PLANT REQUIREMENTS FOR MANUFACTURE OF WOOD TABLES AND CHAIRS

TECHNICAL AIDS BRANCH

INTERNATIONAL COOPERATION ADMINISTRATION

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FOREWORD

This manual is a revision of an earlier report of the same type issued in 1955. This revised version includes current costs of labor, machinery, equipment and supplies, as well as additional information relative to engineering, training, safety, markets, sales, financial and economic factors.

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This manual is designed to provide a general picture of the factors which must be considered in establishing and operating a small-scale factory of this type. It should prove useful in creating interest in the subject, and serve to give enough understanding of the related considerations to help government officials, other leaders and businessmen to determine whether the potential deserves more-detailed attention.

However, it is important to note that in most cases plans for the actual development and installation of a plant will require expert engineering and financial advice in order to meet specific local situations. For further information and assistance, readers should contact their local Productivity Center, Industrial Institute, Servicio, or United States Operations Mission.

Mention of the name of any firm, product, or process in this manual is not to be considered a recommendation or endorsement by the International Cooperation Administration, but merely a citation that is typical in its field.

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The original report was prepared by the Methods Engineering Council, Pittsburgh, Pennsylvania.

Technical information, as well as review, was provided by R. Polakoff, Industrial Consultant, 126 Eleventh Avenue, New York 11, New York.

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PLANT REQUIREMENTS FOR MANUFACTURE OF WOOD TABLES AND CHAIRS

INTRODUCTION

The purpose of this manual is to provide information for the establishment and operation of a small plant to manufacture low cost wooden tables and chairs.

The table and chairs shown in this manual are designed for low cost production and are not intended for the luxury market.

Local customs might require some change in the designs. However, design changes that will add substantially to the cost of the product should be avoided.

GENERAL ASSUMPTIONS

In order to make realistic estimates in this manual, certain assumptions are made. These are:

1. The costs of the building and general facilities are based on United States prices.

2. Material costs are based on sizes and specifications of materials used in the United States.

3. Labor costs are based on the average for the industry as recently published by the United States Bureau of Labor.

4. Adequate power and water are available at the plant site.

5. Adequate transportation facilities are available at the plant site.

6. The plant operates eight hours a day, five days a week, and fifty weeks per year.

7. No special provision is made for the training of new personnel. It is assumed that learner's rates are paid in such cases.

8. The following items cannot be estimated realistically:

   a. Land value;

   b. Distribution and selling costs;

   c. In-freight and out-freight;

   d. Taxes.

   While general estimates will be made of each of these items except taxes, for the purpose of completing cost estimates, adjustment should be made in accordance with actual local costs.

   In fact, all cost estimates contained in this manual should be adjusted to conform to local conditions.

9. Columns are provided in the tables included in this manual to facilitate the conversion of cost figures to conform with local costs.

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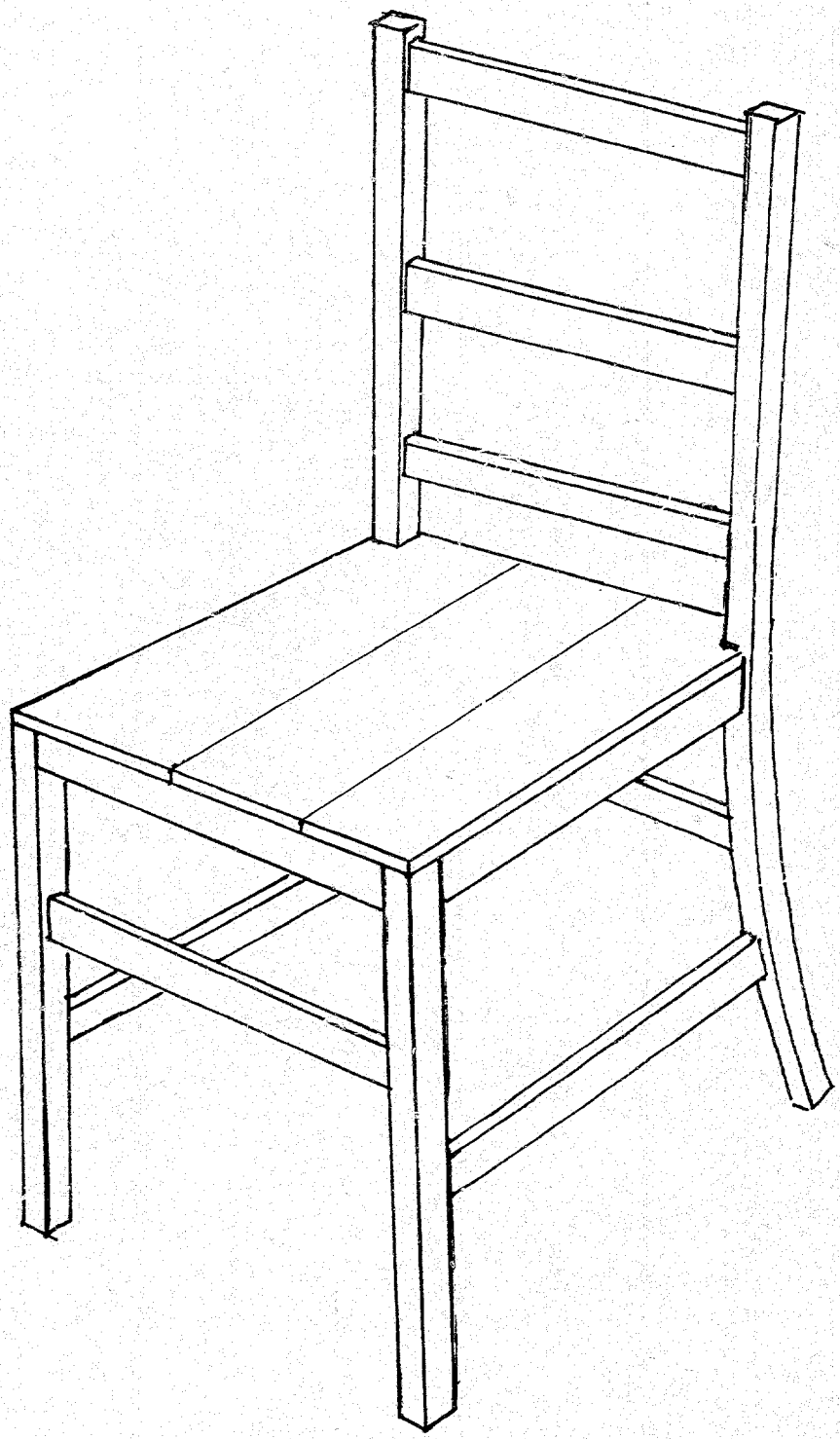
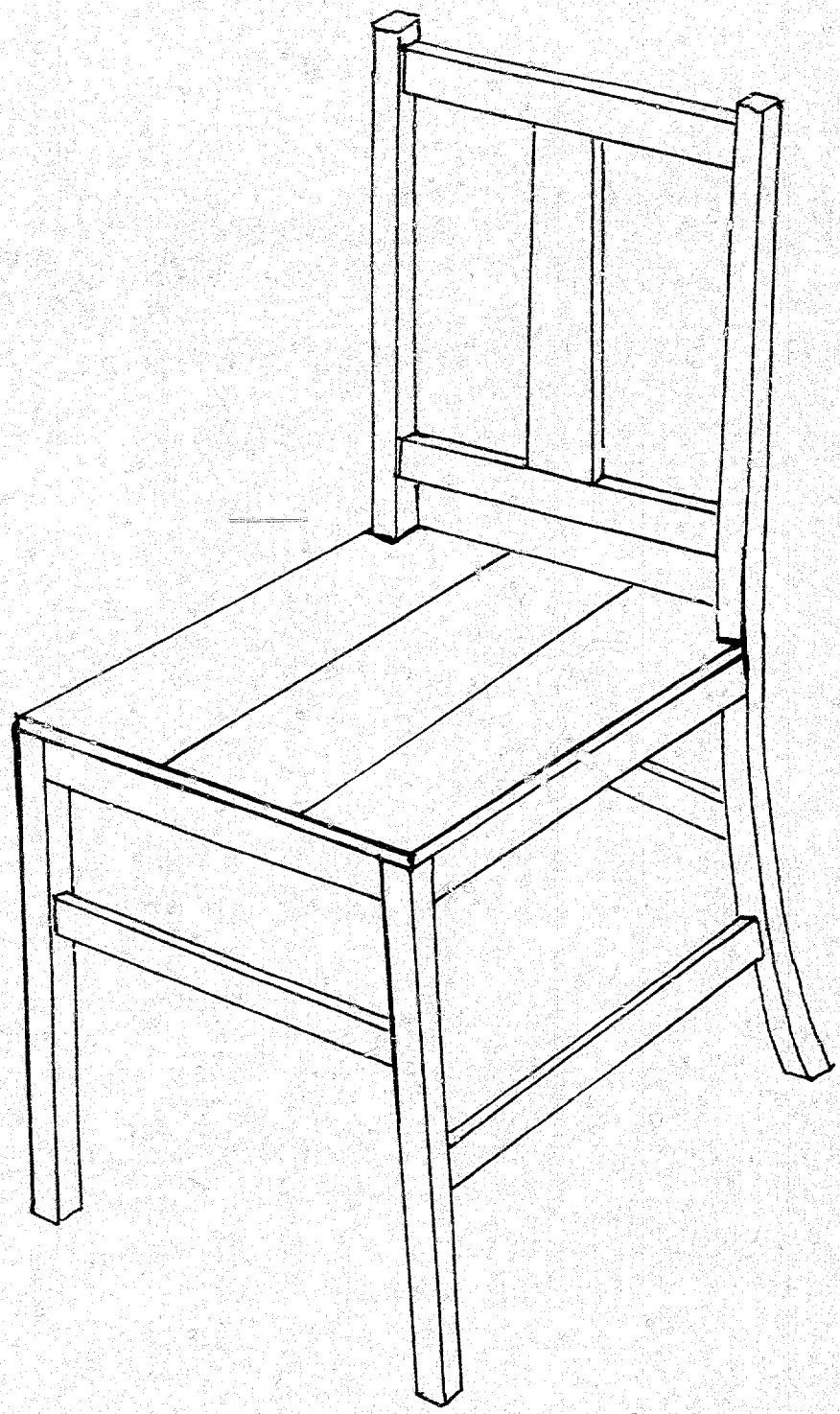
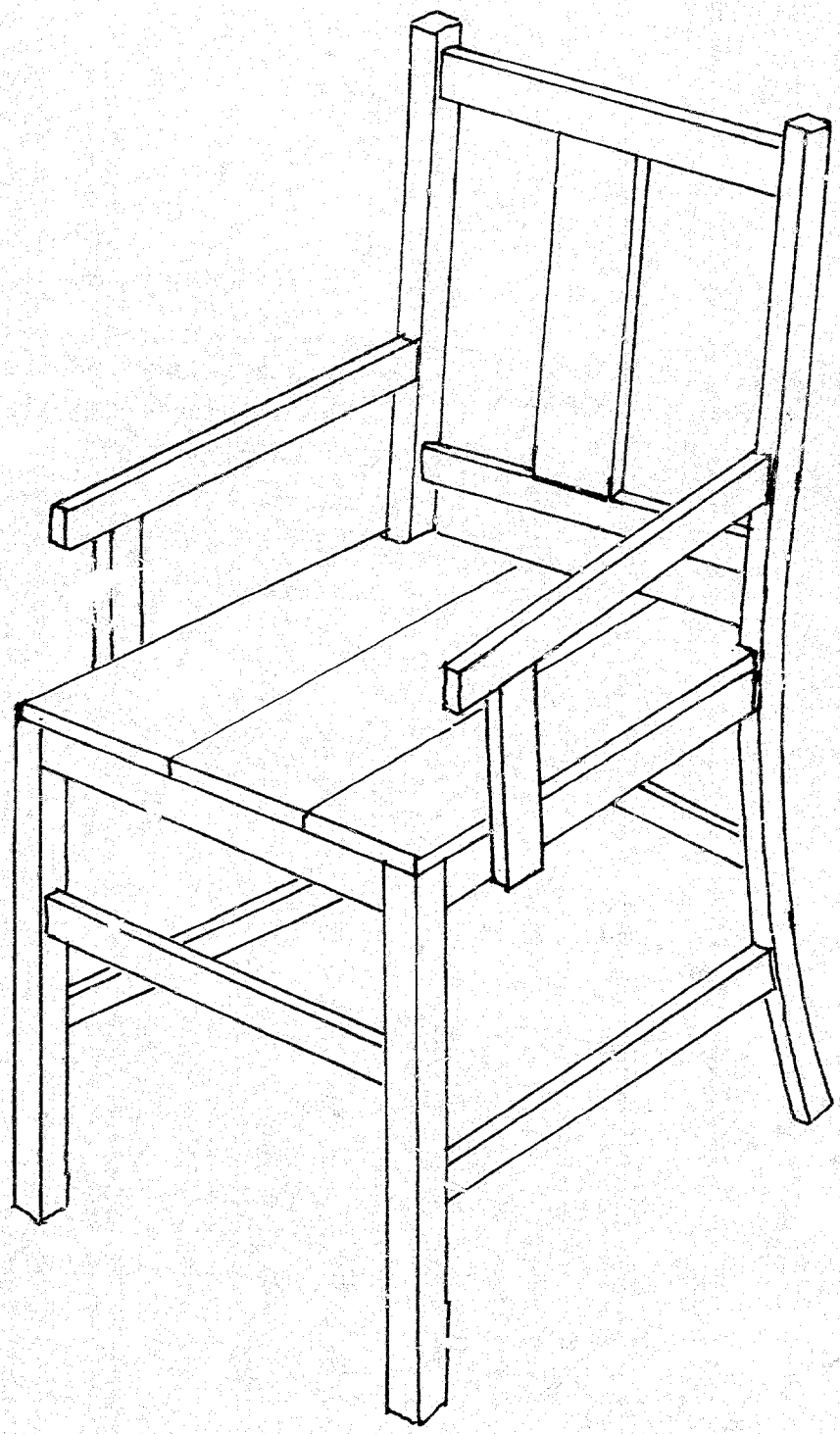


