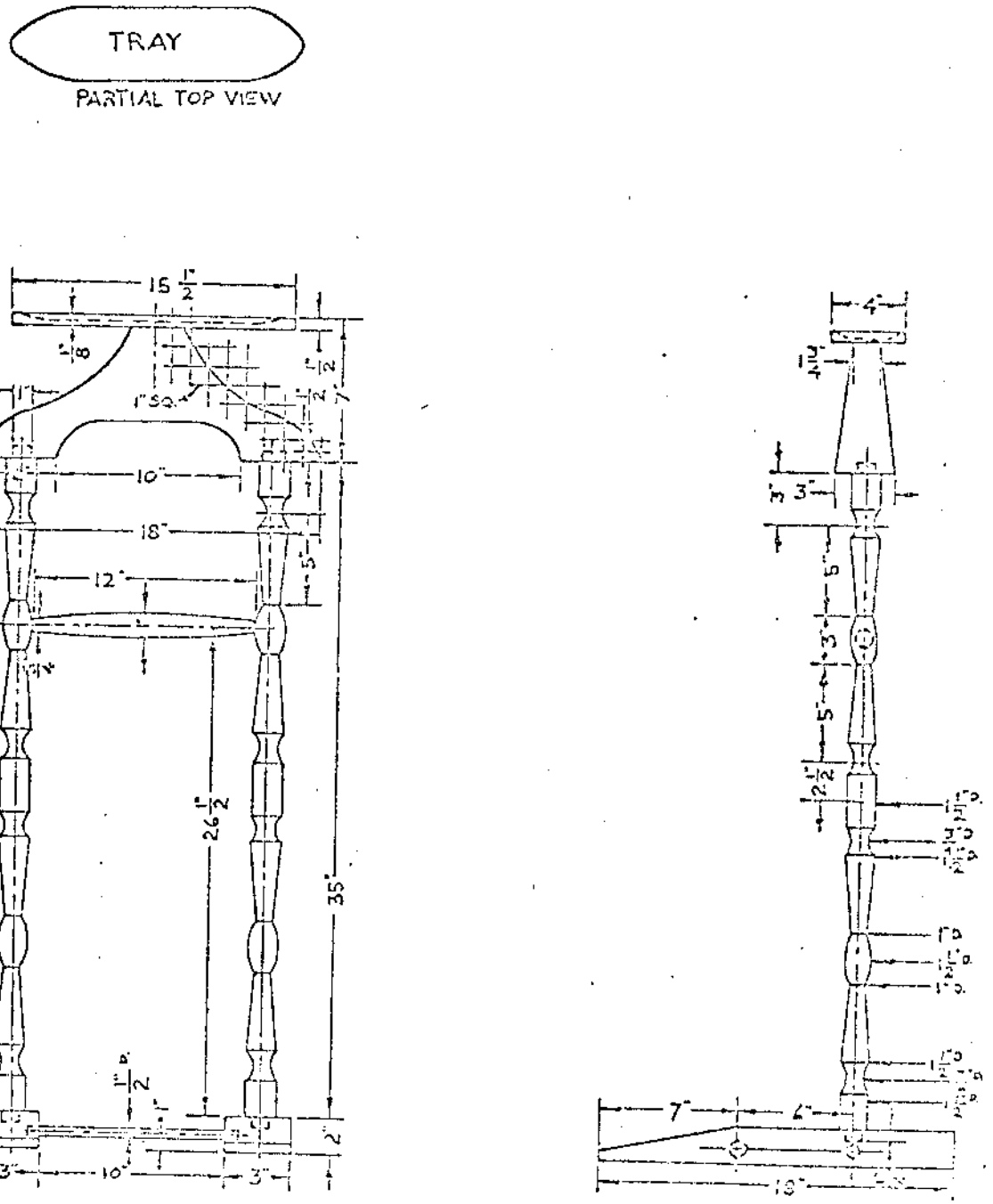


Fig. 49--Valet, suitability considered average for junior high-high school level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

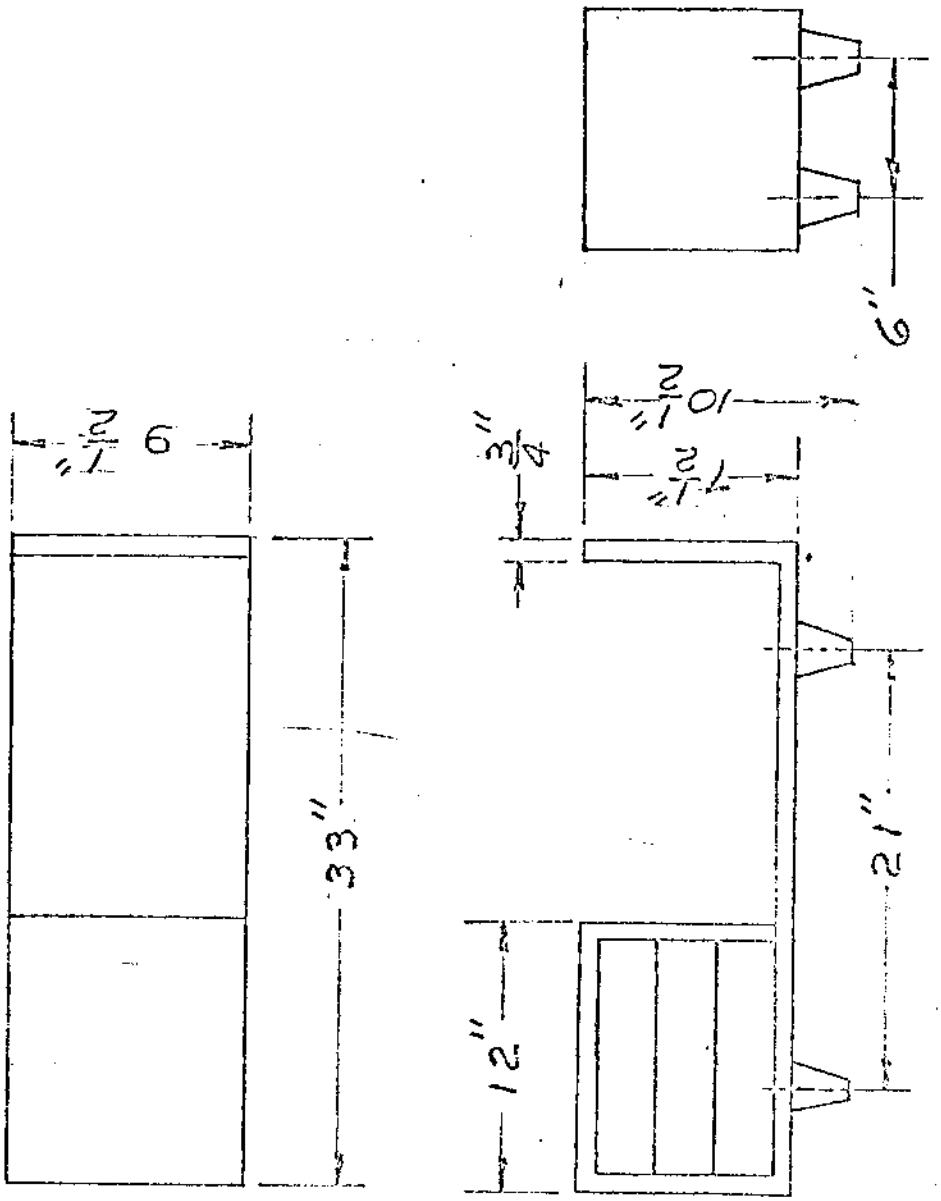


Fig. 50--Night table, suitability considered below average for junior high-high school level.

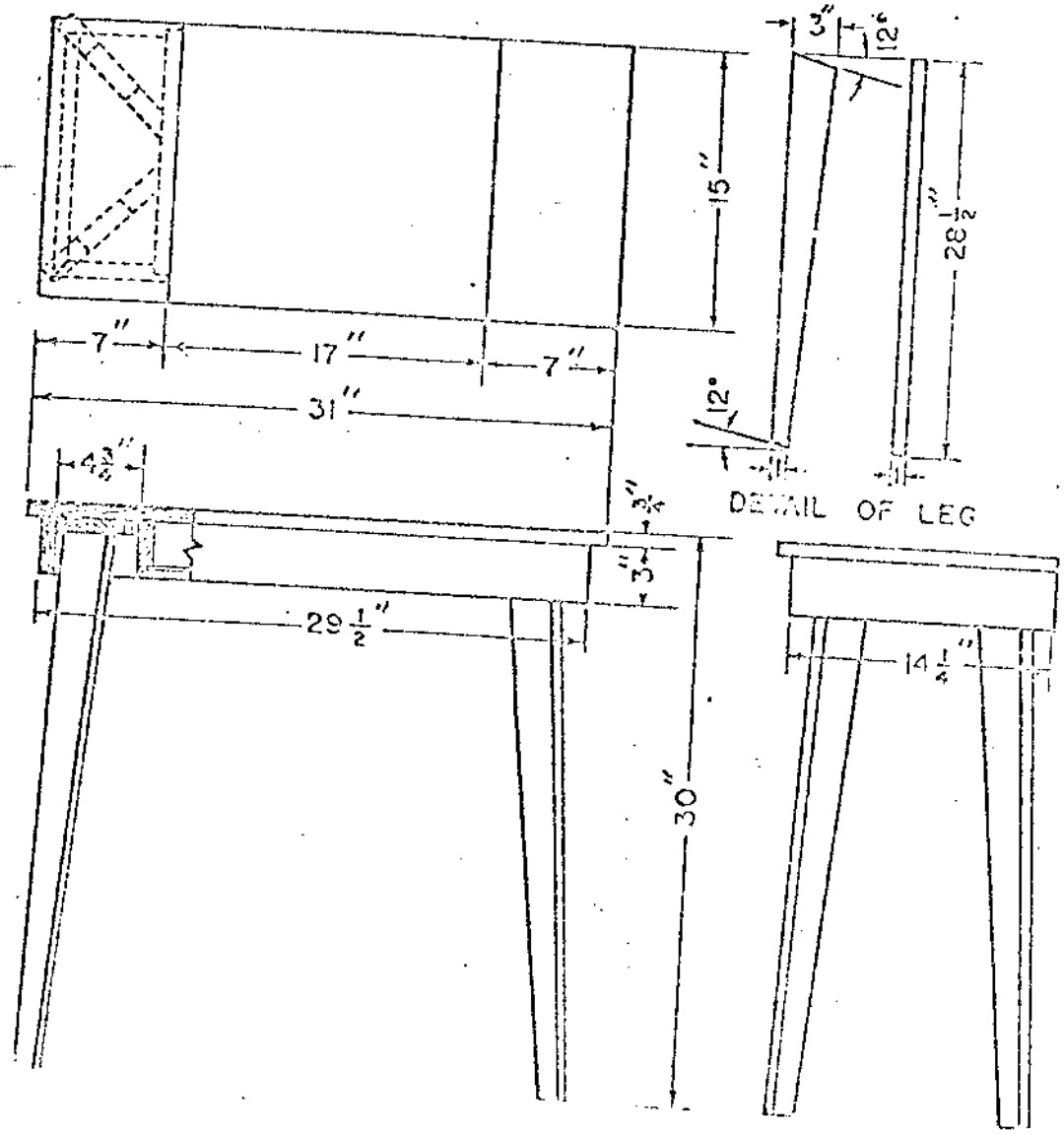


Fig. 51--Vanity table, suitability considered average for junior high-high school level.

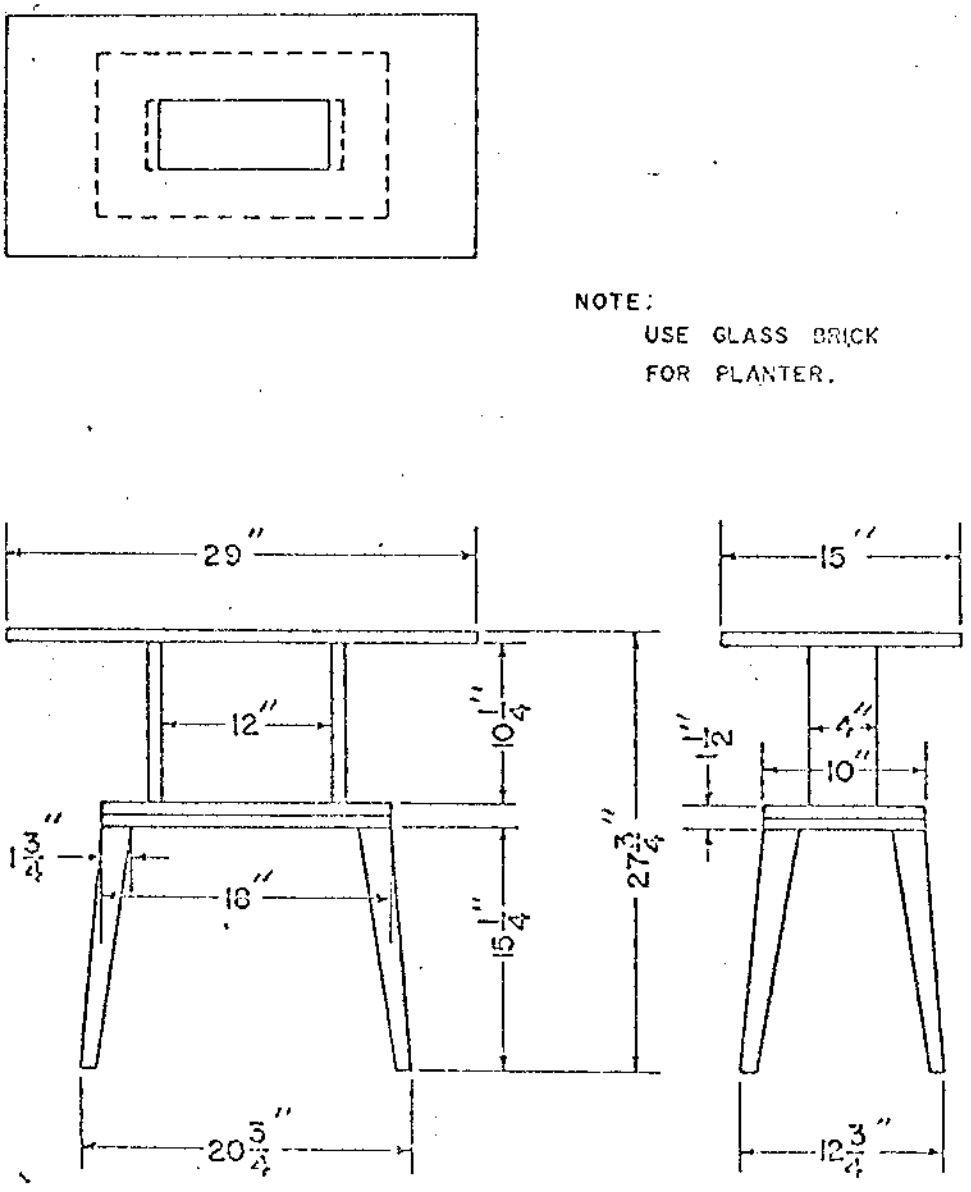


Fig. 52--Planter table, suitability considered average for junior high-high school level.

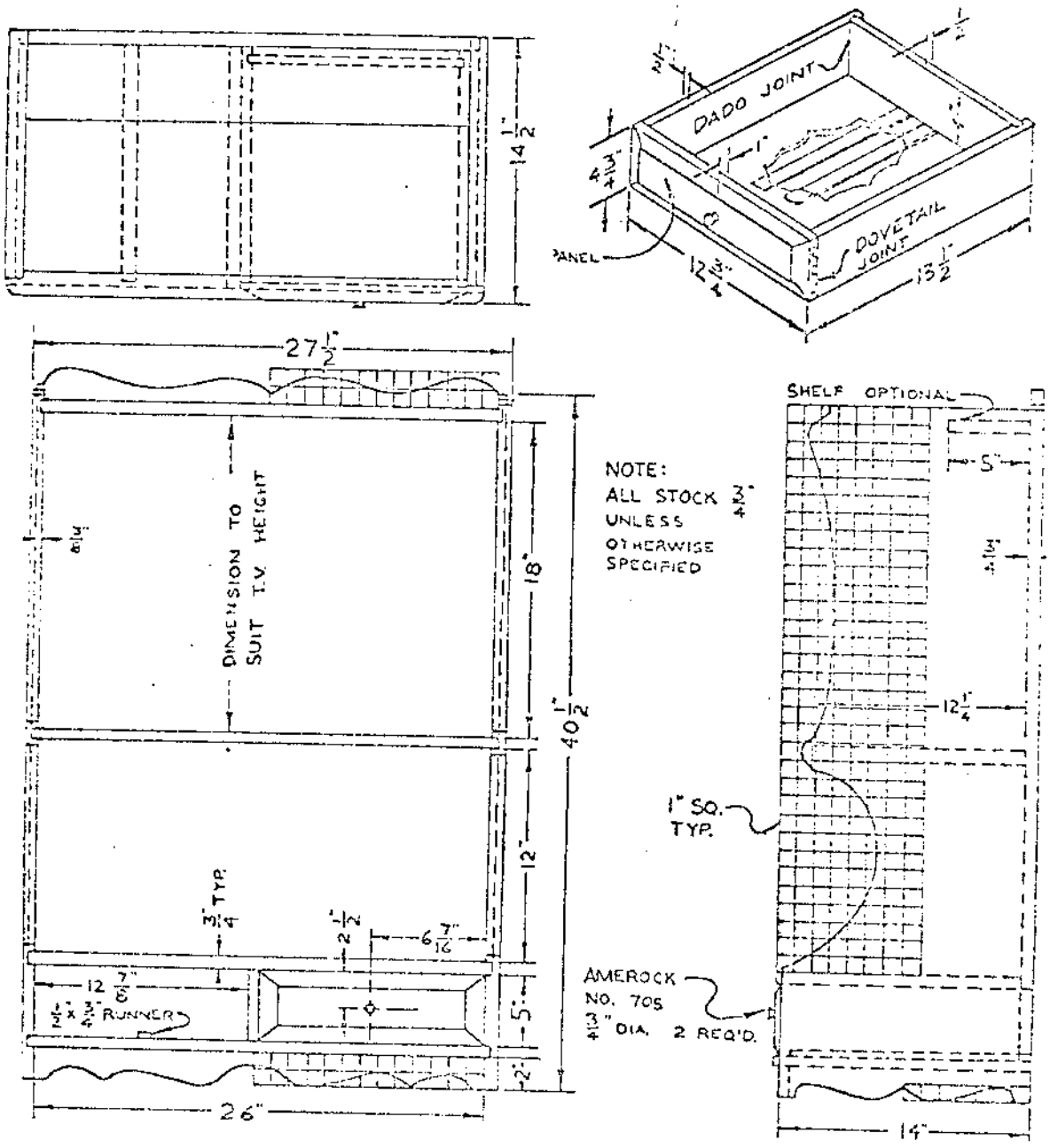


Fig. 53--Wall shelf, suitability considered average for junior high-high school level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

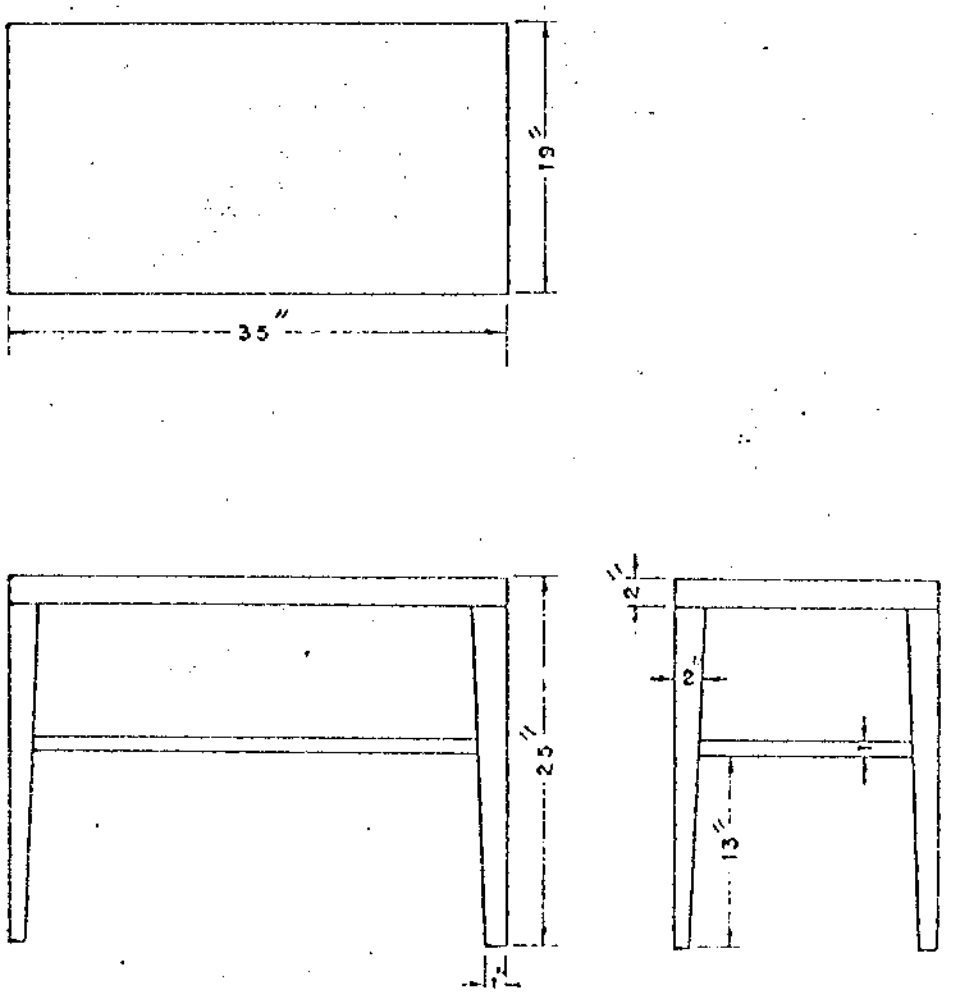


Fig. 54--End table, suitability considered average for junior high-high school level.

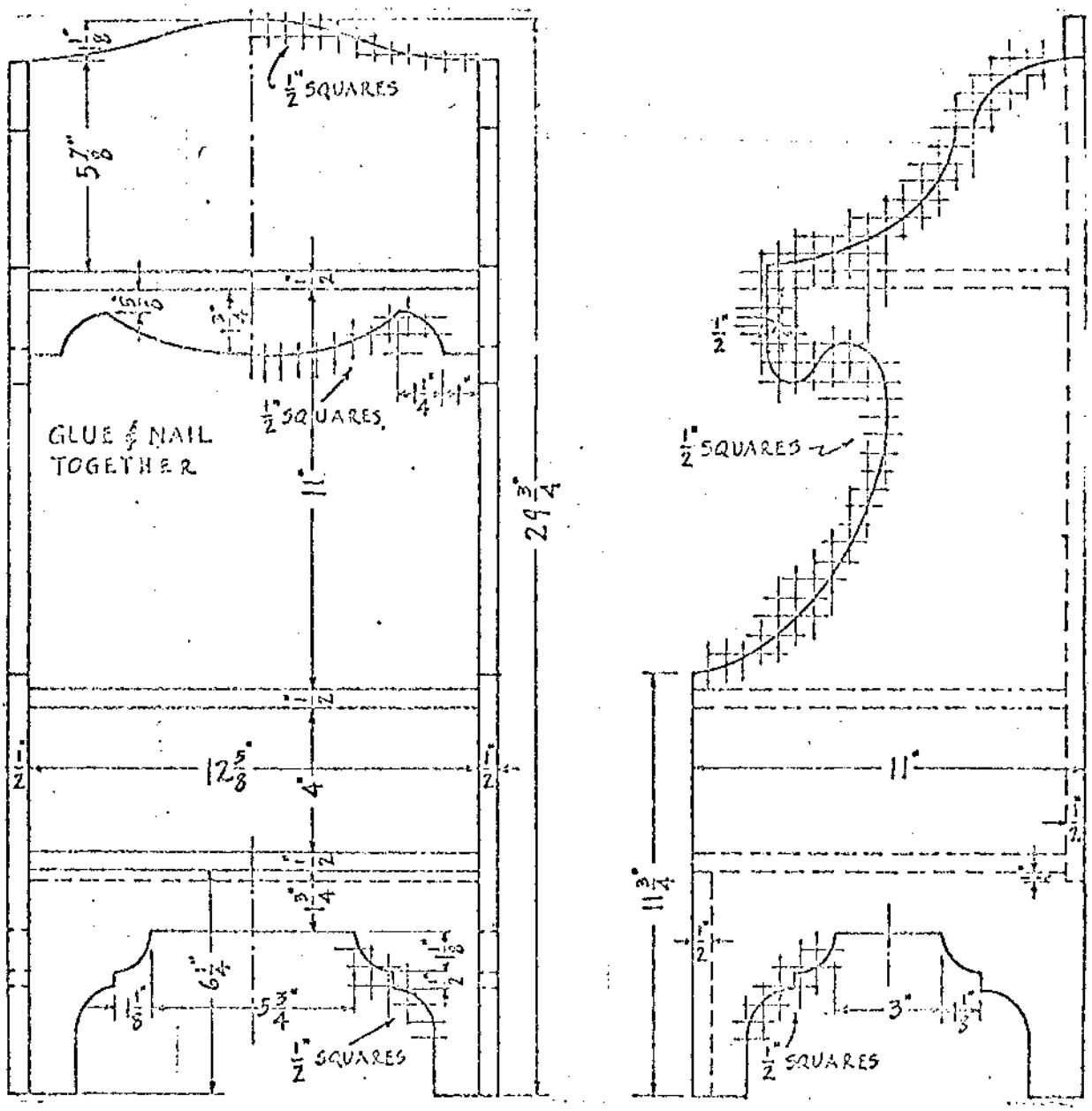


Fig. 55--Wash stand, suitability considered average for junior high-high school level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

APPENDIX C

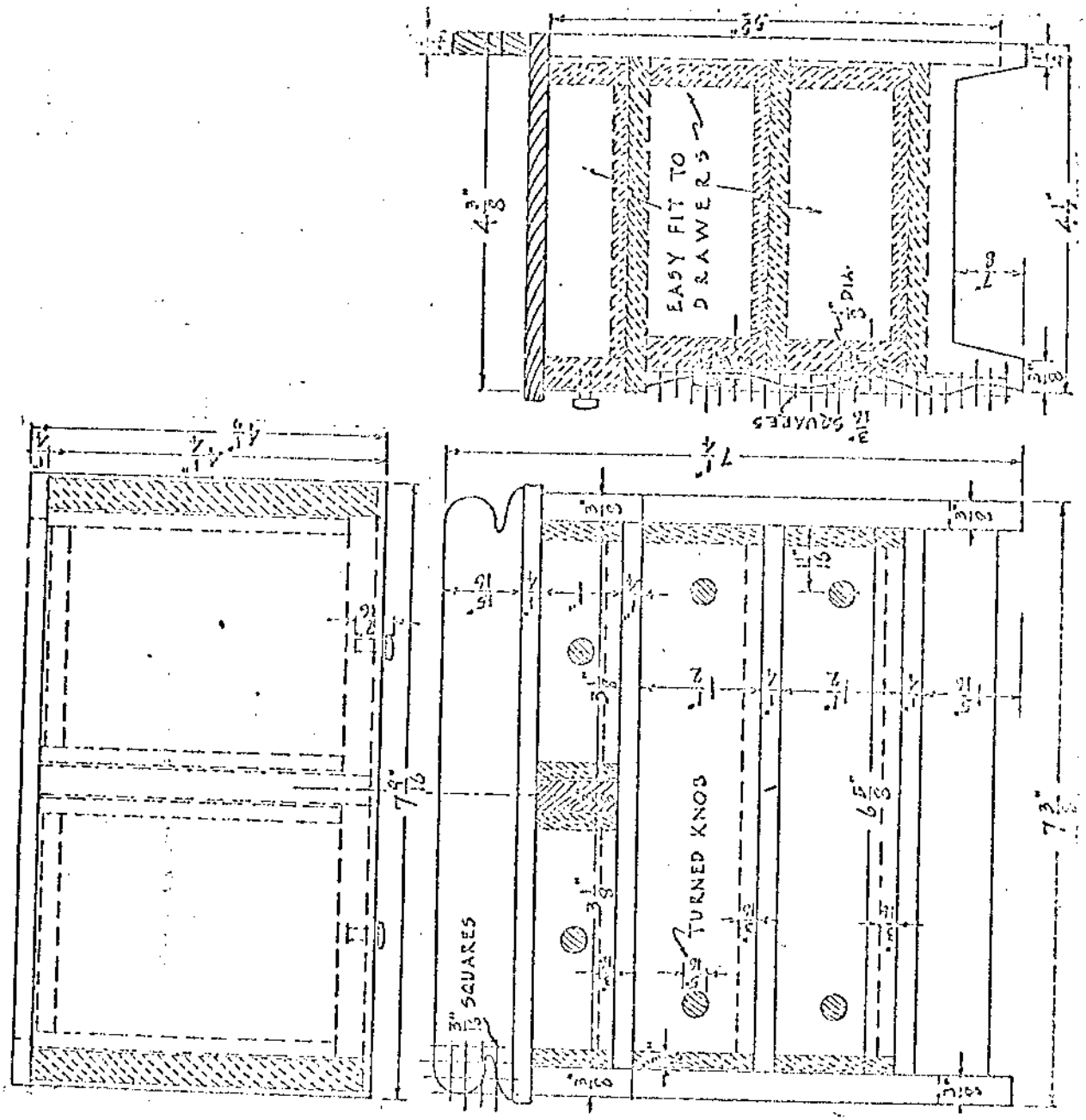


Fig. 56--Dresser chest, suitability considered average for high school level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

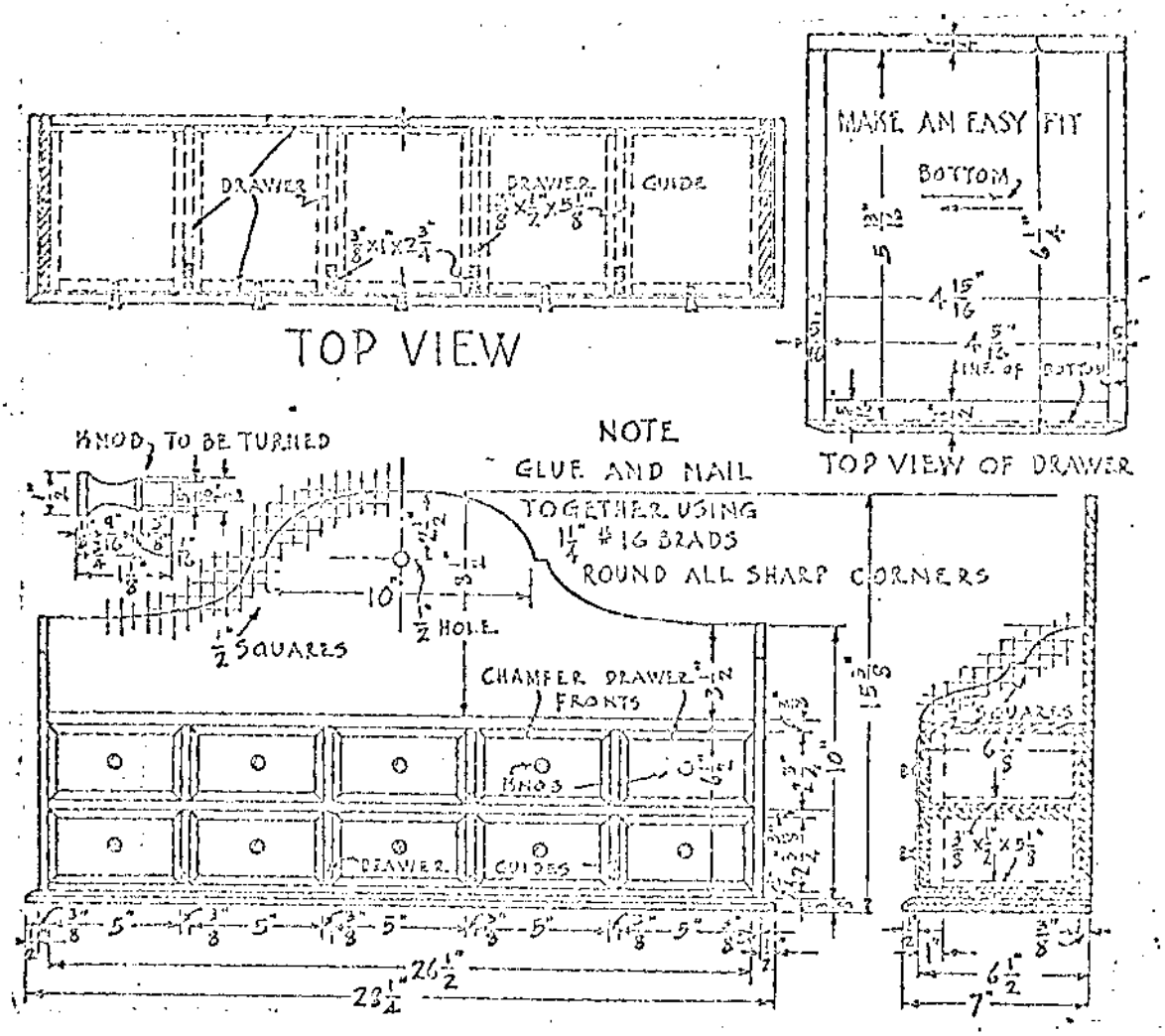


Fig. 57--Spice cabinet, suitability considered average for high school level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

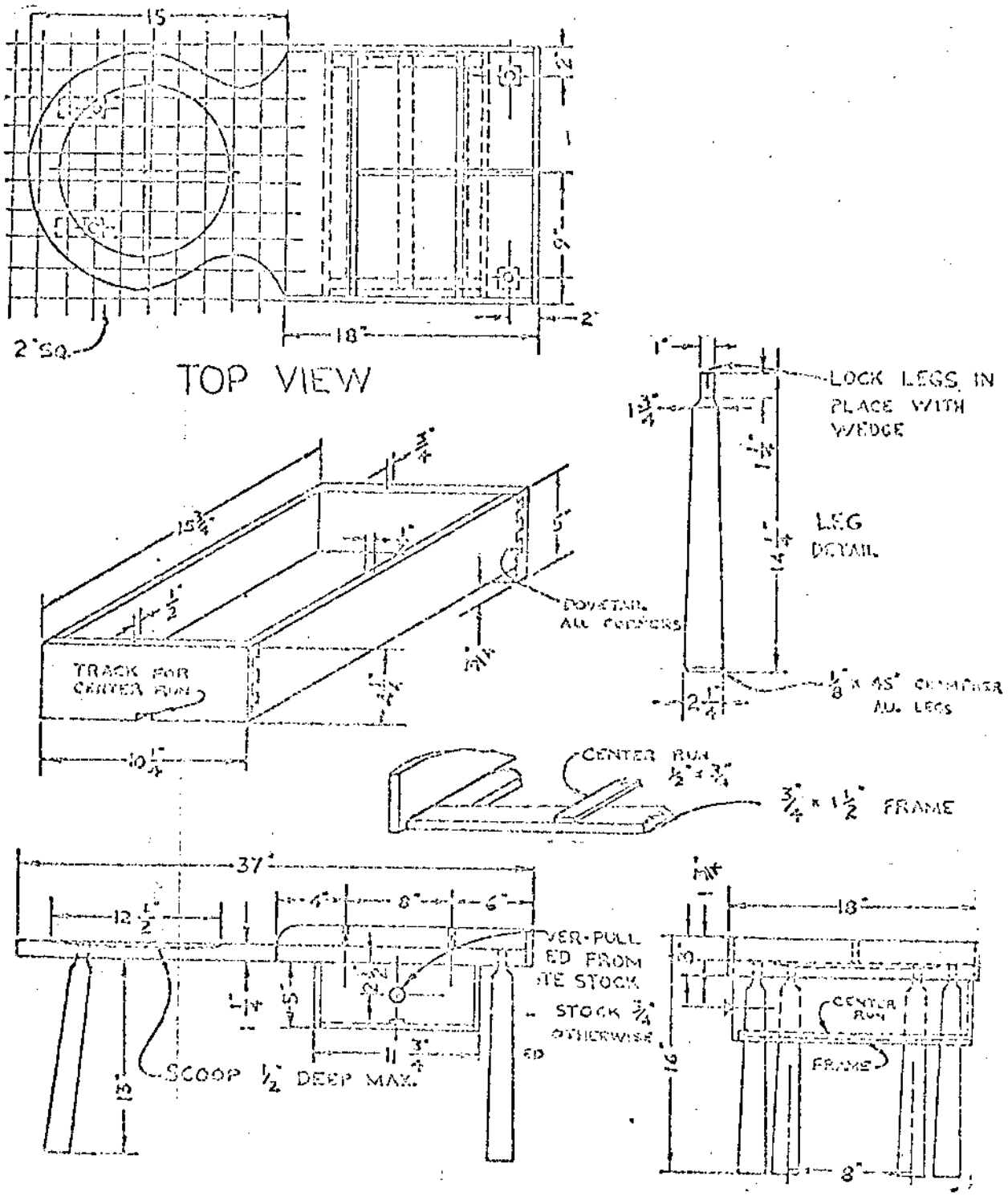


Fig. 58--Cobbler's bench, suitability considered average for high school level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

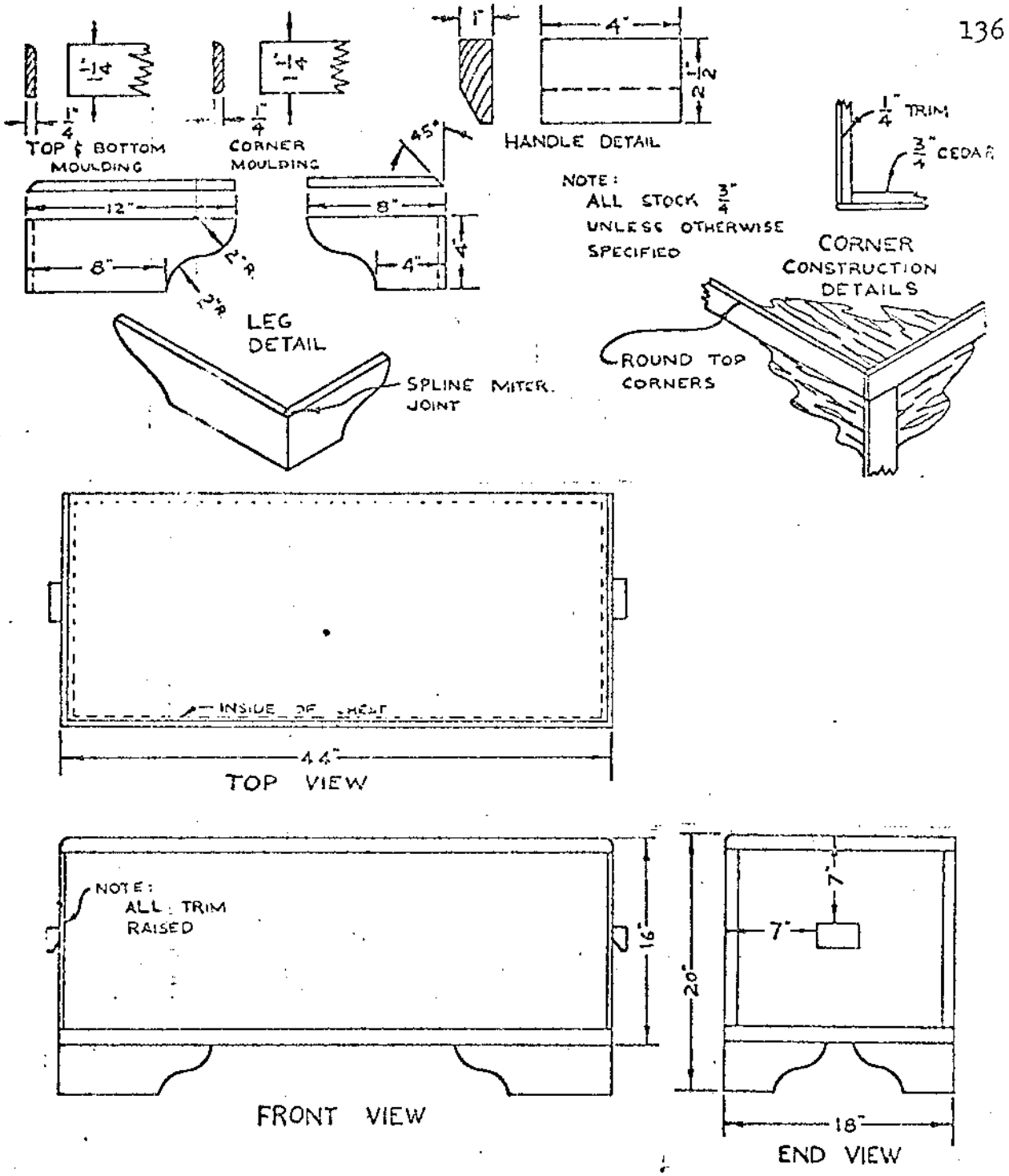


Fig. 59--Cedar chest, suitability considered average for high school level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

APPENDIX D

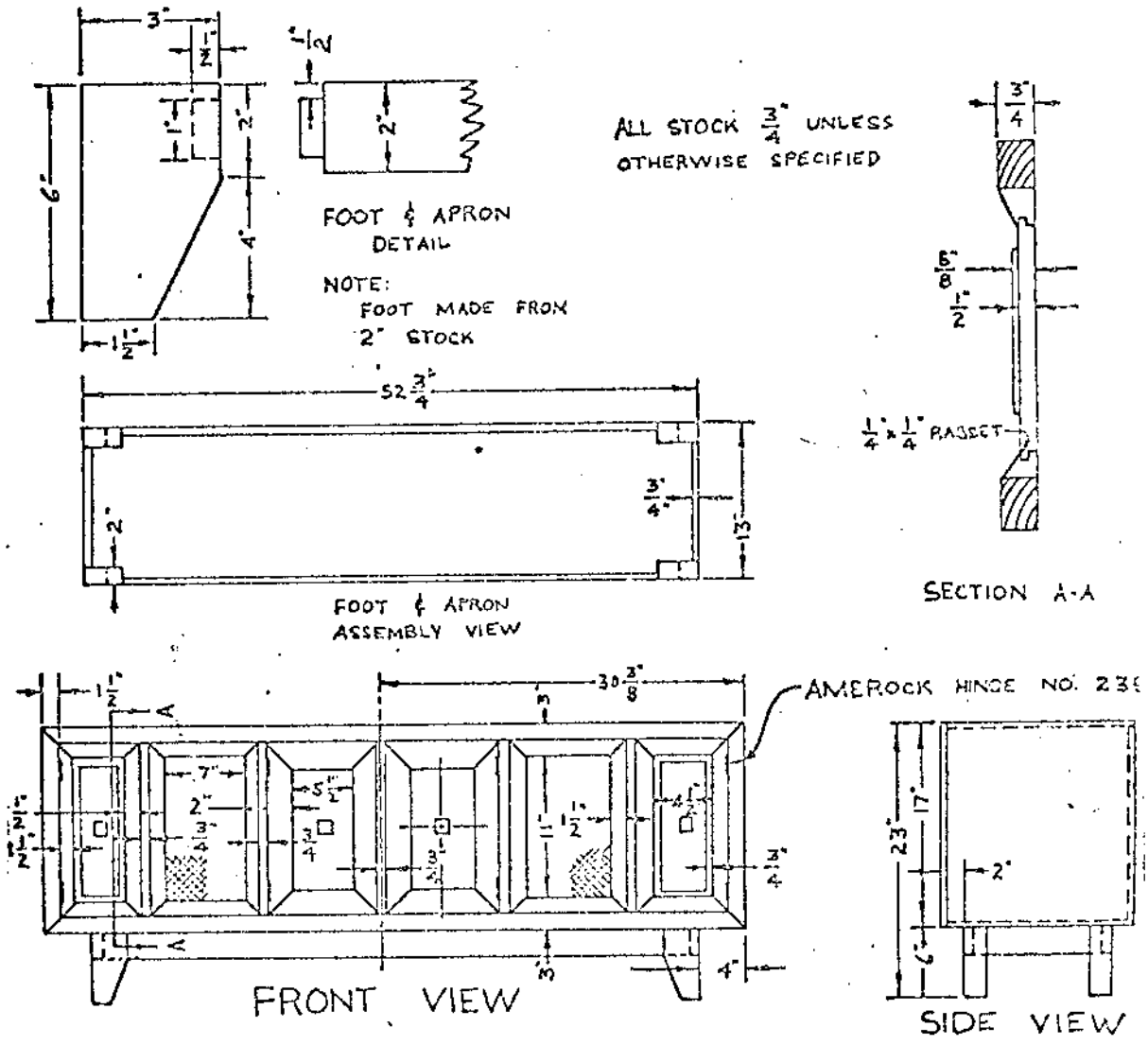


Fig. 60 -- Stereo cabinet, suitability considered average for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

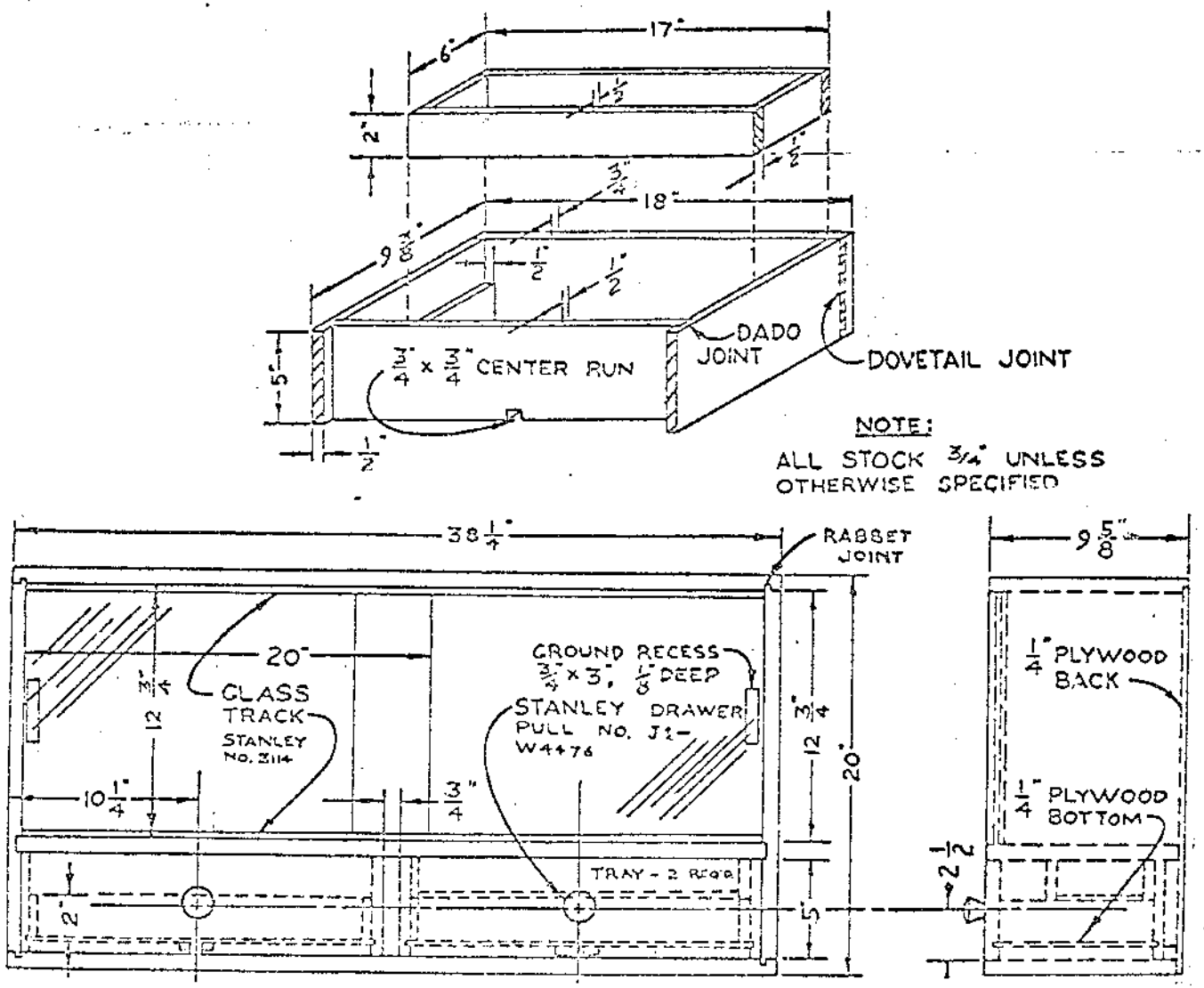


Fig. 61--Display Cabinet, suitability considered average for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