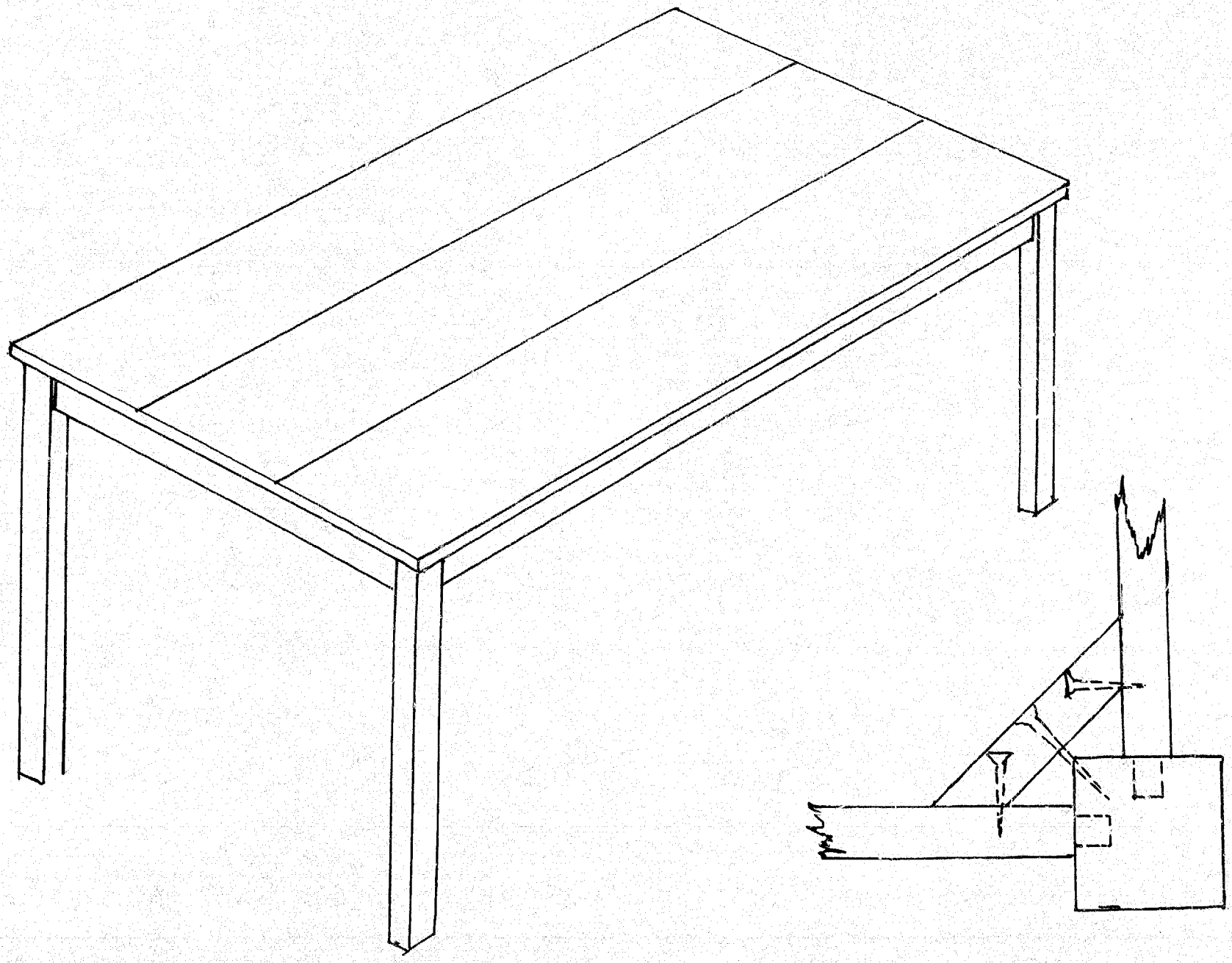
Chair with Three Back Slats



Chair with Two Back Slats and One Panel



Arm Chair



TABLE

PRODUCT SPECIFICATIONS

The chair seat is 17 inches wide at the front, 15 inches wide at the back and 17 inches long. The seat will be 18 inches from the floor. The back ports will be 33 inches long. The chair will be well braced with stretchers, seat rails, back slats, and corner blocks.

Two designs are shown and the cost is the same for both designs. An arm chair is also shown at a small additional cost. Having more than one design adds sales appeal.

The table is 30 inches wide, 60 inches long and 30 inches high.

PRODUCTION CAPACITY

Operating 50 weeks per year the annual capacity of this plant is estimated as follows:

Chairs	250 X 85	or	21,250
Arm Chairs	250 X 17	or	4,250
Tables	250 X 17	or	4,250
Total Pieces			29,750

MANUFACTURING UNIT

The manufacturing unit is a single piece of furniture, one chair, one arm chair, or one table.

MANUFACTURING OPERATIONS

All lumber is cut to length at the radial saw and ripped to size as required.

All parts except corner blocks will be jointed on the jointer to provide straight edges and sides as required for planing.

All parts will be planed, one or two sides and one or two edges as required.

All front parts, back parts, and table legs will be routed on the router. Where a back panel is used the two back slats will be routed.

Each table side rail will have three counterbored holes and each table end rail will have four counterbored holes for wood screws.

The back parts will be marked with a pattern and bandsawed.

The following parts will be tenoned on both ends:

Seat Rails
Table Rails
Back Slats
Back Panels
Stretchers

All parts except corner blocks will have all exposed surfaces sanded on the belt sander. The bandsawed edges on the back parts will also be sanded on the drum of the table sander.

Chair Assembly

The chair back will be assembled complete in a hand press including the following parts:

2 Back Posts
2 or 3 Slats as required
1 Back Panel as required
1 Seat Rail
1 Stretcher

The chair front will be assembled complete in a hand press including the following parts:

2 Front Posts
1 Front Seat Rail
1 Front Stretcher

The two side rails, the front rail, and the two side stretchers are assembled to the chair front assembly and placed in a hand operated chair press together with the assembled chair back. The chair is pressed together and all four corner blocks are nailed in place. The chair is then removed from the press and the seat is assembled to the seat rail with finishing nails completing the chair. Arms are then assembled to chairs that are sold as arm chairs.

Glue is applied to all joints and all tenons and holes during the assembling operations.

Chairs that are to be shipped unpainted are taken to the shipping room. Chairs to be painted or lacquered are taken to the paint department where the paint or lacquer is sprayed on with and air spray gun in a spray booth.

Table Assembly

The two side rails and the two end rails and the four legs are placed in a hand operated press to hold the table frame square while the corner blocks are being assembled with wood screws. The table top is placed on the bench and the table frame is placed on the table top and held in place with a fixture while the table top is fastened to the table frame with wood screws.

Glue is used in all routed holes and tenons.

Tables to be shipped unpainted are sent to the shipping department. Tables to be painted are sent to the paint department to be painted or lacquered with an air spray gun in a spray booth.

SHIPPING

The legs are removed from the tables and fastened to the bottom side of the table. The painted table is then placed in a carton for shipment. The unpainted tables are shipped in packages of two. The table tops being placed together with paper between and held together with four pieces of lumber, two running lengthwise and two crosswise and nailed at the ends with four short blocks.

The painted chairs are wrapped with paper and tied two chairs to a bundle. The chairs that are not painted are bundled together the same as the painted chairs but they are not wrapped.

The wrapping and bundling of the product applies only to items that are shipped long distances. Local deliveries will be made by truck and wrapped in special blankets.

DIRECT MATERIALS

Any local lumber that is suitable for this type of furniture may be used.

For the purpose of this manual Number One Common Red Gum has been used.

The cost of this lumber including freight is $130.00 per 1,000 board feet.

LUMBER COST

CHAIR

Item	Units Needed	Sizes Given In Inches	Board Feet
Stretchers	2	16 X 3/4 X 5/8	.22*
Stretchers	2	20 X 3/4 X 5/8	.28
Front Legs	2	18 X 1-1/2 X 1-1/2	.56
Back Posts	2	33 X 2-1/2 X 1-1/2	1.72
Top Slat	1	15 X 2-1/2 X 3/4	.26
Back Slats	2	15 X 1-1/4 X 5/8	.26
Side Seat Rails	2	17 X 2 X 3/4	.47
Front and Back Seat Rails	2	15 X 2 X 3/4	.42
Corner Blocks	4	6 X 2 X 1-1/2	.34
Total			4.31
Total with 30 per cent added for waste			5.60

* From Scrap

Total lumber required per year for 85 chairs per day = 85 X 250 X 5.60 or 119,000 board feet.

Annual cost of lumber for chairs $15,470.

ARM CHAIR

Material required for chair			4.31
Arm Posts	2	12 X 1-1/2 X 3/4	.25
Arms	2	14 X 1-1/2 X 3/4	.29
Total			4.85
Total with 30 per cent added for waste			6.31

Total lumber required per year for 17 arm chairs per day = 17 X 250 X 6.31 or 26,818 board feet.

Annual cost of lumber for arm chairs $3,486.

Lumber Cost - Continued

TABLE

Item	Units Needed	Sizes Given In Inches	Board Feet
Table Top	1	60 X 30 X 3/4	12.50
End Rails	2	26 X 3 X 3/4	1.85
Side Rails	2	56 X 3 X 3/4	2.33
Legs	4	30 X 1-3/4 X 1-3/4	2.54
Corner Blocks	4	9 X 2 X 1-3/4	.85
Total			20.07
Total with 30 per cent added for waste			26.09

Total lumber required per year for 17 tables per day = 17 X 250 X 26.09 or 110,882 board feet.

Annual cost of lumber for tables $14,415

Annual lumber requirements including scrap 256,700 board feet.

Total Annual Cost of Lumber $33,370.

ANNUAL DIRECT MATERIALS COST

Item	Chairs	Arm Chairs	Tables
Lumber	$ 15,470	$ 3,486	$ 14,415
Nails	850	850	---
Screws	---	49	900
Glue	450	90	300
Paint *	1,200	240	700
Total	$ 17,970	$ 4,715	$ 16,315

Total Annual Cost $39,000

* Based on one half of the products being painted.

PRODUCTION TOOLS AND EQUIPMENT

Description	Number Required	Estimated Unit Cost	Estimated Total Cost	Actual Cost
Radial cut off saw with automatic rip feed attachment	1	$1,000	$1,000	_____
Jointer - 8 inch	1	470	470	_____
Planer - 16 inch with grinding attachment	1	900	900	_____
Drill Press - floor	1	520	520	_____
Band Saw with ripping attachment	1	550	550	_____
Tilting arbor trim and rip saw	2	450	900	_____
Dado Head	2	35	70	_____
Table belt sander	1	1,000	1,000	_____
Single End Tenoner	1	950	950	_____
Chain Mortiser	1	1,900	1,900	_____
Mortiser Chain Grinder	1	300	300	_____
Bench Grinder	1	100	100	_____
Electric screwdrivers	2	40	80	_____
Electric Drills	2	40	80	_____
Total			$8,820	_____

OTHER TOOLS AND EQUIPMENT

Lumber truck	1	$ 100	$ 100	_____
Factory trucks	8	50	400	_____
Work Benches - homemade	4	50	200	_____
Assembling presses	7	100	700	_____
Assembling press	1	300	300	_____
Glue Pots	4	75	300	_____
Saws, knives, and cutting tools			1,000	_____
Hand tools			500	_____
Total			$3,500	_____

FURNITURE AND FIXTURES

Description	Number Required	Estimated Unit Cost	Estimated Total Cost	Actual Cost
Desks and Chairs	2	$ 125	$ 250	_____
Typewriter	1	150	150	_____
Adding Machine	1	130	130	_____
Filing Cabinets	4	60	240	_____
Total			$ 770	_____

Production Tools and Equipment	$ 8,820
Other Tools and Equipment	3,500
Furniture and Fixtures	770
Total	$13,090

SUPPLIES

Item	Estimated Cost	Actual Cost
Lubricants	$ 50	_____
Cutting Tools	450	_____
Hand Tools	200	_____
Maintenance and Repair Parts	500	_____
Office Supplies	191	_____
Truck Expense	500	_____
Total	$ 1,891	_____

DIRECT LABOR

Occupation	Personnel Required	Hourly Rate	Estimated Cost	Actual Cost
Cut-off and rip	1	$ 1.80	$ 3,600	_____
Jointer	1	1.60	3,200	_____
Trim and rip	2	1.70	6,800	_____
Drill Press	1	1.60	3,200	_____
Tenon	1	1.70	3,400	_____
Mortising	1	1.70	3,400	_____
Bandsaw	1	1.70	3,400	_____
Sanding	2	1.70	6,800	_____
Assemblers	4	1.60	12,800	_____
Painters	2	1.60	6,400	_____
Total	16		$53,000	

INDIRECT LABOR

Occupation	Personnel Required	Hourly Rate	Estimated Cost	Actual Cost
Manager	1		$ 8,000	_____
Bookkeeper	1		5,000	_____
Receiving and Shipping	1	$ 1.60	3,200	_____
Yard Man	1	1.60	3,200	_____
Foreman	1		6,000	_____
Truck Driver	1	1.50	3,000	_____
Total			$28,400	_____

PLANT LAYOUT

A plant layout is shown on the last page of this manual.

PLANT SITE

To provide space for a lumber yard and for eventual expansion the land for the plant site should contain about 12,000 square feet. The site should be level and well drained and should be located as advantageously as possible with respect to transportaion, power, water, sources of markets and labor. The cost of such a site is estimated at $1,000.

BUILDING

A one-story building 50 feet by 60 feet or about 3,000 square feet will provide ample space for all operations including an office. The building may be constructed with any suitable local materials. The cost of the building including boiler for heating, adequate plumbing and wiring is estimated at $3.50 per square foot or a total of about $10,500.

POWER

About 80 kilowatt hours of power per shift will be required. Based on a cost of $.025 per kilowatt, the annual cost of power for all purposes is estimated at $500.

FUEL

Scrap lumber and sawdust should supply ample fuel to heat the building.

WATER

The cost of water for production, heating and sanitary purposes is estimated at $200.

TRUCK

A one-ton pick-up and delivery truck is recommended at a cost of $2,500. The cost of the truck driver is included in indirect labor. The cost of the gas, oil and maintenance, amounting to $500, is included in supplies.

DEPRECIATION

Item	Estimated Cost	Years Life	Estimated Per Year	Actual Per Year
Building	$10,500	20	$ 525	_____
Production Tools and Equipment	8,820	10	882	_____
Other Tools and Equipment	3,500	5	700	_____
Furniture and Fixtures	770	10	77	_____
Pick-up Truck	2,500	4	625	_____
Total			$ 2,809	_____

MANUFACTURING OVERHEAD

Item	Estimated Cost	Actual Cost
Depreciation	$ 2,809	_____
Indirect Labor	28,400	_____
Supplies	1,891	_____
Power	500	_____
Water	200	_____
Fuel	---	_____
Total	$33,800	_____

MANUFACTURING COST

Direct Materials	$ 39,000	_____
Direct Labor	53,000	_____
Manufacturing Overhead	33,800	_____
Total	$ 125,800	_____

FIXED ASSETS

Item	Estimated Cost	Actual Cost
Land	$ 500	_____
Building	10,500	_____
Production Tools and Equipment	8,820	_____
Other Tools and Equipment	3,500	_____
Furniture and Fixtures	770	_____
Pick-up Truck	2,500	_____
Total	$ 26,590	_____

WORKING CAPITAL

Item		Estimated Cost	Actual Cost
Direct Materials	- 60 days	$ 6,500	_____
Direct Labor	- 30 days	4,400	_____
Manufacturing Overhead	- 30 days	5,300	_____
Reserve for Sales Collections	- 30 days	14,500	_____
Total		$ 30,700	_____

CAPITAL REQUIREMENTS

Fixed Assets	$ 26,590	_____
Working Capital	30,700	_____
Total	$ 57,290	_____

SALES REVENUE

In the United States chairs and tables of the design and quality described in this manual are sold at the following approximate prices:

Plain Chair	$ 5.00
Arm Chair	6.00
Table	12.00

On this basis the gross annual sales revenue would amount to --

Plain Chairs	21,250	X	$ 5.00	or	$ 106,250
Arm Chairs	4,250	X	6.00	or	25,500
Tables	4,250	X	12.00	or	51,000
Total Gross Sales Revenue					$ 182,750

RECAPITULATION OF COSTS, SALES AND PROFITS

Item	Estimated Cost		Actual Cost
Direct Materials	$ 39,000		_____
Direct Labor	53,000		_____
Manufacturing Overhead	33,800		_____
Total Manufacturing Cost		$ 125,800	_____
Interest on Loans	$ 800		_____
Insurance	300		_____
Legal	600		_____
Auditing	900		_____
Unforeseen Expense	5,350		_____
Total Administrative Cost		7,950	_____
Sales Commissions, Travel Freight Out, Bad Debts, Discounts and Allowances		10,000	_____
Profit before Taxes		39,000	_____
Total Annual Gross Sales		$ 182,750	_____

BUDGET CONTROL

A requisition form designed to provide accurate records of procurement and indicate the purpose of procurement with the least amount of time and effort is shown on the following page.

This form has an account number for each type of the various expenditures which the manager will review in detail, monthly or oftener, in order to control his expenses. Some items, such as power and water, are usually under contract and are easily checked by reference to monthly bills. For simplification, items (marked with an asterisk below) are omitted from the purchase requisition. Variations in the labor costs are easily reviewed by examination of the payroll vouchers. The simplified type of control thus provided makes certain that the manager can control expenditures promptly.