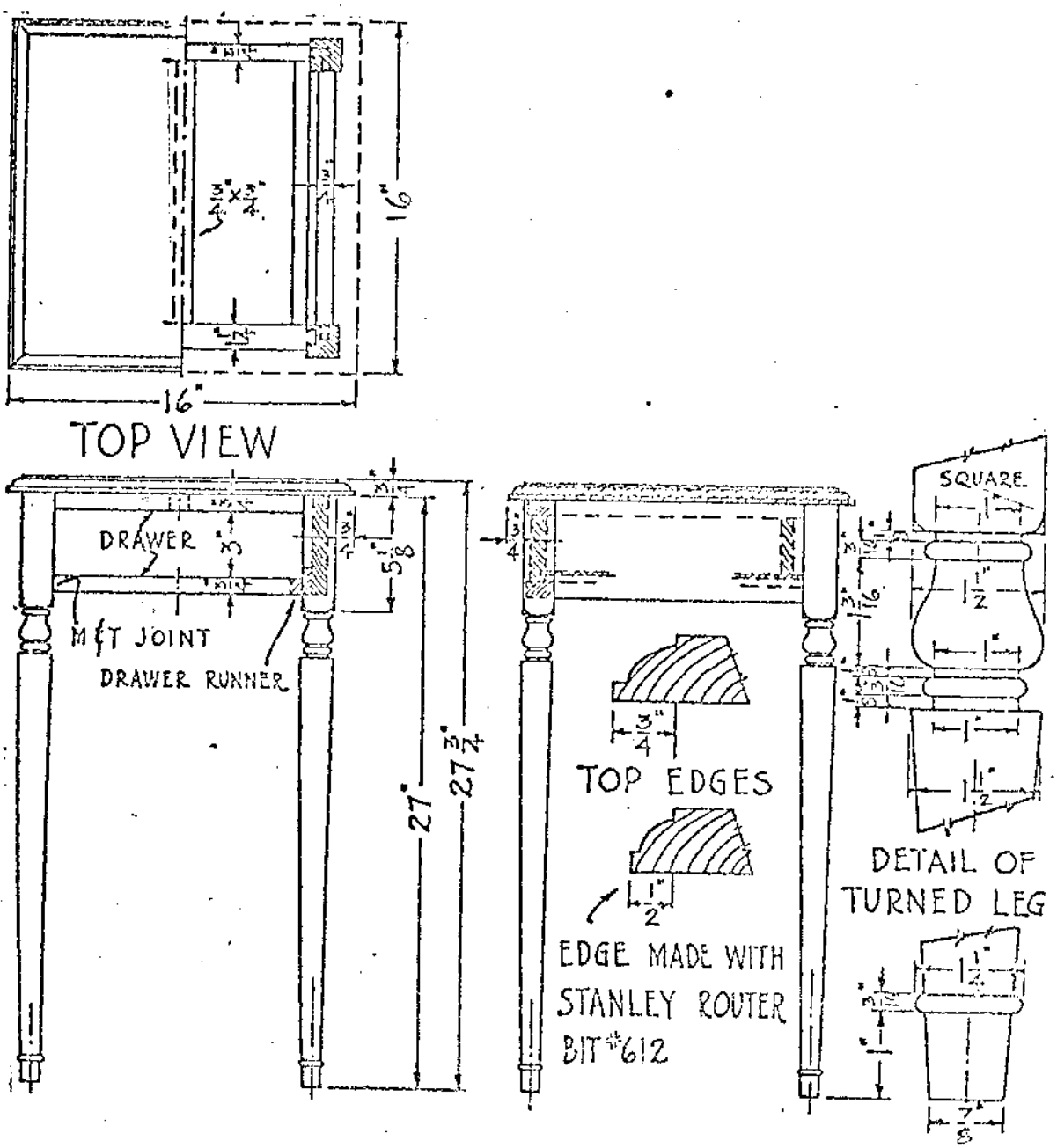


Fig. 62--Night table, suitability considered average for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

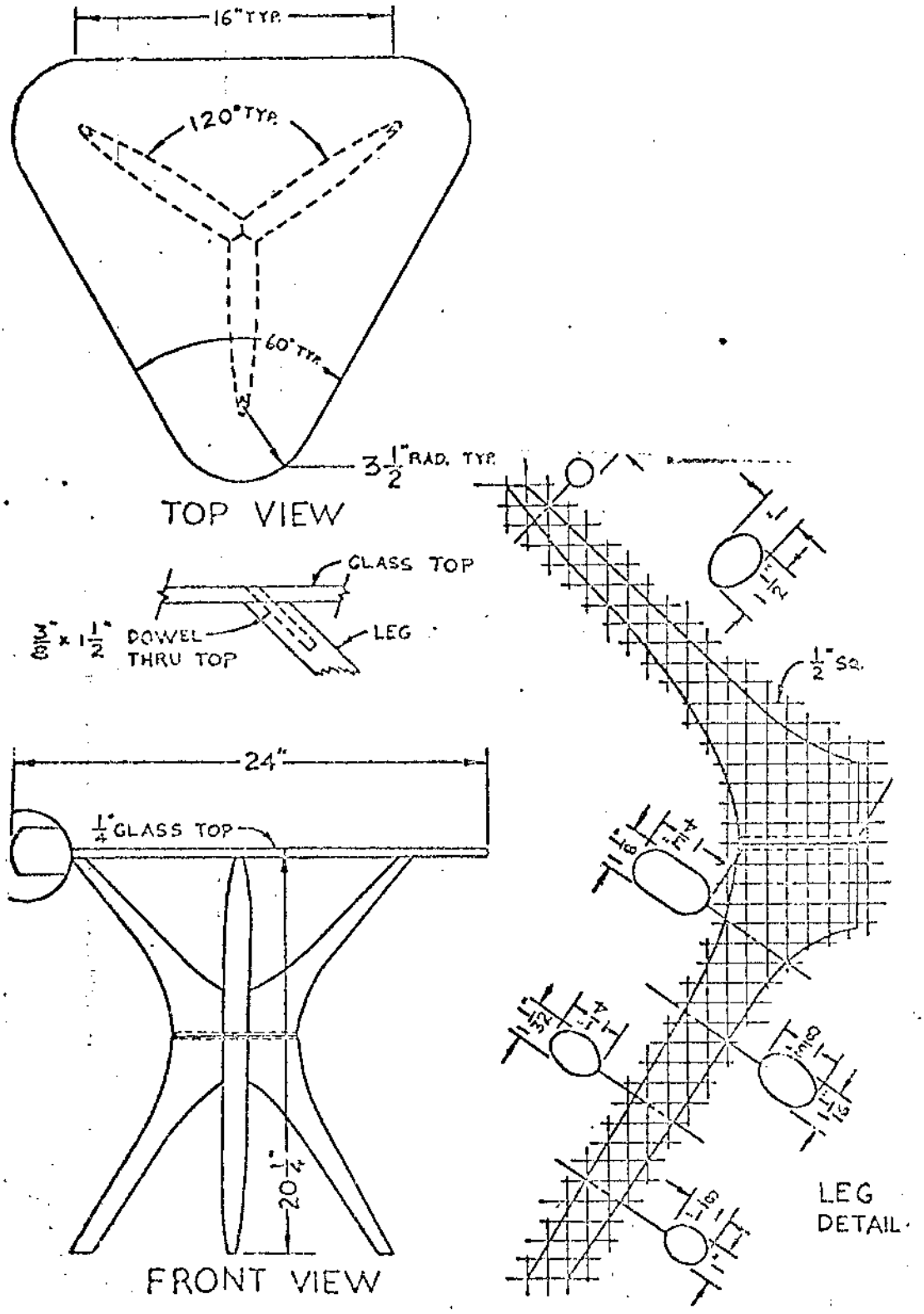


Fig. 63--Glass top table, suitability considered good for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

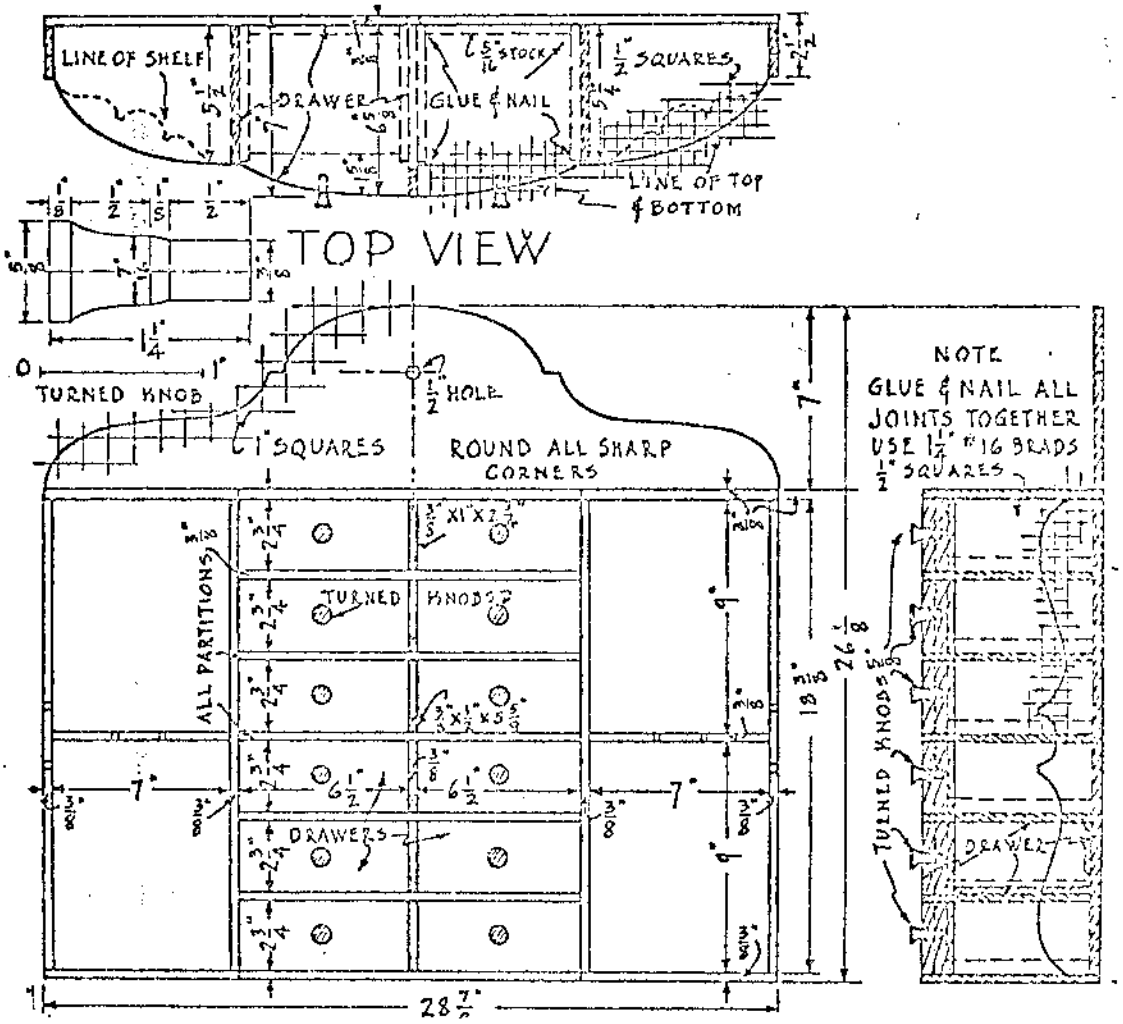


Fig. 64--Spice rack, suitability considered average for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

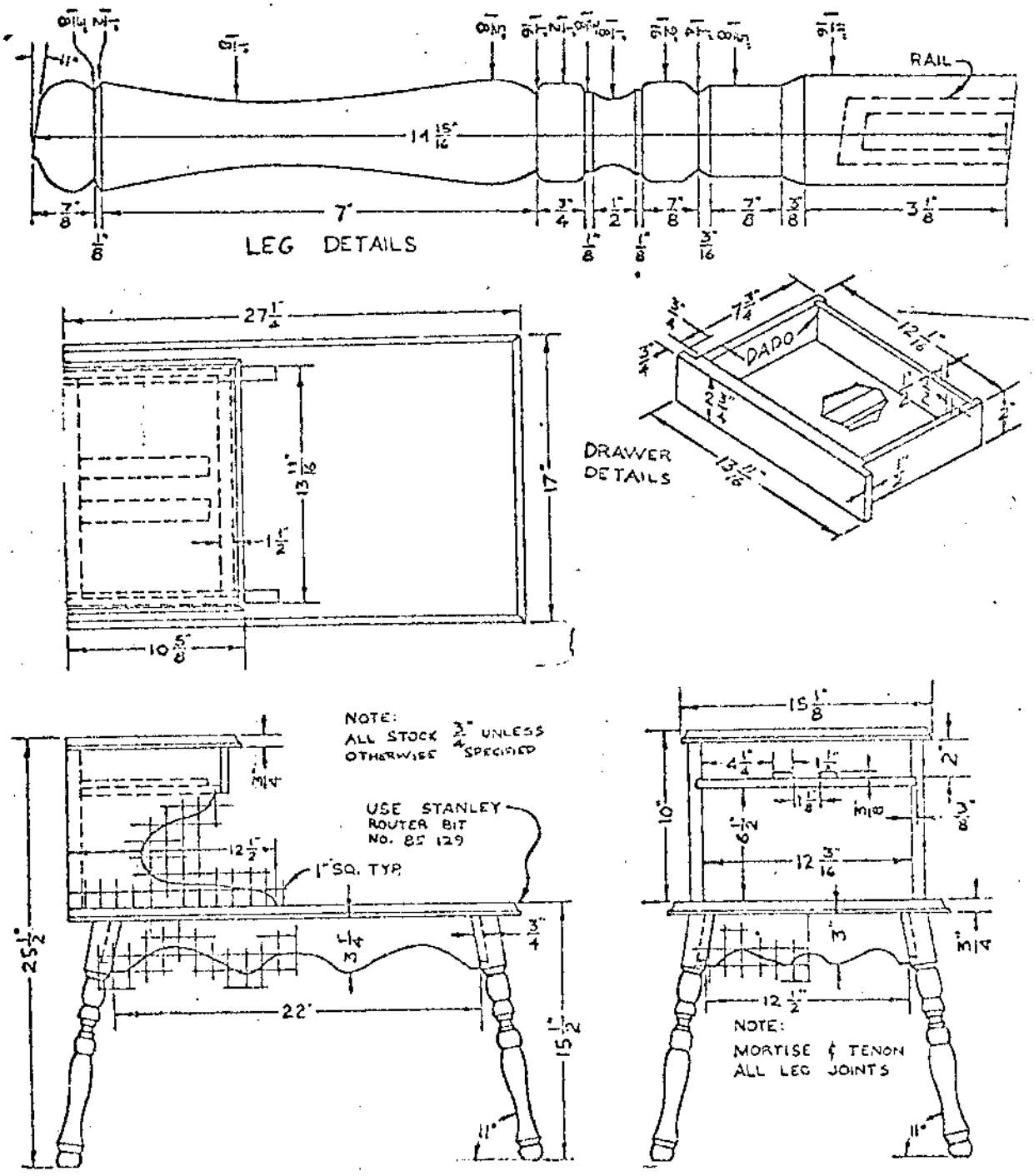


Fig. 65--End table, suitability considered good for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

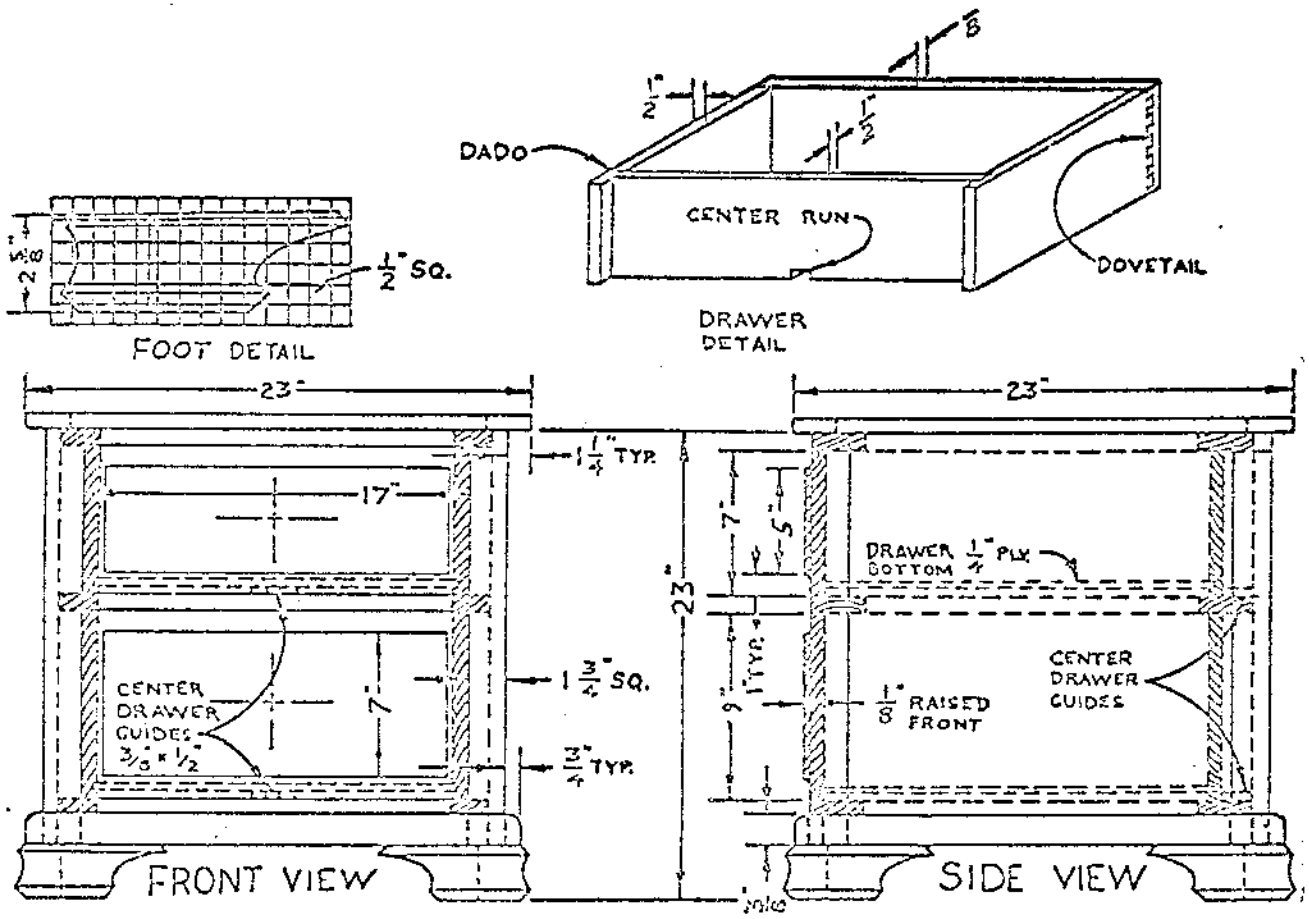


Fig. 66--Chest, suitability considered average for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

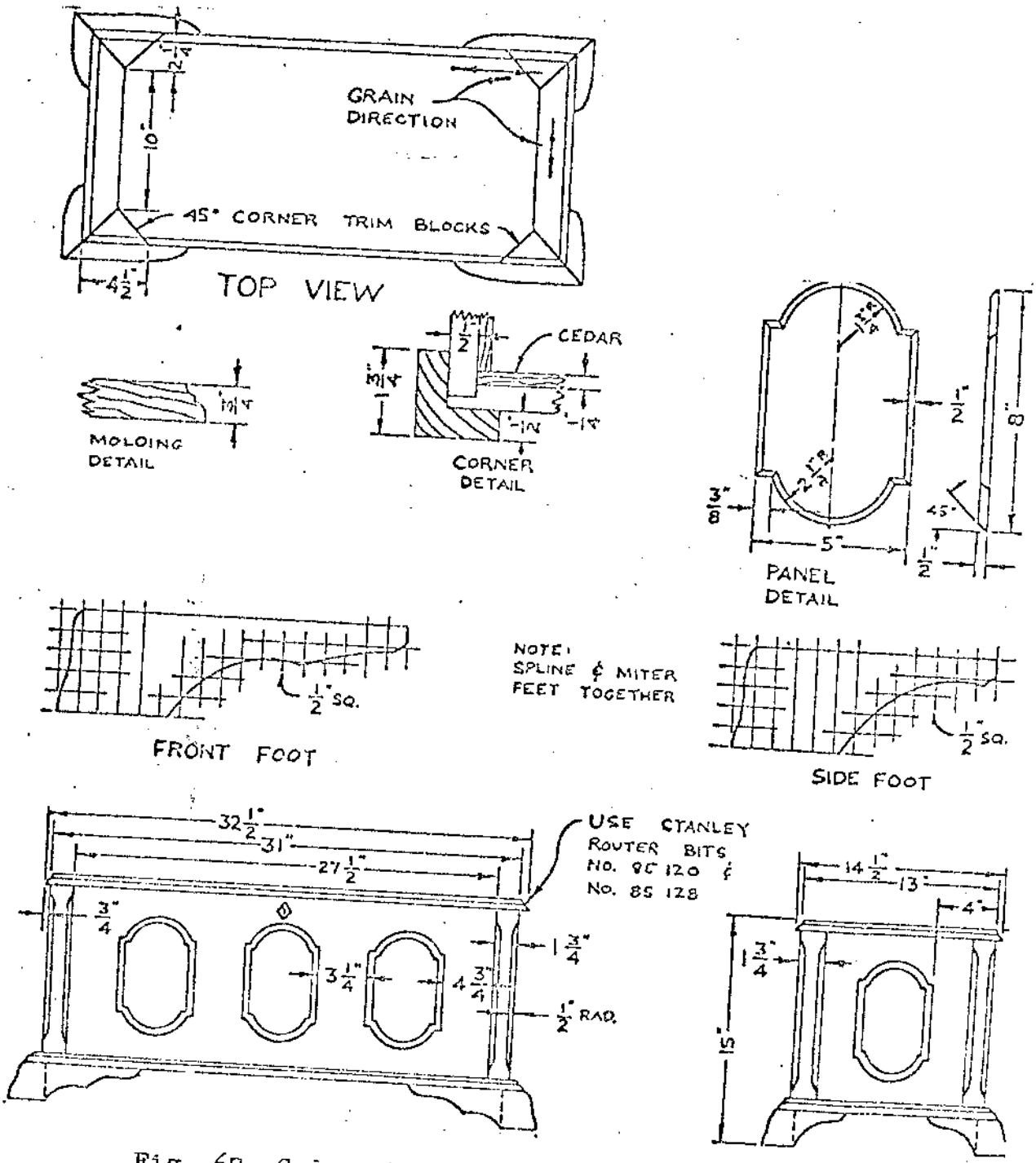


Fig. 67--Cedar chest, suitability considered average for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

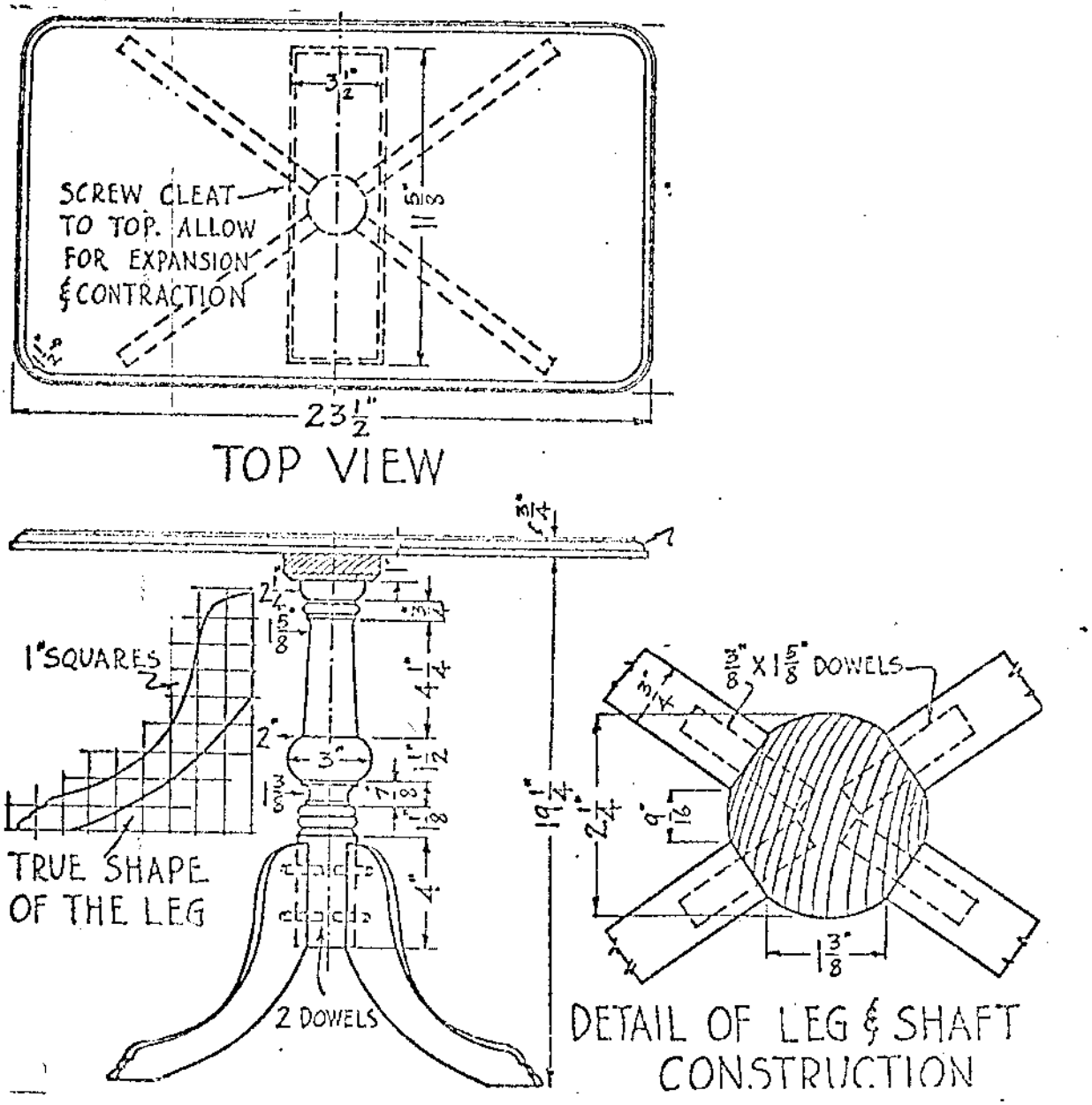


Fig. 68--Coffee table, suitability considered good for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

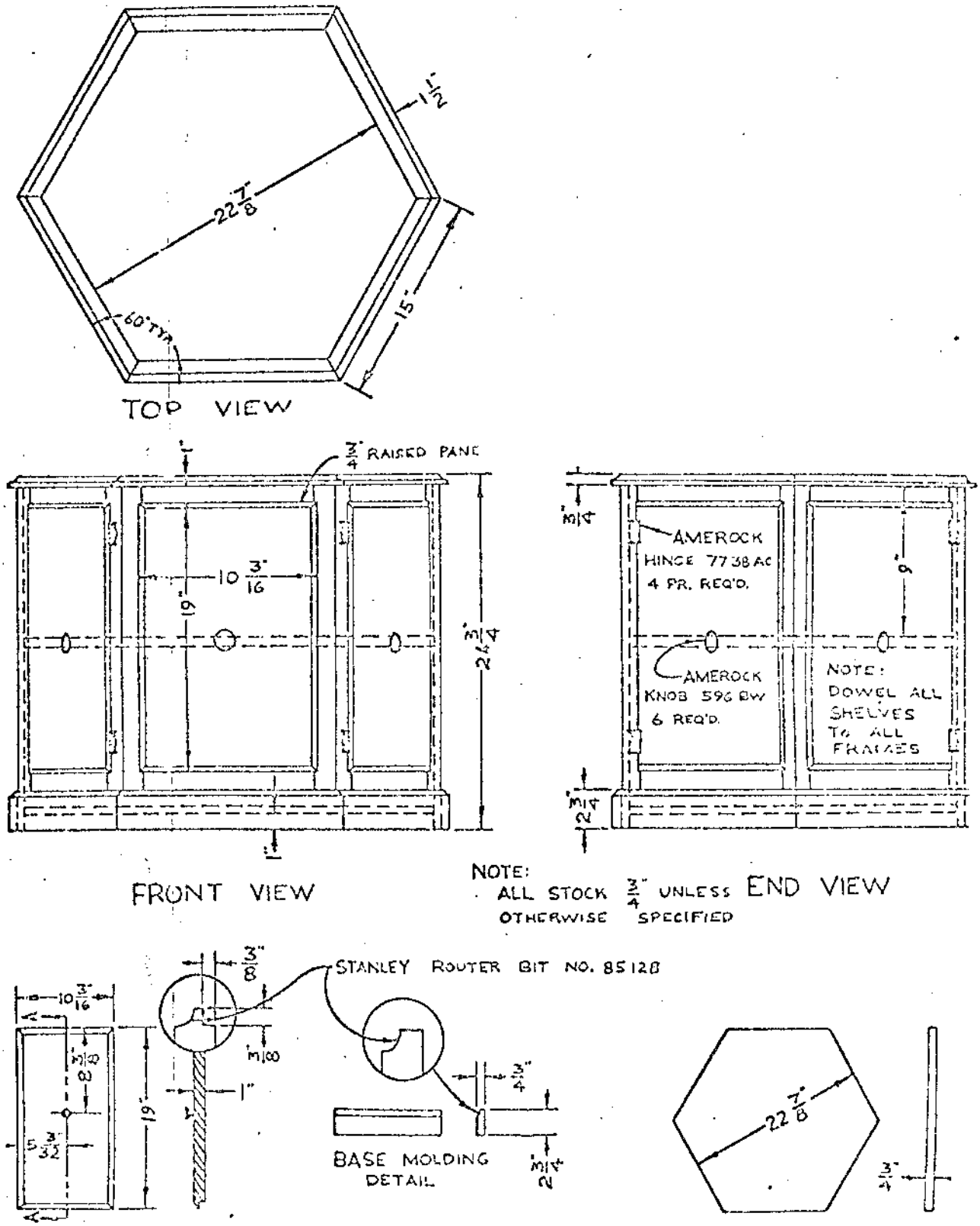


Fig. 69--Night stand, suitability considered good for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

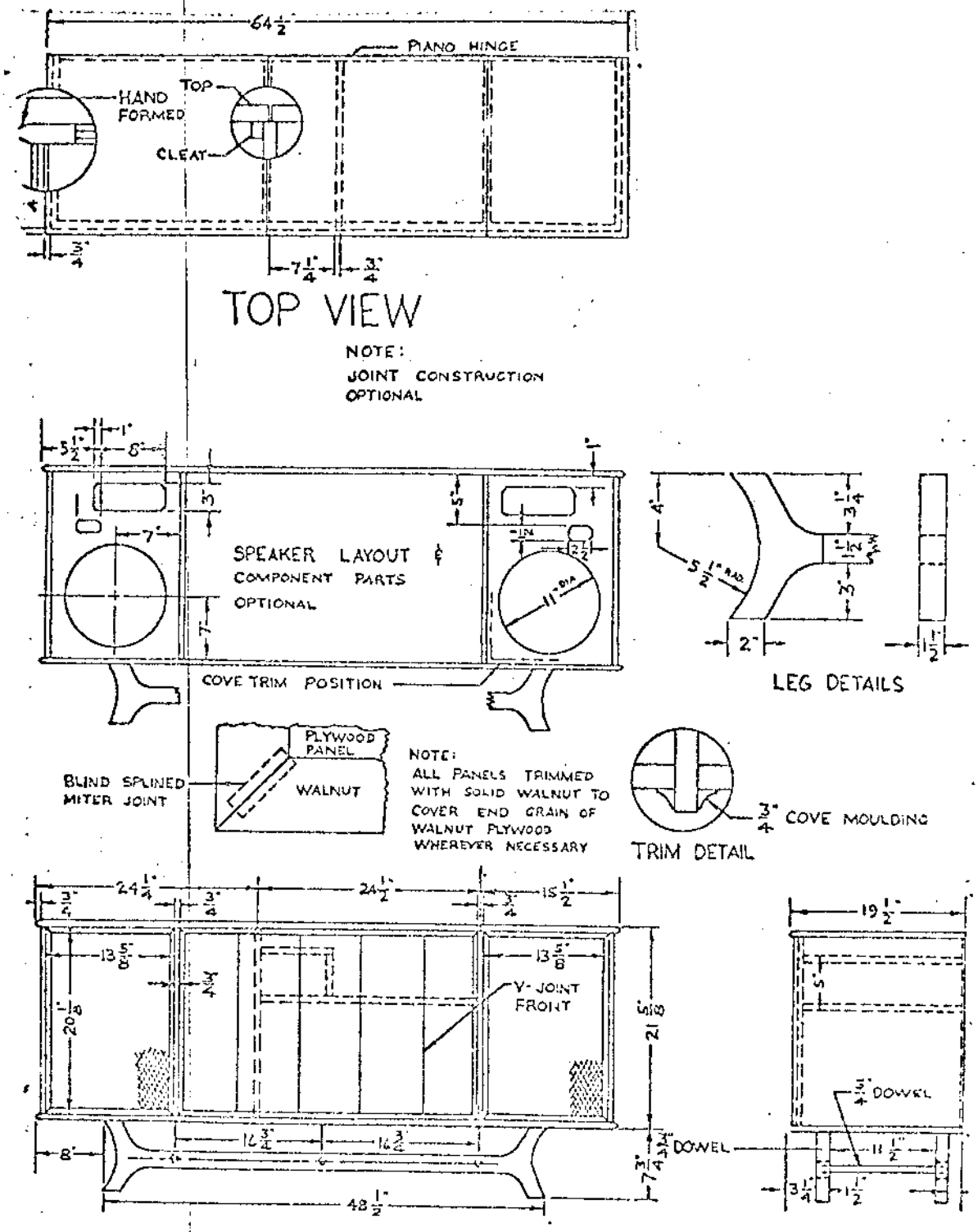


Fig. 70--Stereo cabinet, suitability considered good for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

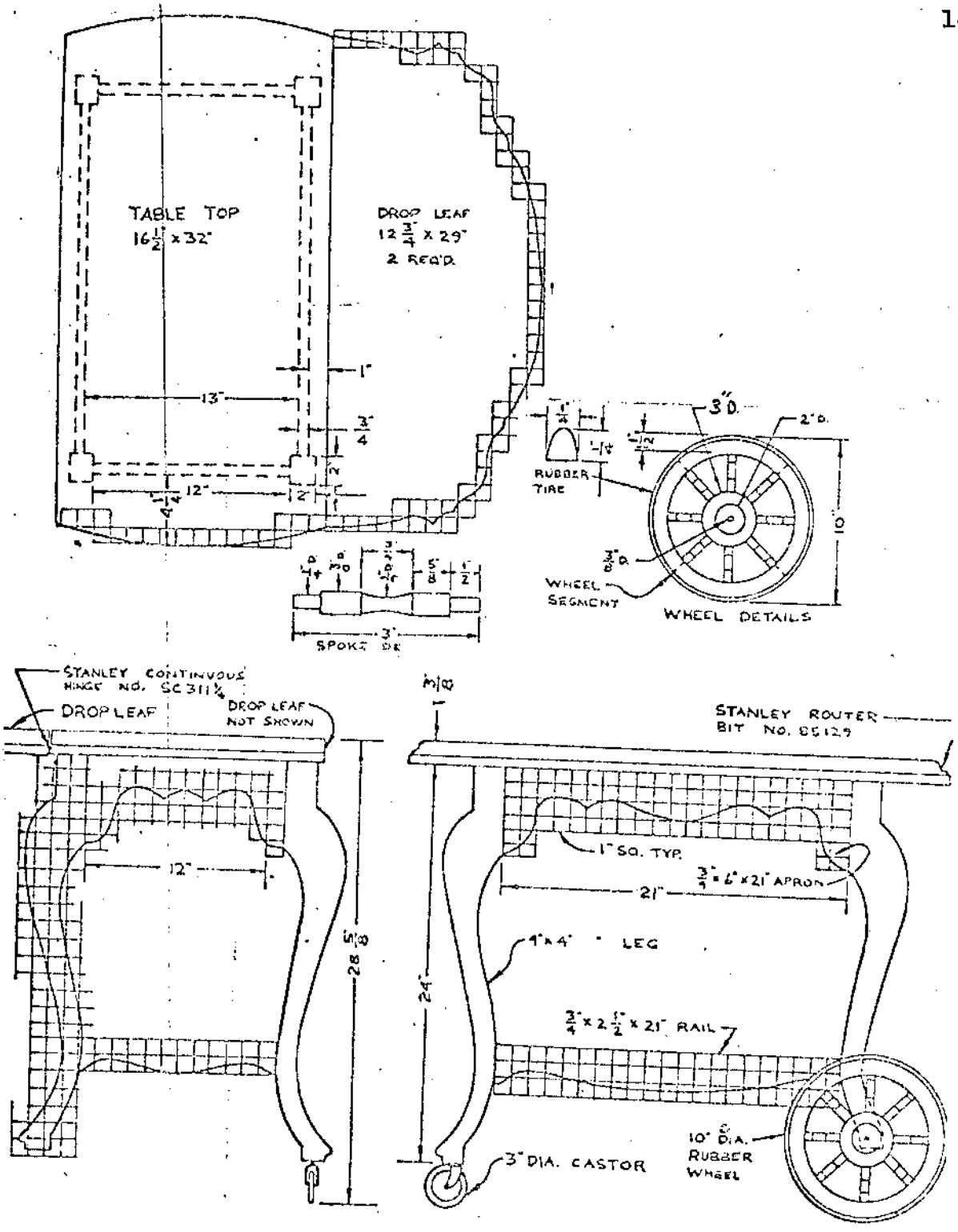


Fig. 71--Serving cart, suitability considered good for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

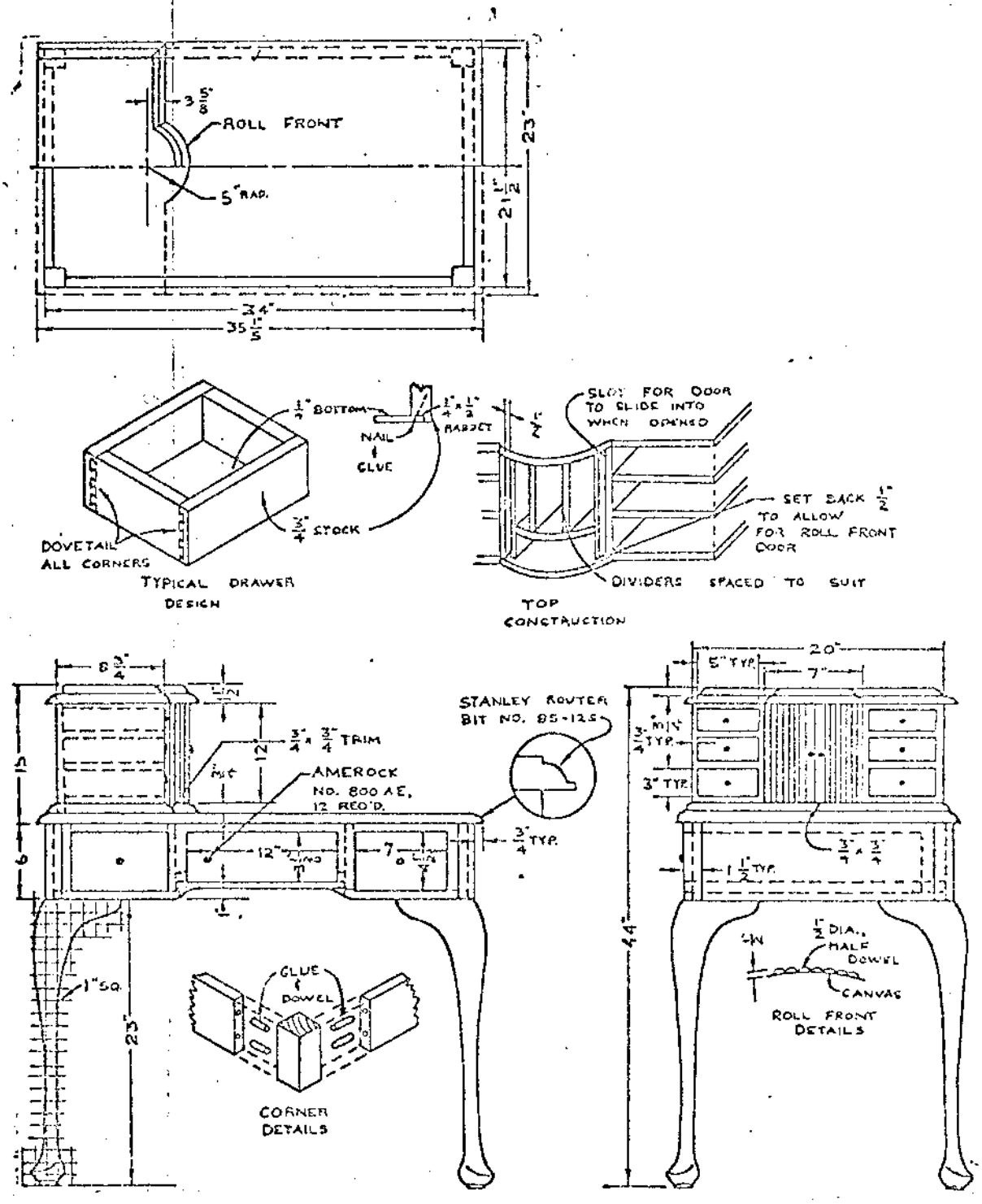


Fig. 72--Lady's desk, suitability considered good for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

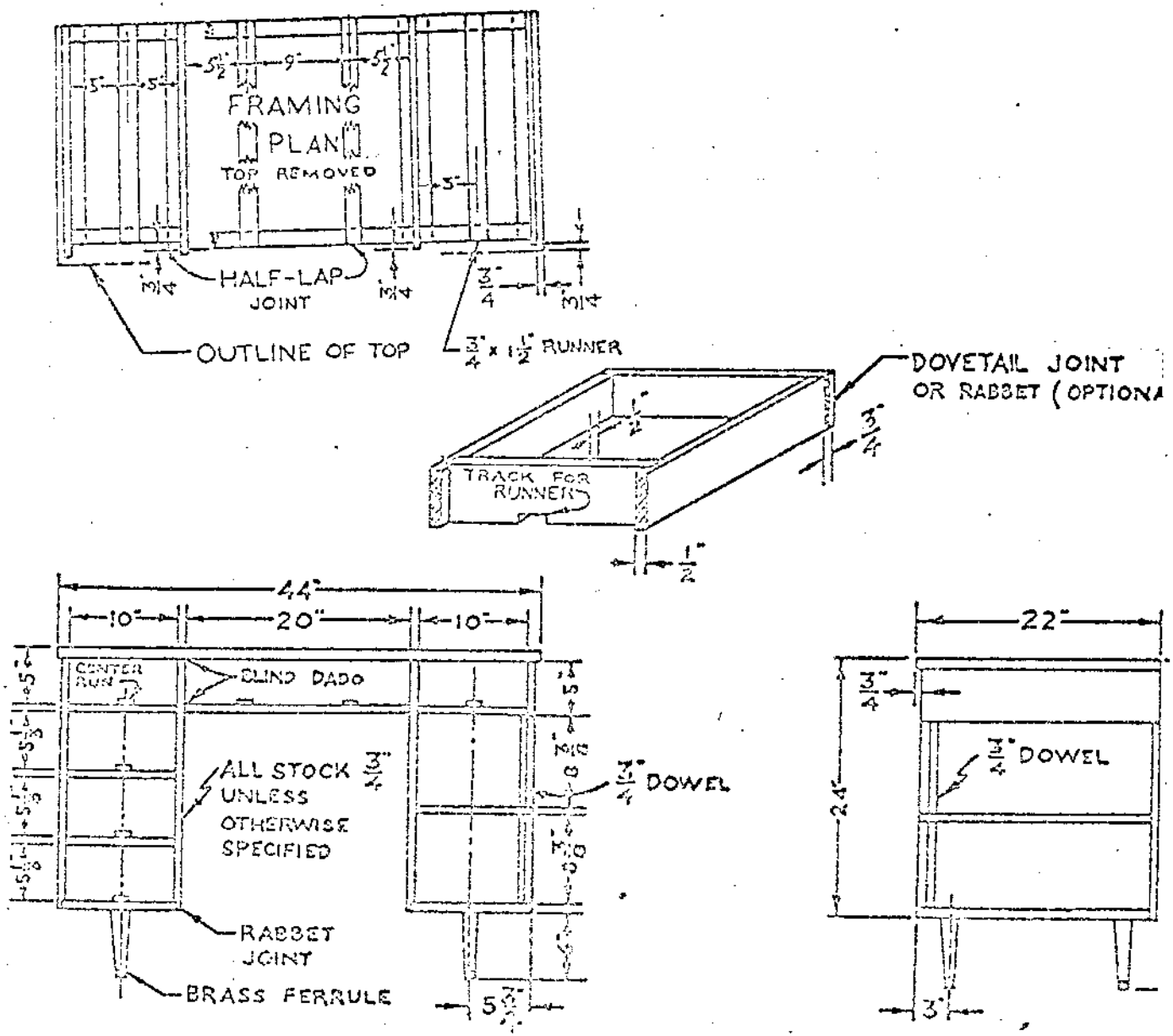


Fig. 73--Office desk, suitability considered good for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

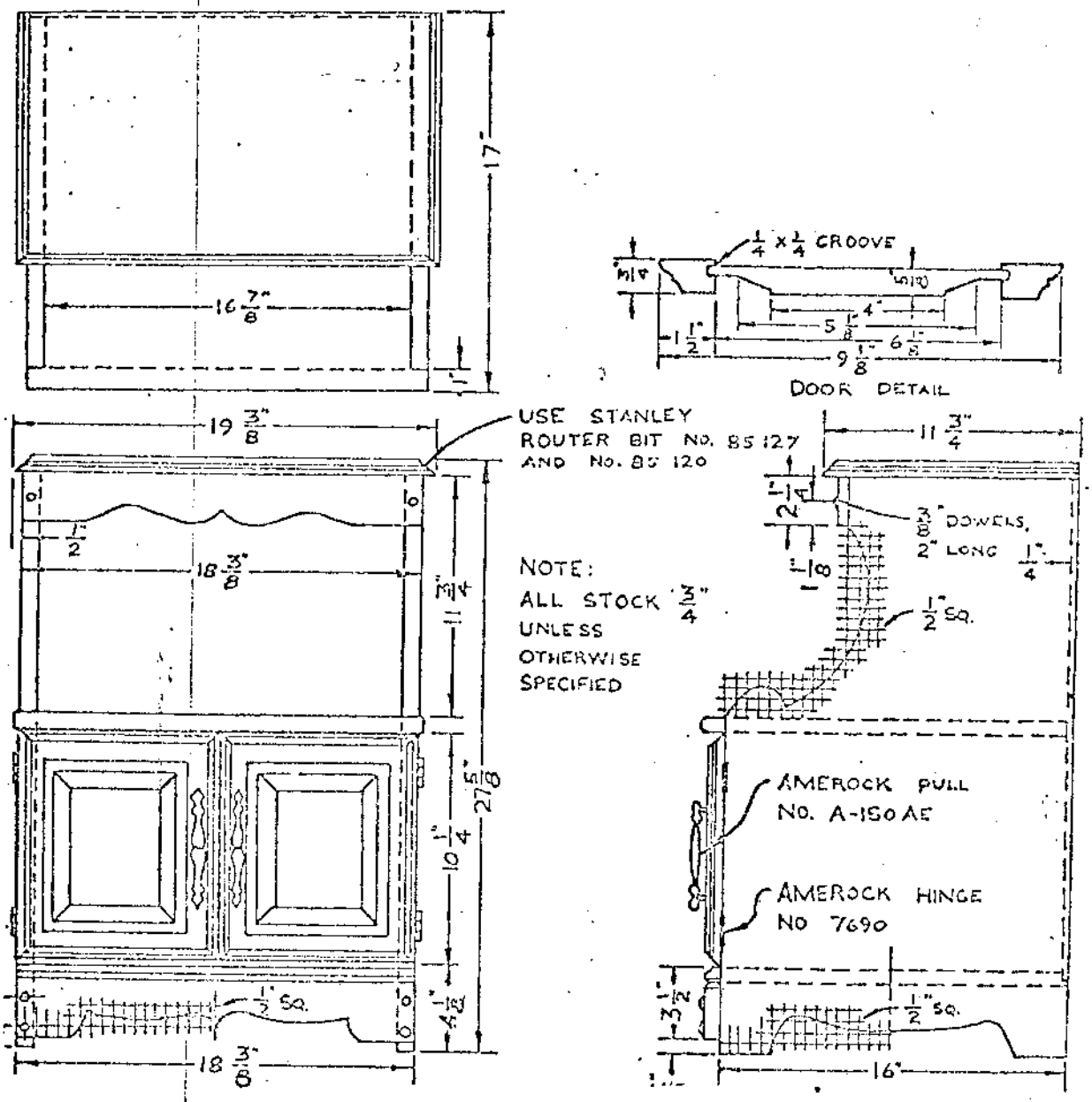


Fig. 74--Hutch, suitability considered good for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