Following the requisition form, a sample voucher check is shown. Voucher checks should be used for the payment of all expenditures and the appropriate book account number placed on each voucher.

At the end of each month the manager will receive a statement of all expenditures broken down by budget accounts. If the expenditures exceed the budgeted monthly allowances of any of the accounts, the bookkeeper will furnish the manager with a break-down of all expenditures relative to the budgeted accounts exceeded. All these supporting data can be secured by reference to the purchase requisitions and the check vouchers. This reference will enable the manager to determine what caused the over-expenditure and take corrective action.

If at any time during each month it becomes apparent that expenditures will exceed any of the budget accounts, the bookkeeper will bring this to the attention of the manager for his information and action.

BUDGET CONTROL ACCOUNTS

Account Number		Monthly Expense	Monthly Budget	Annual Budget	Actual
10	Administrative	$_____	$ 213	$ 2,600	$_____
20	Sales	_____	833	10,000	_____
30	Direct Materials	_____	3,250	39,000	_____
40	Supplies	_____	158	1,891	_____
51	Power*	_____	41	500	_____
52	Water*	_____	16	200	_____
53	Fuel	_____	---	---	_____
60	Unforeseen Expense (Reserve Account)	_____	446	5,350	_____
71	Direct Labor*	_____	4,413	53,000	_____
72	Indirect Labor*	_____	2,366	28,400	_____
80	Depreciation (Reserve Account)	_____	---	2,809	_____

Note: Administrative includes interest on loans, insurance, legal and auditing.

PURCHASE REQUISITION	COMPANY NAME	DATE

☐ 10 ADMINISTRATION ☐ 40 SUPPLIES

☐ 20 SALES ☐ 50 UTILITIES

☐ 30 MATERIALS ☐ 60 UNFORESEEN EXPENSE

INDICATE BELOW THE USE OF MATERIALS

☐ DIRECT MATERIALS ☐ MAINTENANCE SERVICES

☐ MAINTENANCE MATERIALS ☐ OPERATING SUPPLIES

	PLEASE ORDER THESE MATERIALS OR SERVICES	DELIVERY WANTED		
QUANTITY	DESCRIPTION	UNIT	TOTAL	

QUOTES FROM		REQUISITIONED BY	
QUOTES FROM		APPROVED BY	
QUOTES FROM		ORDER NO.	ORDER DATE

R. W. MITCHELL MANUFACTURING COMPANY

1422 BOSWORTH STREET, S. E.

65-22
514

ANYWHERE, U. S. A._____19____ No. 10000

PAY _____ DOLLARS $ _____

TO THE ORDER OF

R. W. MITCHELL MANUFACTURING COMPANY

TO FIRST NATIONAL BANK
ANYWHERE, U. S. A.

BY SAMPLE CHECK

VICE PRESIDENT

ACCOUNT NUMBER

Sample voucher check to be used for the payment of all expenditures in connection with Budget Control.

R. W. MITCHELL MANUFACTURING COMPANY

ENGINEERS

The services of professional engineers are desirable in the design of this plant, even though the proposed plant is small.

A correct design is one which provides the greatest economy in the investment of funds and establishes the basis of operation that will be most profitable in the beginning and will also be capable of expansion without expensive alteration.

The addresses of professional engineers who specialize in industrial design, some of whom may be willing to undertake such work on low cost projects overseas, can be secured by reference to the published cards in various engineering magazines. They may also be reached through their national organizations, one of which is the

National Society of Professional Engineers
2029 K Street, Northwest,
Washington 6, D. C.

Manufacturers of industrial equipment employ engineers familiar with the design and installation of their specialized products. These manufacturers are usually willing to give prospective customers the benefit of technical advice by those engineers in determining the suitability of their equipment in any proposed project.

The equipment manufacturers also know, and can recommend, professional engineers in private practice, who are willing and able to provide appropriate consulting services.

TRAINING

Manufacturing an inferior quality of product during the training period could create sales resistance that might be difficult to cope with later. To avoid such possibilities, the quality of the product should be maintained at all times, including the training period.

In some areas skilled operators may be available locally. In other areas all the operators may have to be trained.

If skilled operators are not available, adequate training would be assured by using one or more of the following methods:

A. If the plant is designed and installed by a competent engineering firm, the contract should be negotiated, if possible, on a turn-key basis. On this basis the contractor agrees to operate the plant and produce the quality and quantity of the product stated in the contract for an agreed period of time. Such a contract would assure adequate personnel training, since full quantity and quality could not be produced with an untrained organization.

B. The engineering firm that designs and installs the plant can usually make training arrangements to have key personnel placed, for training purposes, in a foreign industry that produces the same type of product. This would provide training for the key personnel while the plant is being installed.

C. If neither of the above methods is possible, then qualified and experienced individuals should be employed for the key positions, either permanently or temporarily, to perform the key operations and assist in training the organization, even if they must be secured outside the country.

D. The manager should have years of successful experience in this type of business and be fully qualified in all phases of management, including the training of employees.

SAFETY

There is always danger of accident and injury in any industrial plant. Because of this, the manager should take specific action to bring to the attention of each employee the importance of safety precautions and intelligent first aid.

Practically all machines have safety appliances, and the manager should see that these are in good working condition and that the operators are making full use of them.

In addition to constant watchfulness to make sure that all practicable safety precautions are taken, first aid supplies should be readily available. One complete first aid kit should be maintained near the manager's office, and others at appropriate places throughout the plant. Some of the employees should be trained to provide first aid service.

The use of accident posters in the plant have proved to be of value in reducing accidents. It is recommended that such posters be used, and that some direct special action be taken by the manager, at least once each month, to bring to the attention of all personnel the importance of safety precautions.

A fire brigade should be established and each member trained as to his responsibility in case of fire. Fire drills should be conducted periodically.

It is recommended that the employees be encouraged to offer suggestions or recommendations relative to prevention of accidents, removal of fire hazards and maintaining general interest in all safety factors.

SUMMARY

A small plant, built and operated according to the assumptions made in this manual would be a profitable undertaking.

There are some determinations, however, that should be made before a decision is reached to build and operate such a plant. Among the necessary determinations to be made are those with respect to the following items:

MATERIALS AND SUPPLIES

1. Are all materials and supplies available locally?
2. Is the local material market competitive?
3. Are satisfactory delivery of local materials assured at reasonable prices?
4. What materials and supplies must be imported?
5. Are they available in world markets at competitive prices?
6. Would prompt delivery of imported materials and supplies be assured so that large inventories would not be required?

MARKET FACTORS

1. Is there already a demand for the product?
   - A. Who are the principal consumers?
   - B. Who are possible new consumers?

2. How is demand for the product now satisfied?
   - A. By local production? If so, what is the volume of annual production?
   - B. What percentage of consumption is filled by local production?
   - C. By imports? If so, what is the volume of annual imports?
   - D. What percentage of consumption is met by imports?
   - E. From what areas are imports derived?

3. What is the estimated annual increase in local consumption over the next five years?
   - A. How were such estimates made?
   - B. By reference to official figures on population growth, family budgets, imports, etc.?
   - C. By consultation with trade or industry, ministries, associations, bankers, commercial houses, wholesalers, retailers, industrial consumers, etc.?

4. If the product is already being manufactured, can the existing and estimated future local market absorb production of the new plant without price-cutting or other dislocations?

5. Would the estimated sales price and quality of the new product make it competitive with an imported equivalent?
   A. After adjusting cost to local conditions, is the estimated sales price of the product so high that tariff protection is necessary to protect it from imports?

EXPORT MARKETS

1. Could the product compete in export markets on the basis of price, quality and dependability of supply?
2. Can export markets for the product be developed?
3. If so, in what areas and in what annual volume?
4. What procedures would be necessary to develop export markets?
5. What would it cost?

MARKETING PROBLEMS

1. In calculating costs of the product, has adequate allowance been made for the expense of a sales department, advertising and promotion that might be required?

2. Do consumer prejudices against locally manufactured products exist?
   A. If so, why?
   B. Would they apply to the new product?
   C. If so, how could they be overcome and what would it cost to do so?

3. Do marketing and distribution facilities for the product exist?
   A. If not, can they be set up?
   B. What would it cost to do so?

4. Will the product be sold to:
   A. Wholesalers?
   B. Retailers?
   C. Direct to consumer?
   D. Other industries?
   E. Government?

ECONOMIC FACTORS

1. How much foreign exchange (and in what currency) is required to import machinery, equipment and supplies:
   - A. How much foreign exchange (and in what currency) is required for annual interest payments and amortization of any loans contracted to import machinery and equipment, or for payment of royalties and technical services?
   - B. How much foreign exchange (and in what currency) is required for annual import of raw materials and supplies?
   - C. What are estimated annual foreign exchange earnings and in what currencies?
   - D. Has careful consideration been given to the possibility of depreciation in the foreign exchange value of the local currency?
   - E. Has careful consideration been given to the possibility of import controls, or restrictions on availabilities of foreign exchange necessary to operate the business?
   - F. What benefits would the new business bring to the economy in the use of local raw materials: in employment and in technology?
   - G. Do dependable facilities exist for transportation, power, fuel, water and sewage?
     - (1) If not, can existing deficiencies be eliminated satisfactorily?
     - (2) What would be the cost to do so?

PERSONNEL

1. Is there an adequate labor supply near the plant location?
   - A. If not, how can the problem be solved?

2. Can the problem of training competent management and supervisory personnel be solved?
   - A. Also, the training of skilled labor?
   - B. Is technical advice available in the locality?
   - C. If not, where can it be obtained and what will it cost?

LAWS AND REGULATIONS

1. Do existing labor laws, government regulations, laws and taxes favor establishment of new business?
   - A. If not, can existing obstacles be removed?
   - B. If so, how and when?

FINANCIAL FACTORS

1. Technical advice on selection of machinery and equipment.
   A. In selecting the machinery and equipment for the new plant, have reputable and competent engineers and technicians been consulted?
   B. Have they been asked for advice on the most suitable types of machinery and equipment for the process and locality?
   C. Have they carefully compared costs of various suppliers?
   D. Credit terms offered purchasers?

FINANCIAL REQUIREMENTS OF THE PROJECT

1. In estimating the cost of the project, has careful consideration been given to:
   A. The effect on costs of delays in construction schedules?
   B. In delivery and installation of machinery and equipment?
   C. In import of essential raw materials and supplies?

2. In calculating cash flow and working capital requirements, has careful consideration been given to:
   A. Maintaining adequate inventories of raw materials?
   B. Supplies and spare parts?
   C. Seasonal fluctuations in the business?
   D. The time required to liquidate credit sales to customers and bad debts?
   E. The period necessary to get the plant into production?
   F. Cash required to amortize its principle loans?