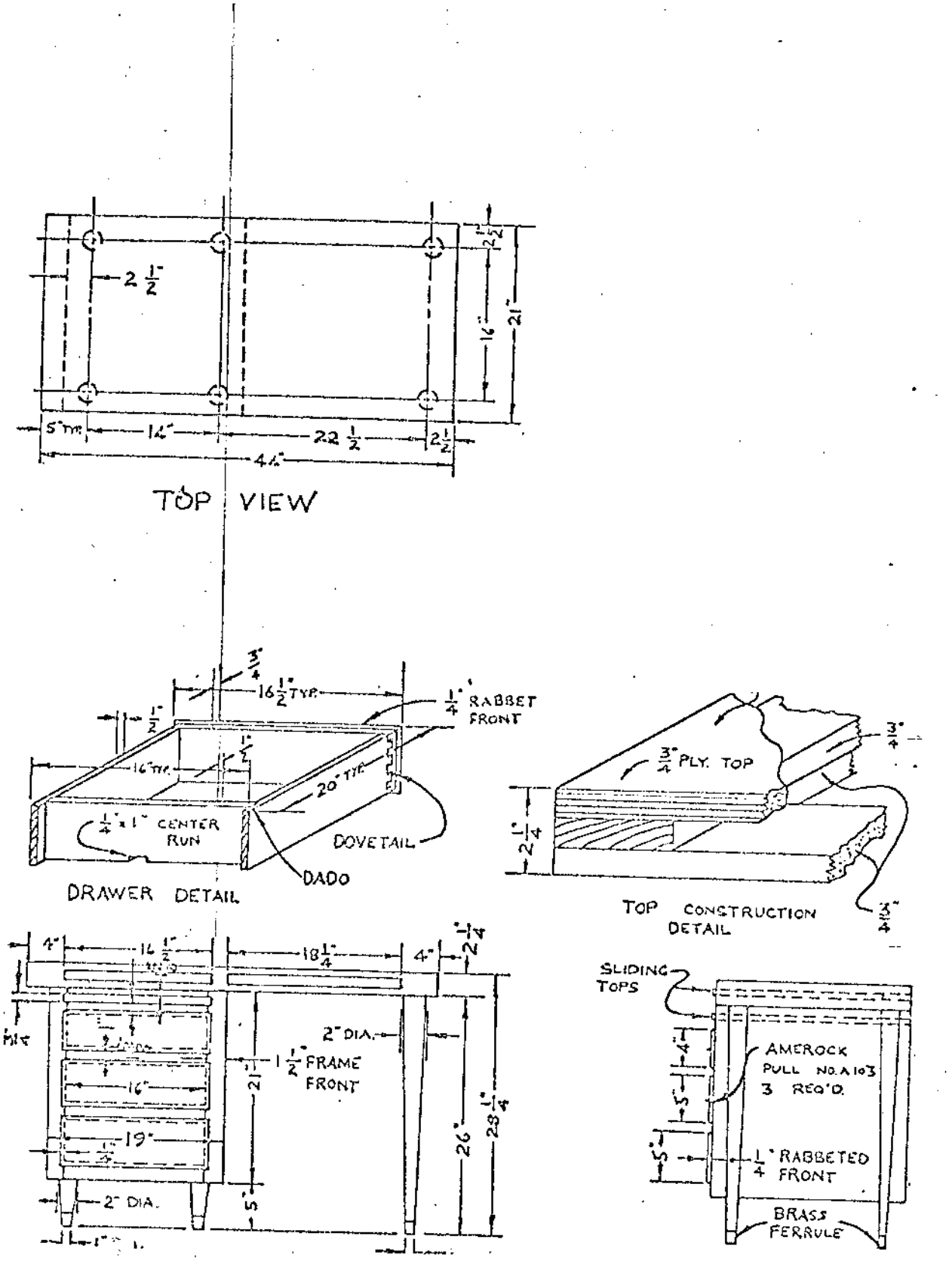


Fig. 75--Student's desk, suitability considered good for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

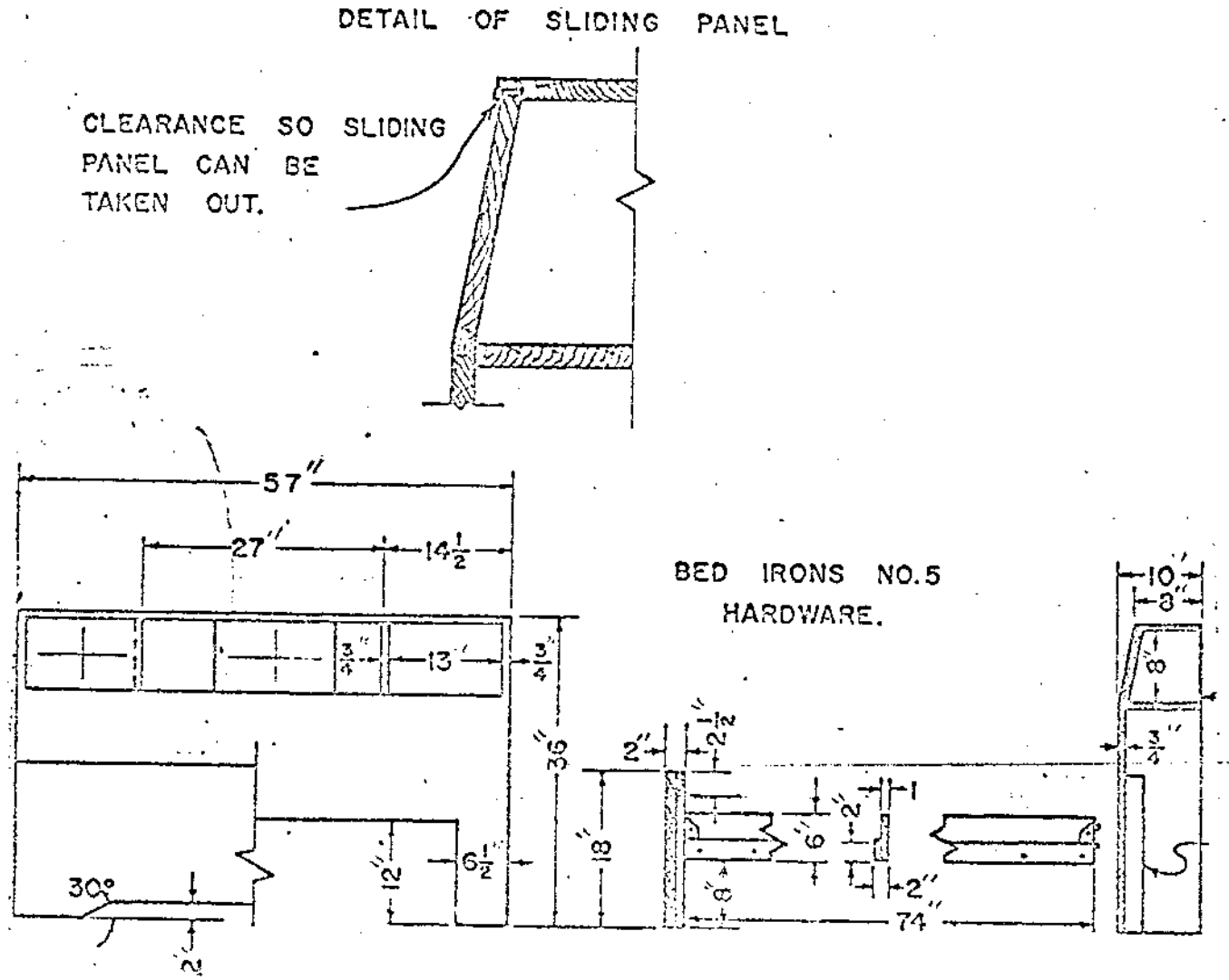


Fig. 76--Bar bed, suitability considered good for high school-college level.

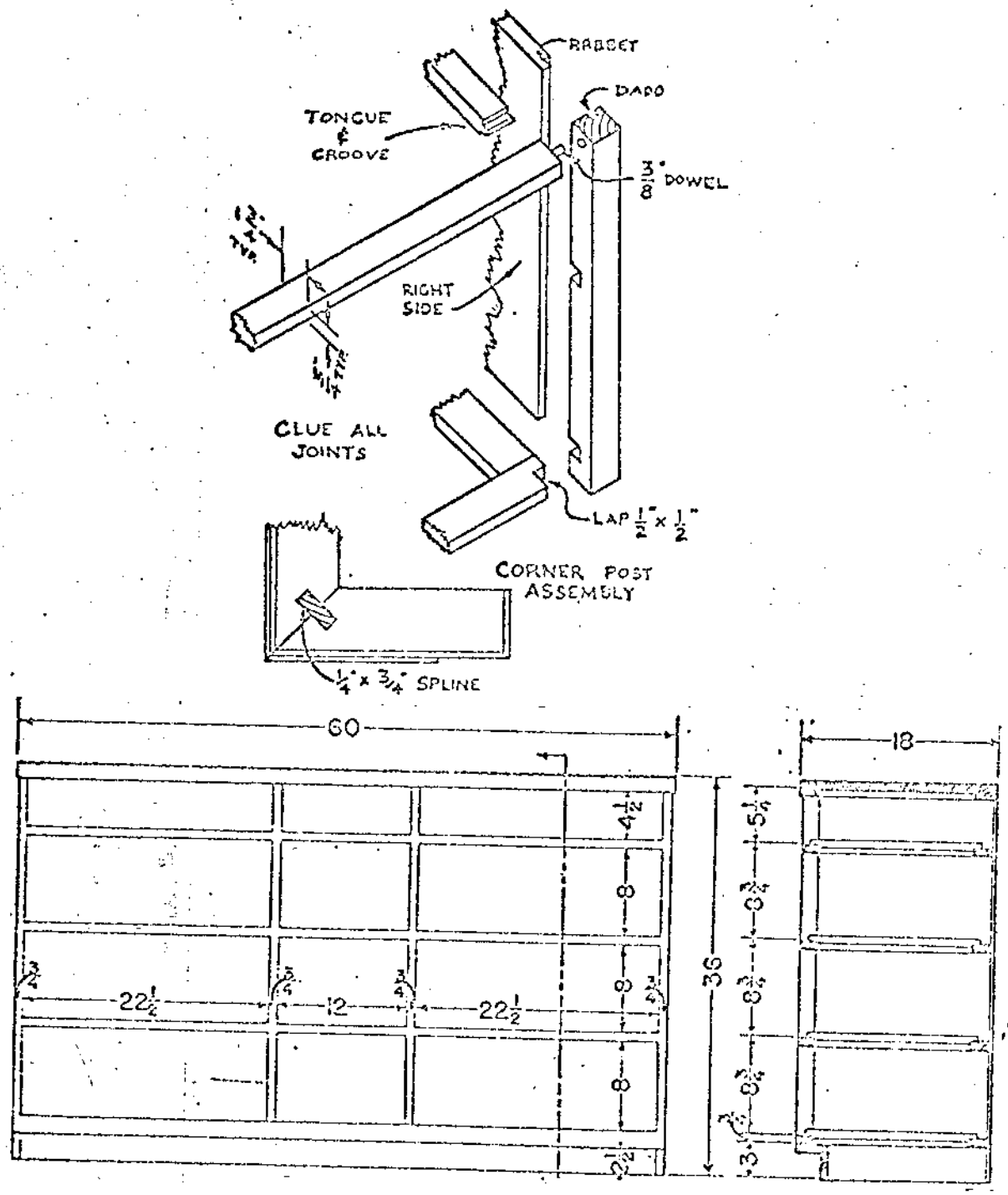


Fig. 77--Triple dresser, suitability considered good for high school-college level.

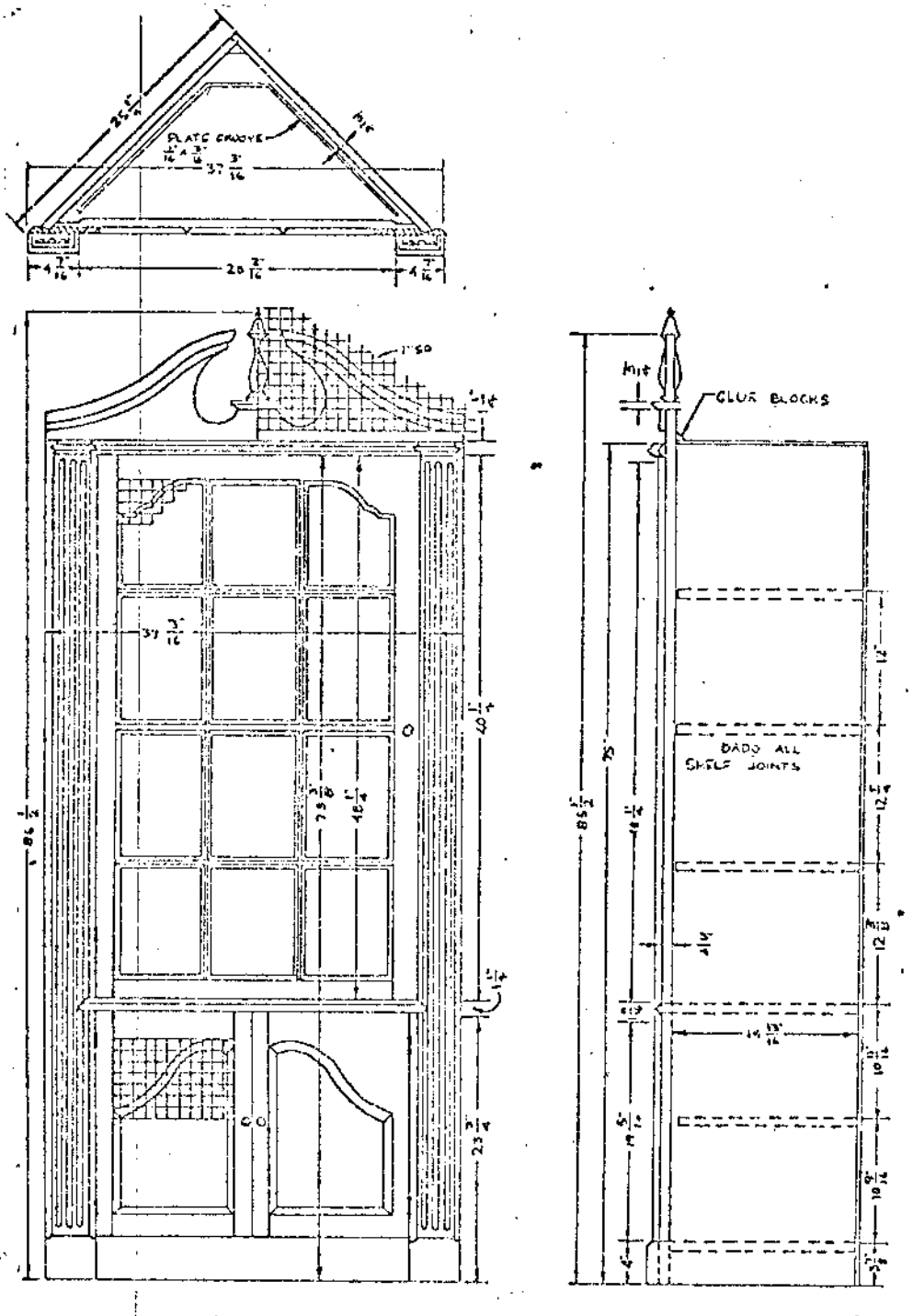


Fig. 78--Corner hutch, suitability considered good for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

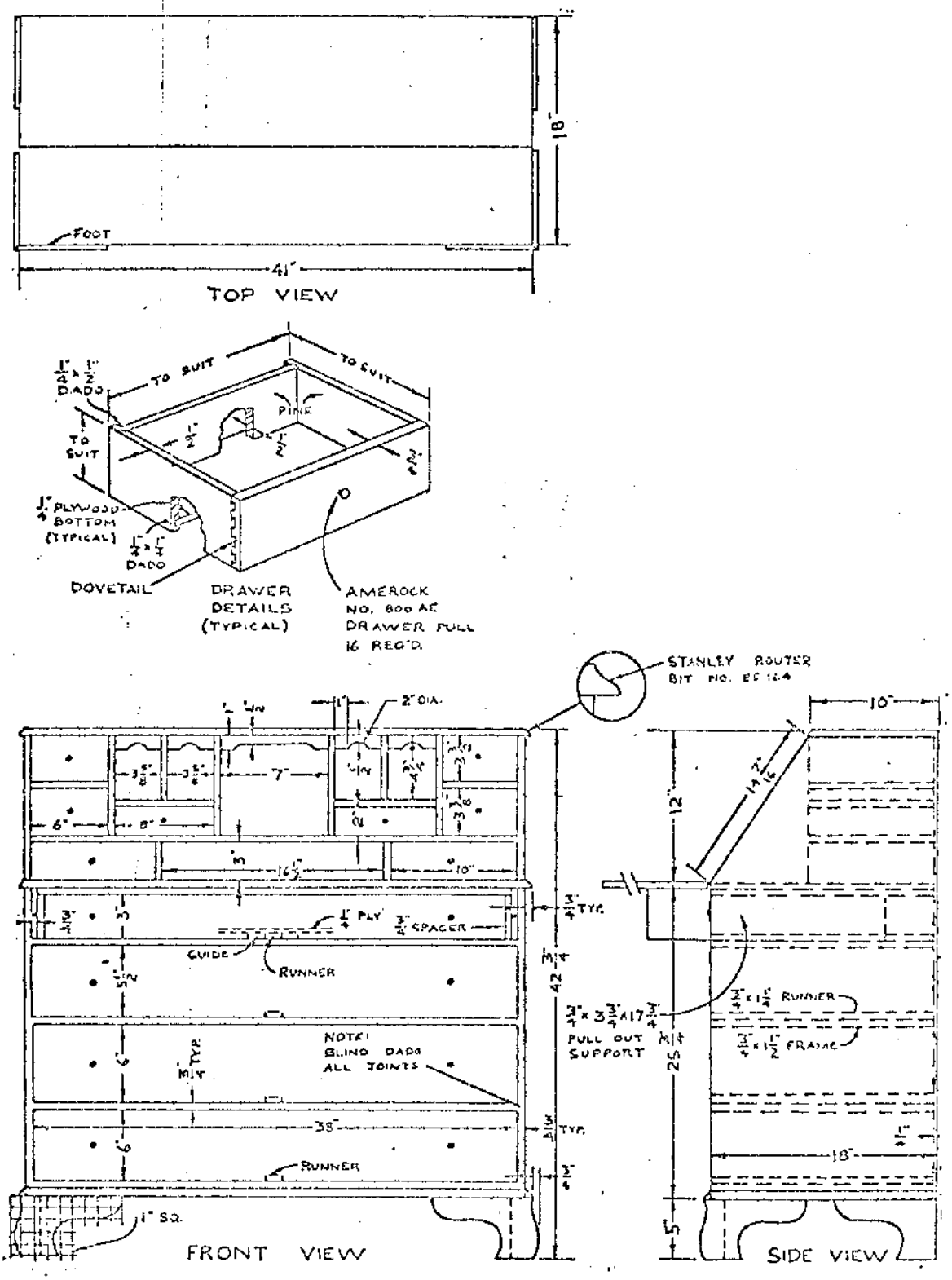


Fig. 79--Governor Winthrop desk, suitability considered good for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

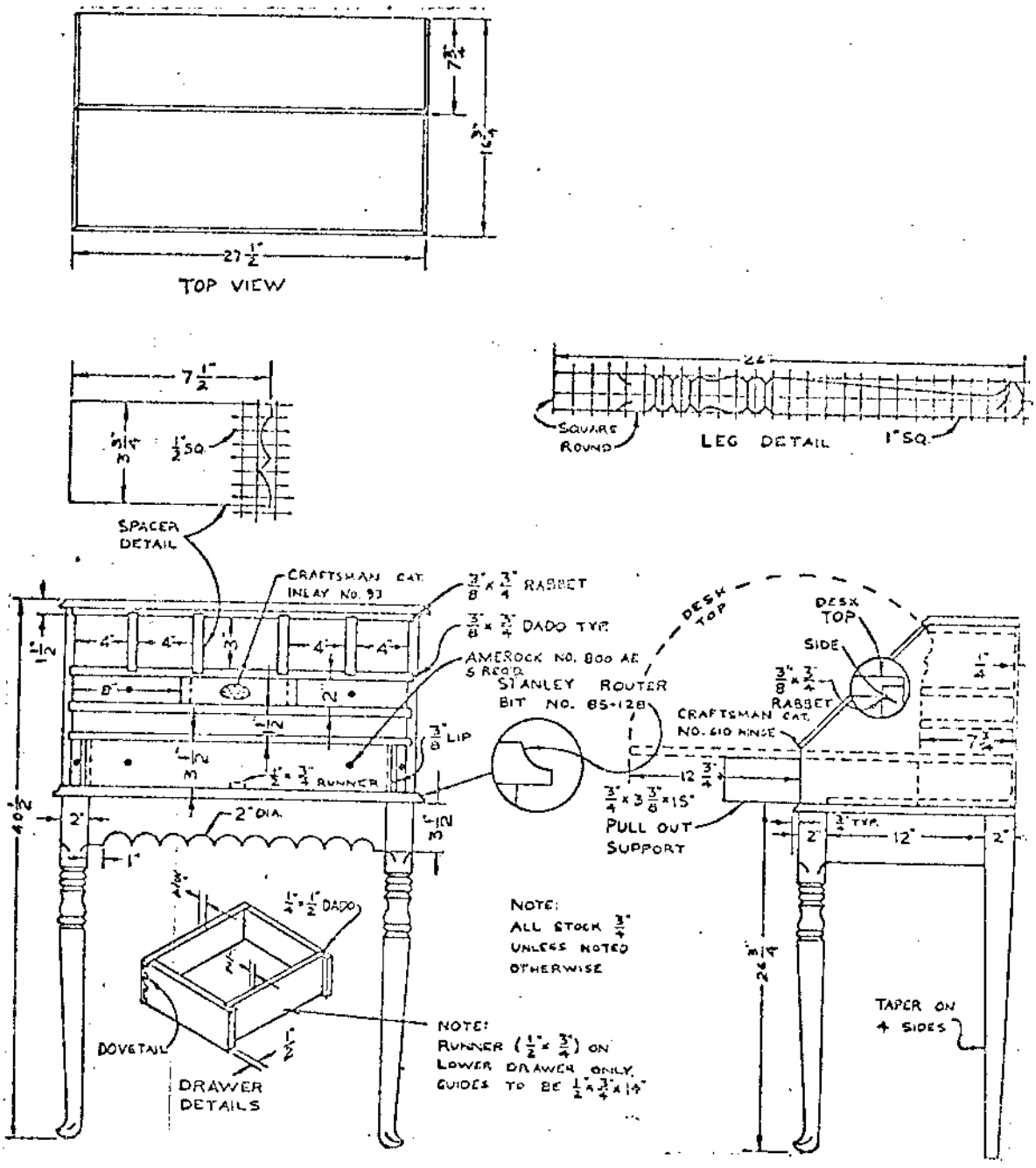


Fig. 80--Slant top desk, suitability considered good for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

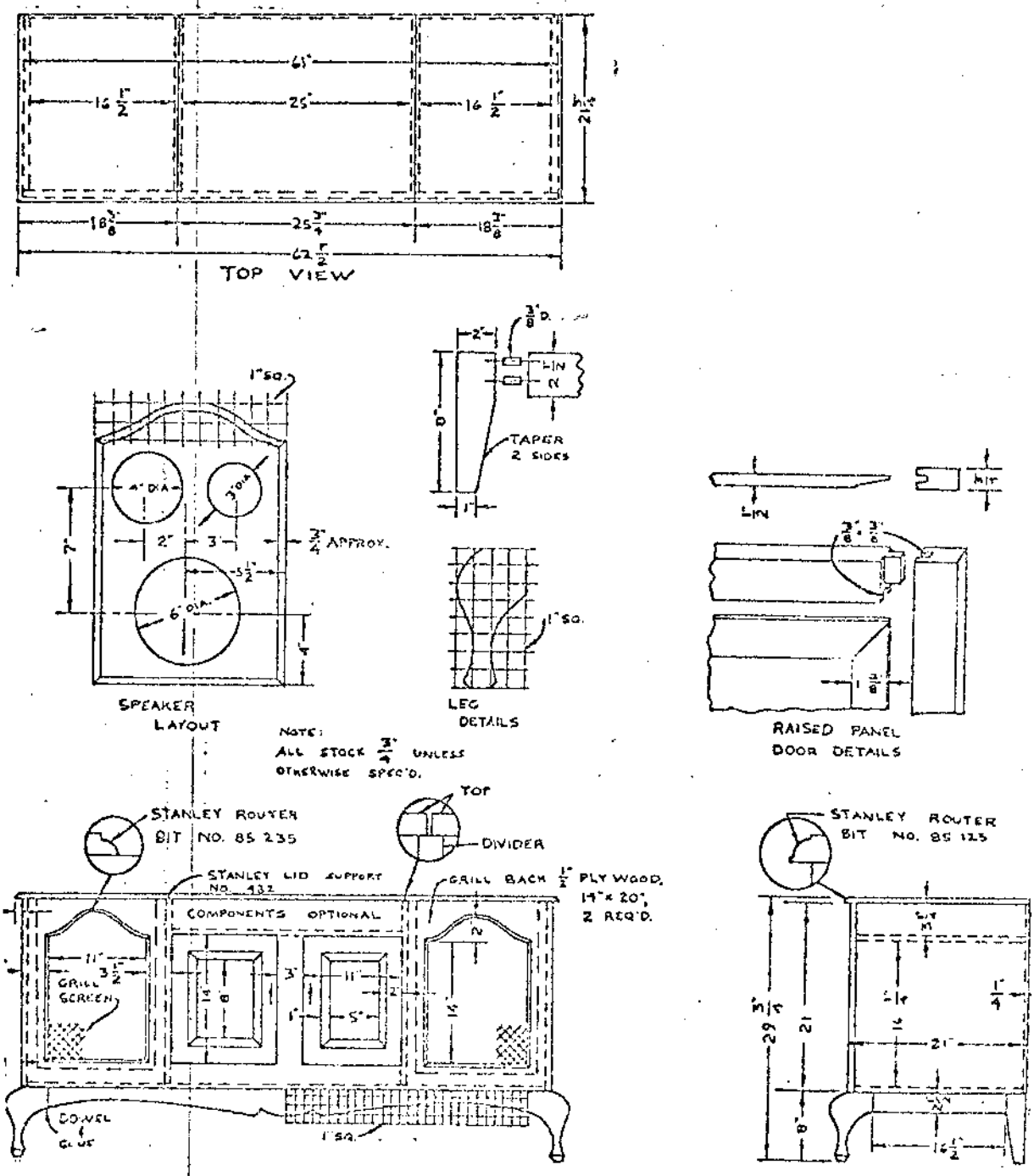


Fig. 81--Stereo cabinet, suitability considered good for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