3. If the economy is in a period of inflation, has full allowance been made for the influence of rising prices and wages on the cost of the project and on working capital requirements?

SHORT TERM BANK CREDITS

1. Has it been possible to make arrangements with local banks to finance short-time working capital requirements of the business?

FINANCIAL PLAN

1. Has a definite plan to finance the project been worked out?
   A. Is sufficient capital available locally?
   B. If not, what is the plan to obtain the required capital?

BIBLIOGRAPHY

Textbooks

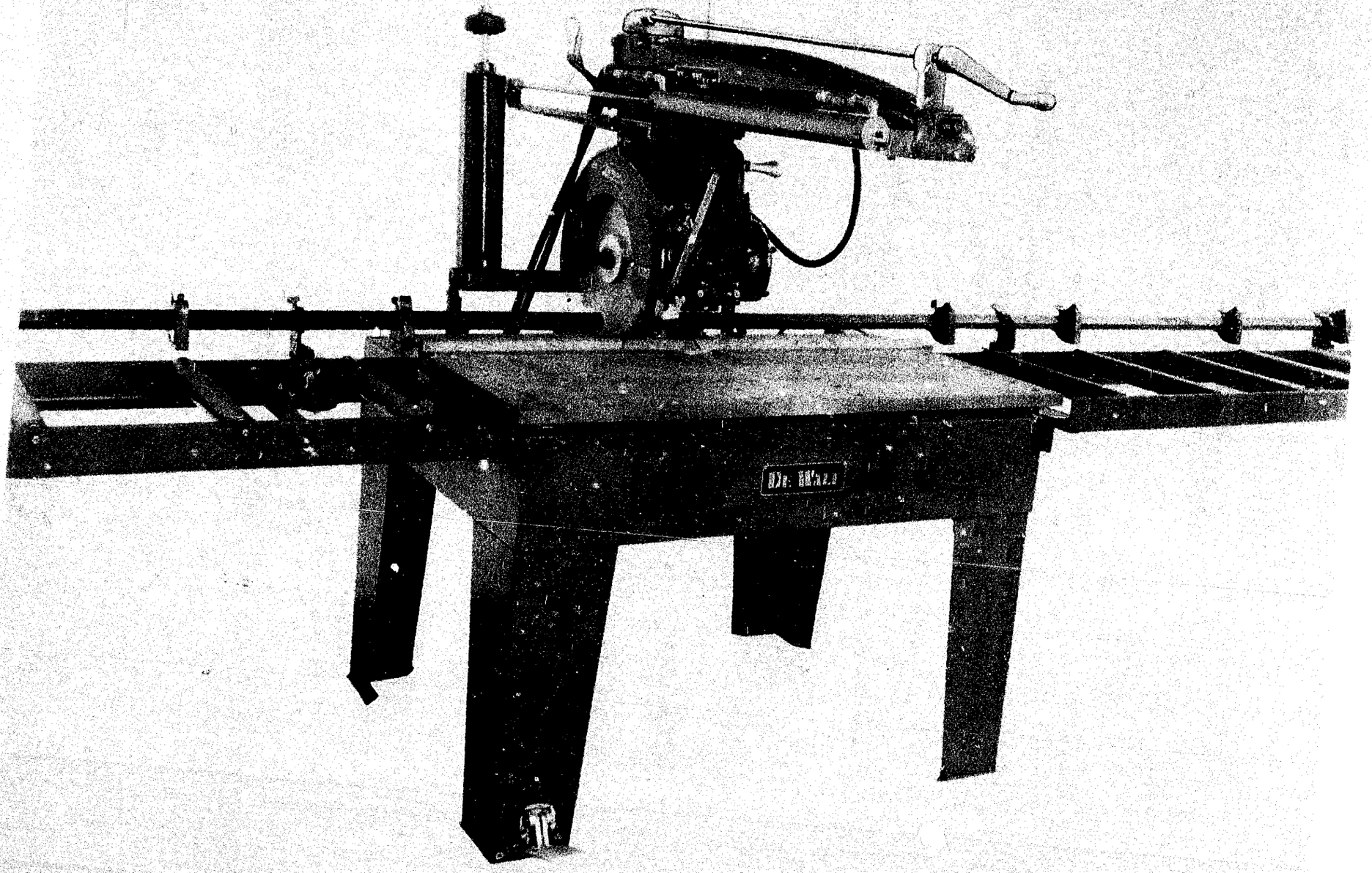
Cutting Techniques for Woodworkers	Hitchcock Publishing Co. Wheaton Illinois
Wood Working Digest	Hitchcock Publishing Co. Wheaton Illinois

Periodicals

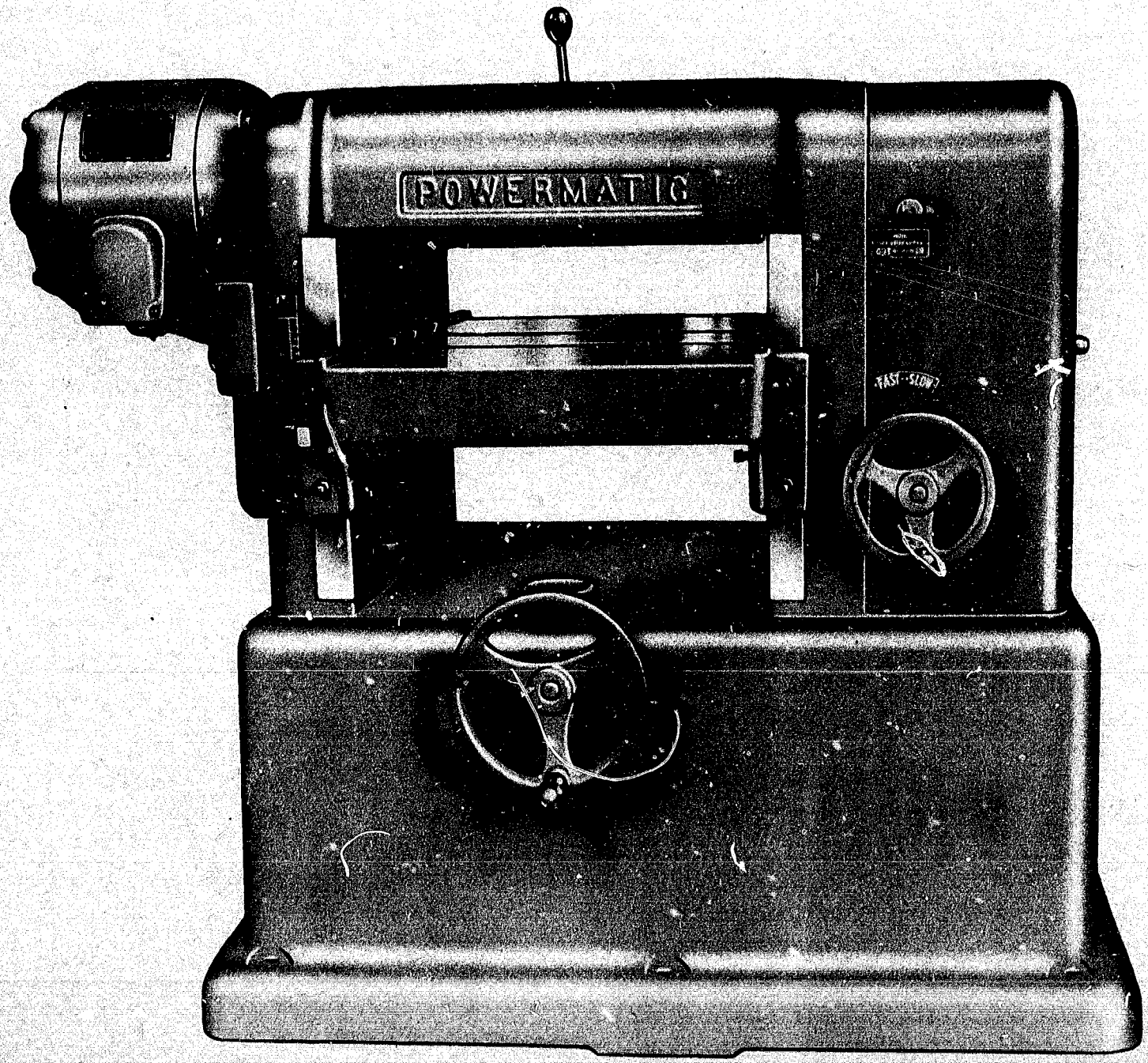
The Wood-Worker	The S. H. Smith Company Indianapolis Indiana

ABBREVIATIONS

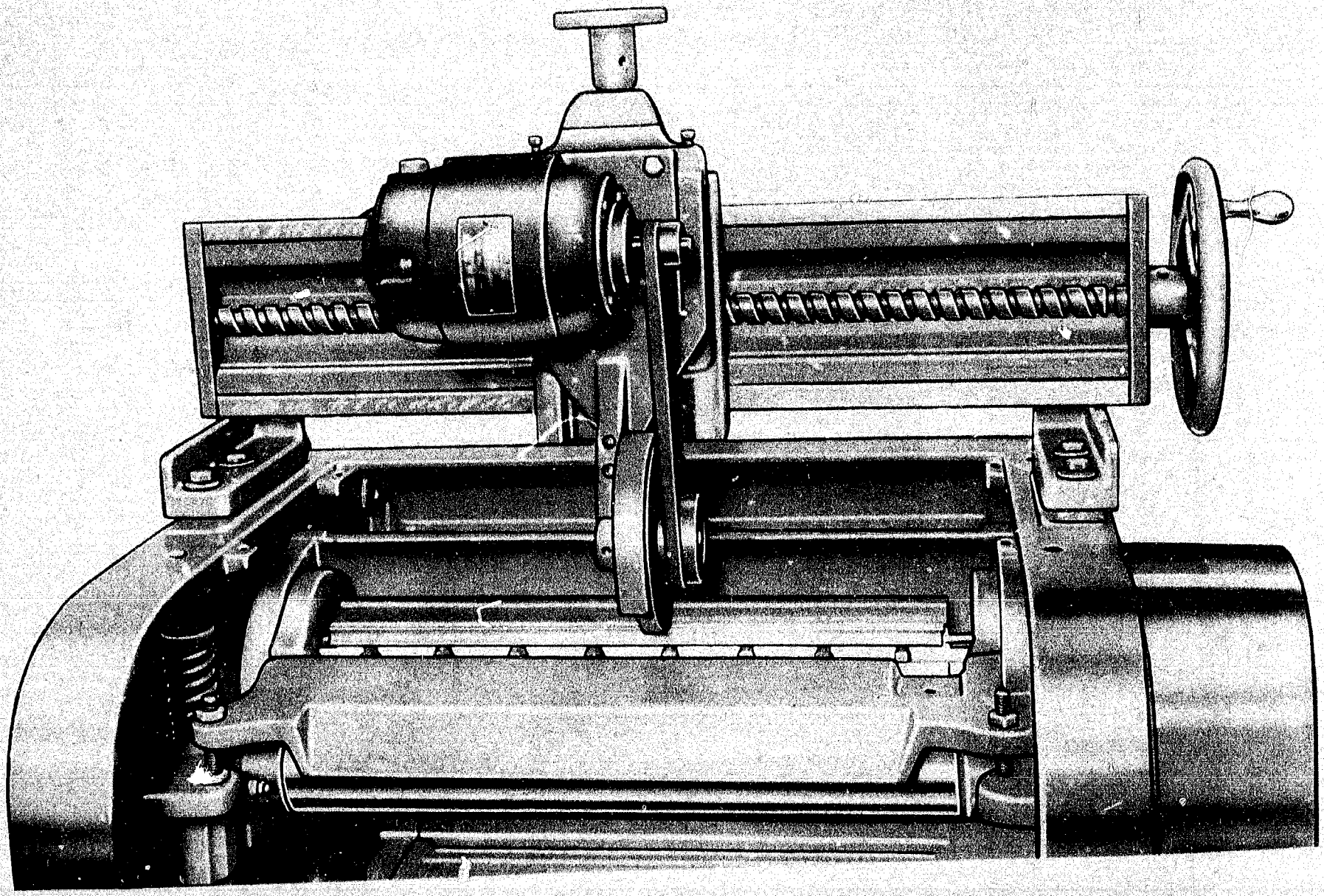
"	Inch or inches
No.	Number



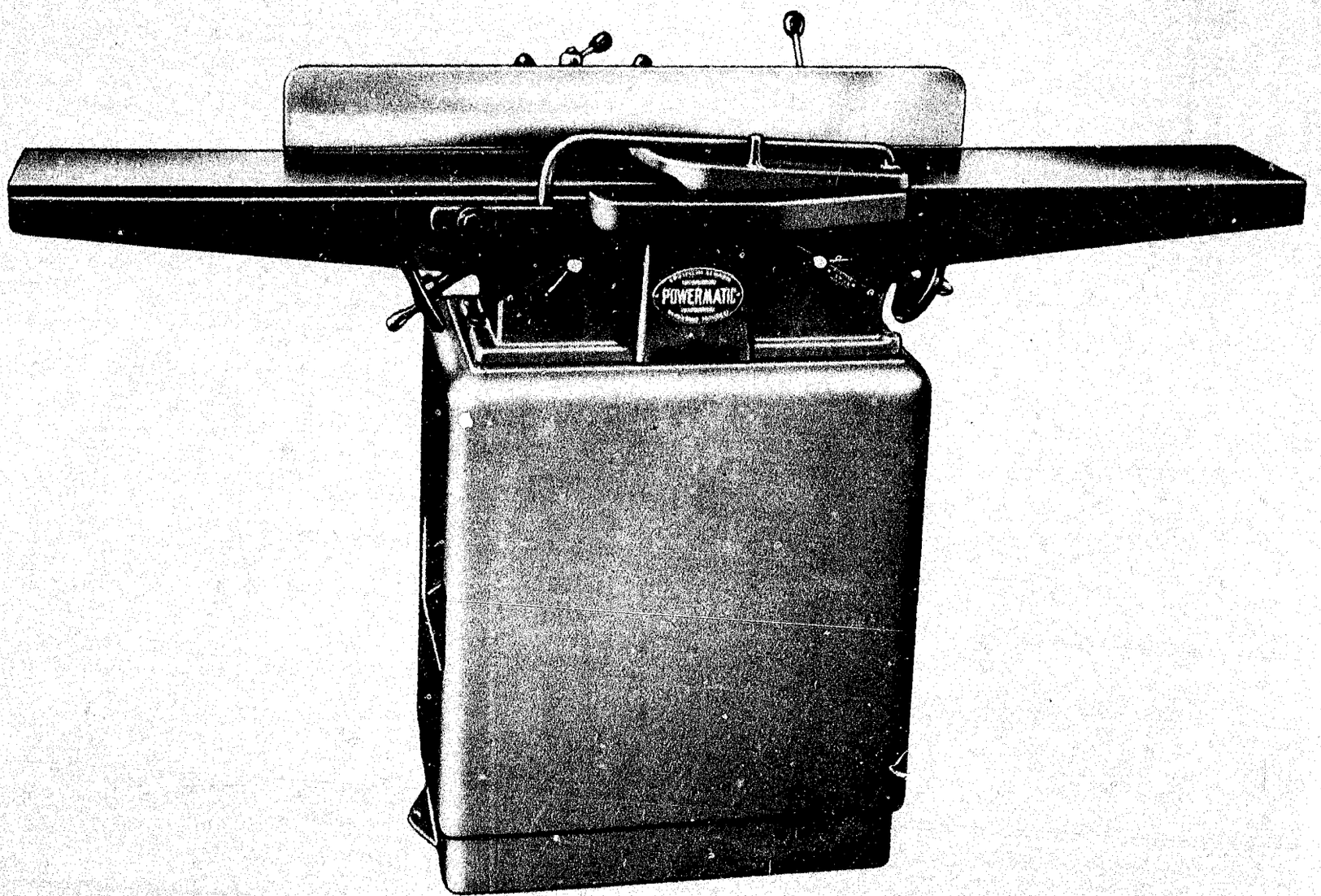
RADIAL CUTOFF AND RIP SAW



16" PLANER



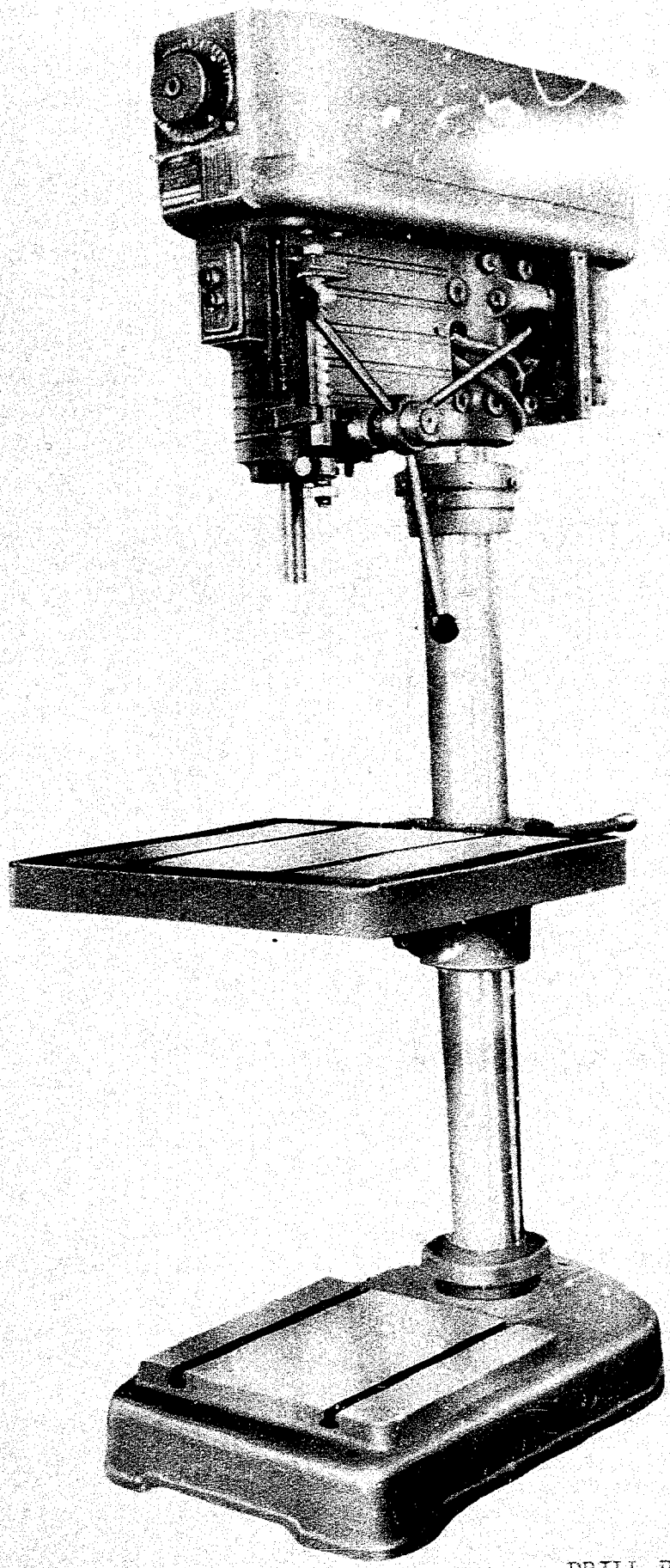
KNIFE GRINDER FOR PLANER