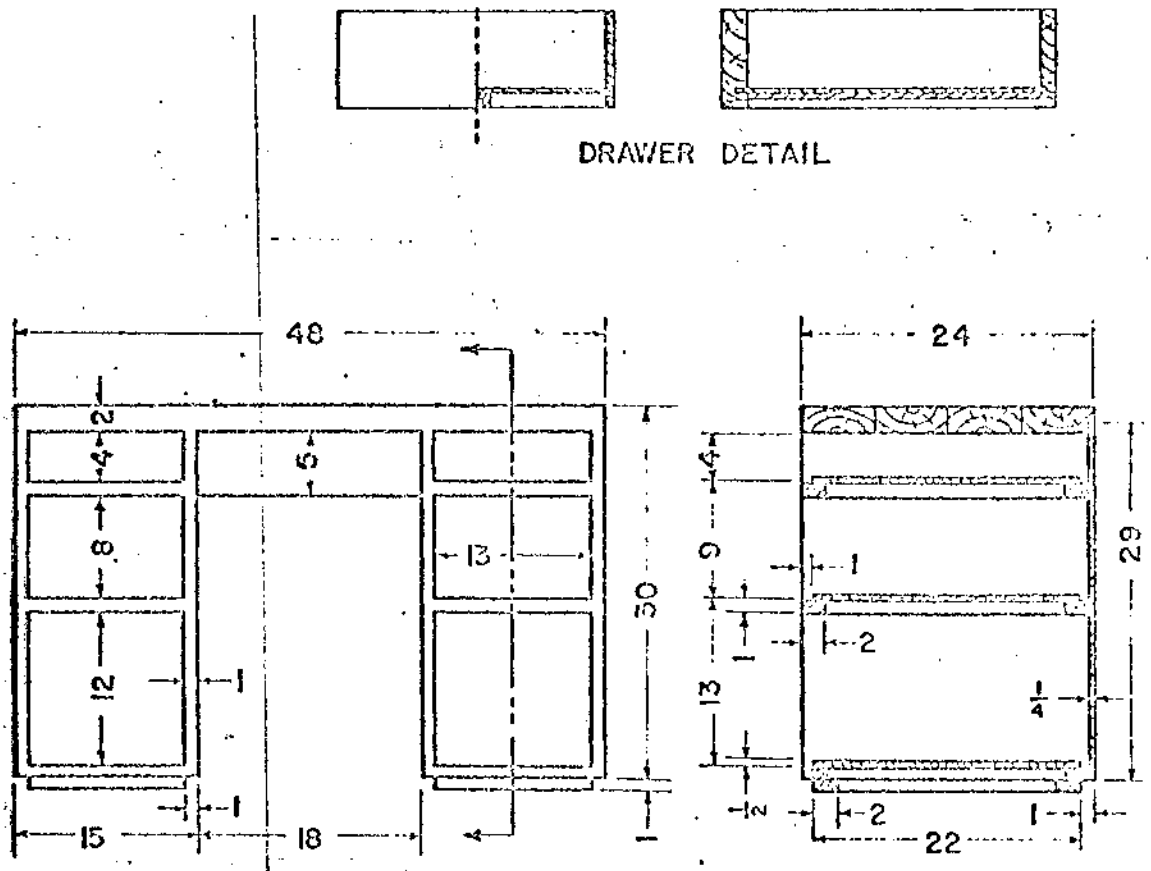


Fig. 82--Desk, suitability considered good for high school-college level.

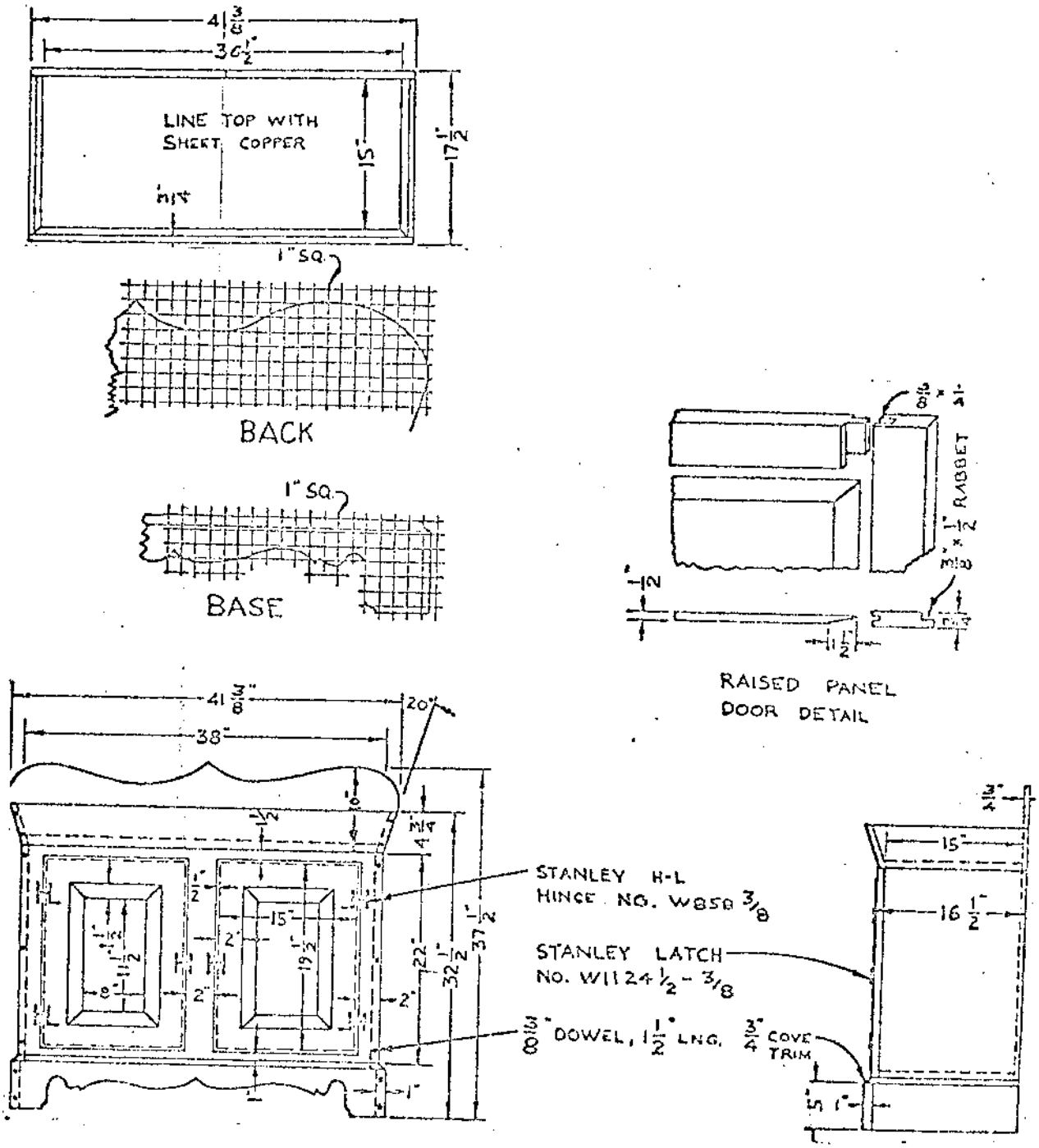


Fig. 83--Dry sink cabinet, suitability considered average for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

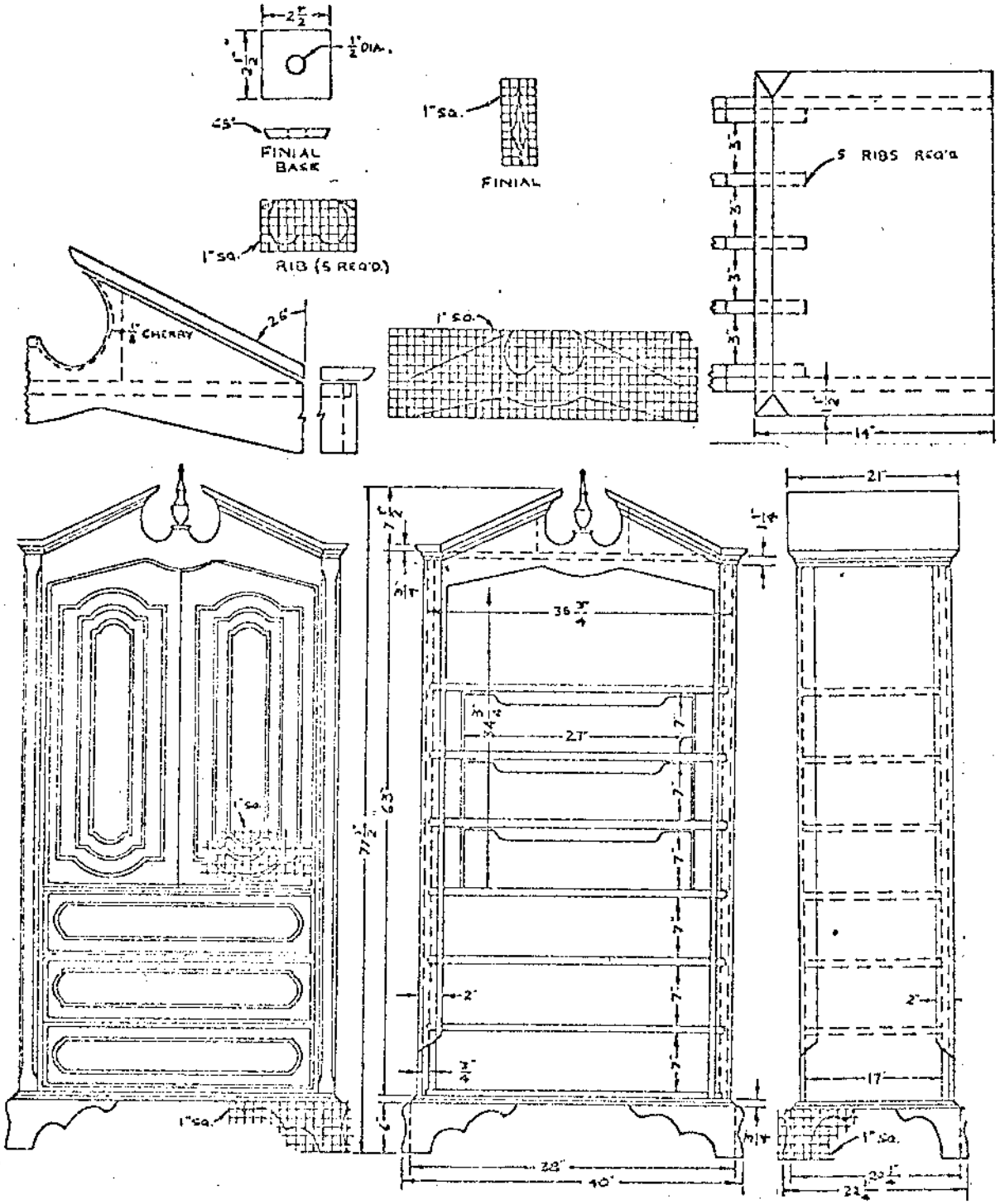


Fig. 84.--Chest of drawers, suitability considered good for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

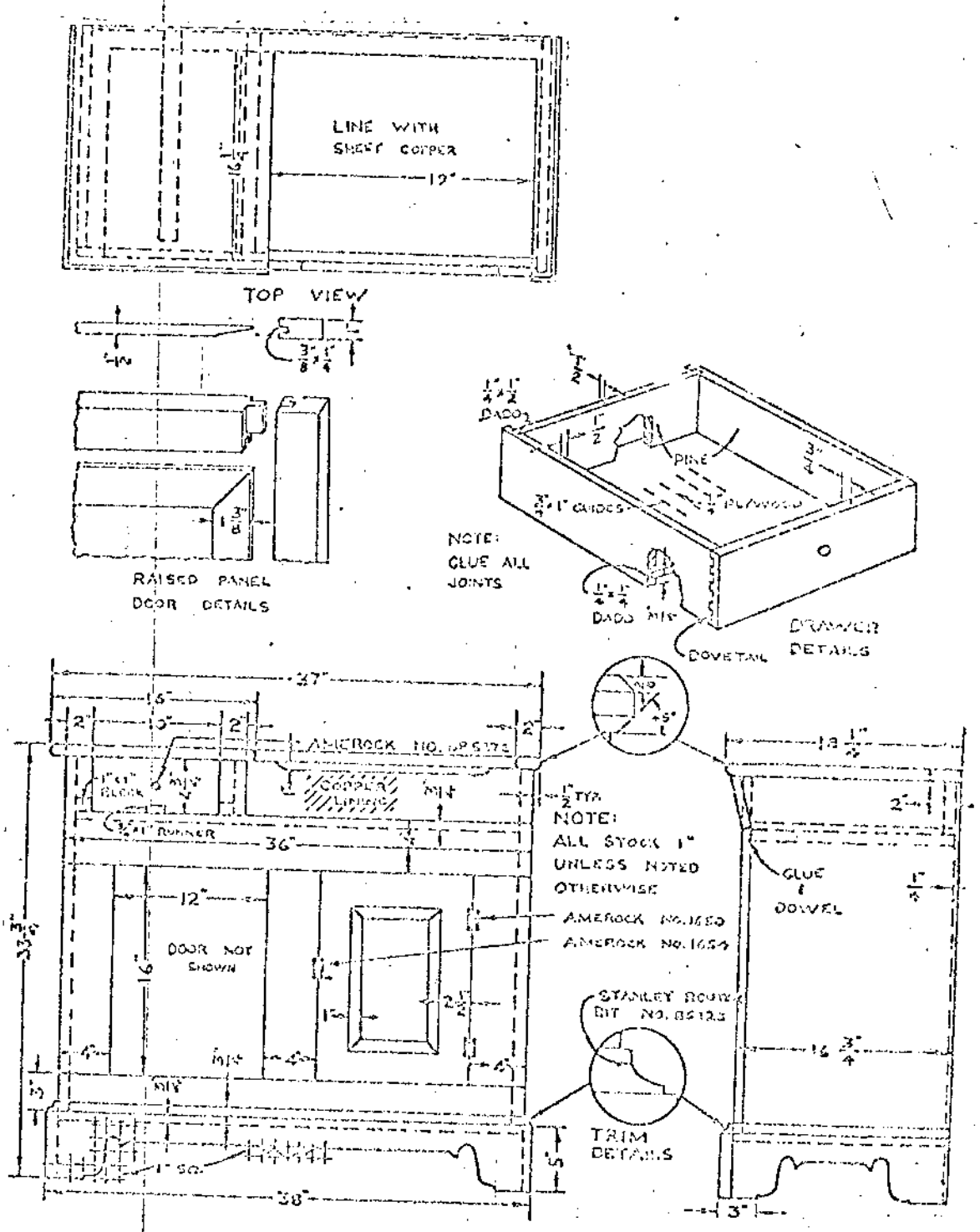


Fig. 85--Dry sink, suitability considered good for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

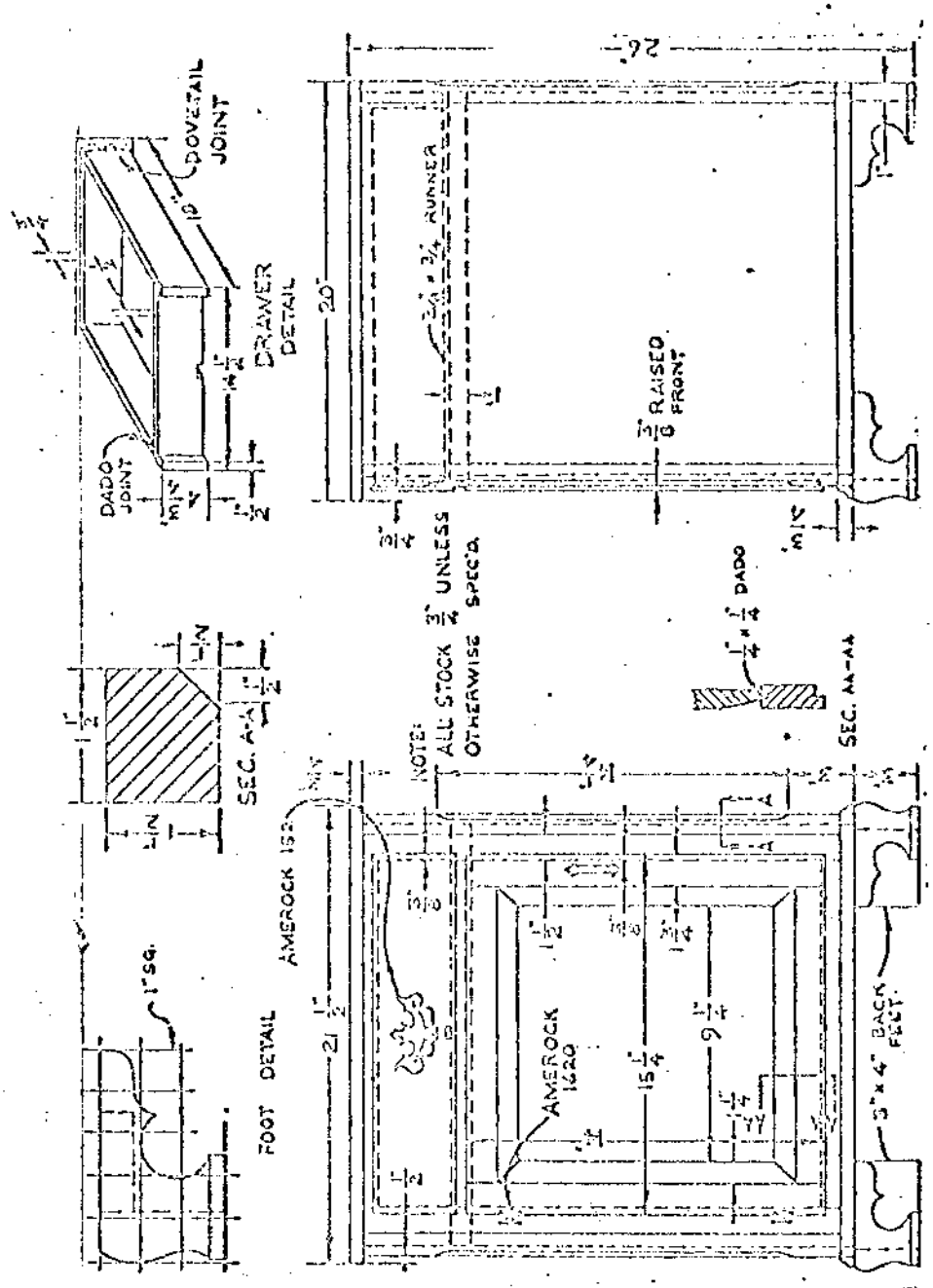


Fig. 36--Commode, suitability considered good for high school-college level.

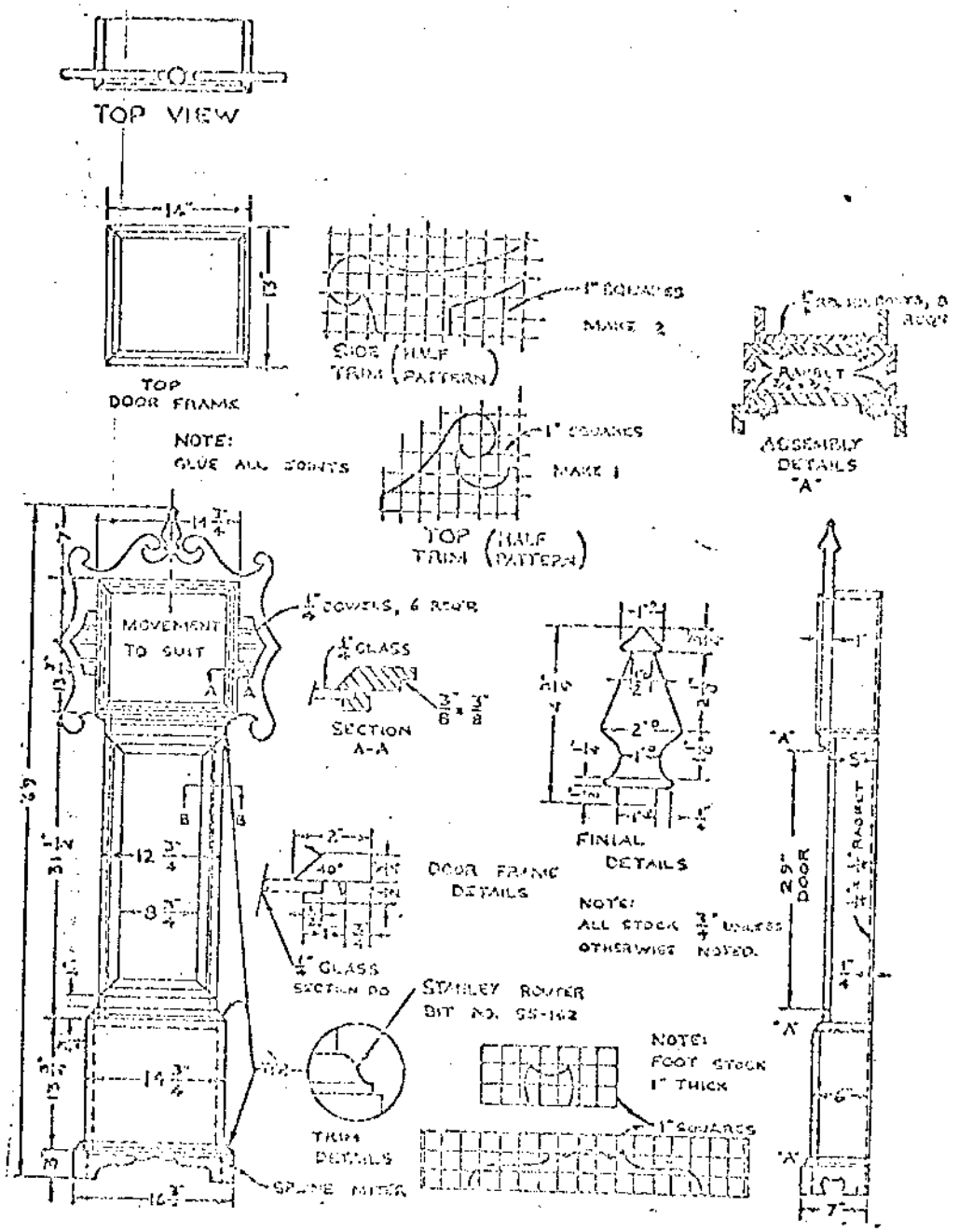


Fig. 87--Grandfather's clock, suitability considered good for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