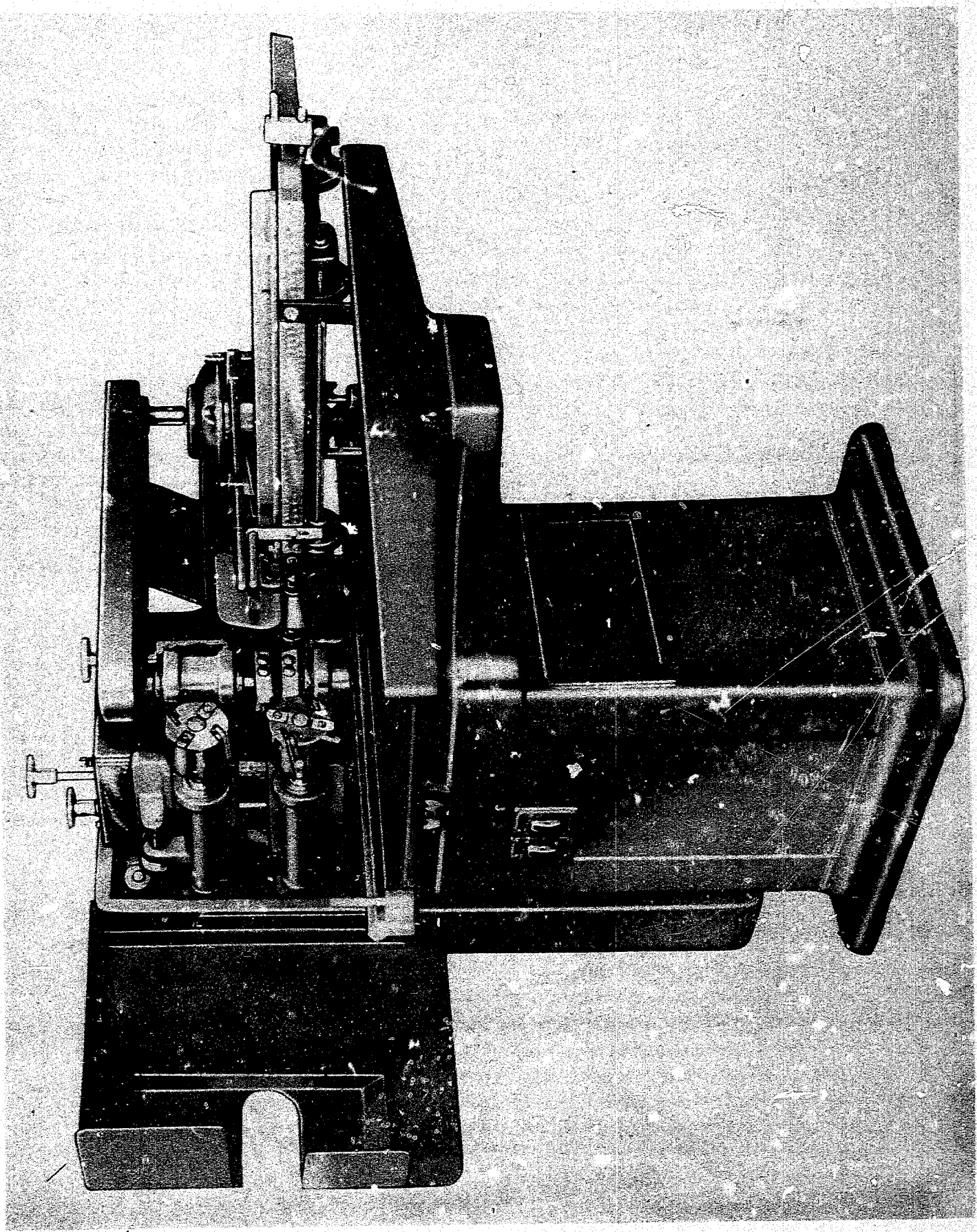
8" JOINTER

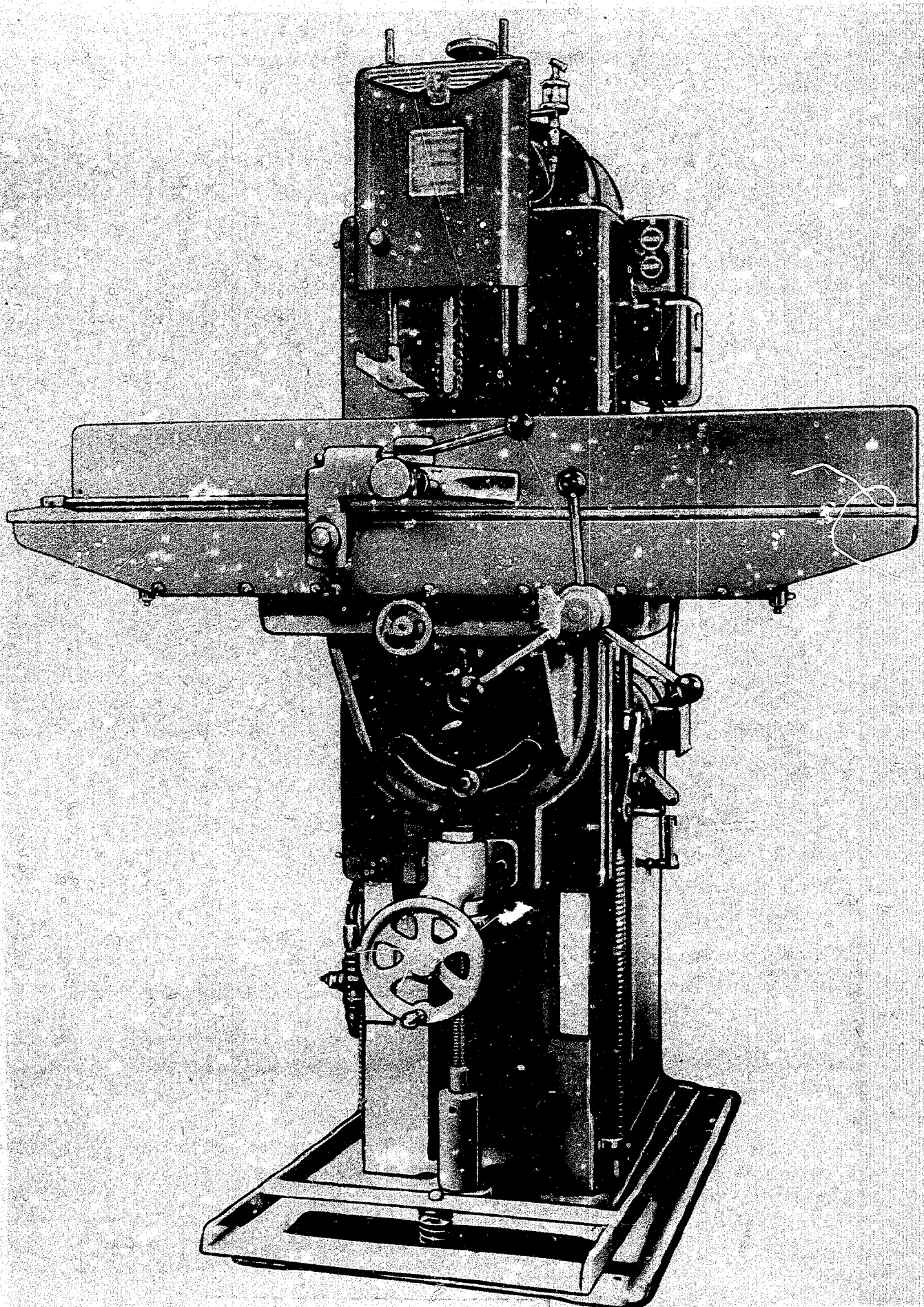
MODEL 1200 20"
DRILL PRESS

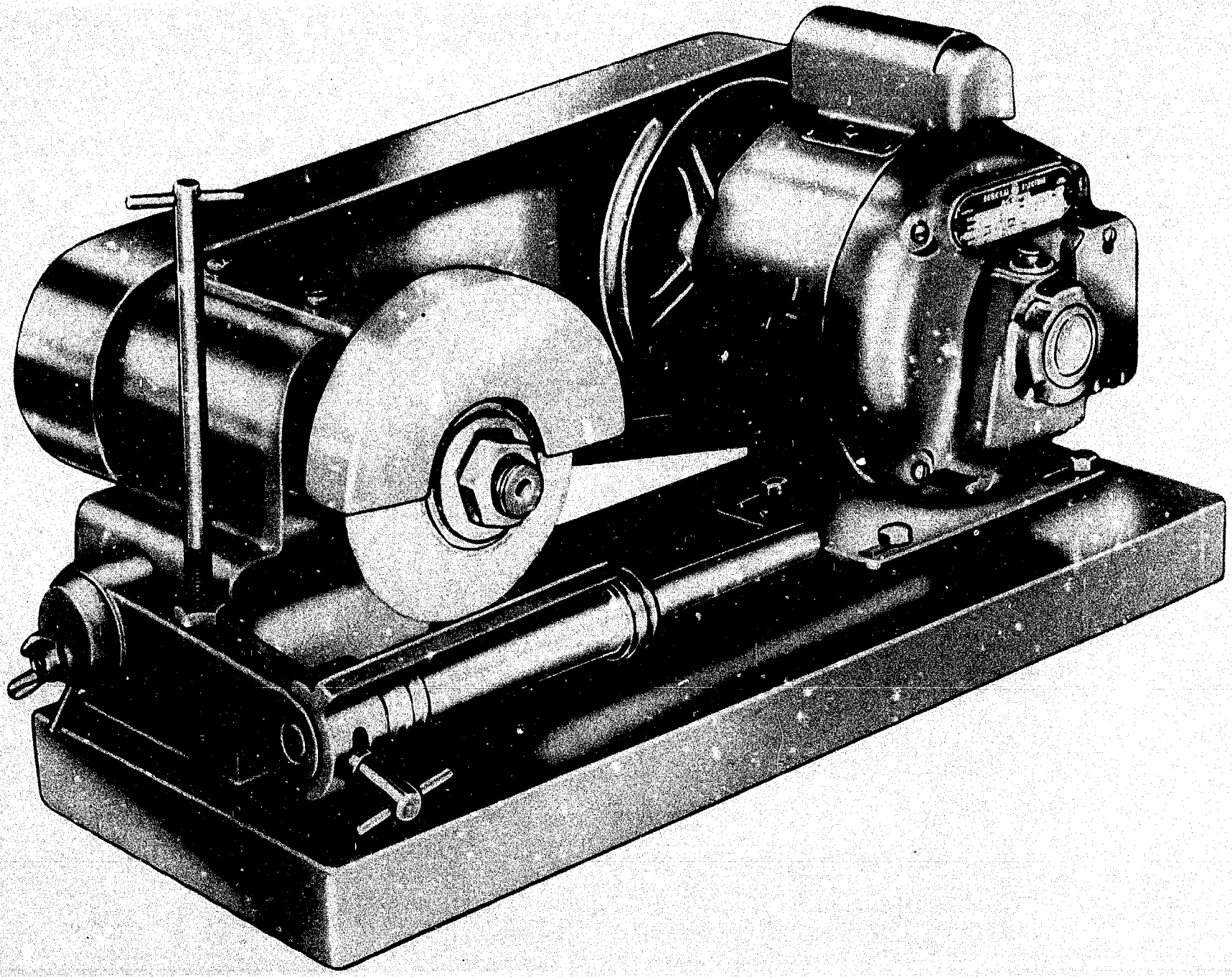
POWERMATIC
MACHINE COMPANY
McMinnville • Tennessee