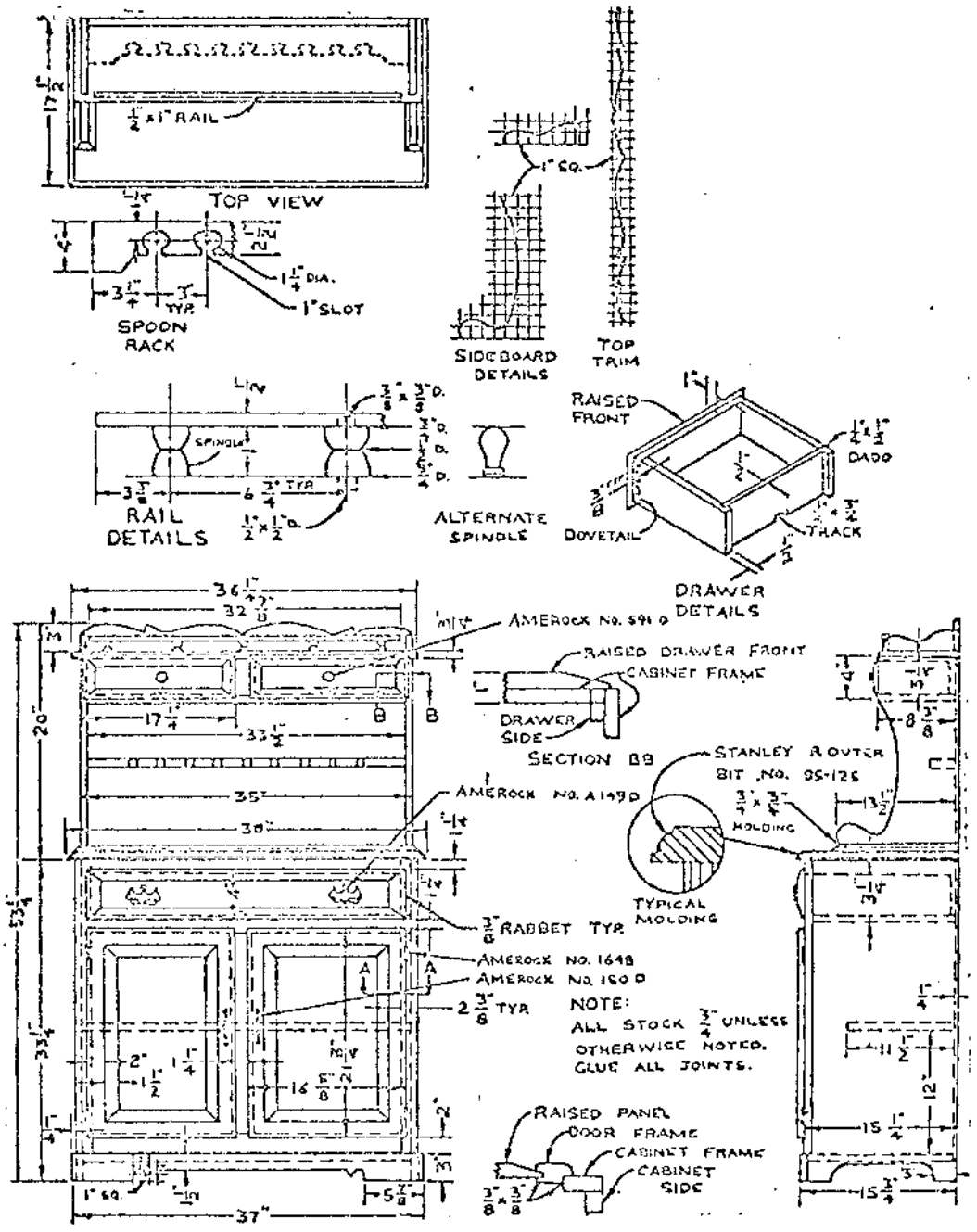


Fig. 88--Hutch, suitability considered good for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

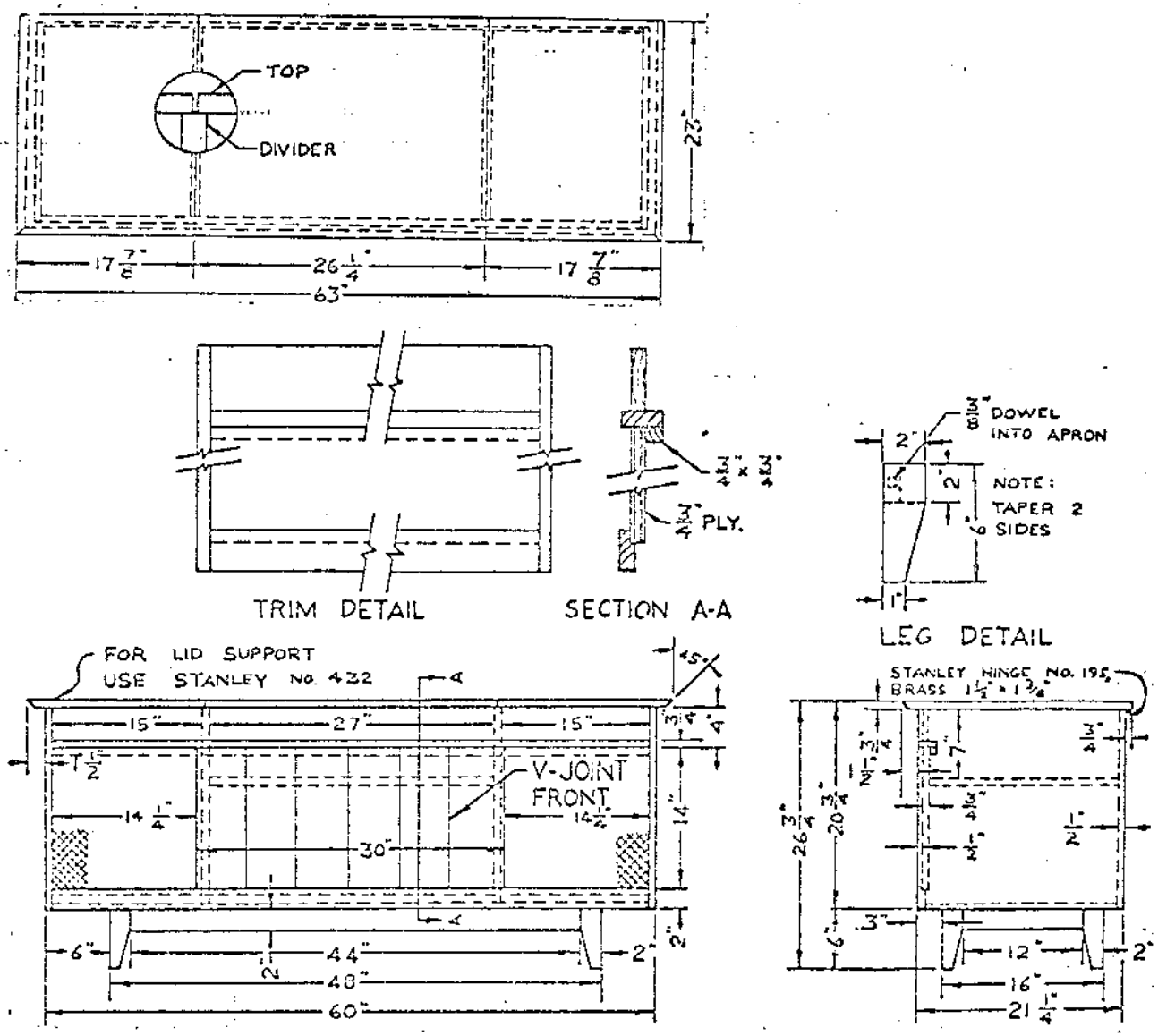


Fig. 89--Stereo cabinet, suitability considered good for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

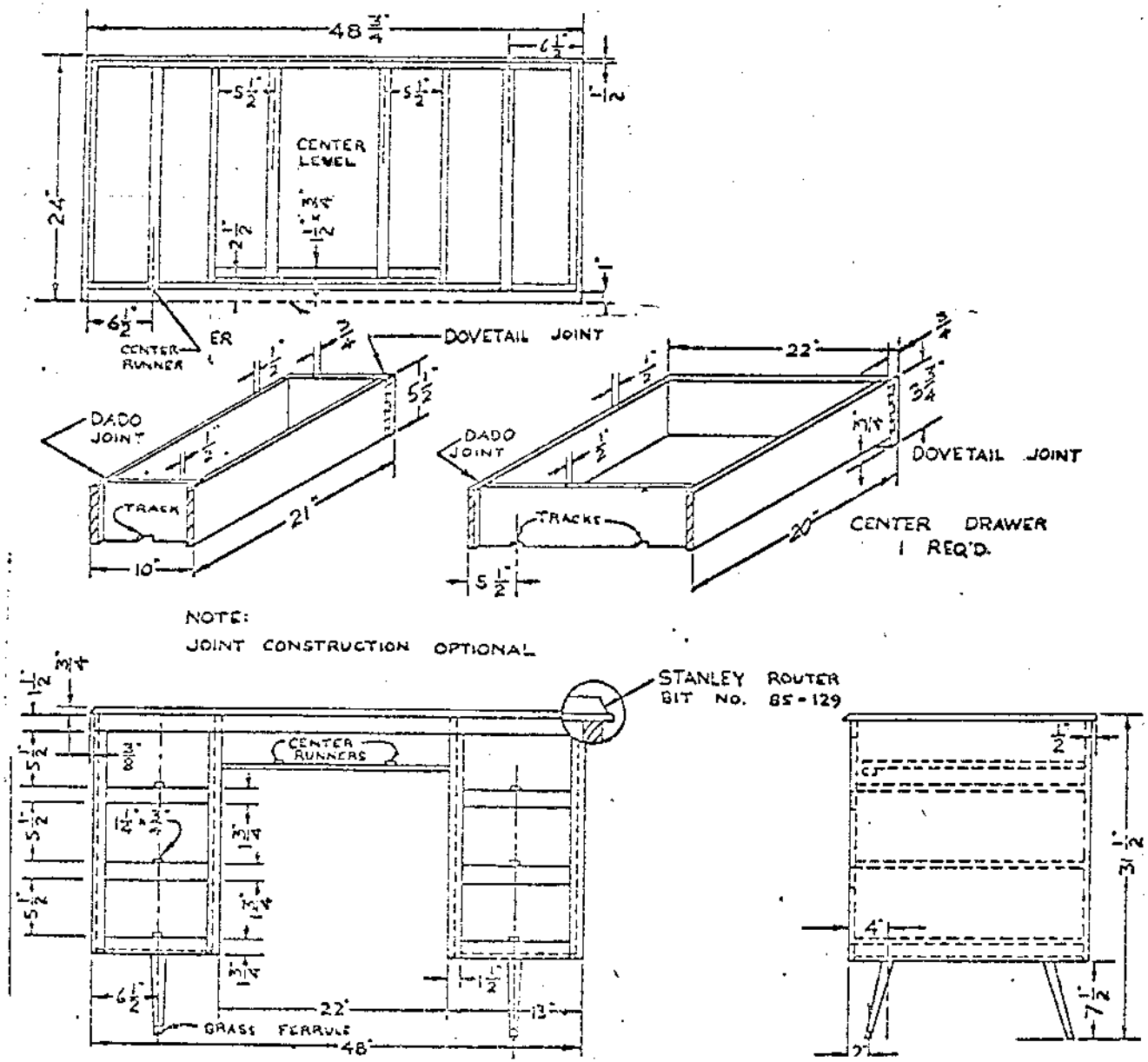


Fig. 90--Modern desk, suitability considered good for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

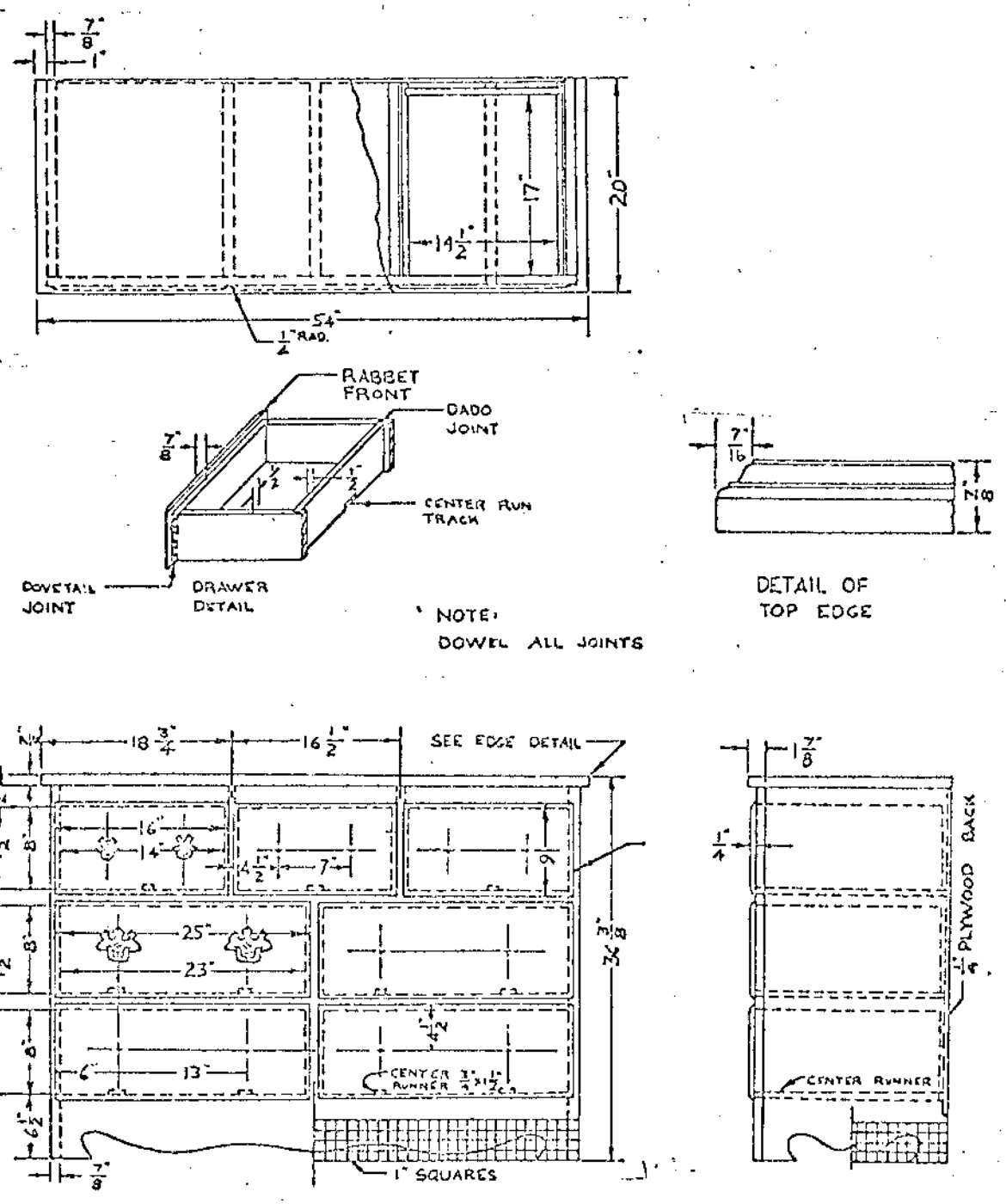


Fig. 91--Chest of drawers, suitability considered good for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

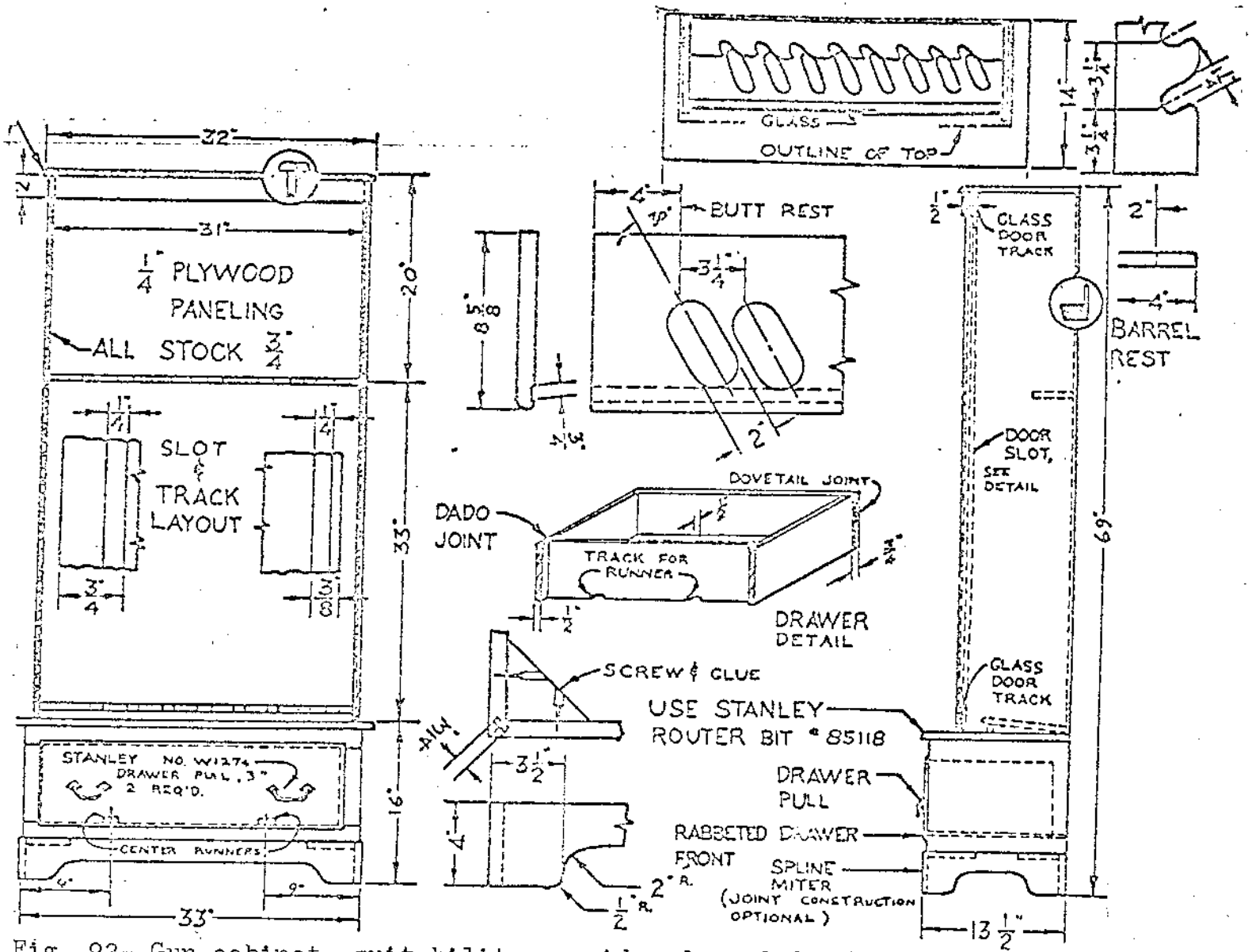


Fig. 92--Gun cabinet, suitability considered good for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

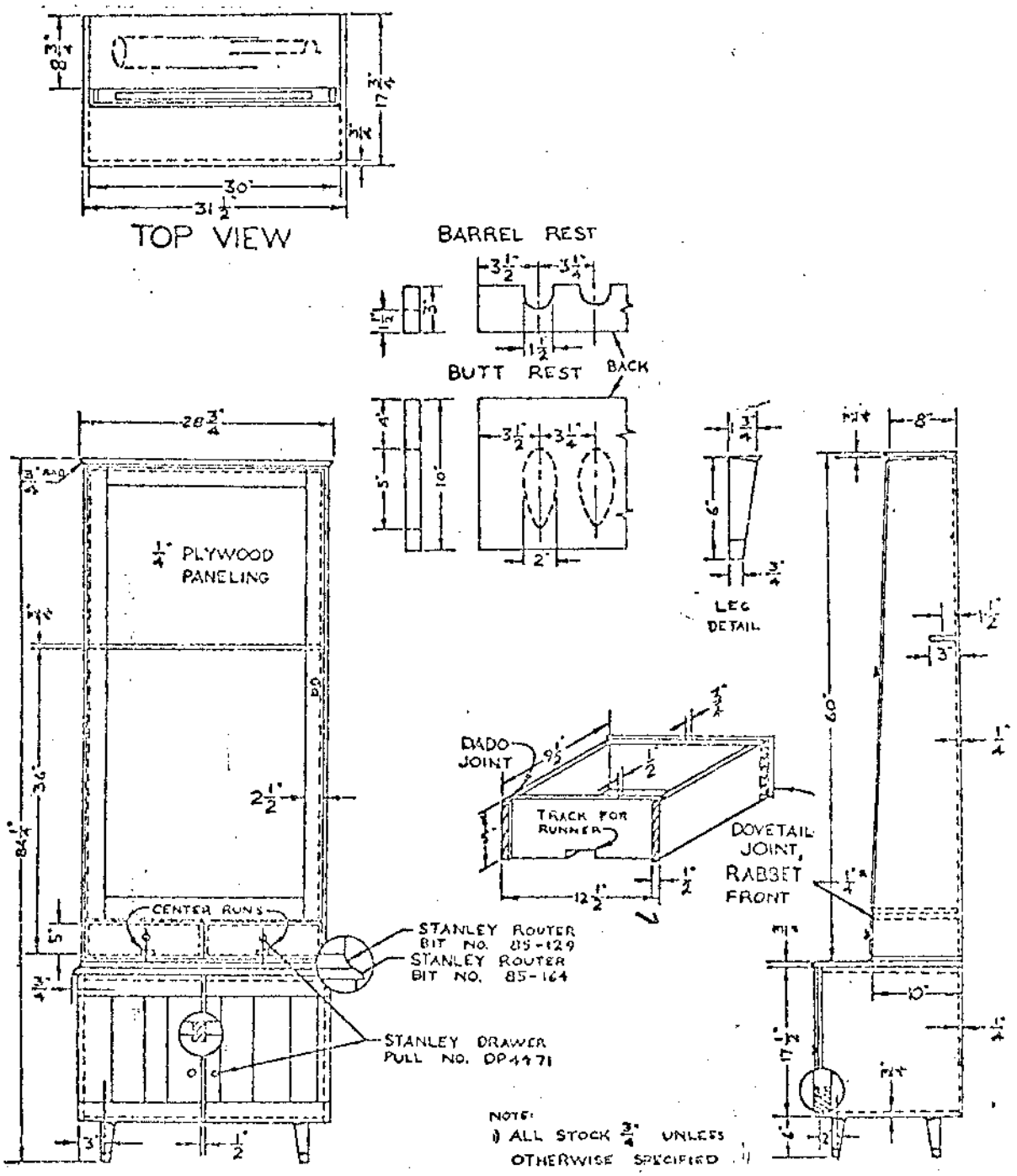


Fig. 93--Gun cabinet, suitability considered average for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

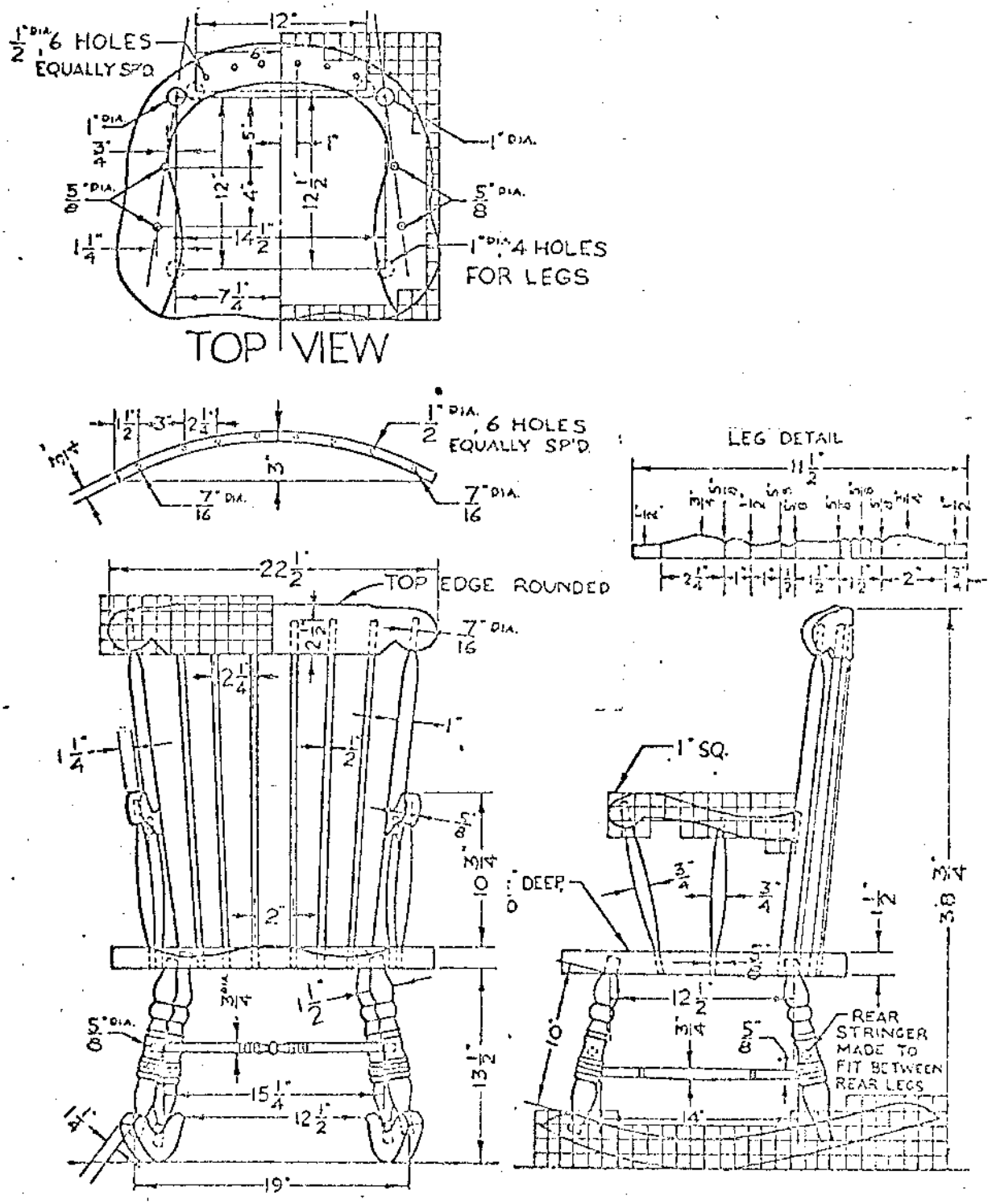


Fig. 94--Boston rocker, suitability considered good for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