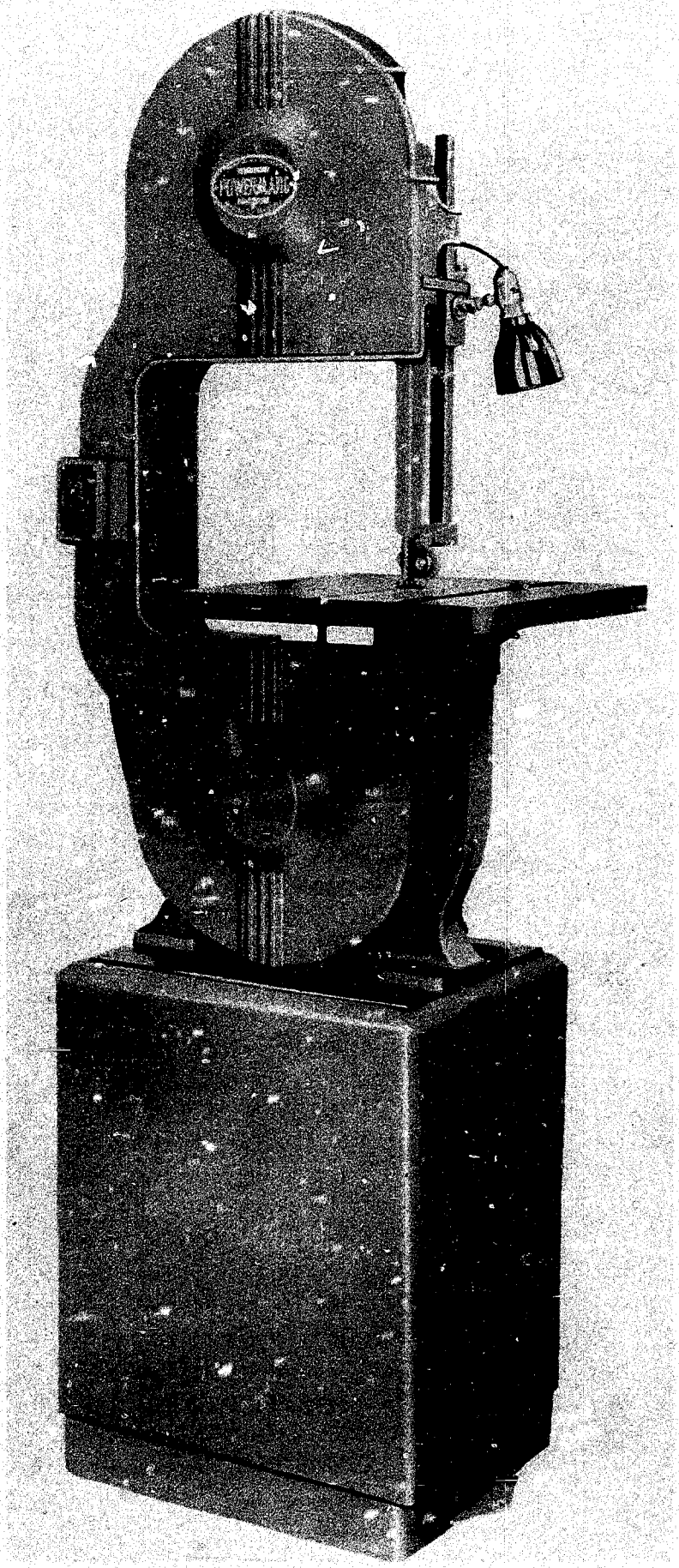


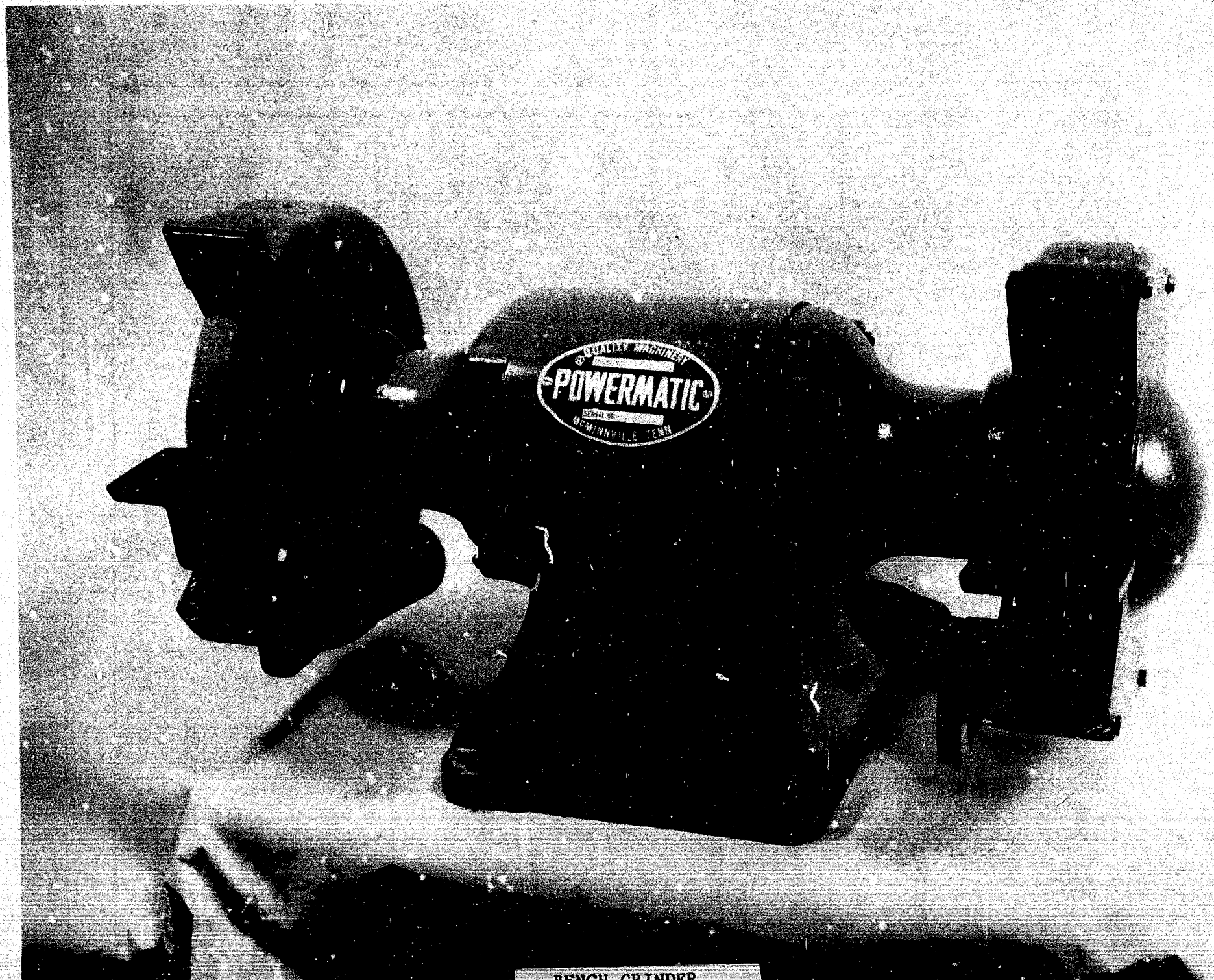
DRILL PRESS







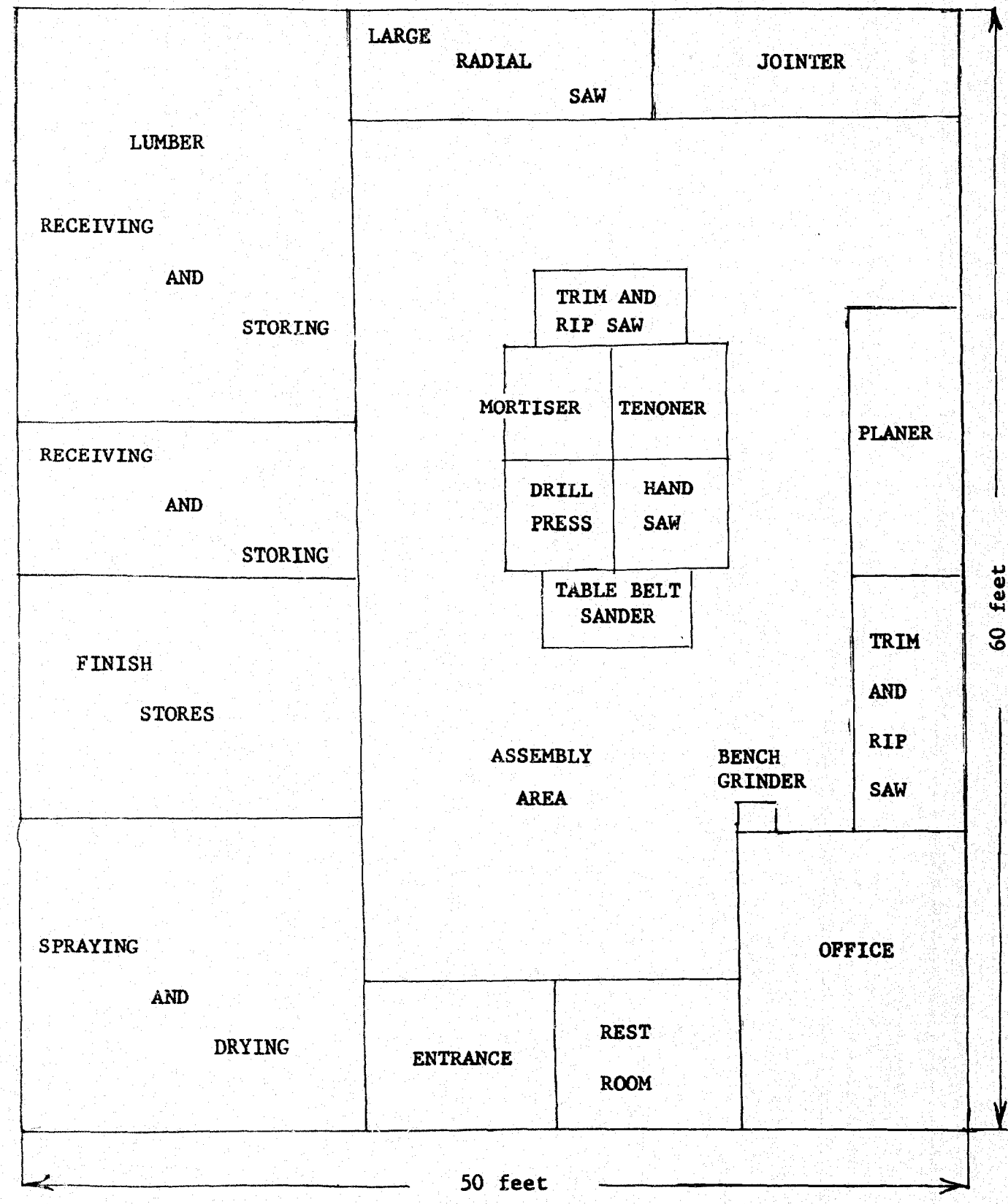




BENCH GRINDER

PLANT LAYOUT

Scale 1 inch = 8 feet



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