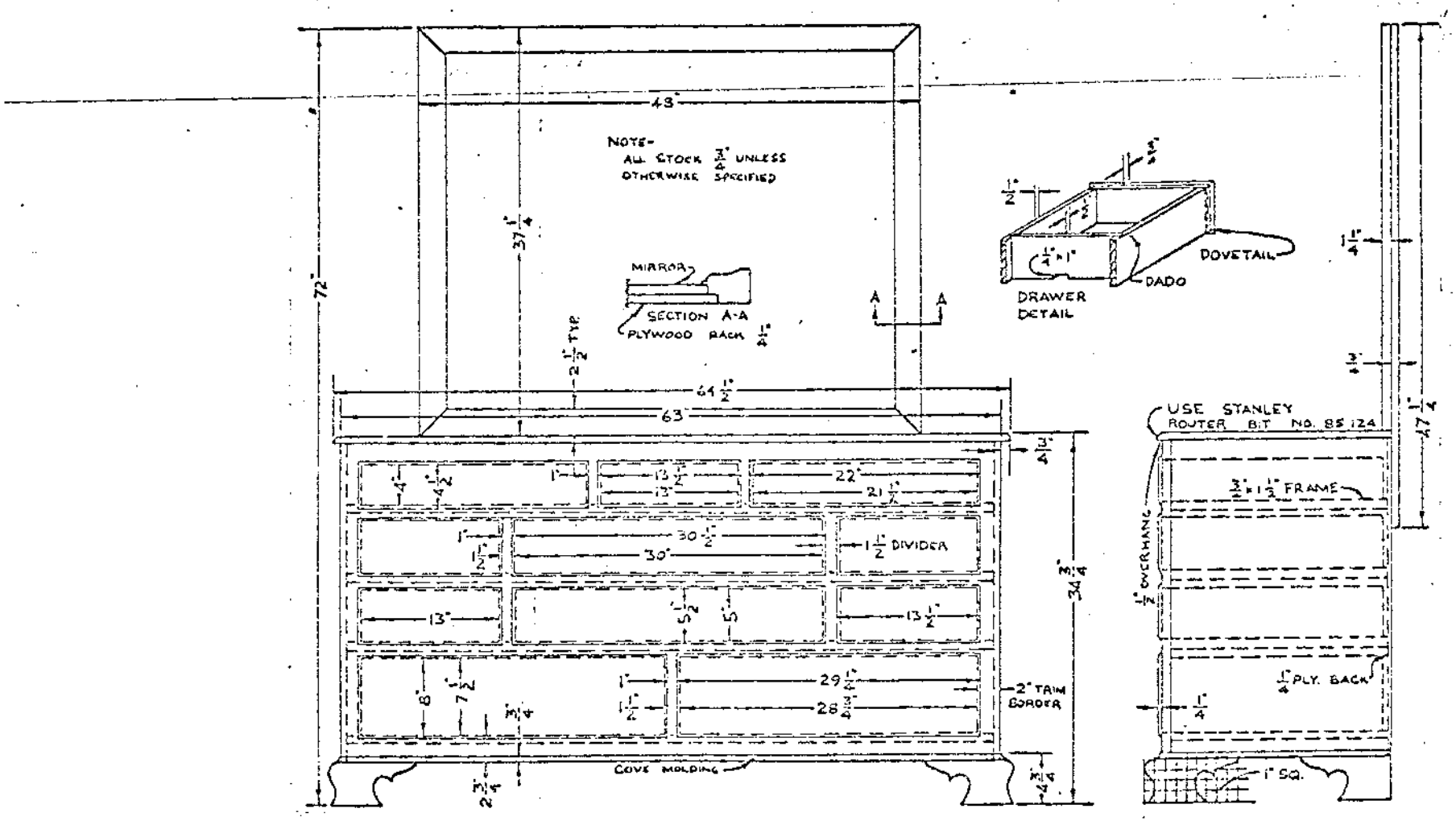


Fig. 95--Chest of drawers, suitability considered good for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

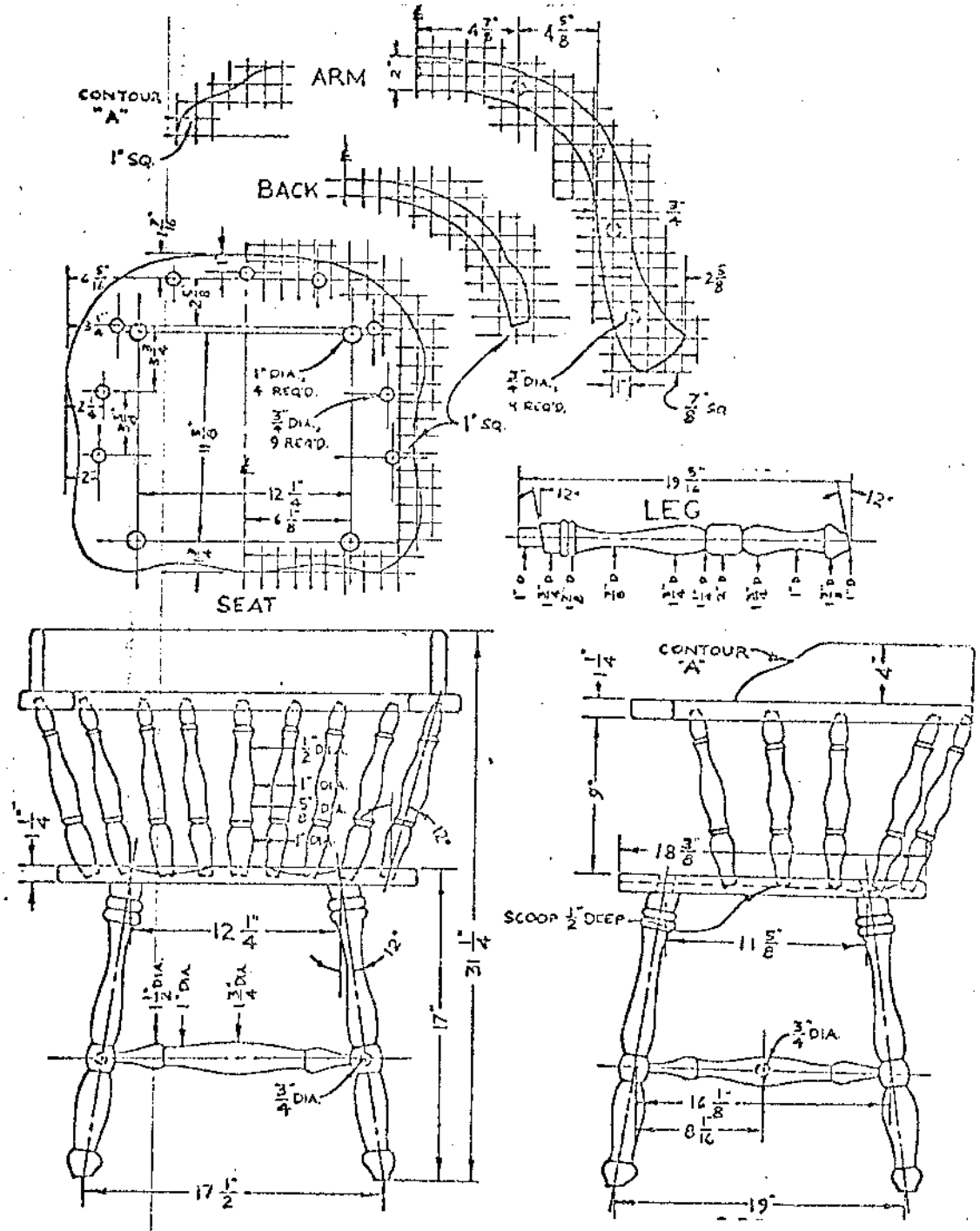


Fig. 96--Captain's chair, suitability considered good for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

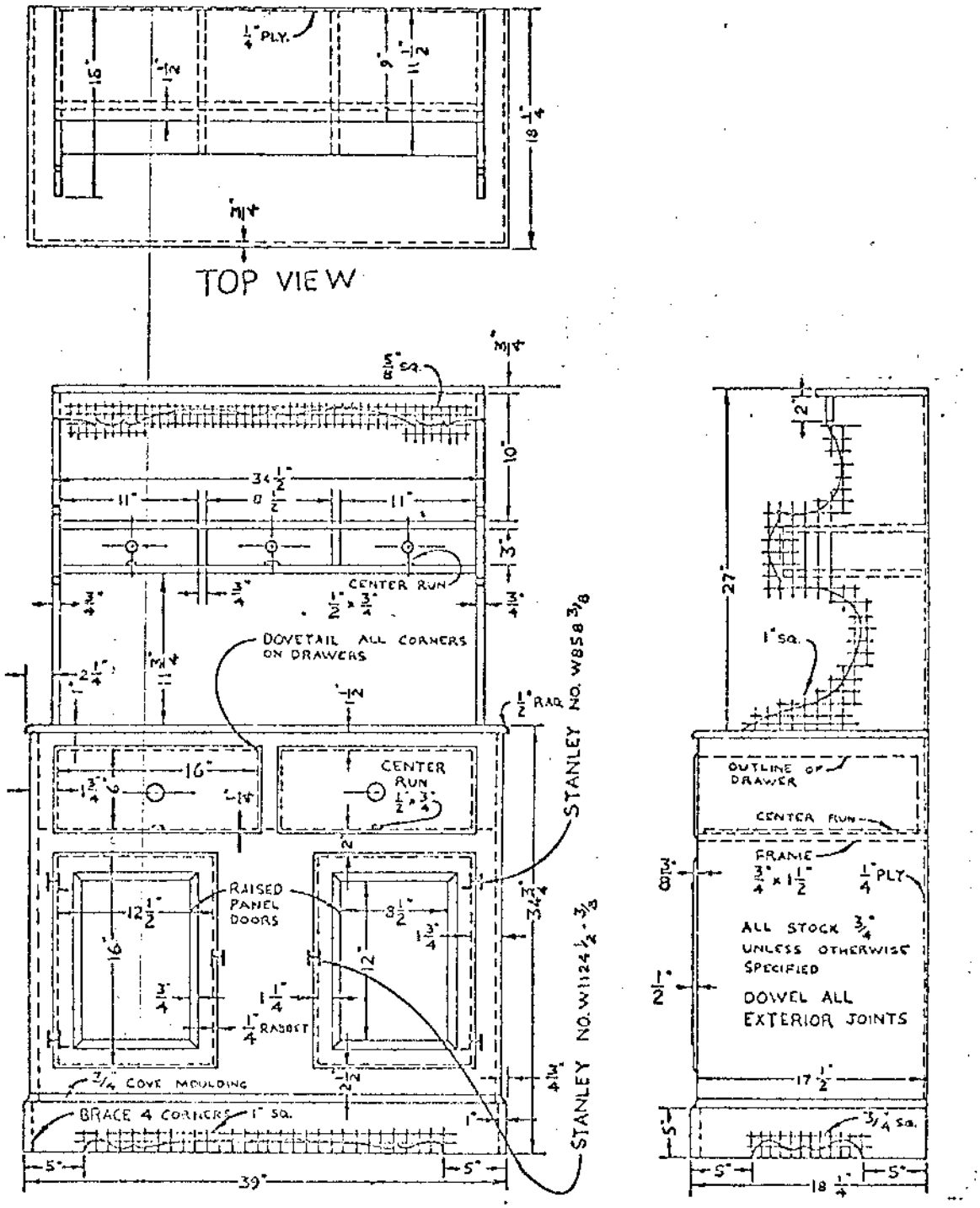


Fig. 97--China cabinet, suitability considered good for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

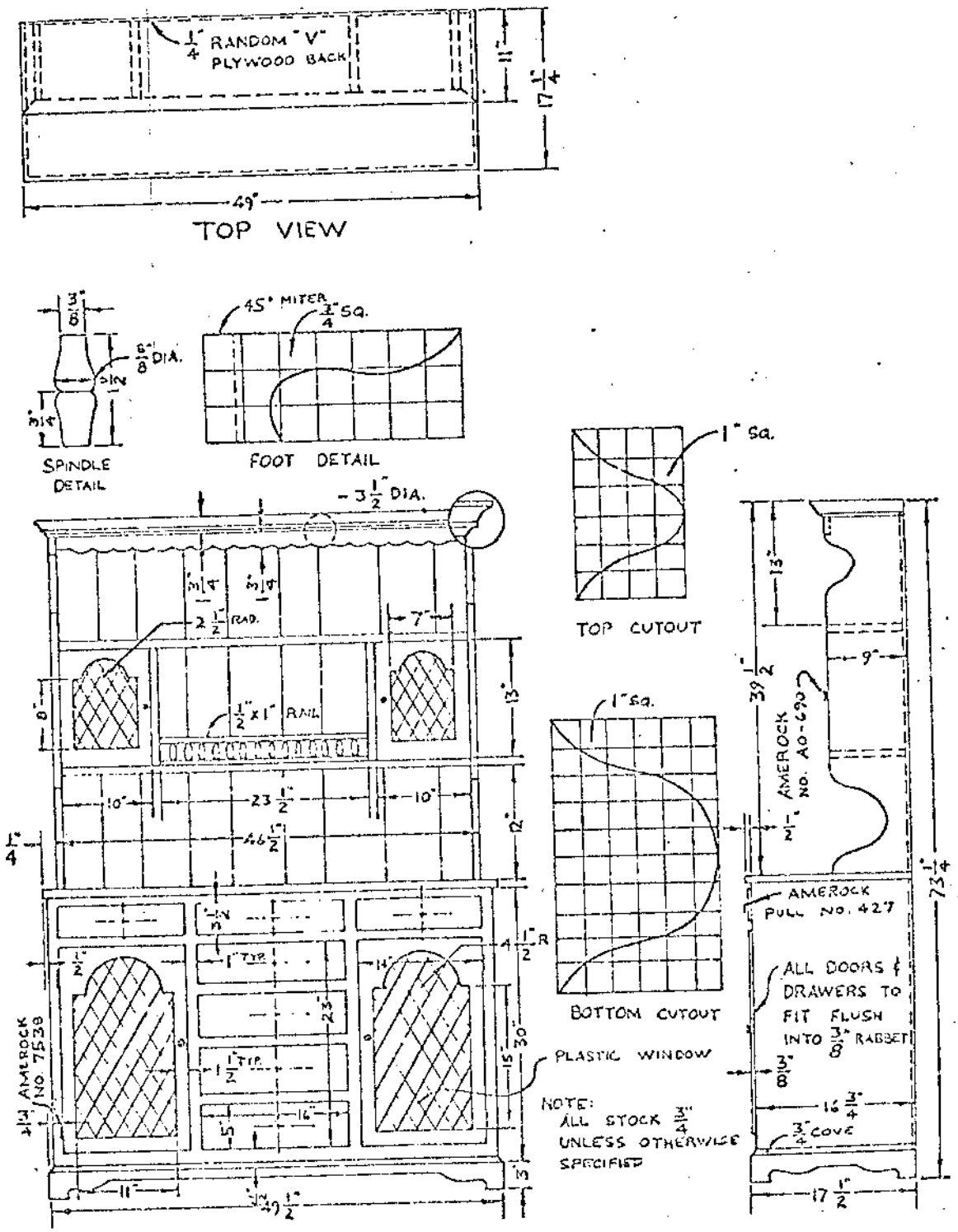


Fig. 98--Early American china cabinet, suitability considered good for high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

APPENDIX E

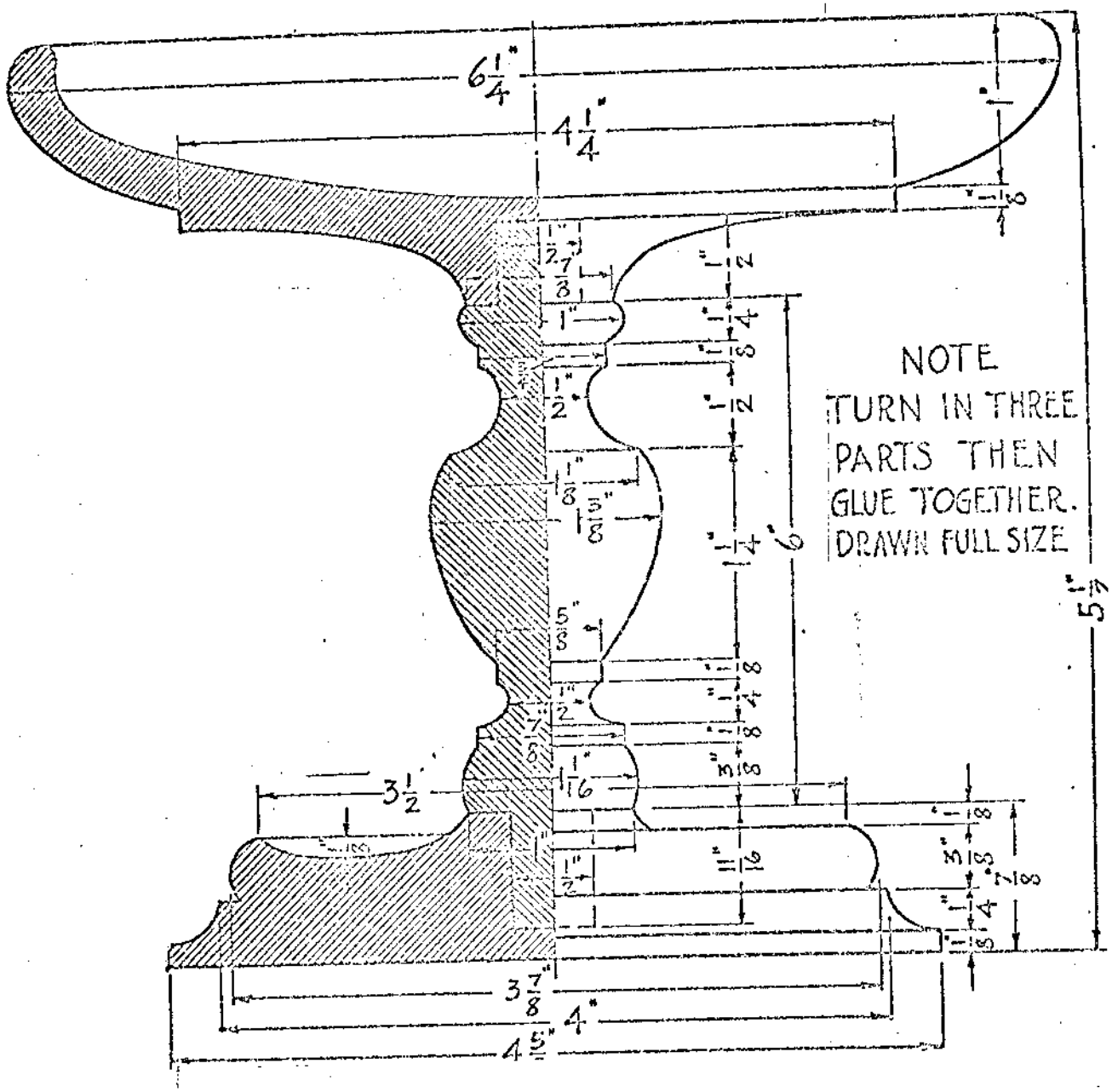


Fig. 99--Mint dish, suitability considered average for junior high-high school-college level, Stanley Tool Company, Project Plans for Woodworking, New Britain, Connecticut.

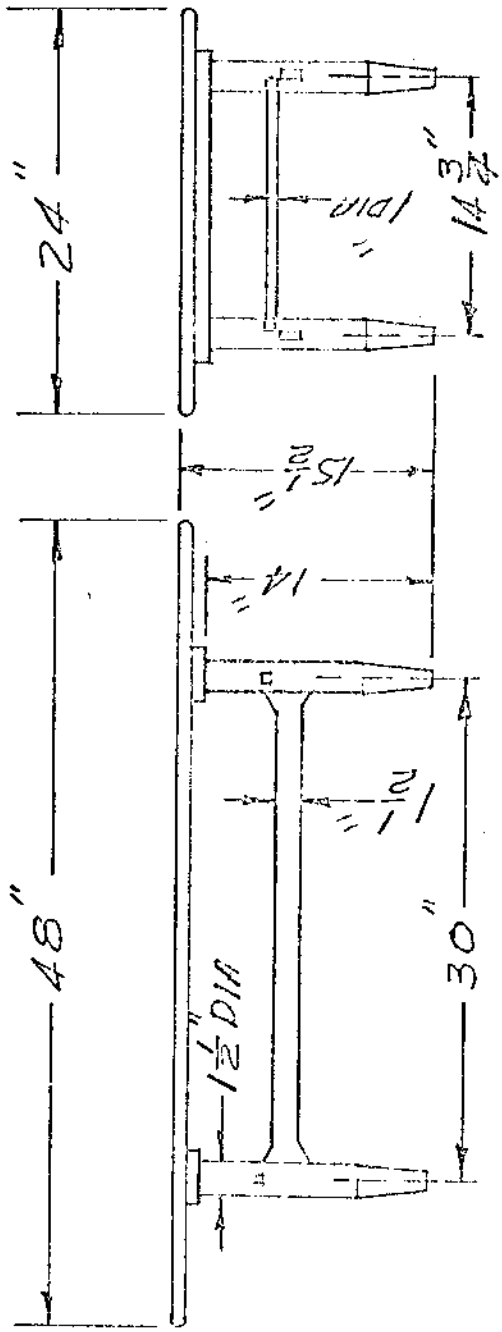


Fig. 100--Coffee table, suitability considered average for junior high-high school-college level.

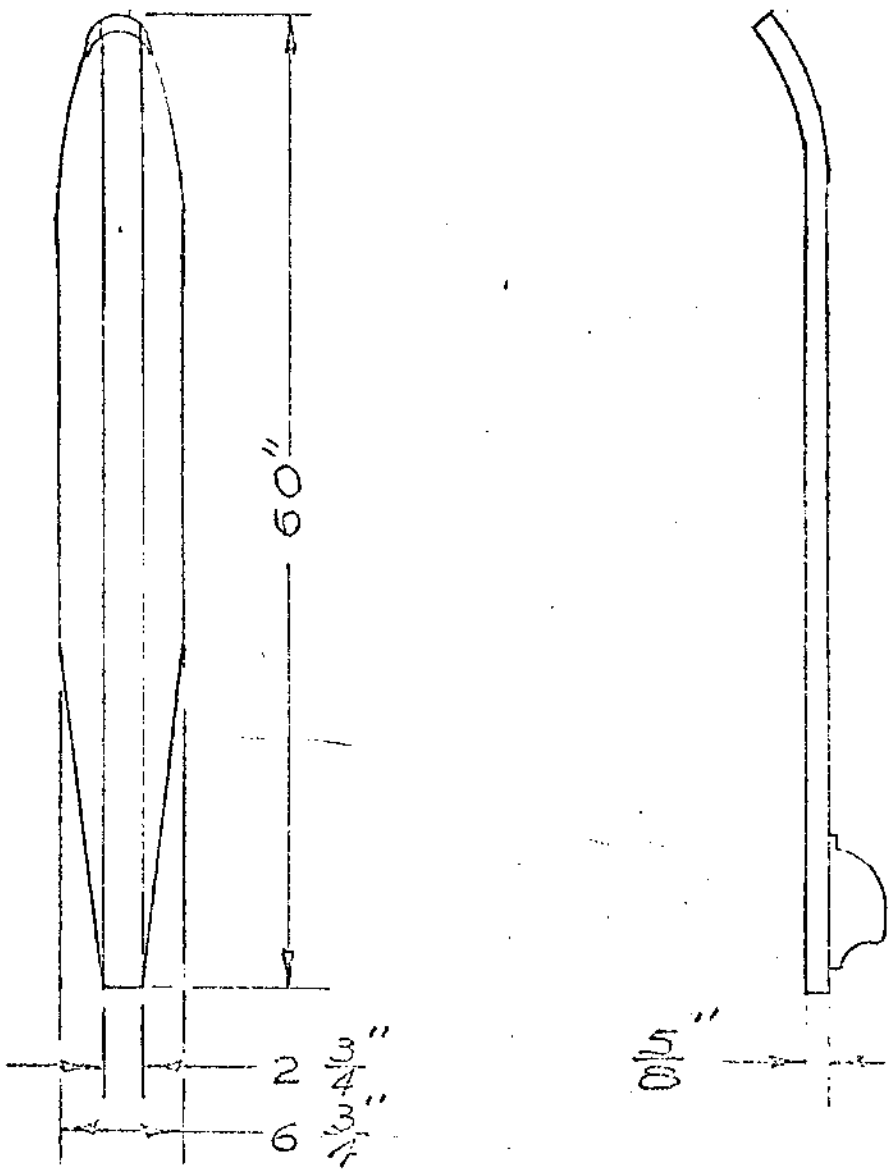


Fig. 101--Water ski, suitability considered average for junior high-high school-college level.

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